Biotechnological Process for Synthesis of ω-Functionalized Carboxylic Acids and Carboxylate Esters from Simple Carbon Sources

Field of Invention

The subject of the invention is a biotechnological process for the production of ω-functionalized carboxylic acids and ω-functionalized carboxylate esters from simple carbon sources.

Prior Art

The biotechnological production of ω-functionalized carboxylic acids and the corresponding esters has previously been described exclusively in the form of biotransformations, wherein the corresponding carboxylic acid as substrate is contacted with an appropriate biological cell, which catalyses the necessary reactions enzymatically.

Such a process and cells which are suitable for the production of the ω-aminocarboxylic acids and esters thereof are for example described in WO2009077461.

EP2322598 also describes the production of ω-hydroxycarboxylic acids and esters thereof in specially equipped *Candida tropicalis* cells from fatty acids as the substrate used. A very similar procedure is described in WO2011008232, wherein *Candida* cells, wherein the β-oxidation is blocked, form corresponding ω-functionalized carboxylic acids and diacids starting from fatty acids by enzymatic oxidation.

The fatty acids and derivatives thereof required as substrates are mainly obtained nowadays exclusively from plant and animal oils or fats. This has a large number of disadvantages:

In particular, as a consequence of the BSE crisis, animal fats as raw materials still meet little client acceptance. Plant oils which contain short- and middle-length fatty acids are either difficult to obtain or are produced in tropical regions. Here the sustainability of production is in many cases called into question, since in some cases rainforest is cleared in order to provide the cultivation areas.

In addition, particular plant and animal oil or fat raw materials have specific, but defined fatty acid profiles. Hence coupled production takes place here, which can be price-determining for a certain fatty acid species. Last but not least, many of the plant oils are simultaneously also foodstuffs, so that under certain conditions a competition can arise between use as a substance and use as a foodstuff.

The purpose of the invention was to provide a biotechnological process for the production of ω-functionalized carboxylic acids and ω-functionalized carboxylate esters which is not reliant on fatty acids as educts.

Description of the Invention

Surprisingly, it has been found that the cells described below containing genetic modifications are capable of solving the problem posed for the invention.

Hence a subject of the present invention are microorganisms which synthesize increased amounts of carboxylic acids or carboxylate esters and on the basis of further genetic features provide these with an ω-functionality.

A further subject of the invention is the use of the aforesaid microorganisms for the production of ω-functionalized carboxylic acids and ω-functionalized carboxylate esters and a process for the production of ω-functionalized carboxylic acids and ω-functionalized carboxylate esters with use of the microorganisms.

An advantage of the present invention is that the product inhibition in the production process can be markedly reduced.

A further advantage of the present invention is that the process enables the production of ω-functionalized carboxylic acids and ω-functionalized carboxylate esters from unrelated carbon sources with high space-time yield, high carbon yield and high concentration in the culture supernatant. As a result of the latter in particular, an efficient workup is facilitated.

The invention comprises methods for the generation of recombinant microbial cells which are capable of producing ω-functionalized carboxylic acids and ω-functionalized carboxylate esters from unrelated carbon sources.

The present invention thus comprises a microorganism, which has a first genetic modification, so that compared to its wild type it is capable of forming more carboxylic acid or carboxylate ester from at least one simple carbon source, characterized in that the microorganism has a

second genetic modification, which comprises that the microorganism has, in comparison to its wild type, increased activity
of at least one enzyme E_1 which catalyses the conversion of carboxylic acids or carboxylate esters to the corresponding ω-hydroxycarboxylic acids or ω-hydroxycarboxylate esters.

In connection with the present invention, the term "a first genetic modification" is understood to mean at least one genetic engineering alteration of the microorganism, whereby the expression of one or more genes has been modified, i.e. increased or reduced, compared to the wild type strain.

In connection with the present invention, the term "simple carbon source" is understood to mean carbon sources wherein in the carbon skeleton at least one C-C bond has been broken and/or at least one carbon atom of the simple carbon source must form at least one new bond with at least one carbon atom of another molecule, in order to arrive at the carbon skeleton of the "more carboxylic acid or carboxylate ester".

All stated percentages (%) are, unless otherwise stated, mass percent.

As the carbon source, carbohydrates such as for example glucose, saccharose, arabinose, xylose, lactose, fructose, maltose, molasses, starch, cellulose and hemicellulose, but also glycerin or very simple organic molecules such as CO_2, CO or synthesis gas, can be used.

Preferred carboxylic acids or carboxylate esters of the present invention are those which have more than one, in particular 3 to 36, preferably 6 to 24, in particular 10 to 14 carbon atoms in the carboxylic acid chain. This can be linear, branched, saturated or unsaturated and optionally substituted with other groups.

The carboxylate esters are preferably those wherein the alcohol component is derived from methanol, ethanol or other primary alcohols with 3 – 18 carbon atoms, in particular methanol and ethanol.

Particularly preferably, the carboxylic acids are fatty acids selected from the group formic acid, acetic acid, propionic acid, butyric acid, valeric acid, caproic acid, oenanthic acid, caprylic acid, pelargonic acid, capric acid, lauric acid, myristic acid, pentadecanoic acid, palmitic acid, margaric acid, stearic acid, nonadecanoic acid, arachic acid, behenic acid, lignoceric acid, cerotic acid, Montan acid, melissic acid, undecylenic acid, myristoleic acid, petroselic acid, oleic

acid, elaidic acid, vaccenic acid, gadoleic acid, icosenic acid, cetoleic acid, erucic acid, nervoic acid, linolic acid, α-linolenic acid, γ-linolenic acid, calendula acid, punicic acid, α-elaeostearic acid, β-elaeostearic acid, arachidonic acid, timnodonic acid, clupanodonic acid, cervonic acid, vernolic acid, ricinoleic acid

and esters thereof, wherein the fatty acid esters are preferably those wherein the alcohol component is derived from methanol, ethanol or other primary alcohols with 3 – 18 carbon atoms, in particular methanol and ethanol.

It is preferable according to the invention that microorganisms are used on the basis of good genetic accessibility; selected from the group of the bacteria, particularly from the group containing, preferably consisting of, *Abiotrophia, Acaryochloris, Accumulibacter, Acetivibrio, Acetobacter, Acetohalobium, Acetonema, Achromobacter, Acidaminococcus, Acidimicrobium, Acidiphilium, Acidithiobacillus, Acidobacterium, Acidothermus, Acidovorax, Acinetobacter, Actinobacillus, Actinomyces, Actinosynnema, Aerococcus, Aeromicrobium, Aeromonas, Afipia, Aggregatibacter, Agrobacterium, Ahrensia, Akkermansia, Alcanivorax, Alicycliphilus, Alicyclobacillus, Aliivibrio, Alkalilimnicola, Alkaliphilus, Allochromatium, Alteromonadales, Alteromonas, Aminobacterium, Aminomonas, Ammonifex, Amycolatopsis, Amycolicicoccus, Anabaena, Anaerobaculum, Anaerococcus, Anaerofustis, Anaerolinea, Anaeromyxobacter, Anaerostipes, Anaerotruncus, Anaplasma, Anoxybacillus, Aquifex, Arcanobacterium, Arcobacter, Aromatoleum, Arthrobacter, Arthrospira, Asticcacaulis, Atopobium, Aurantimonas, Azoarcus, Azorhizobium, Azospirillum, Azotobacter, Bacillus, Bartonella, Basfia, Baumannia, Bdellovibrio, Beggiatoa, Beijerinckia, Bermanella, Beutenbergia, Bifidobacterium, Bilophila, Blastopirellula, Blautia, Blochmannia, Bordetella, Borrelia, Brachybacterium, Brachyspira, Bradyrhizobium, Brevibacillus, Brevibacterium, Brevundimonas, Brucella, Buchnera, Bulleidia, Burkholderia, Butyrivibrio, Caldalkalibacillus, Caldanaerobacter, Caldicellulosiruptor, Calditerrivibrio, Caminibacter, Campylobacter, Carboxydibrachium, Carboxydothermus, Cardiobacterium, Carnobacterium, Carsonella, Catenibacterium, Catenulispora, Catonella, Caulobacter, Cellulomonas, Cellvibrio, Centipeda, Chelativorans, Chloroflexus, Chromobacterium, Chromohalobacter, Chthoniobacter, Citreicella, Citrobacter, Citromicrobium, Clavibacter, Cloacamonas, Clostridium, Collinsella, Colwellia, Comamonas, Conexibacter, Congregibacter, Coprobacillus, Coprococcus, Coprothermobacter, Coraliomargarita, Coriobacterium, corrodens, Corynebacterium, Coxiella, Crocosphaera, Cronobacter,*

Cryptobacterium, Cupriavidus, Cyanobium, Cyanothece, Cylindrospermopsis, Dechloromonas, Deferribacter, Dehalococcoides, Dehalogenimonas, Deinococcus, Delftia, Denitrovibrio, Dermacoccus, Desmospora, Desulfarculus, Desulphateibacillum, Desulfitobacterium, Desulfobacca, Desulfobacterium, Desulfobulbus, Desulfococcus, Desulfohalobium, Desulfomicrobium, Desulfonatronospira, Desulforudis, Desulfotalea, Desulfotomaculum, Desulfovibrio, Desulfurispirillum, Desulfurobacterium, Desulfuromonas, Dethiobacter, Dethiosulfovibrio, Dialister, Dichelobacter, Dickeya, Dictyoglomus, Dietzia, Dinoroseobacter, Dorea, Edwardsiella, Ehrlichia, Eikenella, Elusimicrobium, Endoriftia, Enhydrobacter, Enterobacter, Enterococcus, Epulopiscium, Erwinia, Erysipelothrix, Erythrobacter, Escherichia, Ethanoligenens, Eubacterium, Eubacterium, Exiguobacterium, Faecalibacterium, Ferrimonas, Fervidobacterium, Fibrobacter, Finegoldia, Flexistipes, Francisella, Frankia, Fructobacillus, Fulvimarina, Fusobacterium, Gallibacterium, Gallionella, Gardnerella, Gemella, Gemmata, Gemmatimonas, Geobacillus, Geobacter, Geodermatophilus, Glaciecola, Gloeobacter, Glossina, Gluconacetobacter, Gordonia, Granulibacter, Granulicatella, Grimontia, Haemophilus, Hahella, Halanaerobiumns, Haliangium, Halomonas, Halorhodospira, Halothermothrix, Halothiobacillus, Hamiltonella, Helicobacter, Heliobacterium, Herbaspirillum, Herminiimonas, Herpetosiphon, Hippea, Hirschia, Histophilus, Hodgkinia, Hoeflea, Holdemania, Hydrogenivirga, Hydrogenobaculum, Hylemonella, Hyphomicrobium, Hyphomonas, Idiomarina, Ilyobacter, Intrasporangium, Isoptericola, Isosphaera, Janibacter, Janthinobacterium, Jonesia, Jonquetella, Kangiella, Ketogulonicigenium, Kineococcus, Kingella, Klebsiella, Kocuria, Koribacter, Kosmotoga, Kribbella, Ktedonobacter, Kytococcus, Labrenzia, Lactobacillus, Lactococcus, Laribacter, Lautropia, Lawsonia, Legionella, Leifsonia, Lentisphaera, Leptolyngbya, Leptospira, Leptothrix, Leptotrichia, Leuconostoc, Liberibacter, Limnobacter, Listeria, Loktanella, Lutiella, Lyngbya, Lysinibacillus, Macrococcus, Magnetococcus, Magnetospirillum, Mahella, Mannheimia, Maricaulis, Marinithermus, Marinobacter, Marinomonas, Mariprofundus, Maritimibacter, Marvinbryantia, Megasphaera, Meiothermus, Melissococcus, Mesorhizobium, Methylacidiphilum, Methylibium, Methylobacillus, Methylobacter, Methylobacterium, Methylococcus, Methylocystis, Methylomicrobium, Methylophaga, Methylophilales, Methylosinus, Methyloversatilis, Methylovorus, Microbacterium, Micrococcus, Microcoleus, Microcystis, Microlunatus, Micromonospora, Mitsuokella, Mobiluncus, Moorella, Moraxella, Moritella, Mycobacterium, Myxococcus, Nakamurella, Natranaerobius, Neisseria, Neorickettsia, Neptuniibacter, Nitratifractor, Nitratiruptor, Nitrobacter, Nitrococcus, Nitrosomonas, Nitrosospira,

Nitrospira, Nocardia, Nocardioides, Nocardiopsis, Nodularia, Nostoc, Novosphingobium, Oceanibulbus, Oceanicaulis, Oceanicola, Oceanithermus, Oceanobacillus, Ochrobactrum, Octadecabacter, Odyssella, Oligotropha, Olsenella, Opitutus, Oribacterium, Orientia, Ornithinibacillus, Oscillatoria, Oscillochloris, Oxalobacter, Paenibacillus, Pantoea, Paracoccus, Parascardovia, Parasutterella, Parvibaculum, Parvimonas, Parvularcula, Pasteurella, Pasteuria, Pectobacterium, Pediococcus, Pedosphaera, Pelagibaca, Pelagibacter, Pelobacter, Pelotomaculum, Peptoniphilus, Peptostreptococcus, Persephonella, Petrotoga, Phaeobacter, Phascolarctobacterium, Phenylobacterium, Photobacterium, Pirellula, Planctomyces, Planococcus, Plesiocystis, Polaromonas, Polaromonas, Polymorphum, Polynucleobacter, Poribacteria, Prochlorococcus, Propionibacterium, Proteus, Providencia, Pseudoalteromonas, Pseudoflavonifractor, Pseudomonas, Pseudonocardia, Pseudoramibacter, Pseudovibrio, Pseudoxanthomonas, Psychrobacter, Psychromonas, Puniceispirillum, Pusillimonas, Pyramidobacter, Rahnella, Ralstonia, Raphidiopsis, Regiella, Reinekea, Renibacterium, Rhizobium, Rhodobacter, Rhodococcus, Rhodoferax, Rhodomicrobium, Rhodopirellula, Rhodopseudomonas, Rhodospirillum, Rickettsia, Rickettsiella, Riesia, Roseburia, Roseibium, Roseiflexus, Roseobacter, Roseomonas, Roseovarius, Rothia, Rubrivivax, Rubrobacter, Ruegeria, Ruminococcus, Ruthia, Saccharomonospora, Saccharophagus, Saccharopolyspora, Sagittula, Salinispora, Salmonella, Sanguibacte, Scardovia, Sebaldella, Segniliparus, Selenomonas, Serratia, Shewanella, Shigella, Shuttleworthia, Sideroxydans, Silicibacter, Simonsiella, Sinorhizobium, Slackia, Sodalis, Solibacter, Solobacterium, Sorangium, Sphaerobacter, Sphingobium, Sphingomonas, Sphingopyxis, Spirochaeta, Sporosarcina, Stackebrandtia, Staphylococcus, Starkeya, Stenotrophomonas, Stigmatella, Streptobacillus, Streptococcus, Streptomyces, Streptosporangium, Subdoligranulum, subvibrioides, Succinatimonas, Sulfitobacter, Sulfobacillus, Sulfuricurvum, Sulfurihydrogenibium, Sulfurimonas, Sulfurospirillum, Sulfurovum, Sutterella, Symbiobacterium, Synechocystis, Syntrophobacter, Syntrophobotulus, Syntrophomonas, Syntrophothermus, Syntrophus, taiwanensis, Taylorella, Teredinibacter, Terriglobus, Thalassiobium, Thauera, Thermaerobacter, Thermanaerovibrio, Thermincola, Thermoanaerobacter, Thermoanaerobacterium, Thermobaculum, Thermobifida, Thermobispora, Thermocrinis, Thermodesulphateator, Thermodesulfobacterium, Thermodesulfobium, Thermodesulfovibrio, Thermomicrobium, Thermomonospora, Thermosediminibacter, Thermosinus, Thermosipho, Thermosynechococcus, Thermotoga, Thermovibrio, Thermus, Thioalkalimicrobium,

Thioalkalivibrio, Thiobacillus, Thiomicrospira, Thiomonas, Tolumonas, Treponema, tribocorum, Trichodesmium, Tropheryma, Truepera, Tsukamurella, Turicibacter, Variovorax, Veillonella, Verminephrobacter, Verrucomicrobium, Verrucosispora, Vesicomyosocius, Vibrio, Vibrionales, Victivallis, Weissella, Wigglesworthia, Wolbachia, Wolinella, Xanthobacter, Xanthomonas, Xenorhabdus, Xylanimonas, Xylella, Yersinia, Zinderia and Zymomonas,
in particular *E. coli*, *Pseudomonas* sp., *Pseudomonas fluorescens*, *Pseudomonas putida*, *Pseudomonas stutzeri*, *Acinetobacter* sp., *Burkholderia* sp., *Burkholderia thailandensis*, Cyanobakterien, *Klebsiella* sp., *Klebsiella oxytoca*, *Salmonella sp.*, *Rhizobium sp.* and *Rhizobium meliloti*, *Bacillus* sp., *Bacillus subtilis*, *Clostridium* sp., *Corynebacterium* sp., *Corynebacterium glutamicum*, *Brevibacterium* sp., *Chlorella* sp. and *Nostoc* sp.,
with *E. coli* being particularly preferable.

In comparison to its wild type, a microorganism according to the invention displays increased activity of at least one enzyme E_1.

The term "increased activity of an enzyme", as it is used above and in the following explanations in connection with the present invention is preferably to be understood as increased intracellular activity.

The explanations now following concerning the increasing of the enzyme activity in cells apply both for the increasing of the activity of the enzyme E_1 and also for all enzymes mentioned below whose activity can optionally be increased, and also for increased formation of alkL gene product.

Essentially, an increase in the enzymatic activity can be achieved by increasing the copy number of the gene sequence or of the gene sequences which code for the enzyme, using a strong promoter, altering the codon utilization of the gene, increasing the half-life of the mRNA or of the enzyme in various ways, modifying the regulation of the expression of the gene or utilizing a gene or allele which codes for a corresponding enzyme with increased activity and optionally combining these measures. Microorganisms genetically modified according to the invention are for example created by transformation, transduction, conjugation or a combination of these methods with a vector which contains the desired gene, an allele of this gene or parts thereof and contains a promoter enabling the expression of the gene. The heterologous expression is in particular achieved by integration of the gene or the allele into the chromosome of the cell or an extrachromosomally replicating vector.

An overview of the possibilities for increasing the enzyme activity in cells, with pyruvate carboxylase as the example, is given DE-A-100 31 999, which is herewith incorporated as a reference and the disclosure content whereof forms one part of the disclosure of the present invention regarding the possibilities for increasing enzyme activity in cells.

The expression of the enzymes and genes mentioned above and all mentioned below is determinable by means of 1- and 2-dimensional protein gel separation followed by optical identification of the protein concentration in the gel with appropriate evaluation software.

If the increasing of an enzyme activity is based exclusively on increasing the expression of the corresponding gene, then the quantification of the increasing of the enzyme activity can be simply determined by a comparison of the 1- or 2-dimensional protein separations between wild type and genetically modified cell. A common method for the preparation of the protein gels with bacteria and for identification of the proteins is the procedure described by Hermann et al. (Electrophoresis, 22: 1712-23 (2001). The protein concentration can also be analysed by Western blot hybridization with an antibody specific for the protein to be determined (Sambrook et al., Molecular Cloning: a laboratory manual, 2nd Ed. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, N.Y. USA, 1989) followed by optical evaluation with appropriate software for concentration determination (Lohaus and Meyer (1989) Biospektrum, 5: 32-39; Lottspeich (1999), Angewandte Chemie 111: 2630-2647).

This method is also always an option when possible products of the reaction to be catalysed by the enzyme activity to be determined may be rapidly metabolized in the microorganism or else the activity in the wild type is itself too low for it to be possible adequately to determine the enzyme activity to be determined on the basis of the production formation.

With regard to the enzyme E_1, the conversion of lauric acid and/or methyl laurate to ω-hydroxy-lauric acid and/or methyl ω-hydroxylaurate is understood in particular as a measure of the enzyme activity.

Specified Enzymes E_1

It is preferable according to the invention if in the microorganism the enzyme E_1 is selected from the group:

E_{1a} P450 alkane hydroxylases, which preferentially catalyse the following reactions: reduced haem + alkanoic acid (ester) = oxidized haem + ω-hydroxyalkanoic acid (ester) + H_2O,
2 reduced haem + alkanoic acid (ester) = 2 oxidized haem + ω-oxoalkanoic acid (ester) + 2 H_2O
or
3 reduced haem + alkanoic acid (ester) = alkane monooxygenase + 3 oxidized haem + ω-carboxyalkanoic acid (ester) + 3 H_2O and preferably are
a component of a reaction system consisting of the two enzyme components "cytochrome P450 alkane hydroxylase and NADPH cytochrome P450 oxidoreductase of EC 1.6.2.4" or
a component of a reaction system consisting of the three enzyme components "cytochrome P450 alkane hydroxylase of the CYP153 type, ferredoxin $NAD(P)^+$ reductases of EC 1.18.1.2 or EC 1.18.1.3 and ferredoxin", and
E_{1b} AlkB alkane hydroxylases of EC 1.14.15.3, which preferentially catalyse the following reactions: reduced rubredoxin + alkanoic acid (ester) = oxidized rubredoxin + ω-hydroxyalkanoic acid (ester) + H_2O,
2 reduced rubredoxins + alkanoic acid (ester) = 2 oxidized rubredoxins + ω-oxoalkanoic acid (ester) + 2 H_2O or
3 reduced rubredoxins + alkanoic acid (ester) = alkane monooxygenase + 3 oxidized rubredoxins + ω-carboxyalkanoic acid (ester) + 3 H_2O and preferably are
a component of a reaction system consisting of the three enzyme components "AlkB alkane hydroxylase of EC 1.14.15.3, AlkT rubredoxin $NAD(P)^+$ reductase of EC 1.18.1.1 or of EC 1.18.1.4 and rubredoxin AlkG".

The access numbers stated in connection with the present invention correspond to the NCBI ProteinBank database entries with the date 26.07.2011; as a rule, the version number of the entry is identified here by "numerals" such as for example ".1".

P450 alkane hydroxylases preferred in this connection are selected from the list AAO73954.1, AAO73953.1, XP_002546279.1, AAA34353.2, P30607.1, XP_002421627.1, XP_718670.1, CAA39366.1, XP_001527524.1, AAO73955.1, AAO73956.1, XP_002546278.1, EEQ43157.1, XP_718669.1, AAA34354.1, P10615.3, XP_002421628.1, 226487, P16141.3, CAA39367.1, Q9Y757.2, XP_001485567.1, AAO73958.1, XP_001383506.2, XP_460111.2, AAO73959.1, Q12586.1, XP_460112.2, AAO73960.1, Q12589.1, AAO73961.1, XP_460110.2,

EEQ43763.1, XP_710174.1, EDK41572.2, XP_001482650.1, CAA75058.1, XP_002548818.1, Q12588.1, XP_002422222.1, XP_001383636.2, XP_001525381.1, XP_002548823.1, P30610.1, AAO73952.1, XP_002548428.1, CAA36197.1, XP_002421126.1, AAA34320.1, P16496.3, P30608.1, P24458.1, XP_717999.1, XP_001383817.1, Q9Y758.1, XP_001482092.1, XP_001383710.2, P30609.1, AAB24479.1, XP_457792.1, XP_001524144.1, XP_457727.2, XP_001525578.1, XP_002616743.1, XP_002614836.1, XP_001525577.1, AAO73957.1, Q12585.1, XP_001386440.2, XP_002616857.1, XP_001483276.1, XP_500402.1, EDK39907.2, XP_500560.1, XP_001211376.1, XP_002560027.1, XP_504857.1, XP_500855.1, XP_504406.1, BAA31433.1, XP_500856.1, XP_501148.1, XP_746567.1, XP_001262425.1, XP_001274843.1, XP_002840588.1, XP_002377641.1, XP_001825995.1, XP_001400739.1, XP_718066.1, CAA35593.1, XP_664735.1, XP_002150795.1, XP_500097.1, XP_002483325.1, XP_504311.1, XP_500273.1, XP_002548817.1, EDP54484.1, XP_755288.1, XP_001260447.1, EFY97851.1, ACD75398.1, ADK36660.1, XP_001213081.1, XP_002377989.1, XP_001826299.1, XP_001554811.1, XP_501667.1, XP_002148942.1, ADK36662.1, XP_002565827.1, P30611.1, XP_001267871.1, XP_002372373.1, EFY84686.1, P43083.1, XP_001263094.1, XP_002148355.1, XP_002568429.1, XP_001817314.1, Q12587.1, XP_001396435.1, XP_001938589.1, XP_001388497.2, XP_663661.1, XP_003295335.1, XP_002152088.1, XP_001212071.1, Q12573.1, XP_002379858.1, XP_001821592.1, XP_002844341.1, XP_001394678.1, ACD75400.1, BAK03594.1, XP_003170343.1, XP_001265480.1, XP_002550661.1, EDP55514.1, XP_001528842.1, XP_749919.1, XP_001593058.1, P30612.1, EGC48494.1, EEH04429.1, XP_001585586.1, XP_003236182.1, XP_001400199.1, EEQ46951.1, XP_721410.1, EGP87864.1, XP_002380808.1, XP_001792771.1, XP_001208515.1, XP_001216161.1, XP_003071804.1, EFW16963.1, XP_002542118.1, XP_001936677.1, EGD95268.1, XP_003015678.1, XP_501748.1, XP_003169562.1, EFY96492.1, XP_682653.1, XP_002421356.1, CAK43439.1, EFY93677.1, XP_747767.1, XP_001244958.1, XP_003019635.1, XP_002847463.1, EGP83273.1, EGR52487.1, XP_002622526.1, XP_002563618.1, CBX99718.1, XP_001552081.1, XP_003066638.1, XP_003176049.1, ACD75402.1, BAA05145.1, XP_002482834.1, XP_001257501.1, XP_001934574.1, XP_001269972.1, XP_001587438.1, XP_001215856.1, XP_002149824.1, XP_001550556.1, XP_003011982.1, XP_001827121.1, XP_003233566.1, XP_003022481.1, EGR47044.1, EFQ34695.1, XP_003170005.1, BAG09241.1, XP_002796370.1, XP_003019300.1, XP_002563873.1, CAK40654.1, EEH19741.1,

XP_003012518.1, EGD95716.1, XP_003239409.1, BAJ04363.1, XP_001537012.1, BAE66393.1, EGP85214.1, XP_002487227.1, AAV66104.1, EGE07669.1, XP_362943.2, XP_003016806.1, EFQ27388.1, XP_002384360.1, XP_002836323.1, XP_001274959.1, EFZ03093.1, XP_661521.1, XP_002849803.1, XP_001589398.1, AAR99474.1, XP_003189427.1, XP_001823699.1, XP_364111.1, XP_001262753.1, EFY86805.1, XP_001390153.2, XP_002384738.1, XP_001941811.1, XP_001220831.1, XP_003296981.1, XP_002480829.1, BAD83681.1, XP_001827526.2, XP_369556.1, CAK38224.1, EFQ26532.1, XP_002562328.1, XP_001904540.1, EGO52476.1, XP_002382002.1, XP_001225874.1, XP_958030.2, XP_002540883.1, XP_001908957.1, XP_001559255.1, XP_364102.1, EDP48064.1, XP_365075.1, XP_381460.1, CBX95930.1, XP_003054099.1, XP_361347.2, XP_002846867.1, XP_001214985.1, EFQ35175.1, XP_002479062.1, XP_001908613.1, XP_003345380.1, EGR50567.1, XP_002479350.1, XP_001394417.2, XP_001394159.2, XP_002146776.1, EGP86783.1, EFX02953.1, CAK45889.1, XP_003006887.1, XP_002541427.1, XP_750735.1, XP_001257962.1, EGO51720.1, XP_003005336.1, EGP83197.1, XP_002149832.1, XP_003052680.1, XP_365851.1, XP_001799910.1, XP_003347175.1, XP_002565258.1, EGR48918.1, EGR52524.1, XP_964653.2, XP_002147083.1, XP_002843935.1, EEH19393.1, CAC10088.1, EEH47609.1, EEQ92528.1, XP_001246560.1, XP_002626168.1, XP_003024880.1, XP_003169255.1, XP_003013780.1, XP_003235691.1, XP_746816.1, EGD98483.1, XP_001389925.2, XP_002842817.1, XP_002797278.1, ADK36666.1, XP_003305469.1, XP_001548471.1, XP_001806478.1, EFQ34989.1, XP_001552987.1, CAC24473.1, XP_002541530.1, EEQ89262.1, XP_001247332.1, XP_003066043.1, EDP47672.1, XP_002628451.1, XP_001910644.1, EGR44510.1, EFQ36733.1, XP_003052472.1, XP_001393445.2, XP_001522438.1, EGO04179.1, XP_001397944.2, CAK49049.1, EFQ30109.1, XP_001585052.1, EGO30123.1, XP_388496.1, XP_003173913.1, CBF76609.1, XP_003028593.1, EGO04180.1, CAK46976.1, XP_370476.1, XP_002145942.1, XP_003004457.1, ADK36663.1, XP_003040708.1, XP_003351473.1, EFY84692.1, XP_748328.2, XP_003190325.1, XP_002378813.1, EGR46513.1, XP_003033448.1, XP_002145326.1, XP_662462.1, XP_747469.1, XP_001935085.1, EGR45892.1, EGO01601.1, EGP89995.1, XP_001222615.1, XP_001224356.1, EGN93507.1, XP_001934479.1, BAK09464.1, EGO30124.1, XP_001267956.1, ADK36661.1, EFY97845.1, XP_001834501.1, EGO03790.1, XP_001884320.1, XP_003028899.1, AAP79879.1, EFY84206.1, BAK09467.1,

XP_003030469.1, XP_001412594.1, XP_001834508.1, XP_001839436.2, XP_002583529.1, XP_001886288.1, XP_002843371.1, XP_001587730.1, BAK09418.1, BAK09442.1, EGO28830.1, EGE03365.1, EFZ01428.1, EGO03065.1, XP_001558890.1, XP_002487181.1, EGO29652.1, AAX49400.1, EFY92529.1, XP_002380252.1, XP_001884460.1, BAK09387.1, XP_001839366.2, XP_003031835.1, EFY99978.1, AAL67906.1, BAG09240.1, XP_002381768.1, XP_001800031.1, XP_001825073.2, BAE63940.1, XP_003028894.1, AAL67905.1, XP_002910303.1, EGO22856.1, XP_003028896.1, XP_681680.1, XP_002486603.1, XP_001838945.2, EGR50064.1, XP_001884349.1, XP_001883816.1, CAK37996.1, CAO91865.1, XP_003031227.1, XP_001258702.1, XP_001586739.1, XP_001560806.1, CBF69707.1, ADN43682.1, XP_001593179.1, XP_001886909.1, XP_001934479.1, XP_001587730.1, XP_001886909.1, XP_001831709.2, XP_001392650.1, XP_366716.2, CAL69594.1, XP_001269140.1, XP_002566307.1, XP_001555473.1, XP_663925.1, XP_001598033.1, XP_001835239.2, EGN97256.1, XP_001554305.1, NP_182075.1, XP_001560475.1, EFQ32286.1, XP_001216788.1, XP_002483975.1, AAC31835.1, NP_850427.1, XP_002143660.1, XP_003327130.1, BAJ78287.1, XP_002880182.1, ACB59278.1, EFQ36688.1, BAJ78285.1, BAJ78286.1, XP_001798699.1, EEH44101.1, BAJ78288.1, BAJ78284.1, EGG02425.1, EGG03011.1, AAA34334.1, NP_001189747.1, EGG02601.1, XP_002978645.1, EGG11203.1, XP_762610.1, XP_762620.1, XP_001545581.1, CAB44684.1, CAN80536.1, AAN05337.1, NP_001049423.1, XP_001791898.1, NP_001031814.1, XP_002279531.1, ABK94777.1, AAZ39646.1, XP_002880183.1, ABC68403.1, XP_002839066.1, EGG03014.1, XP_002320074.1, NP_001182854.1, CBI38795.3, XP_002310605.1, NP_196442.2, XP_002270594.1, ABZ80830.1, XP_002275905.1, CBI38796.3, XP_002476978.1, CAB93726.1, EGG03624.1, EGG06527.1, NP_197710.1, XP_001768338.1, XP_002270673.1, BAJ86572.1, XP_002275806.1, CBI38797.3, XP_002320072.1, CAN60189.1, XP_002986290.1, XP_002465888.1, CAN80040.1, XP_002336104.1, XP_002988354.1, XP_002264277.1, EGD72898.1, XP_002866853.1, EAY95236.1, XP_002979701.1, XP_002988762.1, XP_002304502.1, XP_002873349.1, XP_003192947.1, CAN63571.1, NP_001053615.1, NP_176558.1, EGC49561.1, EGG09027.1, XP_002314581.1, XP_002446966.1, XP_002320802.1, ABC59095.1, XP_003323121.1, XP_002974639.1, XP_002395587.1, XP_002866852.1, XP_002319770.1, NP_001146262.1, NP_001169224.1, AAM65207.1, XP_002529058.1, XP_002886391.1, XP_002320071.1, XP_002446967.1, XP_757870.1,

EAY95147.1, XP_002899664.1, EEH05830.1, XP_002874114.1, ADO24345.1, BAJ88802.1, BAA05146.1, XP_002963351.1, EAY88475.1, NP_195658.3, XP_002976944.1, ABC59093.1, XP_002275114.1, XP_003328407.1, CAN75428.1, BAJ86471.1, XP_002981144.1, XP_002277006.1, EAZ26110.1, ACN41008.1, XP_002899542.1, XP_001781614.1, EAY76187.1, BAK06758.1, XP_002511745.1, XP_002982626.1, XP_002963763.1, NP_001065111.1, ABF93892.1, XP_002314117.1, BAK06287.1, XP_001745327.1, NP_001047674.1, XP_002878665.1, XP_002974847.1, NP_179899.1, CAN80156.1, NP_001053543.1, ABC59094.1, XP_002328165.1, XP_002270628.1, XP_002275115.1, XP_002980688.1, XP_002465039.1, AAL91155.1, NP_195910.1, XP_002509820.1, NP_200694.1, CAA62082.1, AAL75903.1, XP_002468241.1, XP_002883546.1, XP_002862636.1, XP_002312905.1, EAY79269.1, AAM12494.1, XP_002875027.1, XP_758010.1, XP_002509524.1, AAP54707.2, XP_002869292.1, NP_001143079.1, ACF82946.1, XP_002270497.1, XP_002979685.1, XP_002465041.1, XP_002533544.1, AAG17470.1, XP_002985393.1, NP_191946.1, XP_002525608.1, AAZ39642.1, XP_002270428.1, XP_002529227.1, CBI24485.3, XP_001763206.1, EGG02922.1, XP_002974848.1, NP_001141467.1, CBI27149.3, NP_001130907.1, XP_002982474.1, NP_001048917.1, XP_002465889.1, ABZ80831.1, XP_002464461.1, EAY88476.1, BAJ90714.1, XP_002893825.1, ACN28568.1, XP_002452782.1, XP_002280004.1, XP_001764611.1, NP_001183394.1, BAJ89570.1, CBI24484.3, BAJ88840.1, ACG38359.1, CAN77648.1, BAJ91452.1, NP_001141345.1, XP_002282185.1, XP_002980994.1, XP_002299820.1, BAJ87982.1, BAJ91842.1, XP_003325270.1, XP_001760399.1, CBI34058.3, ADG34845.1, XP_002523775.1, EEH21852.1, Q50EK3.1, BAK06748.1, XP_002963764.1, ACN34158.1, XP_001764503.1, XP_002311750.1, XP_001782495.1, XP_002988642.1, XP_002465625.1, XP_002892051.1, XP_002279649.1, NP_171666.1, ABK28430.1, BAC42067.1, AED99869.1, NP_174713.1, XP_001781706.1, ABG66204.1, XP_002964775.1, NP_001064901.2, XP_002961706.1, XP_002519477.1, XP_001559854.1, CBH32594.1, BAB92258.1, XP_002264897.1, AAL59025.1, XP_002862576.1, ACL53124.1, XP_002521476.1, NP_200045.1, BAJ89814.1, CBI38794.3, XP_776769.1, NP_001141372.1, EEC74485.1, EAY76557.1, XP_002318861.1, NP_001172660.1, XP_002880978.1, AAO00706.1, BAK07606.1, XP_002979336.1, BAC42841.1, BAF46296.1, XP_002306380.1, XP_002865907.1, ACG34921.1, XP_002876375.1, NP_001056685.1, XP_002264292.1, XP_002893443.1, NP_001066096.1, EEE53477.1, CBH32607.1, EAY94753.1,

NP_001130939.1, NP_182121.1, XP_002437749.1, NP_191222.1, XP_002865881.1, XP_569708.1, XP_002279670.1, BAJ94774.1, ABF93894.1, BAD94304.1, ACG33785.1, NP_194944.1, NP_180337.1, AAB63277.1, BAJ85246.1, XP_002456654.1, ACN27732.1, XP_002445325.1, EER40289.1, XP_001838184.2, BAJ85532.1, XP_002866555.1, EAY88477.1, ACG47870.1, XP_002310074.1, XP_002457224.1, EAZ25521.1, BAJ87689.1, NP_001044838.1, XP_002521004.1, XP_002882043.1, XP_002527038.1, XP_002318721.1, XP_002979339.1, NP_176086.1, XP_001560028.1, ABC59092.1, ABF93891.1, ACR38435.1, EAY78983.1, NP_179782.1, CCA21696.1, XP_002334340.1, EFX88387.1, NP_001044554.1, XP_002321857.1, NP_173862.1, NP_195660.1, XP_001554079.1, EAZ13864.1, EEC67630.1, EAY76183.1, AAP54710.2, NP_001065112.2, ACD10924.1, XP_001559275.1, EEC67338.1, XP_002273811.1, ADJ68242.1, NP_001065698.1, CAN66874.1, CAB41474.1, XP_002868908.1, XP_002904660.1, CAR47816.1, NP_189243.1, EAY98229.1, XP_002448320.1, O81117.2, XP_002458797.1, XP_002277129.1, BAJ88829.1, CAN67559.1, BAK08034.1, XP_002894062.1, XP_002894891.1, XP_002279981.1, ABR16451.1, NP_201150.1, AAM60854.1, XP_002521002.1, XP_002521474.1, XP_002875311.1, NP_195661.1, AAP79889.1, NP_175193.1, P98188.1, BAK08270.1, CBI21357.3, XP_002870817.1, XP_002904451.1, ABA95812.1, XP_002998647.1, NP_001066166.2, XP_002894690.1, EFY92064.1, XP_002278009.1, XP_002336002.1, CCA16508.1, XP_002868909.1, EAZ31703.1, C96517, EAY86526.1, XP_002307954.1, XP_002904638.1, XP_002266883.1, XP_002439880.1, XP_002892730.1, ADI52567.1, EGI61791.1, XP_002511196.1, EGG04372.1, XP_002511875.1, ACE75189.1, NP_001055681.1, XP_001589816.1, NP_001170655.1, XP_002300789.1, XP_001934479.1, XP_001587730.1, XP_001554079.1, XP_001559275.1, XP_002868908.1, XP_002998647.1, EFY92064.1, XP_002605799.1, BAC43393.1, ABK28457.1, AAL54887.1, BAC43161.1, XP_002333384.1, ZP_03631129.1, AAL84318.1, BAJ99856.1, XP_002593704.1, YP_001965159.1, XP_002454121.1, EFX88390.1, ABR16969.1, NP_177109.3, XP_002441724.1, NP_001166017.1, BAB92256.1, ACE75340.1, AAZ39645.1, XP_002312417.1, XP_002887239.1, NP_001172609.1, NP_001065766.1, XP_002515053.1, AAL54885.1, ABR16897.1, XP_002878579.1, NP_001140775.1, XP_003275955.1, ZP_08045694.1, BAJ94069.1, XP_001654558.1, XP_002436562.1, EAY88702.1, BAK03685.1, XP_003327629.1, XP_002322606.1, EEH42702.1, XP_002037976.1, NP_172774.1, XP_002282477.1, EFX88388.1, XP_002522465.1, EFZ21470.1, AAO41955.1, AAL54886.1,

XP_002450277.1, XP_002862559.1, XP_002335046.1, XP_003328408.1, ACE75187.1, XP_001849294.1, XP_002444132.1, XP_002894061.1, EFN77015.1, EGI69992.1, CBI17962.3, AAL54884.1, XP_002998650.1, XP_002105150.1, XP_002877615.1, EFZ22412.1, XP_002439815.1, XP_002300790.1, CBI40391.3, AEI59774.1, XP_002801151.1, XP_003325267.1, XP_001554577.1, EAY79865.1, XP_002465796.1, XP_002931035.1, ABA91371.1, ACE75338.1, XP_001592850.1, XP_001362981.1, XP_002271246.1, EGB11905.1, NP_176713.1, CBJ27248.1, NP_566155.1, EFX87732.1, EEC71661.1, ACG29046.1, NP_001130576.1, XP_001843663.1, ABK25134.1, EGI65081.1, XP_002722841.1, AAL67908.2, AAO15579.1, YP_122047.1, EFA04617.1, YP_001522424.1, ACB87383.1, NP_001027517.1, EEE52725.1, XP_002078257.1, XP_002722842.1, ZP_05128707.1, XP_003208874.1, AAK31592.1, ABA95747.2, NP_001181472.1, NP_001075572.1, XP_001108915.1, XP_001520882.1, XP_002063219.1, EFZ22408.1, AAL57721.1, EFW47740.1, AAQ20834.1, CAN74644.1, XP_002722849.1, BAC30028.1, CAN75729.1, XP_002115603.1, AAN72309.1, EEC68823.1, CAM18519.1, EAZ13863.1, XP_002906159.1, NP_001003947.1, ZP_01858832.1, XP_002882162.1, XP_002089195.1, XP_002892729.1, CAN68037.1, NP_001130648.1, NP_001166016.1, NP_172773.4, ADJ68241.1, EGI62551.1, EFN63658.1, XP_002300103.1, XP_001658673.1, XP_001367719.1, NP_775146.1, XP_001375048.1, AAH21377.1, NP_727589.1, XP_002271847.1, XP_001809620.1, XP_002897528.1, NP_190421.1, XP_002282468.1, XP_536868.2, EEE58297.1, XP_001992105.1, EAY82190.1, ADD20161.1, XP_001363065.1, EAU77129.3, EAY72807.1, EGG03077.1, NP_001181489.1, NP_001177869.1, XP_001966135.1, BAA99522.1, BAK07250.1, XP_002133118.1, NP_001042228.1, AAL57720.1, XP_002897529.1, AAA35712.1, YP_002275016.1, NP_000770.2, XP_002721578.1, XP_321208.4, AAM09532.1, EFN61085.1, BAK06179.1, EFX88389.1, YP_001602608.1, XP_513140.3, NP_001182438.1, AAD31068.1, NP_001093242.1, XP_001367758.2, EFZ18984.1, YP_691921.1, CAH59968.1, AAS80270.1, CAH59967.1, ACQ99381.2, YP_003810988.1, YP_957888.1, CBW44755.1, ZP_05042596.1, ZP_01913735.1, ZP_05043097.1, ADQ00145.1, YP_004494060.1, ZP_08206912.1, BAE78452.1, NP_114222.1, ACZ56357.1, YP_640381.1, ZP_04384919.1, ZP_08025219.1, ZP_07715822.1, ZP_06847816.1, YP_001702784.1, AEK27137.1, ZP_07716433.1, ZP_08199554.1, YP_004495520.1, YP_345718.1, ZP_08022914.1, YP_001851443.1, BAG50428.1, YP_001135848.1, BAF95905.1, YP_345695.1, ACP39691.1, ACP39664.1,

ACP39635.1, ACP39633.1, ACP39710.1, ACP39698.1, ACP39711.1, BAE47475.1, BAE47474.1, ABW76858.1, ACO50699.1, ACP39643.1, ACP39639.1, ACP39708.1, ACM68663.1, ACP39642.1, ACP39684.1, ACP39636.1, ZP_05095005.1, ACP39652.1, BAE47473.1, ACM68664.1, ACP39646.1, ACP39680.1, ACP39692.1, ACP39675.1, ACP39632.1, ZP_05129284.1, ACP39706.1, ACP39695.1, ACM68665.1, ACP39654.1, ACP39665.1, ACP39649.1, BAE47472.1, ACM68668.1, ACP39676.1, ACP39648.1, ACP39647.1, ZP_01102434.1, ACM68666.1, ACP39641.1, ACM68669.1, ZP_01625037.1, ACP39690.1, ACP39696.1, ACP39697.1, ACP39707.1, ACP39682.1, ACP39650.1, ACP39638.1, ZP_05126641.1, CAH04396.1, ACP39658.1, ZP_01102687.1, ACJ06772.1, YP_001413041.1, YP_552058.1, ADE05601.1, ADI19685.1, BAE47479.1, ZP_01626700.1, ZP_01618279.1, CAH61448.1, YP_001411305.1, YP_003591161.1, ZP_01615522.1, ACM68667.1, ACP39651.1, ZP_05095535.1, ZP_01618489.1, NP_418882.1, ADI19983.1, ACP39677.1, BAE47476.1, ACP39655.1, ACP39656.1, ADI19696.1, BAE47477.1, YP_001413399.1, YP_459878.1, BAE47480.1, BAE47481.1, ACP39653.1, BAE47478.1, YP_001681656.1, ZP_01618281.1, ZP_01627262.1, YP_001413057.1, YP_760740.1, YP_001242466.1, YP_001203574.1, CAH61454.1, YP_002129656.1, YP_001672075.1, ACP39709.1, YP_001990805.1, NP_946959.1, YP_001203575.1, YP_783213.1, YP_003059227.1, YP_004110202.1, ACP39645.1, YP_487538.1, CAH61451.1, YP_570816.1, YP_534107.1, YP_001413223.1, YP_001242465.1, YP_557448.1, ZP_08631162.1, NP_773883.1, ZP_00997728.1, ACP39683.1, NP_768493.1, NP_773882.1, ZP_08271781.1, CAH61449.1, YP_003883668.1, YP_003332953.1, YP_004535688.1, YP_495502.1, YP_459378.1, ZP_08700267.1, ZP_01863452.1, ZP_06860085.1, BAE47487.1, YP_617903.1, ZP_08207422.1, BAE47486.1, ZP_01041003.1, BAE47484.1, ACR78197.1, CAH61456.1, ZP_01858113.1, ACP39681.1, BAE47485.1, ACP39673.1, BAE47483.1, ACP39669.1, BAE47482.1, ACP39674.1, ACP39704.1, ACP39703.1, YP_497095.1, ACP39672.1, ACP39702.1, ACP39670.1, ACP39666.1, YP_458852.1, ACP39687.1, ACP39688.1, ACP39634.1, ACP39686.1, ACP39660.1, ACP39700.1, YP_001411309.1, ZP_01465241.1, ACP39701.1, ACP39679.1, ACP39657.1, ACP39694.1, ACP39659.1, ACP39671.1, ACP39693.1 and YP_003342921.1,

in particular

AAO73954.1, AAO73953.1, XP_002546279.1, AAA34353.2, P30607.1, XP_002421627.1, XP_718670.1, CAA39366.1, XP_001527524.1, AAO73955.1, AAO73956.1, XP_002546278.1,

EEQ43157.1, XP_718669.1, AAA34354.1, P10615.3, XP_002421628.1, 226487, P16141.3, CAA39367.1, Q9Y757.2, XP_001485567.1, AAO73958.1, XP_001383506.2, XP_460111.2, AAO73959.1, Q12586.1, XP_460112.2, AAO73960.1, Q12589.1, AAO73961.1, XP_460110.2, EEQ43763.1, XP_710174.1, EDK41572.2, XP_001482650.1, CAA75058.1, XP_002548818.1, Q12588.1, XP_002422222.1, XP_001383636.2, XP_001525381.1, XP_002548823.1, P30610.1, AAO73952.1, XP_002548428.1, CAA36197.1, XP_002421126.1, AAA34320.1, P16496.3, P30608.1, P24458.1, XP_717999.1, XP_001383817.1, Q9Y758.1, XP_001482092.1, XP_001383710.2, P30609.1, AAB24479.1, XP_457792.1, XP_001524144.1, XP_457727.2, XP_001525578.1, XP_002616743.1, XP_002614836.1, XP_001525577.1, AAO73957.1, Q12585.1, XP_001386440.2, XP_002616857.1, XP_001483276.1, XP_500402.1, EDK39907.2, XP_500560.1, XP_001211376.1, XP_002560027.1, XP_504857.1, XP_500855.1, XP_504406.1, BAA31433.1, XP_500856.1, XP_501148.1, XP_746567.1, XP_001262425.1, XP_001274843.1, XP_002840588.1, XP_002377641.1, XP_001825995.1, XP_001400739.1, XP_718066.1, CAA35593.1, XP_664735.1, XP_002150795.1, XP_500097.1, XP_002483325.1, XP_504311.1, XP_500273.1, XP_002548817.1, EDP54484.1, XP_755288.1, XP_001260447.1, EFY97851.1, ACD75398.1, ADK36660.1, XP_001213081.1, XP_002377989.1, XP_001826299.1, XP_001554811.1, XP_501667.1, XP_002148942.1, ADK36662.1, XP_002565827.1, P30611.1, XP_001267871.1, XP_002372373.1, EFY84686.1, P43083.1, XP_001263094.1, XP_002148355.1, XP_002568429.1, XP_001817314.1, Q12587.1, XP_001396435.1, XP_001938589.1, XP_001388497.2, XP_663661.1, XP_003295335.1, XP_002152088.1, XP_001212071.1, Q12573.1, XP_002379858.1, XP_001821592.1, XP_002844341.1, XP_001394678.1, ACD75400.1, XP_003170343.1, XP_001265480.1, XP_002550661.1, EDP55514.1, XP_001528842.1, XP_749919.1, XP_001593058.1, P30612.1, EGC48494.1, EEH04429.1, XP_001585586.1, XP_003236182.1, XP_001400199.1, EEQ46951.1, XP_721410.1, EGP87864.1, XP_002380808.1, XP_001792771.1, XP_001208515.1, XP_001216161.1, XP_003071804.1, EFW16963.1, XP_002542118.1, XP_001936677.1, EGD95268.1, XP_003015678.1, XP_501748.1, XP_003169562.1, EFY96492.1, XP_682653.1, XP_002421356.1, CAK43439.1, EFY93677.1, XP_747767.1, XP_001244958.1, XP_003019635.1, XP_002847463.1, EGP83273.1, EGR52487.1, XP_002622526.1, XP_002563618.1, CBX99718.1, XP_001552081.1, XP_003066638.1, XP_003176049.1, ACD75402.1, BAA05145.1, XP_002482834.1, XP_001257501.1, XP_001934574.1, XP_001269972.1, XP_001587438.1, XP_001215856.1, XP_002149824.1,

XP_001550556.1, XP_003011982.1, XP_001827121.1, XP_003233566.1, XP_003022481.1, EGR47044.1, EFQ34695.1, XP_003170005.1, BAG09241.1, XP_002796370.1, XP_003019300.1, XP_002563873.1, CAK40654.1, EEH19741.1, XP_003012518.1, EGD95716.1, XP_003239409.1, BAJ04363.1, XP_001537012.1, BAE66393.1, EGP85214.1, XP_002487227.1, AAV66104.1, EGE07669.1, XP_362943.2, XP_003016806.1, EFQ27388.1, XP_002384360.1, XP_002836323.1, XP_001274959.1, EFZ03093.1, XP_661521.1, XP_002849803.1, XP_001589398.1, AAR99474.1, XP_003189427.1, XP_001823699.1, XP_364111.1, XP_001262753.1, EFY86805.1, XP_001390153.2, XP_002384738.1, XP_001941811.1, XP_001220831.1, XP_003296981.1, XP_002480829.1, BAD83681.1, XP_001827526.2, XP_369556.1, CAK38224.1, EFQ26532.1, XP_002562328.1, XP_001904540.1, EGO52476.1, XP_002382002.1, XP_001225874.1, XP_958030.2, XP_002540883.1, XP_001908957.1, XP_001559255.1, XP_364102.1, EDP48064.1, XP_365075.1, XP_381460.1, CBX95930.1, XP_003054099.1, XP_361347.2, XP_002846867.1, XP_001214985.1, EFQ35175.1, XP_002479062.1, XP_001908613.1, XP_003345380.1, EGR50567.1, XP_002479350.1, XP_001394417.2, XP_001394159.2, XP_002146776.1, EGP86783.1, EFX02953.1, CAK45889.1, XP_003006887.1, XP_002541427.1, XP_750735.1, XP_001257962.1, EGO51720.1, XP_003005336.1, EGP83197.1, XP_002149832.1, XP_003052680.1, XP_365851.1, XP_001799910.1, XP_003347175.1, XP_002565258.1, EGR48918.1, EGR52524.1, XP_964653.2, XP_002147083.1, XP_002843935.1, EEH19393.1, CAC10088.1, EEH47609.1, EEQ92528.1, XP_001246560.1, XP_002626168.1, XP_003024880.1, XP_003169255.1, XP_003013780.1, XP_003235691.1, XP_746816.1, EGD98483.1, XP_001389925.2, XP_002842817.1, XP_002797278.1, ADK36666.1, XP_003305469.1, XP_001548471.1, XP_001806478.1, EFQ34989.1, XP_001552987.1, CAC24473.1, XP_002541530.1, EEQ89262.1, XP_001247332.1, XP_003066043.1, EDP47672.1, XP_002628451.1, XP_001910644.1, EGR44510.1, EFQ36733.1, XP_003052472.1, XP_001393445.2, XP_001522438.1, XP_001397944.2, CAK49049.1, EFQ30109.1, XP_001585052.1, XP_388496.1, XP_003173913.1, CBF76609.1, CAK46976.1, XP_370476.1, XP_002145942.1, XP_003004457.1, ADK36663.1, XP_003040708.1, XP_003351473.1, EFY84692.1, XP_748328.2, XP_003190325.1, XP_002378813.1, EGR46513.1, XP_002145326.1, XP_662462.1, XP_747469.1, XP_001935085.1, EGR45892.1, EGP89995.1, XP_001222615.1, XP_001224356.1, XP_001934479.1, XP_001267956.1, ADK36661.1, EFY97845.1, EFY84206.1, XP_001412594.1, XP_002583529.1,

XP_002843371.1, XP_001587730.1, EGE03365.1, EFZ01428.1, XP_001558890.1, XP_002487181.1, EFY92529.1, XP_002380252.1, EFY99978.1, BAG09240.1, XP_002381768.1, XP_001800031.1, XP_001825073.2, BAE63940.1, XP_681680.1, XP_002486603.1, EGR50064.1, CAK37996.1, CAO91865.1, XP_001258702.1, XP_001586739.1, XP_001560806.1, CBF69707.1, ADN43682.1, XP_001593179.1, XP_001392650.1, XP_366716.2, CAL69594.1, XP_001269140.1, XP_002566307.1, XP_001555473.1, XP_663925.1, XP_001598033.1, XP_001554305.1, XP_001560475.1, EFQ32286.1, XP_001216788.1, XP_002483975.1, XP_002143660.1, EFQ36688.1, XP_001798699.1, EEH44101.1, AAA34334.1, XP_001545581.1, XP_001791898.1, XP_002839066.1, EGC49561.1, EEH05830.1, BAA05146.1, EEH21852.1, XP_001559854.1, EER40289.1, XP_001560028.1, XP_001554079.1, XP_001559275.1, EFY92064.1, XP_001589816.1, EEH42702.1, XP_001554577.1, XP_001592850.1, YP_691921.1, CAH59968.1, AAS80270.1, CAH59967.1, ACQ99381.2, YP_003810988.1, YP_957888.1, CBW44755.1, ZP_05042596.1, ZP_01913735.1, ZP_05043097.1, ADQ00145.1, YP_004494060.1, ZP_08206912.1, BAE78452.1, NP_114222.1, ACZ56357.1, YP_640381.1, ZP_04384919.1, ZP_08025219.1, ZP_07715822.1, ZP_06847816.1, YP_001702784.1, AEK27137.1, ZP_07716433.1, ZP_08199554.1, YP_004495520.1, YP_345718.1, ZP_08022914.1, YP_001851443.1, BAG50428.1, YP_001135848.1, BAF95905.1, YP_345695.1, ACP39691.1, ACP39664.1, ACP39635.1, ACP39633.1, ACP39710.1, ACP39698.1, ACP39711.1, BAE47475.1, BAE47474.1, ABW76858.1, ACO50699.1, ACP39643.1, ACP39639.1, ACP39708.1, ACM68663.1, ACP39642.1, ACP39684.1, ACP39636.1, ZP_05095005.1, ACP39652.1, BAE47473.1, ACM68664.1, ACP39646.1, ACP39680.1, ACP39692.1, ACP39675.1, ACP39632.1, ZP_05129284.1, ACP39706.1, ACP39695.1, ACM68665.1, ACP39654.1, ACP39665.1, ACP39649.1, BAE47472.1, ACM68668.1, ACP39676.1, ACP39648.1, ACP39647.1, ZP_01102434.1, ACM68666.1, ACP39641.1, ACM68669.1, ZP_01625037.1, ACP39690.1, ACP39696.1, ACP39697.1, ACP39707.1, ACP39682.1, ACP39650.1, ACP39638.1, ZP_05126641.1, CAH04396.1, ACP39658.1, ZP_01102687.1, ACJ06772.1, YP_001413041.1, YP_552058.1, ADE05601.1, ADI19685.1, BAE47479.1, ZP_01626700.1, ZP_01618279.1, CAH61448.1, YP_001411305.1, YP_003591161.1, ZP_01615522.1, ACM68667.1, ACP39651.1, ZP_05095535.1, ZP_01618489.1, NP_418882.1, ADI19983.1, ACP39677.1, BAE47476.1, ACP39655.1, ACP39656.1, ADI19696.1, BAE47477.1, YP_001413399.1, YP_459878.1, BAE47480.1,

BAE47481.1, ACP39653.1, BAE47478.1, YP_001681656.1, ZP_01618281.1, ZP_01627262.1, YP_001413057.1, YP_760740.1, YP_001242466.1, YP_001203574.1, CAH61454.1, YP_002129656.1, YP_001672075.1, ACP39709.1, YP_001990805.1, NP_946959.1, YP_001203575.1, YP_783213.1, YP_003059227.1, YP_004110202.1, ACP39645.1, YP_487538.1, CAH61451.1, YP_570816.1, YP_534107.1, YP_001413223.1, YP_001242465.1, YP_557448.1, ZP_08631162.1, NP_773883.1, ZP_00997728.1

and particularly preferably

AAO73954.1, AAO73953.1, XP_002546279.1, AAA34353.2, P30607.1, XP_002421627.1, XP_718670.1, CAA39366.1, AAO73955.1, AAO73956.1, XP_002546278.1, EEQ43157.1, XP_718669.1, AAA34354.1, P10615.3, XP_002421628.1, 226487, P16141.3, CAA39367.1, AAO73958.1, AAO73959.1, Q12586.1, AAO73960.1, Q12589.1, AAO73961.1, EEQ43763.1, XP_710174.1, CAA75058.1, XP_002548818.1, Q12588.1, XP_002422222.1, XP_002548823.1, P30610.1, AAO73952.1, XP_002548428.1, CAA36197.1, XP_002421126.1, AAA34320.1, P16496.3, P30608.1, P24458.1, XP_717999.1, P30609.1, AAB24479.1, AAO73957.1, Q12585.1, XP_718066.1, CAA35593.1, XP_002548817.1, P30611.1, P43083.1, Q12587.1, Q12573.1, XP_002550661.1, P30612.1, EEQ46951.1, XP_721410.1, XP_002421356.1, BAA05145.1, BAG09241.1, CAC24473.1, BAG09240.1, AAA34334.1, BAA05146.1, XP_500402.1, XP_500560.1, XP_504857.1, XP_500855.1, XP_504406.1, BAA31433.1, XP_500856.1, XP_501148.1, XP_500097.1, XP_504311.1, XP_500273.1, XP_501667.1, XP_501748.1, YP_691921.1, CAH59968.1, AAS80270.1, CAH59967.1, ACQ99381.2, YP_003810988.1, YP_957888.1, CBW44755.1, ZP_05042596.1, ZP_01913735.1, ZP_05043097.1, ADQ00145.1, YP_004494060.1, ZP_08206912.1, BAE78452.1, NP_114222.1, ACZ56357.1, YP_640381.1, ZP_04384919.1, ZP_08025219.1, ZP_07715822.1, ZP_06847816.1, YP_001702784.1, AEK27137.1, ZP_07716433.1, ZP_08199554.1, YP_004495520.1, YP_345718.1, ZP_08022914.1, YP_001851443.1, BAG50428.1, YP_001135848.1, BAF95905.1, YP_345695.1, ACP39691.1, ACP39664.1, ACP39635.1, ACP39633.1, ACP39710.1, ACP39698.1, ACP39711.1, BAE47475.1, BAE47474.1, ABW76858.1, ACO50699.1, ACP39643.1, ACP39639.1, ACP39708.1, ACM68663.1, ACP39642.1, ACP39684.1, ACP39636.1, ZP_05095005.1, ACP39652.1, BAE47473.1, ACM68664.1, ACP39646.1, ACP39680.1, ACP39692.1, ACP39675.1, ACP39632.1, ZP_05129284.1, ACP39706.1, ACP39695.1, ACM68665.1, ACP39654.1, ACP39665.1, ACP39649.1, BAE47472.1, ACM68668.1, ACP39676.1, ACP39648.1, ACP39647.1,

ZP_01102434.1, ACM68666.1, ACP39641.1, ACM68669.1, ZP_01625037.1, ACP39690.1, ACP39696.1, ACP39697.1, ACP39707.1, ACP39682.1, ACP39650.1 and ACP39638.1
and
proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues are modified compared to the aforementioned reference sequences by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_{1a} in general is understood to mean in particular the conversion of lauric acid and/or methyl laurate to ω-hydroxylauric acid and/or methyl ω-hydroxylaurate.
Modifications of amino acid residues of a given polypeptide sequence which lead to no significant modifications of the properties and function of the given polypeptide are known to those skilled in the art. Thus for example many amino acids can often be exchanged for one another without problems; examples of such suitable amino acid substitutions are: Ala by Ser; Arg by Lys; Asn by Gln or His; Asp by Glu; Cys by Ser; Gln by Asn; Glu by Asp; Gly by Pro; His by Asn or Gln; Ile by Leu or Val; Leu by Met or Val; Lys by Arg or Gln or Glu; Met by Leu or Ile; Phe by Met or Leu or Tyr; Ser by Thr; Thr by Ser; Trp by Tyr; Tyr by Trp or Phe; Val by Ile or Leu. It is also known that modifications, particularly at the N- or C-terminus of a polypeptide in the form of for example amino acid insertions or deletions, often exert no significant influence on the function of the polypeptide.

AlkB alkane hydroxylases preferred according to the invention are selected from the list YP_001185946.1, Q9WWW6.1, YP_957898.1, YP_957728.1, YP_694427.1, BAC98365.1, ZP_00957064.1, CAC86944.1, YP_001672212.1, CAB59525.1, ACH99213.1, ACH99215.1, ACH99216.1, AAK56792.1, ACH99229.1, ACS91348.1, AAP41820.1, ZP_05128075.1, CAM58121.1, CAM58085.1, ACQ44675.1, ACZ62808.1, ZP_01738706.1, ZP_01916228.1,

ZP_01225325.1, YP_001023605.1, ACJ22747.1, ACT91140.1, AAT91722.2, CBA27418.1, YP_001889129.1, EGC97932.1, ACT91201.1, ZP_05083049.1, YP_554098.1, ZP_01900149.1, ADG26619.1, ADG26657.1, ADG26640.1, ZP_06838771.1, ADG26649.1, ADG26651.1, ZP_02374120.1, YP_368326.1, ZP_02380481.1, ADG26643.1, ADG26628.1, YP_442346.1, ADG26620.1, ADG26647.1, ZP_07673680.1, ADG26638.1, YP_002232139.1, YP_001118743.1, ZP_01764629.1, YP_108945.1, YP_334185.1, ZP_04897834.1, ZP_02889567.1, YP_620386.1, YP_002897546.1, ZP_02166109.1, ZP_02904755.1, ADG26639.1, YP_001892637.1, ADG26642.1, ZP_04939380.1, ZP_02464124.1, YP_102417.1, CAC36356.1, ACJ22727.1, YP_001764240.1, YP_002765609.1, YP_001945311.1, ZP_03586616.1, ACJ22665.1, ZP_03574223.1, CAC37038.1, ZP_02456517.1, YP_001807560.1, YP_002779449.1, AAK97454.1, YP_002912304.1, ACR55689.1, YP_003397515.1, YP_004361423.1, YP_772734.1, ACJ65014.1, ACT31523.1, ACJ22750.1, ZP_07375042.1, YP_002776786.1, ACB11552.1, ZP_02363472.1, ADG26653.1, ZP_04383196.1, ZP_02356342.1, ACJ22751.1, YP_952571.1, ACU43494.1, YP_001135977.1, YP_002764193.1, YP_003855036.1, YP_004078475.1, AAK97448.1, ZP_04388098.1, ACX30747.1, ADG26632.1, ACJ22719.1, ADO21492.1, ZP_05061580.1, ADR72654.1, ACZ65961.1, ACX30755.1, YP_001849604.1, AAV64895.1, YP_004495037.1, YP_702497.1, YP_001069662.1, ZP_06850622.1, BAF34299.1, CAB51024.2, YP_004008018.1, YP_003768535.1, ACJ65013.1, ZP_07282765.1, YP_886209.1, ACJ22725.1, ZP_08155372.1, YP_004493362.1, ZP_05228000.1, ZP_07717360.1, BAD67020.1, YP_004524245.1, ZP_07715778.1, NP_217769.1, ACS91349.1, YP_960105.1, ZP_07014137.1, YP_004746682.1, ZP_08022271.1, ACN62569.1, ADQ37951.1, YP_003647687.1, YP_003837040.1, ADG26600.1, YP_002768905.1, ZP_08553310.1, ADG26597.1, ACJ22749.1, ADG26598.1, YP_001704327.1, ZP_04385381.1, ZP_04751264.1, ADG26609.1, ADG26610.1, ZP_06417258.1, ADG26607.1, ADP98338.1, YP_003275257.1, YP_004084103.1, ADG26630.1, ADG26625.1, ADG26605.1, ADG26599.1, ZP_05218167.1, ADQ37950.1, YP_921354.1, ADG26645.1, ADG26612.1, YP_004493370.1, YP_638501.1, YP_003809668.1, NP_962298.1, ZP_04750514.1, ADG26608.1, ADT82701.1, ACJ06773.1, YP_120833.1, ADG26618.1, ADG26602.1, ADG26623.1, ZP_04383566.1, ZP_08122407.1, YP_004077166.1, ZP_05041651.1, ZP_04608296.1, ABU93351.2, YP_003658078.1, ADQ37949.1, ADG26652.1, YP_002765850.1, AAK97447.1, CAD24434.1, CAC40954.1, ACT91203.1, YP_120829.1, ZP_07282558.1, YP_003298195.1, YP_001851790.1,

ZP_05827357.1, ADG26633.1, CAB51020.1, YP_953908.1, ZP_07990416.1, YP_119532.1, ZP_08442348.1, ZP_08276444.1, ZP_04661203.1, ABO12068.2, YP_001846325.1, ADQ37952.1, ZP_08198697.1, ZP_00996652.1, YP_001707231.1, ZP_08433663.1, ZP_08205256.1, YP_003732372.1, YP_906529.1, ACT91204.1, YP_001506534.1, YP_001713880.1, YP_883357.1, YP_004525252.1, ADG26604.1, YP_001134633.1, ZP_08195602.1, ZP_06690500.1, ZP_05826167.1, ADY81595.1, ZP_06056754.1, AAK31348.1, YP_251715.1, ZP_08461977.1, ZP_05847237.1, YP_712218.1, YP_001084670.1, ZP_04387164.1, YP_260041.1, YP_002873097.1, ADG26614.1, AAK97446.1, YP_001280943.1, ZP_04386125.1, AAC36353.2, CCA29159.1, CAD10804.1, CCA29151.1, CAC40953.1, CCA29161.1, ABA55770.1, AAS93604.4, CCA29173.1, CCA29155.1, CCA29156.1, ABA55772.1, CCA29154.1, ABA55793.1, CCA29162.1, CCA29170.1, ZP_03824539.1, CCA29166.1, CCA29136.1, ZP_06065934.1, ABB54493.1, CCA29169.1, YP_003112137.1, CCA29127.1, CCA29148.1, CCA29160.1, ZP_06057458.1, ABA55773.1, YP_004016090.1, CCA29139.1, YP_480358.1, ABA55787.1, CCA29150.1, CCA29130.1, ZP_07775830.1, ABA55779.1, CCA29132.1, YP_003732938.1, BAB33284.1, CCA29149.1, CCA29145.1, ABA55783.1, CCA29137.1, CCA29129.1, CCA29158.1, CCA29176.1, CCA29142.1, CCA29144.1, BAB33287.1, CCA29133.1, CCA29140.1, CCA29135.1, ZP_06066074.1, ZP_03823182.1, CCA29171.1, CCA29152.1, CCA29131.1, ABA55780.1, CCA29163.1, CCA29143.1, CCA29153.1, YP_001580600.1, CCA29134.1, CCA29138.1, YP_046098.1, ZP_06072466.1, ZP_05361594.1, ACU43504.1, CCA29147.1, CCA29146.1, ZP_06061712.1, ACT91185.1, ACT91147.1, ACT91178.1, ACT91167.1, ACT91181.1, ACT91188.1, ZP_06069784.1, ACT91205.1, ZP_06725872.1, ACT91171.1, CCA29128.1, ABY56787.1, ADE05602.1, ACU43474.1, ACJ22718.1, ABB90688.1, ACU43519.1, ABB96093.1, ACU43485.1, ACU43493.1, ABW76857.1, ACT91163.1, ACJ22673.1, ZP_06188150.1, ACT91242.1, ACT91225.1, ACT91211.1, ACU43479.1, ACU43491.1, ACU43522.1, ACU43486.1, ACT91221.1, ACJ22662.1, ACU43506.1, ACU43487.1, ACT91259.1, AAA97866.1, ACU43502.1, YP_001252544.1, ABB96084.1, ACU43520.1, ACJ22668.1, ACU43503.1, ACT91230.1, ABA55777.1, ACT91231.1, ZP_01748311.1, ACJ22724.1, ACU43475.1, ACU43511.1, ACU43490.1, ZP_08330953.1, ACU43484.1, CBX01596.1, ACT91168.1, YP_096989.1, ACT91215.1, YP_125370.1, ACT91233.1, ACU43478.1, ADE05603.1, ACJ22715.1, ACU43512.1, ACT91196.1, ACJ22692.1, ACU43510.1, ACU43521.1, ACT91174.1, ACT91213.1, ACT91142.1,

ACT91206.1, ACT91216.1, ACT91182.1, ACT91255.1, ACT91246.1, ACT91217.1, ACT91155.1, ACT91240.1, ACT91207.1, ACU43495.1, YP_128249.1, ACT91160.1, YP_004052990.1, ACT91226.1, ACU43507.1, ABO61855.1, ACT91214.1, ACT91220.1, YP_001188237.1, ACJ22689.1, ZP_01689499.1, YP_004379711.1, ACJ22748.1, ABB90683.1, ACT91223.1, ACT91235.1, ABO61786.1, ACU43508.1, ACU43492.1, ACT91219.1, ACT91244.1, ABO61856.1, ACT91239.1, ACU43473.1, ABO61850.1, ACT91262.1, ACT91261.1, ACT91224.1, ACU43499.1, ACU43488.1, ADO21767.1, YP_004654946.1, ADO21777.1, ABB96089.1, ABO61852.1, ABO61847.1, ACT91222.1, ADO21764.1, ACU43477.1, ADO21773.1, ABO61787.1, ABB96080.1, ABO61857.1, ACT91228.1, ABB96070.1, ADO21744.1, ACT91245.1, CAG17608.1, ADO21747.1, YP_001349162.1, ABK63807.1, ZP_06879583.1, NP_250216.1, ACT91234.1, ZP_01364874.1, ABO61789.1, ADO21772.1, ACU43516.1, ACU43505.1, ACU43501.1, ACT91236.1, ZP_07792758.1, ACZ64723.1, ADO21743.1, ADO21759.1, ACZ64752.1, ADO21755.1, ACD75517.1, YP_790621.1, ACB11551.1, ADO21748.1, NP_251264.1, ZP_01365940.1, ADO21762.1, ADO21739.1, ACU43496.1, ABO61854.1, ZP_06878434.1, ACU43489.1, ACU43483.1, ADO21746.1, ACT91237.1, ZP_01895378.1, ACT91164.1, ADO21736.1, ACJ22711.1, ACZ64754.1, ZP_05042146.1, ADO21688.1, ADO21648.1, YP_001348003.1, ADP98656.1, ADO21737.1, ADO21760.1, ADO21754.1, ADO21740.1, ACZ64758.1, ACU43497.1, ZP_01912185.1, ABB96111.1, ACU43482.1, ACB11549.1, ADO21775.1, CCA29157.1, ADO21681.1, ADO21668.1, ADO21656.1, ACU43517.1, ACT91165.1, ACJ22695.1, ACJ22688.1, ABB96071.1, ADO21763.1, ACT91241.1, ADO21735.1, ACB11550.1, ADO21778.1, ACT91172.1, ADO21765.1, ABB96087.1, CBJ30233.1, ACJ22752.1, ABB96105.1, ACB15251.1, ACJ22694.1, ACZ64741.1, ACZ64706.1, ABB96108.1, ACT91191.1, ABB96101.1, ABB90691.1, ACZ64745.1, YP_691842.1, ABB96075.1, ABB90682.1, ABB90690.1, ADO21676.1, ADO21679.1, ABO61768.1, YP_435857.1, ACJ22722.1, ACT91238.1, ACZ64725.1, CAC14062.1, ADO21682.1, ACZ64771.1, ACZ64718.1, ACZ64724.1, ADO21670.1, ADO21667.1, CAC37048.1, ACZ64708.1, ABB96092.1, ACJ22687.1, ACZ64703.1, ADO21690.1, ABB92364.1, ACB11547.1, ACZ64720.1, ADO21655.1, ACZ64717.1, ADO21680.1, ACZ64757.1, ACZ64733.1, ACT91144.1, ACU43481.1, ACT91179.1, ZP_02181409.1, ACZ64704.1, ABB96073.1, ACJ22675.1, ACZ64721.1, ABB96090.1, ACJ22729.1, ACU43515.1, ZP_01307000.1, ABB90685.1, YP_003862088.1, ACZ64715.1, ACZ64710.1, ACJ22735.1, ABB90687.1,

ADO21661.1, ADO21674.1, ACT91177.1, ABB54492.1, ABB96076.1, ABB92365.1, ACT91194.1, ADO21689.1, ACJ22691.1, ABB90681.1, ADO21649.1, ADO21671.1, ACZ64728.1, ABB96095.1, CAC40945.1, ADO21652.1, ADO21665.1, ADE08461.1, ADO21678.1, ACZ64705.1, ACJ22690.1, ADO21675.1, ADO21685.1, ABB96072.1, ACJ22736.1, ACB11540.1, ABB96091.1, ACI04540.1, ACT91251.1, ACT91146.1, ACT91166.1, ACT91156.1, ADO21752.1, ADO21673.1, ADO21725.1, ABB96104.1, ABB90694.1, ABB90696.1, ACT91173.1, ADO21647.1, ZP_03700804.1, ACT91232.1, ADO21694.1, CAC40949.1, ABB92361.1, ACT91195.1, ACI04538.1, ADO21691.1, ACJ22685.1, ADO21653.1, ABS12461.1, ACZ64736.1, ACZ64772.1, ABB90680.1, ADO21659.1, ACZ64774.1, ADO21684.1, ADO21729.1, ADO21650.1, ADO21733.1, ACZ64755.1, ACZ64751.1, ABA55775.1, ADO21738.1, CCA29174.1, ADO21669.1, ACZ64744.1, ADO21654.1, ADO21768.1, ABB96106.1, CCA29168.1, ACT91176.1, ACB11555.1, ABB90695.1, ADO21660.1, ACJ22666.1, ACZ64778.1, ADO21766.1, ADO21677.1, ZP_02161687.1, CCA29165.1, ADO21745.1, ACB11548.1, ABB90689.1, ABB96107.1, AAT46052.1, ADO21718.1, ADO21722.1, ABB96088.1, EFW40271.1, ADO21686.1, ABB96103.1, ACU43500.1, ACB11536.1, ABB92360.1, CCA29167.1, ACT91199.1, ACZ64770.1, ACJ22716.1, ABA55786.1, ACZ64737.1, ABB96083.1, ACJ22676.1, ACZ64735.1, ACT91212.1, ACJ22765.1, CAJ01371.1, CAC17734.1, ABD36389.1, ACB11537.1, CAC08515.1, ACZ64714.1, ACU43513.1, ABB96082.1, ADN21387.1, ADO21711.1, ABD36392.1, ABR10770.1, CAC37049.1, ABB96098.1, ABB90692.1, ACB11535.1, ACZ64768.1, ACJ22756.1, ABB96094.1, ABA55791.1, ABB96078.1, ACT91141.1, ACZ64779.1, ACZ64750.1, CAJ01370.1, ACZ64753.1, ACU43480.1, ABA55794.1, ABB96085.1, ABB96110.1, YP_004448035.1, ACZ64709.1, ABB96102.1, ACZ64773.1, CCA29175.1, ACZ64749.1, ACZ64756.1, ACZ64781.1, ABO61777.1, ACZ64759.1, ACZ64764.1, ACZ64740.1, ACT91249.1, ZP_03702922.1, ACB11545.1, ACZ64775.1, ACZ64769.1, ACT91145.1, ACZ64742.1, ACT91254.1, ACZ64762.1, ACZ64716.1, ACZ64777.1, ADM26559.1, ABB96096.1, ACZ64780.1, ZP_01201250.1, CAH55829.1, ZP_01052921.1, ABB96077.1, ADO21658.1, ACT91161.1, ABB90684.1, ACR56750.1, ABB90697.1, ACZ64746.1, ABB92367.1, ACT91139.1, ACZ64763.1, ACT91200.1, ABO61773.1, ABB96081.1, ACZ64748.1, ACZ64782.1, ACU43498.1, ADO21651.1, ABB90679.1, BAG06233.1, ACZ64747.1, ABB96086.1, ACZ64761.1, ABB92370.1, ABO61774.1, ACT91175.1, ABB90686.1, ACB11546.1,

ZP_01740604.1, ABO61785.1, YP_001531377.1, XP_001434539.1, ABA55767.1, ABO21865.1, ABF55636.1, ABA55751.1, ABB90698.1, ADD12311.1, ACZ64765.1, ABB92366.1, ABB92368.1, ACI04539.1, XP_001023288.1, ACZ64783.1, ADO21692.1, ZP_01753800.1, ACZ64760.1, ACZ64700.1, ZP_01055480.1, ACZ64767.1, ACZ64701.1, ABA55745.1, ABA55752.1, ACZ64766.1, YP_614640.1, ABA55759.1, ADO21723.1, BAG06232.1, ZP_01002389.1, ABB90693.1, ACT91264.1, ABB92358.1, BAF99026.1, ABR10769.1, ZP_00959618.1, AEA08580.1, ADD22986.1, CAB51023.1, CAC40958.1, ADO21709.1, CAB51025.1, ACI15226.1, ACJ22680.1, ZP_05741459.1, ACT91248.1, ABU48567.1, ABO61792.1, ACJ22754.1, EFN53276.1, AAL87644.1, ACT91209.1, ZP_02147281.1, ACU43518.1, ACZ64776.1, ACB11543.1, ACT91151.1, ACJ22764.1, ACT91159.1, ABA18186.1, AEA08579.1, ADO21770.1, ABF55634.1, CAA27179.1, ABA55741.1, ADO21705.1, ZP_01754375.1, ACB11541.1, ACR56751.1, ACT91250.1, ADO21769.1, ADO21753.1, ABB96097.1, ACT91208.1, ABO21867.1, ADO21757.1, ACB11554.1, ABA55749.1, CAC40951.1, ADO21719.1, ABB96074.1, ZP_00954267.1, ZP_05786269.1, AEH76912.1, ABA55742.1, ABA55748.1, BAG06236.1, ADO21732.1, ABA55750.1, ABA55768.1, ACT31522.1, ZP_05090796.1, ACZ64739.1, YP_915886.1, ADO21731.1, CAC40948.1, XP_001032273.1, AEH76911.1, ABA55743.1, ABO61769.1, ABA55755.1, ZP_05122263.1, ADO21756.1, ABA55744.1, ABA55746.1, ZP_01901011.1, ZP_02150761.1, ADO21742.1, ACR56752.1, ABA55747.1, ABF55637.1, ABA55740.1, ABA55760.1, ZP_00948812.1, ABA55804.1, ADO21771.1, ZP_05342453.1, ABF55638.1, YP_508336.1, ABB92357.1, ZP_01049702.1, ABU48546.1, ABU48555.1, ABA55764.1, ABO21866.1, ZP_05079274.1, ZP_01880441.1, ACZ64738.1, ZP_05842058.1, ACT91218.1, ABA55769.1, ABA55739.1, ABA55803.1, ACT91247.1, ABA55782.1, ACZ17539.1, ABB92359.1, ACH69966.1, ZP_01035050.1, ACZ17537.1, ABA55774.1, ACZ64729.1, ACZ17538.1, ZP_01751972.1, ACZ64731.1, ACZ64702.1, AAR13803.1, AEJ28400.1, ZP_05099213.1, CAB51021.1, ACZ17531.1, AEH76914.1, ZP_05051648.1, ACZ64726.1, ACZ17540.1, ACZ64727.1, ZP_02152773.1, ACT91253.1, ACZ17536.1, XP_001423873.1, ACZ17534.1, YP_168645.1, ACZ17520.1, ABY56786.1, ACB11539.1, ZP_01157350.1, AEH76910.1, ABY56784.1, AAY85982.1, ACT91257.1, ACB11544.1, ACZ17532.1, ZP_01746661.1, ABA55771.1, BAG06235.1, EGR32049.1, YP_001166282.1, ABO61799.1, ABA55757.1, AEH76915.1, ACO59264.1, ABO26125.1, AEA08577.1, ACT91265.1, ABY56785.1, ACZ17528.1, ABO61798.1, ADO21749.1, ACT91263.1, ACT91252.1,

ACZ64722.1, ABO61771.1, ACZ17526.1, ABO26123.1, ADO21714.1, ZP_01000906.1, ABO61796.1, ADC29534.1, ACB15250.1, ACD47155.1, ACZ17525.1, ACB11553.1, ABD36391.1, AEH76913.1, ACZ17523.1, ABO61781.1, ACZ17524.1, ZP_01914093.1, ACB11538.1, ZP_01015838.1, ACJ22693.1, ACB15252.1, CAC86945.1, ACO59265.1, ABO61791.1, ACZ17521.1, ABO26124.1, ACZ64732.1, ACU43514.1, ACT91256.1, ACM63043.1, ACS75820.1, ZP_08666479.1, CAH03133.1, BAG06234.1, AEH76916.1, ABO61790.1, ABE72965.1, ACZ64711.1, ACB11542.1, AAY26148.1, ABA55776.1, ACZ17522.1, ACZ64734.1, AEA08578.1, ACZ17530.1, ZP_04062748.1, ACJ22755.1, NP_969039.1, AAY26149.1, ACJ22761.1, ABU48543.1, ZP_08414255.1, AAT91720.1, ZP_01444283.1, ABA55796.1, ABU48542.1, YP_001042010.1, YP_001234392.1, YP_351510.1, ACZ64730.1, ZP_08634611.1, ACZ17529.1, ACJ22667.1, AAT91719.1, YP_004283531.1, ABO61801.1, ACZ17519.1, ABO15266.1, CAB51040.1, ACZ64707.1, ACJ22766.1, ABO26121.1, ZP_01878984.1, CAB51039.1, ABA55795.1, ABO15269.1, ABO15247.1, ACJ22763.1, ABO15251.1, ACZ17527.1, ABO15270.1, ACJ22769.1, ADE06670.1, ZP_05780387.1, ABO61770.1, ACT91258.1, ABO15258.1, ABO15257.1, ABU48545.1, CAC86946.1, ABO15267.1, ZP_01741446.1, ABU48544.1, YP_002296646.1, AEH76917.1, ADC29550.1, YP_002527219.1, ABK88246.1, ADN21388.1, ACT91210.1, ZP_05064795.1, ABJ16487.1, XP_002675644.1, ABJ16489.1, ADA71089.1, ADA71088.1, AAT46053.1, ZP_01744806.1, ZP_01037964.1, ZP_00955262.1, ABJ16493.1, YP_001840157.1, ZP_00964204.1, ABB40596.1, ACB15249.1, ADD82963.1, YP_004499590.1, ZP_01011524.1, ACJ22758.1, ZP_01748906.1, ACV30052.1, ZP_06191942.1, YP_001188029.1, ACD63080.1, YP_166583.1, AAV41375.1, ZP_00998265.1, ACJ22757.1, ABB13506.2, ABI13999.1, ABI14004.1, ABB13509.1, YP_371980.1, ZP_01755711.1, ZP_05065835.1, ZP_00959368.1, XP_001020063.1, ABJ16481.1, ABI14006.1, ZP_05101918.1, ZP_01913733.1, ABI14001.1, ABM92270.1, ABI14003.1, CAH03132.1, YP_973211.1, ABA55797.1, YP_003578527.1, ABJ16483.1, ABJ16482.1, CBY78068.1, ACT91260.1, YP_509155.1, ABB13508.1, ABJ16485.1, ABO61779.1, ABI14005.1, ACM63042.1, ADC29543.1, ZP_02153440.1, YP_709335.1, ABI13998.1, ABI14002.1, AAB70825.1, ACX30751.1, ABI14000.1, YP_003617173.1, ZP_01155421.1, ACX30752.1, NP_542887.1, ADC29546.1, AAC38359.1, ADC29541.1, XP_001020064.1, ZP_01442436.1, ZP_05103090.1, ADC29544.1, ABO61809.1, AAY89939.1, ACH99235.1, CAH55830.1, ABO26095.1, YP_004011670.1, ABO26084.1, ADA71083.1, ABO26087.1,

ABO61806.1, ADC29531.1, ABO26109.1, ACJ22753.1, ABO26089.1, ABO26093.1, ABO26092.1, ABO61827.1, ABO26105.1, ABO26112.1, AAT91721.1, ABO26120.1, ABO26090.1, ABO26088.1, ABO61811.1, ABO61783.1, CAH55827.1, ACH99232.1, ABO61828.1, ADC29530.1, ACH99234.1, AAQ88276.1, CAH55823.1, ABO26103.1, ACH99233.1, ABO61836.1, ABO26094.1, ABO61840.1, YP_004534277.1, ZP_05845010.1, ABO61821.1, ACH99231.1, AAV68403.1, ABO61839.1, CAH56098.1, ABO26085.1, ABO61826.1, ABO61822.1, ABO26110.1, ABO61810.1, ABO61844.1, ABO61825.1, ABO26099.1, ACJ22767.1, ABO26102.1, YP_004535707.1, ACJ22762.1, ABO26097.1, BAC65444.1, ABO61829.1, YP_114083.1, CAH55828.1, ABO26106.1, YP_552229.1, NP_049190.1, ABO26116.1, CAH56107.1, CAM32407.1, ABO26101.1, ABO61841.1, ABM79805.1, ZP_05075249.1, AAC27438.2, YP_003754872.1, ADC29532.1, ADA71139.1, ADA71107.1, ADA71095.1, YP_001268217.1, ADA71126.1, ADA71094.1, CAH56108.1, ADC29533.1, ADA71085.1, ZP_05054453.1, ADA71097.1, ADA71086.1, ADA71114.1, ADC29548.1, ADA71101.1, ADC29547.1, ADA71138.1, ADC29542.1, ADA71098.1, ADA71128.1, ADA71105.1, ADA71093.1, ADA71135.1, ADA71100.1, YP_557479.1, ADA71113.1, ADA71091.1, ADC29537.1, ADA71084.1, ADA71090.1, CAH56094.1, XP_002945767.1, ADA71137.1, ADA71103.1, ADA71118.1, ADA71133.1, ADA71102.1, ADC29536.1, CAH56100.1, CAH56101.1, ACI15225.1, ACI15225.1, ABO26091.1, CAH55826.1, CAH55824.1, ZP_08484419.1, ADA71111.1, ACJ22759.1, CAH55825.1, CAH56106.1, CAH56099.1, CAC40957.1, ZP_05075037.1, CAH56102.1, ZP_06846296.1, ABJ16491.1, ZP_05067177.1, XP_001698107.1, BAH10789.1, BAH10791.1, BAH10793.1, BAH10788.1, ABJ16490.1, BAH10800.1, BAH10790.1, BAH10792.1, ZP_05075214.1, BAH10799.1, BAH10795.1, BAH10787.1, BAH10798.1, BAH10794.1, BAH10801.1, BAH10796.1, BAH10797.1, BAH10802.1, CAH56095.1, CAH56096.1, ADC29538.1, ABX76425.1, ZP_06727686.1, ZP_07774883.1, YP_001615042.1,
in particular YP_001185946.1, Q9WWW6.1, YP_957898.1, YP_957728.1, YP_694427.1, BAC98365.1, ZP_00957064.1, CAC86944.1, YP_001672212.1, CAB59525.1, ACH99213.1, ACH99215.1, ACH99216.1, AAK56792.1, ACH99229.1, ACS91348.1, AAP41820.1
and particularly preferably YP_001185946.1,

and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid

residues are modified compared to the aforementioned reference sequences by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_{1b} in general is understood to mean in particular the conversion of lauric acid and/or methyl laurate to ω-hydroxylauric acid and/or methyl ω-hydroxylaurate.

Auxiliary enzymes to E_1

It is preferable according to the invention that, if E_{1a} is a eukaryotic P450 alkane hydroxylase, the microorganism according to the invention also has increased activity of a NADPH cytochrome P450 oxidoreductase of EC 1.6.2.4 in comparison to its wild type. This has the technical effect that the activity of the eukaryotic P450 alkane hydroxylases is increased and the product yields increased.
NADPH cytochrome P450 oxidoreductases of EC 1.6.2.4 catalyse the following reaction:
oxidized cytochrome P450 + $NADPH^+$ = reduced cytochrome P450 + $NADP^+$ + H^+

It is preferable according to the invention that, if E_{1a} is a prokaryotic P450 alkane hydroxylase of the CYP153 type, the microorganism according to the invention also has increased activity of a ferredoxin $NAD(P)^+$ reductase of EC 1.18.1.2 or EC 1.18.1.3 and/or of a ferredoxin, in comparison to its wild type. This has the technical effect that the activity of the prokaryotic P450 alkane hydroxylase of the CYP153 type is increased and the product yields increased.
Ferredoxin $NAD(P)^+$ reductases of EC 1.18.1.2 or EC 1.18.1.3 catalyse the following reaction:
oxidized ferredoxin + NAD(P)H + H^+ = reduced ferredoxin + $NAD(P)^+$ and are preferably encoded by a gene which is situated in direct proximity to a gene of an aforementioned

prokaryotic P450 alkane hydroxylase of the CYP153 type or of a ferredoxin described in connection with this invention.

The term "in direct proximity" means that a maximum of three other structural genes are located between the genes in question.

Ferredoxins catalyse the following reactions:

alkane hydroxylase + reduced ferredoxin + alkanoic acid (ester) = alkane monooxygenase + oxidized ferredoxin + ω-hydroxyalkanoic acid (ester) + H_2O,

alkane hydroxylase + 2 reduced ferredoxins + alkanoic acid (ester) = alkane hydroxylase + 2 oxidized ferredoxins + ω-oxoalkanoic acid (ester) + 2 H_2O or

alkane hydroxylase + 3 reduced ferredoxins + alkanoic acid (ester) = alkane hydroxylase + 3 oxidized ferredoxins + ω-carboxyalkanoic acid (ester) + 3 H_2O and

are preferably encoded by a gene which is situated in direct proximity to a gene of an aforementioned prokaryotic P450 alkane hydroxylase of the CYP153 type or an aforementioned ferredoxin $NAD(P)^+$ reductase of EC 1.18.1.2 or EC 1.18.1.3. The term "in direct proximity" means that a maximum of three other structural genes are located between the genes in question.

Preferred microorganisms display increased activity of the ferredoxin $NAD(P)^+$ reductase AlkT and of a ferredoxin in comparison to its wild type.

It is preferable according to the invention that, if E_1 is an AlkB alkane hydroxylase of EC 1.14.15.3, the microorganism according to the invention also displays increased activity of an AlkT rubredoxin $NAD(P)^+$ reductase of EC 1.18.1.1 or of EC 1.18.1.4 and/or of a rubredoxin AlkG in comparison to its wild type. This has the technical effect that the activity of the AlkB alkane hydroxylase is raised and the product yields increased.

AlkT rubredoxin $NAD(P)^+$ reductases of EC 1.18.1.1 or EC 1.18.1.4 catalyse the following reaction:

oxidized rubredoxin + NAD(P)H + H^+ = reduced rubredoxin + $NAD(P)^+$ and are preferably encoded by a gene which is situated in direct proximity to a gene of an aforementioned AlkB alkane hydroxylase of EC 1.14.15.3 or of a rubredoxin AlkG described in connection with this invention.

The term "in direct proximity" means that a maximum of three other structural genes are located between the genes in question.

Rubredoxins AlkG catalyse the following reactions:
alkane monooxygenase + reduced rubredoxin + alkanoic acid (ester) = alkane monooxygenase + oxidized rubredoxin + ω-hydroxyalkanoic acid (ester) + H_2O, alkane monooxygenase + 2 reduced rubredoxins + alkanoic acid (ester) = alkane monooxygenase + 2 oxidized rubredoxins + ω-oxoalkanoic acid (ester) + 2 H_2O or
alkane monooxygenase + 3 reduced rubredoxins + alkanoic acid (ester) = alkane monooxygenase + 3 oxidized rubredoxins + ω-carboxyalkanoic acid (ester) + 3 H_2O and
are preferably encoded by a gene which is situated in direct proximity to a gene of an aforementioned AlkB alkane hydroxylase of EC 1.14.15.3 or an aforementioned AlkT rubredoxin NAD(P)$^+$ reductase of EC 1.18.1.1 or EC 1.18.1.4. The term "in direct proximity" means that a maximum of three other structural genes are located between the genes in question.
Preferred microorganisms display increased activity of the AlkT rubredoxin NAD(P)$^+$ reductase and of the rubredoxin AlkG in comparison to its wild type.

Enzyme E_2 ω-Amination

It is preferable according to the invention to provide a microorganism which in particular is capable of producing ω-functionalized carboxylic acids and ω-functionalized carboxylate esters from at least one simple carbon source, where the ω-functionalization corresponds to an amino group, in particular primary, in the ω position. Thereby, the microorganisms can advantageously be used in processes for the production of ω-aminocarboxylic acids or ω-aminocarboxylate esters.
Hence microorganisms preferred according to the invention are characterized in that the second genetic modification additonally comprises that the microorganism displays increased activity of an enzyme E_2, which catalyses the conversion of ω-oxocarboxylic acids or ω-oxocarboxylate esters to the corresponding ω-aminocarboxylic acids or ω-aminocarboxylate esters, in comparison to its wild type.
According to the invention, the enzyme E_2 is preferably an ω-transaminase of EC 2.6.1.-.
As a measure of the enzyme activity E_2, the conversion of ω-oxolauric acid and/or methyl ω-oxolaurate to ω-aminolauric acid and/or methyl ω-aminolaurate can in particular be utilized.
Preferred enzymes E_2 are selected from the group:

3HMU_A, AAD41041.1, AAK15486.1, ABE03917.1, ADR60699.1, ADR61066.1, ADR62525.1, AEL07495.1, CAZ86955.1, EFW82310.1, EFW87681.1, EGC99983.1, EGD03176.1, EGE58369.1, EGH06681.1, EGH08331.1, EGH24301.1, EGH32343.1, EGH46412.1, EGH55033.1, EGH62152.1, EGH67339.1, EGH70821.1, EGH71404.1, EGH78772.1, EGH85312.1, EGH97105.1, EGP57596.1, NP_102850.1, NP_106560.1, NP_248912.1, NP_248990.1, NP_354026.2, NP_421926.1, NP_637699.1, NP_642792.1, NP_744329.1, NP_744732.1, NP_747283.1, NP_795039.1, NP_901695.1 (encoded by SEQ ID No.12), XP_002943905.1, YP_001021095.1, YP_001059677.1, YP_001061726.1, YP_001066961.1, YP_001074671.1, YP_001120907.1, YP_001140117.1, YP_001170616.1, YP_001185848.1, YP_001188121.1, YP_001233688.1, YP_001268866.1, YP_001270391.1, YP_001345703.1, YP_001412573.1, YP_001417624.1, YP_001526058.1, YP_001579295.1, YP_001581170.1, YP_001668026.1, YP_001669478.1, YP_001671460.1, YP_001685569.1, YP_001747156.1, YP_001749732.1, YP_001765463.1, YP_001766294.1, YP_001790770.1, YP_001808775.1, YP_001809596.1, YP_001859758.1, YP_001888405.1, YP_001903233.1, YP_001977571.1, YP_002229759.1, YP_002231363.1, YP_002280472.1, YP_002297678.1, YP_002543874.1, YP_002549011.1, YP_002796201.1, YP_002801960.1, YP_002875335.1, YP_002897523.1, YP_002912290.1, YP_002974935.1, YP_003060891.1, YP_003264235.1, YP_003552364.1, YP_003578319.1, YP_003591946.1, YP_003607814.1, YP_003641922.1, YP_003674025.1, YP_003692877.1, YP_003755112.1, YP_003896973.1, YP_003907026.1, YP_003912421.1, YP_004086766.1, YP_004142571.1, YP_004147141.1, YP_004228105.1, YP_004278247.1, YP_004305252.1, YP_004356916.1, YP_004361407.1, YP_004378186.1, YP_004379856.1, YP_004390782.1, YP_004472442.1, YP_004590892.1, YP_004612414.1, YP_004676537.1, YP_004693233.1, YP_004701580.1, YP_004701637.1, YP_004704442.1, YP_108931.1, YP_110490.1, YP_168667.1, YP_237931.1, YP_260624.1, YP_262985.1, YP_271307.1, YP_276987.1, YP_334171.1, YP_337172.1, YP_350660.1, YP_351134.1, YP_364386.1, YP_366340.1, YP_369710.1, YP_370582.1, YP_426342.1, YP_440141.1, YP_442361.1, YP_468848.1, YP_521636.1, YP_554363.1, YP_608454.1, YP_610700.1, YP_614980.1, YP_622254.1, YP_625753.1, YP_680590.1, YP_751687.1, YP_767071.1, YP_774090.1, YP_774932.1, YP_788372.1, YP_858562.1, YP_928515.1, YP_983084.1, YP_995622.1, ZP_00948889.1, ZP_00954344.1, ZP_00959736.1, ZP_00998881.1, ZP_01011725.1, ZP_01037109.1, ZP_01058030.1, ZP_01076707.1, ZP_01103959.1, ZP_01167926.1, ZP_01224713.1, ZP_01442907.1, ZP_01446892.1, ZP_01550953.1, ZP_01625518.1,

ZP_01745731.1, ZP_01750280.1, ZP_01754305.1, ZP_01763880.1, ZP_01769626.1, ZP_01865961.1, ZP_01881393.1, ZP_01901558.1, ZP_02145337.1, ZP_02151268.1, ZP_02152332.1, ZP_02167267.1, ZP_02190082.1, ZP_02242934.1, ZP_02360937.1, ZP_02367056.1, ZP_02385477.1, ZP_02456487.1, ZP_02883670.1, ZP_03263915.1, ZP_03263990.1, ZP_03400081.1, ZP_03452573.1, ZP_03456092.1, ZP_03517291.1, ZP_03529055.1, ZP_03571515.1, ZP_03572809.1, ZP_03587785.1, ZP_03588560.1, ZP_03697266.1, ZP_03697962.1, ZP_04521092.1, ZP_04590693.1, ZP_04890914.1, ZP_04891982.1, ZP_04893793.1, ZP_04902131.1, ZP_04905327.1, ZP_04941068.1, ZP_04944536.1, ZP_04945255.1, ZP_04959332.1, ZP_04964181.1, ZP_05053721.1, ZP_05063588.1, ZP_05073059.1, ZP_05077806.1, ZP_05082750.1, ZP_05091128.1, ZP_05095488.1, ZP_05101701.1, ZP_05116783.1, ZP_05121836.1, ZP_05127756.1, ZP_05637806.1, ZP_05742087.1, ZP_05783548.1, ZP_05786246.1, ZP_05843149.1, ZP_05945960.1, ZP_06459045.1, ZP_06487195.1, ZP_06492453.1, ZP_06493162.1, ZP_06703644.1, ZP_06731146.1, ZP_06839371.1, ZP_07007312.1, ZP_07266194.1, ZP_07374050.1, ZP_07662787.1, ZP_07778196.1, ZP_07797983.1, ZP_08099459.1, ZP_08138203.1, ZP_08141719.1, ZP_08142973.1, ZP_08177102.1, ZP_08185821.1, ZP_08186468.1, ZP_08208888.1, ZP_08266590.1, ZP_08402041.1, ZP_08406891.1, ZP_08522175.1, ZP_08527488.1, ZP_08631252.1, ZP_08636687.1, SEQ ID No.08, SEQ ID No.09

in particular NP_901695.1 (encoded by SEQ ID No.12), ZP_03697266.1, AAD41041.1, YP_002796201.1, ZP_03697962.1, YP_001859758.1, YP_002229759.1, YP_001120907.1, YP_110490.1, ZP_04964181.1, YP_774932.1, YP_001766294.1, YP_001581170.1, YP_622254.1, ZP_03588560.1, YP_001809596.1, YP_370582.1, ZP_03572809.1, NP_248990.1, YP_001888405.1, ZP_04905327.1, YP_001061726.1, YP_001668026.1, ZP_01750280.1, ZP_07778196.1, EGH71404.1, NP_744329.1, YP_004147141.1, ADR61066.1, ZP_05783548.1, YP_004701637.1, YP_366340.1, YP_003264235.1, EGD03176.1, YP_001268866.1, ZP_01901558.1, ZP_05121836.1, YP_003692877.1, ZP_03517291.1, YP_002974935.1, YP_001668026.1, ADR61066.1, NP_744329.1, YP_001268866.1, YP_004701637.1, ZP_08142973.1, ADR62525.1, YP_610700.1, NP_747283.1, ADR62525.1, YP_001270391.1, YP_004704442.1, YP_610700.1, YP_001747156.1, ZP_08138203.1, ZP_07266194.1, EGH70821.1, YP_351134.1, EGH32343.1, EGH08331.1, EGH67339.1, YP_001668026.1, YP_004701637.1, YP_237931.1,

ZP_03400081.1, ZP_05116783.1, ZP_01550953.1, ZP_07662787.1, YP_928515.1, YP_788372.1, YP_001021095.1, ZP_07797983.1, YP_003578319.1, YP_004305252.1, NP_248912.1, ZP_08636687.1, YP_003912421.1, YP_751687.1, ZP_08142973.1, YP_271307.1, ZP_05082750.1, YP_001417624.1, YP_353455.1, SEQ ID No.08, SEQ ID No.09 and particularly preferably NP_901695.1 (encoded by SEQ ID No.12), YP_353455.1, SEQ ID No.08 and SEQ ID No.09

and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_2 in general is understood to mean in particular the conversion of ω-oxolauric acid and/or methyl ω-oxolaurate to ω-aminolauric acid and/or methyl ω-aminolaurate.

A microorganism according to the invention with increased activity of an enzyme E_2 in comparison to its wild type advantageously displays in comparison to its wild type decreased activity of an aldehyde dehydrogenase of EC 1.2.1.3, EC 1.2.1.4 or EC 1.2.1.5, which catalyses the following reaction:

ω-oxoalkanoic acid (ester) + $NAD(P)^+$ = ω-carboxyalkanoic acid (ester) + NAD(P)H + H^+

Such aldehyde dehydrogenases are in particular those which are listed below as specific E_5, and those which are listed below as preferred E_4 fatty alcohol oxidases of EC 1.1.3.20, AlkJ alcohol dehydrogenases of EC 1.1.99.- and alcohol dehydrogenases of EC 1.1.1.1 or EC 1.1.1.2 and catalyse at least the second of the two reactions mentioned there; such enzymes are also described below as enzymes E_{4*}.

This has the technical effect that depletion of the ω-oxocarboxylic acid or the ω-oxocarboxylate ester to be aminated is prevented and hence more substrate is available for the ω-amino-carboxylic acid or ω-aminocarboxylate ester product formation.

The wording "in comparison to its wild type, decreased activity" is preferably understood to mean activity decreased by at least 50%, particularly preferably by at least 90%, more preferably by at least 99.9%, still more preferably by at least 99.99% and most preferably by at least 99.999% based on the wild type activity. The wording "decreased activity" also includes no detectable activity ("activity of nil"). The reduction of the activity of a specific enzyme can for example be effected by targetted mutation or by other measures known to those skilled in the art for reducing the activity of a specific enzyme. Further processes for reducing enzymatic activities in microorganisms are known to those skilled in the art. Molecular biological techniques in particular are suitable here. Those skilled in the art will find instructions for the modification and reduction of protein expression and enzymatic activity reduction associated therewith for *Candida,* in particular for interruption of specific genes in WO91/006660 and WO03/100013.

Microorganisms preferred according to the invention are characterized in that the reduction of the enzymatic activity is achieved by modification of a gene comprising a nucleic acid sequence coding for the aforementioned enzymes, wherein the modification is selected from the group comprising, preferably consisting of, insertion of foreign DNA into the gene, deletion at least of parts of the gene, point mutations in the gene sequence, RNA interference (siRNA), *antisense* RNA or modification (insertion, deletion or point mutations) of regulatory sequences which flank the gene. In this connection, foreign DNA should be understood to mean any DNA sequence which is "foreign" to the gene (and not to the organism). In this connection, it is particularly preferable that the gene is interrupted by insertion of a selection marker gene, so that the foreign DNA is a selection marker gene, wherein the insertion was preferably effected by homologous recombination into the gene locus. In this connection, it can be advantageous if the selection marker gene is extended with further functionalities which in turn enable subsequent removal from the gene. This can for example be achieved by recombination systems foreign to the organism, such as for example a Cre/loxP system or FRT (*Flippase Recognition Target*) system or the recombination system intrinsic to the organism.

The reduction of the activity of the microorganism according to the invention in comparison to its wild type is determined according to methods described above for the determination of the activity with use of as far as possible equal cell counts/concentrations, wherein the cells have been grown under the same conditions such as for example medium, gassing and stirring.

Enzyme E_3 Cofactor Recycling ω-Amination

For the production of an ω-amino-functionalized carboxylic acid or an ω-amino-functionalized carboxylate ester it can be advantageous if the second genetic modification comprises increased activity of an enzyme E_3 which catalyses the conversion of an α-ketocarboxylic acid to an amino acid. Preferably the enzyme E_3 is an amino acid dehydrogenase, such as for example serine dehydrogenases, aspartate dehydrogenases, phenylalanine dehydrogenases and glutamate dehydrogenases, particularly preferably an alanine dehydrogenase of EC 1.4.1.1. Such preferable alanine dehydrogenases are selected from EGR93259.1, YP_004743277.1, YP_004741620.1, YP_004737294.1, YP_002509853.1, YP_002492255.1, YP_002489845.1, YP_002481919.1, YP_001819330.1, YP_004728333.1, ZP_08670930.1, YP_004672392.1, YP_004467026.1, YP_004326214.1, YP_002349951.1, YP_001674437.1, YP_003921585.1, YP_001699731.1, YP_004720756.1, YP_004719515.1, EGQ22316.1, EGQ21760.1, YP_004689232.1, YP_004698526.1, YP_004694875.1, EGP67576.1, YP_001832691.1, YP_001760857.1, AEJ53875.1, AEJ42949.1, YP_004392931.1, YP_004404798.1, YP_004374160.1, YP_004303162.1, YP_004196134.1, YP_004178581.1, YP_004163857.1, YP_004161555.1, YP_004099081.1, YP_004101986.1, YP_004042336.1, YP_003994181.1, YP_003966543.1, YP_003913256.1, YP_003825828.1, YP_003806106.1, YP_003686355.1, YP_003678575.1, YP_003654745.1, YP_003651439.1, YP_003637111.1, YP_003631815.1, YP_003300711.1, YP_002886396.1, ZP_03493991.1, YP_001890813.1, YP_001888849.1, YP_001554753.1, YP_001529018.1, YP_001528954.1, YP_001502090.1, YP_001412833.1, YP_001363812.1, YP_923679.1, NP_440110.1, ZP_08640273.1, ZP_08639751.1, ZP_08637916.1, YP_004171395.1, YP_001366419.1, YP_001327051.1, YP_001262560.1, YP_886996.1, YP_882850.1, YP_704410.1, YP_703508.1, ZP_08624689.1, YP_001230376.1, P17557.1, P17556.1, CCB94892.1, CCB73698.1, YP_001168635.1, YP_004668736.1, YP_911378.1, YP_003686997.1,

YP_002263235.1, NP_820115.1, YP_004653761.1, YP_004651159.1, YP_003869397.1, YP_004641708.1, YP_004641134.1, YP_001996597.1, YP_001998297.1, YP_001943676.1, YP_001810799.1, YP_004630087.1, YP_004621893.1, YP_004613083.1, ZP_08621144.1, YP_003954200.1, YP_001372688.1, YP_001233686.1, ZP_08594848.1, ZP_08586665.1, ZP_08578896.1, ZP_08575937.1, YP_004604438.1, YP_004600931.1, ZP_08569139.1, ZP_08566255.1, AEB25326.1, YP_374584.1, YP_004216732.1, ZP_06806151.1, ZP_06440291.1, ZP_06369993.1, ZP_06254238.1, ZP_05844252.1, ZP_05472927.1, ZP_05365401.1, ZP_04747945.1, ZP_04678933.1, ZP_03779761.1, ZP_03728859.1, ZP_03711891.1, ZP_03697269.1, ZP_01628294.1, ZP_01546224.1, ZP_01444021.1, ZP_01308570.1, ZP_01228194.1, ZP_01164841.1, ZP_01114638.1, YP_004566582.1, YP_004572166.1, YP_004571401.1, YP_004569425.1, YP_003513168.1, YP_004561169.1, ZP_08554945.1, YP_400777.1, ZP_08533479.1, ZP_08533412.1, ZP_08525779.1, ZP_08523693.1, YP_004471329.1, YP_004368103.1, YP_001536790.1, YP_001158763.1, YP_662032.1, YP_967824.1, YP_004542206.1, YP_002958019.1, YP_645630.1, ZP_08520595.1, AEG81976.1, YP_002560779.1, YP_496956.1, YP_411850.1, YP_300065.1, NP_840123.1, ZP_08514775.1, YP_002250769.1, YP_002155665.1, YP_002137991.1, YP_001135275.1, YP_001070365.1, YP_639268.1, NP_864377.1, YP_004554709.1, YP_004546384.1, YP_004544159.1, ZP_01448725.1, ZP_01255407.1, EGL88594.1, EGL87587.1, YP_004536059.1, ZP_08512666.1, ZP_08501410.1, ZP_08493566.1, ZP_08486369.1, YP_004497891.1, YP_004494473.1, YP_003945301.1, YP_003835539.1, YP_003634898.1, YP_003503876.1, ZP_06503131.1, YP_003376450.1, YP_003409976.1, YP_003409004.1, YP_003395275.1, YP_003393138.1, YP_003387714.1, YP_003382934.1, ZP_05760008.1, ZP_05300490.1, ZP_04387987.1, ZP_03725713.1, YP_002134125.1, YP_001618802.1, ZP_01899015.1, ZP_01881250.1, ZP_01731833.1, YP_004529602.1, YP_004512974.1, YP_004479110.1, YP_004434722.1, YP_004430602.1, CBX28458.1, ZP_05217624.1, ZP_01074124.1, ZP_01062209.1, ZP_01011939.1, ZP_00956754.1, YP_388045.1, ZP_07910902.1, ZP_07835291.1, ZP_07831081.1, ZP_07704117.1, ZP_07112933.1, ZP_06860168.1, ZP_05915689.1, YP_002352943.1, YP_826544.1, YP_004087624.1, ADP99134.1, YP_003590847.1, YP_003589189.1, YP_001192379.1, ZP_08473868.1, ZP_08469833.1, ZP_08462614.1, ZP_07709417.1, ZP_07672507.1, ZP_07608107.1, ZP_07404685.1, ZP_07334010.1, ZP_07333254.1, ZP_06888732.1, ZP_06837313.1, YP_873046.1, YP_004060177.1, YP_004007860.1, YP_003492711.1,

ZP_08456143.1, YP_003675989.1, YP_003159562.1, NP_302068.1, YP_004461013.1, ZP_08426378.1, ZP_08422563.1, YP_004122643.1, YP_004077807.1, YP_004058618.1, YP_004055696.1, YP_003898888.1, YP_003575339.1, ZP_06186049.1, YP_003314861.1, YP_003148148.1, YP_002786543.1, YP_001661762.1, YP_001666058.1, YP_001549204.1, YP_001518627.1, YP_004453289.1, YP_004450492.1, YP_004301609.1, YP_465316.1, ZP_08411512.1, YP_001394062.1, YP_001035553.1, YP_417038.1, YP_301147.1, YP_014199.1, EGJ45059.1, EGJ36821.1, EGJ36552.1, EGJ19019.1, ZP_08388916.1, YP_004427278.1, YP_003909234.1, YP_002536659.1, YP_001940410.1, YP_001329977.1, YP_001323343.1, YP_001114195.1, YP_001096594.1, YP_949547.1, YP_756289.1, YP_722774.1, YP_525283.1, YP_461225.1, YP_320697.1, YP_289022.1, YP_075651.1, NP_988633.1, YP_004399762.1, YP_004335185.1, ADX76365.1, YP_004203407.1, YP_001917832.1, YP_001642542.1, ZP_08332142.1, YP_041174.1, ZP_08328264.1, YP_004225082.1, EGG96712.1, ZP_08311476.1, ZP_08310170.1, ZP_08267322.1, ZP_08263846.1, ZP_07898723.1, YP_003273311.1, ZP_05909597.1, YP_003073095.1, YP_003022905.1, YP_003013384.1, YP_003011072.1, ZP_04777180.1, ZP_04432601.1, YP_001016505.1, YP_953175.1, YP_731492.1, ZP_08302086.1, ZP_08296718.1, ZP_08285373.1, ZP_08280138.1, ZP_08270040.1, ZP_08261780.1, ZP_08258406.1, ZP_08246570.1, YP_003113209.1, YP_002436565.1, ZP_04409790.1, YP_428767.1, EGG40837.1, CCA54694.1, YP_004147180.1, YP_550034.1, YP_173042.1, EGF75662.1, YP_004205024.1, YP_003670363.1, YP_003476027.1, YP_003241464.1, YP_863990.1, YP_004149630.1, YP_003646700.1, EGF24326.1, BAK15593.1, YP_003991014.1, YP_003988127.1, YP_003722297.1, YP_003254539.1, YP_003251916.1, NP_901692.1, EGF16043.1, EGF07290.1, YP_003048854.1, YP_149301.1, YP_148605.1, YP_004340432.1, EFT09946.1, EFS80513.1, EFS51332.1, EFS42459.1, YP_003060895.1, YP_003059033.1, ZP_03305373.1, YP_002379520.1, YP_372555.1, NP_085655.1, YP_004321492.1, ZP_08239446.1, YP_003817108.1, YP_002951286.1, YP_002950656.1, YP_002522266.1, YP_001982538.1, YP_001127463.1, YP_001126767.1, NP_764939.1, NP_761756.1, NP_244046.1, NP_243195.1, YP_003194671.1, YP_003161559.1, YP_002797803.1, YP_002634404.1, YP_439119.1, YP_314402.1, YP_143482.1, NP_295618.1, ZP_08215173.1, YP_004282846.1, YP_004267961.1, YP_001867313.1, YP_001301882.1, YP_847214.1, YP_004095847.1, YP_003338282.1, YP_003337256.1, YP_355846.1, YP_253131.1, ZP_08197563.1, ZP_08196283.1, ADW06447.1, YP_003370508.1, YP_003317645.1,

YP_003184411.1, YP_003198349.1, YP_003084639.1, YP_004294565.1, YP_004243057.1, CBZ55377.1, EGC26795.1, EGC25718.1, EGC23378.1, ZP_07887872.1, YP_003269716.1, YP_003203632.1, YP_003199972.1, YP_003153148.1, YP_003146304.1, YP_002893498.1, ZP_03230841.1, ZP_03229411.1, YP_001050520.1, YP_963387.1, YP_927645.1, YP_869684.1, YP_734091.1, NP_372233.1, NP_102173.1, ZP_08170259.1, EGD36706.1, EGD32748.1, ZP_08155540.1, YP_004142849.1, YP_002417649.1, YP_001301040.1, YP_001211208.1, YP_266230.1, ZP_08145165.1, YP_001801454.1, YP_001736003.1, YP_833487.1, YP_831236.1, YP_384064.1, YP_094958.1, YP_009793.1, NP_975075.1, NP_847074.1, EGC82166.1, YP_004261609.1, YP_004255502.1, YP_678603.1, YP_004181700.1, ZP_08122013.1, ADT87541.1, YP_003524764.1, YP_002992990.1, YP_002992892.1, YP_081348.1, YP_080482.1, YP_002476349.1, ZP_08115025.1, ZP_08114403.1, YP_003552869.1, YP_002358112.1, ZP_08111138.1, YP_003770046.1, YP_003103898.1, ZP_08101069.1, ZP_08097706.1, ZP_08094005.1, YP_003167240.1, YP_002371817.1, YP_004231854.1, EGA98455.1, YP_002430239.1, ZP_01049900.1, NP_769819.1, NP_768378.1, YP_001143837.1, YP_001108475.1, YP_906040.1, YP_726477.1, YP_575010.1, YP_477594.1, YP_474564.1, YP_130399.1, YP_129373.1, YP_123314.1, NP_810467.1, NP_646469.1, NP_626044.1, NP_391071.1 (encoded by SEQ ID No.11), ZP_08086822.1, ZP_08084776.1, ZP_08083119.1, NP_465104.1, NP_374819.1, NP_337355.1, NP_217296.1, ZP_08072064.1, YP_004197762.1, ZP_08065558.1, ZP_08063535.1, ZP_08061612.1, ZP_08059482.1, ZP_08057644.1, ZP_08055701.1, ZP_08049025.1, ZP_08047015.1, ZP_04062925.1, YP_269473.1, ZP_08033402.1, ZP_07829339.1, ZP_06603053.1, ZP_08020768.1, ZP_08013590.1, ZP_08011832.1, YP_003783744.1, YP_002781576.1, YP_002780533.1, ZP_02195873.1, NP_797482.1, ZP_08006697.1, ZP_08006365.1, ZP_08005962.1, ZP_08004522.1, EFV89241.1, ZP_07980135.1, ZP_07974222.1, ZP_07970379.1, ZP_07962751.1, ZP_07953732.1, ZP_07945354.1, ZP_06273519.1, YP_003428808.1, YP_003426902.1, YP_001711555.1, YP_001703831.1, YP_001621081.1, YP_001223643.1, YP_001228127.1, YP_849789.1, YP_759696.1, NP_969291.1, NP_896596.1, NP_470950.1, YP_359521.1, ZP_01946735.1, ZP_03631968.1, ZP_01101833.1, YP_002826017.1, YP_003796926.1, ZP_07873974.1, ZP_07870908.1, ZP_07645051.1, ZP_07643260.1, ZP_06611917.1, AAT40119.1, ZP_07864946.1, YP_004068409.1, YP_002796203.1, YP_002774420.1, YP_003600348.1, YP_003599946.1, YP_003565624.1, YP_003565223.1, YP_335198.1, YP_423850.1,

YP_155059.1, ZP_07843538.1, ZP_07841226.1, ZP_03566837.1, EFS39373.1, EFS35044.1, ZP_05287373.1, ZP_05280407.1, ZP_05224249.1, ZP_04701236.1, ZP_04692180.1, ZP_03561728.1, ZP_03227314.1, ZP_02931419.1, ZP_02731551.1, ZP_02465413.1, ZP_02451335.1, ZP_02384332.1, ZP_02381808.1, ZP_02330643.1, YP_004047600.1, EFR99988.1, EFR93766.1, EFR90643.1, EFR84459.1, ZP_04059923.1, ZP_03613601.1, ZP_07743242.1, ZP_07740118.1, ZP_07728760.1, ZP_07728640.1, YP_003557047.1, ZP_07204792.1, ZP_07033145.1, ZP_06949396.1, ZP_06928932.1, ZP_05692073.1, ZP_05687006.1, ZP_04867480.1, YP_775531.1, CBE70214.1, ZP_07721182.1, CBW22027.1, BAJ31519.1, ZP_07694389.1, ZP_07653390.1, ZP_07548028.1, ZP_07547185.1, ZP_07462497.1, ZP_07458778.1, ZP_07399459.1, ZP_07397253.1, ZP_07397250.1, ZP_07390390.1, ZP_07390003.1, ZP_07388675.1, ZP_07367724.1, ZP_07206561.1, ZP_07053170.1, ZP_07048770.1, ZP_06873224.1, ZP_06852862.1, ZP_06427630.1, ZP_06307332.1, ZP_06252577.1, ZP_06175164.1, ZP_06080808.1, ZP_06052314.1, ZP_06033748.1, ZP_05945907.1, ZP_05924840.1, ZP_05885109.1, ZP_05882095.1, ZP_05877865.1, ZP_05855512.1, ZP_05745159.1, ZP_05716384.1, ZP_04866524.1, ZP_04819572.1, ZP_04797418.1, ZP_04319784.1, ZP_04302850.1, ZP_04298961.1, ZP_04287684.1, ZP_04277177.1, ZP_04248389.1, ZP_04235899.1, ZP_04230016.1, ZP_04226233.1, ZP_04219330.1, ZP_04216141.1, ZP_04209092.1, ZP_04188247.1, ZP_04184510.1, ZP_04176651.1, ZP_04172877.1, ZP_04170954.1, ZP_04166021.1, ZP_04160852.1, ZP_04158983.1, ZP_04154769.1, ZP_04153266.1, ZP_04149717.1, ZP_04122524.1, ZP_04110635.1, ZP_04109769.1, ZP_04109049.1, ZP_04108444.1, ZP_04104350.1, ZP_04100460.1, ZP_04075249.1, ZP_04074263.1, ZP_04009917.1, ZP_03916440.1, ZP_03703407.1, ZP_03675960.1, ZP_03588177.1, ZP_03569636.1, ZP_03497916.1, ZP_03459468.1, ZP_03299979.1, ZP_03127493.1, ZP_03054334.1, ZP_03015779.1, ZP_02478038.1, ZP_02434435.1, ZP_01891777.1, ZP_01134782.1, ZP_01084087.1, ZP_00959435.1, ZP_06021901.1, ZP_02908521.1, ZP_02892318.1, ZP_02883918.1, ZP_02433787.1, ZP_02428013.1, ZP_02424229.1, ZP_02420399.1, ZP_02190089.1, ZP_02184200.1, ZP_02166566.1, ZP_02159718.1, ZP_02152178.1, ZP_02147727.1, ZP_02144676.1, ZP_02078507.1, ZP_02072824.1, ZP_02067293.1, ZP_02061844.1, ZP_01996280.1, ZP_01991915.1, ZP_01958087.1, ZP_01908911.1, ZP_01901606.1, ZP_01895406.1, ZP_01872936.1, ZP_01870578.1, ZP_01863314.1, ZP_01859623.1, ZP_01852574.1, ZP_01834861.1, ZP_01816459.1, ZP_01770050.1,

ZP_01754550.1, ZP_01750331.1, ZP_01746097.1, ZP_01736276.1, ZP_01723571.1, ZP_01688551.1, ZP_01666824.1, ZP_01627178.1, ZP_01623088.1, ZP_01612926.1, ZP_01470938.1, ZP_01460341.1, ZP_01452344.1, ZP_01439206.1, ZP_01386817.1, ZP_01313561.1, ZP_01304248.1, ZP_01264036.1, ZP_01261877.1, ZP_01235013.1, ZP_01233072.1, ZP_01224625.1, ZP_01223017.1, ZP_01221216.1, ZP_01215557.1, ZP_01202668.1, ZP_01159834.1, ZP_01158968.1, ZP_01157579.1, ZP_01130649.1, ZP_01126987.1, ZP_01122900.1, ZP_01118752.1, ZP_01090470.1, ZP_01067027.1, ZP_01058751.1, ZP_01043459.1, ZP_01041526.1, ZP_01036767.1, ZP_01001935.1, ZP_00995212.1, ZP_00992904.1, ZP_00962062.1, ZP_00952239.1, ZP_00741173.1, ZP_00740055.1, ZP_00738801.1, ZP_00517716.1, ZP_00231205.1, ZP_00208007.1, YP_003974610.1, YP_003546595.1, YP_002317127.1, ZP_07313778.1, ZP_07302778.1, ZP_07298850.1, ZP_07285992.1, ZP_07282306.1, ZP_07279420.1, ZP_07270582.1, ZP_07001670.1, YP_003706150.1, ZP_06916083.1, ZP_06912607.1, ZP_06707160.1, ZP_06324727.1, ZP_06199155.1, ZP_06197322.1, ZP_05788488.1, ZP_05785587.1, ZP_05779471.1, ZP_05739072.1, ZP_05649780.1, ZP_05647025.1, ZP_05546023.1, ZP_05341228.1, ZP_05256588.1, ZP_05127284.1, ZP_05121710.1, ZP_05119732.1, ZP_05105668.1, ZP_05101668.1, ZP_05095370.1, ZP_05090860.1, ZP_05080646.1, ZP_05076859.1, ZP_05069222.1, ZP_05065142.1, ZP_05056378.1, ZP_05052029.1, ZP_05046506.1, ZP_05037402.1, ZP_05033610.1, ZP_05026858.1, ZP_05001187.1, ZP_04959306.1, ZP_04947229.1, ZP_04941878.1, ZP_04896669.1, ZP_04890139.1, ZP_04852481.1, ZP_04849996.1, ZP_04608704.1, ZP_04581931.1, ZP_04555275.1, ZP_04553607.1, ZP_04545440.1, ZP_04538537.1, YP_002311919.1, ZP_01052096.1, YP_432286.1, ZP_07039851.1, ZP_07036831.1, ZP_07035634.1, ZP_06826623.1, ZP_06202690.1, ZP_06091438.1, ZP_06060476.1, YP_002955941.1, YP_002764322.1, YP_002761274.1, YP_002754767.1, YP_002605829.1, YP_002544281.1, YP_002453687.1, YP_002444060.1, YP_002369417.1, YP_002365390.1, YP_002297006.1, YP_002233968.1, YP_001861152.1, YP_001850232.1, YP_001827236.1, YP_001815332.1, YP_001661116.1, YP_001647239.1, YP_001643400.1, YP_001625970.1, YP_001584357.1, YP_001488077.1, YP_001473862.1, YP_001450010.1, YP_001444991.1, YP_001424576.1, YP_001422460.1, YP_001376512.1, YP_001373857.1, YP_001217438.1, YP_001155448.1, YP_001117213.1, YP_001094151.1, YP_950353.1, YP_949946.1, YP_944887.1, YP_854776.1, YP_837848.1, YP_795217.1, YP_750481.1, YP_746463.1, YP_681383.1, YP_673989.1, YP_632321.1,

YP_624008.1, YP_615612.1, YP_611857.1, YP_604242.1, YP_562748.1, YP_536656.1, YP_517218.1, YP_459264.1, YP_382475.1, YP_340233.1, YP_295387.1, YP_285355.1, YP_204286.1, YP_174267.1, YP_165491.1, YP_126314.1, YP_111103.1, YP_098760.1, YP_082111.1, YP_064280.1, YP_064276.1, YP_062161.1, YP_056928.1, YP_008485.1, YP_005739.1, NP_961822.1, NP_953341.1, NP_926915.1, NP_875991.1, NP_834329.1, NP_830409.1, NP_827683.1, NP_694147.1, NP_693109.1, NP_682897.1, NP_661601.1, NP_621858.1, NP_486395.1, NP_385730.1, NP_231539.1, ADL65712.1, XP_003087064.1, YP_003886520.1, YP_003699559.1, YP_003516134.1, ADI98200.1, BAI86717.1, YP_003794343.1, YP_003790454.1, ADI11356.1, YP_003845821.1, ADK69870.1, YP_003784546.1, CBW36497.1, CBW26165.1, YP_003709979.1, CAQ50186.1, ZP_06770463.1, CBK69442.1, YP_003413835.1, YP_003595089.1, ZP_06807811.1, YP_003582455.1, YP_003464731.1, YP_003496397.1, YP_003421918.1, CBL07274.1, CBK64956.1, YP_003508515.1, AAL87460.1, AAC23579.1, AAC23578.1, AAC23577.1, ACU78652.1, YP_003471439.1, YP_003452777.1, ZP_06384971.1, ACY25368.1, ABC26869.1, AAP44334.1, EEZ80018.1, ZP_05110458.1, 1PJB_A, ZP_04717201.1, ZP_04689103.1, ZP_04658071.1, XP_002364705.1, ACN89388.1, 2VHW_A, 2VHV_A, XP_001324625.1, ABZ06259.1, ABR57171.1, CAO90307.1, CAM75354.1, CAA44791.1, BAA77513.1, EGR96638.1, EGR94699.1, ZP_08693646.1, YP_004740306.1, YP_004738947.1, AEE73472.1, YP_002478771.1, YP_002018970.1, YP_001953230.1, ZP_08683223.1, YP_004073823.1, EGQ99856.1, ZP_08664912.1, EGQ79321.1, YP_001681700.1, AEJ51356.1, YP_004378292.1, YP_004237802.1, YP_004166920.1, YP_004043011.1, YP_003997728.1, YP_002975437.1, YP_002514072.1, YP_001433829.1, YP_001185975.1, YP_004676549.1, YP_004016358.1, YP_911347.1, YP_004658403.1, YP_002015455.1, YP_001996171.1, YP_001998271.1, YP_001960099.1, YP_001942826.1, YP_001130666.1, YP_004608353.1, YP_508400.1, YP_374553.1, ZP_06298411.1, ZP_06044299.1, ZP_04390473.1, ZP_04055222.1, ZP_03779980.1, ZP_03729400.1, ZP_03390832.1, YP_004580682.1, YP_001988281.1, YP_644219.1, YP_665459.1, NP_895289.1, YP_004275231.1, NP_208189.1, BAJ60529.1, BAJ59008.1, BAJ57509.1, BAJ56032.1, ZP_01254396.1, YP_445036.1, EGL90046.1, YP_004510847.1, ZP_08450330.1, YP_003387804.1, YP_003058152.1, ZP_03438664.1, ZP_01884341.1, AEG33860.1, YP_004429375.1, ZP_08459444.1, ZP_07909193.1, ZP_07908670.1, EFT26139.1, EFT23947.1, EFT12708.1, EFT03750.1, EFS82814.1, EFS74272.1, EFS67128.1,

ZP_06844564.1, YP_826658.1, YP_001195249.1, YP_003095978.1, YP_469292.1, YP_004442054.1, YP_004461174.1, YP_004055616.1, YP_003576656.1, YP_003094537.1, YP_001295973.1, AEE71143.1, YP_004447480.1, YP_001978005.1, ZP_08413507.1, ZP_07820264.1, YP_416780.1, EGI86036.1, YP_003109321.1, YP_001275268.1, YP_380171.1, YP_159073.1, YP_004203456.1, YP_003761844.1, YP_040853.1, ZP_08328557.1, CBL87253.1, CBL87167.1, YP_004316768.1, EFS92548.1, YP_001016505.1, EGG67688.1, YP_003528837.1, YP_002434942.1, YP_117835.1, YP_004150583.1, YP_003755105.1, YP_002526442.1, YP_003120958.1, EGE94241.1, YP_004345416.1, EFS79952.1, ZP_06964253.1, EGE60050.1, CBZ52359.1, ADU40304.1, ADQ77229.1, YP_003196038.1, YP_144713.1, YP_001304143.1, YP_113082.1, ADO76516.1, YP_003326349.1, YP_003289755.1, YP_003089327.1, ZP_07911965.1, ZP_05773583.1, ZP_05765271.1, YP_003154888.1, YP_003142045.1, YP_002280953.1, NP_371963.1, NP_422368.1, EGC98966.1, EGC76398.1, YP_004263661.1, YP_004252039.1, YP_679036.1, YP_499973.1, ZP_08090745.1, ZP_08108339.1, YP_001531594.1, ZP_01051588.1, NP_646145.1, NP_224146.1, ZP_08054972.1, ZP_08053009.1, YP_003584878.1, ZP_07939405.1, ZP_03439290.1, ADU82392.1, ADU83943.1, ADU85424.1, ADU80668.1, YP_001225733.1, YP_003863039.1, ZP_01061682.1, YP_767568.1, ZP_07865749.1, ZP_06858058.1, YP_628213.1, EFT81350.1, EFT66610.1, EFT51424.1, ZP_04839161.1, ZP_05633406.1, ZP_05288381.1, AAR37813.1, EFS03282.1, EFS03278.1, YP_004046539.1, ZP_07749550.1, ZP_07729731.1, ADN80650.1, ZP_07088856.1, ZP_07080219.1, ZP_06949721.1, ZP_05685436.1, YP_002550450.1, YP_803715.1, ZP_07720023.1, ZP_07469700.1, ZP_07365619.1, ZP_06924335.1, ZP_06715776.1, ZP_06303722.1, ZP_06303721.1, ZP_06264319.1, ZP_06155528.1, ZP_05745707.1, ZP_04866244.1, ZP_04199629.1, ZP_04195783.1, ZP_04067276.1, ZP_03968868.1, ZP_03963857.1, ZP_03933079.1, ZP_03497046.1, ZP_03475134.1, ZP_01890152.1, ZP_01086712.1, ZP_06021845.1, ZP_02183427.1, ZP_02162695.1, ZP_02032824.1, ZP_01993906.1, ZP_01993127.1, ZP_01983694.1, ZP_01972527.1, ZP_01819838.1, ZP_01817962.1, ZP_01740947.1, ZP_01734991.1, ZP_01694775.1, ZP_01678972.1, ZP_01468566.1, ZP_01408749.1, ZP_01386800.1, ZP_01202184.1, ZP_01174108.1, ZP_01174047.1, ZP_01118729.1, ZP_01081268.1, ZP_00998573.1, ZP_00739793.1, YP_002302140.1, ZP_07358151.1, ZP_06668925.1, ZP_06668924.1, ZP_06667106.1, ZP_06324464.1, ZP_06196777.1, ZP_05114159.1, ZP_05083968.1, ZP_05070370.1, ZP_05030022.1,

ZP_04673064.1, ZP_04581752.1, ZP_01052079.1, ZP_07661104.1, ZP_06077819.1, YP_002835579.1, YP_002267069.1, YP_002129114.1, YP_001929236.1, YP_001910999.1, YP_001854051.1, YP_001094152.1, YP_001044252.1, YP_861818.1, YP_915522.1, YP_807371.1, YP_353800.1, YP_342402.1, YP_065168.1, YP_015797.1, YP_005051.1, NP_856449.1, NP_661547.1, NP_358448.1, YP_003929442.1, YP_003927769.1, ADO06185.1, ADO04689.1, ADL23243.1, YP_003789202.1, ADJ79786.1, YP_003516488.1, ADI97953.1, ADI35485.1, YP_003716800.1, ZP_00241359.1, YP_003718040.1, CAQ49862.1, YP_003282331.1, AAP97897.1, ACX99978.1, ACX98578.1, YP_003472544.1, ZP_06382734.1, EEZ79852.1, ZP_05299989.1, ZP_05299895.1, XP_002367632.1, ZP_03529835.1, ZP_03517011.1, ZP_03505783.1, XP_001310698.1, ABK27691.1, CAB59281.2,
in particular NP_391071.1 (encoded by SEQ ID No.11), BAI86717.1, YP_004205024.1, ZP_06873224.1, YP_003974610.1, YP_001422460.1, AEB25326.1, YP_003921585.1, YP_080482.1, ZP_03054334.1, YP_001488077.1, YP_081348.1, YP_003426902.1, NP_243195.1, ZP_08004522.1, YP_003565624.1, YP_004095847.1, YP_003600348.1, ZP_08006697.1, ZP_04248389.1, YP_174267.1, YP_001376512.1, ZP_04226233.1, ZP_04100460.1, YP_002369417.1, ZP_03229411.1, ZP_04110635.1, ZP_04287684.1, ZP_04172877.1, ZP_04158983.1, ZP_04219330.1, NP_830409.1, YP_003790454.1, ZP_04184510.1, YP_001642542.1, ZP_04074263.1, ZP_04319784.1, NP_847074.1, YP_001373857.1, ZP_04122524.1, ZP_03230841.1, YP_082111.1, NP_834329.1, YP_002444060.1, ZP_04170954.1, YP_002453687.1, ZP_04153266.1, ZP_04302850.1, YP_002365390.1, ZP_04216141.1, ZP_04298961.1, ZP_00740055.1, ZP_04277177.1, ZP_04104350.1, ZP_04176651.1, YP_001647239.1, ZP_04188247.1, ZP_04149717.1, YP_003794343.1, ZP_04230016.1, YP_001643400.1, ZP_04209092.1, ZP_04235899.1, YP_003428808.1, ZP_08005962.1, YP_003599946.1, YP_003565223.1, ZP_01859623.1, YP_004569425.1, ZP_04432601.1, ZP_03227314.1, YP_003699559.1, ZP_07709417.1, ZP_01723571.1, NP_244046.1, ZP_08006365.1, ZP_00738801.1, ZP_04160852.1, ZP_04166021.1, ZP_04154769.1, ZP_04109769.1, ZP_04109049.1, ZP_04108444.1, ZP_04075249.1, ZP_00741173.1, ZP_00739793.1, ZP_01174108.1, ZP_01174047.1, ZP_00241359.1, ZP_04195783.1, ZP_04199629.1, ZP_04067276.1
and particularly preferably NP_391071.1 (encoded by SEQ ID No.11)
and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_3 in general is understood to mean in particular the conversion of pyruvate to alanine.

Enzyme E_4 ω-oxidation

For the production of an ω-amino-functionalized carboxylic acid or an ω-amino-functionalized carboxylate ester, it can be advantageous if the second genetic modification comprises increased activity of an enzyme E_4 which catalyses the conversion of ω-hydroxycarboxylic acids or ω-hydroxycarboxylate esters to the corresponding ω-oxocarboxylic acids or ω-oxocarboxylate esters. This increased activity of the enzyme E_4 can also be advantageous if the preparation of ω-oxocarboxylic acids, ω-oxocarboxylate esters, ω-carboxycarboxylic acid or ω-carboxy-carboxylate esters is desired.

Should the microorganisms according to the invention be used in a process for the production of ω-oxocarboxylic acids or ω-oxocarboxylate esters or of ω-functionalized compounds derived from ω-oxocarboxylic acids or ω-oxocarboxylate esters such as for example ω-amino compounds, then it is advantageous if the microorganism, as already described above for E_2, displays decreased activity of an aldehyde dehydrogenase of EC 1.2.1.3, EC 1.2.1.4 or EC 1.2.1.5 in comparison to its wild type. In this connection, preferred enzymes E_4 are those which only catalyse the respective first-mentioned of the two reactions mentioned in the following section.

Specific enzymes E_4

Preferably the enzyme E_4 is
a fatty alcohol oxidase of EC 1.1.3.20, which preferentially catalyses at least one of the following reactions, in particular the first-mentioned:
ω-hydroxyalkanoic acid (ester) + O_2 = ω-oxoalkanoic acid (ester) + H_2O_2 and
ω-oxoalkanoic acid (ester) + O_2 = ω-carboxyalkanoic acid (ester) + H_2O_2 or
an AlkJ alcohol dehydrogenase of EC 1.1.99.-, which preferentially catalyses at least one of the following reactions, in particular the first-mentioned:
ω-hydroxyalkanoic acid (ester) + oxidized acceptor = ω-oxoalkanoic acid (ester) + reduced acceptor and
ω-oxoalkanoic acid (ester) + oxidized acceptor = ω-carboxyalkanoic acid (ester) + reduced acceptor or
an alcohol dehydrogenase of EC 1.1.1.1 or EC 1.1.1.2, which preferentially catalyses at least one of the following reactions, in particular the first-mentioned:
ω-hydroxyalkanoic acid (ester) + $NAD(P)^+$ = ω-oxoalkanoic acid (ester) + NAD(P)H + H^+ and
ω-oxoalkanoic acid (ester) + $NAD(P)^+$ = ω-carboxyalkanoic acid (ester) + NAD(P)H + H^+.

Such preferable fatty alcohol oxidases are selected from
AAS46878.1, ACX81419.1, AAS46879.1, CAB75353.1, AAS46880.1, XP_712350.1, XP_002422236.1, XP_712386.1, EEQ43775.1, XP_001525361.1, XP_001386087.1, XP_459506.2, CAB75351.1, CAB75352.1, XP_001385255.2, EDK39369.2, XP_001484086.1, XP_002618046.1, XP_002548766.1, XP_002548765.1, XP_003041566.1, XP_003328562.1, XP_001214264.1, XP_001904377.1, XP_658227.1, XP_001591990.1, XP_753079.1, XP_002569337.1, XP_001268562.1, XP_003348911.1, EGP90120.1, XP_001389382.1, EER37923.1, XP_001264046.1, EGO58212.1, XP_001554225.1, XP_003298648.1, XP_959005.1, XP_002841296.1, XP_001940486.1, EGR52262.1, EEQ89581.1, EGD99881.1, EFQ33355.1, XP_001821106.1, XP_002622231.1, EGG03784.1, EGC44059.1, XP_003018036.1, XP_003011696.1, EFY90752.1, XP_001227812.1, XP_758170.1, XP_001243546.1, XP_002479333.1, XP_003344707.1, EFW14100.1, XP_003071927.1, XP_003171263.1, XP_003051757.1, XP_002147053.1, EEH19591.1, EEH50473.1, XP_001792978.1, XP_387094.1, EFY98644.1, XP_002788971.1, XP_002842592.1,

EFX04185.1, XP_003231449.1, XP_001729067.1, CBX94189.1, XP_001413535.1, ACF22878.1, B5WWZ9.1, XP_002994642.1, XP_002269629.1, XP_002519938.1, XP_002982582.1, NP_001047464.1, EEC73620.1, XP_002981110.1, XP_002960521.1, NP_566729.1, XP_001541970.1, XP_002967201.1, BAK00483.1, XP_002182547.1, BAK02336.1, XP_002454190.1, XP_002328753.1, XP_002867943.1, XP_002285334.1, CAC87643.1, CAN71289.1, XP_002454188.1, AAL31049.1, XP_002464494.1, AAL31021.1, YP_117187.1, XP_002543430.1, CAA18625.1, XP_002883430.1, NP_193673.2, XP_002529832.1, XP_001753124.1, NP_001142399.1, ACN27562.1, XP_002464495.1, ACR36691.1, BAJ86655.1, B5WWZ8.1, NP_001148058.1, ABR17814.1, EAY78905.1, NP_194586.1, AAM63097.1, AAK64154.1, NP_001064839.2, XP_002869492.1, XP_002314488.1, AAL31024.1, ZP_06967355.1, AAP54248.2, XP_002311685.1, ACF87929.1, YP_907078.1, EGE07035.1, YP_001849908.1, XP_002464496.1, EEC67160.1, AAL31027.1, XP_001761391.1, XP_002961172.1, XP_002528823.1, XP_002966834.1, NP_001176205.1, XP_001763007.1, XP_002272123.1, XP_002889487.1, XP_003003157.1, NP_285451.1, EGG23219.1, NP_171895.2, YP_003395677.1, Q9ZWB9.1, ACF88407.1, ZP_06413771.1, EEE51131.1, YP_003835264.1, YP_003397164.1, YP_004081922.1, XP_003294587.1, EEE51130.1, YP_003647529.1, YP_003647985.1, CBI29206.3, XP_629786.1, ZP_07964664.1, EEE57396.1, EEH09589.1, YP_003265796.1, YP_001840752.1, ZP_08620775.1, ACR36076.1, ZP_05043749.1, YP_980677.1, ZP_05043728.1, YP_692894.1, NP_710223.1, EEC67159.1, AAP03110.1, EFA85697.1, YP_691805.1, YP_551012.1, YP_001174466.1, YP_002796294.1, YP_004716331.1, YP_001019547.1, YP_585737.1, AEA86007.1, YP_960830.1, YP_004743970.1, ZP_03431349.1, ZP_06448642.1, ZP_07430351.1, NP_215006.2, ZP_03535393.1, ZP_06801690.1, YP_001849132.1, NP_854165.1, ZP_03427234.1, CBJ27378.1, NP_334920.1, ZP_08571383.1, YP_728161.1, ZP_01896040.1, ZP_03530923.1, YP_551306.1, YP_003167456.1, YP_606070.1, ZP_06850167.1, ADP99095.1, YP_907986.1, ZP_04924166.1, ZP_08139923.1, YP_001270300.1, YP_521830.1, YP_003147410.1, YP_002007173.1, ADR62464.1, YP_004382294.1, NP_747223.1, YP_004687462.1, NP_902159.1, ZP_04936784.1, YP_003914667.1, ZP_01306356.1, ZP_04750553.1, YP_002875279.1, YP_004704374.1, YP_001671392.1, NP_249055.1, ZP_06876360.1, YP_001345853.1, YP_002437969.1, YP_004356853.1, YP_351075.1, CBI23676.3, YP_001189668.1, YP_001528881.1, YP_001613612.1, YP_001747218.1, YP_003393002.1, YP_001365074.1, ZP_07778129.1,

ZP_07392715.1, YP_001553329.1, YP_262925.1, YP_751961.1, YP_564183.1, YP_003811876.1, YP_002356821.1, YP_001051828.1, YP_001837525.1, NP_716513.1, ZP_01915079.1, ZP_02156621.1, YP_001184631.1, YP_001475595.1, ZP_05042393.1, YP_962228.1, YP_001612275.1, ADV55625.1, YP_001675797.1, YP_003555260.1, ZP_01075039.1, YP_003812822.1, YP_001503351.1, EFN52938.1, YP_001759063.1, ZP_06503577.1, YP_871025.1, ZP_08564919.1, YP_002310162.1, YP_732875.1, YP_001092722.1, YP_739324.1, XP_002333995.1, NP_085596.1, YP_928870.1, EGD05748.1, NP_443993.1, ZP_08138057.1, ZP_05041587.1, ZP_07011380.1, YP_001612684.1, ZP_07669342.1, ZP_06508361.1, ZP_03423639.1, YP_923293.1, ZP_05061865.1, ZP_08181496.1, YP_559605.1, ZP_06841320.1, ZP_01620712.1, YP_001896340.1, ZP_03276650.1, YP_004303194.1, ZP_08180715.1, ZP_06382740.1, ZP_01034555.1, YP_004604560.1, YP_001020142.1, YP_935375.1, ZP_01546137.1, ZP_07661079.1, YP_001860640.1, ZP_06052841.1, ZP_01881170.1, ZP_05781455.1, YP_932732.1, ZP_08119300.1, YP_004715268.1, ZP_03697402.1, YP_004126957.1, ZP_06703136.1, NP_642445.1, ZP_08273900.1, YP_004524313.1, ZP_01902993.1, YP_001900094.1, AEA84888.1, YP_004690289.1, NP_714358.1, YP_682471.1, YP_003239.1, YP_997465.1, YP_003452130.1, ZP_01739153.1, YP_004219483.1, YP_001761298.1, ZP_01438251.1, CBI37146.3, ZP_04748383.1, YP_004362245.1, ZP_05912795.1, YP_003390234.1, YP_003122799.1, CCB77579.1, EGB06416.1, ZP_08389346.1, YP_191496.1, ZP_05224727.1, ZP_01125614.1, YP_466287.1, YP_001368620.1, YP_001380256.1, YP_002361951.1, YP_002756103.1, YP_001801399.1, ZP_06847140.1, YP_003200069.1, YP_001940247.1, YP_001584322.1, ZP_04679227.1, YP_002493674.1, YP_002135530.1, YP_004290424.1, YP_001772011.1, ZP_08189046.1, ZP_03423640.1, YP_001834251.1, ZP_01041752.1, YP_001533410.1, YP_269751.1, YP_002432994.1, YP_003694653.1, CAD47896.1, NP_769359.1, YP_004239460.1, YP_004605221.1, YP_001961214.1, YP_001837513.1, YP_004335962.1, YP_004358600.1, ZP_05050026.1, YP_003202983.1, BAD03777.1, ZP_02165013.1, NP_774131.1, YP_432169.1, ZP_05000547.1, YP_001261233.1, XP_002593969.1, XP_002603265.1, YP_003342435.1, ZP_01253183.1, EGO36831.1, YP_001866737.1, YP_001523879.1, YP_133594.1, YP_003768990.1, YP_001237820.1, YP_003133224.1, ZP_01896771.1, ZP_01865125.1, NP_960319.1, YP_826958.1, YP_003326608.1, YP_002219515.1, NP_217926.1, ZP_07441899.2, YP_001208178.1, ADM42038.1, YP_002433510.1, ZP_08274313.1,

EGO38668.1, ZP_03393221.1, NP_356358.1, ZP_06055780.1, YP_001684562.1, ZP_08528157.1, BAD03162.1, YP_001800712.1, ACL37106.1, YP_883489.1, ZP_01075202.1, NP_969446.1, ZP_01129577.1, YP_001530285.1, ZP_04746501.1, YP_001341980.1, YP_905003.1, ZP_05218299.1, ZP_08665577.1,

preferably

AAS46878.1, ACX81419.1, AAS46879.1, CAB75353.1, AAS46880.1, XP_712350.1, XP_002422236.1, XP_712386.1, EEQ43775.1, XP_001525361.1, XP_001386087.1, XP_459506.2, CAB75351.1, CAB75352.1, XP_001385255.2, EDK39369.2, XP_001484086.1, XP_002618046.1, XP_002548766.1, XP_002548765.1, XP_003041566.1, XP_001214264.1, XP_001904377.1, XP_658227.1, XP_001591990.1, XP_753079.1, XP_002569337.1, XP_001268562.1, XP_003348911.1, EGP90120.1, XP_001389382.1, EER37923.1, XP_001264046.1, EGO58212.1, XP_001554225.1, XP_003298648.1, XP_959005.1, XP_002841296.1, XP_001940486.1, EGR52262.1, EEQ89581.1, EGD99881.1, EFQ33355.1, XP_001821106.1, XP_002622231.1, EGC44059.1, XP_003018036.1, XP_003011696.1, EFY90752.1, XP_001227812.1, XP_001243546.1, XP_002479333.1, XP_003344707.1, EFW14100.1, XP_003071927.1, XP_003171263.1, XP_003051757.1, XP_002147053.1, EEH19591.1, EEH50473.1, XP_001792978.1, XP_387094.1, EFY98644.1, XP_002788971.1, XP_002842592.1, EFX04185.1, XP_003231449.1, CBX94189.1, XP_001413535.1, XP_001541970.1, XP_002543430.1, EGE07035.1, XP_003003157.1

and particularly preferably

AAS46878.1, ACX81419.1, AAS46879.1, CAB75353.1, AAS46880.1, XP_712350.1, XP_002422236.1, XP_712386.1, EEQ43775.1, CAB75351.1, CAB75352.1, XP_002548766.1, XP_002548765.1,

and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per

gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_4 in general is understood to mean in particular the conversion of ω-oxolauric acid and/or methyl ω-oxolaurate to ω-carboxylauric acid and/or methyl ω-carboxylaurate or the conversion of ω-hydroxylauric acid and/or methyl ω-hydroxylaurate to ω-oxolauric acid and/or methyl ω-oxolaurate.

Such preferable AlkJ alcohol dehydrogenases are selected from Q00593.1, Q9WWW2.1, ZP_00957061.1, YP_957894.1, CAC38030.1, YP_694430.1, YP_957725.1, YP_001672216.1, YP_552061.1, YP_130410.1, ZP_06155535.1, ZP_01222730.1, YP_691907.1, YP_002297804.1, YP_004283522.1, YP_001234383.1, YP_004435031.1, ZP_05110316.1, ZP_05042898.1, YP_004466324.1, ZP_08553549.1, YP_004125220.1, ADI22536.1, ADI18461.1, YP_003810975.1, YP_662346.1, YP_004427557.1, YP_692606.1, ZP_05043291.1, YP_440752.1, ZP_02386160.1, ZP_04763547.1, ZP_02361232.1, YP_003376674.1, ZP_02354055.1, ZP_05085930.1, ADQ00130.1, YP_003643016.1, ZP_05040520.1, YP_691922.1, AAX23098.1, BAD07371.1, NP_104379.1, YP_002551960.1, YP_003908558.1, YP_987903.1, ZP_05785860.1, YP_004145612.1, YP_004140926.1, CAZ88300.1, ZP_05041901.1, YP_533645.1, ZP_01754259.1, CBA31223.1, YP_587542.1, YP_106852.1, ZP_08402506.1, ZP_05055020.1, ZP_02400829.1, YP_104747.1, ZP_02409412.1, YP_001057269.1, YP_004229837.1, YP_294429.1, YP_001028112.1, ZP_02479747.1, YP_002874799.1, ZP_03541051.1, YP_003606536.1, ZP_02887167.1, YP_001795572.1, YP_487451.1, ACZ62814.1, YP_560809.1, ZP_02167462.1, YP_004482869.1, YP_001581248.1, ZP_07374066.1, YP_001203981.1, ZP_06840259.1, ZP_01915145.1, NP_774525.1, ZP_03561080.1, YP_001208258.1, YP_001897374.1, YP_001413909.1, YP_366469.1, YP_521854.1, YP_004490642.1, YP_003280349.1, ZP_03588744.1, YP_001562229.1, YP_001120981.1, ZP_03574970.1, YP_004234225.1, ZP_02377531.1, ZP_02149954.1, YP_001237360.1, ZP_03266156.1, YP_782821.1, YP_004754039.1, BAB61732.1, ZP_07046388.1, ZP_02145452.1, BAF45123.1, YP_002129953.1, YP_003812439.1, ZP_01055291.1, BAF45124.1, EGH71399.1, ZP_05060389.1, ZP_05090872.1, BAF45126.1, BAB07804.1, ZP_06053464.1, YP_001238278.1, ZP_04944469.1, YP_001171160.1, YP_002984373.1, YP_002237649.1, ZP_08276443.1, BAF98451.1, ZP_05124197.1, YP_568640.1,

ZP_05785341.1, NP_769037.1, YP_370657.1, YP_775005.1, ZP_02911119.1, YP_165460.1, ZP_02891796.1, YP_622328.1, ZP_07675057.1, YP_001901188.1, YP_003592183.1, ZP_02361040.1, NP_518244.1, YP_001809673.1, NP_947032.1, YP_001766369.1, YP_002255997.1, ZP_04940241.1, YP_004012032.1, YP_841049.1, YP_002983249.1, YP_003643276.1, YP_003855487.1, YP_003778137.1, ZP_02361104.1, CBA30511.1, ZP_05781295.1, YP_756865.1, ZP_02461782.1, YP_002007988.1, YP_004110133.1, YP_002229680.1, ZP_02386040.1, YP_004684069.1, YP_373268.1, YP_440614.1, NP_421441.1, YP_264896.1, YP_004362617.1, ZP_06053847.1, YP_366538.1, YP_003812285.1, YP_004154520.1, ZP_01901081.1, ZP_02372179.1, ZP_02453559.1, ADP98564.1, YP_003747084.1, ZP_02487888.1, ZP_01768075.1, ZP_02400664.1, YP_106680.1, YP_724753.1, YP_002907583.1, YP_004482470.1, YP_167582.1, YP_270109.1, YP_004362333.1, ZP_02504034.1, YP_003189363.1, YP_973212.1, ZP_00952746.1, YP_459665.1, YP_777218.1, YP_581107.1, ZP_01878091.1, ZP_01057973.1, YP_002913124.1, ZP_01035570.1, YP_001777560.1, YP_552627.1, ZP_02890876.1, YP_587146.1, YP_004141814.1, YP_001685369.1, ZP_05343380.1, NP_886000.1, ZP_04942359.1, ZP_01913732.1, ZP_08244266.1, YP_002233254.1, ZP_01816670.1, YP_837233.1, ZP_07478008.1, ZP_01985205.1, ZP_07473972.1, ZP_01067090.1, ZP_01867788.1, ZP_01754024.1, EGM19144.1, ZP_07741283.1, ZP_06876839.1, YP_002395287.1, ZP_07795498.1, NP_102692.1, NP_252789.1, YP_004451100.1, ZP_01305514.1, YP_002438481.1, ZP_04930310.1, YP_001810189.1, YP_104187.1, ZP_01367534.1, YP_001346382.1, ZP_01878466.1, YP_789017.1, YP_001115422.1, ZP_05067451.1, ZP_05842072.1, YP_001682976.1, YP_761348.1, YP_004611600.1, YP_004188241.1, NP_419761.1, EFV85163.1, YP_684227.1, ZP_06177455.1, NP_935088.1, YP_004614491.1, ZP_08697916.1, YP_004689366.1, ZP_05052326.1, YP_267420.1, YP_728575.1, YP_001759584.1, YP_557446.1, ZP_06844897.1, ZP_06079799.1, YP_003771143.1, ZP_05094472.1, YP_511622.1, ACF98205.1, YP_582314.1, ZP_07660450.1, YP_004065269.1, YP_003979606.1, YP_002520401.1, YP_003579281.1, ZP_01749397.1, ZP_03265018.1, ZP_07283393.1, YP_001532150.1, YP_298941.1, ZP_06688181.1, ZP_01611660.1, ZP_02367747.1, EGP42870.1, ZP_00993245.1, ABY65992.1, YP_354800.1, ZP_01747277.1, YP_561728.1, ZP_02190947.1, YP_605824.1, YP_001991873.1, ZP_00955792.1, YP_003594401.1, YP_004156101.1, YP_001472858.1, YP_001746950.1, ZP_08410042.1, ZP_01116604.1,

ADP99912.1, ZP_01692203.1, YP_001328534.1, YP_999236.1, YP_002278452.1, ZP_01306234.1, YP_002871776.1, ZP_02369920.1, ZP_01896942.1, YP_002289724.1, AEG07584.1, YP_999005.1, YP_003552461.1, YP_270668.1, ZP_06862917.1, YP_001811327.1, YP_001166036.1, ABW06653.1, ZP_01548976.1, ZP_07774606.1, ZP_05888080.1, YP_003301477.1, YP_341748.1, ZP_05100248.1, YP_918038.1, YP_001500869.1, YP_004305296.1, YP_003342584.1, NP_947961.1, ZP_05124765.1, ZP_01904700.1, YP_003696207.1, YP_004156699.1, YP_001241858.1, NP_104253.1, YP_676241.1, ZP_01736903.1, ZP_00960121.1, NP_436019.1, YP_002945716.1, YP_259594.1, EFV86615.1, AAY87334.1, NP_900970.1, AEG07409.1, YP_349087.1, YP_004141055.1, YP_001169476.1, YP_001566960.1, YP_260472.1, ZP_07028078.1, YP_004610468.1, YP_003066461.1, YP_961096.1, ZP_08666573.1, ZP_02187363.1, YP_001631518.1, ZP_08141293.1, YP_001666324.1, NP_387083.1, YP_001526184.1, YP_165213.1, YP_003694923.1, YP_004433897.1, YP_001265431.1, ZP_05068964.1, YP_002313077.1, ZP_02372305.1, YP_004486039.1, YP_341901.1, YP_001862312.1, YP_004681983.1, YP_617373.1, EFV86570.1, YP_001673285.1, BAK39604.1, YP_001669327.1, YP_004353150.1, YP_001888124.1, ZP_08645365.1, YP_003410784.1, YP_841363.1, EGP44033.1, YP_001633470.1, EGP42855.1, ZP_01115125.1, ADR57794.1, YP_784649.1, YP_373898.1, Q47944.1, YP_001117950.1, ZP_02380339.1, ZP_03697092.1, YP_003187112.1, YP_004065439.1, NP_742226.1, YP_002429878.1, YP_003556403.1, AEH81535.1, YP_001887935.1, YP_554605.1, ZP_07333059.1, YP_001991668.1, YP_003694210.1, YP_222680.1, YP_002232672.1, YP_001763402.1, YP_001806802.1, YP_662156.1, ZP_05153429.1, ZP_01893457.1, ZP_04595387.1, ADP99389.1, ZP_02890074.1, YP_001313582.1, NP_387401.1, ZP_01863693.1, YP_750630.1, ZP_04939997.1, YP_268077.1, ZP_05169265.1, NP_888994.1, ZP_08408421.1, YP_001155137.1, NP_699017.1, YP_002008190.1, YP_004493716.1, YP_266277.1, YP_004654190.1, YP_943422.1, ZP_05162503.1, ZP_02905080.1, ZP_02905080.1, ZP_03784461.1, YP_001601784.1, YP_002233786.1, YP_622842.1, YP_002822679.1, ZP_04944312.1, ZP_05179897.1, YP_004483124.1, YP_003390414.1, YP_771968.1, YP_001628465.1, YP_004311599.1, ZP_01037150.1, ZP_01611812.1, ZP_03575238.1, YP_002278603.1, YP_001593845.1, EGD01613.1, YP_297574.1, YP_367509.1, YP_998315.1, ZP_08664883.1, ZP_05114787.1, ZP_05450190.1, YP_298028.1, ZP_01034678.1, YP_002827796.1, YP_372762.1, YP_004466723.1, ZP_01012072.1, YP_320380.1,

ZP_01075202.1, YP_001312358.1, YP_681895.1, ZP_07718189.1, EGP55868.1, YP_003750799.1, YP_002984725.1, YP_002543360.1, ZP_01040714.1, ZP_04717111.1, YP_002422932.1, YP_003506115.1, ZP_01444019.1, ZP_03587285.1, YP_771439.1, YP_001947593.1, YP_001049712.1, YP_003979888.1, YP_001553786.1, YP_003980878.1, YP_001578274.1, YP_472442.1, YP_778292.1, EGE56670.1, YP_002779312.1, YP_432169.1, YP_560963.1, YP_001265285.1, YP_002822699.1, YP_002278091.1, ZP_08632361.1, YP_002229178.1, ZP_06840392.1, ZP_05069105.1, ZP_00998644.1, YP_004487901.1, YP_680905.1, YP_728088.1, YP_001985833.1, YP_002007099.1, ZP_05066777.1, ZP_01551182.1, YP_002973332.1, ZP_04681414.1, ZP_07675148.1, AEH83964.1, YP_004692042.1, CBJ36337.1, EGP48473.1, ZP_03585612.1, YP_001369428.1, YP_001897527.1, AEG08472.1, YP_001166065.1, NP_437018.1, NP_294689.1, YP_002541437.1, YP_004692953.1, NP_107484.1, YP_995681.1, YP_765267.1, YP_166223.1, ZP_01740635.1, YP_001234127.1, ZP_02186681.1, YP_004140839.1, YP_001584499.1, ADI17244.1, ZP_08698744.1, YP_001022991.1, EFV84582.1, ZP_01743515.1, YP_001816113.1, YP_004688050.1, YP_001342912.1, ZP_01125614.1, EGD05029.1, ZP_03569823.1, ZP_05089337.1, YP_001901091.1, NP_886663.1, ZP_07718907.1, YP_004687387.1, NP_521464.1, ZP_06688394.1, ZP_08099738.1, ZP_02885452.1, YP_003744085.1, YP_001328823.1, ZP_02488044.1, ZP_01015005.1, YP_002983153.1, ZP_06898725.1, ZP_05886707.1, ZP_08101209.1, ZP_03319462.1, YP_003134969.1, YP_001188857.1, YP_004557767.1, YP_004675666.1, YP_004358728.1, YP_002252541.1, YP_684009.1, ZP_05085667.1, ZP_02144674.1, YP_004127560.1, ZP_01901604.1, YP_004280074.1, AEG67402.1, YP_001416516.1, ZP_01054720.1, ZP_08197897.1, NP_107235.1, YP_002909966.1, ZP_01545876.1, ZP_02147729.1, ZP_00946537.1, ZP_01903844.1, ZP_05085589.1, ACV84069.1, YP_367172.1, ZP_02165272.1, YP_701696.1, ZP_04935724.1, ZP_02191362.1, ZP_01740154.1, ZP_07662819.1, NP_103908.1, YP_003159313.1, YP_003197010.1, ZP_02152342.1, YP_001907189.1, YP_004387414.1, YP_001413869.1, ZP_01916549.1, ZP_03264661.1, AAY82840.1, YP_003277969.1, YP_767433.1, ZP_01226234.1, EGE55950.1, NP_882474.1, ZP_04680938.1, YP_004417965.1, ZP_01367142.1, EGM13684.1, YP_001262083.1, ZP_01881606.1, ZP_01002680.1, YP_003606679.1, YP_001868359.1, ZP_01446736.1, YP_004141411.1, YP_002438878.1, YP_002500414.1, EGP55675.1, ZP_08405873.1, YP_002975318.1, YP_002823637.1, ZP_02188786.1, YP_004617386.1, ABL61001.1,

YP_004190679.1, YP_004418710.1, YP_001264994.1, NP_252399.1, ACA21517.1, YP_002541208.1, YP_001369943.1, YP_789454.1, YP_004688060.1, YP_611623.1, ZP_07795086.1, ZP_04929943.1, YP_004444316.1, ZP_01866687.1, ZP_05973466.1, YP_004353327.1, ZP_05780591.1, ZP_05784784.1, NP_936564.1, ZP_05739211.1, ZP_05113045.1, ZP_06689273.1, ZP_06972168.1, ZP_01616404.1, ZP_07659253.1, ZP_05117914.1, YP_585662.1, YP_004230016.1, NP_763554.1, NP_744101.1, ZP_02465308.1, ACN56476.1, YP_004689565.1, YP_001600608.1, ZP_06792595.1, YP_001258553.1, ZP_05165722.1, ZP_03785098.1, YP_002276744.1, YP_002524856.1, ADP98420.1, YP_001669248.1, ZP_04764988.1, ZP_08528163.1, ZP_08529409.1, ZP_05944625.1, YP_676267.1, CBA26630.1, YP_001592413.1, YP_003486465.1, ZP_02187562.1, ZP_03702891.1, YP_760283.1, ZP_05450850.1, YP_004533595.1, ZP_02153313.1, YP_001859265.1, YP_001524099.1, ZP_06126913.1, ZP_07374926.1, ZP_05050787.1, ZP_01035411.1, Q8YFY2.2, YP_002280903.1, EGM21512.1, YP_004603010.1, ZP_05088581.1, YP_004302488.1, YP_004141219.1, NP_697569.1, YP_003908705.1, YP_915505.1, YP_001789228.1, YP_001042739.1, YP_133405.1, ZP_05180516.1, ZP_05174702.1, ZP_01438051.1, ZP_04590345.1, ZP_08411937.1, NP_356519.2, ZP_00964019.1, ZP_00998343.1, ZP_05181994.1, YP_004107969.1, ZP_02168070.1, ZP_01750865.1, YP_574504.1, YP_004579902.1, YP_104440.1, ZP_05452167.1, ZP_05342702.1, YP_001862883.1, YP_004538242.1, ZP_07471513.1, ZP_05169558.1, ZP_00956995.1, ZP_05096699.1, YP_004610916.1, ZP_01218118.1, AAU95210.1, ZP_02405087.1, ZP_04890639.1, YP_352237.1, ZP_02413594.1, ZP_07474023.1, NP_541317.1, YP_001993222.1, ZP_08199001.1, YP_471839.1, ZP_02492080.1, ZP_04901176.1, ZP_06915396.1, ZP_07474845.1, ZP_07477743.1, YP_004152647.1, YP_004755056.1, ZP_05086419.1, YP_004577547.1, ACD99850.1, YP_980426.1, ZP_05457072.1, ZP_05936041.1, NP_700124.1, ADT85599.1, YP_110012.1, ZP_05076113.1, YP_001068288.1, ZP_02457871.1, ZP_01014169.1, EGE60620.1, YP_001346810.1, YP_003408795.1, YP_003769675.1, YP_001257876.1, EGH93583.1, ZP_01442222.1, YP_331617.1, ZP_05636703.1, YP_001594896.1, YP_002822967.1, YP_118823.1, ZP_01878717.1, ZP_07375284.1, YP_001371250.1, ZP_07658682.1, YP_002898825.1, ZP_01547199.1, YP_223070.1, ZP_05161482.1, ZP_04679742.1, YP_002778618.1, ZP_01626756.1, ZP_05101564.1, YP_002947374.1, NP_385053.1, YP_001328117.1, YP_004493948.1, YP_003339515.1, YP_004699488.1, ZP_05101969.1,

YP_485352.1, ZP_01746033.1, ZP_06712293.1, ZP_01158125.1, ZP_01058616.1, ZP_05739755.1, NP_949067.1, ZP_02364657.1, YP_570690.1, YP_001208663.1, ZP_02357557.1, ZP_04751682.1, YP_001326253.1, YP_487666.1, ZP_05167919.1, ADI18237.1, YP_002825245.1, ZP_02144858.1, ZP_02188790.1, ZP_06794586.1, YP_001809828.1, YP_997974.1, YP_001476791.1, ZP_08635286.1, YP_676287.1, ZP_07308228.1, ZP_04596242.1, YP_001622726.1, NP_699590.1, ZP_01446884.1, YP_001168504.1, ZP_01616388.1, ZP_05117189.1, ZP_05876432.1, ADT64694.1, ZP_01754911.1, ZP_05880498.1, ZP_02360829.1, ZP_06052433.1, ZP_08663540.1, YP_003768966.1, ZP_02165422.1, ZP_00960985.1, ZP_07026655.1, YP_001753039.1, YP_371288.1, YP_002974725.1, YP_776880.1, ZP_05784963.1, ZP_05124380.1, YP_459030.1, ZP_05090690.1, ZP_05064893.1, ZP_02367982.1, ZP_01890564.1, NP_541848.1, ZP_00960263.1, ZP_02961617.1, YP_001242097.1, ZP_05838258.1,

in particular

Q00593.1, Q9WWW2.1, ZP_00957061.1, YP_957894.1, CAC38030.1, YP_694430.1, YP_957725.1, YP_001672216.1, YP_552061.1, YP_130410.1, ZP_06155535.1, ZP_01222730.1, YP_691907.1, YP_002297804.1, YP_004283522.1, YP_001234383.1, YP_004435031.1, ZP_05110316.1, ZP_05042898.1, YP_004466324.1, ZP_08553549.1, YP_004125220.1, ADI22536.1, ADI18461.1, YP_003810975.1, YP_662346.1, YP_004427557.1, YP_692606.1, ZP_05043291.1, YP_440752.1, ZP_02386160.1, ZP_04763547.1, ZP_02361232.1, YP_003376674.1, ZP_02354055.1, ZP_05085930.1, ADQ00130.1, YP_003643016.1, ZP_05040520.1, YP_691922.1, AAX23098.1, BAD07371.1, NP_104379.1, YP_002551960.1, YP_003908558.1, YP_987903.1, ZP_05785860.1, YP_004145612.1, YP_004140926.1, CAZ88300.1,

and particularly preferably

Q00593.1, Q9WWW2.1, ZP_00957061.1, YP_957894.1, CAC38030.1, YP_694430.1, YP_957725.1, YP_001672216.1.

and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with

the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection is understood to mean in particular the conversion of ω-oxolauric acid and/or methyl ω-oxolaurate to ω-carboxylauric acid and/or methyl ω-carboxylaurate or the conversion of ω-hydroxylauric acid and/or methyl ω-hydroxylaurate to ω-oxolauric acid and/or methyl ω-oxolaurate.

Such preferable alcohol dehydrogenases of EC 1.1.1.1 or EC 1.1.1.2 are selected from AdhE, AdhP, YjgB, YqhD, GldA, EutG, YiaY, AdhE, AdhP, YhhX, YahK, HdhA, HisD, SerA, Tdh, Ugd, Udg, Gmd, YefA, YbiC, YdfG, YeaU, TtuC, YeiQ, YgbJ, YgcU, YgcT, YgcV, YggP, YgjR, YliI, YqiB, YzzH, LdhA, GapA, Epd, Dld, GatD, Gcd, GlpA, GlpB, GlpC, GlpD, GpsA and YphC from bacteria, in particular *E. coli*

and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection is understood to mean in particular the conversion of ω-oxolauric acid and/or methyl ω-oxolaurate to ω-carboxylauric acid and/or methyl ω-carboxylaurate or the conversion of ω-hydroxylauric acid and/or methyl ω-hydroxylaurate to ω-oxolauric acid and/or methyl ω-oxolaurate.

WO2010062480 A2 describes, particularly in practical examples 3, 4, 6 and 7, microorganisms which compared to their wild type are capable of forming more fatty acids and fatty acid derivatives, in particular fatty alcohols, from at least one simple carbon source. The document

also describes enzymes E_4 preferred according to the invention and the sequences thereof in particular in figure 10 and practical examples 2 to 7.

Enzyme E_5 ω-oxidation 2

For the production of an ω-carboxy-functionalized carboxylic acid or an ω-carboxy-functionalized carboxylate ester it can be advantageous if the second genetic modification comprises increased activity of an enzyme E_5 which catalyses the conversion of ω-oxocarboxylic acids or ω-oxocarboxylate esters to the corresponding ω-carboxycarboxylic acids or ω-carboxy-carboxylate esters.

Specific enzymes E_5

Preferably the enzyme E_5 is an aldehyde dehydrogenase of EC 1.2.1.3, EC 1.2.1.4 or EC 1.2.1.5, which preferentially catalyses the following reaction:
ω-oxoalkanoic acid (ester) + $NAD(P)^+$ = ω-carboxyalkanoic acid (ester) + NAD(P)H + H^+

Such preferable aldehyde dehydrogenases are selected from Prr, Usg, MhpF, AstD, GdhA, FrmA, Feab, Asd, Sad, PuuE, GabT, YgaW, BetB, PutA, PuuC, FeaB, AldA, Prr, EutA, GabD, AldB, TynA and YneI from bacteria, in particular *E. coli*
and
proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence

of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_5 in general is understood to mean in particular the conversion of ω-oxolauric acid and/or methyl ω-oxolaurate to ω-carboxylauric acid and/or methyl ω-carboxylaurate.

alkL

In general, it can be advantageous for the microorganism according to the invention if it can secrete the ω-functionalized carboxylic acids and ω-functionalized carboxylate esters formed from the simple carbon source rapidly into the medium.
The organism advantageously achieves this in that the second genetic modification additionally comprises that the microorganism compared to its wild type forms more alkL gene product.
In connection with the present invention, the term "alkL gene product" is understood to mean proteins which fulfil at least one of the following two conditions:
1.) the protein is identified as a member of the superfamily of the OmpW proteins (protein family 3922 in the "Conserved Domain Database" (CDD) of the "National Center for Biotechnology Information" (NCBI)), where this assignment is made by alignment of the amino acid sequence of the protein with the database entries present in the CDD of the NCBI, which were deposited up to the 22.03.2010, with use of the standard search parameters, an e-value smaller than 0.01 and with use of the algorithm "blastp 2.2.23+",
2.) in a search for conserved protein domains contained in the amino acid sequence concerned in the NCBI CDD (version 2.20) by means of RPS-BLAST, the presence of the conserved domain "OmpW, Outer membrane protein W" (COG3047) is identified with an e-value of less than 1×10^{-5} ("domain hit").

Preferred gene products contained in the microorganism according to the invention alkL are characterized in that the production of the alkL gene product in the native host is induced by dicyclopropyl ketone; in this connection, it is also preferable that the expression of the alkL gene takes place as part of a group of genes, for example in a regulon such as for example an operon.

AlkL gene products contained in the microorganism according to the invention are preferably encoded by alkL genes from organisms selected from the group of the gram-negative bacteria, in particular the group containing, preferably consisting of, *Pseudomonas* sp., *Azotobacter* sp., *Desulfitobacterium* sp., *Burkholderia* sp., preferably *Burkholderia cepacia*, *Xanthomonas* sp., *Rhodobacter* sp., *Ralstonia* sp., *Delftia* sp.and *Rickettsia* sp., *Oceanicaulis* sp., *Caulobacter* sp., *Marinobacter* sp. and *Rhodopseudomonas* sp., preferably *Pseudomonas putida*, *Oceanicaulis alexandrii*, *Marinobacter aquaeolei*, in particular *Pseudomonas putida* GPo1 and P1, *Oceanicaulis alexandrii* HTCC2633, *Caulobacter* sp. K31 and *Marinobacter aquaeolei* VT8. Quite especially preferred in this connection are alkL gene products encoded by the alkL genes from *Pseudomonas putida* GPo1 and P1, which are represented by Seq ID No.1 and Seq ID No.3, and proteins with polypeptide sequence Seq ID No.2, Seq ID No.4, Seq ID No.5, Seq ID No.6 or Seq ID No.7 or with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues are modified compared to Seq ID No.2, Seq ID No.4, Seq ID No.5, Seq ID No.6 or Seq ID No.7 by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the respective reference sequence Seq ID No.2, Seq ID No.4, Seq ID No.5, Seq ID No.6 or Seq ID No.7, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, this being in a system as described in the practical examples, wherein glucose is converted to ω-aminolauric acid in an *E. coli* cell. A method of choice for the determination of the synthesis level can be found in the practical examples.

For the definition of the units, the definition usual in enzyme kinetics applies here: 1 unit of biocatalyst converts 1 µmol of substrate to the product in one minute.

1 U = 1 µmol/min.

First genetic modification for carboxylic acid- and carboxylate ester-synthesis

According to the invention, the microorganisms have a first genetic modification, so that compared to their wild type they are capable of forming more carboxylic acids and carboxylate ester from at least one simple carbon source.

In this connection, it is preferable according to the invention that the first genetic modification is, compared to the enzymatic activity of the wild type of the microorganism, increased activity of at least one of the enzymes selected from the group

E_i Acyl-ACP (acyl carrier protein) thioesterase, preferably of EC 3.1.2.14 or EC 3.1.2.22, which catalyses the hydrolysis of an acyl-acyl carrier protein thioester,

E_{ii} Acyl-CoA (coenzyme A) thioesterase, preferably of EC 3.1.2.2, EC 3.1.2.18, EC 3.1.2.19, EC 3.1.2.20 or EC 3.1.2.22, which catalyses the hydrolysis of an acyl-coenzyme A thioester,

E_{iib} Acyl-CoA (coenzyme A):ACP (acyl carrier protein) transacylase, which preferentially catalyses a reaction wherein a CoA thioester is converted into an ACP thioester,

E_{iii} Polyketide synthase, which catalyses a reaction which is also involved in the synthesis of carboxylic acids and carboxylate esters, and

E_{iv} Hexanoic acid synthase, a specialized fatty acid synthase of the FAS-I type, which catalyses the synthesis of hexanoic acid from 2 molecules of malonyl-coenzyme A and one molecule of acetyl-coenzyme A.

Specific enzymes E_i

The reaction catalysed by E_i differs from that catalysed by E_{ii} only in that instead of an acyl-acyl carrier protein thioester an acyl-coenzyme A thioester is hydrolysed. It is obvious that because of significant side-activity many of the said enzymes E_i can also be used as E_{ii}, and vice versa.

In cells preferred according to the invention, the enzyme E_i is one which comprises sequences selected from:

AAC72881.1, ABB71579.1, CAC19934.1, AAC49180.1 (encoded by SEQ ID No.10), AAC49783.1, AAC49179.1, CAB60830.1, ABB71581.1, AAC49269.1, CAC19933.1, CAA54060.1, AAC72882.1, Q39513.1, AAC49784.1, ABO38558.1, ABO38555.1, ABO38556.1, ABO38554.1, ADB79568.1, ADB79569.1, ACQ57188.1, ACQ57189.1, ABK96561.1,

ACQ63293.1, ACQ57190.1, Q9SQI3.1, ABU96744.1, ABC47311.1, XP_002324962.1, AAD01982.1, AAB51525.1, ACV40757.1, XP_002309244.1, CBI28125.3, ABD91726.1, XP_002284850.1, XP_002309243.1, XP_002515564.1, ACR56792.1, ACR56793.1, XP_002892461.1, ABI18986.1, NP_172327.1, CAA85387.1, CAA85388.1, ADA79524.1, ACR56795.1, ACR56794.1, CAN81819.1, ACF17654.1, AAB71729.1, ABH11710.1, ACQ57187.1, AAX51637.1, AAB88824.1, AAQ08202.1, AAB71731.1, AAX51636.1, CAC80370.1, CAC80371.1, AAG43858.1, ABD83939.1, AAD42220.2, AAG43860.1, AAG43861.1, AAG43857.1, AAL15645.1, AAB71730.1, NP_001068400.1, EAY86877.1, NP_001056776.1, XP_002436457.1, NP_001149963.1, ACN27901.1, EAY99617.1, ABL85052.1, XP_002437226.1, NP_001151366.1, ACF88154.1, NP_001147887.1, XP_002453522.1, BAJ99650.1, EAZ37535.1, EAZ01545.1, AAN17328.1, EAY86884.1, EEE57469.1, Q41635.1, AAM09524.1, Q39473.1, NP_001057985.1, AAC49001.1, XP_001752161.1, XP_001770108.1, XP_001784994.1, XP_002318751.1, NP_001047567.1, XP_002322277.1, XP_002299627.1, XP_002511148.1, CBI15695.3, XP_002299629.1, XP_002280321.1, CAN60643.1, XP_002459731.1, XP_002975500.1, XP_002962077.1, XP_001773771.1, NP_001151014.1, XP_002317894.1, XP_002971008.1, XP_001774723.1, XP_002280147.1, XP_002526311.1, XP_002517525.1, XP_001764527.1, ABI20759.1, BAD73184.1, XP_002987091.1, XP_002985480.1, CBI26947.3, ABI20760.1, XP_002303055.1, XP_002885681.1, ADH03021.1, XP_002532744.1, EAY74210.1, EEC84846.1, EEE54649.1, AAG35064.1, AAC49002.1, CAD32683.1, ACF78226.1, BAJ96402.1, XP_002462626.1, NP_001130099.1, XP_002462625.1, ABX82799.3, Q42712.1, NP_193041.1, AAB51524.1, NP_189147.1, ABR18461.1, XP_002863277.1, AAC72883.1, AAA33019.1, CBI40881.3, XP_002262721.1, AAB51523.1, NP_001063601.1, ADB79567.1, AAL77443.1, AAL77445.1, AAQ08223.1, AAL79361.1, CAA52070.1, AAA33020.1, CAA52069.1, XP_001785304.1, CAC39106.1, XP_002992591.1, XP_002968049.1, XP_001770737.1, XP_001752563.1, AAG43859.1, XP_002978911.1, XP_002977790.1, ACB29661.1, XP_002314829.1, XP_002991471.1, EAZ45287.1, XP_002986974.1, EEC73687.1, XP_002312421.1, ACJ84621.1, NP_001150707.1, AAD28187.1, XP_001759159.1, XP_001757193.1, XP_002322077.1, ABE01139.1, XP_002447294.1, AAX54515.1, AAD33870.1,

in particular

AAC72881.1, ABB71579.1, CAC19934.1, AAC49180.1 (encoded by SEQ ID No.10), AAC49783.1, AAC49179.1, CAB60830.1, ABB71581.1, AAC49269.1, CAC19933.1, CAA54060.1, AAC72882.1, Q39513.1, AAC49784.1, AAC72883.1, Q41635.1, AAC49001.1, and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_i in general is understood to mean in particular the hydrolysis of dodecanoyl-ACP thioesters.

Microorganisms preferred according to the invention are those which are obtained when the microorganisms listed below having a first genetic modification in the sense of the invention are used as the starting point, in that they are provided with the second genetic modification and optionally at least one further genetic modification in the sense of the invention.
WO2010063031 A2 describes, particularly in paragraphs [0007] to [0008], [0092] to [0100], [0135] to [0136], [0181] to [0186] and [0204] to [0213] and practical examples 4 to 8, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more microbial oil from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in paragraphs [0012] to [0013], [0155], [0160] to [0163], [0185] to [0190] and [0197] to [0199], figure 12, practical examples 4 to 8 and table 3.
WO2010063032 A2 describes, particularly in paragraphs [0007] to [0008], [0092] to [0100], [0135] to [0136], [0181] to [0186] and [0204] to [0213], and practical examples 4 to 8, microorganisms preferably used according to the invention which have a first genetic

modification, so that compared to their wild type they are capable of forming more microbial oil from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in paragraphs [0012] to [0013], [0155], [0160] to [0163], [0185] to [0190] and [0197] to [0199], figure 12, practical examples 4 to 8 and table 3.

WO2011003034 A2 describes, particularly on page 3, second paragraph to page 7, first paragraph, page 20, second paragraph, to page 22, second paragraph, and on page 156 to page 166, fifth paragraph, and in Claims 1 to 100, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular adipic acid, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof particularly on page 35, third paragraph, and page 36, first paragraph.

WO2011008565 A1 describes, particularly in paragraphs [0018] to [0024] and [0086] to [0102] and practical examples 2, 4, 7, 9 and 10, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acids, fatty aldehydes, fatty alcohols, alkanes and fatty acid ester, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in paragraphs [0009] to [0018] and [0073] to [0082], figures 1 to 3 and 7, table 4, practical examples 1 to 10 and Claims 1 to 5 and 11 to 13.

WO2009076559 A1 describes, particularly in paragraphs [0013] to [0051] and [0064] to [00111] and Claims 1 to 10, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acids, fatty alcohols, alkanes or alkenes, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in table 1, paragraphs [0021], [0024] to [0030] and [0064] to [00111] and figure 6.

WO2010017245 A1 describes, particularly in paragraphs [0011] to [0015] and [00114] to [00134], practical example 3 and Claims 1 to 2 and 9 to 11, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives from at least one

simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in tables 1, 2 and 3, paragraphs [0080] to [00112] and Claims 3 to 8.

WO2010127318 A2 describes, particularly on pages 1 to 9 and 11 to 16, practical examples 1, 2 and 4, figures 1A to 1E and Claims 23 to 43, 62 to 79 and 101 to 120, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular biodiesel equivalents and other fatty acid derivatives, above all fatty acid ethyl esters, fatty acid esters, wax esters, fatty alcohols and fatty aldehydes, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly on pages 17 and 19 to 23.

WO2008100251 A1 describes, particularly on pages 4 to 7 and 45 to 46, figures 1A to 1E and Claims 9 to 13, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters, wax esters and fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly on pages 4 to 5 and 45 to 46.

WO2007136762 A2 describes, particularly on pages 2 to 4 and 17 to 18, table 7, figures 2 to 4, practical examples 2 to 8 and Claims 13 and 35, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters, wax esters, hydrocarbons and fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly on pages 17 to 18, in tables 1, 7, 8 and 10 and figure 10.

WO2008113041 A2 describes, particularly on pages 35 to 41 and 64 to 67, figure 2, practical examples 6 and 10 and Claims 7 and 36, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters, wax esters, hydrocarbons, aliphatic ketones and fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in figure 7 and practical examples 6 and 10.

WO2010126891 A1 describes, particularly in paragraphs [0034] to [0091], [0195] to [0222] and [0245] to [0250], figures 3 to 5 and practical examples 1 to 5, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters, wax esters and fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in paragraphs [0245] to [0250], table 1 and practical examples 1 to 5.

WO2010118410 A1 describes, particularly in paragraphs [0022] to [0043], [0158] to [0197], figures 1 to 4, practical examples 3 and 5 to 8 and Claims 1 to 53 and 82 to 100, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters and wax esters, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in paragraphs [0158] to [0197], table 1, figures 3 and 4 and practical examples 3 and 5 to 8.

WO2010118409 A1 describes, particularly in paragraphs [0134] to [0154], figures 1 to 3 and 6 and practical example 3, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters and wax esters, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in paragraphs [0134] to [0154], figures 3 and 6 and practical example 3.

WO2010075483 A2 describes, particularly in paragraphs [0061] to [0090], and [0287] to [0367], figures 1, 4 and 5, practical examples 1 to 38 and Claims 18 to 26, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acids, fatty acid methyl esters, fatty acid ethyl esters, fatty alcohols, fatty alkyl acetates, fatty aldehydes, fatty amines, fatty amides, fatty sulphates, fatty ethers, ketones, alkanes, internal and terminal olefins, dicarboxylic acids, α,ω-dicarboxylic acids and α,ω-diols, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in paragraphs [0012] to

[0060], tables 7, 17, 26 and 27, figures 1, 44 to 47 and 55 to 59, practical examples 1 to 38 and Claims 1 to 17.

WO2010062480 A2 describes, particularly in paragraphs [0022] to [0174] and [0296] to [0330], practical examples 3 and 5 to 8 and Claims 17 and 24, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in paragraphs [0022] to [0174], table 1, and practical examples 3 and 5 to 8.

WO2010042664 A2 describes, particularly in paragraphs [0022] to [0143] and [0241] to [0275], practical example 2 and Claims 3 and 9, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty aldehydes, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences, particularly in table 1, figure 5 and practical example 2.

WO2011008535 A1 describes, particularly in paragraphs [0024] to [0032], and [0138] to [0158] and figure 13, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular carboxylic acids, hydroxycarboxylic acids and lactones thereof, from at least one simple carbon source.

WO2010022090 A1 describes, particularly in paragraphs [0022] to [0143] and [0238] to [0275], figures 3 to 5 , practical example 2 and Claims 5, 15, 16 and 36, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters and wax esters, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in table 1, figure 6 and practical example 2.

WO2009140695 A1 describes, particularly in paragraphs [0214] to [0248] and practical examples 22 to 24, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular hydrocarbons, from at least one simple carbon

source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof in particular in table 1, figure 40 and practical examples 22 to 24.

WO2010021711 A1 describes, particularly in paragraphs [0009] to [0020] and [0257] to [0317], figures 3 to 5 and 19, practical examples 2 to 24 and Claims 4, 5 and 30, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters and wax esters, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, in particular in table 3, figure 6 and practical examples 2 to 24.

WO2009085278 A1 describes, particularly in paragraphs [0188] to [0192] and figure 10, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular olefins, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in table 1 and figure 10.

WO2011019858 A1 describes, particularly in paragraphs [0023], [0064] to [0074] and [0091] to [0099], practical examples 1 to 13, figure 1 and Claim 8, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty alcohols, from at least one simple carbon source. The document also describes preferred enzymes E_i according to the invention and the sequences thereof, particularly in paragraphs [0085] to [0090], practical examples 1 to 13 and table 1.

WO2009009391 A2 describes, particularly in paragraphs [0010] to [0019] and [0191] to [0299], figures 3 to 5, practical examples 2, 4 to 6, 9 to 14, 17 and 19 and Claims 16, 39, 44 and 55 to 59, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters, wax esters and fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in paragraphs [0010] to [0019] and [0191] to [0299], figure 9 and practical examples 2, 4 to 6, 9 to 14, 17 and 19.

WO2008151149 A2 describes, particularly in paragraphs [0009], [0015] to [0033], [0053], [0071], [0174] to [0191], [0274] and [0396], Claims 53 to 114, 188 to 206 and 344 to 355 and

tables 1 to 3, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more microbial oil from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in table 5.

WO2008147781 A2 describes, particularly in paragraphs [0147] to [0156], practical examples 1 to 3, 8, 9 and 14 and Claims 65 to 71, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular hydrocarbons, olefins and aliphatic ketones, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof in particular in practical examples 1 to 3, 8, 9 and 14.

WO2008119082 A2 describes, particularly on pages 3 to 5, 8 to 10 and 40 to 77, in figures 4 and 5, practical examples 2 to 5 and 8 to 18 and Claims 3 to 39 and 152 to 153, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters, wax esters, triglycerides, biodiesel, gasoline, aviation fuel and fatty alcohols from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in table 1, figure 1, practical examples 2 to 5 and 8 to 18 and Claims 124 to 134 and 138 to 141.

WO2010135624 A2 describes, particularly in paragraphs [0067] to [0083], and [0095] to [0098], microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly in paragraphs [0067] to [0083] and [0095] to [0098].

Zheng Z, Gong Q, Liu T, Deng Y, Chen JC and Chen GQ. (Thioesterase II of *Escherichia coli* plays an important role in 3-hydroxydecanoic acid production. Appl Environ Microbiol. 2004. 70(7):3807-13) describe, particularly on pages 3808 to 3810 and 3012 and table 1, 3 and 4, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters, wax esters and fatty alcohols, from at

least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, particularly on pages 3807 and in table 2.

Steen EJ, Kang Y, Bokinsky G, Hu Z, Schirmer A, McClure A, Del Cardayre SB and Keasling JD (Microbial production of fatty acid-derived fuels and chemicals from plant biomass. Nature. 2010. 463(7280):559-62) describe, particularly on p.559, third paragraph, to p.559, first paragraph, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acids and fatty acid esters, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, in particular in supplementary table 1.

Lennen RM, Braden DJ, West RA, Dumesic JA and Pfleger BF (A process for microbial hydrocarbon synthesis: Overproduction of fatty acids in *Escherichia coli* and catalytic conversion to alkanes. Biotechnol Bioeng. 2010. 106(2):193-202) describe, particularly on p.193, first paragraph, p.194, first and second paragraph, p.195, second paragraph to p.197, second paragraph, p.198, second paragraph to p.199, third paragraph, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acids and fatty acid esters, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, in particular on p.193, first paragraph, p.194, first and second paragraph, p.196, second paragraph, and in the supplementary material.

Liu T, Vora H and Khosla C. (Quantitative analysis and engineering of fatty acid biosynthesis in E. coli. Metab Eng. 2010 Jul;12(4):378-86.) describe, particularly in sections 2.2, and 3.1 and in table 1 and 2, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acids and fatty acid esters, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, in particular in table 1.

Yuan L, Voelker TA and Hawkins DJ. (Modification of the substrate specificity of an acyl-acyl carrier protein thioesterase by protein engineering. Proc Natl Acad Sci U S A. 1995 Nov 7;92(23):10639-43) describe, particularly on p.10641, fourth paragraph, and in figure 2 and table 1, microorganisms preferably used according to the invention which have a first genetic

modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acids and fatty acid esters, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, in particular on p.10639 first paragraph, p.10640, second, third and last paragraph, p.10641, second and third paragraph, and in figure 1 and table 1 and 2.

Lu X, Vora H and Khosla C. (Overproduction of free fatty acids in *E. coli*: implications for biodiesel production. Metab Eng. 2008. 10(6):333-9.) describe, particularly on p.334, second paragraph, paragraphs 2.2, 2.3 and 3 (first to fourth paragraph) and in table 1, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acids and fatty acid esters, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, in particular in paragraph 2.2.

Liu X, Sheng J and Curtiss IIII R. (Fatty acid production in genetically modified cyanobacteria. Proc Natl Acad Sci U S A. 2011. 108(17):6899-904) describe, particularly on p. 6899, fourth and last paragraph, p.6900, first to penultimate paragraph, and in table S1 of the "Supporting Information", microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acids and fatty acid esters, from at least one simple carbon source. The document also describes enzymes E_i preferred according to the invention and the sequences thereof, in particular on p.6899, sixth and last paragraph.

Specific enzymes E_{ii}

Microorganisms preferred according to the invention are those which are obtained when the microorganisms listed below having a first genetic modification in the sense of the invention are used as the starting point, in that they are provided with the second genetic modification and optionally at least one further genetic modification in the sense of the invention.

Steen EJ, Kang Y, Bokinsky G, Hu Z, Schirmer A, McClure A, Del Cardayre SB and Keasling JD (Microbial production of fatty-acid-derived fuels and chemicals from plant biomass. Nature. 2010. 463(7280):559-62) describe, particularly on p.559, third paragraph, to p.559, first

paragraph, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more carboxylic acids and carboxylate esters, in particular fatty acids and fatty acid esters, from at least one simple carbon source. The document also describes enzymes E_{ii} preferred according to the invention and the sequences thereof, in particular in supplementary table 1.

Lennen RM, Braden DJ, West RA, Dumesic JA and Pfleger BF (A process for microbial hydrocarbon synthesis: Overproduction of fatty acids in *Escherichia coli* and catalytic conversion to alkanes. Biotechnol Bioeng. 2010. 106(2):193-202) describe, particularly on p.193, first paragraph, p.194, first and second paragraph, p.195, second paragraph to p.197, second paragraph, p.198, second paragraph to p.199, third paragraph, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more carboxylic acids and carboxylate esters, in particular fatty acids and fatty acid esters, from at least one simple carbon source. The document also describes enzymes E_{ii} preferred according to the invention and the sequences thereof, in particular on p.193, first paragraph, p.194, first and second paragraph, p.196, second paragraph, and in the supplementary material.

Liu T, Vora H and Khosla C. (Quantitative analysis and engineering of fatty acid biosynthesis in E. coli. Metab Eng. 2010 Jul;12(4):378-86.) describe, particularly in sections 2.2, and 3.1 and in table 1 and 2, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more carboxylic acids and carboxylate esters, in particular fatty acids and fatty acid esters, from at least one simple carbon source. The document also describes enzymes E_{ii} preferred according to the invention and the sequences thereof, in particular in table 1.

Yuan L, Voelker TA and Hawkins DJ. (Modification of the substrate specificity of an acyl-acyl carrier protein thioesterase by protein engineering. Proc Natl Acad Sci U S A. 1995 Nov 7;92(23):10639-43) describe, particularly on p. 10641, fourth paragraph, and in figure 2 and table 1 microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more carboxylic acids and carboxylate esters, in particular fatty acids and fatty acid esters, from at least one simple carbon source. The document also describes enzymes E_{ii} preferred according to the invention and the sequences thereof, in particular on p.10639 first paragraph, p.10640, second,

third and last paragraph, p.10641, second and third paragraph, and in figure 1 and table 1 and 2.

Lu X, Vora H and Khosla C. (Overproduction of free fatty acids in *E. coli*: implications for biodiesel production. Metab Eng. 2008. 10(6):333-9.) describe, particularly on p.334, second paragraph, paragraphs 2.2, 2.3 and 3 (first to fourth paragraph) and in table 1, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more carboxylic acids and carboxylate esters, in particular fatty acids and fatty acid esters, from at least one simple carbon source. The document also describes enzymes E_{ii} preferred according to the invention and the sequences thereof, in particular in paragraph 2.2.

Liu X, Sheng J and Curtiss IIII R. (Fatty acid production in genetically modified cyanobacteria. Proc Natl Acad Sci U S A. 2011. 108(17):6899-904) describe, particularly on p. 6899, fourth and last paragraph, p.6900, first to penultimate paragraph, and in table S1 of the "Supporting Information", microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more carboxylic acids and carboxylate esters, in particular fatty acids and fatty acid esters, from at least one simple carbon source. The document also describes enzymes E_{ii} preferred according to the invention and the sequences thereof, in particular on p.6899, sixth and last paragraph.

Specific enzymes E_{iii}

Microorganisms preferred according to the invention are those which are obtained when the microorganisms listed below having a first genetic modification in the sense of the invention are used as the starting point, in that they are provided with the second genetic modification and optionally at least one further genetic modification in the sense of the invention.

WO2009121066 A1 describes, particularly in Claims 8 to 14, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular dicarboxylic acids, from at least one simple carbon source. The document also describes enzymes E_{iii} preferred according to the invention and the sequences thereof, particularly in paragraphs [00026] to [0054], practical examples 1 to 6, figures 4 to 10 and Claims 1 to 7.

WO2009134899 A1 describes, particularly in paragraphs [0079] to [0082], practical example 1 and Claim 20, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular carboxylic acids, hydroxycarboxylic acids and lactones thereof, from at least one simple carbon source. The document also describes enzymes E_{iii} preferred according to the invention and the sequences thereof, particularly in paragraphs [0009] to [0010] and [0044] to [0078], practical example 1, figures 1 and 5 to 8 and Claims 15 to 17 and 19.

Specific enzymes E_{iv}

In cells preferred according to the invention, the enzyme E_{iv} is one which comprises sequences selected from:

AAS90071.1, XP_002379948.1, AAS90024.1, XP_001821514.2, BAE59512.1, AAL99898.1, AAS90001.1, AAS90049.1, XP_001911518.1, ACH72901.1, XP_681084.1, AAC49198.1, EFW18013.1, XP_003070494.1, XP_001241401.1, XP_002384449.1, XP_001827206.1, XP_002836001.1, XP_001393196.1, XP_660984.1, XP_001395284.1, XP_002148677.1, XP_001827151.2, BAE66018.1, XP_001217254.1, CAK40139.1, XP_001393516.2, XP_002477829.1, XP_002146311.1, XP_002340042.1, XP_002544942.1, CBF87553.1, XP_002149766.1, 2UV8_A, XP_682676.1, CBX98966.1, XP_002560069.1, XP_001273102.1, P15368.1, XP_001273530.1, CBX99714.1, AAB41493.1, XP_001823764.1, XP_001388458.1, XP_748738.1, EDP53207.1, XP_001259179.1, XP_001825741.2, BAE64608.1, XP_001213437.1, XP_002377327.1, XP_002152724.1, EFZ04065.1, XP_001792784.1, EGP89632.1, XP_001407660.1, EFQ31023.1, XP_003040066.1, 2UV9_A, XP_002486436.1, XP_001585982.1, EFY87204.1, XP_002620504.1, XP_003295647.1, EEQ86108.1, XP_001938586.1, XP_001547465.1, XP_001906653.1, XP_001402457.2, CAK40502.1, XP_002568116.1, XP_003230922.1, XP_001647236.1, XP_385497.1, EGD94294.1, EGE05134.1, XP_002849847.1, XP_003015737.1, EFX06093.1, XP_003019052.1, EEH03423.1, XP_001942351.1, EGC45478.1, XP_002556020.1, XP_003011025.1, CAY86729.1, EDN60916.1, EGA84463.1, EGA56454.1, EEU05652.1, NP_015093.1, XP_003231214.1, XP_445956.1, EGA60201.1, XP_003349949.1, XP_003070417.1,

XP_001241314.1, EGR48038.1, XP_002615278.1, EFW15042.1, EGO59647.1, XP_452914.1, XP_962466.1, XP_001537327.1, XP_002796517.1, XP_003305240.1, XP_002543037.1, XP_002499262.1, NP_985412.2, XP_003019770.1, EFW96269.1, XP_002843350.1, EEH43965.1, XP_457388.1, XP_001799391.1, EEH21370.1, BAD08376.1, XP_001486434.1, BAF79876.1, EFY90998.1, XP_001939431.1, EER44845.1, EFZ02060.1, XP_001386834.2, XP_501096.1, XP_003299758.1, XP_002419391.1, XP_002490414.1, ACZ66251.1, XP_002548204.1, P43098.1, XP_002176039.1, XP_002479407.1, EEQ44526.1, AAA34601.1, XP_001791764.1, XP_003009337.1, BAA11913.1, NP_593823.1, BAB62031.1, BAB62032.1, BAB62030.1, 2PFF_A, XP_380212.1, ADN94478.1, EGF83443.1, XP_681149.1, EGG00662.1, ADN94479.1, ABC94883.1, XP_571099.1, EFY94095.1, EFW39589.1, XP_003194430.1, XP_003031600.1, XP_001836417.1, XP_001880844.1, XP_762607.1, EGN98830.1, EGO24420.1, ACD87451.1, XP_003328630.1, XP_002997955.1, CCA25392.1, XP_002901724.1, EFY86381.1, XP_002901728.1, ADN97213.1, XP_759118.1, XP_003325251.1, XP_003169619.1, XP_002555446.1, ABJ98780.1, XP_723161.1, EDZ68993.1, XP_001526334.1, XP_001223165.1, YP_889015.1, AAO43178.1, YP_001702252.1, XP_003026305.1, YP_003659808.1, ZP_08155637.1, ZP_04749666.1, ZP_08022190.1, YP_004007770.1, YP_954908.1, YP_004522637.1, YP_640811.1, ZP_04448562.1, NP_301868.1, ZP_06851996.1, YP_003273140.1, YP_001071929.1, YP_001133797.1, YP_004076455.1, YP_701403.1, ZP_03324816.1, YP_002778327.1, ZP_02028077.1, YP_909119.1, YP_880884.1, YP_002767320.1, NP_961266.1, ZP_07457010.1, ZP_08206945.1, ZP_02917151.1, ZP_04387794.1, YP_003359863.1, EGO39886.1, ABE96385.1, ZP_05228143.1, ZP_06522069.1, EGL13180.1, ZP_06976698.1, YP_001852225.1, ZP_06596502.1, YP_907384.1, ZP_06518033.1, AEF27803.1, YP_003374392.1, ZP_07485570.1, NP_217040.1, ZP_03742148.1, NP_856198.1, YP_004724192.1, NP_337093.1, AEJ51135.1, ZP_05765008.1, YP_004745991.1, AEJ47516.1, ZP_06927266.1, ZP_03646962.1, AEF31807.1, YP_003939358.1, YP_003971698.1, YP_003986333.1, ZP_05750911.1, ADD61451.1, ZP_07942485.1, YP_004209716.1, YP_004221489.1, AEI96705.1, NP_696693.1, AEG82252.1, YP_004001156.1, ZP_03976473.1, ZP_04663991.1, ZP_00121397.1, YP_003662064.1, YP_003646283.1, YP_004630447.1, YP_002323720.1, YP_002835610.1, YP_117466.1, ZP_02963252.1, ADC85342.1, NP_940183.1, NP_739002.1, ZP_06755645.1, ADL21513.1, YP_003784047.1, ADL11108.1, ZP_06608499.1, ZP_07967121.1, ZP_05966223.1,

ZP_08682531.1, ZP_03918327.1, ZP_07879655.1, ZP_03972703.1, ZP_06162645.1, ZP_06837277.1, ZP_07990916.1, ZP_03394081.1, CAA46024.1, YP_004760934.1, ZP_06751771.1, ZP_03934033.1, NP_601696.1, BAB99888.1, YP_001139316.1, ZP_03926457.1, NP_737523.1, ZP_02044858.1, ZP_07404023.1, ZP_03709883.1, XP_002388648.1, ZP_07402466.1, ZP_03710807.1, ZP_08294093.1, ZP_08232611.1, XP_682514.1, ZP_06837028.1, YP_001137826.1, CAA61087.1, ZP_06043461.1, YP_002833817.1, YP_225128.1, NP_600065.1, ABU23831.1, ZP_07716892.1, ZP_03935133.1, ZP_02549600.1, ZP_05215994.1, YP_004494858.1, XP_001526333.1, AAS90085.1, XP_002379947.1, AAS90025.1, XP_001821515.1, AAL99899.1, AAS90002.1, AAS90050.1, XP_001911517.1, ACH72900.1, XP_681083.1, AAC49199.1, XP_003070495.1, XP_001241402.1, EFW18012.1, CBX98970.1, EEH03422.1, EEQ86107.1, EGC45479.1, XP_002620503.1, XP_001537328.1, XP_002796516.1, 2UVA_G, EEH43966.1, DAA05950.1, EGR47893.1, XP_003070418.1, XP_001241316.1, XP_001827193.1, XP_002384436.1, XP_682677.1, XP_002486435.1, EGP88608.1, EDP53206.1, XP_001259180.1, EEH21369.1, XP_002543038.1, XP_748739.1, XP_003015735.1, EGE05135.1, XP_002152723.1, XP_002560068.1, XP_001273529.1, XP_003230923.1, EFX05327.1, XP_003019051.1, XP_001585981.1, XP_361644.2, XP_001223166.1, XP_003349948.1, XP_002380737.1, AAB41494.1, XP_001823765.1, XP_962465.1, EGO59648.1, XP_001906652.1, XP_003039864.1, XP_001213436.1, XP_385498.1, XP_003295646.1, EFQ31022.1, XP_002849848.1, XP_002148679.1, CBX99715.1, XP_002149767.1, EFY87205.1, EFZ04064.1, XP_002340041.1, EGD94295.1, XP_001938587.1, CAK45758.1, XP_001792785.1, XP_001393189.2, XP_003169620.1, XP_001547461.1, XP_001217253.1, XP_001939430.1, BAA92930.1, Q92215.1, EDK38075.2, EFW97345.1, XP_002495511.1, XP_451653.1, XP_500912.1, CAA42211.1, XP_001486502.1, XP_002477835.1, XP_445436.1, NP_594370.1, XP_001827152.2, BAE66019.1, BAA36384.1, BAB62141.1, XP_003299759.1, XP_002553365.1, XP_002489642.1, 2UV8_G, XP_457311.1, CAY80909.1, XP_001395285.1, EGA61562.1, EDN60099.1, EDV12927.1, NP_012739.1, XP_002616181.1, XP_002420328.1, XP_001524822.1, XP_002550943.1, XP_001386364.2, NP_984945.2, 227846, AAB59310.1, XP_001646561.1, XP_716877.1, XP_001836417.1, XP_002146312.1, P34731.1, EGO24420.1, XP_002544941.1, EFZ02054.1, XP_002175228.1, XP_001393490.2, XP_003031600.1, XP_002479408.1, XP_002568119.1, XP_001825735.2, XP_002377320.1, EGN98830.1, ACD87451.1, XP_001880844.1, XP_571100.1, ABC94882.1, XP_775164.1, BAE64602.1,

EFY90992.1, XP_003194424.1, XP_001273103.1, XP_681142.1, XP_003011020.1, AAA34602.1, XP_003231209.1, XP_003019765.1, ADN94478.1, EEQ46070.1, XP_001799393.1, CAK40504.1, AAM75418.1, ADN94479.1, XP_002843356.1, CAA27616.1, XP_380213.1, ADN97213.1, XP_759118.1, XP_762607.1, CAK49094.1, EER44843.1, XP_003009335.1, XP_002997955.1, XP_002901724.1, CCA25392.1, CAK36856.1, XP_001388457.2, ABO37974.1, ABJ98780.1, XP_660985.1, EDZ71063.1, XP_001402459.2, XP_001791765.1, XP_003324647.1, EGG10429.1, EFW15039.1, XP_002384390.1, XP_003031976.1, EDZ71062.1, EFW39589.1, ACZ80683.1, XP_002901728.1, XP_003328630.1, XP_681125.1, XP_003325251.1,

and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_{iv} in general is understood to mean in particular the conversion to hexanoic acid from 2 molecules of malonyl-coenzyme A and one molecule of acetyl-coenzyme A.

Microorganisms preferred according to the invention are those which are obtained when the microorganisms listed below having a first genetic modification in the sense of the invention are used as the starting point, in that they are provided with the second genetic modification and optionally at least one further genetic modification in the sense of the invention. WO2011003034 A2 describes, particularly on p.2 to 3, p.5 third paragraph, in practical examples 1 to 4, 7 to 9 and 12 to 14 and Claims 1 to 100, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular

hexanoic acid, from at least one simple carbon source. The document also describes enzymes E_{iv} preferred according to the invention and the sequences thereof, particularly on p.5 and in practical example 3.

Hitchman TS, Schmidt EW, Trail F, Rarick MD, Linz JE and Townsend CA. (Hexanoate synthase, a specialized type I fatty acid synthase in aflatoxin B1 biosynthesis. Bioorg Chem. 2001. 29(5):293-307) describe, particularly on p.296, penultimate paragraph, to p.298, second paragraph, microorganisms preferably used according to the invention which have a first genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular hexanoic acid, from at least one simple carbon source. The document also describes enzymes E_{iv} preferred according to the invention and the sequences thereof in in particular p.299, fourth paragraph, to p.302, first paragraph.

In connection with the first genetic modification, it can be beneficial instead of the enzyme E_i to use a combination of increasing the activity of an enzyme E_{ii} compared to that of the wild type paired with that of an enzyme E_{iib} which catalyses a reaction wherein a CoA thioester is converted into an ACP thioester.

Suitable enzymes E_{iib} are known as acyl-CoA (coenzyme A):ACP (acyl carrier protein) transacylases. Preferred enzymes E_{iib} are selected from XP_003402554.1, YP_002908243.1, YP_001778804.1, YP_001670627.1, YP_004703658.1, YP_001747923.1, YP_004348703.1, YP_004352505.1, YP_004379169.1, ADR61731.1, YP_001269622.1, YP_001186851.1, YP_004659609.1, YP_003519049.1, YP_001811696.1, YP_004616040.1, NP_252697.1, NP_252169.1, NP_249421.1, ZP_06456665.1, ZP_01167071.1, ZP_08557569.1, ZP_08554397.1, YP_001157914.1, YP_004475334.1, EGM20156.1, BAK10182.1, YP_347066.1, Q9KJH8.1, YP_002987902.1, ZP_03794633.1, ZP_03627777.1, YP_004434330.1, NP_743567.1, ZP_03456835.1, ZP_07911512.1, ZP_07264431.1, ZP_02265387.2, ZP_03456013.1, ZP_07577798.1, ZP_08429367.1, YP_004055319.1, YP_004053883.1, YP_275219.1, YP_276116.1, YP_003882762.1, EGH97259.1, EGH95622.1, EGH90852.1, EGH85976.1, EGH81248.1, EGH79586.1, EGH79549.1, EGH73565.1, EGH66549.1, EGH64812.1, EGH58099.1, EGH54896.1, EGH50352.1, EGH43364.1, EGH41593.1, EGH29888.1, EGH29417.1, EGH22392.1, EGH22129.1, EGH11618.1, EGH10011.1, ZP_04589662.1, CCA60711.1, YP_003004716.1,

BAK16630.1, YP_003264146.1, YP_371314.1, YP_439272.1, NP_762892.1, ADW02533.1, YP_003291774.1, EGC99875.1, ZP_08139631.1, YP_003333890.1, EGC08366.1, YP_080427.1, YP_258557.1, YP_001985016.1, YP_002875182.1, YP_002871082.1, YP_237050.1, YP_236199.1, NP_794008.1, NP_793082.1, YP_609790.1, EFW81598.1, EFW79804.1, ZP_07261632.1, ZP_07229875.1, ZP_06458504.1, ZP_05640568.1, ZP_03399268.1, ZP_03398232.1, ZP_08004496.1, ZP_06876938.1, ZP_03227482.1, ZP_02511781.1, ZP_02503964.1, ZP_02477255.1, ZP_02466678.1, ZP_02465791.1, ZP_02461688.1, ZP_02417235.1, ZP_02414413.1, ZP_02408727.1, ZP_02376540.1, ZP_02358949.1, ZP_07778021.1, ZP_07774051.1, ZP_07795409.1, ZP_07089008.1, YP_776393.1, ZP_07684652.1, ZP_06640022.1, ZP_03054335.1, ZP_02907621.1, ZP_02891475.1, ZP_01862226.1, ZP_01769192.1, ZP_01367441.1, ZP_01366930.1, ZP_01364106.1, ZP_01312991.1, ZP_01173135.1, ZP_07005523.1, ZP_04955702.1, ZP_04943305.1, ZP_04936014.1, ZP_04932415.1, ZP_04930223.1, ZP_04905334.1, ZP_04893870.1, ZP_04893165.1, ZP_04892059.1, ZP_04884056.1, YP_002438575.1, YP_002234939.1, YP_001488024.1, YP_001346487.1, YP_001350135.1, YP_001347031.1, YP_990329.1, YP_860279.1, YP_789111.1, YP_792557.1, YP_623139.1, YP_175644.1, YP_111362.1, YP_110557.1, YP_105231.1, NP_937516.1, AAU44816.1, AAA25978.1, XP_002721010.1, AAK81868.1, AAK71350.1, AAK71349.1, ZP_06499968.1, ZP_06498781.1, YP_003472045.1, ACA03779.1, ABL84756.1, AAQ16175.1, AAT51302.1, AAT51199.1, ZP_05639386.1, ACH70299.1, ACA60824.1, BAB32432.1,

in particular

AAK81868.1, NP_743567.1, AAK71349.1, YP_001269622.1, ADR61731.1, AAU44816.1, AAQ16175.1, YP_001670627.1, ACH70299.1, Q9KJH8.1, YP_004703658.1, ZP_08139631.1, YP_609790.1, YP_001747923.1, YP_258557.1, YP_347066.1, YP_002871082.1, YP_004352505.1, ACA60824.1, ZP_07774051.1, BAB32432.1, ZP_05640568.1, EGH58099.1, EGH64812.1, EGH11618.1, ZP_06456665.1, YP_276116.1, EFW81598.1, EGH95622.1, EGH22129.1, NP_794008.1, ZP_03399268.1, ZP_07264431.1, EGH73565.1, YP_237050.1, ZP_06498781.1, EGH29888.1, EGH79586.1, EGH50352.1, YP_792557.1, YP_001350135.1, ZP_01364106.1, ZP_04932415.1, NP_249421.1, YP_004379169.1, ACA03779.1, YP_001186851.1, YP_004475334.1, ZP_04589662.1, ZP_03398232.1, EGH10011.1, ZP_07229875.1, ZP_05639386.1, EGH66549.1, YP_275219.1, ZP_07005523.1, EFW79804.1, ZP_06458504.1, EGH85976.1, YP_236199.1, EGH43364.1, ZP_07261632.1, ZP_06499968.1,

EGH29417.1, EGH54896.1, EGH22392.1, EGH97259.1, NP_793082.1, EGH90852.1, EGH41593.1, NP_252169.1, ZP_01366930.1, YP_001347031.1, ZP_07778021.1, YP_002875182.1, AAA25978.1, ABL84756.1, EGH81248.1, ZP_07795409.1 and particularly preferably AAU44816.1, NP_743567.1, YP_001269622.1, ADR61731.1, AAK71349.1, YP_001670627.1, AAK81868.1, AAQ16175.1, Q9KJH8.1, ACH70299.1, YP_004703658.1, ZP_08139631.1, YP_609790.1, YP_001747923.1, AAK71350.1, and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_{iib} in general is understood to mean in particular the conversion of dodecanoyl-CoA thioester to dodecanoyl-ACP thioester.

Third genetic modification for the production of carboxylate esters

In particular for the production of ω-functionalized carboxylate esters, such as for example ω-hydroxy-, ω-oxo-, ω-carboxy- or ω-aminocarboxylate esters it is advantageous if the microorganism has a third genetic modification, which compared with the enzymatic activity of the wild type of the microorganism comprises increased activity of at least one of the enzymes E_{iib}, E_v, E_{vi} or E_{vii}, which are involved in the conversion of carboxylic acids or ω-functionalized carboxylic acids to carboxylate esters or ω-functionalized carboxylate esters.
In this connection, it is preferable according to the invention that this genetic modification is, compared to the enzymatic activity of the wild type of the microorganism, increased activity of at least one of the enzymes selected from the group

E_{iib} Acyl-CoA (coenzyme A):ACP (acyl carrier protein) transacylase, which converts an ACP thioester into a CoA thioester or a CoA thioester into an ACP thioester,

E_v Wax ester synthase or alcohol O acyltransferase, preferably of EC 2.3.1.75 or EC 2.3.1.84, which catalyses the synthesis of an ester from an acyl-coenzyme A thioester or an ACP thioester and an alcohol,

E_{vi} Acyl-CoA (coenzyme A) synthetase, preferably of EC 6.2.1.3, which catalyses the synthesis of an acyl-coenzyme A thioester, and

E_{vii} Acyl thioesterase, preferably of EC 3.1.2.2, EC 3.1.2.4, EC 3.1.2.18, EC 3.1.2.19, EC 3.1.2.20 or EC 3.1.2.22, which catalyses the conversion of an acyl thioester with an alcohol to a carboxylate ester.

In this connection, it is particularly preferable that the third genetic modification comprises combinations of the increased activities of the enzymes selected from E_v, E_{vii}, E_vE_{vi}, $E_{vi}E_{vii}$ and $E_{vi}E_{vii}E_{iib}$.

Preferred enzymes E_{iib} in connection with the third genetic modification correspond to the enzymes E_{iib} listed above as preferable in connection with the first genetic modification.

Specific enzymes E_v

In cells preferred according to the invention, the enzyme E_v is one which comprises sequences selected from:
NP_808414.2, NP_001178653.1, XP_003272721.1, XP_002720111.1, NP_001002254.1, XP_529027.1, XP_002831804.1, BAC28882.1, XP_549056.2, XP_002918053.1, XP_001085075.1, XP_002763005.1, XP_002700092.1, XP_599558.4, EDL95940.1, XP_001496780.1, CAD89267.1, EFB28125.1, YP_004747160.1, YP_004746900.1, YP_004746665.1, YP_004746558.1, YP_004746531.1, YP_004746530.1, YP_004745948.1, YP_004745222.1, YP_004744358.1, YP_004743710.1, YP_002492297.1, AEK40846.1, YP_001847685.1, YP_001712672.1, YP_001706290.1, YP_004724737.1, YP_004723134.1, AEJ51098.1, AEJ48174.1, AEJ47480.1, YP_004392630.1, YP_004099725.1, YP_003912033.1, YP_003652731.1, YP_003301387.1,

YP_003298139.1, YP_001509672.1, YP_001505948.1, YP_001432486.1, YP_001432432.1, YP_924893.1, YP_923981.1, YP_922869.1, YP_922597.1, YP_922419.1, ZP_08629145.1, ZP_08628906.1, YP_001380027.1, YP_001280731.1, YP_001280730.1, YP_888966.1, YP_890540.1, YP_888236.1, YP_888223.1, YP_888574.1, YP_884705.1, YP_889488.1, YP_886248.1, YP_882534.1, YP_881069.1, YP_881444.1, YP_883472.1, YP_879642.1, YP_884073.1, YP_880917.1, YP_882201.1, YP_879422.1, YP_707862.1, YP_707847.1, YP_707633.1, YP_707572.1, YP_707571.1, YP_706785.1, YP_706267.1, YP_705586.1, YP_705294.1, YP_702929.1, YP_701572.1, YP_700576.1, YP_700081.1, YP_700033.1, YP_700018.1, YP_700017.1, YP_699999.1, CCB78299.1, CCB78283.1, CCB72233.1, YP_004663601.1, YP_004525283.1, YP_004524901.1, YP_004524237.1, YP_004524223.1, YP_004523752.1, YP_004522677.1, YP_004521797.1, YP_004521441.1, YP_004020500.1, YP_004014348.1, EGO40684.1, EGO38684.1, EGO38655.1, EGO37244.1, EGO36970.1, EGO36701.1, YP_003951335.1, YP_003812176.1, YP_003811992.1, YP_003810691.1, YP_003810418.1, YP_003809501.1, ZP_08574204.1, CCA19760.1, XP_002900672.1, ZP_06414567.1, ZP_06413635.1, ZP_06411773.1, ZP_06411772.1, ZP_06271823.1, ZP_05620754.1, ZP_05360001.1, ZP_04752019.1, ZP_04751943.1, ZP_04750965.1, ZP_04750465.1, ZP_04750453.1, ZP_04750228.1, ZP_04750091.1, ZP_04749363.1, ZP_04749348.1, ZP_04749293.1, ZP_04749287.1, ZP_04749022.1, ZP_04748677.1, ZP_04747379.1, ZP_04747377.1, ZP_04747348.1, ZP_04747282.1, ZP_04747159.1, ZP_04747093.1, ZP_04746958.1, ZP_04717323.1, ZP_04684258.1, ZP_04386203.1, ZP_04385082.1, ZP_04384030.1, ZP_04384029.1, ZP_03534755.1, ZP_01115502.1, ZP_01102322.1, YP_004583872.1, YP_004583323.1, YP_004573656.1, YP_004571392.1, YP_003513699.1, ZP_08553011.1, ZP_08552672.1, YP_003467054.1, YP_003572597.1, YP_579515.1, YP_001136465.1, YP_001136231.1, YP_001135959.1, YP_001135349.1, YP_001133828.1, YP_001133806.1, YP_001133693.1, YP_001133270.1, YP_001132329.1, YP_001131721.1, YP_001131631.1, YP_001073715.1, YP_001073143.1, YP_001072388.1, YP_001072036.1, YP_001071893.1, YP_001071814.1, YP_001071689.1, YP_001070856.1, YP_001069682.1, YP_001069164.1, YP_001068496.1, YP_939377.1, YP_642242.1, YP_641664.1, YP_641419.1, YP_640919.1, YP_640783.1, YP_640704.1, YP_640572.1, YP_640571.1, YP_640494.1, YP_639709.1, YP_639198.1, YP_638523.1, YP_638030.1, YP_637968.1, YP_637380.1, YP_446603.1, NP_001185377.1, NP_200151.2, NP_568547.1, NP_197641.1, NP_200150.1, NP_197139.1, NP_190490.1, NP_190488.1, NP_177356.1,

YP_004495408.1, YP_004495023.1, YP_004494197.1, YP_004494168.1, YP_004493973.1, YP_004493936.1, YP_004493628.1, YP_004493589.1, YP_004493509.1, YP_004493477.1, YP_004493462.1, YP_004492352.1, YP_004492155.1, YP_004492039.1, YP_004491716.1, YP_004491715.1, YP_004491501.1, YP_003375642.1, YP_003411203.1, YP_003410436.1, YP_003395271.1, YP_003395089.1, YP_003393635.1, YP_003384208.1, YP_003379551.1, ZP_04388235.1, YP_002134168.1, ZP_01900421.1, ZP_01900085.1, ZP_01899829.1, ZP_01898741.1, BAK05274.1, BAJ93623.1, BAJ97841.1, BAK08349.1, BAJ93204.1, BAJ92722.1, BAK06983.1, BAJ86545.1, BAK02325.1, BAJ85619.1, BAJ84892.1, ZP_05218281.1, ZP_05218149.1, ZP_05217310.1, ZP_05216978.1, ZP_05216447.1, ZP_05216446.1, ZP_05216025.1, ZP_05214687.1, ZP_08476543.1, ZP_04749239.1, YP_823060.1, ADP99639.1, ADP98951.1, ADP98855.1, ADP98710.1, ADP96265.1, ZP_08461736.1, ZP_08461735.1, ZP_07608690.1, YP_045555.1 (encoded by SEQ ID No.22), YP_872243.1, YP_004009106.1, YP_004008736.1, YP_004008003.1, YP_004007600.1, YP_004006799.1, YP_004006436.1, YP_004006072.1, YP_004005008.1, YP_003486913.1, NP_301898.1, ZP_08434757.1, YP_004079491.1, YP_004078785.1, YP_004077880.1, YP_004076486.1, YP_004076464.1, YP_004076350.1, YP_004075391.1, YP_004074864.1, ZP_01103855.1, YP_465274.1, ZP_08403393.1, ZP_08402717.1, ZP_08402716.1, YP_004427559.1, YP_001277083.1, YP_001276783.1, YP_524767.1, YP_522739.1, YP_521788.1, YP_004335162.1, YP_004333708.1, YP_004332973.1, YP_004332349.1, YP_004157731.1, YP_004224204.1, YP_003275673.1, YP_003275371.1, YP_003274979.1, YP_003274924.1, YP_003274705.1, YP_956544.1, YP_955502.1, YP_955007.1, YP_954887.1, YP_954886.1, YP_954859.1, YP_954399.1, YP_953715.1, YP_953073.1, YP_952592.1, YP_951909.1, YP_951298.1, YP_951083.1, ZP_08287899.1, ZP_08272356.1, ZP_08270967.1, CCA60099.1, CCA56737.1, YP_983728.1, YP_550833.1, YP_549124.1, YP_121795.1, YP_120815.1, YP_118589.1, YP_117783.1, YP_117375.1, YP_003646883.1, YP_003646055.1, YP_003645661.1, EGE49469.1, ZP_08234310.1, CBZ53121.1, YP_004010866.1, EGE24961.1, EGE18726.1, EGE15701.1, EGE12950.1, EGE10026.1, EGB03968.1, ZP_08206563.1, ZP_08205089.1, ZP_08204958.1, ZP_08204416.1, ZP_08203326.1, YP_714381.1, YP_713817.1, YP_694462.1, YP_693524.1, YP_003341775.1, YP_003339587.1, ZP_08197177.1, ADW01905.1, YP_004242683.1, ZP_07484742.2, ZP_07441979.2, ZP_07441978.2, ZP_07437333.2, ZP_06960424.1, ZP_06801236.1, ZP_06799517.1, ZP_05769718.1, ZP_05768326.1, ZP_05767970.1, ZP_05766272.1,

ZP_05763839.1, YP_003204265.1, YP_003203570.1, YP_003200768.1, YP_003134884.1, YP_003134608.1, ZP_05140320.1, NP_001140997.1, EEE64643.1, EEE55448.1, EEE32548.1, ZP_03534756.1, ZP_03533653.1, ZP_03531929.1, EEC71274.1, EAY98969.1, EAY75974.1, EAY75973.1, ADZ24988.1, ZP_08157247.1, ZP_08156660.1, ZP_08156249.1, ZP_08153292.1, ZP_08152876.1, ZP_08152662.1, YP_002946672.1, YP_960669.1, YP_960629.1, YP_960328.1, YP_958134.1, YP_957462.1, YP_001022272.1, ZP_08123690.1, ZP_08120547.1, ZP_08119498.1, EGB29195.1, EGB27143.1, YP_003770089.1, YP_003769971.1, YP_003764703.1, YP_003764513.1, YP_003103950.1, YP_003168536.1, YP_003168331.1, YP_003166844.1, CAJ88696.1, NP_769520.1, YP_001141853.1, YP_001108534.1, YP_001106516.1, YP_907824.1, YP_907344.1, YP_906945.1, YP_906856.1, YP_906855.1, YP_906831.1, YP_906494.1, YP_906243.1, YP_905962.1, YP_905765.1, YP_905343.1, YP_905239.1, YP_325796.1, YP_130413.1, NP_625255.1, NP_624462.1, NP_338129.1, NP_338004.1, NP_337859.1, NP_337740.1, NP_337694.1, NP_336266.1, NP_335919.1, NP_335351.1, NP_334638.1, NP_218257.1, NP_218251.1, NP_217997.1, NP_217888.1, NP_217751.1, NP_217750.1, NP_217646.1, NP_217604.1, NP_217603.1, NP_217000.1, NP_216801.1, NP_216276.1, NP_215941.1, NP_215410.1, NP_214735.1, ZP_04661667.1, EFW44815.1, EFW44455.1, ZP_08024634.1, ZP_08024620.1, ZP_08023777.1, ZP_08023597.1, YP_002784032.1, YP_002783585.1, YP_002782904.1, YP_002782647.1, YP_002780099.1, YP_002779887.1, YP_002778497.1, YP_002777657.1, YP_002777402.1, ZP_07966321.1, ZP_07944768.1, CBI21867.3, CBI40547.3, CBI40544.3, CBI40540.3, CBI40536.3, CBI40534.3, CBI40533.3, CBI32385.3, ZP_05765756.1, ZP_05765643.1, ZP_05765597.1, ZP_05765596.1, YP_001705267.1, YP_001704692.1, YP_001704281.1, YP_001702654.1, YP_001701260.1, ZP_05770434.1, ZP_05766274.1, ZP_05762133.1, ZP_05762130.1, ZP_01101223.1, YP_481580.1, YP_979623.1, YP_979196.1, ZP_07414300.2, ZP_03537340.1, ZP_03537339.1, ZP_03536772.1, ZP_03536404.1, ZP_03433478.1, ZP_03430367.1, ZP_03430260.1, ZP_03429345.1, ZP_03428583.1, ZP_03426905.1, ZP_03426458.1, ZP_03426456.1, ZP_03426455.1, ZP_03425014.1, ZP_03424082.1, ZP_03421649.1, ZP_03419291.1, ZP_03418394.1, ZP_03417976.1, ZP_03414875.1, ZP_06952098.1, ZP_05528769.1, ZP_05527907.1, ZP_05227984.1, ZP_05227897.1, ZP_05227653.1, ZP_05227585.1, ZP_05227420.1, ZP_05227202.1, ZP_05226387.1, ZP_05226386.1, ZP_05225355.1, ZP_05225200.1, ZP_05223431.1, ZP_05223402.1, ZP_04697793.1, ZP_02550609.1, ZP_02548969.1,

EEE25493.1, ABO13188.2, ZP_07205208.1, YP_589436.1, BAJ33896.1, ZP_07718107.1, ZP_07717513.1, ZP_07717390.1, ZP_07716424.1, ZP_04384387.1, ZP_07376578.1, ZP_06871097.1, ZP_06852444.1, ZP_06852442.1, ZP_06852283.1, ZP_06852150.1, ZP_06852032.1, ZP_06850980.1, ZP_06850766.1, ZP_06850644.1, ZP_06849846.1, ZP_06849446.1, ZP_06849265.1, ZP_06848894.1, ZP_06848550.1, ZP_06847321.1, ZP_06847245.1, ZP_06728640.1, ZP_06155537.1, ZP_03822106.1, ZP_03822105.1, ZP_03264909.1, ZP_01915979.1, ZP_01914209.1, ZP_01909198.1, ZP_01895985.1, ZP_01893763.1, ZP_01893601.1, ZP_01893547.1, ZP_01864269.1, ZP_01736818.1, ZP_01693481.1, ZP_01626518.1, ZP_01616172.1, ZP_01461648.1, ZP_01439861.1, ZP_01311414.1, ZP_01222733.1, ZP_01038993.1, ZP_00997001.1, ZP_06533596.1, ZP_07308012.1, ZP_07282351.1, ZP_07282257.1, ZP_07278697.1, ZP_07277986.1, ZP_07277799.1, ZP_07011797.1, ZP_06913634.1, ZP_06711075.1, ZP_06575037.1, ZP_06523715.1, ZP_06522644.1, ZP_06520408.1, ZP_06518751.1, ZP_06514733.1, ZP_06511304.1, ZP_06510466.1, ZP_06509700.1, ZP_06504004.1, ZP_06452618.1, ZP_06451687.1, ZP_06450049.1, ZP_06444722.1, ZP_06443996.1, ZP_06443677.1, ZP_06438510.1, ZP_06435077.1, ZP_06434554.1, ZP_06432969.1, ZP_06431341.1, ZP_06430915.1, ZP_05129423.1, ZP_05127637.1, ZP_05126217.1, ZP_05096686.1, ZP_05095013.1, ZP_05094400.1, ZP_05093434.1, ZP_05043539.1, ZP_05041631.1, ZP_04959394.1, ZP_04956551.1, ZP_01052702.1, YP_437020.1, YP_436128.1, YP_432512.1, YP_432391.1, ZP_06072118.1, ZP_06069021.1, ZP_06065092.1, ZP_06062254.1, YP_003032200.1, YP_003030813.1, YP_002766854.1, YP_002766842.1, YP_002766292.1, YP_002765623.1, YP_002765076.1, YP_002764977.1, YP_002764976.1, YP_002764693.1, YP_002764633.1, YP_002646305.1, YP_002646304.1, YP_001853537.1, YP_001853530.1, YP_001853214.1, YP_001852100.1, YP_001851711.1, YP_001851686.1, YP_001851684.1, YP_001851611.1, YP_001851610.1, YP_001851579.1, YP_001850950.1, YP_001850935.1, YP_001850900.1, YP_001850899.1, YP_001850378.1, YP_001849911.1, YP_001849825.1, YP_001849624.1, YP_001849470.1, YP_001848848.1, YP_001848784.1, YP_001822237.1, YP_001289190.1, YP_001289078.1, YP_001288434.1, YP_001287727.1, YP_001286168.1, YP_001085790.1, YP_856793.1, YP_629387.1, YP_615587.1, YP_615252.1, YP_457389.1, YP_263530.1, NP_962591.1, NP_962411.1, NP_962281.1, NP_961234.1, NP_960903.1, NP_960387.1, NP_960090.1, NP_959281.1, NP_959065.1, NP_857403.1, NP_857149.1, NP_857148.1, NP_857047.1, NP_856907.1, NP_856759.1,

NP_856156.1, NP_855443.1, NP_855112.1, NP_853892.1, NP_828432.1, NP_603766.1, XP_003081224.1, YP_003778608.1, YP_003730939.1, XP_003059244.1, ADI13131.1, XP_002992800.1, XP_002963877.1, XP_001419779.1, XP_002988280.1, XP_002987493.1, CBH32551.1, CBH32550.1, CBH19575.1, CBH19574.1, YP_003627553.1, XP_002879777.1, XP_002877657.1, XP_002877655.1, XP_002873570.1, XP_002871716.1, XP_002870738.1, XP_002868506.1, XP_002865972.1, XP_002864239.1, XP_002862308.1, ZP_05823139.1, NP_001043877.1, ZP_06693274.1, ZP_06058985.1, NP_001044374.1, XP_002835451.1, XP_002787542.1, XP_002785958.1, XP_002785645.1, XP_002783220.1, XP_002774061.1, XP_002767852.1, XP_002766051.1, XP_002765456.1, XP_002765455.1, XP_002677788.1, XP_002671612.1, XP_002736281.1, CBA31373.1, XP_002184474.1, XP_002325936.1, XP_002323705.1, XP_002325937.1, XP_002323911.1, XP_002323706.1, XP_002328965.1, XP_002318416.1, XP_002310400.1, ACY38597.1, ACY38596.1, ACY38595.1, ACY38594.1, ACY38593.1, ACY38592.1, ACY38591.1, ACY38590.1, ACX81315.1, ACX81314.1, XP_001868729.1, XP_001847517.1, XP_001847515.1, XP_002502575.1, ACU20370.1, ACU18073.1, XP_002523348.1, XP_002516707.1, XP_002429016.1, BAH89673.1, XP_002440221.1, XP_002459294.1, XP_002458560.1, XP_320167.4, XP_001780431.1, XP_002364905.1, XP_002263196.1, XP_002263137.1, XP_002263409.1, XP_002263252.1, XP_002268615.1, XP_002278404.1, XP_002274522.1, XP_002282418.1, XP_001633379.1, XP_001632267.1, XP_001632004.1, XP_001622638.1, XP_002155609.1, XP_759225.1, XP_002152406.1, XP_001914129.1, XP_001738032.1, XP_001731626.1, XP_001209859.1, CAN79451.1, CAN78449.1, CAN72806.1, CAN71951.1, CAN71950.1, CAN76656.1, CAN62907.1, AAZ08051.1, ABO21022.1, ABO21021.1, ABO21020.1, ABJ96321.1, BAF01088.1, XP_758106.1, BAC42871.1, BAB09801.1, BAB09102.1, in particular YP_045555.1 (encoded by SEQ ID No.22) and NP_808414.2

and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e.

the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_v in general is understood to mean in particular the conversion of dodecanoyl-CoA thioester and/or dodecanoyl-ACP thioester with methanol to dodecanoyl methyl esters.

If the enzyme E_v is an alcohol O-acyltransferase of EC 2.3.1.84, then it is preferable that this is selected from:
EGA72844.1, NP_015022.1, S69991, AAP72991.1, EDN63695.1, BAA05552.1, AAP72992.1, S69992, AAP72995.1, XP_002552712.1, XP_001646876.1, XP_002551954.1, EGA82692.1, EDN61766.1, EGA86689.1, EGA74966.1, AAU09735.1, NP_011693.1, XP_445666.1, BAA13067.1, AAP72993.1, EGA62172.1, XP_455762.1, EGA58658.1,
and
proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_v in general is understood to mean in particular the conversion of dodecanoyl-CoA thioester with methanol to dodecanoyl methyl ester.

Microorganisms preferred according to the invention are those which are obtained when the microorganisms listed below having a third genetic modification in the sense of the invention are used as the starting point, in that they are provided with a first and second genetic modification and optionally at least one further genetic modification in the sense of the invention.

WO2007136762 A2 describes, particularly on pages 2 to 4 and 21 to 24, figures 2 to 4, practical examples 1, 2 and 5 to 7 and Claims 1, 2, 5, 6, 9 to 27 and 33, microorganisms preferably used according to the invention which have a third genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters, wax esters, hydrocarbons and fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_v preferred according to the invention and the sequences thereof, particularly on pages 21 to 24, in table 10 and figure 10.

Specific enzymes E_{vi}

In cells preferred according to the invention, the enzyme E_{vi} is one which comprises sequences selected from YP_001724804.1 (encoded by SEQ ID No.21)
and
proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequence are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_{vi} in general is understood to mean in particular the synthesis of dodecanoyl-CoA thioester.

Specific enzymes E_{vii}

Microorganisms preferred according to the invention are those which are obtained when the microorganisms listed below having a third genetic modification in the sense of the invention are

used as the starting point, in that they are provided with a first and second genetic modification and optionally at least one further genetic modification in the sense of the invention.
WO2010075483 A2 describes, particularly in paragraphs [0061] to [0090] and [0287] to [0367], figures 1, 4 and 5, practical examples 1 to 38 and Claims 18 to 26, microorganisms preferably used according to the invention which have a third genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acids, fatty acid methyl esters, fatty acid ethyl esters, fatty alcohols, fatty alkyl acetates, fatty aldehydes, fatty amines, fatty amides, fatty sulphates, fatty ethers, ketones, alkanes, internal and terminal olefins, dicarboxylic acids, α,ω-dicarboxylic acids and α,ω-diols, from at least one simple carbon source. The document also describes enzymes E_{vii} preferred according to the invention and the sequences thereof, particularly in paragraphs [0012] to [0060], tables 7, 17, 26 and 27, figures 1, 44 to 47 and 55 to 59, practical examples 1 to 38 and Claims 1 to 17.

Fourth genetic modification for the production of ω-hydroxy- or ω-oxo-functionalized carboxylic acids and esters

For the case where the production of ω-hydroxy- or ω-oxo-functionalized carboxylic acids and esters – also as precursor stages for further ω-functionalizations such as for example ω-amination – is desired, it can be advantageous suitably to reduce the corresponding carboxylic acids or esters which have been oxidized in the ω position up to the carboxy function in the microorganism.
For this, microorganisms preferred according to the invention have a fourth genetic modification which, compared with the enzymatic activity of the wild type of the microorganism, comprises increased activity of at least one of the enzymes selected from the group

E_{iib} Acyl-CoA (coenzyme A):ACP (acyl carrier protein) transacylase, which converts an ACP thioester into a CoA thioester or a CoA thioester into an ACP thioester,

E_{vi} Acyl-CoA (coenzyme A) synthetase, preferably of EC 6.2.1.3, which preferentially catalyses the synthesis of an acyl-coenzyme A thioester,

E_{viii} Acyl-CoA (coenzyme A) reductase, preferably of EC 1.2.1.42 or EC 1.2.1.50, which preferentially catalyses the reduction of an acyl-coenzyme A thioester to the corresponding alkan-1-al or alkan-1-ol

E_{ix} Fatty acid reductase (also fatty aldehyde dehydrogenase or arylaldehyde oxidoreductase), preferably of EC 1.2.1.3, EC 1.2.1.20 or EC 1.2.1.48, which preferentially catalyses the reduction of an alkanoic acid to the corresponding alkan-1-al, and

E_x Acyl-ACP (acyl carrier protein) reductase, preferably of EC 1.2.1.80, which preferentially catalyses the reduction of an acyl-ACP thioester to the corresponding alkan-1-al or alkan-1-ol.

In this connection, it is particularly preferable that the fourth genetic modification comprises combinations of increased activities of the enzymes selected from E_{viii},E_{ix}, E_x, $E_{vi}E_{viii}$ and $E_{vi}E_xE_{iib}$.

Preferred enzymes E_{iib} in connection with the fourth genetic modification correspond to the enzymes E_{iib} listed above as preferable in connection with the first and third genetic modification.

Thus configured organisms preferred according to the invention are also outstandingly suitable for the production of compounds which are selected from α,ω-alkanediols, α,ω-alkanedialdehydes, α-oxo-ω-hydroxyalkanes and α,ω-alkanediamines, α,ω-alkenediols, α,ω-alkenedialdehydes, α-oxo-ω-hydroxyalkenes and α,ω-alkenediamines, since compounds of these classes are produced in significant quantities as well as the ω-functionalized carboxylic acids and ω-functionalized carboxylate esters.
In this connection, it may be mentioned that the alkene derivatives in particular arise through the conversion of unsaturated fatty acids formed by the microorganism, such as for example palmitoleic acid, oleic acid, linolic acid, α-linolenic acid and γ-linolenic acid.

Specific enzymes E_{viii}

Microorganisms preferred according to the invention are those which are obtained when the microorganisms listed below having a fourth genetic modification in the sense of the invention

are used as the starting point, in that they are provided with a first and second genetic modification and optionally at least one further genetic modification in the sense of the invention.

WO2011008565 A1 describes, particularly in paragraphs [0021], [0103] to [0106], [0108] and [0129], microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acids, fatty aldehydes, fatty alcohols, alkanes and fatty acid esters from at least one simple carbon source. The document also describes enzymes E_{viii} preferred according to the invention and the sequences thereof, particularly in paragraphs [0104] to [0106] and [0108] and [0129] and practical example 11.

WO2008151149 A2 describes, particularly in paragraphs [0009], [0015] to [0037], [0053], [0071], [0171], [0174] to [0191], [0274] and [0396], Claims 53 to 114, 188 to 206 and 344 to 355 and tables 1 to 3, microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more microbial oil from at least one simple carbon source. The document also describes enzymes E_{viii} preferred according to the invention and the sequences thereof, particularly in paragraphs [0255] to [0261] and [0269] and tables 6 and 7.

WO2007136762 A2 describes, particularly on pages 2 to 4 and 19 to 20, figures 2 to 4, practical examples 2 to 7 and Claims 4, 8 to 27 and 33, microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters, wax esters, hydrocarbons and fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_{viii} preferred according to the invention and the sequences thereof, particularly on pages 19 to 20, in table 10 and figure 10.

WO2011019858 A1 describes, particularly in paragraphs [0015] to [0020], [0064] to [0074], [0085] to [0086] and [0092] to [0099], practical examples 1 to 13, figure 1 and Claims 1 to 14, microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_{viii} preferred according to the invention and the sequences thereof, particularly in paragraphs [0004] to [0007] and [0075] to [0080] and practical examples 1 to 13.

WO2009140695 A1 describes, particularly in paragraphs [0031] to [0040], [0051] and [0214] to [0233], practical examples 22 to 24, table 1, figure 40, practical examples 5 to 24 and 28 to 30 and Claims 29 to 30, microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular hydrocarbons, from at least one simple carbon source. The document also describes enzymes E_{viii} preferred according to the invention and the sequences thereof, particularly in paragraphs [0023] to [0030], [0056], [0066] to [0069] and [0193] to [0208], table 1, figure 39, practical examples 5 to 24 and 28 to 30 and Claims 69 to 74.
WO2011008535 A1 describes, particularly in paragraphs [0023] to [0024], and [0133] to [0158], figure 13, Claims 39 and 45 to 47 and practical examples 1 to 5, microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular carboxylic acids, hydroxycarboxylic acids and lactones thereof from at least one simple carbon source. The document also describes enzymes E_{viii} preferred according to the invention and the sequences thereof, particularly in paragraphs [0017] to [0022], [0084] to [0132], figures 2 to 12, Claims 31 to 37 and 40 to 44 and practical examples 1 to 5.
WO2010063031 A2 describes, particularly in paragraphs [0007], [0092] to [0100], [0181] to [0183] and [0199] to [0213], microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more microbial oil from at least one simple carbon source. The document also describes enzymes E_{viii} preferred according to the invention and the sequences thereof, particularly in paragraphs [0191] to [0194] and tables 4 and 5.
WO2010063032 A2 describes, particularly in paragraphs [0007], [0092] to [0100], [0181] to [0183] and [0199] to [0213], microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more microbial oil from at least one simple carbon source. The document also describes enzymes E_{viii} preferred according to the invention and the sequences thereof, particularly in paragraphs [0191] to [0194] and tables 4 and 5.

Specific enzymes E_{ix}

Microorganisms preferred according to the invention are those which are obtained when the microorganisms listed below having a fourth genetic modification in the sense of the invention are used as the starting point, in that they are provided with a first and second genetic modification and optionally at least one further genetic modification in the sense of the invention.

WO2011019858 A1 describes, particularly in paragraphs [0004] to [0008], [0064] to [0074], [0085] to [0086], [0095] to [0099], practical examples 1 to 13, figure 1 and Claim 7, microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_{ix} preferred according to the invention and the sequences thereof, particularly in paragraphs [0008] to [0009], [0074] and [0081] to [0082] and practical examples 1 to 13.

WO2010135624 A2 describes, particularly in paragraphs [0005], [0067] to [0085] and [0092] to [0102], Claims 13 to 17 and practical examples 1 to 4, microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular carboxylic acids, hydroxycarboxylic acids and lactones thereof, from at least one simple carbon source. The document also describes enzymes E_{ix} preferred according to the invention and the sequences thereof, particularly in paragraphs [0005] to [0006] and [0086] to [0090], figures 3 to 7, Claim 28 and practical examples 1 to 4.

WO2010062480 A2 describes, particularly in paragraphs [0022] to [0174] and [0292] to [0316], practical examples 1 and 3 to 8, figure 9 and Claims 17 and 24, microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_{ix} preferred according to the invention and the sequences thereof, particularly in paragraphs [0019] to [0032] and [0263] to [0286], table 1, figures 6 to 8 and practical examples 1 and 3 to 8.

WO201042664 A2 describes, particularly in paragraphs [0236] to [0261], practical example 2, figure 1 and 5 and Claim 25, microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of

forming more fatty acids and fatty acid derivatives, in particular fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_{ix} preferred according to the invention and the sequences thereof, particularly in paragraphs [0211] to [0233], figures 2 to 4 and practical examples 1 to 2.

Specific enzymes E_x

Microorganisms preferred according to the invention are those which are obtained when the microorganisms listed below having a fourth genetic modification in the sense of the invention are used as the starting point, in that they are provided with a first and second genetic modification and optionally at least one further genetic modification in the sense of the invention.

WO2007136762 A2 describes, particularly on pages 2 to 4 and 19 to 20, figures 2 to 4, practical examples 2 to 7 and Claims 4, 8 to 27 and 33, microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty acid esters, wax esters, hydrocarbons and fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_x preferred according to the invention and the sequences thereof, particularly on pages 19 to 20, in table 10 and figure 10.

WO2011019858 A1 describes, particularly in paragraphs [0015] to [0020], [0064] to [0074], [0085] to [0086] and [0092] to [0099], practical examples 1 to 13, figure 1 and Claims 1 to 14, microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular fatty alcohols, from at least one simple carbon source. The document also describes enzymes E_x preferred according to the invention and the sequences thereof, particularly in paragraphs [0004] to [0007] and [0075] to [0080] and practical examples 1 to 13.

WO2009140695 A1 describes, particularly in paragraphs [0031] to [0040], [0051] and [0214] to [0233], practical examples 22 to 24, table 1, figure 40, practical examples 5 to 24 and 28 to 30 and Claim 29, microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more fatty

acids and fatty acid derivatives, in particular hydrocarbons, from at least one simple carbon source. The document also describes enzymes E_x preferred according to the invention and the sequences thereof, particularly in paragraphs [0023] to [0030], [0056], [0066] to [0069] and [0193] to [0208], table 1, figure 39, practical examples 5 to 24 and 28 to 30 and Claims 69 to 74. WO2011008535 A1 describes, particularly in paragraphs [0023] to [0024], and [0133] to [0158], figure 13, Claims 39 and 45 to 47 and practical examples 1 to 5, microorganisms preferably used according to the invention which have a fourth genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular carboxylic acids, hydroxycarboxylic acids and lactones thereof, from at least one simple carbon source. The document also describes enzymes E_x preferred according to the invention and the sequences thereof, particularly in paragraphs [0017] to [0022], [0084] to [0132], figures 2 to 12, Claims 31 to 37 and 40 to 44 and practical examples 1 to 5.

Fifth genetic modification for suppression of the degradation of carboxylic acids- and carboxylic acid derivatives

Also preferable according to the invention are microorganisms which have a fifth genetic modification which comprises, compared with the enzymatic activity of the wild type of the microorganism, decreased activity of at least one of the enzymes selected from the group

E_a Acyl-CoA synthetase, preferably of EC 6.2.1.3, which catalyses the synthesis of an acyl-coenzyme A thioester,

E_b Acyl-CoA dehydrogenase, preferably of EC 1.3.99.-, EC 1.3.99.3, or EC 1.3.99.13, which catalyses the oxidation of an acyl-coenzyme A thioester to the corresponding enoyl-coenzyme A thioester,

E_c Acyl-CoA-oxidase, preferably of EC 1.3.3.6, which catalyses the oxidation of an acyl-coenzyme A thioester to the corresponding enoyl-coenzyme A thioester,

E_d Enoyl-CoA hydratase, preferably of EC 4.2.1.17 or EC 4.2.1.74, which catalyses the hydration of an enoyl-coenzyme A thioester to the corresponding 3-hydroxyacyl-coenzyme A thioester,

E_e 3-hydroxyacyl-CoA dehydrogenase, preferably of EC 1.1.1.35 or EC 1.1.1.211, which catalyses the oxidation of a 3-hydroxyacyl-coenzyme A thioester to the corresponding 3-oxoacyl-coenzyme A thioester and

E_f Acetyl-CoA acyltransferase, preferably of EC 2.3.1.16, which catalyses the transfer of an acyl residue from a 3-oxoacyl-coenzyme A thioester to coenzyme A and thus creates an acyl-coenzyme A thioester shortened by two carbon atoms.

This has the technical effect that depletion of the carboxylic acids and carboxylate esters formed in increased quantity through the first genetic modification, but also of the ω-functionalized carboxylic acids and carboxylate esters formed in increased quantity through the second, third and fourth genetic modification, is prevented.

Specific enzymes E_a

It is also preferable according to the invention that the enzyme E_a in the cells according to the invention is one which comprises the sequence NP_416319.1.
and
proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_a in general is understood to mean in particular the synthesis of dodecanoyl-CoA thioester.

Specific enzymes E_b

It is also preferable according to the invention that in the cells according to the invention the enzyme E_b is one which comprises sequences selected from:
AP_000876.1, ZP_08341828.1, YP_002291517.1, ZP_08393771.1, EFW53921.1, YP_003227327.1, YP_001461409.1, AEG35025.1, YP_002385739.1, EGJ00024.1, ZP_08352177.1, ZP_03070250.1, ZP_08367389.1, EGM63466.1, CBI99746.1, ZP_06660773.1, ZP_08372569.1, YP_309282.2, YP_001879017.1, YP_003497883.1, ACI71032.1, YP_002406464.1, EGB79412.1, EFZ76765.1, ZP_07145000.1, ZP_07151031.1, AAZ87047.1, EFZ56676.1, ZP_06656148.1, EGB35012.1, EGB71054.1, EFW49392.1, ZP_07183316.1, YP_002396328.1, YP_002327805.1, ZP_03027602.1, AAG54546.1, YP_001742341.1, ZP_04538240.1, EFX12717.1, ACI71029.1, NP_285938.2, ZP_03064986.1, ZP_07120505.1, YP_539295.2, ZP_03049609.1, ZP_06652178.1, AAP15817.1, NP_706224.3, ABI99723.1, EGB60663.1, EFW71911.1, EGH38574.1, YP_668186.1, EGK29152.1, EGC05203.1, ZP_02801146.2, YP_687886.1, ZP_08346491.1, EGJ94671.1, EGC94003.1, ZP_08362542.1, YP_002381459.1, AAN78852.1, NP_752308.2, ZP_07173894.1, ZP_08357265.1, ZP_08382276.1, ZP_02902298.1, ZP_04560694.1, ZP_06354226.1, CBY94356.1, NP_459307.1, EGE28353.1, ZP_04657138.1, YP_002225434.1, YP_002635948.1, YP_151638.1, ZP_02663643.1, NP_454921.1, YP_004729161.1, YP_215297.1, YP_001454506.1, YP_001571699.1, YP_003363866.1, EGK30199.1, EGJ91900.1, EGK28208.1, ZP_08497358.1, CBK85993.1, YP_003611563.1, YP_004592567.1, YP_003441061.1, YP_002240296.1, YP_002917946.1, ZP_06549304.1, ZP_06017126.1, YP_001333918.1, AAM28523.1, ZP_08305363.1, YP_001439185.1, EGL74026.1, YP_001175495.1, ZP_05968792.1, YP_003209204.1, YP_003943022.1, YP_004499335.1, ZP_06191708.1, YP_001477183.1, ZP_07951567.1, YP_003740265.1, NP_668276.1, ZP_04637564.1, ZP_04631714.1, CBY26031.1, YP_004297237.1, YP_001007400.1, ZP_04625511.1, YP_069424.1, ZP_04616432.1, ZP_04639135.1, YP_001871363.1, ZP_04620883.1, ZP_06636999.1, ZP_07377275.1, YP_003929932.1, YP_001722031.1, ZP_04614013.1, ZP_04628476.1, YP_003713213.1, YP_003530236.1, CBX79727.1, YP_004114694.1, YP_001908526.1, ADP11689.1, YP_002649711.1, YP_003469212.1, YP_003519171.1, YP_051564.1, ZP_03833764.1, ZP_03827249.1, NP_928504.1, YP_004211704.1, ZP_07681706.1, YP_003018849.1, YP_003260788.1, YP_003042091.1, ZP_05973896.1, ZP_03317495.1, ZP_02958330.2, EFW60358.1,

EGI98786.1, ZP_06127315.2, YP_002150121.1, ZP_03842196.1, YP_003884303.1, YP_003003248.1, YP_003334792.1, ZP_03379559.1, CBA73629.1, YP_002986552.1, ZP_06538530.1, ZP_01258771.1, ZP_04921840.1, ZP_06180371.1, ZP_08308836.1, ZP_06174994.1, YP_001446380.1, ZP_01237449.1, ZP_01161468.1, ZP_01222040.1, ZP_06038476.1, ZP_05925639.1, ZP_06154677.1, ZP_02195704.1, ZP_01989646.1, ZP_01868523.1, YP_131060.1, ZP_05722161.1, ZP_05716057.1, NP_798668.1, EGF45205.1, ZP_05120764.1, EGR07881.1, ZP_08100412.1, ZP_04919383.1, ZP_06054287.1, YP_002156761.1, YP_205315.2, ZP_04961417.1, ZP_06050299.1, ZP_08103013.1, ZP_01949008.1, NP_231862.1, AEA79156.1, ZP_06081122.1, ZP_04418155.1, YP_001217747.1, ZP_04413631.1, NP_935312.1, ZP_01977990.1, NP_760770.1, YP_004188005.1, YP_002810906.1, ZP_05884155.1, ZP_05946273.1, ZP_01065180.1, ZP_01815735.1, YP_002417909.1, YP_002263750.1, YP_856109.1, ZP_07744057.1, ZP_08520214.1, ZP_06034047.1, YP_004565576.1, ZP_05881167.1, ZP_00991316.1, YP_734276.1, ADT86286.1, YP_001142550.1, YP_869958.1, ZP_08566610.1, ZP_05876732.1, YP_001366225.1, YP_001094233.1, ADV54653.1, YP_963612.1, YP_738268.1, YP_001502248.1, YP_004391846.1, YP_002311644.1, YP_002358241.1, YP_001050670.1, ZP_07390237.1, YP_001674114.1, YP_001554497.1, NP_718122.1, YP_001760976.1, YP_927745.1, YP_562771.1, YP_003557130.1, ZP_02159449.1, YP_003913548.1, YP_001473736.1, YP_750554.1, ZP_01897495.1, YP_268985.1, ZP_01042474.1, ZP_08570996.1, YP_004427315.1, ZP_07010199.1, YP_156047.1, ZP_07097521.1, YP_004467113.1, ZP_01614110.1, YP_340459.1, YP_004434754.1, YP_662062.1, YP_004068195.1, ZP_08409704.1, ZP_08622396.1, ZP_01135962.1, ZP_03560927.1, ZP_04716612.1, EGB41427.1, EGP48304.1, EFV84045.1, ZP_08505249.1, ZP_06688896.1, YP_003980530.1, YP_003168652.1, YP_003146346.1, YP_001250478.1, YP_095752.1, YP_124009.1, CBW99992.1, YP_284763.1, YP_127029.1, YP_746940.1, ZP_07663653.1, ZP_03349444.1, YP_002354470.1, YP_004145615.1, YP_003524477.1, ZP_03698069.1, YP_003376672.1, ZP_06188282.1, EFW81359.1, EGH83675.1, EGH67821.1, EFW83732.1, YP_273865.1, NP_902393.1, ZP_06457469.1, EGH99235.1, ZP_03397893.1, ZP_07004262.1, ZP_06732661.1, ZP_07263971.1, EGH75297.1, NP_888341.1, EGH31566.1, EGH45251.1, NP_643363.1, EGH24154.1, EGH92666.1, EGH73945.1, EGH12424.1, NP_793629.1, ZP_06705890.1, YP_234714.1, EGH62932.1, EGH52925.1, ZP_01126966.1, NP_841588.1, ZP_05109483.1, YP_003847638.1, YP_004294524.1, ZP_02244088.1,

NP_884586.1, ZP_08176463.1, ZP_04588788.1, YP_450732.1, ZP_08185386.1, YP_001914265.1, YP_003527565.1, YP_004696148.1, NP_638218.1, ZP_05046817.1, YP_343737.1, ZP_07652844.1, YP_004227922.1, YP_364921.1, YP_001632020.1, NP_744048.1, YP_001898007.1, YP_003145987.1, YP_558241.1, YP_410795.1, YP_001895310.1, YP_002980410.1, ZP_06841648.1, YP_258889.1, YP_931967.1, YP_003760619.1, YP_002029446.1, YP_004474743.1, YP_158312.1, YP_004380764.1, YP_001973352.1, CBJ39115.1, YP_349912.1, YP_003753442.1, ZP_05135288.1, YP_004700980.1, YP_927690.1, YP_001269130.1, YP_742956.1, ADR61321.1, YP_001347709.1, YP_004355482.1, YP_003907207.1, NP_251505.1, ZP_04929120.1, NP_518658.1, YP_002871500.1, ZP_01451059.1, EGM21899.1, YP_001187411.1, ZP_08570514.1, ZP_07794119.1, YP_004391835.1, YP_002256385.1, ZP_07774414.1, YP_855885.1, YP_563120.1, YP_001172167.1, YP_004713921.1, ZP_08138366.1, AEA83572.1, YP_003746704.1, ZP_08521441.1, ZP_05061205.1, YP_001667709.1, YP_750573.1, YP_607261.1, ZP_05118288.1, YP_002311716.1, NP_718079.1, YP_003777020.1, ZP_06052248.1, ZP_00943163.1, ZP_08309312.1, AEG70141.1, YP_001748377.1, YP_001857928.1, YP_001094176.1, YP_003604813.1, ZP_01947893.1,
in particular
EFW81359.1, EGH83675.1, EGH67821.1, EFW83732.1, YP_273865.1, ZP_06457469.1, EGH99235.1, ZP_03397893.1, ZP_07004262.1, ZP_07263971.1, EGH75297.1, EGH31566.1, EGH45251.1, EGH24154.1, EGH92666.1, EGH73945.1, EGH12424.1, NP_793629.1, YP_234714.1, EGH62932.1, EGH52925.1, ZP_04588788.1, NP_744048.1, YP_258889.1, YP_004474743.1, YP_004380764.1, YP_349912.1, YP_004700980.1, YP_001269130.1, ADR61321.1, YP_001347709.1, YP_004355482.1, NP_251505.1, ZP_04929120.1, YP_002871500.1, EGM21899.1, YP_001187411.1, ZP_07794119.1, ZP_07774414.1, YP_001172167.1, YP_004713921.1, ZP_08138366.1, AEA83572.1, YP_001667709.1, YP_607261.1, YP_001748377.1, YP_260045.1, YP_002873091.1, ZP_07775826.1, CAC34855.1, EGH11916.1, ZP_05641615.1, ZP_06480669.1, ZP_06480668.1, ZP_05641616.1, ZP_06492823.1, ZP_06492821.1, EGH11920.1, EGH25319.1, ZP_06492824.1, ADX52254.1, AP_000876.1, ZP_08341828.1, YP_002291517.1, YP_003227327.1, YP_001461409.1, AEG35025.1, YP_002385739.1, ZP_08352177.1, ZP_03070250.1, ZP_08367389.1, CBI99746.1, ZP_06660773.1, ZP_08372569.1, YP_003497883.1, ACI71032.1, YP_002406464.1, EGB79412.1, EFZ76765.1, ZP_07145000.1,

ZP_07151031.1, EFZ56676.1, ZP_06656148.1, EGB35012.1, EGB71054.1, ZP_07183316.1, YP_002396328.1, YP_002327805.1, ZP_03027602.1, AAG54546.1, YP_001742341.1, ABE05764.1, EFX12717.1, ACI71029.1, NP_285938.2, ZP_07120505.1, YP_539295.2, ZP_03049609.1, ZP_06652178.1, ABI99723.1, EGB60663.1, EFW71911.1, EGH38574.1, YP_668186.1, ZP_02801146.2, ZP_08346491.1, ZP_08362542.1, AAN78852.1, NP_752308.2, ZP_07173894.1, ZP_08357265.1, ZP_08382276.1, AAM28523.1, ZP_07097521.1, EGB41427.1, EGB41426.1, BAA07583.1, ZP_07100038.1, CAX20347.1

and particularly preferably

NP_744048.1, YP_004700980.1, YP_001269130.1, ADR61321.1, YP_001667709.1, YP_001748377.1, YP_258889.1, YP_349912.1, YP_002871500.1, ZP_07774414.1, YP_260045.1, YP_002873091.1, ZP_07775826.1, CAC34855.1, YP_001172167.1, YP_004713921.1, AEA83572.1, AP_000876.1, BAA07583.1, ZP_07594808.1.

and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_b in general is understood to mean in particular the oxidation of dodecanoyl-CoA thioesters to 2-dodecenoyl-CoA thioesters.

Specific enzymes E_c

It is also preferable according to the invention that in the cells according to the invention the enzyme E_c is one which comprises sequences selected from:

YP_003571780.1, YP_445820.1, YP_634556.1, YP_004665862.1, ZP_01461690.1, YP_921666.1, YP_002778910.1, ZP_08550394.1, YP_003384289.1, YP_001195727.1, YP_702012.1, ZP_04384437.1, YP_002765110.1, ZP_04996322.1, ZP_08195144.1, ZP_04700546.1, YP_954595.1, YP_004736804.1, ADW07059.1, YP_001827916.1, ZP_04691466.1, YP_001109453.1, ZP_08240125.1, YP_003272226.1, YP_004053469.1, ZP_06272176.1, YP_004491616.1, YP_001133991.1, YP_001071715.1, YP_290295.1, YP_003193744.1, YP_001704317.1, YP_004008413.1, YP_004655806.1, YP_640598.1, ZP_08153802.1, ZP_00995173.1, ZP_05225674.1, YP_888747.1, YP_003114111.1, YP_004522832.1, ZP_06848773.1, ZP_08203814.1, YP_001851901.1, EGO40578.1, YP_003134974.1, ZP_07282448.1, YP_003770185.1, YP_881295.1, YP_004336131.1, NP_961035.1, YP_004164861.1, YP_003681133.1, ZP_04749633.1, ZP_07718288.1, ZP_01201898.1, YP_004223976.1, YP_118690.1, YP_905275.1, BAE47462.1, YP_831622.1, YP_003407476.1, ZP_01129477.1, YP_003645654.1, YP_004454693.1, YP_002487953.1, YP_004084231.1, YP_003836912.1, YP_004241154.1, ZP_07706098.1, YP_001855531.1, ZP_08124588.1, YP_947882.1, BAE47461.1, YP_003327670.1, YP_001363757.1, YP_004601796.1, YP_001625220.1, YP_003638017.1, ZP_06501585.1, YP_004404736.1, YP_062974.1, YP_002957230.1, YP_003316209.1, YP_003149881.1, YP_001221553.1, YP_003162313.1, ZP_03978917.1, YP_001708860.1, ZP_05912043.1, ZP_06806059.1, YP_003155732.1, YP_002835700.1, YP_003916799.1, ZP_03936415.1, ZP_07090640.1, ZP_08516453.1, AAB97825.1, YP_004541029.1, YP_004606508.1, YP_001801238.1, ZP_07989876.1, YP_004761186.1, YP_002883572.1, ZP_08023616.1, ZP_05847263.1, YP_251740.1, ZP_03394212.1, YP_001107648.1, YP_002872770.1, YP_001821654.1, ZP_08233739.1, AAD12170.1, ZP_08215859.1, AAD40800.1, ZP_05005905.1, ADW07311.1, YP_348592.1, NP_824883.1, NP_627459.1, YP_001828149.1, ZP_05525554.1, ZP_08240364.1, ZP_07299658.1, ZP_06582153.1, ZP_06921827.1, ZP_04703961.1, BAJ27090.1, ZP_06592678.1, ZP_04691265.1, YP_001751500.1, BAJ31579.1, preferably YP_003571780.1, YP_445820.1, YP_634556.1, YP_004665862.1, ZP_01461690.1, YP_921666.1, YP_002778910.1, ZP_08550394.1, YP_003384289.1, YP_001195727.1, YP_702012.1, ZP_04384437.1, YP_002765110.1, ZP_04996322.1, ZP_08195144.1, ZP_04700546.1, YP_954595.1, YP_004736804.1, ADW07059.1, YP_001827916.1, ZP_04691466.1, YP_001109453.1, ZP_08240125.1, YP_003272226.1, YP_004053469.1, ZP_06272176.1, YP_004491616.1, YP_001133991.1, YP_001071715.1, YP_290295.1,

YP_003193744.1, YP_001704317.1, YP_004008413.1, YP_004655806.1, YP_640598.1, ZP_08153802.1, ZP_00995173.1, ZP_05225674.1, YP_888747.1, YP_003114111.1, YP_004522832.1, ZP_06848773.1, ZP_08203814.1, YP_001851901.1, EGO40578.1, YP_003134974.1, ZP_07282448.1, YP_003770185.1, YP_881295.1, YP_004336131.1, NP_961035.1, YP_004164861.1, YP_003681133.1, ZP_04749633.1, ZP_07718288.1, ZP_01201898.1, YP_004223976.1, YP_118690.1, YP_905275.1, BAE47462.1, YP_831622.1, YP_003407476.1, ZP_01129477.1, YP_003645654.1, YP_004454693.1, YP_002487953.1, YP_004084231.1, YP_003836912.1, YP_004241154.1, ZP_07706098.1, YP_001855531.1, ZP_08124588.1, YP_947882.1, BAE47461.1, YP_003327670.1, YP_001363757.1, YP_004601796.1, YP_001625220.1, YP_003638017.1, ZP_06501585.1, YP_004404736.1, YP_062974.1, YP_002957230.1, YP_003316209.1, YP_003149881.1, YP_001221553.1, YP_003162313.1, ZP_03978917.1, YP_001708860.1, ZP_05912043.1, ZP_06806059.1, YP_003155732.1, YP_002835700.1, YP_003916799.1, ZP_03936415.1, ZP_07090640.1, ZP_08516453.1, AAB97825.1, YP_004541029.1, YP_004606508.1, YP_001801238.1, ZP_07989876.1, YP_004761186.1, YP_002883572.1, ZP_08023616.1, ZP_05847263.1, YP_251740.1,

and particularly preferably YP_002835700.1, ZP_03936415.1, BAE47461.1, YP_001801238.1, ZP_03978917.1, ZP_03394212.1, ZP_05847263.1, ZP_08516453.1, YP_004606508.1, YP_251740.1, ZP_07090640.1, ZP_07989876.1, YP_004761186.1,

and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_c in general is understood to mean in particular the oxidation of dodecanoyl-CoA thioesters to 2-dodecenoyl-CoA thioesters.

Specific enzymes E_d and E_e

It is also preferable according to the invention that in the cells according to the invention the enzyme E_d or E_e is one which comprises sequences selected from:
ZP_07164313.1, NP_418288.1, YP_003231641.1, EGM59778.1, EFZ53307.1, AAA23750.1, ZP_07192215.1, YP_001460638.1, YP_001727088.1, EGK16564.1, ZP_08380619.1, ZP_07136310.1, CAB40809.1, NP_839030.1, ZP_07690617.1, EGC97039.1, ZP_07103516.1, ZP_03027888.1, ZP_07121980.1, YP_002414996.1, EGP22873.1, EGJ82677.1, EGB59499.1, ZP_07118761.1, YP_002409078.1, YP_002295407.1, EGE62412.1, EGB69560.1, ZP_06655948.1, ZP_06664574.1, ZP_03070699.1, ZP_07145404.1, ZP_08376058.1, EGB85466.1, ZP_07189176.1, ZP_02999920.1, ZP_08356523.1, ZP_06659936.1, ZP_07139396.1, YP_001746178.1, YP_002384700.1, ZP_07098889.1, CBG37051.1, ZP_04873109.1, CBJ03626.1, ZP_08366395.1, ZP_03066301.1, BAI57243.1, YP_001465330.1, YP_405325.1, NP_312801.1, EGI89589.1, EGC09628.1, EFW73050.1, ZP_07221474.1, EGB39932.1, EFW72281.1, ZP_07154547.1, YP_002331616.1, EGB76756.1, EFZ75005.1, ZP_07449248.1, NP_756652.2, ZP_04006347.1, NP_290476.1, EGH36687.1, YP_671920.1, ZP_08350773.1, EGC05062.1, ZP_07174622.1, CAP78309.1, ZP_08361145.1, YP_002400350.1, ZP_08386169.1, EFU60028.1, ZP_02904283.1, YP_859447.1, YP_543379.2, NP_462868.1, ZP_02663494.1, ACY91152.1, ZP_03221347.1, YP_001591071.1, YP_002639596.1, EFY10009.1, ZP_04656823.1, ZP_03213459.1, ZP_02701437.1, ZP_02347126.1, YP_002217909.1, ZP_02658976.1, YP_002245833.1, YP_002228260.1, YP_001451793.1, EGE35935.1, YP_002047992.1, ZP_02834645.1, ZP_02669606.1, YP_001572623.1, ZP_03075319.1, YP_002148908.1, YP_004591813.1, ZP_03163685.1, YP_002043211.1, NP_457769.1, YP_003367347.1, YP_004732313.1, ZP_06546517.1, ZP_08495782.1, ZP_04558441.1, YP_002241091.1, ZP_06354348.2, ZP_06552493.1, YP_001337975.1, YP_001178655.1, CBK87780.1, ZP_05970964.1, ZP_06014071.1, YP_002917176.1, YP_152910.1, Q9F0Y7.1, ZP_08302760.1, YP_003615422.1, YP_003943709.1, EGI93642.1, YP_001439747.1, YP_003208640.1, YP_001476499.1, ZP_06638309.1, YP_004498688.1, YP_004296470.1, ZP_06192594.1, YP_001004653.1, ZP_04634366.1, CBY29055.1, ZP_04641538.1, ZP_04628383.1,

ZP_04620754.1, ZP_04624649.1, YP_003739635.1, ZP_07953302.1, YP_001399280.1, NP_667802.1, YP_068813.1, ADV97208.1, ZP_04637125.1, YP_003019595.1, YP_048335.1, ZP_04612255.1, ZP_03831342.1, ZP_03827989.1, YP_003261565.1, ZP_04616540.1, EFW54755.1, YP_004214864.1, BAK13441.1, YP_003518496.1, YP_003933023.1, ZP_07380063.1, YP_003042702.1, YP_003713991.1, YP_003466462.1, YP_004114076.1, YP_001906200.1, NP_931575.1, EGK17810.1, CBX79037.1, YP_003529581.1, ZP_06937250.1, YP_002647270.1, ADP11112.1, ZP_05974166.1, ZP_03318464.1, ZP_02958886.1, YP_003331802.1, ZP_06125606.1, YP_003006180.1, YP_003885045.1, YP_128321.1, ZP_01236908.1, ZP_01161145.1, YP_002989323.1, YP_002154796.1, YP_203408.1, ZP_08310903.1, YP_002264299.1, ZP_01221704.1, ZP_06050960.1, ZP_03841335.1, ZP_05883431.1, YP_002153226.1, ADT85583.1, ZP_05879947.1, ZP_04923724.1, ZP_01262258.1, ZP_06179383.1, ZP_05883853.1, EGF42158.1, ZP_01957954.1, ZP_08101926.1, ZP_06177050.1, NP_759944.1, NP_796409.1, ZP_04419618.1, ZP_01987794.1, ZP_05121182.1, YP_001443702.1, ZP_01948571.1, ZP_01682057.1, ZP_04405432.1, NP_232384.1, ZP_04409574.1, ZP_01870127.1, NP_932822.1, ZP_06943917.1, EGR05147.1, ZP_04961951.1, EGR10674.1, ZP_04414292.1, ZP_05718020.1, ZP_08098153.1, ZP_05719938.1, ZP_03356468.1, ZP_07742015.1, YP_004564872.1, ZP_01979859.1, ZP_00992843.1, ZP_05927571.1, ZP_01065523.1, YP_002415749.1, ZP_01815881.1, ZP_02196043.1, YP_001143922.1, ZP_08518445.1, ZP_06156529.1, YP_004394586.1, ZP_01900693.1, YP_854676.1, ZP_05943242.1, CBA71812.1, ZP_01991723.1, YP_001092151.1, YP_001672251.1, YP_961420.1, YP_003554801.1, YP_003911300.1, ADV52504.1, YP_001364252.1, YP_001552462.1, ZP_07394327.1, YP_001048426.1, YP_002355987.1, ZP_02158912.1, ABE53312.1, YP_561035.2, YP_748714.1, ZP_01135242.1, NP_715663.1, YP_732157.1, YP_867675.1, YP_736079.1, YP_001758417.1, YP_001499882.1, YP_004436299.1, YP_659787.1, ZP_08620874.1, YP_002309470.1, CBW44433.1, ZP_08568624.1, YP_958423.1, YP_925914.1, YP_001471764.1, ZP_01165107.1, ZP_04717156.1, ZP_01042072.1, ZP_08568929.1, YP_004468425.1, ZP_01614054.1, EGH60623.1, NP_744285.1, ZP_04587907.1, EGH84450.1, YP_609235.1, Q93Q12.1, ZP_07263341.1, YP_004425808.1, EGH10831.1, ZP_08142928.1, YP_435877.1, YP_004701152.1, ADR61111.1, EGH72107.1, ZP_07255969.1, EGH76237.1, YP_154404.1, EGH66371.1, ZP_07005687.1, YP_001268914.1, ZP_03397164.1, YP_267151.1, EGH45982.1, NP_793297.1, YP_236360.1,

YP_001667915.1, EGH29726.1, ZP_03561781.1, YP_275370.1, ABP88736.1, ZP_06458302.1, YP_001748526.1, YP_002871195.1, ZP_06478839.1, EGH95845.1, YP_004067126.1, EGH21541.1, ZP_05638744.1, Q9AHY3.2, YP_338568.1, ZP_06078672.1, YP_004352961.1, ZP_01892768.1, ZP_06040413.1, YP_349607.1, YP_259059.1, ZP_08409548.1, ADP97276.1, YP_004713990.1, YP_003626258.1, P28793.1, YP_001172246.1, YP_003810247.1, YP_004313957.1, EGE21928.1, EGE19309.1, EGE13641.1, ZP_08462037.1, EGE13529.1, ZP_06034789.1, EGE12165.1, AEA83639.1, YP_002798635.1, ZP_01306165.1, YP_004474976.1, ZP_01739261.1, NP_251704.1, ACP17923.1, YP_004379416.1, YP_001280990.1, YP_003145204.1, YP_001347517.1, ZP_06877966.1, YP_001187076.1, ZP_08638729.1, YP_001340441.1, ZP_05128804.1, YP_003896827.1, YP_003073151.1, ZP_05096745.1, ZP_01103278.1, YP_693372.1, ZP_01366482.1, ZP_05619303.1, ZP_08328596.1, ZP_05042935.1, YP_574439.1, ZP_01074264.1, YP_004482149.1, YP_045111.1, YP_265216.1, ZP_05362445.1, YP_001715228.1, YP_001844981.1, YP_001708314.1, YP_581488.1, ADY83798.1, ZP_06692406.1, YP_003733838.1, ZP_05824704.1, ZP_06058514.1, ZP_08554004.1, ZP_06068411.1, ZP_06067277.1, ZP_06726497.1, ADX01983.1, ZP_03822268.1, ZP_03347927.1, ZP_01116792.1, YP_527079.1, ZP_06063435.1, ZP_06534677.1, ZP_01219812.1, ZP_03347768.1, YP_002798829.1, ZP_07774142.1, YP_003557881.1, ZP_06157092.1, ZP_01223872.1, ZP_05946076.1, ZP_06499586.1, YP_003451185.1, YP_002361722.1, YP_003266103.1, YP_285556.2, AAZ47086.1, NP_968701.1, ZP_06936670.1, ZP_03805048.1, YP_943922.1, ZP_01217009.1, ADT87675.1, ZP_05877956.1, ZP_03355309.1, ZP_05885304.1, EGK17811.1, ZP_05944972.1, ZP_05119053.1, ZP_06039619.1, ZP_05716842.1, ZP_05721090.1, ZP_06079171.1, ZP_06033023.1, ZP_08098475.1, ZP_08104504.1, ZP_06048048.1, ZP_01677170.1, ZP_01681193.1, NP_230692.2, ZP_05926205.1, ZP_05881372.1, ZP_01975051.1, ZP_04412573.1, ZP_01977591.1, ZP_04415061.1, ZP_06048243.1, YP_742943.1, ZP_04962518.1, ZP_01955504.1, ZP_07741831.1, EGK33112.1, ZP_01980800.1, CBW26643.1, EGQ99075.1, ZP_03561616.1, ZP_06155835.1, ZP_01613403.1, YP_003147156.1, ZP_01866421.1, ZP_08569601.1, YP_004068133.1, ZP_01992793.1, YP_003760621.1, NP_760849.1, NP_935233.1, YP_661240.1, CBA76402.1, YP_003527567.1, ZP_05071916.1, YP_155382.1, ZP_08567109.1, ZP_08410490.1, YP_002357526.1, YP_001473368.1, ZP_05061211.1, ZP_08309062.1, ZP_00990722.1, ZP_01813160.1,

YP_343735.1, YP_001366977.1, ZP_07393465.1, YP_002312436.1, ZP_03805047.1, ZP_04716066.1, ZP_01043968.1, YP_562538.1, ZP_01064421.1, YP_928042.1, YP_002416486.1, YP_962941.1, YP_001051116.1, YP_004467793.1, YP_004434876.1, YP_001183979.1, ZP_01125518.1, YP_001555281.1, ZP_01900341.1, YP_001459147.1, ADV54930.1, ZP_06054161.1, YP_001674882.1, YP_001381324.1, ZP_02158374.1, NP_718651.1, YP_737529.1, YP_869101.1, ZP_01258852.1, ZP_05978956.1, ZP_06179776.1, YP_733543.1, ZP_01989664.1, NP_798587.1, EGF45285.1, ZP_05908370.1, YP_001502453.1, ZP_06639387.1, YP_003557654.1, ZP_04921889.1, YP_001436988.1, YP_003468880.1, YP_001761392.1, YP_003267851.1, YP_004730996.1, EGL72460.1, YP_003742516.1, YP_003258850.1, ZP_01132697.1, ZP_01987078.1, YP_004392689.1, ZP_06191156.1, YP_002381996.1, ZP_06176023.1, EGC06853.1, ZP_07196084.1, NP_754768.1, ZP_02901855.1, ZP_08620438.1, EGE30558.1, YP_003211325.1, ZP_03220131.1, YP_217377.1, YP_003940937.1, YP_004669896.1, YP_633521.1, YP_002041652.1, NP_456929.1, YP_001446296.1, ZP_02699767.1, YP_001586838.1, YP_751355.1, ZP_08384609.1, YP_002216460.1, A8GH86.2, ZP_02667448.1, YP_004595105.1, YP_002408448.1, YP_001479604.1, YP_149790.1, NP_461330.1, YP_002227302.1, ZP_07187886.1, ZP_08374604.1, ZP_02343362.1, ZP_02683558.1, YP_001141958.1, ZP_02662473.1, ZP_07151809.1, YP_004211957.1, YP_003366276.1, YP_003713364.1, ZP_03035287.1, ZP_08364768.1, YP_002413389.1, ZP_07448710.1, ZP_04656170.1, ZP_02654823.1, ZP_01222785.1, EGB63194.1, ZP_08359459.1, YP_002636921.1, YP_002329984.1, YP_001744544.1, CAP76837.1, EFZ73229.1, EFU57443.1, YP_002398712.1, YP_003018387.1, ZP_08520753.1, YP_541623.1, ZP_02574174.1, ZP_07144040.1, ZP_08349090.1, CBG35413.1, ZP_04562847.1, ZP_02195785.1, ZP_02773221.1, EGB40918.1, ZP_03050715.1, ZP_07787570.1, ZP_03831301.1, YP_003003682.1, ZP_08354786.1, YP_051168.1, YP_002403607.1, AEE57458.1, YP_856678.1, YP_001177597.1, ZP_06658276.1, NP_288914.1, YP_002392166.1, ZP_06654274.1, ZP_07102361.1, EGB72544.1, YP_004501987.1, ZP_03027319.1, YP_670274.1, YP_003913906.1, ZP_07097669.1, YP_001463687.1, BAI55757.1, ZP_08553509.1, YP_003500399.1, ZP_07121648.1, ZP_01235780.1, CBK87125.1, YP_002293925.1, ZP_05431367.1, YP_129175.1, ZP_03003629.1, YP_002387809.1, ZP_03043524.1, YP_001569579.1, ZP_05435840.1, ZP_01464666.1, YP_001724305.1, ZP_03068335.1, CBJ01980.1, AEJ57562.1, NP_416843.1,

YP_002920590.1, ZP_03828462.1, EGM60943.1, ZP_06351976.1, ZP_05968584.1, EGK21055.1, YP_003040254.1, NP_708223.1, YP_689824.1, ZP_04625886.1, AEJ99232.1, ZP_07135079.1, YP_339488.1, ZP_07247352.1, ZP_07590743.1, ZP_08303100.1, EFU96242.1, EFZ69715.1, YP_001336370.1, YP_001094550.1, ZP_07679578.1, ZP_06547779.1, EGI93593.1, YP_003438264.1, YP_003614165.1, YP_408769.1, YP_001881164.1, YP_003655512.1, YP_002237269.1, YP_004116642.1, ZP_03065203.1, ZP_07951118.1, CAQ79951.1, AAZ26206.1, BAK12062.1, YP_269853.2, NP_930429.2, YP_404102.1, ZP_04620204.1, ZP_08498986.1, YP_001452041.1, ZP_01159981.1, CAE15574.1, A1JK30.2, ZP_04635573.1, ZP_02904987.1, ZP_02961182.1, YP_001005598.1, ZP_01301762.1, ZP_06016509.1, CBY28037.1, ZP_05060968.1, ZP_04632512.1, YP_002156637.1, YP_002132807.1, Q5E3U1.2, YP_205193.1, ZP_04613435.1, ZP_07380136.1, YP_004299028.1, YP_003334344.1, YP_001610684.1, YP_001720255.1, YP_001400379.1, YP_652007.1, NP_668898.1, ZP_04640314.1, ADV98116.1, ZP_03840558.1, ZP_07047543.1, ZP_03320348.1, YP_001681761.1, ZP_04615169.1, ZP_08182604.1, YP_003520988.1, YP_002151536.1, NP_641653.1, ZP_08188276.1, Q668V1.2, YP_463621.1, ZP_05032523.1, YP_363100.1, YP_002490860.1, YP_071146.1, YP_003527951.1, YP_004615064.1, ZP_06702935.1, YP_003277339.1, ZP_06729873.1, YP_004552309.1, ZP_08178119.1, YP_558747.1, YP_003059322.1, ZP_04628689.1, ZP_05043496.1, YP_755774.1, NP_106254.1, NP_774461.1, YP_004145058.1, NP_636640.1, YP_001411745.1, YP_244043.1, YP_003906899.1, ZP_02151779.1, EFW54754.1, YP_004147062.1, YP_434583.1, ZP_06862658.1, YP_003559491.1, ZP_07474361.1, ZP_07478578.1, ZP_03787298.1, ZP_06840682.1, ZP_05161835.1, ZP_06794105.1, ZP_05181908.1, ZP_05174379.1, YP_003883888.1, NP_541475.1, NP_949054.1, YP_003931777.1, YP_001993209.1, ZP_06124668.1, YP_001594738.1, ZP_06070710.1, ZP_06484372.1, YP_002515449.1, YP_001895558.1, YP_002029364.1, ZP_02891585.1, ZP_04682672.1, YP_003761433.1, YP_004107983.1, YP_223224.1, YP_003812264.1, YP_001622574.1, ZP_05452320.1, YP_002734532.1, YP_001257739.1, YP_001372564.1, ZP_05137372.1, YP_001973266.1, YP_342869.1, NP_699967.1, ZP_05086267.1, ZP_01736760.1, YP_001914218.1, ZP_05157647.1, YP_485365.1, YP_001926123.1, ZP_05116437.1, ZP_03544469.1, ZP_08330383.1, ZP_06491403.1, ZP_01896167.1, ADP99705.1, ZP_02883593.1, YP_004228182.1, YP_570677.1, ZP_01225298.1, YP_200487.1, YP_002988196.1, ZP_08269313.1, NP_767800.1, YP_001094989.1,

ZP_06065014.1, YP_002981447.1, YP_001260831.1, YP_003817548.1, YP_532099.1, ZP_07676723.1, YP_001242863.1, ZP_02244047.1, YP_982073.1, YP_001899020.1, NP_519880.1, ZP_02379339.1, NP_946171.1, ZP_01615132.1, YP_456953.1, ZP_02168372.1, ZP_08552434.1, CBJ37969.1, YP_004418392.1, ZP_02362492.1, YP_004107339.1, YP_001203133.1, ZP_01546752.1, YP_002974094.1, ZP_02186892.1, YP_001989920.1, YP_002964466.1, ZP_03265887.1, YP_555553.1, CBA26305.1, ZP_06728723.1, ZP_07656835.1, ZP_05620865.1, YP_575713.1, YP_001907090.1, YP_002911224.1, YP_047520.1, YP_004688052.1,

in particular

EGH60623.1, NP_744285.1, ZP_04587907.1, EGH84450.1, YP_609235.1, Q93Q12.1, ZP_07263341.1, EGH10831.1, ZP_08142928.1, YP_004701152.1, ADR61111.1, EGH72107.1, ZP_07255969.1, EGH76237.1, EGH66371.1, ZP_07005687.1, YP_001268914.1, ZP_03397164.1, EGH45982.1, NP_793297.1, YP_236360.1, YP_001667915.1, EGH29726.1, YP_275370.1, ABP88736.1, ZP_06458302.1, YP_001748526.1, YP_002871195.1, ZP_06478839.1, EGH95845.1, EGH21541.1, ZP_05638744.1, Q9AHY3.2, YP_004352961.1, YP_349607.1, YP_259059.1, YP_004713990.1, P28793.1, YP_001172246.1, AEA83639.1, YP_004474976.1, NP_251704.1, ACP17923.1, YP_004379416.1, YP_001347517.1, ZP_06877966.1, YP_001187076.1, ZP_01366482.1, ZP_07774142.1, ZP_06499586.1, YP_791508.1, ZP_07796310.1, NP_250428.1, YP_002441177.1, YP_001348922.1, ZP_06879352.1, AEA82038.1, YP_001170648.1, YP_004473370.1, YP_004712521.1, YP_004353314.1, ZP_07164313.1, NP_418288.1, YP_003231641.1, AAA23750.1, ZP_07192215.1, YP_001460638.1, YP_001727088.1, ZP_08380619.1, ZP_07136310.1, CAB40809.1, ZP_07690617.1, ZP_07103516.1, ZP_03027888.1, ZP_07121980.1, YP_002414996.1, EGP22873.1, EGB59499.1, ZP_07118761.1, YP_002409078.1, YP_002295407.1, EGE62412.1, EGB69560.1, ZP_06655948.1, ZP_06664574.1, ZP_03070699.1, ZP_07145404.1, ZP_08376058.1, EGB85466.1, ZP_07189176.1, ZP_02999920.1, ZP_08356523.1, ZP_06659936.1, ZP_07139396.1, YP_001746178.1, ZP_07098889.1, CBG37051.1, CBJ03626.1, ZP_08366395.1, BAI57243.1, YP_001465330.1, NP_312801.1, EGC09628.1, EFW73050.1, ZP_07221474.1, EGB39932.1, EFW72281.1, ZP_07154547.1, YP_002331616.1, EGB76756.1, EFZ75005.1, ZP_07449248.1, NP_756652.2, ZP_04006347.1, NP_290476.1, EGH36687.1, YP_671920.1, ZP_08350773.1, ZP_07174622.1, CAP78309.1, ZP_08361145.1, YP_002400350.1, ZP_08386169.1, EFU60028.1, YP_859447.1,

YP_543379.2, ZP_06937250.1, ZP_06936670.1, YP_001459147.1, ZP_07196084.1, NP_754768.1, ZP_08384609.1, YP_002408448.1, ZP_07187886.1, ZP_08374604.1, ZP_07151809.1, ZP_03035287.1, ZP_08364768.1, YP_002413389.1, ZP_07448710.1, EGB63194.1, ZP_08359459.1, YP_002329984.1, YP_001744544.1, CAP76837.1, EFZ73229.1, EFU57443.1, YP_002398712.1, YP_541623.1, ZP_07144040.1, ZP_08349090.1, CBG35413.1, ZP_02773221.1, EGB40918.1, ZP_03050715.1, ZP_07787570.1, ZP_08354786.1, YP_002403607.1, AEE57458.1, ZP_06658276.1, NP_288914.1, YP_002392166.1, ZP_06654274.1, ZP_07102361.1, EGB72544.1, ZP_03027319.1, YP_670274.1, ZP_07097669.1, YP_001463687.1, BAI55757.1, YP_003500399.1, ZP_07121648.1, YP_002293925.1, ZP_03003629.1, YP_002387809.1, ZP_03043524.1, YP_001724305.1, ZP_03068335.1, CBJ01980.1, AEJ57562.1, NP_416843.1, ZP_07135079.1, ZP_07247352.1, ZP_07590743.1, EFU96242.1, EFZ69715.1,

and particularly preferably

NP_744285.1, YP_004701152.1, ADR61111.1, YP_001268914.1, YP_001667915.1, ABP88736.1, YP_001748526.1, Q9AHY3.2, YP_004713990.1, YP_001172246.1, AEA83639.1, AEA82038.1, YP_001170648.1, YP_004712521.1, YP_002871195.1, YP_349607.1, YP_259059.1, ZP_07774142.1, NP_418288.1, NP_416843.1, ZP_07593201.1, ZP_07590743.1,

and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_d and E_e in general is understood to mean in particular the conversion of 2-dodecenoyl-CoA thioesters to 3-oxo-dodecanoyl-CoA thioesters.

Specific enzymes E_f

It is also preferable according to the invention that in the cells according to the invention the enzyme E_f is one which comprises sequences selected from:
YP_026272.1, YP_002389323.1, EGB30581.1, YP_001460637.1, YP_001727089.1, CAB40810.1, EGK16565.1, NP_709649.1, YP_001882545.1, ZP_08356522.1, ZP_06664573.1, AAA67642.1, ADA76222.1, EGK17812.1, YP_405326.1, YP_003236969.1, ZP_06659935.1, YP_410143.1, NP_290475.1, ZP_03027945.1, EFZ59092.1, YP_002295406.1, CBG37050.1, EGP22872.1, EGE62411.1, EGC97040.1, ZP_05435276.1, YP_002400349.1, EGB59498.1, EFW54756.1, ZP_08361144.1, YP_001465329.1, YP_002384701.1, YP_002409079.1, ZP_06655947.1, YP_002414995.1, EGB69559.1, YP_859446.1, EGC05061.1, ZP_02904263.1, ZP_08386168.1, YP_543378.1, ZP_08366394.1, ZP_03066325.1, YP_001746177.1, ZP_07154548.1, ZP_03070708.1, NP_756651.1, YP_312775.1, YP_671919.1, YP_002331615.1, YP_003367348.1, ZP_07449249.1, ZP_04558440.1, ZP_06354347.1, YP_001451792.1, YP_004732312.1, ZP_06938722.1, NP_457770.1, ZP_02834646.1, ZP_02658975.1, ZP_03221210.1, EFY10008.1, YP_001591070.1, YP_218866.1, YP_003943710.1, ZP_03086141.1, ZP_03163187.1, ZP_08495783.1, EGE35936.1, YP_003615423.1, YP_002228261.1, YP_002148907.1, ZP_05970963.1, YP_002241092.1, YP_004591812.1, YP_001178656.1, ZP_08302761.1, YP_002917175.1, YP_001337974.1, Q9F0Y6.1, ZP_06014072.1, YP_001439748.1, YP_003208639.1, 3GOA_A, YP_003739634.1, ZP_06192593.1, YP_001906199.1, YP_001476498.1, YP_003019596.1, YP_003261566.1, ZP_03831341.1, ZP_07380062.1, YP_048334.1, YP_003933022.1, ZP_07953301.1, YP_004114075.1, YP_002647269.1, ADP11111.1, ZP_03827988.1, ZP_06638308.1, YP_004214865.1, YP_003518495.1, ZP_04616541.1, BAK13440.1, CBX79036.1, YP_003529580.1, ZP_04628384.1, ZP_04634365.1, ZP_04641537.1, ZP_04612254.1, ZP_04637126.1, YP_003331801.1, YP_001004652.1, YP_004296469.1, YP_003006181.1, ZP_04620755.1, YP_003885046.1, ZP_04624648.1, NP_667801.1, EGI89588.1, YP_128320.1, ZP_01221705.1, YP_002989324.1, ZP_01236909.1, ZP_01161146.1, ZP_08310904.1, YP_003713992.1, YP_003466461.1, NP_931576.1, YP_003042703.1, ZP_06050959.1, EGF42157.1, ZP_00992844.1, YP_002415748.1, ZP_01065522.1, ZP_05883432.1, ZP_05879948.1,

ZP_06156528.1, ZP_05927570.1, ZP_07189177.1, YP_004564871.1, ZP_01870126.1, ZP_02196042.1, YP_003911299.1, ZP_01815882.1, NP_796408.1, YP_004394587.1, ZP_08518444.1, YP_854675.1, ZP_07742014.1, ZP_01135243.1, YP_002154795.1, NP_759945.1, YP_001143923.1, NP_932821.1, Q5E8X7.2, ZP_08568928.1, ZP_06078671.1, ZP_05718021.1, ZP_01948567.1, YP_203407.3, ZP_04923725.1, ZP_05719937.1, YP_002309469.1, ZP_06179384.1, ZP_06048881.1, ZP_01979851.1, ZP_01262259.1, ZP_01957951.1, ZP_04405431.1, ZP_08098152.1, ZP_06034494.1, YP_001758416.1, ZP_04414293.1, ZP_06040414.1, ZP_01682043.1, NP_232385.1, ZP_05883854.1, YP_002264298.1, ZP_01987792.1, YP_338567.1, ZP_01900694.1, YP_001672250.1, YP_925913.1, YP_001499881.1, ZP_02158913.1, YP_001471763.1, NP_715662.1, YP_748713.1, YP_736078.1, ZP_08568623.1, ZP_02958885.2, YP_004067125.1, ZP_08409549.1, YP_001181547.1, ADV52503.1, YP_732156.1, YP_001092150.1, YP_003554800.1, YP_001048425.1, YP_961419.1, YP_561034.1, ZP_06125607.2, YP_867674.1, YP_001443701.1, ZP_05943241.1, ZP_05121169.1, ZP_05974167.1, ZP_03318463.1, ZP_08620875.1, ZP_01042073.1, YP_154403.1, ZP_04717155.1, ZP_03805050.1, YP_004468426.1, ZP_03841336.1, YP_002153225.1, YP_004425807.1, ZP_03351120.1, YP_659788.1, YP_004436298.1, YP_267150.1, ZP_06034790.1, YP_003145205.1, ZP_03561780.1, YP_003810248.1, ZP_05043383.1, YP_693373.1, ZP_01306166.1, YP_004313956.1, YP_790159.1, ZP_06877967.1, NP_251703.1, YP_004482148.1, EGH66370.1, EGH10832.1, YP_349606.1, YP_236359.1, ZP_07263340.1, EGH95844.1, ZP_03368595.1, NP_793296.1, ZP_01165108.1, 1WDK_C, P28790.2, YP_259060.1, ZP_01074263.1, ZP_04587908.1, EGH45981.1, ZP_07774144.1, EGH84449.1, YP_958424.1, YP_275369.1, ZP_07005686.1, YP_001172247.1, YP_004352962.1, ACP17922.1, YP_002871196.1, YP_435876.1, ZP_01739262.1, YP_003557880.1, ZP_01892767.1, ZP_08142929.1, ZP_08462036.1, YP_004701153.1, YP_001667916.1, YP_001280989.1, YP_001268913.1, Q93Q11.1, ZP_05619304.1, AEA79634.1, Q9R9W0.1, NP_744286.1, YP_001187077.1, YP_609234.1, ADP97277.1, YP_045110.1, YP_004379417.1, YP_003626259.1, ZP_06692405.1, ZP_06063436.1, YP_003733839.1, EGE12166.1, ZP_05824703.1, EGE26385.1, EGE13530.1, YP_004474975.1, YP_001708315.1, EGE16076.1, ZP_06726496.1, ZP_06067276.1, ZP_06058513.1, ZP_06068412.1, ZP_06157093.1, ZP_03822267.1, A3M1H9.2, YP_001340442.1, ZP_05362446.1, ABP88737.1, ZP_01219813.1, ZP_08638730.1, YP_265215.1, YP_581487.1, YP_003896828.1,

YP_002798636.1, ZP_01678475.1, ZP_05946075.1, YP_527080.1, ZP_08554005.1, ZP_03360083.1, YP_574438.1, YP_003073152.1, YP_001083375.1, ZP_08648989.1, YP_001982171.1, ZP_05096741.1, ZP_03336985.1, ZP_01103277.1, ZP_07136312.1, ZP_08328590.1, ZP_05128805.1, EGH76239.1, ZP_03377529.1, CBA71811.1, EFZ47010.1, ZP_03377530.1, ZP_07136311.1, EFZ47009.1, EGH29725.1, YP_003022611.1, YP_002138248.1, ZP_01462439.1, ZP_06499584.1, YP_004669687.1, YP_633289.1, ZP_01907074.1, YP_001611010.1, ADI22030.1, ZP_03026937.1, YP_580525.1, YP_003265025.1, YP_001525888.1, YP_002298157.1, YP_002945338.1, YP_003271056.1, YP_004198848.1, ZP_01895445.1, ZP_08636846.1, ADP95813.1, ZP_03357270.1, YP_002535575.1, YP_160280.1, YP_385012.1, YP_004154467.1, YP_742957.1, YP_984918.1, ZP_07949467.1, YP_002552054.1, YP_003439807.1, YP_002919224.1, YP_001475439.1, ZP_07652842.1, YP_001335140.1, YP_972400.1, ZP_08308052.1, YP_001749490.1, YP_004594280.1, ZP_05360584.1, YP_002490812.1, ZP_03336986.1, YP_004236457.1, ZP_08387650.1, YP_046370.1, ZP_03823670.1, AEJ97944.1, ZP_06188204.1, ABF82237.1, ZP_06016043.1, YP_046135.1, YP_942111.1, ZP_01614052.1, YP_001341942.1, YP_004713534.1, ZP_01460231.1, YP_001630800.1, YP_001264278.1, CAD76924.1, ZP_07200324.1, YP_550745.1, YP_001413963.1, YP_002132758.1, ZP_05972210.1, ZP_06065848.1, ZP_08209169.1, ZP_06061642.1, ZP_05109438.1, YP_001419321.1, YP_463572.1, YP_608369.1, YP_001683323.1, AEA83130.1, YP_001230361.1, YP_001832875.1, YP_002237684.1, AAN39378.1, YP_001019613.1, YP_426398.1, ZP_03543802.1, YP_001171793.1, YP_002138936.1, YP_001562369.1, ZP_01786296.1, YP_001528043.1, NP_881363.1, ZP_04625099.1, ZP_02187462.1, YP_002355162.1, YP_248479.1, ZP_07043392.1, YP_002028041.1, YP_001900023.1, ZP_01792340.1, ZP_03541158.1, NP_438930.1, ZP_04464778.1, YP_003278968.1, YP_004490499.1, ZP_07662038.1, AAM48101.1, YP_422117.1, YP_524752.1, YP_918568.1, YP_001264814.1, YP_003807823.1, YP_001260276.1, ZP_07046088.1, ZP_01784141.1, ZP_05135853.1, YP_002982015.1, EEZ80724.1, YP_001292714.1, YP_001971860.1, YP_788379.1, ZP_05783989.1, YP_004415862.1, CAE45106.1, YP_004618019.1, ZP_01126529.1, ZP_06062289.1, YP_004538662.1, NP_248919.1, YP_001098905.1, YP_003847633.1, YP_002432816.1, YP_003280245.1, A64092, ZP_08404839.1, YP_003466069.1, YP_001348923.1, YP_158582.1, YP_004229600.1, ZP_07797976.1, YP_001416028.1, YP_001747677.1, YP_002362051.1, YP_931973.1, ZP_08505255.1,

EGP53986.1, NP_250427.1, YP_366806.1, ZP_04638299.1, ZP_08485306.1, YP_001675166.1, AAA23322.1, NP_927515.1, AAR83740.1, YP_433439.1, YP_001668851.1, YP_001713606.1, YP_002354475.1, ZP_06548530.1, ZP_04764695.1, ZP_01910282.1, YP_004146469.1, YP_095382.1, ZP_06495825.1, YP_003777379.1, ZP_01914912.1, ZP_06895226.1, YP_004379898.1, YP_003365234.1, YP_001784146.1, YP_003021900.1, YP_004555586.1, YP_001101071.1, CBW99592.1, YP_003254723.1, AAG30258.1, YP_004536011.1, NP_884797.1, NP_635761.1, YP_002429235.1, YP_001901798.1, ZP_06485970.1, YP_123631.1, YP_001352245.1, ZP_03697428.1, ZP_05824476.1, ZP_01014491.1, EGH60624.1, YP_004028852.1, ZP_04633718.1, YP_001846659.1, ZP_04933402.1, YP_003731942.1, YP_001345710.1, YP_003979747.1, ZP_00053266.1, YP_126656.1, YP_003442067.1, YP_585810.1, ZP_01614053.1, ZP_06690229.1, YP_001858908.1, ZP_01128624.1, NP_888558.1, ZP_05827098.1, Q8VPF1.1, YP_004473788.1, EGH77345.1, P45363.1, EGH44350.1, YP_001676522.1, ZP_05824514.1, ZP_06487592.1, ZP_02887415.1, ZP_04761513.1, YP_003377502.1, YP_001188713.1, ZP_01167911.1, ZP_06690267.1, YP_004680403.1, YP_003731982.1, YP_002800937.1, YP_001758618.1, YP_004380648.1, YP_001188079.1, YP_001707349.1, YP_004687867.1, CAZ89607.1, ZP_05827058.1, ZP_08142248.1, YP_195739.1, YP_004703691.1, YP_001354779.1, ZP_08627639.1, ZP_04936650.1, NP_642338.1, ZP_03451105.1, YP_001713567.1, EFV87627.1, YP_728366.1, YP_002912837.1, YP_001707333.1, YP_363794.1, YP_003524466.1, YP_959751.1, YP_606872.1, YP_102034.1, YP_002942733.1, YP_002238110.1, ZP_05032457.1, YP_001846620.1, YP_004153168.1, ZP_02462362.1, YP_003777513.1, YP_199120.1, ZP_08179077.1, ZP_08188845.1, YP_107279.1, ADP98459.1, YP_004157409.1, YP_610092.1, EGP55478.1, CBJ37328.1, ZP_08181461.1, ZP_06842278.1, ZP_06703672.1, ADR61907.1, ZP_06688595.1, ZP_04934614.1, ZP_07262554.1, YP_786611.1, YP_003439146.1, YP_003592852.1, YP_001747891.1, YP_004386570.1, Q51956.1, YP_004593695.1, YP_560516.1, ZP_06731844.1, YP_001897101.1, ZP_08388430.1, YP_001166210.1, YP_557015.1, ZP_06843809.1, EGP42659.1, YP_002005592.1, YP_002871766.1, YP_555845.1, ZP_05921114.1, NP_746745.1, NP_637343.1, ZP_02243308.1, YP_001267798.1, ZP_02354510.1, NP_841567.1, ZP_08177693.1, YP_004703877.1, YP_001166143.1, EGH73771.1, ZP_06489206.1, ZP_01892079.1, YP_934562.1, ADY81955.1, EGB73439.1, NP_520373.1, YP_003905682.1, EGH61062.1, YP_001894311.1, ZP_02245330.1,

YP_918778.1, YP_001120651.1, YP_003612896.1, YP_004125334.1, ZP_07952596.1, YP_001479268.1, ZP_07043083.1, YP_003644271.1, NP_421210.1, ZP_02882590.1, EGP25245.1, YP_233920.1, EGD00226.1, YP_004418315.1, ADY81914.1, ZP_04944762.1, YP_003603999.1, YP_001060552.1, ZP_03026966.1, YP_441123.1, YP_201177.1, ZP_05117283.1, YP_004232360.1, YP_002802211.1, YP_106085.1, YP_258448.1, YP_001989549.1, NP_945866.1, ZP_03573123.1, YP_283604.1, YP_004702122.1, ZP_03398400.1, YP_105310.1, YP_001479310.1, CAC41637.1, ZP_02372747.1, YP_001578772.1, ZP_08181762.1, ZP_00439074.2, ADX92638.1, ZP_03790444.1, YP_110295.1, YP_002439726.1, YP_004361986.1, ZP_04946665.1, YP_003751825.1, YP_001061488.1, ZP_03545148.1, ZP_01767462.1, ZP_01769818.1, YP_990241.1, YP_002382777.1, YP_002898389.1, YP_003452421.1, EGH66881.1, CBW26817.1, YP_004352451.1, EGC07165.1, YP_003982691.1, ZP_02906520.1, YP_410799.1, YP_001189077.1, YP_004226900.1, ADP96997.1, YP_237079.1, YP_002946310.1, YP_004029037.1, NP_745423.1, ZP_08139209.1, YP_004294989.1, NP_251630.1, EGH73592.1, ZP_04934925.1, ZP_03583227.1, ZP_03584241.1, YP_004684330.1, YP_004501533.1, YP_001186637.1, YP_003980170.1, AEJ98540.1, YP_004688333.1, YP_003276725.1, EGH11975.1, YP_276147.1, YP_790233.1, ZP_01736635.1, YP_002440908.1, YP_002230040.1, YP_724980.1, YP_004231717.1, ZP_01226775.1, ZP_03454556.1, ZP_05586076.1, ZP_02890239.1, YP_001172996.1, ZP_02377875.1, ZP_07202399.1, YP_774661.1, YP_440314.2, YP_443408.1, ZP_06878044.1, ZP_08274339.1, YP_001618203.1, ZP_08631485.1, ZP_01545529.1, ZP_03267843.1, ZP_07797009.1, YP_003376084.1, EGH21143.1, YP_003753513.1, YP_004282234.1, YP_726356.1, ZP_06014951.1, YP_109637.1, ZP_06461447.1, YP_001795795.1, YP_621981.1, ZP_07794257.1, ZP_05060451.1, YP_002919830.1, YP_001796645.1, NP_794063.1, ZP_01365347.1, YP_003610065.1, YP_001462757.1, YP_001807185.1, ZP_04928407.1, YP_002229986.1, ZP_02883901.1, YP_370284.1, ZP_05053491.1, AAC24332.1, ZP_04929241.1, ZP_00943679.1, YP_001766064.1, YP_001670661.1, YP_003296167.1, YP_003773673.1, NP_250691.1, ZP_05823066.1, YP_004381309.1, YP_004714773.1, YP_746962.1, YP_002513585.1, YP_294674.1, YP_004593822.1, YP_622032.1, YP_001897940.1, YP_001335713.1, YP_001856626.1, YP_791238.1, YP_004140309.1, YP_001269802.1, ZP_06879064.1, ZP_01736318.1, ZP_02886139.1, ZP_04941413.1, YP_001670851.1, YP_371023.1, YP_002980343.1, YP_002795605.1,

ZP_06069679.1, ZP_02463309.1, ZP_05785212.1, YP_001793049.1, YP_003965283.1, YP_001233153.1, YP_299776.1, ZP_06498740.1, AEJ99148.1, YP_004685690.1, YP_003746771.1, YP_004381943.1, YP_004378973.1, YP_004314684.1, EGH79619.1, ZP_04882546.1, YP_347001.1, YP_347471.1, YP_001757758.1, YP_002911324.1, NP_518596.1, ZP_00948908.1, YP_442777.1, YP_002874183.1, YP_002230989.1, YP_004360850.1, ABC36127.1, YP_004696127.1, YP_002799527.1, YP_001631275.1, YP_626125.1, ZP_05090649.1, ZP_07774002.1, ZP_04940525.1, AEK60371.1, ADR60119.1, YP_102981.1, YP_003451423.1, NP_743536.1, CAA45255.1,

in particular

YP_790159.1, ZP_06877967.1, NP_251703.1, EGH66370.1, EGH10832.1, YP_349606.1, YP_236359.1, ZP_07263340.1, EGH95844.1, NP_793296.1, 1WDK_C, P28790.2, YP_259060.1, ZP_04587908.1, EGH45981.1, ZP_07774144.1, EGH84449.1, YP_275369.1, ZP_07005686.1, YP_001172247.1, YP_004352962.1, ACP17922.1, YP_002871196.1, ZP_08142929.1, YP_004701153.1, YP_001667916.1, YP_001268913.1, Q93Q11.1, Q9R9W0.1, NP_744286.1, YP_001187077.1, YP_609234.1, YP_004379417.1, YP_004474975.1, ABP88737.1, EGH76239.1, EGH29725.1, ZP_06499584.1, YP_001749490.1, ABF82237.1, YP_004713534.1, CAD76924.1, YP_608369.1, AEA83130.1, YP_001171793.1, YP_788379.1, CAE45106.1, NP_248919.1, YP_001348923.1, ZP_07797976.1, YP_001747677.1, NP_250427.1, AAR83740.1, YP_001668851.1, ZP_06495825.1, YP_004379898.1, EGH60624.1, ZP_04933402.1, YP_001345710.1, Q8VPF1.1, YP_004473788.1, EGH77345.1, EGH44350.1, YP_001188713.1, YP_004380648.1, YP_001188079.1, ZP_08142248.1, YP_004703691.1, ZP_04936650.1, YP_606872.1, YP_610092.1, ADR61907.1, ZP_04934614.1, ZP_07262554.1, YP_001747891.1, Q51956.1, YP_002871766.1, NP_746745.1, YP_001267798.1, YP_004703877.1, EGH73771.1, EGH61062.1, YP_233920.1, YP_258448.1, YP_004702122.1, ZP_03398400.1, YP_002439726.1, EGH66881.1, YP_004352451.1, YP_001189077.1, YP_237079.1, NP_745423.1, ZP_08139209.1, NP_251630.1, EGH73592.1, ZP_04934925.1, YP_001186637.1, EGH11975.1, YP_276147.1, YP_790233.1, YP_002440908.1, YP_001172996.1, ZP_06878044.1, ZP_07797009.1, EGH21143.1, ZP_06461447.1, ZP_07794257.1, NP_794063.1, ZP_01365347.1, ZP_04928407.1, AAC24332.1, ZP_04929241.1, YP_001670661.1, NP_250691.1, YP_004381309.1, YP_004714773.1, YP_791238.1, YP_001269802.1, ZP_06879064.1, YP_001670851.1, ZP_06498740.1,

YP_004381943.1, YP_004378973.1, EGH79619.1, YP_347001.1, YP_347471.1, YP_002874183.1, ZP_07774002.1, ADR60119.1, NP_743536.1, YP_001269653.1, ZP_06482365.1, ADI95330.1, ZP_07003619.1, BAB96553.1, ZP_07777009.1, ABA10831.1, YP_273131.1, YP_259428.1, EFW86233.1, EGH85840.1, ZP_07774597.1, EGH54613.1, YP_004353129.1, YP_002871014.1, YP_001171232.1, EGH67454.1, EFW82139.1, ZP_04590526.1, EGH58132.1, EGH06629.1, EGH99157.1, ZP_05638078.1, NP_790796.1, AEE59172.1, YP_026272.1, YP_002389323.1, EGB30581.1, YP_001460637.1, YP_001727089.1, CAB40810.1, ZP_03049054.1, ZP_08356522.1, ZP_06664573.1, AAA67642.1, YP_003236969.1, ZP_06659935.1, NP_290475.1, ZP_03027945.1, EFZ59092.1, YP_002295406.1, CBG37050.1, EGP22872.1, EGE62411.1, YP_002400349.1, EGB59498.1, ZP_08361144.1, YP_001465329.1, YP_002409079.1, ZP_06655947.1, YP_002414995.1, EGB69559.1, YP_859446.1, ZP_08386168.1, YP_543378.1, ZP_08366394.1, YP_001746177.1, ZP_07154548.1, ZP_03070708.1, NP_756651.1, YP_671919.1, YP_002331615.1, ZP_07449249.1, ZP_06938722.1, ZP_03086141.1, ZP_07189177.1, ZP_07136312.1, EFZ47010.1, ZP_07136311.1, EFZ47009.1, ZP_03026937.1, EGB73439.1, EGP25245.1, ZP_03026966.1, YP_001462757.1, CAP76727.1, YP_670163.1,

and particularly preferably

YP_026272.1, AAA67642.1, ZP_07593202.1, YP_004701153.1, YP_001667916.1, YP_001268913.1, Q9R9W0.1, NP_744286.1, ABP88737.1, YP_001749490.1, YP_001747677.1, YP_001668851.1, YP_004703691.1, ADR61907.1, YP_001747891.1, Q51956.1, NP_746745.1, YP_001267798.1, YP_004703877.1, YP_004702122.1, NP_745423.1, AAC24332.1, YP_001670661.1, YP_001269802.1, YP_001670851.1, ADR60119.1, NP_743536.1, YP_001269653.1, ADI95330.1, BAB96553.1, YP_001172247.1, YP_004713534.1, AEA83130.1, YP_001171793.1, YP_001172996.1, YP_004714773.1, YP_001171232.1, YP_349606.1, YP_259060.1, ZP_07774144.1, YP_002871196.1, ABF82237.1, YP_002871766.1, YP_258448.1, YP_347001.1, YP_347471.1, YP_002874183.1, ZP_07774002.1, ZP_07777009.1, YP_259428.1, ZP_07774597.1, YP_002871014.1,

and

proteins with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% of the amino acid residues compared to the aforementioned reference sequences are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably

65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the corresponding, aforementioned reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection and in connection with the determination of the activity of the enzyme E_f in general is understood to mean in particular the conversion of 3-oxo-dodecanoyl-CoA thioesters and CoA to decanoyl-CoA thioesters and acetyl-CoA.

Sixth genetic modification for intensification of the acyl-ACP thioester synthesis

According to the invention, the microorganisms have a sixth genetic modification, so that compared to their wild type they are capable of forming more acyl-ACP thioester from at least one simple carbon source. An overview of correspondingly desirable genetic modifications is to be found in Fig.1 of WO2008119082, paragraph 1 (Fatty Acid Production Increase / Product Production Increase).

This has the technical effect that formation of carboxylic acids and carboxylate ester intensified by the first genetic modification, but also of ω-functionalized carboxylic acids and carboxylate esters formed in greater quantity through the second, third, fourth, fifth or seventh genetic modification, is still further intensified.

Thus configured organisms preferred according to the invention are also outstandingly suitable for the production of compounds which are selected from α,ω-alkanediols, α,ω-alkanedialdehydes, α-oxo-ω-hydroxyalkanes and α,ω-alkanediamines, since compounds of these classes are produced in significant quantities together with ω-functionalized alkanoic acids and ω-functionalized alkanoate esters

Seventh genetic modification for the production of ω-functionalized carboxylic acids and ω-functionalized carboxylate esters with a terminal double bond

The microorganisms according to the invention can additionally be configured such that they are advantageously suitable for the production of ω-functionalized carboxylic acids and ω-functionalized carboxylate esters with a terminal double bond. For this, preferred microorganisms contain a seventh genetic modification which comprises, compared to the enzymatic activity of the wild type of the microorganism, increased activity of an enzyme E_{xi} which catalyses the conversion of ω-carboxycarboxylic acids or ω-carboxycarboxylate esters to carboxylic acids or carboxylate esters with a terminal double bond, selected from the group

E_{xi}) Cytochrome P450 fatty acid decarboxylase, which catalyses the conversion of an alkanoic acid with n carbon atoms to a corresponding terminal olefin with n-1 carbon atoms, in particular of dodecanoic acid to undec-10-enoic acid.

Microorganisms preferred according to the invention are those which are obtained when the microorganisms listed below having a seventh genetic modification in the sense of the invention are used as the starting point, in that they are provided with a first and second genetic modification and optionally at least one further genetic modification in the sense of the invention.

WO2009085278 A1 describes, particularly in paragraphs [0033] to [0048], [0056] to [0063] and [0188] to [0202], figure 10, table 8, practical examples 5 to 18 and Claims 28 to 51 and 188 to 195, microorganisms preferred according to the invention which have a seventh genetic modification, so that compared to their wild type they are capable of forming more fatty acids and fatty acid derivatives, in particular olefins, from at least one simple carbon source. The document also describes E_{xi} preferred according to the invention enzymes and the sequences thereof, particularly in paragraphs [0021] to [0032], [0051] to [0055], [0081] to [0084] and [0160] to [0183], table 8, practical examples 5 to 18, Claims 1 to 25 and figures 3, 7 and 9.

Specific embodiments of preferable microorganisms and enzymes

According to the invention, microorganisms are particularly preferably selected from those which have

a first and a second genetic modification in the sense of the invention,

a first, a second and a fifth genetic modification in the sense of the invention,

a first, a second and a third genetic modification in the sense of the invention,
a first, a second, a third and a fifth genetic modification in the sense of the invention,
a first, a second and a fourth genetic modification in the sense of the invention,
a first, a second, a fourth and a fifth genetic modification in the sense of the invention,
a first, a second, a third and a fourth genetic modification in the sense of the invention,
a first, a second, a third, a fourth and a fifth genetic modification in the sense of the invention,
a first, a second and a seventh genetic modification in the sense of the invention,
a first, a second, a fifth and a seventh genetic modification in the sense of the invention,
a first, a second, a third and a seventh genetic modification in the sense of the invention or
a first, a second, a third, a fifth and a seventh genetic modification in the sense of the invention
a first, a second and a sixth genetic modification in the sense of the invention,
a first, a second, a fifth and a sixth genetic modification in the sense of the invention,
a first, a second, a third and a sixth genetic modification in the sense of the invention,
a first, a second, a third, a fifth and a sixth genetic modification in the sense of the invention,
a first, a second, a fourth and a sixth genetic modification in the sense of the invention,
a first, a second, a fourth, a fifth and a sixth genetic modification in the sense of the invention,
a first, a second, a third, a fourth and a sixth genetic modification in the sense of the invention,
a first, a second, a third, a fourth, a fifth and a sixth genetic modification in the sense of the invention,
a first, a second, a sixth and a seventh genetic modification in the sense of the invention,
a first, a second, a fifth, a sixth and a seventh genetic modification in the sense of the invention,
a first, a second, a third, a sixth and a seventh genetic modification in the sense of the invention or
a first, a second, a third, a fifth, sixth and a seventh genetic modification in the sense of the invention.

According to the invention, microorganisms are particularly preferable which have a first genetic modification, so that compared to their wild type they are capable of forming more carboxylic acids and carboxylate ester from at least one simple carbon source, wherein the first genetic modification displays, compared to the enzymatic activity of the wild type of the microorganism, increased activity of at least one of the enzymes E_i or of one of the enzymes with a polypeptide sequence wherein up to 60%, preferably up to 25%, particularly preferably up to 15%, in

particular up to 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1% amino acid residues compared to the sequences stated in the following table by reference are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, preferably 65%, particularly preferably 80%, in particular more than 90% of the activity of the protein with the respective reference sequence, wherein 100% activity of the reference protein is understood to mean the increasing of the activity of the cells used as a biocatalyst, i.e. the quantity of substance converted per unit time based on the cell quantity used (units per gram cell dry weight [U/g CDW]) in comparison to the activity of the biocatalyst in the absence of the reference protein, wherein the activity in this connection in general is understood to mean in particular the hydrolysis of an ACP thioester with the carbon chain length assigned in the following table to the individual enzymes E_i, and the carboxylic acid and carboxylate ester have a carbon chain length of the carboxylic acid part, as shown in the following table:

Enzyme E_i selected from	Carbon chain length
AAC49269.1, CAB60830.1, AAC49179.1, AAC49784.1, ABB71579.1, CAC19934.1 and SEQ ID Nos.26, 29, 33, 38, 40, 97 and 99 of WO2011008565	C8
AAC49269.1, CAB60830.1, AAC49179.1, AAC49784.1, ABB71579.1, CAC19934.1 and SEQ ID Nos.73, 75, 87 and 89 of WO2011008565.	C10
Q41635.1, Q39473.1, AAC49180.1, CAC19934.1, AAC72881.1, AAC49783.1, AAC49784.1 and SEQ ID Nos.49 and 51 of WO2011008565.	C12
Q41635.1, Q39473.1, AAC49180.1, CAC19934.1, AAC72881.1 AAC49783.1, AAC49784.1 and SEQ ID Nos. 49, 51, 53, 55, 61, 63, 67, 69, 77, 79, 83 and 85 of WO2011008565.	C14

The aforementioned deletions of amino acid residues compared to the sequences stated in the above table by reference relate in particular to deletions at the N- and/or C-terminus, in particular at the N-Terminus. Particularly preferably, the aforementioned N-terminus is that of a plant plastid targeting sequence. Such plant plastid targeting sequences can for example be predicted by means of the algorithms utilized by the predictive tool TargetP 1.1 (www.cbs.dtu.dk/services/TargetP/) and described in the following publications, preferably without use of cutoffs:
Predicting subcellular localization of proteins based on their N-terminal amino acid sequence. Olof Emanuelsson, Henrik Nielsen, Søren Brunak and Gunnar von Heijne.
J. Mol. Biol., 300: 1005-1016, 2000 and *Identification of prokaryotic and eukaryotic signal peptides and prediction of their cleavage sites.* Henrik Nielsen, Jacob Engelbrecht, Søren Brunak and Gunnar von Heijne. Protein Engineering, 10:1-6, 1997.

Microorganisms quite especially preferred according to the invention (abbreviated as MO) are outstandingly suitable for the production of ω-aminocarboxylic acids and have increased or decreased enzyme activities (abbreviated as E) described in the following table, where these can in addition advantageously be combined with an increased enzyme activity compared to the wild type of the microorganism, which is described for the 3-ketoacyl-ACP (Acyl Carrrier Protein) synthase III (EC 2.3.1.41), in particular that from plants, preferably that from plants the seeds whereof contain fatty acids with alkyl residues shorter than 14 C atoms, and particularly preferably that from plants of the genera *Cuphea*, *Elaeis*, *Cocos*, *Umbellularia* and *Cinnamomum* and gene products selected from AccA, AccB, AccC, AccD, AceE, AceF, Lpd, AcpP, FabA, FabB, FabD, FabF, FabG, FabH, FabI, FabZ, PanD, PanK, UdhA, PntA or PntB. Any combinations of at least two of these enzyme activities can advantageously be increased. In addition, moreover, it can be advantageous if the microorganism is provided with a lower enzyme activity compared to the wild type of the microorganism, which is described for the gene products selected from TdcE, PflA, PflB, PflC, PflD, PoxB, YgfG, AckA, AckB, TdcD, Pta, LdhA, AdhE, MgsA, FdnG, FdnH, FdnI, FdhF, FdoG, FdoH, FdoI, PrpC, PrpD, PrpF , PrpB , TdcD, Pdc, PorA, PorB, PorC, PorD, AlsS, IlvB, IlvM, IlvN, IlvG, IlvI, IlvH, AlsD, ButB, Thl, ThlA, ThlB, PhaA, PhaB, Crt, BdhA, BdhB, Adc, Adh, CtfB, AtoA, AtoD, LdhL, GltA, FabR, FhuA, Dld, LldA or LldP, singly or in any combination.

MO	E increased	E decreased
1	$E_{1a}E_2$	
2	$E_{1b}E_2$	
3	$E_{1a}E_2E_3$	
4	$E_{1b}E_2E_3$	
5	$E_{1a}E_2E_i$	
6	$E_{1b}E_2E_i$	
7	$E_{1a}E_2E_{ii}$	
8	$E_{1b}E_2E_{ii}$	
9	$E_{1a}E_2E_{ii}E_{iib}$	
10	$E_{1b}E_2E_{ii}E_{iib}$	
11	$E_{1a}E_2E_3E_i$	
12	$E_{1b}E_2E_3E_i$	
13	$E_{1a}E_2E_3E_{ii}$	
14	$E_{1b}E_2E_3E_{ii}$	
15	$E_{1a}E_2E_3E_{ii}E_{iib}$	
16	$E_{1b}E_2E_3E_{ii}E_{iib}$	
17	$E_{1a}E_2E_4$	
18	$E_{1b}E_2E_4$	
19	$E_{1a}E_2E_3E_4$	
20	$E_{1b}E_2E_3E_4$	
21	$E_{1a}E_2E_iE_4$	
22	$E_{1b}E_2E_iE_4$	
23	$E_{1a}E_2E_{ii}E_4$	
24	$E_{1b}E_2E_{ii}E_4$	
25	$E_{1a}E_2E_{ii}E_{iib}E_4$	
26	$E_{1b}E_2E_{ii}E_{iib}E_4$	
27	$E_{1a}E_2E_3E_iE_4$	
28	$E_{1b}E_2E_3E_iE_4$	
29	$E_{1a}E_2E_3E_{ii}E_4$	
30	$E_{1b}E_2E_3E_{ii}E_4$	
31	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	
32	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	
33	$E_{1a}E_2E_{iii}$	
34	$E_{1b}E_2E_{iii}$	
35	$E_{1a}E_2E_3E_{iii}$	
36	$E_{1b}E_2E_3E_{iii}$	
37	$E_{1a}E_2E_{ii}E_4$	
38	$E_{1b}E_2E_{iii}E_4$	
39	$E_{1a}E_2E_3E_{iii}E_4$	
40	$E_{1b}E_2E_3E_{iii}E_4$	
41	$E_{1a}E_2E_{iv}$	
42	$E_{1b}E_2E_{iv}$	
43	$E_{1a}E_2E_3E_{iv}$	
44	$E_{1b}E_2E_3E_{iv}$	
45	$E_{1a}E_2E_{iv}E_4$	
46	$E_{1b}E_2E_{iv}E_4$	
47	$E_{1a}E_2E_3E_{iv}E_4$	
48	$E_{1b}E_2E_3E_{iv}E_4$	
49	$E_{1a}E_2$	E_{4^*}
50	$E_{1b}E_2$	E_{4^*}
51	$E_{1a}E_2E_3$	E_{4^*}
52	$E_{1b}E_2E_3$	E_{4^*}
53	$E_{1a}E_2E_i$	E_{4^*}
54	$E_{1b}E_2E_i$	E_{4^*}
55	$E_{1a}E_2E_{ii}$	E_{4^*}
56	$E_{1b}E_2E_{ii}$	E_{4^*}
57	$E_{1a}E_2E_{ii}E_{iib}$	E_{4^*}
58	$E_{1b}E_2E_{ii}E_{iib}$	E_{4^*}
59	$E_{1a}E_2E_3E_i$	E_{4^*}
60	$E_{1b}E_2E_3E_i$	E_{4^*}
61	$E_{1a}E_2E_3E_{ii}$	E_{4^*}
62	$E_{1b}E_2E_3E_{ii}$	E_{4^*}
63	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{4^*}
64	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{4^*}
65	$E_{1a}E_2E_4$	E_{4^*}
66	$E_{1b}E_2E_4$	E_{4^*}
67	$E_{1a}E_2E_3E_4$	E_{4^*}
68	$E_{1b}E_2E_3E_4$	E_{4^*}
69	$E_{1a}E_2E_iE_4$	E_{4^*}
70	$E_{1b}E_2E_iE_4$	E_{4^*}
71	$E_{1a}E_2E_{ii}E_4$	E_{4^*}
72	$E_{1b}E_2E_{ii}E_4$	E_{4^*}
73	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{4^*}
74	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{4^*}
75	$E_{1a}E_2E_3E_iE_4$	E_{4^*}
76	$E_{1b}E_2E_3E_iE_4$	E_{4^*}
77	$E_{1a}E_2E_3E_{ii}E_4$	E_{4^*}
78	$E_{1b}E_2E_3E_{ii}E_4$	E_{4^*}
79	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{4^*}
80	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{4^*}
81	$E_{1a}E_2E_{iii}$	E_{4^*}
82	$E_{1b}E_2E_{iii}$	E_{4^*}
83	$E_{1a}E_2E_3E_{iii}$	E_{4^*}
84	$E_{1b}E_2E_3E_{iii}$	E_{4^*}
85	$E_{1a}E_2E_{iii}E_4$	E_{4^*}

86	$E_{1b}E_2E_{iii}E_4$	$E_{4'}$
87	$E_{1a}E_2E_3E_{iii}E_4$	$E_{4'}$
88	$E_{1b}E_2E_3E_{iii}E_4$	$E_{4'}$
89	$E_{1a}E_2E_{iv}$	$E_{4'}$
90	$E_{1b}E_2E_{iv}$	$E_{4'}$
91	$E_{1a}E_2E_3E_{iv}$	$E_{4'}$
92	$E_{1b}E_2E_3E_{iv}$	$E_{4'}$
93	$E_{1a}E_2E_{iv}E_4$	$E_{4'}$
94	$E_{1b}E_2E_{iv}E_4$	$E_{4'}$
95	$E_{1a}E_2E_3E_{iv}E_4$	$E_{4'}$
96	$E_{1b}E_2E_3E_{iv}E_4$	$E_{4'}$
97	$E_{1a}E_2$	E_5
98	$E_{1b}E_2$	E_5
99	$E_{1a}E_2E_3$	E_5
100	$E_{1b}E_2E_3$	E_5
101	$E_{1a}E_2E_i$	E_5
102	$E_{1b}E_2E_i$	E_5
103	$E_{1a}E_2E_{ii}$	E_5
104	$E_{1b}E_2E_{ii}$	E_5
105	$E_{1a}E_2E_{ii}E_{iib}$	E_5
106	$E_{1b}E_2E_{ii}E_{iib}$	E_5
107	$E_{1a}E_2E_3E_i$	E_5
108	$E_{1b}E_2E_3E_i$	E_5
109	$E_{1a}E_2E_3E_{ii}$	E_5
110	$E_{1b}E_2E_3E_{ii}$	E_5
111	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_5
112	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_5
113	$E_{1a}E_2E_4$	E_5
114	$E_{1b}E_2E_4$	E_5
115	$E_{1a}E_2E_3E_4$	E_5
116	$E_{1b}E_2E_3E_4$	E_5
117	$E_{1a}E_2E_iE_4$	E_5
118	$E_{1b}E_2E_iE_4$	E_5
119	$E_{1a}E_2E_{ii}E_4$	E_5
120	$E_{1b}E_2E_{ii}E_4$	E_5
121	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_5
122	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_5
123	$E_{1a}E_2E_3E_iE_4$	E_5
124	$E_{1b}E_2E_3E_iE_4$	E_5
125	$E_{1a}E_2E_3E_{ii}E_4$	E_5
126	$E_{1b}E_2E_3E_{ii}E_4$	E_5
127	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_5
128	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_5

129	$E_{1a}E_2E_{iii}$	E_5
130	$E_{1b}E_2E_{iii}$	E_5
131	$E_{1a}E_2E_3E_{iii}$	E_5
132	$E_{1b}E_2E_3E_{iii}$	E_5
133	$E_{1a}E_2E_{iii}E_4$	E_5
134	$E_{1b}E_2E_{iii}E_4$	E_5
135	$E_{1a}E_2E_3E_{iii}E_4$	E_5
136	$E_{1b}E_2E_3E_{iii}E_4$	E_5
137	$E_{1a}E_2E_{iv}$	E_5
138	$E_{1b}E_2E_{iv}$	E_5
139	$E_{1a}E_2E_3E_{iv}$	E_5
140	$E_{1b}E_2E_3E_{iv}$	E_5
141	$E_{1a}E_2E_{iv}E_4$	E_5
142	$E_{1b}E_2E_{iv}E_4$	E_5
143	$E_{1a}E_2E_3E_{iv}E_4$	E_5
144	$E_{1b}E_2E_3E_{iv}E_4$	E_5
145	$E_{1a}E_2$	$E_{4'}E_5$
146	$E_{1b}E_2$	$E_{4'}E_5$
147	$E_{1a}E_2E_3$	$E_{4'}E_5$
148	$E_{1b}E_2E_3$	$E_{4'}E_5$
149	$E_{1a}E_2E_i$	$E_{4'}E_5$
150	$E_{1b}E_2E_i$	$E_{4'}E_5$
151	$E_{1a}E_2E_{ii}$	$E_{4'}E_5$
152	$E_{1b}E_2E_{ii}$	$E_{4'}E_5$
153	$E_{1a}E_2E_{ii}E_{iib}$	$E_{4'}E_5$
154	$E_{1b}E_2E_{ii}E_{iib}$	$E_{4'}E_5$
155	$E_{1a}E_2E_3E_i$	$E_{4'}E_5$
156	$E_{1b}E_2E_3E_i$	$E_{4'}E_5$
157	$E_{1a}E_2E_3E_{ii}$	$E_{4'}E_5$
158	$E_{1b}E_2E_3E_{ii}$	$E_{4'}E_5$
159	$E_{1a}E_2E_3E_{ii}E_{iib}$	$E_{4'}E_5$
160	$E_{1b}E_2E_3E_{ii}E_{iib}$	$E_{4'}E_5$
161	$E_{1a}E_2E_4$	$E_{4'}E_5$
162	$E_{1b}E_2E_4$	$E_{4'}E_5$
163	$E_{1a}E_2E_3E_4$	$E_{4'}E_5$
164	$E_{1b}E_2E_3E_4$	$E_{4'}E_5$
165	$E_{1a}E_2E_iE_4$	$E_{4'}E_5$
166	$E_{1b}E_2E_iE_4$	$E_{4'}E_5$
167	$E_{1a}E_2E_{ii}E_4$	$E_{4'}E_5$
168	$E_{1b}E_2E_{ii}E_4$	$E_{4'}E_5$
169	$E_{1a}E_2E_{ii}E_{iib}E_4$	$E_{4'}E_5$
170	$E_{1b}E_2E_{ii}E_{iib}E_4$	$E_{4'}E_5$
171	$E_{1a}E_2E_3E_iE_4$	$E_{4'}E_5$

172	$E_{1b}E_2E_3E_iE_4$		E_4-E_5
173	$E_{1a}E_2E_3E_{ii}E_4$		E_4-E_5
174	$E_{1b}E_2E_3E_{ii}E_4$		E_4-E_5
175	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$		E_4-E_5
176	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$		E_4-E_5
177	$E_{1a}E_2E_{iii}$		E_4-E_5
178	$E_{1b}E_2E_{iii}$		E_4-E_5
179	$E_{1a}E_2E_3E_{iii}$		E_4-E_5
180	$E_{1b}E_2E_3E_{iii}$		E_4-E_5
181	$E_{1a}E_2E_{iii}E_4$		E_4-E_5
182	$E_{1b}E_2E_{iii}E_4$		E_4-E_5
183	$E_{1a}E_2E_3E_{iii}E_4$		E_4-E_5
184	$E_{1b}E_2E_3E_{iii}E_4$		E_4-E_5
185	$E_{1a}E_2E_{iv}$		E_4-E_5
186	$E_{1b}E_2E_{iv}$		E_4-E_5
187	$E_{1a}E_2E_3E_{iv}$		E_4-E_5
188	$E_{1b}E_2E_3E_{iv}$		E_4-E_5
189	$E_{1a}E_2E_{iv}E_4$		E_4-E_5
190	$E_{1b}E_2E_{iv}E_4$		E_4-E_5
191	$E_{1a}E_2E_3E_{iv}E_4$		E_4-E_5
192	$E_{1b}E_2E_3E_{iv}E_4$		E_4-E_5
193	$E_{1a}E_2$	AlkL	
194	$E_{1b}E_2$	AlkL	
195	$E_{1a}E_2E_3$	AlkL	
196	$E_{1b}E_2E_3$	AlkL	
197	$E_{1a}E_2E_i$	AlkL	
198	$E_{1b}E_2E_i$	AlkL	
199	$E_{1a}E_2E_{ii}$	AlkL	
200	$E_{1b}E_2E_{ii}$	AlkL	
201	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	
202	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	
203	$E_{1a}E_2E_3E_i$	AlkL	
204	$E_{1b}E_2E_3E_i$	AlkL	
205	$E_{1a}E_2E_3E_{ii}$	AlkL	
206	$E_{1b}E_2E_3E_{ii}$	AlkL	
207	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	
208	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	
209	$E_{1a}E_2E_4$	AlkL	
210	$E_{1b}E_2E_4$	AlkL	
211	$E_{1a}E_2E_3E_4$	AlkL	
212	$E_{1b}E_2E_3E_4$	AlkL	
213	$E_{1a}E_2E_iE_4$	AlkL	
214	$E_{1b}E_2E_iE_4$	AlkL	

215	$E_{1a}E_2E_{ii}E_4$	AlkL	
216	$E_{1b}E_2E_{ii}E_4$	AlkL	
217	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	
218	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	
219	$E_{1a}E_2E_3E_iE_4$	AlkL	
220	$E_{1b}E_2E_3E_iE_4$	AlkL	
221	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	
222	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	
223	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	
224	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	
225	$E_{1a}E_2E_{iii}$	AlkL	
226	$E_{1b}E_2E_{iii}$	AlkL	
227	$E_{1a}E_2E_3E_{iii}$	AlkL	
228	$E_{1b}E_2E_3E_{iii}$	AlkL	
229	$E_{1a}E_2E_{iii}E_4$	AlkL	
230	$E_{1b}E_2E_{iii}E_4$	AlkL	
231	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	
232	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	
233	$E_{1a}E_2E_{iv}$	AlkL	
234	$E_{1b}E_2E_{iv}$	AlkL	
235	$E_{1a}E_2E_3E_{iv}$	AlkL	
236	$E_{1b}E_2E_3E_{iv}$	AlkL	
237	$E_{1a}E_2E_{iv}E_4$	AlkL	
238	$E_{1b}E_2E_{iv}E_4$	AlkL	
239	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	
240	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	
241	$E_{1a}E_2$	AlkL	E_4-
242	$E_{1b}E_2$	AlkL	E_4-
243	$E_{1a}E_2E_3$	AlkL	E_4-
244	$E_{1b}E_2E_3$	AlkL	E_4-
245	$E_{1a}E_2E_i$	AlkL	E_4-
246	$E_{1b}E_2E_i$	AlkL	E_4-
247	$E_{1a}E_2E_{ii}$	AlkL	E_4-
248	$E_{1b}E_2E_{ii}$	AlkL	E_4-
249	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_4-
250	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_4-
251	$E_{1a}E_2E_3E_i$	AlkL	E_4-
252	$E_{1b}E_2E_3E_i$	AlkL	E_4-
253	$E_{1a}E_2E_3E_{ii}$	AlkL	E_4-
254	$E_{1b}E_2E_3E_{ii}$	AlkL	E_4-
255	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-
256	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-
257	$E_{1a}E_2E_4$	AlkL	E_4-

258	$E_{1b}E_2E_4$	AlkL	$E_{4'}$
259	$E_{1a}E_2E_3E_4$	AlkL	$E_{4'}$
260	$E_{1b}E_2E_3E_4$	AlkL	$E_{4'}$
261	$E_{1a}E_2E_iE_4$	AlkL	$E_{4'}$
262	$E_{1b}E_2E_iE_4$	AlkL	$E_{4'}$
263	$E_{1a}E_2E_{ii}E_4$	AlkL	$E_{4'}$
264	$E_{1b}E_2E_{ii}E_4$	AlkL	$E_{4'}$
265	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$
266	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$
267	$E_{1a}E_2E_3E_iE_4$	AlkL	$E_{4'}$
268	$E_{1b}E_2E_3E_iE_4$	AlkL	$E_{4'}$
269	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	$E_{4'}$
270	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	$E_{4'}$
271	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$
272	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$
273	$E_{1a}E_2E_{iii}$	AlkL	$E_{4'}$
274	$E_{1b}E_2E_{iii}$	AlkL	$E_{4'}$
275	$E_{1a}E_2E_3E_{iii}$	AlkL	$E_{4'}$
276	$E_{1b}E_2E_3E_{iii}$	AlkL	$E_{4'}$
277	$E_{1a}E_2E_{iii}E_4$	AlkL	$E_{4'}$
278	$E_{1b}E_2E_{iii}E_4$	AlkL	$E_{4'}$
279	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	$E_{4'}$
280	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	$E_{4'}$
281	$E_{1a}E_2E_{iv}$	AlkL	$E_{4'}$
282	$E_{1b}E_2E_{iv}$	AlkL	$E_{4'}$
283	$E_{1a}E_2E_3E_{iv}$	AlkL	$E_{4'}$
284	$E_{1b}E_2E_3E_{iv}$	AlkL	$E_{4'}$
285	$E_{1a}E_2E_{iv}E_4$	AlkL	$E_{4'}$
286	$E_{1b}E_2E_{iv}E_4$	AlkL	$E_{4'}$
287	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	$E_{4'}$
288	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	$E_{4'}$
289	$E_{1a}E_2$	AlkL	E_5
290	$E_{1b}E_2$	AlkL	E_5
291	$E_{1a}E_2E_3$	AlkL	E_5
292	$E_{1b}E_2E_3$	AlkL	E_5
293	$E_{1a}E_2E_i$	AlkL	E_5
294	$E_{1b}E_2E_i$	AlkL	E_5
295	$E_{1a}E_2E_{ii}$	AlkL	E_5
296	$E_{1b}E_2E_{ii}$	AlkL	E_5
297	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_5
298	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_5
299	$E_{1a}E_2E_3E_i$	AlkL	E_5
300	$E_{1b}E_2E_3E_i$	AlkL	E_5

301	$E_{1a}E_2E_3E_{ii}$	AlkL	E_5
302	$E_{1b}E_2E_3E_{ii}$	AlkL	E_5
303	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_5
304	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_5
305	$E_{1a}E_2E_4$	AlkL	E_5
306	$E_{1b}E_2E_4$	AlkL	E_5
307	$E_{1a}E_2E_3E_4$	AlkL	E_5
308	$E_{1b}E_2E_3E_4$	AlkL	E_5
309	$E_{1a}E_2E_iE_4$	AlkL	E_5
310	$E_{1b}E_2E_iE_4$	AlkL	E_5
311	$E_{1a}E_2E_{ii}E_4$	AlkL	E_5
312	$E_{1b}E_2E_{ii}E_4$	AlkL	E_5
313	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_5
314	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_5
315	$E_{1a}E_2E_3E_iE_4$	AlkL	E_5
316	$E_{1b}E_2E_3E_iE_4$	AlkL	E_5
317	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_5
318	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_5
319	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_5
320	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_5
321	$E_{1a}E_2E_{iii}$	AlkL	E_5
322	$E_{1b}E_2E_{iii}$	AlkL	E_5
323	$E_{1a}E_2E_3E_{iii}$	AlkL	E_5
324	$E_{1b}E_2E_3E_{iii}$	AlkL	E_5
325	$E_{1a}E_2E_{iii}E_4$	AlkL	E_5
326	$E_{1b}E_2E_{iii}E_4$	AlkL	E_5
327	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_5
328	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_5
329	$E_{1a}E_2E_{iv}$	AlkL	E_5
330	$E_{1b}E_2E_{iv}$	AlkL	E_5
331	$E_{1a}E_2E_3E_{iv}$	AlkL	E_5
332	$E_{1b}E_2E_3E_{iv}$	AlkL	E_5
333	$E_{1a}E_2E_{iv}E_4$	AlkL	E_5
334	$E_{1b}E_2E_{iv}E_4$	AlkL	E_5
335	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_5
336	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_5
337	$E_{1a}E_2$	AlkL	$E_{4'}E_5$
338	$E_{1b}E_2$	AlkL	$E_{4'}E_5$
339	$E_{1a}E_2E_3$	AlkL	$E_{4'}E_5$
340	$E_{1b}E_2E_3$	AlkL	$E_{4'}E_5$
341	$E_{1a}E_2E_i$	AlkL	$E_{4'}E_5$
342	$E_{1b}E_2E_i$	AlkL	$E_{4'}E_5$
343	$E_{1a}E_2E_{ii}$	AlkL	$E_{4'}E_5$

344	$E_{1b}E_2E_{ii}$	AlkL	E_4-E_5
345	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_4-E_5
346	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_4-E_5
347	$E_{1a}E_2E_3E_i$	AlkL	E_4-E_5
348	$E_{1b}E_2E_3E_i$	AlkL	E_4-E_5
349	$E_{1a}E_2E_3E_{ii}$	AlkL	E_4-E_5
350	$E_{1b}E_2E_3E_{ii}$	AlkL	E_4-E_5
351	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-E_5
352	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-E_5
353	$E_{1a}E_2E_4$	AlkL	E_4-E_5
354	$E_{1b}E_2E_4$	AlkL	E_4-E_5
355	$E_{1a}E_2E_3E_4$	AlkL	E_4-E_5
356	$E_{1b}E_2E_3E_4$	AlkL	E_4-E_5
357	$E_{1a}E_2E_iE_4$	AlkL	E_4-E_5
358	$E_{1b}E_2E_iE_4$	AlkL	E_4-E_5
359	$E_{1a}E_2E_{ii}E_4$	AlkL	E_4-E_5
360	$E_{1b}E_2E_{ii}E_4$	AlkL	E_4-E_5
361	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-E_5
362	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-E_5
363	$E_{1a}E_2E_3E_iE_4$	AlkL	E_4-E_5
364	$E_{1b}E_2E_3E_iE_4$	AlkL	E_4-E_5
365	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_4-E_5
366	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_4-E_5
367	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_4-E_5
368	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_4-E_5
369	$E_{1a}E_2E_{iii}$	AlkL	E_4-E_5
370	$E_{1b}E_2E_{iii}$	AlkL	E_4-E_5
371	$E_{1a}E_2E_3E_{iii}$	AlkL	E_4-E_5
372	$E_{1b}E_2E_3E_{iii}$	AlkL	E_4-E_5
373	$E_{1a}E_2E_{iii}E_4$	AlkL	E_4-E_5
374	$E_{1b}E_2E_{iii}E_4$	AlkL	E_4-E_5
375	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_4-E_5
376	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_4-E_5
377	$E_{1a}E_2E_{iv}$	AlkL	E_4-E_5
378	$E_{1b}E_2E_{iv}$	AlkL	E_4-E_5
379	$E_{1a}E_2E_3E_{iv}$	AlkL	E_4-E_5
380	$E_{1b}E_2E_3E_{iv}$	AlkL	E_4-E_5
381	$E_{1a}E_2E_{iv}E_4$	AlkL	E_4-E_5
382	$E_{1b}E_2E_{iv}E_4$	AlkL	E_4-E_5
383	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_4-E_5
384	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_4-E_5
385	$E_{1a}E_2$		E_a
386	$E_{1b}E_2$		E_a

387	$E_{1a}E_2E_3$	E_a
388	$E_{1b}E_2E_3$	E_a
389	$E_{1a}E_2E_i$	E_a
390	$E_{1b}E_2E_i$	E_a
391	$E_{1a}E_2E_{ii}$	E_a
392	$E_{1b}E_2E_{ii}$	E_a
393	$E_{1a}E_2E_{ii}E_{iib}$	E_a
394	$E_{1b}E_2E_{ii}E_{iib}$	E_a
395	$E_{1a}E_2E_3E_i$	E_a
396	$E_{1b}E_2E_3E_i$	E_a
397	$E_{1a}E_2E_3E_{ii}$	E_a
398	$E_{1b}E_2E_3E_{ii}$	E_a
399	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_a
400	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_a
401	$E_{1a}E_2E_4$	E_a
402	$E_{1b}E_2E_4$	E_a
403	$E_{1a}E_2E_3E_4$	E_a
404	$E_{1b}E_2E_3E_4$	E_a
405	$E_{1a}E_2E_iE_4$	E_a
406	$E_{1b}E_2E_iE_4$	E_a
407	$E_{1a}E_2E_{ii}E_4$	E_a
408	$E_{1b}E_2E_{ii}E_4$	E_a
409	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_a
410	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_a
411	$E_{1a}E_2E_3E_iE_4$	E_a
412	$E_{1b}E_2E_3E_iE_4$	E_a
413	$E_{1a}E_2E_3E_{ii}E_4$	E_a
414	$E_{1b}E_2E_3E_{ii}E_4$	E_a
415	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_a
416	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_a
417	$E_{1a}E_2E_{iii}$	E_a
418	$E_{1b}E_2E_{iii}$	E_a
419	$E_{1a}E_2E_3E_{iii}$	E_a
420	$E_{1b}E_2E_3E_{iii}$	E_a
421	$E_{1a}E_2E_{iii}E_4$	E_a
422	$E_{1b}E_2E_{iii}E_4$	E_a
423	$E_{1a}E_2E_3E_{iii}E_4$	E_a
424	$E_{1b}E_2E_3E_{iii}E_4$	E_a
425	$E_{1a}E_2E_{iv}$	E_a
426	$E_{1b}E_2E_{iv}$	E_a
427	$E_{1a}E_2E_3E_{iv}$	E_a
428	$E_{1b}E_2E_3E_{iv}$	E_a
429	$E_{1a}E_2E_{iv}E_4$	E_a

430	$E_{1b}E_2E_{iv}E_4$		E_a
431	$E_{1a}E_2E_3E_{iv}E_4$		E_a
432	$E_{1b}E_2E_3E_{iv}E_4$		E_a
433	$E_{1a}E_2$	E_{4^*}	E_a
434	$E_{1b}E_2$	E_{4^*}	E_a
435	$E_{1a}E_2E_3$	E_{4^*}	E_a
436	$E_{1b}E_2E_3$	E_{4^*}	E_a
437	$E_{1a}E_2E_i$	E_{4^*}	E_a
438	$E_{1b}E_2E_i$	E_{4^*}	E_a
439	$E_{1a}E_2E_{ii}$	E_{4^*}	E_a
440	$E_{1b}E_2E_{ii}$	E_{4^*}	E_a
441	$E_{1a}E_2E_{ii}E_{iib}$	E_{4^*}	E_a
442	$E_{1b}E_2E_{ii}E_{iib}$	E_{4^*}	E_a
443	$E_{1a}E_2E_3E_i$	E_{4^*}	E_a
444	$E_{1b}E_2E_3E_i$	E_{4^*}	E_a
445	$E_{1a}E_2E_3E_{ii}$	E_{4^*}	E_a
446	$E_{1b}E_2E_3E_{ii}$	E_{4^*}	E_a
447	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{4^*}	E_a
448	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{4^*}	E_a
449	$E_{1a}E_2E_4$	E_{4^*}	E_a
450	$E_{1b}E_2E_4$	E_{4^*}	E_a
451	$E_{1a}E_2E_3E_4$	E_{4^*}	E_a
452	$E_{1b}E_2E_3E_4$	E_{4^*}	E_a
453	$E_{1a}E_2E_iE_4$	E_{4^*}	E_a
454	$E_{1b}E_2E_iE_4$	E_{4^*}	E_a
455	$E_{1a}E_2E_{ii}E_4$	E_{4^*}	E_a
456	$E_{1b}E_2E_{ii}E_4$	E_{4^*}	E_a
457	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{4^*}	E_a
458	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{4^*}	E_a
459	$E_{1a}E_2E_3E_iE_4$	E_{4^*}	E_a
460	$E_{1b}E_2E_3E_iE_4$	E_{4^*}	E_a
461	$E_{1a}E_2E_3E_{ii}E_4$	E_{4^*}	E_a
462	$E_{1b}E_2E_3E_{ii}E_4$	E_{4^*}	E_a
463	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{4^*}	E_a
464	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{4^*}	E_a
465	$E_{1a}E_2E_{iii}$	E_{4^*}	E_a
466	$E_{1b}E_2E_{iii}$	E_{4^*}	E_a
467	$E_{1a}E_2E_3E_{iii}$	E_{4^*}	E_a
468	$E_{1b}E_2E_3E_{iii}$	E_{4^*}	E_a
469	$E_{1a}E_2E_{iii}E_4$	E_{4^*}	E_a
470	$E_{1b}E_2E_{iii}E_4$	E_{4^*}	E_a
471	$E_{1a}E_2E_3E_{iii}E_4$	E_{4^*}	E_a
472	$E_{1b}E_2E_3E_{iii}E_4$	E_{4^*}	E_a

473	$E_{1a}E_2E_{iv}$	E_{4^*}	E_a
474	$E_{1b}E_2E_{iv}$	E_{4^*}	E_a
475	$E_{1a}E_2E_3E_{iv}$	E_{4^*}	E_a
476	$E_{1b}E_2E_3E_{iv}$	E_{4^*}	E_a
477	$E_{1a}E_2E_{iv}E_4$	E_{4^*}	E_a
478	$E_{1b}E_2E_{iv}E_4$	E_{4^*}	E_a
479	$E_{1a}E_2E_3E_{iv}E_4$	E_{4^*}	E_a
480	$E_{1b}E_2E_3E_{iv}E_4$	E_{4^*}	E_a
481	$E_{1a}E_2$	E_5	E_a
482	$E_{1b}E_2$	E_5	E_a
483	$E_{1a}E_2E_3$	E_5	E_a
484	$E_{1b}E_2E_3$	E_5	E_a
485	$E_{1a}E_2E_i$	E_5	E_a
486	$E_{1b}E_2E_i$	E_5	E_a
487	$E_{1a}E_2E_{ii}$	E_5	E_a
488	$E_{1b}E_2E_{ii}$	E_5	E_a
489	$E_{1a}E_2E_{ii}E_{iib}$	E_5	E_a
490	$E_{1b}E_2E_{ii}E_{iib}$	E_5	E_a
491	$E_{1a}E_2E_3E_i$	E_5	E_a
492	$E_{1b}E_2E_3E_i$	E_5	E_a
493	$E_{1a}E_2E_3E_{ii}$	E_5	E_a
494	$E_{1b}E_2E_3E_{ii}$	E_5	E_a
495	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_5	E_a
496	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_5	E_a
497	$E_{1a}E_2E_4$	E_5	E_a
498	$E_{1b}E_2E_4$	E_5	E_a
499	$E_{1a}E_2E_3E_4$	E_5	E_a
500	$E_{1b}E_2E_3E_4$	E_5	E_a
501	$E_{1a}E_2E_iE_4$	E_5	E_a
502	$E_{1b}E_2E_iE_4$	E_5	E_a
503	$E_{1a}E_2E_{ii}E_4$	E_5	E_a
504	$E_{1b}E_2E_{ii}E_4$	E_5	E_a
505	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_5	E_a
506	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_5	E_a
507	$E_{1a}E_2E_3E_iE_4$	E_5	E_a
508	$E_{1b}E_2E_3E_iE_4$	E_5	E_a
509	$E_{1a}E_2E_3E_{ii}E_4$	E_5	E_a
510	$E_{1b}E_2E_3E_{ii}E_4$	E_5	E_a
511	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_5	E_a
512	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_5	E_a
513	$E_{1a}E_2E_{iii}$	E_5	E_a
514	$E_{1b}E_2E_{iii}$	E_5	E_a
515	$E_{1a}E_2E_3E_{iii}$	E_5	E_a

516	$E_{1b}E_2E_3E_{iii}$	E_5	E_a
517	$E_{1a}E_2E_{iii}E_4$	E_5	E_a
518	$E_{1b}E_2E_{iii}E_4$	E_5	E_a
519	$E_{1a}E_2E_3E_{iii}E_4$	E_5	E_a
520	$E_{1b}E_2E_3E_{iii}E_4$	E_5	E_a
521	$E_{1a}E_2E_{iv}$	E_5	E_a
522	$E_{1b}E_2E_{iv}$	E_5	E_a
523	$E_{1a}E_2E_3E_{iv}$	E_5	E_a
524	$E_{1b}E_2E_3E_{iv}$	E_5	E_a
525	$E_{1a}E_2E_{iv}E_4$	E_5	E_a
526	$E_{1b}E_2E_{iv}E_4$	E_5	E_a
527	$E_{1a}E_2E_3E_{iv}E_4$	E_5	E_a
528	$E_{1b}E_2E_3E_{iv}E_4$	E_5	E_a
529	$E_{1a}E_2$	E_4-E_5	E_a
530	$E_{1b}E_2$	E_4-E_5	E_a
531	$E_{1a}E_2E_3$	E_4-E_5	E_a
532	$E_{1b}E_2E_3$	E_4-E_5	E_a
533	$E_{1a}E_2E_i$	E_4-E_5	E_a
534	$E_{1b}E_2E_i$	E_4-E_5	E_a
535	$E_{1a}E_2E_{ii}$	E_4-E_5	E_a
536	$E_{1b}E_2E_{ii}$	E_4-E_5	E_a
537	$E_{1a}E_2E_{ii}E_{iib}$	E_4-E_5	E_a
538	$E_{1b}E_2E_{ii}E_{iib}$	E_4-E_5	E_a
539	$E_{1a}E_2E_3E_i$	E_4-E_5	E_a
540	$E_{1b}E_2E_3E_i$	E_4-E_5	E_a
541	$E_{1a}E_2E_3E_{ii}$	E_4-E_5	E_a
542	$E_{1b}E_2E_3E_{ii}$	E_4-E_5	E_a
543	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_4-E_5	E_a
544	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_4-E_5	E_a
545	$E_{1a}E_2E_4$	E_4-E_5	E_a
546	$E_{1b}E_2E_4$	E_4-E_5	E_a
547	$E_{1a}E_2E_3E_4$	E_4-E_5	E_a
548	$E_{1b}E_2E_3E_4$	E_4-E_5	E_a
549	$E_{1a}E_2E_iE_4$	E_4-E_5	E_a
550	$E_{1b}E_2E_iE_4$	E_4-E_5	E_a
551	$E_{1a}E_2E_{ii}E_4$	E_4-E_5	E_a
552	$E_{1b}E_2E_{ii}E_4$	E_4-E_5	E_a
553	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_4-E_5	E_a
554	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_4-E_5	E_a
555	$E_{1a}E_2E_3E_iE_4$	E_4-E_5	E_a
556	$E_{1b}E_2E_3E_iE_4$	E_4-E_5	E_a
557	$E_{1a}E_2E_3E_{ii}E_4$	E_4-E_5	E_a
558	$E_{1b}E_2E_3E_{ii}E_4$	E_4-E_5	E_a

559	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$		E_4-E_5	E_a
560	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$		E_4-E_5	E_a
561	$E_{1a}E_2E_{iii}$		E_4-E_5	E_a
562	$E_{1b}E_2E_{iii}$		E_4-E_5	E_a
563	$E_{1a}E_2E_3E_{iii}$		E_4-E_5	E_a
564	$E_{1b}E_2E_3E_{iii}$		E_4-E_5	E_a
565	$E_{1a}E_2E_{iii}E_4$		E_4-E_5	E_a
566	$E_{1b}E_2E_{iii}E_4$		E_4-E_5	E_a
567	$E_{1a}E_2E_3E_{iii}E_4$		E_4-E_5	E_a
568	$E_{1b}E_2E_3E_{iii}E_4$		E_4-E_5	E_a
569	$E_{1a}E_2E_{iv}$		E_4-E_5	E_a
570	$E_{1b}E_2E_{iv}$		E_4-E_5	E_a
571	$E_{1a}E_2E_3E_{iv}$		E_4-E_5	E_a
572	$E_{1b}E_2E_3E_{iv}$		E_4-E_5	E_a
573	$E_{1a}E_2E_{iv}E_4$		E_4-E_5	E_a
574	$E_{1b}E_2E_{iv}E_4$		E_4-E_5	E_a
575	$E_{1a}E_2E_3E_{iv}E_4$		E_4-E_5	E_a
576	$E_{1b}E_2E_3E_{iv}E_4$		E_4-E_5	E_a
577	$E_{1a}E_2$	AlkL		E_a
578	$E_{1b}E_2$	AlkL		E_a
579	$E_{1a}E_2E_3$	AlkL		E_a
580	$E_{1b}E_2E_3$	AlkL		E_a
581	$E_{1a}E_2E_i$	AlkL		E_a
582	$E_{1b}E_2E_i$	AlkL		E_a
583	$E_{1a}E_2E_{ii}$	AlkL		E_a
584	$E_{1b}E_2E_{ii}$	AlkL		E_a
585	$E_{1a}E_2E_{ii}E_{iib}$	AlkL		E_a
586	$E_{1b}E_2E_{ii}E_{iib}$	AlkL		E_a
587	$E_{1a}E_2E_3E_i$	AlkL		E_a
588	$E_{1b}E_2E_3E_i$	AlkL		E_a
589	$E_{1a}E_2E_3E_{ii}$	AlkL		E_a
590	$E_{1b}E_2E_3E_{ii}$	AlkL		E_a
591	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL		E_a
592	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL		E_a
593	$E_{1a}E_2E_4$	AlkL		E_a
594	$E_{1b}E_2E_4$	AlkL		E_a
595	$E_{1a}E_2E_3E_4$	AlkL		E_a
596	$E_{1b}E_2E_3E_4$	AlkL		E_a
597	$E_{1a}E_2E_iE_4$	AlkL		E_a
598	$E_{1b}E_2E_iE_4$	AlkL		E_a
599	$E_{1a}E_2E_{ii}E_4$	AlkL		E_a
600	$E_{1b}E_2E_{ii}E_4$	AlkL		E_a
601	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL		E_a

602	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL		E_a
603	$E_{1a}E_2E_3E_iE_4$	AlkL		E_a
604	$E_{1b}E_2E_3E_iE_4$	AlkL		E_a
605	$E_{1a}E_2E_3E_{ii}E_4$	AlkL		E_a
606	$E_{1b}E_2E_3E_{ii}E_4$	AlkL		E_a
607	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL		E_a
608	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL		E_a
609	$E_{1a}E_2E_{iii}$	AlkL		E_a
610	$E_{1b}E_2E_{iii}$	AlkL		E_a
611	$E_{1a}E_2E_3E_{iii}$	AlkL		E_a
612	$E_{1b}E_2E_3E_{iii}$	AlkL		E_a
613	$E_{1a}E_2E_{iii}E_4$	AlkL		E_a
614	$E_{1b}E_2E_{iii}E_4$	AlkL		E_a
615	$E_{1a}E_2E_3E_{iii}E_4$	AlkL		E_a
616	$E_{1b}E_2E_3E_{iii}E_4$	AlkL		E_a
617	$E_{1a}E_2E_{iv}$	AlkL		E_a
618	$E_{1b}E_2E_{iv}$	AlkL		E_a
619	$E_{1a}E_2E_3E_{iv}$	AlkL		E_a
620	$E_{1b}E_2E_3E_{iv}$	AlkL		E_a
621	$E_{1a}E_2E_{iv}E_4$	AlkL		E_a
622	$E_{1b}E_2E_{iv}E_4$	AlkL		E_a
623	$E_{1a}E_2E_3E_{iv}E_4$	AlkL		E_a
624	$E_{1b}E_2E_3E_{iv}E_4$	AlkL		E_a
625	$E_{1a}E_2$	AlkL	E_{4^*}	E_a
626	$E_{1b}E_2$	AlkL	E_{4^*}	E_a
627	$E_{1a}E_2E_3$	AlkL	E_{4^*}	E_a
628	$E_{1b}E_2E_3$	AlkL	E_{4^*}	E_a
629	$E_{1a}E_2E_i$	AlkL	E_{4^*}	E_a
630	$E_{1b}E_2E_i$	AlkL	E_{4^*}	E_a
631	$E_{1a}E_2E_{ii}$	AlkL	E_{4^*}	E_a
632	$E_{1b}E_2E_{ii}$	AlkL	E_{4^*}	E_a
633	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_{4^*}	E_a
634	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_{4^*}	E_a
635	$E_{1a}E_2E_3E_i$	AlkL	E_{4^*}	E_a
636	$E_{1b}E_2E_3E_i$	AlkL	E_{4^*}	E_a
637	$E_{1a}E_2E_3E_{ii}$	AlkL	E_{4^*}	E_a
638	$E_{1b}E_2E_3E_{ii}$	AlkL	E_{4^*}	E_a
639	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_{4^*}	E_a
640	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_{4^*}	E_a
641	$E_{1a}E_2E_4$	AlkL	E_{4^*}	E_a
642	$E_{1b}E_2E_4$	AlkL	E_{4^*}	E_a
643	$E_{1a}E_2E_3E_4$	AlkL	E_{4^*}	E_a
644	$E_{1b}E_2E_3E_4$	AlkL	E_{4^*}	E_a

645	$E_{1a}E_2E_iE_4$	AlkL	E_{4^*}	E_a
646	$E_{1b}E_2E_iE_4$	AlkL	E_{4^*}	E_a
647	$E_{1a}E_2E_{ii}E_4$	AlkL	E_{4^*}	E_a
648	$E_{1b}E_2E_{ii}E_4$	AlkL	E_{4^*}	E_a
649	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_{4^*}	E_a
650	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_{4^*}	E_a
651	$E_{1a}E_2E_3E_iE_4$	AlkL	E_{4^*}	E_a
652	$E_{1b}E_2E_3E_iE_4$	AlkL	E_{4^*}	E_a
653	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_{4^*}	E_a
654	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_{4^*}	E_a
655	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_{4^*}	E_a
656	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_{4^*}	E_a
657	$E_{1a}E_2E_{iii}$	AlkL	E_{4^*}	E_a
658	$E_{1b}E_2E_{iii}$	AlkL	E_{4^*}	E_a
659	$E_{1a}E_2E_3E_{iii}$	AlkL	E_{4^*}	E_a
660	$E_{1b}E_2E_3E_{iii}$	AlkL	E_{4^*}	E_a
661	$E_{1a}E_2E_{iii}E_4$	AlkL	E_{4^*}	E_a
662	$E_{1b}E_2E_{iii}E_4$	AlkL	E_{4^*}	E_a
663	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_{4^*}	E_a
664	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_{4^*}	E_a
665	$E_{1a}E_2E_{iv}$	AlkL	E_{4^*}	E_a
666	$E_{1b}E_2E_{iv}$	AlkL	E_{4^*}	E_a
667	$E_{1a}E_2E_3E_{iv}$	AlkL	E_{4^*}	E_a
668	$E_{1b}E_2E_3E_{iv}$	AlkL	E_{4^*}	E_a
669	$E_{1a}E_2E_{iv}E_4$	AlkL	E_{4^*}	E_a
670	$E_{1b}E_2E_{iv}E_4$	AlkL	E_{4^*}	E_a
671	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_{4^*}	E_a
672	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_{4^*}	E_a
673	$E_{1a}E_2$	AlkL	E_5	E_a
674	$E_{1b}E_2$	AlkL	E_5	E_a
675	$E_{1a}E_2E_3$	AlkL	E_5	E_a
676	$E_{1b}E_2E_3$	AlkL	E_5	E_a
677	$E_{1a}E_2E_i$	AlkL	E_5	E_a
678	$E_{1b}E_2E_i$	AlkL	E_5	E_a
679	$E_{1a}E_2E_{ii}$	AlkL	E_5	E_a
680	$E_{1b}E_2E_{ii}$	AlkL	E_5	E_a
681	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_5	E_a
682	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_5	E_a
683	$E_{1a}E_2E_3E_i$	AlkL	E_5	E_a
684	$E_{1b}E_2E_3E_i$	AlkL	E_5	E_a
685	$E_{1a}E_2E_3E_{ii}$	AlkL	E_5	E_a
686	$E_{1b}E_2E_3E_{ii}$	AlkL	E_5	E_a
687	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_5	E_a

688	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_5	E_a
689	$E_{1a}E_2E_4$	AlkL	E_5	E_a
690	$E_{1b}E_2E_4$	AlkL	E_5	E_a
691	$E_{1a}E_2E_3E_4$	AlkL	E_5	E_a
692	$E_{1b}E_2E_3E_4$	AlkL	E_5	E_a
693	$E_{1a}E_2E_iE_4$	AlkL	E_5	E_a
694	$E_{1b}E_2E_iE_4$	AlkL	E_5	E_a
695	$E_{1a}E_2E_{ii}E_4$	AlkL	E_5	E_a
696	$E_{1b}E_2E_{ii}E_4$	AlkL	E_5	E_a
697	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_5	E_a
698	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_5	E_a
699	$E_{1a}E_2E_3E_iE_4$	AlkL	E_5	E_a
700	$E_{1b}E_2E_3E_iE_4$	AlkL	E_5	E_a
701	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_5	E_a
702	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_5	E_a
703	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_5	E_a
704	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_5	E_a
705	$E_{1a}E_2E_{iii}$	AlkL	E_5	E_a
706	$E_{1b}E_2E_{iii}$	AlkL	E_5	E_a
707	$E_{1a}E_2E_3E_{iii}$	AlkL	E_5	E_a
708	$E_{1b}E_2E_3E_{iii}$	AlkL	E_5	E_a
709	$E_{1a}E_2E_{iii}E_4$	AlkL	E_5	E_a
710	$E_{1b}E_2E_{iii}E_4$	AlkL	E_5	E_a
711	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_5	E_a
712	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_5	E_a
713	$E_{1a}E_2E_{iv}$	AlkL	E_5	E_a
714	$E_{1b}E_2E_{iv}$	AlkL	E_5	E_a
715	$E_{1a}E_2E_3E_{iv}$	AlkL	E_5	E_a
716	$E_{1b}E_2E_3E_{iv}$	AlkL	E_5	E_a
717	$E_{1a}E_2E_{iv}E_4$	AlkL	E_5	E_a
718	$E_{1b}E_2E_{iv}E_4$	AlkL	E_5	E_a
719	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_5	E_a
720	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_5	E_a
721	$E_{1a}E_2$	AlkL	E_4-E_5	E_a
722	$E_{1b}E_2$	AlkL	E_4-E_5	E_a
723	$E_{1a}E_2E_3$	AlkL	E_4-E_5	E_a
724	$E_{1b}E_2E_3$	AlkL	E_4-E_5	E_a
725	$E_{1a}E_2E_i$	AlkL	E_4-E_5	E_a
726	$E_{1b}E_2E_i$	AlkL	E_4-E_5	E_a
727	$E_{1a}E_2E_{ii}$	AlkL	E_4-E_5	E_a
728	$E_{1b}E_2E_{ii}$	AlkL	E_4-E_5	E_a
729	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_4-E_5	E_a
730	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_4-E_5	E_a

731	$E_{1a}E_2E_3E_i$	AlkL	E_4-E_5	E_a
732	$E_{1b}E_2E_3E_i$	AlkL	E_4-E_5	E_a
733	$E_{1a}E_2E_3E_{ii}$	AlkL	E_4-E_5	E_a
734	$E_{1b}E_2E_3E_{ii}$	AlkL	E_4-E_5	E_a
735	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-E_5	E_a
736	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-E_5	E_a
737	$E_{1a}E_2E_4$	AlkL	E_4-E_5	E_a
738	$E_{1b}E_2E_4$	AlkL	E_4-E_5	E_a
739	$E_{1a}E_2E_3E_4$	AlkL	E_4-E_5	E_a
740	$E_{1b}E_2E_3E_4$	AlkL	E_4-E_5	E_a
741	$E_{1a}E_2E_iE_4$	AlkL	E_4-E_5	E_a
742	$E_{1b}E_2E_iE_4$	AlkL	E_4-E_5	E_a
743	$E_{1a}E_2E_{ii}E_4$	AlkL	E_4-E_5	E_a
744	$E_{1b}E_2E_{ii}E_4$	AlkL	E_4-E_5	E_a
745	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_a
746	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_a
747	$E_{1a}E_2E_3E_iE_4$	AlkL	E_4-E_5	E_a
748	$E_{1b}E_2E_3E_iE_4$	AlkL	E_4-E_5	E_a
749	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_4-E_5	E_a
750	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_4-E_5	E_a
751	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_a
752	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_a
753	$E_{1a}E_2E_{iii}$	AlkL	E_4-E_5	E_a
754	$E_{1b}E_2E_{iii}$	AlkL	E_4-E_5	E_a
755	$E_{1a}E_2E_3E_{iii}$	AlkL	E_4-E_5	E_a
756	$E_{1b}E_2E_3E_{iii}$	AlkL	E_4-E_5	E_a
757	$E_{1a}E_2E_{iii}E_4$	AlkL	E_4-E_5	E_a
758	$E_{1b}E_2E_{iii}E_4$	AlkL	E_4-E_5	E_a
759	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_4-E_5	E_a
760	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_4-E_5	E_a
761	$E_{1a}E_2E_{iv}$	AlkL	E_4-E_5	E_a
762	$E_{1b}E_2E_{iv}$	AlkL	E_4-E_5	E_a
763	$E_{1a}E_2E_3E_{iv}$	AlkL	E_4-E_5	E_a
764	$E_{1b}E_2E_3E_{iv}$	AlkL	E_4-E_5	E_a
765	$E_{1a}E_2E_{iv}E_4$	AlkL	E_4-E_5	E_a
766	$E_{1b}E_2E_{iv}E_4$	AlkL	E_4-E_5	E_a
767	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_4-E_5	E_a
768	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_4-E_5	E_a
769	$E_{1a}E_2$			E_b
770	$E_{1b}E_2$			E_b
771	$E_{1a}E_2E_3$			E_b
772	$E_{1b}E_2E_3$			E_b
773	$E_{1a}E_2E_i$			E_b

774	$E_{1b}E_2E_i$	E_b
775	$E_{1a}E_2E_{ii}$	E_b
776	$E_{1b}E_2E_{ii}$	E_b
777	$E_{1a}E_2E_{ii}E_{iib}$	E_b
778	$E_{1b}E_2E_{ii}E_{iib}$	E_b
779	$E_{1a}E_2E_3E_i$	E_b
780	$E_{1b}E_2E_3E_i$	E_b
781	$E_{1a}E_2E_3E_{ii}$	E_b
782	$E_{1b}E_2E_3E_{ii}$	E_b
783	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_b
784	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_b
785	$E_{1a}E_2E_4$	E_b
786	$E_{1b}E_2E_4$	E_b
787	$E_{1a}E_2E_3E_4$	E_b
788	$E_{1b}E_2E_3E_4$	E_b
789	$E_{1a}E_2E_iE_4$	E_b
790	$E_{1b}E_2E_iE_4$	E_b
791	$E_{1a}E_2E_{ii}E_4$	E_b
792	$E_{1b}E_2E_{ii}E_4$	E_b
793	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_b
794	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_b
795	$E_{1a}E_2E_3E_iE_4$	E_b
796	$E_{1b}E_2E_3E_iE_4$	E_b
797	$E_{1a}E_2E_3E_{ii}E_4$	E_b
798	$E_{1b}E_2E_3E_{ii}E_4$	E_b
799	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_b
800	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_b
801	$E_{1a}E_2E_{iii}$	E_b
802	$E_{1b}E_2E_{iii}$	E_b
803	$E_{1a}E_2E_3E_{iii}$	E_b
804	$E_{1b}E_2E_3E_{iii}$	E_b
805	$E_{1a}E_2E_{iii}E_4$	E_b
806	$E_{1b}E_2E_{iii}E_4$	E_b
807	$E_{1a}E_2E_3E_{iii}E_4$	E_b
808	$E_{1b}E_2E_3E_{iii}E_4$	E_b
809	$E_{1a}E_2E_{iv}$	E_b
810	$E_{1b}E_2E_{iv}$	E_b
811	$E_{1a}E_2E_3E_{iv}$	E_b
812	$E_{1b}E_2E_3E_{iv}$	E_b
813	$E_{1a}E_2E_{iv}E_4$	E_b
814	$E_{1b}E_2E_{iv}E_4$	E_b
815	$E_{1a}E_2E_3E_{iv}E_4$	E_b
816	$E_{1b}E_2E_3E_{iv}E_4$	E_b

817	$E_{1a}E_2$	E_{4^*}	E_b
818	$E_{1b}E_2$	E_{4^*}	E_b
819	$E_{1a}E_2E_3$	E_{4^*}	E_b
820	$E_{1b}E_2E_3$	E_{4^*}	E_b
821	$E_{1a}E_2E_i$	E_{4^*}	E_b
822	$E_{1b}E_2E_i$	E_{4^*}	E_b
823	$E_{1a}E_2E_{ii}$	E_{4^*}	E_b
824	$E_{1b}E_2E_{ii}$	E_{4^*}	E_b
825	$E_{1a}E_2E_{ii}E_{iib}$	E_{4^*}	E_b
826	$E_{1b}E_2E_{ii}E_{iib}$	E_{4^*}	E_b
827	$E_{1a}E_2E_3E_i$	E_{4^*}	E_b
828	$E_{1b}E_2E_3E_i$	E_{4^*}	E_b
829	$E_{1a}E_2E_3E_{ii}$	E_{4^*}	E_b
830	$E_{1b}E_2E_3E_{ii}$	E_{4^*}	E_b
831	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{4^*}	E_b
832	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{4^*}	E_b
833	$E_{1a}E_2E_4$	E_{4^*}	E_b
834	$E_{1b}E_2E_4$	E_{4^*}	E_b
835	$E_{1a}E_2E_3E_4$	E_{4^*}	E_b
836	$E_{1b}E_2E_3E_4$	E_{4^*}	E_b
837	$E_{1a}E_2E_iE_4$	E_{4^*}	E_b
838	$E_{1b}E_2E_iE_4$	E_{4^*}	E_b
839	$E_{1a}E_2E_{ii}E_4$	E_{4^*}	E_b
840	$E_{1b}E_2E_{ii}E_4$	E_{4^*}	E_b
841	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{4^*}	E_b
842	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{4^*}	E_b
843	$E_{1a}E_2E_3E_iE_4$	E_{4^*}	E_b
844	$E_{1b}E_2E_3E_iE_4$	E_{4^*}	E_b
845	$E_{1a}E_2E_3E_{ii}E_4$	E_{4^*}	E_b
846	$E_{1b}E_2E_3E_{ii}E_4$	E_{4^*}	E_b
847	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{4^*}	E_b
848	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{4^*}	E_b
849	$E_{1a}E_2E_{iii}$	E_{4^*}	E_b
850	$E_{1b}E_2E_{iii}$	E_{4^*}	E_b
851	$E_{1a}E_2E_3E_{iii}$	E_{4^*}	E_b
852	$E_{1b}E_2E_3E_{iii}$	E_{4^*}	E_b
853	$E_{1a}E_2E_{iii}E_4$	E_{4^*}	E_b
854	$E_{1b}E_2E_{iii}E_4$	E_{4^*}	E_b
855	$E_{1a}E_2E_3E_{iii}E_4$	E_{4^*}	E_b
856	$E_{1b}E_2E_3E_{iii}E_4$	E_{4^*}	E_b
857	$E_{1a}E_2E_{iv}$	E_{4^*}	E_b
858	$E_{1b}E_2E_{iv}$	E_{4^*}	E_b
859	$E_{1a}E_2E_3E_{iv}$	E_{4^*}	E_b

860	$E_{1b}E_2E_3E_{iv}$	E_{4^*}	E_b
861	$E_{1a}E_2E_{iv}E_4$	E_{4^*}	E_b
862	$E_{1b}E_2E_{iv}E_4$	E_{4^*}	E_b
863	$E_{1a}E_2E_3E_{iv}E_4$	E_{4^*}	E_b
864	$E_{1b}E_2E_3E_{iv}E_4$	E_{4^*}	E_b
865	$E_{1a}E_2$	E_5	E_b
866	$E_{1b}E_2$	E_5	E_b
867	$E_{1a}E_2E_3$	E_5	E_b
868	$E_{1b}E_2E_3$	E_5	E_b
869	$E_{1a}E_2E_i$	E_5	E_b
870	$E_{1b}E_2E_i$	E_5	E_b
871	$E_{1a}E_2E_{ii}$	E_5	E_b
872	$E_{1b}E_2E_{ii}$	E_5	E_b
873	$E_{1a}E_2E_{ii}E_{iib}$	E_5	E_b
874	$E_{1b}E_2E_{ii}E_{iib}$	E_5	E_b
875	$E_{1a}E_2E_3E_i$	E_5	E_b
876	$E_{1b}E_2E_3E_i$	E_5	E_b
877	$E_{1a}E_2E_3E_{ii}$	E_5	E_b
878	$E_{1b}E_2E_3E_{ii}$	E_5	E_b
879	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_5	E_b
880	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_5	E_b
881	$E_{1a}E_2E_4$	E_5	E_b
882	$E_{1b}E_2E_4$	E_5	E_b
883	$E_{1a}E_2E_3E_4$	E_5	E_b
884	$E_{1b}E_2E_3E_4$	E_5	E_b
885	$E_{1a}E_2E_iE_4$	E_5	E_b
886	$E_{1b}E_2E_iE_4$	E_5	E_b
887	$E_{1a}E_2E_{ii}E_4$	E_5	E_b
888	$E_{1b}E_2E_{ii}E_4$	E_5	E_b
889	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_5	E_b
890	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_5	E_b
891	$E_{1a}E_2E_3E_iE_4$	E_5	E_b
892	$E_{1b}E_2E_3E_iE_4$	E_5	E_b
893	$E_{1a}E_2E_3E_{ii}E_4$	E_5	E_b
894	$E_{1b}E_2E_3E_{ii}E_4$	E_5	E_b
895	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_5	E_b
896	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_5	E_b
897	$E_{1a}E_2E_{iii}$	E_5	E_b
898	$E_{1b}E_2E_{iii}$	E_5	E_b
899	$E_{1a}E_2E_3E_{iii}$	E_5	E_b
900	$E_{1b}E_2E_3E_{iii}$	E_5	E_b
901	$E_{1a}E_2E_{iii}E_4$	E_5	E_b
902	$E_{1b}E_2E_{iii}E_4$	E_5	E_b

903	$E_{1a}E_2E_3E_{iii}E_4$	E_5	E_b
904	$E_{1b}E_2E_3E_{iii}E_4$	E_5	E_b
905	$E_{1a}E_2E_{iv}$	E_5	E_b
906	$E_{1b}E_2E_{iv}$	E_5	E_b
907	$E_{1a}E_2E_3E_{iv}$	E_5	E_b
908	$E_{1b}E_2E_3E_{iv}$	E_5	E_b
909	$E_{1a}E_2E_{iv}E_4$	E_5	E_b
910	$E_{1b}E_2E_{iv}E_4$	E_5	E_b
911	$E_{1a}E_2E_3E_{iv}E_4$	E_5	E_b
912	$E_{1b}E_2E_3E_{iv}E_4$	E_5	E_b
913	$E_{1a}E_2$	$E_{4^*}E_5$	E_b
914	$E_{1b}E_2$	$E_{4^*}E_5$	E_b
915	$E_{1a}E_2E_3$	$E_{4^*}E_5$	E_b
916	$E_{1b}E_2E_3$	$E_{4^*}E_5$	E_b
917	$E_{1a}E_2E_i$	$E_{4^*}E_5$	E_b
918	$E_{1b}E_2E_i$	$E_{4^*}E_5$	E_b
919	$E_{1a}E_2E_{ii}$	$E_{4^*}E_5$	E_b
920	$E_{1b}E_2E_{ii}$	$E_{4^*}E_5$	E_b
921	$E_{1a}E_2E_{ii}E_{iib}$	$E_{4^*}E_5$	E_b
922	$E_{1b}E_2E_{ii}E_{iib}$	$E_{4^*}E_5$	E_b
923	$E_{1a}E_2E_3E_i$	$E_{4^*}E_5$	E_b
924	$E_{1b}E_2E_3E_i$	$E_{4^*}E_5$	E_b
925	$E_{1a}E_2E_3E_{ii}$	$E_{4^*}E_5$	E_b
926	$E_{1b}E_2E_3E_{ii}$	$E_{4^*}E_5$	E_b
927	$E_{1a}E_2E_3E_{ii}E_{iib}$	$E_{4^*}E_5$	E_b
928	$E_{1b}E_2E_3E_{ii}E_{iib}$	$E_{4^*}E_5$	E_b
929	$E_{1a}E_2E_4$	$E_{4^*}E_5$	E_b
930	$E_{1b}E_2E_4$	$E_{4^*}E_5$	E_b
931	$E_{1a}E_2E_3E_4$	$E_{4^*}E_5$	E_b
932	$E_{1b}E_2E_3E_4$	$E_{4^*}E_5$	E_b
933	$E_{1a}E_2E_iE_4$	$E_{4^*}E_5$	E_b
934	$E_{1b}E_2E_iE_4$	$E_{4^*}E_5$	E_b
935	$E_{1a}E_2E_{ii}E_4$	$E_{4^*}E_5$	E_b
936	$E_{1b}E_2E_{ii}E_4$	$E_{4^*}E_5$	E_b
937	$E_{1a}E_2E_{ii}E_{iib}E_4$	$E_{4^*}E_5$	E_b
938	$E_{1b}E_2E_{ii}E_{iib}E_4$	$E_{4^*}E_5$	E_b
939	$E_{1a}E_2E_3E_iE_4$	$E_{4^*}E_5$	E_b
940	$E_{1b}E_2E_3E_iE_4$	$E_{4^*}E_5$	E_b
941	$E_{1a}E_2E_3E_{ii}E_4$	$E_{4^*}E_5$	E_b
942	$E_{1b}E_2E_3E_{ii}E_4$	$E_{4^*}E_5$	E_b
943	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$E_{4^*}E_5$	E_b
944	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$E_{4^*}E_5$	E_b
945	$E_{1a}E_2E_{iii}$	$E_{4^*}E_5$	E_b

946	$E_{1b}E_2E_{iii}$		E_4-E_5	E_b
947	$E_{1a}E_2E_3E_{iii}$		E_4-E_5	E_b
948	$E_{1b}E_2E_3E_{iii}$		E_4-E_5	E_b
949	$E_{1a}E_2E_{iii}E_4$		E_4-E_5	E_b
950	$E_{1b}E_2E_{iii}E_4$		E_4-E_5	E_b
951	$E_{1a}E_2E_3E_{iii}E_4$		E_4-E_5	E_b
952	$E_{1b}E_2E_3E_{iii}E_4$		E_4-E_5	E_b
953	$E_{1a}E_2E_{iv}$		E_4-E_5	E_b
954	$E_{1b}E_2E_{iv}$		E_4-E_5	E_b
955	$E_{1a}E_2E_3E_{iv}$		E_4-E_5	E_b
956	$E_{1b}E_2E_3E_{iv}$		E_4-E_5	E_b
957	$E_{1a}E_2E_{iv}E_4$		E_4-E_5	E_b
958	$E_{1b}E_2E_{iv}E_4$		E_4-E_5	E_b
959	$E_{1a}E_2E_3E_{iv}E_4$		E_4-E_5	E_b
960	$E_{1b}E_2E_3E_{iv}E_4$		E_4-E_5	E_b
961	$E_{1a}E_2$	AlkL		E_b
962	$E_{1b}E_2$	AlkL		E_b
963	$E_{1a}E_2E_3$	AlkL		E_b
964	$E_{1b}E_2E_3$	AlkL		E_b
965	$E_{1a}E_2E_i$	AlkL		E_b
966	$E_{1b}E_2E_i$	AlkL		E_b
967	$E_{1a}E_2E_{ii}$	AlkL		E_b
968	$E_{1b}E_2E_{ii}$	AlkL		E_b
969	$E_{1a}E_2E_{ii}E_{iib}$	AlkL		E_b
970	$E_{1b}E_2E_{ii}E_{iib}$	AlkL		E_b
971	$E_{1a}E_2E_3E_i$	AlkL		E_b
972	$E_{1b}E_2E_3E_i$	AlkL		E_b
973	$E_{1a}E_2E_3E_{ii}$	AlkL		E_b
974	$E_{1b}E_2E_3E_{ii}$	AlkL		E_b
975	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL		E_b
976	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL		E_b
977	$E_{1a}E_2E_4$	AlkL		E_b
978	$E_{1b}E_2E_4$	AlkL		E_b
979	$E_{1a}E_2E_3E_4$	AlkL		E_b
980	$E_{1b}E_2E_3E_4$	AlkL		E_b
981	$E_{1a}E_2E_iE_4$	AlkL		E_b
982	$E_{1b}E_2E_iE_4$	AlkL		E_b
983	$E_{1a}E_2E_{ii}E_4$	AlkL		E_b
984	$E_{1b}E_2E_{ii}E_4$	AlkL		E_b
985	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL		E_b
986	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL		E_b
987	$E_{1a}E_2E_3E_iE_4$	AlkL		E_b
988	$E_{1b}E_2E_3E_iE_4$	AlkL		E_b

989	$E_{1a}E_2E_3E_{ii}E_4$	AlkL		E_b
990	$E_{1b}E_2E_3E_{ii}E_4$	AlkL		E_b
991	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL		E_b
992	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL		E_b
993	$E_{1a}E_2E_{iii}$	AlkL		E_b
994	$E_{1b}E_2E_{iii}$	AlkL		E_b
995	$E_{1a}E_2E_3E_{iii}$	AlkL		E_b
996	$E_{1b}E_2E_3E_{iii}$	AlkL		E_b
997	$E_{1a}E_2E_{iii}E_4$	AlkL		E_b
998	$E_{1b}E_2E_{iii}E_4$	AlkL		E_b
999	$E_{1a}E_2E_3E_{iii}E_4$	AlkL		E_b
1000	$E_{1b}E_2E_3E_{iii}E_4$	AlkL		E_b
1001	$E_{1a}E_2E_{iv}$	AlkL		E_b
1002	$E_{1b}E_2E_{iv}$	AlkL		E_b
1003	$E_{1a}E_2E_3E_{iv}$	AlkL		E_b
1004	$E_{1b}E_2E_3E_{iv}$	AlkL		E_b
1005	$E_{1a}E_2E_{iv}E_4$	AlkL		E_b
1006	$E_{1b}E_2E_{iv}E_4$	AlkL		E_b
1007	$E_{1a}E_2E_3E_{iv}E_4$	AlkL		E_b
1008	$E_{1b}E_2E_3E_{iv}E_4$	AlkL		E_b
1009	$E_{1a}E_2$	AlkL	E_4-	E_b
1010	$E_{1b}E_2$	AlkL	E_4-	E_b
1011	$E_{1a}E_2E_3$	AlkL	E_4-	E_b
1012	$E_{1b}E_2E_3$	AlkL	E_4-	E_b
1013	$E_{1a}E_2E_i$	AlkL	E_4-	E_b
1014	$E_{1b}E_2E_i$	AlkL	E_4-	E_b
1015	$E_{1a}E_2E_{ii}$	AlkL	E_4-	E_b
1016	$E_{1b}E_2E_{ii}$	AlkL	E_4-	E_b
1017	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_4-	E_b
1018	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_4-	E_b
1019	$E_{1a}E_2E_3E_i$	AlkL	E_4-	E_b
1020	$E_{1b}E_2E_3E_i$	AlkL	E_4-	E_b
1021	$E_{1a}E_2E_3E_{ii}$	AlkL	E_4-	E_b
1022	$E_{1b}E_2E_3E_{ii}$	AlkL	E_4-	E_b
1023	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-	E_b
1024	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-	E_b
1025	$E_{1a}E_2E_4$	AlkL	E_4-	E_b
1026	$E_{1b}E_2E_4$	AlkL	E_4-	E_b
1027	$E_{1a}E_2E_3E_4$	AlkL	E_4-	E_b
1028	$E_{1b}E_2E_3E_4$	AlkL	E_4-	E_b
1029	$E_{1a}E_2E_iE_4$	AlkL	E_4-	E_b
1030	$E_{1b}E_2E_iE_4$	AlkL	E_4-	E_b
1031	$E_{1a}E_2E_{ii}E_4$	AlkL	E_4-	E_b

1032	$E_{1b}E_2E_{ii}E_4$	AlkL	$E_{4'}$	E_b
1033	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_b
1034	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_b
1035	$E_{1a}E_2E_3E_iE_4$	AlkL	$E_{4'}$	E_b
1036	$E_{1b}E_2E_3E_iE_4$	AlkL	$E_{4'}$	E_b
1037	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	$E_{4'}$	E_b
1038	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	$E_{4'}$	E_b
1039	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_b
1040	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_b
1041	$E_{1a}E_2E_{iii}$	AlkL	$E_{4'}$	E_b
1042	$E_{1b}E_2E_{iii}$	AlkL	$E_{4'}$	E_b
1043	$E_{1a}E_2E_3E_{iii}$	AlkL	$E_{4'}$	E_b
1044	$E_{1b}E_2E_3E_{iii}$	AlkL	$E_{4'}$	E_b
1045	$E_{1a}E_2E_{iii}E_4$	AlkL	$E_{4'}$	E_b
1046	$E_{1b}E_2E_{iii}E_4$	AlkL	$E_{4'}$	E_b
1047	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	$E_{4'}$	E_b
1048	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	$E_{4'}$	E_b
1049	$E_{1a}E_2E_{iv}$	AlkL	$E_{4'}$	E_b
1050	$E_{1b}E_2E_{iv}$	AlkL	$E_{4'}$	E_b
1051	$E_{1a}E_2E_3E_{iv}$	AlkL	$E_{4'}$	E_b
1052	$E_{1b}E_2E_3E_{iv}$	AlkL	$E_{4'}$	E_b
1053	$E_{1a}E_2E_{iv}E_4$	AlkL	$E_{4'}$	E_b
1054	$E_{1b}E_2E_{iv}E_4$	AlkL	$E_{4'}$	E_b
1055	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	$E_{4'}$	E_b
1056	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	$E_{4'}$	E_b
1057	$E_{1a}E_2$	AlkL	E_5	E_b
1058	$E_{1b}E_2$	AlkL	E_5	E_b
1059	$E_{1a}E_2E_3$	AlkL	E_5	E_b
1060	$E_{1b}E_2E_3$	AlkL	E_5	E_b
1061	$E_{1a}E_2E_i$	AlkL	E_5	E_b
1062	$E_{1b}E_2E_i$	AlkL	E_5	E_b
1063	$E_{1a}E_2E_{ii}$	AlkL	E_5	E_b
1064	$E_{1b}E_2E_{ii}$	AlkL	E_5	E_b
1065	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_5	E_b
1066	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_5	E_b
1067	$E_{1a}E_2E_3E_i$	AlkL	E_5	E_b
1068	$E_{1b}E_2E_3E_i$	AlkL	E_5	E_b
1069	$E_{1a}E_2E_3E_{ii}$	AlkL	E_5	E_b
1070	$E_{1b}E_2E_3E_{ii}$	AlkL	E_5	E_b
1071	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_5	E_b
1072	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_5	E_b
1073	$E_{1a}E_2E_4$	AlkL	E_5	E_b
1074	$E_{1b}E_2E_4$	AlkL	E_5	E_b

1075	$E_{1a}E_2E_3E_4$	AlkL	E_5	E_b
1076	$E_{1b}E_2E_3E_4$	AlkL	E_5	E_b
1077	$E_{1a}E_2E_iE_4$	AlkL	E_5	E_b
1078	$E_{1b}E_2E_iE_4$	AlkL	E_5	E_b
1079	$E_{1a}E_2E_{ii}E_4$	AlkL	E_5	E_b
1080	$E_{1b}E_2E_{ii}E_4$	AlkL	E_5	E_b
1081	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_5	E_b
1082	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_5	E_b
1083	$E_{1a}E_2E_3E_iE_4$	AlkL	E_5	E_b
1084	$E_{1b}E_2E_3E_iE_4$	AlkL	E_5	E_b
1085	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_5	E_b
1086	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_5	E_b
1087	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_5	E_b
1088	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_5	E_b
1089	$E_{1a}E_2E_{iii}$	AlkL	E_5	E_b
1090	$E_{1b}E_2E_{iii}$	AlkL	E_5	E_b
1091	$E_{1a}E_2E_3E_{iii}$	AlkL	E_5	E_b
1092	$E_{1b}E_2E_3E_{iii}$	AlkL	E_5	E_b
1093	$E_{1a}E_2E_{iii}E_4$	AlkL	E_5	E_b
1094	$E_{1b}E_2E_{iii}E_4$	AlkL	E_5	E_b
1095	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_5	E_b
1096	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_5	E_b
1097	$E_{1a}E_2E_{iv}$	AlkL	E_5	E_b
1098	$E_{1b}E_2E_{iv}$	AlkL	E_5	E_b
1099	$E_{1a}E_2E_3E_{iv}$	AlkL	E_5	E_b
1100	$E_{1b}E_2E_3E_{iv}$	AlkL	E_5	E_b
1101	$E_{1a}E_2E_{iv}E_4$	AlkL	E_5	E_b
1102	$E_{1b}E_2E_{iv}E_4$	AlkL	E_5	E_b
1103	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_5	E_b
1104	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_5	E_b
1105	$E_{1a}E_2$	AlkL	E_4-E_5	E_b
1106	$E_{1b}E_2$	AlkL	E_4-E_5	E_b
1107	$E_{1a}E_2E_3$	AlkL	E_4-E_5	E_b
1108	$E_{1b}E_2E_3$	AlkL	E_4-E_5	E_b
1109	$E_{1a}E_2E_i$	AlkL	E_4-E_5	E_b
1110	$E_{1b}E_2E_i$	AlkL	E_4-E_5	E_b
1111	$E_{1a}E_2E_{ii}$	AlkL	E_4-E_5	E_b
1112	$E_{1b}E_2E_{ii}$	AlkL	E_4-E_5	E_b
1113	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_4-E_5	E_b
1114	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_4-E_5	E_b
1115	$E_{1a}E_2E_3E_i$	AlkL	E_4-E_5	E_b
1116	$E_{1b}E_2E_3E_i$	AlkL	E_4-E_5	E_b
1117	$E_{1a}E_2E_3E_{ii}$	AlkL	E_4-E_5	E_b

1118	$E_{1b}E_2E_3E_{ii}$	AlkL	E_4-E_5	E_b
1119	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-E_5	E_b
1120	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-E_5	E_b
1121	$E_{1a}E_2E_4$	AlkL	E_4-E_5	E_b
1122	$E_{1b}E_2E_4$	AlkL	E_4-E_5	E_b
1123	$E_{1a}E_2E_3E_4$	AlkL	E_4-E_5	E_b
1124	$E_{1b}E_2E_3E_4$	AlkL	E_4-E_5	E_b
1125	$E_{1a}E_2E_iE_4$	AlkL	E_4-E_5	E_b
1126	$E_{1b}E_2E_iE_4$	AlkL	E_4-E_5	E_b
1127	$E_{1a}E_2E_{ii}E_4$	AlkL	E_4-E_5	E_b
1128	$E_{1b}E_2E_{ii}E_4$	AlkL	E_4-E_5	E_b
1129	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_b
1130	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_b
1131	$E_{1a}E_2E_3E_iE_4$	AlkL	E_4-E_5	E_b
1132	$E_{1b}E_2E_3E_iE_4$	AlkL	E_4-E_5	E_b
1133	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_4-E_5	E_b
1134	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_4-E_5	E_b
1135	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_b
1136	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_b
1137	$E_{1a}E_2E_{iii}$	AlkL	E_4-E_5	E_b
1138	$E_{1b}E_2E_{iii}$	AlkL	E_4-E_5	E_b
1139	$E_{1a}E_2E_3E_{iii}$	AlkL	E_4-E_5	E_b
1140	$E_{1b}E_2E_3E_{iii}$	AlkL	E_4-E_5	E_b
1141	$E_{1a}E_2E_{iii}E_4$	AlkL	E_4-E_5	E_b
1142	$E_{1b}E_2E_{iii}E_4$	AlkL	E_4-E_5	E_b
1143	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_4-E_5	E_b
1144	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_4-E_5	E_b
1145	$E_{1a}E_2E_{iv}$	AlkL	E_4-E_5	E_b
1146	$E_{1b}E_2E_{iv}$	AlkL	E_4-E_5	E_b
1147	$E_{1a}E_2E_3E_{iv}$	AlkL	E_4-E_5	E_b
1148	$E_{1b}E_2E_3E_{iv}$	AlkL	E_4-E_5	E_b
1149	$E_{1a}E_2E_{iv}E_4$	AlkL	E_4-E_5	E_b
1150	$E_{1b}E_2E_{iv}E_4$	AlkL	E_4-E_5	E_b
1151	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_4-E_5	E_b
1152	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_4-E_5	E_b
1153	$E_{1a}E_2$			E_d
1154	$E_{1b}E_2$			E_d
1155	$E_{1a}E_2E_3$			E_d
1156	$E_{1b}E_2E_3$			E_d
1157	$E_{1a}E_2E_i$			E_d
1158	$E_{1b}E_2E_i$			E_d
1159	$E_{1a}E_2E_{ii}$			E_d
1160	$E_{1b}E_2E_{ii}$			E_d

1161	$E_{1a}E_2E_{ii}E_{iib}$		E_d
1162	$E_{1b}E_2E_{ii}E_{iib}$		E_d
1163	$E_{1a}E_2E_3E_i$		E_d
1164	$E_{1b}E_2E_3E_i$		E_d
1165	$E_{1a}E_2E_3E_{ii}$		E_d
1166	$E_{1b}E_2E_3E_{ii}$		E_d
1167	$E_{1a}E_2E_3E_{ii}E_{iib}$		E_d
1168	$E_{1b}E_2E_3E_{ii}E_{iib}$		E_d
1169	$E_{1a}E_2E_4$		E_d
1170	$E_{1b}E_2E_4$		E_d
1171	$E_{1a}E_2E_3E_4$		E_d
1172	$E_{1b}E_2E_3E_4$		E_d
1173	$E_{1a}E_2E_iE_4$		E_d
1174	$E_{1b}E_2E_iE_4$		E_d
1175	$E_{1a}E_2E_{ii}E_4$		E_d
1176	$E_{1b}E_2E_{ii}E_4$		E_d
1177	$E_{1a}E_2E_{ii}E_{iib}E_4$		E_d
1178	$E_{1b}E_2E_{ii}E_{iib}E_4$		E_d
1179	$E_{1a}E_2E_3E_iE_4$		E_d
1180	$E_{1b}E_2E_3E_iE_4$		E_d
1181	$E_{1a}E_2E_3E_{ii}E_4$		E_d
1182	$E_{1b}E_2E_3E_{ii}E_4$		E_d
1183	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$		E_d
1184	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$		E_d
1185	$E_{1a}E_2E_{iii}$		E_d
1186	$E_{1b}E_2E_{iii}$		E_d
1187	$E_{1a}E_2E_3E_{iii}$		E_d
1188	$E_{1b}E_2E_3E_{iii}$		E_d
1189	$E_{1a}E_2E_{iii}E_4$		E_d
1190	$E_{1b}E_2E_{iii}E_4$		E_d
1191	$E_{1a}E_2E_3E_{iii}E_4$		E_d
1192	$E_{1b}E_2E_3E_{iii}E_4$		E_d
1193	$E_{1a}E_2E_{iv}$		E_d
1194	$E_{1b}E_2E_{iv}$		E_d
1195	$E_{1a}E_2E_3E_{iv}$		E_d
1196	$E_{1b}E_2E_3E_{iv}$		E_d
1197	$E_{1a}E_2E_{iv}E_4$		E_d
1198	$E_{1b}E_2E_{iv}E_4$		E_d
1199	$E_{1a}E_2E_3E_{iv}E_4$		E_d
1200	$E_{1b}E_2E_3E_{iv}E_4$		E_d
1201	$E_{1a}E_2$	E_4-	E_d
1202	$E_{1b}E_2$	E_4-	E_d
1203	$E_{1a}E_2E_3$	E_4-	E_d

1204	$E_{1b}E_2E_3$	E_{4^*}	E_d
1205	$E_{1a}E_2E_i$	E_{4^*}	E_d
1206	$E_{1b}E_2E_i$	E_{4^*}	E_d
1207	$E_{1a}E_2E_{ii}$	E_{4^*}	E_d
1208	$E_{1b}E_2E_{ii}$	E_{4^*}	E_d
1209	$E_{1a}E_2E_{ii}E_{iib}$	E_{4^*}	E_d
1210	$E_{1b}E_2E_{ii}E_{iib}$	E_{4^*}	E_d
1211	$E_{1a}E_2E_3E_i$	E_{4^*}	E_d
1212	$E_{1b}E_2E_3E_i$	E_{4^*}	E_d
1213	$E_{1a}E_2E_3E_{ii}$	E_{4^*}	E_d
1214	$E_{1b}E_2E_3E_{ii}$	E_{4^*}	E_d
1215	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{4^*}	E_d
1216	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{4^*}	E_d
1217	$E_{1a}E_2E_4$	E_{4^*}	E_d
1218	$E_{1b}E_2E_4$	E_{4^*}	E_d
1219	$E_{1a}E_2E_3E_4$	E_{4^*}	E_d
1220	$E_{1b}E_2E_3E_4$	E_{4^*}	E_d
1221	$E_{1a}E_2E_iE_4$	E_{4^*}	E_d
1222	$E_{1b}E_2E_iE_4$	E_{4^*}	E_d
1223	$E_{1a}E_2E_{ii}E_4$	E_{4^*}	E_d
1224	$E_{1b}E_2E_{ii}E_4$	E_{4^*}	E_d
1225	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{4^*}	E_d
1226	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{4^*}	E_d
1227	$E_{1a}E_2E_3E_iE_4$	E_{4^*}	E_d
1228	$E_{1b}E_2E_3E_iE_4$	E_{4^*}	E_d
1229	$E_{1a}E_2E_3E_{ii}E_4$	E_{4^*}	E_d
1230	$E_{1b}E_2E_3E_{ii}E_4$	E_{4^*}	E_d
1231	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{4^*}	E_d
1232	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{4^*}	E_d
1233	$E_{1a}E_2E_{iii}$	E_{4^*}	E_d
1234	$E_{1b}E_2E_{iii}$	E_{4^*}	E_d
1235	$E_{1a}E_2E_3E_{iii}$	E_{4^*}	E_d
1236	$E_{1b}E_2E_3E_{iii}$	E_{4^*}	E_d
1237	$E_{1a}E_2E_{iii}E_4$	E_{4^*}	E_d
1238	$E_{1b}E_2E_{iii}E_4$	E_{4^*}	E_d
1239	$E_{1a}E_2E_3E_{iii}E_4$	E_{4^*}	E_d
1240	$E_{1b}E_2E_3E_{iii}E_4$	E_{4^*}	E_d
1241	$E_{1a}E_2E_{iv}$	E_{4^*}	E_d
1242	$E_{1b}E_2E_{iv}$	E_{4^*}	E_d
1243	$E_{1a}E_2E_3E_{iv}$	E_{4^*}	E_d
1244	$E_{1b}E_2E_3E_{iv}$	E_{4^*}	E_d
1245	$E_{1a}E_2E_{iv}E_4$	E_{4^*}	E_d
1246	$E_{1b}E_2E_{iv}E_4$	E_{4^*}	E_d
1247	$E_{1a}E_2E_3E_{iv}E_4$	E_{4^*}	E_d
1248	$E_{1b}E_2E_3E_{iv}E_4$	E_{4^*}	E_d
1249	$E_{1a}E_2$	E_5	E_d
1250	$E_{1b}E_2$	E_5	E_d
1251	$E_{1a}E_2E_3$	E_5	E_d
1252	$E_{1b}E_2E_3$	E_5	E_d
1253	$E_{1a}E_2E_i$	E_5	E_d
1254	$E_{1b}E_2E_i$	E_5	E_d
1255	$E_{1a}E_2E_{ii}$	E_5	E_d
1256	$E_{1b}E_2E_{ii}$	E_5	E_d
1257	$E_{1a}E_2E_{ii}E_{iib}$	E_5	E_d
1258	$E_{1b}E_2E_{ii}E_{iib}$	E_5	E_d
1259	$E_{1a}E_2E_3E_i$	E_5	E_d
1260	$E_{1b}E_2E_3E_i$	E_5	E_d
1261	$E_{1a}E_2E_3E_{ii}$	E_5	E_d
1262	$E_{1b}E_2E_3E_{ii}$	E_5	E_d
1263	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_5	E_d
1264	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_5	E_d
1265	$E_{1a}E_2E_4$	E_5	E_d
1266	$E_{1b}E_2E_4$	E_5	E_d
1267	$E_{1a}E_2E_3E_4$	E_5	E_d
1268	$E_{1b}E_2E_3E_4$	E_5	E_d
1269	$E_{1a}E_2E_iE_4$	E_5	E_d
1270	$E_{1b}E_2E_iE_4$	E_5	E_d
1271	$E_{1a}E_2E_{ii}E_4$	E_5	E_d
1272	$E_{1b}E_2E_{ii}E_4$	E_5	E_d
1273	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_5	E_d
1274	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_5	E_d
1275	$E_{1a}E_2E_3E_iE_4$	E_5	E_d
1276	$E_{1b}E_2E_3E_iE_4$	E_5	E_d
1277	$E_{1a}E_2E_3E_{ii}E_4$	E_5	E_d
1278	$E_{1b}E_2E_3E_{ii}E_4$	E_5	E_d
1279	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_5	E_d
1280	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_5	E_d
1281	$E_{1a}E_2E_{iii}$	E_5	E_d
1282	$E_{1b}E_2E_{iii}$	E_5	E_d
1283	$E_{1a}E_2E_3E_{iii}$	E_5	E_d
1284	$E_{1b}E_2E_3E_{iii}$	E_5	E_d
1285	$E_{1a}E_2E_{iii}E_4$	E_5	E_d
1286	$E_{1b}E_2E_{iii}E_4$	E_5	E_d
1287	$E_{1a}E_2E_3E_{iii}E_4$	E_5	E_d
1288	$E_{1b}E_2E_3E_{iii}E_4$	E_5	E_d
1289	$E_{1a}E_2E_{iv}$	E_5	E_d

1290	$E_{1b}E_2E_{iv}$	E_5	E_d
1291	$E_{1a}E_2E_3E_{iv}$	E_5	E_d
1292	$E_{1b}E_2E_3E_{iv}$	E_5	E_d
1293	$E_{1a}E_2E_{iv}E_4$	E_5	E_d
1294	$E_{1b}E_2E_{iv}E_4$	E_5	E_d
1295	$E_{1a}E_2E_3E_{iv}E_4$	E_5	E_d
1296	$E_{1b}E_2E_3E_{iv}E_4$	E_5	E_d
1297	$E_{1a}E_2$	E_4-E_5	E_d
1298	$E_{1b}E_2$	E_4-E_5	E_d
1299	$E_{1a}E_2E_3$	E_4-E_5	E_d
1300	$E_{1b}E_2E_3$	E_4-E_5	E_d
1301	$E_{1a}E_2E_i$	E_4-E_5	E_d
1302	$E_{1b}E_2E_i$	E_4-E_5	E_d
1303	$E_{1a}E_2E_{ii}$	E_4-E_5	E_d
1304	$E_{1b}E_2E_{ii}$	E_4-E_5	E_d
1305	$E_{1a}E_2E_{ii}E_{iib}$	E_4-E_5	E_d
1306	$E_{1b}E_2E_{ii}E_{iib}$	E_4-E_5	E_d
1307	$E_{1a}E_2E_3E_i$	E_4-E_5	E_d
1308	$E_{1b}E_2E_3E_i$	E_4-E_5	E_d
1309	$E_{1a}E_2E_3E_{ii}$	E_4-E_5	E_d
1310	$E_{1b}E_2E_3E_{ii}$	E_4-E_5	E_d
1311	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_4-E_5	E_d
1312	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_4-E_5	E_d
1313	$E_{1a}E_2E_4$	E_4-E_5	E_d
1314	$E_{1b}E_2E_4$	E_4-E_5	E_d
1315	$E_{1a}E_2E_3E_4$	E_4-E_5	E_d
1316	$E_{1b}E_2E_3E_4$	E_4-E_5	E_d
1317	$E_{1a}E_2E_iE_4$	E_4-E_5	E_d
1318	$E_{1b}E_2E_iE_4$	E_4-E_5	E_d
1319	$E_{1a}E_2E_{ii}E_4$	E_4-E_5	E_d
1320	$E_{1b}E_2E_{ii}E_4$	E_4-E_5	E_d
1321	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_4-E_5	E_d
1322	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_4-E_5	E_d
1323	$E_{1a}E_2E_3E_iE_4$	E_4-E_5	E_d
1324	$E_{1b}E_2E_3E_iE_4$	E_4-E_5	E_d
1325	$E_{1a}E_2E_3E_{ii}E_4$	E_4-E_5	E_d
1326	$E_{1b}E_2E_3E_{ii}E_4$	E_4-E_5	E_d
1327	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_4-E_5	E_d
1328	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_4-E_5	E_d
1329	$E_{1a}E_2E_{iii}$	E_4-E_5	E_d
1330	$E_{1b}E_2E_{iii}$	E_4-E_5	E_d
1331	$E_{1a}E_2E_3E_{iii}$	E_4-E_5	E_d
1332	$E_{1b}E_2E_3E_{iii}$	E_4-E_5	E_d

1333	$E_{1a}E_2E_{iii}E_4$		E_4-E_5	E_d
1334	$E_{1b}E_2E_{iii}E_4$		E_4-E_5	E_d
1335	$E_{1a}E_2E_3E_{iii}E_4$		E_4-E_5	E_d
1336	$E_{1b}E_2E_3E_{iii}E_4$		E_4-E_5	E_d
1337	$E_{1a}E_2E_{iv}$		E_4-E_5	E_d
1338	$E_{1b}E_2E_{iv}$		E_4-E_5	E_d
1339	$E_{1a}E_2E_3E_{iv}$		E_4-E_5	E_d
1340	$E_{1b}E_2E_3E_{iv}$		E_4-E_5	E_d
1341	$E_{1a}E_2E_{iv}E_4$		E_4-E_5	E_d
1342	$E_{1b}E_2E_{iv}E_4$		E_4-E_5	E_d
1343	$E_{1a}E_2E_3E_{iv}E_4$		E_4-E_5	E_d
1344	$E_{1b}E_2E_3E_{iv}E_4$		E_4-E_5	E_d
1345	$E_{1a}E_2$	AlkL		E_d
1346	$E_{1b}E_2$	AlkL		E_d
1347	$E_{1a}E_2E_3$	AlkL		E_d
1348	$E_{1b}E_2E_3$	AlkL		E_d
1349	$E_{1a}E_2E_i$	AlkL		E_d
1350	$E_{1b}E_2E_i$	AlkL		E_d
1351	$E_{1a}E_2E_{ii}$	AlkL		E_d
1352	$E_{1b}E_2E_{ii}$	AlkL		E_d
1353	$E_{1a}E_2E_{ii}E_{iib}$	AlkL		E_d
1354	$E_{1b}E_2E_{ii}E_{iib}$	AlkL		E_d
1355	$E_{1a}E_2E_3E_i$	AlkL		E_d
1356	$E_{1b}E_2E_3E_i$	AlkL		E_d
1357	$E_{1a}E_2E_3E_{ii}$	AlkL		E_d
1358	$E_{1b}E_2E_3E_{ii}$	AlkL		E_d
1359	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL		E_d
1360	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL		E_d
1361	$E_{1a}E_2E_4$	AlkL		E_d
1362	$E_{1b}E_2E_4$	AlkL		E_d
1363	$E_{1a}E_2E_3E_4$	AlkL		E_d
1364	$E_{1b}E_2E_3E_4$	AlkL		E_d
1365	$E_{1a}E_2E_iE_4$	AlkL		E_d
1366	$E_{1b}E_2E_iE_4$	AlkL		E_d
1367	$E_{1a}E_2E_{ii}E_4$	AlkL		E_d
1368	$E_{1b}E_2E_{ii}E_4$	AlkL		E_d
1369	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL		E_d
1370	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL		E_d
1371	$E_{1a}E_2E_3E_iE_4$	AlkL		E_d
1372	$E_{1b}E_2E_3E_iE_4$	AlkL		E_d
1373	$E_{1a}E_2E_3E_{ii}E_4$	AlkL		E_d
1374	$E_{1b}E_2E_3E_{ii}E_4$	AlkL		E_d
1375	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL		E_d

1376	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL		E_d
1377	$E_{1a}E_2E_{iii}$	AlkL		E_d
1378	$E_{1b}E_2E_{iii}$	AlkL		E_d
1379	$E_{1a}E_2E_3E_{iii}$	AlkL		E_d
1380	$E_{1b}E_2E_3E_{iii}$	AlkL		E_d
1381	$E_{1a}E_2E_{iii}E_4$	AlkL		E_d
1382	$E_{1b}E_2E_{iii}E_4$	AlkL		E_d
1383	$E_{1a}E_2E_3E_{iii}E_4$	AlkL		E_d
1384	$E_{1b}E_2E_3E_{iii}E_4$	AlkL		E_d
1385	$E_{1a}E_2E_{iv}$	AlkL		E_d
1386	$E_{1b}E_2E_{iv}$	AlkL		E_d
1387	$E_{1a}E_2E_3E_{iv}$	AlkL		E_d
1388	$E_{1b}E_2E_3E_{iv}$	AlkL		E_d
1389	$E_{1a}E_2E_{iv}E_4$	AlkL		E_d
1390	$E_{1b}E_2E_{iv}E_4$	AlkL		E_d
1391	$E_{1a}E_2E_3E_{iv}E_4$	AlkL		E_d
1392	$E_{1b}E_2E_3E_{iv}E_4$	AlkL		E_d
1393	$E_{1a}E_2$	AlkL	E_{4^*}	E_d
1394	$E_{1b}E_2$	AlkL	E_{4^*}	E_d
1395	$E_{1a}E_2E_3$	AlkL	E_{4^*}	E_d
1396	$E_{1b}E_2E_3$	AlkL	E_{4^*}	E_d
1397	$E_{1a}E_2E_i$	AlkL	E_{4^*}	E_d
1398	$E_{1b}E_2E_i$	AlkL	E_{4^*}	E_d
1399	$E_{1a}E_2E_{ii}$	AlkL	E_{4^*}	E_d
1400	$E_{1b}E_2E_{ii}$	AlkL	E_{4^*}	E_d
1401	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_{4^*}	E_d
1402	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_{4^*}	E_d
1403	$E_{1a}E_2E_3E_i$	AlkL	E_{4^*}	E_d
1404	$E_{1b}E_2E_3E_i$	AlkL	E_{4^*}	E_d
1405	$E_{1a}E_2E_3E_{ii}$	AlkL	E_{4^*}	E_d
1406	$E_{1b}E_2E_3E_{ii}$	AlkL	E_{4^*}	E_d
1407	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_{4^*}	E_d
1408	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_{4^*}	E_d
1409	$E_{1a}E_2E_4$	AlkL	E_{4^*}	E_d
1410	$E_{1b}E_2E_4$	AlkL	E_{4^*}	E_d
1411	$E_{1a}E_2E_3E_4$	AlkL	E_{4^*}	E_d
1412	$E_{1b}E_2E_3E_4$	AlkL	E_{4^*}	E_d
1413	$E_{1a}E_2E_iE_4$	AlkL	E_{4^*}	E_d
1414	$E_{1b}E_2E_iE_4$	AlkL	E_{4^*}	E_d
1415	$E_{1a}E_2E_{ii}E_4$	AlkL	E_{4^*}	E_d
1416	$E_{1b}E_2E_{ii}E_4$	AlkL	E_{4^*}	E_d
1417	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_{4^*}	E_d
1418	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_{4^*}	E_d

1419	$E_{1a}E_2E_3E_iE_4$	AlkL	E_{4^*}	E_d
1420	$E_{1b}E_2E_3E_iE_4$	AlkL	E_{4^*}	E_d
1421	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_{4^*}	E_d
1422	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_{4^*}	E_d
1423	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_{4^*}	E_d
1424	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_{4^*}	E_d
1425	$E_{1a}E_2E_{iii}$	AlkL	E_{4^*}	E_d
1426	$E_{1b}E_2E_{iii}$	AlkL	E_{4^*}	E_d
1427	$E_{1a}E_2E_3E_{iii}$	AlkL	E_{4^*}	E_d
1428	$E_{1b}E_2E_3E_{iii}$	AlkL	E_{4^*}	E_d
1429	$E_{1a}E_2E_{iii}E_4$	AlkL	E_{4^*}	E_d
1430	$E_{1b}E_2E_{iii}E_4$	AlkL	E_{4^*}	E_d
1431	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_{4^*}	E_d
1432	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_{4^*}	E_d
1433	$E_{1a}E_2E_{iv}$	AlkL	E_{4^*}	E_d
1434	$E_{1b}E_2E_{iv}$	AlkL	E_{4^*}	E_d
1435	$E_{1a}E_2E_3E_{iv}$	AlkL	E_{4^*}	E_d
1436	$E_{1b}E_2E_3E_{iv}$	AlkL	E_{4^*}	E_d
1437	$E_{1a}E_2E_{iv}E_4$	AlkL	E_{4^*}	E_d
1438	$E_{1b}E_2E_{iv}E_4$	AlkL	E_{4^*}	E_d
1439	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_{4^*}	E_d
1440	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_{4^*}	E_d
1441	$E_{1a}E_2$	AlkL	E_5	E_d
1442	$E_{1b}E_2$	AlkL	E_5	E_d
1443	$E_{1a}E_2E_3$	AlkL	E_5	E_d
1444	$E_{1b}E_2E_3$	AlkL	E_5	E_d
1445	$E_{1a}E_2E_i$	AlkL	E_5	E_d
1446	$E_{1b}E_2E_i$	AlkL	E_5	E_d
1447	$E_{1a}E_2E_{ii}$	AlkL	E_5	E_d
1448	$E_{1b}E_2E_{ii}$	AlkL	E_5	E_d
1449	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_5	E_d
1450	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_5	E_d
1451	$E_{1a}E_2E_3E_i$	AlkL	E_5	E_d
1452	$E_{1b}E_2E_3E_i$	AlkL	E_5	E_d
1453	$E_{1a}E_2E_3E_{ii}$	AlkL	E_5	E_d
1454	$E_{1b}E_2E_3E_{ii}$	AlkL	E_5	E_d
1455	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_5	E_d
1456	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_5	E_d
1457	$E_{1a}E_2E_4$	AlkL	E_5	E_d
1458	$E_{1b}E_2E_4$	AlkL	E_5	E_d
1459	$E_{1a}E_2E_3E_4$	AlkL	E_5	E_d
1460	$E_{1b}E_2E_3E_4$	AlkL	E_5	E_d
1461	$E_{1a}E_2E_iE_4$	AlkL	E_5	E_d

1462	$E_{1b}E_2E_iE_4$	AlkL	E_5	E_d
1463	$E_{1a}E_2E_{ii}E_4$	AlkL	E_5	E_d
1464	$E_{1b}E_2E_{ii}E_4$	AlkL	E_5	E_d
1465	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_5	E_d
1466	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_5	E_d
1467	$E_{1a}E_2E_3E_iE_4$	AlkL	E_5	E_d
1468	$E_{1b}E_2E_3E_iE_4$	AlkL	E_5	E_d
1469	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_5	E_d
1470	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_5	E_d
1471	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_5	E_d
1472	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_5	E_d
1473	$E_{1a}E_2E_{iii}$	AlkL	E_5	E_d
1474	$E_{1b}E_2E_{iii}$	AlkL	E_5	E_d
1475	$E_{1a}E_2E_3E_{iii}$	AlkL	E_5	E_d
1476	$E_{1b}E_2E_3E_{iii}$	AlkL	E_5	E_d
1477	$E_{1a}E_2E_{iii}E_4$	AlkL	E_5	E_d
1478	$E_{1b}E_2E_{iii}E_4$	AlkL	E_5	E_d
1479	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_5	E_d
1480	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_5	E_d
1481	$E_{1a}E_2E_{iv}$	AlkL	E_5	E_d
1482	$E_{1b}E_2E_{iv}$	AlkL	E_5	E_d
1483	$E_{1a}E_2E_3E_{iv}$	AlkL	E_5	E_d
1484	$E_{1b}E_2E_3E_{iv}$	AlkL	E_5	E_d
1485	$E_{1a}E_2E_{iv}E_4$	AlkL	E_5	E_d
1486	$E_{1b}E_2E_{iv}E_4$	AlkL	E_5	E_d
1487	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_5	E_d
1488	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_5	E_d
1489	$E_{1a}E_2$	AlkL	E_4-E_5	E_d
1490	$E_{1b}E_2$	AlkL	E_4-E_5	E_d
1491	$E_{1a}E_2E_3$	AlkL	E_4-E_5	E_d
1492	$E_{1b}E_2E_3$	AlkL	E_4-E_5	E_d
1493	$E_{1a}E_2E_i$	AlkL	E_4-E_5	E_d
1494	$E_{1b}E_2E_i$	AlkL	E_4-E_5	E_d
1495	$E_{1a}E_2E_{ii}$	AlkL	E_4-E_5	E_d
1496	$E_{1b}E_2E_{ii}$	AlkL	E_4-E_5	E_d
1497	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_4-E_5	E_d
1498	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_4-E_5	E_d
1499	$E_{1a}E_2E_3E_i$	AlkL	E_4-E_5	E_d
1500	$E_{1b}E_2E_3E_i$	AlkL	E_4-E_5	E_d
1501	$E_{1a}E_2E_3E_{ii}$	AlkL	E_4-E_5	E_d
1502	$E_{1b}E_2E_3E_{ii}$	AlkL	E_4-E_5	E_d
1503	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-E_5	E_d
1504	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-E_5	E_d

1505	$E_{1a}E_2E_4$	AlkL	E_4-E_5	E_d
1506	$E_{1b}E_2E_4$	AlkL	E_4-E_5	E_d
1507	$E_{1a}E_2E_3E_4$	AlkL	E_4-E_5	E_d
1508	$E_{1b}E_2E_3E_4$	AlkL	E_4-E_5	E_d
1509	$E_{1a}E_2E_iE_4$	AlkL	E_4-E_5	E_d
1510	$E_{1b}E_2E_iE_4$	AlkL	E_4-E_5	E_d
1511	$E_{1a}E_2E_{ii}E_4$	AlkL	E_4-E_5	E_d
1512	$E_{1b}E_2E_{ii}E_4$	AlkL	E_4-E_5	E_d
1513	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_d
1514	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_d
1515	$E_{1a}E_2E_3E_iE_4$	AlkL	E_4-E_5	E_d
1516	$E_{1b}E_2E_3E_iE_4$	AlkL	E_4-E_5	E_d
1517	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_4-E_5	E_d
1518	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_4-E_5	E_d
1519	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_d
1520	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_d
1521	$E_{1a}E_2E_{iii}$	AlkL	E_4-E_5	E_d
1522	$E_{1b}E_2E_{iii}$	AlkL	E_4-E_5	E_d
1523	$E_{1a}E_2E_3E_{iii}$	AlkL	E_4-E_5	E_d
1524	$E_{1b}E_2E_3E_{iii}$	AlkL	E_4-E_5	E_d
1525	$E_{1a}E_2E_{iii}E_4$	AlkL	E_4-E_5	E_d
1526	$E_{1b}E_2E_{iii}E_4$	AlkL	E_4-E_5	E_d
1527	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_4-E_5	E_d
1528	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_4-E_5	E_d
1529	$E_{1a}E_2E_{iv}$	AlkL	E_4-E_5	E_d
1530	$E_{1b}E_2E_{iv}$	AlkL	E_4-E_5	E_d
1531	$E_{1a}E_2E_3E_{iv}$	AlkL	E_4-E_5	E_d
1532	$E_{1b}E_2E_3E_{iv}$	AlkL	E_4-E_5	E_d
1533	$E_{1a}E_2E_{iv}E_4$	AlkL	E_4-E_5	E_d
1534	$E_{1b}E_2E_{iv}E_4$	AlkL	E_4-E_5	E_d
1535	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_4-E_5	E_d
1536	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_4-E_5	E_d
1537	$E_{1a}E_2$			E_e
1538	$E_{1b}E_2$			E_e
1539	$E_{1a}E_2E_3$			E_e
1540	$E_{1b}E_2E_3$			E_e
1541	$E_{1a}E_2E_i$			E_e
1542	$E_{1b}E_2E_i$			E_e
1543	$E_{1a}E_2E_{ii}$			E_e
1544	$E_{1b}E_2E_{ii}$			E_e
1545	$E_{1a}E_2E_{ii}E_{iib}$			E_e
1546	$E_{1b}E_2E_{ii}E_{iib}$			E_e
1547	$E_{1a}E_2E_3E_i$			E_e

1548	$E_{1b}E_2E_3E_i$		E_e
1549	$E_{1a}E_2E_3E_{ii}$		E_e
1550	$E_{1b}E_2E_3E_{ii}$		E_e
1551	$E_{1a}E_2E_3E_{ii}E_{iib}$		E_e
1552	$E_{1b}E_2E_3E_{ii}E_{iib}$		E_e
1553	$E_{1a}E_2E_4$		E_e
1554	$E_{1b}E_2E_4$		E_e
1555	$E_{1a}E_2E_3E_4$		E_e
1556	$E_{1b}E_2E_3E_4$		E_e
1557	$E_{1a}E_2E_iE_4$		E_e
1558	$E_{1b}E_2E_iE_4$		E_e
1559	$E_{1a}E_2E_{ii}E_4$		E_e
1560	$E_{1b}E_2E_{ii}E_4$		E_e
1561	$E_{1a}E_2E_{ii}E_{iib}E_4$		E_e
1562	$E_{1b}E_2E_{ii}E_{iib}E_4$		E_e
1563	$E_{1a}E_2E_3E_iE_4$		E_e
1564	$E_{1b}E_2E_3E_iE_4$		E_e
1565	$E_{1a}E_2E_3E_{ii}E_4$		E_e
1566	$E_{1b}E_2E_3E_{ii}E_4$		E_e
1567	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$		E_e
1568	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$		E_e
1569	$E_{1a}E_2E_{iii}$		E_e
1570	$E_{1b}E_2E_{iii}$		E_e
1571	$E_{1a}E_2E_3E_{iii}$		E_e
1572	$E_{1b}E_2E_3E_{iii}$		E_e
1573	$E_{1a}E_2E_{iii}E_4$		E_e
1574	$E_{1b}E_2E_{iii}E_4$		E_e
1575	$E_{1a}E_2E_3E_{iii}E_4$		E_e
1576	$E_{1b}E_2E_3E_{iii}E_4$		E_e
1577	$E_{1a}E_2E_{iv}$		E_e
1578	$E_{1b}E_2E_{iv}$		E_e
1579	$E_{1a}E_2E_3E_{iv}$		E_e
1580	$E_{1b}E_2E_3E_{iv}$		E_e
1581	$E_{1a}E_2E_{iv}E_4$		E_e
1582	$E_{1b}E_2E_{iv}E_4$		E_e
1583	$E_{1a}E_2E_3E_{iv}E_4$		E_e
1584	$E_{1b}E_2E_3E_{iv}E_4$		E_e
1585	$E_{1a}E_2$	E_{4^*}	E_e
1586	$E_{1b}E_2$	E_{4^*}	E_e
1587	$E_{1a}E_2E_3$	E_{4^*}	E_e
1588	$E_{1b}E_2E_3$	E_{4^*}	E_e
1589	$E_{1a}E_2E_i$	E_{4^*}	E_e
1590	$E_{1b}E_2E_i$	E_{4^*}	E_e

1591	$E_{1a}E_2E_{ii}$	E_{4^*}	E_e
1592	$E_{1b}E_2E_{ii}$	E_{4^*}	E_e
1593	$E_{1a}E_2E_{ii}E_{iib}$	E_{4^*}	E_e
1594	$E_{1b}E_2E_{ii}E_{iib}$	E_{4^*}	E_e
1595	$E_{1a}E_2E_3E_i$	E_{4^*}	E_e
1596	$E_{1b}E_2E_3E_i$	E_{4^*}	E_e
1597	$E_{1a}E_2E_3E_{ii}$	E_{4^*}	E_e
1598	$E_{1b}E_2E_3E_{ii}$	E_{4^*}	E_e
1599	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{4^*}	E_e
1600	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{4^*}	E_e
1601	$E_{1a}E_2E_4$	E_{4^*}	E_e
1602	$E_{1b}E_2E_4$	E_{4^*}	E_e
1603	$E_{1a}E_2E_3E_4$	E_{4^*}	E_e
1604	$E_{1b}E_2E_3E_4$	E_{4^*}	E_e
1605	$E_{1a}E_2E_iE_4$	E_{4^*}	E_e
1606	$E_{1b}E_2E_iE_4$	E_{4^*}	E_e
1607	$E_{1a}E_2E_{ii}E_4$	E_{4^*}	E_e
1608	$E_{1b}E_2E_{ii}E_4$	E_{4^*}	E_e
1609	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{4^*}	E_e
1610	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{4^*}	E_e
1611	$E_{1a}E_2E_3E_iE_4$	E_{4^*}	E_e
1612	$E_{1b}E_2E_3E_iE_4$	E_{4^*}	E_e
1613	$E_{1a}E_2E_3E_{ii}E_4$	E_{4^*}	E_e
1614	$E_{1b}E_2E_3E_{ii}E_4$	E_{4^*}	E_e
1615	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{4^*}	E_e
1616	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{4^*}	E_e
1617	$E_{1a}E_2E_{iii}$	E_{4^*}	E_e
1618	$E_{1b}E_2E_{iii}$	E_{4^*}	E_e
1619	$E_{1a}E_2E_3E_{iii}$	E_{4^*}	E_e
1620	$E_{1b}E_2E_3E_{iii}$	E_{4^*}	E_e
1621	$E_{1a}E_2E_{iii}E_4$	E_{4^*}	E_e
1622	$E_{1b}E_2E_{iii}E_4$	E_{4^*}	E_e
1623	$E_{1a}E_2E_3E_{iii}E_4$	E_{4^*}	E_e
1624	$E_{1b}E_2E_3E_{iii}E_4$	E_{4^*}	E_e
1625	$E_{1a}E_2E_{iv}$	E_{4^*}	E_e
1626	$E_{1b}E_2E_{iv}$	E_{4^*}	E_e
1627	$E_{1a}E_2E_3E_{iv}$	E_{4^*}	E_e
1628	$E_{1b}E_2E_3E_{iv}$	E_{4^*}	E_e
1629	$E_{1a}E_2E_{iv}E_4$	E_{4^*}	E_e
1630	$E_{1b}E_2E_{iv}E_4$	E_{4^*}	E_e
1631	$E_{1a}E_2E_3E_{iv}E_4$	E_{4^*}	E_e
1632	$E_{1b}E_2E_3E_{iv}E_4$	E_{4^*}	E_e
1633	$E_{1a}E_2$	E_5	E_e

1634	$E_{1b}E_2$	E_5	E_e
1635	$E_{1a}E_2E_3$	E_5	E_e
1636	$E_{1b}E_2E_3$	E_5	E_e
1637	$E_{1a}E_2E_i$	E_5	E_e
1638	$E_{1b}E_2E_i$	E_5	E_e
1639	$E_{1a}E_2E_{ii}$	E_5	E_e
1640	$E_{1b}E_2E_{ii}$	E_5	E_e
1641	$E_{1a}E_2E_{ii}E_{iib}$	E_5	E_e
1642	$E_{1b}E_2E_{ii}E_{iib}$	E_5	E_e
1643	$E_{1a}E_2E_3E_i$	E_5	E_e
1644	$E_{1b}E_2E_3E_i$	E_5	E_e
1645	$E_{1a}E_2E_3E_{ii}$	E_5	E_e
1646	$E_{1b}E_2E_3E_{ii}$	E_5	E_e
1647	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_5	E_e
1648	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_5	E_e
1649	$E_{1a}E_2E_4$	E_5	E_e
1650	$E_{1b}E_2E_4$	E_5	E_e
1651	$E_{1a}E_2E_3E_4$	E_5	E_e
1652	$E_{1b}E_2E_3E_4$	E_5	E_e
1653	$E_{1a}E_2E_iE_4$	E_5	E_e
1654	$E_{1b}E_2E_iE_4$	E_5	E_e
1655	$E_{1a}E_2E_{ii}E_4$	E_5	E_e
1656	$E_{1b}E_2E_{ii}E_4$	E_5	E_e
1657	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_5	E_e
1658	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_5	E_e
1659	$E_{1a}E_2E_3E_iE_4$	E_5	E_e
1660	$E_{1b}E_2E_3E_iE_4$	E_5	E_e
1661	$E_{1a}E_2E_3E_{ii}E_4$	E_5	E_e
1662	$E_{1b}E_2E_3E_{ii}E_4$	E_5	E_e
1663	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_5	E_e
1664	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_5	E_e
1665	$E_{1a}E_2E_{iii}$	E_5	E_e
1666	$E_{1b}E_2E_{iii}$	E_5	E_e
1667	$E_{1a}E_2E_3E_{iii}$	E_5	E_e
1668	$E_{1b}E_2E_3E_{iii}$	E_5	E_e
1669	$E_{1a}E_2E_{iii}E_4$	E_5	E_e
1670	$E_{1b}E_2E_{iii}E_4$	E_5	E_e
1671	$E_{1a}E_2E_3E_{iii}E_4$	E_5	E_e
1672	$E_{1b}E_2E_3E_{iii}E_4$	E_5	E_e
1673	$E_{1a}E_2E_{iv}$	E_5	E_e
1674	$E_{1b}E_2E_{iv}$	E_5	E_e
1675	$E_{1a}E_2E_3E_{iv}$	E_5	E_e
1676	$E_{1b}E_2E_3E_{iv}$	E_5	E_e

1677	$E_{1a}E_2E_{iv}E_4$	E_5	E_e
1678	$E_{1b}E_2E_{iv}E_4$	E_5	E_e
1679	$E_{1a}E_2E_3E_{iv}E_4$	E_5	E_e
1680	$E_{1b}E_2E_3E_{iv}E_4$	E_5	E_e
1681	$E_{1a}E_2$	E_4-E_5	E_e
1682	$E_{1b}E_2$	E_4-E_5	E_e
1683	$E_{1a}E_2E_3$	E_4-E_5	E_e
1684	$E_{1b}E_2E_3$	E_4-E_5	E_e
1685	$E_{1a}E_2E_i$	E_4-E_5	E_e
1686	$E_{1b}E_2E_i$	E_4-E_5	E_e
1687	$E_{1a}E_2E_{ii}$	E_4-E_5	E_e
1688	$E_{1b}E_2E_{ii}$	E_4-E_5	E_e
1689	$E_{1a}E_2E_{ii}E_{iib}$	E_4-E_5	E_e
1690	$E_{1b}E_2E_{ii}E_{iib}$	E_4-E_5	E_e
1691	$E_{1a}E_2E_3E_i$	E_4-E_5	E_e
1692	$E_{1b}E_2E_3E_i$	E_4-E_5	E_e
1693	$E_{1a}E_2E_3E_{ii}$	E_4-E_5	E_e
1694	$E_{1b}E_2E_3E_{ii}$	E_4-E_5	E_e
1695	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_4-E_5	E_e
1696	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_4-E_5	E_e
1697	$E_{1a}E_2E_4$	E_4-E_5	E_e
1698	$E_{1b}E_2E_4$	E_4-E_5	E_e
1699	$E_{1a}E_2E_3E_4$	E_4-E_5	E_e
1700	$E_{1b}E_2E_3E_4$	E_4-E_5	E_e
1701	$E_{1a}E_2E_iE_4$	E_4-E_5	E_e
1702	$E_{1b}E_2E_iE_4$	E_4-E_5	E_e
1703	$E_{1a}E_2E_{ii}E_4$	E_4-E_5	E_e
1704	$E_{1b}E_2E_{ii}E_4$	E_4-E_5	E_e
1705	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_4-E_5	E_e
1706	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_4-E_5	E_e
1707	$E_{1a}E_2E_3E_iE_4$	E_4-E_5	E_e
1708	$E_{1b}E_2E_3E_iE_4$	E_4-E_5	E_e
1709	$E_{1a}E_2E_3E_{ii}E_4$	E_4-E_5	E_e
1710	$E_{1b}E_2E_3E_{ii}E_4$	E_4-E_5	E_e
1711	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_4-E_5	E_e
1712	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_4-E_5	E_e
1713	$E_{1a}E_2E_{iii}$	E_4-E_5	E_e
1714	$E_{1b}E_2E_{iii}$	E_4-E_5	E_e
1715	$E_{1a}E_2E_3E_{iii}$	E_4-E_5	E_e
1716	$E_{1b}E_2E_3E_{iii}$	E_4-E_5	E_e
1717	$E_{1a}E_2E_{iii}E_4$	E_4-E_5	E_e
1718	$E_{1b}E_2E_{iii}E_4$	E_4-E_5	E_e
1719	$E_{1a}E_2E_3E_{iii}E_4$	E_4-E_5	E_e

1720	$E_{1b}E_2E_3E_{iii}E_4$		E_4-E_5	E_e
1721	$E_{1a}E_2E_{iv}$		E_4-E_5	E_e
1722	$E_{1b}E_2E_{iv}$		E_4-E_5	E_e
1723	$E_{1a}E_2E_3E_{iv}$		E_4-E_5	E_e
1724	$E_{1b}E_2E_3E_{iv}$		E_4-E_5	E_e
1725	$E_{1a}E_2E_{iv}E_4$		E_4-E_5	E_e
1726	$E_{1b}E_2E_{iv}E_4$		E_4-E_5	E_e
1727	$E_{1a}E_2E_3E_{iv}E_4$		E_4-E_5	E_e
1728	$E_{1b}E_2E_3E_{iv}E_4$		E_4-E_5	E_e
1729	$E_{1a}E_2$	AlkL		E_e
1730	$E_{1b}E_2$	AlkL		E_e
1731	$E_{1a}E_2E_3$	AlkL		E_e
1732	$E_{1b}E_2E_3$	AlkL		E_e
1733	$E_{1a}E_2E_i$	AlkL		E_e
1734	$E_{1b}E_2E_i$	AlkL		E_e
1735	$E_{1a}E_2E_{ii}$	AlkL		E_e
1736	$E_{1b}E_2E_{ii}$	AlkL		E_e
1737	$E_{1a}E_2E_{ii}E_{iib}$	AlkL		E_e
1738	$E_{1b}E_2E_{ii}E_{iib}$	AlkL		E_e
1739	$E_{1a}E_2E_3E_i$	AlkL		E_e
1740	$E_{1b}E_2E_3E_i$	AlkL		E_e
1741	$E_{1a}E_2E_3E_{ii}$	AlkL		E_e
1742	$E_{1b}E_2E_3E_{ii}$	AlkL		E_e
1743	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL		E_e
1744	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL		E_e
1745	$E_{1a}E_2E_4$	AlkL		E_e
1746	$E_{1b}E_2E_4$	AlkL		E_e
1747	$E_{1a}E_2E_3E_4$	AlkL		E_e
1748	$E_{1b}E_2E_3E_4$	AlkL		E_e
1749	$E_{1a}E_2E_iE_4$	AlkL		E_e
1750	$E_{1b}E_2E_iE_4$	AlkL		E_e
1751	$E_{1a}E_2E_{ii}E_4$	AlkL		E_e
1752	$E_{1b}E_2E_{ii}E_4$	AlkL		E_e
1753	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL		E_e
1754	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL		E_e
1755	$E_{1a}E_2E_3E_iE_4$	AlkL		E_e
1756	$E_{1b}E_2E_3E_iE_4$	AlkL		E_e
1757	$E_{1a}E_2E_3E_{ii}E_4$	AlkL		E_e
1758	$E_{1b}E_2E_3E_{ii}E_4$	AlkL		E_e
1759	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL		E_e
1760	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL		E_e
1761	$E_{1a}E_2E_{iii}$	AlkL		E_e
1762	$E_{1b}E_2E_{iii}$	AlkL		E_e

1763	$E_{1a}E_2E_3E_{iii}$	AlkL		E_e
1764	$E_{1b}E_2E_3E_{iii}$	AlkL		E_e
1765	$E_{1a}E_2E_{iii}E_4$	AlkL		E_e
1766	$E_{1b}E_2E_{iii}E_4$	AlkL		E_e
1767	$E_{1a}E_2E_3E_{iii}E_4$	AlkL		E_e
1768	$E_{1b}E_2E_3E_{iii}E_4$	AlkL		E_e
1769	$E_{1a}E_2E_{iv}$	AlkL		E_e
1770	$E_{1b}E_2E_{iv}$	AlkL		E_e
1771	$E_{1a}E_2E_3E_{iv}$	AlkL		E_e
1772	$E_{1b}E_2E_3E_{iv}$	AlkL		E_e
1773	$E_{1a}E_2E_{iv}E_4$	AlkL		E_e
1774	$E_{1b}E_2E_{iv}E_4$	AlkL		E_e
1775	$E_{1a}E_2E_3E_{iv}E_4$	AlkL		E_e
1776	$E_{1b}E_2E_3E_{iv}E_4$	AlkL		E_e
1777	$E_{1a}E_2$	AlkL	E_4-	E_e
1778	$E_{1b}E_2$	AlkL	E_4-	E_e
1779	$E_{1a}E_2E_3$	AlkL	E_4-	E_e
1780	$E_{1b}E_2E_3$	AlkL	E_4-	E_e
1781	$E_{1a}E_2E_i$	AlkL	E_4-	E_e
1782	$E_{1b}E_2E_i$	AlkL	E_4-	E_e
1783	$E_{1a}E_2E_{ii}$	AlkL	E_4-	E_e
1784	$E_{1b}E_2E_{ii}$	AlkL	E_4-	E_e
1785	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_4-	E_e
1786	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_4-	E_e
1787	$E_{1a}E_2E_3E_i$	AlkL	E_4-	E_e
1788	$E_{1b}E_2E_3E_i$	AlkL	E_4-	E_e
1789	$E_{1a}E_2E_3E_{ii}$	AlkL	E_4-	E_e
1790	$E_{1b}E_2E_3E_{ii}$	AlkL	E_4-	E_e
1791	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-	E_e
1792	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-	E_e
1793	$E_{1a}E_2E_4$	AlkL	E_4-	E_e
1794	$E_{1b}E_2E_4$	AlkL	E_4-	E_e
1795	$E_{1a}E_2E_3E_4$	AlkL	E_4-	E_e
1796	$E_{1b}E_2E_3E_4$	AlkL	E_4-	E_e
1797	$E_{1a}E_2E_iE_4$	AlkL	E_4-	E_e
1798	$E_{1b}E_2E_iE_4$	AlkL	E_4-	E_e
1799	$E_{1a}E_2E_{ii}E_4$	AlkL	E_4-	E_e
1800	$E_{1b}E_2E_{ii}E_4$	AlkL	E_4-	E_e
1801	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-	E_e
1802	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-	E_e
1803	$E_{1a}E_2E_3E_iE_4$	AlkL	E_4-	E_e
1804	$E_{1b}E_2E_3E_iE_4$	AlkL	E_4-	E_e
1805	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_4-	E_e

1806	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	$E_{4'}$	E_e
1807	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_e
1808	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_e
1809	$E_{1a}E_2E_{iii}$	AlkL	$E_{4'}$	E_e
1810	$E_{1b}E_2E_{iii}$	AlkL	$E_{4'}$	E_e
1811	$E_{1a}E_2E_3E_{iii}$	AlkL	$E_{4'}$	E_e
1812	$E_{1b}E_2E_3E_{iii}$	AlkL	$E_{4'}$	E_e
1813	$E_{1a}E_2E_{iii}E_4$	AlkL	$E_{4'}$	E_e
1814	$E_{1b}E_2E_{iii}E_4$	AlkL	$E_{4'}$	E_e
1815	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	$E_{4'}$	E_e
1816	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	$E_{4'}$	E_e
1817	$E_{1a}E_2E_{iv}$	AlkL	$E_{4'}$	E_e
1818	$E_{1b}E_2E_{iv}$	AlkL	$E_{4'}$	E_e
1819	$E_{1a}E_2E_3E_{iv}$	AlkL	$E_{4'}$	E_e
1820	$E_{1b}E_2E_3E_{iv}$	AlkL	$E_{4'}$	E_e
1821	$E_{1a}E_2E_{iv}E_4$	AlkL	$E_{4'}$	E_e
1822	$E_{1b}E_2E_{iv}E_4$	AlkL	$E_{4'}$	E_e
1823	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	$E_{4'}$	E_e
1824	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	$E_{4'}$	E_e
1825	$E_{1a}E_2$	AlkL	E_5	E_e
1826	$E_{1b}E_2$	AlkL	E_5	E_e
1827	$E_{1a}E_2E_3$	AlkL	E_5	E_e
1828	$E_{1b}E_2E_3$	AlkL	E_5	E_e
1829	$E_{1a}E_2E_i$	AlkL	E_5	E_e
1830	$E_{1b}E_2E_i$	AlkL	E_5	E_e
1831	$E_{1a}E_2E_{ii}$	AlkL	E_5	E_e
1832	$E_{1b}E_2E_{ii}$	AlkL	E_5	E_e
1833	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_5	E_e
1834	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_5	E_e
1835	$E_{1a}E_2E_3E_i$	AlkL	E_5	E_e
1836	$E_{1b}E_2E_3E_i$	AlkL	E_5	E_e
1837	$E_{1a}E_2E_3E_{ii}$	AlkL	E_5	E_e
1838	$E_{1b}E_2E_3E_{ii}$	AlkL	E_5	E_e
1839	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_5	E_e
1840	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_5	E_e
1841	$E_{1a}E_2E_4$	AlkL	E_5	E_e
1842	$E_{1b}E_2E_4$	AlkL	E_5	E_e
1843	$E_{1a}E_2E_3E_4$	AlkL	E_5	E_e
1844	$E_{1b}E_2E_3E_4$	AlkL	E_5	E_e
1845	$E_{1a}E_2E_iE_4$	AlkL	E_5	E_e
1846	$E_{1b}E_2E_iE_4$	AlkL	E_5	E_e
1847	$E_{1a}E_2E_{ii}E_4$	AlkL	E_5	E_e
1848	$E_{1b}E_2E_{ii}E_4$	AlkL	E_5	E_e
1849	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_5	E_e
1850	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_5	E_e
1851	$E_{1a}E_2E_3E_iE_4$	AlkL	E_5	E_e
1852	$E_{1b}E_2E_3E_iE_4$	AlkL	E_5	E_e
1853	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_5	E_e
1854	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_5	E_e
1855	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_5	E_e
1856	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_5	E_e
1857	$E_{1a}E_2E_{iii}$	AlkL	E_5	E_e
1858	$E_{1b}E_2E_{iii}$	AlkL	E_5	E_e
1859	$E_{1a}E_2E_3E_{iii}$	AlkL	E_5	E_e
1860	$E_{1b}E_2E_3E_{iii}$	AlkL	E_5	E_e
1861	$E_{1a}E_2E_{iii}E_4$	AlkL	E_5	E_e
1862	$E_{1b}E_2E_{iii}E_4$	AlkL	E_5	E_e
1863	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_5	E_e
1864	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_5	E_e
1865	$E_{1a}E_2E_{iv}$	AlkL	E_5	E_e
1866	$E_{1b}E_2E_{iv}$	AlkL	E_5	E_e
1867	$E_{1a}E_2E_3E_{iv}$	AlkL	E_5	E_e
1868	$E_{1b}E_2E_3E_{iv}$	AlkL	E_5	E_e
1869	$E_{1a}E_2E_{iv}E_4$	AlkL	E_5	E_e
1870	$E_{1b}E_2E_{iv}E_4$	AlkL	E_5	E_e
1871	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_5	E_e
1872	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_5	E_e
1873	$E_{1a}E_2$	AlkL	$E_{4'}E_5$	E_e
1874	$E_{1b}E_2$	AlkL	$E_{4'}E_5$	E_e
1875	$E_{1a}E_2E_3$	AlkL	$E_{4'}E_5$	E_e
1876	$E_{1b}E_2E_3$	AlkL	$E_{4'}E_5$	E_e
1877	$E_{1a}E_2E_i$	AlkL	$E_{4'}E_5$	E_e
1878	$E_{1b}E_2E_i$	AlkL	$E_{4'}E_5$	E_e
1879	$E_{1a}E_2E_{ii}$	AlkL	$E_{4'}E_5$	E_e
1880	$E_{1b}E_2E_{ii}$	AlkL	$E_{4'}E_5$	E_e
1881	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	$E_{4'}E_5$	E_e
1882	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	$E_{4'}E_5$	E_e
1883	$E_{1a}E_2E_3E_i$	AlkL	$E_{4'}E_5$	E_e
1884	$E_{1b}E_2E_3E_i$	AlkL	$E_{4'}E_5$	E_e
1885	$E_{1a}E_2E_3E_{ii}$	AlkL	$E_{4'}E_5$	E_e
1886	$E_{1b}E_2E_3E_{ii}$	AlkL	$E_{4'}E_5$	E_e
1887	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	$E_{4'}E_5$	E_e
1888	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	$E_{4'}E_5$	E_e
1889	$E_{1a}E_2E_4$	AlkL	$E_{4'}E_5$	E_e
1890	$E_{1b}E_2E_4$	AlkL	$E_{4'}E_5$	E_e
1891	$E_{1a}E_2E_3E_4$	AlkL	$E_{4'}E_5$	E_e

1892	$E_{1b}E_2E_3E_4$	AlkL	E_4-E_5	E_e
1893	$E_{1a}E_2E_iE_4$	AlkL	E_4-E_5	E_e
1894	$E_{1b}E_2E_iE_4$	AlkL	E_4-E_5	E_e
1895	$E_{1a}E_2E_{ii}E_4$	AlkL	E_4-E_5	E_e
1896	$E_{1b}E_2E_{ii}E_4$	AlkL	E_4-E_5	E_e
1897	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_e
1898	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_e
1899	$E_{1a}E_2E_3E_iE_4$	AlkL	E_4-E_5	E_e
1900	$E_{1b}E_2E_3E_iE_4$	AlkL	E_4-E_5	E_e
1901	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_4-E_5	E_e
1902	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_4-E_5	E_e
1903	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_e
1904	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_e
1905	$E_{1a}E_2E_{iii}$	AlkL	E_4-E_5	E_e
1906	$E_{1b}E_2E_{iii}$	AlkL	E_4-E_5	E_e
1907	$E_{1a}E_2E_3E_{iii}$	AlkL	E_4-E_5	E_e
1908	$E_{1b}E_2E_3E_{iii}$	AlkL	E_4-E_5	E_e
1909	$E_{1a}E_2E_{iii}E_4$	AlkL	E_4-E_5	E_e
1910	$E_{1b}E_2E_{iii}E_4$	AlkL	E_4-E_5	E_e
1911	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_4-E_5	E_e
1912	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_4-E_5	E_e
1913	$E_{1a}E_2E_{iv}$	AlkL	E_4-E_5	E_e
1914	$E_{1b}E_2E_{iv}$	AlkL	E_4-E_5	E_e
1915	$E_{1a}E_2E_3E_{iv}$	AlkL	E_4-E_5	E_e
1916	$E_{1b}E_2E_3E_{iv}$	AlkL	E_4-E_5	E_e
1917	$E_{1a}E_2E_{iv}E_4$	AlkL	E_4-E_5	E_e
1918	$E_{1b}E_2E_{iv}E_4$	AlkL	E_4-E_5	E_e
1919	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_4-E_5	E_e
1920	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_4-E_5	E_e
1921	$E_{1a}E_2$			E_f
1922	$E_{1b}E_2$			E_f
1923	$E_{1a}E_2E_3$			E_f
1924	$E_{1b}E_2E_3$			E_f
1925	$E_{1a}E_2E_i$			E_f
1926	$E_{1b}E_2E_i$			E_f
1927	$E_{1a}E_2E_{ii}$			E_f
1928	$E_{1b}E_2E_{ii}$			E_f
1929	$E_{1a}E_2E_{ii}E_{iib}$			E_f
1930	$E_{1b}E_2E_{ii}E_{iib}$			E_f
1931	$E_{1a}E_2E_3E_i$			E_f
1932	$E_{1b}E_2E_3E_i$			E_f
1933	$E_{1a}E_2E_3E_{ii}$			E_f
1934	$E_{1b}E_2E_3E_{ii}$			E_f

1935	$E_{1a}E_2E_3E_{ii}E_{iib}$		E_f
1936	$E_{1b}E_2E_3E_{ii}E_{iib}$		E_f
1937	$E_{1a}E_2E_4$		E_f
1938	$E_{1b}E_2E_4$		E_f
1939	$E_{1a}E_2E_3E_4$		E_f
1940	$E_{1b}E_2E_3E_4$		E_f
1941	$E_{1a}E_2E_iE_4$		E_f
1942	$E_{1b}E_2E_iE_4$		E_f
1943	$E_{1a}E_2E_{ii}E_4$		E_f
1944	$E_{1b}E_2E_{ii}E_4$		E_f
1945	$E_{1a}E_2E_{ii}E_{iib}E_4$		E_f
1946	$E_{1b}E_2E_{ii}E_{iib}E_4$		E_f
1947	$E_{1a}E_2E_3E_iE_4$		E_f
1948	$E_{1b}E_2E_3E_iE_4$		E_f
1949	$E_{1a}E_2E_3E_{ii}E_4$		E_f
1950	$E_{1b}E_2E_3E_{ii}E_4$		E_f
1951	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$		E_f
1952	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$		E_f
1953	$E_{1a}E_2E_{iii}$		E_f
1954	$E_{1b}E_2E_{iii}$		E_f
1955	$E_{1a}E_2E_3E_{iii}$		E_f
1956	$E_{1b}E_2E_3E_{iii}$		E_f
1957	$E_{1a}E_2E_{iii}E_4$		E_f
1958	$E_{1b}E_2E_{iii}E_4$		E_f
1959	$E_{1a}E_2E_3E_{iii}E_4$		E_f
1960	$E_{1b}E_2E_3E_{iii}E_4$		E_f
1961	$E_{1a}E_2E_{iv}$		E_f
1962	$E_{1b}E_2E_{iv}$		E_f
1963	$E_{1a}E_2E_3E_{iv}$		E_f
1964	$E_{1b}E_2E_3E_{iv}$		E_f
1965	$E_{1a}E_2E_{iv}E_4$		E_f
1966	$E_{1b}E_2E_{iv}E_4$		E_f
1967	$E_{1a}E_2E_3E_{iv}E_4$		E_f
1968	$E_{1b}E_2E_3E_{iv}E_4$		E_f
1969	$E_{1a}E_2$	E_4-	E_f
1970	$E_{1b}E_2$	E_4-	E_f
1971	$E_{1a}E_2E_3$	E_4-	E_f
1972	$E_{1b}E_2E_3$	E_4-	E_f
1973	$E_{1a}E_2E_i$	E_4-	E_f
1974	$E_{1b}E_2E_i$	E_4-	E_f
1975	$E_{1a}E_2E_{ii}$	E_4-	E_f
1976	$E_{1b}E_2E_{ii}$	E_4-	E_f
1977	$E_{1a}E_2E_{ii}E_{iib}$	E_4-	E_f

1978	$E_{1b}E_2E_{ii}E_{iib}$	E_{4^*}	E_f
1979	$E_{1a}E_2E_3E_i$	E_{4^*}	E_f
1980	$E_{1b}E_2E_3E_i$	E_{4^*}	E_f
1981	$E_{1a}E_2E_3E_{ii}$	E_{4^*}	E_f
1982	$E_{1b}E_2E_3E_{ii}$	E_{4^*}	E_f
1983	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{4^*}	E_f
1984	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{4^*}	E_f
1985	$E_{1a}E_2E_4$	E_{4^*}	E_f
1986	$E_{1b}E_2E_4$	E_{4^*}	E_f
1987	$E_{1a}E_2E_3E_4$	E_{4^*}	E_f
1988	$E_{1b}E_2E_3E_4$	E_{4^*}	E_f
1989	$E_{1a}E_2E_iE_4$	E_{4^*}	E_f
1990	$E_{1b}E_2E_iE_4$	E_{4^*}	E_f
1991	$E_{1a}E_2E_{ii}E_4$	E_{4^*}	E_f
1992	$E_{1b}E_2E_{ii}E_4$	E_{4^*}	E_f
1993	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{4^*}	E_f
1994	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{4^*}	E_f
1995	$E_{1a}E_2E_3E_iE_4$	E_{4^*}	E_f
1996	$E_{1b}E_2E_3E_iE_4$	E_{4^*}	E_f
1997	$E_{1a}E_2E_3E_{ii}E_4$	E_{4^*}	E_f
1998	$E_{1b}E_2E_3E_{ii}E_4$	E_{4^*}	E_f
1999	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{4^*}	E_f
2000	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{4^*}	E_f
2001	$E_{1a}E_2E_{iii}$	E_{4^*}	E_f
2002	$E_{1b}E_2E_{iii}$	E_{4^*}	E_f
2003	$E_{1a}E_2E_3E_{iii}$	E_{4^*}	E_f
2004	$E_{1b}E_2E_3E_{iii}$	E_{4^*}	E_f
2005	$E_{1a}E_2E_{iii}E_4$	E_{4^*}	E_f
2006	$E_{1b}E_2E_{iii}E_4$	E_{4^*}	E_f
2007	$E_{1a}E_2E_3E_{iii}E_4$	E_{4^*}	E_f
2008	$E_{1b}E_2E_3E_{iii}E_4$	E_{4^*}	E_f
2009	$E_{1a}E_2E_{iv}$	E_{4^*}	E_f
2010	$E_{1b}E_2E_{iv}$	E_{4^*}	E_f
2011	$E_{1a}E_2E_3E_{iv}$	E_{4^*}	E_f
2012	$E_{1b}E_2E_3E_{iv}$	E_{4^*}	E_f
2013	$E_{1a}E_2E_{iv}E_4$	E_{4^*}	E_f
2014	$E_{1b}E_2E_{iv}E_4$	E_{4^*}	E_f
2015	$E_{1a}E_2E_3E_{iv}E_4$	E_{4^*}	E_f
2016	$E_{1b}E_2E_3E_{iv}E_4$	E_{4^*}	E_f
2017	$E_{1a}E_2$	E_5	E_f
2018	$E_{1b}E_2$	E_5	E_f
2019	$E_{1a}E_2E_3$	E_5	E_f
2020	$E_{1b}E_2E_3$	E_5	E_f

2021	$E_{1a}E_2E_i$	E_5	E_f
2022	$E_{1b}E_2E_i$	E_5	E_f
2023	$E_{1a}E_2E_{ii}$	E_5	E_f
2024	$E_{1b}E_2E_{ii}$	E_5	E_f
2025	$E_{1a}E_2E_{ii}E_{iib}$	E_5	E_f
2026	$E_{1b}E_2E_{ii}E_{iib}$	E_5	E_f
2027	$E_{1a}E_2E_3E_i$	E_5	E_f
2028	$E_{1b}E_2E_3E_i$	E_5	E_f
2029	$E_{1a}E_2E_3E_{ii}$	E_5	E_f
2030	$E_{1b}E_2E_3E_{ii}$	E_5	E_f
2031	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_5	E_f
2032	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_5	E_f
2033	$E_{1a}E_2E_4$	E_5	E_f
2034	$E_{1b}E_2E_4$	E_5	E_f
2035	$E_{1a}E_2E_3E_4$	E_5	E_f
2036	$E_{1b}E_2E_3E_4$	E_5	E_f
2037	$E_{1a}E_2E_iE_4$	E_5	E_f
2038	$E_{1b}E_2E_iE_4$	E_5	E_f
2039	$E_{1a}E_2E_{ii}E_4$	E_5	E_f
2040	$E_{1b}E_2E_{ii}E_4$	E_5	E_f
2041	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_5	E_f
2042	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_5	E_f
2043	$E_{1a}E_2E_3E_iE_4$	E_5	E_f
2044	$E_{1b}E_2E_3E_iE_4$	E_5	E_f
2045	$E_{1a}E_2E_3E_{ii}E_4$	E_5	E_f
2046	$E_{1b}E_2E_3E_{ii}E_4$	E_5	E_f
2047	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_5	E_f
2048	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_5	E_f
2049	$E_{1a}E_2E_{iii}$	E_5	E_f
2050	$E_{1b}E_2E_{iii}$	E_5	E_f
2051	$E_{1a}E_2E_3E_{iii}$	E_5	E_f
2052	$E_{1b}E_2E_3E_{iii}$	E_5	E_f
2053	$E_{1a}E_2E_{iii}E_4$	E_5	E_f
2054	$E_{1b}E_2E_{iii}E_4$	E_5	E_f
2055	$E_{1a}E_2E_3E_{iii}E_4$	E_5	E_f
2056	$E_{1b}E_2E_3E_{iii}E_4$	E_5	E_f
2057	$E_{1a}E_2E_{iv}$	E_5	E_f
2058	$E_{1b}E_2E_{iv}$	E_5	E_f
2059	$E_{1a}E_2E_3E_{iv}$	E_5	E_f
2060	$E_{1b}E_2E_3E_{iv}$	E_5	E_f
2061	$E_{1a}E_2E_{iv}E_4$	E_5	E_f
2062	$E_{1b}E_2E_{iv}E_4$	E_5	E_f
2063	$E_{1a}E_2E_3E_{iv}E_4$	E_6	E_f

2064	$E_{1b}E_2E_3E_{iv}E_4$	E_5	E_f
2065	$E_{1a}E_2$	E_4-E_5	E_f
2066	$E_{1b}E_2$	E_4-E_5	E_f
2067	$E_{1a}E_2E_3$	E_4-E_5	E_f
2068	$E_{1b}E_2E_3$	E_4-E_5	E_f
2069	$E_{1a}E_2E_i$	E_4-E_5	E_f
2070	$E_{1b}E_2E_i$	E_4-E_5	E_f
2071	$E_{1a}E_2E_{ii}$	E_4-E_5	E_f
2072	$E_{1b}E_2E_{ii}$	E_4-E_5	E_f
2073	$E_{1a}E_2E_{ii}E_{iib}$	E_4-E_5	E_f
2074	$E_{1b}E_2E_{ii}E_{iib}$	E_4-E_5	E_f
2075	$E_{1a}E_2E_3E_i$	E_4-E_5	E_f
2076	$E_{1b}E_2E_3E_i$	E_4-E_5	E_f
2077	$E_{1a}E_2E_3E_{ii}$	E_4-E_5	E_f
2078	$E_{1b}E_2E_3E_{ii}$	E_4-E_5	E_f
2079	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_4-E_5	E_f
2080	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_4-E_5	E_f
2081	$E_{1a}E_2E_4$	E_4-E_5	E_f
2082	$E_{1b}E_2E_4$	E_4-E_5	E_f
2083	$E_{1a}E_2E_3E_4$	E_4-E_5	E_f
2084	$E_{1b}E_2E_3E_4$	E_4-E_5	E_f
2085	$E_{1a}E_2E_iE_4$	E_4-E_5	E_f
2086	$E_{1b}E_2E_iE_4$	E_4-E_5	E_f
2087	$E_{1a}E_2E_{ii}E_4$	E_4-E_5	E_f
2088	$E_{1b}E_2E_{ii}E_4$	E_4-E_5	E_f
2089	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_4-E_5	E_f
2090	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_4-E_5	E_f
2091	$E_{1a}E_2E_3E_iE_4$	E_4-E_5	E_f
2092	$E_{1b}E_2E_3E_iE_4$	E_4-E_5	E_f
2093	$E_{1a}E_2E_3E_{ii}E_4$	E_4-E_5	E_f
2094	$E_{1b}E_2E_3E_{ii}E_4$	E_4-E_5	E_f
2095	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_4-E_5	E_f
2096	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_4-E_5	E_f
2097	$E_{1a}E_2E_{iii}$	E_4-E_5	E_f
2098	$E_{1b}E_2E_{iii}$	E_4-E_5	E_f
2099	$E_{1a}E_2E_3E_{iii}$	E_4-E_5	E_f
2100	$E_{1b}E_2E_3E_{iii}$	E_4-E_5	E_f
2101	$E_{1a}E_2E_{iii}E_4$	E_4-E_5	E_f
2102	$E_{1b}E_2E_{iii}E_4$	E_4-E_5	E_f
2103	$E_{1a}E_2E_3E_{iii}E_4$	E_4-E_5	E_f
2104	$E_{1b}E_2E_3E_{iii}E_4$	E_4-E_5	E_f
2105	$E_{1a}E_2E_{iv}$	E_4-E_5	E_f
2106	$E_{1b}E_2E_{iv}$	E_4-E_5	E_f

2107	$E_{1a}E_2E_3E_{iv}$		E_4-E_5	E_f
2108	$E_{1b}E_2E_3E_{iv}$		E_4-E_5	E_f
2109	$E_{1a}E_2E_{iv}E_4$		E_4-E_5	E_f
2110	$E_{1b}E_2E_{iv}E_4$		E_4-E_5	E_f
2111	$E_{1a}E_2E_3E_{iv}E_4$		E_4-E_5	E_f
2112	$E_{1b}E_2E_3E_{iv}E_4$		E_4-E_5	E_f
2113	$E_{1a}E_2$	AlkL		E_f
2114	$E_{1b}E_2$	AlkL		E_f
2115	$E_{1a}E_2E_3$	AlkL		E_f
2116	$E_{1b}E_2E_3$	AlkL		E_f
2117	$E_{1a}E_2E_i$	AlkL		E_f
2118	$E_{1b}E_2E_i$	AlkL		E_f
2119	$E_{1a}E_2E_{ii}$	AlkL		E_f
2120	$E_{1b}E_2E_{ii}$	AlkL		E_f
2121	$E_{1a}E_2E_{ii}E_{iib}$	AlkL		E_f
2122	$E_{1b}E_2E_{ii}E_{iib}$	AlkL		E_f
2123	$E_{1a}E_2E_3E_i$	AlkL		E_f
2124	$E_{1b}E_2E_3E_i$	AlkL		E_f
2125	$E_{1a}E_2E_3E_{ii}$	AlkL		E_f
2126	$E_{1b}E_2E_3E_{ii}$	AlkL		E_f
2127	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL		E_f
2128	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL		E_f
2129	$E_{1a}E_2E_4$	AlkL		E_f
2130	$E_{1b}E_2E_4$	AlkL		E_f
2131	$E_{1a}E_2E_3E_4$	AlkL		E_f
2132	$E_{1b}E_2E_3E_4$	AlkL		E_f
2133	$E_{1a}E_2E_iE_4$	AlkL		E_f
2134	$E_{1b}E_2E_iE_4$	AlkL		E_f
2135	$E_{1a}E_2E_{ii}E_4$	AlkL		E_f
2136	$E_{1b}E_2E_{ii}E_4$	AlkL		E_f
2137	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL		E_f
2138	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL		E_f
2139	$E_{1a}E_2E_3E_iE_4$	AlkL		E_f
2140	$E_{1b}E_2E_3E_iE_4$	AlkL		E_f
2141	$E_{1a}E_2E_3E_{ii}E_4$	AlkL		E_f
2142	$E_{1b}E_2E_3E_{ii}E_4$	AlkL		E_f
2143	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL		E_f
2144	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL		E_f
2145	$E_{1a}E_2E_{iii}$	AlkL		E_f
2146	$E_{1b}E_2E_{iii}$	AlkL		E_f
2147	$E_{1a}E_2E_3E_{iii}$	AlkL		E_f
2148	$E_{1b}E_2E_3E_{iii}$	AlkL		E_f
2149	$E_{1a}E_2E_{iii}E_4$	AlkL		E_f

2150	$E_{1b}E_2E_{iii}E_4$	AlkL		E_f
2151	$E_{1a}E_2E_3E_{iii}E_4$	AlkL		E_f
2152	$E_{1b}E_2E_3E_{iii}E_4$	AlkL		E_f
2153	$E_{1a}E_2E_{iv}$	AlkL		E_f
2154	$E_{1b}E_2E_{iv}$	AlkL		E_f
2155	$E_{1a}E_2E_3E_{iv}$	AlkL		E_f
2156	$E_{1b}E_2E_3E_{iv}$	AlkL		E_f
2157	$E_{1a}E_2E_{iv}E_4$	AlkL		E_f
2158	$E_{1b}E_2E_{iv}E_4$	AlkL		E_f
2159	$E_{1a}E_2E_3E_{iv}E_4$	AlkL		E_f
2160	$E_{1b}E_2E_3E_{iv}E_4$	AlkL		E_f
2161	$E_{1a}E_2$	AlkL	$E_{4'}$	E_f
2162	$E_{1b}E_2$	AlkL	$E_{4'}$	E_f
2163	$E_{1a}E_2E_3$	AlkL	$E_{4'}$	E_f
2164	$E_{1b}E_2E_3$	AlkL	$E_{4'}$	E_f
2165	$E_{1a}E_2E_i$	AlkL	$E_{4'}$	E_f
2166	$E_{1b}E_2E_i$	AlkL	$E_{4'}$	E_f
2167	$E_{1a}E_2E_{ii}$	AlkL	$E_{4'}$	E_f
2168	$E_{1b}E_2E_{ii}$	AlkL	$E_{4'}$	E_f
2169	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_f
2170	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_f
2171	$E_{1a}E_2E_3E_i$	AlkL	$E_{4'}$	E_f
2172	$E_{1b}E_2E_3E_i$	AlkL	$E_{4'}$	E_f
2173	$E_{1a}E_2E_3E_{ii}$	AlkL	$E_{4'}$	E_f
2174	$E_{1b}E_2E_3E_{ii}$	AlkL	$E_{4'}$	E_f
2175	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_f
2176	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_f
2177	$E_{1a}E_2E_4$	AlkL	$E_{4'}$	E_f
2178	$E_{1b}E_2E_4$	AlkL	$E_{4'}$	E_f
2179	$E_{1a}E_2E_3E_4$	AlkL	$E_{4'}$	E_f
2180	$E_{1b}E_2E_3E_4$	AlkL	$E_{4'}$	E_f
2181	$E_{1a}E_2E_iE_4$	AlkL	$E_{4'}$	E_f
2182	$E_{1b}E_2E_iE_4$	AlkL	$E_{4'}$	E_f
2183	$E_{1a}E_2E_{ii}E_4$	AlkL	$E_{4'}$	E_f
2184	$E_{1b}E_2E_{ii}E_4$	AlkL	$E_{4'}$	E_f
2185	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_f
2186	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_f
2187	$E_{1a}E_2E_3E_iE_4$	AlkL	$E_{4'}$	E_f
2188	$E_{1b}E_2E_3E_iE_4$	AlkL	$E_{4'}$	E_f
2189	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	$E_{4'}$	E_f
2190	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	$E_{4'}$	E_f
2191	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_f
2192	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_f

2193	$E_{1a}E_2E_{iii}$	AlkL	$E_{4'}$	E_f
2194	$E_{1b}E_2E_{iii}$	AlkL	$E_{4'}$	E_f
2195	$E_{1a}E_2E_3E_{iii}$	AlkL	$E_{4'}$	E_f
2196	$E_{1b}E_2E_3E_{iii}$	AlkL	$E_{4'}$	E_f
2197	$E_{1a}E_2E_{iii}E_4$	AlkL	$E_{4'}$	E_f
2198	$E_{1b}E_2E_{iii}E_4$	AlkL	$E_{4'}$	E_f
2199	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	$E_{4'}$	E_f
2200	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	$E_{4'}$	E_f
2201	$E_{1a}E_2E_{iv}$	AlkL	$E_{4'}$	E_f
2202	$E_{1b}E_2E_{iv}$	AlkL	$E_{4'}$	E_f
2203	$E_{1a}E_2E_3E_{iv}$	AlkL	$E_{4'}$	E_f
2204	$E_{1b}E_2E_3E_{iv}$	AlkL	$E_{4'}$	E_f
2205	$E_{1a}E_2E_{iv}E_4$	AlkL	$E_{4'}$	E_f
2206	$E_{1b}E_2E_{iv}E_4$	AlkL	$E_{4'}$	E_f
2207	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	$E_{4'}$	E_f
2208	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	$E_{4'}$	E_f
2209	$E_{1a}E_2$	AlkL	E_5	E_f
2210	$E_{1b}E_2$	AlkL	E_5	E_f
2211	$E_{1a}E_2E_3$	AlkL	E_5	E_f
2212	$E_{1b}E_2E_3$	AlkL	E_5	E_f
2213	$E_{1a}E_2E_i$	AlkL	E_5	E_f
2214	$E_{1b}E_2E_i$	AlkL	E_5	E_f
2215	$E_{1a}E_2E_{ii}$	AlkL	E_5	E_f
2216	$E_{1b}E_2E_{ii}$	AlkL	E_5	E_f
2217	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_5	E_f
2218	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_5	E_f
2219	$E_{1a}E_2E_3E_i$	AlkL	E_5	E_f
2220	$E_{1b}E_2E_3E_i$	AlkL	E_5	E_f
2221	$E_{1a}E_2E_3E_{ii}$	AlkL	E_5	E_f
2222	$E_{1b}E_2E_3E_{ii}$	AlkL	E_5	E_f
2223	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_5	E_f
2224	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_5	E_f
2225	$E_{1a}E_2E_4$	AlkL	E_5	E_f
2226	$E_{1b}E_2E_4$	AlkL	E_5	E_f
2227	$E_{1a}E_2E_3E_4$	AlkL	E_5	E_f
2228	$E_{1b}E_2E_3E_4$	AlkL	E_5	E_f
2229	$E_{1a}E_2E_iE_4$	AlkL	E_5	E_f
2230	$E_{1b}E_2E_iE_4$	AlkL	E_5	E_f
2231	$E_{1a}E_2E_{ii}E_4$	AlkL	E_5	E_f
2232	$E_{1b}E_2E_{ii}E_4$	AlkL	E_5	E_f
2233	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_5	E_f
2234	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_5	E_f
2235	$E_{1a}E_2E_3E_iE_4$	AlkL	E_5	E_f

2236	$E_{1b}E_2E_3E_iE_4$	AlkL	E_5	E_f
2237	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_5	E_f
2238	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_5	E_f
2239	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_5	E_f
2240	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_5	E_f
2241	$E_{1a}E_2E_{iii}$	AlkL	E_5	E_f
2242	$E_{1b}E_2E_{iii}$	AlkL	E_5	E_f
2243	$E_{1a}E_2E_3E_{iii}$	AlkL	E_5	E_f
2244	$E_{1b}E_2E_3E_{iii}$	AlkL	E_5	E_f
2245	$E_{1a}E_2E_{iii}E_4$	AlkL	E_5	E_f
2246	$E_{1b}E_2E_{iii}E_4$	AlkL	E_5	E_f
2247	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_5	E_f
2248	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_5	E_f
2249	$E_{1a}E_2E_{iv}$	AlkL	E_5	E_f
2250	$E_{1b}E_2E_{iv}$	AlkL	E_5	E_f
2251	$E_{1a}E_2E_3E_{iv}$	AlkL	E_5	E_f
2252	$E_{1b}E_2E_3E_{iv}$	AlkL	E_5	E_f
2253	$E_{1a}E_2E_{iv}E_4$	AlkL	E_5	E_f
2254	$E_{1b}E_2E_{iv}E_4$	AlkL	E_5	E_f
2255	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_5	E_f
2256	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_5	E_f
2257	$E_{1a}E_2$	AlkL	E_4-E_5	E_f
2258	$E_{1b}E_2$	AlkL	E_4-E_5	E_f
2259	$E_{1a}E_2E_3$	AlkL	E_4-E_5	E_f
2260	$E_{1b}E_2E_3$	AlkL	E_4-E_5	E_f
2261	$E_{1a}E_2E_i$	AlkL	E_4-E_5	E_f
2262	$E_{1b}E_2E_i$	AlkL	E_4-E_5	E_f
2263	$E_{1a}E_2E_{ii}$	AlkL	E_4-E_5	E_f
2264	$E_{1b}E_2E_{ii}$	AlkL	E_4-E_5	E_f
2265	$E_{1a}E_2E_{ii}E_{iib}$	AlkL	E_4-E_5	E_f
2266	$E_{1b}E_2E_{ii}E_{iib}$	AlkL	E_4-E_5	E_f
2267	$E_{1a}E_2E_3E_i$	AlkL	E_4-E_5	E_f
2268	$E_{1b}E_2E_3E_i$	AlkL	E_4-E_5	E_f
2269	$E_{1a}E_2E_3E_{ii}$	AlkL	E_4-E_5	E_f
2270	$E_{1b}E_2E_3E_{ii}$	AlkL	E_4-E_5	E_f
2271	$E_{1a}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-E_5	E_f
2272	$E_{1b}E_2E_3E_{ii}E_{iib}$	AlkL	E_4-E_5	E_f
2273	$E_{1a}E_2E_4$	AlkL	E_4-E_5	E_f
2274	$E_{1b}E_2E_4$	AlkL	E_4-E_5	E_f
2275	$E_{1a}E_2E_3E_4$	AlkL	E_4-E_5	E_f
2276	$E_{1b}E_2E_3E_4$	AlkL	E_4-E_5	E_f
2277	$E_{1a}E_2E_iE_4$	AlkL	E_4-E_5	E_f
2278	$E_{1b}E_2E_iE_4$	AlkL	E_4-E_5	E_f
2279	$E_{1a}E_2E_{ii}E_4$	AlkL	E_4-E_5	E_f
2280	$E_{1b}E_2E_{ii}E_4$	AlkL	E_4-E_5	E_f
2281	$E_{1a}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_f
2282	$E_{1b}E_2E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_f
2283	$E_{1a}E_2E_3E_iE_4$	AlkL	E_4-E_5	E_f
2284	$E_{1b}E_2E_3E_iE_4$	AlkL	E_4-E_5	E_f
2285	$E_{1a}E_2E_3E_{ii}E_4$	AlkL	E_4-E_5	E_f
2286	$E_{1b}E_2E_3E_{ii}E_4$	AlkL	E_4-E_5	E_f
2287	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_f
2288	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_f
2289	$E_{1a}E_2E_{iii}$	AlkL	E_4-E_5	E_f
2290	$E_{1b}E_2E_{iii}$	AlkL	E_4-E_5	E_f
2291	$E_{1a}E_2E_3E_{iii}$	AlkL	E_4-E_5	E_f
2292	$E_{1b}E_2E_3E_{iii}$	AlkL	E_4-E_5	E_f
2293	$E_{1a}E_2E_{iii}E_4$	AlkL	E_4-E_5	E_f
2294	$E_{1b}E_2E_{iii}E_4$	AlkL	E_4-E_5	E_f
2295	$E_{1a}E_2E_3E_{iii}E_4$	AlkL	E_4-E_5	E_f
2296	$E_{1b}E_2E_3E_{iii}E_4$	AlkL	E_4-E_5	E_f
2297	$E_{1a}E_2E_{iv}$	AlkL	E_4-E_5	E_f
2298	$E_{1b}E_2E_{iv}$	AlkL	E_4-E_5	E_f
2299	$E_{1a}E_2E_3E_{iv}$	AlkL	E_4-E_5	E_f
2300	$E_{1b}E_2E_3E_{iv}$	AlkL	E_4-E_5	E_f
2301	$E_{1a}E_2E_{iv}E_4$	AlkL	E_4-E_5	E_f
2302	$E_{1b}E_2E_{iv}E_4$	AlkL	E_4-E_5	E_f
2303	$E_{1a}E_2E_3E_{iv}E_4$	AlkL	E_4-E_5	E_f
2304	$E_{1b}E_2E_3E_{iv}E_4$	AlkL	E_4-E_5	E_f

Microorganisms quite especially preferred according to the invention (abbreviated as MO) are outstandingly suitable for the production of ω-aminocarboxylate esters and have increased or decreased enzyme activities (abbreviated as E) described in the following table, where these

can in addition advantageously be combined with an increased enzyme activity compared to the wild type of the microorganism, which is described for the 3-ketoacyl-ACP (Acyl Carrrier Protein) synthase III (EC 2.3.1.41), in particular that from plants, preferably that from plants the seeds whereof contain fatty acids with alkyl residues shorter than 14 C atoms, and particularly preferably that from plants of the genera *Cuphea*, *Elaeis*, *Cocos*, *Umbellularia* and *Cinnamomum* and gene products selected from AccA, AccB, AccC, AccD, AceE, AceF, Lpd, AcpP, FabA, FabB, FabD, FabF, FabG, FabH, FabI, FabZ, PanD, PanK, UdhA, PntA or PntB. Any combinations of at least two of these enzyme activities can advantageously be increased. In addition, moreover, it can be advantageous if the microorganism is provided with a lower enzyme activity compared to the wild type of the microorganism, which is described for the gene products selected from TdcE, PflA, PflB, PflC, PflD, PoxB, YgfG, AckA, AckB, TdcD, Pta, LdhA, AdhE, MgsA, FdnG, FdnH, FdnI, FdhF, FdoG, FdoH, FdoI, PrpC, PrpD, PrpF , PrpB , TdcD, Pdc, PorA, PorB, PorC, PorD, AlsS, IlvB, IlvM, IlvN, IlvG, IlvI, IlvH, AlsD, ButB, Thl, ThlA, ThlB, PhaA, PhaB, Crt, BdhA, BdhB, Adc, Adh, CtfB, AtoA, AtoD, LdhL, GltA, FabR, FhuA, Dld, LidA or LldP, singly or in any combination.

MO	E increased		E decreased
1	$E_{1a}E_2$	E_vE_{vi}	
2	$E_{1b}E_2$	E_vE_{vi}	
3	$E_{1a}E_2E_3$	E_vE_{vi}	
4	$E_{1b}E_2E_3$	E_vE_{vi}	
5	$E_{1a}E_2E_i$	E_vE_{vi}	
6	$E_{1b}E_2E_i$	E_vE_{vi}	
7	$E_{1a}E_2E_{ii}$	E_vE_{vi}	
8	$E_{1b}E_2E_{ii}$	E_vE_{vi}	
9	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	
10	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	
11	$E_{1a}E_2E_3E_i$	E_vE_{vi}	
12	$E_{1b}E_2E_3E_i$	E_vE_{vi}	
13	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	
14	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	
15	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	
16	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	
17	$E_{1a}E_2E_4$	E_vE_{vi}	
18	$E_{1b}E_2E_4$	E_vE_{vi}	
19	$E_{1a}E_2E_3E_4$	E_vE_{vi}	
20	$E_{1b}E_2E_3E_4$	E_vE_{vi}	
21	$E_{1a}E_2E_iE_4$	E_vE_{vi}	
22	$E_{1b}E_2E_iE_4$	E_vE_{vi}	
23	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	
24	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	
25	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	
26	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	
27	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	
28	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	
29	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	
30	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	
31	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	
32	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	
33	$E_{1a}E_2E_{iii}$	E_vE_{vi}	
34	$E_{1b}E_2E_{iii}$	E_vE_{vi}	
35	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	
36	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	
37	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	
38	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	
39	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	
40	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	
41	$E_{1a}E_2E_{iv}$	E_vE_{vi}	
42	$E_{1b}E_2E_{iv}$	E_vE_{vi}	
43	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	

44	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	
45	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	
46	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	
47	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	
48	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	
49	$E_{1a}E_2$	E_vE_{vi}	E_{4^*}
50	$E_{1b}E_2$	E_vE_{vi}	E_{4^*}
51	$E_{1a}E_2E_3$	E_vE_{vi}	E_{4^*}
52	$E_{1b}E_2E_3$	E_vE_{vi}	E_{4^*}
53	$E_{1a}E_2E_i$	E_vE_{vi}	E_{4^*}
54	$E_{1b}E_2E_i$	E_vE_{vi}	E_{4^*}
55	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_{4^*}
56	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_{4^*}
57	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}
58	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}
59	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_{4^*}
60	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_{4^*}
61	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_{4^*}
62	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_{4^*}
63	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}
64	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}
65	$E_{1a}E_2E_4$	E_vE_{vi}	E_{4^*}
66	$E_{1b}E_2E_4$	E_vE_{vi}	E_{4^*}
67	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_{4^*}
68	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_{4^*}
69	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_{4^*}
70	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_{4^*}
71	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_{4^*}
72	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_{4^*}
73	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}
74	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}
75	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_{4^*}
76	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_{4^*}
77	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_{4^*}
78	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_{4^*}
79	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}
80	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}
81	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_{4^*}
82	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_{4^*}
83	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_{4^*}
84	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_{4^*}
85	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_{4^*}
86	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_{4^*}

87	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_{4^*}
88	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_{4^*}
89	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_{4^*}
90	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_{4^*}
91	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_{4^*}
92	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_{4^*}
93	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_{4^*}
94	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_{4^*}
95	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_{4^*}
96	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_{4^*}
97	$E_{1a}E_2$	E_vE_{vi}	E_5
98	$E_{1b}E_2$	E_vE_{vi}	E_5
99	$E_{1a}E_2E_3$	E_vE_{vi}	E_5
100	$E_{1b}E_2E_3$	E_vE_{vi}	E_5
101	$E_{1a}E_2E_i$	E_vE_{vi}	E_5
102	$E_{1b}E_2E_i$	E_vE_{vi}	E_5
103	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_5
104	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_5
105	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_5
106	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_5
107	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_5
108	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_5
109	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_5
110	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_5
111	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_5
112	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_5
113	$E_{1a}E_2E_4$	E_vE_{vi}	E_5
114	$E_{1b}E_2E_4$	E_vE_{vi}	E_5
115	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_5
116	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_5
117	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_5
118	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_5
119	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_5
120	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_5
121	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5
122	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5
123	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_5
124	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_5
125	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_5
126	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_5
127	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5
128	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5
129	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_5

130	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_5
131	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_5
132	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_5
133	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_5
134	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_5
135	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_5
136	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_5
137	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_5
138	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_5
139	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_5
140	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_5
141	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_5
142	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_5
143	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_5
144	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_5
145	$E_{1a}E_2$	E_vE_{vi}	E_4-E_5
146	$E_{1b}E_2$	E_vE_{vi}	E_4-E_5
147	$E_{1a}E_2E_3$	E_vE_{vi}	E_4-E_5
148	$E_{1b}E_2E_3$	E_vE_{vi}	E_4-E_5
149	$E_{1a}E_2E_i$	E_vE_{vi}	E_4-E_5
150	$E_{1b}E_2E_i$	E_vE_{vi}	E_4-E_5
151	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_4-E_5
152	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_4-E_5
153	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5
154	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5
155	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_4-E_5
156	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_4-E_5
157	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_4-E_5
158	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_4-E_5
159	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5
160	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5
161	$E_{1a}E_2E_4$	E_vE_{vi}	E_4-E_5
162	$E_{1b}E_2E_4$	E_vE_{vi}	E_4-E_5
163	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_4-E_5
164	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_4-E_5
165	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_4-E_5
166	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_4-E_5
167	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_4-E_5
168	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_4-E_5
169	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5
170	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5
171	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_4-E_5
172	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_4-E_5
173	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_4-E_5
174	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_4-E_5
175	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5
176	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5
177	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_4-E_5
178	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_4-E_5
179	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_4-E_5
180	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_4-E_5
181	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_4-E_5
182	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_4-E_5
183	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_4-E_5
184	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_4-E_5
185	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_4-E_5
186	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_4-E_5
187	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_4-E_5
188	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_4-E_5
189	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_4-E_5
190	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_4-E_5
191	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_4-E_5
192	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_4-E_5
193	$E_{1a}E_2$	$AlkLE_vE_{vi}$	
194	$E_{1b}E_2$	$AlkLE_vE_{vi}$	
195	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	
196	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	
197	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	
198	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	
199	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	
200	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	
201	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	
202	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	
203	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	
204	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	
205	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	
206	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	
207	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	
208	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	
209	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	
210	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	
211	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	
212	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	
213	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	
214	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	
215	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	

216	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	
217	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	
218	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	
219	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	
220	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	
221	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	
222	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	
223	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	
224	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	
225	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	
226	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	
227	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	
228	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	
229	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	
230	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	
231	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	
232	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	
233	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	
234	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	
235	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	
236	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	
237	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	
238	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	
239	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	
240	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	
241	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_{4^*}
242	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_{4^*}
243	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_{4^*}
244	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_{4^*}
245	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_{4^*}
246	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_{4^*}
247	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}
248	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}
249	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}
250	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}
251	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_{4^*}
252	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_{4^*}
253	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}
254	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}
255	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}
256	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}
257	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_{4^*}
258	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_{4^*}
259	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_{4^*}
260	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_{4^*}
261	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}
262	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}
263	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
264	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
265	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
266	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
267	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}
268	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}
269	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
270	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
271	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
272	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
273	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}
274	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}
275	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}
276	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}
277	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
278	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
279	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
280	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
281	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}
282	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}
283	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}
284	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}
285	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
286	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
287	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
288	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}
289	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_5
290	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_5
291	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_5
292	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_5
293	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_5
294	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_5
295	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_5
296	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_5
297	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5
298	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5
299	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_5
300	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_5
301	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_5

302	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_5
303	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5
304	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5
305	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_5
306	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_5
307	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_5
308	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_5
309	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_5
310	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_5
311	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5
312	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5
313	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5
314	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5
315	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_5
316	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_5
317	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5
318	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5
319	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5
320	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5
321	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_5
322	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_5
323	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_5
324	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_5
325	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5
326	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5
327	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5
328	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5
329	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_5
330	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_5
331	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_5
332	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_5
333	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5
334	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5
335	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5
336	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5
337	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_4-E_5
338	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_4-E_5
339	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_4-E_5
340	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_4-E_5
341	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_4-E_5
342	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_4-E_5
343	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5
344	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5
345	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5
346	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5
347	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4-E_5
348	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4-E_5
349	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5
350	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5
351	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5
352	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5
353	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_4-E_5
354	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_4-E_5
355	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4-E_5
356	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4-E_5
357	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5
358	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5
359	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
360	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
361	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
362	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
363	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5
364	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5
365	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
366	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
367	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
368	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
369	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5
370	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5
371	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5
372	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5
373	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
374	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
375	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
376	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
377	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5
378	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5
379	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5
380	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5
381	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
382	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
383	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
384	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5
385	$E_{1a}E_2$	E_vE_{vi}	E_a
386	$E_{1b}E_2$	E_vE_{vi}	E_a
387	$E_{1a}E_2E_3$	E_vE_{vi}	E_a

388	$E_{1b}E_2E_3$	E_vE_{vi}	E_a
389	$E_{1a}E_2E_i$	E_vE_{vi}	E_a
390	$E_{1b}E_2E_i$	E_vE_{vi}	E_a
391	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_a
392	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_a
393	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_a
394	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_a
395	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_a
396	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_a
397	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_a
398	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_a
399	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_a
400	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_a
401	$E_{1a}E_2E_4$	E_vE_{vi}	E_a
402	$E_{1b}E_2E_4$	E_vE_{vi}	E_a
403	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_a
404	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_a
405	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_a
406	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_a
407	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_a
408	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_a
409	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_a
410	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_a
411	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_a
412	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_a
413	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_a
414	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_a
415	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_a
416	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_a
417	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_a
418	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_a
419	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_a
420	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_a
421	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_a
422	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_a
423	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_a
424	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_a
425	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_a
426	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_a
427	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_a
428	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_a
429	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_a
430	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_a

431	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}		E_a
432	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}		E_a
433	$E_{1a}E_2$	E_vE_{vi}	E_{4^*}	E_a
434	$E_{1b}E_2$	E_vE_{vi}	E_{4^*}	E_a
435	$E_{1a}E_2E_3$	E_vE_{vi}	E_{4^*}	E_a
436	$E_{1b}E_2E_3$	E_vE_{vi}	E_{4^*}	E_a
437	$E_{1a}E_2E_i$	E_vE_{vi}	E_{4^*}	E_a
438	$E_{1b}E_2E_i$	E_vE_{vi}	E_{4^*}	E_a
439	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_{4^*}	E_a
440	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_{4^*}	E_a
441	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_a
442	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_a
443	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_{4^*}	E_a
444	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_{4^*}	E_a
445	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_{4^*}	E_a
446	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_{4^*}	E_a
447	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_a
448	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_a
449	$E_{1a}E_2E_4$	E_vE_{vi}	E_{4^*}	E_a
450	$E_{1b}E_2E_4$	E_vE_{vi}	E_{4^*}	E_a
451	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_{4^*}	E_a
452	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_{4^*}	E_a
453	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_{4^*}	E_a
454	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_{4^*}	E_a
455	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_a
456	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_a
457	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_a
458	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_a
459	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_{4^*}	E_a
460	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_{4^*}	E_a
461	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_a
462	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_a
463	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_a
464	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_a
465	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_{4^*}	E_a
466	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_{4^*}	E_a
467	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_{4^*}	E_a
468	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_{4^*}	E_a
469	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_a
470	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_a
471	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_a
472	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_a
473	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_{4^*}	E_a

474	$E_{1b}E_2E_{iv}$	E_vE_{vi}	$E_{4'}$	E_a
475	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	$E_{4'}$	E_a
476	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	$E_{4'}$	E_a
477	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_a
478	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_a
479	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_a
480	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_a
481	$E_{1a}E_2$	E_vE_{vi}	E_5	E_a
482	$E_{1b}E_2$	E_vE_{vi}	E_5	E_a
483	$E_{1a}E_2E_3$	E_vE_{vi}	E_5	E_a
484	$E_{1b}E_2E_3$	E_vE_{vi}	E_5	E_a
485	$E_{1a}E_2E_i$	E_vE_{vi}	E_5	E_a
486	$E_{1b}E_2E_i$	E_vE_{vi}	E_5	E_a
487	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_5	E_a
488	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_5	E_a
489	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_a
490	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_a
491	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_5	E_a
492	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_5	E_a
493	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_5	E_a
494	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_5	E_a
495	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_a
496	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_a
497	$E_{1a}E_2E_4$	E_vE_{vi}	E_5	E_a
498	$E_{1b}E_2E_4$	E_vE_{vi}	E_5	E_a
499	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_5	E_a
500	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_5	E_a
501	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_5	E_a
502	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_5	E_a
503	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_5	E_a
504	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_5	E_a
505	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_a
506	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_a
507	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_5	E_a
508	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_5	E_a
509	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_5	E_a
510	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_5	E_a
511	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_a
512	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_a
513	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_5	E_a
514	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_5	E_a
515	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_5	E_a
516	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_5	E_a

517	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_5	E_a
518	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_5	E_a
519	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_5	E_a
520	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_5	E_a
521	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_5	E_a
522	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_5	E_a
523	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_5	E_a
524	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_5	E_a
525	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_5	E_a
526	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_5	E_a
527	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_5	E_a
528	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_5	E_a
529	$E_{1a}E_2$	E_vE_{vi}	$E_{4'}E_5$	E_a
530	$E_{1b}E_2$	E_vE_{vi}	$E_{4'}E_5$	E_a
531	$E_{1a}E_2E_3$	E_vE_{vi}	$E_{4'}E_5$	E_a
532	$E_{1b}E_2E_3$	E_vE_{vi}	$E_{4'}E_5$	E_a
533	$E_{1a}E_2E_i$	E_vE_{vi}	$E_{4'}E_5$	E_a
534	$E_{1b}E_2E_i$	E_vE_{vi}	$E_{4'}E_5$	E_a
535	$E_{1a}E_2E_{ii}$	E_vE_{vi}	$E_{4'}E_5$	E_a
536	$E_{1b}E_2E_{ii}$	E_vE_{vi}	$E_{4'}E_5$	E_a
537	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}E_5$	E_a
538	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}E_5$	E_a
539	$E_{1a}E_2E_3E_i$	E_vE_{vi}	$E_{4'}E_5$	E_a
540	$E_{1b}E_2E_3E_i$	E_vE_{vi}	$E_{4'}E_5$	E_a
541	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	$E_{4'}E_5$	E_a
542	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	$E_{4'}E_5$	E_a
543	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}E_5$	E_a
544	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}E_5$	E_a
545	$E_{1a}E_2E_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
546	$E_{1b}E_2E_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
547	$E_{1a}E_2E_3E_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
548	$E_{1b}E_2E_3E_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
549	$E_{1a}E_2E_iE_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
550	$E_{1b}E_2E_iE_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
551	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
552	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
553	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
554	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
555	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
556	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
557	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
558	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	$E_{4'}E_5$	E_a
559	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}E_5$	E_a

560	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4*E_5	E_a
561	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_4*E_5	E_a
562	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_4*E_5	E_a
563	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_4*E_5	E_a
564	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_4*E_5	E_a
565	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_4*E_5	E_a
566	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_4*E_5	E_a
567	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_4*E_5	E_a
568	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_4*E_5	E_a
569	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_4*E_5	E_a
570	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_4*E_5	E_a
571	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_4*E_5	E_a
572	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_4*E_5	E_a
573	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_4*E_5	E_a
574	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_4*E_5	E_a
575	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_4*E_5	E_a
576	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_4*E_5	E_a
577	$E_{1a}E_2$	$AlkLE_vE_{vi}$		E_a
578	$E_{1b}E_2$	$AlkLE_vE_{vi}$		E_a
579	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$		E_a
580	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$		E_a
581	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$		E_a
582	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$		E_a
583	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$		E_a
584	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$		E_a
585	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_a
586	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_a
587	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$		E_a
588	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$		E_a
589	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$		E_a
590	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$		E_a
591	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_a
592	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_a
593	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$		E_a
594	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$		E_a
595	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$		E_a
596	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$		E_a
597	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$		E_a
598	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$		E_a
599	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$		E_a
600	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$		E_a
601	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_a
602	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_a

603	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$		E_a
604	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$		E_a
605	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$		E_a
606	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$		E_a
607	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_a
608	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_a
609	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$		E_a
610	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$		E_a
611	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$		E_a
612	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$		E_a
613	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$		E_a
614	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$		E_a
615	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$		E_a
616	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$		E_a
617	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$		E_a
618	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$		E_a
619	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$		E_a
620	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$		E_a
621	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$		E_a
622	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$		E_a
623	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$		E_a
624	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$		E_a
625	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_4*	E_a
626	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_4*	E_a
627	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_4*	E_a
628	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_4*	E_a
629	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_4*	E_a
630	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_4*	E_a
631	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4*	E_a
632	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4*	E_a
633	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*	E_a
634	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*	E_a
635	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4*	E_a
636	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4*	E_a
637	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4*	E_a
638	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4*	E_a
639	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*	E_a
640	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*	E_a
641	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_4*	E_a
642	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_4*	E_a
643	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4*	E_a
644	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4*	E_a
645	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4*	E_a

646	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
647	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
648	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
649	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
650	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
651	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
652	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
653	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
654	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
655	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
656	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
657	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
658	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
659	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
660	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
661	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
662	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
663	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
664	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
665	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
666	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
667	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
668	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
669	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
670	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
671	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
672	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_a
673	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_5	E_a
674	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_5	E_a
675	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_5	E_a
676	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_5	E_a
677	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_5	E_a
678	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_5	E_a
679	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_a
680	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_a
681	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_a
682	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_a
683	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_5	E_a
684	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_5	E_a
685	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_a
686	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_a
687	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_a
688	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_a

689	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_5	E_a
690	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_5	E_a
691	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_5	E_a
692	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_5	E_a
693	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_a
694	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_a
695	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
696	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
697	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
698	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
699	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_a
700	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_a
701	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
702	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
703	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
704	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
705	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_a
706	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_a
707	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_a
708	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_a
709	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
710	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
711	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
712	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
713	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_a
714	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_a
715	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_a
716	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_a
717	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
718	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
719	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
720	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
721	$E_{1a}E_2$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_a
722	$E_{1b}E_2$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_a
723	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_a
724	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_a
725	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_a
726	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_a
727	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_a
728	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_a
729	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_a
730	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_a
731	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_a

732	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
733	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
734	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
735	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
736	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
737	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
738	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
739	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
740	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
741	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
742	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
743	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
744	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
745	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
746	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
747	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
748	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
749	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
750	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
751	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
752	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
753	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
754	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
755	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
756	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
757	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
758	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
759	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
760	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
761	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
762	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
763	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
764	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
765	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
766	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
767	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
768	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
769	$E_{1a}E_2$	E_vE_{vi}		E_b
770	$E_{1b}E_2$	E_vE_{vi}		E_b
771	$E_{1a}E_2E_3$	E_vE_{vi}		E_b
772	$E_{1b}E_2E_3$	E_vE_{vi}		E_b
773	$E_{1a}E_2E_i$	E_vE_{vi}		E_b
774	$E_{1b}E_2E_i$	E_vE_{vi}		E_b

775	$E_{1a}E_2E_{ii}$	E_vE_{vi}		E_b
776	$E_{1b}E_2E_{ii}$	E_vE_{vi}		E_b
777	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}		E_b
778	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}		E_b
779	$E_{1a}E_2E_3E_i$	E_vE_{vi}		E_b
780	$E_{1b}E_2E_3E_i$	E_vE_{vi}		E_b
781	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}		E_b
782	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}		E_b
783	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}		E_b
784	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}		E_b
785	$E_{1a}E_2E_4$	E_vE_{vi}		E_b
786	$E_{1b}E_2E_4$	E_vE_{vi}		E_b
787	$E_{1a}E_2E_3E_4$	E_vE_{vi}		E_b
788	$E_{1b}E_2E_3E_4$	E_vE_{vi}		E_b
789	$E_{1a}E_2E_iE_4$	E_vE_{vi}		E_b
790	$E_{1b}E_2E_iE_4$	E_vE_{vi}		E_b
791	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}		E_b
792	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}		E_b
793	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}		E_b
794	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}		E_b
795	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}		E_b
796	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}		E_b
797	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}		E_b
798	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}		E_b
799	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}		E_b
800	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}		E_b
801	$E_{1a}E_2E_{iii}$	E_vE_{vi}		E_b
802	$E_{1b}E_2E_{iii}$	E_vE_{vi}		E_b
803	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}		E_b
804	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}		E_b
805	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}		E_b
806	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}		E_b
807	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}		E_b
808	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}		E_b
809	$E_{1a}E_2E_{iv}$	E_vE_{vi}		E_b
810	$E_{1b}E_2E_{iv}$	E_vE_{vi}		E_b
811	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}		E_b
812	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}		E_b
813	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}		E_b
814	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}		E_b
815	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}		E_b
816	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}		E_b
817	$E_{1a}E_2$	E_vE_{vi}	E_4-	E_b

818	$E_{1b}E_2$	E_vE_{vi}	E_{4^*}	E_b
819	$E_{1a}E_2E_3$	E_vE_{vi}	E_{4^*}	E_b
820	$E_{1b}E_2E_3$	E_vE_{vi}	E_{4^*}	E_b
821	$E_{1a}E_2E_i$	E_vE_{vi}	E_{4^*}	E_b
822	$E_{1b}E_2E_i$	E_vE_{vi}	E_{4^*}	E_b
823	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_{4^*}	E_b
824	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_{4^*}	E_b
825	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_b
826	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_b
827	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_{4^*}	E_b
828	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_{4^*}	E_b
829	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_{4^*}	E_b
830	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_{4^*}	E_b
831	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_b
832	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_b
833	$E_{1a}E_2E_4$	E_vE_{vi}	E_{4^*}	E_b
834	$E_{1b}E_2E_4$	E_vE_{vi}	E_{4^*}	E_b
835	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_{4^*}	E_b
836	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_{4^*}	E_b
837	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_{4^*}	E_b
838	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_{4^*}	E_b
839	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_b
840	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_b
841	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_b
842	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_b
843	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_{4^*}	E_b
844	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_{4^*}	E_b
845	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_b
846	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_b
847	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_b
848	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_b
849	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_{4^*}	E_b
850	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_{4^*}	E_b
851	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_{4^*}	E_b
852	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_{4^*}	E_b
853	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_b
854	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_b
855	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_b
856	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_b
857	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_{4^*}	E_b
858	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_{4^*}	E_b
859	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_{4^*}	E_b
860	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_{4^*}	E_b

861	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_b
862	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_b
863	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_b
864	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_b
865	$E_{1a}E_2$	E_vE_{vi}	E_5	E_b
866	$E_{1b}E_2$	E_vE_{vi}	E_5	E_b
867	$E_{1a}E_2E_3$	E_vE_{vi}	E_5	E_b
868	$E_{1b}E_2E_3$	E_vE_{vi}	E_5	E_b
869	$E_{1a}E_2E_i$	E_vE_{vi}	E_5	E_b
870	$E_{1b}E_2E_i$	E_vE_{vi}	E_5	E_b
871	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_5	E_b
872	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_5	E_b
873	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_b
874	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_b
875	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_5	E_b
876	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_5	E_b
877	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_5	E_b
878	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_5	E_b
879	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_b
880	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_b
881	$E_{1a}E_2E_4$	E_vE_{vi}	E_5	E_b
882	$E_{1b}E_2E_4$	E_vE_{vi}	E_5	E_b
883	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_5	E_b
884	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_5	E_b
885	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_5	E_b
886	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_5	E_b
887	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_5	E_b
888	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_5	E_b
889	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_b
890	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_b
891	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_5	E_b
892	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_5	E_b
893	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_5	E_b
894	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_5	E_b
895	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_b
896	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_b
897	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_5	E_b
898	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_5	E_b
899	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_5	E_b
900	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_5	E_b
901	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_5	E_b
902	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_5	E_b
903	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_5	E_b

904	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_5	E_b
905	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_5	E_b
906	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_5	E_b
907	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_5	E_b
908	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_5	E_b
909	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_5	E_b
910	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_5	E_b
911	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_5	E_b
912	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_5	E_b
913	$E_{1a}E_2$	E_vE_{vi}	E_4-E_5	E_b
914	$E_{1b}E_2$	E_vE_{vi}	E_4-E_5	E_b
915	$E_{1a}E_2E_3$	E_vE_{vi}	E_4-E_5	E_b
916	$E_{1b}E_2E_3$	E_vE_{vi}	E_4-E_5	E_b
917	$E_{1a}E_2E_i$	E_vE_{vi}	E_4-E_5	E_b
918	$E_{1b}E_2E_i$	E_vE_{vi}	E_4-E_5	E_b
919	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_4-E_5	E_b
920	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_4-E_5	E_b
921	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_b
922	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_b
923	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_4-E_5	E_b
924	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_4-E_5	E_b
925	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_4-E_5	E_b
926	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_4-E_5	E_b
927	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_b
928	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_b
929	$E_{1a}E_2E_4$	E_vE_{vi}	E_4-E_5	E_b
930	$E_{1b}E_2E_4$	E_vE_{vi}	E_4-E_5	E_b
931	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_4-E_5	E_b
932	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_4-E_5	E_b
933	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_4-E_5	E_b
934	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_4-E_5	E_b
935	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_b
936	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_b
937	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_b
938	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_b
939	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_4-E_5	E_b
940	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_4-E_5	E_b
941	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_b
942	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_b
943	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_b
944	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_b
945	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_4-E_5	E_b
946	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_4-E_5	E_b

947	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_4-E_5	E_b
948	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_4-E_5	E_b
949	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_b
950	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_b
951	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_b
952	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_b
953	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_4-E_5	E_b
954	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_4-E_5	E_b
955	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_4-E_5	E_b
956	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_4-E_5	E_b
957	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_b
958	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_b
959	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_b
960	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_b
961	$E_{1a}E_2$	$AlkLE_vE_{vi}$		E_b
962	$E_{1b}E_2$	$AlkLE_vE_{vi}$		E_b
963	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$		E_b
964	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$		E_b
965	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$		E_b
966	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$		E_b
967	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$		E_b
968	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$		E_b
969	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_b
970	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_b
971	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$		E_b
972	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$		E_b
973	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$		E_b
974	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$		E_b
975	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_b
976	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_b
977	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$		E_b
978	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$		E_b
979	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$		E_b
980	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$		E_b
981	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$		E_b
982	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$		E_b
983	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$		E_b
984	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$		E_b
985	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_b
986	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_b
987	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$		E_b
988	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$		E_b
989	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$		E_b

990	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$		E_b
991	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_b
992	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_b
993	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$		E_b
994	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$		E_b
995	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$		E_b
996	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$		E_b
997	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$		E_b
998	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$		E_b
999	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$		E_b
1000	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$		E_b
1001	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$		E_b
1002	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$		E_b
1003	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$		E_b
1004	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$		E_b
1005	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$		E_b
1006	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$		E_b
1007	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$		E_b
1008	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$		E_b
1009	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1010	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1011	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1012	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1013	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1014	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1015	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1016	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1017	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1018	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1019	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1020	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1021	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1022	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1023	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1024	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1025	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1026	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1027	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1028	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1029	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1030	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1031	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1032	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b

1033	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1034	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1035	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1036	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1037	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1038	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1039	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1040	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1041	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1042	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1043	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1044	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1045	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1046	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1047	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1048	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1049	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1050	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1051	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1052	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1053	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1054	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1055	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1056	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
1057	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_5	E_b
1058	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_5	E_b
1059	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_5	E_b
1060	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_5	E_b
1061	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_5	E_b
1062	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_5	E_b
1063	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_b
1064	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_b
1065	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_b
1066	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_b
1067	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_5	E_b
1068	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_5	E_b
1069	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_b
1070	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_b
1071	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_b
1072	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_b
1073	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1074	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1075	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_5	E_b

1076	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1077	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_b
1078	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_b
1079	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1080	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1081	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1082	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1083	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_b
1084	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_b
1085	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1086	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1087	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1088	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1089	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_b
1090	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_b
1091	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_b
1092	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_b
1093	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1094	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1095	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1096	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1097	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_b
1098	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_b
1099	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_b
1100	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_b
1101	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1102	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1103	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1104	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
1105	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1106	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1107	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1108	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1109	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1110	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1111	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1112	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1113	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1114	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1115	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1116	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1117	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1118	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b

1119	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1120	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1121	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1122	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1123	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1124	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1125	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1126	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1127	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1128	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1129	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1130	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1131	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1132	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1133	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1134	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1135	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1136	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1137	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1138	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1139	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1140	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1141	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1142	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1143	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1144	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1145	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1146	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1147	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1148	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1149	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1150	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1151	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1152	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
1153	$E_{1a}E_2$	E_vE_{vi}		E_d
1154	$E_{1b}E_2$	E_vE_{vi}		E_d
1155	$E_{1a}E_2E_3$	E_vE_{vi}		E_d
1156	$E_{1b}E_2E_3$	E_vE_{vi}		E_d
1157	$E_{1a}E_2E_i$	E_vE_{vi}		E_d
1158	$E_{1b}E_2E_i$	E_vE_{vi}		E_d
1159	$E_{1a}E_2E_{ii}$	E_vE_{vi}		E_d
1160	$E_{1b}E_2E_{ii}$	E_vE_{vi}		E_d
1161	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}		E_d

1162	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}		E_d
1163	$E_{1a}E_2E_3E_i$	E_vE_{vi}		E_d
1164	$E_{1b}E_2E_3E_i$	E_vE_{vi}		E_d
1165	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}		E_d
1166	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}		E_d
1167	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}		E_d
1168	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}		E_d
1169	$E_{1a}E_2E_4$	E_vE_{vi}		E_d
1170	$E_{1b}E_2E_4$	E_vE_{vi}		E_d
1171	$E_{1a}E_2E_3E_4$	E_vE_{vi}		E_d
1172	$E_{1b}E_2E_3E_4$	E_vE_{vi}		E_d
1173	$E_{1a}E_2E_iE_4$	E_vE_{vi}		E_d
1174	$E_{1b}E_2E_iE_4$	E_vE_{vi}		E_d
1175	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}		E_d
1176	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}		E_d
1177	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}		E_d
1178	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}		E_d
1179	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}		E_d
1180	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}		E_d
1181	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}		E_d
1182	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}		E_d
1183	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}		E_d
1184	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}		E_d
1185	$E_{1a}E_2E_{iii}$	E_vE_{vi}		E_d
1186	$E_{1b}E_2E_{iii}$	E_vE_{vi}		E_d
1187	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}		E_d
1188	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}		E_d
1189	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}		E_d
1190	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}		E_d
1191	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}		E_d
1192	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}		E_d
1193	$E_{1a}E_2E_{iv}$	E_vE_{vi}		E_d
1194	$E_{1b}E_2E_{iv}$	E_vE_{vi}		E_d
1195	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}		E_d
1196	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}		E_d
1197	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}		E_d
1198	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}		E_d
1199	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}		E_d
1200	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}		E_d
1201	$E_{1a}E_2$	E_vE_{vi}	E_{4^*}	E_d
1202	$E_{1b}E_2$	E_vE_{vi}	E_{4^*}	E_d
1203	$E_{1a}E_2E_3$	E_vE_{vi}	E_{4^*}	E_d
1204	$E_{1b}E_2E_3$	E_vE_{vi}	E_{4^*}	E_d

1205	$E_{1a}E_2E_i$	E_vE_{vi}	E_{4^*}	E_d
1206	$E_{1b}E_2E_i$	E_vE_{vi}	E_{4^*}	E_d
1207	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_{4^*}	E_d
1208	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_{4^*}	E_d
1209	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_d
1210	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_d
1211	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_{4^*}	E_d
1212	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_{4^*}	E_d
1213	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_{4^*}	E_d
1214	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_{4^*}	E_d
1215	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_d
1216	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_d
1217	$E_{1a}E_2E_4$	E_vE_{vi}	E_{4^*}	E_d
1218	$E_{1b}E_2E_4$	E_vE_{vi}	E_{4^*}	E_d
1219	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_{4^*}	E_d
1220	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_{4^*}	E_d
1221	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_{4^*}	E_d
1222	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_{4^*}	E_d
1223	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_d
1224	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_d
1225	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_d
1226	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_d
1227	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_{4^*}	E_d
1228	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_{4^*}	E_d
1229	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_d
1230	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_d
1231	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_d
1232	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_d
1233	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_{4^*}	E_d
1234	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_{4^*}	E_d
1235	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_{4^*}	E_d
1236	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_{4^*}	E_d
1237	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_d
1238	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_d
1239	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_d
1240	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_d
1241	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_{4^*}	E_d
1242	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_{4^*}	E_d
1243	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_{4^*}	E_d
1244	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_{4^*}	E_d
1245	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_d
1246	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_d
1247	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_d

1248	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_4,	E_d
1249	$E_{1a}E_2$	E_vE_{vi}	E_5	E_d
1250	$E_{1b}E_2$	E_vE_{vi}	E_5	E_d
1251	$E_{1a}E_2E_3$	E_vE_{vi}	E_5	E_d
1252	$E_{1b}E_2E_3$	E_vE_{vi}	E_5	E_d
1253	$E_{1a}E_2E_i$	E_vE_{vi}	E_5	E_d
1254	$E_{1b}E_2E_i$	E_vE_{vi}	E_5	E_d
1255	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_5	E_d
1256	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_5	E_d
1257	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_d
1258	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_d
1259	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_5	E_d
1260	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_5	E_d
1261	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_5	E_d
1262	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_5	E_d
1263	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_d
1264	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_d
1265	$E_{1a}E_2E_4$	E_vE_{vi}	E_5	E_d
1266	$E_{1b}E_2E_4$	E_vE_{vi}	E_5	E_d
1267	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_5	E_d
1268	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_5	E_d
1269	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_5	E_d
1270	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_5	E_d
1271	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_5	E_d
1272	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_5	E_d
1273	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_d
1274	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_d
1275	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_5	E_d
1276	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_5	E_d
1277	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_5	E_d
1278	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_5	E_d
1279	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_d
1280	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_d
1281	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_5	E_d
1282	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_5	E_d
1283	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_5	E_d
1284	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_5	E_d
1285	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_5	E_d
1286	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_5	E_d
1287	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_5	E_d
1288	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_5	E_d
1289	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_5	E_d
1290	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_5	E_d

1291	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_5	E_d
1292	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_5	E_d
1293	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_5	E_d
1294	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_5	E_d
1295	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_5	E_d
1296	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_5	E_d
1297	$E_{1a}E_2$	E_vE_{vi}	E_4,E_5	E_d
1298	$E_{1b}E_2$	E_vE_{vi}	E_4,E_5	E_d
1299	$E_{1a}E_2E_3$	E_vE_{vi}	E_4,E_5	E_d
1300	$E_{1b}E_2E_3$	E_vE_{vi}	E_4,E_5	E_d
1301	$E_{1a}E_2E_i$	E_vE_{vi}	E_4,E_5	E_d
1302	$E_{1b}E_2E_i$	E_vE_{vi}	E_4,E_5	E_d
1303	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_4,E_5	E_d
1304	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_4,E_5	E_d
1305	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_4,E_5	E_d
1306	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_4,E_5	E_d
1307	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_4,E_5	E_d
1308	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_4,E_5	E_d
1309	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_4,E_5	E_d
1310	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_4,E_5	E_d
1311	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_4,E_5	E_d
1312	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_4,E_5	E_d
1313	$E_{1a}E_2E_4$	E_vE_{vi}	E_4,E_5	E_d
1314	$E_{1b}E_2E_4$	E_vE_{vi}	E_4,E_5	E_d
1315	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_4,E_5	E_d
1316	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_4,E_5	E_d
1317	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_4,E_5	E_d
1318	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_4,E_5	E_d
1319	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_4,E_5	E_d
1320	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_4,E_5	E_d
1321	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4,E_5	E_d
1322	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4,E_5	E_d
1323	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_4,E_5	E_d
1324	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_4,E_5	E_d
1325	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_4,E_5	E_d
1326	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_4,E_5	E_d
1327	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4,E_5	E_d
1328	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4,E_5	E_d
1329	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_4,E_5	E_d
1330	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_4,E_5	E_d
1331	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_4,E_5	E_d
1332	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_4,E_5	E_d
1333	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_4,E_5	E_d

1334	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_d
1335	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_d
1336	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_d
1337	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_4-E_5	E_d
1338	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_4-E_5	E_d
1339	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_4-E_5	E_d
1340	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_4-E_5	E_d
1341	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_d
1342	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_d
1343	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_d
1344	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_d
1345	$E_{1a}E_2$	$AlkLE_vE_{vi}$		E_d
1346	$E_{1b}E_2$	$AlkLE_vE_{vi}$		E_d
1347	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$		E_d
1348	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$		E_d
1349	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$		E_d
1350	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$		E_d
1351	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$		E_d
1352	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$		E_d
1353	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_d
1354	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_d
1355	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$		E_d
1356	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$		E_d
1357	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$		E_d
1358	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$		E_d
1359	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_d
1360	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_d
1361	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$		E_d
1362	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$		E_d
1363	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$		E_d
1364	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$		E_d
1365	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$		E_d
1366	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$		E_d
1367	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$		E_d
1368	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$		E_d
1369	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_d
1370	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_d
1371	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$		E_d
1372	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$		E_d
1373	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$		E_d
1374	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$		E_d
1375	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_d
1376	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_d

1377	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$		E_d
1378	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$		E_d
1379	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$		E_d
1380	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$		E_d
1381	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$		E_d
1382	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$		E_d
1383	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$		E_d
1384	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$		E_d
1385	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$		E_d
1386	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$		E_d
1387	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$		E_d
1388	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$		E_d
1389	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$		E_d
1390	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$		E_d
1391	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$		E_d
1392	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$		E_d
1393	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_4-	E_d
1394	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_4-	E_d
1395	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_4-	E_d
1396	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_4-	E_d
1397	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_4-	E_d
1398	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_4-	E_d
1399	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4-	E_d
1400	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4-	E_d
1401	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-	E_d
1402	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-	E_d
1403	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4-	E_d
1404	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4-	E_d
1405	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4-	E_d
1406	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4-	E_d
1407	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-	E_d
1408	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-	E_d
1409	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_4-	E_d
1410	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_4-	E_d
1411	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4-	E_d
1412	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4-	E_d
1413	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4-	E_d
1414	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4-	E_d
1415	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-	E_d
1416	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-	E_d
1417	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-	E_d
1418	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-	E_d
1419	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4-	E_d

1420	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1421	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1422	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1423	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1424	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1425	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1426	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1427	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1428	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1429	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1430	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1431	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1432	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1433	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1434	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1435	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1436	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1437	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1438	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1439	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1440	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
1441	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_5	E_d
1442	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_5	E_d
1443	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_5	E_d
1444	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_5	E_d
1445	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_5	E_d
1446	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_5	E_d
1447	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_d
1448	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_d
1449	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_d
1450	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_d
1451	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_5	E_d
1452	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_5	E_d
1453	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_d
1454	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_d
1455	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_d
1456	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_d
1457	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1458	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1459	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1460	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1461	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_d
1462	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_d

1463	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1464	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1465	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1466	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1467	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_d
1468	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_d
1469	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1470	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1471	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1472	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1473	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_d
1474	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_d
1475	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_d
1476	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_d
1477	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1478	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1479	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1480	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1481	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_d
1482	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_d
1483	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_d
1484	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_d
1485	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1486	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1487	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1488	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
1489	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1490	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1491	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1492	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1493	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1494	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1495	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1496	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1497	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1498	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1499	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1500	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1501	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1502	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1503	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1504	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1505	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d

1506	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1507	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1508	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1509	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1510	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1511	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1512	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1513	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1514	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1515	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1516	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1517	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1518	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1519	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1520	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1521	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1522	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1523	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1524	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1525	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1526	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1527	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1528	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1529	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1530	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1531	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1532	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1533	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1534	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1535	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1536	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_d
1537	$E_{1a}E_2$	E_vE_{vi}		E_e
1538	$E_{1b}E_2$	E_vE_{vi}		E_e
1539	$E_{1a}E_2E_3$	E_vE_{vi}		E_e
1540	$E_{1b}E_2E_3$	E_vE_{vi}		E_e
1541	$E_{1a}E_2E_i$	E_vE_{vi}		E_e
1542	$E_{1b}E_2E_i$	E_vE_{vi}		E_e
1543	$E_{1a}E_2E_{ii}$	E_vE_{vi}		E_e
1544	$E_{1b}E_2E_{ii}$	E_vE_{vi}		E_e
1545	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}		E_e
1546	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}		E_e
1547	$E_{1a}E_2E_3E_i$	E_vE_{vi}		E_e
1548	$E_{1b}E_2E_3E_i$	E_vE_{vi}		E_e
1549	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}		E_e
1550	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}		E_e
1551	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}		E_e
1552	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}		E_e
1553	$E_{1a}E_2E_4$	E_vE_{vi}		E_e
1554	$E_{1b}E_2E_4$	E_vE_{vi}		E_e
1555	$E_{1a}E_2E_3E_4$	E_vE_{vi}		E_e
1556	$E_{1b}E_2E_3E_4$	E_vE_{vi}		E_e
1557	$E_{1a}E_2E_iE_4$	E_vE_{vi}		E_e
1558	$E_{1b}E_2E_iE_4$	E_vE_{vi}		E_e
1559	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}		E_e
1560	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}		E_e
1561	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}		E_e
1562	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}		E_e
1563	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}		E_e
1564	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}		E_e
1565	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}		E_e
1566	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}		E_e
1567	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}		E_e
1568	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}		E_e
1569	$E_{1a}E_2E_{iii}$	E_vE_{vi}		E_e
1570	$E_{1b}E_2E_{iii}$	E_vE_{vi}		E_e
1571	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}		E_e
1572	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}		E_e
1573	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}		E_e
1574	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}		E_e
1575	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}		E_e
1576	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}		E_e
1577	$E_{1a}E_2E_{iv}$	E_vE_{vi}		E_e
1578	$E_{1b}E_2E_{iv}$	E_vE_{vi}		E_e
1579	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}		E_e
1580	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}		E_e
1581	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}		E_e
1582	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}		E_e
1583	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}		E_e
1584	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}		E_e
1585	$E_{1a}E_2$	E_vE_{vi}	E_4-	E_e
1586	$E_{1b}E_2$	E_vE_{vi}	E_4-	E_e
1587	$E_{1a}E_2E_3$	E_vE_{vi}	E_4-	E_e
1588	$E_{1b}E_2E_3$	E_vE_{vi}	E_4-	E_e
1589	$E_{1a}E_2E_i$	E_vE_{vi}	E_4-	E_e
1590	$E_{1b}E_2E_i$	E_vE_{vi}	E_4-	E_e
1591	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_4-	E_e

1592	$E_{1b}E_2E_{ii}$	E_vE_{vi}	$E_{4'}$	E_e
1593	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$	E_e
1594	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$	E_e
1595	$E_{1a}E_2E_3E_i$	E_vE_{vi}	$E_{4'}$	E_e
1596	$E_{1b}E_2E_3E_i$	E_vE_{vi}	$E_{4'}$	E_e
1597	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	$E_{4'}$	E_e
1598	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	$E_{4'}$	E_e
1599	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$	E_e
1600	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$	E_e
1601	$E_{1a}E_2E_4$	E_vE_{vi}	$E_{4''}$	E_e
1602	$E_{1b}E_2E_4$	E_vE_{vi}	$E_{4''}$	E_e
1603	$E_{1a}E_2E_3E_4$	E_vE_{vi}	$E_{4'}$	E_e
1604	$E_{1b}E_2E_3E_4$	E_vE_{vi}	$E_{4'}$	E_e
1605	$E_{1a}E_2E_iE_4$	E_vE_{vi}	$E_{4'}$	E_e
1606	$E_{1b}E_2E_iE_4$	E_vE_{vi}	$E_{4'}$	E_e
1607	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1608	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1609	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1610	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1611	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	$E_{4'}$	E_e
1612	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	$E_{4'}$	E_e
1613	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1614	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1615	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1616	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1617	$E_{1a}E_2E_{iii}$	E_vE_{vi}	$E_{4'}$	E_e
1618	$E_{1b}E_2E_{iii}$	E_vE_{vi}	$E_{4'}$	E_e
1619	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	$E_{4'}$	E_e
1620	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	$E_{4'}$	E_e
1621	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1622	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1623	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1624	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1625	$E_{1a}E_2E_{iv}$	E_vE_{vi}	$E_{4'}$	E_e
1626	$E_{1b}E_2E_{iv}$	E_vE_{vi}	$E_{4'}$	E_e
1627	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	$E_{4'}$	E_e
1628	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	$E_{4'}$	E_e
1629	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1630	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1631	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1632	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_e
1633	$E_{1a}E_2$	E_vE_{vi}	E_5	E_e
1634	$E_{1b}E_2$	E_vE_{vi}	E_5	E_e

1635	$E_{1a}E_2E_3$	E_vE_{vi}	E_5	E_e
1636	$E_{1b}E_2E_3$	E_vE_{vi}	E_5	E_e
1637	$E_{1a}E_2E_i$	E_vE_{vi}	E_5	E_e
1638	$E_{1b}E_2E_i$	E_vE_{vi}	E_5	E_e
1639	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_5	E_e
1640	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_5	E_e
1641	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_e
1642	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_e
1643	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_5	E_e
1644	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_5	E_e
1645	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_5	E_e
1646	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_5	E_e
1647	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_e
1648	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_e
1649	$E_{1a}E_2E_4$	E_vE_{vi}	E_5	E_e
1650	$E_{1b}E_2E_4$	E_vE_{vi}	E_5	E_e
1651	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_5	E_e
1652	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_5	E_e
1653	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_5	E_e
1654	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_5	E_e
1655	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_5	E_e
1656	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_5	E_e
1657	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_e
1658	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_e
1659	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_5	E_e
1660	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_5	E_e
1661	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_5	E_e
1662	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_5	E_e
1663	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_e
1664	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_e
1665	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_5	E_e
1666	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_5	E_e
1667	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_5	E_e
1668	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_5	E_e
1669	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_5	E_e
1670	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_5	E_e
1671	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_5	E_e
1672	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_5	E_e
1673	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_5	E_e
1674	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_5	E_e
1675	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_5	E_e
1676	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_5	E_e
1677	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_5	E_e

1678	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_5	E_e
1679	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_5	E_e
1680	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_5	E_e
1681	$E_{1a}E_2$	E_vE_{vi}	E_4-E_5	E_e
1682	$E_{1b}E_2$	E_vE_{vi}	E_4-E_5	E_e
1683	$E_{1a}E_2E_3$	E_vE_{vi}	E_4-E_5	E_e
1684	$E_{1b}E_2E_3$	E_vE_{vi}	E_4-E_5	E_e
1685	$E_{1a}E_2E_i$	E_vE_{vi}	E_4-E_5	E_e
1686	$E_{1b}E_2E_i$	E_vE_{vi}	E_4-E_5	E_e
1687	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_4-E_5	E_e
1688	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_4-E_5	E_e
1689	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_e
1690	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_e
1691	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_4-E_5	E_e
1692	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_4-E_5	E_e
1693	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_4-E_5	E_e
1694	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_4-E_5	E_e
1695	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_e
1696	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_e
1697	$E_{1a}E_2E_4$	E_vE_{vi}	E_4-E_5	E_e
1698	$E_{1b}E_2E_4$	E_vE_{vi}	E_4-E_5	E_e
1699	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_4-E_5	E_e
1700	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_4-E_5	E_e
1701	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_4-E_5	E_e
1702	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_4-E_5	E_e
1703	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_e
1704	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_e
1705	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_e
1706	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_e
1707	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_4-E_5	E_e
1708	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_4-E_5	E_e
1709	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_e
1710	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_e
1711	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_e
1712	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_e
1713	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_4-E_5	E_e
1714	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_4-E_5	E_e
1715	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_4-E_5	E_e
1716	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_4-E_5	E_e
1717	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_e
1718	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_e
1719	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_e
1720	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_e

1721	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_4-E_5	E_e
1722	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_4-E_5	E_e
1723	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_4-E_5	E_e
1724	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_4-E_5	E_e
1725	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_e
1726	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_e
1727	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_e
1728	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_e
1729	$E_{1a}E_2$	$AlkLE_vE_{vi}$		E_e
1730	$E_{1b}E_2$	$AlkLE_vE_{vi}$		E_e
1731	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$		E_e
1732	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$		E_e
1733	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$		E_e
1734	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$		E_e
1735	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$		E_e
1736	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$		E_e
1737	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_e
1738	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_e
1739	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$		E_e
1740	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$		E_e
1741	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$		E_e
1742	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$		E_e
1743	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_e
1744	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_e
1745	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$		E_e
1746	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$		E_e
1747	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$		E_e
1748	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$		E_e
1749	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$		E_e
1750	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$		E_e
1751	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$		E_e
1752	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$		E_e
1753	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_e
1754	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_e
1755	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$		E_e
1756	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$		E_e
1757	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$		E_e
1758	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$		E_e
1759	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_e
1760	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_e
1761	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$		E_e
1762	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$		E_e
1763	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$		E_e

1764	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$		E_e
1765	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$		E_e
1766	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$		E_e
1767	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$		E_e
1768	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$		E_e
1769	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$		E_e
1770	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$		E_e
1771	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$		E_e
1772	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$		E_e
1773	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$		E_e
1774	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$		E_e
1775	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$		E_e
1776	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$		E_e
1777	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1778	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1779	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1780	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1781	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1782	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1783	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1784	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1785	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1786	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1787	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1788	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1789	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1790	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1791	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1792	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1793	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1794	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1795	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1796	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1797	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1798	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1799	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1800	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1801	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1802	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1803	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1804	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1805	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1806	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1807	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1808	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1809	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1810	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1811	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1812	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1813	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1814	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1815	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1816	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1817	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1818	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1819	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1820	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1821	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1822	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1823	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1824	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_e
1825	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_5	E_e
1826	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_5	E_e
1827	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_5	E_e
1828	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_5	E_e
1829	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_5	E_e
1830	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_5	E_e
1831	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_e
1832	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_e
1833	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_e
1834	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_e
1835	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_5	E_e
1836	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_5	E_e
1837	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_e
1838	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_e
1839	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_e
1840	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_e
1841	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1842	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1843	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1844	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1845	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_e
1846	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_e
1847	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1848	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1849	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_e

1850	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1851	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_e
1852	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_e
1853	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1854	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1855	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1856	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1857	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_e
1858	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_e
1859	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_e
1860	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_e
1861	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1862	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1863	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1864	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1865	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_e
1866	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_e
1867	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_e
1868	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_e
1869	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1870	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1871	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1872	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
1873	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1874	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1875	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1876	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1877	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1878	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1879	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1880	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1881	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1882	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1883	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1884	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1885	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1886	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1887	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1888	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1889	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1890	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1891	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1892	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e

1893	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1894	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1895	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1896	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1897	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1898	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1899	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1900	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1901	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1902	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1903	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1904	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1905	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1906	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1907	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1908	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1909	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1910	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1911	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1912	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1913	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1914	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1915	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1916	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1917	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1918	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1919	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1920	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
1921	$E_{1a}E_2$	E_vE_{vi}		E_f
1922	$E_{1b}E_2$	E_vE_{vi}		E_f
1923	$E_{1a}E_2E_3$	E_vE_{vi}		E_f
1924	$E_{1b}E_2E_3$	E_vE_{vi}		E_f
1925	$E_{1a}E_2E_i$	E_vE_{vi}		E_f
1926	$E_{1b}E_2E_i$	E_vE_{vi}		E_f
1927	$E_{1a}E_2E_{ii}$	E_vE_{vi}		E_f
1928	$E_{1b}E_2E_{ii}$	E_vE_{vi}		E_f
1929	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}		E_f
1930	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}		E_f
1931	$E_{1a}E_2E_3E_i$	E_vE_{vi}		E_f
1932	$E_{1b}E_2E_3E_i$	E_vE_{vi}		E_f
1933	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}		E_f
1934	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}		E_f
1935	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}		E_f

1936	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}		E_f
1937	$E_{1a}E_2E_4$	E_vE_{vi}		E_f
1938	$E_{1b}E_2E_4$	E_vE_{vi}		E_f
1939	$E_{1a}E_2E_3E_4$	E_vE_{vi}		E_f
1940	$E_{1b}E_2E_3E_4$	E_vE_{vi}		E_f
1941	$E_{1a}E_2E_iE_4$	E_vE_{vi}		E_f
1942	$E_{1b}E_2E_iE_4$	E_vE_{vi}		E_f
1943	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}		E_f
1944	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}		E_f
1945	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}		E_f
1946	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}		E_f
1947	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}		E_f
1948	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}		E_f
1949	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}		E_f
1950	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}		E_f
1951	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}		E_f
1952	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}		E_f
1953	$E_{1a}E_2E_{iii}$	E_vE_{vi}		E_f
1954	$E_{1b}E_2E_{iii}$	E_vE_{vi}		E_f
1955	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}		E_f
1956	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}		E_f
1957	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}		E_f
1958	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}		E_f
1959	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}		E_f
1960	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}		E_f
1961	$E_{1a}E_2E_{iv}$	E_vE_{vi}		E_f
1962	$E_{1b}E_2E_{iv}$	E_vE_{vi}		E_f
1963	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}		E_f
1964	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}		E_f
1965	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}		E_f
1966	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}		E_f
1967	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}		E_f
1968	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}		E_f
1969	$E_{1a}E_2$	E_vE_{vi}	E_{4^*}	E_f
1970	$E_{1b}E_2$	E_vE_{vi}	E_{4^*}	E_f
1971	$E_{1a}E_2E_3$	E_vE_{vi}	E_{4^*}	E_f
1972	$E_{1b}E_2E_3$	E_vE_{vi}	E_{4^*}	E_f
1973	$E_{1a}E_2E_i$	E_vE_{vi}	E_{4^*}	E_f
1974	$E_{1b}E_2E_i$	E_vE_{vi}	E_{4^*}	E_f
1975	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_{4^*}	E_f
1976	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_{4^*}	E_f
1977	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_f
1978	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_f

1979	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_{4^*}	E_f
1980	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_{4^*}	E_f
1981	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_{4^*}	E_f
1982	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_{4^*}	E_f
1983	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_f
1984	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_f
1985	$E_{1a}E_2E_4$	E_vE_{vi}	E_{4^*}	E_f
1986	$E_{1b}E_2E_4$	E_vE_{vi}	E_{4^*}	E_f
1987	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_{4^*}	E_f
1988	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_{4^*}	E_f
1989	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_{4^*}	E_f
1990	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_{4^*}	E_f
1991	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_f
1992	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_f
1993	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_f
1994	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_f
1995	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_{4^*}	E_f
1996	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_{4^*}	E_f
1997	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_f
1998	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_f
1999	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_f
2000	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_f
2001	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_{4^*}	E_f
2002	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_{4^*}	E_f
2003	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_{4^*}	E_f
2004	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_{4^*}	E_f
2005	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_f
2006	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_f
2007	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_f
2008	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_f
2009	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_{4^*}	E_f
2010	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_{4^*}	E_f
2011	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_{4^*}	E_f
2012	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_{4^*}	E_f
2013	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_f
2014	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_f
2015	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_f
2016	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_f
2017	$E_{1a}E_2$	E_vE_{vi}	E_5	E_f
2018	$E_{1b}E_2$	E_vE_{vi}	E_5	E_f
2019	$E_{1a}E_2E_3$	E_vE_{vi}	E_5	E_f
2020	$E_{1b}E_2E_3$	E_vE_{vi}	E_5	E_f
2021	$E_{1a}E_2E_i$	E_vE_{vi}	E_5	E_f

2022	$E_{1b}E_2E_i$	E_vE_{vi}	E_5	E_f
2023	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_5	E_f
2024	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_5	E_f
2025	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_f
2026	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_f
2027	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_5	E_f
2028	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_5	E_f
2029	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_5	E_f
2030	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_5	E_f
2031	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_f
2032	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_f
2033	$E_{1a}E_2E_4$	E_vE_{vi}	E_5	E_f
2034	$E_{1b}E_2E_4$	E_vE_{vi}	E_5	E_f
2035	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_5	E_f
2036	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_5	E_f
2037	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_5	E_f
2038	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_5	E_f
2039	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_5	E_f
2040	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_5	E_f
2041	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_f
2042	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_f
2043	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_5	E_f
2044	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_5	E_f
2045	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_5	E_f
2046	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_5	E_f
2047	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_f
2048	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_f
2049	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_5	E_f
2050	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_5	E_f
2051	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_5	E_f
2052	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_5	E_f
2053	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_5	E_f
2054	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_5	E_f
2055	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_5	E_f
2056	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_5	E_f
2057	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_5	E_f
2058	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_5	E_f
2059	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_5	E_f
2060	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_5	E_f
2061	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_5	E_f
2062	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_5	E_f
2063	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_5	E_f
2064	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_5	E_f

2065	$E_{1a}E_2$	E_vE_{vi}	E_4-E_5	E_f
2066	$E_{1b}E_2$	E_vE_{vi}	E_4-E_5	E_f
2067	$E_{1a}E_2E_3$	E_vE_{vi}	E_4-E_5	E_f
2068	$E_{1b}E_2E_3$	E_vE_{vi}	E_4-E_5	E_f
2069	$E_{1a}E_2E_i$	E_vE_{vi}	E_4-E_5	E_f
2070	$E_{1b}E_2E_i$	E_vE_{vi}	E_4-E_5	E_f
2071	$E_{1a}E_2E_{ii}$	E_vE_{vi}	E_4-E_5	E_f
2072	$E_{1b}E_2E_{ii}$	E_vE_{vi}	E_4-E_5	E_f
2073	$E_{1a}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_f
2074	$E_{1b}E_2E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_f
2075	$E_{1a}E_2E_3E_i$	E_vE_{vi}	E_4-E_5	E_f
2076	$E_{1b}E_2E_3E_i$	E_vE_{vi}	E_4-E_5	E_f
2077	$E_{1a}E_2E_3E_{ii}$	E_vE_{vi}	E_4-E_5	E_f
2078	$E_{1b}E_2E_3E_{ii}$	E_vE_{vi}	E_4-E_5	E_f
2079	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_f
2080	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_f
2081	$E_{1a}E_2E_4$	E_vE_{vi}	E_4-E_5	E_f
2082	$E_{1b}E_2E_4$	E_vE_{vi}	E_4-E_5	E_f
2083	$E_{1a}E_2E_3E_4$	E_vE_{vi}	E_4-E_5	E_f
2084	$E_{1b}E_2E_3E_4$	E_vE_{vi}	E_4-E_5	E_f
2085	$E_{1a}E_2E_iE_4$	E_vE_{vi}	E_4-E_5	E_f
2086	$E_{1b}E_2E_iE_4$	E_vE_{vi}	E_4-E_5	E_f
2087	$E_{1a}E_2E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_f
2088	$E_{1b}E_2E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_f
2089	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_f
2090	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_f
2091	$E_{1a}E_2E_3E_iE_4$	E_vE_{vi}	E_4-E_5	E_f
2092	$E_{1b}E_2E_3E_iE_4$	E_vE_{vi}	E_4-E_5	E_f
2093	$E_{1a}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_f
2094	$E_{1b}E_2E_3E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_f
2095	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_f
2096	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_f
2097	$E_{1a}E_2E_{iii}$	E_vE_{vi}	E_4-E_5	E_f
2098	$E_{1b}E_2E_{iii}$	E_vE_{vi}	E_4-E_5	E_f
2099	$E_{1a}E_2E_3E_{iii}$	E_vE_{vi}	E_4-E_5	E_f
2100	$E_{1b}E_2E_3E_{iii}$	E_vE_{vi}	E_4-E_5	E_f
2101	$E_{1a}E_2E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_f
2102	$E_{1b}E_2E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_f
2103	$E_{1a}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_f
2104	$E_{1b}E_2E_3E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_f
2105	$E_{1a}E_2E_{iv}$	E_vE_{vi}	E_4-E_5	E_f
2106	$E_{1b}E_2E_{iv}$	E_vE_{vi}	E_4-E_5	E_f
2107	$E_{1a}E_2E_3E_{iv}$	E_vE_{vi}	E_4-E_5	E_f

2108	$E_{1b}E_2E_3E_{iv}$	E_vE_{vi}	E_4-E_5	E_f
2109	$E_{1a}E_2E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_f
2110	$E_{1b}E_2E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_f
2111	$E_{1a}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_f
2112	$E_{1b}E_2E_3E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_f
2113	$E_{1a}E_2$	$AlkLE_vE_{vi}$		E_f
2114	$E_{1b}E_2$	$AlkLE_vE_{vi}$		E_f
2115	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$		E_f
2116	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$		E_f
2117	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$		E_f
2118	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$		E_f
2119	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$		E_f
2120	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$		E_f
2121	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_f
2122	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_f
2123	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$		E_f
2124	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$		E_f
2125	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$		E_f
2126	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$		E_f
2127	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_f
2128	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_f
2129	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$		E_f
2130	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$		E_f
2131	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$		E_f
2132	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$		E_f
2133	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$		E_f
2134	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$		E_f
2135	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$		E_f
2136	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$		E_f
2137	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_f
2138	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_f
2139	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$		E_f
2140	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$		E_f
2141	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$		E_f
2142	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$		E_f
2143	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_f
2144	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_f
2145	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$		E_f
2146	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$		E_f
2147	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$		E_f
2148	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$		E_f
2149	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$		E_f
2150	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$		E_f

2151	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$		E_f
2152	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$		E_f
2153	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$		E_f
2154	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$		E_f
2155	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$		E_f
2156	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$		E_f
2157	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$		E_f
2158	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$		E_f
2159	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$		E_f
2160	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$		E_f
2161	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_4*	E_f
2162	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_4*	E_f
2163	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_4*	E_f
2164	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_4*	E_f
2165	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_4*	E_f
2166	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_4*	E_f
2167	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4*	E_f
2168	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_4*	E_f
2169	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*	E_f
2170	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*	E_f
2171	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4*	E_f
2172	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_4*	E_f
2173	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4*	E_f
2174	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_4*	E_f
2175	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*	E_f
2176	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*	E_f
2177	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2178	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2179	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2180	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2181	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2182	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2183	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2184	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2185	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2186	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2187	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2188	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2189	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2190	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2191	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2192	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
2193	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_4*	E_f

2194	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2195	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2196	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2197	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2198	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2199	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2200	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2201	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2202	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2203	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2204	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2205	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2206	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2207	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2208	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_f
2209	$E_{1a}E_2$	$AlkLE_vE_{vi}$	E_5	E_f
2210	$E_{1b}E_2$	$AlkLE_vE_{vi}$	E_5	E_f
2211	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	E_5	E_f
2212	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	E_5	E_f
2213	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	E_5	E_f
2214	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	E_5	E_f
2215	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_f
2216	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_f
2217	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_f
2218	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_f
2219	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_5	E_f
2220	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	E_5	E_f
2221	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_f
2222	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_f
2223	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_f
2224	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_f
2225	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2226	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2227	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2228	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2229	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_f
2230	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_f
2231	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2232	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2233	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2234	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2235	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_f
2236	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_f
2237	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2238	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2239	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2240	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2241	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_f
2242	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_f
2243	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_f
2244	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_f
2245	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2246	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2247	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2248	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2249	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_f
2250	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_f
2251	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_f
2252	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_f
2253	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2254	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2255	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2256	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
2257	$E_{1a}E_2$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2258	$E_{1b}E_2$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2259	$E_{1a}E_2E_3$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2260	$E_{1b}E_2E_3$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2261	$E_{1a}E_2E_i$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2262	$E_{1b}E_2E_i$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2263	$E_{1a}E_2E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2264	$E_{1b}E_2E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2265	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2266	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2267	$E_{1a}E_2E_3E_i$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2268	$E_{1b}E_2E_3E_i$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2269	$E_{1a}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2270	$E_{1b}E_2E_3E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2271	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2272	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2273	$E_{1a}E_2E_4$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2274	$E_{1b}E_2E_4$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2275	$E_{1a}E_2E_3E_4$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2276	$E_{1b}E_2E_3E_4$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2277	$E_{1a}E_2E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2278	$E_{1b}E_2E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f
2279	$E_{1a}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}E_5$	E_f

2280	$E_{1b}E_2E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2281	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2282	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2283	$E_{1a}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2284	$E_{1b}E_2E_3E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2285	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2286	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2287	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2288	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2289	$E_{1a}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2290	$E_{1b}E_2E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2291	$E_{1a}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2292	$E_{1b}E_2E_3E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2293	$E_{1a}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2294	$E_{1b}E_2E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2295	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2296	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2297	$E_{1a}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2298	$E_{1b}E_2E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2299	$E_{1a}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2300	$E_{1b}E_2E_3E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2301	$E_{1a}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2302	$E_{1b}E_2E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2303	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2304	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
2305	$E_{1a}E_2$	E_{vii}		
2306	$E_{1b}E_2$	E_{vii}		
2307	$E_{1a}E_2E_3$	E_{vii}		
2308	$E_{1b}E_2E_3$	E_{vii}		
2309	$E_{1a}E_2E_i$	E_{vii}		
2310	$E_{1b}E_2E_i$	E_{vii}		
2311	$E_{1a}E_2E_{ii}$	E_{vii}		
2312	$E_{1b}E_2E_{ii}$	E_{vii}		
2313	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}		
2314	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}		
2315	$E_{1a}E_2E_3E_i$	E_{vii}		
2316	$E_{1b}E_2E_3E_i$	E_{vii}		
2317	$E_{1a}E_2E_3E_{ii}$	E_{vii}		
2318	$E_{1b}E_2E_3E_{ii}$	E_{vii}		
2319	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}		
2320	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}		
2321	$E_{1a}E_2E_4$	E_{vii}		
2322	$E_{1b}E_2E_4$	E_{vii}		

2323	$E_{1a}E_2E_3E_4$	E_{vii}	
2324	$E_{1b}E_2E_3E_4$	E_{vii}	
2325	$E_{1a}E_2E_iE_4$	E_{vii}	
2326	$E_{1b}E_2E_iE_4$	E_{vii}	
2327	$E_{1a}E_2E_{ii}E_4$	E_{vii}	
2328	$E_{1b}E_2E_{ii}E_4$	E_{vii}	
2329	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	
2330	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	
2331	$E_{1a}E_2E_3E_iE_4$	E_{vii}	
2332	$E_{1b}E_2E_3E_iE_4$	E_{vii}	
2333	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	
2334	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	
2335	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	
2336	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	
2337	$E_{1a}E_2E_{iii}$	E_{vii}	
2338	$E_{1b}E_2E_{iii}$	E_{vii}	
2339	$E_{1a}E_2E_3E_{iii}$	E_{vii}	
2340	$E_{1b}E_2E_3E_{iii}$	E_{vii}	
2341	$E_{1a}E_2E_{iii}E_4$	E_{vii}	
2342	$E_{1b}E_2E_{iii}E_4$	E_{vii}	
2343	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	
2344	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	
2345	$E_{1a}E_2E_{iv}$	E_{vii}	
2346	$E_{1b}E_2E_{iv}$	E_{vii}	
2347	$E_{1a}E_2E_3E_{iv}$	E_{vii}	
2348	$E_{1b}E_2E_3E_{iv}$	E_{vii}	
2349	$E_{1a}E_2E_{iv}E_4$	E_{vii}	
2350	$E_{1b}E_2E_{iv}E_4$	E_{vii}	
2351	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	
2352	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	
2353	$E_{1a}E_2$	E_{vii}	E_{4*}
2354	$E_{1b}E_2$	E_{vii}	E_{4*}
2355	$E_{1a}E_2E_3$	E_{vii}	E_{4*}
2356	$E_{1b}E_2E_3$	E_{vii}	E_{4*}
2357	$E_{1a}E_2E_i$	E_{vii}	E_{4*}
2358	$E_{1b}E_2E_i$	E_{vii}	E_{4*}
2359	$E_{1a}E_2E_{ii}$	E_{vii}	E_{4*}
2360	$E_{1b}E_2E_{ii}$	E_{vii}	E_{4*}
2361	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_{4*}
2362	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_{4*}
2363	$E_{1a}E_2E_3E_i$	E_{vii}	E_{4*}
2364	$E_{1b}E_2E_3E_i$	E_{vii}	E_{4*}
2365	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_{4*}

2366	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_4
2367	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4
2368	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4
2369	$E_{1a}E_2E_4$	E_{vii}	E_4
2370	$E_{1b}E_2E_4$	E_{vii}	E_4
2371	$E_{1a}E_2E_3E_4$	E_{vii}	E_4
2372	$E_{1b}E_2E_3E_4$	E_{vii}	E_4
2373	$E_{1a}E_2E_iE_4$	E_{vii}	E_4
2374	$E_{1b}E_2E_iE_4$	E_{vii}	E_4
2375	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_4
2376	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_4
2377	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4
2378	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4
2379	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_4
2380	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_4
2381	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_4
2382	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_4
2383	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4
2384	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4
2385	$E_{1a}E_2E_{iii}$	E_{vii}	E_4
2386	$E_{1b}E_2E_{iii}$	E_{vii}	E_4
2387	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_4
2388	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_4
2389	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_4
2390	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_4
2391	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_4
2392	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_4
2393	$E_{1a}E_2E_{iv}$	E_{vii}	E_4
2394	$E_{1b}E_2E_{iv}$	E_{vii}	E_4
2395	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_4
2396	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_4
2397	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_4
2398	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_4
2399	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_4
2400	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_4
2401	$E_{1a}E_2$	E_{vii}	E_5
2402	$E_{1b}E_2$	E_{vii}	E_5
2403	$E_{1a}E_2E_3$	E_{vii}	E_5
2404	$E_{1b}E_2E_3$	E_{vii}	E_5
2405	$E_{1a}E_2E_i$	E_{vii}	E_5
2406	$E_{1b}E_2E_i$	E_{vii}	E_5
2407	$E_{1a}E_2E_{ii}$	E_{vii}	E_5
2408	$E_{1b}E_2E_{ii}$	E_{vii}	E_5

2409	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_5
2410	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_5
2411	$E_{1a}E_2E_3E_i$	E_{vii}	E_5
2412	$E_{1b}E_2E_3E_i$	E_{vii}	E_5
2413	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_5
2414	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_5
2415	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_5
2416	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_5
2417	$E_{1a}E_2E_4$	E_{vii}	E_5
2418	$E_{1b}E_2E_4$	E_{vii}	E_5
2419	$E_{1a}E_2E_3E_4$	E_{vii}	E_5
2420	$E_{1b}E_2E_3E_4$	E_{vii}	E_5
2421	$E_{1a}E_2E_iE_4$	E_{vii}	E_5
2422	$E_{1b}E_2E_iE_4$	E_{vii}	E_5
2423	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_5
2424	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_5
2425	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_5
2426	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_5
2427	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_5
2428	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_5
2429	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_5
2430	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_5
2431	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_5
2432	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_5
2433	$E_{1a}E_2E_{iii}$	E_{vii}	E_5
2434	$E_{1b}E_2E_{iii}$	E_{vii}	E_5
2435	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_5
2436	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_5
2437	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_5
2438	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_5
2439	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_5
2440	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_5
2441	$E_{1a}E_2E_{iv}$	E_{vii}	E_5
2442	$E_{1b}E_2E_{iv}$	E_{vii}	E_5
2443	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_5
2444	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_5
2445	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_5
2446	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_5
2447	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_5
2448	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_5
2449	$E_{1a}E_2$	E_{vii}	E_4-E_5
2450	$E_{1b}E_2$	E_{vii}	E_4-E_5
2451	$E_{1a}E_2E_3$	E_{vii}	E_4-E_5

2452	$E_{1b}E_2E_3$	E_{vii}	E_4-E_5
2453	$E_{1a}E_2E_i$	E_{vii}	E_4-E_5
2454	$E_{1b}E_2E_i$	E_{vii}	E_4-E_5
2455	$E_{1a}E_2E_{ii}$	E_{vii}	E_4-E_5
2456	$E_{1b}E_2E_{ii}$	E_{vii}	E_4-E_5
2457	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_4-E_5
2458	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_4-E_5
2459	$E_{1a}E_2E_3E_i$	E_{vii}	E_4-E_5
2460	$E_{1b}E_2E_3E_i$	E_{vii}	E_4-E_5
2461	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_4-E_5
2462	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_4-E_5
2463	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4-E_5
2464	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4-E_5
2465	$E_{1a}E_2E_4$	E_{vii}	E_4-E_5
2466	$E_{1b}E_2E_4$	E_{vii}	E_4-E_5
2467	$E_{1a}E_2E_3E_4$	E_{vii}	E_4-E_5
2468	$E_{1b}E_2E_3E_4$	E_{vii}	E_4-E_5
2469	$E_{1a}E_2E_iE_4$	E_{vii}	E_4-E_5
2470	$E_{1b}E_2E_iE_4$	E_{vii}	E_4-E_5
2471	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_4-E_5
2472	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_4-E_5
2473	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5
2474	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5
2475	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_4-E_5
2476	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_4-E_5
2477	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_4-E_5
2478	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_4-E_5
2479	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5
2480	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5
2481	$E_{1a}E_2E_{iii}$	E_{vii}	E_4-E_5
2482	$E_{1b}E_2E_{iii}$	E_{vii}	E_4-E_5
2483	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_4-E_5
2484	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_4-E_5
2485	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_4-E_5
2486	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_4-E_5
2487	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_4-E_5
2488	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_4-E_5
2489	$E_{1a}E_2E_{iv}$	E_{vii}	E_4-E_5
2490	$E_{1b}E_2E_{iv}$	E_{vii}	E_4-E_5
2491	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_4-E_5
2492	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_4-E_5
2493	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_4-E_5
2494	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_4-E_5

2495	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_4-E_5
2496	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_4-E_5
2497	$E_{1a}E_2$	$AlkLE_{vii}$	
2498	$E_{1b}E_2$	$AlkLE_{vii}$	
2499	$E_{1a}E_2E_3$	$AlkLE_{vii}$	
2500	$E_{1b}E_2E_3$	$AlkLE_{vii}$	
2501	$E_{1a}E_2E_i$	$AlkLE_{vii}$	
2502	$E_{1b}E_2E_i$	$AlkLE_{vii}$	
2503	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	
2504	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	
2505	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	
2506	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	
2507	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	
2508	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	
2509	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	
2510	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	
2511	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	
2512	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	
2513	$E_{1a}E_2E_4$	$AlkLE_{vii}$	
2514	$E_{1b}E_2E_4$	$AlkLE_{vii}$	
2515	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	
2516	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	
2517	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	
2518	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	
2519	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	
2520	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	
2521	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	
2522	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	
2523	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	
2524	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	
2525	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	
2526	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	
2527	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	
2528	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	
2529	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	
2530	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	
2531	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	
2532	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	
2533	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	
2534	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	
2535	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	
2536	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	
2537	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	

2538	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	
2539	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	
2540	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	
2541	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	
2542	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	
2543	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	
2544	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	
2545	$E_{1a}E_2$	$AlkLE_{vii}$	E_{4^*}
2546	$E_{1b}E_2$	$AlkLE_{vii}$	E_{4^*}
2547	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_{4^*}
2548	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_{4^*}
2549	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_{4^*}
2550	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_{4^*}
2551	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_{4^*}
2552	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_{4^*}
2553	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_{4^*}
2554	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_{4^*}
2555	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_{4^*}
2556	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_{4^*}
2557	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_{4^*}
2558	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_{4^*}
2559	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_{4^*}
2560	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_{4^*}
2561	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_{4^*}
2562	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_{4^*}
2563	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_{4^*}
2564	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_{4^*}
2565	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_{4^*}
2566	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_{4^*}
2567	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_{4^*}
2568	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_{4^*}
2569	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_{4^*}
2570	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_{4^*}
2571	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_{4^*}
2572	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_{4^*}
2573	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_{4^*}
2574	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_{4^*}
2575	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_{4^*}
2576	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_{4^*}
2577	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_{4^*}
2578	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_{4^*}
2579	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_{4^*}
2580	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_{4^*}

2581	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_{4^*}
2582	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_{4^*}
2583	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_{4^*}
2584	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_{4^*}
2585	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_{4^*}
2586	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_{4^*}
2587	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_{4^*}
2588	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_{4^*}
2589	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}
2590	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}
2591	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}
2592	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}
2593	$E_{1a}E_2$	$AlkLE_{vii}$	E_5
2594	$E_{1b}E_2$	$AlkLE_{vii}$	E_5
2595	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_5
2596	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_5
2597	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_5
2598	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_5
2599	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_5
2600	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_5
2601	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5
2602	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5
2603	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_5
2604	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_5
2605	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_5
2606	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_5
2607	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5
2608	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5
2609	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_5
2610	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_5
2611	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_5
2612	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_5
2613	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_5
2614	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_5
2615	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_5
2616	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_5
2617	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5
2618	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5
2619	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_5
2620	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_5
2621	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_5
2622	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_5
2623	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5

2624	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5
2625	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_5
2626	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_5
2627	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_5
2628	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_5
2629	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_5
2630	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_5
2631	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_5
2632	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_5
2633	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_5
2634	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_5
2635	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_5
2636	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_5
2637	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_5
2638	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_5
2639	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_5
2640	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_5
2641	$E_{1a}E_2$	$AlkLE_{vii}$	E_4-E_5
2642	$E_{1b}E_2$	$AlkLE_{vii}$	E_4-E_5
2643	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_4-E_5
2644	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_4-E_5
2645	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_4-E_5
2646	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_4-E_5
2647	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_4-E_5
2648	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_4-E_5
2649	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5
2650	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5
2651	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_4-E_5
2652	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_4-E_5
2653	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_4-E_5
2654	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_4-E_5
2655	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5
2656	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5
2657	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_4-E_5
2658	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_4-E_5
2659	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_4-E_5
2660	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_4-E_5
2661	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_4-E_5
2662	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_4-E_5
2663	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5
2664	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5
2665	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5
2666	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5
2667	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_4-E_5
2668	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_4-E_5
2669	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5
2670	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5
2671	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5
2672	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5
2673	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_4-E_5
2674	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_4-E_5
2675	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_4-E_5
2676	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_4-E_5
2677	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5
2678	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5
2679	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5
2680	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5
2681	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_4-E_5
2682	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_4-E_5
2683	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_4-E_5
2684	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_4-E_5
2685	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5
2686	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5
2687	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5
2688	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5
2689	$E_{1a}E_2$	E_{vii}	E_a
2690	$E_{1b}E_2$	E_{vii}	E_a
2691	$E_{1a}E_2E_3$	E_{vii}	E_a
2692	$E_{1b}E_2E_3$	E_{vii}	E_a
2693	$E_{1a}E_2E_i$	E_{vii}	E_a
2694	$E_{1b}E_2E_i$	E_{vii}	E_a
2695	$E_{1a}E_2E_{ii}$	E_{vii}	E_a
2696	$E_{1b}E_2E_{ii}$	E_{vii}	E_a
2697	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_a
2698	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_a
2699	$E_{1a}E_2E_3E_i$	E_{vii}	E_a
2700	$E_{1b}E_2E_3E_i$	E_{vii}	E_a
2701	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_a
2702	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_a
2703	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_a
2704	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_a
2705	$E_{1a}E_2E_4$	E_{vii}	E_a
2706	$E_{1b}E_2E_4$	E_{vii}	E_a
2707	$E_{1a}E_2E_3E_4$	E_{vii}	E_a
2708	$E_{1b}E_2E_3E_4$	E_{vii}	E_a
2709	$E_{1a}E_2E_iE_4$	E_{vii}	E_a

2710	$E_{1b}E_2E_iE_4$	E_{vii}		E_a
2711	$E_{1a}E_2E_{ii}E_4$	E_{vii}		E_a
2712	$E_{1b}E_2E_{ii}E_4$	E_{vii}		E_a
2713	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}		E_a
2714	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}		E_a
2715	$E_{1a}E_2E_3E_iE_4$	E_{vii}		E_a
2716	$E_{1b}E_2E_3E_iE_4$	E_{vii}		E_a
2717	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}		E_a
2718	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}		E_a
2719	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}		E_a
2720	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}		E_a
2721	$E_{1a}E_2E_{iii}$	E_{vii}		E_a
2722	$E_{1b}E_2E_{iii}$	E_{vii}		E_a
2723	$E_{1a}E_2E_3E_{iii}$	E_{vii}		E_a
2724	$E_{1b}E_2E_3E_{iii}$	E_{vii}		E_a
2725	$E_{1a}E_2E_{iii}E_4$	E_{vii}		E_a
2726	$E_{1b}E_2E_{iii}E_4$	E_{vii}		E_a
2727	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}		E_a
2728	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}		E_a
2729	$E_{1a}E_2E_{iv}$	E_{vii}		E_a
2730	$E_{1b}E_2E_{iv}$	E_{vii}		E_a
2731	$E_{1a}E_2E_3E_{iv}$	E_{vii}		E_a
2732	$E_{1b}E_2E_3E_{iv}$	E_{vii}		E_a
2733	$E_{1a}E_2E_{iv}E_4$	E_{vii}		E_a
2734	$E_{1b}E_2E_{iv}E_4$	E_{vii}		E_a
2735	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}		E_a
2736	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}		E_a
2737	$E_{1a}E_2$	E_{vii}	E_{4^*}	E_a
2738	$E_{1b}E_2$	E_{vii}	E_{4^*}	E_a
2739	$E_{1a}E_2E_3$	E_{vii}	E_{4^*}	E_a
2740	$E_{1b}E_2E_3$	E_{vii}	E_{4^*}	E_a
2741	$E_{1a}E_2E_i$	E_{vii}	E_{4^*}	E_a
2742	$E_{1b}E_2E_i$	E_{vii}	E_{4^*}	E_a
2743	$E_{1a}E_2E_{ii}$	E_{vii}	E_{4^*}	E_a
2744	$E_{1b}E_2E_{ii}$	E_{vii}	E_{4^*}	E_a
2745	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_a
2746	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_a
2747	$E_{1a}E_2E_3E_i$	E_{vii}	E_{4^*}	E_a
2748	$E_{1b}E_2E_3E_i$	E_{vii}	E_{4^*}	E_a
2749	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_{4^*}	E_a
2750	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_{4^*}	E_a
2751	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_a
2752	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_a

2753	$E_{1a}E_2E_4$	E_{vii}	E_{4^*}	E_a
2754	$E_{1b}E_2E_4$	E_{vii}	E_{4^*}	E_a
2755	$E_{1a}E_2E_3E_4$	E_{vii}	E_{4^*}	E_a
2756	$E_{1b}E_2E_3E_4$	E_{vii}	E_{4^*}	E_a
2757	$E_{1a}E_2E_iE_4$	E_{vii}	E_{4^*}	E_a
2758	$E_{1b}E_2E_iE_4$	E_{vii}	E_{4^*}	E_a
2759	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_{4^*}	E_a
2760	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_{4^*}	E_a
2761	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_a
2762	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_a
2763	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_{4^*}	E_a
2764	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_{4^*}	E_a
2765	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_{4^*}	E_a
2766	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_{4^*}	E_a
2767	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_a
2768	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_a
2769	$E_{1a}E_2E_{iii}$	E_{vii}	E_{4^*}	E_a
2770	$E_{1b}E_2E_{iii}$	E_{vii}	E_{4^*}	E_a
2771	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_{4^*}	E_a
2772	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_{4^*}	E_a
2773	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_{4^*}	E_a
2774	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_{4^*}	E_a
2775	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_{4^*}	E_a
2776	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_{4^*}	E_a
2777	$E_{1a}E_2E_{iv}$	E_{vii}	E_{4^*}	E_a
2778	$E_{1b}E_2E_{iv}$	E_{vii}	E_{4^*}	E_a
2779	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_{4^*}	E_a
2780	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_{4^*}	E_a
2781	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_{4^*}	E_a
2782	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_{4^*}	E_a
2783	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_{4^*}	E_a
2784	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_{4^*}	E_a
2785	$E_{1a}E_2$	E_{vii}	E_5	E_a
2786	$E_{1b}E_2$	E_{vii}	E_5	E_a
2787	$E_{1a}E_2E_3$	E_{vii}	E_5	E_a
2788	$E_{1b}E_2E_3$	E_{vii}	E_5	E_a
2789	$E_{1a}E_2E_i$	E_{vii}	E_5	E_a
2790	$E_{1b}E_2E_i$	E_{vii}	E_5	E_a
2791	$E_{1a}E_2E_{ii}$	E_{vii}	E_5	E_a
2792	$E_{1b}E_2E_{ii}$	E_{vii}	E_5	E_a
2793	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_5	E_a
2794	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_5	E_a
2795	$E_{1a}E_2E_3E_i$	E_{vii}	E_5	E_a

2796	$E_{1b}E_2E_3E_i$	E_{vii}	E_5	E_a
2797	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_5	E_a
2798	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_5	E_a
2799	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_5	E_a
2800	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_5	E_a
2801	$E_{1a}E_2E_4$	E_{vii}	E_5	E_a
2802	$E_{1b}E_2E_4$	E_{vii}	E_5	E_a
2803	$E_{1a}E_2E_3E_4$	E_{vii}	E_5	E_a
2804	$E_{1b}E_2E_3E_4$	E_{vii}	E_5	E_a
2805	$E_{1a}E_2E_iE_4$	E_{vii}	E_5	E_a
2806	$E_{1b}E_2E_iE_4$	E_{vii}	E_5	E_a
2807	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_5	E_a
2808	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_5	E_a
2809	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_a
2810	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_a
2811	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_5	E_a
2812	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_5	E_a
2813	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_5	E_a
2814	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_5	E_a
2815	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_a
2816	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_a
2817	$E_{1a}E_2E_{iii}$	E_{vii}	E_5	E_a
2818	$E_{1b}E_2E_{iii}$	E_{vii}	E_5	E_a
2819	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_5	E_a
2820	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_5	E_a
2821	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_5	E_a
2822	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_5	E_a
2823	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_5	E_a
2824	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_5	E_a
2825	$E_{1a}E_2E_{iv}$	E_{vii}	E_5	E_a
2826	$E_{1b}E_2E_{iv}$	E_{vii}	E_5	E_a
2827	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_5	E_a
2828	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_5	E_a
2829	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_5	E_a
2830	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_5	E_a
2831	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_5	E_a
2832	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_5	E_a
2833	$E_{1a}E_2$	E_{vii}	E_4-E_5	E_a
2834	$E_{1b}E_2$	E_{vii}	E_4-E_5	E_a
2835	$E_{1a}E_2E_3$	E_{vii}	E_4-E_5	E_a
2836	$E_{1b}E_2E_3$	E_{vii}	E_4-E_5	E_a
2837	$E_{1a}E_2E_i$	E_{vii}	E_4-E_5	E_a
2838	$E_{1b}E_2E_i$	E_{vii}	E_4-E_5	E_a

2839	$E_{1a}E_2E_{ii}$	E_{vii}	E_4-E_5	E_a
2840	$E_{1b}E_2E_{ii}$	E_{vii}	E_4-E_5	E_a
2841	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_a
2842	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_a
2843	$E_{1a}E_2E_3E_i$	E_{vii}	E_4-E_5	E_a
2844	$E_{1b}E_2E_3E_i$	E_{vii}	E_4-E_5	E_a
2845	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_4-E_5	E_a
2846	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_4-E_5	E_a
2847	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_a
2848	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_a
2849	$E_{1a}E_2E_4$	E_{vii}	E_4-E_5	E_a
2850	$E_{1b}E_2E_4$	E_{vii}	E_4-E_5	E_a
2851	$E_{1a}E_2E_3E_4$	E_{vii}	E_4-E_5	E_a
2852	$E_{1b}E_2E_3E_4$	E_{vii}	E_4-E_5	E_a
2853	$E_{1a}E_2E_iE_4$	E_{vii}	E_4-E_5	E_a
2854	$E_{1b}E_2E_iE_4$	E_{vii}	E_4-E_5	E_a
2855	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_4-E_5	E_a
2856	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_4-E_5	E_a
2857	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_a
2858	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_a
2859	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_4-E_5	E_a
2860	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_4-E_5	E_a
2861	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_4-E_5	E_a
2862	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_4-E_5	E_a
2863	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_a
2864	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_a
2865	$E_{1a}E_2E_{iii}$	E_{vii}	E_4-E_5	E_a
2866	$E_{1b}E_2E_{iii}$	E_{vii}	E_4-E_5	E_a
2867	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_4-E_5	E_a
2868	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_4-E_5	E_a
2869	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_4-E_5	E_a
2870	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_4-E_5	E_a
2871	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_4-E_5	E_a
2872	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_4-E_5	E_a
2873	$E_{1a}E_2E_{iv}$	E_{vii}	E_4-E_5	E_a
2874	$E_{1b}E_2E_{iv}$	E_{vii}	E_4-E_5	E_a
2875	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_4-E_5	E_a
2876	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_4-E_5	E_a
2877	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_4-E_5	E_a
2878	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_4-E_5	E_a
2879	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_4-E_5	E_a
2880	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_4-E_5	E_a
2881	$E_{1a}E_2$	$AlkLE_{vii}$		E_a

2882	$E_{1b}E_2$	$AlkLE_{vii}$	E_a
2883	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_a
2884	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_a
2885	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_a
2886	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_a
2887	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_a
2888	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_a
2889	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_a
2890	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_a
2891	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_a
2892	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_a
2893	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_a
2894	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_a
2895	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_a
2896	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_a
2897	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_a
2898	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_a
2899	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_a
2900	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_a
2901	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_a
2902	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_a
2903	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_a
2904	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_a
2905	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_a
2906	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_a
2907	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_a
2908	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_a
2909	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_a
2910	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_a
2911	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_a
2912	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_a
2913	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_a
2914	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_a
2915	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_a
2916	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_a
2917	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_a
2918	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_a
2919	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_a
2920	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_a
2921	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_a
2922	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_a
2923	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_a
2924	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_a
2925	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_a
2926	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_a
2927	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_a
2928	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_a
2929	$E_{1a}E_2$	$AlkLE_{vii}$	$E_{4'}$ E_a
2930	$E_{1b}E_2$	$AlkLE_{vii}$	$E_{4'}$ E_a
2931	$E_{1a}E_2E_3$	$AlkLE_{vii}$	$E_{4'}$ E_a
2932	$E_{1b}E_2E_3$	$AlkLE_{vii}$	$E_{4'}$ E_a
2933	$E_{1a}E_2E_i$	$AlkLE_{vii}$	$E_{4'}$ E_a
2934	$E_{1b}E_2E_i$	$AlkLE_{vii}$	$E_{4'}$ E_a
2935	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	$E_{4'}$ E_a
2936	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	$E_{4'}$ E_a
2937	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$ E_a
2938	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$ E_a
2939	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	$E_{4'}$ E_a
2940	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	$E_{4'}$ E_a
2941	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	$E_{4'}$ E_a
2942	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	$E_{4'}$ E_a
2943	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$ E_a
2944	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$ E_a
2945	$E_{1a}E_2E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2946	$E_{1b}E_2E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2947	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2948	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2949	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2950	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2951	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2952	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2953	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2954	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2955	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2956	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2957	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2958	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2959	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2960	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2961	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	$E_{4'}$ E_a
2962	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	$E_{4'}$ E_a
2963	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	$E_{4'}$ E_a
2964	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	$E_{4'}$ E_a
2965	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2966	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a
2967	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$ E_a

2968	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
2969	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_a
2970	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_a
2971	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_a
2972	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_a
2973	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
2974	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
2975	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
2976	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
2977	$E_{1a}E_2$	$AlkLE_{vii}$	E_5	E_a
2978	$E_{1b}E_2$	$AlkLE_{vii}$	E_5	E_a
2979	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_5	E_a
2980	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_5	E_a
2981	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_5	E_a
2982	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_5	E_a
2983	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_5	E_a
2984	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_5	E_a
2985	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_a
2986	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_a
2987	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_5	E_a
2988	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_5	E_a
2989	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_5	E_a
2990	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_5	E_a
2991	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_a
2992	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_a
2993	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_5	E_a
2994	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_5	E_a
2995	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_5	E_a
2996	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_5	E_a
2997	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_5	E_a
2998	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_5	E_a
2999	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_a
3000	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_a
3001	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_a
3002	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_a
3003	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_5	E_a
3004	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_5	E_a
3005	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_a
3006	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_a
3007	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_a
3008	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_a
3009	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_5	E_a
3010	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_5	E_a

3011	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_5	E_a
3012	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_5	E_a
3013	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_a
3014	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_a
3015	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_a
3016	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_a
3017	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_5	E_a
3018	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_5	E_a
3019	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_5	E_a
3020	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_5	E_a
3021	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_a
3022	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_a
3023	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_a
3024	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_a
3025	$E_{1a}E_2$	$AlkLE_{vii}$	E_4-E_5	E_a
3026	$E_{1b}E_2$	$AlkLE_{vii}$	E_4-E_5	E_a
3027	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_4-E_5	E_a
3028	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_4-E_5	E_a
3029	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_4-E_5	E_a
3030	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_4-E_5	E_a
3031	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_a
3032	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_a
3033	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_a
3034	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_a
3035	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_4-E_5	E_a
3036	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_4-E_5	E_a
3037	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_a
3038	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_a
3039	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_a
3040	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_a
3041	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3042	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3043	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3044	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3045	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3046	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3047	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3048	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3049	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3050	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3051	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3052	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3053	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a

3054	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3055	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3056	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3057	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_a
3058	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_a
3059	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_a
3060	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_a
3061	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3062	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3063	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3064	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3065	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_a
3066	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_a
3067	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_a
3068	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_a
3069	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3070	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3071	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3072	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
3073	$E_{1a}E_2$	E_{vii}		E_b
3074	$E_{1b}E_2$	E_{vii}		E_b
3075	$E_{1a}E_2E_3$	E_{vii}		E_b
3076	$E_{1b}E_2E_3$	E_{vii}		E_b
3077	$E_{1a}E_2E_i$	E_{vii}		E_b
3078	$E_{1b}E_2E_i$	E_{vii}		E_b
3079	$E_{1a}E_2E_{ii}$	E_{vii}		E_b
3080	$E_{1b}E_2E_{ii}$	E_{vii}		E_b
3081	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}		E_b
3082	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}		E_b
3083	$E_{1a}E_2E_3E_i$	E_{vii}		E_b
3084	$E_{1b}E_2E_3E_i$	E_{vii}		E_b
3085	$E_{1a}E_2E_3E_{ii}$	E_{vii}		E_b
3086	$E_{1b}E_2E_3E_{ii}$	E_{vii}		E_b
3087	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}		E_b
3088	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}		E_b
3089	$E_{1a}E_2E_4$	E_{vii}		E_b
3090	$E_{1b}E_2E_4$	E_{vii}		E_b
3091	$E_{1a}E_2E_3E_4$	E_{vii}		E_b
3092	$E_{1b}E_2E_3E_4$	E_{vii}		E_b
3093	$E_{1a}E_2E_iE_4$	E_{vii}		E_b
3094	$E_{1b}E_2E_iE_4$	E_{vii}		E_b
3095	$E_{1a}E_2E_{ii}E_4$	E_{vii}		E_b
3096	$E_{1b}E_2E_{ii}E_4$	E_{vii}		E_b

3097	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}		E_b
3098	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}		E_b
3099	$E_{1a}E_2E_3E_iE_4$	E_{vii}		E_b
3100	$E_{1b}E_2E_3E_iE_4$	E_{vii}		E_b
3101	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}		E_b
3102	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}		E_b
3103	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}		E_b
3104	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}		E_b
3105	$E_{1a}E_2E_{iii}$	E_{vii}		E_b
3106	$E_{1b}E_2E_{iii}$	E_{vii}		E_b
3107	$E_{1a}E_2E_3E_{iii}$	E_{vii}		E_b
3108	$E_{1b}E_2E_3E_{iii}$	E_{vii}		E_b
3109	$E_{1a}E_2E_{iii}E_4$	E_{vii}		E_b
3110	$E_{1b}E_2E_{iii}E_4$	E_{vii}		E_b
3111	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}		E_b
3112	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}		E_b
3113	$E_{1a}E_2E_{iv}$	E_{vii}		E_b
3114	$E_{1b}E_2E_{iv}$	E_{vii}		E_b
3115	$E_{1a}E_2E_3E_{iv}$	E_{vii}		E_b
3116	$E_{1b}E_2E_3E_{iv}$	E_{vii}		E_b
3117	$E_{1a}E_2E_{iv}E_4$	E_{vii}		E_b
3118	$E_{1b}E_2E_{iv}E_4$	E_{vii}		E_b
3119	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}		E_b
3120	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}		E_b
3121	$E_{1a}E_2$	E_{vii}	E_4*	E_b
3122	$E_{1b}E_2$	E_{vii}	E_4*	E_b
3123	$E_{1a}E_2E_3$	E_{vii}	E_4*	E_b
3124	$E_{1b}E_2E_3$	E_{vii}	E_4*	E_b
3125	$E_{1a}E_2E_i$	E_{vii}	E_4*	E_b
3126	$E_{1b}E_2E_i$	E_{vii}	E_4*	E_b
3127	$E_{1a}E_2E_{ii}$	E_{vii}	E_4*	E_b
3128	$E_{1b}E_2E_{ii}$	E_{vii}	E_4*	E_b
3129	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_4*	E_b
3130	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_4*	E_b
3131	$E_{1a}E_2E_3E_i$	E_{vii}	E_4*	E_b
3132	$E_{1b}E_2E_3E_i$	E_{vii}	E_4*	E_b
3133	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_4*	E_b
3134	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_4*	E_b
3135	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4*	E_b
3136	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4*	E_b
3137	$E_{1a}E_2E_4$	E_{vii}	E_4*	E_b
3138	$E_{1b}E_2E_4$	E_{vii}	E_4*	E_b
3139	$E_{1a}E_2E_3E_4$	E_{vii}	E_4*	E_b

3140	$E_{1b}E_2E_3E_4$	E_{vii}	$E_{4'}$	E_b
3141	$E_{1a}E_2E_iE_4$	E_{vii}	$E_{4'}$	E_b
3142	$E_{1b}E_2E_iE_4$	E_{vii}	$E_{4'}$	E_b
3143	$E_{1a}E_2E_{ii}E_4$	E_{vii}	$E_{4'}$	E_b
3144	$E_{1b}E_2E_{ii}E_4$	E_{vii}	$E_{4'}$	E_b
3145	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_b
3146	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_b
3147	$E_{1a}E_2E_3E_iE_4$	E_{vii}	$E_{4'}$	E_b
3148	$E_{1b}E_2E_3E_iE_4$	E_{vii}	$E_{4'}$	E_b
3149	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	$E_{4'}$	E_b
3150	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	$E_{4'}$	E_b
3151	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_b
3152	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_b
3153	$E_{1a}E_2E_{iii}$	E_{vii}	$E_{4'}$	E_b
3154	$E_{1b}E_2E_{iii}$	E_{vii}	$E_{4'}$	E_b
3155	$E_{1a}E_2E_3E_{iii}$	E_{vii}	$E_{4'}$	E_b
3156	$E_{1b}E_2E_3E_{iii}$	E_{vii}	$E_{4'}$	E_b
3157	$E_{1a}E_2E_{iii}E_4$	E_{vii}	$E_{4'}$	E_b
3158	$E_{1b}E_2E_{iii}E_4$	E_{vii}	$E_{4'}$	E_b
3159	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	$E_{4'}$	E_b
3160	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	$E_{4'}$	E_b
3161	$E_{1a}E_2E_{iv}$	E_{vii}	$E_{4'}$	E_b
3162	$E_{1b}E_2E_{iv}$	E_{vii}	$E_{4'}$	E_b
3163	$E_{1a}E_2E_3E_{iv}$	E_{vii}	$E_{4'}$	E_b
3164	$E_{1b}E_2E_3E_{iv}$	E_{vii}	$E_{4'}$	E_b
3165	$E_{1a}E_2E_{iv}E_4$	E_{vii}	$E_{4'}$	E_b
3166	$E_{1b}E_2E_{iv}E_4$	E_{vii}	$E_{4'}$	E_b
3167	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	$E_{4'}$	E_b
3168	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	$E_{4'}$	E_b
3169	$E_{1a}E_2$	E_{vii}	E_5	E_b
3170	$E_{1b}E_2$	E_{vii}	E_5	E_b
3171	$E_{1a}E_2E_3$	E_{vii}	E_5	E_b
3172	$E_{1b}E_2E_3$	E_{vii}	E_5	E_b
3173	$E_{1a}E_2E_i$	E_{vii}	E_5	E_b
3174	$E_{1b}E_2E_i$	E_{vii}	E_5	E_b
3175	$E_{1a}E_2E_{ii}$	E_{vii}	E_5	E_b
3176	$E_{1b}E_2E_{ii}$	E_{vii}	E_5	E_b
3177	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_5	E_b
3178	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_5	E_b
3179	$E_{1a}E_2E_3E_i$	E_{vii}	E_5	E_b
3180	$E_{1b}E_2E_3E_i$	E_{vii}	E_5	E_b
3181	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_5	E_b
3182	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_5	E_b

3183	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_5	E_b
3184	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_5	E_b
3185	$E_{1a}E_2E_4$	E_{vii}	E_5	E_b
3186	$E_{1b}E_2E_4$	E_{vii}	E_5	E_b
3187	$E_{1a}E_2E_3E_4$	E_{vii}	E_5	E_b
3188	$E_{1b}E_2E_3E_4$	E_{vii}	E_5	E_b
3189	$E_{1a}E_2E_iE_4$	E_{vii}	E_5	E_b
3190	$E_{1b}E_2E_iE_4$	E_{vii}	E_5	E_b
3191	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_5	E_b
3192	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_5	E_b
3193	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_b
3194	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_b
3195	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_5	E_b
3196	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_5	E_b
3197	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_5	E_b
3198	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_5	E_b
3199	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_b
3200	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_b
3201	$E_{1a}E_2E_{iii}$	E_{vii}	E_5	E_b
3202	$E_{1b}E_2E_{iii}$	E_{vii}	E_5	E_b
3203	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_5	E_b
3204	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_5	E_b
3205	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_5	E_b
3206	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_5	E_b
3207	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_5	E_b
3208	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_5	E_b
3209	$E_{1a}E_2E_{iv}$	E_{vii}	E_5	E_b
3210	$E_{1b}E_2E_{iv}$	E_{vii}	E_5	E_b
3211	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_5	E_b
3212	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_5	E_b
3213	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_5	E_b
3214	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_5	E_b
3215	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_5	E_b
3216	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_5	E_b
3217	$E_{1a}E_2$	E_{vii}	E_4-E_5	E_b
3218	$E_{1b}E_2$	E_{vii}	E_4-E_5	E_b
3219	$E_{1a}E_2E_3$	E_{vii}	E_4-E_5	E_b
3220	$E_{1b}E_2E_3$	E_{vii}	E_4-E_5	E_b
3221	$E_{1a}E_2E_i$	E_{vii}	E_4-E_5	E_b
3222	$E_{1b}E_2E_i$	E_{vii}	E_4-E_5	E_b
3223	$E_{1a}E_2E_{ii}$	E_{vii}	E_4-E_5	E_b
3224	$E_{1b}E_2E_{ii}$	E_{vii}	E_4-E_5	E_b
3225	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_b

3226	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_b
3227	$E_{1a}E_2E_3E_i$	E_{vii}	E_4-E_5	E_b
3228	$E_{1b}E_2E_3E_i$	E_{vii}	E_4-E_5	E_b
3229	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_4-E_5	E_b
3230	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_4-E_5	E_b
3231	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_b
3232	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_b
3233	$E_{1a}E_2E_4$	E_{vii}	E_4-E_5	E_b
3234	$E_{1b}E_2E_4$	E_{vii}	E_4-E_5	E_b
3235	$E_{1a}E_2E_3E_4$	E_{vii}	E_4-E_5	E_b
3236	$E_{1b}E_2E_3E_4$	E_{vii}	E_4-E_5	E_b
3237	$E_{1a}E_2E_iE_4$	E_{vii}	E_4-E_5	E_b
3238	$E_{1b}E_2E_iE_4$	E_{vii}	E_4-E_5	E_b
3239	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_4-E_5	E_b
3240	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_4-E_5	E_b
3241	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_b
3242	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_b
3243	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_4-E_5	E_b
3244	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_4-E_5	E_b
3245	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_4-E_5	E_b
3246	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_4-E_5	E_b
3247	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_b
3248	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_b
3249	$E_{1a}E_2E_{iii}$	E_{vii}	E_4-E_5	E_b
3250	$E_{1b}E_2E_{iii}$	E_{vii}	E_4-E_5	E_b
3251	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_4-E_5	E_b
3252	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_4-E_5	E_b
3253	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_4-E_5	E_b
3254	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_4-E_5	E_b
3255	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_4-E_5	E_b
3256	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_4-E_5	E_b
3257	$E_{1a}E_2E_{iv}$	E_{vii}	E_4-E_5	E_b
3258	$E_{1b}E_2E_{iv}$	E_{vii}	E_4-E_5	E_b
3259	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_4-E_5	E_b
3260	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_4-E_5	E_b
3261	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_4-E_5	E_b
3262	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_4-E_5	E_b
3263	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_4-E_5	E_b
3264	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_4-E_5	E_b
3265	$E_{1a}E_2$	$AlkLE_{vii}$		E_b
3266	$E_{1b}E_2$	$AlkLE_{vii}$		E_b
3267	$E_{1a}E_2E_3$	$AlkLE_{vii}$		E_b
3268	$E_{1b}E_2E_3$	$AlkLE_{vii}$		E_b

3269	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_b
3270	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_b
3271	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_b
3272	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_b
3273	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_b
3274	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_b
3275	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_b
3276	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_b
3277	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_b
3278	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_b
3279	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_b
3280	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_b
3281	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_b
3282	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_b
3283	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_b
3284	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_b
3285	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_b
3286	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_b
3287	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_b
3288	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_b
3289	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_b
3290	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_b
3291	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_b
3292	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_b
3293	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_b
3294	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_b
3295	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_b
3296	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_b
3297	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_b
3298	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_b
3299	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_b
3300	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_b
3301	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_b
3302	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_b
3303	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_b
3304	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_b
3305	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_b
3306	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_b
3307	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_b
3308	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_b
3309	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_b
3310	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_b
3311	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_b

3312	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$		E_b
3313	$E_{1a}E_2$	$AlkLE_{vii}$	$E_{4'}$	E_b
3314	$E_{1b}E_2$	$AlkLE_{vii}$	$E_{4'}$	E_b
3315	$E_{1a}E_2E_3$	$AlkLE_{vii}$	$E_{4'}$	E_b
3316	$E_{1b}E_2E_3$	$AlkLE_{vii}$	$E_{4'}$	E_b
3317	$E_{1a}E_2E_i$	$AlkLE_{vii}$	$E_{4'}$	E_b
3318	$E_{1b}E_2E_i$	$AlkLE_{vii}$	$E_{4'}$	E_b
3319	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3320	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3321	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3322	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3323	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	$E_{4'}$	E_b
3324	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	$E_{4'}$	E_b
3325	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3326	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3327	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3328	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3329	$E_{1a}E_2E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3330	$E_{1b}E_2E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3331	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3332	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3333	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3334	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3335	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3336	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3337	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3338	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3339	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3340	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3341	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3342	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3343	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3344	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3345	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3346	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3347	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3348	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3349	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3350	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3351	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3352	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3353	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3354	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_b

3355	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3356	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_b
3357	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3358	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3359	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3360	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_b
3361	$E_{1a}E_2$	$AlkLE_{vii}$	E_5	E_b
3362	$E_{1b}E_2$	$AlkLE_{vii}$	E_5	E_b
3363	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_5	E_b
3364	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_5	E_b
3365	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_5	E_b
3366	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_5	E_b
3367	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_5	E_b
3368	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_5	E_b
3369	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_b
3370	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_b
3371	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_5	E_b
3372	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_5	E_b
3373	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_5	E_b
3374	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_5	E_b
3375	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_b
3376	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_b
3377	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_5	E_b
3378	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_5	E_b
3379	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_5	E_b
3380	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_5	E_b
3381	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_5	E_b
3382	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_5	E_b
3383	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_b
3384	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_b
3385	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_b
3386	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_b
3387	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_5	E_b
3388	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_5	E_b
3389	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_b
3390	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_b
3391	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_b
3392	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_b
3393	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_5	E_b
3394	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_5	E_b
3395	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_5	E_b
3396	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_5	E_b
3397	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_b

3398	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_b
3399	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_b
3400	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_b
3401	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_5	E_b
3402	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_5	E_b
3403	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_5	E_b
3404	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_5	E_b
3405	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_b
3406	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_b
3407	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_b
3408	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_b
3409	$E_{1a}E_2$	$AlkLE_{vii}$	E_4-E_5	E_b
3410	$E_{1b}E_2$	$AlkLE_{vii}$	E_4-E_5	E_b
3411	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_4-E_5	E_b
3412	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_4-E_5	E_b
3413	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_4-E_5	E_b
3414	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_4-E_5	E_b
3415	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_b
3416	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_b
3417	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_b
3418	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_b
3419	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_4-E_5	E_b
3420	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_4-E_5	E_b
3421	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_b
3422	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_b
3423	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_b
3424	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_b
3425	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3426	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3427	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3428	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3429	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3430	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3431	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3432	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3433	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3434	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3435	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3436	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3437	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3438	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3439	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3440	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b

3441	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_b
3442	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_b
3443	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_b
3444	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_b
3445	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3446	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3447	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3448	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3449	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_b
3450	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_b
3451	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_b
3452	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_b
3453	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3454	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3455	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3456	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_b
3457	$E_{1a}E_2$	E_{vii}		E_d
3458	$E_{1b}E_2$	E_{vii}		E_d
3459	$E_{1a}E_2E_3$	E_{vii}		E_d
3460	$E_{1b}E_2E_3$	E_{vii}		E_d
3461	$E_{1a}E_2E_i$	E_{vii}		E_d
3462	$E_{1b}E_2E_i$	E_{vii}		E_d
3463	$E_{1a}E_2E_{ii}$	E_{vii}		E_d
3464	$E_{1b}E_2E_{ii}$	E_{vii}		E_d
3465	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}		E_d
3466	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}		E_d
3467	$E_{1a}E_2E_3E_i$	E_{vii}		E_d
3468	$E_{1b}E_2E_3E_i$	E_{vii}		E_d
3469	$E_{1a}E_2E_3E_{ii}$	E_{vii}		E_d
3470	$E_{1b}E_2E_3E_{ii}$	E_{vii}		E_d
3471	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}		E_d
3472	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}		E_d
3473	$E_{1a}E_2E_4$	E_{vii}		E_d
3474	$E_{1b}E_2E_4$	E_{vii}		E_d
3475	$E_{1a}E_2E_3E_4$	E_{vii}		E_d
3476	$E_{1b}E_2E_3E_4$	E_{vii}		E_d
3477	$E_{1a}E_2E_iE_4$	E_{vii}		E_d
3478	$E_{1b}E_2E_iE_4$	E_{vii}		E_d
3479	$E_{1a}E_2E_{ii}E_4$	E_{vii}		E_d
3480	$E_{1b}E_2E_{ii}E_4$	E_{vii}		E_d
3481	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}		E_d
3482	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}		E_d
3483	$E_{1a}E_2E_3E_iE_4$	E_{vii}		E_d

3484	$E_{1b}E_2E_3E_iE_4$	E_{vii}		E_d
3485	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}		E_d
3486	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}		E_d
3487	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}		E_d
3488	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}		E_d
3489	$E_{1a}E_2E_{iii}$	E_{vii}		E_d
3490	$E_{1b}E_2E_{iii}$	E_{vii}		E_d
3491	$E_{1a}E_2E_3E_{iii}$	E_{vii}		E_d
3492	$E_{1b}E_2E_3E_{iii}$	E_{vii}		E_d
3493	$E_{1a}E_2E_{iii}E_4$	E_{vii}		E_d
3494	$E_{1b}E_2E_{iii}E_4$	E_{vii}		E_d
3495	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}		E_d
3496	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}		E_d
3497	$E_{1a}E_2E_{iv}$	E_{vii}		E_d
3498	$E_{1b}E_2E_{iv}$	E_{vii}		E_d
3499	$E_{1a}E_2E_3E_{iv}$	E_{vii}		E_d
3500	$E_{1b}E_2E_3E_{iv}$	E_{vii}		E_d
3501	$E_{1a}E_2E_{iv}E_4$	E_{vii}		E_d
3502	$E_{1b}E_2E_{iv}E_4$	E_{vii}		E_d
3503	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}		E_d
3504	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}		E_d
3505	$E_{1a}E_2$	E_{vii}	E_{4^*}	E_d
3506	$E_{1b}E_2$	E_{vii}	E_{4^*}	E_d
3507	$E_{1a}E_2E_3$	E_{vii}	E_{4^*}	E_d
3508	$E_{1b}E_2E_3$	E_{vii}	E_{4^*}	E_d
3509	$E_{1a}E_2E_i$	E_{vii}	E_{4^*}	E_d
3510	$E_{1b}E_2E_i$	E_{vii}	E_{4^*}	E_d
3511	$E_{1a}E_2E_{ii}$	E_{vii}	E_{4^*}	E_d
3512	$E_{1b}E_2E_{ii}$	E_{vii}	E_{4^*}	E_d
3513	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_d
3514	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_d
3515	$E_{1a}E_2E_3E_i$	E_{vii}	E_{4^*}	E_d
3516	$E_{1b}E_2E_3E_i$	E_{vii}	E_{4^*}	E_d
3517	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_{4^*}	E_d
3518	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_{4^*}	E_d
3519	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_d
3520	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_d
3521	$E_{1a}E_2E_4$	E_{vii}	E_{4^*}	E_d
3522	$E_{1b}E_2E_4$	E_{vii}	E_{4^*}	E_d
3523	$E_{1a}E_2E_3E_4$	E_{vii}	E_{4^*}	E_d
3524	$E_{1b}E_2E_3E_4$	E_{vii}	E_{4^*}	E_d
3525	$E_{1a}E_2E_iE_4$	E_{vii}	E_{4^*}	E_d
3526	$E_{1b}E_2E_iE_4$	E_{vii}	E_{4^*}	E_d

3527	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_{4^*}	E_d
3528	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_{4^*}	E_d
3529	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_d
3530	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_d
3531	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_{4^*}	E_d
3532	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_{4^*}	E_d
3533	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_{4^*}	E_d
3534	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_{4^*}	E_d
3535	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_d
3536	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_d
3537	$E_{1a}E_2E_{iii}$	E_{vii}	E_{4^*}	E_d
3538	$E_{1b}E_2E_{iii}$	E_{vii}	E_{4^*}	E_d
3539	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_{4^*}	E_d
3540	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_{4^*}	E_d
3541	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_{4^*}	E_d
3542	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_{4^*}	E_d
3543	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_{4^*}	E_d
3544	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_{4^*}	E_d
3545	$E_{1a}E_2E_{iv}$	E_{vii}	E_{4^*}	E_d
3546	$E_{1b}E_2E_{iv}$	E_{vii}	E_{4^*}	E_d
3547	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_{4^*}	E_d
3548	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_{4^*}	E_d
3549	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_{4^*}	E_d
3550	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_{4^*}	E_d
3551	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_{4^*}	E_d
3552	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_{4^*}	E_d
3553	$E_{1a}E_2$	E_{vii}	E_5	E_d
3554	$E_{1b}E_2$	E_{vii}	E_5	E_d
3555	$E_{1a}E_2E_3$	E_{vii}	E_5	E_d
3556	$E_{1b}E_2E_3$	E_{vii}	E_5	E_d
3557	$E_{1a}E_2E_i$	E_{vii}	E_5	E_d
3558	$E_{1b}E_2E_i$	E_{vii}	E_5	E_d
3559	$E_{1a}E_2E_{ii}$	E_{vii}	E_5	E_d
3560	$E_{1b}E_2E_{ii}$	E_{vii}	E_5	E_d
3561	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_5	E_d
3562	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_5	E_d
3563	$E_{1a}E_2E_3E_i$	E_{vii}	E_5	E_d
3564	$E_{1b}E_2E_3E_i$	E_{vii}	E_5	E_d
3565	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_5	E_d
3566	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_5	E_d
3567	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_5	E_d
3568	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_5	E_d
3569	$E_{1a}E_2E_4$	E_{vii}	E_5	E_d

3570	$E_{1b}E_2E_4$	E_{vii}	E_5	E_d
3571	$E_{1a}E_2E_3E_4$	E_{vii}	E_5	E_d
3572	$E_{1b}E_2E_3E_4$	E_{vii}	E_5	E_d
3573	$E_{1a}E_2E_iE_4$	E_{vii}	E_5	E_d
3574	$E_{1b}E_2E_iE_4$	E_{vii}	E_5	E_d
3575	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_5	E_d
3576	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_5	E_d
3577	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_d
3578	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_d
3579	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_5	E_d
3580	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_5	E_d
3581	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_5	E_d
3582	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_5	E_d
3583	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_d
3584	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_d
3585	$E_{1a}E_2E_{iii}$	E_{vii}	E_5	E_d
3586	$E_{1b}E_2E_{iii}$	E_{vii}	E_5	E_d
3587	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_5	E_d
3588	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_5	E_d
3589	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_5	E_d
3590	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_5	E_d
3591	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_5	E_d
3592	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_5	E_d
3593	$E_{1a}E_2E_{iv}$	E_{vii}	E_5	E_d
3594	$E_{1b}E_2E_{iv}$	E_{vii}	E_5	E_d
3595	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_5	E_d
3596	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_5	E_d
3597	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_5	E_d
3598	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_5	E_d
3599	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_5	E_d
3600	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_5	E_d
3601	$E_{1a}E_2$	E_{vii}	E_4-E_5	E_d
3602	$E_{1b}E_2$	E_{vii}	E_4-E_5	E_d
3603	$E_{1a}E_2E_3$	E_{vii}	E_4-E_5	E_d
3604	$E_{1b}E_2E_3$	E_{vii}	E_4-E_5	E_d
3605	$E_{1a}E_2E_i$	E_{vii}	E_4-E_5	E_d
3606	$E_{1b}E_2E_i$	E_{vii}	E_4-E_5	E_d
3607	$E_{1a}E_2E_{ii}$	E_{vii}	E_4-E_5	E_d
3608	$E_{1b}E_2E_{ii}$	E_{vii}	E_4-E_5	E_d
3609	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_d
3610	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_d
3611	$E_{1a}E_2E_3E_i$	E_{vii}	E_4-E_5	E_d
3612	$E_{1b}E_2E_3E_i$	E_{vii}	E_4-E_5	E_d

3613	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_4-E_5	E_d
3614	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_4-E_5	E_d
3615	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_d
3616	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_d
3617	$E_{1a}E_2E_4$	E_{vii}	E_4-E_5	E_d
3618	$E_{1b}E_2E_4$	E_{vii}	E_4-E_5	E_d
3619	$E_{1a}E_2E_3E_4$	E_{vii}	E_4-E_5	E_d
3620	$E_{1b}E_2E_3E_4$	E_{vii}	E_4-E_5	E_d
3621	$E_{1a}E_2E_iE_4$	E_{vii}	E_4-E_5	E_d
3622	$E_{1b}E_2E_iE_4$	E_{vii}	E_4-E_5	E_d
3623	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_4-E_5	E_d
3624	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_4-E_5	E_d
3625	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_d
3626	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_d
3627	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_4-E_5	E_d
3628	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_4-E_5	E_d
3629	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_4-E_5	E_d
3630	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_4-E_5	E_d
3631	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_d
3632	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_d
3633	$E_{1a}E_2E_{iii}$	E_{vii}	E_4-E_5	E_d
3634	$E_{1b}E_2E_{iii}$	E_{vii}	E_4-E_5	E_d
3635	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_4-E_5	E_d
3636	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_4-E_5	E_d
3637	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_4-E_5	E_d
3638	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_4-E_5	E_d
3639	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_4-E_5	E_d
3640	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_4-E_5	E_d
3641	$E_{1a}E_2E_{iv}$	E_{vii}	E_4-E_5	E_d
3642	$E_{1b}E_2E_{iv}$	E_{vii}	E_4-E_5	E_d
3643	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_4-E_5	E_d
3644	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_4-E_5	E_d
3645	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_4-E_5	E_d
3646	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_4-E_5	E_d
3647	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_4-E_5	E_d
3648	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_4-E_5	E_d
3649	$E_{1a}E_2$	$AlkLE_{vii}$		E_d
3650	$E_{1b}E_2$	$AlkLE_{vii}$		E_d
3651	$E_{1a}E_2E_3$	$AlkLE_{vii}$		E_d
3652	$E_{1b}E_2E_3$	$AlkLE_{vii}$		E_d
3653	$E_{1a}E_2E_i$	$AlkLE_{vii}$		E_d
3654	$E_{1b}E_2E_i$	$AlkLE_{vii}$		E_d
3655	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$		E_d

3656	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$		E_d
3657	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$		E_d
3658	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$		E_d
3659	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$		E_d
3660	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$		E_d
3661	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$		E_d
3662	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$		E_d
3663	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$		E_d
3664	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$		E_d
3665	$E_{1a}E_2E_4$	$AlkLE_{vii}$		E_d
3666	$E_{1b}E_2E_4$	$AlkLE_{vii}$		E_d
3667	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$		E_d
3668	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$		E_d
3669	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$		E_d
3670	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$		E_d
3671	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$		E_d
3672	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$		E_d
3673	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_d
3674	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_d
3675	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$		E_d
3676	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$		E_d
3677	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$		E_d
3678	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$		E_d
3679	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_d
3680	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_d
3681	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$		E_d
3682	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$		E_d
3683	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$		E_d
3684	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$		E_d
3685	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$		E_d
3686	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$		E_d
3687	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$		E_d
3688	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$		E_d
3689	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$		E_d
3690	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$		E_d
3691	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$		E_d
3692	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$		E_d
3693	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$		E_d
3694	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$		E_d
3695	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$		E_d
3696	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$		E_d
3697	$E_{1a}E_2$	$AlkLE_{vii}$	$E_{4'}$	E_d
3698	$E_{1b}E_2$	$AlkLE_{vii}$	$E_{4'}$	E_d

3699	$E_{1a}E_2E_3$	$AlkLE_{vii}$	$E_{4'}$	E_d
3700	$E_{1b}E_2E_3$	$AlkLE_{vii}$	$E_{4'}$	E_d
3701	$E_{1a}E_2E_i$	$AlkLE_{vii}$	$E_{4'}$	E_d
3702	$E_{1b}E_2E_i$	$AlkLE_{vii}$	$E_{4'}$	E_d
3703	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3704	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3705	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3706	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3707	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	$E_{4'}$	E_d
3708	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	$E_{4'}$	E_d
3709	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3710	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3711	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3712	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3713	$E_{1a}E_2E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3714	$E_{1b}E_2E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3715	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3716	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3717	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3718	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3719	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3720	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3721	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3722	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3723	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3724	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3725	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3726	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3727	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3728	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3729	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3730	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3731	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3732	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3733	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3734	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3735	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3736	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
3737	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3738	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3739	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3740	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_d
3741	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d

3742	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_4	E_d
3743	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4	E_d
3744	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4	E_d
3745	$E_{1a}E_2$	$AlkLE_{vii}$	E_5	E_d
3746	$E_{1b}E_2$	$AlkLE_{vii}$	E_5	E_d
3747	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_5	E_d
3748	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_5	E_d
3749	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_5	E_d
3750	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_5	E_d
3751	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_5	E_d
3752	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_5	E_d
3753	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_d
3754	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_d
3755	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_5	E_d
3756	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_5	E_d
3757	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_5	E_d
3758	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_5	E_d
3759	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_d
3760	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_d
3761	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_5	E_d
3762	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_5	E_d
3763	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_5	E_d
3764	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_5	E_d
3765	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_5	E_d
3766	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_5	E_d
3767	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_d
3768	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_d
3769	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_d
3770	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_d
3771	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_5	E_d
3772	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_5	E_d
3773	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_d
3774	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_d
3775	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_d
3776	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_d
3777	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_5	E_d
3778	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_5	E_d
3779	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_5	E_d
3780	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_5	E_d
3781	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_d
3782	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_d
3783	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_d
3784	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_d

3785	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_5	E_d
3786	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_5	E_d
3787	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_5	E_d
3788	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_5	E_d
3789	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_d
3790	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_d
3791	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_d
3792	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_d
3793	$E_{1a}E_2$	$AlkLE_{vii}$	E_4-E_5	E_d
3794	$E_{1b}E_2$	$AlkLE_{vii}$	E_4-E_5	E_d
3795	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_4-E_5	E_d
3796	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_4-E_5	E_d
3797	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_4-E_5	E_d
3798	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_4-E_5	E_d
3799	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_d
3800	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_d
3801	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_d
3802	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_d
3803	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_4-E_5	E_d
3804	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_4-E_5	E_d
3805	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_d
3806	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_d
3807	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_d
3808	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_d
3809	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3810	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3811	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3812	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3813	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3814	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3815	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3816	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3817	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3818	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3819	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3820	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3821	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3822	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3823	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3824	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3825	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_d
3826	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_d
3827	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_d

3828	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_d
3829	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3830	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3831	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3832	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3833	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_d
3834	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_d
3835	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_d
3836	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_d
3837	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3838	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3839	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3840	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
3841	$E_{1a}E_2$	E_{vii}		E_e
3842	$E_{1b}E_2$	E_{vii}		E_e
3843	$E_{1a}E_2E_3$	E_{vii}		E_e
3844	$E_{1b}E_2E_3$	E_{vii}		E_e
3845	$E_{1a}E_2E_i$	E_{vii}		E_e
3846	$E_{1b}E_2E_i$	E_{vii}		E_e
3847	$E_{1a}E_2E_{ii}$	E_{vii}		E_e
3848	$E_{1b}E_2E_{ii}$	E_{vii}		E_e
3849	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}		E_e
3850	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}		E_e
3851	$E_{1a}E_2E_3E_i$	E_{vii}		E_e
3852	$E_{1b}E_2E_3E_i$	E_{vii}		E_e
3853	$E_{1a}E_2E_3E_{ii}$	E_{vii}		E_e
3854	$E_{1b}E_2E_3E_{ii}$	E_{vii}		E_e
3855	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}		E_e
3856	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}		E_e
3857	$E_{1a}E_2E_4$	E_{vii}		E_e
3858	$E_{1b}E_2E_4$	E_{vii}		E_e
3859	$E_{1a}E_2E_3E_4$	E_{vii}		E_e
3860	$E_{1b}E_2E_3E_4$	E_{vii}		E_e
3861	$E_{1a}E_2E_iE_4$	E_{vii}		E_e
3862	$E_{1b}E_2E_iE_4$	E_{vii}		E_e
3863	$E_{1a}E_2E_{ii}E_4$	E_{vii}		E_e
3864	$E_{1b}E_2E_{ii}E_4$	E_{vii}		E_e
3865	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}		E_e
3866	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}		E_e
3867	$E_{1a}E_2E_3E_iE_4$	E_{vii}		E_e
3868	$E_{1b}E_2E_3E_iE_4$	E_{vii}		E_e
3869	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}		E_e
3870	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}		E_e

3871	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}		E_e
3872	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}		E_e
3873	$E_{1a}E_2E_{iii}$	E_{vii}		E_e
3874	$E_{1b}E_2E_{iii}$	E_{vii}		E_e
3875	$E_{1a}E_2E_3E_{iii}$	E_{vii}		E_e
3876	$E_{1b}E_2E_3E_{iii}$	E_{vii}		E_e
3877	$E_{1a}E_2E_{iii}E_4$	E_{vii}		E_e
3878	$E_{1b}E_2E_{iii}E_4$	E_{vii}		E_e
3879	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}		E_e
3880	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}		E_e
3881	$E_{1a}E_2E_{iv}$	E_{vii}		E_e
3882	$E_{1b}E_2E_{iv}$	E_{vii}		E_e
3883	$E_{1a}E_2E_3E_{iv}$	E_{vii}		E_e
3884	$E_{1b}E_2E_3E_{iv}$	E_{vii}		E_e
3885	$E_{1a}E_2E_{iv}E_4$	E_{vii}		E_e
3886	$E_{1b}E_2E_{iv}E_4$	E_{vii}		E_e
3887	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}		E_e
3888	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}		E_e
3889	$E_{1a}E_2$	E_{vii}	E_4*	E_e
3890	$E_{1b}E_2$	E_{vii}	E_4*	E_e
3891	$E_{1a}E_2E_3$	E_{vii}	E_4*	E_e
3892	$E_{1b}E_2E_3$	E_{vii}	E_4*	E_e
3893	$E_{1a}E_2E_i$	E_{vii}	E_4*	E_e
3894	$E_{1b}E_2E_i$	E_{vii}	E_4*	E_e
3895	$E_{1a}E_2E_{ii}$	E_{vii}	E_4*	E_e
3896	$E_{1b}E_2E_{ii}$	E_{vii}	E_4*	E_e
3897	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_4*	E_e
3898	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_4*	E_e
3899	$E_{1a}E_2E_3E_i$	E_{vii}	E_4*	E_e
3900	$E_{1b}E_2E_3E_i$	E_{vii}	E_4*	E_e
3901	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_4*	E_e
3902	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_4*	E_e
3903	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4*	E_e
3904	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4*	E_e
3905	$E_{1a}E_2E_4$	E_{vii}	E_4*	E_e
3906	$E_{1b}E_2E_4$	E_{vii}	E_4*	E_e
3907	$E_{1a}E_2E_3E_4$	E_{vii}	E_4*	E_e
3908	$E_{1b}E_2E_3E_4$	E_{vii}	E_4*	E_e
3909	$E_{1a}E_2E_iE_4$	E_{vii}	E_4*	E_e
3910	$E_{1b}E_2E_iE_4$	E_{vii}	E_4*	E_e
3911	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_4*	E_e
3912	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_4*	E_e
3913	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4*	E_e

3914	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4*	E_e
3915	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_4*	E_e
3916	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_4*	E_e
3917	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_4*	E_e
3918	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_4*	E_e
3919	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4*	E_e
3920	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4*	E_e
3921	$E_{1a}E_2E_{iii}$	E_{vii}	E_4*	E_e
3922	$E_{1b}E_2E_{iii}$	E_{vii}	E_4*	E_e
3923	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_4*	E_e
3924	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_4*	E_e
3925	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_4*	E_e
3926	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_4*	E_e
3927	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_4*	E_e
3928	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_4*	E_e
3929	$E_{1a}E_2E_{iv}$	E_{vii}	E_4*	E_e
3930	$E_{1b}E_2E_{iv}$	E_{vii}	E_4*	E_e
3931	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_4*	E_e
3932	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_4*	E_e
3933	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_4*	E_e
3934	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_4*	E_e
3935	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_4*	E_e
3936	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_4*	E_e
3937	$E_{1a}E_2$	E_{vii}	E_5	E_e
3938	$E_{1b}E_2$	E_{vii}	E_5	E_e
3939	$E_{1a}E_2E_3$	E_{vii}	E_5	E_e
3940	$E_{1b}E_2E_3$	E_{vii}	E_5	E_e
3941	$E_{1a}E_2E_i$	E_{vii}	E_5	E_e
3942	$E_{1b}E_2E_i$	E_{vii}	E_5	E_e
3943	$E_{1a}E_2E_{ii}$	E_{vii}	E_5	E_e
3944	$E_{1b}E_2E_{ii}$	E_{vii}	E_5	E_e
3945	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_5	E_e
3946	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_5	E_e
3947	$E_{1a}E_2E_3E_i$	E_{vii}	E_5	E_e
3948	$E_{1b}E_2E_3E_i$	E_{vii}	E_5	E_e
3949	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_5	E_e
3950	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_5	E_e
3951	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_5	E_e
3952	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_5	E_e
3953	$E_{1a}E_2E_4$	E_{vii}	E_5	E_e
3954	$E_{1b}E_2E_4$	E_{vii}	E_5	E_e
3955	$E_{1a}E_2E_3E_4$	E_{vii}	E_5	E_e
3956	$E_{1b}E_2E_3E_4$	E_{vii}	E_5	E_e

3957	$E_{1a}E_2E_iE_4$	E_{vii}	E_5	E_e
3958	$E_{1b}E_2E_iE_4$	E_{vii}	E_5	E_e
3959	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_5	E_e
3960	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_5	E_e
3961	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_e
3962	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_e
3963	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_5	E_e
3964	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_5	E_e
3965	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_5	E_e
3966	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_5	E_e
3967	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_e
3968	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_e
3969	$E_{1a}E_2E_{iii}$	E_{vii}	E_5	E_e
3970	$E_{1b}E_2E_{iii}$	E_{vii}	E_5	E_e
3971	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_5	E_e
3972	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_5	E_e
3973	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_5	E_e
3974	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_5	E_e
3975	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_5	E_e
3976	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_5	E_e
3977	$E_{1a}E_2E_{iv}$	E_{vii}	E_5	E_e
3978	$E_{1b}E_2E_{iv}$	E_{vii}	E_5	E_e
3979	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_5	E_e
3980	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_5	E_e
3981	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_5	E_e
3982	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_5	E_e
3983	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_5	E_e
3984	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_5	E_e
3985	$E_{1a}E_2$	E_{vii}	E_4*E_5	E_e
3986	$E_{1b}E_2$	E_{vii}	E_4*E_5	E_e
3987	$E_{1a}E_2E_3$	E_{vii}	E_4*E_5	E_e
3988	$E_{1b}E_2E_3$	E_{vii}	E_4*E_5	E_e
3989	$E_{1a}E_2E_i$	E_{vii}	E_4*E_5	E_e
3990	$E_{1b}E_2E_i$	E_{vii}	E_4*E_5	E_e
3991	$E_{1a}E_2E_{ii}$	E_{vii}	E_4*E_5	E_e
3992	$E_{1b}E_2E_{ii}$	E_{vii}	E_4*E_5	E_e
3993	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_4*E_5	E_e
3994	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_4*E_5	E_e
3995	$E_{1a}E_2E_3E_i$	E_{vii}	E_4*E_5	E_e
3996	$E_{1b}E_2E_3E_i$	E_{vii}	E_4*E_5	E_e
3997	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_4*E_5	E_e
3998	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_4*E_5	E_e
3999	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4*E_5	E_e

4000	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_e
4001	$E_{1a}E_2E_4$	E_{vii}	E_4-E_5	E_e
4002	$E_{1b}E_2E_4$	E_{vii}	E_4-E_5	E_e
4003	$E_{1a}E_2E_3E_4$	E_{vii}	E_4-E_5	E_e
4004	$E_{1b}E_2E_3E_4$	E_{vii}	E_4-E_5	E_e
4005	$E_{1a}E_2E_iE_4$	E_{vii}	E_4-E_5	E_e
4006	$E_{1b}E_2E_iE_4$	E_{vii}	E_4-E_5	E_e
4007	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_4-E_5	E_e
4008	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_4-E_5	E_e
4009	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_e
4010	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_e
4011	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_4-E_5	E_e
4012	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_4-E_5	E_e
4013	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_4-E_5	E_e
4014	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_4-E_5	E_e
4015	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_e
4016	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_e
4017	$E_{1a}E_2E_{iii}$	E_{vii}	E_4-E_5	E_e
4018	$E_{1b}E_2E_{iii}$	E_{vii}	E_4-E_5	E_e
4019	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_4-E_5	E_e
4020	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_4-E_5	E_e
4021	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_4-E_5	E_e
4022	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_4-E_5	E_e
4023	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_4-E_5	E_e
4024	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_4-E_5	E_e
4025	$E_{1a}E_2E_{iv}$	E_{vii}	E_4-E_5	E_e
4026	$E_{1b}E_2E_{iv}$	E_{vii}	E_4-E_5	E_e
4027	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_4-E_5	E_e
4028	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_4-E_5	E_e
4029	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_4-E_5	E_e
4030	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_4-E_5	E_e
4031	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_4-E_5	E_e
4032	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_4-E_5	E_e
4033	$E_{1a}E_2$	$AlkLE_{vii}$		E_e
4034	$E_{1b}E_2$	$AlkLE_{vii}$		E_e
4035	$E_{1a}E_2E_3$	$AlkLE_{vii}$		E_e
4036	$E_{1b}E_2E_3$	$AlkLE_{vii}$		E_e
4037	$E_{1a}E_2E_i$	$AlkLE_{vii}$		E_e
4038	$E_{1b}E_2E_i$	$AlkLE_{vii}$		E_e
4039	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$		E_e
4040	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$		E_e
4041	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$		E_e
4042	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$		E_e

4043	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$		E_e
4044	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$		E_e
4045	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$		E_e
4046	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$		E_e
4047	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$		E_e
4048	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$		E_e
4049	$E_{1a}E_2E_4$	$AlkLE_{vii}$		E_e
4050	$E_{1b}E_2E_4$	$AlkLE_{vii}$		E_e
4051	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$		E_e
4052	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$		E_e
4053	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$		E_e
4054	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$		E_e
4055	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$		E_e
4056	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$		E_e
4057	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_e
4058	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_e
4059	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$		E_e
4060	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$		E_e
4061	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$		E_e
4062	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$		E_e
4063	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_e
4064	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_e
4065	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$		E_e
4066	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$		E_e
4067	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$		E_e
4068	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$		E_e
4069	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$		E_e
4070	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$		E_e
4071	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$		E_e
4072	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$		E_e
4073	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$		E_e
4074	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$		E_e
4075	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$		E_e
4076	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$		E_e
4077	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$		E_e
4078	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$		E_e
4079	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$		E_e
4080	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$		E_e
4081	$E_{1a}E_2$	$AlkLE_{vii}$	E_4-	E_e
4082	$E_{1b}E_2$	$AlkLE_{vii}$	E_4-	E_e
4083	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_4-	E_e
4084	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_4-	E_e
4085	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_4-	E_e

4086	$E_{1b}E_2E_i$	$AlkLE_{vii}$	$E_{4'}$	E_e
4087	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4088	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4089	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4090	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4091	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	$E_{4'}$	E_e
4092	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	$E_{4'}$	E_e
4093	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4094	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4095	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4096	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4097	$E_{1a}E_2E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4098	$E_{1b}E_2E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4099	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4100	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4101	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4102	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4103	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4104	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4105	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4106	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4107	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4108	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4109	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4110	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4111	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4112	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4113	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4114	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4115	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4116	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4117	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4118	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4119	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4120	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4121	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4122	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4123	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4124	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_e
4125	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4126	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4127	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
4128	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e

4129	$E_{1a}E_2$	$AlkLE_{vii}$	E_5	E_e
4130	$E_{1b}E_2$	$AlkLE_{vii}$	E_5	E_e
4131	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_5	E_e
4132	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_5	E_e
4133	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_5	E_e
4134	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_5	E_e
4135	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_5	E_e
4136	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_5	E_e
4137	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_e
4138	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_e
4139	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_5	E_e
4140	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_5	E_e
4141	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_5	E_e
4142	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_5	E_e
4143	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_e
4144	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_e
4145	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_5	E_e
4146	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_5	E_e
4147	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_5	E_e
4148	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_5	E_e
4149	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_5	E_e
4150	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_5	E_e
4151	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_e
4152	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_e
4153	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_e
4154	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_e
4155	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_5	E_e
4156	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_5	E_e
4157	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_e
4158	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_e
4159	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_e
4160	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_e
4161	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_5	E_e
4162	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_5	E_e
4163	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_5	E_e
4164	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_5	E_e
4165	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_e
4166	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_e
4167	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_e
4168	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_e
4169	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_5	E_e
4170	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_5	E_e
4171	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_5	E_e

4172	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_5	E_e
4173	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_e
4174	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_e
4175	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_e
4176	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_e
4177	$E_{1a}E_2$	$AlkLE_{vii}$	E_4-E_5	E_e
4178	$E_{1b}E_2$	$AlkLE_{vii}$	E_4-E_5	E_e
4179	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_4-E_5	E_e
4180	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_4-E_5	E_e
4181	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_4-E_5	E_e
4182	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_4-E_5	E_e
4183	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_e
4184	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_e
4185	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_e
4186	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_e
4187	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_4-E_5	E_e
4188	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_4-E_5	E_e
4189	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_e
4190	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_e
4191	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_e
4192	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_e
4193	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4194	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4195	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4196	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4197	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4198	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4199	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4200	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4201	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4202	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4203	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4204	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4205	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4206	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4207	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4208	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4209	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_e
4210	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_e
4211	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_e
4212	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_e
4213	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4214	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e

4215	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4216	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4217	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_e
4218	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_e
4219	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_e
4220	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_e
4221	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4222	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4223	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4224	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
4225	$E_{1a}E_2$	E_{vii}		E_f
4226	$E_{1b}E_2$	E_{vii}		E_f
4227	$E_{1a}E_2E_3$	E_{vii}		E_f
4228	$E_{1b}E_2E_3$	E_{vii}		E_f
4229	$E_{1a}E_2E_i$	E_{vii}		E_f
4230	$E_{1b}E_2E_i$	E_{vii}		E_f
4231	$E_{1a}E_2E_{ii}$	E_{vii}		E_f
4232	$E_{1b}E_2E_{ii}$	E_{vii}		E_f
4233	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}		E_f
4234	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}		E_f
4235	$E_{1a}E_2E_3E_i$	E_{vii}		E_f
4236	$E_{1b}E_2E_3E_i$	E_{vii}		E_f
4237	$E_{1a}E_2E_3E_{ii}$	E_{vii}		E_f
4238	$E_{1b}E_2E_3E_{ii}$	E_{vii}		E_f
4239	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}		E_f
4240	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}		E_f
4241	$E_{1a}E_2E_4$	E_{vii}		E_f
4242	$E_{1b}E_2E_4$	E_{vii}		E_f
4243	$E_{1a}E_2E_3E_4$	E_{vii}		E_f
4244	$E_{1b}E_2E_3E_4$	E_{vii}		E_f
4245	$E_{1a}E_2E_iE_4$	E_{vii}		E_f
4246	$E_{1b}E_2E_iE_4$	E_{vii}		E_f
4247	$E_{1a}E_2E_{ii}E_4$	E_{vii}		E_f
4248	$E_{1b}E_2E_{ii}E_4$	E_{vii}		E_f
4249	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}		E_f
4250	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}		E_f
4251	$E_{1a}E_2E_3E_iE_4$	E_{vii}		E_f
4252	$E_{1b}E_2E_3E_iE_4$	E_{vii}		E_f
4253	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}		E_f
4254	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}		E_f
4255	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}		E_f
4256	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}		E_f
4257	$E_{1a}E_2E_{iii}$	E_{vii}		E_f

4258	$E_{1b}E_2E_{iii}$	E_{vii}		E_f
4259	$E_{1a}E_2E_3E_{iii}$	E_{vii}		E_f
4260	$E_{1b}E_2E_3E_{iii}$	E_{vii}		E_f
4261	$E_{1a}E_2E_{iii}E_4$	E_{vii}		E_f
4262	$E_{1b}E_2E_{iii}E_4$	E_{vii}		E_f
4263	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}		E_f
4264	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}		E_f
4265	$E_{1a}E_2E_{iv}$	E_{vii}		E_f
4266	$E_{1b}E_2E_{iv}$	E_{vii}		E_f
4267	$E_{1a}E_2E_3E_{iv}$	E_{vii}		E_f
4268	$E_{1b}E_2E_3E_{iv}$	E_{vii}		E_f
4269	$E_{1a}E_2E_{iv}E_4$	E_{vii}		E_f
4270	$E_{1b}E_2E_{iv}E_4$	E_{vii}		E_f
4271	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}		E_f
4272	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}		E_f
4273	$E_{1a}E_2$	E_{vii}	E_{4^*}	E_f
4274	$E_{1b}E_2$	E_{vii}	E_{4^*}	E_f
4275	$E_{1a}E_2E_3$	E_{vii}	E_{4^*}	E_f
4276	$E_{1b}E_2E_3$	E_{vii}	E_{4^*}	E_f
4277	$E_{1a}E_2E_i$	E_{vii}	E_{4^*}	E_f
4278	$E_{1b}E_2E_i$	E_{vii}	E_{4^*}	E_f
4279	$E_{1a}E_2E_{ii}$	E_{vii}	E_{4^*}	E_f
4280	$E_{1b}E_2E_{ii}$	E_{vii}	E_{4^*}	E_f
4281	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_f
4282	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_f
4283	$E_{1a}E_2E_3E_i$	E_{vii}	E_{4^*}	E_f
4284	$E_{1b}E_2E_3E_i$	E_{vii}	E_{4^*}	E_f
4285	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_{4^*}	E_f
4286	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_{4^*}	E_f
4287	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_f
4288	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_f
4289	$E_{1a}E_2E_4$	E_{vii}	E_{4^*}	E_f
4290	$E_{1b}E_2E_4$	E_{vii}	E_{4^*}	E_f
4291	$E_{1a}E_2E_3E_4$	E_{vii}	E_{4^*}	E_f
4292	$E_{1b}E_2E_3E_4$	E_{vii}	E_{4^*}	E_f
4293	$E_{1a}E_2E_iE_4$	E_{vii}	E_{4^*}	E_f
4294	$E_{1b}E_2E_iE_4$	E_{vii}	E_{4^*}	E_f
4295	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_{4^*}	E_f
4296	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_{4^*}	E_f
4297	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_f
4298	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_f
4299	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_{4^*}	E_f
4300	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_{4^*}	E_f

4301	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_{4^*}	E_f
4302	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_{4^*}	E_f
4303	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_f
4304	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_f
4305	$E_{1a}E_2E_{iii}$	E_{vii}	E_{4^*}	E_f
4306	$E_{1b}E_2E_{iii}$	E_{vii}	E_{4^*}	E_f
4307	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_{4^*}	E_f
4308	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_{4^*}	E_f
4309	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_{4^*}	E_f
4310	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_{4^*}	E_f
4311	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_{4^*}	E_f
4312	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_{4^*}	E_f
4313	$E_{1a}E_2E_{iv}$	E_{vii}	E_{4^*}	E_f
4314	$E_{1b}E_2E_{iv}$	E_{vii}	E_{4^*}	E_f
4315	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_{4^*}	E_f
4316	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_{4^*}	E_f
4317	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_{4^*}	E_f
4318	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_{4^*}	E_f
4319	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_{4^*}	E_f
4320	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_{4^*}	E_f
4321	$E_{1a}E_2$	E_{vii}	E_5	E_f
4322	$E_{1b}E_2$	E_{vii}	E_5	E_f
4323	$E_{1a}E_2E_3$	E_{vii}	E_5	E_f
4324	$E_{1b}E_2E_3$	E_{vii}	E_5	E_f
4325	$E_{1a}E_2E_i$	E_{vii}	E_5	E_f
4326	$E_{1b}E_2E_i$	E_{vii}	E_5	E_f
4327	$E_{1a}E_2E_{ii}$	E_{vii}	E_5	E_f
4328	$E_{1b}E_2E_{ii}$	E_{vii}	E_5	E_f
4329	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_5	E_f
4330	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_5	E_f
4331	$E_{1a}E_2E_3E_i$	E_{vii}	E_5	E_f
4332	$E_{1b}E_2E_3E_i$	E_{vii}	E_5	E_f
4333	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_5	E_f
4334	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_5	E_f
4335	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_5	E_f
4336	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_5	E_f
4337	$E_{1a}E_2E_4$	E_{vii}	E_5	E_f
4338	$E_{1b}E_2E_4$	E_{vii}	E_5	E_f
4339	$E_{1a}E_2E_3E_4$	E_{vii}	E_5	E_f
4340	$E_{1b}E_2E_3E_4$	E_{vii}	E_5	E_f
4341	$E_{1a}E_2E_iE_4$	E_{vii}	E_5	E_f
4342	$E_{1b}E_2E_iE_4$	E_{vii}	E_5	E_f
4343	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_5	E_f

4344	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_5	E_f
4345	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_f
4346	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_f
4347	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_5	E_f
4348	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_5	E_f
4349	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_5	E_f
4350	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_5	E_f
4351	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_f
4352	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_f
4353	$E_{1a}E_2E_{iii}$	E_{vii}	E_5	E_f
4354	$E_{1b}E_2E_{iii}$	E_{vii}	E_5	E_f
4355	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_5	E_f
4356	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_5	E_f
4357	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_5	E_f
4358	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_5	E_f
4359	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_5	E_f
4360	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_5	E_f
4361	$E_{1a}E_2E_{iv}$	E_{vii}	E_5	E_f
4362	$E_{1b}E_2E_{iv}$	E_{vii}	E_5	E_f
4363	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_5	E_f
4364	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_5	E_f
4365	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_5	E_f
4366	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_5	E_f
4367	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_5	E_f
4368	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_5	E_f
4369	$E_{1a}E_2$	E_{vii}	E_4-E_5	E_f
4370	$E_{1b}E_2$	E_{vii}	E_4-E_5	E_f
4371	$E_{1a}E_2E_3$	E_{vii}	E_4-E_5	E_f
4372	$E_{1b}E_2E_3$	E_{vii}	E_4-E_5	E_f
4373	$E_{1a}E_2E_i$	E_{vii}	E_4-E_5	E_f
4374	$E_{1b}E_2E_i$	E_{vii}	E_4-E_5	E_f
4375	$E_{1a}E_2E_{ii}$	E_{vii}	E_4-E_5	E_f
4376	$E_{1b}E_2E_{ii}$	E_{vii}	E_4-E_5	E_f
4377	$E_{1a}E_2E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_f
4378	$E_{1b}E_2E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_f
4379	$E_{1a}E_2E_3E_i$	E_{vii}	E_4-E_5	E_f
4380	$E_{1b}E_2E_3E_i$	E_{vii}	E_4-E_5	E_f
4381	$E_{1a}E_2E_3E_{ii}$	E_{vii}	E_4-E_5	E_f
4382	$E_{1b}E_2E_3E_{ii}$	E_{vii}	E_4-E_5	E_f
4383	$E_{1a}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_f
4384	$E_{1b}E_2E_3E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_f
4385	$E_{1a}E_2E_4$	E_{vii}	E_4-E_5	E_f
4386	$E_{1b}E_2E_4$	E_{vii}	E_4-E_5	E_f

4387	$E_{1a}E_2E_3E_4$	E_{vii}	E_4-E_5	E_f
4388	$E_{1b}E_2E_3E_4$	E_{vii}	E_4-E_5	E_f
4389	$E_{1a}E_2E_iE_4$	E_{vii}	E_4-E_5	E_f
4390	$E_{1b}E_2E_iE_4$	E_{vii}	E_4-E_5	E_f
4391	$E_{1a}E_2E_{ii}E_4$	E_{vii}	E_4-E_5	E_f
4392	$E_{1b}E_2E_{ii}E_4$	E_{vii}	E_4-E_5	E_f
4393	$E_{1a}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_f
4394	$E_{1b}E_2E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_f
4395	$E_{1a}E_2E_3E_iE_4$	E_{vii}	E_4-E_5	E_f
4396	$E_{1b}E_2E_3E_iE_4$	E_{vii}	E_4-E_5	E_f
4397	$E_{1a}E_2E_3E_{ii}E_4$	E_{vii}	E_4-E_5	E_f
4398	$E_{1b}E_2E_3E_{ii}E_4$	E_{vii}	E_4-E_5	E_f
4399	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_f
4400	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_f
4401	$E_{1a}E_2E_{iii}$	E_{vii}	E_4-E_5	E_f
4402	$E_{1b}E_2E_{iii}$	E_{vii}	E_4-E_5	E_f
4403	$E_{1a}E_2E_3E_{iii}$	E_{vii}	E_4-E_5	E_f
4404	$E_{1b}E_2E_3E_{iii}$	E_{vii}	E_4-E_5	E_f
4405	$E_{1a}E_2E_{iii}E_4$	E_{vii}	E_4-E_5	E_f
4406	$E_{1b}E_2E_{iii}E_4$	E_{vii}	E_4-E_5	E_f
4407	$E_{1a}E_2E_3E_{iii}E_4$	E_{vii}	E_4-E_5	E_f
4408	$E_{1b}E_2E_3E_{iii}E_4$	E_{vii}	E_4-E_5	E_f
4409	$E_{1a}E_2E_{iv}$	E_{vii}	E_4-E_5	E_f
4410	$E_{1b}E_2E_{iv}$	E_{vii}	E_4-E_5	E_f
4411	$E_{1a}E_2E_3E_{iv}$	E_{vii}	E_4-E_5	E_f
4412	$E_{1b}E_2E_3E_{iv}$	E_{vii}	E_4-E_5	E_f
4413	$E_{1a}E_2E_{iv}E_4$	E_{vii}	E_4-E_5	E_f
4414	$E_{1b}E_2E_{iv}E_4$	E_{vii}	E_4-E_5	E_f
4415	$E_{1a}E_2E_3E_{iv}E_4$	E_{vii}	E_4-E_5	E_f
4416	$E_{1b}E_2E_3E_{iv}E_4$	E_{vii}	E_4-E_5	E_f
4417	$E_{1a}E_2$	$AlkLE_{vii}$		E_f
4418	$E_{1b}E_2$	$AlkLE_{vii}$		E_f
4419	$E_{1a}E_2E_3$	$AlkLE_{vii}$		E_f
4420	$E_{1b}E_2E_3$	$AlkLE_{vii}$		E_f
4421	$E_{1a}E_2E_i$	$AlkLE_{vii}$		E_f
4422	$E_{1b}E_2E_i$	$AlkLE_{vii}$		E_f
4423	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$		E_f
4424	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$		E_f
4425	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$		E_f
4426	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$		E_f
4427	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$		E_f
4428	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$		E_f
4429	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$		E_f

4430	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$		E_f
4431	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$		E_f
4432	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$		E_f
4433	$E_{1a}E_2E_4$	$AlkLE_{vii}$		E_f
4434	$E_{1b}E_2E_4$	$AlkLE_{vii}$		E_f
4435	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$		E_f
4436	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$		E_f
4437	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$		E_f
4438	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$		E_f
4439	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$		E_f
4440	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$		E_f
4441	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_f
4442	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_f
4443	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$		E_f
4444	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$		E_f
4445	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$		E_f
4446	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$		E_f
4447	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_f
4448	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_f
4449	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$		E_f
4450	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$		E_f
4451	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$		E_f
4452	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$		E_f
4453	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$		E_f
4454	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$		E_f
4455	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$		E_f
4456	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$		E_f
4457	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$		E_f
4458	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$		E_f
4459	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$		E_f
4460	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$		E_f
4461	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$		E_f
4462	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$		E_f
4463	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$		E_f
4464	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$		E_f
4465	$E_{1a}E_2$	$AlkLE_{vii}$	$E_{4'}$	E_f
4466	$E_{1b}E_2$	$AlkLE_{vii}$	$E_{4'}$	E_f
4467	$E_{1a}E_2E_3$	$AlkLE_{vii}$	$E_{4'}$	E_f
4468	$E_{1b}E_2E_3$	$AlkLE_{vii}$	$E_{4'}$	E_f
4469	$E_{1a}E_2E_i$	$AlkLE_{vii}$	$E_{4'}$	E_f
4470	$E_{1b}E_2E_i$	$AlkLE_{vii}$	$E_{4'}$	E_f
4471	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4472	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_f

4473	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4474	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4475	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	$E_{4'}$	E_f
4476	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	$E_{4'}$	E_f
4477	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4478	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4479	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4480	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4481	$E_{1a}E_2E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4482	$E_{1b}E_2E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4483	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4484	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4485	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4486	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4487	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4488	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4489	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4490	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4491	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4492	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4493	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4494	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4495	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4496	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4497	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4498	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4499	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4500	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4501	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4502	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4503	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4504	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4505	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4506	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4507	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4508	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_f
4509	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4510	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4511	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4512	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
4513	$E_{1a}E_2$	$AlkLE_{vii}$	E_5	E_f
4514	$E_{1b}E_2$	$AlkLE_{vii}$	E_5	E_f
4515	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_5	E_f

4516	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_5	E_f
4517	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_5	E_f
4518	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_5	E_f
4519	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_5	E_f
4520	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_5	E_f
4521	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_f
4522	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_f
4523	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_5	E_f
4524	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_5	E_f
4525	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_5	E_f
4526	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_5	E_f
4527	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_f
4528	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_f
4529	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_5	E_f
4530	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_5	E_f
4531	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_5	E_f
4532	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_5	E_f
4533	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_5	E_f
4534	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_5	E_f
4535	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_f
4536	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_f
4537	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_f
4538	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_f
4539	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_5	E_f
4540	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_5	E_f
4541	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_f
4542	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_f
4543	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_f
4544	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_f
4545	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_5	E_f
4546	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_5	E_f
4547	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_5	E_f
4548	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_5	E_f
4549	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_f
4550	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_f
4551	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_f
4552	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_f
4553	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_5	E_f
4554	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_5	E_f
4555	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_5	E_f
4556	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_5	E_f
4557	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_f
4558	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_f

4559	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_f
4560	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_f
4561	$E_{1a}E_2$	$AlkLE_{vii}$	E_4-E_5	E_f
4562	$E_{1b}E_2$	$AlkLE_{vii}$	E_4-E_5	E_f
4563	$E_{1a}E_2E_3$	$AlkLE_{vii}$	E_4-E_5	E_f
4564	$E_{1b}E_2E_3$	$AlkLE_{vii}$	E_4-E_5	E_f
4565	$E_{1a}E_2E_i$	$AlkLE_{vii}$	E_4-E_5	E_f
4566	$E_{1b}E_2E_i$	$AlkLE_{vii}$	E_4-E_5	E_f
4567	$E_{1a}E_2E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_f
4568	$E_{1b}E_2E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_f
4569	$E_{1a}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_f
4570	$E_{1b}E_2E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_f
4571	$E_{1a}E_2E_3E_i$	$AlkLE_{vii}$	E_4-E_5	E_f
4572	$E_{1b}E_2E_3E_i$	$AlkLE_{vii}$	E_4-E_5	E_f
4573	$E_{1a}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_f
4574	$E_{1b}E_2E_3E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_f
4575	$E_{1a}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_f
4576	$E_{1b}E_2E_3E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_f
4577	$E_{1a}E_2E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4578	$E_{1b}E_2E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4579	$E_{1a}E_2E_3E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4580	$E_{1b}E_2E_3E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4581	$E_{1a}E_2E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4582	$E_{1b}E_2E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4583	$E_{1a}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4584	$E_{1b}E_2E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4585	$E_{1a}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4586	$E_{1b}E_2E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4587	$E_{1a}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4588	$E_{1b}E_2E_3E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4589	$E_{1a}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4590	$E_{1b}E_2E_3E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4591	$E_{1a}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4592	$E_{1b}E_2E_3E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4593	$E_{1a}E_2E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_f
4594	$E_{1b}E_2E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_f
4595	$E_{1a}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_f
4596	$E_{1b}E_2E_3E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_f
4597	$E_{1a}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4598	$E_{1b}E_2E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4599	$E_{1a}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4600	$E_{1b}E_2E_3E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4601	$E_{1a}E_2E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_f

4602	$E_{1b}E_2E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_f
4603	$E_{1a}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_f
4604	$E_{1b}E_2E_3E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_f
4605	$E_{1a}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f

4606	$E_{1b}E_2E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4607	$E_{1a}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f
4608	$E_{1b}E_2E_3E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_f

Microorganisms quite especially preferred according to the invention (abbreviated as MO) are outstandingly suitable for the production of ω-hydroxycarboxylic acids or ω-oxocarboxylic acids and have increased or decreased enzyme activities (abbreviated as E) described in the following table, where these can in addition advantageously be combined with an increased enzyme activity compared to the wild type of the microorganism, which is described for the 3-ketoacyl-ACP (Acyl Carrrier Protein) synthase III (EC 2.3.1.41), in particular that from plants, preferably that from plants the seeds whereof contain fatty acids with alkyl residues shorter than 14 C atoms, and particularly preferably that from plants of the genera *Cuphea*, *Elaeis*, *Cocos*, *Umbellularia* and *Cinnamomum* and gene products selected from AccA, AccB, AccC, AccD, AceE, AceF, Lpd, AcpP, FabA, FabB, FabD, FabF, FabG, FabH, FabI, FabZ, PanD, PanK, UdhA, PntA or PntB.

Any combinations of at least two of these enzyme activities can advantageously be increased. In addition, moreover, it can be advantageous if the microorganism is provided with a lower enzyme activity compared to the wild type of the microorganism, which is described for the gene products selected from TdcE, PflA, PflB, PflC, PflD, PoxB, YgfG, AckA, AckB, TdcD, Pta, LdhA, AdhE, MgsA, FdnG, FdnH, FdnI, FdhF, FdoG, FdoH, FdoI, PrpC, PrpD, PrpF , PrpB , TdcD, Pdc, PorA, PorB, PorC, PorD, AlsS, IlvB, IlvM, IlvN, IlvG, IlvI, IlvH, AlsD, ButB, Thl, ThlA, ThlB, PhaA, PhaB, Crt, BdhA, BdhB, Adc, Adh, CtfB, AtoA, AtoD, LdhL, GltA, FabR, FhuA, Dld, LldA or LldP, singly or in any combination.

MO	E increased	E decreased
1	E_{1a}	
2	E_{1b}	
3	$E_{1a}E_i$	
4	$E_{1b}E_i$	
5	$E_{1a}E_{ii}$	
6	$E_{1b}E_{ii}$	
7	$E_{1a}E_{ii}E_{iib}$	
8	$E_{1b}E_{ii}E_{iib}$	

9	$E_{1a}E_4$	
10	$E_{1b}E_4$	
11	$E_{1a}E_iE_4$	
12	$E_{1b}E_iE_4$	
13	$E_{1a}E_{ii}E_4$	
14	$E_{1b}E_{ii}E_4$	
15	$E_{1a}E_{ii}E_{iib}E_4$	
16	$E_{1b}E_{ii}E_{iib}E_4$	
17	$E_{1a}E_{iii}$	

18	$E_{1b}E_{iii}$	
19	$E_{1a}E_{iii}E_4$	
20	$E_{1b}E_{iii}E_4$	
21	$E_{1a}E_{iv}$	
22	$E_{1b}E_{iv}$	
23	$E_{1a}E_{iv}E_4$	
24	$E_{1b}E_{iv}E_4$	
25	E_{1a}	$E_{4'}$
26	E_{1b}	$E_{4'}$
27	$E_{1a}E_i$	$E_{4'}$
28	$E_{1b}E_i$	$E_{4'}$
29	$E_{1a}E_{ii}$	$E_{4'}$
30	$E_{1b}E_{ii}$	$E_{4'}$
31	$E_{1a}E_{ii}E_{iib}$	$E_{4'}$
32	$E_{1b}E_{ii}E_{iib}$	$E_{4'}$
33	$E_{1a}E_4$	$E_{4'}$
34	$E_{1b}E_4$	$E_{4'}$
35	$E_{1a}E_iE_4$	$E_{4'}$
36	$E_{1b}E_iE_4$	$E_{4'}$
37	$E_{1a}E_{ii}E_4$	$E_{4'}$
38	$E_{1b}E_{ii}E_4$	$E_{4'}$
39	$E_{1a}E_{ii}E_{iib}E_4$	$E_{4'}$
40	$E_{1b}E_{ii}E_{iib}E_4$	$E_{4'}$
41	$E_{1a}E_{iii}$	$E_{4'}$
42	$E_{1b}E_{iii}$	$E_{4'}$
43	$E_{1a}E_{iii}E_4$	$E_{4'}$
44	$E_{1b}E_{iii}E_4$	$E_{4'}$
45	$E_{1a}E_{iv}$	$E_{4'}$
46	$E_{1b}E_{iv}$	$E_{4'}$
47	$E_{1a}E_{iv}E_4$	$E_{4'}$
48	$E_{1b}E_{iv}E_4$	$E_{4'}$
49	E_{1a}	E_5
50	E_{1b}	E_5
51	$E_{1a}E_i$	E_5
52	$E_{1b}E_i$	E_5
53	$E_{1a}E_{ii}$	E_5
54	$E_{1b}E_{ii}$	E_5
55	$E_{1a}E_{ii}E_{iib}$	E_5
56	$E_{1b}E_{ii}E_{iib}$	E_5
57	$E_{1a}E_4$	E_5
58	$E_{1b}E_4$	E_5
59	$E_{1a}E_iE_4$	E_5
60	$E_{1b}E_iE_4$	E_5

61	$E_{1a}E_{ii}E_4$	E_5
62	$E_{1b}E_{ii}E_4$	E_5
63	$E_{1a}E_{ii}E_{iib}E_4$	E_5
64	$E_{1b}E_{ii}E_{iib}E_4$	E_5
65	$E_{1a}E_{iii}$	E_5
66	$E_{1b}E_{iii}$	E_5
67	$E_{1a}E_{iii}E_4$	E_5
68	$E_{1b}E_{iii}E_4$	E_5
69	$E_{1a}E_{iv}$	E_5
70	$E_{1b}E_{iv}$	E_5
71	$E_{1a}E_{iv}E_4$	E_5
72	$E_{1b}E_{iv}E_4$	E_5
73	E_{1a}	E_4-E_5
74	E_{1b}	E_4-E_5
75	$E_{1a}E_i$	E_4-E_5
76	$E_{1b}E_i$	E_4-E_5
77	$E_{1a}E_{ii}$	E_4-E_5
78	$E_{1b}E_{ii}$	E_4-E_5
79	$E_{1a}E_{ii}E_{iib}$	E_4-E_5
80	$E_{1b}E_{ii}E_{iib}$	E_4-E_5
81	$E_{1a}E_4$	E_4-E_5
82	$E_{1b}E_4$	E_4-E_5
83	$E_{1a}E_iE_4$	E_4-E_5
84	$E_{1b}E_iE_4$	E_4-E_5
85	$E_{1a}E_{ii}E_4$	E_4-E_5
86	$E_{1b}E_{ii}E_4$	E_4-E_5
87	$E_{1a}E_{ii}E_{iib}E_4$	E_4-E_5
88	$E_{1b}E_{ii}E_{iib}E_4$	E_4-E_5
89	$E_{1a}E_{iii}$	E_4-E_5
90	$E_{1b}E_{iii}$	E_4-E_5
91	$E_{1a}E_{iii}E_4$	E_4-E_5
92	$E_{1b}E_{iii}E_4$	E_4-E_5
93	$E_{1a}E_{iv}$	E_4-E_5
94	$E_{1b}E_{iv}$	E_4-E_5
95	$E_{1a}E_{iv}E_4$	E_4-E_5
96	$E_{1b}E_{iv}E_4$	E_4-E_5
97	E_{1a} AlkL	
98	E_{1b} AlkL	
99	$E_{1a}E_i$ AlkL	
100	$E_{1b}E_i$ AlkL	
101	$E_{1a}E_{ii}$ AlkL	
102	$E_{1b}E_{ii}$ AlkL	
103	$E_{1a}E_{ii}E_{iib}$ AlkL	

104	$E_{1b}E_{ii}E_{iib}$	AlkL	
105	$E_{1a}E_4$	AlkL	
106	$E_{1b}E_4$	AlkL	
107	$E_{1a}E_iE_4$	AlkL	
108	$E_{1b}E_iE_4$	AlkL	
109	$E_{1a}E_{ii}E_4$	AlkL	
110	$E_{1b}E_{ii}E_4$	AlkL	
111	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	
112	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	
113	$E_{1a}E_{iii}$	AlkL	
114	$E_{1b}E_{iii}$	AlkL	
115	$E_{1a}E_{iii}E_4$	AlkL	
116	$E_{1b}E_{iii}E_4$	AlkL	
117	$E_{1a}E_{iv}$	AlkL	
118	$E_{1b}E_{iv}$	AlkL	
119	$E_{1a}E_{iv}E_4$	AlkL	
120	$E_{1b}E_{iv}E_4$	AlkL	
121	E_{1a}	AlkL	E_4-
122	E_{1b}	AlkL	E_4-
123	$E_{1a}E_i$	AlkL	E_4-
124	$E_{1b}E_i$	AlkL	E_4-
125	$E_{1a}E_{ii}$	AlkL	E_4-
126	$E_{1b}E_{ii}$	AlkL	E_4-
127	$E_{1a}E_{ii}E_{iib}$	AlkL	E_4-
128	$E_{1b}E_{ii}E_{iib}$	AlkL	E_4-
129	$E_{1a}E_4$	AlkL	E_4-
130	$E_{1b}E_4$	AlkL	E_4-
131	$E_{1a}E_iE_4$	AlkL	E_4-
132	$E_{1b}E_iE_4$	AlkL	E_4-
133	$E_{1a}E_{ii}E_4$	AlkL	E_4-
134	$E_{1b}E_{ii}E_4$	AlkL	E_4-
135	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_4-
136	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_4-
137	$E_{1a}E_{iii}$	AlkL	E_4-
138	$E_{1b}E_{iii}$	AlkL	E_4-
139	$E_{1a}E_{iii}E_4$	AlkL	E_4-
140	$E_{1b}E_{iii}E_4$	AlkL	E_4-
141	$E_{1a}E_{iv}$	AlkL	E_4-
142	$E_{1b}E_{iv}$	AlkL	E_4-
143	$E_{1a}E_{iv}E_4$	AlkL	E_4-
144	$E_{1b}E_{iv}E_4$	AlkL	E_4-
145	E_{1a}	AlkL	E_5
146	E_{1b}	AlkL	E_5
147	$E_{1a}E_i$	AlkL	E_5
148	$E_{1b}E_i$	AlkL	E_5
149	$E_{1a}E_{ii}$	AlkL	E_5
150	$E_{1b}E_{ii}$	AlkL	E_5
151	$E_{1a}E_{ii}E_{iib}$	AlkL	E_5
152	$E_{1b}E_{ii}E_{iib}$	AlkL	E_5
153	$E_{1a}E_4$	AlkL	E_5
154	$E_{1b}E_4$	AlkL	E_5
155	$E_{1a}E_iE_4$	AlkL	E_5
156	$E_{1b}E_iE_4$	AlkL	E_5
157	$E_{1a}E_{ii}E_4$	AlkL	E_5
158	$E_{1b}E_{ii}E_4$	AlkL	E_5
159	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_5
160	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_5
161	$E_{1a}E_{iii}$	AlkL	E_5
162	$E_{1b}E_{iii}$	AlkL	E_5
163	$E_{1a}E_{iii}E_4$	AlkL	E_5
164	$E_{1b}E_{iii}E_4$	AlkL	E_5
165	$E_{1a}E_{iv}$	AlkL	E_5
166	$E_{1b}E_{iv}$	AlkL	E_5
167	$E_{1a}E_{iv}E_4$	AlkL	E_5
168	$E_{1b}E_{iv}E_4$	AlkL	E_5
169	E_{1a}	AlkL	E_4-E_5
170	E_{1b}	AlkL	E_4-E_5
171	$E_{1a}E_i$	AlkL	E_4-E_5
172	$E_{1b}E_i$	AlkL	E_4-E_5
173	$E_{1a}E_{ii}$	AlkL	E_4-E_5
174	$E_{1b}E_{ii}$	AlkL	E_4-E_5
175	$E_{1a}E_{ii}E_{iib}$	AlkL	E_4-E_5
176	$E_{1b}E_{ii}E_{iib}$	AlkL	E_4-E_5
177	$E_{1a}E_4$	AlkL	E_4-E_5
178	$E_{1b}E_4$	AlkL	E_4-E_5
179	$E_{1a}E_iE_4$	AlkL	E_4-E_5
180	$E_{1b}E_iE_4$	AlkL	E_4-E_5
181	$E_{1a}E_{ii}E_4$	AlkL	E_4-E_5
182	$E_{1b}E_{ii}E_4$	AlkL	E_4-E_5
183	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_4-E_5
184	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_4-E_5
185	$E_{1a}E_{iii}$	AlkL	E_4-E_5
186	$E_{1b}E_{iii}$	AlkL	E_4-E_5
187	$E_{1a}E_{iii}E_4$	AlkL	E_4-E_5
188	$E_{1b}E_{iii}E_4$	AlkL	E_4-E_5
189	$E_{1a}E_{iv}$	AlkL	E_4-E_5

190	$E_{1b}E_{iv}$	AlkL	E_4-E_5
191	$E_{1a}E_{iv}E_4$	AlkL	E_4-E_5
192	$E_{1b}E_{iv}E_4$	AlkL	E_4-E_5
193	E_{1a}		E_a
194	E_{1b}		E_a
195	$E_{1a}E_i$		E_a
196	$E_{1b}E_i$		E_a
197	$E_{1a}E_{ii}$		E_a
198	$E_{1b}E_{ii}$		E_a
199	$E_{1a}E_{ii}E_{iib}$		E_a
200	$E_{1b}E_{ii}E_{iib}$		E_a
201	$E_{1a}E_4$		E_a
202	$E_{1b}E_4$		E_a
203	$E_{1a}E_iE_4$		E_a
204	$E_{1b}E_iE_4$		E_a
205	$E_{1a}E_{ii}E_4$		E_a
206	$E_{1b}E_{ii}E_4$		E_a
207	$E_{1a}E_{ii}E_{iib}E_4$		E_a
208	$E_{1b}E_{ii}E_{iib}E_4$		E_a
209	$E_{1a}E_{iii}$		E_a
210	$E_{1b}E_{iii}$		E_a
211	$E_{1a}E_{iii}E_4$		E_a
212	$E_{1b}E_{iii}E_4$		E_a
213	$E_{1a}E_{iv}$		E_a
214	$E_{1b}E_{iv}$		E_a
215	$E_{1a}E_{iv}E_4$		E_a
216	$E_{1b}E_{iv}E_4$		E_a
217	E_{1a}	E_4*	E_a
218	E_{1b}	E_4*	E_a
219	$E_{1a}E_i$	E_4*	E_a
220	$E_{1b}E_i$	E_4*	E_a
221	$E_{1a}E_{ii}$	E_4*	E_a
222	$E_{1b}E_{ii}$	E_4*	E_a
223	$E_{1a}E_{ii}E_{iib}$	E_4*	E_a
224	$E_{1b}E_{ii}E_{iib}$	E_4*	E_a
225	$E_{1a}E_4$	E_4*	E_a
226	$E_{1b}E_4$	E_4*	E_a
227	$E_{1a}E_iE_4$	E_4*	E_a
228	$E_{1b}E_iE_4$	E_4*	E_a
229	$E_{1a}E_{ii}E_4$	E_4*	E_a
230	$E_{1b}E_{ii}E_4$	E_4*	E_a
231	$E_{1a}E_{ii}E_{iib}E_4$	E_4*	E_a
232	$E_{1b}E_{ii}E_{iib}E_4$	E_4*	E_a

233	$E_{1a}E_{iii}$	E_4*	E_a
234	$E_{1b}E_{iii}$	E_4*	E_a
235	$E_{1a}E_{iii}E_4$	E_4*	E_a
236	$E_{1b}E_{iii}E_4$	E_4*	E_a
237	$E_{1a}E_{iv}$	E_4*	E_a
238	$E_{1b}E_{iv}$	E_4*	E_a
239	$E_{1a}E_{iv}E_4$	E_4*	E_a
240	$E_{1b}E_{iv}E_4$	E_4*	E_a
241	E_{1a}	E_5	E_a
242	E_{1b}	E_5	E_a
243	$E_{1a}E_i$	E_5	E_a
244	$E_{1b}E_i$	E_5	E_a
245	$E_{1a}E_{ii}$	E_5	E_a
246	$E_{1b}E_{ii}$	E_5	E_a
247	$E_{1a}E_{ii}E_{iib}$	E_5	E_a
248	$E_{1b}E_{ii}E_{iib}$	E_5	E_a
249	$E_{1a}E_4$	E_5	E_a
250	$E_{1b}E_4$	E_5	E_a
251	$E_{1a}E_iE_4$	E_5	E_a
252	$E_{1b}E_iE_4$	E_5	E_a
253	$E_{1a}E_{ii}E_4$	E_5	E_a
254	$E_{1b}E_{ii}E_4$	E_5	E_a
255	$E_{1a}E_{ii}E_{iib}E_4$	E_5	E_a
256	$E_{1b}E_{ii}E_{iib}E_4$	E_5	E_a
257	$E_{1a}E_{iii}$	E_5	E_a
258	$E_{1b}E_{iii}$	E_5	E_a
259	$E_{1a}E_{iii}E_4$	E_5	E_a
260	$E_{1b}E_{iii}E_4$	E_5	E_a
261	$E_{1a}E_{iv}$	E_5	E_a
262	$E_{1b}E_{iv}$	E_5	E_a
263	$E_{1a}E_{iv}E_4$	E_5	E_a
264	$E_{1b}E_{iv}E_4$	E_5	E_a
265	E_{1a}	E_4-E_5	E_a
266	E_{1b}	E_4-E_5	E_a
267	$E_{1a}E_i$	E_4-E_5	E_a
268	$E_{1b}E_i$	E_4-E_5	E_a
269	$E_{1a}E_{ii}$	E_4-E_5	E_a
270	$E_{1b}E_{ii}$	E_4-E_5	E_a
271	$E_{1a}E_{ii}E_{iib}$	E_4-E_5	E_a
272	$E_{1b}E_{ii}E_{iib}$	E_4-E_5	E_a
273	$E_{1a}E_4$	E_4-E_5	E_a
274	$E_{1b}E_4$	E_4-E_5	E_a
275	$E_{1a}E_iE_4$	E_4-E_5	E_a

276	$E_{1b}E_iE_4$		E_4-E_5	E_a
277	$E_{1a}E_{ii}E_4$		E_4-E_5	E_a
278	$E_{1b}E_{ii}E_4$		E_4-E_5	E_a
279	$E_{1a}E_{ii}E_{iib}E_4$		E_4-E_5	E_a
280	$E_{1b}E_{ii}E_{iib}E_4$		E_4-E_5	E_a
281	$E_{1a}E_{iii}$		E_4-E_5	E_a
282	$E_{1b}E_{iii}$		E_4-E_5	E_a
283	$E_{1a}E_{iii}E_4$		E_4-E_5	E_a
284	$E_{1b}E_{iii}E_4$		E_4-E_5	E_a
285	$E_{1a}E_{iv}$		E_4-E_5	E_a
286	$E_{1b}E_{iv}$		E_4-E_5	E_a
287	$E_{1a}E_{iv}E_4$		E_4-E_5	E_a
288	$E_{1b}E_{iv}E_4$		E_4-E_5	E_a
289	E_{1a}	AlkL		E_a
290	E_{1b}	AlkL		E_a
291	$E_{1a}E_i$	AlkL		E_a
292	$E_{1b}E_i$	AlkL		E_a
293	$E_{1a}E_{ii}$	AlkL		E_a
294	$E_{1b}E_{ii}$	AlkL		E_a
295	$E_{1a}E_{ii}E_{iib}$	AlkL		E_a
296	$E_{1b}E_{ii}E_{iib}$	AlkL		E_a
297	$E_{1a}E_4$	AlkL		E_a
298	$E_{1b}E_4$	AlkL		E_a
299	$E_{1a}E_iE_4$	AlkL		E_a
300	$E_{1b}E_iE_4$	AlkL		E_a
301	$E_{1a}E_{ii}E_4$	AlkL		E_a
302	$E_{1b}E_{ii}E_4$	AlkL		E_a
303	$E_{1a}E_{ii}E_{iib}E_4$	AlkL		E_a
304	$E_{1b}E_{ii}E_{iib}E_4$	AlkL		E_a
305	$E_{1a}E_{iii}$	AlkL		E_a
306	$E_{1b}E_{iii}$	AlkL		E_a
307	$E_{1a}E_{iii}E_4$	AlkL		E_a
308	$E_{1b}E_{iii}E_4$	AlkL		E_a
309	$E_{1a}E_{iv}$	AlkL		E_a
310	$E_{1b}E_{iv}$	AlkL		E_a
311	$E_{1a}E_{iv}E_4$	AlkL		E_a
312	$E_{1b}E_{iv}E_4$	AlkL		E_a
313	E_{1a}	AlkL	E_4-	E_a
314	E_{1b}	AlkL	E_4-	E_a
315	$E_{1a}E_i$	AlkL	E_4-	E_a
316	$E_{1b}E_i$	AlkL	E_4-	E_a
317	$E_{1a}E_{ii}$	AlkL	E_4-	E_a
318	$E_{1b}E_{ii}$	AlkL	E_4-	E_a

319	$E_{1a}E_{ii}E_{iib}$	AlkL	E_4-	E_a
320	$E_{1b}E_{ii}E_{iib}$	AlkL	E_4-	E_a
321	$E_{1a}E_4$	AlkL	E_4-	E_a
322	$E_{1b}E_4$	AlkL	E_4-	E_a
323	$E_{1a}E_iE_4$	AlkL	E_4-	E_a
324	$E_{1b}E_iE_4$	AlkL	E_4-	E_a
325	$E_{1a}E_{ii}E_4$	AlkL	E_4-	E_a
326	$E_{1b}E_{ii}E_4$	AlkL	E_4-	E_a
327	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_4-	E_a
328	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_4-	E_a
329	$E_{1a}E_{iii}$	AlkL	E_4-	E_a
330	$E_{1b}E_{iii}$	AlkL	E_4-	E_a
331	$E_{1a}E_{iii}E_4$	AlkL	E_4-	E_a
332	$E_{1b}E_{iii}E_4$	AlkL	E_4-	E_a
333	$E_{1a}E_{iv}$	AlkL	E_4-	E_a
334	$E_{1b}E_{iv}$	AlkL	E_4-	E_a
335	$E_{1a}E_{iv}E_4$	AlkL	E_4-	E_a
336	$E_{1b}E_{iv}E_4$	AlkL	E_4-	E_a
337	E_{1a}	AlkL	E_5	E_a
338	E_{1b}	AlkL	E_5	E_a
339	$E_{1a}E_i$	AlkL	E_5	E_a
340	$E_{1b}E_i$	AlkL	E_5	E_a
341	$E_{1a}E_{ii}$	AlkL	E_5	E_a
342	$E_{1b}E_{ii}$	AlkL	E_5	E_a
343	$E_{1a}E_{ii}E_{iib}$	AlkL	E_5	E_a
344	$E_{1b}E_{ii}E_{iib}$	AlkL	E_5	E_a
345	$E_{1a}E_4$	AlkL	E_5	E_a
346	$E_{1b}E_4$	AlkL	E_5	E_a
347	$E_{1a}E_iE_4$	AlkL	E_5	E_a
348	$E_{1b}E_iE_4$	AlkL	E_5	E_a
349	$E_{1a}E_{ii}E_4$	AlkL	E_5	E_a
350	$E_{1b}E_{ii}E_4$	AlkL	E_5	E_a
351	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_5	E_a
352	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_5	E_a
353	$E_{1a}E_{iii}$	AlkL	E_5	E_a
354	$E_{1b}E_{iii}$	AlkL	E_5	E_a
355	$E_{1a}E_{iii}E_4$	AlkL	E_5	E_a
356	$E_{1b}E_{iii}E_4$	AlkL	E_5	E_a
357	$E_{1a}E_{iv}$	AlkL	E_5	E_a
358	$E_{1b}E_{iv}$	AlkL	E_5	E_a
359	$E_{1a}E_{iv}E_4$	AlkL	E_5	E_a
360	$E_{1b}E_{iv}E_4$	AlkL	E_5	E_a
361	E_{1a}	AlkL	E_4-E_5	E_a

362	E_{1b}	AlkL	E_4-E_5	E_a
363	$E_{1a}E_i$	AlkL	E_4-E_5	E_a
364	$E_{1b}E_i$	AlkL	E_4-E_5	E_a
365	$E_{1a}E_{ii}$	AlkL	E_4-E_5	E_a
366	$E_{1b}E_{ii}$	AlkL	E_4-E_5	E_a
367	$E_{1a}E_{ii}E_{iib}$	AlkL	E_4-E_5	E_a
368	$E_{1b}E_{ii}E_{iib}$	AlkL	E_4-E_5	E_a
369	$E_{1a}E_4$	AlkL	E_4-E_5	E_a
370	$E_{1b}E_4$	AlkL	E_4-E_5	E_a
371	$E_{1a}E_iE_4$	AlkL	E_4-E_5	E_a
372	$E_{1b}E_iE_4$	AlkL	E_4-E_5	E_a
373	$E_{1a}E_{ii}E_4$	AlkL	E_4-E_5	E_a
374	$E_{1b}E_{ii}E_4$	AlkL	E_4-E_5	E_a
375	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_a
376	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_a
377	$E_{1a}E_{iii}$	AlkL	E_4-E_5	E_a
378	$E_{1b}E_{iii}$	AlkL	E_4-E_5	E_a
379	$E_{1a}E_{iii}E_4$	AlkL	E_4-E_5	E_a
380	$E_{1b}E_{iii}E_4$	AlkL	E_4-E_5	E_a
381	$E_{1a}E_{iv}$	AlkL	E_4-E_5	E_a
382	$E_{1b}E_{iv}$	AlkL	E_4-E_5	E_a
383	$E_{1a}E_{iv}E_4$	AlkL	E_4-E_5	E_a
384	$E_{1b}E_{iv}E_4$	AlkL	E_4-E_5	E_a
385	E_{1a}			E_b
386	E_{1b}			E_b
387	$E_{1a}E_i$			E_b
388	$E_{1b}E_i$			E_b
389	$E_{1a}E_{ii}$			E_b
390	$E_{1b}E_{ii}$			E_b
391	$E_{1a}E_{ii}E_{iib}$			E_b
392	$E_{1b}E_{ii}E_{iib}$			E_b
393	$E_{1a}E_4$			E_b
394	$E_{1b}E_4$			E_b
395	$E_{1a}E_iE_4$			E_b
396	$E_{1b}E_iE_4$			E_b
397	$E_{1a}E_{ii}E_4$			E_b
398	$E_{1b}E_{ii}E_4$			E_b
399	$E_{1a}E_{ii}E_{iib}E_4$			E_b
400	$E_{1b}E_{ii}E_{iib}E_4$			E_b
401	$E_{1a}E_{iii}$			E_b
402	$E_{1b}E_{iii}$			E_b
403	$E_{1a}E_{iii}E_4$			E_b
404	$E_{1b}E_{iii}E_4$			E_b

405	$E_{1a}E_{iv}$		E_b
406	$E_{1b}E_{iv}$		E_b
407	$E_{1a}E_{iv}E_4$		E_b
408	$E_{1b}E_{iv}E_4$		E_b
409	E_{1a}	E_4-	E_b
410	E_{1b}	E_4-	E_b
411	$E_{1a}E_i$	E_4-	E_b
412	$E_{1b}E_i$	E_4-	E_b
413	$E_{1a}E_{ii}$	E_4-	E_b
414	$E_{1b}E_{ii}$	E_4-	E_b
415	$E_{1a}E_{ii}E_{iib}$	E_4-	E_b
416	$E_{1b}E_{ii}E_{iib}$	E_4-	E_b
417	$E_{1a}E_4$	E_4-	E_b
418	$E_{1b}E_4$	E_4-	E_b
419	$E_{1a}E_iE_4$	E_4-	E_b
420	$E_{1b}E_iE_4$	E_4-	E_b
421	$E_{1a}E_{ii}E_4$	E_4-	E_b
422	$E_{1b}E_{ii}E_4$	E_4-	E_b
423	$E_{1a}E_{ii}E_{iib}E_4$	E_4-	E_b
424	$E_{1b}E_{ii}E_{iib}E_4$	E_4-	E_b
425	$E_{1a}E_{iii}$	E_4-	E_b
426	$E_{1b}E_{iii}$	E_4-	E_b
427	$E_{1a}E_{iii}E_4$	E_4-	E_b
428	$E_{1b}E_{iii}E_4$	E_4-	E_b
429	$E_{1a}E_{iv}$	E_4-	E_b
430	$E_{1b}E_{iv}$	E_4-	E_b
431	$E_{1a}E_{iv}E_4$	E_4-	E_b
432	$E_{1b}E_{iv}E_4$	E_4-	E_b
433	E_{1a}	E_5	E_b
434	E_{1b}	E_5	E_b
435	$E_{1a}E_i$	E_5	E_b
436	$E_{1b}E_i$	E_5	E_b
437	$E_{1a}E_{ii}$	E_5	E_b
438	$E_{1b}E_{ii}$	E_5	E_b
439	$E_{1a}E_{ii}E_{iib}$	E_5	E_b
440	$E_{1b}E_{ii}E_{iib}$	E_5	E_b
441	$E_{1a}E_4$	E_5	E_b
442	$E_{1b}E_4$	E_5	E_b
443	$E_{1a}E_iE_4$	E_5	E_b
444	$E_{1b}E_iE_4$	E_5	E_b
445	$E_{1a}E_{ii}E_4$	E_5	E_b
446	$E_{1b}E_{ii}E_4$	E_5	E_b
447	$E_{1a}E_{ii}E_{iib}E_4$	E_5	E_b

448	$E_{1b}E_{ii}E_{iib}E_4$	E_5	E_b
449	$E_{1a}E_{iii}$	E_5	E_b
450	$E_{1b}E_{iii}$	E_5	E_b
451	$E_{1a}E_{iii}E_4$	E_5	E_b
452	$E_{1b}E_{iii}E_4$	E_5	E_b
453	$E_{1a}E_{iv}$	E_5	E_b
454	$E_{1b}E_{iv}$	E_5	E_b
455	$E_{1a}E_{iv}E_4$	E_5	E_b
456	$E_{1b}E_{iv}E_4$	E_5	E_b
457	E_{1a}	E_4-E_5	E_b
458	E_{1b}	E_4-E_5	E_b
459	$E_{1a}E_i$	E_4-E_5	E_b
460	$E_{1b}E_i$	E_4-E_5	E_b
461	$E_{1a}E_{ii}$	E_4-E_5	E_b
462	$E_{1b}E_{ii}$	E_4-E_5	E_b
463	$E_{1a}E_{ii}E_{iib}$	E_4-E_5	E_b
464	$E_{1b}E_{ii}E_{iib}$	E_4-E_5	E_b
465	$E_{1a}E_4$	E_4-E_5	E_b
466	$E_{1b}E_4$	E_4-E_5	E_b
467	$E_{1a}E_iE_4$	E_4-E_5	E_b
468	$E_{1b}E_iE_4$	E_4-E_5	E_b
469	$E_{1a}E_{ii}E_4$	E_4-E_5	E_b
470	$E_{1b}E_{ii}E_4$	E_4-E_5	E_b
471	$E_{1a}E_{ii}E_{iib}E_4$	E_4-E_5	E_b
472	$E_{1b}E_{ii}E_{iib}E_4$	E_4-E_5	E_b
473	$E_{1a}E_{iii}$	E_4-E_5	E_b
474	$E_{1b}E_{iii}$	E_4-E_5	E_b
475	$E_{1a}E_{iii}E_4$	E_4-E_5	E_b
476	$E_{1b}E_{iii}E_4$	E_4-E_5	E_b
477	$E_{1a}E_{iv}$	E_4-E_5	E_b
478	$E_{1b}E_{iv}$	E_4-E_5	E_b
479	$E_{1a}E_{iv}E_4$	E_4-E_5	E_b
480	$E_{1b}E_{iv}E_4$	E_4-E_5	E_b
481	E_{1a} AlkL		E_b
482	E_{1b} AlkL		E_b
483	$E_{1a}E_i$ AlkL		E_b
484	$E_{1b}E_i$ AlkL		E_b
485	$E_{1a}E_{ii}$ AlkL		E_b
486	$E_{1b}E_{ii}$ AlkL		E_b
487	$E_{1a}E_{ii}E_{iib}$ AlkL		E_b
488	$E_{1b}E_{ii}E_{iib}$ AlkL		E_b
489	$E_{1a}E_4$ AlkL		E_b
490	$E_{1b}E_4$ AlkL		E_b

491	$E_{1a}E_iE_4$	AlkL		E_b
492	$E_{1b}E_iE_4$	AlkL		E_b
493	$E_{1a}E_{ii}E_4$	AlkL		E_b
494	$E_{1b}E_{ii}E_4$	AlkL		E_b
495	$E_{1a}E_{ii}E_{iib}E_4$	AlkL		E_b
496	$E_{1b}E_{ii}E_{iib}E_4$	AlkL		E_b
497	$E_{1a}E_{iii}$	AlkL		E_b
498	$E_{1b}E_{iii}$	AlkL		E_b
499	$E_{1a}E_{iii}E_4$	AlkL		E_b
500	$E_{1b}E_{iii}E_4$	AlkL		E_b
501	$E_{1a}E_{iv}$	AlkL		E_b
502	$E_{1b}E_{iv}$	AlkL		E_b
503	$E_{1a}E_{iv}E_4$	AlkL		E_b
504	$E_{1b}E_{iv}E_4$	AlkL		E_b
505	E_{1a}	AlkL	E_4-	E_b
506	E_{1b}	AlkL	E_4-	E_b
507	$E_{1a}E_i$	AlkL	E_4-	E_b
508	$E_{1b}E_i$	AlkL	E_4-	E_b
509	$E_{1a}E_{ii}$	AlkL	E_4-	E_b
510	$E_{1b}E_{ii}$	AlkL	E_4-	E_b
511	$E_{1a}E_{ii}E_{iib}$	AlkL	E_4-	E_b
512	$E_{1b}E_{ii}E_{iib}$	AlkL	E_4-	E_b
513	$E_{1a}E_4$	AlkL	E_4-	E_b
514	$E_{1b}E_4$	AlkL	E_4-	E_b
515	$E_{1a}E_iE_4$	AlkL	E_4-	E_b
516	$E_{1b}E_iE_4$	AlkL	E_4-	E_b
517	$E_{1a}E_{ii}E_4$	AlkL	E_4-	E_b
518	$E_{1b}E_{ii}E_4$	AlkL	E_4-	E_b
519	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_4-	E_b
520	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_4-	E_b
521	$E_{1a}E_{iii}$	AlkL	E_4-	E_b
522	$E_{1b}E_{iii}$	AlkL	E_4-	E_b
523	$E_{1a}E_{iii}E_4$	AlkL	E_4-	E_b
524	$E_{1b}E_{iii}E_4$	AlkL	E_4-	E_b
525	$E_{1a}E_{iv}$	AlkL	E_4-	E_b
526	$E_{1b}E_{iv}$	AlkL	E_4-	E_b
527	$E_{1a}E_{iv}E_4$	AlkL	E_4-	E_b
528	$E_{1b}E_{iv}E_4$	AlkL	E_4-	E_b
529	E_{1a}	AlkL	E_5	E_b
530	E_{1b}	AlkL	E_5	E_b
531	$E_{1a}E_i$	AlkL	E_5	E_b
532	$E_{1b}E_i$	AlkL	E_5	E_b
533	$E_{1a}E_{ii}$	AlkL	E_5	E_b

534	$E_{1b}E_{ii}$	AlkL	E_5	E_b
535	$E_{1a}E_{ii}E_{iib}$	AlkL	E_5	E_b
536	$E_{1b}E_{ii}E_{iib}$	AlkL	E_5	E_b
537	$E_{1a}E_4$	AlkL	E_5	E_b
538	$E_{1b}E_4$	AlkL	E_5	E_b
539	$E_{1a}E_iE_4$	AlkL	E_5	E_b
540	$E_{1b}E_iE_4$	AlkL	E_5	E_b
541	$E_{1a}E_{ii}E_4$	AlkL	E_5	E_b
542	$E_{1b}E_{ii}E_4$	AlkL	E_5	E_b
543	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_5	E_b
544	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_5	E_b
545	$E_{1a}E_{iii}$	AlkL	E_5	E_b
546	$E_{1b}E_{iii}$	AlkL	E_5	E_b
547	$E_{1a}E_{iii}E_4$	AlkL	E_5	E_b
548	$E_{1b}E_{iii}E_4$	AlkL	E_5	E_b
549	$E_{1a}E_{iv}$	AlkL	E_5	E_b
550	$E_{1b}E_{iv}$	AlkL	E_5	E_b
551	$E_{1a}E_{iv}E_4$	AlkL	E_5	E_b
552	$E_{1b}E_{iv}E_4$	AlkL	E_5	E_b
553	E_{1a}	AlkL	E_4-E_5	E_b
554	E_{1b}	AlkL	E_4-E_5	E_b
555	$E_{1a}E_i$	AlkL	E_4-E_5	E_b
556	$E_{1b}E_i$	AlkL	E_4-E_5	E_b
557	$E_{1a}E_{ii}$	AlkL	E_4-E_5	E_b
558	$E_{1b}E_{ii}$	AlkL	E_4-E_5	E_b
559	$E_{1a}E_{ii}E_{iib}$	AlkL	E_4-E_5	E_b
560	$E_{1b}E_{ii}E_{iib}$	AlkL	E_4-E_5	E_b
561	$E_{1a}E_4$	AlkL	E_4-E_5	E_b
562	$E_{1b}E_4$	AlkL	E_4-E_5	E_b
563	$E_{1a}E_iE_4$	AlkL	E_4-E_5	E_b
564	$E_{1b}E_iE_4$	AlkL	E_4-E_5	E_b
565	$E_{1a}E_{ii}E_4$	AlkL	E_4-E_5	E_b
566	$E_{1b}E_{ii}E_4$	AlkL	E_4-E_5	E_b
567	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_b
568	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_b
569	$E_{1a}E_{iii}$	AlkL	E_4-E_5	E_b
570	$E_{1b}E_{iii}$	AlkL	E_4-E_5	E_b
571	$E_{1a}E_{iii}E_4$	AlkL	E_4-E_5	E_b
572	$E_{1b}E_{iii}E_4$	AlkL	E_4-E_5	E_b
573	$E_{1a}E_{iv}$	AlkL	E_4-E_5	E_b
574	$E_{1b}E_{iv}$	AlkL	E_4-E_5	E_b
575	$E_{1a}E_{iv}E_4$	AlkL	E_4-E_5	E_b
576	$E_{1b}E_{iv}E_4$	AlkL	E_4-E_5	E_b

577	E_{1a}		E_d
578	E_{1b}		E_d
579	$E_{1a}E_i$		E_d
580	$E_{1b}E_i$		E_d
581	$E_{1a}E_{ii}$		E_d
582	$E_{1b}E_{ii}$		E_d
583	$E_{1a}E_{ii}E_{iib}$		E_d
584	$E_{1b}E_{ii}E_{iib}$		E_d
585	$E_{1a}E_4$		E_d
586	$E_{1b}E_4$		E_d
587	$E_{1a}E_iE_4$		E_d
588	$E_{1b}E_iE_4$		E_d
589	$E_{1a}E_{ii}E_4$		E_d
590	$E_{1b}E_{ii}E_4$		E_d
591	$E_{1a}E_{ii}E_{iib}E_4$		E_d
592	$E_{1b}E_{ii}E_{iib}E_4$		E_d
593	$E_{1a}E_{iii}$		E_d
594	$E_{1b}E_{iii}$		E_d
595	$E_{1a}E_{iii}E_4$		E_d
596	$E_{1b}E_{iii}E_4$		E_d
597	$E_{1a}E_{iv}$		E_d
598	$E_{1b}E_{iv}$		E_d
599	$E_{1a}E_{iv}E_4$		E_d
600	$E_{1b}E_{iv}E_4$		E_d
601	E_{1a}	E_{4^*}	E_d
602	E_{1b}	E_{4^*}	E_d
603	$E_{1a}E_i$	E_{4^*}	E_d
604	$E_{1b}E_i$	E_{4^*}	E_d
605	$E_{1a}E_{ii}$	E_{4^*}	E_d
606	$E_{1b}E_{ii}$	E_{4^*}	E_d
607	$E_{1a}E_{ii}E_{iib}$	E_{4^*}	E_d
608	$E_{1b}E_{ii}E_{iib}$	E_{4^*}	E_d
609	$E_{1a}E_4$	E_{4^*}	E_d
610	$E_{1b}E_4$	E_{4^*}	E_d
611	$E_{1a}E_iE_4$	E_{4^*}	E_d
612	$E_{1b}E_iE_4$	E_{4^*}	E_d
613	$E_{1a}E_{ii}E_4$	E_{4^*}	E_d
614	$E_{1b}E_{ii}E_4$	E_{4^*}	E_d
615	$E_{1a}E_{ii}E_{iib}E_4$	E_{4^*}	E_d
616	$E_{1b}E_{ii}E_{iib}E_4$	E_{4^*}	E_d
617	$E_{1a}E_{iii}$	E_{4^*}	E_d
618	$E_{1b}E_{iii}$	E_{4^*}	E_d
619	$E_{1a}E_{iii}E_4$	E_{4^*}	E_d

620	$E_{1b}E_{iii}E_4$	$E_{4'}$	E_d
621	$E_{1a}E_{iv}$	$E_{4'}$	E_d
622	$E_{1b}E_{iv}$	$E_{4'}$	E_d
623	$E_{1a}E_{iv}E_4$	$E_{4'}$	E_d
624	$E_{1b}E_{iv}E_4$	$E_{4'}$	E_d
625	E_{1a}	E_5	E_d
626	E_{1b}	E_5	E_d
627	$E_{1a}E_i$	E_5	E_d
628	$E_{1b}E_i$	E_5	E_d
629	$E_{1a}E_{ii}$	E_5	E_d
630	$E_{1b}E_{ii}$	E_5	E_d
631	$E_{1a}E_{ii}E_{iib}$	E_5	E_d
632	$E_{1b}E_{ii}E_{iib}$	E_5	E_d
633	$E_{1a}E_4$	E_5	E_d
634	$E_{1b}E_4$	E_5	E_d
635	$E_{1a}E_iE_4$	E_5	E_d
636	$E_{1b}E_iE_4$	E_5	E_d
637	$E_{1a}E_{ii}E_4$	E_5	E_d
638	$E_{1b}E_{ii}E_4$	E_5	E_d
639	$E_{1a}E_{ii}E_{iib}E_4$	E_5	E_d
640	$E_{1b}E_{ii}E_{iib}E_4$	E_5	E_d
641	$E_{1a}E_{iii}$	E_5	E_d
642	$E_{1b}E_{iii}$	E_5	E_d
643	$E_{1a}E_{iii}E_4$	E_5	E_d
644	$E_{1b}E_{iii}E_4$	E_5	E_d
645	$E_{1a}E_{iv}$	E_5	E_d
646	$E_{1b}E_{iv}$	E_5	E_d
647	$E_{1a}E_{iv}E_4$	E_5	E_d
648	$E_{1b}E_{iv}E_4$	E_5	E_d
649	E_{1a}	$E_{4'}E_5$	E_d
650	E_{1b}	$E_{4'}E_5$	E_d
651	$E_{1a}E_i$	$E_{4'}E_5$	E_d
652	$E_{1b}E_i$	$E_{4'}E_5$	E_d
653	$E_{1a}E_{ii}$	$E_{4'}E_5$	E_d
654	$E_{1b}E_{ii}$	$E_{4'}E_5$	E_d
655	$E_{1a}E_{ii}E_{iib}$	$E_{4'}E_5$	E_d
656	$E_{1b}E_{ii}E_{iib}$	$E_{4'}E_5$	E_d
657	$E_{1a}E_4$	$E_{4'}E_5$	E_d
658	$E_{1b}E_4$	$E_{4'}E_5$	E_d
659	$E_{1a}E_iE_4$	$E_{4'}E_5$	E_d
660	$E_{1b}E_iE_4$	$E_{4'}E_5$	E_d
661	$E_{1a}E_{ii}E_4$	$E_{4'}E_5$	E_d
662	$E_{1b}E_{ii}E_4$	$E_{4'}E_5$	E_d

663	$E_{1a}E_{ii}E_{iib}E_4$		$E_{4'}E_5$	E_d
664	$E_{1b}E_{ii}E_{iib}E_4$		$E_{4'}E_5$	E_d
665	$E_{1a}E_{iii}$		$E_{4'}E_5$	E_d
666	$E_{1b}E_{iii}$		$E_{4'}E_5$	E_d
667	$E_{1a}E_{iii}E_4$		$E_{4'}E_5$	E_d
668	$E_{1b}E_{iii}E_4$		$E_{4'}E_5$	E_d
669	$E_{1a}E_{iv}$		$E_{4'}E_5$	E_d
670	$E_{1b}E_{iv}$		$E_{4'}E_5$	E_d
671	$E_{1a}E_{iv}E_4$		$E_{4'}E_5$	E_d
672	$E_{1b}E_{iv}E_4$		$E_{4'}E_5$	E_d
673	E_{1a}	AlkL		E_d
674	E_{1b}	AlkL		E_d
675	$E_{1a}E_i$	AlkL		E_d
676	$E_{1b}E_i$	AlkL		E_d
677	$E_{1a}E_{ii}$	AlkL		E_d
678	$E_{1b}E_{ii}$	AlkL		E_d
679	$E_{1a}E_{ii}E_{iib}$	AlkL		E_d
680	$E_{1b}E_{ii}E_{iib}$	AlkL		E_d
681	$E_{1a}E_4$	AlkL		E_d
682	$E_{1b}E_4$	AlkL		E_d
683	$E_{1a}E_iE_4$	AlkL		E_d
684	$E_{1b}E_iE_4$	AlkL		E_d
685	$E_{1a}E_{ii}E_4$	AlkL		E_d
686	$E_{1b}E_{ii}E_4$	AlkL		E_d
687	$E_{1a}E_{ii}E_{iib}E_4$	AlkL		E_d
688	$E_{1b}E_{ii}E_{iib}E_4$	AlkL		E_d
689	$E_{1a}E_{iii}$	AlkL		E_d
690	$E_{1b}E_{iii}$	AlkL		E_d
691	$E_{1a}E_{iii}E_4$	AlkL		E_d
692	$E_{1b}E_{iii}E_4$	AlkL		E_d
693	$E_{1a}E_{iv}$	AlkL		E_d
694	$E_{1b}E_{iv}$	AlkL		E_d
695	$E_{1a}E_{iv}E_4$	AlkL		E_d
696	$E_{1b}E_{iv}E_4$	AlkL		E_d
697	E_{1a}	AlkL	$E_{4'}$	E_d
698	E_{1b}	AlkL	$E_{4'}$	E_d
699	$E_{1a}E_i$	AlkL	$E_{4'}$	E_d
700	$E_{1b}E_i$	AlkL	$E_{4'}$	E_d
701	$E_{1a}E_{ii}$	AlkL	$E_{4'}$	E_d
702	$E_{1b}E_{ii}$	AlkL	$E_{4'}$	E_d
703	$E_{1a}E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_d
704	$E_{1b}E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_d
705	$E_{1a}E_4$	AlkL	$E_{4'}$	E_d

706	$E_{1b}E_4$	AlkL	E_4-	E_d
707	$E_{1a}E_iE_4$	AlkL	E_4-	E_d
708	$E_{1b}E_iE_4$	AlkL	E_4-	E_d
709	$E_{1a}E_{ii}E_4$	AlkL	E_4-	E_d
710	$E_{1b}E_{ii}E_4$	AlkL	E_4-	E_d
711	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_4-	E_d
712	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_4-	E_d
713	$E_{1a}E_{iii}$	AlkL	E_4-	E_d
714	$E_{1b}E_{iii}$	AlkL	E_4-	E_d
715	$E_{1a}E_{iii}E_4$	AlkL	E_4-	E_d
716	$E_{1b}E_{iii}E_4$	AlkL	E_4-	E_d
717	$E_{1a}E_{iv}$	AlkL	E_4-	E_d
718	$E_{1b}E_{iv}$	AlkL	E_4-	E_d
719	$E_{1a}E_{iv}E_4$	AlkL	E_4-	E_d
720	$E_{1b}E_{iv}E_4$	AlkL	E_4-	E_d
721	E_{1a}	AlkL	E_5	E_d
722	E_{1b}	AlkL	E_5	E_d
723	$E_{1a}E_i$	AlkL	E_5	E_d
724	$E_{1b}E_i$	AlkL	E_5	E_d
725	$E_{1a}E_{ii}$	AlkL	E_5	E_d
726	$E_{1b}E_{ii}$	AlkL	E_5	E_d
727	$E_{1a}E_{ii}E_{iib}$	AlkL	E_5	E_d
728	$E_{1b}E_{ii}E_{iib}$	AlkL	E_5	E_d
729	$E_{1a}E_4$	AlkL	E_5	E_d
730	$E_{1b}E_4$	AlkL	E_5	E_d
731	$E_{1a}E_iE_4$	AlkL	E_5	E_d
732	$E_{1b}E_iE_4$	AlkL	E_5	E_d
733	$E_{1a}E_{ii}E_4$	AlkL	E_5	E_d
734	$E_{1b}E_{ii}E_4$	AlkL	E_5	E_d
735	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_5	E_d
736	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_5	E_d
737	$E_{1a}E_{iii}$	AlkL	E_5	E_d
738	$E_{1b}E_{iii}$	AlkL	E_5	E_d
739	$E_{1a}E_{iii}E_4$	AlkL	E_5	E_d
740	$E_{1b}E_{iii}E_4$	AlkL	E_5	E_d
741	$E_{1a}E_{iv}$	AlkL	E_5	E_d
742	$E_{1b}E_{iv}$	AlkL	E_5	E_d
743	$E_{1a}E_{iv}E_4$	AlkL	E_5	E_d
744	$E_{1b}E_{iv}E_4$	AlkL	E_5	E_d
745	E_{1a}	AlkL	E_4-E_5	E_d
746	E_{1b}	AlkL	E_4-E_5	E_d
747	$E_{1a}E_i$	AlkL	E_4-E_5	E_d
748	$E_{1b}E_i$	AlkL	E_4-E_5	E_d

749	$E_{1a}E_{ii}$	AlkL	E_4-E_5	E_d
750	$E_{1b}E_{ii}$	AlkL	E_4-E_5	E_d
751	$E_{1a}E_{ii}E_{iib}$	AlkL	E_4-E_5	E_d
752	$E_{1b}E_{ii}E_{iib}$	AlkL	E_4-E_5	E_d
753	$E_{1a}E_4$	AlkL	E_4-E_5	E_d
754	$E_{1b}E_4$	AlkL	E_4-E_5	E_d
755	$E_{1a}E_iE_4$	AlkL	E_4-E_5	E_d
756	$E_{1b}E_iE_4$	AlkL	E_4-E_5	E_d
757	$E_{1a}E_{ii}E_4$	AlkL	E_4-E_5	E_d
758	$E_{1b}E_{ii}E_4$	AlkL	E_4-E_5	E_d
759	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_d
760	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_d
761	$E_{1a}E_{iii}$	AlkL	E_4-E_5	E_d
762	$E_{1b}E_{iii}$	AlkL	E_4-E_5	E_d
763	$E_{1a}E_{iii}E_4$	AlkL	E_4-E_5	E_d
764	$E_{1b}E_{iii}E_4$	AlkL	E_4-E_5	E_d
765	$E_{1a}E_{iv}$	AlkL	E_4-E_5	E_d
766	$E_{1b}E_{iv}$	AlkL	E_4-E_5	E_d
767	$E_{1a}E_{iv}E_4$	AlkL	E_4-E_5	E_d
768	$E_{1b}E_{iv}E_4$	AlkL	E_4-E_5	E_d
769	E_{1a}			E_e
770	E_{1b}			E_e
771	$E_{1a}E_i$			E_e
772	$E_{1b}E_i$			E_e
773	$E_{1a}E_{ii}$			E_e
774	$E_{1b}E_{ii}$			E_e
775	$E_{1a}E_{ii}E_{iib}$			E_e
776	$E_{1b}E_{ii}E_{iib}$			E_e
777	$E_{1a}E_4$			E_e
778	$E_{1b}E_4$			E_e
779	$E_{1a}E_iE_4$			E_e
780	$E_{1b}E_iE_4$			E_e
781	$E_{1a}E_{ii}E_4$			E_e
782	$E_{1b}E_{ii}E_4$			E_e
783	$E_{1a}E_{ii}E_{iib}E_4$			E_e
784	$E_{1b}E_{ii}E_{iib}E_4$			E_e
785	$E_{1a}E_{iii}$			E_e
786	$E_{1b}E_{iii}$			E_e
787	$E_{1a}E_{iii}E_4$			E_e
788	$E_{1b}E_{iii}E_4$			E_e
789	$E_{1a}E_{iv}$			E_e
790	$E_{1b}E_{iv}$			E_e
791	$E_{1a}E_{iv}E_4$			E_e

792	$E_{1b}E_{iv}E_4$		E_e
793	E_{1a}	E_4-	E_e
794	E_{1b}	E_4-	E_e
795	$E_{1a}E_i$	E_4-	E_e
796	$E_{1b}E_i$	E_4-	E_e
797	$E_{1a}E_{ii}$	E_4-	E_e
798	$E_{1b}E_{ii}$	E_4-	E_e
799	$E_{1a}E_{ii}E_{iib}$	E_4-	E_e
800	$E_{1b}E_{ii}E_{iib}$	E_4-	E_e
801	$E_{1a}E_4$	E_4-	E_e
802	$E_{1b}E_4$	E_4-	E_e
803	$E_{1a}E_iE_4$	E_4-	E_e
804	$E_{1b}E_iE_4$	E_4-	E_e
805	$E_{1a}E_{ii}E_4$	E_4-	E_e
806	$E_{1b}E_{ii}E_4$	E_4-	E_e
807	$E_{1a}E_{ii}E_{iib}E_4$	E_4-	E_e
808	$E_{1b}E_{ii}E_{iib}E_4$	E_4-	E_e
809	$E_{1a}E_{iii}$	E_4-	E_e
810	$E_{1b}E_{iii}$	E_4-	E_e
811	$E_{1a}E_{iii}E_4$	E_4-	E_e
812	$E_{1b}E_{iii}E_4$	E_4-	E_e
813	$E_{1a}E_{iv}$	E_4-	E_e
814	$E_{1b}E_{iv}$	E_4-	E_e
815	$E_{1a}E_{iv}E_4$	E_4-	E_e
816	$E_{1b}E_{iv}E_4$	E_4-	E_e
817	E_{1a}	E_5	E_e
818	E_{1b}	E_5	E_e
819	$E_{1a}E_i$	E_5	E_e
820	$E_{1b}E_i$	E_5	E_e
821	$E_{1a}E_{ii}$	E_5	E_e
822	$E_{1b}E_{ii}$	E_5	E_e
823	$E_{1a}E_{ii}E_{iib}$	E_5	E_e
824	$E_{1b}E_{ii}E_{iib}$	E_5	E_e
825	$E_{1a}E_4$	E_5	E_e
826	$E_{1b}E_4$	E_5	E_e
827	$E_{1a}E_iE_4$	E_5	E_e
828	$E_{1b}E_iE_4$	E_5	E_e
829	$E_{1a}E_{ii}E_4$	E_5	E_e
830	$E_{1b}E_{ii}E_4$	E_5	E_e
831	$E_{1a}E_{ii}E_{iib}E_4$	E_5	E_e
832	$E_{1b}E_{ii}E_{iib}E_4$	E_5	E_e
833	$E_{1a}E_{iii}$	E_5	E_e
834	$E_{1b}E_{iii}$	E_5	E_e

835	$E_{1a}E_{iii}E_4$	E_5	E_e
836	$E_{1b}E_{iii}E_4$	E_5	E_e
837	$E_{1a}E_{iv}$	E_5	E_e
838	$E_{1b}E_{iv}$	E_5	E_e
839	$E_{1a}E_{iv}E_4$	E_5	E_e
840	$E_{1b}E_{iv}E_4$	E_5	E_e
841	E_{1a}	E_4-E_5	E_e
842	E_{1b}	E_4-E_5	E_e
843	$E_{1a}E_i$	E_4-E_5	E_e
844	$E_{1b}E_i$	E_4-E_5	E_e
845	$E_{1a}E_{ii}$	E_4-E_5	E_e
846	$E_{1b}E_{ii}$	E_4-E_5	E_e
847	$E_{1a}E_{ii}E_{iib}$	E_4-E_5	E_e
848	$E_{1b}E_{ii}E_{iib}$	E_4-E_5	E_e
849	$E_{1a}E_4$	E_4-E_5	E_e
850	$E_{1b}E_4$	E_4-E_5	E_e
851	$E_{1a}E_iE_4$	E_4-E_5	E_e
852	$E_{1b}E_iE_4$	E_4-E_5	E_e
853	$E_{1a}E_{ii}E_4$	E_4-E_5	E_e
854	$E_{1b}E_{ii}E_4$	E_4-E_5	E_e
855	$E_{1a}E_{ii}E_{iib}E_4$	E_4-E_5	E_e
856	$E_{1b}E_{ii}E_{iib}E_4$	E_4-E_5	E_e
857	$E_{1a}E_{iii}$	E_4-E_5	E_e
858	$E_{1b}E_{iii}$	E_4-E_5	E_e
859	$E_{1a}E_{iii}E_4$	E_4-E_5	E_e
860	$E_{1b}E_{iii}E_4$	E_4-E_5	E_e
861	$E_{1a}E_{iv}$	E_4-E_5	E_e
862	$E_{1b}E_{iv}$	E_4-E_5	E_e
863	$E_{1a}E_{iv}E_4$	E_4-E_5	E_e
864	$E_{1b}E_{iv}E_4$	E_4-E_5	E_e
865	E_{1a} AlkL		E_e
866	E_{1b} AlkL		E_e
867	$E_{1a}E_i$ AlkL		E_e
868	$E_{1b}E_i$ AlkL		E_e
869	$E_{1a}E_{ii}$ AlkL		E_e
870	$E_{1b}E_{ii}$ AlkL		E_e
871	$E_{1a}E_{ii}E_{iib}$ AlkL		E_e
872	$E_{1b}E_{ii}E_{iib}$ AlkL		E_e
873	$E_{1a}E_4$ AlkL		E_e
874	$E_{1b}E_4$ AlkL		E_e
875	$E_{1a}E_iE_4$ AlkL		E_e
876	$E_{1b}E_iE_4$ AlkL		E_e
877	$E_{1a}E_{ii}E_4$ AlkL		E_e

878	$E_{1b}E_{ii}E_4$	AlkL		E_e
879	$E_{1a}E_{ii}E_{iib}E_4$	AlkL		E_e
880	$E_{1b}E_{ii}E_{iib}E_4$	AlkL		E_e
881	$E_{1a}E_{iii}$	AlkL		E_e
882	$E_{1b}E_{iii}$	AlkL		E_e
883	$E_{1a}E_{iii}E_4$	AlkL		E_e
884	$E_{1b}E_{iii}E_4$	AlkL		E_e
885	$E_{1a}E_{iv}$	AlkL		E_e
886	$E_{1b}E_{iv}$	AlkL		E_e
887	$E_{1a}E_{iv}E_4$	AlkL		E_e
888	$E_{1b}E_{iv}E_4$	AlkL		E_e
889	E_{1a}	AlkL	E_4-	E_e
890	E_{1b}	AlkL	E_4-	E_e
891	$E_{1a}E_i$	AlkL	E_4-	E_e
892	$E_{1b}E_i$	AlkL	E_4-	E_e
893	$E_{1a}E_{ii}$	AlkL	E_4-	E_e
894	$E_{1b}E_{ii}$	AlkL	E_4-	E_e
895	$E_{1a}E_{ii}E_{iib}$	AlkL	E_4-	E_e
896	$E_{1b}E_{ii}E_{iib}$	AlkL	E_4-	E_e
897	$E_{1a}E_4$	AlkL	E_4-	E_e
898	$E_{1b}E_4$	AlkL	E_4-	E_e
899	$E_{1a}E_iE_4$	AlkL	E_4-	E_e
900	$E_{1b}E_iE_4$	AlkL	E_4-	E_e
901	$E_{1a}E_{ii}E_4$	AlkL	E_4-	E_e
902	$E_{1b}E_{ii}E_4$	AlkL	E_4-	E_e
903	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_4-	E_e
904	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_4-	E_e
905	$E_{1a}E_{iii}$	AlkL	E_4-	E_e
906	$E_{1b}E_{iii}$	AlkL	E_4-	E_e
907	$E_{1a}E_{iii}E_4$	AlkL	E_4-	E_e
908	$E_{1b}E_{iii}E_4$	AlkL	E_4-	E_e
909	$E_{1a}E_{iv}$	AlkL	E_4-	E_e
910	$E_{1b}E_{iv}$	AlkL	E_4-	E_e
911	$E_{1a}E_{iv}E_4$	AlkL	E_4-	E_e
912	$E_{1b}E_{iv}E_4$	AlkL	E_4-	E_e
913	E_{1a}	AlkL	E_5	E_e
914	E_{1b}	AlkL	E_5	E_e
915	$E_{1a}E_i$	AlkL	E_5	E_e
916	$E_{1b}E_i$	AlkL	E_5	E_e
917	$E_{1a}E_{ii}$	AlkL	E_5	E_e
918	$E_{1b}E_{ii}$	AlkL	E_5	E_e
919	$E_{1a}E_{ii}E_{iib}$	AlkL	E_5	E_e
920	$E_{1b}E_{ii}E_{iib}$	AlkL	E_5	E_e

921	$E_{1a}E_4$	AlkL	E_5	E_e
922	$E_{1b}E_4$	AlkL	E_5	E_e
923	$E_{1a}E_iE_4$	AlkL	E_5	E_e
924	$E_{1b}E_iE_4$	AlkL	E_5	E_e
925	$E_{1a}E_{ii}E_4$	AlkL	E_5	E_e
926	$E_{1b}E_{ii}E_4$	AlkL	E_5	E_e
927	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_5	E_e
928	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_5	E_e
929	$E_{1a}E_{iii}$	AlkL	E_5	E_e
930	$E_{1b}E_{iii}$	AlkL	E_5	E_e
931	$E_{1a}E_{iii}E_4$	AlkL	E_5	E_e
932	$E_{1b}E_{iii}E_4$	AlkL	E_5	E_e
933	$E_{1a}E_{iv}$	AlkL	E_5	E_e
934	$E_{1b}E_{iv}$	AlkL	E_5	E_e
935	$E_{1a}E_{iv}E_4$	AlkL	E_5	E_e
936	$E_{1b}E_{iv}E_4$	AlkL	E_5	E_e
937	E_{1a}	AlkL	E_4-E_5	E_e
938	E_{1b}	AlkL	E_4-E_5	E_e
939	$E_{1a}E_i$	AlkL	E_4-E_5	E_e
940	$E_{1b}E_i$	AlkL	E_4-E_5	E_e
941	$E_{1a}E_{ii}$	AlkL	E_4-E_5	E_e
942	$E_{1b}E_{ii}$	AlkL	E_4-E_5	E_e
943	$E_{1a}E_{ii}E_{iib}$	AlkL	E_4-E_5	E_e
944	$E_{1b}E_{ii}E_{iib}$	AlkL	E_4-E_5	E_e
945	$E_{1a}E_4$	AlkL	E_4-E_5	E_e
946	$E_{1b}E_4$	AlkL	E_4-E_5	E_e
947	$E_{1a}E_iE_4$	AlkL	E_4-E_5	E_e
948	$E_{1b}E_iE_4$	AlkL	E_4-E_5	E_e
949	$E_{1a}E_{ii}E_4$	AlkL	E_4-E_5	E_e
950	$E_{1b}E_{ii}E_4$	AlkL	E_4-E_5	E_e
951	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_e
952	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_e
953	$E_{1a}E_{iii}$	AlkL	E_4-E_5	E_e
954	$E_{1b}E_{iii}$	AlkL	E_4-E_5	E_e
955	$E_{1a}E_{iii}E_4$	AlkL	E_4-E_5	E_e
956	$E_{1b}E_{iii}E_4$	AlkL	E_4-E_5	E_e
957	$E_{1a}E_{iv}$	AlkL	E_4-E_5	E_e
958	$E_{1b}E_{iv}$	AlkL	E_4-E_5	E_e
959	$E_{1a}E_{iv}E_4$	AlkL	E_4-E_5	E_e
960	$E_{1b}E_{iv}E_4$	AlkL	E_4-E_5	E_e
961	E_{1a}			E_f
962	E_{1b}			E_f
963	$E_{1a}E_i$			E_f

964	$E_{1b}E_{i}$		E_f
965	$E_{1a}E_{ii}$		E_f
966	$E_{1b}E_{ii}$		E_f
967	$E_{1a}E_{ii}E_{iib}$		E_f
968	$E_{1b}E_{ii}E_{iib}$		E_f
969	$E_{1a}E_4$		E_f
970	$E_{1b}E_4$		E_f
971	$E_{1a}E_iE_4$		E_f
972	$E_{1b}E_iE_4$		E_f
973	$E_{1a}E_{ii}E_4$		E_f
974	$E_{1b}E_{ii}E_4$		E_f
975	$E_{1a}E_{ii}E_{iib}E_4$		E_f
976	$E_{1b}E_{ii}E_{iib}E_4$		E_f
977	$E_{1a}E_{iii}$		E_f
978	$E_{1b}E_{iii}$		E_f
979	$E_{1a}E_{iii}E_4$		E_f
980	$E_{1b}E_{iii}E_4$		E_f
981	$E_{1a}E_{iv}$		E_f
982	$E_{1b}E_{iv}$		E_f
983	$E_{1a}E_{iv}E_4$		E_f
984	$E_{1b}E_{iv}E_4$		E_f
985	E_{1a}	E_{4^*}	E_f
986	E_{1b}	E_{4^*}	E_f
987	$E_{1a}E_i$	E_{4^*}	E_f
988	$E_{1b}E_i$	E_{4^*}	E_f
989	$E_{1a}E_{ii}$	E_{4^*}	E_f
990	$E_{1b}E_{ii}$	E_{4^*}	E_f
991	$E_{1a}E_{ii}E_{iib}$	E_{4^*}	E_f
992	$E_{1b}E_{ii}E_{iib}$	E_{4^*}	E_f
993	$E_{1a}E_4$	E_{4^*}	E_f
994	$E_{1b}E_4$	E_{4^*}	E_f
995	$E_{1a}E_iE_4$	E_{4^*}	E_f
996	$E_{1b}E_iE_4$	E_{4^*}	E_f
997	$E_{1a}E_{ii}E_4$	E_{4^*}	E_f
998	$E_{1b}E_{ii}E_4$	E_{4^*}	E_f
999	$E_{1a}E_{ii}E_{iib}E_4$	E_{4^*}	E_f
1000	$E_{1b}E_{ii}E_{iib}E_4$	E_{4^*}	E_f
1001	$E_{1a}E_{iii}$	E_{4^*}	E_f
1002	$E_{1b}E_{iii}$	E_{4^*}	E_f
1003	$E_{1a}E_{iii}E_4$	E_{4^*}	E_f
1004	$E_{1b}E_{iii}E_4$	E_{4^*}	E_f
1005	$E_{1a}E_{iv}$	E_{4^*}	E_f
1006	$E_{1b}E_{iv}$	E_{4^*}	E_f
1007	$E_{1a}E_{iv}E_4$	E_{4^*}	E_f
1008	$E_{1b}E_{iv}E_4$	E_{4^*}	E_f
1009	E_{1a}	E_5	E_f
1010	E_{1b}	E_5	E_f
1011	$E_{1a}E_i$	E_5	E_f
1012	$E_{1b}E_i$	E_5	E_f
1013	$E_{1a}E_{ii}$	E_5	E_f
1014	$E_{1b}E_{ii}$	E_5	E_f
1015	$E_{1a}E_{ii}E_{iib}$	E_5	E_f
1016	$E_{1b}E_{ii}E_{iib}$	E_5	E_f
1017	$E_{1a}E_4$	E_5	E_f
1018	$E_{1b}E_4$	E_5	E_f
1019	$E_{1a}E_iE_4$	E_5	E_f
1020	$E_{1b}E_iE_4$	E_5	E_f
1021	$E_{1a}E_{ii}E_4$	E_5	E_f
1022	$E_{1b}E_{ii}E_4$	E_5	E_f
1023	$E_{1a}E_{ii}E_{iib}E_4$	E_5	E_f
1024	$E_{1b}E_{ii}E_{iib}E_4$	E_5	E_f
1025	$E_{1a}E_{iii}$	E_5	E_f
1026	$E_{1b}E_{iii}$	E_5	E_f
1027	$E_{1a}E_{iii}E_4$	E_5	E_f
1028	$E_{1b}E_{iii}E_4$	E_5	E_f
1029	$E_{1a}E_{iv}$	E_5	E_f
1030	$E_{1b}E_{iv}$	E_5	E_f
1031	$E_{1a}E_{iv}E_4$	E_5	E_f
1032	$E_{1b}E_{iv}E_4$	E_5	E_f
1033	E_{1a}	E_4-E_5	E_f
1034	E_{1b}	E_4-E_5	E_f
1035	$E_{1a}E_i$	E_4-E_5	E_f
1036	$E_{1b}E_i$	E_4-E_5	E_f
1037	$E_{1a}E_{ii}$	E_4-E_5	E_f
1038	$E_{1b}E_{ii}$	E_4-E_5	E_f
1039	$E_{1a}E_{ii}E_{iib}$	E_4-E_5	E_f
1040	$E_{1b}E_{ii}E_{iib}$	E_4-E_5	E_f
1041	$E_{1a}E_4$	E_4-E_5	E_f
1042	$E_{1b}E_4$	E_4-E_5	E_f
1043	$E_{1a}E_iE_4$	E_4-E_5	E_f
1044	$E_{1b}E_iE_4$	E_4-E_5	E_f
1045	$E_{1a}E_{ii}E_4$	E_4-E_5	E_f
1046	$E_{1b}E_{ii}E_4$	E_4-E_5	E_f
1047	$E_{1a}E_{ii}E_{iib}E_4$	E_4-E_5	E_f
1048	$E_{1b}E_{ii}E_{iib}E_4$	E_4-E_5	E_f
1049	$E_{1a}E_{iii}$	E_4-E_5	E_f

1050	$E_{1b}E_{iii}$		E_4-E_5	E_f
1051	$E_{1a}E_{iii}E_4$		E_4-E_5	E_f
1052	$E_{1b}E_{iii}E_4$		E_4-E_5	E_f
1053	$E_{1a}E_{iv}$		E_4-E_5	E_f
1054	$E_{1b}E_{iv}$		E_4-E_5	E_f
1055	$E_{1a}E_{iv}E_4$		E_4-E_5	E_f
1056	$E_{1b}E_{iv}E_4$		E_4-E_5	E_f
1057	E_{1a}	AlkL		E_f
1058	E_{1b}	AlkL		E_f
1059	$E_{1a}E_i$	AlkL		E_f
1060	$E_{1b}E_i$	AlkL		E_f
1061	$E_{1a}E_{ii}$	AlkL		E_f
1062	$E_{1b}E_{ii}$	AlkL		E_f
1063	$E_{1a}E_{ii}E_{iib}$	AlkL		E_f
1064	$E_{1b}E_{ii}E_{iib}$	AlkL		E_f
1065	$E_{1a}E_4$	AlkL		E_f
1066	$E_{1b}E_4$	AlkL		E_f
1067	$E_{1a}E_iE_4$	AlkL		E_f
1068	$E_{1b}E_iE_4$	AlkL		E_f
1069	$E_{1a}E_{ii}E_4$	AlkL		E_f
1070	$E_{1b}E_{ii}E_4$	AlkL		E_f
1071	$E_{1a}E_{ii}E_{iib}E_4$	AlkL		E_f
1072	$E_{1b}E_{ii}E_{iib}E_4$	AlkL		E_f
1073	$E_{1a}E_{iii}$	AlkL		E_f
1074	$E_{1b}E_{iii}$	AlkL		E_f
1075	$E_{1a}E_{iii}E_4$	AlkL		E_f
1076	$E_{1b}E_{iii}E_4$	AlkL		E_f
1077	$E_{1a}E_{iv}$	AlkL		E_f
1078	$E_{1b}E_{iv}$	AlkL		E_f
1079	$E_{1a}E_{iv}E_4$	AlkL		E_f
1080	$E_{1b}E_{iv}E_4$	AlkL		E_f
1081	E_{1a}	AlkL	E_4-	E_f
1082	E_{1b}	AlkL	E_4-	E_f
1083	$E_{1a}E_i$	AlkL	E_4-	E_f
1084	$E_{1b}E_i$	AlkL	E_4-	E_f
1085	$E_{1a}E_{ii}$	AlkL	E_4-	E_f
1086	$E_{1b}E_{ii}$	AlkL	E_4-	E_f
1087	$E_{1a}E_{ii}E_{iib}$	AlkL	E_4-	E_f
1088	$E_{1b}E_{ii}E_{iib}$	AlkL	E_4-	E_f
1089	$E_{1a}E_4$	AlkL	E_4-	E_f
1090	$E_{1b}E_4$	AlkL	E_4-	E_f
1091	$E_{1a}E_iE_4$	AlkL	E_4-	E_f
1092	$E_{1b}E_iE_4$	AlkL	E_4-	E_f

1093	$E_{1a}E_{ii}E_4$	AlkL	E_4-	E_f
1094	$E_{1b}E_{ii}E_4$	AlkL	E_4-	E_f
1095	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_4-	E_f
1096	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_4-	E_f
1097	$E_{1a}E_{iii}$	AlkL	E_4-	E_f
1098	$E_{1b}E_{iii}$	AlkL	E_4-	E_f
1099	$E_{1a}E_{iii}E_4$	AlkL	E_4-	E_f
1100	$E_{1b}E_{iii}E_4$	AlkL	E_4-	E_f
1101	$E_{1a}E_{iv}$	AlkL	E_4-	E_f
1102	$E_{1b}E_{iv}$	AlkL	E_4-	E_f
1103	$E_{1a}E_{iv}E_4$	AlkL	E_4-	E_f
1104	$E_{1b}E_{iv}E_4$	AlkL	E_4-	E_f
1105	E_{1a}	AlkL	E_5	E_f
1106	E_{1b}	AlkL	E_5	E_f
1107	$E_{1a}E_i$	AlkL	E_5	E_f
1108	$E_{1b}E_i$	AlkL	E_5	E_f
1109	$E_{1a}E_{ii}$	AlkL	E_5	E_f
1110	$E_{1b}E_{ii}$	AlkL	E_5	E_f
1111	$E_{1a}E_{ii}E_{iib}$	AlkL	E_5	E_f
1112	$E_{1b}E_{ii}E_{iib}$	AlkL	E_5	E_f
1113	$E_{1a}E_4$	AlkL	E_5	E_f
1114	$E_{1b}E_4$	AlkL	E_5	E_f
1115	$E_{1a}E_iE_4$	AlkL	E_5	E_f
1116	$E_{1b}E_iE_4$	AlkL	E_5	E_f
1117	$E_{1a}E_{ii}E_4$	AlkL	E_5	E_f
1118	$E_{1b}E_{ii}E_4$	AlkL	E_5	E_f
1119	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_5	E_f
1120	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_5	E_f
1121	$E_{1a}E_{iii}$	AlkL	E_5	E_f
1122	$E_{1b}E_{iii}$	AlkL	E_5	E_f
1123	$E_{1a}E_{iii}E_4$	AlkL	E_5	E_f
1124	$E_{1b}E_{iii}E_4$	AlkL	E_5	E_f
1125	$E_{1a}E_{iv}$	AlkL	E_5	E_f
1126	$E_{1b}E_{iv}$	AlkL	E_5	E_f
1127	$E_{1a}E_{iv}E_4$	AlkL	E_5	E_f
1128	$E_{1b}E_{iv}E_4$	AlkL	E_5	E_f
1129	E_{1a}	AlkL	E_4-E_5	E_f
1130	E_{1b}	AlkL	E_4-E_5	E_f
1131	$E_{1a}E_i$	AlkL	E_4-E_5	E_f
1132	$E_{1b}E_i$	AlkL	E_4-E_5	E_f
1133	$E_{1a}E_{ii}$	AlkL	E_4-E_5	E_f
1134	$E_{1b}E_{ii}$	AlkL	E_4-E_5	E_f
1135	$E_{1a}E_{ii}E_{iib}$	AlkL	E_4-E_5	E_f

1136	$E_{1b}E_{ii}E_{iib}$	AlkL	E_4-E_5	E_f
1137	$E_{1a}E_4$	AlkL	E_4-E_5	E_f
1138	$E_{1b}E_4$	AlkL	E_4-E_5	E_f
1139	$E_{1a}E_iE_4$	AlkL	E_4-E_5	E_f
1140	$E_{1b}E_iE_4$	AlkL	E_4-E_5	E_f
1141	$E_{1a}E_{ii}E_4$	AlkL	E_4-E_5	E_f
1142	$E_{1b}E_{ii}E_4$	AlkL	E_4-E_5	E_f
1143	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_f
1144	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_4-E_5	E_f
1145	$E_{1a}E_{iii}$	AlkL	E_4-E_5	E_f

1146	$E_{1b}E_{iii}$	AlkL	E_4-E_5	E_f
1147	$E_{1a}E_{iii}E_4$	AlkL	E_4-E_5	E_f
1148	$E_{1b}E_{iii}E_4$	AlkL	E_4-E_5	E_f
1149	$E_{1a}E_{iv}$	AlkL	E_4-E_5	E_f
1150	$E_{1b}E_{iv}$	AlkL	E_4-E_5	E_f
1151	$E_{1a}E_{iv}E_4$	AlkL	E_4-E_5	E_f
1152	$E_{1b}E_{iv}E_4$	AlkL	E_4-E_5	E_f

Microorganisms quite especially preferred according to the invention (abbreviated as MO) are outstandingly suitable for the production of ω-hydroxycarboxylate esters or ω-oxocarboxylate esters and have increased or decreased enzyme activities (abbreviated as E) described in the following table, where these can in addition advantageously be combined with an increased enzyme activity compared to the wild type of the microorganism, which is described for the 3-ketoacyl-ACP (Acyl Carrrier Protein) synthase III (EC 2.3.1.41), in particular that from plants, preferably that from plants the seeds whereof contain fatty acids with alkyl residues shorter than 14 C atoms, and particularly preferably that from plants of the genera *Cuphea*, *Elaeis*, *Cocos*, *Umbellularia* and *Cinnamomum* and gene products selected from AccA, AccB, AccC, AccD, AceE, AceF, Lpd, AcpP, FabA, FabB, FabD, FabF, FabG, FabH, FabI, FabZ, PanD, PanK, UdhA, PntA or PntB.

Any combinations of at least two of these enzyme activities can advantageously be increased. In addition, moreover, it can be advantageous if the microorganism is provided with a lower enzyme activity compared to the wild type of the microorganism, which is described for the gene products selected from TdcE, PflA, PflB, PflC, PflD, PoxB, YgfG, AckA, AckB, TdcD, Pta, LdhA, AdhE, MgsA, FdnG, FdnH, FdnI, FdhF, FdoG, FdoH, FdoI, PrpC, PrpD, PrpF , PrpB , TdcD, Pdc, PorA, PorB, PorC, PorD, AlsS, IlvB, IlvM, IlvN, IlvG, IlvI, IlvH, AlsD, ButB, ThI, ThlA, ThlB, PhaA, PhaB, Crt, BdhA, BdhB, Adc, Adh, CtfB, AtoA, AtoD, LdhL, GltA, FabR, FhuA, Dld, LldA or LldP, singly or in any combination.

MO	E increased		E decreased
1	E_{1a}	E_vE_{vi}	
2	E_{1b}	E_vE_{vi}	
3	$E_{1a}E_i$	E_vE_{vi}	
4	$E_{1b}E_i$	E_vE_{vi}	

5	$E_{1a}E_{ii}$	E_vE_{vi}	
6	$E_{1b}E_{ii}$	E_vE_{vi}	
7	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	
8	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	
9	$E_{1a}E_4$	E_vE_{vi}	

10	$E_{1b}E_4$	E_vE_{vi}	
11	$E_{1a}E_iE_4$	E_vE_{vi}	
12	$E_{1b}E_iE_4$	E_vE_{vi}	
13	$E_{1a}E_{ii}E_4$	E_vE_{vi}	
14	$E_{1b}E_{ii}E_4$	E_vE_{vi}	
15	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	
16	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	
17	$E_{1a}E_{iii}$	E_vE_{vi}	
18	$E_{1b}E_{iii}$	E_vE_{vi}	
19	$E_{1a}E_{iii}E_4$	E_vE_{vi}	
20	$E_{1b}E_{iii}E_4$	E_vE_{vi}	
21	$E_{1a}E_{iv}$	E_vE_{vi}	
22	$E_{1b}E_{iv}$	E_vE_{vi}	
23	$E_{1a}E_{iv}E_4$	E_vE_{vi}	
24	$E_{1b}E_{iv}E_4$	E_vE_{vi}	
25	E_{1a}	E_vE_{vi}	$E_{4'}$
26	E_{1b}	E_vE_{vi}	$E_{4'}$
27	$E_{1a}E_i$	E_vE_{vi}	$E_{4'}$
28	$E_{1b}E_i$	E_vE_{vi}	$E_{4'}$
29	$E_{1a}E_{ii}$	E_vE_{vi}	$E_{4'}$
30	$E_{1b}E_{ii}$	E_vE_{vi}	$E_{4'}$
31	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$
32	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$
33	$E_{1a}E_4$	E_vE_{vi}	$E_{4'}$
34	$E_{1b}E_4$	E_vE_{vi}	$E_{4'}$
35	$E_{1a}E_iE_4$	E_vE_{vi}	$E_{4'}$
36	$E_{1b}E_iE_4$	E_vE_{vi}	$E_{4'}$
37	$E_{1a}E_{ii}E_4$	E_vE_{vi}	$E_{4'}$
38	$E_{1b}E_{ii}E_4$	E_vE_{vi}	$E_{4'}$
39	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$
40	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$
41	$E_{1a}E_{iii}$	E_vE_{vi}	$E_{4'}$
42	$E_{1b}E_{iii}$	E_vE_{vi}	$E_{4'}$
43	$E_{1a}E_{iii}E_4$	E_vE_{vi}	$E_{4'}$
44	$E_{1b}E_{iii}E_4$	E_vE_{vi}	$E_{4'}$
45	$E_{1a}E_{iv}$	E_vE_{vi}	$E_{4'}$
46	$E_{1b}E_{iv}$	E_vE_{vi}	$E_{4'}$
47	$E_{1a}E_{iv}E_4$	E_vE_{vi}	$E_{4'}$
48	$E_{1b}E_{iv}E_4$	E_vE_{vi}	$E_{4'}$
49	E_{1a}	E_vE_{vi}	E_5
50	E_{1b}	E_vE_{vi}	E_5
51	$E_{1a}E_i$	E_vE_{vi}	E_5
52	$E_{1b}E_i$	E_vE_{vi}	E_5

53	$E_{1a}E_{ii}$	E_vE_{vi}	E_5
54	$E_{1b}E_{ii}$	E_vE_{vi}	E_5
55	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_5
56	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_5
57	$E_{1a}E_4$	E_vE_{vi}	E_5
58	$E_{1b}E_4$	E_vE_{vi}	E_5
59	$E_{1a}E_iE_4$	E_vE_{vi}	E_5
60	$E_{1b}E_iE_4$	E_vE_{vi}	E_5
61	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_5
62	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_5
63	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5
64	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5
65	$E_{1a}E_{iii}$	E_vE_{vi}	E_5
66	$E_{1b}E_{iii}$	E_vE_{vi}	E_5
67	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_5
68	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_5
69	$E_{1a}E_{iv}$	E_vE_{vi}	E_5
70	$E_{1b}E_{iv}$	E_vE_{vi}	E_5
71	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_5
72	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_5
73	E_{1a}	E_vE_{vi}	$E_{4'}E_5$
74	E_{1b}	E_vE_{vi}	$E_{4'}E_5$
75	$E_{1a}E_i$	E_vE_{vi}	$E_{4'}E_5$
76	$E_{1b}E_i$	E_vE_{vi}	$E_{4'}E_5$
77	$E_{1a}E_{ii}$	E_vE_{vi}	$E_{4'}E_5$
78	$E_{1b}E_{ii}$	E_vE_{vi}	$E_{4'}E_5$
79	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}E_5$
80	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}E_5$
81	$E_{1a}E_4$	E_vE_{vi}	$E_{4'}E_5$
82	$E_{1b}E_4$	E_vE_{vi}	$E_{4'}E_5$
83	$E_{1a}E_iE_4$	E_vE_{vi}	$E_{4'}E_5$
84	$E_{1b}E_iE_4$	E_vE_{vi}	$E_{4'}E_5$
85	$E_{1a}E_{ii}E_4$	E_vE_{vi}	$E_{4'}E_5$
86	$E_{1b}E_{ii}E_4$	E_vE_{vi}	$E_{4'}E_5$
87	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}E_5$
88	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}E_5$
89	$E_{1a}E_{iii}$	E_vE_{vi}	$E_{4'}E_5$
90	$E_{1b}E_{iii}$	E_vE_{vi}	$E_{4'}E_5$
91	$E_{1a}E_{iii}E_4$	E_vE_{vi}	$E_{4'}E_5$
92	$E_{1b}E_{iii}E_4$	E_vE_{vi}	$E_{4'}E_5$
93	$E_{1a}E_{iv}$	E_vE_{vi}	$E_{4'}E_5$
94	$E_{1b}E_{iv}$	E_vE_{vi}	$E_{4'}E_5$
95	$E_{1a}E_{iv}E_4$	E_vE_{vi}	$E_{4'}E_5$

96	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_4*E_5
97	E_{1a}	$AlkLE_vE_{vi}$	
98	E_{1b}	$AlkLE_vE_{vi}$	
99	$E_{1a}E_i$	$AlkLE_vE_{vi}$	
100	$E_{1b}E_i$	$AlkLE_vE_{vi}$	
101	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	
102	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	
103	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	
104	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	
105	$E_{1a}E_4$	$AlkLE_vE_{vi}$	
106	$E_{1b}E_4$	$AlkLE_vE_{vi}$	
107	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	
108	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	
109	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	
110	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	
111	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	
112	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	
113	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	
114	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	
115	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	
116	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	
117	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	
118	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	
119	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	
120	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	
121	E_{1a}	$AlkLE_vE_{vi}$	E_4*
122	E_{1b}	$AlkLE_vE_{vi}$	E_4*
123	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_4*
124	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_4*
125	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_4*
126	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_4*
127	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*
128	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*
129	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_4*
130	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_4*
131	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_4*
132	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_4*
133	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*
134	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*
135	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*
136	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*
137	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_4*
138	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_4*
139	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4*
140	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4*
141	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_4*
142	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_4*
143	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4*
144	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4*
145	E_{1a}	$AlkLE_vE_{vi}$	E_5
146	E_{1b}	$AlkLE_vE_{vi}$	E_5
147	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_5
148	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_5
149	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_5
150	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_5
151	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5
152	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5
153	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_5
154	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_5
155	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_5
156	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_5
157	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5
158	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5
159	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5
160	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5
161	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_5
162	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_5
163	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5
164	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5
165	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_5
166	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_5
167	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5
168	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5
169	E_{1a}	$AlkLE_vE_{vi}$	E_4*E_5
170	E_{1b}	$AlkLE_vE_{vi}$	E_4*E_5
171	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_4*E_5
172	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_4*E_5
173	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_4*E_5
174	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_4*E_5
175	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*E_5
176	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*E_5
177	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_4*E_5
178	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_4*E_5
179	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_4*E_5
180	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_4*E_5
181	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*E_6

182	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	
183	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	
184	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	
185	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_4*E_5	
186	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_4*E_5	
187	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	
188	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	
189	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_4*E_5	
190	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_4*E_5	
191	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	
192	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	
193	E_{1a}	E_vE_{vi}		E_a
194	E_{1b}	E_vE_{vi}		E_a
195	$E_{1a}E_i$	E_vE_{vi}		E_a
196	$E_{1b}E_i$	E_vE_{vi}		E_a
197	$E_{1a}E_{ii}$	E_vE_{vi}		E_a
198	$E_{1b}E_{ii}$	E_vE_{vi}		E_a
199	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}		E_a
200	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}		E_a
201	$E_{1a}E_4$	E_vE_{vi}		E_a
202	$E_{1b}E_4$	E_vE_{vi}		E_a
203	$E_{1a}E_iE_4$	E_vE_{vi}		E_a
204	$E_{1b}E_iE_4$	E_vE_{vi}		E_a
205	$E_{1a}E_{ii}E_4$	E_vE_{vi}		E_a
206	$E_{1b}E_{ii}E_4$	E_vE_{vi}		E_a
207	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_a
208	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_a
209	$E_{1a}E_{iii}$	E_vE_{vi}		E_a
210	$E_{1b}E_{iii}$	E_vE_{vi}		E_a
211	$E_{1a}E_{iii}E_4$	E_vE_{vi}		E_a
212	$E_{1b}E_{iii}E_4$	E_vE_{vi}		E_a
213	$E_{1a}E_{iv}$	E_vE_{vi}		E_a
214	$E_{1b}E_{iv}$	E_vE_{vi}		E_a
215	$E_{1a}E_{iv}E_4$	E_vE_{vi}		E_a
216	$E_{1b}E_{iv}E_4$	E_vE_{vi}		E_a
217	E_{1a}	E_vE_{vi}	E_4*	E_a
218	E_{1b}	E_vE_{vi}	E_4*	E_a
219	$E_{1a}E_i$	E_vE_{vi}	E_4*	E_a
220	$E_{1b}E_i$	E_vE_{vi}	E_4*	E_a
221	$E_{1a}E_{ii}$	E_vE_{vi}	E_4*	E_a
222	$E_{1b}E_{ii}$	E_vE_{vi}	E_4*	E_a
223	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_4*	E_a
224	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_4*	E_a

225	$E_{1a}E_4$	E_vE_{vi}	E_4*	E_a
226	$E_{1b}E_4$	E_vE_{vi}	E_4*	E_a
227	$E_{1a}E_iE_4$	E_vE_{vi}	E_4*	E_a
228	$E_{1b}E_iE_4$	E_vE_{vi}	E_4*	E_a
229	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_4*	E_a
230	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_4*	E_a
231	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4*	E_a
232	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4*	E_a
233	$E_{1a}E_{iii}$	E_vE_{vi}	E_4*	E_a
234	$E_{1b}E_{iii}$	E_vE_{vi}	E_4*	E_a
235	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_4*	E_a
236	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_4*	E_a
237	$E_{1a}E_{iv}$	E_vE_{vi}	E_4*	E_a
238	$E_{1b}E_{iv}$	E_vE_{vi}	E_4*	E_a
239	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_4*	E_a
240	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_4*	E_a
241	E_{1a}	E_vE_{vi}	E_5	E_a
242	E_{1b}	E_vE_{vi}	E_5	E_a
243	$E_{1a}E_i$	E_vE_{vi}	E_5	E_a
244	$E_{1b}E_i$	E_vE_{vi}	E_5	E_a
245	$E_{1a}E_{ii}$	E_vE_{vi}	E_5	E_a
246	$E_{1b}E_{ii}$	E_vE_{vi}	E_5	E_a
247	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_a
248	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_a
249	$E_{1a}E_4$	E_vE_{vi}	E_5	E_a
250	$E_{1b}E_4$	E_vE_{vi}	E_5	E_a
251	$E_{1a}E_iE_4$	E_vE_{vi}	E_5	E_a
252	$E_{1b}E_iE_4$	E_vE_{vi}	E_5	E_a
253	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_5	E_a
254	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_5	E_a
255	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_a
256	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_a
257	$E_{1a}E_{iii}$	E_vE_{vi}	E_5	E_a
258	$E_{1b}E_{iii}$	E_vE_{vi}	E_5	E_a
259	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_5	E_a
260	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_5	E_a
261	$E_{1a}E_{iv}$	E_vE_{vi}	E_5	E_a
262	$E_{1b}E_{iv}$	E_vE_{vi}	E_5	E_a
263	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_5	E_a
264	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_5	E_a
265	E_{1a}	E_vE_{vi}	E_4*E_5	E_a
266	E_{1b}	E_vE_{vi}	E_4*E_5	E_a
267	$E_{1a}E_i$	E_vE_{vi}	E_4*E_5	E_a

268	$E_{1b}E_{i}$	E_vE_{vi}	E_4-E_5	E_a
269	$E_{1a}E_{ii}$	E_vE_{vi}	E_4-E_5	E_a
270	$E_{1b}E_{ii}$	E_vE_{vi}	E_4-E_5	E_a
271	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_a
272	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_a
273	$E_{1a}E_4$	E_vE_{vi}	E_4-E_5	E_a
274	$E_{1b}E_4$	E_vE_{vi}	E_4-E_5	E_a
275	$E_{1a}E_iE_4$	E_vE_{vi}	E_4-E_5	E_a
276	$E_{1b}E_iE_4$	E_vE_{vi}	E_4-E_5	E_a
277	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_a
278	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_a
279	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_a
280	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_a
281	$E_{1a}E_{iii}$	E_vE_{vi}	E_4-E_5	E_a
282	$E_{1b}E_{iii}$	E_vE_{vi}	E_4-E_5	E_a
283	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_a
284	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_a
285	$E_{1a}E_{iv}$	E_vE_{vi}	E_4-E_5	E_a
286	$E_{1b}E_{iv}$	E_vE_{vi}	E_4-E_5	E_a
287	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_a
288	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_a
289	E_{1a}	$AlkLE_vE_{vi}$		E_a
290	E_{1b}	$AlkLE_vE_{vi}$		E_a
291	$E_{1a}E_i$	$AlkLE_vE_{vi}$		E_a
292	$E_{1b}E_i$	$AlkLE_vE_{vi}$		E_a
293	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$		E_a
294	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$		E_a
295	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_a
296	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_a
297	$E_{1a}E_4$	$AlkLE_vE_{vi}$		E_a
298	$E_{1b}E_4$	$AlkLE_vE_{vi}$		E_a
299	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$		E_a
300	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$		E_a
301	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_a
302	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_a
303	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_a
304	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_a
305	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$		E_a
306	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$		E_a
307	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_a
308	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_a
309	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$		E_a
310	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$		E_a
311	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_a
312	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_a
313	E_{1a}	$AlkLE_vE_{vi}$	E_4-	E_a
314	E_{1b}	$AlkLE_vE_{vi}$	E_4-	E_a
315	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_4-	E_a
316	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_4-	E_a
317	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_4-	E_a
318	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_4-	E_a
319	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-	E_a
320	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-	E_a
321	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_4-	E_a
322	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_4-	E_a
323	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_4-	E_a
324	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_4-	E_a
325	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-	E_a
326	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-	E_a
327	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-	E_a
328	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-	E_a
329	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_4-	E_a
330	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_4-	E_a
331	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-	E_a
332	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-	E_a
333	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_4-	E_a
334	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_4-	E_a
335	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-	E_a
336	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-	E_a
337	E_{1a}	$AlkLE_vE_{vi}$	E_5	E_a
338	E_{1b}	$AlkLE_vE_{vi}$	E_5	E_a
339	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_5	E_a
340	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_5	E_a
341	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_a
342	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_a
343	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_a
344	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_a
345	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
346	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
347	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_a
348	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_a
349	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
350	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
351	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
352	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
353	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_a

354	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_a
355	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
356	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
357	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_a
358	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_a
359	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
360	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_a
361	E_{1a}	$AlkLE_vE_{vi}$	E_4-E_5	E_a
362	E_{1b}	$AlkLE_vE_{vi}$	E_4-E_5	E_a
363	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
364	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
365	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
366	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
367	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
368	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
369	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
370	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
371	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
372	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
373	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
374	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
375	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
376	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
377	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
378	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
379	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
380	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
381	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
382	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
383	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
384	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_a
385	E_{1a}	E_vE_{vi}		E_b
386	E_{1b}	E_vE_{vi}		E_b
387	$E_{1a}E_i$	E_vE_{vi}		E_b
388	$E_{1b}E_i$	E_vE_{vi}		E_b
389	$E_{1a}E_{ii}$	E_vE_{vi}		E_b
390	$E_{1b}E_{ii}$	E_vE_{vi}		E_b
391	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}		E_b
392	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}		E_b
393	$E_{1a}E_4$	E_vE_{vi}		E_b
394	$E_{1b}E_4$	E_vE_{vi}		E_b
395	$E_{1a}E_iE_4$	E_vE_{vi}		E_b
396	$E_{1b}E_iE_4$	E_vE_{vi}		E_b

397	$E_{1a}E_{ii}E_4$	E_vE_{vi}		E_b
398	$E_{1b}E_{ii}E_4$	E_vE_{vi}		E_b
399	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_b
400	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_b
401	$E_{1a}E_{iii}$	E_vE_{vi}		E_b
402	$E_{1b}E_{iii}$	E_vE_{vi}		E_b
403	$E_{1a}E_{iii}E_4$	E_vE_{vi}		E_b
404	$E_{1b}E_{iii}E_4$	E_vE_{vi}		E_b
405	$E_{1a}E_{iv}$	E_vE_{vi}		E_b
406	$E_{1b}E_{iv}$	E_vE_{vi}		E_b
407	$E_{1a}E_{iv}E_4$	E_vE_{vi}		E_b
408	$E_{1b}E_{iv}E_4$	E_vE_{vi}		E_b
409	E_{1a}	E_vE_{vi}	E_4*	E_b
410	E_{1b}	E_vE_{vi}	E_4*	E_b
411	$E_{1a}E_i$	E_vE_{vi}	E_4*	E_b
412	$E_{1b}E_i$	E_vE_{vi}	E_4*	E_b
413	$E_{1a}E_{ii}$	E_vE_{vi}	E_4*	E_b
414	$E_{1b}E_{ii}$	E_vE_{vi}	E_4*	E_b
415	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_4*	E_b
416	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_4*	E_b
417	$E_{1a}E_4$	E_vE_{vi}	E_4*	E_b
418	$E_{1b}E_4$	E_vE_{vi}	E_4*	E_b
419	$E_{1a}E_iE_4$	E_vE_{vi}	E_4*	E_b
420	$E_{1b}E_iE_4$	E_vE_{vi}	E_4*	E_b
421	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_4*	E_b
422	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_4*	E_b
423	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4*	E_b
424	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4*	E_b
425	$E_{1a}E_{iii}$	E_vE_{vi}	E_4*	E_b
426	$E_{1b}E_{iii}$	E_vE_{vi}	E_4*	E_b
427	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_4*	E_b
428	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_4*	E_b
429	$E_{1a}E_{iv}$	E_vE_{vi}	E_4*	E_b
430	$E_{1b}E_{iv}$	E_vE_{vi}	E_4*	E_b
431	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_4*	E_b
432	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_4*	E_b
433	E_{1a}	E_vE_{vi}	E_5	E_b
434	E_{1b}	E_vE_{vi}	E_5	E_b
435	$E_{1a}E_i$	E_vE_{vi}	E_5	E_b
436	$E_{1b}E_i$	E_vE_{vi}	E_5	E_b
437	$E_{1a}E_{ii}$	E_vE_{vi}	E_5	E_b
438	$E_{1b}E_{ii}$	E_vE_{vi}	E_5	E_b
439	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_b

440	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_b
441	$E_{1a}E_4$	E_vE_{vi}	E_5	E_b
442	$E_{1b}E_4$	E_vE_{vi}	E_5	E_b
443	$E_{1a}E_iE_4$	E_vE_{vi}	E_5	E_b
444	$E_{1b}E_iE_4$	E_vE_{vi}	E_5	E_b
445	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_5	E_b
446	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_5	E_b
447	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_b
448	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_b
449	$E_{1a}E_{iii}$	E_vE_{vi}	E_5	E_b
450	$E_{1b}E_{iii}$	E_vE_{vi}	E_5	E_b
451	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_5	E_b
452	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_5	E_b
453	$E_{1a}E_{iv}$	E_vE_{vi}	E_5	E_b
454	$E_{1b}E_{iv}$	E_vE_{vi}	E_5	E_b
455	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_5	E_b
456	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_5	E_b
457	E_{1a}	E_vE_{vi}	E_4-E_5	E_b
458	E_{1b}	E_vE_{vi}	E_4-E_5	E_b
459	$E_{1a}E_i$	E_vE_{vi}	E_4-E_5	E_b
460	$E_{1b}E_i$	E_vE_{vi}	E_4-E_5	E_b
461	$E_{1a}E_{ii}$	E_vE_{vi}	E_4-E_5	E_b
462	$E_{1b}E_{ii}$	E_vE_{vi}	E_4-E_5	E_b
463	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_b
464	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_b
465	$E_{1a}E_4$	E_vE_{vi}	E_4-E_5	E_b
466	$E_{1b}E_4$	E_vE_{vi}	E_4-E_5	E_b
467	$E_{1a}E_iE_4$	E_vE_{vi}	E_4-E_5	E_b
468	$E_{1b}E_iE_4$	E_vE_{vi}	E_4-E_5	E_b
469	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_b
470	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_b
471	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_b
472	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_b
473	$E_{1a}E_{iii}$	E_vE_{vi}	E_4-E_5	E_b
474	$E_{1b}E_{iii}$	E_vE_{vi}	E_4-E_5	E_b
475	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_b
476	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_b
477	$E_{1a}E_{iv}$	E_vE_{vi}	E_4-E_5	E_b
478	$E_{1b}E_{iv}$	E_vE_{vi}	E_4-E_5	E_b
479	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_b
480	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_b
481	E_{1a}	$AlkLE_vE_{vi}$		E_b
482	E_{1b}	$AlkLE_vE_{vi}$		E_b

483	$E_{1a}E_i$	$AlkLE_vE_{vi}$		E_b
484	$E_{1b}E_i$	$AlkLE_vE_{vi}$		E_b
485	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$		E_b
486	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$		E_b
487	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_b
488	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_b
489	$E_{1a}E_4$	$AlkLE_vE_{vi}$		E_b
490	$E_{1b}E_4$	$AlkLE_vE_{vi}$		E_b
491	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$		E_b
492	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$		E_b
493	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_b
494	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_b
495	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_b
496	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_b
497	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$		E_b
498	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$		E_b
499	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_b
500	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_b
501	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$		E_b
502	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$		E_b
503	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_b
504	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_b
505	E_{1a}	$AlkLE_vE_{vi}$	E_4-	E_b
506	E_{1b}	$AlkLE_vE_{vi}$	E_4-	E_b
507	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_4-	E_b
508	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_4-	E_b
509	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_4-	E_b
510	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_4-	E_b
511	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-	E_b
512	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-	E_b
513	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_4-	E_b
514	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_4-	E_b
515	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_4-	E_b
516	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_4-	E_b
517	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-	E_b
518	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-	E_b
519	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-	E_b
520	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-	E_b
521	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_4-	E_b
522	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_4-	E_b
523	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-	E_b
524	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-	E_b
525	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_4-	E_b

526	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_4-	E_b
527	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-	E_b
528	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-	E_b
529	E_{1a}	$AlkLE_vE_{vi}$	E_5	E_b
530	E_{1b}	$AlkLE_vE_{vi}$	E_5	E_b
531	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_5	E_b
532	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_5	E_b
533	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_b
534	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_b
535	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_b
536	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_b
537	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
538	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
539	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_b
540	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_b
541	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
542	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
543	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
544	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
545	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_b
546	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_b
547	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
548	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
549	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_b
550	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_b
551	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
552	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_b
553	E_{1a}	$AlkLE_vE_{vi}$	E_4-E_5	E_b
554	E_{1b}	$AlkLE_vE_{vi}$	E_4-E_5	E_b
555	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
556	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
557	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
558	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
559	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
560	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
561	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
562	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
563	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
564	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
565	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
566	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
567	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
568	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
569	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
570	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
571	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
572	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
573	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
574	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
575	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
576	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_b
577	E_{1a}	E_vE_{vi}		E_d
578	E_{1b}	E_vE_{vi}		E_d
579	$E_{1a}E_i$	E_vE_{vi}		E_d
580	$E_{1b}E_i$	E_vE_{vi}		E_d
581	$E_{1a}E_{ii}$	E_vE_{vi}		E_d
582	$E_{1b}E_{ii}$	E_vE_{vi}		E_d
583	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}		E_d
584	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}		E_d
585	$E_{1a}E_4$	E_vE_{vi}		E_d
586	$E_{1b}E_4$	E_vE_{vi}		E_d
587	$E_{1a}E_iE_4$	E_vE_{vi}		E_d
588	$E_{1b}E_iE_4$	E_vE_{vi}		E_d
589	$E_{1a}E_{ii}E_4$	E_vE_{vi}		E_d
590	$E_{1b}E_{ii}E_4$	E_vE_{vi}		E_d
591	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_d
592	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_d
593	$E_{1a}E_{iii}$	E_vE_{vi}		E_d
594	$E_{1b}E_{iii}$	E_vE_{vi}		E_d
595	$E_{1a}E_{iii}E_4$	E_vE_{vi}		E_d
596	$E_{1b}E_{iii}E_4$	E_vE_{vi}		E_d
597	$E_{1a}E_{iv}$	E_vE_{vi}		E_d
598	$E_{1b}E_{iv}$	E_vE_{vi}		E_d
599	$E_{1a}E_{iv}E_4$	E_vE_{vi}		E_d
600	$E_{1b}E_{iv}E_4$	E_vE_{vi}		E_d
601	E_{1a}	E_vE_{vi}	E_4-	E_d
602	E_{1b}	E_vE_{vi}	E_4-	E_d
603	$E_{1a}E_i$	E_vE_{vi}	E_4-	E_d
604	$E_{1b}E_i$	E_vE_{vi}	E_4-	E_d
605	$E_{1a}E_{ii}$	E_vE_{vi}	E_4-	E_d
606	$E_{1b}E_{ii}$	E_vE_{vi}	E_4-	E_d
607	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_4-	E_d
608	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_4-	E_d
609	$E_{1a}E_4$	E_vE_{vi}	E_4-	E_d
610	$E_{1b}E_4$	E_vE_{vi}	E_4-	E_d
611	$E_{1a}E_iE_4$	E_vE_{vi}	E_4-	E_d

612	$E_{1b}E_iE_4$	E_vE_{vi}	E_{4*}	E_d
613	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_{4*}	E_d
614	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_{4*}	E_d
615	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4*}	E_d
616	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4*}	E_d
617	$E_{1a}E_{iii}$	E_vE_{vi}	E_{4*}	E_d
618	$E_{1b}E_{iii}$	E_vE_{vi}	E_{4*}	E_d
619	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_{4*}	E_d
620	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_{4*}	E_d
621	$E_{1a}E_{iv}$	E_vE_{vi}	E_{4*}	E_d
622	$E_{1b}E_{iv}$	E_vE_{vi}	E_{4*}	E_d
623	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_{4*}	E_d
624	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_{4*}	E_d
625	E_{1a}	E_vE_{vi}	E_5	E_d
626	E_{1b}	E_vE_{vi}	E_5	E_d
627	$E_{1a}E_i$	E_vE_{vi}	E_5	E_d
628	$E_{1b}E_i$	E_vE_{vi}	E_5	E_d
629	$E_{1a}E_{ii}$	E_vE_{vi}	E_5	E_d
630	$E_{1b}E_{ii}$	E_vE_{vi}	E_5	E_d
631	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_d
632	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_d
633	$E_{1a}E_4$	E_vE_{vi}	E_5	E_d
634	$E_{1b}E_4$	E_vE_{vi}	E_5	E_d
635	$E_{1a}E_iE_4$	E_vE_{vi}	E_5	E_d
636	$E_{1b}E_iE_4$	E_vE_{vi}	E_5	E_d
637	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_5	E_d
638	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_5	E_d
639	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_d
640	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_d
641	$E_{1a}E_{iii}$	E_vE_{vi}	E_5	E_d
642	$E_{1b}E_{iii}$	E_vE_{vi}	E_5	E_d
643	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_5	E_d
644	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_5	E_d
645	$E_{1a}E_{iv}$	E_vE_{vi}	E_5	E_d
646	$E_{1b}E_{iv}$	E_vE_{vi}	E_5	E_d
647	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_5	E_d
648	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_5	E_d
649	E_{1a}	E_vE_{vi}	$E_{4*}E_5$	E_d
650	E_{1b}	E_vE_{vi}	$E_{4*}E_5$	E_d
651	$E_{1a}E_i$	E_vE_{vi}	$E_{4*}E_5$	E_d
652	$E_{1b}E_i$	E_vE_{vi}	$E_{4*}E_5$	E_d
653	$E_{1a}E_{ii}$	E_vE_{vi}	$E_{4*}E_5$	E_d
654	$E_{1b}E_{ii}$	E_vE_{vi}	$E_{4*}E_5$	E_d

655	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	$E_{4*}E_5$	E_d
656	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	$E_{4*}E_5$	E_d
657	$E_{1a}E_4$	E_vE_{vi}	$E_{4*}E_5$	E_d
658	$E_{1b}E_4$	E_vE_{vi}	$E_{4*}E_5$	E_d
659	$E_{1a}E_iE_4$	E_vE_{vi}	$E_{4*}E_5$	E_d
660	$E_{1b}E_iE_4$	E_vE_{vi}	$E_{4*}E_5$	E_d
661	$E_{1a}E_{ii}E_4$	E_vE_{vi}	$E_{4*}E_5$	E_d
662	$E_{1b}E_{ii}E_4$	E_vE_{vi}	$E_{4*}E_5$	E_d
663	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4*}E_5$	E_d
664	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4*}E_5$	E_d
665	$E_{1a}E_{iii}$	E_vE_{vi}	$E_{4*}E_5$	E_d
666	$E_{1b}E_{iii}$	E_vE_{vi}	$E_{4*}E_5$	E_d
667	$E_{1a}E_{iii}E_4$	E_vE_{vi}	$E_{4*}E_5$	E_d
668	$E_{1b}E_{iii}E_4$	E_vE_{vi}	$E_{4*}E_5$	E_d
669	$E_{1a}E_{iv}$	E_vE_{vi}	$E_{4*}E_5$	E_d
670	$E_{1b}E_{iv}$	E_vE_{vi}	$E_{4*}E_5$	E_d
671	$E_{1a}E_{iv}E_4$	E_vE_{vi}	$E_{4*}E_5$	E_d
672	$E_{1b}E_{iv}E_4$	E_vE_{vi}	$E_{4*}E_5$	E_d
673	E_{1a}	$AlkLE_vE_{vi}$		E_d
674	E_{1b}	$AlkLE_vE_{vi}$		E_d
675	$E_{1a}E_i$	$AlkLE_vE_{vi}$		E_d
676	$E_{1b}E_i$	$AlkLE_vE_{vi}$		E_d
677	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$		E_d
678	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$		E_d
679	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_d
680	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_d
681	$E_{1a}E_4$	$AlkLE_vE_{vi}$		E_d
682	$E_{1b}E_4$	$AlkLE_vE_{vi}$		E_d
683	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$		E_d
684	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$		E_d
685	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_d
686	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_d
687	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_d
688	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_d
689	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$		E_d
690	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$		E_d
691	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_d
692	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_d
693	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$		E_d
694	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$		E_d
695	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_d
696	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_d
697	E_{1a}	$AlkLE_vE_{vi}$	E_{4*}	E_d

698	E_{1b}	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
699	$E_{1a}E_i$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
700	$E_{1b}E_i$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
701	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
702	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
703	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
704	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
705	$E_{1a}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
706	$E_{1b}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
707	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
708	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
709	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
710	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
711	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
712	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
713	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
714	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
715	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
716	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
717	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
718	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
719	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
720	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
721	E_{1a}	$AlkLE_vE_{vi}$	E_5	E_d
722	E_{1b}	$AlkLE_vE_{vi}$	E_5	E_d
723	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_5	E_d
724	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_5	E_d
725	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_d
726	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_d
727	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_d
728	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_d
729	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
730	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
731	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_d
732	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_d
733	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
734	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
735	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
736	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
737	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_d
738	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_d
739	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
740	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_d

741	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_d
742	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_d
743	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
744	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_d
745	E_{1a}	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
746	E_{1b}	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
747	$E_{1a}E_i$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
748	$E_{1b}E_i$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
749	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
750	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
751	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
752	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
753	$E_{1a}E_4$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
754	$E_{1b}E_4$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
755	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
756	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
757	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
758	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
759	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
760	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
761	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
762	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
763	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
764	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
765	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
766	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
767	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
768	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_4{}'E_5$	E_d
769	E_{1a}	E_vE_{vi}		E_e
770	E_{1b}	E_vE_{vi}		E_e
771	$E_{1a}E_i$	E_vE_{vi}		E_e
772	$E_{1b}E_i$	E_vE_{vi}		E_e
773	$E_{1a}E_{ii}$	E_vE_{vi}		E_e
774	$E_{1b}E_{ii}$	E_vE_{vi}		E_e
775	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}		E_e
776	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}		E_e
777	$E_{1a}E_4$	E_vE_{vi}		E_e
778	$E_{1b}E_4$	E_vE_{vi}		E_e
779	$E_{1a}E_iE_4$	E_vE_{vi}		E_e
780	$E_{1b}E_iE_4$	E_vE_{vi}		E_e
781	$E_{1a}E_{ii}E_4$	E_vE_{vi}		E_e
782	$E_{1b}E_{ii}E_4$	E_vE_{vi}		E_e
783	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_e

784	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_e
785	$E_{1a}E_{iii}$	E_vE_{vi}		E_e
786	$E_{1b}E_{iii}$	E_vE_{vi}		E_e
787	$E_{1a}E_{iii}E_4$	E_vE_{vi}		E_e
788	$E_{1b}E_{iii}E_4$	E_vE_{vi}		E_e
789	$E_{1a}E_{iv}$	E_vE_{vi}		E_e
790	$E_{1b}E_{iv}$	E_vE_{vi}		E_e
791	$E_{1a}E_{iv}E_4$	E_vE_{vi}		E_e
792	$E_{1b}E_{iv}E_4$	E_vE_{vi}		E_e
793	E_{1a}	E_vE_{vi}	E_4*	E_e
794	E_{1b}	E_vE_{vi}	E_4*	E_e
795	$E_{1a}E_i$	E_vE_{vi}	E_4*	E_e
796	$E_{1b}E_i$	E_vE_{vi}	E_4*	E_e
797	$E_{1a}E_{ii}$	E_vE_{vi}	E_4*	E_e
798	$E_{1b}E_{ii}$	E_vE_{vi}	E_4*	E_e
799	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_4*	E_e
800	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_4*	E_e
801	$E_{1a}E_4$	E_vE_{vi}	E_4*	E_e
802	$E_{1b}E_4$	E_vE_{vi}	E_4*	E_e
803	$E_{1a}E_iE_4$	E_vE_{vi}	E_4*	E_e
804	$E_{1b}E_iE_4$	E_vE_{vi}	E_4*	E_e
805	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_4*	E_e
806	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_4*	E_e
807	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4*	E_e
808	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4*	E_e
809	$E_{1a}E_{iii}$	E_vE_{vi}	E_4*	E_e
810	$E_{1b}E_{iii}$	E_vE_{vi}	E_4*	E_e
811	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_4*	E_e
812	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_4*	E_e
813	$E_{1a}E_{iv}$	E_vE_{vi}	E_4*	E_e
814	$E_{1b}E_{iv}$	E_vE_{vi}	E_4*	E_e
815	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_4*	E_e
816	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_4*	E_e
817	E_{1a}	E_vE_{vi}	E_5	E_e
818	E_{1b}	E_vE_{vi}	E_5	E_e
819	$E_{1a}E_i$	E_vE_{vi}	E_5	E_e
820	$E_{1b}E_i$	E_vE_{vi}	E_5	E_e
821	$E_{1a}E_{ii}$	E_vE_{vi}	E_5	E_e
822	$E_{1b}E_{ii}$	E_vE_{vi}	E_5	E_e
823	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_e
824	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_e
825	$E_{1a}E_4$	E_vE_{vi}	E_5	E_e
826	$E_{1b}E_4$	E_vE_{vi}	E_5	E_e

827	$E_{1a}E_iE_4$	E_vE_{vi}	E_5	E_e
828	$E_{1b}E_iE_4$	E_vE_{vi}	E_5	E_e
829	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_5	E_e
830	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_5	E_e
831	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_e
832	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_e
833	$E_{1a}E_{iii}$	E_vE_{vi}	E_5	E_e
834	$E_{1b}E_{iii}$	E_vE_{vi}	E_5	E_e
835	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_5	E_e
836	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_5	E_e
837	$E_{1a}E_{iv}$	E_vE_{vi}	E_5	E_e
838	$E_{1b}E_{iv}$	E_vE_{vi}	E_5	E_e
839	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_5	E_e
840	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_5	E_e
841	E_{1a}	E_vE_{vi}	E_4*E_5	E_e
842	E_{1b}	E_vE_{vi}	E_4*E_5	E_e
843	$E_{1a}E_i$	E_vE_{vi}	E_4*E_5	E_e
844	$E_{1b}E_i$	E_vE_{vi}	E_4*E_5	E_e
845	$E_{1a}E_{ii}$	E_vE_{vi}	E_4*E_5	E_e
846	$E_{1b}E_{ii}$	E_vE_{vi}	E_4*E_5	E_e
847	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_4*E_5	E_e
848	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_4*E_5	E_e
849	$E_{1a}E_4$	E_vE_{vi}	E_4*E_5	E_e
850	$E_{1b}E_4$	E_vE_{vi}	E_4*E_5	E_e
851	$E_{1a}E_iE_4$	E_vE_{vi}	E_4*E_5	E_e
852	$E_{1b}E_iE_4$	E_vE_{vi}	E_4*E_5	E_e
853	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_4*E_5	E_e
854	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_4*E_5	E_e
855	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4*E_5	E_e
856	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4*E_5	E_e
857	$E_{1a}E_{iii}$	E_vE_{vi}	E_4*E_5	E_e
858	$E_{1b}E_{iii}$	E_vE_{vi}	E_4*E_5	E_e
859	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_4*E_5	E_e
860	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_4*E_5	E_e
861	$E_{1a}E_{iv}$	E_vE_{vi}	E_4*E_5	E_e
862	$E_{1b}E_{iv}$	E_vE_{vi}	E_4*E_5	E_e
863	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_4*E_5	E_e
864	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_4*E_5	E_e
865	E_{1a}	$AlkLE_vE_{vi}$		E_e
866	E_{1b}	$AlkLE_vE_{vi}$		E_e
867	$E_{1a}E_i$	$AlkLE_vE_{vi}$		E_e
868	$E_{1b}E_i$	$AlkLE_vE_{vi}$		E_e
869	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$		E_e

870	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$		E_e
871	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_e
872	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_e
873	$E_{1a}E_4$	$AlkLE_vE_{vi}$		E_e
874	$E_{1b}E_4$	$AlkLE_vE_{vi}$		E_e
875	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$		E_e
876	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$		E_e
877	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_e
878	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_e
879	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_e
880	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_e
881	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$		E_e
882	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$		E_e
883	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_e
884	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_e
885	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$		E_e
886	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$		E_e
887	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_e
888	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_e
889	E_{1a}	$AlkLE_vE_{vi}$	E_4*	E_e
890	E_{1b}	$AlkLE_vE_{vi}$	E_4*	E_e
891	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_4*	E_e
892	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_4*	E_e
893	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_4*	E_e
894	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_4*	E_e
895	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*	E_e
896	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*	E_e
897	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_4*	E_e
898	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_4*	E_e
899	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_4*	E_e
900	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_4*	E_e
901	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*	E_e
902	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*	E_e
903	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*	E_e
904	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*	E_e
905	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_4*	E_e
906	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_4*	E_e
907	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4*	E_e
908	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4*	E_e
909	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_4*	E_e
910	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_4*	E_e
911	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4*	E_e
912	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4*	E_e

913	E_{1a}	$AlkLE_vE_{vi}$	E_5	E_e
914	E_{1b}	$AlkLE_vE_{vi}$	E_5	E_e
915	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_5	E_e
916	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_5	E_e
917	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_e
918	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_e
919	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_e
920	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_e
921	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
922	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
923	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_e
924	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_e
925	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
926	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
927	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
928	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
929	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_e
930	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_e
931	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
932	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
933	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_e
934	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_e
935	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
936	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_e
937	E_{1a}	$AlkLE_vE_{vi}$	E_4*E_5	E_e
938	E_{1b}	$AlkLE_vE_{vi}$	E_4*E_5	E_e
939	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
940	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
941	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
942	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
943	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
944	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
945	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
946	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
947	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
948	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
949	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
950	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
951	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
952	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
953	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
954	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_4*E_5	E_e
955	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4*E_5	E_e

956	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
957	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
958	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
959	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
960	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_e
961	E_{1a}	E_vE_{vi}		E_f
962	E_{1b}	E_vE_{vi}		E_f
963	$E_{1a}E_i$	E_vE_{vi}		E_f
964	$E_{1b}E_i$	E_vE_{vi}		E_f
965	$E_{1a}E_{ii}$	E_vE_{vi}		E_f
966	$E_{1b}E_{ii}$	E_vE_{vi}		E_f
967	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}		E_f
968	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}		E_f
969	$E_{1a}E_4$	E_vE_{vi}		E_f
970	$E_{1b}E_4$	E_vE_{vi}		E_f
971	$E_{1a}E_iE_4$	E_vE_{vi}		E_f
972	$E_{1b}E_iE_4$	E_vE_{vi}		E_f
973	$E_{1a}E_{ii}E_4$	E_vE_{vi}		E_f
974	$E_{1b}E_{ii}E_4$	E_vE_{vi}		E_f
975	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_f
976	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_f
977	$E_{1a}E_{iii}$	E_vE_{vi}		E_f
978	$E_{1b}E_{iii}$	E_vE_{vi}		E_f
979	$E_{1a}E_{iii}E_4$	E_vE_{vi}		E_f
980	$E_{1b}E_{iii}E_4$	E_vE_{vi}		E_f
981	$E_{1a}E_{iv}$	E_vE_{vi}		E_f
982	$E_{1b}E_{iv}$	E_vE_{vi}		E_f
983	$E_{1a}E_{iv}E_4$	E_vE_{vi}		E_f
984	$E_{1b}E_{iv}E_4$	E_vE_{vi}		E_f
985	E_{1a}	E_vE_{vi}	E_4*	E_f
986	E_{1b}	E_vE_{vi}	E_4*	E_f
987	$E_{1a}E_i$	E_vE_{vi}	E_4*	E_f
988	$E_{1b}E_i$	E_vE_{vi}	E_4*	E_f
989	$E_{1a}E_{ii}$	E_vE_{vi}	E_4*	E_f
990	$E_{1b}E_{ii}$	E_vE_{vi}	E_4*	E_f
991	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_4*	E_f
992	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_4*	E_f
993	$E_{1a}E_4$	E_vE_{vi}	E_4*	E_f
994	$E_{1b}E_4$	E_vE_{vi}	E_4*	E_f
995	$E_{1a}E_iE_4$	E_vE_{vi}	E_4*	E_f
996	$E_{1b}E_iE_4$	E_vE_{vi}	E_4*	E_f
997	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_4*	E_f
998	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_4*	E_f

999	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4*	E_f
1000	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4*	E_f
1001	$E_{1a}E_{iii}$	E_vE_{vi}	E_4*	E_f
1002	$E_{1b}E_{iii}$	E_vE_{vi}	E_4*	E_f
1003	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_4*	E_f
1004	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_4*	E_f
1005	$E_{1a}E_{iv}$	E_vE_{vi}	E_4*	E_f
1006	$E_{1b}E_{iv}$	E_vE_{vi}	E_4*	E_f
1007	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_4*	E_f
1008	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_4*	E_f
1009	E_{1a}	E_vE_{vi}	E_5	E_f
1010	E_{1b}	E_vE_{vi}	E_5	E_f
1011	$E_{1a}E_i$	E_vE_{vi}	E_5	E_f
1012	$E_{1b}E_i$	E_vE_{vi}	E_5	E_f
1013	$E_{1a}E_{ii}$	E_vE_{vi}	E_5	E_f
1014	$E_{1b}E_{ii}$	E_vE_{vi}	E_5	E_f
1015	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_f
1016	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_5	E_f
1017	$E_{1a}E_4$	E_vE_{vi}	E_5	E_f
1018	$E_{1b}E_4$	E_vE_{vi}	E_5	E_f
1019	$E_{1a}E_iE_4$	E_vE_{vi}	E_5	E_f
1020	$E_{1b}E_iE_4$	E_vE_{vi}	E_5	E_f
1021	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_5	E_f
1022	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_5	E_f
1023	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_f
1024	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_5	E_f
1025	$E_{1a}E_{iii}$	E_vE_{vi}	E_5	E_f
1026	$E_{1b}E_{iii}$	E_vE_{vi}	E_5	E_f
1027	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_5	E_f
1028	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_5	E_f
1029	$E_{1a}E_{iv}$	E_vE_{vi}	E_5	E_f
1030	$E_{1b}E_{iv}$	E_vE_{vi}	E_5	E_f
1031	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_5	E_f
1032	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_5	E_f
1033	E_{1a}	E_vE_{vi}	E_4-E_5	E_f
1034	E_{1b}	E_vE_{vi}	E_4-E_5	E_f
1035	$E_{1a}E_i$	E_vE_{vi}	E_4-E_5	E_f
1036	$E_{1b}E_i$	E_vE_{vi}	E_4-E_5	E_f
1037	$E_{1a}E_{ii}$	E_vE_{vi}	E_4-E_5	E_f
1038	$E_{1b}E_{ii}$	E_vE_{vi}	E_4-E_5	E_f
1039	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_f
1040	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_4-E_5	E_f
1041	$E_{1a}E_4$	E_vE_{vi}	E_4-E_5	E_f

1042	$E_{1b}E_4$	E_vE_{vi}	E_4-E_5	E_f
1043	$E_{1a}E_iE_4$	E_vE_{vi}	E_4-E_5	E_f
1044	$E_{1b}E_iE_4$	E_vE_{vi}	E_4-E_5	E_f
1045	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_f
1046	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_4-E_5	E_f
1047	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_f
1048	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_4-E_5	E_f
1049	$E_{1a}E_{iii}$	E_vE_{vi}	E_4-E_5	E_f
1050	$E_{1b}E_{iii}$	E_vE_{vi}	E_4-E_5	E_f
1051	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_f
1052	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_4-E_5	E_f
1053	$E_{1a}E_{iv}$	E_vE_{vi}	E_4-E_5	E_f
1054	$E_{1b}E_{iv}$	E_vE_{vi}	E_4-E_5	E_f
1055	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_f
1056	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_4-E_5	E_f
1057	E_{1a}	$AlkLE_vE_{vi}$		E_f
1058	E_{1b}	$AlkLE_vE_{vi}$		E_f
1059	$E_{1a}E_i$	$AlkLE_vE_{vi}$		E_f
1060	$E_{1b}E_i$	$AlkLE_vE_{vi}$		E_f
1061	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$		E_f
1062	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$		E_f
1063	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_f
1064	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_f
1065	$E_{1a}E_4$	$AlkLE_vE_{vi}$		E_f
1066	$E_{1b}E_4$	$AlkLE_vE_{vi}$		E_f
1067	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$		E_f
1068	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$		E_f
1069	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_f
1070	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_f
1071	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_f
1072	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_f
1073	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$		E_f
1074	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$		E_f
1075	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_f
1076	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_f
1077	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$		E_f
1078	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$		E_f
1079	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_f
1080	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_f
1081	E_{1a}	$AlkLE_vE_{vi}$	E_4*	E_f
1082	E_{1b}	$AlkLE_vE_{vi}$	E_4*	E_f
1083	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_4*	E_f
1084	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_4*	E_f

1085	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_4*	E_f
1086	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_4*	E_f
1087	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*	E_f
1088	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4*	E_f
1089	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
1090	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
1091	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_4*	E_f
1092	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_4*	E_f
1093	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
1094	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
1095	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
1096	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
1097	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_4*	E_f
1098	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_4*	E_f
1099	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
1100	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
1101	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_4*	E_f
1102	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_4*	E_f
1103	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
1104	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4*	E_f
1105	E_{1a}	$AlkLE_vE_{vi}$	E_5	E_f
1106	E_{1b}	$AlkLE_vE_{vi}$	E_5	E_f
1107	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_5	E_f
1108	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_5	E_f
1109	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_f
1110	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_5	E_f
1111	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_f
1112	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_5	E_f
1113	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
1114	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
1115	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_f
1116	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_5	E_f
1117	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
1118	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
1119	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
1120	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
1121	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_f
1122	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_5	E_f
1123	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
1124	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
1125	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_f
1126	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_5	E_f
1127	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_6	E_f

1128	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_5	E_f
1129	E_{1a}	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1130	E_{1b}	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1131	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1132	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1133	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1134	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1135	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1136	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1137	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1138	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1139	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1140	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1141	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1142	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1143	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1144	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1145	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1146	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1147	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1148	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1149	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1150	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1151	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1152	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4-E_5	E_f
1153	E_{1a}	E_{vii}		
1154	E_{1b}	E_{vii}		
1155	$E_{1a}E_i$	E_{vii}		
1156	$E_{1b}E_i$	E_{vii}		
1157	$E_{1a}E_{ii}$	E_{vii}		
1158	$E_{1b}E_{ii}$	E_{vii}		
1159	$E_{1a}E_{ii}E_{iib}$	E_{vii}		
1160	$E_{1b}E_{ii}E_{iib}$	E_{vii}		
1161	$E_{1a}E_4$	E_{vii}		
1162	$E_{1b}E_4$	E_{vii}		
1163	$E_{1a}E_iE_4$	E_{vii}		
1164	$E_{1b}E_iE_4$	E_{vii}		
1165	$E_{1a}E_{ii}E_4$	E_{vii}		
1166	$E_{1b}E_{ii}E_4$	E_{vii}		
1167	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}		
1168	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}		
1169	$E_{1a}E_{iii}$	E_{vii}		
1170	$E_{1b}E_{iii}$	E_{vii}		

1171	$E_{1a}E_{iii}E_4$	E_{vii}	
1172	$E_{1b}E_{iii}E_4$	E_{vii}	
1173	$E_{1a}E_{iv}$	E_{vii}	
1174	$E_{1b}E_{iv}$	E_{vii}	
1175	$E_{1a}E_{iv}E_4$	E_{vii}	
1176	$E_{1b}E_{iv}E_4$	E_{vii}	
1177	E_{1a}	E_{vii}	E_4*
1178	E_{1b}	E_{vii}	E_4*
1179	$E_{1a}E_i$	E_{vii}	E_4*
1180	$E_{1b}E_i$	E_{vii}	E_4*
1181	$E_{1a}E_{ii}$	E_{vii}	E_4*
1182	$E_{1b}E_{ii}$	E_{vii}	E_4*
1183	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_4*
1184	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_4*
1185	$E_{1a}E_4$	E_{vii}	E_4*
1186	$E_{1b}E_4$	E_{vii}	E_4*
1187	$E_{1a}E_iE_4$	E_{vii}	E_4*
1188	$E_{1b}E_iE_4$	E_{vii}	E_4*
1189	$E_{1a}E_{ii}E_4$	E_{vii}	E_4*
1190	$E_{1b}E_{ii}E_4$	E_{vii}	E_4*
1191	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_4*
1192	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_4*
1193	$E_{1a}E_{iii}$	E_{vii}	E_4*
1194	$E_{1b}E_{iii}$	E_{vii}	E_4*
1195	$E_{1a}E_{iii}E_4$	E_{vii}	E_4*
1196	$E_{1b}E_{iii}E_4$	E_{vii}	E_4*
1197	$E_{1a}E_{iv}$	E_{vii}	E_4*
1198	$E_{1b}E_{iv}$	E_{vii}	E_4*
1199	$E_{1a}E_{iv}E_4$	E_{vii}	E_4*
1200	$E_{1b}E_{iv}E_4$	E_{vii}	E_4*
1201	E_{1a}	E_{vii}	E_5
1202	E_{1b}	E_{vii}	E_5
1203	$E_{1a}E_i$	E_{vii}	E_5
1204	$E_{1b}E_i$	E_{vii}	E_5
1205	$E_{1a}E_{ii}$	E_{vii}	E_5
1206	$E_{1b}E_{ii}$	E_{vii}	E_5
1207	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_5
1208	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_5
1209	$E_{1a}E_4$	E_{vii}	E_5
1210	$E_{1b}E_4$	E_{vii}	E_5
1211	$E_{1a}E_iE_4$	E_{vii}	E_5
1212	$E_{1b}E_iE_4$	E_{vii}	E_5
1213	$E_{1a}E_{ii}E_4$	E_{vii}	E_5

1214	$E_{1b}E_{ii}E_4$	E_{vii}	E_5
1215	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_5
1216	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_5
1217	$E_{1a}E_{iii}$	E_{vii}	E_5
1218	$E_{1b}E_{iii}$	E_{vii}	E_5
1219	$E_{1a}E_{iii}E_4$	E_{vii}	E_5
1220	$E_{1b}E_{iii}E_4$	E_{vii}	E_5
1221	$E_{1a}E_{iv}$	E_{vii}	E_5
1222	$E_{1b}E_{iv}$	E_{vii}	E_5
1223	$E_{1a}E_{iv}E_4$	E_{vii}	E_5
1224	$E_{1b}E_{iv}E_4$	E_{vii}	E_5
1225	E_{1a}	E_{vii}	E_4-E_5
1226	E_{1b}	E_{vii}	E_4-E_5
1227	$E_{1a}E_i$	E_{vii}	E_4-E_5
1228	$E_{1b}E_i$	E_{vii}	E_4-E_5
1229	$E_{1a}E_{ii}$	E_{vii}	E_4-E_5
1230	$E_{1b}E_{ii}$	E_{vii}	E_4-E_5
1231	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_4-E_5
1232	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_4-E_5
1233	$E_{1a}E_4$	E_{vii}	E_4-E_5
1234	$E_{1b}E_4$	E_{vii}	E_4-E_5
1235	$E_{1a}E_iE_4$	E_{vii}	E_4-E_5
1236	$E_{1b}E_iE_4$	E_{vii}	E_4-E_5
1237	$E_{1a}E_{ii}E_4$	E_{vii}	E_4-E_5
1238	$E_{1b}E_{ii}E_4$	E_{vii}	E_4-E_5
1239	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5
1240	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5
1241	$E_{1a}E_{iii}$	E_{vii}	E_4-E_5
1242	$E_{1b}E_{iii}$	E_{vii}	E_4-E_5
1243	$E_{1a}E_{iii}E_4$	E_{vii}	E_4-E_5
1244	$E_{1b}E_{iii}E_4$	E_{vii}	E_4-E_5
1245	$E_{1a}E_{iv}$	E_{vii}	E_4-E_5
1246	$E_{1b}E_{iv}$	E_{vii}	E_4-E_5
1247	$E_{1a}E_{iv}E_4$	E_{vii}	E_4-E_5
1248	$E_{1b}E_{iv}E_4$	E_{vii}	E_4-E_5
1249	E_{1a}	$AlkLE_{vii}$	
1250	E_{1b}	$AlkLE_{vii}$	
1251	$E_{1a}E_i$	$AlkLE_{vii}$	
1252	$E_{1b}E_i$	$AlkLE_{vii}$	
1253	$E_{1a}E_{ii}$	$AlkLE_{vii}$	
1254	$E_{1b}E_{ii}$	$AlkLE_{vii}$	
1255	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	
1256	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	
1257	$E_{1a}E_4$	$AlkLE_{vii}$	
1258	$E_{1b}E_4$	$AlkLE_{vii}$	
1259	$E_{1a}E_iE_4$	$AlkLE_{vii}$	
1260	$E_{1b}E_iE_4$	$AlkLE_{vii}$	
1261	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	
1262	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	
1263	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	
1264	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	
1265	$E_{1a}E_{iii}$	$AlkLE_{vii}$	
1266	$E_{1b}E_{iii}$	$AlkLE_{vii}$	
1267	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	
1268	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	
1269	$E_{1a}E_{iv}$	$AlkLE_{vii}$	
1270	$E_{1b}E_{iv}$	$AlkLE_{vii}$	
1271	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	
1272	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	
1273	E_{1a}	$AlkLE_{vii}$	E_4-
1274	E_{1b}	$AlkLE_{vii}$	E_4-
1275	$E_{1a}E_i$	$AlkLE_{vii}$	E_4-
1276	$E_{1b}E_i$	$AlkLE_{vii}$	E_4-
1277	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_4-
1278	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_4-
1279	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-
1280	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-
1281	$E_{1a}E_4$	$AlkLE_{vii}$	E_4-
1282	$E_{1b}E_4$	$AlkLE_{vii}$	E_4-
1283	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_4-
1284	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_4-
1285	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_4-
1286	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_4-
1287	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-
1288	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-
1289	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_4-
1290	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_4-
1291	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_4-
1292	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_4-
1293	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_4-
1294	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_4-
1295	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_4-
1296	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_4-
1297	E_{1a}	$AlkLE_{vii}$	E_5
1298	E_{1b}	$AlkLE_{vii}$	E_5
1299	$E_{1a}E_i$	$AlkLE_{vii}$	E_5

1300	$E_{1b}E_{i}$	$AlkLE_{vii}$	E_5
1301	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_5
1302	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_5
1303	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5
1304	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5
1305	$E_{1a}E_4$	$AlkLE_{vii}$	E_5
1306	$E_{1b}E_4$	$AlkLE_{vii}$	E_5
1307	$E_{1a}E_{i}E_4$	$AlkLE_{vii}$	E_5
1308	$E_{1b}E_{i}E_4$	$AlkLE_{vii}$	E_5
1309	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_5
1310	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_5
1311	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5
1312	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5
1313	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_5
1314	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_5
1315	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_5
1316	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_5
1317	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_5
1318	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_5
1319	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_5
1320	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_5
1321	E_{1a}	$AlkLE_{vii}$	E_4-E_5
1322	E_{1b}	$AlkLE_{vii}$	E_4-E_5
1323	$E_{1a}E_{i}$	$AlkLE_{vii}$	E_4-E_5
1324	$E_{1b}E_{i}$	$AlkLE_{vii}$	E_4-E_5
1325	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_4-E_5
1326	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_4-E_5
1327	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5
1328	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5
1329	$E_{1a}E_4$	$AlkLE_{vii}$	E_4-E_5
1330	$E_{1b}E_4$	$AlkLE_{vii}$	E_4-E_5
1331	$E_{1a}E_{i}E_4$	$AlkLE_{vii}$	E_4-E_5
1332	$E_{1b}E_{i}E_4$	$AlkLE_{vii}$	E_4-E_5
1333	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5
1334	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5
1335	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5
1336	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5
1337	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_4-E_5
1338	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_4-E_5
1339	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5
1340	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5
1341	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_4-E_5
1342	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_4-E_5

1343	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5
1344	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5
1345	E_{1a}	E_{vii}	E_a
1346	E_{1b}	E_{vii}	E_a
1347	$E_{1a}E_{i}$	E_{vii}	E_a
1348	$E_{1b}E_{i}$	E_{vii}	E_a
1349	$E_{1a}E_{ii}$	E_{vii}	E_a
1350	$E_{1b}E_{ii}$	E_{vii}	E_a
1351	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_a
1352	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_a
1353	$E_{1a}E_4$	E_{vii}	E_a
1354	$E_{1b}E_4$	E_{vii}	E_a
1355	$E_{1a}E_{i}E_4$	E_{vii}	E_a
1356	$E_{1b}E_{i}E_4$	E_{vii}	E_a
1357	$E_{1a}E_{ii}E_4$	E_{vii}	E_a
1358	$E_{1b}E_{ii}E_4$	E_{vii}	E_a
1359	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_a
1360	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_a
1361	$E_{1a}E_{iii}$	E_{vii}	E_a
1362	$E_{1b}E_{iii}$	E_{vii}	E_a
1363	$E_{1a}E_{iii}E_4$	E_{vii}	E_a
1364	$E_{1b}E_{iii}E_4$	E_{vii}	E_a
1365	$E_{1a}E_{iv}$	E_{vii}	E_a
1366	$E_{1b}E_{iv}$	E_{vii}	E_a
1367	$E_{1a}E_{iv}E_4$	E_{vii}	E_a
1368	$E_{1b}E_{iv}E_4$	E_{vii}	E_a
1369	E_{1a}	E_{vii}	E_4- E_a
1370	E_{1b}	E_{vii}	E_4- E_a
1371	$E_{1a}E_{i}$	E_{vii}	E_4- E_a
1372	$E_{1b}E_{i}$	E_{vii}	E_4- E_a
1373	$E_{1a}E_{ii}$	E_{vii}	E_4- E_a
1374	$E_{1b}E_{ii}$	E_{vii}	E_4- E_a
1375	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_4- E_a
1376	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_4- E_a
1377	$E_{1a}E_4$	E_{vii}	E_4- E_a
1378	$E_{1b}E_4$	E_{vii}	E_4- E_a
1379	$E_{1a}E_{i}E_4$	E_{vii}	E_4- E_a
1380	$E_{1b}E_{i}E_4$	E_{vii}	E_4- E_a
1381	$E_{1a}E_{ii}E_4$	E_{vii}	E_4- E_a
1382	$E_{1b}E_{ii}E_4$	E_{vii}	E_4- E_a
1383	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_4- E_a
1384	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_4- E_a
1385	$E_{1a}E_{iii}$	E_{vii}	E_4- E_a

1386	$E_{1b}E_{iii}$	E_{vii}	$E_{4'}$	E_a
1387	$E_{1a}E_{iii}E_4$	E_{vii}	$E_{4'}$	E_a
1388	$E_{1b}E_{iii}E_4$	E_{vii}	$E_{4'}$	E_a
1389	$E_{1a}E_{iv}$	E_{vii}	$E_{4'}$	E_a
1390	$E_{1b}E_{iv}$	E_{vii}	$E_{4'}$	E_a
1391	$E_{1a}E_{iv}E_4$	E_{vii}	$E_{4'}$	E_a
1392	$E_{1b}E_{iv}E_4$	E_{vii}	$E_{4'}$	E_a
1393	E_{1a}	E_{vii}	E_5	E_a
1394	E_{1b}	E_{vii}	E_5	E_a
1395	$E_{1a}E_i$	E_{vii}	E_5	E_a
1396	$E_{1b}E_i$	E_{vii}	E_5	E_a
1397	$E_{1a}E_{ii}$	E_{vii}	E_5	E_a
1398	$E_{1b}E_{ii}$	E_{vii}	E_5	E_a
1399	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_5	E_a
1400	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_5	E_a
1401	$E_{1a}E_4$	E_{vii}	E_5	E_a
1402	$E_{1b}E_4$	E_{vii}	E_5	E_a
1403	$E_{1a}E_iE_4$	E_{vii}	E_5	E_a
1404	$E_{1b}E_iE_4$	E_{vii}	E_5	E_a
1405	$E_{1a}E_{ii}E_4$	E_{vii}	E_5	E_a
1406	$E_{1b}E_{ii}E_4$	E_{vii}	E_5	E_a
1407	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_a
1408	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_a
1409	$E_{1a}E_{iii}$	E_{vii}	E_5	E_a
1410	$E_{1b}E_{iii}$	E_{vii}	E_5	E_a
1411	$E_{1a}E_{iii}E_4$	E_{vii}	E_5	E_a
1412	$E_{1b}E_{iii}E_4$	E_{vii}	E_5	E_a
1413	$E_{1a}E_{iv}$	E_{vii}	E_5	E_a
1414	$E_{1b}E_{iv}$	E_{vii}	E_5	E_a
1415	$E_{1a}E_{iv}E_4$	E_{vii}	E_5	E_a
1416	$E_{1b}E_{iv}E_4$	E_{vii}	E_5	E_a
1417	E_{1a}	E_{vii}	E_4-E_5	E_a
1418	E_{1b}	E_{vii}	E_4-E_5	E_a
1419	$E_{1a}E_i$	E_{vii}	E_4-E_5	E_a
1420	$E_{1b}E_i$	E_{vii}	E_4-E_5	E_a
1421	$E_{1a}E_{ii}$	E_{vii}	E_4-E_5	E_a
1422	$E_{1b}E_{ii}$	E_{vii}	E_4-E_5	E_a
1423	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_a
1424	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_4-E_5	E_a
1425	$E_{1a}E_4$	E_{vii}	E_4-E_5	E_a
1426	$E_{1b}E_4$	E_{vii}	E_4-E_5	E_a
1427	$E_{1a}E_iE_4$	E_{vii}	E_4-E_5	E_a
1428	$E_{1b}E_iE_4$	E_{vii}	E_4-E_5	E_a

1429	$E_{1a}E_{ii}E_4$	E_{vii}	E_4-E_5	E_a
1430	$E_{1b}E_{ii}E_4$	E_{vii}	E_4-E_5	E_a
1431	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_a
1432	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_a
1433	$E_{1a}E_{iii}$	E_{vii}	E_4-E_5	E_a
1434	$E_{1b}E_{iii}$	E_{vii}	E_4-E_5	E_a
1435	$E_{1a}E_{iii}E_4$	E_{vii}	E_4-E_5	E_a
1436	$E_{1b}E_{iii}E_4$	E_{vii}	E_4-E_5	E_a
1437	$E_{1a}E_{iv}$	E_{vii}	E_4-E_5	E_a
1438	$E_{1b}E_{iv}$	E_{vii}	E_4-E_5	E_a
1439	$E_{1a}E_{iv}E_4$	E_{vii}	E_4-E_5	E_a
1440	$E_{1b}E_{iv}E_4$	E_{vii}	E_4-E_5	E_a
1441	E_{1a}	$AlkLE_{vii}$		E_a
1442	E_{1b}	$AlkLE_{vii}$		E_a
1443	$E_{1a}E_i$	$AlkLE_{vii}$		E_a
1444	$E_{1b}E_i$	$AlkLE_{vii}$		E_a
1445	$E_{1a}E_{ii}$	$AlkLE_{vii}$		E_a
1446	$E_{1b}E_{ii}$	$AlkLE_{vii}$		E_a
1447	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_a
1448	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_a
1449	$E_{1a}E_4$	$AlkLE_{vii}$		E_a
1450	$E_{1b}E_4$	$AlkLE_{vii}$		E_a
1451	$E_{1a}E_iE_4$	$AlkLE_{vii}$		E_a
1452	$E_{1b}E_iE_4$	$AlkLE_{vii}$		E_a
1453	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$		E_a
1454	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$		E_a
1455	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_a
1456	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_a
1457	$E_{1a}E_{iii}$	$AlkLE_{vii}$		E_a
1458	$E_{1b}E_{iii}$	$AlkLE_{vii}$		E_a
1459	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$		E_a
1460	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$		E_a
1461	$E_{1a}E_{iv}$	$AlkLE_{vii}$		E_a
1462	$E_{1b}E_{iv}$	$AlkLE_{vii}$		E_a
1463	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$		E_a
1464	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$		E_a
1465	E_{1a}	$AlkLE_{vii}$	$E_{4'}$	E_a
1466	E_{1b}	$AlkLE_{vii}$	$E_{4'}$	E_a
1467	$E_{1a}E_i$	$AlkLE_{vii}$	$E_{4'}$	E_a
1468	$E_{1b}E_i$	$AlkLE_{vii}$	$E_{4'}$	E_a
1469	$E_{1a}E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1470	$E_{1b}E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1471	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_a

1472	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_a
1473	$E_{1a}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1474	$E_{1b}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1475	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1476	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1477	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1478	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1479	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1480	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1481	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_a
1482	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_a
1483	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1484	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1485	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_a
1486	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_a
1487	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1488	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1489	E_{1a}	$AlkLE_{vii}$	E_5	E_a
1490	E_{1b}	$AlkLE_{vii}$	E_5	E_a
1491	$E_{1a}E_i$	$AlkLE_{vii}$	E_5	E_a
1492	$E_{1b}E_i$	$AlkLE_{vii}$	E_5	E_a
1493	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_5	E_a
1494	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_5	E_a
1495	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_a
1496	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_a
1497	$E_{1a}E_4$	$AlkLE_{vii}$	E_5	E_a
1498	$E_{1b}E_4$	$AlkLE_{vii}$	E_5	E_a
1499	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_5	E_a
1500	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_5	E_a
1501	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_a
1502	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_a
1503	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_a
1504	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_a
1505	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_5	E_a
1506	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_5	E_a
1507	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_a
1508	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_a
1509	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_5	E_a
1510	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_5	E_a
1511	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_a
1512	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_a
1513	E_{1a}	$AlkLE_{vii}$	E_4-E_5	E_a
1514	E_{1b}	$AlkLE_{vii}$	E_4-E_5	E_a

1515	$E_{1a}E_i$	$AlkLE_{vii}$	E_4-E_5	E_a
1516	$E_{1b}E_i$	$AlkLE_{vii}$	E_4-E_5	E_a
1517	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_a
1518	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_a
1519	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_a
1520	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_a
1521	$E_{1a}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1522	$E_{1b}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1523	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1524	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1525	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1526	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1527	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1528	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1529	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_a
1530	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_a
1531	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1532	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1533	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_a
1534	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_a
1535	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1536	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_a
1537	E_{1a}	E_{vii}		E_b
1538	E_{1b}	E_{vii}		E_b
1539	$E_{1a}E_i$	E_{vii}		E_b
1540	$E_{1b}E_i$	E_{vii}		E_b
1541	$E_{1a}E_{ii}$	E_{vii}		E_b
1542	$E_{1b}E_{ii}$	E_{vii}		E_b
1543	$E_{1a}E_{ii}E_{iib}$	E_{vii}		E_b
1544	$E_{1b}E_{ii}E_{iib}$	E_{vii}		E_b
1545	$E_{1a}E_4$	E_{vii}		E_b
1546	$E_{1b}E_4$	E_{vii}		E_b
1547	$E_{1a}E_iE_4$	E_{vii}		E_b
1548	$E_{1b}E_iE_4$	E_{vii}		E_b
1549	$E_{1a}E_{ii}E_4$	E_{vii}		E_b
1550	$E_{1b}E_{ii}E_4$	E_{vii}		E_b
1551	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}		E_b
1552	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}		E_b
1553	$E_{1a}E_{iii}$	E_{vii}		E_b
1554	$E_{1b}E_{iii}$	E_{vii}		E_b
1555	$E_{1a}E_{iii}E_4$	E_{vii}		E_b
1556	$E_{1b}E_{iii}E_4$	E_{vii}		E_b
1557	$E_{1a}E_{iv}$	E_{vii}		E_b

1558	$E_{1b}E_{iv}$	E_{vii}		E_b
1559	$E_{1a}E_{iv}E_4$	E_{vii}		E_b
1560	$E_{1b}E_{iv}E_4$	E_{vii}		E_b
1561	E_{1a}	E_{vii}	E_4*	E_b
1562	E_{1b}	E_{vii}	E_4*	E_b
1563	$E_{1a}E_i$	E_{vii}	E_4*	E_b
1564	$E_{1b}E_i$	E_{vii}	E_4*	E_b
1565	$E_{1a}E_{ii}$	E_{vii}	E_4*	E_b
1566	$E_{1b}E_{ii}$	E_{vii}	E_4*	E_b
1567	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_4*	E_b
1568	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_4*	E_b
1569	$E_{1a}E_4$	E_{vii}	E_4*	E_b
1570	$E_{1b}E_4$	E_{vii}	E_4*	E_b
1571	$E_{1a}E_iE_4$	E_{vii}	E_4*	E_b
1572	$E_{1b}E_iE_4$	E_{vii}	E_4*	E_b
1573	$E_{1a}E_{ii}E_4$	E_{vii}	E_4*	E_b
1574	$E_{1b}E_{ii}E_4$	E_{vii}	E_4*	E_b
1575	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_4*	E_b
1576	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_4*	E_b
1577	$E_{1a}E_{iii}$	E_{vii}	E_4*	E_b
1578	$E_{1b}E_{iii}$	E_{vii}	E_4*	E_b
1579	$E_{1a}E_{iii}E_4$	E_{vii}	E_4*	E_b
1580	$E_{1b}E_{iii}E_4$	E_{vii}	E_4*	E_b
1581	$E_{1a}E_{iv}$	E_{vii}	E_4*	E_b
1582	$E_{1b}E_{iv}$	E_{vii}	E_4*	E_b
1583	$E_{1a}E_{iv}E_4$	E_{vii}	E_4*	E_b
1584	$E_{1b}E_{iv}E_4$	E_{vii}	E_4*	E_b
1585	E_{1a}	E_{vii}	E_5	E_b
1586	E_{1b}	E_{vii}	E_5	E_b
1587	$E_{1a}E_i$	E_{vii}	E_5	E_b
1588	$E_{1b}E_i$	E_{vii}	E_5	E_b
1589	$E_{1a}E_{ii}$	E_{vii}	E_5	E_b
1590	$E_{1b}E_{ii}$	E_{vii}	E_5	E_b
1591	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_5	E_b
1592	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_5	E_b
1593	$E_{1a}E_4$	E_{vii}	E_5	E_b
1594	$E_{1b}E_4$	E_{vii}	E_5	E_b
1595	$E_{1a}E_iE_4$	E_{vii}	E_5	E_b
1596	$E_{1b}E_iE_4$	E_{vii}	E_5	E_b
1597	$E_{1a}E_{ii}E_4$	E_{vii}	E_5	E_b
1598	$E_{1b}E_{ii}E_4$	E_{vii}	E_5	E_b
1599	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_b
1600	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_b

1601	$E_{1a}E_{iii}$	E_{vii}	E_5	E_b
1602	$E_{1b}E_{iii}$	E_{vii}	E_5	E_b
1603	$E_{1a}E_{iii}E_4$	E_{vii}	E_5	E_b
1604	$E_{1b}E_{iii}E_4$	E_{vii}	E_5	E_b
1605	$E_{1a}E_{iv}$	E_{vii}	E_5	E_b
1606	$E_{1b}E_{iv}$	E_{vii}	E_5	E_b
1607	$E_{1a}E_{iv}E_4$	E_{vii}	E_5	E_b
1608	$E_{1b}E_{iv}E_4$	E_{vii}	E_5	E_b
1609	E_{1a}	E_{vii}	E_4*E_5	E_b
1610	E_{1b}	E_{vii}	E_4*E_5	E_b
1611	$E_{1a}E_i$	E_{vii}	E_4*E_5	E_b
1612	$E_{1b}E_i$	E_{vii}	E_4*E_5	E_b
1613	$E_{1a}E_{ii}$	E_{vii}	E_4*E_5	E_b
1614	$E_{1b}E_{ii}$	E_{vii}	E_4*E_5	E_b
1615	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_4*E_5	E_b
1616	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_4*E_5	E_b
1617	$E_{1a}E_4$	E_{vii}	E_4*E_5	E_b
1618	$E_{1b}E_4$	E_{vii}	E_4*E_5	E_b
1619	$E_{1a}E_iE_4$	E_{vii}	E_4*E_5	E_b
1620	$E_{1b}E_iE_4$	E_{vii}	E_4*E_5	E_b
1621	$E_{1a}E_{ii}E_4$	E_{vii}	E_4*E_5	E_b
1622	$E_{1b}E_{ii}E_4$	E_{vii}	E_4*E_5	E_b
1623	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_4*E_5	E_b
1624	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_4*E_5	E_b
1625	$E_{1a}E_{iii}$	E_{vii}	E_4*E_5	E_b
1626	$E_{1b}E_{iii}$	E_{vii}	E_4*E_5	E_b
1627	$E_{1a}E_{iii}E_4$	E_{vii}	E_4*E_5	E_b
1628	$E_{1b}E_{iii}E_4$	E_{vii}	E_4*E_5	E_b
1629	$E_{1a}E_{iv}$	E_{vii}	E_4*E_5	E_b
1630	$E_{1b}E_{iv}$	E_{vii}	E_4*E_5	E_b
1631	$E_{1a}E_{iv}E_4$	E_{vii}	E_4*E_5	E_b
1632	$E_{1b}E_{iv}E_4$	E_{vii}	E_4*E_5	E_b
1633	E_{1a}	$AlkLE_{vii}$		E_b
1634	E_{1b}	$AlkLE_{vii}$		E_b
1635	$E_{1a}E_i$	$AlkLE_{vii}$		E_b
1636	$E_{1b}E_i$	$AlkLE_{vii}$		E_b
1637	$E_{1a}E_{ii}$	$AlkLE_{vii}$		E_b
1638	$E_{1b}E_{ii}$	$AlkLE_{vii}$		E_b
1639	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_b
1640	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_b
1641	$E_{1a}E_4$	$AlkLE_{vii}$		E_b
1642	$E_{1b}E_4$	$AlkLE_{vii}$		E_b
1643	$E_{1a}E_iE_4$	$AlkLE_{vii}$		E_b

1644	$E_{1b}E_iE_4$	$AlkLE_{vii}$		E_b
1645	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$		E_b
1646	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$		E_b
1647	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_b
1648	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_b
1649	$E_{1a}E_{iii}$	$AlkLE_{vii}$		E_b
1650	$E_{1b}E_{iii}$	$AlkLE_{vii}$		E_b
1651	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$		E_b
1652	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$		E_b
1653	$E_{1a}E_{iv}$	$AlkLE_{vii}$		E_b
1654	$E_{1b}E_{iv}$	$AlkLE_{vii}$		E_b
1655	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$		E_b
1656	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$		E_b
1657	E_{1a}	$AlkLE_{vii}$	E_4*	E_b
1658	E_{1b}	$AlkLE_{vii}$	E_4*	E_b
1659	$E_{1a}E_i$	$AlkLE_{vii}$	E_4*	E_b
1660	$E_{1b}E_i$	$AlkLE_{vii}$	E_4*	E_b
1661	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_4*	E_b
1662	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_4*	E_b
1663	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4*	E_b
1664	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4*	E_b
1665	$E_{1a}E_4$	$AlkLE_{vii}$	E_4*	E_b
1666	$E_{1b}E_4$	$AlkLE_{vii}$	E_4*	E_b
1667	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_4*	E_b
1668	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_4*	E_b
1669	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_4*	E_b
1670	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_4*	E_b
1671	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4*	E_b
1672	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4*	E_b
1673	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_4*	E_b
1674	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_4*	E_b
1675	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_4*	E_b
1676	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_4*	E_b
1677	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_4*	E_b
1678	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_4*	E_b
1679	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_4*	E_b
1680	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_4*	E_b
1681	E_{1a}	$AlkLE_{vii}$	E_5	E_b
1682	E_{1b}	$AlkLE_{vii}$	E_5	E_b
1683	$E_{1a}E_i$	$AlkLE_{vii}$	E_5	E_b
1684	$E_{1b}E_i$	$AlkLE_{vii}$	E_5	E_b
1685	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_5	E_b
1686	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_5	E_b
1687	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_b
1688	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_b
1689	$E_{1a}E_4$	$AlkLE_{vii}$	E_5	E_b
1690	$E_{1b}E_4$	$AlkLE_{vii}$	E_5	E_b
1691	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_5	E_b
1692	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_5	E_b
1693	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_b
1694	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_b
1695	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_b
1696	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_b
1697	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_5	E_b
1698	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_5	E_b
1699	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_b
1700	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_b
1701	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_5	E_b
1702	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_5	E_b
1703	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_b
1704	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_b
1705	E_{1a}	$AlkLE_{vii}$	E_4*E_5	E_b
1706	E_{1b}	$AlkLE_{vii}$	E_4*E_5	E_b
1707	$E_{1a}E_i$	$AlkLE_{vii}$	E_4*E_5	E_b
1708	$E_{1b}E_i$	$AlkLE_{vii}$	E_4*E_5	E_b
1709	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_4*E_5	E_b
1710	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_4*E_5	E_b
1711	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4*E_5	E_b
1712	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4*E_5	E_b
1713	$E_{1a}E_4$	$AlkLE_{vii}$	E_4*E_5	E_b
1714	$E_{1b}E_4$	$AlkLE_{vii}$	E_4*E_5	E_b
1715	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_4*E_5	E_b
1716	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_4*E_5	E_b
1717	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_4*E_5	E_b
1718	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_4*E_5	E_b
1719	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4*E_5	E_b
1720	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4*E_5	E_b
1721	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_4*E_5	E_b
1722	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_4*E_5	E_b
1723	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_4*E_5	E_b
1724	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_4*E_5	E_b
1725	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_4*E_5	E_b
1726	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_4*E_5	E_b
1727	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_4*E_5	E_b
1728	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_4*E_5	E_b
1729	E_{1a}	E_{vii}		E_d

1730	E_{1b}	E_{vii}		E_d
1731	$E_{1a}E_i$	E_{vii}		E_d
1732	$E_{1b}E_i$	E_{vii}		E_d
1733	$E_{1a}E_{ii}$	E_{vii}		E_d
1734	$E_{1b}E_{ii}$	E_{vii}		E_d
1735	$E_{1a}E_{ii}E_{iib}$	E_{vii}		E_d
1736	$E_{1b}E_{ii}E_{iib}$	E_{vii}		E_d
1737	$E_{1a}E_4$	E_{vii}		E_d
1738	$E_{1b}E_4$	E_{vii}		E_d
1739	$E_{1a}E_iE_4$	E_{vii}		E_d
1740	$E_{1b}E_iE_4$	E_{vii}		E_d
1741	$E_{1a}E_{ii}E_4$	E_{vii}		E_d
1742	$E_{1b}E_{ii}E_4$	E_{vii}		E_d
1743	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}		E_d
1744	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}		E_d
1745	$E_{1a}E_{iii}$	E_{vii}		E_d
1746	$E_{1b}E_{iii}$	E_{vii}		E_d
1747	$E_{1a}E_{iii}E_4$	E_{vii}		E_d
1748	$E_{1b}E_{iii}E_4$	E_{vii}		E_d
1749	$E_{1a}E_{iv}$	E_{vii}		E_d
1750	$E_{1b}E_{iv}$	E_{vii}		E_d
1751	$E_{1a}E_{iv}E_4$	E_{vii}		E_d
1752	$E_{1b}E_{iv}E_4$	E_{vii}		E_d
1753	E_{1a}	E_{vii}	E_{4^*}	E_d
1754	E_{1b}	E_{vii}	E_{4^*}	E_d
1755	$E_{1a}E_i$	E_{vii}	E_{4^*}	E_d
1756	$E_{1b}E_i$	E_{vii}	E_{4^*}	E_d
1757	$E_{1a}E_{ii}$	E_{vii}	E_{4^*}	E_d
1758	$E_{1b}E_{ii}$	E_{vii}	E_{4^*}	E_d
1759	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_d
1760	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_d
1761	$E_{1a}E_4$	E_{vii}	E_{4^*}	E_d
1762	$E_{1b}E_4$	E_{vii}	E_{4^*}	E_d
1763	$E_{1a}E_iE_4$	E_{vii}	E_{4^*}	E_d
1764	$E_{1b}E_iE_4$	E_{vii}	E_{4^*}	E_d
1765	$E_{1a}E_{ii}E_4$	E_{vii}	E_{4^*}	E_d
1766	$E_{1b}E_{ii}E_4$	E_{vii}	E_{4^*}	E_d
1767	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_d
1768	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_d
1769	$E_{1a}E_{iii}$	E_{vii}	E_{4^*}	E_d
1770	$E_{1b}E_{iii}$	E_{vii}	E_{4^*}	E_d
1771	$E_{1a}E_{iii}E_4$	E_{vii}	E_{4^*}	E_d
1772	$E_{1b}E_{iii}E_4$	E_{vii}	E_{4^*}	E_d

1773	$E_{1a}E_{iv}$	E_{vii}	E_{4^*}	E_d
1774	$E_{1b}E_{iv}$	E_{vii}	E_{4^*}	E_d
1775	$E_{1a}E_{iv}E_4$	E_{vii}	E_{4^*}	E_d
1776	$E_{1b}E_{iv}E_4$	E_{vii}	E_{4^*}	E_d
1777	E_{1a}	E_{vii}	E_5	E_d
1778	E_{1b}	E_{vii}	E_5	E_d
1779	$E_{1a}E_i$	E_{vii}	E_5	E_d
1780	$E_{1b}E_i$	E_{vii}	E_5	E_d
1781	$E_{1a}E_{ii}$	E_{vii}	E_5	E_d
1782	$E_{1b}E_{ii}$	E_{vii}	E_5	E_d
1783	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_5	E_d
1784	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_5	E_d
1785	$E_{1a}E_4$	E_{vii}	E_5	E_d
1786	$E_{1b}E_4$	E_{vii}	E_5	E_d
1787	$E_{1a}E_iE_4$	E_{vii}	E_5	E_d
1788	$E_{1b}E_iE_4$	E_{vii}	E_5	E_d
1789	$E_{1a}E_{ii}E_4$	E_{vii}	E_5	E_d
1790	$E_{1b}E_{ii}E_4$	E_{vii}	E_5	E_d
1791	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_d
1792	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_d
1793	$E_{1a}E_{iii}$	E_{vii}	E_5	E_d
1794	$E_{1b}E_{iii}$	E_{vii}	E_5	E_d
1795	$E_{1a}E_{iii}E_4$	E_{vii}	E_5	E_d
1796	$E_{1b}E_{iii}E_4$	E_{vii}	E_5	E_d
1797	$E_{1a}E_{iv}$	E_{vii}	E_5	E_d
1798	$E_{1b}E_{iv}$	E_{vii}	E_5	E_d
1799	$E_{1a}E_{iv}E_4$	E_{vii}	E_5	E_d
1800	$E_{1b}E_{iv}E_4$	E_{vii}	E_5	E_d
1801	E_{1a}	E_{vii}	$E_{4^*}E_5$	E_d
1802	E_{1b}	E_{vii}	$E_{4^*}E_5$	E_d
1803	$E_{1a}E_i$	E_{vii}	$E_{4^*}E_5$	E_d
1804	$E_{1b}E_i$	E_{vii}	$E_{4^*}E_5$	E_d
1805	$E_{1a}E_{ii}$	E_{vii}	$E_{4^*}E_5$	E_d
1806	$E_{1b}E_{ii}$	E_{vii}	$E_{4^*}E_5$	E_d
1807	$E_{1a}E_{ii}E_{iib}$	E_{vii}	$E_{4^*}E_5$	E_d
1808	$E_{1b}E_{ii}E_{iib}$	E_{vii}	$E_{4^*}E_5$	E_d
1809	$E_{1a}E_4$	E_{vii}	$E_{4^*}E_5$	E_d
1810	$E_{1b}E_4$	E_{vii}	$E_{4^*}E_5$	E_d
1811	$E_{1a}E_iE_4$	E_{vii}	$E_{4^*}E_5$	E_d
1812	$E_{1b}E_iE_4$	E_{vii}	$E_{4^*}E_5$	E_d
1813	$E_{1a}E_{ii}E_4$	E_{vii}	$E_{4^*}E_5$	E_d
1814	$E_{1b}E_{ii}E_4$	E_{vii}	$E_{4^*}E_5$	E_d
1815	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	$E_{4^*}E_5$	E_d

1816	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_4-E_5	E_d
1817	$E_{1a}E_{iii}$	E_{vii}	E_4-E_5	E_d
1818	$E_{1b}E_{iii}$	E_{vii}	E_4-E_5	E_d
1819	$E_{1a}E_{iii}E_4$	E_{vii}	E_4-E_5	E_d
1820	$E_{1b}E_{iii}E_4$	E_{vii}	E_4-E_5	E_d
1821	$E_{1a}E_{iv}$	E_{vii}	E_4-E_5	E_d
1822	$E_{1b}E_{iv}$	E_{vii}	E_4-E_5	E_d
1823	$E_{1a}E_{iv}E_4$	E_{vii}	E_4-E_5	E_d
1824	$E_{1b}E_{iv}E_4$	E_{vii}	E_4-E_5	E_d
1825	E_{1a}	$AlkLE_{vii}$		E_d
1826	E_{1b}	$AlkLE_{vii}$		E_d
1827	$E_{1a}E_i$	$AlkLE_{vii}$		E_d
1828	$E_{1b}E_i$	$AlkLE_{vii}$		E_d
1829	$E_{1a}E_{ii}$	$AlkLE_{vii}$		E_d
1830	$E_{1b}E_{ii}$	$AlkLE_{vii}$		E_d
1831	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_d
1832	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_d
1833	$E_{1a}E_4$	$AlkLE_{vii}$		E_d
1834	$E_{1b}E_4$	$AlkLE_{vii}$		E_d
1835	$E_{1a}E_iE_4$	$AlkLE_{vii}$		E_d
1836	$E_{1b}E_iE_4$	$AlkLE_{vii}$		E_d
1837	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$		E_d
1838	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$		E_d
1839	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_d
1840	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_d
1841	$E_{1a}E_{iii}$	$AlkLE_{vii}$		E_d
1842	$E_{1b}E_{iii}$	$AlkLE_{vii}$		E_d
1843	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$		E_d
1844	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$		E_d
1845	$E_{1a}E_{iv}$	$AlkLE_{vii}$		E_d
1846	$E_{1b}E_{iv}$	$AlkLE_{vii}$		E_d
1847	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$		E_d
1848	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$		E_d
1849	E_{1a}	$AlkLE_{vii}$	E_4*	E_d
1850	E_{1b}	$AlkLE_{vii}$	E_4*	E_d
1851	$E_{1a}E_i$	$AlkLE_{vii}$	E_4*	E_d
1852	$E_{1b}E_i$	$AlkLE_{vii}$	E_4*	E_d
1853	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_4*	E_d
1854	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_4*	E_d
1855	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4*	E_d
1856	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4*	E_d
1857	$E_{1a}E_4$	$AlkLE_{vii}$	E_4*	E_d
1858	$E_{1b}E_4$	$AlkLE_{vii}$	E_4*	E_d

1859	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_4*	E_d
1860	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_4*	E_d
1861	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_4*	E_d
1862	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_4*	E_d
1863	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4*	E_d
1864	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4*	E_d
1865	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_4*	E_d
1866	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_4*	E_d
1867	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_4*	E_d
1868	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_4*	E_d
1869	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_4*	E_d
1870	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_4*	E_d
1871	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_4*	E_d
1872	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_4*	E_d
1873	E_{1a}	$AlkLE_{vii}$	E_5	E_d
1874	E_{1b}	$AlkLE_{vii}$	E_5	E_d
1875	$E_{1a}E_i$	$AlkLE_{vii}$	E_5	E_d
1876	$E_{1b}E_i$	$AlkLE_{vii}$	E_5	E_d
1877	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_5	E_d
1878	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_5	E_d
1879	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_d
1880	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_d
1881	$E_{1a}E_4$	$AlkLE_{vii}$	E_5	E_d
1882	$E_{1b}E_4$	$AlkLE_{vii}$	E_5	E_d
1883	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_5	E_d
1884	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_5	E_d
1885	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_d
1886	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_d
1887	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_d
1888	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_d
1889	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_5	E_d
1890	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_5	E_d
1891	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_d
1892	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_d
1893	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_5	E_d
1894	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_5	E_d
1895	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_d
1896	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_d
1897	E_{1a}	$AlkLE_{vii}$	E_4-E_5	E_d
1898	E_{1b}	$AlkLE_{vii}$	E_4-E_5	E_d
1899	$E_{1a}E_i$	$AlkLE_{vii}$	E_4-E_5	E_d
1900	$E_{1b}E_i$	$AlkLE_{vii}$	E_4-E_5	E_d
1901	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_d

1902	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_d
1903	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_d
1904	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_d
1905	$E_{1a}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
1906	$E_{1b}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
1907	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_d
1908	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_d
1909	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
1910	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
1911	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
1912	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
1913	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_d
1914	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_d
1915	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
1916	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
1917	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_d
1918	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_d
1919	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
1920	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_d
1921	E_{1a}	E_{vii}		E_e
1922	E_{1b}	E_{vii}		E_e
1923	$E_{1a}E_i$	E_{vii}		E_e
1924	$E_{1b}E_i$	E_{vii}		E_e
1925	$E_{1a}E_{ii}$	E_{vii}		E_e
1926	$E_{1b}E_{ii}$	E_{vii}		E_e
1927	$E_{1a}E_{ii}E_{iib}$	E_{vii}		E_e
1928	$E_{1b}E_{ii}E_{iib}$	E_{vii}		E_e
1929	$E_{1a}E_4$	E_{vii}		E_e
1930	$E_{1b}E_4$	E_{vii}		E_e
1931	$E_{1a}E_iE_4$	E_{vii}		E_e
1932	$E_{1b}E_iE_4$	E_{vii}		E_e
1933	$E_{1a}E_{ii}E_4$	E_{vii}		E_e
1934	$E_{1b}E_{ii}E_4$	E_{vii}		E_e
1935	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}		E_e
1936	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}		E_e
1937	$E_{1a}E_{iii}$	E_{vii}		E_e
1938	$E_{1b}E_{iii}$	E_{vii}		E_e
1939	$E_{1a}E_{iii}E_4$	E_{vii}		E_e
1940	$E_{1b}E_{iii}E_4$	E_{vii}		E_e
1941	$E_{1a}E_{iv}$	E_{vii}		E_e
1942	$E_{1b}E_{iv}$	E_{vii}		E_e
1943	$E_{1a}E_{iv}E_4$	E_{vii}		E_e
1944	$E_{1b}E_{iv}E_4$	E_{vii}		E_e

1945	E_{1a}	E_{vii}	E_4*	E_e
1946	E_{1b}	E_{vii}	E_4*	E_e
1947	$E_{1a}E_i$	E_{vii}	E_4*	E_e
1948	$E_{1b}E_i$	E_{vii}	E_4*	E_e
1949	$E_{1a}E_{ii}$	E_{vii}	E_4*	E_e
1950	$E_{1b}E_{ii}$	E_{vii}	E_4*	E_e
1951	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_4*	E_e
1952	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_4*	E_e
1953	$E_{1a}E_4$	E_{vii}	E_4*	E_e
1954	$E_{1b}E_4$	E_{vii}	E_4*	E_e
1955	$E_{1a}E_iE_4$	E_{vii}	E_4*	E_e
1956	$E_{1b}E_iE_4$	E_{vii}	E_4*	E_e
1957	$E_{1a}E_{ii}E_4$	E_{vii}	E_4*	E_e
1958	$E_{1b}E_{ii}E_4$	E_{vii}	E_4*	E_e
1959	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_4*	E_e
1960	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_4*	E_e
1961	$E_{1a}E_{iii}$	E_{vii}	E_4*	E_e
1962	$E_{1b}E_{iii}$	E_{vii}	E_4*	E_e
1963	$E_{1a}E_{iii}E_4$	E_{vii}	E_4*	E_e
1964	$E_{1b}E_{iii}E_4$	E_{vii}	E_4*	E_e
1965	$E_{1a}E_{iv}$	E_{vii}	E_4*	E_e
1966	$E_{1b}E_{iv}$	E_{vii}	E_4*	E_e
1967	$E_{1a}E_{iv}E_4$	E_{vii}	E_4*	E_e
1968	$E_{1b}E_{iv}E_4$	E_{vii}	E_4*	E_e
1969	E_{1a}	E_{vii}	E_5	E_e
1970	E_{1b}	E_{vii}	E_5	E_e
1971	$E_{1a}E_i$	E_{vii}	E_5	E_e
1972	$E_{1b}E_i$	E_{vii}	E_5	E_e
1973	$E_{1a}E_{ii}$	E_{vii}	E_5	E_e
1974	$E_{1b}E_{ii}$	E_{vii}	E_5	E_e
1975	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_5	E_e
1976	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_5	E_e
1977	$E_{1a}E_4$	E_{vii}	E_5	E_e
1978	$E_{1b}E_4$	E_{vii}	E_5	E_e
1979	$E_{1a}E_iE_4$	E_{vii}	E_5	E_e
1980	$E_{1b}E_iE_4$	E_{vii}	E_5	E_e
1981	$E_{1a}E_{ii}E_4$	E_{vii}	E_5	E_e
1982	$E_{1b}E_{ii}E_4$	E_{vii}	E_5	E_e
1983	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_e
1984	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_e
1985	$E_{1a}E_{iii}$	E_{vii}	E_5	E_e
1986	$E_{1b}E_{iii}$	E_{vii}	E_5	E_e
1987	$E_{1a}E_{iii}E_4$	E_{vii}	E_5	E_e

1988	$E_{1b}E_{iii}E_4$	E_{vii}	E_5	E_e
1989	$E_{1a}E_{iv}$	E_{vii}	E_5	E_e
1990	$E_{1b}E_{iv}$	E_{vii}	E_5	E_e
1991	$E_{1a}E_{iv}E_4$	E_{vii}	E_5	E_e
1992	$E_{1b}E_{iv}E_4$	E_{vii}	E_5	E_e
1993	E_{1a}	E_{vii}	E_4*E_5	E_e
1994	E_{1b}	E_{vii}	E_4*E_5	E_e
1995	$E_{1a}E_i$	E_{vii}	E_4*E_5	E_e
1996	$E_{1b}E_i$	E_{vii}	E_4*E_5	E_e
1997	$E_{1a}E_{ii}$	E_{vii}	E_4*E_5	E_e
1998	$E_{1b}E_{ii}$	E_{vii}	E_4*E_5	E_e
1999	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_4*E_5	E_e
2000	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_4*E_5	E_e
2001	$E_{1a}E_4$	E_{vii}	E_4*E_5	E_e
2002	$E_{1b}E_4$	E_{vii}	E_4*E_5	E_e
2003	$E_{1a}E_iE_4$	E_{vii}	E_4*E_5	E_e
2004	$E_{1b}E_iE_4$	E_{vii}	E_4*E_5	E_e
2005	$E_{1a}E_{ii}E_4$	E_{vii}	E_4*E_5	E_e
2006	$E_{1b}E_{ii}E_4$	E_{vii}	E_4*E_5	E_e
2007	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_4*E_5	E_e
2008	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_4*E_5	E_e
2009	$E_{1a}E_{iii}$	E_{vii}	E_4*E_5	E_e
2010	$E_{1b}E_{iii}$	E_{vii}	E_4*E_5	E_e
2011	$E_{1a}E_{iii}E_4$	E_{vii}	E_4*E_5	E_e
2012	$E_{1b}E_{iii}E_4$	E_{vii}	E_4*E_5	E_e
2013	$E_{1a}E_{iv}$	E_{vii}	E_4*E_5	E_e
2014	$E_{1b}E_{iv}$	E_{vii}	E_4*E_5	E_e
2015	$E_{1a}E_{iv}E_4$	E_{vii}	E_4*E_5	E_e
2016	$E_{1b}E_{iv}E_4$	E_{vii}	E_4*E_5	E_e
2017	E_{1a}	$AlkLE_{vii}$		E_e
2018	E_{1b}	$AlkLE_{vii}$		E_e
2019	$E_{1a}E_i$	$AlkLE_{vii}$		E_e
2020	$E_{1b}E_i$	$AlkLE_{vii}$		E_e
2021	$E_{1a}E_{ii}$	$AlkLE_{vii}$		E_e
2022	$E_{1b}E_{ii}$	$AlkLE_{vii}$		E_e
2023	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_e
2024	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_e
2025	$E_{1a}E_4$	$AlkLE_{vii}$		E_e
2026	$E_{1b}E_4$	$AlkLE_{vii}$		E_e
2027	$E_{1a}E_iE_4$	$AlkLE_{vii}$		E_e
2028	$E_{1b}E_iE_4$	$AlkLE_{vii}$		E_e
2029	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$		E_e
2030	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$		E_e

2031	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_e
2032	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_e
2033	$E_{1a}E_{iii}$	$AlkLE_{vii}$		E_e
2034	$E_{1b}E_{iii}$	$AlkLE_{vii}$		E_e
2035	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$		E_e
2036	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$		E_e
2037	$E_{1a}E_{iv}$	$AlkLE_{vii}$		E_e
2038	$E_{1b}E_{iv}$	$AlkLE_{vii}$		E_e
2039	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$		E_e
2040	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$		E_e
2041	E_{1a}	$AlkLE_{vii}$	E_4*	E_e
2042	E_{1b}	$AlkLE_{vii}$	E_4*	E_e
2043	$E_{1a}E_i$	$AlkLE_{vii}$	E_4*	E_e
2044	$E_{1b}E_i$	$AlkLE_{vii}$	E_4*	E_e
2045	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_4*	E_e
2046	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_4*	E_e
2047	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4*	E_e
2048	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4*	E_e
2049	$E_{1a}E_4$	$AlkLE_{vii}$	E_4*	E_e
2050	$E_{1b}E_4$	$AlkLE_{vii}$	E_4*	E_e
2051	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_4*	E_e
2052	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_4*	E_e
2053	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_4*	E_e
2054	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_4*	E_e
2055	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4*	E_e
2056	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4*	E_e
2057	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_4*	E_e
2058	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_4*	E_e
2059	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_4*	E_e
2060	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_4*	E_e
2061	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_4*	E_e
2062	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_4*	E_e
2063	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_4*	E_e
2064	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_4*	E_e
2065	E_{1a}	$AlkLE_{vii}$	E_5	E_e
2066	E_{1b}	$AlkLE_{vii}$	E_5	E_e
2067	$E_{1a}E_i$	$AlkLE_{vii}$	E_5	E_e
2068	$E_{1b}E_i$	$AlkLE_{vii}$	E_5	E_e
2069	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_5	E_e
2070	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_5	E_e
2071	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_e
2072	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_e
2073	$E_{1a}E_4$	$AlkLE_{vii}$	E_5	E_e

2074	$E_{1b}E_4$	$AlkLE_{vii}$	E_5	E_e
2075	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_5	E_e
2076	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_5	E_e
2077	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_e
2078	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_e
2079	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_e
2080	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_e
2081	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_5	E_e
2082	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_5	E_e
2083	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_e
2084	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_e
2085	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_5	E_e
2086	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_5	E_e
2087	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_e
2088	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_e
2089	E_{1a}	$AlkLE_{vii}$	E_4-E_5	E_e
2090	E_{1b}	$AlkLE_{vii}$	E_4-E_5	E_e
2091	$E_{1a}E_i$	$AlkLE_{vii}$	E_4-E_5	E_e
2092	$E_{1b}E_i$	$AlkLE_{vii}$	E_4-E_5	E_e
2093	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_e
2094	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_4-E_5	E_e
2095	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_e
2096	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4-E_5	E_e
2097	$E_{1a}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
2098	$E_{1b}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
2099	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_e
2100	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_4-E_5	E_e
2101	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
2102	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
2103	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
2104	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
2105	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_e
2106	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_4-E_5	E_e
2107	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
2108	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
2109	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_e
2110	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_4-E_5	E_e
2111	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
2112	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_4-E_5	E_e
2113	E_{1a}	E_{vii}		E_f
2114	E_{1b}	E_{vii}		E_f
2115	$E_{1a}E_i$	E_{vii}		E_f
2116	$E_{1b}E_i$	E_{vii}		E_f

2117	$E_{1a}E_{ii}$	E_{vii}		E_f
2118	$E_{1b}E_{ii}$	E_{vii}		E_f
2119	$E_{1a}E_{ii}E_{iib}$	E_{vii}		E_f
2120	$E_{1b}E_{ii}E_{iib}$	E_{vii}		E_f
2121	$E_{1a}E_4$	E_{vii}		E_f
2122	$E_{1b}E_4$	E_{vii}		E_f
2123	$E_{1a}E_iE_4$	E_{vii}		E_f
2124	$E_{1b}E_iE_4$	E_{vii}		E_f
2125	$E_{1a}E_{ii}E_4$	E_{vii}		E_f
2126	$E_{1b}E_{ii}E_4$	E_{vii}		E_f
2127	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}		E_f
2128	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}		E_f
2129	$E_{1a}E_{iii}$	E_{vii}		E_f
2130	$E_{1b}E_{iii}$	E_{vii}		E_f
2131	$E_{1a}E_{iii}E_4$	E_{vii}		E_f
2132	$E_{1b}E_{iii}E_4$	E_{vii}		E_f
2133	$E_{1a}E_{iv}$	E_{vii}		E_f
2134	$E_{1b}E_{iv}$	E_{vii}		E_f
2135	$E_{1a}E_{iv}E_4$	E_{vii}		E_f
2136	$E_{1b}E_{iv}E_4$	E_{vii}		E_f
2137	E_{1a}	E_{vii}	E_{4^*}	E_f
2138	E_{1b}	E_{vii}	E_{4^*}	E_f
2139	$E_{1a}E_i$	E_{vii}	E_{4^*}	E_f
2140	$E_{1b}E_i$	E_{vii}	E_{4^*}	E_f
2141	$E_{1a}E_{ii}$	E_{vii}	E_{4^*}	E_f
2142	$E_{1b}E_{ii}$	E_{vii}	E_{4^*}	E_f
2143	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_f
2144	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_f
2145	$E_{1a}E_4$	E_{vii}	E_{4^*}	E_f
2146	$E_{1b}E_4$	E_{vii}	E_{4^*}	E_f
2147	$E_{1a}E_iE_4$	E_{vii}	E_{4^*}	E_f
2148	$E_{1b}E_iE_4$	E_{vii}	E_{4^*}	E_f
2149	$E_{1a}E_{ii}E_4$	E_{vii}	E_{4^*}	E_f
2150	$E_{1b}E_{ii}E_4$	E_{vii}	E_{4^*}	E_f
2151	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_f
2152	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_f
2153	$E_{1a}E_{iii}$	E_{vii}	E_{4^*}	E_f
2154	$E_{1b}E_{iii}$	E_{vii}	E_{4^*}	E_f
2155	$E_{1a}E_{iii}E_4$	E_{vii}	E_{4^*}	E_f
2156	$E_{1b}E_{iii}E_4$	E_{vii}	E_{4^*}	E_f
2157	$E_{1a}E_{iv}$	E_{vii}	E_{4^*}	E_f
2158	$E_{1b}E_{iv}$	E_{vii}	E_{4^*}	E_f
2159	$E_{1a}E_{iv}E_4$	E_{vii}	E_{4^*}	E_f

2160	$E_{1b}E_{iv}E_4$	E_{vii}	E_4*	E_f
2161	E_{1a}	E_{vii}	E_5	E_f
2162	E_{1b}	E_{vii}	E_5	E_f
2163	$E_{1a}E_i$	E_{vii}	E_5	E_f
2164	$E_{1b}E_i$	E_{vii}	E_5	E_f
2165	$E_{1a}E_{ii}$	E_{vii}	E_5	E_f
2166	$E_{1b}E_{ii}$	E_{vii}	E_5	E_f
2167	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_5	E_f
2168	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_5	E_f
2169	$E_{1a}E_4$	E_{vii}	E_5	E_f
2170	$E_{1b}E_4$	E_{vii}	E_5	E_f
2171	$E_{1a}E_iE_4$	E_{vii}	E_5	E_f
2172	$E_{1b}E_iE_4$	E_{vii}	E_5	E_f
2173	$E_{1a}E_{ii}E_4$	E_{vii}	E_5	E_f
2174	$E_{1b}E_{ii}E_4$	E_{vii}	E_5	E_f
2175	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_f
2176	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_5	E_f
2177	$E_{1a}E_{iii}$	E_{vii}	E_5	E_f
2178	$E_{1b}E_{iii}$	E_{vii}	E_5	E_f
2179	$E_{1a}E_{iii}E_4$	E_{vii}	E_5	E_f
2180	$E_{1b}E_{iii}E_4$	E_{vii}	E_5	E_f
2181	$E_{1a}E_{iv}$	E_{vii}	E_5	E_f
2182	$E_{1b}E_{iv}$	E_{vii}	E_5	E_f
2183	$E_{1a}E_{iv}E_4$	E_{vii}	E_5	E_f
2184	$E_{1b}E_{iv}E_4$	E_{vii}	E_5	E_f
2185	E_{1a}	E_{vii}	E_4*E_5	E_f
2186	E_{1b}	E_{vii}	E_4*E_5	E_f
2187	$E_{1a}E_i$	E_{vii}	E_4*E_5	E_f
2188	$E_{1b}E_i$	E_{vii}	E_4*E_5	E_f
2189	$E_{1a}E_{ii}$	E_{vii}	E_4*E_5	E_f
2190	$E_{1b}E_{ii}$	E_{vii}	E_4*E_5	E_f
2191	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_4*E_5	E_f
2192	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_4*E_5	E_f
2193	$E_{1a}E_4$	E_{vii}	E_4*E_5	E_f
2194	$E_{1b}E_4$	E_{vii}	E_4*E_5	E_f
2195	$E_{1a}E_iE_4$	E_{vii}	E_4*E_5	E_f
2196	$E_{1b}E_iE_4$	E_{vii}	E_4*E_5	E_f
2197	$E_{1a}E_{ii}E_4$	E_{vii}	E_4*E_5	E_f
2198	$E_{1b}E_{ii}E_4$	E_{vii}	E_4*E_5	E_f
2199	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_4*E_5	E_f
2200	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_4*E_5	E_f
2201	$E_{1a}E_{iii}$	E_{vii}	E_4*E_5	E_f
2202	$E_{1b}E_{iii}$	E_{vii}	E_4*E_5	E_f

2203	$E_{1a}E_{iii}E_4$	E_{vii}	E_4*E_5	E_f
2204	$E_{1b}E_{iii}E_4$	E_{vii}	E_4*E_5	E_f
2205	$E_{1a}E_{iv}$	E_{vii}	E_4*E_5	E_f
2206	$E_{1b}E_{iv}$	E_{vii}	E_4*E_5	E_f
2207	$E_{1a}E_{iv}E_4$	E_{vii}	E_4*E_5	E_f
2208	$E_{1b}E_{iv}E_4$	E_{vii}	E_4*E_5	E_f
2209	E_{1a}	$AlkLE_{vii}$		E_f
2210	E_{1b}	$AlkLE_{vii}$		E_f
2211	$E_{1a}E_i$	$AlkLE_{vii}$		E_f
2212	$E_{1b}E_i$	$AlkLE_{vii}$		E_f
2213	$E_{1a}E_{ii}$	$AlkLE_{vii}$		E_f
2214	$E_{1b}E_{ii}$	$AlkLE_{vii}$		E_f
2215	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_f
2216	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_f
2217	$E_{1a}E_4$	$AlkLE_{vii}$		E_f
2218	$E_{1b}E_4$	$AlkLE_{vii}$		E_f
2219	$E_{1a}E_iE_4$	$AlkLE_{vii}$		E_f
2220	$E_{1b}E_iE_4$	$AlkLE_{vii}$		E_f
2221	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$		E_f
2222	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$		E_f
2223	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_f
2224	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_f
2225	$E_{1a}E_{iii}$	$AlkLE_{vii}$		E_f
2226	$E_{1b}E_{iii}$	$AlkLE_{vii}$		E_f
2227	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$		E_f
2228	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$		E_f
2229	$E_{1a}E_{iv}$	$AlkLE_{vii}$		E_f
2230	$E_{1b}E_{iv}$	$AlkLE_{vii}$		E_f
2231	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$		E_f
2232	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$		E_f
2233	E_{1a}	$AlkLE_{vii}$	E_4*	E_f
2234	E_{1b}	$AlkLE_{vii}$	E_4*	E_f
2235	$E_{1a}E_i$	$AlkLE_{vii}$	E_4*	E_f
2236	$E_{1b}E_i$	$AlkLE_{vii}$	E_4*	E_f
2237	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_4*	E_f
2238	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_4*	E_f
2239	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4*	E_f
2240	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_4*	E_f
2241	$E_{1a}E_4$	$AlkLE_{vii}$	E_4*	E_f
2242	$E_{1b}E_4$	$AlkLE_{vii}$	E_4*	E_f
2243	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_4*	E_f
2244	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_4*	E_f
2245	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_4*	E_f

2246	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
2247	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
2248	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
2249	$E_{1a}E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_f
2250	$E_{1b}E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_f
2251	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
2252	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
2253	$E_{1a}E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_f
2254	$E_{1b}E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_f
2255	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
2256	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
2257	E_{1a}	$AlkLE_{vii}$	E_5	E_f
2258	E_{1b}	$AlkLE_{vii}$	E_5	E_f
2259	$E_{1a}E_i$	$AlkLE_{vii}$	E_5	E_f
2260	$E_{1b}E_i$	$AlkLE_{vii}$	E_5	E_f
2261	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_5	E_f
2262	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_5	E_f
2263	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_f
2264	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_5	E_f
2265	$E_{1a}E_4$	$AlkLE_{vii}$	E_5	E_f
2266	$E_{1b}E_4$	$AlkLE_{vii}$	E_5	E_f
2267	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_5	E_f
2268	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_5	E_f
2269	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_f
2270	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_5	E_f
2271	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_f
2272	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_5	E_f
2273	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_5	E_f
2274	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_5	E_f
2275	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_f
2276	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_5	E_f
2277	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_5	E_f
2278	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_5	E_f
2279	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_f
2280	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_5	E_f
2281	E_{1a}	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2282	E_{1b}	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2283	$E_{1a}E_i$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2284	$E_{1b}E_i$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2285	$E_{1a}E_{ii}$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2286	$E_{1b}E_{ii}$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2287	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2288	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2289	$E_{1a}E_4$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2290	$E_{1b}E_4$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2291	$E_{1a}E_iE_4$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2292	$E_{1b}E_iE_4$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2293	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2294	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2295	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2296	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2297	$E_{1a}E_{iii}$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2298	$E_{1b}E_{iii}$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2299	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2300	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2301	$E_{1a}E_{iv}$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2302	$E_{1b}E_{iv}$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2303	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f
2304	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}E_5$	E_f

Microorganisms quite especially preferred according to the invention (abbreviated as MO) are outstandingly suitable for the production of ω-carboxycarboxylic acids and have increased or decreased enzyme activities (abbreviated as E) described in the following table, where these can in addition advantageously be combined with an increased enzyme activity compared to the wild type of the microorganism, which is described for the 3-ketoacyl-ACP (Acyl Carrrier Protein) synthase III (EC 2.3.1.41), in particular that from plants, preferably that from plants the seeds

whereof contain fatty acids with alkyl residues shorter than 14 C atoms, and particularly preferably that from plants of the genera *Cuphea*, *Elaeis*, *Cocos*, *Umbellularia* and *Cinnamomum* and gene products selected from AccA, AccB, AccC, AccD, AceE, AceF, Lpd, AcpP, FabA, FabB, FabD, FabF, FabG, FabH, FabI, FabZ, PanD, PanK, UdhA, PntA or PntB. Any combinations of at least two of these enzyme activities can advantageously be increased. In addition, moreover, it can be advantageous if the microorganism is provided with a lower enzyme activity compared to the wild type of the microorganism, which is described for the gene products selected from TdcE, PflA, PflB, PflC, PflD, PoxB, YgfG, AckA, AckB, TdcD, Pta, LdhA, AdhE, MgsA, FdnG, FdnH, FdnI, FdhF, FdoG, FdoH, FdoI, PrpC, PrpD, PrpF , PrpB , TdcD, Pdc, PorA, PorB, PorC, PorD, AlsS, IlvB, IlvM, IlvN, IlvG, IlvI, IlvH, AlsD, ButB, ThI, ThlA, ThlB, PhaA, PhaB, Crt, BdhA, BdhB, Adc, Adh, CtfB, AtoA, AtoD, LdhL, GltA, FabR, FhuA, Dld, LldA or LldP, singly or in any combination.

MO	E increased	E decreased
1	E_{1a}	
2	E_{1b}	
3	$E_{1a}E_5$	
4	$E_{1b}E_5$	
5	$E_{1a}E_i$	
6	$E_{1b}E_i$	
7	$E_{1a}E_{ii}$	
8	$E_{1b}E_{ii}$	
9	$E_{1a}E_{ii}E_{iib}$	
10	$E_{1b}E_{ii}E_{iib}$	
11	$E_{1a}E_5E_i$	
12	$E_{1b}E_5E_i$	
13	$E_{1a}E_6E_{ii}$	
14	$E_{1b}E_5E_{ii}$	
15	$E_{1a}E_5E_{ii}E_{iib}$	
16	$E_{1b}E_5E_{ii}E_{iib}$	
17	$E_{1a}E_4$	
18	$E_{1b}E_4$	
19	$E_{1a}E_5E_4$	
20	$E_{1b}E_5E_4$	
21	$E_{1a}E_iE_4$	
22	$E_{1b}E_iE_4$	
23	$E_{1a}E_{ii}E_4$	
24	$E_{1b}E_{ii}E_4$	
25	$E_{1a}E_{ii}E_{iib}E_4$	
26	$E_{1b}E_{ii}E_{iib}E_4$	
27	$E_{1a}E_5E_iE_4$	
28	$E_{1b}E_5E_iE_4$	
29	$E_{1a}E_5E_{ii}E_4$	
30	$E_{1b}E_5E_{ii}E_4$	
31	$E_{1a}E_5E_{ii}E_{iib}E_4$	
32	$E_{1b}E_5E_{ii}E_{iib}E_4$	
33	$E_{1a}E_{iii}$	
34	$E_{1b}E_{iii}$	
35	$E_{1a}E_5E_{iii}$	
36	$E_{1b}E_5E_{iii}$	
37	$E_{1a}E_{iii}E_4$	
38	$E_{1b}E_{iii}E_4$	
39	$E_{1a}E_5E_{iii}E_4$	
40	$E_{1b}E_5E_{iii}E_4$	
41	$E_{1a}E_{iv}$	
42	$E_{1b}E_{iv}$	
43	$E_{1a}E_5E_{iv}$	
44	$E_{1b}E_5E_{iv}$	
45	$E_{1a}E_{iv}E_4$	
46	$E_{1b}E_{iv}E_4$	
47	$E_{1a}E_6E_{iv}E_4$	
48	$E_{1b}E_5E_{iv}E_4$	
49	E_{1a}	$E_{4'}$
50	E_{1b}	$E_{4'}$
51	$E_{1a}E_5$	$E_{4'}$

52	$E_{1b}E_5$	$E_{4'}$
53	$E_{1a}E_i$	$E_{4'}$
54	$E_{1b}E_i$	$E_{4'}$
55	$E_{1a}E_{ii}$	$E_{4'}$
56	$E_{1b}E_{ii}$	$E_{4'}$
57	$E_{1a}E_{ii}E_{iib}$	$E_{4'}$
58	$E_{1b}E_{ii}E_{iib}$	$E_{4'}$
59	$E_{1a}E_5E_i$	$E_{4'}$
60	$E_{1b}E_5E_i$	$E_{4'}$
61	$E_{1a}E_5E_{ii}$	$E_{4'}$
62	$E_{1b}E_5E_{ii}$	$E_{4'}$
63	$E_{1a}E_5E_{ii}E_{iib}$	$E_{4'}$
64	$E_{1b}E_5E_{ii}E_{iib}$	$E_{4'}$
65	$E_{1a}E_4$	$E_{4'}$
66	$E_{1b}E_4$	$E_{4'}$
67	$E_{1a}E_5E_4$	$E_{4'}$
68	$E_{1b}E_5E_4$	$E_{4'}$
69	$E_{1a}E_iE_4$	$E_{4'}$
70	$E_{1b}E_iE_4$	$E_{4'}$
71	$E_{1a}E_{ii}E_4$	$E_{4'}$
72	$E_{1b}E_{ii}E_4$	$E_{4'}$
73	$E_{1a}E_{ii}E_{iib}E_4$	$E_{4'}$
74	$E_{1b}E_{ii}E_{iib}E_4$	$E_{4'}$
75	$E_{1a}E_5E_iE_4$	$E_{4'}$
76	$E_{1b}E_5E_iE_4$	$E_{4'}$
77	$E_{1a}E_5E_{ii}E_4$	$E_{4'}$
78	$E_{1b}E_5E_{ii}E_4$	$E_{4'}$
79	$E_{1a}E_5E_{ii}E_{iib}E_4$	$E_{4'}$
80	$E_{1b}E_5E_{ii}E_{iib}E_4$	$E_{4'}$
81	$E_{1a}E_{iii}$	$E_{4'}$
82	$E_{1b}E_{iii}$	$E_{4'}$
83	$E_{1a}E_5E_{iii}$	$E_{4'}$
84	$E_{1b}E_5E_{iii}$	$E_{4'}$
85	$E_{1a}E_{iii}E_4$	$E_{4'}$
86	$E_{1b}E_{iii}E_4$	$E_{4'}$
87	$E_{1a}E_5E_{iii}E_4$	$E_{4'}$
88	$E_{1b}E_5E_{iii}E_4$	$E_{4'}$
89	$E_{1a}E_{iv}$	$E_{4'}$
90	$E_{1b}E_{iv}$	$E_{4'}$
91	$E_{1a}E_5E_{iv}$	$E_{4'}$
92	$E_{1b}E_5E_{iv}$	$E_{4'}$
93	$E_{1a}E_{iv}E_4$	$E_{4'}$
94	$E_{1b}E_{iv}E_4$	$E_{4'}$

95	$E_{1a}E_5E_{iv}E_4$		$E_{4'}$
96	$E_{1b}E_5E_{iv}E_4$		$E_{4'}$
97	E_{1a}	AlkL	
98	E_{1b}	AlkL	
99	$E_{1a}E_5$	AlkL	
100	$E_{1b}E_5$	AlkL	
101	$E_{1a}E_i$	AlkL	
102	$E_{1b}E_i$	AlkL	
103	$E_{1a}E_{ii}$	AlkL	
104	$E_{1b}E_{ii}$	AlkL	
105	$E_{1a}E_{ii}E_{iib}$	AlkL	
106	$E_{1b}E_{ii}E_{iib}$	AlkL	
107	$E_{1a}E_5E_i$	AlkL	
108	$E_{1b}E_5E_i$	AlkL	
109	$E_{1a}E_5E_{ii}$	AlkL	
110	$E_{1b}E_5E_{ii}$	AlkL	
111	$E_{1a}E_5E_{ii}E_{iib}$	AlkL	
112	$E_{1b}E_5E_{ii}E_{iib}$	AlkL	
113	$E_{1a}E_4$	AlkL	
114	$E_{1b}E_4$	AlkL	
115	$E_{1a}E_5E_4$	AlkL	
116	$E_{1b}E_5E_4$	AlkL	
117	$E_{1a}E_iE_4$	AlkL	
118	$E_{1b}E_iE_4$	AlkL	
119	$E_{1a}E_{ii}E_4$	AlkL	
120	$E_{1b}E_{ii}E_4$	AlkL	
121	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	
122	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	
123	$E_{1a}E_5E_iE_4$	AlkL	
124	$E_{1b}E_5E_iE_4$	AlkL	
125	$E_{1a}E_5E_{ii}E_4$	AlkL	
126	$E_{1b}E_5E_{ii}E_4$	AlkL	
127	$E_{1a}E_5E_{ii}E_{iib}E_4$	AlkL	
128	$E_{1b}E_5E_{ii}E_{iib}E_4$	AlkL	
129	$E_{1a}E_{iii}$	AlkL	
130	$E_{1b}E_{iii}$	AlkL	
131	$E_{1a}E_5E_{iii}$	AlkL	
132	$E_{1b}E_5E_{iii}$	AlkL	
133	$E_{1a}E_{iii}E_4$	AlkL	
134	$E_{1b}E_{iii}E_4$	AlkL	
135	$E_{1a}E_5E_{iii}E_4$	AlkL	
136	$E_{1b}E_5E_{iii}E_4$	AlkL	
137	$E_{1a}E_{iv}$	AlkL	

138	$E_{1b}E_{iv}$	AlkL	
139	$E_{1a}E_5E_{iv}$	AlkL	
140	$E_{1b}E_5E_{iv}$	AlkL	
141	$E_{1a}E_{iv}E_4$	AlkL	
142	$E_{1b}E_{iv}E_4$	AlkL	
143	$E_{1a}E_5E_{iv}E_4$	AlkL	
144	$E_{1b}E_5E_{iv}E_4$	AlkL	
145	E_{1a}	AlkL	$E_{4'}$
146	E_{1b}	AlkL	$E_{4'}$
147	$E_{1a}E_5$	AlkL	$E_{4'}$
148	$E_{1b}E_5$	AlkL	$E_{4'}$
149	$E_{1a}E_i$	AlkL	$E_{4'}$
150	$E_{1b}E_i$	AlkL	$E_{4'}$
151	$E_{1a}E_{ii}$	AlkL	$E_{4'}$
152	$E_{1b}E_{ii}$	AlkL	$E_{4'}$
153	$E_{1a}E_{ii}E_{iib}$	AlkL	$E_{4'}$
154	$E_{1b}E_{ii}E_{iib}$	AlkL	$E_{4'}$
155	$E_{1a}E_5E_i$	AlkL	$E_{4'}$
156	$E_{1b}E_5E_i$	AlkL	$E_{4'}$
157	$E_{1a}E_5E_{ii}$	AlkL	$E_{4'}$
158	$E_{1b}E_5E_{ii}$	AlkL	$E_{4'}$
159	$E_{1a}E_5E_{ii}E_{iib}$	AlkL	$E_{4'}$
160	$E_{1b}E_5E_{ii}E_{iib}$	AlkL	$E_{4'}$
161	$E_{1a}E_4$	AlkL	$E_{4'}$
162	$E_{1b}E_4$	AlkL	$E_{4'}$
163	$E_{1a}E_5E_4$	AlkL	$E_{4'}$
164	$E_{1b}E_6E_4$	AlkL	$E_{4'}$
165	$E_{1a}E_iE_4$	AlkL	$E_{4'}$
166	$E_{1b}E_iE_4$	AlkL	$E_{4'}$
167	$E_{1a}E_{ii}E_4$	AlkL	$E_{4'}$
168	$E_{1b}E_{ii}E_4$	AlkL	$E_{4'}$
169	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$
170	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$
171	$E_{1a}E_5E_iE_4$	AlkL	$E_{4'}$
172	$E_{1b}E_5E_iE_4$	AlkL	$E_{4'}$
173	$E_{1a}E_5E_{ii}E_4$	AlkL	$E_{4'}$
174	$E_{1b}E_5E_{ii}E_4$	AlkL	$E_{4'}$
175	$E_{1a}E_5E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$
176	$E_{1b}E_5E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$
177	$E_{1a}E_{iii}$	AlkL	$E_{4'}$
178	$E_{1b}E_{iii}$	AlkL	$E_{4'}$
179	$E_{1a}E_5E_{iii}$	AlkL	$E_{4'}$
180	$E_{1b}E_5E_{iii}$	AlkL	$E_{4'}$

181	$E_{1a}E_{iii}E_4$	AlkL	$E_{4'}$
182	$E_{1b}E_{iii}E_4$	AlkL	$E_{4'}$
183	$E_{1a}E_5E_{iii}E_4$	AlkL	$E_{4'}$
184	$E_{1b}E_5E_{iii}E_4$	AlkL	$E_{4'}$
185	$E_{1a}E_{iv}$	AlkL	$E_{4'}$
186	$E_{1b}E_{iv}$	AlkL	$E_{4'}$
187	$E_{1a}E_5E_{iv}$	AlkL	$E_{4'}$
188	$E_{1b}E_5E_{iv}$	AlkL	$E_{4'}$
189	$E_{1a}E_{iv}E_4$	AlkL	$E_{4'}$
190	$E_{1b}E_{iv}E_4$	AlkL	$E_{4'}$
191	$E_{1a}E_5E_{iv}E_4$	AlkL	$E_{4'}$
192	$E_{1b}E_5E_{iv}E_4$	AlkL	$E_{4'}$
193	E_{1a}		E_a
194	E_{1b}		E_a
195	$E_{1a}E_5$		E_a
196	$E_{1b}E_5$		E_a
197	$E_{1a}E_i$		E_a
198	$E_{1b}E_i$		E_a
199	$E_{1a}E_{ii}$		E_a
200	$E_{1b}E_{ii}$		E_a
201	$E_{1a}E_{ii}E_{iib}$		E_a
202	$E_{1b}E_{ii}E_{iib}$		E_a
203	$E_{1a}E_5E_i$		E_a
204	$E_{1b}E_6E_i$		E_a
205	$E_{1a}E_5E_{ii}$		E_a
206	$E_{1b}E_5E_{ii}$		E_a
207	$E_{1a}E_5E_{ii}E_{iib}$		E_a
208	$E_{1b}E_5E_{ii}E_{iib}$		E_a
209	$E_{1a}E_4$		E_a
210	$E_{1b}E_4$		E_a
211	$E_{1a}E_5E_4$		E_a
212	$E_{1b}E_5E_4$		E_a
213	$E_{1a}E_iE_4$		E_a
214	$E_{1b}E_iE_4$		E_a
215	$E_{1a}E_{ii}E_4$		E_a
216	$E_{1b}E_{ii}E_4$		E_a
217	$E_{1a}E_{ii}E_{iib}E_4$		E_a
218	$E_{1b}E_{ii}E_{iib}E_4$		E_a
219	$E_{1a}E_5E_iE_4$		E_a
220	$E_{1b}E_5E_iE_4$		E_a
221	$E_{1a}E_5E_{ii}E_4$		E_a
222	$E_{1b}E_5E_{ii}E_4$		E_a
223	$E_{1a}E_5E_{ii}E_{iib}E_4$		E_a

224	$E_{1b}E_5E_{ii}E_{iib}E_4$		E_a
225	$E_{1a}E_{iii}$		E_a
226	$E_{1b}E_{iii}$		E_a
227	$E_{1a}E_5E_{iii}$		E_a
228	$E_{1b}E_5E_{iii}$		E_a
229	$E_{1a}E_{iii}E_4$		E_a
230	$E_{1b}E_{iii}E_4$		E_a
231	$E_{1a}E_5E_{iii}E_4$		E_a
232	$E_{1b}E_5E_{iii}E_4$		E_a
233	$E_{1a}E_{iv}$		E_a
234	$E_{1b}E_{iv}$		E_a
235	$E_{1a}E_5E_{iv}$		E_a
236	$E_{1b}E_5E_{iv}$		E_a
237	$E_{1a}E_{iv}E_4$		E_a
238	$E_{1b}E_{iv}E_4$		E_a
239	$E_{1a}E_5E_{iv}E_4$		E_a
240	$E_{1b}E_5E_{iv}E_4$		E_a
241	E_{1a}	E_{4^*}	E_a
242	E_{1b}	E_{4^*}	E_a
243	$E_{1a}E_5$	E_{4^*}	E_a
244	$E_{1b}E_5$	E_{4^*}	E_a
245	$E_{1a}E_i$	E_{4^*}	E_a
246	$E_{1b}E_i$	E_{4^*}	E_a
247	$E_{1a}E_{ii}$	E_{4^*}	E_a
248	$E_{1b}E_{ii}$	E_{4^*}	E_a
249	$E_{1a}E_{ii}E_{iib}$	E_{4^*}	E_a
250	$E_{1b}E_{ii}E_{iib}$	E_{4^*}	E_a
251	$E_{1a}E_5E_i$	E_{4^*}	E_a
252	$E_{1b}E_5E_i$	E_{4^*}	E_a
253	$E_{1a}E_5E_{ii}$	E_{4^*}	E_a
254	$E_{1b}E_5E_{ii}$	E_{4^*}	E_a
255	$E_{1a}E_5E_{ii}E_{iib}$	E_{4^*}	E_a
256	$E_{1b}E_5E_{ii}E_{iib}$	E_{4^*}	E_a
257	$E_{1a}E_4$	E_{4^*}	E_a
258	$E_{1b}E_4$	E_{4^*}	E_a
259	$E_{1a}E_5E_4$	E_{4^*}	E_a
260	$E_{1b}E_5E_4$	E_{4^*}	E_a
261	$E_{1a}E_iE_4$	E_{4^*}	E_a
262	$E_{1b}E_iE_4$	E_{4^*}	E_a
263	$E_{1a}E_{ii}E_4$	E_{4^*}	E_a
264	$E_{1b}E_{ii}E_4$	E_{4^*}	E_a
265	$E_{1a}E_{ii}E_{iib}E_4$	E_{4^*}	E_a
266	$E_{1b}E_{ii}E_{iib}E_4$	E_{4^*}	E_a
267	$E_{1a}E_5E_iE_4$	E_{4^*}	E_a
268	$E_{1b}E_5E_iE_4$	E_{4^*}	E_a
269	$E_{1a}E_5E_{ii}E_4$	E_{4^*}	E_a
270	$E_{1b}E_5E_{ii}E_4$	E_{4^*}	E_a
271	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{4^*}	E_a
272	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{4^*}	E_a
273	$E_{1a}E_{iii}$	E_{4^*}	E_a
274	$E_{1b}E_{iii}$	E_{4^*}	E_a
275	$E_{1a}E_5E_{iii}$	E_{4^*}	E_a
276	$E_{1b}E_5E_{iii}$	E_{4^*}	E_a
277	$E_{1a}E_{iii}E_4$	E_{4^*}	E_a
278	$E_{1b}E_{iii}E_4$	E_{4^*}	E_a
279	$E_{1a}E_5E_{iii}E_4$	E_{4^*}	E_a
280	$E_{1b}E_5E_{iii}E_4$	E_{4^*}	E_a
281	$E_{1a}E_{iv}$	E_{4^*}	E_a
282	$E_{1b}E_{iv}$	E_{4^*}	E_a
283	$E_{1a}E_5E_{iv}$	E_{4^*}	E_a
284	$E_{1b}E_5E_{iv}$	E_{4^*}	E_a
285	$E_{1a}E_{iv}E_4$	E_{4^*}	E_a
286	$E_{1b}E_{iv}E_4$	E_{4^*}	E_a
287	$E_{1a}E_5E_{iv}E_4$	E_{4^*}	E_a
288	$E_{1b}E_5E_{iv}E_4$	E_{4^*}	E_a
289	E_{1a}	AlkL	E_a
290	E_{1b}	AlkL	E_a
291	$E_{1a}E_5$	AlkL	E_a
292	$E_{1b}E_5$	AlkL	E_a
293	$E_{1a}E_i$	AlkL	E_a
294	$E_{1b}E_i$	AlkL	E_a
295	$E_{1a}E_{ii}$	AlkL	E_a
296	$E_{1b}E_{ii}$	AlkL	E_a
297	$E_{1a}E_{ii}E_{iib}$	AlkL	E_a
298	$E_{1b}E_{ii}E_{iib}$	AlkL	E_a
299	$E_{1a}E_5E_i$	AlkL	E_a
300	$E_{1b}E_5E_i$	AlkL	E_a
301	$E_{1a}E_5E_{ii}$	AlkL	E_a
302	$E_{1b}E_5E_{ii}$	AlkL	E_a
303	$E_{1a}E_5E_{ii}E_{iib}$	AlkL	E_a
304	$E_{1b}E_5E_{ii}E_{iib}$	AlkL	E_a
305	$E_{1a}E_4$	AlkL	E_a
306	$E_{1b}E_4$	AlkL	E_a
307	$E_{1a}E_5E_4$	AlkL	E_a
308	$E_{1b}E_5E_4$	AlkL	E_a
309	$E_{1a}E_iE_4$	AlkL	E_a

310	$E_{1b}E_iE_4$	AlkL		E_a
311	$E_{1a}E_{ii}E_4$	AlkL		E_a
312	$E_{1b}E_{ii}E_4$	AlkL		E_a
313	$E_{1a}E_{ii}E_{iib}E_4$	AlkL		E_a
314	$E_{1b}E_{ii}E_{iib}E_4$	AlkL		E_a
315	$E_{1a}E_5E_iE_4$	AlkL		E_a
316	$E_{1b}E_5E_iE_4$	AlkL		E_a
317	$E_{1a}E_5E_{ii}E_4$	AlkL		E_a
318	$E_{1b}E_5E_{ii}E_4$	AlkL		E_a
319	$E_{1a}E_5E_{ii}E_{iib}E_4$	AlkL		E_a
320	$E_{1b}E_5E_{ii}E_{iib}E_4$	AlkL		E_a
321	$E_{1a}E_{iii}$	AlkL		E_a
322	$E_{1b}E_{iii}$	AlkL		E_a
323	$E_{1a}E_5E_{iii}$	AlkL		E_a
324	$E_{1b}E_5E_{iii}$	AlkL		E_a
325	$E_{1a}E_{iii}E_4$	AlkL		E_a
326	$E_{1b}E_{iii}E_4$	AlkL		E_a
327	$E_{1a}E_5E_{iii}E_4$	AlkL		E_a
328	$E_{1b}E_5E_{iii}E_4$	AlkL		E_a
329	$E_{1a}E_{iv}$	AlkL		E_a
330	$E_{1b}E_{iv}$	AlkL		E_a
331	$E_{1a}E_5E_{iv}$	AlkL		E_a
332	$E_{1b}E_5E_{iv}$	AlkL		E_a
333	$E_{1a}E_{iv}E_4$	AlkL		E_a
334	$E_{1b}E_{iv}E_4$	AlkL		E_a
335	$E_{1a}E_5E_{iv}E_4$	AlkL		E_a
336	$E_{1b}E_5E_{iv}E_4$	AlkL		E_a
337	E_{1a}	AlkL	$E_{4'}$	E_a
338	E_{1b}	AlkL	$E_{4'}$	E_a
339	$E_{1a}E_5$	AlkL	$E_{4'}$	E_a
340	$E_{1b}E_5$	AlkL	$E_{4'}$	E_a
341	$E_{1a}E_i$	AlkL	$E_{4'}$	E_a
342	$E_{1b}E_i$	AlkL	$E_{4'}$	E_a
343	$E_{1a}E_{ii}$	AlkL	$E_{4'}$	E_a
344	$E_{1b}E_{ii}$	AlkL	$E_{4'}$	E_a
345	$E_{1a}E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_a
346	$E_{1b}E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_a
347	$E_{1a}E_5E_i$	AlkL	$E_{4'}$	E_a
348	$E_{1b}E_5E_i$	AlkL	$E_{4'}$	E_a
349	$E_{1a}E_5E_{ii}$	AlkL	$E_{4'}$	E_a
350	$E_{1b}E_5E_{ii}$	AlkL	$E_{4'}$	E_a
351	$E_{1a}E_5E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_a
352	$E_{1b}E_5E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_a

353	$E_{1a}E_4$	AlkL	$E_{4'}$	E_a
354	$E_{1b}E_4$	AlkL	$E_{4'}$	E_a
355	$E_{1a}E_5E_4$	AlkL	$E_{4'}$	E_a
356	$E_{1b}E_5E_4$	AlkL	$E_{4'}$	E_a
357	$E_{1a}E_iE_4$	AlkL	$E_{4'}$	E_a
358	$E_{1b}E_iE_4$	AlkL	$E_{4'}$	E_a
359	$E_{1a}E_{ii}E_4$	AlkL	$E_{4'}$	E_a
360	$E_{1b}E_{ii}E_4$	AlkL	$E_{4'}$	E_a
361	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_a
362	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_a
363	$E_{1a}E_5E_iE_4$	AlkL	$E_{4'}$	E_a
364	$E_{1b}E_5E_iE_4$	AlkL	$E_{4'}$	E_a
365	$E_{1a}E_5E_{ii}E_4$	AlkL	$E_{4'}$	E_a
366	$E_{1b}E_5E_{ii}E_4$	AlkL	$E_{4'}$	E_a
367	$E_{1a}E_5E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_a
368	$E_{1b}E_5E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_a
369	$E_{1a}E_{iii}$	AlkL	$E_{4'}$	E_a
370	$E_{1b}E_{iii}$	AlkL	$E_{4'}$	E_a
371	$E_{1a}E_5E_{iii}$	AlkL	$E_{4'}$	E_a
372	$E_{1b}E_5E_{iii}$	AlkL	$E_{4'}$	E_a
373	$E_{1a}E_{iii}E_4$	AlkL	$E_{4'}$	E_a
374	$E_{1b}E_{iii}E_4$	AlkL	$E_{4'}$	E_a
375	$E_{1a}E_5E_{iii}E_4$	AlkL	$E_{4'}$	E_a
376	$E_{1b}E_5E_{iii}E_4$	AlkL	$E_{4'}$	E_a
377	$E_{1a}E_{iv}$	AlkL	$E_{4'}$	E_a
378	$E_{1b}E_{iv}$	AlkL	$E_{4'}$	E_a
379	$E_{1a}E_5E_{iv}$	AlkL	$E_{4'}$	E_a
380	$E_{1b}E_5E_{iv}$	AlkL	$E_{4'}$	E_a
381	$E_{1a}E_{iv}E_4$	AlkL	$E_{4'}$	E_a
382	$E_{1b}E_{iv}E_4$	AlkL	$E_{4'}$	E_a
383	$E_{1a}E_5E_{iv}E_4$	AlkL	$E_{4'}$	E_a
384	$E_{1b}E_5E_{iv}E_4$	AlkL	$E_{4'}$	E_a
385	E_{1a}			E_b
386	E_{1b}			E_b
387	$E_{1a}E_5$			E_b
388	$E_{1b}E_5$			E_b
389	$E_{1a}E_i$			E_b
390	$E_{1b}E_i$			E_b
391	$E_{1a}E_{ii}$			E_b
392	$E_{1b}E_{ii}$			E_b
393	$E_{1a}E_{ii}E_{iib}$			E_b
394	$E_{1b}E_{ii}E_{iib}$			E_b
395	$E_{1a}E_5E_i$			E_b

396	$E_{1b}E_5E_i$		E_b
397	$E_{1a}E_5E_{ii}$		E_b
398	$E_{1b}E_5E_{ii}$		E_b
399	$E_{1a}E_5E_{ii}E_{iib}$		E_b
400	$E_{1b}E_5E_{ii}E_{iib}$		E_b
401	$E_{1a}E_4$		E_b
402	$E_{1b}E_4$		E_b
403	$E_{1a}E_5E_4$		E_b
404	$E_{1b}E_5E_4$		E_b
405	$E_{1a}E_iE_4$		E_b
406	$E_{1b}E_iE_4$		E_b
407	$E_{1a}E_{ii}E_4$		E_b
408	$E_{1b}E_{ii}E_4$		E_b
409	$E_{1a}E_{ii}E_{iib}E_4$		E_b
410	$E_{1b}E_{ii}E_{iib}E_4$		E_b
411	$E_{1a}E_5E_iE_4$		E_b
412	$E_{1b}E_5E_iE_4$		E_b
413	$E_{1a}E_5E_{ii}E_4$		E_b
414	$E_{1b}E_5E_{ii}E_4$		E_b
415	$E_{1a}E_5E_{ii}E_{iib}E_4$		E_b
416	$E_{1b}E_5E_{ii}E_{iib}E_4$		E_b
417	$E_{1a}E_{iii}$		E_b
418	$E_{1b}E_{iii}$		E_b
419	$E_{1a}E_5E_{iii}$		E_b
420	$E_{1b}E_5E_{iii}$		E_b
421	$E_{1a}E_{iii}E_4$		E_b
422	$E_{1b}E_{iii}E_4$		E_b
423	$E_{1a}E_5E_{iii}E_4$		E_b
424	$E_{1b}E_5E_{iii}E_4$		E_b
425	$E_{1a}E_{iv}$		E_b
426	$E_{1b}E_{iv}$		E_b
427	$E_{1a}E_5E_{iv}$		E_b
428	$E_{1b}E_5E_{iv}$		E_b
429	$E_{1a}E_{iv}E_4$		E_b
430	$E_{1b}E_{iv}E_4$		E_b
431	$E_{1a}E_5E_{iv}E_4$		E_b
432	$E_{1b}E_5E_{iv}E_4$		E_b
433	E_{1a}	E_{4^*}	E_b
434	E_{1b}	E_{4^*}	E_b
435	$E_{1a}E_5$	E_{4^*}	E_b
436	$E_{1b}E_5$	E_{4^*}	E_b
437	$E_{1a}E_i$	E_{4^*}	E_b
438	$E_{1b}E_i$	E_{4^*}	E_b

439	$E_{1a}E_{ii}$	E_{4^*}	E_b
440	$E_{1b}E_{ii}$	E_{4^*}	E_b
441	$E_{1a}E_{ii}E_{iib}$	E_{4^*}	E_b
442	$E_{1b}E_{ii}E_{iib}$	E_{4^*}	E_b
443	$E_{1a}E_5E_i$	E_{4^*}	E_b
444	$E_{1b}E_5E_i$	E_{4^*}	E_b
445	$E_{1a}E_5E_{ii}$	E_{4^*}	E_b
446	$E_{1b}E_5E_{ii}$	E_{4^*}	E_b
447	$E_{1a}E_5E_{ii}E_{iib}$	E_{4^*}	E_b
448	$E_{1b}E_5E_{ii}E_{iib}$	E_{4^*}	E_b
449	$E_{1a}E_4$	E_{4^*}	E_b
450	$E_{1b}E_4$	E_{4^*}	E_b
451	$E_{1a}E_5E_4$	E_{4^*}	E_b
452	$E_{1b}E_5E_4$	E_{4^*}	E_b
453	$E_{1a}E_iE_4$	E_{4^*}	E_b
454	$E_{1b}E_iE_4$	E_{4^*}	E_b
455	$E_{1a}E_{ii}E_4$	E_{4^*}	E_b
456	$E_{1b}E_{ii}E_4$	E_{4^*}	E_b
457	$E_{1a}E_{ii}E_{iib}E_4$	E_{4^*}	E_b
458	$E_{1b}E_{ii}E_{iib}E_4$	E_{4^*}	E_b
459	$E_{1a}E_5E_iE_4$	E_{4^*}	E_b
460	$E_{1b}E_5E_iE_4$	E_{4^*}	E_b
461	$E_{1a}E_5E_{ii}E_4$	E_{4^*}	E_b
462	$E_{1b}E_5E_{ii}E_4$	E_{4^*}	E_b
463	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{4^*}	E_b
464	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{4^*}	E_b
465	$E_{1a}E_{iii}$	E_{4^*}	E_b
466	$E_{1b}E_{iii}$	E_{4^*}	E_b
467	$E_{1a}E_5E_{iii}$	E_{4^*}	E_b
468	$E_{1b}E_5E_{iii}$	E_{4^*}	E_b
469	$E_{1a}E_{iii}E_4$	E_{4^*}	E_b
470	$E_{1b}E_{iii}E_4$	E_{4^*}	E_b
471	$E_{1a}E_5E_{iii}E_4$	E_{4^*}	E_b
472	$E_{1b}E_5E_{iii}E_4$	E_{4^*}	E_b
473	$E_{1a}E_{iv}$	E_{4^*}	E_b
474	$E_{1b}E_{iv}$	E_{4^*}	E_b
475	$E_{1a}E_5E_{iv}$	E_{4^*}	E_b
476	$E_{1b}E_5E_{iv}$	E_{4^*}	E_b
477	$E_{1a}E_{iv}E_4$	E_{4^*}	E_b
478	$E_{1b}E_{iv}E_4$	E_{4^*}	E_b
479	$E_{1a}E_5E_{iv}E_4$	E_{4^*}	E_b
480	$E_{1b}E_5E_{iv}E_4$	E_{4^*}	E_b
481	E_{1a} AlkL		E_b

482	E_{1b}	AlkL	E_b
483	$E_{1a}E_5$	AlkL	E_b
484	$E_{1b}E_5$	AlkL	E_b
485	$E_{1a}E_i$	AlkL	E_b
486	$E_{1b}E_i$	AlkL	E_b
487	$E_{1a}E_{ii}$	AlkL	E_b
488	$E_{1b}E_{ii}$	AlkL	E_b
489	$E_{1a}E_{ii}E_{iib}$	AlkL	E_b
490	$E_{1b}E_{ii}E_{iib}$	AlkL	E_b
491	$E_{1a}E_5E_i$	AlkL	E_b
492	$E_{1b}E_5E_i$	AlkL	E_b
493	$E_{1a}E_5E_{ii}$	AlkL	E_b
494	$E_{1b}E_5E_{ii}$	AlkL	E_b
495	$E_{1a}E_5E_{ii}E_{iib}$	AlkL	E_b
496	$E_{1b}E_5E_{ii}E_{iib}$	AlkL	E_b
497	$E_{1a}E_4$	AlkL	E_b
498	$E_{1b}E_4$	AlkL	E_b
499	$E_{1a}E_5E_4$	AlkL	E_b
500	$E_{1b}E_5E_4$	AlkL	E_b
501	$E_{1a}E_iE_4$	AlkL	E_b
502	$E_{1b}E_iE_4$	AlkL	E_b
503	$E_{1a}E_{ii}E_4$	AlkL	E_b
504	$E_{1b}E_{ii}E_4$	AlkL	E_b
505	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_b
506	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_b
507	$E_{1a}E_5E_iE_4$	AlkL	E_b
508	$E_{1b}E_5E_iE_4$	AlkL	E_b
509	$E_{1a}E_5E_{ii}E_4$	AlkL	E_b
510	$E_{1b}E_5E_{ii}E_4$	AlkL	E_b
511	$E_{1a}E_5E_{ii}E_{iib}E_4$	AlkL	E_b
512	$E_{1b}E_5E_{ii}E_{iib}E_4$	AlkL	E_b
513	$E_{1a}E_{iii}$	AlkL	E_b
514	$E_{1b}E_{iii}$	AlkL	E_b
515	$E_{1a}E_5E_{iii}$	AlkL	E_b
516	$E_{1b}E_5E_{iii}$	AlkL	E_b
517	$E_{1a}E_{iii}E_4$	AlkL	E_b
518	$E_{1b}E_{iii}E_4$	AlkL	E_b
519	$E_{1a}E_5E_{iii}E_4$	AlkL	E_b
520	$E_{1b}E_5E_{iii}E_4$	AlkL	E_b
521	$E_{1a}E_{iv}$	AlkL	E_b
522	$E_{1b}E_{iv}$	AlkL	E_b
523	$E_{1a}E_5E_{iv}$	AlkL	E_b
524	$E_{1b}E_5E_{iv}$	AlkL	E_b

525	$E_{1a}E_{iv}E_4$	AlkL		E_b
526	$E_{1b}E_{iv}E_4$	AlkL		E_b
527	$E_{1a}E_5E_{iv}E_4$	AlkL		E_b
528	$E_{1b}E_5E_{iv}E_4$	AlkL		E_b
529	E_{1a}	AlkL	$E_{4'}$	E_b
530	E_{1b}	AlkL	$E_{4'}$	E_b
531	$E_{1a}E_5$	AlkL	$E_{4'}$	E_b
532	$E_{1b}E_5$	AlkL	$E_{4'}$	E_b
533	$E_{1a}E_i$	AlkL	$E_{4'}$	E_b
534	$E_{1b}E_i$	AlkL	$E_{4'}$	E_b
535	$E_{1a}E_{ii}$	AlkL	$E_{4'}$	E_b
536	$E_{1b}E_{ii}$	AlkL	$E_{4'}$	E_b
537	$E_{1a}E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_b
538	$E_{1b}E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_b
539	$E_{1a}E_5E_i$	AlkL	$E_{4'}$	E_b
540	$E_{1b}E_5E_i$	AlkL	$E_{4'}$	E_b
541	$E_{1a}E_5E_{ii}$	AlkL	$E_{4'}$	E_b
542	$E_{1b}E_5E_{ii}$	AlkL	$E_{4'}$	E_b
543	$E_{1a}E_5E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_b
544	$E_{1b}E_5E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_b
545	$E_{1a}E_4$	AlkL	$E_{4'}$	E_b
546	$E_{1b}E_4$	AlkL	$E_{4'}$	E_b
547	$E_{1a}E_5E_4$	AlkL	$E_{4'}$	E_b
548	$E_{1b}E_5E_4$	AlkL	$E_{4'}$	E_b
549	$E_{1a}E_iE_4$	AlkL	$E_{4'}$	E_b
550	$E_{1b}E_iE_4$	AlkL	$E_{4'}$	E_b
551	$E_{1a}E_{ii}E_4$	AlkL	$E_{4'}$	E_b
552	$E_{1b}E_{ii}E_4$	AlkL	$E_{4'}$	E_b
553	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_b
554	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_b
555	$E_{1a}E_5E_iE_4$	AlkL	$E_{4'}$	E_b
556	$E_{1b}E_5E_iE_4$	AlkL	$E_{4'}$	E_b
557	$E_{1a}E_5E_{ii}E_4$	AlkL	$E_{4'}$	E_b
558	$E_{1b}E_5E_{ii}E_4$	AlkL	$E_{4'}$	E_b
559	$E_{1a}E_5E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_b
560	$E_{1b}E_5E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_b
561	$E_{1a}E_{iii}$	AlkL	$E_{4'}$	E_b
562	$E_{1b}E_{iii}$	AlkL	$E_{4'}$	E_b
563	$E_{1a}E_5E_{iii}$	AlkL	$E_{4'}$	E_b
564	$E_{1b}E_5E_{iii}$	AlkL	$E_{4'}$	E_b
565	$E_{1a}E_{iii}E_4$	AlkL	$E_{4'}$	E_b
566	$E_{1b}E_{iii}E_4$	AlkL	$E_{4'}$	E_b
567	$E_{1a}E_5E_{iii}E_4$	AlkL	$E_{4'}$	E_b

568	$E_{1b}E_5E_{iii}E_4$	AlkL	E_{4^*}	E_b
569	$E_{1a}E_{iv}$	AlkL	E_{4^*}	E_b
570	$E_{1b}E_{iv}$	AlkL	E_{4^*}	E_b
571	$E_{1a}E_5E_{iv}$	AlkL	E_{4^*}	E_b
572	$E_{1b}E_5E_{iv}$	AlkL	E_{4^*}	E_b
573	$E_{1a}E_{iv}E_4$	AlkL	E_{4^*}	E_b
574	$E_{1b}E_{iv}E_4$	AlkL	E_{4^*}	E_b
575	$E_{1a}E_5E_{iv}E_4$	AlkL	E_{4^*}	E_b
576	$E_{1b}E_5E_{iv}E_4$	AlkL	E_{4^*}	E_b
577	E_{1a}			E_d
578	E_{1b}			E_d
579	$E_{1a}E_5$			E_d
580	$E_{1b}E_5$			E_d
581	$E_{1a}E_i$			E_d
582	$E_{1b}E_i$			E_d
583	$E_{1a}E_{ii}$			E_d
584	$E_{1b}E_{ii}$			E_d
585	$E_{1a}E_{ii}E_{iib}$			E_d
586	$E_{1b}E_{ii}E_{iib}$			E_d
587	$E_{1a}E_5E_i$			E_d
588	$E_{1b}E_5E_i$			E_d
589	$E_{1a}E_5E_{ii}$			E_d
590	$E_{1b}E_5E_{ii}$			E_d
591	$E_{1a}E_5E_{ii}E_{iib}$			E_d
592	$E_{1b}E_5E_{ii}E_{iib}$			E_d
593	$E_{1a}E_4$			E_d
594	$E_{1b}E_4$			E_d
595	$E_{1a}E_5E_4$			E_d
596	$E_{1b}E_5E_4$			E_d
597	$E_{1a}E_iE_4$			E_d
598	$E_{1b}E_iE_4$			E_d
599	$E_{1a}E_{ii}E_4$			E_d
600	$E_{1b}E_{ii}E_4$			E_d
601	$E_{1a}E_{ii}E_{iib}E_4$			E_d
602	$E_{1b}E_{ii}E_{iib}E_4$			E_d
603	$E_{1a}E_5E_iE_4$			E_d
604	$E_{1b}E_5E_iE_4$			E_d
605	$E_{1a}E_5E_{ii}E_4$			E_d
606	$E_{1b}E_5E_{ii}E_4$			E_d
607	$E_{1a}E_5E_{ii}E_{iib}E_4$			E_d
608	$E_{1b}E_5E_{ii}E_{iib}E_4$			E_d
609	$E_{1a}E_{iii}$			E_d
610	$E_{1b}E_{iii}$			E_d

611	$E_{1a}E_5E_{iii}$		E_d
612	$E_{1b}E_5E_{iii}$		E_d
613	$E_{1a}E_{iii}E_4$		E_d
614	$E_{1b}E_{iii}E_4$		E_d
615	$E_{1a}E_5E_{iii}E_4$		E_d
616	$E_{1b}E_5E_{iii}E_4$		E_d
617	$E_{1a}E_{iv}$		E_d
618	$E_{1b}E_{iv}$		E_d
619	$E_{1a}E_5E_{iv}$		E_d
620	$E_{1b}E_5E_{iv}$		E_d
621	$E_{1a}E_{iv}E_4$		E_d
622	$E_{1b}E_{iv}E_4$		E_d
623	$E_{1a}E_5E_{iv}E_4$		E_d
624	$E_{1b}E_5E_{iv}E_4$		E_d
625	E_{1a}	E_{4^*}	E_d
626	E_{1b}	E_{4^*}	E_d
627	$E_{1a}E_5$	E_{4^*}	E_d
628	$E_{1b}E_5$	E_{4^*}	E_d
629	$E_{1a}E_i$	E_{4^*}	E_d
630	$E_{1b}E_i$	E_{4^*}	E_d
631	$E_{1a}E_{ii}$	E_{4^*}	E_d
632	$E_{1b}E_{ii}$	E_{4^*}	E_d
633	$E_{1a}E_{ii}E_{iib}$	E_{4^*}	E_d
634	$E_{1b}E_{ii}E_{iib}$	E_{4^*}	E_d
635	$E_{1a}E_5E_i$	E_{4^*}	E_d
636	$E_{1b}E_5E_i$	E_{4^*}	E_d
637	$E_{1a}E_5E_{ii}$	E_{4^*}	E_d
638	$E_{1b}E_5E_{ii}$	E_{4^*}	E_d
639	$E_{1a}E_5E_{ii}E_{iib}$	E_{4^*}	E_d
640	$E_{1b}E_5E_{ii}E_{iib}$	E_{4^*}	E_d
641	$E_{1a}E_4$	E_{4^*}	E_d
642	$E_{1b}E_4$	E_{4^*}	E_d
643	$E_{1a}E_5E_4$	E_{4^*}	E_d
644	$E_{1b}E_5E_4$	E_{4^*}	E_d
645	$E_{1a}E_iE_4$	E_{4^*}	E_d
646	$E_{1b}E_iE_4$	E_{4^*}	E_d
647	$E_{1a}E_{ii}E_4$	E_{4^*}	E_d
648	$E_{1b}E_{ii}E_4$	E_{4^*}	E_d
649	$E_{1a}E_{ii}E_{iib}E_4$	E_{4^*}	E_d
650	$E_{1b}E_{ii}E_{iib}E_4$	E_{4^*}	E_d
651	$E_{1a}E_5E_iE_4$	E_{4^*}	E_d
652	$E_{1b}E_5E_iE_4$	E_{4^*}	E_d
653	$E_{1a}E_5E_{ii}E_4$	E_{4^*}	E_d

654	$E_{1b}E_5E_{ii}E_4$		$E_{4'}$	E_d
655	$E_{1a}E_5E_{ii}E_{iib}E_4$		$E_{4'}$	E_d
656	$E_{1b}E_5E_{ii}E_{iib}E_4$		$E_{4'}$	E_d
657	$E_{1a}E_{iii}$		$E_{4'}$	E_d
658	$E_{1b}E_{iii}$		$E_{4'}$	E_d
659	$E_{1a}E_5E_{iii}$		$E_{4'}$	E_d
660	$E_{1b}E_5E_{iii}$		$E_{4'}$	E_d
661	$E_{1a}E_{iii}E_4$		$E_{4'}$	E_d
662	$E_{1b}E_{iii}E_4$		$E_{4'}$	E_d
663	$E_{1a}E_5E_{iii}E_4$		$E_{4'}$	E_d
664	$E_{1b}E_5E_{iii}E_4$		$E_{4'}$	E_d
665	$E_{1a}E_{iv}$		$E_{4'}$	E_d
666	$E_{1b}E_{iv}$		$E_{4'}$	E_d
667	$E_{1a}E_5E_{iv}$		$E_{4'}$	E_d
668	$E_{1b}E_5E_{iv}$		$E_{4'}$	E_d
669	$E_{1a}E_{iv}E_4$		$E_{4'}$	E_d
670	$E_{1b}E_{iv}E_4$		$E_{4'}$	E_d
671	$E_{1a}E_5E_{iv}E_4$		$E_{4'}$	E_d
672	$E_{1b}E_5E_{iv}E_4$		$E_{4'}$	E_d
673	E_{1a}	AlkL		E_d
674	E_{1b}	AlkL		E_d
675	$E_{1a}E_5$	AlkL		E_d
676	$E_{1b}E_5$	AlkL		E_d
677	$E_{1a}E_i$	AlkL		E_d
678	$E_{1b}E_i$	AlkL		E_d
679	$E_{1a}E_{ii}$	AlkL		E_d
680	$E_{1b}E_{ii}$	AlkL		E_d
681	$E_{1a}E_{ii}E_{iib}$	AlkL		E_d
682	$E_{1b}E_{ii}E_{iib}$	AlkL		E_d
683	$E_{1a}E_5E_i$	AlkL		E_d
684	$E_{1b}E_5E_i$	AlkL		E_d
685	$E_{1a}E_5E_{ii}$	AlkL		E_d
686	$E_{1b}E_5E_{ii}$	AlkL		E_d
687	$E_{1a}E_5E_{ii}E_{iib}$	AlkL		E_d
688	$E_{1b}E_5E_{ii}E_{iib}$	AlkL		E_d
689	$E_{1a}E_4$	AlkL		E_d
690	$E_{1b}E_4$	AlkL		E_d
691	$E_{1a}E_5E_4$	AlkL		E_d
692	$E_{1b}E_5E_4$	AlkL		E_d
693	$E_{1a}E_iE_4$	AlkL		E_d
694	$E_{1b}E_iE_4$	AlkL		E_d
695	$E_{1a}E_{ii}E_4$	AlkL		E_d
696	$E_{1b}E_{ii}E_4$	AlkL		E_d
697	$E_{1a}E_{ii}E_{iib}E_4$	AlkL		E_d
698	$E_{1b}E_{ii}E_{iib}E_4$	AlkL		E_d
699	$E_{1a}E_5E_iE_4$	AlkL		E_d
700	$E_{1b}E_5E_iE_4$	AlkL		E_d
701	$E_{1a}E_5E_{ii}E_4$	AlkL		E_d
702	$E_{1b}E_5E_{ii}E_4$	AlkL		E_d
703	$E_{1a}E_5E_{ii}E_{iib}E_4$	AlkL		E_d
704	$E_{1b}E_5E_{ii}E_{iib}E_4$	AlkL		E_d
705	$E_{1a}E_{iii}$	AlkL		E_d
706	$E_{1b}E_{iii}$	AlkL		E_d
707	$E_{1a}E_5E_{iii}$	AlkL		E_d
708	$E_{1b}E_5E_{iii}$	AlkL		E_d
709	$E_{1a}E_{iii}E_4$	AlkL		E_d
710	$E_{1b}E_{iii}E_4$	AlkL		E_d
711	$E_{1a}E_5E_{iii}E_4$	AlkL		E_d
712	$E_{1b}E_5E_{iii}E_4$	AlkL		E_d
713	$E_{1a}E_{iv}$	AlkL		E_d
714	$E_{1b}E_{iv}$	AlkL		E_d
715	$E_{1a}E_5E_{iv}$	AlkL		E_d
716	$E_{1b}E_5E_{iv}$	AlkL		E_d
717	$E_{1a}E_{iv}E_4$	AlkL		E_d
718	$E_{1b}E_{iv}E_4$	AlkL		E_d
719	$E_{1a}E_5E_{iv}E_4$	AlkL		E_d
720	$E_{1b}E_5E_{iv}E_4$	AlkL		E_d
721	E_{1a}	AlkL	$E_{4'}$	E_d
722	E_{1b}	AlkL	$E_{4'}$	E_d
723	$E_{1a}E_5$	AlkL	$E_{4'}$	E_d
724	$E_{1b}E_5$	AlkL	$E_{4'}$	E_d
725	$E_{1a}E_i$	AlkL	$E_{4'}$	E_d
726	$E_{1b}E_i$	AlkL	$E_{4'}$	E_d
727	$E_{1a}E_{ii}$	AlkL	$E_{4'}$	E_d
728	$E_{1b}E_{ii}$	AlkL	$E_{4'}$	E_d
729	$E_{1a}E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_d
730	$E_{1b}E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_d
731	$E_{1a}E_5E_i$	AlkL	$E_{4'}$	E_d
732	$E_{1b}E_5E_i$	AlkL	$E_{4'}$	E_d
733	$E_{1a}E_5E_{ii}$	AlkL	$E_{4'}$	E_d
734	$E_{1b}E_5E_{ii}$	AlkL	$E_{4'}$	E_d
735	$E_{1a}E_5E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_d
736	$E_{1b}E_5E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_d
737	$E_{1a}E_4$	AlkL	$E_{4'}$	E_d
738	$E_{1b}E_4$	AlkL	$E_{4'}$	E_d
739	$E_{1a}E_5E_4$	AlkL	$E_{4'}$	E_d

740	$E_{1b}E_5E_4$	AlkL	$E_{4'}$	E_d
741	$E_{1a}E_iE_4$	AlkL	$E_{4'}$	E_d
742	$E_{1b}E_iE_4$	AlkL	$E_{4'}$	E_d
743	$E_{1a}E_{ii}E_4$	AlkL	$E_{4'}$	E_d
744	$E_{1b}E_{ii}E_4$	AlkL	$E_{4'}$	E_d
745	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_d
746	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_d
747	$E_{1a}E_5E_iE_4$	AlkL	$E_{4'}$	E_d
748	$E_{1b}E_6E_iE_4$	AlkL	$E_{4'}$	E_d
749	$E_{1a}E_5E_{ii}E_4$	AlkL	$E_{4'}$	E_d
750	$E_{1b}E_5E_{ii}E_4$	AlkL	$E_{4'}$	E_d
751	$E_{1a}E_5E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_d
752	$E_{1b}E_6E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_d
753	$E_{1a}E_{iii}$	AlkL	$E_{4'}$	E_d
754	$E_{1b}E_{iii}$	AlkL	$E_{4'}$	E_d
755	$E_{1a}E_5E_{iii}$	AlkL	$E_{4'}$	E_d
756	$E_{1b}E_5E_{iii}$	AlkL	$E_{4'}$	E_d
757	$E_{1a}E_{iii}E_4$	AlkL	$E_{4'}$	E_d
758	$E_{1b}E_{iii}E_4$	AlkL	$E_{4'}$	E_d
759	$E_{1a}E_5E_{iii}E_4$	AlkL	$E_{4'}$	E_d
760	$E_{1b}E_5E_{iii}E_4$	AlkL	$E_{4'}$	E_d
761	$E_{1a}E_{iv}$	AlkL	$E_{4'}$	E_d
762	$E_{1b}E_{iv}$	AlkL	$E_{4'}$	E_d
763	$E_{1a}E_5E_{iv}$	AlkL	$E_{4'}$	E_d
764	$E_{1b}E_5E_{iv}$	AlkL	$E_{4'}$	E_d
765	$E_{1a}E_{iv}E_4$	AlkL	$E_{4'}$	E_d
766	$E_{1b}E_{iv}E_4$	AlkL	$E_{4'}$	E_d
767	$E_{1a}E_5E_{iv}E_4$	AlkL	$E_{4'}$	E_d
768	$E_{1b}E_5E_{iv}E_4$	AlkL	$E_{4'}$	E_d
769	E_{1a}			E_e
770	E_{1b}			E_e
771	$E_{1a}E_5$			E_e
772	$E_{1b}E_5$			E_e
773	$E_{1a}E_i$			E_e
774	$E_{1b}E_i$			E_e
775	$E_{1a}E_{ii}$			E_e
776	$E_{1b}E_{ii}$			E_e
777	$E_{1a}E_{ii}E_{iib}$			E_e
778	$E_{1b}E_{ii}E_{iib}$			E_e
779	$E_{1a}E_5E_i$			E_e
780	$E_{1b}E_5E_i$			E_e
781	$E_{1a}E_5E_{ii}$			E_e
782	$E_{1b}E_5E_{ii}$			E_e

783	$E_{1a}E_5E_{ii}E_{iib}$		E_e
784	$E_{1b}E_5E_{ii}E_{iib}$		E_e
785	$E_{1a}E_4$		E_e
786	$E_{1b}E_4$		E_e
787	$E_{1a}E_5E_4$		E_e
788	$E_{1b}E_5E_4$		E_e
789	$E_{1a}E_iE_4$		E_e
790	$E_{1b}E_iE_4$		E_e
791	$E_{1a}E_{ii}E_4$		E_e
792	$E_{1b}E_{ii}E_4$		E_e
793	$E_{1a}E_{ii}E_{iib}E_4$		E_e
794	$E_{1b}E_{ii}E_{iib}E_4$		E_e
795	$E_{1a}E_6E_iE_4$		E_e
796	$E_{1b}E_5E_iE_4$		E_e
797	$E_{1a}E_5E_{ii}E_4$		E_e
798	$E_{1b}E_5E_{ii}E_4$		E_e
799	$E_{1a}E_5E_{ii}E_{iib}E_4$		E_e
800	$E_{1b}E_6E_{ii}E_{iib}E_4$		E_e
801	$E_{1a}E_{iii}$		E_e
802	$E_{1b}E_{iii}$		E_e
803	$E_{1a}E_5E_{iii}$		E_e
804	$E_{1b}E_5E_{iii}$		E_e
805	$E_{1a}E_{iii}E_4$		E_e
806	$E_{1b}E_{iii}E_4$		E_e
807	$E_{1a}E_5E_{iii}E_4$		E_e
808	$E_{1b}E_5E_{iii}E_4$		E_e
809	$E_{1a}E_{iv}$		E_e
810	$E_{1b}E_{iv}$		E_e
811	$E_{1a}E_5E_{iv}$		E_e
812	$E_{1b}E_5E_{iv}$		E_e
813	$E_{1a}E_{iv}E_4$		E_e
814	$E_{1b}E_{iv}E_4$		E_e
815	$E_{1a}E_5E_{iv}E_4$		E_e
816	$E_{1b}E_5E_{iv}E_4$		E_e
817	E_{1a}	$E_{4'}$	E_e
818	E_{1b}	$E_{4'}$	E_e
819	$E_{1a}E_5$	$E_{4'}$	E_e
820	$E_{1b}E_5$	$E_{4'}$	E_e
821	$E_{1a}E_i$	$E_{4'}$	E_e
822	$E_{1b}E_i$	$E_{4'}$	E_e
823	$E_{1a}E_{ii}$	$E_{4'}$	E_e
824	$E_{1b}E_{ii}$	$E_{4'}$	E_e
825	$E_{1a}E_{ii}E_{iib}$	$E_{4'}$	E_e

826	$E_{1b}E_{ii}E_{iib}$	$E_{4'}$	E_e
827	$E_{1a}E_5E_i$	$E_{4'}$	E_e
828	$E_{1b}E_5E_i$	$E_{4'}$	E_e
829	$E_{1a}E_5E_{ii}$	$E_{4'}$	E_e
830	$E_{1b}E_5E_{ii}$	$E_{4'}$	E_e
831	$E_{1a}E_5E_{ii}E_{iib}$	$E_{4'}$	E_e
832	$E_{1b}E_5E_{ii}E_{iib}$	$E_{4'}$	E_e
833	$E_{1a}E_4$	$E_{4'}$	E_e
834	$E_{1b}E_4$	$E_{4'}$	E_e
835	$E_{1a}E_5E_4$	$E_{4'}$	E_e
836	$E_{1b}E_5E_4$	$E_{4'}$	E_e
837	$E_{1a}E_iE_4$	$E_{4'}$	E_e
838	$E_{1b}E_iE_4$	$E_{4'}$	E_e
839	$E_{1a}E_{ii}E_4$	$E_{4'}$	E_e
840	$E_{1b}E_{ii}E_4$	$E_{4'}$	E_e
841	$E_{1a}E_{ii}E_{iib}E_4$	$E_{4'}$	E_e
842	$E_{1b}E_{ii}E_{iib}E_4$	$E_{4'}$	E_e
843	$E_{1a}E_5E_iE_4$	$E_{4'}$	E_e
844	$E_{1b}E_5E_iE_4$	$E_{4'}$	E_e
845	$E_{1a}E_5E_{ii}E_4$	$E_{4'}$	E_e
846	$E_{1b}E_5E_{ii}E_4$	$E_{4'}$	E_e
847	$E_{1a}E_5E_{ii}E_{iib}E_4$	$E_{4'}$	E_e
848	$E_{1b}E_5E_{ii}E_{iib}E_4$	$E_{4'}$	E_e
849	$E_{1a}E_{iii}$	$E_{4'}$	E_e
850	$E_{1b}E_{iii}$	$E_{4'}$	E_e
851	$E_{1a}E_5E_{iii}$	$E_{4'}$	E_e
852	$E_{1b}E_5E_{iii}$	$E_{4'}$	E_e
853	$E_{1a}E_{iii}E_4$	$E_{4'}$	E_e
854	$E_{1b}E_{iii}E_4$	$E_{4'}$	E_e
855	$E_{1a}E_5E_{iii}E_4$	$E_{4'}$	E_e
856	$E_{1b}E_5E_{iii}E_4$	$E_{4'}$	E_e
857	$E_{1a}E_{iv}$	$E_{4'}$	E_e
858	$E_{1b}E_{iv}$	$E_{4'}$	E_e
859	$E_{1a}E_5E_{iv}$	$E_{4'}$	E_e
860	$E_{1b}E_5E_{iv}$	$E_{4'}$	E_e
861	$E_{1a}E_{iv}E_4$	$E_{4'}$	E_e
862	$E_{1b}E_{iv}E_4$	$E_{4'}$	E_e
863	$E_{1a}E_5E_{iv}E_4$	$E_{4'}$	E_e
864	$E_{1b}E_5E_{iv}E_4$	$E_{4'}$	E_e
865	E_{1a} AlkL		E_e
866	E_{1b} AlkL		E_e
867	$E_{1a}E_5$ AlkL		E_e
868	$E_{1b}E_5$ AlkL		E_e

869	$E_{1a}E_i$	AlkL	E_e
870	$E_{1b}E_i$	AlkL	E_e
871	$E_{1a}E_{ii}$	AlkL	E_e
872	$E_{1b}E_{ii}$	AlkL	E_e
873	$E_{1a}E_{ii}E_{iib}$	AlkL	E_e
874	$E_{1b}E_{ii}E_{iib}$	AlkL	E_e
875	$E_{1a}E_5E_i$	AlkL	E_e
876	$E_{1b}E_5E_i$	AlkL	E_e
877	$E_{1a}E_5E_{ii}$	AlkL	E_e
878	$E_{1b}E_5E_{ii}$	AlkL	E_e
879	$E_{1a}E_5E_{ii}E_{iib}$	AlkL	E_e
880	$E_{1b}E_5E_{ii}E_{iib}$	AlkL	E_e
881	$E_{1a}E_4$	AlkL	E_e
882	$E_{1b}E_4$	AlkL	E_e
883	$E_{1a}E_5E_4$	AlkL	E_e
884	$E_{1b}E_5E_4$	AlkL	E_e
885	$E_{1a}E_iE_4$	AlkL	E_e
886	$E_{1b}E_iE_4$	AlkL	E_e
887	$E_{1a}E_{ii}E_4$	AlkL	E_e
888	$E_{1b}E_{ii}E_4$	AlkL	E_e
889	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_e
890	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_e
891	$E_{1a}E_5E_iE_4$	AlkL	E_e
892	$E_{1b}E_5E_iE_4$	AlkL	E_e
893	$E_{1a}E_5E_{ii}E_4$	AlkL	E_e
894	$E_{1b}E_5E_{ii}E_4$	AlkL	E_e
895	$E_{1a}E_5E_{ii}E_{iib}E_4$	AlkL	E_e
896	$E_{1b}E_5E_{ii}E_{iib}E_4$	AlkL	E_e
897	$E_{1a}E_{iii}$	AlkL	E_e
898	$E_{1b}E_{iii}$	AlkL	E_e
899	$E_{1a}E_5E_{iii}$	AlkL	E_e
900	$E_{1b}E_5E_{iii}$	AlkL	E_e
901	$E_{1a}E_{iii}E_4$	AlkL	E_e
902	$E_{1b}E_{iii}E_4$	AlkL	E_e
903	$E_{1a}E_5E_{iii}E_4$	AlkL	E_e
904	$E_{1b}E_5E_{iii}E_4$	AlkL	E_e
905	$E_{1a}E_{iv}$	AlkL	E_e
906	$E_{1b}E_{iv}$	AlkL	E_e
907	$E_{1a}E_5E_{iv}$	AlkL	E_e
908	$E_{1b}E_5E_{iv}$	AlkL	E_e
909	$E_{1a}E_{iv}E_4$	AlkL	E_e
910	$E_{1b}E_{iv}E_4$	AlkL	E_e
911	$E_{1a}E_5E_{iv}E_4$	AlkL	E_e

912	$E_{1b}E_5E_{iv}E_4$	AlkL		E_e
913	E_{1a}	AlkL	$E_{4'}$	E_e
914	E_{1b}	AlkL	$E_{4'}$	E_e
915	$E_{1a}E_5$	AlkL	$E_{4'}$	E_e
916	$E_{1b}E_5$	AlkL	$E_{4'}$	E_e
917	$E_{1a}E_i$	AlkL	$E_{4'}$	E_e
918	$E_{1b}E_i$	AlkL	$E_{4'}$	E_e
919	$E_{1a}E_{ii}$	AlkL	$E_{4'}$	E_e
920	$E_{1b}E_{ii}$	AlkL	$E_{4'}$	E_e
921	$E_{1a}E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_e
922	$E_{1b}E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_e
923	$E_{1a}E_5E_i$	AlkL	$E_{4'}$	E_e
924	$E_{1b}E_5E_i$	AlkL	$E_{4'}$	E_e
925	$E_{1a}E_5E_{ii}$	AlkL	$E_{4'}$	E_e
926	$E_{1b}E_5E_{ii}$	AlkL	$E_{4'}$	E_e
927	$E_{1a}E_5E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_e
928	$E_{1b}E_5E_{ii}E_{iib}$	AlkL	$E_{4'}$	E_e
929	$E_{1a}E_4$	AlkL	$E_{4'}$	E_e
930	$E_{1b}E_4$	AlkL	$E_{4'}$	E_e
931	$E_{1a}E_5E_4$	AlkL	$E_{4'}$	E_e
932	$E_{1b}E_5E_4$	AlkL	$E_{4'}$	E_e
933	$E_{1a}E_iE_4$	AlkL	$E_{4'}$	E_e
934	$E_{1b}E_iE_4$	AlkL	$E_{4'}$	E_e
935	$E_{1a}E_{ii}E_4$	AlkL	$E_{4'}$	E_e
936	$E_{1b}E_{ii}E_4$	AlkL	$E_{4'}$	E_e
937	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_e
938	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_e
939	$E_{1a}E_5E_iE_4$	AlkL	$E_{4'}$	E_e
940	$E_{1b}E_5E_iE_4$	AlkL	$E_{4'}$	E_e
941	$E_{1a}E_5E_{ii}E_4$	AlkL	$E_{4'}$	E_e
942	$E_{1b}E_5E_{ii}E_4$	AlkL	$E_{4'}$	E_e
943	$E_{1a}E_5E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_e
944	$E_{1b}E_5E_{ii}E_{iib}E_4$	AlkL	$E_{4'}$	E_e
945	$E_{1a}E_{iii}$	AlkL	$E_{4'}$	E_e
946	$E_{1b}E_{iii}$	AlkL	$E_{4'}$	E_e
947	$E_{1a}E_5E_{iii}$	AlkL	$E_{4'}$	E_e
948	$E_{1b}E_5E_{iii}$	AlkL	$E_{4'}$	E_e
949	$E_{1a}E_{iii}E_4$	AlkL	$E_{4'}$	E_e
950	$E_{1b}E_{iii}E_4$	AlkL	$E_{4'}$	E_e
951	$E_{1a}E_5E_{iii}E_4$	AlkL	$E_{4'}$	E_e
952	$E_{1b}E_5E_{iii}E_4$	AlkL	$E_{4'}$	E_e
953	$E_{1a}E_{iv}$	AlkL	$E_{4'}$	E_e
954	$E_{1b}E_{iv}$	AlkL	$E_{4'}$	E_e

955	$E_{1a}E_5E_{iv}$	AlkL	$E_{4'}$	E_e
956	$E_{1b}E_5E_{iv}$	AlkL	$E_{4'}$	E_e
957	$E_{1a}E_{iv}E_4$	AlkL	$E_{4'}$	E_e
958	$E_{1b}E_{iv}E_4$	AlkL	$E_{4'}$	E_e
959	$E_{1a}E_5E_{iv}E_4$	AlkL	$E_{4'}$	E_e
960	$E_{1b}E_5E_{iv}E_4$	AlkL	$E_{4'}$	E_e
961	E_{1a}			E_f
962	E_{1b}			E_f
963	$E_{1a}E_5$			E_f
964	$E_{1b}E_5$			E_f
965	$E_{1a}E_i$			E_f
966	$E_{1b}E_i$			E_f
967	$E_{1a}E_{ii}$			E_f
968	$E_{1b}E_{ii}$			E_f
969	$E_{1a}E_{ii}E_{iib}$			E_f
970	$E_{1b}E_{ii}E_{iib}$			E_f
971	$E_{1a}E_5E_i$			E_f
972	$E_{1b}E_5E_i$			E_f
973	$E_{1a}E_5E_{ii}$			E_f
974	$E_{1b}E_5E_{ii}$			E_f
975	$E_{1a}E_5E_{ii}E_{iib}$			E_f
976	$E_{1b}E_5E_{ii}E_{iib}$			E_f
977	$E_{1a}E_4$			E_f
978	$E_{1b}E_4$			E_f
979	$E_{1a}E_5E_4$			E_f
980	$E_{1b}E_5E_4$			E_f
981	$E_{1a}E_iE_4$			E_f
982	$E_{1b}E_iE_4$			E_f
983	$E_{1a}E_{ii}E_4$			E_f
984	$E_{1b}E_{ii}E_4$			E_f
985	$E_{1a}E_{ii}E_{iib}E_4$			E_f
986	$E_{1b}E_{ii}E_{iib}E_4$			E_f
987	$E_{1a}E_5E_iE_4$			E_f
988	$E_{1b}E_5E_iE_4$			E_f
989	$E_{1a}E_5E_{ii}E_4$			E_f
990	$E_{1b}E_5E_{ii}E_4$			E_f
991	$E_{1a}E_5E_{ii}E_{iib}E_4$			E_f
992	$E_{1b}E_5E_{ii}E_{iib}E_4$			E_f
993	$E_{1a}E_{iii}$			E_f
994	$E_{1b}E_{iii}$			E_f
995	$E_{1a}E_5E_{iii}$			E_f
996	$E_{1b}E_5E_{iii}$			E_f
997	$E_{1a}E_{iii}E_4$			E_f

998	$E_{1b}E_{iii}E_4$		E_f
999	$E_{1a}E_5E_{iii}E_4$		E_f
1000	$E_{1b}E_5E_{iii}E_4$		E_f
1001	$E_{1a}E_{iv}$		E_f
1002	$E_{1b}E_{iv}$		E_f
1003	$E_{1a}E_5E_{iv}$		E_f
1004	$E_{1b}E_5E_{iv}$		E_f
1005	$E_{1a}E_{iv}E_4$		E_f
1006	$E_{1b}E_{iv}E_4$		E_f
1007	$E_{1a}E_5E_{iv}E_4$		E_f
1008	$E_{1b}E_5E_{iv}E_4$		E_f
1009	E_{1a}	$E_{4'}$	E_f
1010	E_{1b}	$E_{4'}$	E_f
1011	$E_{1a}E_5$	$E_{4'}$	E_f
1012	$E_{1b}E_5$	$E_{4'}$	E_f
1013	$E_{1a}E_i$	$E_{4'}$	E_f
1014	$E_{1b}E_i$	$E_{4'}$	E_f
1015	$E_{1a}E_{ii}$	$E_{4'}$	E_f
1016	$E_{1b}E_{ii}$	$E_{4'}$	E_f
1017	$E_{1a}E_{ii}E_{iib}$	$E_{4'}$	E_f
1018	$E_{1b}E_{ii}E_{iib}$	$E_{4'}$	E_f
1019	$E_{1a}E_5E_i$	$E_{4'}$	E_f
1020	$E_{1b}E_5E_i$	$E_{4'}$	E_f
1021	$E_{1a}E_5E_{ii}$	$E_{4'}$	E_f
1022	$E_{1b}E_5E_{ii}$	$E_{4'}$	E_f
1023	$E_{1a}E_5E_{ii}E_{iib}$	$E_{4'}$	E_f
1024	$E_{1b}E_5E_{ii}E_{iib}$	$E_{4'}$	E_f
1025	$E_{1a}E_4$	$E_{4'}$	E_f
1026	$E_{1b}E_4$	$E_{4'}$	E_f
1027	$E_{1a}E_5E_4$	$E_{4'}$	E_f
1028	$E_{1b}E_5E_4$	$E_{4'}$	E_f
1029	$E_{1a}E_iE_4$	$E_{4'}$	E_f
1030	$E_{1b}E_iE_4$	$E_{4'}$	E_f
1031	$E_{1a}E_{ii}E_4$	$E_{4'}$	E_f
1032	$E_{1b}E_{ii}E_4$	$E_{4'}$	E_f
1033	$E_{1a}E_{ii}E_{iib}E_4$	$E_{4'}$	E_f
1034	$E_{1b}E_{ii}E_{iib}E_4$	$E_{4'}$	E_f
1035	$E_{1a}E_5E_iE_4$	$E_{4'}$	E_f
1036	$E_{1b}E_5E_iE_4$	$E_{4'}$	E_f
1037	$E_{1a}E_5E_{ii}E_4$	$E_{4'}$	E_f
1038	$E_{1b}E_5E_{ii}E_4$	$E_{4'}$	E_f
1039	$E_{1a}E_5E_{ii}E_{iib}E_4$	$E_{4'}$	E_f
1040	$E_{1b}E_5E_{ii}E_{iib}E_4$	$E_{4'}$	E_f

1041	$E_{1a}E_{iii}$		$E_{4'}$	E_f
1042	$E_{1b}E_{iii}$		$E_{4'}$	E_f
1043	$E_{1a}E_5E_{iii}$		$E_{4'}$	E_f
1044	$E_{1b}E_5E_{iii}$		$E_{4'}$	E_f
1045	$E_{1a}E_{iii}E_4$		$E_{4'}$	E_f
1046	$E_{1b}E_{iii}E_4$		$E_{4'}$	E_f
1047	$E_{1a}E_5E_{iii}E_4$		$E_{4'}$	E_f
1048	$E_{1b}E_5E_{iii}E_4$		$E_{4'}$	E_f
1049	$E_{1a}E_{iv}$		$E_{4'}$	E_f
1050	$E_{1b}E_{iv}$		$E_{4'}$	E_f
1051	$E_{1a}E_5E_{iv}$		$E_{4'}$	E_f
1052	$E_{1b}E_5E_{iv}$		$E_{4'}$	E_f
1053	$E_{1a}E_{iv}E_4$		$E_{4'}$	E_f
1054	$E_{1b}E_{iv}E_4$		$E_{4'}$	E_f
1055	$E_{1a}E_5E_{iv}E_4$		$E_{4'}$	E_f
1056	$E_{1b}E_5E_{iv}E_4$		$E_{4'}$	E_f
1057	E_{1a}	AlkL		E_f
1058	E_{1b}	AlkL		E_f
1059	$E_{1a}E_5$	AlkL		E_f
1060	$E_{1b}E_5$	AlkL		E_f
1061	$E_{1a}E_i$	AlkL		E_f
1062	$E_{1b}E_i$	AlkL		E_f
1063	$E_{1a}E_{ii}$	AlkL		E_f
1064	$E_{1b}E_{ii}$	AlkL		E_f
1065	$E_{1a}E_{ii}E_{iib}$	AlkL		E_f
1066	$E_{1b}E_{ii}E_{iib}$	AlkL		E_f
1067	$E_{1a}E_5E_i$	AlkL		E_f
1068	$E_{1b}E_5E_i$	AlkL		E_f
1069	$E_{1a}E_5E_{ii}$	AlkL		E_f
1070	$E_{1b}E_5E_{ii}$	AlkL		E_f
1071	$E_{1a}E_5E_{ii}E_{iib}$	AlkL		E_f
1072	$E_{1b}E_5E_{ii}E_{iib}$	AlkL		E_f
1073	$E_{1a}E_4$	AlkL		E_f
1074	$E_{1b}E_4$	AlkL		E_f
1075	$E_{1a}E_5E_4$	AlkL		E_f
1076	$E_{1b}E_5E_4$	AlkL		E_f
1077	$E_{1a}E_iE_4$	AlkL		E_f
1078	$E_{1b}E_iE_4$	AlkL		E_f
1079	$E_{1a}E_{ii}E_4$	AlkL		E_f
1080	$E_{1b}E_{ii}E_4$	AlkL		E_f
1081	$E_{1a}E_{ii}E_{iib}E_4$	AlkL		E_f
1082	$E_{1b}E_{ii}E_{iib}E_4$	AlkL		E_f
1083	$E_{1a}E_5E_iE_4$	AlkL		E_f

1084	$E_{1b}E_5E_iE_4$	AlkL		E_f
1085	$E_{1a}E_5E_{ii}E_4$	AlkL		E_f
1086	$E_{1b}E_5E_{ii}E_4$	AlkL		E_f
1087	$E_{1a}E_5E_{ii}E_{iib}E_4$	AlkL		E_f
1088	$E_{1b}E_5E_{ii}E_{iib}E_4$	AlkL		E_f
1089	$E_{1a}E_{iii}$	AlkL		E_f
1090	$E_{1b}E_{iii}$	AlkL		E_f
1091	$E_{1a}E_5E_{iii}$	AlkL		E_f
1092	$E_{1b}E_5E_{iii}$	AlkL		E_f
1093	$E_{1a}E_{iii}E_4$	AlkL		E_f
1094	$E_{1b}E_{iii}E_4$	AlkL		E_f
1095	$E_{1a}E_5E_{iii}E_4$	AlkL		E_f
1096	$E_{1b}E_5E_{iii}E_4$	AlkL		E_f
1097	$E_{1a}E_{iv}$	AlkL		E_f
1098	$E_{1b}E_{iv}$	AlkL		E_f
1099	$E_{1a}E_5E_{iv}$	AlkL		E_f
1100	$E_{1b}E_5E_{iv}$	AlkL		E_f
1101	$E_{1a}E_{iv}E_4$	AlkL		E_f
1102	$E_{1b}E_{iv}E_4$	AlkL		E_f
1103	$E_{1a}E_5E_{iv}E_4$	AlkL		E_f
1104	$E_{1b}E_5E_{iv}E_4$	AlkL		E_f
1105	E_{1a}	AlkL	E_{4^*}	E_f
1106	E_{1b}	AlkL	E_{4^*}	E_f
1107	$E_{1a}E_5$	AlkL	E_{4^*}	E_f
1108	$E_{1b}E_5$	AlkL	E_{4^*}	E_f
1109	$E_{1a}E_i$	AlkL	E_{4^*}	E_f
1110	$E_{1b}E_i$	AlkL	E_{4^*}	E_f
1111	$E_{1a}E_{ii}$	AlkL	E_{4^*}	E_f
1112	$E_{1b}E_{ii}$	AlkL	E_{4^*}	E_f
1113	$E_{1a}E_{ii}E_{iib}$	AlkL	E_{4^*}	E_f
1114	$E_{1b}E_{ii}E_{iib}$	AlkL	E_{4^*}	E_f
1115	$E_{1a}E_5E_i$	AlkL	E_{4^*}	E_f
1116	$E_{1b}E_5E_i$	AlkL	E_{4^*}	E_f
1117	$E_{1a}E_5E_{ii}$	AlkL	E_{4^*}	E_f
1118	$E_{1b}E_5E_{ii}$	AlkL	E_{4^*}	E_f
1119	$E_{1a}E_5E_{ii}E_{iib}$	AlkL	E_{4^*}	E_f
1120	$E_{1b}E_5E_{ii}E_{iib}$	AlkL	E_{4^*}	E_f

1121	$E_{1a}E_4$	AlkL	E_{4^*}	E_f
1122	$E_{1b}E_4$	AlkL	E_{4^*}	E_f
1123	$E_{1a}E_5E_4$	AlkL	E_{4^*}	E_f
1124	$E_{1b}E_5E_4$	AlkL	E_{4^*}	E_f
1125	$E_{1a}E_iE_4$	AlkL	E_{4^*}	E_f
1126	$E_{1b}E_iE_4$	AlkL	E_{4^*}	E_f
1127	$E_{1a}E_{ii}E_4$	AlkL	E_{4^*}	E_f
1128	$E_{1b}E_{ii}E_4$	AlkL	E_{4^*}	E_f
1129	$E_{1a}E_{ii}E_{iib}E_4$	AlkL	E_{4^*}	E_f
1130	$E_{1b}E_{ii}E_{iib}E_4$	AlkL	E_{4^*}	E_f
1131	$E_{1a}E_5E_iE_4$	AlkL	E_{4^*}	E_f
1132	$E_{1b}E_5E_iE_4$	AlkL	E_{4^*}	E_f
1133	$E_{1a}E_5E_{ii}E_4$	AlkL	E_{4^*}	E_f
1134	$E_{1b}E_5E_{ii}E_4$	AlkL	E_{4^*}	E_f
1135	$E_{1a}E_5E_{ii}E_{iib}E_4$	AlkL	E_{4^*}	E_f
1136	$E_{1b}E_5E_{ii}E_{iib}E_4$	AlkL	E_{4^*}	E_f
1137	$E_{1a}E_{iii}$	AlkL	E_{4^*}	E_f
1138	$E_{1b}E_{iii}$	AlkL	E_{4^*}	E_f
1139	$E_{1a}E_5E_{iii}$	AlkL	E_{4^*}	E_f
1140	$E_{1b}E_5E_{iii}$	AlkL	E_{4^*}	E_f
1141	$E_{1a}E_{iii}E_4$	AlkL	E_{4^*}	E_f
1142	$E_{1b}E_{iii}E_4$	AlkL	E_{4^*}	E_f
1143	$E_{1a}E_5E_{iii}E_4$	AlkL	E_{4^*}	E_f
1144	$E_{1b}E_5E_{iii}E_4$	AlkL	E_{4^*}	E_f
1145	$E_{1a}E_{iv}$	AlkL	E_{4^*}	E_f
1146	$E_{1b}E_{iv}$	AlkL	E_{4^*}	E_f
1147	$E_{1a}E_5E_{iv}$	AlkL	E_{4^*}	E_f
1148	$E_{1b}E_5E_{iv}$	AlkL	E_{4^*}	E_f
1149	$E_{1a}E_{iv}E_4$	AlkL	E_{4^*}	E_f
1150	$E_{1b}E_{iv}E_4$	AlkL	E_{4^*}	E_f
1151	$E_{1a}E_5E_{iv}E_4$	AlkL	E_{4^*}	E_f
1152	$E_{1b}E_5E_{iv}E_4$	AlkL	E_{4^*}	E_f

Microorganisms quite especially preferred according to the invention (abbreviated as MO) are outstandingly suitable for the production of ω-carboxycarboxylate esters and have increased or decreased enzyme activities (abbreviated as E) described in the following table, where these

can in addition advantageously be combined with an increased enzyme activity compared to the wild type of the microorganism, which is described for the 3-ketoacyl-ACP (Acyl Carrrier Protein) synthase III (EC 2.3.1.41), in particular that from plants, preferably that from plants the seeds whereof contain fatty acids with alkyl residues shorter than 14 C atoms, and particularly preferably that from plants of the genera *Cuphea*, *Elaeis*, *Cocos*, *Umbellularia* and *Cinnamomum* and gene products selected from AccA, AccB, AccC, AccD, AceE, AceF, Lpd, AcpP, FabA, FabB, FabD, FabF, FabG, FabH, FabI, FabZ, PanD, PanK, UdhA, PntA or PntB. Any combinations of at least two of these enzyme activities can advantageously be increased. In addition, moreover, it can be advantageous if the microorganism is provided with a lower enzyme activity compared to the wild type of the microorganism, which is described for the gene products selected from TdcE, PflA, PflB, PflC, PflD, PoxB, YgfG, AckA, AckB, TdcD, Pta, LdhA, AdhE, MgsA, FdnG, FdnH, FdnI, FdhF, FdoG, FdoH, FdoI, PrpC, PrpD, PrpF , PrpB , TdcD, Pdc, PorA, PorB, PorC, PorD, AlsS, IlvB, IlvM, IlvN, IlvG, IlvI, IlvH, AlsD, ButB, Thl, ThlA, ThlB, PhaA, PhaB, Crt, BdhA, BdhB, Adc, Adh, CtfB, AtoA, AtoD, LdhL, GltA, FabR, FhuA, Dld, LldA or LldP, singly or in any combination.

MO	E increased		E decreased
1	E_{1a}	E_vE_{vi}	
2	E_{1b}	E_vE_{vi}	
3	$E_{1a}E_5$	E_vE_{vi}	
4	$E_{1b}E_5$	E_vE_{vi}	
5	$E_{1a}E_i$	E_vE_{vi}	
6	$E_{1b}E_i$	E_vE_{vi}	
7	$E_{1a}E_{ii}$	E_vE_{vi}	
8	$E_{1b}E_{ii}$	E_vE_{vi}	
9	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	
10	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	
11	$E_{1a}E_5E_i$	E_vE_{vi}	
12	$E_{1b}E_5E_i$	E_vE_{vi}	
13	$E_{1a}E_5E_{ii}$	E_vE_{vi}	
14	$E_{1b}E_5E_{ii}$	E_vE_{vi}	
15	$E_{1a}E_5E_{ii}E_{iib}$	E_vE_{vi}	
16	$E_{1b}E_5E_{ii}E_{iib}$	E_vE_{vi}	
17	$E_{1a}E_4$	E_vE_{vi}	
18	$E_{1b}E_4$	E_vE_{vi}	
19	$E_{1a}E_5E_4$	E_vE_{vi}	
20	$E_{1b}E_5E_4$	E_vE_{vi}	
21	$E_{1a}E_iE_4$	E_vE_{vi}	
22	$E_{1b}E_iE_4$	E_vE_{vi}	
23	$E_{1a}E_{ii}E_4$	E_vE_{vi}	
24	$E_{1b}E_{ii}E_4$	E_vE_{vi}	
25	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	
26	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	
27	$E_{1a}E_5E_iE_4$	E_vE_{vi}	
28	$E_{1b}E_5E_iE_4$	E_vE_{vi}	
29	$E_{1a}E_5E_{ii}E_4$	E_vE_{vi}	
30	$E_{1b}E_5E_{ii}E_4$	E_vE_{vi}	
31	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	
32	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	
33	$E_{1a}E_{iii}$	E_vE_{vi}	
34	$E_{1b}E_{iii}$	E_vE_{vi}	
35	$E_{1a}E_5E_{iii}$	E_vE_{vi}	
36	$E_{1b}E_5E_{iii}$	E_vE_{vi}	
37	$E_{1a}E_{iii}E_4$	E_vE_{vi}	
38	$E_{1b}E_{iii}E_4$	E_vE_{vi}	
39	$E_{1a}E_5E_{iii}E_4$	E_vE_{vi}	
40	$E_{1b}E_5E_{iii}E_4$	E_vE_{vi}	
41	$E_{1a}E_{iv}$	E_vE_{vi}	
42	$E_{1b}E_{iv}$	E_vE_{vi}	
43	$E_{1a}E_5E_{iv}$	E_vE_{vi}	

44	$E_{1b}E_5E_{iv}$	E_vE_{vi}	
45	$E_{1a}E_{iv}E_4$	E_vE_{vi}	
46	$E_{1b}E_{iv}E_4$	E_vE_{vi}	
47	$E_{1a}E_5E_{iv}E_4$	E_vE_{vi}	
48	$E_{1b}E_5E_{iv}E_4$	E_vE_{vi}	
49	E_{1a}	E_vE_{vi}	E_{4^*}
50	E_{1b}	E_vE_{vi}	E_{4^*}
51	$E_{1a}E_5$	E_vE_{vi}	E_{4^*}
52	$E_{1b}E_5$	E_vE_{vi}	E_{4^*}
53	$E_{1a}E_i$	E_vE_{vi}	E_{4^*}
54	$E_{1b}E_i$	E_vE_{vi}	E_{4^*}
55	$E_{1a}E_{ii}$	E_vE_{vi}	E_{4^*}
56	$E_{1b}E_{ii}$	E_vE_{vi}	E_{4^*}
57	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}
58	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}
59	$E_{1a}E_5E_i$	E_vE_{vi}	E_{4^*}
60	$E_{1b}E_5E_i$	E_vE_{vi}	E_{4^*}
61	$E_{1a}E_5E_{ii}$	E_vE_{vi}	E_{4^*}
62	$E_{1b}E_5E_{ii}$	E_vE_{vi}	E_{4^*}
63	$E_{1a}E_5E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}
64	$E_{1b}E_5E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}
65	$E_{1a}E_4$	E_vE_{vi}	E_{4^*}
66	$E_{1b}E_4$	E_vE_{vi}	E_{4^*}
67	$E_{1a}E_5E_4$	E_vE_{vi}	E_{4^*}
68	$E_{1b}E_5E_4$	E_vE_{vi}	E_{4^*}
69	$E_{1a}E_iE_4$	E_vE_{vi}	E_{4^*}
70	$E_{1b}E_iE_4$	E_vE_{vi}	E_{4^*}
71	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_{4^*}
72	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_{4^*}
73	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}
74	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}
75	$E_{1a}E_5E_iE_4$	E_vE_{vi}	E_{4^*}
76	$E_{1b}E_5E_iE_4$	E_vE_{vi}	E_{4^*}
77	$E_{1a}E_5E_{ii}E_4$	E_vE_{vi}	E_{4^*}
78	$E_{1b}E_5E_{ii}E_4$	E_vE_{vi}	E_{4^*}
79	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}
80	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}
81	$E_{1a}E_{iii}$	E_vE_{vi}	E_{4^*}
82	$E_{1b}E_{iii}$	E_vE_{vi}	E_{4^*}
83	$E_{1a}E_5E_{iii}$	E_vE_{vi}	E_{4^*}
84	$E_{1b}E_5E_{iii}$	E_vE_{vi}	E_{4^*}
85	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_{4^*}
86	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_{4^*}

87	$E_{1a}E_5E_{iii}E_4$	E_vE_{vi}	E_{4^*}
88	$E_{1b}E_5E_{iii}E_4$	E_vE_{vi}	E_{4^*}
89	$E_{1a}E_{iv}$	E_vE_{vi}	E_{4^*}
90	$E_{1b}E_{iv}$	E_vE_{vi}	E_{4^*}
91	$E_{1a}E_5E_{iv}$	E_vE_{vi}	E_{4^*}
92	$E_{1b}E_5E_{iv}$	E_vE_{vi}	E_{4^*}
93	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_{4^*}
94	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_{4^*}
95	$E_{1a}E_5E_{iv}E_4$	E_vE_{vi}	E_{4^*}
96	$E_{1b}E_5E_{iv}E_4$	E_vE_{vi}	E_{4^*}
97	E_{1a}	$AlkLE_vE_{vi}$	
98	E_{1b}	$AlkLE_vE_{vi}$	
99	$E_{1a}E_5$	$AlkLE_vE_{vi}$	
100	$E_{1b}E_5$	$AlkLE_vE_{vi}$	
101	$E_{1a}E_i$	$AlkLE_vE_{vi}$	
102	$E_{1b}E_i$	$AlkLE_vE_{vi}$	
103	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	
104	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	
105	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	
106	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	
107	$E_{1a}E_5E_i$	$AlkLE_vE_{vi}$	
108	$E_{1b}E_5E_i$	$AlkLE_vE_{vi}$	
109	$E_{1a}E_5E_{ii}$	$AlkLE_vE_{vi}$	
110	$E_{1b}E_5E_{ii}$	$AlkLE_vE_{vi}$	
111	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	
112	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	
113	$E_{1a}E_4$	$AlkLE_vE_{vi}$	
114	$E_{1b}E_4$	$AlkLE_vE_{vi}$	
115	$E_{1a}E_5E_4$	$AlkLE_vE_{vi}$	
116	$E_{1b}E_5E_4$	$AlkLE_vE_{vi}$	
117	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	
118	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	
119	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	
120	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	
121	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	
122	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	
123	$E_{1a}E_5E_iE_4$	$AlkLE_vE_{vi}$	
124	$E_{1b}E_5E_iE_4$	$AlkLE_vE_{vi}$	
125	$E_{1a}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	
126	$E_{1b}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	
127	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	
128	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	
129	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	

130	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	
131	$E_{1a}E_5E_{iii}$	$AlkLE_vE_{vi}$	
132	$E_{1b}E_5E_{iii}$	$AlkLE_vE_{vi}$	
133	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	
134	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	
135	$E_{1a}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$	
136	$E_{1b}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$	
137	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	
138	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	
139	$E_{1a}E_5E_{iv}$	$AlkLE_vE_{vi}$	
140	$E_{1b}E_5E_{iv}$	$AlkLE_vE_{vi}$	
141	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	
142	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	
143	$E_{1a}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	
144	$E_{1b}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	
145	E_{1a}	$AlkLE_vE_{vi}$	$E_{4'}$
146	E_{1b}	$AlkLE_vE_{vi}$	$E_{4'}$
147	$E_{1a}E_5$	$AlkLE_vE_{vi}$	$E_{4'}$
148	$E_{1b}E_5$	$AlkLE_vE_{vi}$	$E_{4'}$
149	$E_{1a}E_i$	$AlkLE_vE_{vi}$	$E_{4'}$
150	$E_{1b}E_i$	$AlkLE_vE_{vi}$	$E_{4'}$
151	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}$
152	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}$
153	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}$
154	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}$
155	$E_{1a}E_5E_i$	$AlkLE_vE_{vi}$	$E_{4'}$
156	$E_{1b}E_5E_i$	$AlkLE_vE_{vi}$	$E_{4'}$
157	$E_{1a}E_5E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}$
158	$E_{1b}E_5E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}$
159	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}$
160	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}$
161	$E_{1a}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
162	$E_{1b}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
163	$E_{1a}E_5E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
164	$E_{1b}E_5E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
165	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$
166	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$
167	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
168	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
169	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
170	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
171	$E_{1a}E_5E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$
172	$E_{1b}E_5E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$

173	$E_{1a}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
174	$E_{1b}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
175	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
176	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
177	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$
178	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$
179	$E_{1a}E_5E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$
180	$E_{1b}E_5E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$
181	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
182	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
183	$E_{1a}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
184	$E_{1b}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
185	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$
186	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$
187	$E_{1a}E_5E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$
188	$E_{1b}E_5E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$
189	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
190	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
191	$E_{1a}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
192	$E_{1b}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$
193	E_{1a}	E_vE_{vi}	E_a
194	E_{1b}	E_vE_{vi}	E_a
195	$E_{1a}E_5$	E_vE_{vi}	E_a
196	$E_{1b}E_5$	E_vE_{vi}	E_a
197	$E_{1a}E_i$	E_vE_{vi}	E_a
198	$E_{1b}E_i$	E_vE_{vi}	E_a
199	$E_{1a}E_{ii}$	E_vE_{vi}	E_a
200	$E_{1b}E_{ii}$	E_vE_{vi}	E_a
201	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_a
202	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_a
203	$E_{1a}E_5E_i$	E_vE_{vi}	E_a
204	$E_{1b}E_5E_i$	E_vE_{vi}	E_a
205	$E_{1a}E_5E_{ii}$	E_vE_{vi}	E_a
206	$E_{1b}E_5E_{ii}$	E_vE_{vi}	E_a
207	$E_{1a}E_5E_{ii}E_{iib}$	E_vE_{vi}	E_a
208	$E_{1b}E_5E_{ii}E_{iib}$	E_vE_{vi}	E_a
209	$E_{1a}E_4$	E_vE_{vi}	E_a
210	$E_{1b}E_4$	E_vE_{vi}	E_a
211	$E_{1a}E_5E_4$	E_vE_{vi}	E_a
212	$E_{1b}E_5E_4$	E_vE_{vi}	E_a
213	$E_{1a}E_iE_4$	E_vE_{vi}	E_a
214	$E_{1b}E_iE_4$	E_vE_{vi}	E_a
215	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_a

216	$E_{1b}E_{ii}E_4$	E_vE_{vi}		E_a
217	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_a
218	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_a
219	$E_{1a}E_5E_iE_4$	E_vE_{vi}		E_a
220	$E_{1b}E_5E_iE_4$	E_vE_{vi}		E_a
221	$E_{1a}E_5E_{ii}E_4$	E_vE_{vi}		E_a
222	$E_{1b}E_5E_{ii}E_4$	E_vE_{vi}		E_a
223	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}		E_a
224	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}		E_a
225	$E_{1a}E_{iii}$	E_vE_{vi}		E_a
226	$E_{1b}E_{iii}$	E_vE_{vi}		E_a
227	$E_{1a}E_5E_{iii}$	E_vE_{vi}		E_a
228	$E_{1b}E_5E_{iii}$	E_vE_{vi}		E_a
229	$E_{1a}E_{iii}E_4$	E_vE_{vi}		E_a
230	$E_{1b}E_{iii}E_4$	E_vE_{vi}		E_a
231	$E_{1a}E_5E_{iii}E_4$	E_vE_{vi}		E_a
232	$E_{1b}E_5E_{iii}E_4$	E_vE_{vi}		E_a
233	$E_{1a}E_{iv}$	E_vE_{vi}		E_a
234	$E_{1b}E_{iv}$	E_vE_{vi}		E_a
235	$E_{1a}E_5E_{iv}$	E_vE_{vi}		E_a
236	$E_{1b}E_5E_{iv}$	E_vE_{vi}		E_a
237	$E_{1a}E_{iv}E_4$	E_vE_{vi}		E_a
238	$E_{1b}E_{iv}E_4$	E_vE_{vi}		E_a
239	$E_{1a}E_5E_{iv}E_4$	E_vE_{vi}		E_a
240	$E_{1b}E_5E_{iv}E_4$	E_vE_{vi}		E_a
241	E_{1a}	E_vE_{vi}	E_{4^*}	E_a
242	E_{1b}	E_vE_{vi}	E_{4^*}	E_a
243	$E_{1a}E_5$	E_vE_{vi}	E_{4^*}	E_a
244	$E_{1b}E_5$	E_vE_{vi}	E_{4^*}	E_a
245	$E_{1a}E_i$	E_vE_{vi}	E_{4^*}	E_a
246	$E_{1b}E_i$	E_vE_{vi}	E_{4^*}	E_a
247	$E_{1a}E_{ii}$	E_vE_{vi}	E_{4^*}	E_a
248	$E_{1b}E_{ii}$	E_vE_{vi}	E_{4^*}	E_a
249	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_a
250	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_a
251	$E_{1a}E_5E_i$	E_vE_{vi}	E_{4^*}	E_a
252	$E_{1b}E_5E_i$	E_vE_{vi}	E_{4^*}	E_a
253	$E_{1a}E_5E_{ii}$	E_vE_{vi}	E_{4^*}	E_a
254	$E_{1b}E_5E_{ii}$	E_vE_{vi}	E_{4^*}	E_a
255	$E_{1a}E_5E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_a
256	$E_{1b}E_5E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_a
257	$E_{1a}E_4$	E_vE_{vi}	E_{4^*}	E_a
258	$E_{1b}E_4$	E_vE_{vi}	E_{4^*}	E_a

259	$E_{1a}E_5E_4$	E_vE_{vi}	E_{4^*}	E_a
260	$E_{1b}E_5E_4$	E_vE_{vi}	E_{4^*}	E_a
261	$E_{1a}E_iE_4$	E_vE_{vi}	E_{4^*}	E_a
262	$E_{1b}E_iE_4$	E_vE_{vi}	E_{4^*}	E_a
263	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_a
264	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_a
265	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_a
266	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_a
267	$E_{1a}E_5E_iE_4$	E_vE_{vi}	E_{4^*}	E_a
268	$E_{1b}E_5E_iE_4$	E_vE_{vi}	E_{4^*}	E_a
269	$E_{1a}E_5E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_a
270	$E_{1b}E_5E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_a
271	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_a
272	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_a
273	$E_{1a}E_{iii}$	E_vE_{vi}	E_{4^*}	E_a
274	$E_{1b}E_{iii}$	E_vE_{vi}	E_{4^*}	E_a
275	$E_{1a}E_5E_{iii}$	E_vE_{vi}	E_{4^*}	E_a
276	$E_{1b}E_5E_{iii}$	E_vE_{vi}	E_{4^*}	E_a
277	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_a
278	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_a
279	$E_{1a}E_5E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_a
280	$E_{1b}E_5E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_a
281	$E_{1a}E_{iv}$	E_vE_{vi}	E_{4^*}	E_a
282	$E_{1b}E_{iv}$	E_vE_{vi}	E_{4^*}	E_a
283	$E_{1a}E_5E_{iv}$	E_vE_{vi}	E_{4^*}	E_a
284	$E_{1b}E_5E_{iv}$	E_vE_{vi}	E_{4^*}	E_a
285	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_a
286	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_a
287	$E_{1a}E_5E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_a
288	$E_{1b}E_5E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_a
289	E_{1a}	$AlkLE_vE_{vi}$		E_a
290	E_{1b}	$AlkLE_vE_{vi}$		E_a
291	$E_{1a}E_5$	$AlkLE_vE_{vi}$		E_a
292	$E_{1b}E_5$	$AlkLE_vE_{vi}$		E_a
293	$E_{1a}E_i$	$AlkLE_vE_{vi}$		E_a
294	$E_{1b}E_i$	$AlkLE_vE_{vi}$		E_a
295	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$		E_a
296	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$		E_a
297	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_a
298	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_a
299	$E_{1a}E_5E_i$	$AlkLE_vE_{vi}$		E_a
300	$E_{1b}E_5E_i$	$AlkLE_vE_{vi}$		E_a
301	$E_{1a}E_5E_{ii}$	$AlkLE_vE_{vi}$		E_a

302	$E_{1b}E_5E_{ii}$	$AlkLE_vE_{vi}$		E_a
303	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_a
304	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_a
305	$E_{1a}E_4$	$AlkLE_vE_{vi}$		E_a
306	$E_{1b}E_4$	$AlkLE_vE_{vi}$		E_a
307	$E_{1a}E_5E_4$	$AlkLE_vE_{vi}$		E_a
308	$E_{1b}E_5E_4$	$AlkLE_vE_{vi}$		E_a
309	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$		E_a
310	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$		E_a
311	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_a
312	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_a
313	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_a
314	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_a
315	$E_{1a}E_5E_iE_4$	$AlkLE_vE_{vi}$		E_a
316	$E_{1b}E_5E_iE_4$	$AlkLE_vE_{vi}$		E_a
317	$E_{1a}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$		E_a
318	$E_{1b}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$		E_a
319	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_a
320	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_a
321	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$		E_a
322	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$		E_a
323	$E_{1a}E_5E_{iii}$	$AlkLE_vE_{vi}$		E_a
324	$E_{1b}E_5E_{iii}$	$AlkLE_vE_{vi}$		E_a
325	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_a
326	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_a
327	$E_{1a}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$		E_a
328	$E_{1b}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$		E_a
329	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$		E_a
330	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$		E_a
331	$E_{1a}E_5E_{iv}$	$AlkLE_vE_{vi}$		E_a
332	$E_{1b}E_5E_{iv}$	$AlkLE_vE_{vi}$		E_a
333	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_a
334	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_a
335	$E_{1a}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$		E_a
336	$E_{1b}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$		E_a
337	E_{1a}	$AlkLE_vE_{vi}$	E_{4^*}	E_a
338	E_{1b}	$AlkLE_vE_{vi}$	E_{4^*}	E_a
339	$E_{1a}E_5$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
340	$E_{1b}E_5$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
341	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
342	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
343	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
344	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
345	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
346	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
347	$E_{1a}E_5E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
348	$E_{1b}E_5E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
349	$E_{1a}E_5E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
350	$E_{1b}E_5E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
351	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
352	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
353	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
354	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
355	$E_{1a}E_5E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
356	$E_{1b}E_5E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
357	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
358	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
359	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
360	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
361	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
362	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
363	$E_{1a}E_5E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
364	$E_{1b}E_5E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
365	$E_{1a}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
366	$E_{1b}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
367	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
368	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
369	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
370	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
371	$E_{1a}E_5E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
372	$E_{1b}E_5E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
373	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
374	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
375	$E_{1a}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
376	$E_{1b}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
377	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
378	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
379	$E_{1a}E_5E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
380	$E_{1b}E_5E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
381	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
382	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
383	$E_{1a}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
384	$E_{1b}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_a
385	E_{1a}	E_vE_{vi}		E_b
386	E_{1b}	E_vE_{vi}		E_b
387	$E_{1a}E_5$	E_vE_{vi}		E_b

388	$E_{1b}E_5$	E_vE_{vi}	E_b
389	$E_{1a}E_i$	E_vE_{vi}	E_b
390	$E_{1b}E_i$	E_vE_{vi}	E_b
391	$E_{1a}E_{ii}$	E_vE_{vi}	E_b
392	$E_{1b}E_{ii}$	E_vE_{vi}	E_b
393	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_b
394	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_b
395	$E_{1a}E_5E_i$	E_vE_{vi}	E_b
396	$E_{1b}E_5E_i$	E_vE_{vi}	E_b
397	$E_{1a}E_5E_{ii}$	E_vE_{vi}	E_b
398	$E_{1b}E_5E_{ii}$	E_vE_{vi}	E_b
399	$E_{1a}E_5E_{ii}E_{iib}$	E_vE_{vi}	E_b
400	$E_{1b}E_5E_{ii}E_{iib}$	E_vE_{vi}	E_b
401	$E_{1a}E_4$	E_vE_{vi}	E_b
402	$E_{1b}E_4$	E_vE_{vi}	E_b
403	$E_{1a}E_5E_4$	E_vE_{vi}	E_b
404	$E_{1b}E_5E_4$	E_vE_{vi}	E_b
405	$E_{1a}E_iE_4$	E_vE_{vi}	E_b
406	$E_{1b}E_iE_4$	E_vE_{vi}	E_b
407	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_b
408	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_b
409	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_b
410	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_b
411	$E_{1a}E_5E_iE_4$	E_vE_{vi}	E_b
412	$E_{1b}E_5E_iE_4$	E_vE_{vi}	E_b
413	$E_{1a}E_5E_{ii}E_4$	E_vE_{vi}	E_b
414	$E_{1b}E_5E_{ii}E_4$	E_vE_{vi}	E_b
415	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	E_b
416	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	E_b
417	$E_{1a}E_{iii}$	E_vE_{vi}	E_b
418	$E_{1b}E_{iii}$	E_vE_{vi}	E_b
419	$E_{1a}E_5E_{iii}$	E_vE_{vi}	E_b
420	$E_{1b}E_5E_{iii}$	E_vE_{vi}	E_b
421	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_b
422	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_b
423	$E_{1a}E_5E_{iii}E_4$	E_vE_{vi}	E_b
424	$E_{1b}E_5E_{iii}E_4$	E_vE_{vi}	E_b
425	$E_{1a}E_{iv}$	E_vE_{vi}	E_b
426	$E_{1b}E_{iv}$	E_vE_{vi}	E_b
427	$E_{1a}E_5E_{iv}$	E_vE_{vi}	E_b
428	$E_{1b}E_5E_{iv}$	E_vE_{vi}	E_b
429	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_b
430	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_b

431	$E_{1a}E_5E_{iv}E_4$	E_vE_{vi}		E_b
432	$E_{1b}E_5E_{iv}E_4$	E_vE_{vi}		E_b
433	E_{1a}	E_vE_{vi}	$E_{4'}$	E_b
434	E_{1b}	E_vE_{vi}	$E_{4'}$	E_b
435	$E_{1a}E_5$	E_vE_{vi}	$E_{4'}$	E_b
436	$E_{1b}E_5$	E_vE_{vi}	$E_{4'}$	E_b
437	$E_{1a}E_i$	E_vE_{vi}	$E_{4'}$	E_b
438	$E_{1b}E_i$	E_vE_{vi}	$E_{4'}$	E_b
439	$E_{1a}E_{ii}$	E_vE_{vi}	$E_{4'}$	E_b
440	$E_{1b}E_{ii}$	E_vE_{vi}	$E_{4'}$	E_b
441	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$	E_b
442	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$	E_b
443	$E_{1a}E_5E_i$	E_vE_{vi}	$E_{4'}$	E_b
444	$E_{1b}E_5E_i$	E_vE_{vi}	$E_{4'}$	E_b
445	$E_{1a}E_5E_{ii}$	E_vE_{vi}	$E_{4'}$	E_b
446	$E_{1b}E_5E_{ii}$	E_vE_{vi}	$E_{4'}$	E_b
447	$E_{1a}E_5E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$	E_b
448	$E_{1b}E_5E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$	E_b
449	$E_{1a}E_4$	E_vE_{vi}	$E_{4'}$	E_b
450	$E_{1b}E_4$	E_vE_{vi}	$E_{4'}$	E_b
451	$E_{1a}E_5E_4$	E_vE_{vi}	$E_{4'}$	E_b
452	$E_{1b}E_5E_4$	E_vE_{vi}	$E_{4'}$	E_b
453	$E_{1a}E_iE_4$	E_vE_{vi}	$E_{4'}$	E_b
454	$E_{1b}E_iE_4$	E_vE_{vi}	$E_{4'}$	E_b
455	$E_{1a}E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_b
456	$E_{1b}E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_b
457	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_b
458	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_b
459	$E_{1a}E_5E_iE_4$	E_vE_{vi}	$E_{4'}$	E_b
460	$E_{1b}E_5E_iE_4$	E_vE_{vi}	$E_{4'}$	E_b
461	$E_{1a}E_5E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_b
462	$E_{1b}E_5E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_b
463	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_b
464	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_b
465	$E_{1a}E_{iii}$	E_vE_{vi}	$E_{4'}$	E_b
466	$E_{1b}E_{iii}$	E_vE_{vi}	$E_{4'}$	E_b
467	$E_{1a}E_5E_{iii}$	E_vE_{vi}	$E_{4'}$	E_b
468	$E_{1b}E_5E_{iii}$	E_vE_{vi}	$E_{4'}$	E_b
469	$E_{1a}E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_b
470	$E_{1b}E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_b
471	$E_{1a}E_5E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_b
472	$E_{1b}E_5E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_b
473	$E_{1a}E_{iv}$	E_vE_{vi}	$E_{4'}$	E_b

474	$E_{1b}E_{iv}$	E_vE_{vi}	E_{4^*}	E_b
475	$E_{1a}E_5E_{iv}$	E_vE_{vi}	E_{4^*}	E_b
476	$E_{1b}E_5E_{iv}$	E_vE_{vi}	E_{4^*}	E_b
477	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_b
478	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_b
479	$E_{1a}E_5E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_b
480	$E_{1b}E_5E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_b
481	E_{1a}	$AlkLE_vE_{vi}$		E_b
482	E_{1b}	$AlkLE_vE_{vi}$		E_b
483	$E_{1a}E_5$	$AlkLE_vE_{vi}$		E_b
484	$E_{1b}E_5$	$AlkLE_vE_{vi}$		E_b
485	$E_{1a}E_i$	$AlkLE_vE_{vi}$		E_b
486	$E_{1b}E_i$	$AlkLE_vE_{vi}$		E_b
487	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$		E_b
488	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$		E_b
489	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_b
490	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_b
491	$E_{1a}E_5E_i$	$AlkLE_vE_{vi}$		E_b
492	$E_{1b}E_5E_i$	$AlkLE_vE_{vi}$		E_b
493	$E_{1a}E_5E_{ii}$	$AlkLE_vE_{vi}$		E_b
494	$E_{1b}E_5E_{ii}$	$AlkLE_vE_{vi}$		E_b
495	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_b
496	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_b
497	$E_{1a}E_4$	$AlkLE_vE_{vi}$		E_b
498	$E_{1b}E_4$	$AlkLE_vE_{vi}$		E_b
499	$E_{1a}E_5E_4$	$AlkLE_vE_{vi}$		E_b
500	$E_{1b}E_5E_4$	$AlkLE_vE_{vi}$		E_b
501	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$		E_b
502	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$		E_b
503	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_b
504	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_b
505	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_b
506	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_b
507	$E_{1a}E_5E_iE_4$	$AlkLE_vE_{vi}$		E_b
508	$E_{1b}E_5E_iE_4$	$AlkLE_vE_{vi}$		E_b
509	$E_{1a}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$		E_b
510	$E_{1b}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$		E_b
511	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_b
512	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_b
513	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$		E_b
514	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$		E_b
515	$E_{1a}E_5E_{iii}$	$AlkLE_vE_{vi}$		E_b
516	$E_{1b}E_5E_{iii}$	$AlkLE_vE_{vi}$		E_b

517	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_b
518	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_b
519	$E_{1a}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$		E_b
520	$E_{1b}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$		E_b
521	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$		E_b
522	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$		E_b
523	$E_{1a}E_5E_{iv}$	$AlkLE_vE_{vi}$		E_b
524	$E_{1b}E_5E_{iv}$	$AlkLE_vE_{vi}$		E_b
525	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_b
526	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_b
527	$E_{1a}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$		E_b
528	$E_{1b}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$		E_b
529	E_{1a}	$AlkLE_vE_{vi}$	E_{4^*}	E_b
530	E_{1b}	$AlkLE_vE_{vi}$	E_{4^*}	E_b
531	$E_{1a}E_5$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
532	$E_{1b}E_5$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
533	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
534	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
535	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
536	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
537	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
538	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
539	$E_{1a}E_5E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
540	$E_{1b}E_5E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
541	$E_{1a}E_5E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
542	$E_{1b}E_5E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
543	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
544	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
545	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
546	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
547	$E_{1a}E_5E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
548	$E_{1b}E_5E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
549	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
550	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
551	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
552	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
553	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
554	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
555	$E_{1a}E_5E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
556	$E_{1b}E_5E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
557	$E_{1a}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
558	$E_{1b}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
559	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b

560	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
561	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
562	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
563	$E_{1a}E_5E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
564	$E_{1b}E_5E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
565	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
566	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
567	$E_{1a}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
568	$E_{1b}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
569	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
570	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
571	$E_{1a}E_5E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
572	$E_{1b}E_5E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
573	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
574	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
575	$E_{1a}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
576	$E_{1b}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_b
577	E_{1a}	E_vE_{vi}		E_d
578	E_{1b}	E_vE_{vi}		E_d
579	$E_{1a}E_5$	E_vE_{vi}		E_d
580	$E_{1b}E_5$	E_vE_{vi}		E_d
581	$E_{1a}E_i$	E_vE_{vi}		E_d
582	$E_{1b}E_i$	E_vE_{vi}		E_d
583	$E_{1a}E_{ii}$	E_vE_{vi}		E_d
584	$E_{1b}E_{ii}$	E_vE_{vi}		E_d
585	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}		E_d
586	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}		E_d
587	$E_{1a}E_5E_i$	E_vE_{vi}		E_d
588	$E_{1b}E_5E_i$	E_vE_{vi}		E_d
589	$E_{1a}E_5E_{ii}$	E_vE_{vi}		E_d
590	$E_{1b}E_5E_{ii}$	E_vE_{vi}		E_d
591	$E_{1a}E_5E_{ii}E_{iib}$	E_vE_{vi}		E_d
592	$E_{1b}E_5E_{ii}E_{iib}$	E_vE_{vi}		E_d
593	$E_{1a}E_4$	E_vE_{vi}		E_d
594	$E_{1b}E_4$	E_vE_{vi}		E_d
595	$E_{1a}E_5E_4$	E_vE_{vi}		E_d
596	$E_{1b}E_5E_4$	E_vE_{vi}		E_d
597	$E_{1a}E_iE_4$	E_vE_{vi}		E_d
598	$E_{1b}E_iE_4$	E_vE_{vi}		E_d
599	$E_{1a}E_{ii}E_4$	E_vE_{vi}		E_d
600	$E_{1b}E_{ii}E_4$	E_vE_{vi}		E_d
601	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_d
602	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_d

603	$E_{1a}E_5E_iE_4$	E_vE_{vi}		E_d
604	$E_{1b}E_5E_iE_4$	E_vE_{vi}		E_d
605	$E_{1a}E_5E_{ii}E_4$	E_vE_{vi}		E_d
606	$E_{1b}E_5E_{ii}E_4$	E_vE_{vi}		E_d
607	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}		E_d
608	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}		E_d
609	$E_{1a}E_{iii}$	E_vE_{vi}		E_d
610	$E_{1b}E_{iii}$	E_vE_{vi}		E_d
611	$E_{1a}E_5E_{iii}$	E_vE_{vi}		E_d
612	$E_{1b}E_5E_{iii}$	E_vE_{vi}		E_d
613	$E_{1a}E_{iii}E_4$	E_vE_{vi}		E_d
614	$E_{1b}E_{iii}E_4$	E_vE_{vi}		E_d
615	$E_{1a}E_5E_{iii}E_4$	E_vE_{vi}		E_d
616	$E_{1b}E_5E_{iii}E_4$	E_vE_{vi}		E_d
617	$E_{1a}E_{iv}$	E_vE_{vi}		E_d
618	$E_{1b}E_{iv}$	E_vE_{vi}		E_d
619	$E_{1a}E_5E_{iv}$	E_vE_{vi}		E_d
620	$E_{1b}E_6E_{iv}$	E_vE_{vi}		E_d
621	$E_{1a}E_{iv}E_4$	E_vE_{vi}		E_d
622	$E_{1b}E_{iv}E_4$	E_vE_{vi}		E_d
623	$E_{1a}E_5E_{iv}E_4$	E_vE_{vi}		E_d
624	$E_{1b}E_5E_{iv}E_4$	E_vE_{vi}		E_d
625	E_{1a}	E_vE_{vi}	E_{4^*}	E_d
626	E_{1b}	E_vE_{vi}	E_{4^*}	E_d
627	$E_{1a}E_5$	E_vE_{vi}	E_{4^*}	E_d
628	$E_{1b}E_5$	E_vE_{vi}	E_{4^*}	E_d
629	$E_{1a}E_i$	E_vE_{vi}	E_{4^*}	E_d
630	$E_{1b}E_i$	E_vE_{vi}	E_{4^*}	E_d
631	$E_{1a}E_{ii}$	E_vE_{vi}	E_{4^*}	E_d
632	$E_{1b}E_{ii}$	E_vE_{vi}	E_{4^*}	E_d
633	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_d
634	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_d
635	$E_{1a}E_5E_i$	E_vE_{vi}	E_{4^*}	E_d
636	$E_{1b}E_5E_i$	E_vE_{vi}	E_{4^*}	E_d
637	$E_{1a}E_5E_{ii}$	E_vE_{vi}	E_{4^*}	E_d
638	$E_{1b}E_5E_{ii}$	E_vE_{vi}	E_{4^*}	E_d
639	$E_{1a}E_5E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_d
640	$E_{1b}E_5E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_d
641	$E_{1a}E_4$	E_vE_{vi}	E_{4^*}	E_d
642	$E_{1b}E_4$	E_vE_{vi}	E_{4^*}	E_d
643	$E_{1a}E_5E_4$	E_vE_{vi}	E_{4^*}	E_d
644	$E_{1b}E_5E_4$	E_vE_{vi}	E_{4^*}	E_d
645	$E_{1a}E_iE_4$	E_vE_{vi}	E_{4^*}	E_d

646	$E_{1b}E_iE_4$	E_vE_{vi}	$E_{4'}$	E_d
647	$E_{1a}E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_d
648	$E_{1b}E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_d
649	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_d
650	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_d
651	$E_{1a}E_5E_iE_4$	E_vE_{vi}	$E_{4'}$	E_d
652	$E_{1b}E_5E_iE_4$	E_vE_{vi}	$E_{4'}$	E_d
653	$E_{1a}E_5E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_d
654	$E_{1b}E_5E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_d
655	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_d
656	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_d
657	$E_{1a}E_{iii}$	E_vE_{vi}	$E_{4'}$	E_d
658	$E_{1b}E_{iii}$	E_vE_{vi}	$E_{4'}$	E_d
659	$E_{1a}E_5E_{iii}$	E_vE_{vi}	$E_{4'}$	E_d
660	$E_{1b}E_5E_{iii}$	E_vE_{vi}	$E_{4'}$	E_d
661	$E_{1a}E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_d
662	$E_{1b}E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_d
663	$E_{1a}E_5E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_d
664	$E_{1b}E_5E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_d
665	$E_{1a}E_{iv}$	E_vE_{vi}	$E_{4'}$	E_d
666	$E_{1b}E_{iv}$	E_vE_{vi}	$E_{4'}$	E_d
667	$E_{1a}E_5E_{iv}$	E_vE_{vi}	$E_{4'}$	E_d
668	$E_{1b}E_5E_{iv}$	E_vE_{vi}	$E_{4'}$	E_d
669	$E_{1a}E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_d
670	$E_{1b}E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_d
671	$E_{1a}E_5E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_d
672	$E_{1b}E_5E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_d
673	E_{1a}	$AlkLE_vE_{vi}$		E_d
674	E_{1b}	$AlkLE_vE_{vi}$		E_d
675	$E_{1a}E_5$	$AlkLE_vE_{vi}$		E_d
676	$E_{1b}E_5$	$AlkLE_vE_{vi}$		E_d
677	$E_{1a}E_i$	$AlkLE_vE_{vi}$		E_d
678	$E_{1b}E_i$	$AlkLE_vE_{vi}$		E_d
679	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$		E_d
680	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$		E_d
681	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_d
682	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_d
683	$E_{1a}E_5E_i$	$AlkLE_vE_{vi}$		E_d
684	$E_{1b}E_5E_i$	$AlkLE_vE_{vi}$		E_d
685	$E_{1a}E_5E_{ii}$	$AlkLE_vE_{vi}$		E_d
686	$E_{1b}E_5E_{ii}$	$AlkLE_vE_{vi}$		E_d
687	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_d
688	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_d

689	$E_{1a}E_4$	$AlkLE_vE_{vi}$		E_d
690	$E_{1b}E_4$	$AlkLE_vE_{vi}$		E_d
691	$E_{1a}E_5E_4$	$AlkLE_vE_{vi}$		E_d
692	$E_{1b}E_5E_4$	$AlkLE_vE_{vi}$		E_d
693	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$		E_d
694	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$		E_d
695	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_d
696	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_d
697	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_d
698	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_d
699	$E_{1a}E_5E_iE_4$	$AlkLE_vE_{vi}$		E_d
700	$E_{1b}E_5E_iE_4$	$AlkLE_vE_{vi}$		E_d
701	$E_{1a}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$		E_d
702	$E_{1b}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$		E_d
703	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_d
704	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_d
705	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$		E_d
706	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$		E_d
707	$E_{1a}E_5E_{iii}$	$AlkLE_vE_{vi}$		E_d
708	$E_{1b}E_5E_{iii}$	$AlkLE_vE_{vi}$		E_d
709	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_d
710	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_d
711	$E_{1a}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$		E_d
712	$E_{1b}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$		E_d
713	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$		E_d
714	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$		E_d
715	$E_{1a}E_5E_{iv}$	$AlkLE_vE_{vi}$		E_d
716	$E_{1b}E_5E_{iv}$	$AlkLE_vE_{vi}$		E_d
717	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_d
718	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_d
719	$E_{1a}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$		E_d
720	$E_{1b}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$		E_d
721	E_{1a}	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
722	E_{1b}	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
723	$E_{1a}E_5$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
724	$E_{1b}E_5$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
725	$E_{1a}E_i$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
726	$E_{1b}E_i$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
727	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
728	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
729	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
730	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
731	$E_{1a}E_5E_i$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d

732	$E_{1b}E_5E_i$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
733	$E_{1a}E_5E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
734	$E_{1b}E_5E_{ii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
735	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
736	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
737	$E_{1a}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
738	$E_{1b}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
739	$E_{1a}E_5E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
740	$E_{1b}E_5E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
741	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
742	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
743	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
744	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
745	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
746	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
747	$E_{1a}E_5E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
748	$E_{1b}E_5E_iE_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
749	$E_{1a}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
750	$E_{1b}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
751	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
752	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
753	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
754	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
755	$E_{1a}E_5E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
756	$E_{1b}E_5E_{iii}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
757	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
758	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
759	$E_{1a}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
760	$E_{1b}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
761	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
762	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
763	$E_{1a}E_5E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
764	$E_{1b}E_5E_{iv}$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
765	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
766	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
767	$E_{1a}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
768	$E_{1b}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	$E_{4'}$	E_d
769	E_{1a}	E_vE_{vi}		E_e
770	E_{1b}	E_vE_{vi}		E_e
771	$E_{1a}E_5$	E_vE_{vi}		E_e
772	$E_{1b}E_5$	E_vE_{vi}		E_e
773	$E_{1a}E_i$	E_vE_{vi}		E_e
774	$E_{1b}E_i$	E_vE_{vi}		E_e
775	$E_{1a}E_{ii}$	E_vE_{vi}		E_e
776	$E_{1b}E_{ii}$	E_vE_{vi}		E_e
777	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}		E_e
778	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}		E_e
779	$E_{1a}E_5E_i$	E_vE_{vi}		E_e
780	$E_{1b}E_5E_i$	E_vE_{vi}		E_e
781	$E_{1a}E_5E_{ii}$	E_vE_{vi}		E_e
782	$E_{1b}E_5E_{ii}$	E_vE_{vi}		E_e
783	$E_{1a}E_5E_{ii}E_{iib}$	E_vE_{vi}		E_e
784	$E_{1b}E_5E_{ii}E_{iib}$	E_vE_{vi}		E_e
785	$E_{1a}E_4$	E_vE_{vi}		E_e
786	$E_{1b}E_4$	E_vE_{vi}		E_e
787	$E_{1a}E_5E_4$	E_vE_{vi}		E_e
788	$E_{1b}E_5E_4$	E_vE_{vi}		E_e
789	$E_{1a}E_iE_4$	E_vE_{vi}		E_e
790	$E_{1b}E_iE_4$	E_vE_{vi}		E_e
791	$E_{1a}E_{ii}E_4$	E_vE_{vi}		E_e
792	$E_{1b}E_{ii}E_4$	E_vE_{vi}		E_e
793	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_e
794	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_e
795	$E_{1a}E_5E_iE_4$	E_vE_{vi}		E_e
796	$E_{1b}E_5E_iE_4$	E_vE_{vi}		E_e
797	$E_{1a}E_5E_{ii}E_4$	E_vE_{vi}		E_e
798	$E_{1b}E_5E_{ii}E_4$	E_vE_{vi}		E_e
799	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}		E_e
800	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}		E_e
801	$E_{1a}E_{iii}$	E_vE_{vi}		E_e
802	$E_{1b}E_{iii}$	E_vE_{vi}		E_e
803	$E_{1a}E_5E_{iii}$	E_vE_{vi}		E_e
804	$E_{1b}E_5E_{iii}$	E_vE_{vi}		E_e
805	$E_{1a}E_{iii}E_4$	E_vE_{vi}		E_e
806	$E_{1b}E_{iii}E_4$	E_vE_{vi}		E_e
807	$E_{1a}E_5E_{iii}E_4$	E_vE_{vi}		E_e
808	$E_{1b}E_5E_{iii}E_4$	E_vE_{vi}		E_e
809	$E_{1a}E_{iv}$	E_vE_{vi}		E_e
810	$E_{1b}E_{iv}$	E_vE_{vi}		E_e
811	$E_{1a}E_5E_{iv}$	E_vE_{vi}		E_e
812	$E_{1b}E_5E_{iv}$	E_vE_{vi}		E_e
813	$E_{1a}E_{iv}E_4$	E_vE_{vi}		E_e
814	$E_{1b}E_{iv}E_4$	E_vE_{vi}		E_e
815	$E_{1a}E_5E_{iv}E_4$	E_vE_{vi}		E_e
816	$E_{1b}E_5E_{iv}E_4$	E_vE_{vi}		E_e
817	E_{1a}	E_vE_{vi}	$E_{4'}$	E_e

818	E_{1b}	E_vE_{vi}	$E_{4'}$	E_e
819	$E_{1a}E_5$	E_vE_{vi}	$E_{4'}$	E_e
820	$E_{1b}E_5$	E_vE_{vi}	$E_{4'}$	E_e
821	$E_{1a}E_i$	E_vE_{vi}	$E_{4'}$	E_e
822	$E_{1b}E_i$	E_vE_{vi}	$E_{4'}$	E_e
823	$E_{1a}E_{ii}$	E_vE_{vi}	$E_{4'}$	E_e
824	$E_{1b}E_{ii}$	E_vE_{vi}	$E_{4'}$	E_e
825	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$	E_e
826	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$	E_e
827	$E_{1a}E_5E_i$	E_vE_{vi}	$E_{4'}$	E_e
828	$E_{1b}E_5E_i$	E_vE_{vi}	$E_{4'}$	E_e
829	$E_{1a}E_5E_{ii}$	E_vE_{vi}	$E_{4'}$	E_e
830	$E_{1b}E_5E_{ii}$	E_vE_{vi}	$E_{4'}$	E_e
831	$E_{1a}E_5E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$	E_e
832	$E_{1b}E_5E_{ii}E_{iib}$	E_vE_{vi}	$E_{4'}$	E_e
833	$E_{1a}E_4$	E_vE_{vi}	$E_{4'}$	E_e
834	$E_{1b}E_4$	E_vE_{vi}	$E_{4'}$	E_e
835	$E_{1a}E_5E_4$	E_vE_{vi}	$E_{4'}$	E_e
836	$E_{1b}E_5E_4$	E_vE_{vi}	$E_{4'}$	E_e
837	$E_{1a}E_iE_4$	E_vE_{vi}	$E_{4'}$	E_e
838	$E_{1b}E_iE_4$	E_vE_{vi}	$E_{4'}$	E_e
839	$E_{1a}E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
840	$E_{1b}E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
841	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_e
842	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_e
843	$E_{1a}E_5E_iE_4$	E_vE_{vi}	$E_{4'}$	E_e
844	$E_{1b}E_5E_iE_4$	E_vE_{vi}	$E_{4'}$	E_e
845	$E_{1a}E_5E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
846	$E_{1b}E_5E_{ii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
847	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_e
848	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	$E_{4'}$	E_e
849	$E_{1a}E_{iii}$	E_vE_{vi}	$E_{4'}$	E_e
850	$E_{1b}E_{iii}$	E_vE_{vi}	$E_{4'}$	E_e
851	$E_{1a}E_5E_{iii}$	E_vE_{vi}	$E_{4'}$	E_e
852	$E_{1b}E_5E_{iii}$	E_vE_{vi}	$E_{4'}$	E_e
853	$E_{1a}E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
854	$E_{1b}E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
855	$E_{1a}E_5E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
856	$E_{1b}E_5E_{iii}E_4$	E_vE_{vi}	$E_{4'}$	E_e
857	$E_{1a}E_{iv}$	E_vE_{vi}	$E_{4'}$	E_e
858	$E_{1b}E_{iv}$	E_vE_{vi}	$E_{4'}$	E_e
859	$E_{1a}E_5E_{iv}$	E_vE_{vi}	$E_{4'}$	E_e
860	$E_{1b}E_6E_{iv}$	E_vE_{vi}	$E_{4'}$	E_e

861	$E_{1a}E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_e
862	$E_{1b}E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_e
863	$E_{1a}E_5E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_e
864	$E_{1b}E_5E_{iv}E_4$	E_vE_{vi}	$E_{4'}$	E_e
865	E_{1a}	$AlkLE_vE_{vi}$		E_e
866	E_{1b}	$AlkLE_vE_{vi}$		E_e
867	$E_{1a}E_5$	$AlkLE_vE_{vi}$		E_e
868	$E_{1b}E_5$	$AlkLE_vE_{vi}$		E_e
869	$E_{1a}E_i$	$AlkLE_vE_{vi}$		E_e
870	$E_{1b}E_i$	$AlkLE_vE_{vi}$		E_e
871	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$		E_e
872	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$		E_e
873	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_e
874	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_e
875	$E_{1a}E_5E_i$	$AlkLE_vE_{vi}$		E_e
876	$E_{1b}E_5E_i$	$AlkLE_vE_{vi}$		E_e
877	$E_{1a}E_5E_{ii}$	$AlkLE_vE_{vi}$		E_e
878	$E_{1b}E_5E_{ii}$	$AlkLE_vE_{vi}$		E_e
879	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_e
880	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_e
881	$E_{1a}E_4$	$AlkLE_vE_{vi}$		E_e
882	$E_{1b}E_4$	$AlkLE_vE_{vi}$		E_e
883	$E_{1a}E_5E_4$	$AlkLE_vE_{vi}$		E_e
884	$E_{1b}E_5E_4$	$AlkLE_vE_{vi}$		E_e
885	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$		E_e
886	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$		E_e
887	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_e
888	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_e
889	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_e
890	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_e
891	$E_{1a}E_5E_iE_4$	$AlkLE_vE_{vi}$		E_e
892	$E_{1b}E_5E_iE_4$	$AlkLE_vE_{vi}$		E_e
893	$E_{1a}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$		E_e
894	$E_{1b}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$		E_e
895	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_e
896	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_e
897	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$		E_e
898	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$		E_e
899	$E_{1a}E_5E_{iii}$	$AlkLE_vE_{vi}$		E_e
900	$E_{1b}E_5E_{iii}$	$AlkLE_vE_{vi}$		E_e
901	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_e
902	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_e
903	$E_{1a}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$		E_e

904	$E_{1b}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$		E_e
905	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$		E_e
906	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$		E_e
907	$E_{1a}E_5E_{iv}$	$AlkLE_vE_{vi}$		E_e
908	$E_{1b}E_5E_{iv}$	$AlkLE_vE_{vi}$		E_e
909	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_e
910	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_e
911	$E_{1a}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$		E_e
912	$E_{1b}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$		E_e
913	E_{1a}	$AlkLE_vE_{vi}$	E_4	E_e
914	E_{1b}	$AlkLE_vE_{vi}$	E_4	E_e
915	$E_{1a}E_5$	$AlkLE_vE_{vi}$	E_4	E_e
916	$E_{1b}E_5$	$AlkLE_vE_{vi}$	E_4	E_e
917	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_4	E_e
918	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_4	E_e
919	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_4	E_e
920	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_4	E_e
921	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4	E_e
922	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4	E_e
923	$E_{1a}E_5E_i$	$AlkLE_vE_{vi}$	E_4	E_e
924	$E_{1b}E_5E_i$	$AlkLE_vE_{vi}$	E_4	E_e
925	$E_{1a}E_5E_{ii}$	$AlkLE_vE_{vi}$	E_4	E_e
926	$E_{1b}E_5E_{ii}$	$AlkLE_vE_{vi}$	E_4	E_e
927	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4	E_e
928	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_4	E_e
929	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
930	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
931	$E_{1a}E_5E_4$	$AlkLE_vE_{vi}$	E_4	E_e
932	$E_{1b}E_5E_4$	$AlkLE_vE_{vi}$	E_4	E_e
933	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_4	E_e
934	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_4	E_e
935	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
936	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
937	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
938	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
939	$E_{1a}E_5E_iE_4$	$AlkLE_vE_{vi}$	E_4	E_e
940	$E_{1b}E_5E_iE_4$	$AlkLE_vE_{vi}$	E_4	E_e
941	$E_{1a}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
942	$E_{1b}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
943	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
944	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
945	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_4	E_e
946	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_4	E_e

947	$E_{1a}E_5E_{iii}$	$AlkLE_vE_{vi}$	E_4	E_e
948	$E_{1b}E_5E_{iii}$	$AlkLE_vE_{vi}$	E_4	E_e
949	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
950	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
951	$E_{1a}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
952	$E_{1b}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
953	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_4	E_e
954	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_4	E_e
955	$E_{1a}E_5E_{iv}$	$AlkLE_vE_{vi}$	E_4	E_e
956	$E_{1b}E_5E_{iv}$	$AlkLE_vE_{vi}$	E_4	E_e
957	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
958	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
959	$E_{1a}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
960	$E_{1b}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	E_4	E_e
961	E_{1a}	E_vE_{vi}		E_f
962	E_{1b}	E_vE_{vi}		E_f
963	$E_{1a}E_5$	E_vE_{vi}		E_f
964	$E_{1b}E_5$	E_vE_{vi}		E_f
965	$E_{1a}E_i$	E_vE_{vi}		E_f
966	$E_{1b}E_i$	E_vE_{vi}		E_f
967	$E_{1a}E_{ii}$	E_vE_{vi}		E_f
968	$E_{1b}E_{ii}$	E_vE_{vi}		E_f
969	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}		E_f
970	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}		E_f
971	$E_{1a}E_5E_i$	E_vE_{vi}		E_f
972	$E_{1b}E_5E_i$	E_vE_{vi}		E_f
973	$E_{1a}E_5E_{ii}$	E_vE_{vi}		E_f
974	$E_{1b}E_5E_{ii}$	E_vE_{vi}		E_f
975	$E_{1a}E_5E_{ii}E_{iib}$	E_vE_{vi}		E_f
976	$E_{1b}E_5E_{ii}E_{iib}$	E_vE_{vi}		E_f
977	$E_{1a}E_4$	E_vE_{vi}		E_f
978	$E_{1b}E_4$	E_vE_{vi}		E_f
979	$E_{1a}E_5E_4$	E_vE_{vi}		E_f
980	$E_{1b}E_5E_4$	E_vE_{vi}		E_f
981	$E_{1a}E_iE_4$	E_vE_{vi}		E_f
982	$E_{1b}E_iE_4$	E_vE_{vi}		E_f
983	$E_{1a}E_{ii}E_4$	E_vE_{vi}		E_f
984	$E_{1b}E_{ii}E_4$	E_vE_{vi}		E_f
985	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_f
986	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}		E_f
987	$E_{1a}E_5E_iE_4$	E_vE_{vi}		E_f
988	$E_{1b}E_5E_iE_4$	E_vE_{vi}		E_f
989	$E_{1a}E_5E_{ii}E_4$	E_vE_{vi}		E_f

990	$E_{1b}E_5E_{ii}E_4$	E_vE_{vi}		E_f
991	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}		E_f
992	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}		E_f
993	$E_{1a}E_{iii}$	E_vE_{vi}		E_f
994	$E_{1b}E_{iii}$	E_vE_{vi}		E_f
995	$E_{1a}E_5E_{iii}$	E_vE_{vi}		E_f
996	$E_{1b}E_5E_{iii}$	E_vE_{vi}		E_f
997	$E_{1a}E_{iii}E_4$	E_vE_{vi}		E_f
998	$E_{1b}E_{iii}E_4$	E_vE_{vi}		E_f
999	$E_{1a}E_5E_{iii}E_4$	E_vE_{vi}		E_f
1000	$E_{1b}E_5E_{iii}E_4$	E_vE_{vi}		E_f
1001	$E_{1a}E_{iv}$	E_vE_{vi}		E_f
1002	$E_{1b}E_{iv}$	E_vE_{vi}		E_f
1003	$E_{1a}E_5E_{iv}$	E_vE_{vi}		E_f
1004	$E_{1b}E_5E_{iv}$	E_vE_{vi}		E_f
1005	$E_{1a}E_{iv}E_4$	E_vE_{vi}		E_f
1006	$E_{1b}E_{iv}E_4$	E_vE_{vi}		E_f
1007	$E_{1a}E_5E_{iv}E_4$	E_vE_{vi}		E_f
1008	$E_{1b}E_5E_{iv}E_4$	E_vE_{vi}		E_f
1009	E_{1a}	E_vE_{vi}	E_{4^*}	E_f
1010	E_{1b}	E_vE_{vi}	E_{4^*}	E_f
1011	$E_{1a}E_5$	E_vE_{vi}	E_{4^*}	E_f
1012	$E_{1b}E_5$	E_vE_{vi}	E_{4^*}	E_f
1013	$E_{1a}E_i$	E_vE_{vi}	E_{4^*}	E_f
1014	$E_{1b}E_i$	E_vE_{vi}	E_{4^*}	E_f
1015	$E_{1a}E_{ii}$	E_vE_{vi}	E_{4^*}	E_f
1016	$E_{1b}E_{ii}$	E_vE_{vi}	E_{4^*}	E_f
1017	$E_{1a}E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_f
1018	$E_{1b}E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_f
1019	$E_{1a}E_5E_i$	E_vE_{vi}	E_{4^*}	E_f
1020	$E_{1b}E_5E_i$	E_vE_{vi}	E_{4^*}	E_f
1021	$E_{1a}E_5E_{ii}$	E_vE_{vi}	E_{4^*}	E_f
1022	$E_{1b}E_5E_{ii}$	E_vE_{vi}	E_{4^*}	E_f
1023	$E_{1a}E_5E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_f
1024	$E_{1b}E_5E_{ii}E_{iib}$	E_vE_{vi}	E_{4^*}	E_f
1025	$E_{1a}E_4$	E_vE_{vi}	E_{4^*}	E_f
1026	$E_{1b}E_4$	E_vE_{vi}	E_{4^*}	E_f
1027	$E_{1a}E_5E_4$	E_vE_{vi}	E_{4^*}	E_f
1028	$E_{1b}E_5E_4$	E_vE_{vi}	E_{4^*}	E_f
1029	$E_{1a}E_iE_4$	E_vE_{vi}	E_{4^*}	E_f
1030	$E_{1b}E_iE_4$	E_vE_{vi}	E_{4^*}	E_f
1031	$E_{1a}E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_f
1032	$E_{1b}E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_f

1033	$E_{1a}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_f
1034	$E_{1b}E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_f
1035	$E_{1a}E_5E_iE_4$	E_vE_{vi}	E_{4^*}	E_f
1036	$E_{1b}E_5E_iE_4$	E_vE_{vi}	E_{4^*}	E_f
1037	$E_{1a}E_5E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_f
1038	$E_{1b}E_5E_{ii}E_4$	E_vE_{vi}	E_{4^*}	E_f
1039	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_f
1040	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_vE_{vi}	E_{4^*}	E_f
1041	$E_{1a}E_{iii}$	E_vE_{vi}	E_{4^*}	E_f
1042	$E_{1b}E_{iii}$	E_vE_{vi}	E_{4^*}	E_f
1043	$E_{1a}E_5E_{iii}$	E_vE_{vi}	E_{4^*}	E_f
1044	$E_{1b}E_5E_{iii}$	E_vE_{vi}	E_{4^*}	E_f
1045	$E_{1a}E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_f
1046	$E_{1b}E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_f
1047	$E_{1a}E_5E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_f
1048	$E_{1b}E_5E_{iii}E_4$	E_vE_{vi}	E_{4^*}	E_f
1049	$E_{1a}E_{iv}$	E_vE_{vi}	E_{4^*}	E_f
1050	$E_{1b}E_{iv}$	E_vE_{vi}	E_{4^*}	E_f
1051	$E_{1a}E_5E_{iv}$	E_vE_{vi}	E_{4^*}	E_f
1052	$E_{1b}E_5E_{iv}$	E_vE_{vi}	E_{4^*}	E_f
1053	$E_{1a}E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_f
1054	$E_{1b}E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_f
1055	$E_{1a}E_5E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_f
1056	$E_{1b}E_5E_{iv}E_4$	E_vE_{vi}	E_{4^*}	E_f
1057	E_{1a}	$AlkLE_vE_{vi}$		E_f
1058	E_{1b}	$AlkLE_vE_{vi}$		E_f
1059	$E_{1a}E_5$	$AlkLE_vE_{vi}$		E_f
1060	$E_{1b}E_5$	$AlkLE_vE_{vi}$		E_f
1061	$E_{1a}E_i$	$AlkLE_vE_{vi}$		E_f
1062	$E_{1b}E_i$	$AlkLE_vE_{vi}$		E_f
1063	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$		E_f
1064	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$		E_f
1065	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_f
1066	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_f
1067	$E_{1a}E_5E_i$	$AlkLE_vE_{vi}$		E_f
1068	$E_{1b}E_5E_i$	$AlkLE_vE_{vi}$		E_f
1069	$E_{1a}E_5E_{ii}$	$AlkLE_vE_{vi}$		E_f
1070	$E_{1b}E_5E_{ii}$	$AlkLE_vE_{vi}$		E_f
1071	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_f
1072	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$		E_f
1073	$E_{1a}E_4$	$AlkLE_vE_{vi}$		E_f
1074	$E_{1b}E_4$	$AlkLE_vE_{vi}$		E_f
1075	$E_{1a}E_5E_4$	$AlkLE_vE_{vi}$		E_f

1076	$E_{1b}E_5E_4$	$AlkLE_vE_{vi}$		E_f
1077	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$		E_f
1078	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$		E_f
1079	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_f
1080	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$		E_f
1081	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_f
1082	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_f
1083	$E_{1a}E_5E_iE_4$	$AlkLE_vE_{vi}$		E_f
1084	$E_{1b}E_5E_iE_4$	$AlkLE_vE_{vi}$		E_f
1085	$E_{1a}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$		E_f
1086	$E_{1b}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$		E_f
1087	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_f
1088	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$		E_f
1089	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$		E_f
1090	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$		E_f
1091	$E_{1a}E_5E_{iii}$	$AlkLE_vE_{vi}$		E_f
1092	$E_{1b}E_5E_{iii}$	$AlkLE_vE_{vi}$		E_f
1093	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_f
1094	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$		E_f
1095	$E_{1a}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$		E_f
1096	$E_{1b}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$		E_f
1097	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$		E_f
1098	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$		E_f
1099	$E_{1a}E_5E_{iv}$	$AlkLE_vE_{vi}$		E_f
1100	$E_{1b}E_5E_{iv}$	$AlkLE_vE_{vi}$		E_f
1101	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_f
1102	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$		E_f
1103	$E_{1a}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$		E_f
1104	$E_{1b}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$		E_f
1105	E_{1a}	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1106	E_{1b}	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1107	$E_{1a}E_5$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1108	$E_{1b}E_5$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1109	$E_{1a}E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1110	$E_{1b}E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1111	$E_{1a}E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1112	$E_{1b}E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1113	$E_{1a}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1114	$E_{1b}E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1115	$E_{1a}E_5E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1116	$E_{1b}E_5E_i$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1117	$E_{1a}E_5E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1118	$E_{1b}E_5E_{ii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f

1119	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1120	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1121	$E_{1a}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1122	$E_{1b}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1123	$E_{1a}E_5E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1124	$E_{1b}E_5E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1125	$E_{1a}E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1126	$E_{1b}E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1127	$E_{1a}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1128	$E_{1b}E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1129	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1130	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1131	$E_{1a}E_5E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1132	$E_{1b}E_5E_iE_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1133	$E_{1a}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1134	$E_{1b}E_5E_{ii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1135	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1136	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1137	$E_{1a}E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1138	$E_{1b}E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1139	$E_{1a}E_5E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1140	$E_{1b}E_5E_{iii}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1141	$E_{1a}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1142	$E_{1b}E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1143	$E_{1a}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1144	$E_{1b}E_5E_{iii}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1145	$E_{1a}E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1146	$E_{1b}E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1147	$E_{1a}E_5E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1148	$E_{1b}E_5E_{iv}$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1149	$E_{1a}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1150	$E_{1b}E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1151	$E_{1a}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1152	$E_{1b}E_5E_{iv}E_4$	$AlkLE_vE_{vi}$	E_{4^*}	E_f
1153	E_{1a}	E_{vii}		
1154	E_{1b}	E_{vii}		
1155	$E_{1a}E_5$	E_{vii}		
1156	$E_{1b}E_5$	E_{vii}		
1157	$E_{1a}E_i$	E_{vii}		
1158	$E_{1b}E_i$	E_{vii}		
1159	$E_{1a}E_{ii}$	E_{vii}		
1160	$E_{1b}E_{ii}$	E_{vii}		
1161	$E_{1a}E_{ii}E_{iib}$	E_{vii}		

1162	$E_{1b}E_{ii}E_{iib}$	E_{vii}	
1163	$E_{1a}E_5E_i$	E_{vii}	
1164	$E_{1b}E_5E_i$	E_{vii}	
1165	$E_{1a}E_5E_{ii}$	E_{vii}	
1166	$E_{1b}E_5E_{ii}$	E_{vii}	
1167	$E_{1a}E_5E_{ii}E_{iib}$	E_{vii}	
1168	$E_{1b}E_5E_{ii}E_{iib}$	E_{vii}	
1169	$E_{1a}E_4$	E_{vii}	
1170	$E_{1b}E_4$	E_{vii}	
1171	$E_{1a}E_5E_4$	E_{vii}	
1172	$E_{1b}E_5E_4$	E_{vii}	
1173	$E_{1a}E_iE_4$	E_{vii}	
1174	$E_{1b}E_iE_4$	E_{vii}	
1175	$E_{1a}E_{ii}E_4$	E_{vii}	
1176	$E_{1b}E_{ii}E_4$	E_{vii}	
1177	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	
1178	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	
1179	$E_{1a}E_5E_iE_4$	E_{vii}	
1180	$E_{1b}E_5E_iE_4$	E_{vii}	
1181	$E_{1a}E_5E_{ii}E_4$	E_{vii}	
1182	$E_{1b}E_5E_{ii}E_4$	E_{vii}	
1183	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{vii}	
1184	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{vii}	
1185	$E_{1a}E_{iii}$	E_{vii}	
1186	$E_{1b}E_{iii}$	E_{vii}	
1187	$E_{1a}E_5E_{iii}$	E_{vii}	
1188	$E_{1b}E_5E_{iii}$	E_{vii}	
1189	$E_{1a}E_{iii}E_4$	E_{vii}	
1190	$E_{1b}E_{iii}E_4$	E_{vii}	
1191	$E_{1a}E_5E_{iii}E_4$	E_{vii}	
1192	$E_{1b}E_5E_{iii}E_4$	E_{vii}	
1193	$E_{1a}E_{iv}$	E_{vii}	
1194	$E_{1b}E_{iv}$	E_{vii}	
1195	$E_{1a}E_5E_{iv}$	E_{vii}	
1196	$E_{1b}E_5E_{iv}$	E_{vii}	
1197	$E_{1a}E_{iv}E_4$	E_{vii}	
1198	$E_{1b}E_{iv}E_4$	E_{vii}	
1199	$E_{1a}E_5E_{iv}E_4$	E_{vii}	
1200	$E_{1b}E_5E_{iv}E_4$	E_{vii}	
1201	E_{1a}	E_{vii}	E_{4^*}
1202	E_{1b}	E_{vii}	E_{4^*}
1203	$E_{1a}E_5$	E_{vii}	E_{4^*}
1204	$E_{1b}E_5$	E_{vii}	E_{4^*}

1205	$E_{1a}E_i$	E_{vii}	E_{4^*}
1206	$E_{1b}E_i$	E_{vii}	E_{4^*}
1207	$E_{1a}E_{ii}$	E_{vii}	E_{4^*}
1208	$E_{1b}E_{ii}$	E_{vii}	E_{4^*}
1209	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_{4^*}
1210	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_{4^*}
1211	$E_{1a}E_5E_i$	E_{vii}	E_{4^*}
1212	$E_{1b}E_5E_i$	E_{vii}	E_{4^*}
1213	$E_{1a}E_5E_{ii}$	E_{vii}	E_{4^*}
1214	$E_{1b}E_5E_{ii}$	E_{vii}	E_{4^*}
1215	$E_{1a}E_5E_{ii}E_{iib}$	E_{vii}	E_{4^*}
1216	$E_{1b}E_5E_{ii}E_{iib}$	E_{vii}	E_{4^*}
1217	$E_{1a}E_4$	E_{vii}	E_{4^*}
1218	$E_{1b}E_4$	E_{vii}	E_{4^*}
1219	$E_{1a}E_5E_4$	E_{vii}	E_{4^*}
1220	$E_{1b}E_5E_4$	E_{vii}	E_{4^*}
1221	$E_{1a}E_iE_4$	E_{vii}	E_{4^*}
1222	$E_{1b}E_iE_4$	E_{vii}	E_{4^*}
1223	$E_{1a}E_{ii}E_4$	E_{vii}	E_{4^*}
1224	$E_{1b}E_{ii}E_4$	E_{vii}	E_{4^*}
1225	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}
1226	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}
1227	$E_{1a}E_5E_iE_4$	E_{vii}	E_{4^*}
1228	$E_{1b}E_5E_iE_4$	E_{vii}	E_{4^*}
1229	$E_{1a}E_5E_{ii}E_4$	E_{vii}	E_{4^*}
1230	$E_{1b}E_5E_{ii}E_4$	E_{vii}	E_{4^*}
1231	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}
1232	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}
1233	$E_{1a}E_{iii}$	E_{vii}	E_{4^*}
1234	$E_{1b}E_{iii}$	E_{vii}	E_{4^*}
1235	$E_{1a}E_5E_{iii}$	E_{vii}	E_{4^*}
1236	$E_{1b}E_5E_{iii}$	E_{vii}	E_{4^*}
1237	$E_{1a}E_{iii}E_4$	E_{vii}	E_{4^*}
1238	$E_{1b}E_{iii}E_4$	E_{vii}	E_{4^*}
1239	$E_{1a}E_5E_{iii}E_4$	E_{vii}	E_{4^*}
1240	$E_{1b}E_5E_{iii}E_4$	E_{vii}	E_{4^*}
1241	$E_{1a}E_{iv}$	E_{vii}	E_{4^*}
1242	$E_{1b}E_{iv}$	E_{vii}	E_{4^*}
1243	$E_{1a}E_5E_{iv}$	E_{vii}	E_{4^*}
1244	$E_{1b}E_5E_{iv}$	E_{vii}	E_{4^*}
1245	$E_{1a}E_{iv}E_4$	E_{vii}	E_{4^*}
1246	$E_{1b}E_{iv}E_4$	E_{vii}	E_{4^*}
1247	$E_{1a}E_5E_{iv}E_4$	E_{vii}	E_{4^*}

1248	$E_{1b}E_5E_{iv}E_4$	E_{vii}	$E_{4'}$
1249	E_{1a}	$AlkLE_{vii}$	
1250	E_{1b}	$AlkLE_{vii}$	
1251	$E_{1a}E_5$	$AlkLE_{vii}$	
1252	$E_{1b}E_5$	$AlkLE_{vii}$	
1253	$E_{1a}E_i$	$AlkLE_{vii}$	
1254	$E_{1b}E_i$	$AlkLE_{vii}$	
1255	$E_{1a}E_{ii}$	$AlkLE_{vii}$	
1256	$E_{1b}E_{ii}$	$AlkLE_{vii}$	
1257	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	
1258	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	
1259	$E_{1a}E_5E_i$	$AlkLE_{vii}$	
1260	$E_{1b}E_5E_i$	$AlkLE_{vii}$	
1261	$E_{1a}E_5E_{ii}$	$AlkLE_{vii}$	
1262	$E_{1b}E_5E_{ii}$	$AlkLE_{vii}$	
1263	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	
1264	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	
1265	$E_{1a}E_4$	$AlkLE_{vii}$	
1266	$E_{1b}E_4$	$AlkLE_{vii}$	
1267	$E_{1a}E_5E_4$	$AlkLE_{vii}$	
1268	$E_{1b}E_5E_4$	$AlkLE_{vii}$	
1269	$E_{1a}E_iE_4$	$AlkLE_{vii}$	
1270	$E_{1b}E_iE_4$	$AlkLE_{vii}$	
1271	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	
1272	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	
1273	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	
1274	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	
1275	$E_{1a}E_5E_iE_4$	$AlkLE_{vii}$	
1276	$E_{1b}E_5E_iE_4$	$AlkLE_{vii}$	
1277	$E_{1a}E_5E_{ii}E_4$	$AlkLE_{vii}$	
1278	$E_{1b}E_5E_{ii}E_4$	$AlkLE_{vii}$	
1279	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	
1280	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	
1281	$E_{1a}E_{iii}$	$AlkLE_{vii}$	
1282	$E_{1b}E_{iii}$	$AlkLE_{vii}$	
1283	$E_{1a}E_5E_{iii}$	$AlkLE_{vii}$	
1284	$E_{1b}E_5E_{iii}$	$AlkLE_{vii}$	
1285	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	
1286	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	
1287	$E_{1a}E_5E_{iii}E_4$	$AlkLE_{vii}$	
1288	$E_{1b}E_5E_{iii}E_4$	$AlkLE_{vii}$	
1289	$E_{1a}E_{iv}$	$AlkLE_{vii}$	
1290	$E_{1b}E_{iv}$	$AlkLE_{vii}$	

1291	$E_{1a}E_5E_{iv}$	$AlkLE_{vii}$	
1292	$E_{1b}E_5E_{iv}$	$AlkLE_{vii}$	
1293	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	
1294	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	
1295	$E_{1a}E_5E_{iv}E_4$	$AlkLE_{vii}$	
1296	$E_{1b}E_5E_{iv}E_4$	$AlkLE_{vii}$	
1297	E_{1a}	$AlkLE_{vii}$	$E_{4'}$
1298	E_{1b}	$AlkLE_{vii}$	$E_{4'}$
1299	$E_{1a}E_5$	$AlkLE_{vii}$	$E_{4'}$
1300	$E_{1b}E_5$	$AlkLE_{vii}$	$E_{4'}$
1301	$E_{1a}E_i$	$AlkLE_{vii}$	$E_{4'}$
1302	$E_{1b}E_i$	$AlkLE_{vii}$	$E_{4'}$
1303	$E_{1a}E_{ii}$	$AlkLE_{vii}$	$E_{4'}$
1304	$E_{1b}E_{ii}$	$AlkLE_{vii}$	$E_{4'}$
1305	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$
1306	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$
1307	$E_{1a}E_5E_i$	$AlkLE_{vii}$	$E_{4'}$
1308	$E_{1b}E_5E_i$	$AlkLE_{vii}$	$E_{4'}$
1309	$E_{1a}E_5E_{ii}$	$AlkLE_{vii}$	$E_{4'}$
1310	$E_{1b}E_5E_{ii}$	$AlkLE_{vii}$	$E_{4'}$
1311	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$
1312	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$
1313	$E_{1a}E_4$	$AlkLE_{vii}$	$E_{4'}$
1314	$E_{1b}E_4$	$AlkLE_{vii}$	$E_{4'}$
1315	$E_{1a}E_5E_4$	$AlkLE_{vii}$	$E_{4'}$
1316	$E_{1b}E_5E_4$	$AlkLE_{vii}$	$E_{4'}$
1317	$E_{1a}E_iE_4$	$AlkLE_{vii}$	$E_{4'}$
1318	$E_{1b}E_iE_4$	$AlkLE_{vii}$	$E_{4'}$
1319	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$
1320	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$
1321	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$
1322	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$
1323	$E_{1a}E_5E_iE_4$	$AlkLE_{vii}$	$E_{4'}$
1324	$E_{1b}E_5E_iE_4$	$AlkLE_{vii}$	$E_{4'}$
1325	$E_{1a}E_5E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$
1326	$E_{1b}E_5E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$
1327	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$
1328	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$
1329	$E_{1a}E_{iii}$	$AlkLE_{vii}$	$E_{4'}$
1330	$E_{1b}E_{iii}$	$AlkLE_{vii}$	$E_{4'}$
1331	$E_{1a}E_5E_{iii}$	$AlkLE_{vii}$	$E_{4'}$
1332	$E_{1b}E_5E_{iii}$	$AlkLE_{vii}$	$E_{4'}$
1333	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$

1334	$E_{1b}E_{iii}E_4$	AlkLE_{vii}	$E_{4'}$
1335	$E_{1a}E_5E_{iii}E_4$	AlkLE_{vii}	$E_{4'}$
1336	$E_{1b}E_5E_{iii}E_4$	AlkLE_{vii}	$E_{4'}$
1337	$E_{1a}E_{iv}$	AlkLE_{vii}	$E_{4'}$
1338	$E_{1b}E_{iv}$	AlkLE_{vii}	$E_{4'}$
1339	$E_{1a}E_5E_{iv}$	AlkLE_{vii}	$E_{4'}$
1340	$E_{1b}E_5E_{iv}$	AlkLE_{vii}	$E_{4'}$
1341	$E_{1a}E_{iv}E_4$	AlkLE_{vii}	$E_{4'}$
1342	$E_{1b}E_{iv}E_4$	AlkLE_{vii}	$E_{4'}$
1343	$E_{1a}E_5E_{iv}E_4$	AlkLE_{vii}	$E_{4'}$
1344	$E_{1b}E_5E_{iv}E_4$	AlkLE_{vii}	$E_{4'}$
1345	E_{1a}	E_{vii}	E_a
1346	E_{1b}	E_{vii}	E_a
1347	$E_{1a}E_5$	E_{vii}	E_a
1348	$E_{1b}E_5$	E_{vii}	E_a
1349	$E_{1a}E_i$	E_{vii}	E_a
1350	$E_{1b}E_i$	E_{vii}	E_a
1351	$E_{1a}E_{ii}$	E_{vii}	E_a
1352	$E_{1b}E_{ii}$	E_{vii}	E_a
1353	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_a
1354	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_a
1355	$E_{1a}E_5E_i$	E_{vii}	E_a
1356	$E_{1b}E_5E_i$	E_{vii}	E_a
1357	$E_{1a}E_5E_{ii}$	E_{vii}	E_a
1358	$E_{1b}E_5E_{ii}$	E_{vii}	E_a
1359	$E_{1a}E_5E_{ii}E_{iib}$	E_{vii}	E_a
1360	$E_{1b}E_5E_{ii}E_{iib}$	E_{vii}	E_a
1361	$E_{1a}E_4$	E_{vii}	E_a
1362	$E_{1b}E_4$	E_{vii}	E_a
1363	$E_{1a}E_5E_4$	E_{vii}	E_a
1364	$E_{1b}E_5E_4$	E_{vii}	E_a
1365	$E_{1a}E_iE_4$	E_{vii}	E_a
1366	$E_{1b}E_iE_4$	E_{vii}	E_a
1367	$E_{1a}E_{ii}E_4$	E_{vii}	E_a
1368	$E_{1b}E_{ii}E_4$	E_{vii}	E_a
1369	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_a
1370	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_a
1371	$E_{1a}E_5E_iE_4$	E_{vii}	E_a
1372	$E_{1b}E_5E_iE_4$	E_{vii}	E_a
1373	$E_{1a}E_5E_{ii}E_4$	E_{vii}	E_a
1374	$E_{1b}E_5E_{ii}E_4$	E_{vii}	E_a
1375	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{vii}	E_a
1376	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{vii}	E_a

1377	$E_{1a}E_{iii}$	E_{vii}	E_a
1378	$E_{1b}E_{iii}$	E_{vii}	E_a
1379	$E_{1a}E_5E_{iii}$	E_{vii}	E_a
1380	$E_{1b}E_5E_{iii}$	E_{vii}	E_a
1381	$E_{1a}E_{iii}E_4$	E_{vii}	E_a
1382	$E_{1b}E_{iii}E_4$	E_{vii}	E_a
1383	$E_{1a}E_5E_{iii}E_4$	E_{vii}	E_a
1384	$E_{1b}E_5E_{iii}E_4$	E_{vii}	E_a
1385	$E_{1a}E_{iv}$	E_{vii}	E_a
1386	$E_{1b}E_{iv}$	E_{vii}	E_a
1387	$E_{1a}E_5E_{iv}$	E_{vii}	E_a
1388	$E_{1b}E_5E_{iv}$	E_{vii}	E_a
1389	$E_{1a}E_{iv}E_4$	E_{vii}	E_a
1390	$E_{1b}E_{iv}E_4$	E_{vii}	E_a
1391	$E_{1a}E_5E_{iv}E_4$	E_{vii}	E_a
1392	$E_{1b}E_5E_{iv}E_4$	E_{vii}	E_a
1393	E_{1a}	E_{vii}	$E_{4'}$ E_a
1394	E_{1b}	E_{vii}	$E_{4'}$ E_a
1395	$E_{1a}E_5$	E_{vii}	$E_{4'}$ E_a
1396	$E_{1b}E_5$	E_{vii}	$E_{4'}$ E_a
1397	$E_{1a}E_i$	E_{vii}	$E_{4'}$ E_a
1398	$E_{1b}E_i$	E_{vii}	$E_{4'}$ E_a
1399	$E_{1a}E_{ii}$	E_{vii}	$E_{4'}$ E_a
1400	$E_{1b}E_{ii}$	E_{vii}	$E_{4'}$ E_a
1401	$E_{1a}E_{ii}E_{iib}$	E_{vii}	$E_{4'}$ E_a
1402	$E_{1b}E_{ii}E_{iib}$	E_{vii}	$E_{4'}$ E_a
1403	$E_{1a}E_5E_i$	E_{vii}	$E_{4'}$ E_a
1404	$E_{1b}E_5E_i$	E_{vii}	$E_{4'}$ E_a
1405	$E_{1a}E_5E_{ii}$	E_{vii}	$E_{4'}$ E_a
1406	$E_{1b}E_5E_{ii}$	E_{vii}	$E_{4'}$ E_a
1407	$E_{1a}E_5E_{ii}E_{iib}$	E_{vii}	$E_{4'}$ E_a
1408	$E_{1b}E_5E_{ii}E_{iib}$	E_{vii}	$E_{4'}$ E_a
1409	$E_{1a}E_4$	E_{vii}	$E_{4'}$ E_a
1410	$E_{1b}E_4$	E_{vii}	$E_{4'}$ E_a
1411	$E_{1a}E_5E_4$	E_{vii}	$E_{4'}$ E_a
1412	$E_{1b}E_5E_4$	E_{vii}	$E_{4'}$ E_a
1413	$E_{1a}E_iE_4$	E_{vii}	$E_{4'}$ E_a
1414	$E_{1b}E_iE_4$	E_{vii}	$E_{4'}$ E_a
1415	$E_{1a}E_{ii}E_4$	E_{vii}	$E_{4'}$ E_a
1416	$E_{1b}E_{ii}E_4$	E_{vii}	$E_{4'}$ E_a
1417	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$ E_a
1418	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$ E_a
1419	$E_{1a}E_5E_iE_4$	E_{vii}	$E_{4'}$ E_a

1420	$E_{1b}E_5E_iE_4$	E_{vii}	$E_{4'}$	E_a
1421	$E_{1a}E_5E_{ii}E_4$	E_{vii}	$E_{4'}$	E_a
1422	$E_{1b}E_5E_{ii}E_4$	E_{vii}	$E_{4'}$	E_a
1423	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_a
1424	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_a
1425	$E_{1a}E_{iii}$	E_{vii}	$E_{4'}$	E_a
1426	$E_{1b}E_{iii}$	E_{vii}	$E_{4'}$	E_a
1427	$E_{1a}E_5E_{iii}$	E_{vii}	$E_{4'}$	E_a
1428	$E_{1b}E_5E_{iii}$	E_{vii}	$E_{4'}$	E_a
1429	$E_{1a}E_{iii}E_4$	E_{vii}	$E_{4'}$	E_a
1430	$E_{1b}E_{iii}E_4$	E_{vii}	$E_{4'}$	E_a
1431	$E_{1a}E_5E_{iii}E_4$	E_{vii}	$E_{4'}$	E_a
1432	$E_{1b}E_5E_{iii}E_4$	E_{vii}	$E_{4'}$	E_a
1433	$E_{1a}E_{iv}$	E_{vii}	$E_{4'}$	E_a
1434	$E_{1b}E_{iv}$	E_{vii}	$E_{4'}$	E_a
1435	$E_{1a}E_5E_{iv}$	E_{vii}	$E_{4'}$	E_a
1436	$E_{1b}E_5E_{iv}$	E_{vii}	$E_{4'}$	E_a
1437	$E_{1a}E_{iv}E_4$	E_{vii}	$E_{4'}$	E_a
1438	$E_{1b}E_{iv}E_4$	E_{vii}	$E_{4'}$	E_a
1439	$E_{1a}E_5E_{iv}E_4$	E_{vii}	$E_{4'}$	E_a
1440	$E_{1b}E_5E_{iv}E_4$	E_{vii}	$E_{4'}$	E_a
1441	E_{1a}	$AlkLE_{vii}$		E_a
1442	E_{1b}	$AlkLE_{vii}$		E_a
1443	$E_{1a}E_5$	$AlkLE_{vii}$		E_a
1444	$E_{1b}E_5$	$AlkLE_{vii}$		E_a
1445	$E_{1a}E_i$	$AlkLE_{vii}$		E_a
1446	$E_{1b}E_i$	$AlkLE_{vii}$		E_a
1447	$E_{1a}E_{ii}$	$AlkLE_{vii}$		E_a
1448	$E_{1b}E_{ii}$	$AlkLE_{vii}$		E_a
1449	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_a
1450	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_a
1451	$E_{1a}E_5E_i$	$AlkLE_{vii}$		E_a
1452	$E_{1b}E_5E_i$	$AlkLE_{vii}$		E_a
1453	$E_{1a}E_5E_{ii}$	$AlkLE_{vii}$		E_a
1454	$E_{1b}E_5E_{ii}$	$AlkLE_{vii}$		E_a
1455	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$		E_a
1456	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$		E_a
1457	$E_{1a}E_4$	$AlkLE_{vii}$		E_a
1458	$E_{1b}E_4$	$AlkLE_{vii}$		E_a
1459	$E_{1a}E_5E_4$	$AlkLE_{vii}$		E_a
1460	$E_{1b}E_5E_4$	$AlkLE_{vii}$		E_a
1461	$E_{1a}E_iE_4$	$AlkLE_{vii}$		E_a
1462	$E_{1b}E_iE_4$	$AlkLE_{vii}$		E_a

1463	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$		E_a
1464	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$		E_a
1465	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_a
1466	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_a
1467	$E_{1a}E_5E_iE_4$	$AlkLE_{vii}$		E_a
1468	$E_{1b}E_5E_iE_4$	$AlkLE_{vii}$		E_a
1469	$E_{1a}E_5E_{ii}E_4$	$AlkLE_{vii}$		E_a
1470	$E_{1b}E_5E_{ii}E_4$	$AlkLE_{vii}$		E_a
1471	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_a
1472	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_a
1473	$E_{1a}E_{iii}$	$AlkLE_{vii}$		E_a
1474	$E_{1b}E_{iii}$	$AlkLE_{vii}$		E_a
1475	$E_{1a}E_5E_{iii}$	$AlkLE_{vii}$		E_a
1476	$E_{1b}E_5E_{iii}$	$AlkLE_{vii}$		E_a
1477	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$		E_a
1478	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$		E_a
1479	$E_{1a}E_5E_{iii}E_4$	$AlkLE_{vii}$		E_a
1480	$E_{1b}E_5E_{iii}E_4$	$AlkLE_{vii}$		E_a
1481	$E_{1a}E_{iv}$	$AlkLE_{vii}$		E_a
1482	$E_{1b}E_{iv}$	$AlkLE_{vii}$		E_a
1483	$E_{1a}E_5E_{iv}$	$AlkLE_{vii}$		E_a
1484	$E_{1b}E_5E_{iv}$	$AlkLE_{vii}$		E_a
1485	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$		E_a
1486	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$		E_a
1487	$E_{1a}E_5E_{iv}E_4$	$AlkLE_{vii}$		E_a
1488	$E_{1b}E_5E_{iv}E_4$	$AlkLE_{vii}$		E_a
1489	E_{1a}	$AlkLE_{vii}$	$E_{4'}$	E_a
1490	E_{1b}	$AlkLE_{vii}$	$E_{4'}$	E_a
1491	$E_{1a}E_5$	$AlkLE_{vii}$	$E_{4'}$	E_a
1492	$E_{1b}E_5$	$AlkLE_{vii}$	$E_{4'}$	E_a
1493	$E_{1a}E_i$	$AlkLE_{vii}$	$E_{4'}$	E_a
1494	$E_{1b}E_i$	$AlkLE_{vii}$	$E_{4'}$	E_a
1495	$E_{1a}E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1496	$E_{1b}E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1497	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1498	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1499	$E_{1a}E_5E_i$	$AlkLE_{vii}$	$E_{4'}$	E_a
1500	$E_{1b}E_5E_i$	$AlkLE_{vii}$	$E_{4'}$	E_a
1501	$E_{1a}E_5E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1502	$E_{1b}E_5E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1503	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1504	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1505	$E_{1a}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a

1506	$E_{1b}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1507	$E_{1a}E_5E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1508	$E_{1b}E_5E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1509	$E_{1a}E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1510	$E_{1b}E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1511	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1512	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1513	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1514	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1515	$E_{1a}E_5E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1516	$E_{1b}E_5E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1517	$E_{1a}E_5E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1518	$E_{1b}E_5E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1519	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1520	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1521	$E_{1a}E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1522	$E_{1b}E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1523	$E_{1a}E_5E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1524	$E_{1b}E_5E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1525	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1526	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1527	$E_{1a}E_5E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1528	$E_{1b}E_5E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1529	$E_{1a}E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1530	$E_{1b}E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1531	$E_{1a}E_5E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1532	$E_{1b}E_5E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_a
1533	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1534	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1535	$E_{1a}E_5E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1536	$E_{1b}E_5E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_a
1537	E_{1a}	E_{vii}		E_b
1538	E_{1b}	E_{vii}		E_b
1539	$E_{1a}E_5$	E_{vii}		E_b
1540	$E_{1b}E_5$	E_{vii}		E_b
1541	$E_{1a}E_i$	E_{vii}		E_b
1542	$E_{1b}E_i$	E_{vii}		E_b
1543	$E_{1a}E_{ii}$	E_{vii}		E_b
1544	$E_{1b}E_{ii}$	E_{vii}		E_b
1545	$E_{1a}E_{ii}E_{iib}$	E_{vii}		E_b
1546	$E_{1b}E_{ii}E_{iib}$	E_{vii}		E_b
1547	$E_{1a}E_5E_i$	E_{vii}		E_b
1548	$E_{1b}E_5E_i$	E_{vii}		E_b

1549	$E_{1a}E_5E_{ii}$	E_{vii}		E_b
1550	$E_{1b}E_5E_{ii}$	E_{vii}		E_b
1551	$E_{1a}E_5E_{ii}E_{iib}$	E_{vii}		E_b
1552	$E_{1b}E_5E_{ii}E_{iib}$	E_{vii}		E_b
1553	$E_{1a}E_4$	E_{vii}		E_b
1554	$E_{1b}E_4$	E_{vii}		E_b
1555	$E_{1a}E_5E_4$	E_{vii}		E_b
1556	$E_{1b}E_5E_4$	E_{vii}		E_b
1557	$E_{1a}E_iE_4$	E_{vii}		E_b
1558	$E_{1b}E_iE_4$	E_{vii}		E_b
1559	$E_{1a}E_{ii}E_4$	E_{vii}		E_b
1560	$E_{1b}E_{ii}E_4$	E_{vii}		E_b
1561	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}		E_b
1562	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}		E_b
1563	$E_{1a}E_5E_iE_4$	E_{vii}		E_b
1564	$E_{1b}E_5E_iE_4$	E_{vii}		E_b
1565	$E_{1a}E_5E_{ii}E_4$	E_{vii}		E_b
1566	$E_{1b}E_5E_{ii}E_4$	E_{vii}		E_b
1567	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{vii}		E_b
1568	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{vii}		E_b
1569	$E_{1a}E_{iii}$	E_{vii}		E_b
1570	$E_{1b}E_{iii}$	E_{vii}		E_b
1571	$E_{1a}E_5E_{iii}$	E_{vii}		E_b
1572	$E_{1b}E_5E_{iii}$	E_{vii}		E_b
1573	$E_{1a}E_{iii}E_4$	E_{vii}		E_b
1574	$E_{1b}E_{iii}E_4$	E_{vii}		E_b
1575	$E_{1a}E_5E_{iii}E_4$	E_{vii}		E_b
1576	$E_{1b}E_5E_{iii}E_4$	E_{vii}		E_b
1577	$E_{1a}E_{iv}$	E_{vii}		E_b
1578	$E_{1b}E_{iv}$	E_{vii}		E_b
1579	$E_{1a}E_5E_{iv}$	E_{vii}		E_b
1580	$E_{1b}E_5E_{iv}$	E_{vii}		E_b
1581	$E_{1a}E_{iv}E_4$	E_{vii}		E_b
1582	$E_{1b}E_{iv}E_4$	E_{vii}		E_b
1583	$E_{1a}E_5E_{iv}E_4$	E_{vii}		E_b
1584	$E_{1b}E_5E_{iv}E_4$	E_{vii}		E_b
1585	E_{1a}	E_{vii}	$E_{4'}$	E_b
1586	E_{1b}	E_{vii}	$E_{4'}$	E_b
1587	$E_{1a}E_5$	E_{vii}	$E_{4'}$	E_b
1588	$E_{1b}E_5$	E_{vii}	$E_{4'}$	E_b
1589	$E_{1a}E_i$	E_{vii}	$E_{4'}$	E_b
1590	$E_{1b}E_i$	E_{vii}	$E_{4'}$	E_b
1591	$E_{1a}E_{ii}$	E_{vii}	$E_{4'}$	E_b

1592	$E_{1b}E_{ii}$	E_{vii}	$E_{4'}$	E_b
1593	$E_{1a}E_{ii}E_{iib}$	E_{vii}	$E_{4'}$	E_b
1594	$E_{1b}E_{ii}E_{iib}$	E_{vii}	$E_{4'}$	E_b
1595	$E_{1a}E_5E_i$	E_{vii}	$E_{4'}$	E_b
1596	$E_{1b}E_5E_i$	E_{vii}	$E_{4'}$	E_b
1597	$E_{1a}E_5E_{ii}$	E_{vii}	$E_{4'}$	E_b
1598	$E_{1b}E_5E_{ii}$	E_{vii}	$E_{4'}$	E_b
1599	$E_{1a}E_5E_{ii}E_{iib}$	E_{vii}	$E_{4'}$	E_b
1600	$E_{1b}E_5E_{ii}E_{iib}$	E_{vii}	$E_{4'}$	E_b
1601	$E_{1a}E_4$	E_{vii}	$E_{4'}$	E_b
1602	$E_{1b}E_4$	E_{vii}	$E_{4'}$	E_b
1603	$E_{1a}E_5E_4$	E_{vii}	$E_{4'}$	E_b
1604	$E_{1b}E_5E_4$	E_{vii}	$E_{4'}$	E_b
1605	$E_{1a}E_iE_4$	E_{vii}	$E_{4'}$	E_b
1606	$E_{1b}E_iE_4$	E_{vii}	$E_{4'}$	E_b
1607	$E_{1a}E_{ii}E_4$	E_{vii}	$E_{4'}$	E_b
1608	$E_{1b}E_{ii}E_4$	E_{vii}	$E_{4'}$	E_b
1609	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_b
1610	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_b
1611	$E_{1a}E_5E_iE_4$	E_{vii}	$E_{4'}$	E_b
1612	$E_{1b}E_5E_iE_4$	E_{vii}	$E_{4'}$	E_b
1613	$E_{1a}E_5E_{ii}E_4$	E_{vii}	$E_{4'}$	E_b
1614	$E_{1b}E_5E_{ii}E_4$	E_{vii}	$E_{4'}$	E_b
1615	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_b
1616	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_b
1617	$E_{1a}E_{iii}$	E_{vii}	$E_{4'}$	E_b
1618	$E_{1b}E_{iii}$	E_{vii}	$E_{4'}$	E_b
1619	$E_{1a}E_5E_{iii}$	E_{vii}	$E_{4'}$	E_b
1620	$E_{1b}E_5E_{iii}$	E_{vii}	$E_{4'}$	E_b
1621	$E_{1a}E_{iii}E_4$	E_{vii}	$E_{4'}$	E_b
1622	$E_{1b}E_{iii}E_4$	E_{vii}	$E_{4'}$	E_b
1623	$E_{1a}E_5E_{iii}E_4$	E_{vii}	$E_{4'}$	E_b
1624	$E_{1b}E_5E_{iii}E_4$	E_{vii}	$E_{4'}$	E_b
1625	$E_{1a}E_{iv}$	E_{vii}	$E_{4'}$	E_b
1626	$E_{1b}E_{iv}$	E_{vii}	$E_{4'}$	E_b
1627	$E_{1a}E_5E_{iv}$	E_{vii}	$E_{4'}$	E_b
1628	$E_{1b}E_5E_{iv}$	E_{vii}	$E_{4'}$	E_b
1629	$E_{1a}E_{iv}E_4$	E_{vii}	$E_{4'}$	E_b
1630	$E_{1b}E_{iv}E_4$	E_{vii}	$E_{4'}$	E_b
1631	$E_{1a}E_5E_{iv}E_4$	E_{vii}	$E_{4'}$	E_b
1632	$E_{1b}E_5E_{iv}E_4$	E_{vii}	$E_{4'}$	E_b
1633	E_{1a}	$AlkLE_{vii}$		E_b
1634	E_{1b}	$AlkLE_{vii}$		E_b

1635	$E_{1a}E_5$	$AlkLE_{vii}$	E_b
1636	$E_{1b}E_5$	$AlkLE_{vii}$	E_b
1637	$E_{1a}E_i$	$AlkLE_{vii}$	E_b
1638	$E_{1b}E_i$	$AlkLE_{vii}$	E_b
1639	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_b
1640	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_b
1641	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_b
1642	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_b
1643	$E_{1a}E_5E_i$	$AlkLE_{vii}$	E_b
1644	$E_{1b}E_5E_i$	$AlkLE_{vii}$	E_b
1645	$E_{1a}E_5E_{ii}$	$AlkLE_{vii}$	E_b
1646	$E_{1b}E_5E_{ii}$	$AlkLE_{vii}$	E_b
1647	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	E_b
1648	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	E_b
1649	$E_{1a}E_4$	$AlkLE_{vii}$	E_b
1650	$E_{1b}E_4$	$AlkLE_{vii}$	E_b
1651	$E_{1a}E_5E_4$	$AlkLE_{vii}$	E_b
1652	$E_{1b}E_5E_4$	$AlkLE_{vii}$	E_b
1653	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_b
1654	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_b
1655	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_b
1656	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_b
1657	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_b
1658	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_b
1659	$E_{1a}E_5E_iE_4$	$AlkLE_{vii}$	E_b
1660	$E_{1b}E_5E_iE_4$	$AlkLE_{vii}$	E_b
1661	$E_{1a}E_5E_{ii}E_4$	$AlkLE_{vii}$	E_b
1662	$E_{1b}E_5E_{ii}E_4$	$AlkLE_{vii}$	E_b
1663	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_b
1664	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_b
1665	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_b
1666	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_b
1667	$E_{1a}E_5E_{iii}$	$AlkLE_{vii}$	E_b
1668	$E_{1b}E_5E_{iii}$	$AlkLE_{vii}$	E_b
1669	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_b
1670	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_b
1671	$E_{1a}E_5E_{iii}E_4$	$AlkLE_{vii}$	E_b
1672	$E_{1b}E_5E_{iii}E_4$	$AlkLE_{vii}$	E_b
1673	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_b
1674	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_b
1675	$E_{1a}E_5E_{iv}$	$AlkLE_{vii}$	E_b
1676	$E_{1b}E_5E_{iv}$	$AlkLE_{vii}$	E_b
1677	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_b

1678	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$		E_b
1679	$E_{1a}E_5E_{iv}E_4$	$AlkLE_{vii}$		E_b
1680	$E_{1b}E_5E_{iv}E_4$	$AlkLE_{vii}$		E_b
1681	E_{1a}	$AlkLE_{vii}$	E_{4^*}	E_b
1682	E_{1b}	$AlkLE_{vii}$	E_{4^*}	E_b
1683	$E_{1a}E_5$	$AlkLE_{vii}$	E_{4^*}	E_b
1684	$E_{1b}E_5$	$AlkLE_{vii}$	E_{4^*}	E_b
1685	$E_{1a}E_i$	$AlkLE_{vii}$	E_{4^*}	E_b
1686	$E_{1b}E_i$	$AlkLE_{vii}$	E_{4^*}	E_b
1687	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_{4^*}	E_b
1688	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_{4^*}	E_b
1689	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_{4^*}	E_b
1690	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_{4^*}	E_b
1691	$E_{1a}E_5E_i$	$AlkLE_{vii}$	E_{4^*}	E_b
1692	$E_{1b}E_5E_i$	$AlkLE_{vii}$	E_{4^*}	E_b
1693	$E_{1a}E_5E_{ii}$	$AlkLE_{vii}$	E_{4^*}	E_b
1694	$E_{1b}E_5E_{ii}$	$AlkLE_{vii}$	E_{4^*}	E_b
1695	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	E_{4^*}	E_b
1696	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	E_{4^*}	E_b
1697	$E_{1a}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1698	$E_{1b}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1699	$E_{1a}E_5E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1700	$E_{1b}E_5E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1701	$E_{1a}E_iE_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1702	$E_{1b}E_iE_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1703	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1704	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1705	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1706	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1707	$E_{1a}E_5E_iE_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1708	$E_{1b}E_5E_iE_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1709	$E_{1a}E_5E_{ii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1710	$E_{1b}E_5E_{ii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1711	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1712	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1713	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_{4^*}	E_b
1714	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_{4^*}	E_b
1715	$E_{1a}E_5E_{iii}$	$AlkLE_{vii}$	E_{4^*}	E_b
1716	$E_{1b}E_5E_{iii}$	$AlkLE_{vii}$	E_{4^*}	E_b
1717	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1718	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1719	$E_{1a}E_5E_{iii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1720	$E_{1b}E_5E_{iii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b

1721	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_{4^*}	E_b
1722	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_{4^*}	E_b
1723	$E_{1a}E_5E_{iv}$	$AlkLE_{vii}$	E_{4^*}	E_b
1724	$E_{1b}E_5E_{iv}$	$AlkLE_{vii}$	E_{4^*}	E_b
1725	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1726	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1727	$E_{1a}E_5E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1728	$E_{1b}E_5E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}	E_b
1729	E_{1a}	E_{vii}		E_d
1730	E_{1b}	E_{vii}		E_d
1731	$E_{1a}E_5$	E_{vii}		E_d
1732	$E_{1b}E_5$	E_{vii}		E_d
1733	$E_{1a}E_i$	E_{vii}		E_d
1734	$E_{1b}E_i$	E_{vii}		E_d
1735	$E_{1a}E_{ii}$	E_{vii}		E_d
1736	$E_{1b}E_{ii}$	E_{vii}		E_d
1737	$E_{1a}E_{ii}E_{iib}$	E_{vii}		E_d
1738	$E_{1b}E_{ii}E_{iib}$	E_{vii}		E_d
1739	$E_{1a}E_5E_i$	E_{vii}		E_d
1740	$E_{1b}E_5E_i$	E_{vii}		E_d
1741	$E_{1a}E_5E_{ii}$	E_{vii}		E_d
1742	$E_{1b}E_5E_{ii}$	E_{vii}		E_d
1743	$E_{1a}E_5E_{ii}E_{iib}$	E_{vii}		E_d
1744	$E_{1b}E_5E_{ii}E_{iib}$	E_{vii}		E_d
1745	$E_{1a}E_4$	E_{vii}		E_d
1746	$E_{1b}E_4$	E_{vii}		E_d
1747	$E_{1a}E_5E_4$	E_{vii}		E_d
1748	$E_{1b}E_5E_4$	E_{vii}		E_d
1749	$E_{1a}E_iE_4$	E_{vii}		E_d
1750	$E_{1b}E_iE_4$	E_{vii}		E_d
1751	$E_{1a}E_{ii}E_4$	E_{vii}		E_d
1752	$E_{1b}E_{ii}E_4$	E_{vii}		E_d
1753	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}		E_d
1754	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}		E_d
1755	$E_{1a}E_5E_iE_4$	E_{vii}		E_d
1756	$E_{1b}E_5E_iE_4$	E_{vii}		E_d
1757	$E_{1a}E_5E_{ii}E_4$	E_{vii}		E_d
1758	$E_{1b}E_5E_{ii}E_4$	E_{vii}		E_d
1759	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{vii}		E_d
1760	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{vii}		E_d
1761	$E_{1a}E_{iii}$	E_{vii}		E_d
1762	$E_{1b}E_{iii}$	E_{vii}		E_d
1763	$E_{1a}E_5E_{iii}$	E_{vii}		E_d

1764	$E_{1b}E_5E_{iii}$	E_{vii}		E_d
1765	$E_{1a}E_{iii}E_4$	E_{vii}		E_d
1766	$E_{1b}E_{iii}E_4$	E_{vii}		E_d
1767	$E_{1a}E_5E_{iii}E_4$	E_{vii}		E_d
1768	$E_{1b}E_5E_{iii}E_4$	E_{vii}		E_d
1769	$E_{1a}E_{iv}$	E_{vii}		E_d
1770	$E_{1b}E_{iv}$	E_{vii}		E_d
1771	$E_{1a}E_5E_{iv}$	E_{vii}		E_d
1772	$E_{1b}E_5E_{iv}$	E_{vii}		E_d
1773	$E_{1a}E_{iv}E_4$	E_{vii}		E_d
1774	$E_{1b}E_{iv}E_4$	E_{vii}		E_d
1775	$E_{1a}E_5E_{iv}E_4$	E_{vii}		E_d
1776	$E_{1b}E_5E_{iv}E_4$	E_{vii}		E_d
1777	E_{1a}	E_{vii}	E_{4^*}	E_d
1778	E_{1b}	E_{vii}	E_{4^*}	E_d
1779	$E_{1a}E_5$	E_{vii}	E_{4^*}	E_d
1780	$E_{1b}E_5$	E_{vii}	E_{4^*}	E_d
1781	$E_{1a}E_i$	E_{vii}	E_{4^*}	E_d
1782	$E_{1b}E_i$	E_{vii}	E_{4^*}	E_d
1783	$E_{1a}E_{ii}$	E_{vii}	E_{4^*}	E_d
1784	$E_{1b}E_{ii}$	E_{vii}	E_{4^*}	E_d
1785	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_d
1786	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_d
1787	$E_{1a}E_5E_i$	E_{vii}	E_{4^*}	E_d
1788	$E_{1b}E_5E_i$	E_{vii}	E_{4^*}	E_d
1789	$E_{1a}E_5E_{ii}$	E_{vii}	E_{4^*}	E_d
1790	$E_{1b}E_5E_{ii}$	E_{vii}	E_{4^*}	E_d
1791	$E_{1a}E_5E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_d
1792	$E_{1b}E_5E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_d
1793	$E_{1a}E_4$	E_{vii}	E_{4^*}	E_d
1794	$E_{1b}E_4$	E_{vii}	E_{4^*}	E_d
1795	$E_{1a}E_5E_4$	E_{vii}	E_{4^*}	E_d
1796	$E_{1b}E_5E_4$	E_{vii}	E_{4^*}	E_d
1797	$E_{1a}E_iE_4$	E_{vii}	E_{4^*}	E_d
1798	$E_{1b}E_iE_4$	E_{vii}	E_{4^*}	E_d
1799	$E_{1a}E_{ii}E_4$	E_{vii}	E_{4^*}	E_d
1800	$E_{1b}E_{ii}E_4$	E_{vii}	E_{4^*}	E_d
1801	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_d
1802	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_d
1803	$E_{1a}E_5E_iE_4$	E_{vii}	E_{4^*}	E_d
1804	$E_{1b}E_5E_iE_4$	E_{vii}	E_{4^*}	E_d
1805	$E_{1a}E_5E_{ii}E_4$	E_{vii}	E_{4^*}	E_d
1806	$E_{1b}E_5E_{ii}E_4$	E_{vii}	E_{4^*}	E_d

1807	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_d
1808	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_d
1809	$E_{1a}E_{iii}$	E_{vii}	E_{4^*}	E_d
1810	$E_{1b}E_{iii}$	E_{vii}	E_{4^*}	E_d
1811	$E_{1a}E_5E_{iii}$	E_{vii}	E_{4^*}	E_d
1812	$E_{1b}E_5E_{iii}$	E_{vii}	E_{4^*}	E_d
1813	$E_{1a}E_{iii}E_4$	E_{vii}	E_{4^*}	E_d
1814	$E_{1b}E_{iii}E_4$	E_{vii}	E_{4^*}	E_d
1815	$E_{1a}E_5E_{iii}E_4$	E_{vii}	E_{4^*}	E_d
1816	$E_{1b}E_5E_{iii}E_4$	E_{vii}	E_{4^*}	E_d
1817	$E_{1a}E_{iv}$	E_{vii}	E_{4^*}	E_d
1818	$E_{1b}E_{iv}$	E_{vii}	E_{4^*}	E_d
1819	$E_{1a}E_5E_{iv}$	E_{vii}	E_{4^*}	E_d
1820	$E_{1b}E_5E_{iv}$	E_{vii}	E_{4^*}	E_d
1821	$E_{1a}E_{iv}E_4$	E_{vii}	E_{4^*}	E_d
1822	$E_{1b}E_{iv}E_4$	E_{vii}	E_{4^*}	E_d
1823	$E_{1a}E_5E_{iv}E_4$	E_{vii}	E_{4^*}	E_d
1824	$E_{1b}E_5E_{iv}E_4$	E_{vii}	E_{4^*}	E_d
1825	E_{1a}	$AlkLE_{vii}$		E_d
1826	E_{1b}	$AlkLE_{vii}$		E_d
1827	$E_{1a}E_5$	$AlkLE_{vii}$		E_d
1828	$E_{1b}E_5$	$AlkLE_{vii}$		E_d
1829	$E_{1a}E_i$	$AlkLE_{vii}$		E_d
1830	$E_{1b}E_i$	$AlkLE_{vii}$		E_d
1831	$E_{1a}E_{ii}$	$AlkLE_{vii}$		E_d
1832	$E_{1b}E_{ii}$	$AlkLE_{vii}$		E_d
1833	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_d
1834	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_d
1835	$E_{1a}E_5E_i$	$AlkLE_{vii}$		E_d
1836	$E_{1b}E_5E_i$	$AlkLE_{vii}$		E_d
1837	$E_{1a}E_5E_{ii}$	$AlkLE_{vii}$		E_d
1838	$E_{1b}E_5E_{ii}$	$AlkLE_{vii}$		E_d
1839	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$		E_d
1840	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$		E_d
1841	$E_{1a}E_4$	$AlkLE_{vii}$		E_d
1842	$E_{1b}E_4$	$AlkLE_{vii}$		E_d
1843	$E_{1a}E_5E_4$	$AlkLE_{vii}$		E_d
1844	$E_{1b}E_5E_4$	$AlkLE_{vii}$		E_d
1845	$E_{1a}E_iE_4$	$AlkLE_{vii}$		E_d
1846	$E_{1b}E_iE_4$	$AlkLE_{vii}$		E_d
1847	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$		E_d
1848	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$		E_d
1849	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_d

1850	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_d
1851	$E_{1a}E_5E_iE_4$	$AlkLE_{vii}$		E_d
1852	$E_{1b}E_5E_iE_4$	$AlkLE_{vii}$		E_d
1853	$E_{1a}E_5E_{ii}E_4$	$AlkLE_{vii}$		E_d
1854	$E_{1b}E_5E_{ii}E_4$	$AlkLE_{vii}$		E_d
1855	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_d
1856	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_d
1857	$E_{1a}E_{iii}$	$AlkLE_{vii}$		E_d
1858	$E_{1b}E_{iii}$	$AlkLE_{vii}$		E_d
1859	$E_{1a}E_5E_{iii}$	$AlkLE_{vii}$		E_d
1860	$E_{1b}E_5E_{iii}$	$AlkLE_{vii}$		E_d
1861	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$		E_d
1862	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$		E_d
1863	$E_{1a}E_5E_{iii}E_4$	$AlkLE_{vii}$		E_d
1864	$E_{1b}E_5E_{iii}E_4$	$AlkLE_{vii}$		E_d
1865	$E_{1a}E_{iv}$	$AlkLE_{vii}$		E_d
1866	$E_{1b}E_{iv}$	$AlkLE_{vii}$		E_d
1867	$E_{1a}E_5E_{iv}$	$AlkLE_{vii}$		E_d
1868	$E_{1b}E_5E_{iv}$	$AlkLE_{vii}$		E_d
1869	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$		E_d
1870	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$		E_d
1871	$E_{1a}E_5E_{iv}E_4$	$AlkLE_{vii}$		E_d
1872	$E_{1b}E_5E_{iv}E_4$	$AlkLE_{vii}$		E_d
1873	E_{1a}	$AlkLE_{vii}$	$E_{4'}$	E_d
1874	E_{1b}	$AlkLE_{vii}$	$E_{4'}$	E_d
1875	$E_{1a}E_5$	$AlkLE_{vii}$	$E_{4'}$	E_d
1876	$E_{1b}E_5$	$AlkLE_{vii}$	$E_{4'}$	E_d
1877	$E_{1a}E_i$	$AlkLE_{vii}$	$E_{4'}$	E_d
1878	$E_{1b}E_i$	$AlkLE_{vii}$	$E_{4'}$	E_d
1879	$E_{1a}E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1880	$E_{1b}E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1881	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1882	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1883	$E_{1a}E_5E_i$	$AlkLE_{vii}$	$E_{4'}$	E_d
1884	$E_{1b}E_5E_i$	$AlkLE_{vii}$	$E_{4'}$	E_d
1885	$E_{1a}E_5E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1886	$E_{1b}E_5E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1887	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1888	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1889	$E_{1a}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1890	$E_{1b}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1891	$E_{1a}E_5E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1892	$E_{1b}E_5E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d

1893	$E_{1a}E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1894	$E_{1b}E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1895	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1896	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1897	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1898	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1899	$E_{1a}E_5E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1900	$E_{1b}E_5E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1901	$E_{1a}E_5E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1902	$E_{1b}E_5E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1903	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1904	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1905	$E_{1a}E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1906	$E_{1b}E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1907	$E_{1a}E_5E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1908	$E_{1b}E_5E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1909	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1910	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1911	$E_{1a}E_5E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1912	$E_{1b}E_5E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1913	$E_{1a}E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1914	$E_{1b}E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1915	$E_{1a}E_5E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1916	$E_{1b}E_5E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_d
1917	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1918	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1919	$E_{1a}E_5E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1920	$E_{1b}E_5E_{iv}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_d
1921	E_{1a}	E_{vii}		E_e
1922	E_{1b}	E_{vii}		E_e
1923	$E_{1a}E_5$	E_{vii}		E_e
1924	$E_{1b}E_5$	E_{vii}		E_e
1925	$E_{1a}E_i$	E_{vii}		E_e
1926	$E_{1b}E_i$	E_{vii}		E_e
1927	$E_{1a}E_{ii}$	E_{vii}		E_e
1928	$E_{1b}E_{ii}$	E_{vii}		E_e
1929	$E_{1a}E_{ii}E_{iib}$	E_{vii}		E_e
1930	$E_{1b}E_{ii}E_{iib}$	E_{vii}		E_e
1931	$E_{1a}E_5E_i$	E_{vii}		E_e
1932	$E_{1b}E_5E_i$	E_{vii}		E_e
1933	$E_{1a}E_5E_{ii}$	E_{vii}		E_e
1934	$E_{1b}E_5E_{ii}$	E_{vii}		E_e
1935	$E_{1a}E_5E_{ii}E_{iib}$	E_{vii}		E_e

1936	$E_{1b}E_5E_{ii}E_{iib}$	E_{vii}		E_e
1937	$E_{1a}E_4$	E_{vii}		E_e
1938	$E_{1b}E_4$	E_{vii}		E_e
1939	$E_{1a}E_5E_4$	E_{vii}		E_e
1940	$E_{1b}E_5E_4$	E_{vii}		E_e
1941	$E_{1a}E_iE_4$	E_{vii}		E_e
1942	$E_{1b}E_iE_4$	E_{vii}		E_e
1943	$E_{1a}E_{ii}E_4$	E_{vii}		E_e
1944	$E_{1b}E_{ii}E_4$	E_{vii}		E_e
1945	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}		E_e
1946	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}		E_e
1947	$E_{1a}E_5E_iE_4$	E_{vii}		E_e
1948	$E_{1b}E_5E_iE_4$	E_{vii}		E_e
1949	$E_{1a}E_5E_{ii}E_4$	E_{vii}		E_e
1950	$E_{1b}E_5E_{ii}E_4$	E_{vii}		E_e
1951	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{vii}		E_e
1952	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{vii}		E_e
1953	$E_{1a}E_{iii}$	E_{vii}		E_e
1954	$E_{1b}E_{iii}$	E_{vii}		E_e
1955	$E_{1a}E_5E_{iii}$	E_{vii}		E_e
1956	$E_{1b}E_5E_{iii}$	E_{vii}		E_e
1957	$E_{1a}E_{iii}E_4$	E_{vii}		E_e
1958	$E_{1b}E_{iii}E_4$	E_{vii}		E_e
1959	$E_{1a}E_5E_{iii}E_4$	E_{vii}		E_e
1960	$E_{1b}E_5E_{iii}E_4$	E_{vii}		E_e
1961	$E_{1a}E_{iv}$	E_{vii}		E_e
1962	$E_{1b}E_{iv}$	E_{vii}		E_e
1963	$E_{1a}E_5E_{iv}$	E_{vii}		E_e
1964	$E_{1b}E_5E_{iv}$	E_{vii}		E_e
1965	$E_{1a}E_{iv}E_4$	E_{vii}		E_e
1966	$E_{1b}E_{iv}E_4$	E_{vii}		E_e
1967	$E_{1a}E_5E_{iv}E_4$	E_{vii}		E_e
1968	$E_{1b}E_5E_{iv}E_4$	E_{vii}		E_e
1969	E_{1a}	E_{vii}	$E_{4'}$	E_e
1970	E_{1b}	E_{vii}	$E_{4'}$	E_e
1971	$E_{1a}E_5$	E_{vii}	$E_{4'}$	E_e
1972	$E_{1b}E_5$	E_{vii}	$E_{4'}$	E_e
1973	$E_{1a}E_i$	E_{vii}	$E_{4'}$	E_e
1974	$E_{1b}E_i$	E_{vii}	$E_{4'}$	E_e
1975	$E_{1a}E_{ii}$	E_{vii}	$E_{4'}$	E_e
1976	$E_{1b}E_{ii}$	E_{vii}	$E_{4'}$	E_e
1977	$E_{1a}E_{ii}E_{iib}$	E_{vii}	$E_{4'}$	E_e
1978	$E_{1b}E_{ii}E_{iib}$	E_{vii}	$E_{4'}$	E_e

1979	$E_{1a}E_5E_i$	E_{vii}	$E_{4'}$	E_e
1980	$E_{1b}E_5E_i$	E_{vii}	$E_{4'}$	E_e
1981	$E_{1a}E_5E_{ii}$	E_{vii}	$E_{4'}$	E_e
1982	$E_{1b}E_5E_{ii}$	E_{vii}	$E_{4'}$	E_e
1983	$E_{1a}E_5E_{ii}E_{iib}$	E_{vii}	$E_{4'}$	E_e
1984	$E_{1b}E_5E_{ii}E_{iib}$	E_{vii}	$E_{4'}$	E_e
1985	$E_{1a}E_4$	E_{vii}	$E_{4'}$	E_e
1986	$E_{1b}E_4$	E_{vii}	$E_{4'}$	E_e
1987	$E_{1a}E_5E_4$	E_{vii}	$E_{4'}$	E_e
1988	$E_{1b}E_5E_4$	E_{vii}	$E_{4'}$	E_e
1989	$E_{1a}E_iE_4$	E_{vii}	$E_{4'}$	E_e
1990	$E_{1b}E_iE_4$	E_{vii}	$E_{4'}$	E_e
1991	$E_{1a}E_{ii}E_4$	E_{vii}	$E_{4'}$	E_e
1992	$E_{1b}E_{ii}E_4$	E_{vii}	$E_{4'}$	E_e
1993	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_e
1994	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_e
1995	$E_{1a}E_5E_iE_4$	E_{vii}	$E_{4'}$	E_e
1996	$E_{1b}E_5E_iE_4$	E_{vii}	$E_{4'}$	E_e
1997	$E_{1a}E_5E_{ii}E_4$	E_{vii}	$E_{4'}$	E_e
1998	$E_{1b}E_5E_{ii}E_4$	E_{vii}	$E_{4'}$	E_e
1999	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_e
2000	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{vii}	$E_{4'}$	E_e
2001	$E_{1a}E_{iii}$	E_{vii}	$E_{4'}$	E_e
2002	$E_{1b}E_{iii}$	E_{vii}	$E_{4'}$	E_e
2003	$E_{1a}E_5E_{iii}$	E_{vii}	$E_{4'}$	E_e
2004	$E_{1b}E_5E_{iii}$	E_{vii}	$E_{4'}$	E_e
2005	$E_{1a}E_{iii}E_4$	E_{vii}	$E_{4'}$	E_e
2006	$E_{1b}E_{iii}E_4$	E_{vii}	$E_{4'}$	E_e
2007	$E_{1a}E_5E_{iii}E_4$	E_{vii}	$E_{4'}$	E_e
2008	$E_{1b}E_5E_{iii}E_4$	E_{vii}	$E_{4'}$	E_e
2009	$E_{1a}E_{iv}$	E_{vii}	$E_{4'}$	E_e
2010	$E_{1b}E_{iv}$	E_{vii}	$E_{4'}$	E_e
2011	$E_{1a}E_5E_{iv}$	E_{vii}	$E_{4'}$	E_e
2012	$E_{1b}E_5E_{iv}$	E_{vii}	$E_{4'}$	E_e
2013	$E_{1a}E_{iv}E_4$	E_{vii}	$E_{4'}$	E_e
2014	$E_{1b}E_{iv}E_4$	E_{vii}	$E_{4'}$	E_e
2015	$E_{1a}E_5E_{iv}E_4$	E_{vii}	$E_{4'}$	E_e
2016	$E_{1b}E_5E_{iv}E_4$	E_{vii}	$E_{4'}$	E_e
2017	E_{1a}	$AlkLE_{vii}$		E_e
2018	E_{1b}	$AlkLE_{vii}$		E_e
2019	$E_{1a}E_5$	$AlkLE_{vii}$		E_e
2020	$E_{1b}E_5$	$AlkLE_{vii}$		E_e
2021	$E_{1a}E_i$	$AlkLE_{vii}$		E_e

2022	$E_{1b}E_{i}$	$AlkLE_{vii}$	E_e
2023	$E_{1a}E_{ii}$	$AlkLE_{vii}$	E_e
2024	$E_{1b}E_{ii}$	$AlkLE_{vii}$	E_e
2025	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_e
2026	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	E_e
2027	$E_{1a}E_5E_{i}$	$AlkLE_{vii}$	E_e
2028	$E_{1b}E_5E_{i}$	$AlkLE_{vii}$	E_e
2029	$E_{1a}E_5E_{ii}$	$AlkLE_{vii}$	E_e
2030	$E_{1b}E_5E_{ii}$	$AlkLE_{vii}$	E_e
2031	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	E_e
2032	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	E_e
2033	$E_{1a}E_4$	$AlkLE_{vii}$	E_e
2034	$E_{1b}E_4$	$AlkLE_{vii}$	E_e
2035	$E_{1a}E_5E_4$	$AlkLE_{vii}$	E_e
2036	$E_{1b}E_5E_4$	$AlkLE_{vii}$	E_e
2037	$E_{1a}E_{i}E_4$	$AlkLE_{vii}$	E_e
2038	$E_{1b}E_{i}E_4$	$AlkLE_{vii}$	E_e
2039	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	E_e
2040	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_e
2041	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_e
2042	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_e
2043	$E_{1a}E_5E_{i}E_4$	$AlkLE_{vii}$	E_e
2044	$E_{1b}E_5E_{i}E_4$	$AlkLE_{vii}$	E_e
2045	$E_{1a}E_5E_{ii}E_4$	$AlkLE_{vii}$	E_e
2046	$E_{1b}E_5E_{ii}E_4$	$AlkLE_{vii}$	E_e
2047	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_e
2048	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_e
2049	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_e
2050	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_e
2051	$E_{1a}E_5E_{iii}$	$AlkLE_{vii}$	E_e
2052	$E_{1b}E_5E_{iii}$	$AlkLE_{vii}$	E_e
2053	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_e
2054	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_e
2055	$E_{1a}E_5E_{iii}E_4$	$AlkLE_{vii}$	E_e
2056	$E_{1b}E_5E_{iii}E_4$	$AlkLE_{vii}$	E_e
2057	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_e
2058	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_e
2059	$E_{1a}E_5E_{iv}$	$AlkLE_{vii}$	E_e
2060	$E_{1b}E_5E_{iv}$	$AlkLE_{vii}$	E_e
2061	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_e
2062	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_e
2063	$E_{1a}E_5E_{iv}E_4$	$AlkLE_{vii}$	E_e
2064	$E_{1b}E_5E_{iv}E_4$	$AlkLE_{vii}$	E_e

2065	E_{1a}	$AlkLE_{vii}$	$E_{4'}$	E_e
2066	E_{1b}	$AlkLE_{vii}$	$E_{4'}$	E_e
2067	$E_{1a}E_5$	$AlkLE_{vii}$	$E_{4'}$	E_e
2068	$E_{1b}E_5$	$AlkLE_{vii}$	$E_{4'}$	E_e
2069	$E_{1a}E_{i}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2070	$E_{1b}E_{i}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2071	$E_{1a}E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2072	$E_{1b}E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2073	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2074	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2075	$E_{1a}E_5E_{i}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2076	$E_{1b}E_5E_{i}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2077	$E_{1a}E_5E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2078	$E_{1b}E_5E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2079	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2080	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2081	$E_{1a}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2082	$E_{1b}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2083	$E_{1a}E_5E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2084	$E_{1b}E_5E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2085	$E_{1a}E_{i}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2086	$E_{1b}E_{i}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2087	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2088	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2089	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2090	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2091	$E_{1a}E_5E_{i}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2092	$E_{1b}E_5E_{i}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2093	$E_{1a}E_5E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2094	$E_{1b}E_5E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2095	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2096	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2097	$E_{1a}E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2098	$E_{1b}E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2099	$E_{1a}E_5E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2100	$E_{1b}E_5E_{iii}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2101	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2102	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2103	$E_{1a}E_5E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2104	$E_{1b}E_5E_{iii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_e
2105	$E_{1a}E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2106	$E_{1b}E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_e
2107	$E_{1a}E_5E_{iv}$	$AlkLE_{vii}$	$E_{4'}$	E_e

2108	$E_{1b}E_5E_{iv}$	$AlkLE_{vii}$	E_{4^*}	E_e
2109	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}	E_e
2110	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}	E_e
2111	$E_{1a}E_5E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}	E_e
2112	$E_{1b}E_5E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}	E_e
2113	E_{1a}	E_{vii}		E_f
2114	E_{1b}	E_{vii}		E_f
2115	$E_{1a}E_5$	E_{vii}		E_f
2116	$E_{1b}E_5$	E_{vii}		E_f
2117	$E_{1a}E_i$	E_{vii}		E_f
2118	$E_{1b}E_i$	E_{vii}		E_f
2119	$E_{1a}E_{ii}$	E_{vii}		E_f
2120	$E_{1b}E_{ii}$	E_{vii}		E_f
2121	$E_{1a}E_{ii}E_{iib}$	E_{vii}		E_f
2122	$E_{1b}E_{ii}E_{iib}$	E_{vii}		E_f
2123	$E_{1a}E_5E_i$	E_{vii}		E_f
2124	$E_{1b}E_5E_i$	E_{vii}		E_f
2125	$E_{1a}E_5E_{ii}$	E_{vii}		E_f
2126	$E_{1b}E_5E_{ii}$	E_{vii}		E_f
2127	$E_{1a}E_5E_{ii}E_{iib}$	E_{vii}		E_f
2128	$E_{1b}E_5E_{ii}E_{iib}$	E_{vii}		E_f
2129	$E_{1a}E_4$	E_{vii}		E_f
2130	$E_{1b}E_4$	E_{vii}		E_f
2131	$E_{1a}E_5E_4$	E_{vii}		E_f
2132	$E_{1b}E_5E_4$	E_{vii}		E_f
2133	$E_{1a}E_iE_4$	E_{vii}		E_f
2134	$E_{1b}E_iE_4$	E_{vii}		E_f
2135	$E_{1a}E_{ii}E_4$	E_{vii}		E_f
2136	$E_{1b}E_{ii}E_4$	E_{vii}		E_f
2137	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}		E_f
2138	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}		E_f
2139	$E_{1a}E_5E_iE_4$	E_{vii}		E_f
2140	$E_{1b}E_5E_iE_4$	E_{vii}		E_f
2141	$E_{1a}E_5E_{ii}E_4$	E_{vii}		E_f
2142	$E_{1b}E_5E_{ii}E_4$	E_{vii}		E_f
2143	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{vii}		E_f
2144	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{vii}		E_f
2145	$E_{1a}E_{iii}$	E_{vii}		E_f
2146	$E_{1b}E_{iii}$	E_{vii}		E_f
2147	$E_{1a}E_5E_{iii}$	E_{vii}		E_f
2148	$E_{1b}E_5E_{iii}$	E_{vii}		E_f
2149	$E_{1a}E_{iii}E_4$	E_{vii}		E_f
2150	$E_{1b}E_{iii}E_4$	E_{vii}		E_f

2151	$E_{1a}E_5E_{iii}E_4$	E_{vii}		E_f
2152	$E_{1b}E_5E_{iii}E_4$	E_{vii}		E_f
2153	$E_{1a}E_{iv}$	E_{vii}		E_f
2154	$E_{1b}E_{iv}$	E_{vii}		E_f
2155	$E_{1a}E_5E_{iv}$	E_{vii}		E_f
2156	$E_{1b}E_5E_{iv}$	E_{vii}		E_f
2157	$E_{1a}E_{iv}E_4$	E_{vii}		E_f
2158	$E_{1b}E_{iv}E_4$	E_{vii}		E_f
2159	$E_{1a}E_5E_{iv}E_4$	E_{vii}		E_f
2160	$E_{1b}E_5E_{iv}E_4$	E_{vii}		E_f
2161	E_{1a}	E_{vii}	E_{4^*}	E_f
2162	E_{1b}	E_{vii}	E_{4^*}	E_f
2163	$E_{1a}E_5$	E_{vii}	E_{4^*}	E_f
2164	$E_{1b}E_5$	E_{vii}	E_{4^*}	E_f
2165	$E_{1a}E_i$	E_{vii}	E_{4^*}	E_f
2166	$E_{1b}E_i$	E_{vii}	E_{4^*}	E_f
2167	$E_{1a}E_{ii}$	E_{vii}	E_{4^*}	E_f
2168	$E_{1b}E_{ii}$	E_{vii}	E_{4^*}	E_f
2169	$E_{1a}E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_f
2170	$E_{1b}E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_f
2171	$E_{1a}E_5E_i$	E_{vii}	E_{4^*}	E_f
2172	$E_{1b}E_5E_i$	E_{vii}	E_{4^*}	E_f
2173	$E_{1a}E_5E_{ii}$	E_{vii}	E_{4^*}	E_f
2174	$E_{1b}E_5E_{ii}$	E_{vii}	E_{4^*}	E_f
2175	$E_{1a}E_5E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_f
2176	$E_{1b}E_5E_{ii}E_{iib}$	E_{vii}	E_{4^*}	E_f
2177	$E_{1a}E_4$	E_{vii}	E_{4^*}	E_f
2178	$E_{1b}E_4$	E_{vii}	E_{4^*}	E_f
2179	$E_{1a}E_5E_4$	E_{vii}	E_{4^*}	E_f
2180	$E_{1b}E_5E_4$	E_{vii}	E_{4^*}	E_f
2181	$E_{1a}E_iE_4$	E_{vii}	E_{4^*}	E_f
2182	$E_{1b}E_iE_4$	E_{vii}	E_{4^*}	E_f
2183	$E_{1a}E_{ii}E_4$	E_{vii}	E_{4^*}	E_f
2184	$E_{1b}E_{ii}E_4$	E_{vii}	E_{4^*}	E_f
2185	$E_{1a}E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_f
2186	$E_{1b}E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_f
2187	$E_{1a}E_5E_iE_4$	E_{vii}	E_{4^*}	E_f
2188	$E_{1b}E_5E_iE_4$	E_{vii}	E_{4^*}	E_f
2189	$E_{1a}E_5E_{ii}E_4$	E_{vii}	E_{4^*}	E_f
2190	$E_{1b}E_5E_{ii}E_4$	E_{vii}	E_{4^*}	E_f
2191	$E_{1a}E_5E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_f
2192	$E_{1b}E_5E_{ii}E_{iib}E_4$	E_{vii}	E_{4^*}	E_f
2193	$E_{1a}E_{iii}$	E_{vii}	E_{4^*}	E_f

2194	$E_{1b}E_{iii}$	E_{vii}	$E_{4'}$	E_f
2195	$E_{1a}E_5E_{iii}$	E_{vii}	$E_{4'}$	E_f
2196	$E_{1b}E_5E_{iii}$	E_{vii}	$E_{4'}$	E_f
2197	$E_{1a}E_{iii}E_4$	E_{vii}	$E_{4'}$	E_f
2198	$E_{1b}E_{iii}E_4$	E_{vii}	$E_{4'}$	E_f
2199	$E_{1a}E_5E_{iii}E_4$	E_{vii}	$E_{4'}$	E_f
2200	$E_{1b}E_5E_{iii}E_4$	E_{vii}	$E_{4'}$	E_f
2201	$E_{1a}E_{iv}$	E_{vii}	$E_{4'}$	E_f
2202	$E_{1b}E_{iv}$	E_{vii}	$E_{4'}$	E_f
2203	$E_{1a}E_5E_{iv}$	E_{vii}	$E_{4'}$	E_f
2204	$E_{1b}E_5E_{iv}$	E_{vii}	$E_{4'}$	E_f
2205	$E_{1a}E_{iv}E_4$	E_{vii}	$E_{4'}$	E_f
2206	$E_{1b}E_{iv}E_4$	E_{vii}	$E_{4'}$	E_f
2207	$E_{1a}E_5E_{iv}E_4$	E_{vii}	$E_{4'}$	E_f
2208	$E_{1b}E_5E_{iv}E_4$	E_{vii}	$E_{4'}$	E_f
2209	E_{1a}	$AlkLE_{vii}$		E_f
2210	E_{1b}	$AlkLE_{vii}$		E_f
2211	$E_{1a}E_5$	$AlkLE_{vii}$		E_f
2212	$E_{1b}E_5$	$AlkLE_{vii}$		E_f
2213	$E_{1a}E_i$	$AlkLE_{vii}$		E_f
2214	$E_{1b}E_i$	$AlkLE_{vii}$		E_f
2215	$E_{1a}E_{ii}$	$AlkLE_{vii}$		E_f
2216	$E_{1b}E_{ii}$	$AlkLE_{vii}$		E_f
2217	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_f
2218	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$		E_f
2219	$E_{1a}E_5E_i$	$AlkLE_{vii}$		E_f
2220	$E_{1b}E_5E_i$	$AlkLE_{vii}$		E_f
2221	$E_{1a}E_5E_{ii}$	$AlkLE_{vii}$		E_f
2222	$E_{1b}E_5E_{ii}$	$AlkLE_{vii}$		E_f
2223	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$		E_f
2224	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$		E_f
2225	$E_{1a}E_4$	$AlkLE_{vii}$		E_f
2226	$E_{1b}E_4$	$AlkLE_{vii}$		E_f
2227	$E_{1a}E_5E_4$	$AlkLE_{vii}$		E_f
2228	$E_{1b}E_5E_4$	$AlkLE_{vii}$		E_f
2229	$E_{1a}E_iE_4$	$AlkLE_{vii}$		E_f
2230	$E_{1b}E_iE_4$	$AlkLE_{vii}$		E_f
2231	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$		E_f
2232	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$		E_f
2233	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_f
2234	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_f
2235	$E_{1a}E_5E_iE_4$	$AlkLE_{vii}$		E_f
2236	$E_{1b}E_5E_iE_4$	$AlkLE_{vii}$		E_f

2237	$E_{1a}E_5E_{ii}E_4$	$AlkLE_{vii}$		E_f
2238	$E_{1b}E_5E_{ii}E_4$	$AlkLE_{vii}$		E_f
2239	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_f
2240	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$		E_f
2241	$E_{1a}E_{iii}$	$AlkLE_{vii}$		E_f
2242	$E_{1b}E_{iii}$	$AlkLE_{vii}$		E_f
2243	$E_{1a}E_5E_{iii}$	$AlkLE_{vii}$		E_f
2244	$E_{1b}E_5E_{iii}$	$AlkLE_{vii}$		E_f
2245	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$		E_f
2246	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$		E_f
2247	$E_{1a}E_5E_{iii}E_4$	$AlkLE_{vii}$		E_f
2248	$E_{1b}E_5E_{iii}E_4$	$AlkLE_{vii}$		E_f
2249	$E_{1a}E_{iv}$	$AlkLE_{vii}$		E_f
2250	$E_{1b}E_{iv}$	$AlkLE_{vii}$		E_f
2251	$E_{1a}E_5E_{iv}$	$AlkLE_{vii}$		E_f
2252	$E_{1b}E_5E_{iv}$	$AlkLE_{vii}$		E_f
2253	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$		E_f
2254	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$		E_f
2255	$E_{1a}E_5E_{iv}E_4$	$AlkLE_{vii}$		E_f
2256	$E_{1b}E_5E_{iv}E_4$	$AlkLE_{vii}$		E_f
2257	E_{1a}	$AlkLE_{vii}$	$E_{4'}$	E_f
2258	E_{1b}	$AlkLE_{vii}$	$E_{4'}$	E_f
2259	$E_{1a}E_5$	$AlkLE_{vii}$	$E_{4'}$	E_f
2260	$E_{1b}E_5$	$AlkLE_{vii}$	$E_{4'}$	E_f
2261	$E_{1a}E_i$	$AlkLE_{vii}$	$E_{4'}$	E_f
2262	$E_{1b}E_i$	$AlkLE_{vii}$	$E_{4'}$	E_f
2263	$E_{1a}E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_f
2264	$E_{1b}E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_f
2265	$E_{1a}E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_f
2266	$E_{1b}E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_f
2267	$E_{1a}E_5E_i$	$AlkLE_{vii}$	$E_{4'}$	E_f
2268	$E_{1b}E_5E_i$	$AlkLE_{vii}$	$E_{4'}$	E_f
2269	$E_{1a}E_5E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_f
2270	$E_{1b}E_5E_{ii}$	$AlkLE_{vii}$	$E_{4'}$	E_f
2271	$E_{1a}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_f
2272	$E_{1b}E_5E_{ii}E_{iib}$	$AlkLE_{vii}$	$E_{4'}$	E_f
2273	$E_{1a}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
2274	$E_{1b}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
2275	$E_{1a}E_5E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
2276	$E_{1b}E_5E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
2277	$E_{1a}E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
2278	$E_{1b}E_iE_4$	$AlkLE_{vii}$	$E_{4'}$	E_f
2279	$E_{1a}E_{ii}E_4$	$AlkLE_{vii}$	$E_{4'}$	E_f

2280	$E_{1b}E_{ii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2281	$E_{1a}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2282	$E_{1b}E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2283	$E_{1a}E_5E_iE_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2284	$E_{1b}E_5E_iE_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2285	$E_{1a}E_5E_{ii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2286	$E_{1b}E_5E_{ii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2287	$E_{1a}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2288	$E_{1b}E_5E_{ii}E_{iib}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2289	$E_{1a}E_{iii}$	$AlkLE_{vii}$	E_{4^*}	E_f
2290	$E_{1b}E_{iii}$	$AlkLE_{vii}$	E_{4^*}	E_f
2291	$E_{1a}E_5E_{iii}$	$AlkLE_{vii}$	E_{4^*}	E_f
2292	$E_{1b}E_5E_{iii}$	$AlkLE_{vii}$	E_{4^*}	E_f
2293	$E_{1a}E_{iii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2294	$E_{1b}E_{iii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2295	$E_{1a}E_5E_{iii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2296	$E_{1b}E_5E_{iii}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2297	$E_{1a}E_{iv}$	$AlkLE_{vii}$	E_{4^*}	E_f
2298	$E_{1b}E_{iv}$	$AlkLE_{vii}$	E_{4^*}	E_f
2299	$E_{1a}E_5E_{iv}$	$AlkLE_{vii}$	E_{4^*}	E_f
2300	$E_{1b}E_5E_{iv}$	$AlkLE_{vii}$	E_{4^*}	E_f
2301	$E_{1a}E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2302	$E_{1b}E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2303	$E_{1a}E_5E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f
2304	$E_{1b}E_5E_{iv}E_4$	$AlkLE_{vii}$	E_{4^*}	E_f

Use of the microorganisms according to the invention

A further subject of the present invention relates to the use of the aforesaid microorganisms for the production of ω-functionalized carboxylic acids and ω-functionalized carboxylate esters, in particular of those carboxylic acids and carboxylate esters, which were emphasized above as preferable in connection with the microorganisms according to the invention, wherein as the ω-functionalization, ω-amination in particular is to be emphasized. The use of the aforesaid microorganisms for the production of ω-aminocarboxylic acids and ω-aminocarboxylate esters, in particular ω-aminolauric acid and methyl and ethyl ω-aminolaurates and ω-aminocaproic acid and methyl and ethyl ω-aminocaproates is particularly preferable.

Microorganisms emphasized as preferable in connection with the microorganisms according to the invention are also preferable in connection with the use according to the invention. Which organisms according to the invention are preferable for specific ω-functionalized carboxylic acids or ω-functionalized carboxylate esters has already been emphasized in connection with the microorganisms according to the invention.

Process for the production of ω-functionalized carboxylic acids and of ω-functionalized carboxylate esters

A further subject of the present invention relates to a process for the production of ω-functionalized carboxylic acids and ω-functionalized carboxylate esters from a simple carbon source comprising the process steps

I) contacting a microorganism according to the invention with a medium containing the simple carbon source,

II) culturing the microorganism under conditions which enable the microorganism to form the ω-functionalized carboxylic acids or ω-functionalized carboxylate esters from the simple carbon source and

III) optionally isolation of the ω-functionalized carboxylic acids or ω-functionalized carboxylate esters formed.

In the process according to the invention, the microorganisms according to the invention can be contacted with the culture medium and cultured continuously or discontinuously in the batch process (batch culturing) or the fed-batch process or the repeated fed-batch process for the purpose of producing the ω-functionalized carboxylic acids or ω-functionalized carboxylate esters. Also possible is a semicontinuous process as described in GB-A-1009370. A summary of known culturing methods is described in the textbook by Chmiel ("Bioprozesstechnik 1. Einführung in die Bioverfahrenstechnik", Gustav Fischer Verlag, Stuttgart, 1991) or in the textbook by Storhas ("Bioreaktoren und periphere Einrichtungen", Vieweg Verlag, Braunschweig/Wiesbaden, 1994).

The culture medium to be used must appropriately meet the requirements of the respective strains. Descriptions of culture media for various microorganisms are contained in the American Society for Bacteriology manual "Manual of Methods for General Bacteriology" (Washington D.C., USA, 1981).

In the process according to the invention, microorganisms preferred according to the invention are preferably used.

As the simple carbon source in the process according to the invention, those mentioned above as preferable are used.

As the nitrogen source, organic nitrogen-containing compounds such as peptone, yeast extract, meat extract, malt extract, corn steep liquor, soya bean meal and urea or inorganic compounds such as ammonium sulphate, ammonium chloride, ammonium phosphate, ammonium

carbonate and ammonium nitrate, ammonia, ammonium hydroxide or aqueous ammonia can be used. The nitrogen sources can be used singly or as a mixture.

As the phosphorus source, phosphoric acid, potassium dihydrogen phosphate or dipotassium hydrogen phosphate or the corresponding sodium-containing salts can be used. The culture medium must further contain salts of metals, such as for example magnesium sulphate or iron sulphate, which are necessary for growth. Finally, essential nutrients such as amino acids and vitamins can be used in addition to the abovementioned substances. Apart from this, suitable precursors can be added to the culture medium. The said additives can be added to the culture in the form of a single preparation or fed in during the culturing in a suitable manner.

For pH control of the culture, basic compounds such as sodium hydroxide, potassium hydroxide, ammonia or aqueous ammonia or acidic compounds such as phosphoric acid or sulphuric acid can be used in a suitable manner. To control foam development, antifoaming agents such as for example fatty acid polyglycol esters can be used. For maintenance of the stability of plasmids, suitable selectively acting substances such as for example antibiotics can be added to the media. In order to maintain aerobic conditions, oxygen or oxygen-containing gas mixtures such as for example air are introduced into the culture.

According to one embodiment of the process according to the invention, this is performed in a two-phase system, comprising

A) an aqueous phase, and

B) an organic phase,

wherein the formation of the ω-functionalized carboxylic acids or ω-functionalized carboxylate esters by the microorganism in process step II) takes place in the aqueous phase and the ω-functionalized carboxylic acids or ω-functionalized carboxylate esters formed accumulate in the organic phase. In this manner, it is possible to extract the ω-functionalized carboxylic acids or ω-functionalized carboxylate esters formed *in situ*.

Preferred ω-functionalized carboxylic acids or ω-functionalized carboxylate esters which are produced with the process according to the invention are those mentioned above as preferred in connection with the microorganisms according to the invention and the use according to the invention.

Especially preferred ω-functionalized carboxylic acids or ω-functionalized carboxylate esters are the

ω-aminocarboxylic acids and ω-aminocarboxylate esters, in particular ω-aminolauric acid and methyl and ethyl ω-aminolaurates and ω-aminocaproic acid and methyl and ethyl ω-aminocaproates, and

ω-hydroxycarboxylic acids and ω-hydroxycarboxylate esters, in particular ω-hydroxylauric acid and methyl and ethyl ω-hydroxylaurates and ω-hydroxycaproic acid and methyl and ethyl ω-hydroxycaproates, and

ω-carboxycarboxylic acids and ω-carboxycarboxylate esters, in particular ω-carboxylauric acid and methyl and ethyl ω-carboxylaurates, and ω-carboxycaproic acid and methyl and ethyl ω-carboxycaproates.

Which organisms according to the invention are preferably used in preferred processes according to the invention for specific ω-functionalized carboxylic acids or ω-functionalized carboxylate esters has already been emphasized in connection with the microorganisms according to the invention.

A further subject of the present invention is a process for the production of polyamides based on ω-aminocarboxylic acids, comprising the process steps:

(a1) Production of ω-aminocarboxylic acids or ω-aminocarboxylate esters by one of the processes described above for the production of ω-aminocarboxylic acids, in particular by the process described above for the production of ω-aminolauric acid, methyl ω-aminolaurate, ω-aminocaproic acid or methyl ω-aminocaproate and optionally conversion of the ω-aminocarboxylate esters into ω-aminocarboxylic acids;

(a2) Polymerization of the ω-aminocarboxylic acid with obtention of a polyamide.

In process step (a2) of the process according to the invention for the production of polyamides based on ω-aminocarboxylic acids, the ω-aminocarboxylate esters can be converted into the ω-aminocarboxylic acids by any processes such as for example acid- or base-catalysed hydrolysis.

In process step (a2) of the process according to the invention for the production of polyamides based on ω-aminocarboxylic acids, the ω-aminocarboxylic acids obtained in process step (a1),

in particular the ω-aminolauric acid obtained in process step (a1), is converted to a polyamide in a polymerization wherein optionally mixtures of various ω-aminocarboxylic acids can also be used, whereof at least a part of the ω-aminocarboxylic acids, preferably at least 50 wt.% based on all ω-aminocarboxylic acids used in the process, but optionally also all ω-aminocarboxylic acids were produced by the process according to the invention for the production of ω-aminocarboxylic acids.

The production of the polyamides from the ω-aminocarboxylic acids can be effected in processes known per se, as for example described in L. Notarbartolo, Ind. Plast. Mod. 10 (1958) 2, p.44, JP 01-074224, JP 01-051433, JP63286428, JP58080324 or JP60179425.

In the examples presented below, the present invention is described by way of example, without it being intended that the invention, the scope of whose application appears from the whole description and claims, be limited to the embodiments mentioned in the examples.

Examples:

Example 1: Production of expression vectors for the genes fatB2 from Cuphea palustris, ald from Bacillus subtilis and Cv_2025 from Chromobacterium violaceum

For the production of an *E. coli* expression vector for the genes *fatB2* (SEQ ID No.10) from *Cuphea palustris* (enzyme E_1), *ald* (SEQ ID No.11) from *Bacillus subtilis* (enzyme E_3) and *Cv_2025* (SEQ ID No.12) from *Chromobacterium violaceum* (enzyme E_2), these genes were successively cloned into the vector pJ294 (DNA2.0 Inc., Menlo Park, CA, USA). The gene *Cv_2025* was synthesized together with a *lac*UV5 promoter and the gene *ald* from *Bacillus sphaericus* and simultaneously a cleavage site upstream of the promoter and a cleavage site downstream of the terminator were introduced. The synthesized DNA fragment P_{lacUV5}-ald_Bsp_TA_C.v.(Ct) (SEQ ID No.13) was digested with the restriction endonucleases *Pst*I and *Xba*I and ligated into the correspondingly cleaved vector pJ294. The finished *E. coli* expression vector was designated as pJ294_alaD_Bsp_TA_C.v.(Ct) (SEQ ID *No.*14). In this vector, the *Bacillus sphaericus ald* gene was replaced by the gene *ald* from *Bacillus subtilis*. The gene *ald* was amplified by PCR from chromosomal DNA of the strain *Bacillus subtilis* str. 168. The following oligonucleotides were used in this:

alaDH_pCR22_fw: 5'-ATGATCATAGGGGTTCCTAAAGAG-3'
(SEQ ID No.15)
alaDH_pCR22_rev: 5'-TTAAGCACCCGCCACAGATG-3'
(SEQ ID No.16)

The following parameters were used for the PCR: 1x: initial denaturation, 98°C, 0:30 mins; 35 x: denaturation, 98°C, 0:10 min, annealing, 65°C, 0:30 mins; elongation, 72°C, 0:20 mins; 1 x: terminal elongation, 72°C, 10 min. For the amplification, the Phusion™ High-Fidelity Master Mix from New England Biolabs (Frankfurt) was used according to the manufacturer's recommendations. 50 µl of each PCR reaction were then separated on a 1% TAE agarose gel. The PCR, agarose gel electrophoresis, ethidium bromide staining of the DNA and determination of the PCR fragment sizes were performed in the manner known to those skilled in the art. The PCR fragment exhibited the expected size of 1137 base-pairs and was purified from the PCR preparation with the Quick PCR Purification Kit from Qiagen (Hilden) according to the manufacturer's instructions. For the ligation of the PCR product with the vector, 5'-phosphates were attached to the PCR product by means of polynucleotide kinase (New England Biolabs, Frankfurt). For this, the manufacturer's recommendation was followed.

The vector was digested with the restriction endonucleases *Hin*dIII and *Nde*I, whereby the contained gene *Bacillus sphaericus ald* was removed. The restriction digestion mixture was separated on a 1% TAE agarose gel. Two bands, of sizes 5696 bp and 1124 bp could be identified. For the isolation of the vector-DNA from the agarose gel, the DNA band of 5696 bp was isolated from the gel with a scalpel and purified with the Quick Gel Extraction Kit from Qiagen (Hilden) according to the manufacturer's instructions. To create blunt ends, the 5' overhangs of the purified vector DNA were filled in by means of the Klenow fragment of DNA polymerase I (New England Biolabs, Frankfurt). For this, the manufacturer's instructions were followed. The DNA fragment *Bacillus subtilis ald* with 5' phosphate residues was ligated into the vector with blunt ends. The finished *E. coli* expression vector was designated as pJ294_alaDH_B.s._TA_C.v.(Ct) (SEQ ID No.17).

For the production of the complete expression vector, the gene *fatB2* from *Cuphea palustris* was codon-optimized for expression in *Escherichia coli*. The gene was synthesized together with a *tac* promoter (DNA 2.0; Menlo Park, CA, USA) and simultaneously a cleavage site upstream of the promoter and a cleavage site downstream of the terminator were introduced.

The synthesized DNA fragment *P_{tac}-CpFatB2* (SEQ ID No.18) was digested with the restriction endonucleases *BamH*I and *Not*I and ligated into the correspondingly cleaved vector pJ294_alaDH_B.s._TA_C.v.(Ct) and the vector pJ294. The finished vectors were designated as pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CpFATB2] (SEQ ID No.19) and pJ294[Ptac-CpFATB2_optEc] (SEQ ID No.20).

Example 2: LC-ESI/MS^2-based quantification of products

The quantification of methyl laurate LSME, methyl ω-hydroxylaurate HLSME, methyl ω-oxolaurate OLSME, methyl ω-aminolaurate ALSME and methyl ω-carboxylaurate DDSME, ω-aminolauric acid ALS, ω-carboxylauric acid DDS, lauric acid LS, ω-hydroxylauric acid HLS and ω-oxolauric acid OLS in fermentation samples was effected by means of LC-ESI/MS^2 on the basis of an external calibration for all analytes and with use of the internal standard aminoundecanoic acid (AUD).

For this, the following instruments were used:

- HPLC unit 1260 (Agilent; Böblingen) with autosampler (G1367E), binary pump (G1312B) and column oven (G1316A)
- Mass spectrometer TripelQuad 6410 (Agilent; Böblingen) with ESI source
- HPLC column: Kinetex C18, 100 x 2.1 mm, particle size: 2.6 µm, pore size 100 Å (Phenomenex; Aschaffenburg)
- Precolumn: KrudKatcher Ultra HPLC in-line filter; 0.5 µm filter depth and 0.004 mm internal diameter (Phenomenex; Aschaffenburg)

The samples were prepared by pipetting 1900 µL of solvent (acetone/ 0.1 N HCl mixture = 1:1) and 100 µL of sample into a 2 mL reaction vessel. The mixture was vortexed for ca. 10 seconds and then centrifuged at ca. 13,000 rpm for 5 mins. The clear supernatant was withdrawn with a pipette and analysed after appropriate dilution with diluent (80% (v/v) ACN, 20% bidest. H_2O (v/v), + 0.1% formic acid). 100 µL of ISTD were pipetted into each 900 µL sample (10 µL with a sample volume of 90 µL).

The HPLC separation was effected with the aforementioned column and precolumn. The injection volume was 0.7 µL, the column temperature 50°C and the flow rate 0.6 mL/min. The mobile phase consisted of eluent A (0.1% (v/v) aqueous formic acid) and eluent B (acetonitrile with 0.1% (v/v) formic acid). The following gradient profile was used

Time [mins]	Eluent A [%]	Eluent B [%]
0	77	23
0.3	77	23
0.4	40	60
2.5	40	60
2.6	2	98
5.5	2	98
5.6	77	23
9	77	23

The ESI-MS^2 analysis was effected in positive mode with the following ESI source parameters:

- Gas temperature 280°C
- Gas flow rate 11 l/min
- Nebulizer pressure 50 psi
- Capillary voltage 4000 V

The detection and quantification of the individual compounds was effected with the following parameters, wherein in each case one product ion was used as *Qualifier* and one as *Quantifier*:

Analyte	Precursor Ion	Product Ion	Dwell time	Collision energy
DDSME	245.2	167.1	25	6
DDSME	245.2	149.1	50	8
HLSME	231.3	181.2	15	2
HLSME	231.3	163.2	25	5
DDS	231.2	213.2	50	0
DDS	231.2	149.1	25	9
ALSME	230.3	198.1	25	10
ALSME	230.3	163.2	15	10
OLSME	229.2	197.2	50	0

OLSME	229.2	161.1	25	5
HLS	217.2	181.2	35	0
HLS	217.2	163.1	20	4
OLS	215.2	161.2	25	0
OLS	215.2	95.2	60	13

Example 3: Production of aminolauric acid by an E. coli strain with deletion of the gene fadE and expression vectors for the genes fatB2 from Cuphea palustris, ald from Bacillus subtilis, and Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes alkB, alkG, alkT and alkL from the alk operon of Pseudomonas putida.

The host strain used *E. coli* JW5020-1 (CGSC, The coli genetic stock center, Yale University, New Haven, USA) is an E. *coli* BW25113 derivative which carries a deletion of the gene *fadE* (coding for enzyme E_b). The gene *fadE* was replaced by a kanamycin cassette. Before the provision of the strain with the expression vectors by means of a helper plasmid which codes for the Flp recombinase, this was removed in a manner known to those skilled in the art (see Datsenko K.A. and Wanner B.L. (2000) PNAS 97(12):6640-6645), resulting in the strain *E. coli* JW5020-1 Kan^S. To create an E. *coli* strain with expression vectors for the genes *fatB2* from *Cuphea palustris* (enzyme E_i), *ald* from *Bacillus subtilis* (enzyme E_3), and *Cv_2025* from *Chromobacterium violaceum* (enzyme E_2) in combination with the expression vector pBT10_alkL (sequence and production: compare Example 1 of PCT/EP2011/053834 and the Seq ID No.8 listed there) for the genes *alkB* (enzyme E_{1a}), *alkG, alkT* (auxiliary enzymes to enzyme E_{1b}) and *alkL* (coding for alkL gene product) from the alk operon of *Pseudomonas putida* GPo1, electrocompetent cells of *E. coli* JW5020-1 Kan^S were produced. This took place in a manner known to those skilled in the art. This was transformed with the plasmids pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CpFATB2] and pBT10_alkL and plated out onto LB agar plates containing ampicillin (100 µg/ml) and kanamycin (50 µg/ml). Transformants were checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis. In this manner, the following strain was constructed: *E. coli* JW5020-1 Kan^S pBT10_alkL / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CpFATB2].

The strain was subjected to a *fed-batch* fermentation in order to analyse its capacity for the production of aminolauric acid from glucose. The strain to be tested was firstly grown from a

glycerine culture as a preculture in M9 medium containing 100 µg/ml ampicillin and 50 µg/ml kanamycin at 37°C overnight. The medium, consisting of 38 mM disodium hydrogen phosphate dihydrate, 22 mM potassium dihydrogen phosphate, 8.6 mM sodium chloride, 37 mM ammonium chloride, 1.5% (w/v) glucose, 2 mM magnesium sulphate heptahydrate (all substances from Merck, Darmstadt) and 0.5% (v/v) trace element solution, was adjusted to a pH of 7.4 with 25% ammonium hydroxide solution. The trace element solution added, consisting of 9.7 mM manganese(II) chloride tetrahydrate, 6.5 mM zinc sulphate heptahydrate, 2.5 mM sodium EDTA (Titriplex III), 4.9 mM boric acid, 1 mM sodium molybdate dihydrate, 32 mM calcium chloride dihydrate, 64 mM iron(II) sulphate heptahydrate and 0.9 mM copper(II) chloride dihydrate dissolved in 37% hydrochloric acid (all substances from Merck, Darmstadt) was sterile-filtered before addition to the M9 medium. The fermenter was inoculated with the preculture such that an optical density of 0.06 was reached. The culturing was effected at a pH of 6.8, regulated with 25% aqueous ammonia and 0.5 M sulphuric acid, an oxygen partial pressure of 20%, regulated via a stirrer speed of 800 rpm/min and air feed of 0.4 vvm/min at the start of the fermentation, and a temperature of 37°C. The glucose feed took place after consumption of the glucose present in the medium, at a feed rate of 5 g/l/hr based on the initial volume. At the start of the glucose feed after 9 hours fermentation, the temperature was adjusted to 30°C. The gene expression was induced 2 hours after the start of the glucose feed by addition of 1 mM isopropyl-β-D-thiogalactopyranoside and 0.025% dicyclopropyl ketone. The strain was cultured for a further 49 hours under constant conditions. During the culturing, 1 ml samples were withdrawn and the concentration of fatty acids and ω-functionalized fatty acids quantified by the method described in Example 2. The results are shown in the following table.

$c_{\text{lauric acid}}$ [mg/l]	$c_{\text{carboxylauric acid}}$ [mg/l]	$c_{\text{hydroxylauric acid}}$ [mg/l]	$c_{\text{aminolauric acid}}$ [mg/l]
56.5	16.0	54.4	22.8

Production of ω-functionalized fatty acids with *E. coli* JW5020-1 Kan^S pBT10_alkL / pJ294[alaDH_Bs_TAcv(ct_Ptac-CpFATB2]. The concentrations of lauric acid and ω-carboxy-lauric acid, ω-hydroxylauric acid and ω-aminolauric acid after 60 hours fermentation are stated:

Example 4: Production of an E. coli *expression vector for the genes* fadD *from* Escherichia coli *and* atfA *from* Acinetobacter sp. *ADP1*

For the production of the *E. coli* expression vector for the genes *fadD* (SEQ ID No.21) from *Escherichia coli* (coding for enzyme E_{vi}) and *atfA* with terminator (SEQ ID No.22) from *Acinetobacter sp.* ADP1 (coding for enzyme E_v) under control of a *tac* promoter, these genes were amplified from chromosomal DNA of *E. coli* W3110 and *Acinetobacter calcoaceticus* ADP1 respectively by PCR with incorporation of homologous regions for the recombination cloning. The synthetic *tac* promoter (SEQ ID No.23) was amplified with ribosome binding site from a pJ294 derivative (DNA 2.0; Menlo Park, CA, USA) with incorporation of homologous regions. The preparation of the chromosomal DNA from *E. coli* W3110 and *Acinetobacter calcoaceticus* ADP1 was effected by means of DNeasy Blood & Tissue Kit (Qiagen, Hilden) according to the manufacturer's instructions. In the amplification of the genes *fadD* from *E. coli* and *atfA* from *Acinetobacter sp.* ADP1 with chromosomal DNA of *E. coli* W3110 and *Acinetobacter calcoaceticus* ADP1 respectively as matrix, and the amplification of the synthetic promoter P_{tac} from a pJ294 derivative the following oligonucleotides were used:

P_{tac}:

11-001_fw: 5'-TTATGCGACTCCTGCGTTTAGGGAAAGAGCATTTG-3'
(SEQ ID No.24)

Ptac-rv: 5'- GTTAACATATGTTTTACCTCCTGTTAAACAAA-3'
(SEQ ID No.25)

fadD [*E. coli*]:

fadD-fw: 5'-TAAAACATATGTTAACGGCATGTATATCATTT-3'
(SEQ ID No.26)

fadD-rv: 5'-TCTCCTCAGACTTAACGCTCAGGCTTTATTGT-3'
(SEQ ID No.27)

atfA [*Acinetobacter sp.* ADP1]:

atfA-fw: 5'-GTTAAGTCTGAGGAGATCCACGCTATGCGCCC-3'
(SEQ ID No.28)

11-002_rv: 5'-CAATTGAGATCTGCCACGACTGCAATGGTTCATC-3'
(SEQ ID No.29)

The following parameters were used for the PCR: 1 x: initial denaturation, 103°C, 3:00 mins; 35 x: denaturation, 98°C, 0:10 mins, annealing, 65°C, 0:15 min; elongation, 72°C, 0:45 mins; 1 x: terminal elongation, 72°C, 10 mins. For the amplification, the Phusion™ High-Fidelity Master Mix from New England Biolabs (Frankfurt) was used according to the manufacturer's recommendations. 50 µl of each PCR reaction were then separated on a 1% TAE agarose gel. The PCR, agarose gel electrophoresis, ethidium bromide staining of the DNA and determination of the PCR fragment sizes were performed in the manner known to those skilled in the art.
In all cases, PCR fragments of the expected size could be amplified. These were: for the promoter region P_{tac} 607 bp, for *fadD* 1778 bp and for *atfA* 1540 bp.
For the isolation of the DNA from an agarose gel, the target DNA was isolated from the gel with a scalpel and purified with the Quick Gel Extraction Kit from Qiagen (Hilden) according to the manufacturer's instructions. The purified PCR products were recombined with the *EcoN*I/*Nde*I - cleaved vector pCDFDuet™-1 (71340-3, Merck, Darmstadt) by means of *in vitro* cloning with use of the Geneart Seamless Cloning and Assembly Kit from Invitrogen (Darmstadt). The use corresponded to the manufacturer's recommendations. pCDFDuet-1 is an E. *coli* vector which mediates a spectinomycin/streptomycin resistance in the organism and carries a ColDF13 replication origin. The transformation of chemically competent *E. coli* DH5α cells (New England Biolabs, Frankfurt) was effected in a manner known to those skilled in the art.
The correctness of the plasmid was checked by a restriction analysis with *Xba*I. The authenticity of the inserted fragments was checked by DNA sequencing. The finished *E. coli* expression vector was designated as pCDF[fadD-atfA] (SEQ ID No.30).

Example 5: Production of methyl aminolaurate and ethyl aminolaurate by an E. coli strain with deletion of the gene fadE and expression vectors for the genes fatB2 from Cuphea palustris, ald from Bacillus subtilis, and Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes alkB, alkG, alkT and alkL from the alk operon of Pseudomonas putida and an expression vector for the genes fadD from Escherichia coli and atfA from Acinetobacter sp. ADP1.

To create an E. *coli* strain with expression vectors for the genes *fatB2* from *Cuphea palustris* (coding for enzyme E_1), *ald* from *Bacillus subtilis* (coding for enzyme E_3) and *Cv_2025* from

Chromobacterium violaceum (coding for enzyme E_2) in combination with an expression vector for the genes *alkB* (coding for enzyme E_{1b}), *alkG, alkT* (coding for auxiliary enzymes to enzyme E_{1b}) and *alkL* (coding for alkL gene product) from the alk operon of *Pseudomonas putida* GPo1 and an expression vector for the genes *fadD* from *Escherichia coli* (coding for enzyme E_{vi}) and *atfA* from *Acinetobacter sp.* ADP1 (coding for enzyme E_v), electrocompetent cells of *E. coli* JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art. *E. coli* JW5020-1 Kan^S is a derivative of *E. coli* JW5020-1 (CGSC, The coli genetic stock center, Yale University, New Haven, USA), and this in turn is an E. *coli* BW25113 derivative which carries a deletion of the gene *fadE* (coding for enzyme E_b). The gene *fadE* was replaced by a kanamycin cassette. Before the provision of the strain with the expression vectors by means of a helper plasmid, which codes for the Flp recombinase, this was removed in a manner known to those skilled in the art (see Datsenko K.A. and Wanner B.L. (2000) PNAS 97(12):6640-6645), resulting in the strain *E. coli* JW5020-1 Kan^S. *E. coli* JW5020-1 Kan^S and *E. coli* W3110 ΔfadE (construction described in Example 8) are sequentially transformed with the plasmids pBT10_alkL, pCDF[fadD-atfA] and pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CpFATB2] and plated out onto LB agar plates containing kanamycin (50 µg/ml), spectinomycin (100 µg/ml) and ampicillin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis. In this manner, the following strains are constructed: *E. coli* JW5020-1 Kan^S pBT10_alkL / pCDF[fadD-atfA] / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CpFATB2] and *E. coli* W3110 ΔfadE pBT10_alkL / pCDF[fadD-atfA] / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CpFATB2].

The strain is subjected to *fed-batch* fermentation in order to analyse its capacity for the production of methyl aminolaurate and ethyl aminolaurate from glucose. The strain to be tested is firstly grown from a glycerine culture as a preculture in M9 medium containing kanamycin (50 µg/ml), spectinomycin (100 µg/ml) and ampicillin (100 µg/ml) at 37°C overnight. The medium, consisting of 38 mM disodium hydrogen phosphate dihydrate, 22 mM potassium dihydrogen phosphate, 8.6 mM sodium chloride, 37 mM ammonium chloride, 1.5% (w/v) glucose, 2 mM magnesium sulphate heptahydrate (all substances from Merck, Darmstadt) and 0.5% (v/v) trace element solution, is adjusted to a pH of 7.4 with 25% ammonium hydroxide solution. The trace element solution added, consisting of 9.7 mM manganese(II) chloride tetrahydrate, 6.5 mM zinc sulphate heptahydrate, 2.5 mM sodium EDTA (Titriplex III), 4.9 mM boric acid, 1 mM sodium molybdate dihydrate, 32 mM calcium chloride dihydrate, 64 mM iron(II)

sulphate heptahydrate and 0.9 mM copper(II) chloride dihydrate dissolved in 37% hydrochloric acid (all substances from Merck, Darmstadt), is sterile-filtered before addition to the M9 medium. The fermenter is inoculated with the preculture such that an optical density of 0.2 is reached. The culturing is effected at a pH of 6.8, regulated with 25% aqueous ammonia and 0.5 M sulphuric acid, an oxygen partial pressure of 20%, regulated via the stirrer speed and the air feed, and a temperature of 37°C. The glucose feed is effected after consumption of the glucose present in the medium, at a feed rate of 5 g/l/hr based on the initial volume. At the start of the glucose feed, the temperature is adjusted to 30°C. Gene expression is induced 2 hours after the start of the glucose feed by addition of 1 mM isopropyl-β-D-thiogalactopyranoside and 0.025% dicyclopropyl ketone. Simultaneously with the induction, 2% (v/v) methanol or 2% (v/v) ethanol are added as methyl group donor or ethyl group donor for the fatty acid esterification. The strain is cultured for at least a further 48 hours under constant conditions. During the culturing, 1 ml samples are withdrawn and the concentration of fatty acid methyl esters, fatty acid ethyl esters, ω-functionalized fatty acid methyl esters and ω-functionalized fatty acid ethyl esters quantified by the method described in Example 2. It is shown that the strains *E. coli* JW5020-1 Kan^S pBT10_alkL / pCDF[fadD-atfA] / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CpFATB2] and *E. coli* W3110 ΔfadE pBT10_alkL / pCDF[fadD-atfA] / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CpFATB2] are capable of forming methyl laurate, methyl ω-hydroxylaurate, methyl ω-oxolaurate, methyl ω-aminolaurate and methyl ω-carboxylaurate with addition of 2% (v/v) methanol and ethyl laurate, ethyl ω-hydroxylaurate, ethyl ω-oxolaurate, ethyl ω-aminolaurate and ethyl ω-carboxylaurate with addition of 2% (v/v) ethanol respectively.

Example 6: Production of expression vectors for the genes synUcTE from Umbellularia californica, ald from Bacillus subtilis and Cv_2025 from Chromobacterium violaceum

For the production of an *E. coli* expression vector for the genes *synUcTE* (SEQ ID No.31) from *Umbellularia californica* (coding for an enzyme E_1), *ald* (SEQ ID No.33) from *Bacillus subtilis* (coding for an enzyme E_3) and *Cv_2025* (SEQ ID No.35) from *Chromobacterium violaceum* (coding for an enzyme E_2), the gene *synUcTE* was codon-optimized for expression in *Escherichia coli* and synthesized together with a *tac* promoter (SEQ ID No.37). During the synthesis, a cleavage site upstream of the promoter and a cleavage site downstream of the terminator were introduced. The synthesized DNA fragment P_{tac}-*synUcTE* was digested with the

restriction endonucleases *BamH*I and *Not*I and ligated into the correspondingly cleaved vector pJ294_alaDH_B.s._TA_C.v.(Ct) (SEQ ID No.17) and the vector pJ294 (DNA2.0 Inc., Menlo Park, CA, USA). The finished vectors were designated as pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.38) and pJ294[Ptac-synUcTE] (SEQ ID No.39).

Example 7: Production of expression vectors for the genes fadD from Escherichia coli and wax-dgaT from Acinetobacter sp. ADP1 and atfA1 from Alcanivorax borkumensis

For the production of expression vectors for the genes *fadD* (SEQ ID No.21) from *Escherichia coli* and *wax-dgaT* (SEQ ID No.42) (coding for an enzyme E_v) from *Acinetobacter sp.* ADP1 and *atfA1* (SEQ ID No.44) (coding for an enzyme E_v) from *Alcanivorax borkumensis* SK2 respectively, the genes *wax-dgaT* and *atfA1* were codon-optimized for expression in *Escherichia coli* and synthesized in combination with the Gen *fadD* from E. coli (coding for an enzyme E_{vi}). The synthesized DNA fragments *wax-dgaT_AsADP1-fadD_Ec* (SEQ ID No.46) and *atfA1_Ab-fadD_Ec* (SEQ ID No.47) were amplified with incorporation of homologous regions for recombination cloning.

For the amplification of the fragment *wax-dgaT_AsADP1-fadD_Ec* the following oligonucleotides were used:

wax-dgaT_H1_fw: 5'- ACAGGAGGTAAAACATATGCGTCCTCTGCACCCG-3'
(SEQ ID No.51)

fadD_H2_rv: 5'- GTTTCTTTACCAGACTCGAGATTGTTTTCTCTTTAGTGGGCGTC-3'
(SEQ ID No.52)

For the amplification of the fragment *atfA1_Ab-fadD_Ec* the following oligonucleotides were used:

atfA_Ab_fw_kurz: 5'- ACAGGAGGTAAAACATATGAAAGCGCTGTCCC-3'
(SEQ ID No.53)

fadD_H2_rv_N: 5'-GTTTCTTTACCAGACTCGAGATTGTTTTCTCTTTAGTGGGC-3'
(SEQ ID No.54)

The following parameters were used for the PCR: 1 x: initial denaturation, 98°C, 0:30 mins;

35 x: denaturation, 98°C, 0:10 min, annealing, 70°C, 0:20 mins; elongation, 72°C, 1 min; 1 x: terminal elongation, 72°C, 10 min. For the amplification, the Phusion™ High-Fidelity Master Mix from New England Biolabs (Frankfurt) was used according to the manufacturer's recommendations. 50 µl of each PCR reaction were then separated on a 1% TAE agarose gel. The PCR, agarose gel electrophoresis, ethidium bromide staining of the DNA and determination of the PCR fragment sizes were performed in the manner known to those skilled in the art. In both cases, PCR fragments of the expected size could be amplified. These were 3192 base pairs for *wax-dgaT_AsADP1-fadD_Ec* and 3189 base pairs for *atfA1_Ab-fadD_Ec*. For the isolation of the DNA from the agarose gel, the target DNA was cut out from the gel with a scalpel and purified with the *QiaQuick Gel extraction Kit* according to the manufacturer's instructions (Qiagen, Hilden). The purified PCR products were cloned into a *NdeI*- and *XhoI*-cleaved pCDF derivative, which already contains a synthetic *tac* promoter (SEQ ID No.50), by means of recombination with use of the Geneart® Seamless Cloning and Assembly Kit according to the manufacturer's instructions (Life Technologies, Carlsbad, CA, USA). The transformation of chemically competent *E. coli* DH5α (New England Biolabs, Frankfurt) was effected in a manner known to those skilled in the art. The correct insertion of the target genes was checked by restriction analysis and the authenticity of the incorporated genes confirmed by DNA sequencing. The resulting expression vectors were designated as pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec] (SEQ ID No.48) and pCDF[atfA1_Ab(co_Ec)-fadD_Ec] (SEQ ID No.49).

Example 8: Production of methyl aminolaurate by an E. coli strain with deletion in the gene fadE and expression vectors for the genes synUcTE from Umbellularia californica, ald from Bacillus subtilis, and Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes alkB, alkG, alkT and alkL from the alk operon of Pseudomonas putida and an expression vector for the genes fadD from Escherichia coli and wax-dgaT from Acinetobacter sp. ADP1 or atfA1 from Alcanivorax borkumensis

Firstly, an *E. coli* strain with deletion in the gene *fadE* (SEQ ID No.40) was constructed. For the production of the gene deletion, a plasmid was constructed which carries the DNA sequence Δ*fadE* (SEQ ID No.55). This sequence was synthesized and consists of homologous regions 500 base pairs upstream and downstream from the *fadE* gene and the recognition sequence for

the restriction endonuclease *Not*I at the 5' and 3' end. The sequence Δ*fadE* was digested with the restriction endonuclease *Not*I and ligated into the correspondingly cleaved vector pKO3. The strain *E. coli* W3110 Δ*fadE* was constructed by means of the pKO3-Δ*fadE* construct (SEQ ID No.56) by methods known to those skilled in the art (see Link AJ, Phillips D, Church GM. J.Bacteriol. 1997. 179(20)). The DNA sequence of *fadE* after deletion is reproduced in SEQ ID No.57.

To create an E. *coli* strain with expression vectors for the genes *synUcTE* from *Umbellularia californica*, *ald* from *Bacillus subtilis*, and *Cv_2025* from *Chromobacterium violaceum* in combination with an expression vector for the genes *alkB* (enzyme E_{1a}), *alkG*, *alkT* (auxiliary enzymes to enzyme E_{1b}) and *alkL* (coding for alkL gene product) from the alk operon of *Pseudomonas putida* GPo1 and an expression vector for the genes *fadD* from *Escherichia coli* and *wax-dgaT* from *Acinetobacter sp.* ADP1 or *atfA1* from *Alcanivorax borkumensis* SK2, electrocompetent cells of *E. coli* W3110 ΔfadE were produced. This took place in a manner known to those skilled in the art. *E. coli* W3110 ΔfadE was sequentially transformed with the plasmids pBT10_alkL (sequence and production: compare Example 1 of PCT/EP2011/053834 and the Seq ID No.8 listed there), pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.38) and pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec] (SEQ ID No.48) and pCDF[atfA1_Ab(co_Ec)-fadD_Ec] (SEQ ID No.49) respectively and plated out onto LB agar plates containing kanamycin (50 µg/ml), ampicillin (100 µg/ml) and spectinomycin (100 µg/ml). Transformants were checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis. In this manner the following strains were constructed:

E. coli W3110 ΔfadE pBT10_alkL / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]

E. coli W3110 ΔfadE pBT10_alkL / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

The strains were subjected to a *fed-batch* fermentation in order to analyse their capacity for the production of methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl aminolaurate from glucose. This was performed with an 8-fold parallel fermentation system from DASGIP.

For the fermentation, 1L reactors were used, which were equipped with overhead stirrers and impeller turbines. For process monitoring, pH and pO_2 were measured online. OTR/CTR

measurements were used inter alia for estimation of the metabolic selectivity and fitness of the cells.

The pH probes were calibrated by means of a two-point calibration with standard solutions of pH 4.0 and pH 7.0 according to the technical manual of DASGIP. The reactors were equipped with the necessary sensors and connections according to the technical manual and the stirrer shaft mounted. They were filled with 300 mL water and autoclaved for 20 mins at 121°C to ensure sterility. Next, the pO2 probes were polarized overnight after connection to the measurement amplifier. Next, the water was removed under the clean bench, and replaced by high cell density medium consisting of $(NH_4)_2SO4$ 1.76 g/L, K_2HPO_4 19.08 g/L, KH_2PO_4 12.5 g/L, yeast extract 6.66 g/L, trisodium citrate dihydrate 11.2g, 17mL /L of a separately autoclaved 1% ammonium iron citrate solution, and 5 mL/L of separately autoclaved trace element stock solution (consisting of HCl (37%) 36.50 g/L, $MnCl_2*4H_2O$ 1.91 g/L, $ZnSO_4*7H_2O$ 1.87 g/L, ethylenediaminetetraacetic acid dihydrate 0.84 g/L, H_3BO_3 0.30 g/L. $Na_2MoO_4*2H_2O$ 0.25 g/L, $CaCl_2*2H_2O$ 4.70 g/L, $FeSO_4*7H_2O$ 17.80 g/L, $CuCl_2*2H_2O$ 0.15 g/L) with 15 g/L glucose as carbon source (added by metering in 30 mL/L of a separately autoclaved feed solution consisting of 500 g/L glucose, 1% (w/v) $MgSO_4*7H_2O$ and 2.2% (w/v) NH_4Cl) containing 100 mg/L ampicillin, 50 mg/L kanamycin and 100 mg/L spectinomycin.

Below, the pO2 probes were calibrated with a one-point calibration (stirrer: 600 rpm / gassing: 10 sL/hr air) and the feed-, correction agent and induction agent lines cleaned by means of Cleaning-in-Place according to the technical manual. For this, the tubes were flushed with 70% ethanol, then with 1 M NaOH, then with sterile demineralized water and finally filled with the respective media.

The strains W3110 ΔfadE pJ294[alaDH_Bs/TAcv(ct)]{Ptac}[synUcTE] pBT10_alkL pCDF[atfA_AsADP1(co_Ec)/fadD] and W3110 ΔfadE pJ294[alaDH_Bs/TAcv(ct)]{Ptac}[synUcTE] pBT10_alkL pCDF[atfA1_Ab(co_Ec)/fadD] were firstly grown from a cryoculture in LB medium (25 mL in a 100 mL baffle flask) containing 100 mg/L ampicillin, 50 mg/L kanamycin and 100 mg/L spectinomycin overnight at 37°C and 200 rpm for ca. 18 hrs. Next, 2 mL of this culture were transferred for a second preculture stage into 25 mL of high cell density medium consisting of $(NH_4)_2SO_4$ 1.76 g/L, K_2HPO_4 19.08 g/L, KH_2PO_4 12.5 g/L, yeast extract 6.66 g/L, trisodium citrate dihydrate 11.2g, 17mL /L of a separately autoclaved 1% ammonium iron citrate solution, and 5 mL/L of separately autoclaved trace element stock solution (consisting of HCl (37%) 36.50 g/L, $MnCl_2*4H_2O$ 1.91 g/L,

$ZnSO_4*7H_2O$ 1.87 g/L, ethylenediaminetetraacetic acid dihydrate 0.84 g/L, H_3BO_3 0.30 g/L. $Na_2MoO_4*2H_2O$ 0.25 g/L, $CaCl_2*2H_2O$ 4.70 g/L, $FeSO_4*7H_2O$ 17.80 g/L, $CuCl_2*2H_2O$ 0.15 g/L) with 15 g/L glucose as carbon source (added by metering in 30 mL/L of a separately autoclaved feed solution consisting of 500 g/L glucose, 1% (w/v) $MgSO_4*7H_2O$ and 2.2% (w/v) NH_4Cl) containing the antibiotics already described in a 100 mL shaker flask and again incubated at 37°C / 200 rpm for a further 6 hrs.

In order to inoculate the reactors with an optical density of 0.1, the OD of the second preculture stage was measured and the quantity of culture required for the inoculation calculated. The required quantity of culture was added to the thermostatted and aerated reactor through a septum by means of a 5 mL syringe.

The following standard programme was used:

DO regulator		pH regulator	
Preset	0%	Preset	0 mL/hr
P	0.1	P	5
Ti	300 secs	Ti	200 secs
Min	0%	Min	0 mL/hr
Max	100%	Max	40 mL/hr

N (Rotation)	from	to	XO2 (gas mixture)	from	to	F (gas flow)	from	to
Growth and biotrans-formation	0%	30%	Growth and biotrans-formation	0%	100%	Growth and biotrans-formation	15%	80%
	400 rpm	1500 rpm		21%	21%		6 sL/hr	72 sL/hr

Script	
Trigger exactly	31% DO (1/60hr)
Induction IPTG	2 hrs after feed start
Feed trigger	50% DO

Feed rate	3 [mL/hr]

The pH was regulated at pH 6.8 with 12.5% ammonia solution. During growth and biotransformation, the dissolved oxygen (pO_2 or DO) in the culture was regulated to at least 30% via stirrer revolution rate and gassing rate. After inoculation, the DO fell from 100% to this 30%, where it was maintained stable for the remainder of the fermentation.

The fermentation was performed as fed-batch, wherein as entry to the fed phase, with 5 g/Lhr glucose feed consisting of 500 g/L glucose, 1% (w/v) $MgSO_4*7H_2O$ and 2.2% (w/v) NH_4Cl, the feed start was triggered via the DO peak indicating the end of the batch phase. At feed start, the temperature was also lowered from 37°C to 30°C.

At this time, 24 mL of oleic acid, an oleic acid/hexadecane (1:1 (w/w)) or 2-hexyldecanoic acid/hexadecane mixture (1:1 (w/w)) were added to the reactors. 2 hrs after feed start, the expression of the genes *fadD* from *Escherichia coli* and *atfA* from *Acinetobacter sp.* ADP1 or *atfA1* from *Alcanivorax borkumensis* SK2 was induced by the automatic addition of a prepared IPTG solution for 1 mM final concentration in the reactor. This IPTG solution also contained 3 mL methanol, which is required for the esterification of the fatty acids produced. The induction of the *alkBGT* genes was effected by the manual addition of 0.025% (v/v) DCPK 10 hrs after feed start.

During the culturing, samples were withdrawn and the concentration of fatty acids and ω-functionalized fatty acids quantified with the method described below.

For the sampling, 2 mL of fermentation broth were withdrawn from the vessel and a portion thereof diluted 1/10 in an acetonitrile-formic acid mixture (80% (v/v) acetonitrile in water; 0.1% (v/v) formic acid).

The quantification of methyl laurate LSME, methyl ω-hydroxylaurate HLSME, methyl ω-oxolaurate OLSME, methyl ω-aminolaurate ALSME and methyl ω-carboxylaurate DDSME, ω-aminolauric acid ALS, ω-carboxylauric acid DDS, lauric acid LS, ω-hydroxylauric acid HLS and ω-oxolauric acid OLS in the fermentation samples was effected by means of LC-ESI/MS^2 on the basis of an external calibration for all analytes (0.1 – 50 mg/L) and with use of the internal standards aminoundecanoic acid (AUD), d4-ALSME, 13C-DDSME and d3-LSME.

For this, the following instruments were used:

- HPLC unit 1260 (Agilent; Böblingen) with autosampler (G1367E), binary pump (G1312B) and column oven (G1316A)

- Mass spectrometer TripelQuad 6410 (Agilent; Böblingen) with ESI source
- HPLC column: Kinetex C18, 100 x 2.1 mm, particle size: 2.6 µm, pore size 100 Å (Phenomenex; Aschaffenburg)
- Precolumn: KrudKatcher Ultra HPLC in-line filter; 0.5 µm filter depth and 0.004 mm internal diameter (Phenomenex; Aschaffenburg)

The samples were prepared by pipetting 1900 µL of solvent (80% (v/v) ACN, 20% bidest. H_2O (v/v), + 0.1% formic acid) and 100 µL of sample into a 2 mL reaction vessel. The mixture was vortexed for ca. 10 seconds and then centrifuged at ca. 13,000 rpm for 5 mins. The clear supernatant was withdrawn with a pipette and analysed after appropriate dilution with diluent (80% (v/v) ACN, 20% bidest. H_2O (v/v), + 0.1% formic acid). 100 µL of ISTD were pipetted into each 900 µL sample (10 µL with a sample volume of 90 µL).

The HPLC separation was effected with the aforementioned column and precolumn. The injection volume was 0.7 µL, the column temperature 50°C and the flow rate 0.6 mL/min. The mobile phase consisted of eluent A (0.1% (v/v) aqueous formic acid) and eluent B (acetonitrile with 0.1% (v/v) formic acid). The following gradient profile was used

Time [mins]	Eluent A [%]	Eluent B [%]
0	77	23
0.3	77	23
0.4	40	60
2.5	40	60
2.6	2	98
5.5	2	98
5.6	77	23
9	77	23

The ESI-MS^2 analysis was effected in positive mode with the following ESI source parameters:

- Gas temperature 280°C
- Gas flow rate 11 L/min

- Nebulizer pressure 50 psi
- Capillary voltage 4000 V

The detection and quantification of the individual compounds was effected with the following parameters, wherein in each case one product ion was used as *Qualifier* and one as *Quantifier*:

Analyte	Precursor Ion [m/z]	Product Ion [m/z]	Dwell time[ms]	Collision energy [eV]
DDSME	245.2	167.1	25	6
DDSME	245.2	149.1	50	8
HLSME	231.3	181.2	15	2
HLSME	231.3	163.2	25	5
DDS	231.2	213.2	50	0
DDS	231.2	149.1	25	9
ALSME	230.3	198.1	25	10
ALSME	230.3	163.2	15	10
OLSME	229.2	197.2	50	0
OLSME	229.2	161.1	25	5
HLS	217.2	181.2	35	0
HLS	217.2	163.1	20	4
OLS	215.2	161.2	25	0
OLS	215.2	95.2	60	13

It was shown that the strains *E. coli* W3110 ΔfadE pBT10_alkL / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec] and *E. coli* W3110 ΔfadE pBT10_alkL / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec] with addition of 1% (v/v) methanol are capable of forming methyl laurate, methyl ω-hydroxylaurate, methyl ω-oxolaurate, methyl ω-aminolaurate and methyl ω-carboxylaurate. In addition it could be shown that under these conditions both strains also form lauric acid, ω-hydroxylauric acid, ω-oxolauric acid, ω-aminolauric acid and ω-carboxy-lauric acid.

Production of ω-functionalized fatty acid methyl esters. The concentrations of methyl laurate, methyl ω-carboxylaurate, methyl ω-hydroxylaurate, methyl ω-oxolaurate and methyl ω-amino-laurate after 38.33 hours fermentation time are stated.

Strain	Added organic phase	$c_{methyl\ laurate}$ [mg/L]	$c_{methyl\ \omega\text{-}carboxylaurate}$ [mg/L]	$c_{methyl\ \omega\text{-}hydroxylaurate}$ [mg/L]	$c_{methyl\ \omega\text{-}oxolaurate}$ [mg/L]	$c_{methyl\ \omega\text{-}aminolaurate}$ [mg/L]
E.coli W3110 ΔfadE pBT10_alkL / pJ294[alaDH_B.s._TA_C.v.(ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]	Oleic acid	28.4	1.8	4.6	2.0	4.0
E.coli W3110 ΔfadE pBT10_alkL / pJ294[alaDH_B.s._TA_C.v.(ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]	Oleic acid	20.2	0.4	0.8	1.2	2.2
E.coli W3110 ΔfadE pBT10_alkL / pJ294[alaDH_B.s._TA_C.v.(ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]	Oleic acid/ hexadecane	13.2	1.4	2.1	1.3	2.6
E.coli W3110 ΔfadE pBT10_alkL / pJ294[alaDH_B.s._TA_C.v.(ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]	2-hexyl-decanoic acid/ hexadecane	7.5	0.9	1.7	0.1	40.6

Example 9: Production of methyl aminolaurate by an E. coli strain with deletion of the gene fadE and expression vectors for the genes synUcTE from Umbellularia californica, ald from Bacillus subtilis, and Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes alkB, alkG and alkT from the alk operon of Pseudomonas putida and an expression vector for the genes fadD from Escherichia coli and wax-dgaT from Acinetobacter sp. ADP1 or atfA1 from Alcanivorax borkumensis

To create an E. *coli* strain with expression vectors for the genes *synUcTE* from *Umbellularia californica*, *ald* from *Bacillus subtilis*, and *Cv_2025* from *Chromobacterium violaceum* in combination with an expression vector for the genes *alkB, alkG* and *alkT* from the alk operon of *Pseudomonas putida* GPo1 and an expression vector for the genes *fadD* from *Escherichia coli* and *wax-dgaT* from *Acinetobacter sp.* ADP1 or *atfA1* from *Alcanivorax borkumensis* SK2, electrocompetent cells of *E. coli* W3110 ΔfadE (construction described in Example 8) are produced. This takes place in a manner known to those skilled in the art. *E. coli* W3110 ΔfadE is sequentially transformed with the plasmids pBT10 (construction described in practical example B.2 of PCT/EP2008/067447), pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.5) and pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec] (SEQ ID No.16) and pCDF[atfA1_Ab(co_Ec)-fadD_Ec] (SEQ ID No.17) respectively and plated out onto LB agar plates containing kanamycin (50 µg/ml), ampicillin (100 µg/ml) and spectinomycin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis. In this manner, the following strains are constructed:

- *E. coli* W3110 ΔfadE pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* W3110 ΔfadE pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

The strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for the production of methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl aminolaurate from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that the strains *E. coli* W3110 ΔfadE pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec] and *E. coli* W3110 ΔfadE pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec] with addition of 1% (v/v) methanol are capable of forming lauric acid, methyl laurate, methyl ω-hydroxylaurate, methyl ω-oxolaurate, methyl ω-aminolaurate and methyl ω-carboxylaurate.

Example 10: Production of methyl aminohexanoate, methyl aminooctanoate, methyl aminodecanoate, methyl aminotetradecanoate and methyl amino-9-hexadecenoate by E. coli

strains without deletion of an fad gene and with deletion of one of the genes fadA, fadB, fadD, fadE or fadL and expression vectors for the genes synUcTE from Umbellularia californica, ChFATB2 from Cuphea hookeriana, CnFATB3 from Cocos nucifera or CPF_2954 from Clostridium perfringens and ald from Bacillus subtilis, Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes alkB, alkG and alkT from the alk operon of Pseudomonas putida and an expression vector for the genes fadD from Escherichia coli and wax-dgaT from Acinetobacter sp. ADP1 or atfA1 from Alcanivorax borkumensis

To create *E. coli* strains with expression vectors for the genes synUcTE from *Umbellularia californica*, ChFATB2 from *Cuphea hookeriana* (SEQ ID No.58), CnFATB3 from *Cocos nucifera* (SEQ ID No.60) or CPF_2954 from *Clostridium perfringens* (SEQ ID No.62) and *ald* from *Bacillus subtilis*, and *Cv_2025* from *Chromobacterium violaceum* in combination with an expression vector for the genes *alkB, alkG* and *alkT* from the alk operon of *Pseudomonas putida* GPo1 and an expression vector for the gene *fadD* from *Escherichia coli* and *wax-dgaT* from *Acinetobacter sp.* ADP1 or *atfA1* from *Alcanivorax borkumensis* SK2, electrocompetent cells of *E. coli* BW25113, JW5578-1 Kan^S, JW3822-1 Kan^S, JW1794-1 Kan^S, JW5020-1 Kan^S and JW2341-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.

E. coli JW5578-1 Kan^S, JW3822-1 Kan^S, JW1794-1 Kan^S, JW5020-1 Kan^S and JW2341-1 Kan^S are derivatives of *E. coli E. coli* JW5578-1, JW3822-1, JW1794-1, JW5020-1 and JW2341-1 (CGSC, The coli genetic stock center, Yale University, New Haven, USA), and these in turn are *E. coli* BW25113 derivatives which carry a deletion of the genes *fadA* (SEQ ID No.64; coding for enzyme E_f), *fadB* (SEQ ID No.66; coding for enzyme E_d and an enzyme E_e), *fadD* (SEQ ID No.21; coding for enzyme E_a), *fadE* (SEQ ID No.40; coding for enzyme E_b) and *fadL* (SEQ ID No.68; coding for an enzyme which catalyses the transport of fatty acid methyl esters across the outer membrane). The genes *fadA*, *fadB*, *fadD*, *fadE* and *fadL* are replaced by a kanamycin cassette. Before the provision of the strain with the expression vectors by means of a helper plasmid, which codes for the Flp recombinase, this is removed in a manner known to those skilled in the art (see Datsenko K.A. and Wanner B.L. (2000) PNAS 97(12):6640-6645), resulting in strains JW5578-1 Kan^S, JW3822-1 Kan^S, JW1794-1 Kan^S, JW5020-1 Kan^S and JW2341-1 Kan^S.

BW25113, JW5578-1 Kan^S, JW3822-1 Kan^S, JW1794-1 Kan^S, JW5020-1 Kan^S and JW2341-1 Kan^S are sequentially transformed with the plasmids

1. pBT10 (construction described in practical example B.2 of PCT/EP2008/067447), and
2. pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.38), pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] (SEQ ID No.70), pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] (SEQ ID No.71), or pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] (SEQ ID No.72), and
3. pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec] (SEQ ID No.16) or pCDF[atfA1_Ab(co_Ec)-fadD_Ec] (SEQ ID No.17)

and plated out onto LB agar plates containing kanamycin (50 µg/ml), ampicillin (100 µg/ml) and spectinomycin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.

The plasmids pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] (SEQ ID No.38), pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] (SEQ ID No.70) and pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] (SEQ ID No.71) are created starting from the plasmid pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.72), in that the gene coding for the thioesterase synUcTE together with P_{tac} and a 3' flanking region is cut out from the vector via *Bam*HI/*Not*I and replaced by the genes coding for the thioesterases ChFATB2 (SEQ ID No.59) CnFATB3 (SEQ ID No.61) or CPF_2954 (SEQ ID No.63) (incl. P_{tac} and identical 3' flanking region). These fragments are created by gene synthesis, wherein the regions coding for ChFATB2 and CnFATB3 are codon-optimized for translation in *E. coli*, but the region coding for CPF_2954 is not codon-optimized, but instead the wild type sequence is used.

In this manner, inter alia the following strains are constructed:

- *E. coli* BW25113 pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* BW25113 pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

- *E. coli* JW5578-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5578-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW3822-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW3822-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW1794-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW1794-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW2341-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW2341-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl aminolaurate and methyl hydroxytetradecanoate, methyl oxotetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.
It is shown that these strains, with addition of 1% (v/v) methanol, are capable of forming methyl laurate, methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl

aminolaurate and methyl tetradecanoate, methyl hydroxytetradecanoate, methyl oxo-tetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate from glucose.

Further, the following strains are constructed:

- *E. coli* BW25113 pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* BW25113 pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW5578-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5578-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW3822-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW3822-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW1794-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW1794-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW2341-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]

- *E. coli* JW2341-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of methyl hydroxyoctanoate, methyl oxooctanoate, methyl carboxyoctanoate and methyl aminooctanoate and methyl hydroxydecanoate, methyl oxodecanoate, methyl carboxydecanoate and methyl aminodecanoate from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.
It is shown that these strains, with addition of 1% (v/v) methanol, are capable of forming methyl octanoate, methyl hydroxyoctanoate, methyl oxooctanoate, methyl carboxyoctanoate and methyl aminooctanoate and methyl decanoate, methyl hydroxydecanoate, methyl oxodecanoate, methyl carboxydecanoate and methyl aminodecanoate from glucose.

Further, the following strains are constructed:

- *E. coli* BW25113 pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* BW25113 pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW5578-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5578-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW3822-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW3822-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW1794-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]

- *E. coli* JW1794-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW2341-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW2341-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl aminolaurate and methyl hydroxytetradecanoate, methyl oxotetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate and methyl hydroxy-9-hexadecenoate, methyl oxo-9-hexadecenoate, methyl carboxy-9-hexadecenoate and methyl amino-9-hexadecenoate from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that these strains, with addition of 1% (v/v) methanol, are capable of forming methyl laurate, methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl aminolaurate and methyl tetradecanoate, methyl hydroxytetradecanoate, methyl oxotetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate and methyl 9-hexadecenoate, methyl hydroxy-9-hexadecenoate, methyl oxo-9-hexadecenoate, methyl carboxy-9-hexadecenoate and methyl amino-9-hexadecenoate from glucose.

Finally, the following strains are constructed:

- *E. coli* BW25113 pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* BW25113 pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

- *E. coli* JW5578-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5578-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW3822-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW3822-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW1794-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW1794-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW2341-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW2341-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of methyl hydroxyoctanoate, methyl oxooctanoate, methyl carboxyoctanoate and methyl aminooctanoate and methyl hydroxyhexanoate, methyl oxohexanoate, methyl carboxyhexanoate and methyl aminohexanoate from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that these strains, with addition of 1% (v/v) methanol, are capable of forming methyl octanoate, methyl hydroxyoctanoate, methyl oxooctanoate, methyl carboxyoctanoate and

methyl aminooctanoate and methyl hexanoate, methyl hydroxyhexanoate, methyl oxohexanoate, methyl carboxyhexanoate and methyl aminohexanoate from glucose.

Example 11: Production of aminohexanoic acid, aminooctanoic acid, aminodecanoic acid, aminotetradecanoic acid and amino-9-hexadecenoic acid by E. coli strains with deletion of one of the genes fadA, fadB, fadD, fadE or fadL and expression vectors for the genes synUcTE from Umbellularia californica, ChFATB2 from Cuphea hookeriana, CnFATB3 from Cocos nucifera or CPF_2954 from Clostridium perfringens (Genbank Acc. # ABG82470 SEQ-ID XY) and ald from Bacillus subtilis, Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes alkB, alkG and alkT from the alk operon of Pseudomonas putida

To create *E. coli* strains with expression vectors for the genes synUcTE from *Umbellularia californica*, ChFATB2 from *Cuphea hookeriana* (SEQ ID No.58), CnFATB3 from *Cocos nucifera* (SEQ ID No.60) or CPF_2954 from *Clostridium perfringens* (SEQ ID No.62) and *ald* from *Bacillus subtilis*, and *Cv_2025* from *Chromobacterium violaceum* in combination with an expression vector for the genes *alkB, alkG* and *alkT* from the alk operon of *Pseudomonas putida* GPo1, electrocompetent cells of *E. coli* JW5578-1 Kan^S, JW3822-1 Kan^S, JW1794-1 Kan^S, JW5020-1 Kan^S and JW2341-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.

JW5578-1 Kan^S, JW3822-1 Kan^S, JW1794-1 Kan^S, JW5020-1 Kan^S and JW2341-1 Kan^S are sequentially transformed with the plasmids

1. pBT10 (construction described in practical example B.2 of PCT/EP2008/067447), and
2. pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.38),
   pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] (SEQ ID No.70),
   pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] (SEQ ID No.71), or
   pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] (SEQ ID No.72)

and plated out onto LB agar plates containing kanamycin (50 µg/ml) and ampicillin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.

In this manner, inter alia the following strains are constructed:

- *E. coli* BW25113 pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE]
- *E. coli* JW5578-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE]
- *E. coli* JW3822-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE]
- *E. coli* JW1794-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE]
- *E. coli* JW2341-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of hydroxylauric acid, oxolauric acid, carboxylauric acid and aminolauric acid and hydroxytetradecanoic acid, oxotetradecanoic acid, carboxytetradecanoic acid and aminotetradecanoic acid from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that these strains are capable of forming lauric acid, hydroxylauric acid, oxolauric acid, carboxylauric acid and aminolauric acid and tetradecanoic acid, hydroxytetradecanoic acid, oxotetradecanoic acid, carboxytetradecanoic acid and aminotetradecanoic acid from glucose.

Further, the following strains are constructed:

- *E. coli* BW25113 pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2]
- *E. coli* JW5578-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2]
- *E. coli* JW3822-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2]
- *E. coli* JW1794-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] /
- *E. coli* JW2341-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of hydroxyoctanoic acid, oxooctanoic acid, carboxyoctanoic acid and aminooctanoic acid and hydroxydecanoic acid, oxodecanoic acid, carboxydecanoic acid and aminodecanoic

acid from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that these strains are capable of forming octanoic acid, hydroxyoctanoic acid, oxooctanoic acid, carboxyoctanoic acid and aminooctanoic acid and decanoic acid, hydroxydecanoic acid, oxodecanoic acid, carboxydecanoic acid and aminodecanoic acid from glucose.

Further, the following strains are constructed:

- *E. coli* BW25113 pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3]
- *E. coli* JW5578-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3]
- *E. coli* JW3822-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3]
- *E. coli* JW1794-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3]
- *E. coli* JW2341-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of hydroxylauric acid, oxolauric acid, carboxylauric acid and aminolauric acid and hydroxytetradecanoic acid, oxotetradecanoic acid, carboxytetradecanoic acid and aminotetradecanoic acid and hydroxy-9-hexadecenoic acid, oxo-9-hexadecenoic acid, carboxy-9-hexadecenoic acid and amino-9-hexadecenoic acid from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that these strains are capable of forming lauric acid, hydroxylauric acid, oxolauric acid, carboxylauric acid and aminolauric acid and tetradecanoic acid, hydroxytetradecanoic acid, oxotetradecanoic acid, carboxytetradecanoic acid and aminotetradecanoic acid and 9-hexadecenoic acid, hydroxy-9-hexadecenoic acid, oxo-9-hexadecenoic acid, carboxy-9-hexadecenoic acid and amino-9-hexadecenoic acid from glucose.

Finally, the following strains are constructed:

- *E. coli* BW25113 pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954]
- *E. coli* JW5578-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954]
- *E. coli* JW3822-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954]

- *E. coli* JW1794-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954]
- *E. coli* JW2341-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of hydroxyoctanoic acid, oxooctanoic acid, carboxyoctanoic acid and aminooctanoic acid and hydroxyhexanoic acid, oxohexanoic acid, carboxyhexanoic acid and aminohexanoic acid from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that these strains are capable of forming octanoic acid, hydroxyoctanoic acid, oxooctanoic acid, carboxyoctanoic acid and aminooctanoic acid and hexanoic acid, hydroxyhexanoic acid, oxohexanoic acid, carboxyhexanoic acid and aminohexanoic acid from glucose.

Example 12: Production of methyl aminolaurate by an E. coli strain with deletion in the gene fadE and expression vectors for the genes synUcTE from Umbellularia californica, ald from Bacillus subtilis, Psyr_4866 from Pseudomonas syringae pv. syringae B728a, PFL_5927 from Pseudomonas protegens Pf-5, PSPPH_4896 from Pseudomonas syringae pv. phaseolicola 1448A or PSPTOT1_2473 from Pseudomonas syringae pv. tomato T1 in combination with an expression vector for the genes alkB, alkG, alkT and alkL from the alk operon of Pseudomonas putida and an expression vector for the genes fadD from Escherichia coli and wax-dgaT from Acinetobacter sp. ADP1 or atfA1 from Alcanivorax borkumensis

To create *E. coli* strains with expression vectors for the genes synUcTE from *Umbellularia californica*, *ald* from *Bacillus subtilis*, Psyr_4866 from *Pseudomonas syringae pv. syringae* B728a (SEQ ID No.73), PFL_5927 from *Pseudomonas protegens* Pf-5 (SEQ ID No.75), PSPPH_4896 from *Pseudomonas syringae pv. phaseolicola* 1448A (SEQ ID No.77) or PSPTOT1_2473 from *Pseudomonas syringae pv. tomato* T1 (SEQ ID No.79) in combination with an expression vector for the genes *alkB, alkG* and *alkT* from the alk operon of *Pseudomonas putida* GPo1 and an expression vector for the genes *fadD* from *Escherichia coli* and *wax-dgaT* from *Acinetobacter sp.* ADP1 or *atfA1* from *Alcanivorax borkumensis*,

electrocompetent cells of *E. coli* JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.

JW5020-1 Kan^S is sequentially transformed with the plasmids

1. pBT10 (construction described in practical example B.2 of PCT/EP2008/067447), and
2. pJ294[alaDH_B.s._TA_Psyr_4866_Ptac-synUcTE] (SEQ ID No.81), pJ294[alaDH_B.s._TA_PFL_5927_Ptac-synUcTE] (SEQ ID No.82), pJ294[alaDH_B.s._TA_PSPPH_4896_Ptac-synUcTE] (SEQ ID No.83), or pJ294[alaDH_B.s._TA_PSPTOT1_2473_Ptac-synUcTE] (SEQ ID No.84), and
3. pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec] (SEQ ID No.16) or pCDF[atfA1_Ab(co_Ec)-fadD_Ec] (SEQ ID No.17)

and plated out onto LB agar plates containing kanamycin (50 µg/ml), ampicillin (100 µg/ml) and spectinomycin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.

The plasmids pJ294[alaDH_B.s._Psyr_4866_Ptac-synUcTE] (SEQ ID No.81), pJ294[alaDH_B.s._TA_PFL_5927_Ptac-synUcTE] (SEQ ID No.82), pJ294[alaDH_B.s._TA_PSPPH_4896_Ptac-synUcTE] (SEQ ID No.83) and pJ294[alaDH_B.s._TA_PSPTOT1_2473_Ptac-synUcTE] (SEQ ID No.84) are created starting from the plasmid pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.38), in that the gene coding for the transaminase Cv_2025 with the 3' end of the *ald* gene from *Bacillus subtilis* and a 3' flanking region is cut out from the vector via *Bgl*II/*Fse*I and replaced by the genes coding for the transaminases Psyr_4866 (SEQ ID No.74), PFL_5927 (SEQ ID No.76), PSPPH_4896 (SEQ ID No.78) or PSPTOT1_2473 (SEQ ID No.80) (incl. the 3' end of the *ald* gene from *Bacillus subtilis* and identical 3' flanking region). These fragments are created by gene synthesis, wherein the regions coding for Psyr_4866, PFL_5927, PSPPH_4896 and PSPTOT1_2473 are codon-optimized for translation in *E. coli.*

In this manner, the following strains are constructed:

- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._Psyr_4866_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]

- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._Psyr_4866_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_PFL_5927_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_PFL_5927_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_PSPPH_4896_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_PSPPH_4896_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_PSPTOT1_2473_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_PSPTOT1_2473_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl aminolaurate and methyl hydroxytetradecanoate, methyl oxotetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.
It is shown that these strains, with addition of 1% (v/v) methanol, are capable of forming methyl laurate, methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl aminolaurate and methyl tetradecanoate, methyl hydroxytetradecanoate, methyl oxotetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate from glucose.

Example 13: Production of aminolauric acid by an E. coli strain with deletion in the gene fadE and expression vectors for the genes synUcTE from Umbellularia californica, ald from Bacillus subtilis, Psyr_4866 from Pseudomonas syringae pv. syringae B728a, PFL_5927 from Pseudomonas protegens Pf-5, PSPPH_4896 from Pseudomonas syringae pv. phaseolicola

1448A or PSPTOT1_2473 from Pseudomonas syringae pv. tomato T1 in combination with an expression vector for the genes alkB, alkG, alkT and alkL from the alk operon of Pseudomonas putida

To create *E. coli* strains with expression vectors for the genes synUcTE from *Umbellularia californica*, *ald* from *Bacillus subtilis*, Psyr_4866 from *Pseudomonas syringae pv. syringae* B728a (SEQ ID No.73), PFL_5927 from *Pseudomonas protegens* Pf-5 (SEQ ID No.75), PSPPH_4896 from *Pseudomonas syringae pv. phaseolicola* 1448A (SEQ ID No.77) or PSPTOT1_2473 from *Pseudomonas syringae pv. tomato* T1 (SEQ ID No.79) in combination with an expression vector for the genes *alkB, alkG* and *alkT* from the alk operon of *Pseudomonas putida* GPo1, electrocompetent cells of *E. coli* JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.

JW5020-1 Kan^S is sequentially transformed with the plasmids

1. pBT10 (construction described in practical example B.2 of PCT/EP2008/067447), and
2. pJ294[alaDH_B.s._TA_Psyr_4866_Ptac-synUcTE] (SEQ ID No.81),
   pJ294[alaDH_B.s._TA_PFL_5927_Ptac-synUcTE] (SEQ ID No.82),
   pJ294[alaDH_B.s._TA_PSPPH_4896_Ptac-synUcTE] (SEQ ID No.83), or
   pJ294[alaDH_B.s._TA_PSPTOT1_2473_Ptac-synUcTE] (SEQ ID No.84)

and plated out onto LB agar plates containing kanamycin (50 µg/ml) and ampicillin (100 µg/ml) t. Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.

In this manner, the following strains are constructed:

- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._Psyr_4866_Ptac-synUcTE]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_PFL_5927_Ptac-synUcTE]
- *E. coli* JW5020-1 Kan^S pBT10pJ294[alaDH_B.s._TA_PSPPH_4896_Ptac-synUcTE]
- *E. coli* JW5020-1 Kan^S pBT10pJ294[alaDH_B.s._TA_PSPTOT1_2473_Ptac-synUcTE]

These strains are subjected to *fed-batch* fermentation in order to analyse their capacity for production of hydroxylauric acid, oxolauric acid, carboxylauric acid and aminolauric acid and hydroxytetradecanoic acid, oxotetradecanoic acid, carboxytetradecanoic acid and

aminotetradecanoic acid from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that these strains are capable of forming lauric acid, hydroxylauric acid, oxolauric acid, carboxylauric acid and aminolauric acid and tetradecanoic acid, hydroxytetradecanoic acid, oxotetradecanoic acid, carboxytetradecanoic acid and aminotetradecanoic acid from glucose.

Example 14: Production of methyl aminolaurate by an E. coli strain with deletion in the gene fadE and expression vectors for the genes synUcTE from Umbellularia californica, alr2355 from Nostoc sp. PCC 7120, Rleg_1610 from Rhizobium leguminasorum bv. trifolii WSM1325, blr1738 (aldA) from Bradyrhizobium japonicum USDA 110 or BMD_5199 from Bacillus megaterium DSM 319 and Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes alkB, alkG, alkT and alkL from the alk operon of Pseudomonas putida and an expression vector for the genes fadD from Escherichia coli and wax-dgaT from Acinetobacter sp. ADP1 or atfA1 from Alcanivorax borkumensis

To create *E. coli* strains with expression vectors for the genes synUcTE from *Umbellularia californica*, *alr2355* from *Nostoc sp.* PCC 7120 (SEQ ID No.85), *Rleg_1610* from *Rhizobium leguminasorum bv. trifolii* WSM1325 (SEQ ID No.87), *blr1738* (*aldA*) from *Bradyrhizobium japonicum* USDA 110 (SEQ ID No.89) or *BMD_5199* from Bacillus megaterium DSM 319 (SEQ ID No.91) and Cv_2025 from *Chromobacterium violaceum* in combination with an expression vector for the genes *alkB, alkG* and *alkT* from the alk operon of *Pseudomonas putida* GPo1 and an expression vector for the genes *fadD* from *Escherichia coli* and *wax-dgaT* from *Acinetobacter sp.* ADP1 or *atfA1* from *Alcanivorax borkumensis*, electrocompetent cells of *E. coli* JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.

JW5020-1 Kan^S is sequentially transformed with the plasmids

1. pBT10 (construction described in practical example B.2 of PCT/EP2008/067447), and
2. pJ294[alr2355_TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.93),
   pJ294[Rleg_1610_TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.94),
   pJ294[blr1738_TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.95), or

pJ294[BMD_5199_TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.96),
and

3. pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec] (SEQ ID No.16) bzw. pCDF[atfA1_Ab(co_Ec)-fadD_Ec] (SEQ ID No.17)

and plated out onto LB agar plates containing kanamycin (50 µg/ml), ampicillin (100 µg/ml) and spectinomycin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.
The plasmids pJ294[alr2355_TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.93), pJ294[Rleg_1610_TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.94), pJ294[blr1738_TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.95) and pJ294[BMD_5199_TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.96) are created starting from the plasmid pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.38, in that the gene coding for the alanine dehydrogenase from *Bacillus subtilis* together with the P_{lacUV5} and the 5' end of the *Cv_2025* gene from *Chromobacterium violaceum* is cut out of the vector via *Pst*I/*Eco*NI and replaced by the genes coding for the alanine dehydrogenases alr2355 (SEQ ID No.86), Rleg_1610 (SEQ ID No.88), blr1738 (SEQ ID No.90) or BMD_5199 (SEQ ID No.92) (incl. P_{lacUV5} and the 5' end of the *Cv_2025* gene from *Chromobacterium violaceum*). These fragments are created by gene synthesis, wherein the regions coding for alr2355, Rleg_1610, blr1738 and BMD_5199 are not codon-optimized for translation in *E. coli*, but instead the wild type sequences are used.
In this manner, the following strains are constructed:

- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alr2355_TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alr2355_TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[Rleg_1610_TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[Rleg_1610_TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[blr1738_TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[blr1738_TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[BMD_5199_TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[BMD_5199_TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl aminolaurate and methyl hydroxytetradecanoate, methyl oxotetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.
It is shown that these strains, with addition of 1% (v/v) methanol, are capable of forming methyl laurate, methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl aminolaurate and methyl tetradecanoate, methyl hydroxytetradecanoate, methyl oxotetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate from glucose.

Example 15: Production of aminolauric acid by an E. coli strain with deletion in the gene fadE and expression vectors for the genes synUcTE from Umbellularia californica, alr2355 from Nostoc sp. PCC 7120, Rleg_1610 from Rhizobium leguminasorum bv. trifolii WSM1325, blr1738 (aldA) from Bradyrhizobium japonicum USDA 110 or BMD_5199 from Bacillus megaterium DSM 319 and Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes alkB, alkG, alkT and alkL from the alk operon of Pseudomonas putida

To create *E. coli* strains with expression vectors for the genes synUcTE from *Umbellularia californica*, *alr2355* from *Nostoc sp.* PCC 7120 (SEQ ID No.85), *Rleg_1610* from *Rhizobium leguminasorum bv. trifolii* WSM1325 (SEQ ID No.87), *blr1738* (*aldA*) from *Bradyrhizobium japonicum* USDA 110 (SEQ ID No.89) or *BMD_5199* from Bacillus megaterium DSM 319 (SEQ

ID No.91) and Cv_2025 from *Chromobacterium violaceum* in combination with an expression vector for the genes *alkB, alkG* and *alkT* from the alk operon of *Pseudomonas putida* GPo1, electrocompetent cells of *E. coli* JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.

JW5020-1 Kan^S is sequentially transformed with the plasmids

1. pBT10 (construction described in practical example B.2 of PCT/EP2008/067447), and
2. pJ294[alr2355_TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.93),
   pJ294[Rleg_1610_TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.94),
   pJ294[blr1738_TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.95), or
   pJ294[BMD_5199_TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.96)

and plated out onto LB agar plates containing kanamycin (50 µg/ml) and ampicillin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.

In this manner, the following strains are constructed:

- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alr2355_TA_C.v.(Ct)_Ptac-synUcTE]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[Rleg_1610_TA_C.v.(Ct)_Ptac-synUcTE]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[blr1738_TA_C.v.(Ct)_Ptac-synUcTE]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[BMD_5199_TA_C.v.(Ct)_Ptac-synUcTE]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of hydroxylauric acid, oxolauric acid, carboxylauric acid and aminolauric acid and hydroxytetradecanoic acid, oxotetradecanoic acid, carboxytetradecanoic acid and aminotetradecanoic acid from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that these strains are capable of forming lauric acid, hydroxylauric acid, oxolauric acid, carboxylauric acid and aminolauric acid and tetradecanoic acid, hydroxytetradecanoic acid, oxotetradecanoic acid, carboxytetradecanoic acid and aminotetradecanoic acid from glucose.

Example 16: Production of methyl aminolaurate by an E. coli strain with deletion in the gene fadE and expression vectors for the genes synUcTE from Umbellularia californica and Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes alkB, alkG, alkT and alkL from the alk operon of Pseudomonas putida and an expression vector for the genes fadD from Escherichia coli and wax-dgaT from Acinetobacter sp. ADP1 or atfA1 from Alcanivorax borkumensis

To create *E. coli* strains with expression vectors for the genes synUcTE from *Umbellularia californica* and Cv_2025 from *Chromobacterium violaceum* in combination with an expression vector for the genes *alkB, alkG* and *alkT* from the alk operon of *Pseudomonas putida* GPo1 and an expression vector for the genes *fadD* from *Escherichia coli* and *wax-dgaT* from *Acinetobacter sp.* ADP1 or *atfA1* from *Alcanivorax borkumensis*, electrocompetent cells of *E. coli* JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.

JW5020-1 Kan^S is sequentially transformed with the plasmids

1. pBT10 (construction described in practical example B.2 of PCT/EP2008/067447), and
2. pJ294[TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.97), and
3. pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec] (SEQ ID No.16), or pCDF[atfA1_Ab(co_Ec)-fadD_Ec] (SEQ ID No.17)

and plated out onto LB agar plates containing kanamycin (50 µg/ml), ampicillin (100 µg/ml) and spectinomycin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.

The plasmid pJ294[TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.97) is created starting from the plasmid pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.38), in that parts of the gene coding for the alanine dehydrogenase from *Bacillus subtilis* essential for functional expression are cut out from the vector with *Pme*I/*Sna*BI and this is then religated.

In this manner, the following strains are constructed:

- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl aminolaurate and methyl hydroxytetradecanoate, methyl oxotetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.
It is shown that these strains, with addition of 1% (v/v) methanol, are capable of forming methyl laurate, methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl aminolaurate and methyl tetradecanoate, methyl hydroxytetradecanoate, methyl oxotetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate from glucose.

Example 17: Production of aminolauric acid by an E. coli strain with deletion in the gene fadE and expression vectors for the genes synUcTE from Umbellularia californica and Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes alkB, alkG, alkT and alkL from the alk operon of Pseudomonas putida

To create *E. coli* strains with expression vectors for the genes synUcTE from *Umbellularia californica* and Cv_2025 from *Chromobacterium violaceum* in combination with an expression vector for the genes *alkB, alkG* and *alkT* from the alk operon of *Pseudomonas putida* GPo1, electrocompetent cells of *E. coli* JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.
JW5020-1 Kan^S is sequentially transformed with the plasmids

1. pBT10 (construction described in practical example B.2 of PCT/EP2008/067447), and
2. pJ294[TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.97)

and plated out onto LB agar plates containing kanamycin (50 µg/ml) and ampicillin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.
In this manner, the following strain is constructed:

- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[TA_C.v.(Ct)_Ptac-synUcTE]

This strain is subjected to a *fed-batch* fermentation in order to analyse its capacity for the production of hydroxylauric acid, oxolauric acid, carboxylauric acid and aminolauric acid and hydroxytetradecanoic acid, oxotetradecanoic acid, carboxytetradecanoic acid and

aminotetradecanoic acid from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that this strain is capable of producing lauric acid, hydroxylauric acid, oxolauric acid, carboxylauric acid and aminolauric acid and tetradecanoic acid, hydroxytetradecanoic acid, oxotetradecanoic acid, carboxytetradecanoic acid and aminotetradecanoic acid from glucose.

Example 18: Production of methyl aminolaurate by an E. coli strain with deletion in the gene fadE and an expression vector for the gene synUcTE from Umbellularia californica in combination with an expression vector for the genes alkB, alkG, alkT and alkL from the alk operon of Pseudomonas putida and an expression vector for the gene fadD from Escherichia coli and wax-dgaT from Acinetobacter sp. ADP1 or atfA1 from Alcanivorax borkumensis

To create *E. coli* strains with an expression vector for the gene synUcTE from *Umbellularia californica* in combination with an expression vector for the genes *alkB, alkG* and *alkT* from the alk operon of *Pseudomonas putida* GPo1 and an expression vector for the genes *fadD* from *Escherichia coli* and *wax-dgaT* from *Acinetobacter sp.* ADP1 or *atfA1* from *Alcanivorax borkumensis*, electrocompetent cells of *E. coli* JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.

JW5020-1 Kan^S is sequentially transformed with the plasmids

1. pBT10 (construction described in practical example B.2 of PCT/EP2008/067447), and
2. pJ294[Ptac-synUcTE] (SEQ ID No.98), and
3. pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec] (SEQ ID No.16), or pCDF[atfA1_Ab(co_Ec)-fadD_Ec] (SEQ ID No.17)

and plated out onto LB agar plates containing kanamycin (50 µg/ml), ampicillin (100 µg/ml) and spectinomycin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.

The plasmid pJ294[Ptac-synUcTE] (SEQ ID No.98) is created starting from the plasmid pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.38), in that parts of the genes coding for the alanine dehydrogenase from *Bacillus subtilis* and the transaminase *Cv_2025*

from *Chromobacterium violaceum* essential for functional expression are cut out from the vector with *Srf*I/*Sna*BI and this is then religated.

In this manner, the following strains are constructed:

- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of methyl hydroxylaurate, methyl oxolaurate and methyl carboxylaurate and methyl hydroxytetradecanoate, methyl oxotetradecanoate and methyl carboxytetradecanoate from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that these strains, with addition of 1% (v/v) methanol, are capable of forming methyl laurate, methyl hydroxylaurate, methyl oxolaurate and methyl carboxylaurate and methyl tetradecanoate, methyl hydroxytetradecanoate, methyl oxotetradecanoate and methyl carboxytetradecanoate from glucose.

Example 19: Production of aminolauric acid by an E. coli strain with deletion in the gene fadE and an expression vector for the gene synUcTE from Umbellularia californica in combination with an expression vector for the genes alkB, alkG, alkT and alkL from the alk operon of Pseudomonas putida

To create *E. coli* strains with an expression vector for the gene synUcTE from *Umbellularia californica* in combination with an expression vector for the genes *alkB, alkG* and *alkT* from the alk operon of *Pseudomonas putida* GPo1, electrocompetent cells of *E. coli* JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.

JW5020-1 Kan^S is sequentially transformed with the plasmids

1. pBT10 (construction described in practical example B.2 of PCT/EP2008/067447), and
2. pJ294[Ptac-synUcTE] (SEQ ID No.96)

and plated out onto LB agar plates containing kanamycin (50 µg/ml) and ampicillin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.

In this manner, the following strain is constructed:

- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[Ptac-synUcTE]

This strain is subjected to a *fed-batch* fermentation in order to analyse its capacity for the production of hydroxylauric acid, oxolauric acid and carboxylauric acid and hydroxy-tetradecanoic acid, oxotetradecanoic acid and carboxytetradecanoic acid from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8. It is shown that this strain is capable of producing lauric acid, hydroxylauric acid, oxolauric acid and carboxylauric acid and tetradecanoic acid, hydroxytetradecanoic acid, oxotetradecanoic acid and carboxytetradecanoic acid from glucose.

Example 20: Production of methyl aminohexanoate, methyl aminooctanoate, methyl aminodecanoate, methyl aminotetradecanoate and methyl amino-9-hexadecenoate by E. coli strains with deletion of the fadE gene and expression vectors for the genes synUcTE from Umbellularia californica, ChFATB2 from Cuphea hookeriana, CnFATB3 from Cocos nucifera or CPF_2954 from Clostridium perfringens and ald from Bacillus subtilis, Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes alkB, alkG and alkT from the alk operon of Pseudomonas putida and an expression vector for the gene Mmar_3356 from Mycobacterium marinum or the gene 'tesA from E. coli*

To create *E. coli* strains with expression vectors for the genes *synUcTE* from *Umbellularia californica, ChFATB2* from *Cuphea hookeriana* (SEQ ID No.58), *CnFATB3* from *Cocos nucifera* (SEQ ID No.60) or *CPF_2954 from Clostridium perfringens* (SEQ ID No.62) and *ald* from *Bacillus subtilis,* and *Cv_2025* from *Chromobacterium violaceum* in combination with an expression vector for the genes *alkB, alkG and alkT* from the *alk* operon of *Pseudomonas putida GPo1* and an expression vector for the gene *Mmar_3356 from Mycobacterium marinum* (SEQ ID No.99) or the gene *'tesA** from *E. coli* (SEQ ID No.101), electrocompetent cells of E. coli JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.

JW5020-1 Kan^S is sequentially transformed with the plasmids

- pBT10 (construction described in practical example B.2 of PCT/EP2008/067447), and
- pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.38), pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] (SEQ ID No.70), pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] (SEQ ID No.71), or pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CPF_2954] (SEQ ID No.72), and
- pCDF[Mmar_3356] (SEQ ID No.103), or pCDF[Ec'tesA*] (SEQ ID No.104)

and plated out onto LB agar plates containing kanamycin (50 µg/ml), ampicillin (100 µg/ml) and spectinomycin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.

The plasmids pCDF[Mmar_3356] (SEQ ID No.103) and pCDF[Ec'tesA*] (SEQ ID No.104) are created starting from the plasmid pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec] (SEQ ID No.16), in that the *wax-dgaT* gene from *Acinetobacter sp.* ADP1 and the *fadD* gene from *E. coli* are cut out from the vector with *Bam*HI/*Xho*I incl. P_{tac} and the 3'-flanking region of *fadD* and replaced by the genes coding for the fatty acid O-methyltransferase Mmar_3356 (SEQ ID No.100) or the acyl-ACP: methanol O-methyltransferase 'TesA* (SEQ ID No.102) (incl. P_{tac} and the region identical to the 3'-flanking region of *fadD*). These fragments are created by gene synthesis, wherein the region coding for the fatty acid O-methyltransferase is codon-optimized for translation in *E. coli*, while the region coding for the thioester transesterase 'TesA* is not codon-optimized for translation in *E. coli*, but instead the wild type sequence is used.

In this manner, the following strains are constructed:

- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[Mmar_3356]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[Mmar_3356]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[Mmar_3356]

- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac- CPF_2954] / pCDF[Mmar_3356]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[Ec'tesA*]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[Ec'tesA*]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[Ec'tesA*]
- *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac- CPF_2954] / pCDF[Ec'tesA*]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of hydroxy fatty acid methyl esters, oxo fatty acid methyl esters, carboxy fatty acid methyl esters and amino fatty acid methyl esters from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that the strains *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[Mmar_3356] and *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[Ec'tesA*], with addition of 1% (v/v) methanol, are capable of forming methyl laurate, methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl aminolaurate and methyl tetradecanoate, methyl hydroxytetradecanoate, methyl oxotetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate from glucose.

It is shown that the strains *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[Mmar_3356] and *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-ChFATB2] / pCDF[Ec'tesA*], with addition of 1% (v/v) methanol, are capable of forming methyl octanoate, methyl hydroxyoctanoate, methyl oxooctanoate, methyl carboxyoctanoate and methyl aminooctanoate and methyl decanoate, methyl hydroxydecanoate, methyl oxodecanoate, methyl carboxydecanoate and methyl aminodecanoate from glucose.

It is shown that the strains *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[Mmar_3356] and *E. coli* JW5020-1

Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[Ec'tesA*], with addition of 1% (v/v) methanol, are capable of forming methyl laurate, methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl aminolaurate and methyl tetradecanoate, methyl hydroxytetradecanoate, methyl oxotetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate and methyl 9-hexadecenoate, methyl hydroxy-9-hexadecenoate, methyl oxo-9-hexadecenoate, methyl carboxy-9-hexadecenoate and methyl amino-9-hexadecenoate from glucose.

It is shown that the strains *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[Mmar_3356] and *E. coli* JW5020-1 Kan^S pBT10 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-CnFATB3] / pCDF[Ec'tesA*], with addition of 1% (v/v) methanol, are capable of forming methyl octanoate, methyl hydroxyoctanoate, methyl oxooctanoate, methyl carboxyoctanoate and methyl aminooctanoate and methyl hexanoate, methyl hydroxyhexanoate, methyl oxohexanoate, methyl carboxyhexanoate and methyl aminohexanoate from glucose.

Example 21: Production of methyl aminolaurate and methyl aminotetradecanoate by E. coli strains with deletion of the gene fadE and expression vectors for the genes synUcTE from Umbellularia californica, and ald from Bacillus subtilis, and Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes alkM, alkG and alkT from the alk operon of Acinetobacter sp. ADP1 or alkS, alkT, alkB1, alkG and alkT from the alk operon of Marinobacter aquaeoli VT8 and an expression vector for the genes fadD from Escherichia coli and wax-dgaT from Acinetobacter sp. ADP1 or atfA1 from Alcanivorax borkumensis

To create *E. coli* strains with expression vectors for the genes synUcTE from *Umbellularia californica* and *ald* from *Bacillus subtilis* and *Cv_2025* from *Chromobacterium violaceum* in combination with expression vectors for the genes *alkM*, *alkG* and *alkT* from the alk operon of *Acinetobacter sp.* ADP1 (SEQ ID No.105) or *alkS*, *alkT*, *alkB1*, *alkG* and *alkT* from the alk operon of *Marinobacter aquaeoli* VT8 (SEQ ID No.106) and an expression vector for the genes *fadD* from *Escherichia coli* and *wax-dgaT* from *Acinetobacter sp.* ADP1 or *atfA1* from *Alcanivorax borkumensis* SK2, electrocompetent cells of *E. coli* JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.

JW5020-1 Kan^S is sequentially transformed with the plasmids

4. pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.38),
5. pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec] (SEQ ID No.16) bzw. pCDF[atfA1_Ab(co_Ec)-fadD_Ec] (SEQ ID No.17)
6. pCOM10-AcalkMGT (SEQ ID No.107)
   pCOM10-MaalkST-B1G (SEQ ID No.108)

and plated out onto LB agar plates containing kanamycin (50 µg/ml), ampicillin (100 µg/ml) and spectinomycin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.

The plasmids pCOM10-AcalkMGT (SEQ ID No.107) and pCOM10-MaalkST-B1G (SEQ ID No.108) are created starting from the plasmid pCOM10 (SEQ ID No.109; Smits TH, Seeger MA, Witholt B, van Beilen JB. New alkane-responsive expression vectors for *Escherichia coli* and *Pseudomonas*. Plasmid. 2001. 46(1):16-24.). For this, pCOM10 is cleaved with *Xho*I/*Bam*HI (pCOM10-MaalkST-B1G) or *Eco*RI (pCOM10-AcalkMGT) and the loci *Acinetobacter sp.* ADP1 alkMGT or *Marinobacter aquaeoli* VT8 alkST-alkB1G respectively inserted into pCOM10. These loci are created by gene synthesis, wherein the regions coding for *Acinetobacter sp.* ADP1 AlkM (SEQ ID No.110), AlkG (SEQ ID No.111) and AlkT (SEQ ID No.112) and those coding for *Marinobacter aquaeoli* VT8 AlkS (SEQ ID No.113), AlkT (SEQ ID No.114), AlkB1 (SEQ ID No.115) and AlkG (SEQ ID No.116) are not codon-optimized for translation in *E. coli*, but instead the wild type sequence is used.

In this manner, the following strains are constructed:

- *E. coli* JW5020-1 Kan^S pCOM10-AcalkMGT / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pCOM10-AcalkMGT / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pCOM10-MaalkST-B1G / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pCOM10-MaalkST-B1G / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of hydroxy fatty acid methyl esters, oxo fatty acid methyl esters, carboxy fatty acid methyl esters and amino fatty acid methyl esters from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that, with addition of 1% (v/v) methanol, these strains are capable of forming methyl laurate, methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl amino-laurate and methyl tetradecanoate, methyl hydroxytetradecanoate, methyl oxotetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate from glucose.

Example 22: Production of aminolauric acid and aminotetradecanoic acid by E. coli strains with deletion of the gene fadE and expression vectors for the genes synUcTE from Umbellularia californica, and ald from Bacillus subtilis, and Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes alkM, alkG and alkT from the alk operon of Acinetobacter sp. ADP1 or alkS, alkT, alkB1, alkG and alkT from the alk operon of Marinobacter aquaeoli VT8

To create *E. coli* strains with expression vectors for the genes synUcTE from *Umbellularia californica* and *ald* from *Bacillus subtilis* and *Cv_2025* from *Chromobacterium violaceum* in combination with expression vectors for the genes *alkM*, *alkG* and *alkT* from the alk operon of *Acinetobacter sp.* ADP1 (SEQ ID No.105) or *alkS*, *alkT*, *alkB1*, *alkG* and *alkT* from the alk operon of *Marinobacter aquaeoli* VT8 (SEQ ID No.106), electrocompetent cells of *E. coli* JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art. JW5020-1 Kan^S is sequentially transformed with the plasmids

1. pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.38),
2. pCOM10-AcalkMGT (SEQ ID No.107)
   pCOM10-MaalkST-B1G (SEQ ID No.108)

and plated out onto LB agar plates containing kanamycin (50 µg/ml) and ampicillin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.

In this manner, the following strains are constructed:

- *E. coli* JW5020-1 Kan^S pCOM10-AcalkMGT / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE]
- *E. coli* JW5020-1 Kan^S pCOM10-AcalkMGT / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE]
- *E. coli* JW5020-1 Kan^S pCOM10-MaalkST-B1G / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE]
- *E. coli* JW5020-1 Kan^S pCOM10-MaalkST-B1G / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of hydroxy fatty acids, oxo fatty acids, carboxy fatty acids and amino fatty acids from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.
It is shown that these strains are capable of forming lauric acid, hydroxylauric acid, oxolauric acid, carboxylauric acid and aminolauric acid and tetradecanoic acid, hydroxytetradecanoic acid, oxotetradecanoic acid, carboxytetradecanoic acid and aminotetradecanoic acid from glucose.

Example 23: Production of methyl aminolaurate and methyl aminotetradecanoate by E. coli strains with deletion of the gene fadE and expression vectors for the genes synUcTE from Umbellularia californica, and ald from Bacillus subtilis, and Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes ABO_0200, ABO_0201 and ABO_0203 from Alcanivorax borkumensis SK2 and an expression vector for the genes fadD from Escherichia coli and wax-dgaT from Acinetobacter sp. ADP1 or atfA1 from Alcanivorax borkumensis

To create *E. coli* strains with expression vectors for the genes synUcTE from *Umbellularia californica* and *ald* from *Bacillus subtilis* and *Cv_2025* from *Chromobacterium violaceum* in combination with an expression vector for the genes ABO_0200, ABO_0201 and ABO_0203 from *Alcanivorax borkumensis* SK2 (SEQ ID No.117), coding for a ferredoxin (ABO_0200; SEQ

ID No.118), a CYP153 monooxygenase (ABO_0201; SEQ ID No.119) and a ferredoxin oxidoreductase (ABO_0203; SEQ ID No.120) and an expression vector for the genes *fadD* from *Escherichia coli* and *wax-dgaT* from *Acinetobacter sp.* ADP1 or *atfA1* from *Alcanivorax borkumensis* SK2, electrocompetent cells of *E. coli* JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.

JW5020-1 Kan^S is sequentially transformed with the plasmids

1. pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.38),
2. pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec] (SEQ ID No.16) bzw. pCDF[atfA1_Ab(co_Ec)-fadD_Ec] (SEQ ID No.17)
3. pCOM10-AbCYP153 (SEQ ID No.121)

and plated out onto LB agar plates containing kanamycin (50 µg/ml), ampicillin (100 µg/ml) and spectinomycin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.

The plasmid pCOM10-AbCYP153 (SEQ ID No.121) is created starting from the plasmid pCOM10 (SEQ ID No.97; Smits TH, Seeger MA, Witholt B, van Beilen JB. New alkane-responsive expression vectors for *Escherichia coli* and *Pseudomonas*. Plasmid. 2001. 46(1):16-24.). For this, pCOM10 is cleaved with *Eco*RI/*Sal*I and the fragment containing the genes ABO_0200, ABO_0201 and ABO_0203 from *Alcanivorax borkumensis* SK2 inserted. This fragment is created by gene synthesis, wherein the sections from *Alcanivorax borkumensis* SK2 coding for the ferredoxin (ABO_0200; SEQ ID No.106), the CYP153 monooxygenase (ABO_0201; SEQ ID No.107) and the ferredoxin oxidoreductase (ABO_0203; SEQ ID No.108) are not codon-optimized for translation in *E. coli*, but instead the wild type sequence is used.

In this manner, the following strains are constructed:

- *E. coli* JW5020-1 Kan^S pCOM10-AbCYP153 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[wax-dgaT_AsADP1(co_Ec)-fadD_Ec]
- *E. coli* JW5020-1 Kan^S pCOM10-AbCYP153 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] / pCDF[atfA1_Ab(co_Ec)-fadD_Ec]

These strains are subjected to a *fed-batch* fermentation in order to analyse their capacity for production of hydroxy fatty acid methyl esters, oxo fatty acid methyl esters, carboxy fatty acid methyl esters and amino fatty acid methyl esters from glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that, with addition of 1% (v/v) methanol, these strains are capable of forming methyl laurate, methyl hydroxylaurate, methyl oxolaurate, methyl carboxylaurate and methyl amino-laurate and methyl tetradecanoate, methyl hydroxytetradecanoate, methyl oxotetradecanoate, methyl carboxytetradecanoate and methyl aminotetradecanoate from glucose.

Example 24: Production of aminolauric acid and aminotetradecanoic acid by E. coli strains with deletion of the gene fadE and expression vectors for the genes synUcTE from Umbellularia californica, and ald from Bacillus subtilis, and Cv_2025 from Chromobacterium violaceum in combination with an expression vector for the genes ABO_0200, ABO_0201 and ABO_0203 from Alcanivorax borkumensis SK2

To create *E. coli* strains with expression vectors for the genes synUcTE from *Umbellularia californica* and *ald* from *Bacillus subtilis* and *Cv_2025* from *Chromobacterium violaceum* in combination with an expression vector for the genes ABO_0200, ABO_0201 and ABO_0203 from *Alcanivorax borkumensis* SK2 (SEQ ID No.117), coding for a ferredoxin (ABO_0200; SEQ ID No.118), a CYP153 monooxygenase (ABO_0201; SEQ ID No.119) and a ferredoxin oxidoreductase (ABO_0203; SEQ ID No.120), electrocompetent cells of *E. coli* JW5020-1 Kan^S are produced. This takes place in a manner known to those skilled in the art.

JW5020-1 Kan^S is sequentially transformed with the plasmids

1. pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE] (SEQ ID No.38)
   and
2. pCOM10-AbCYP153 (SEQ ID No.121)

and plated out onto LB agar plates containing kanamycin (50 µg/ml) and ampicillin (100 µg/ml). Transformants are checked for the presence of the correct plasmids by plasmid preparation and analytical restriction analysis.

In this manner, the following strain is constructed:

- *E. coli* JW5020-1 Kan^S pCOM10-AbCYP153 / pJ294[alaDH_B.s._TA_C.v.(Ct)_Ptac-synUcTE]

This strain is subjected to a *fed-batch* fermentation in order to analyse its capacity for the production of hydroxy fatty acids, oxo fatty acids, carboxy fatty acids and amino fatty acids from

glucose. This is performed with an 8-fold parallel fermentation system from DASGIP, as described in Example 8.

It is shown that this strain is capable of forming lauric acid, hydroxylauric acid, oxolauric acid, carboxylauric acid and aminolauric acid and tetradecanoic acid, hydroxytetradecanoic acid, oxotetradecanoic acid, carboxytetradecanoic acid and aminotetradecanoic acid from glucose.

Claims

1. Microorganism which has a first genetic engineering modification, so that compared to its wild type it is capable of forming more carboxylic acid or carboxylate ester from at least one simple carbon source,
characterized in that,
the microorganism has a second genetic engineering modification, which comprises that the microorganism in comparison to its wild type displays increased activity of at least one enzyme E_1 which catalyses the conversion of carboxylic acids or carboxylate esters to the corresponding ω-hydroxycarboxylic acids or ω-hydroxycarboxylate esters.

2. Microorganism according to Claim 1, characterized in that the enzyme E_1 is selected from the group:
E_{1a} P450 alkane hydroxylases and E_{1b} AlkB alkane hydroxylases of EC 1.14.15.3.

3. Microorganism according to Claim 1 or 2, characterized in that the second genetic modification additionally comprises that the microorganism in comparison to its wild type displays increased activity selected from
an enzyme E_2 which catalyses the conversion of ω-oxocarboxylic acids or ω-oxocarboxylate esters to the corresponding ω-aminocarboxylic acids or ω-aminocarboxylate esters
an enzyme E_3 which catalyses the conversion of an α-ketocarboxylic acid to an amino acid,
an enzyme E_4 which catalyses the conversion of ω-hydroxycarboxylic acids or ω-hydroxycarboxylate esters to the corresponding ω-oxocarboxylic acids or ω-oxocarboxylate esters, and
an enzyme E_5 which catalyses the conversion of ω-oxocarboxylic acids or ω-oxocarboxylate esters to the corresponding ω-carboxycarboxylic acids or ω-carboxycarboxylate esters.

4. Microorganism according to at least one of the previous claims, characterized in that the second genetic modification comprises a combination of increased activities of the enzymes selected from
$E_1E_2E_3$, $E_1E_2E_3E_4$, E_1E_5 and $E_1E_4E_5$.

5. Microorganism according to at least one of Claims 2 to 4, characterized in that
the enzyme E_2 is an ω-transaminase,
the enzyme E_3 an alanine dehydrogenase of EC 1.4.1.1,
the enzyme E_4 a fatty alcohol oxidase of EC 1.1.3.20, an AlkJ alcohol dehydrogenase of EC 1.1.99.- or an alcohol dehydrogenase of EC 1.1.1.1 or EC 1.1.1.2 and
the enzyme E_5 an aldehyde dehydrogenase of EC 1.2.1.3, EC 1.2.1.4 or EC 1.2.1.5.

6. Microorganism according to at least one of the previous claims, characterized in that the enzyme E_1 is the alkane monooxygenase from Pseu*domonas putida* GPo1 encoded by alkBGT and proteins with a polypeptide sequence wherein up to 60% of the amino acid residues compared to the aforementioned reference sequence are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50% of the activity of the protein with the corresponding, aforementioned reference sequence.

7. Microorganism according to at least one of the previous claims, characterized in that the second genetic modification additionally comprises that compared to its wild type the microorganism forms more alkL gene product.

8. Microorganism according to Claim 7, characterized in that the alkL gene product is encoded by alkL genes of organisms selected from gram-negative bacteria, in particular from the group containing, preferably consisting of, *Pseudomonas* sp., *Azotobacter* sp., *Desulfitobacterium* sp., *Burkholderia* sp., preferably *Burkholderia cepacia*, *Xanthomonas* sp., *Rhodobacter* sp., *Ralstonia* sp., *Delftia* sp. and *Rickettsia* sp., *Oceanicaulis* sp., *Caulobacter* sp., *Marinobacter* sp. and *Rhodopseudomonas* sp., preferably *Pseudomonas putida*, *Oceanicaulis alexandrii*, *Marinobacter aquaeolei*, in particular *Pseudomonas putida* GPo1 and P1, *Oceanicaulis alexandrii* HTCC2633, *Caulobacter* sp. K31 and *Marinobacter aquaeolei* VT8.

9. Microorganism according to at least Claim 7 or 8, characterized in that the alkL gene product is selected from the group consisting of
proteins encoded by Seq ID No.1 and Seq ID No.3 and
proteins with polypeptide sequence Seq ID No.2, Seq ID No.2, Seq ID No.4, Seq ID No.5, Seq ID No.6 or Seq ID No.7 and
proteins with a polypeptide sequence wherein up to 60% of the amino acid residues compared to Seq ID No.2, Seq ID No.4, Seq ID No.5, Seq ID No.6 or Seq ID No.7 are modified by deletion, insertion, substitution or a combination thereof and which still possess at least 50%, of the activity of the protein with the respective reference sequence Seq ID No.2, Seq ID No.4, Seq ID No.5, Seq ID No.6 or Seq ID No.7.

10. Microorganism according to at least one of the previous claims, characterized in that it is selected from
E. coli, Pseudomonas sp., Pseudomonas fluorescens, Pseudomonas putida, Pseudomonas stutzeri, Acinetobacter sp., Burkholderia sp., Burkholderia thailandensis, Cyanobakterien, Klebsiella sp., Klebsiella oxytoca, Salmonella sp., Rhizobium sp. and Rhizobium meliloti, Bacillus sp., Bacillus subtilis, Clostridium sp., Corynebacterium sp., Corynebacterium glutamicum, Brevibacterium sp., Chlorella sp. and Nostoc sp..

11. Microorganism according to at least one of the previous claims, characterized in that the first genetic modification is, compared to the enzymatic activity of the wild type of the microorganism, increased activity of at least one of the enzymes selected from the group
E_i Acyl-ACP thioesterase, preferably of EC 3.1.2.14 or EC 3.1.2.22,
E_{ii} Acyl-CoA thioesterase, preferably of EC 3.1.2.2, EC 3.1.2.18, EC 3.1.2.19, EC 3.1.2.20 or EC 3.1.2.22,
E_{iib} Acyl-CoA:ACP transacylase,
E_{iii} Polyketide synthase, which catalyses a reaction which is involved in the synthesis of carboxylic acids and carboxylate esters, and
E_{iv} Hexanoic acid synthase.

12. Microorganism according to at least one of the previous claims, characterized in that it has a third genetic modification which comprises, compared with the enzymatic activity of the wild type of the microorganism, increased activity of at least one of the enzymes E_{iib}, E_v, E_{vi} or E_{vii} which is involved in the conversion of carboxylic acids or ω-functionalized carboxylic acids to carboxylate esters or ω-functionalized carboxylate esters, selected from the group

E_{iib} Acyl-CoA:ACP transacylase, which converts an ACP thioester into a CoA thioester or a CoA thioester into an ACP thioester,

E_v Wax ester synthase or alcohol O-acyltransferase, preferably of EC 2.3.1.75 or EC 2.3.1.84, which catalyses the synthesis of an ester from an acyl-coenzyme A thioester or an acyl-ACP thioester and an alcohol,

E_{vi} Acyl-CoA (coenzyme A) synthetase, preferably of EC 6.2.1.3, which catalyses the synthesis of an acyl-coenzyme A thioester, and

E_{vii} Acyl thioesterase, preferably of EC 3.1.2.2, EC 3.1.2.4, EC 3.1.2.18, EC 3.1.2.19, EC 3.1.2.20 or EC 3.1.2.22, which catalyses the conversion of an acyl thioester with an alcohol to a carboxylate ester.

13. Microorganism according to at least one of the previous claims, characterized in that the third genetic modification comprises a combination of increased activities of the enzymes selected from

E_v, E_{vii}, E_vE_{vi}, $E_{vi}E_{vii}$ and $E_{vi}E_{vii}E_{iib}$.

14. Microorganism according to at least one of the previous claims, characterized in that it has a fourth genetic modification which comprises, compared with the enzymatic activity of the wild type of the microorganism, increased activity of at least one of the enzymes selected from the group

E_{iib} Acyl-CoA (coenzyme A):ACP (acyl carrier protein) transacylase, which converts an ACP thioester into a CoA thioester or a CoA thioester into an ACP thioester,

E_{vi} Acyl-CoA (coenzyme A) synthetase, preferably of EC 6.2.1.3, which preferably catalyses the synthesis of an acyl-coenzyme A thioester,

E_{viii} Acyl-CoA (coenzyme A) reductase, preferably of EC 1.2.1.42 or EC 1.2.1.50, which preferentially catalyses the reduction of an acyl-coenzyme A thioester to the corresponding alkan-1-al or alkan-1-ol

E_{ix} Fatty acid reductase (also fatty aldehyde dehydrogenase or arylaldehyde oxidoreductase), preferably of EC 1.2.1.3, EC 1.2.1.20 or EC 1.2.1.48, which preferentially catalyses the reduction of an alkanoic acid to the corresponding alkan-1-al, and

E_x) Acyl-ACP (acyl carrier protein) reductase, preferably of EC 1.2.1.80, which preferentially catalyses the reduction of an acyl-ACP thioester to the corresponding alkan-1-al or alkan-1-ol.

15. Microorganism according to at least one of the previous claims, characterized in that the second genetic modification comprises a combination of increased activities of the enzymes selected from

E_{viii}, E_{ix}, E_x, $E_{vi}E_{viii}$, and $E_{vi}E_xE_{iib}$.

16. Microorganism according to at least one of the previous claims, characterized in that it contains a fifth genetic modification which comprises, compared with the enzymatic activity of the wild type of the microorganism, decreased activity of at least one of the enzymes selected from the group

E_a Acyl-CoA synthetase, preferably of EC 6.2.1.3, which catalyses the synthesis of an acyl-coenzyme A thioester,

E_b Acyl-CoA dehydrogenase, preferably of EC 1.3.99.-, EC 1.3.99.3, or EC 1.3.99.13, which catalyses the oxidation of an acyl-coenzyme A thioester to the corresponding enoyl-coenzyme A thioester,

E_c Acyl-CoA-oxidase, preferably of EC 1.3.3.6, which catalyses the oxidation of an acyl-coenzyme A thioester to the corresponding enoyl-coenzyme A thioester,

E_d Enoyl-CoA hydratase, preferably of EC 4.2.1.17 or EC 4.2.1.74, which catalyses the hydration of an enoyl-coenzyme A thioester to the corresponding 3-hydroxyacyl-coenzyme A thioester,

E_e 3-hydroxyacyl-CoA dehydrogenase, preferably of EC 1.1.1.35 or EC 1.1.1.211, which catalyses the oxidation of a 3-hydroxyacyl-coenzyme A thioester to the corresponding 3-oxoacyl-coenzyme A thioester and

E_f Acetyl-CoA acyltransferase, preferably of EC 2.3.1.16, which catalyses the transfer of an acyl residue from a 3-oxoacyl-coenzyme A thioester to Coenzyme A and thereby creates an acyl-coenzyme A thioester shortened by two carbon atoms.

17. Use of a microorganism according to at least one of the previous claims for the production of ω-functionalized carboxylic acids and of ω-functionalized carboxylate esters, in particular of a microorganism according to Claim 3 or 4, for the production of ω-amino-carboxylic acids and of ω-aminocarboxylate esters, in particular of ω-aminolauric acid and of methyl and ethyl ω-aminolaurates and ω-aminocaproic acid and of methyl and ethyl ω-aminocaproates.

18. Process for the production of ω-functionalized carboxylic acids and of ω-functionalized carboxylate esters from a simple carbon source comprising the process steps

I) contacting a microorganism according to at least one of Claims 1 to 16 with a medium containing the simple carbon source,

II) Culturing the microorganism under conditions which enable the microorganism to form the ω-functionalized carboxylic acids or ω-functionalized carboxylate esters from the simple carbon source and

III) optionally isolation of the ω-functionalized carboxylic acids or ω-functionalized carboxylate esters formed.

19. Process according to Claim 18 for the production of ω-aminocarboxylic acids and of ω-aminocarboxylate esters, in particular of ω-aminolauric acid and of methyl and ethyl ω-aminolaurates and ω-aminocaproic acid and of methyl and ethyl ω-aminocaproates, from a simple carbon source, in particular with a microorganism according to at least one of Claims 3 to 15 and 18.

20. A process for the production of polyamides based on ω-aminocarboxylic acids, in particular on ω-aminolauric acid or on ω-aminocaproic acid, comprising the process steps:

(a1) Production of ω-aminocarboxylic acids by a process according to Claim 21,

(a2) Polymerization of optionally mixtures of different ω-aminocarboxylic acids, whereof which at least a part of the ω-aminocarboxylic acids, preferably at least 50 wt.% based on all ω-aminocarboxylic acids used in the process were produced in step (a1),
or of ω-aminocarboxylic acids from step (a1)
with obtention of a polyamide.

21. Polyamide obtainable by a process according to Claim 20, in particular polyamide 12 and polyamide 6.

22. Process according to Claim 18 for the production of ω-hydroxycarboxylic acids and of ω-hydroxycarboxylate esters, in particular of ω-hydroxylauric acid and of methyl and ethyl ω-hydroxylaurates and ω-hydroxycaproic acid and of methyl and ethyl ω-hydroxycaproates, from a simple carbon source, in particular with a microorganism according to at least one of Claims 3 to 16.

23. Process according to Claim 18 for the production of ω-carboxycarboxylic acids and of ω-carboxycarboxylate esters, in particular of ω-carboxylauric acid and of methyl and ethyl ω-carboxylaurates and ω-carboxycaproic acid and of methyl and ethyl ω-carboxycaproate, from a simple carbon source, in particular with a microorganism according to at least one of Claims 3 to 18.

SEQUENCE LISTING

<110> Evonik Degussa GmbH

<120> Biotechnologisches Syntheseverfahren von omega-funktionalisierten Carbonsäuren und Carbonsäureestern aus einfachen Kohlenstoffquellen

<130> 201100237

<160> 121

<170> PatentIn version 3.5

<210> 1
<211> 693
<212> DNA
<213> Pseudomonas putida

<220>
<221> AlkL
<222> (1)..(693)

<220>
<221> CDS
<222> (1)..(693)

<400> 1

```
atg agt ttt tct aat tat aaa gta atc gcg atg ccg gtg ttg gtt gct          48
Met Ser Phe Ser Asn Tyr Lys Val Ile Ala Met Pro Val Leu Val Ala
1               5                   10                  15

aat ttt gtt ttg ggg gcg gcc act gca tgg gcg aat gaa aat tat ccg          96
Asn Phe Val Leu Gly Ala Ala Thr Ala Trp Ala Asn Glu Asn Tyr Pro
            20                  25                  30

gcg aaa tct gct ggc tat aat cag ggt gac tgg gtc gct agc ttc aat         144
Ala Lys Ser Ala Gly Tyr Asn Gln Gly Asp Trp Val Ala Ser Phe Asn
        35                  40                  45

ttt tct aag gtc tat gtg ggt gag gag ctt ggc gat cta aat gtt gga         192
Phe Ser Lys Val Tyr Val Gly Glu Glu Leu Gly Asp Leu Asn Val Gly
    50                  55                  60

ggg ggg gct ttg cca aat gct gat gta agt att ggt aat gat aca aca         240
Gly Gly Ala Leu Pro Asn Ala Asp Val Ser Ile Gly Asn Asp Thr Thr
65                  70                  75                  80

ctt acg ttt gat atc gcc tat ttt gtt agc tca aat ata gcg gtg gat         288
Leu Thr Phe Asp Ile Ala Tyr Phe Val Ser Ser Asn Ile Ala Val Asp
                85                  90                  95

ttt ttt gtt ggg gtg cca gct agg gct aaa ttt caa ggt gag aaa tca         336
Phe Phe Val Gly Val Pro Ala Arg Ala Lys Phe Gln Gly Glu Lys Ser
            100                 105                 110

atc tcc tcg ctg gga aga gtc agt gaa gtt gat tac ggc cct gca att         384
Ile Ser Ser Leu Gly Arg Val Ser Glu Val Asp Tyr Gly Pro Ala Ile
        115                 120                 125

ctt tcg ctt caa tat cat tac gat agc ttt gag cga ctt tat cca tat         432
Leu Ser Leu Gln Tyr His Tyr Asp Ser Phe Glu Arg Leu Tyr Pro Tyr
    130                 135                 140

gtt ggg gtt ggt gtt ggt cgg gtg cta ttt ttt gat aaa acc gac ggt         480
Val Gly Val Gly Val Gly Arg Val Leu Phe Phe Asp Lys Thr Asp Gly
145                 150                 155                 160
```

```
gct ttg agt tcg ttt gat att aag gat aaa tgg gcg cct gct ttt cag        528
Ala Leu Ser Ser Phe Asp Ile Lys Asp Lys Trp Ala Pro Ala Phe Gln
                165                 170                 175

gtt ggc ctt aga tat gac ctt ggt aac tca tgg atg cta aat tca gat        576
Val Gly Leu Arg Tyr Asp Leu Gly Asn Ser Trp Met Leu Asn Ser Asp
            180                 185                 190

gtg cgt tat att cct ttc aaa acg gac gtc aca ggt act ctt ggc ccg        624
Val Arg Tyr Ile Pro Phe Lys Thr Asp Val Thr Gly Thr Leu Gly Pro
        195                 200                 205

gtt cct gtt tct act aaa att gag gtt gat cct ttc att ctc agt ctt        672
Val Pro Val Ser Thr Lys Ile Glu Val Asp Pro Phe Ile Leu Ser Leu
    210                 215                 220

ggt gcg tca tat gtt ttc taa                                           693
Gly Ala Ser Tyr Val Phe
225                 230
```

<210> 2
<211> 230
<212> PRT
<213> Pseudomonas putida

<400> 2

```
Met Ser Phe Ser Asn Tyr Lys Val Ile Ala Met Pro Val Leu Val Ala
1               5                   10                  15

Asn Phe Val Leu Gly Ala Ala Thr Ala Trp Ala Asn Glu Asn Tyr Pro
            20                  25                  30

Ala Lys Ser Ala Gly Tyr Asn Gln Gly Asp Trp Val Ala Ser Phe Asn
        35                  40                  45

Phe Ser Lys Val Tyr Val Gly Glu Glu Leu Gly Asp Leu Asn Val Gly
    50                  55                  60

Gly Gly Ala Leu Pro Asn Ala Asp Val Ser Ile Gly Asn Asp Thr Thr
65                  70                  75                  80

Leu Thr Phe Asp Ile Ala Tyr Phe Val Ser Ser Asn Ile Ala Val Asp
                85                  90                  95

Phe Phe Val Gly Val Pro Ala Arg Ala Lys Phe Gln Gly Glu Lys Ser
            100                 105                 110

Ile Ser Ser Leu Gly Arg Val Ser Glu Val Asp Tyr Gly Pro Ala Ile
        115                 120                 125

Leu Ser Leu Gln Tyr His Tyr Asp Ser Phe Glu Arg Leu Tyr Pro Tyr
    130                 135                 140

Val Gly Val Gly Val Gly Arg Val Leu Phe Phe Asp Lys Thr Asp Gly
145                 150                 155                 160
```

```
Ala Leu Ser Ser Phe Asp Ile Lys Asp Lys Trp Ala Pro Ala Phe Gln
                165                 170                 175

Val Gly Leu Arg Tyr Asp Leu Gly Asn Ser Trp Met Leu Asn Ser Asp
            180                 185                 190

Val Arg Tyr Ile Pro Phe Lys Thr Asp Val Thr Gly Thr Leu Gly Pro
        195                 200                 205

Val Pro Val Ser Thr Lys Ile Glu Val Asp Pro Phe Ile Leu Ser Leu
    210                 215                 220

Gly Ala Ser Tyr Val Phe
225                 230


<210>  3
<211>  693
<212>  DNA
<213>  Pseudomonas putida


<220>
<221>  AlkL
<222>  (1)..(693)

<220>
<221>  CDS
<222>  (1)..(693)

<400>  3
atg aat ccg cct att tta aaa aaa ctc gct atg tcg ata tta gca act          48
Met Asn Pro Pro Ile Leu Lys Lys Leu Ala Met Ser Ile Leu Ala Thr
1               5                   10                  15

agt ttt gtg ttg ggt ggg gcc agt gcg tgg tca ggt gaa atc tat tcg          96
Ser Phe Val Leu Gly Gly Ala Ser Ala Trp Ser Gly Glu Ile Tyr Ser
            20                  25                  30

act gaa act gct ggc tac aat cag ggc gac tgg gtt gct agc ttt aat         144
Thr Glu Thr Ala Gly Tyr Asn Gln Gly Asp Trp Val Ala Ser Phe Asn
        35                  40                  45

atg tct aaa gtt tat gta gac gag acg cta ggc tcc cta aat gta ggt         192
Met Ser Lys Val Tyr Val Asp Glu Thr Leu Gly Ser Leu Asn Val Gly
    50                  55                  60

ggg gct act gta ccc aat gct gct gta agc atc ggt aat gat aca aca         240
Gly Ala Thr Val Pro Asn Ala Ala Val Ser Ile Gly Asn Asp Thr Thr
65                  70                  75                  80

gtt tct ttt gat att tcc tat ttt att agt aac aat gta gct ttg gat         288
Val Ser Phe Asp Ile Ser Tyr Phe Ile Ser Asn Asn Val Ala Leu Asp
                85                  90                  95

ttt ttc gtc ggg att cca gct aaa gct aag ttt caa ggt gaa aaa tcc         336
Phe Phe Val Gly Ile Pro Ala Lys Ala Lys Phe Gln Gly Glu Lys Ser
            100                 105                 110

atc tct gcg ctg gga aga gtc agt gaa gtt gat tat ggc cct gca att         384
Ile Ser Ala Leu Gly Arg Val Ser Glu Val Asp Tyr Gly Pro Ala Ile
        115                 120                 125
```

```
ttg tca ctt cag tat cat ttt gat aat ttt gag cga ctt tat cca tat          432
Leu Ser Leu Gln Tyr His Phe Asp Asn Phe Glu Arg Leu Tyr Pro Tyr
    130                 135                 140

gtc gga cta ggt gtc ggt cga gtg ttt ttc ttc gac aaa act gat ggt          480
Val Gly Leu Gly Val Gly Arg Val Phe Phe Phe Asp Lys Thr Asp Gly
145                 150                 155                 160

gcc ttg act tca ttt gat atc aaa gat aaa tgg gcg cct gct gtt cag          528
Ala Leu Thr Ser Phe Asp Ile Lys Asp Lys Trp Ala Pro Ala Val Gln
                165                 170                 175

gtc ggc ctt aga tat gat ttt ggt aac tca tgg atg tta aat tca gat          576
Val Gly Leu Arg Tyr Asp Phe Gly Asn Ser Trp Met Leu Asn Ser Asp
            180                 185                 190

gtg cgc tat att cct ttc aaa aca gat gtt tct ggt aca ctt ggg gct          624
Val Arg Tyr Ile Pro Phe Lys Thr Asp Val Ser Gly Thr Leu Gly Ala
        195                 200                 205

gca cct gtt tct acc aag att gag att gat cct ttc att ctg agt ctt          672
Ala Pro Val Ser Thr Lys Ile Glu Ile Asp Pro Phe Ile Leu Ser Leu
    210                 215                 220

gga gca tca tat aag ttc tga                                             693
Gly Ala Ser Tyr Lys Phe
225                 230
```

<210> 4
<211> 230
<212> PRT
<213> Pseudomonas putida

<400> 4

```
Met Asn Pro Pro Ile Leu Lys Lys Leu Ala Met Ser Ile Leu Ala Thr
1               5                   10                  15

Ser Phe Val Leu Gly Gly Ala Ser Ala Trp Ser Gly Glu Ile Tyr Ser
            20                  25                  30

Thr Glu Thr Ala Gly Tyr Asn Gln Gly Asp Trp Val Ala Ser Phe Asn
        35                  40                  45

Met Ser Lys Val Tyr Val Asp Glu Thr Leu Gly Ser Leu Asn Val Gly
    50                  55                  60

Gly Ala Thr Val Pro Asn Ala Ala Val Ser Ile Gly Asn Asp Thr Thr
65                  70                  75                  80

Val Ser Phe Asp Ile Ser Tyr Phe Ile Ser Asn Asn Val Ala Leu Asp
                85                  90                  95

Phe Phe Val Gly Ile Pro Ala Lys Ala Lys Phe Gln Gly Glu Lys Ser
            100                 105                 110

Ile Ser Ala Leu Gly Arg Val Ser Glu Val Asp Tyr Gly Pro Ala Ile
        115                 120                 125
```

Leu Ser Leu Gln Tyr His Phe Asp Asn Phe Glu Arg Leu Tyr Pro Tyr
130 135 140

Val Gly Leu Gly Val Gly Arg Val Phe Phe Phe Asp Lys Thr Asp Gly
145 150 155 160

Ala Leu Thr Ser Phe Asp Ile Lys Asp Lys Trp Ala Pro Ala Val Gln
165 170 175

Val Gly Leu Arg Tyr Asp Phe Gly Asn Ser Trp Met Leu Asn Ser Asp
180 185 190

Val Arg Tyr Ile Pro Phe Lys Thr Asp Val Ser Gly Thr Leu Gly Ala
195 200 205

Ala Pro Val Ser Thr Lys Ile Glu Ile Asp Pro Phe Ile Leu Ser Leu
210 215 220

Gly Ala Ser Tyr Lys Phe
225 230

<210> 5
<211> 246
<212> PRT
<213> Marinobacter aquaeolei VT8

<400> 5

Met Cys Tyr Glu Lys Leu Gln Phe Tyr Leu Lys Pro Ile Cys Phe Asn
1 5 10 15

Thr Lys Lys Asp Asn Lys Lys Met Lys Pro Lys Ile Ile Ser Lys Val
20 25 30

Ser Leu Val Ala Phe Leu Leu Leu Ser Leu Ala Ala Ser Leu Ala Asn
35 40 45

Ala Gln Ser Glu Pro Val Tyr Ser Arg Gly Asp Trp Val Val Gly Leu
50 55 60

Asn Ala Thr Arg Val Leu Thr Asp Glu Asp Leu Arg Ser Ala Ser Ala
65 70 75 80

Gly Gly Ala Pro Val Pro Asn Ser Asn Leu Ser Ile Asn Asn Asp Thr
85 90 95

Thr Val Ser Phe Asp Val Ser Tyr Phe Leu Ser Asn Gln Leu Ala Phe
100 105 110

Asn Ile Phe Gly Gly Ile Pro Ala Ser Ala Asp Leu Gln Gly Glu Glu
115 120 125

Ser Leu Ser Gly Leu Phe Leu Gly Gln Thr Asp Tyr Gly Pro Val Ile

130 135 140

Leu Ser Leu Gln Tyr His Val Leu Thr Gly Ser Asn Phe Ser Pro Tyr
145 150 155 160

Phe Gly Ala Gly Val Gly Arg Ile Leu Phe Leu Asp Glu Lys Asp Arg
165 170 175

Ala Leu Thr Asp Phe Asp Val Glu Asp Thr Trp Ala Pro Ala Ile Gln
180 185 190

Ala Gly Phe Arg Trp Arg Ile His Asn Asn Trp Ser Ala Asn Phe Asp
195 200 205

Val Arg Tyr Ala Pro Phe Lys Ala Asp Ile Thr Gly Asn Leu Gly Pro
210 215 220

Ala Pro Val Gln Ala Glu Val Glu Val Asp Pro Thr Ile Val Ser Ile
225 230 235 240

Gly Val Ala Tyr Arg Phe
245

<210> 6
<211> 228
<212> PRT
<213> Oceanicaulis alexandrii HTCC2633

<400> 6

Met Lys Gln Ser Asn Val Lys Ser Lys Gly Pro Phe Ala Ser Lys Phe
1 5 10 15

Val Leu Ile Thr Met Ile Gly Gly Phe Ser Ser Phe Ser Val Ala Asn
20 25 30

Ala Glu Pro Leu Tyr Ser Lys Gly Asp Trp Leu Phe Gly Leu Asn Ala
35 40 45

Ala Lys Val Phe Thr Asn Glu Thr Leu Asp Ser Ile Ser Ala Gly Gly
50 55 60

Ala Pro Ile Pro Gly Ala Gly Val Asn Ile Thr Asp Asp Thr Thr Leu
65 70 75 80

Ser Phe Asp Val Ser Tyr Phe Leu Asn Ser Ser Val Ala Leu Asn Phe
85 90 95

Phe Gly Gly Leu Pro Ala Ser Ala Asn Leu Ala Gly Ser Gly Ser Leu
100 105 110

Ala Gly Leu Pro Val Gly Glu Thr Glu Tyr Gly Pro Ala Val Leu Ser
115 120 125

Leu Gln Tyr His Phe Ser Thr Asn Ser Ser Val Ser Pro Tyr Val Gly
130 135 140

Ala Gly Ile Ala Arg Ile Leu Phe Leu Glu Glu Gln Gly Asp Ala Leu
145 150 155 160

Ala Asp Phe Asp Leu Lys Asp Ala Trp Ala Pro Ala Val Gln Val Gly
165 170 175

Met Arg Tyr Gln Met Ser Asp Asn Trp Phe Ala Asn Ala Asp Ile Arg
180 185 190

Tyr Thr Pro Phe Glu Thr Asp Ile Ser Gly Thr Leu Gly Gly Ala Pro
195 200 205

Val Arg Gly Lys Ile Ser Val Asp Pro Thr Ile Leu Asn Ile Gly Ile
210 215 220

Ala Tyr Arg Phe
225

<210> 7
<211> 227
<212> PRT
<213> Caulobacter sp. K31

<400> 7

Met Arg Lys Asn Gly Ala Tyr Met Tyr Ala Arg Leu Ala Gln Tyr Ala
1 5 10 15

Thr Ala Leu Ala Val Leu Ser Val Phe Pro Gln Ala Ala Leu Ala Gln
20 25 30

Asn Ser Glu Gly Phe Lys Leu Trp Ala Val Ser Leu Asn Ala Thr Arg
35 40 45

Val Phe Val Asp Glu Asp Ala Pro Asp Ile Thr Leu Ala Gly Gly Pro
50 55 60

Val Pro Gly Ser Asn Val Arg Ile Gly Asp Ala Thr Ser Ala Thr Ile
65 70 75 80

Asp Ile Gly Tyr Phe Phe Thr Pro Asn Val Ala Gly Asn Leu Phe Leu
85 90 95

Gly Val Pro Ala Thr Ala Gln Ile Asp Gly Ala Gly Ser Leu Glu Pro
100 105 110

Leu Gly Thr Leu Ala Lys Val Asn Tyr Gly Pro Ile Ile Leu Ser Ala
115 120 125

```
Gln Tyr His Phe Asn Asn Leu Gly Lys Val His Pro Tyr Leu Gly Val
    130                 135                 140

Gly Val Gly Arg Ile Val Phe Leu Asn Glu Arg Asp Arg Ala Leu Leu
145                 150                 155                 160

Asn Phe Ser Ile Asp Asp Ser Trp Ala Pro Ala Ala Gln Val Gly Val
                165                 170                 175

Arg Tyr Glu Leu Gly Ala Glu Trp Met Leu Asn Ala Asp Val Arg Tyr
            180                 185                 190

Val Pro Phe Ser Thr His Ala Thr Gly Ser Leu Gly Gly Ala Pro Val
        195                 200                 205

Arg Thr Arg Leu Asp Ile Asp Pro Ile Leu Thr Ser Ala Gly Val Thr
    210                 215                 220

Tyr Arg Phe
225
```

<210> 8
<211> 453
<212> PRT
<213> Pseudomonas putida

<400> 8

```
Met Ser Val Asn Asn Pro Gln Thr Arg Glu Trp Gln Thr Leu Ser Gly
1               5                   10                  15

Glu His His Leu Ala Pro Phe Ser Asp Tyr Lys Gln Leu Lys Glu Lys
            20                  25                  30

Gly Pro Arg Ile Ile Thr Lys Ala Gln Gly Val His Leu Trp Asp Ser
        35                  40                  45

Glu Gly His Lys Ile Leu Asp Gly Met Ala Gly Leu Trp Cys Val Ala
    50                  55                  60

Val Gly Tyr Gly Arg Glu Glu Leu Val Gln Ala Ala Glu Lys Gln Met
65                  70                  75                  80

Arg Glu Leu Pro Tyr Tyr Asn Leu Phe Phe Gln Thr Ala His Pro Pro
                85                  90                  95

Ala Leu Glu Leu Ala Lys Ala Ile Thr Asp Val Ala Pro Glu Gly Met
            100                 105                 110

Thr His Val Phe Phe Thr Gly Ser Gly Ser Glu Gly Asn Asp Thr Val
        115                 120                 125
```

```
Leu Arg Met Val Arg His Tyr Trp Ala Leu Lys Gly Lys Pro His Lys
    130                 135                 140

Gln Thr Ile Ile Gly Arg Ile Asn Gly Tyr His Gly Ser Thr Phe Ala
145                 150                 155                 160

Gly Ala Cys Leu Gly Gly Met Ser Gly Met His Glu Gln Gly Gly Leu
                165                 170                 175

Pro Ile Pro Gly Ile Val His Ile Pro Gln Pro Tyr Trp Phe Gly Glu
            180                 185                 190

Gly Gly Asp Met Thr Pro Asp Ala Phe Gly Ile Trp Ala Ala Glu Gln
        195                 200                 205

Leu Glu Lys Lys Ile Leu Glu Val Gly Glu Asp Asn Val Ala Ala Phe
    210                 215                 220

Ile Ala Glu Pro Ile Gln Gly Ala Gly Gly Val Ile Ile Pro Pro Glu
225                 230                 235                 240

Thr Tyr Trp Pro Lys Val Lys Glu Ile Leu Ala Lys Tyr Asp Ile Leu
                245                 250                 255

Phe Val Ala Asp Glu Val Ile Cys Gly Phe Gly Arg Thr Gly Glu Trp
            260                 265                 270

Phe Gly Ser Asp Tyr Tyr Asp Leu Lys Pro Asp Leu Met Thr Ile Ala
        275                 280                 285

Lys Gly Leu Thr Ser Gly Tyr Ile Pro Met Gly Gly Val Ile Val Arg
    290                 295                 300

Asp Lys Val Ala Lys Val Ile Ser Glu Gly Gly Asp Phe Asn His Gly
305                 310                 315                 320

Phe Thr Tyr Ser Gly His Pro Val Ala Ala Ala Val Gly Leu Glu Asn
                325                 330                 335

Leu Arg Ile Leu Arg Asp Glu Gln Ile Val Glu Lys Ala Arg Thr Glu
            340                 345                 350

Ala Ala Pro Tyr Leu Gln Lys Arg Leu Arg Glu Leu Gln Asp His Pro
        355                 360                 365

Leu Val Gly Glu Val Arg Gly Leu Gly Met Leu Gly Ala Ile Glu Leu
    370                 375                 380

Val Lys Asp Lys Ala Thr Arg Ser Arg Tyr Glu Gly Lys Gly Val Gly
385                 390                 395                 400
```

Met Ile Cys Arg Thr Phe Cys Phe Glu Asn Gly Leu Ile Met Arg Ala
405 410 415

Val Gly Asp Thr Met Ile Ile Ala Pro Pro Leu Val Ile Ser His Ala
420 425 430

Glu Ile Asp Glu Leu Val Glu Lys Ala Arg Lys Cys Leu Asp Leu Thr
435 440 445

Leu Glu Ala Ile Arg
450

<210> 9
<211> 452
<212> PRT
<213> Pseudomonas putida

<400> 9

Met Ser Glu Gln Asn Ser Gln Thr Leu Ala Trp Gln Ser Met Ser Arg
1 5 10 15

Asp His His Leu Ala Pro Phe Ser Asp Val Lys Gln Leu Ala Glu Lys
20 25 30

Gly Pro Arg Ile Ile Thr Ser Ala Lys Gly Val Tyr Leu Trp Asp Ser
35 40 45

Glu Gly Asn Lys Ile Leu Asp Gly Met Ala Gly Leu Trp Cys Val Ala
50 55 60

Val Gly Tyr Gly Arg Asp Glu Leu Ala Glu Val Ala Ser Gln Gln Met
65 70 75 80

Lys Gln Leu Pro Tyr Tyr Asn Leu Phe Phe Gln Thr Ala His Pro Pro
85 90 95

Ala Leu Glu Leu Ala Lys Ala Ile Ala Asp Val Ala Pro Gln Gly Met
100 105 110

Asn His Val Phe Phe Thr Gly Ser Gly Ser Glu Gly Asn Asp Thr Val
115 120 125

Leu Arg Met Val Arg His Tyr Trp Ala Leu Lys Gly Lys Lys Asn Lys
130 135 140

Asn Val Ile Ile Gly Arg Ile Asn Gly Tyr His Gly Ser Thr Val Ala
145 150 155 160

Gly Ala Ala Leu Gly Gly Met Ser Gly Met His Gln Gln Gly Gly Val
165 170 175

Ile Pro Asp Ile Val His Ile Pro Gln Pro Tyr Trp Phe Gly Glu Gly

180 185 190

Gly Asp Met Thr Glu Ala Asp Phe Gly Val Trp Ala Ala Glu Gln Leu
195 200 205

Glu Lys Lys Ile Leu Glu Val Gly Val Asp Asn Val Ala Ala Phe Ile
210 215 220

Ala Glu Pro Ile Gln Gly Ala Gly Gly Val Ile Ile Pro Pro Gln Thr
225 230 235 240

Tyr Trp Pro Lys Val Lys Glu Ile Leu Ala Arg Tyr Asp Ile Leu Phe
245 250 255

Val Ala Asp Glu Val Ile Cys Gly Phe Gly Arg Thr Gly Glu Trp Phe
260 265 270

Gly Thr Asp Tyr Tyr Asp Leu Lys Pro Asp Leu Met Thr Ile Ala Lys
275 280 285

Gly Leu Thr Ser Gly Tyr Ile Pro Met Gly Gly Val Ile Val Arg Asp
290 295 300

Glu Val Ala Lys Val Ile Ser Glu Gly Gly Asp Phe Asn His Gly Phe
305 310 315 320

Thr Tyr Ser Gly His Pro Val Ala Ala Ala Val Gly Leu Glu Asn Leu
325 330 335

Arg Ile Leu Arg Asp Glu Gln Ile Ile Gln Gln Val His Asp Lys Thr
340 345 350

Ala Pro Tyr Leu Gln Gln Arg Leu Arg Glu Leu Ala Asp His Pro Leu
355 360 365

Val Gly Glu Val Arg Gly Leu Gly Met Leu Gly Ala Ile Glu Leu Val
370 375 380

Lys Asp Lys Ala Thr Arg Ala Arg Tyr Glu Gly Lys Gly Val Gly Met
385 390 395 400

Ile Cys Arg Gln His Cys Phe Asp Asn Gly Leu Ile Met Arg Ala Val
405 410 415

Gly Asp Thr Met Ile Ile Ala Pro Pro Leu Val Ile Ser Ile Glu Glu
420 425 430

Ile Asp Glu Leu Val Glu Lys Ala Arg Lys Cys Leu Asp Leu Thr Tyr
435 440 445

Glu Ala Val Arg

450

<210> 10
<211> 918
<212> DNA
<213> Cuphea palustris

<400> 10
atgctggacc gcaaatccaa acgccctgac atgctggtcg aacctctggg tgttgatcgt 60

atcgtctacg atggtgttag ctttcgtcag agcttcagca ttcgcagcta cgagatcggc 120

gctgatcgca ctgcgtctat tgaaaccctg atgaacatgt ttcaggaaac gtcgctgaat 180

cactgcaaaa tcattggcct gttgaacgat ggcttcggcc gtaccccgga gatgtgtaag 240

cgtgacctga tctgggtcgt cacgaagatg cagattgaag tgaatcgtta tccgacctgg 300

ggtgatacca tcgaggtgaa tacgtgggtg tccgccagcg gtaagcacgg tatgggccgt 360

gactggctga tttctgactg tcataccggt gagatcctga ttcgtgcgac cagcgtgtgg 420

gccatgatga accagaaaac tcgtcgcctg agcaaaatcc cgtacgaagt gcgtcaggag 480

atcgagccgc aattcgtgga cagcgcaccg gttattgttg acgatcgcaa attccataaa 540

ctggatctga aaaccggcga cagcatttgc aacggtctga cgccgcgttg gacggatctg 600

gacgtcaacc aacacgtcaa taatgtgaag tacattggtt ggatcttgca gagcgttccg 660

accgaagtgt ttgaaacgca agagctgtgc ggcttgaccc tggagtatcg tcgcgagtgt 720

ggtcgtgact ccgttttgga gtctgttacc gcaatggacc caagcaagga aggtgatcgt 780

agcctgtatc aacacctgct gcgcctggag gacggtgcgg atattgttaa gggccgtacc 840

gaatggcgtc cgaagaacgc gggtgcgaaa ggtgcaatcc tgacgggtaa gaccagcaac 900

ggcaatagca tcagctaa 918

<210> 11
<211> 1137
<212> DNA
<213> Bacillus subtilis

<400> 11
atgatcatag gggttcctaa agagataaaa aacaatgaaa accgtgtcgc attaacaccc 60

gggggcgttt ctcagctcat ttcaaacggc caccgggtgc tggttgaaac aggcgcgggc 120

cttggaagcg gatttgaaaa tgaagcctat gagtcagcag gagcggaaat cattgctgat 180

ccgaagcagg tctgggacgc cgaaatggtc atgaaagtaa aagaaccgct gccggaagaa 240

tatgtttatt ttcgcaaagg acttgtgctg tttacgtacc ttcatttagc agctgagcct 300

gagcttgcac aggccttgaa ggataaagga gtaactgcca tcgcatatga aacggtcagt 360

gaaggccgga cattgcctct tctgacgcca atgtcagagg ttgcgggcag aatggcagcg 420

caaatcggcg ctcaattctt agaaaagcct aaaggcggaa aaggcattct gcttgccggg 480

gtgcctggcg tttcccgcgg aaaagtaaca attatcggag gaggcgttgt cgggacaaac 540

gcggcgaaaa tggctgtcgg cctcggtgca gatgtgacga tcattgactt aaacgcagac 600

cgcttgcgcc agcttgatga catcttcggc catcagatta aaacgttaat ttctaatccg 660

gtcaatattg ctgatgctgt ggcggaagcg gatctcctca tttgcgcggt attaattccg 720

ggtgctaaag ctccgactct tgtcactgag gaaatggtaa aacaaatgaa acccggttca 780

gttattgttg atgtagcgat cgaccaaggc ggcatcgtcg aaactgtcga ccatatcaca 840

acacatgatc agccaacata tgaaaaacac ggggttgtgc attatgctgt agcgaacatg 900

ccaggcgcag tccctcgtac atcaacaatc gccctgacta acgttactgt tccatacgcg 960

ctgcaaatcg cgaacaaagg ggcagtaaaa gcgctcgcag acaatacggc actgagagcg 1020

ggtttaaaca ccgcaaacgg acacgtgacc tatgaagctg tagcaagaga tctaggctat 1080

gagtatgttc ctgccgagaa agctttacag gatgaatcat ctgtggcggg tgcttaa 1137

<210> 12
<211> 1380
<212> DNA
<213> Chromobacterium violaceum

<400> 12
atgcagaaac agcgtaccac ctctcagtgg cgtgaactcg atgcggcgca tcatctccat 60

ccgtttaccg ataccgcgag cctcaatcag gcgggtgcgc gtgtgatgac ccgtggcgaa 120

ggcgtgtatc tctgggatag cgaaggcaac aaaattattg atggcatggc gggcctctgg 180

tgcgtgaacg tgggctatgg ccgtaaagat tttgcggaag cggcgcgtcg tcagatggaa 240

gaactcccgt tttataacac cttctttaaa accacccatc cggcggtggt ggaactcagc 300

agcctcctcg ccgaagttac cccggcaggt tttgatcgtg tgttttatac caacagcggc 360

agcgaaagcg tggataccat gattcgtatg gtgcgtcgtt attgggatgt gcagggcaaa 420

ccggaaaaaa aaaccctcat tggccgttgg aacggctatc acggcagcac cattggcggt 480

gcgagcctcg gcggcatgaa atatatgcat gaacagggcg atctcccgat tccgggcatg 540

gcgcatattg aacagccgtg gtggtataaa catggcaaag atatgacccc ggatgaattt 600

ggcgtggttg cggcgcgttg gctcgaagaa aaaattctcg aaatcggcgc ggataaagtg 660

gcggcgtttg tgggcgaacc gattcagggt gcgggcggtg tgattgttcc gccggcaacc 720

tattggccgg aaattgaacg tatttgccgc aaatatgatg tgctcctcgt tgcggatgaa 780

gtgatttgcg gctttggccg taccggcgaa tggtttggcc atcagcattt tggctttcag 840

ccggacctct ttaccgcggc gaaaggcctc agcagcggct atctcccgat tggcgcggtg 900

tttgtgggca aacgtgttgc ggaaggtctc attgcgggcg gtgattttaa ccatggcttt 960

acctatagcg gccatccggt gtgtgcggcg gtggcgcatg cgaatgttgc ggcgctccgt 1020

gatgaaggca ttgtgcagcg tgtgaaagat gatattggcc cgtatatgca gaaacgttgg 1080

cgtgaaacct ttagccgttt tgaacatgtg gatgatgtgc gtggcgtggg catggtgcag 1140

gcgtttaccc tcgtgaaaaa caaagcgaaa cgtgaactct ttccggattt tggcgaaatt 1200

ggcaccctct gccgcgatat ttttttcgc aacaacctca ttatgcgtgc gtgcggcgat 1260

cacattgtgt ctgcaccgcc gctcgttatg acccgtgcgg aagtggatga aatgctcgcc 1320

gtggcggaac gttgcctcga agaatttgaa cagaccctca aagcgcgtgg cctcgcctaa 1380

<210> 13
<211> 2673
<212> DNA
<213> Artificial Sequence

<220>
<223> Vector

<400> 13
ggcagtgagc gcaacgcaat taatgtaagt tagctcactc attaggcacc ccaggcttga 60

cactttatgc ttccggctcg tataatgtgt ggaattgtga gcggataaca ataacaattt 120

cacacaggat ctaggaacca aggagagtgg catatgaaga ttggtattcc aaaggaaatt 180

aaaaacaacg aaaatcgcgt agcaatgaca ccagcaggag ttgtatcctt aacgcatgct 240

gggcacgaga ggttagctat tgaaacagga ggtggtatcg gttcaagttt tacagatgca 300

gagtacgtag cagcaggtgc agcatatcgt tgcatcggca aagaagcgtg ggctcaagaa 360

atgattttaa aagtaaaaga acccgtagca tcggaatacg attactttta tgagggacaa 420

atcttattta cctacttgca cttagcgccc agagctgaat taacgcaggc attaatagat 480

aaaaaagttg taggtattgc ctatgaaacg gttcaacttg caaatggttc actaccttta 540

ttaacaccaa tgagtgaagt agctggtaaa atggcaacac aaattggtgc gcaatattta 600

gagaaaaatc acggtggtaa agggatttta ctaggcggtg tatcaggtgt acacgcgcgt 660

aaagtaacag taattggtgg cggaatcgcg ggaacaaacg ctgcgaaaat tgcagttggt 720

atgggagcag acgtaacagt tattgattta agtccagaac gtctacgtca attagaagat 780

atgtttggtc gcgatgttca aacattaatg tctaacccgt ataatattgc agaatctgtg 840

aaacactcag atttagttgt cggtgctgtt ctaattcctg gtgcaaaggc tccaaagtta 900

gtttcggaag aaatgattca atcgatgcaa ccaggttctg ttgttgtgga tattgcgatt 960

gaccaaggtg gaatttttgc gacatctgat cgtgttacaa cacatgatga tccaacgtat 1020

gttaaacatg gggtagtcca ttatgctgtt gcaaatatgc caggggctgt gccacgtact 1080

tcaacgattg ctttaacaaa taatacaatt ccttatgcgt tgcaaattgc caataaaggc 1140

tataagcaag catgtattga caatcctgca ttgaaaaaag gtgtgaatgc attagagggg 1200

catattactt ataaagcggt agcagaagca caaggcttgc cttatgtgaa tgtggatgaa 1260

ttaatccaat aataagcttt aaggagatat aatatgcaga aacagcgtac cacctctcag 1320

tggcgtgaac tcgatgcggc gcatcatctc catccgttta ccgataccgc gagcctcaat 1380

caggcgggtg cgcgtgtgat gacccgtggc gaaggcgtgt atctctggga tagcgaaggc 1440

aacaaaatta ttgatggcat ggcgggcctc tggtgcgtga acgtgggcta tggccgtaaa 1500

gattttgcgg aagcggcgcg tcgtcagatg gaagaactcc cgttttataa caccttcttt 1560

aaaaccaccc atccggcggt ggtggaactc agcagcctcc tcgccgaagt taccccggca 1620

ggttttgatc gtgtgtttta taccaacagc ggcagcgaaa gcgtggatac catgattcgt 1680

atggtgcgtc gttattggga tgtgcagggc aaaccggaaa aaaaaaccct cattggccgt 1740

tggaacggct atcacggcag caccattggc ggtgcgagcc tcggcggcat gaaatatatg 1800

catgaacagg gcgatctccc gattccgggc atggcgcata ttgaacagcc gtggtggtat 1860

aaacatggca aagatatgac cccggatgaa tttggcgtgg ttgcggcgcg ttggctcgaa 1920

gaaaaaattc tcgaaatcgg cgcggataaa gtggcggcgt ttgtgggcga accgattcag 1980

ggtgcgggcg gtgtgattgt tccgccggca acctattggc cggaaattga acgtatttgc 2040

cgcaaatatg atgtgctcct cgttgcggat gaagtgattt gcggctttgg ccgtaccggc 2100

gaatggtttg gccatcagca ttttggcttt cagccggacc tctttaccgc ggcgaaaggc 2160

ctcagcagcg gctatctccc gattggcgcg gtgtttgtgg gcaaacgtgt tgcggaaggt 2220

ctcattgcgg gcggtgattt taaccatggc tttacctata gcggccatcc ggtgtgtgcg 2280

gcggtggcgc atgcgaatgt tgcggcgctc cgtgatgaag gcattgtgca gcgtgtgaaa 2340

gatgatattg gcccgtatat gcagaaacgt tggcgtgaaa cctttagccg ttttgaacat 2400

gtggatgatg tgcgtggcgt gggcatggtg caggcgttta ccctcgtgaa aaacaaagcg 2460

aaacgtgaac tctttccgga ttttggcgaa attggcaccc tctgccgcga tatttttttt 2520

cgcaacaacc tcattatgcg tgcgtgcggc gatcacattg tgtctgcacc gccgctcgtt 2580

atgacccgtg cggaagtgga tgaaatgctc gccgtggcgg aacgttgcct cgaagaattt 2640

gaacagaccc tcaaagcgcg tggcctcgcc taa 2673

<210> 14
<211> 6820
<212> DNA
<213> Artificial Sequence

<220>
<223> Vector

<400> 14
agcgttggta ctcacgcctg ttatactatg agtactcacg cacagaaggg ggttttatgg 60

aatacgaaaa aagcgcttca gggtcggtct acctgatcaa aagtgacaag ggctattggt 120

tgcccggtgg ctttggttat acgtcaaaca aggccgaggc tggccgcttt tcagtcgctg 180

atatggccag ccttaacctt gacggctggg ccggccctcg agccccactt cagaagttcc 240

tatactacta gagaatagga acttcactat agagtcgaat aagggcgaca ccccataatt 300

agcccgggcg aaaggcccag tctttcgact gagcctttcg ttttatttga tgcctggcag 360

ttccctactc tcgcatgggg agtccccaca ctaccatcgg cgctacggcg tttcacttct 420

gagttcggca tggggtcagg tgggaccacc gcgctactgc cgccaggcaa acaaggggtg 480

ttatgagcca tattcaggta taaatgggct cgcgataatg ttcagaattg gttaattggt 540

tgtaacactg acccctattt gtttatttttt ctaaatacat tcaaatatgt atccgctcat 600

gagacaataa ccctgataaa tgcttcaata atattgaaaa aggaagaata tgagtattca 660

acatttccgt gtcgccctta ttcccttttt tgcggcattt tgccttcctg tttttgctca 720

cccagaaacg ctggtgaaag taaaagatgc tgaagatcag ttgggtgcac gagtgggtta 780
catcgaactg gatctcaaca gcggtaagat ccttgagagt tttcgccccg aagaacgttt 840
tccaatgatg agcactttta aagttctgct atgtggcgcg gtattatccc gtattgacgc 900
cgggcaagag caactcggtc gccgcataca ctattctcag aatgacttgg ttgagtactc 960
accagtcaca gaaaagcatc ttacggatgg catgacagta agagaattat gcagtgctgc 1020
cataaccatg agtgataaca ctgcggccaa cttacttctg acaacgatcg gaggaccgaa 1080
ggagctaacc gctttttttgc acaacatggg ggatcatgta actcgccttg atcgttggga 1140
accggagctg aatgaagcca taccaaacga cgagcgtgac accacgatgc ctgtagcgat 1200
ggcaacaacg ttgcgcaaac tattaactgg cgaactactt actctagctt cccggcaaca 1260
attaatagac tggatggagg cggataaagt tgcaggacca cttctgcgct cggcccttcc 1320
ggctggctgg tttattgctg ataaatccgg agccggtgag cgtggttctc gcggtatcat 1380
cgcagcgctg gggccagatg gtaagccctc ccgtatcgta gttatctaca cgacggggag 1440
tcaggcaact atggatgaac gaaatagaca gatcgctgag ataggtgcct cactgattaa 1500
gcattggtaa aagcggcgcg ccatcgaatg gcgcaaaacc tttcgcggta tggcatgata 1560
gcgcccggaa gagagtcaat tcagggtggt gaatatgaaa ccagtaacgt tatacgatgt 1620
cgcagagtat gccggtgtct cttatcagac cgtttcccgc gtggtgaacc aggccagcca 1680
cgtttctgcg aaaacgcggg aaaaagtgga agcggcgatg gcggagctga attacattcc 1740
caaccgcgtg gcacaacaac tggcgggcaa acagtcgttg ctgattggcg ttgccacctc 1800
cagtctggcc ctgcacgcgc cgtcgcaaat tgtcgcggcg attaaatctc gcgccgatca 1860
actgggtgcc agcgtggtgg tgtcgatggt agaacgaagc ggcgtcgaag cctgtaaagc 1920
ggcggtgcac aatcttctcg cgcaacgcgt cagtgggctg atcattaact atccgctgga 1980
tgaccaggat gccattgctg tggaagctgc ctgcactaat gttccggcgt tatttcttga 2040
tgtctctgac cagacaccca tcaacagtat tattttctcc catgaggacg gtacgcgact 2100
gggcgtggag catctggtcg cattgggtca ccagcaaatc gcgctgttag cgggcccatt 2160
aagttctgtc tcggcgcgtc tgcgtctggc tggctggcat aaatatctca ctcgcaatca 2220
aattcagccg atagcggaac gggaaggcga ctggagtgcc atgtccggtt ttcaacaaac 2280
catgcaaatg ctgaatgagg gcatcgttcc cactgcgatg ctggttgcca acgatcagat 2340
ggcgctgggc gcaatgcgcg ccattaccga gtccgggctg cgcgttggtg cggatatctc 2400
ggtagtggga tacgacgata ccgaagatag ctcatgttat atcccgccgt taaccaccat 2460
caaacaggat tttcgcctgc tggggcaaac cagcgtggac cgcttgctgc aactctctca 2520
gggccaggcg gtgaagggca atcagctgtt gccagtctca ctggtgaaaa gaaaaaccac 2580
cctggcgccc aatacgcaaa ccgcctctcc ccgcgcgttg gccgattcat taatgcagct 2640
ggcacgacag gtttcccgac tggaaagcgg gcagtgatta ataagatgat cttcttgaga 2700
tcgttttggt ctgcgcgtaa tctcttgctc tgaaaacgaa aaaaccgcct tgcagggcgg 2760

tttttcgaag gttctctgag ctaccaactc tttgaaccga ggtaactggc ttggaggagc 2820

gcagtcacca aaacttgtcc tttcagttta gccttaaccg gcgcatgact tcaagactaa 2880

ctcctctaaa tcaattacca gtggctgctg ccagtggtgc ttttgcatgt ctttccgggt 2940

tggactcaag acgatagtta ccggataagg cgcagcggtc ggactgaacg gggggttcgt 3000

gcatacagtc cagcttggag cgaactgcct acccggaact gagtgtcagg cgtggaatga 3060

gacaaacgcg gccataacag cggaatgaca ccggtaaacc gaaaggcagg aacaggagag 3120

cgcacgaggg agccgccagg gggaaacgcc tggtatcttt atagtcctgt cgggtttcgc 3180

caccactgat ttgagcgtca gatttcgtga tgcttgtcag gggggcggag cctatggaaa 3240

aacggctttg ccgcggccct ctcacttccc tgttaagtat cttcctggca tcttccagga 3300

aatctccgcc ccgttcgtaa gccatttccg ctcgccgcag tcgaacgacc gagcgtagcg 3360

agtcagtgag cgaggaagcg gaatatatcc tgtatcacat attctgctga cgcaccggtg 3420

cagccttttt tctcctgcca catgaagcac ttcactgaca ccctcatcag tgccaacata 3480

gtaagccagt atacactccg ctagcgctga ggtcccgcag ccgaacgacc gagcgcagcg 3540

gcgagagtag ggaactgcca ggcatcctgg gcggttctga taacgagtaa tcgttaatcc 3600

gcaaataacg taaaaacccg cttcggcggg ttttttttatg gggggagttt agggaaagag 3660

catttgtcag aatatttaag ggcgcctgtc actttgcttg atatatgaga attatttaac 3720

cttataaatg agaaaaaagc aacgcacttt aaataagata cgttgctttt tcgattgatg 3780

aacacctata attaaactat tcatctatta tttatgattt tttgtatata caatatttct 3840

agtttgttaa agagaattaa gaaaataaat ctcgaaaata ataaagggaa aatcagtttt 3900

tgatatcaaa attatacatg tcaacgataa tacaaaatat aatacaaact ataagatgtt 3960

atcagtattt attatgcatt tagaatacct tttgtgtcgc ccttattcga ctccctatag 4020

aagttcctat tctctagtaa gtataggaac ttcccttcat tttctcgagg cggccgcgga 4080

tcctgcagcc ccgcagggcc tgtctcggtc gatcattcag cccggctcat agatatgcgg 4140

gcagtgagcg caacgcaatt aatgtaagtt agctcactca ttaggcaccc caggcttgac 4200

actttatgct tccggctcgt ataatgtgtg gaattgtgag cggataacaa taacaatttc 4260

acacaggatc taggaaccaa ggagagtggc atatgaagat tggtattcca aaggaaatta 4320

aaaacaacga aaatcgcgta gcaatgacac cagcaggagt tgtatcctta acgcatgctg 4380

ggcacgagag gttagctatt gaaacaggag gtggtatcgg ttcaagtttt acagatgcag 4440

agtacgtagc agcaggtgca gcatatcgtt gcatcggcaa agaagcgtgg gctcaagaaa 4500

tgattttaaa agtaaaagaa cccgtagcat cggaatacga ttacttttat gagggacaaa 4560

tcttatttac ctacttgcac ttagcgccca gagctgaatt aacgcaggca ttaatagata 4620

aaaaagttgt aggtattgcc tatgaaacgg ttcaacttgc aaatggttca ctacctttat 4680

taacaccaat gagtgaagta gctggtaaaa tggcaacaca aattggtgcg caatatttag 4740

agaaaaatca cggtggtaaa gggattttac taggcggtgt atcaggtgta cacgcgcgta 4800

aagtaacagt aattggtggc ggaatcgcgg gaacaaacgc tgcgaaaatt gcagttggta 4860

tgggagcaga cgtaacagtt attgatttaa gtccagaacg tctacgtcaa ttagaagata 4920

tgtttggtcg cgatgttcaa acattaatgt ctaacccgta taatattgca gaatctgtga 4980

aacactcaga tttagttgtc ggtgctgttc taattcctgg tgcaaaggct ccaaagttag 5040

tttcggaaga aatgattcaa tcgatgcaac caggttctgt tgttgtggat attgcgattg 5100

accaaggtgg aatttttgcg acatctgatc gtgttacaac acatgatgat ccaacgtatg 5160

ttaaacatgg ggtagtccat tatgctgttg caaatatgcc aggggctgtg ccacgtactt 5220

caacgattgc tttaacaaat aatacaattc cttatgcgtt gcaaattgcc aataaaggct 5280

ataagcaagc atgtattgac aatcctgcat tgaaaaaagg tgtgaatgca ttagaggggc 5340

atattactta taaagcggta gcagaagcac aaggcttgcc ttatgtgaat gtggatgaat 5400

taatccaata ataagcttta aggagatata atatgcagaa acagcgtacc acctctcagt 5460

ggcgtgaact cgatgcggcg catcatctcc atccgtttac cgataccgcg agcctcaatc 5520

aggcgggtgc gcgtgtgatg acccgtggcg aaggcgtgta tctctgggat agcgaaggca 5580

acaaaattat tgatggcatg gcgggcctct ggtgcgtgaa cgtgggctat ggccgtaaag 5640

attttgcgga agcggcgcgt cgtcagatgg aagaactccc gttttataac accttcttta 5700

aaaccaccca tccggcggtg gtggaactca gcagcctcct cgccgaagtt accccggcag 5760

gttttgatcg tgtgttttat accaacagcg gcagcgaaag cgtggatacc atgattcgta 5820

tggtgcgtcg ttattgggat gtgcagggca aaccggaaaa aaaaaccctc attggccgtt 5880

ggaacggcta tcacggcagc accattggcg gtgcgagcct cggcggcatg aaatatatgc 5940

atgaacaggg cgatctcccg attccgggca tggcgcatat tgaacagccg tggtggtata 6000

aacatggcaa agatatgacc ccggatgaat ttggcgtggt tgcggcgcgt tggctcgaag 6060

aaaaaattct cgaaatcggc gcggataaag tggcggcgtt tgtgggcgaa ccgattcagg 6120

gtgcgggcgg tgtgattgtt ccgccggcaa cctattggcc ggaaattgaa cgtatttgcc 6180

gcaaatatga tgtgctcctc gttgcggatg aagtgatttg cggctttggc cgtaccggcg 6240

aatggtttgg ccatcagcat tttggctttc agccggacct ctttaccgcg gcgaaaggcc 6300

tcagcagcgg ctatctcccg attggcgcgg tgtttgtggg caaacgtgtt gcggaaggtc 6360

tcattgcggg cggtgatttt aaccatggct ttacctatag cggccatccg gtgtgtgcgg 6420

cggtggcgca tgcgaatgtt gcggcgctcc gtgatgaagg cattgtgcag cgtgtgaaag 6480

atgatattgg cccgtatatg cagaaacgtt ggcgtgaaac ctttagccgt tttgaacatg 6540

tggatgatgt gcgtggcgtg ggcatggtgc aggcgtttac cctcgtgaaa aacaaagcga 6600

aacgtgaact ctttccggat tttggcgaaa ttggcaccct ctgccgcgat attttttttc 6660

gcaacaacct cattatgcgt gcgtgcggcg atcacattgt gtctgcaccg ccgctcgtta 6720

tgacccgtgc ggaagtggat gaaatgctcg ccgtggcgga acgttgcctc gaagaatttg 6780

aacagaccct caaagcgcgt ggcctcgcct aataatctag 6820

<210> 15
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 15
atgatcatag gggttcctaa agag 24

<210> 16
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 16
ttaagcaccc gccacagatg 20

<210> 17
<211> 6837
<212> DNA
<213> Artificial Sequence

<220>
<223> Vector

<400> 17
agcgttggta ctcacgcctg ttatactatg agtactcacg cacagaaggg ggttttatgg 60

aatacgaaaa aagcgcttca gggtcggtct acctgatcaa aagtgacaag ggctattggt 120

tgcccggtgg ctttggttat acgtcaaaca aggccgaggc tggccgcttt tcagtcgctg 180

atatggccag ccttaacctt gacggctggg ccggccctcg agccccactt cagaagttcc 240

tatactacta gagaatagga acttcactat agagtcgaat aagggcgaca ccccataatt 300

agcccgggcg aaaggcccag tctttcgact gagcctttcg ttttatttga tgcctggcag 360

ttccctactc tcgcatgggg agtccccaca ctaccatcgg cgctacggcg tttcacttct 420

gagttcggca tggggtcagg tgggaccacc gcgctactgc cgccaggcaa acaaggggtg 480

ttatgagcca tattcaggta taaatgggct cgcgataatg ttcagaattg gttaattggt 540

tgtaacactg acccctattt gtttattttt ctaaatacat tcaaatatgt atccgctcat 600

gagacaataa ccctgataaa tgcttcaata atattgaaaa aggaagaata tgagtattca 660

acatttccgt gtcgccctta ttcccttttt tgcggcattt tgccttcctg tttttgctca 720

cccagaaacg ctggtgaaag taaaagatgc tgaagatcag ttgggtgcac gagtgggtta 780

catcgaactg gatctcaaca gcggtaagat ccttgagagt tttcgccccg aagaacgttt 840

tccaatgatg agcactttta aagttctgct atgtggcgcg gtattatccc gtattgacgc 900

cgggcaagag caactcggtc gccgcataca ctattctcag aatgacttgg ttgagtactc 960

accagtcaca gaaaagcatc ttacggatgg catgacagta agagaattat gcagtgctgc 1020

cataaccatg agtgataaca ctgcggccaa cttacttctg acaacgatcg gaggaccgaa 1080

ggagctaacc gctttttttgc acaacatggg ggatcatgta actcgccttg atcgttggga 1140

accggagctg aatgaagcca taccaaacga cgagcgtgac accacgatgc ctgtagcgat 1200

ggcaacaacg ttgcgcaaac tattaactgg cgaactactt actctagctt cccggcaaca 1260

attaatagac tggatggagg cggataaagt tgcaggacca cttctgcgct cggcccttcc 1320

ggctggctgg tttattgctg ataaatccgg agccggtgag cgtggttctc gcggtatcat 1380

cgcagcgctg gggccagatg gtaagccctc ccgtatcgta gttatctaca cgacggggag 1440

tcaggcaact atggatgaac gaaatagaca gatcgctgag ataggtgcct cactgattaa 1500

gcattggtaa aagcggcgcg ccatcgaatg gcgcaaaacc tttcgcggta tggcatgata 1560

gcgcccggaa gagagtcaat tcagggtggt gaatatgaaa ccagtaacgt tatacgatgt 1620

cgcagagtat gccggtgtct cttatcagac cgtttcccgc gtggtgaacc aggccagcca 1680

cgtttctgcg aaaacgcggg aaaaagtgga agcggcgatg gcggagctga attacattcc 1740

caaccgcgtg gcacaacaac tggcgggcaa acagtcgttg ctgattggcg ttgccacctc 1800

cagtctggcc ctgcacgcgc cgtcgcaaat tgtcgcggcg attaaatctc gcgccgatca 1860

actgggtgcc agcgtggtgg tgtcgatggt agaacgaagc ggcgtcgaag cctgtaaagc 1920

ggcggtgcac aatcttctcg cgcaacgcgt cagtgggctg atcattaact atccgctgga 1980

tgaccaggat gccattgctg tggaagctgc ctgcactaat gttccggcgt tatttcttga 2040

tgtctctgac cagacaccca tcaacagtat tattttctcc catgaggacg gtacgcgact 2100

gggcgtggag catctggtcg cattgggtca ccagcaaatc gcgctgttag cgggcccatt 2160

aagttctgtc tcggcgcgtc tgcgtctggc tggctggcat aaatatctca ctcgcaatca 2220

aattcagccg atagcggaac gggaaggcga ctggagtgcc atgtccggtt ttcaacaaac 2280

catgcaaatg ctgaatgagg gcatcgttcc cactgcgatg ctggttgcca acgatcagat 2340

ggcgctgggc gcaatgcgcg ccattaccga gtccgggctg cgcgttggtg cggatatctc 2400

ggtagtggga tacgacgata ccgaagatag ctcatgttat atcccgccgt taaccaccat 2460

caaacaggat tttcgcctgc tggggcaaac cagcgtggac cgcttgctgc aactctctca 2520

gggccaggcg gtgaagggca atcagctgtt gccagtctca ctggtgaaaa gaaaaaccac 2580

cctggcgccc aatacgcaaa ccgcctctcc ccgcgcgttg gccgattcat taatgcagct 2640

ggcacgacag gtttcccgac tggaaagcgg gcagtgatta ataagatgat cttcttgaga 2700

tcgttttggt ctgcgcgtaa tctcttgctc tgaaaacgaa aaaaccgcct tgcagggcgg 2760

tttttcgaag gttctctgag ctaccaactc tttgaaccga ggtaactggc ttggaggagc 2820

gcagtcacca aaacttgtcc tttcagttta gccttaaccg gcgcatgact tcaagactaa 2880

ctcctctaaa tcaattacca gtggctgctg ccagtggtgc ttttgcatgt ctttccgggt 2940

tggactcaag acgatagtta ccggataagg cgcagcggtc ggactgaacg gggggttcgt 3000

gcatacagtc cagcttggag cgaactgcct acccggaact gagtgtcagg cgtggaatga 3060

gacaaacgcg gccataacag cggaatgaca ccggtaaacc gaaaggcagg aacaggagag 3120

cgcacgaggg agccgccagg gggaaacgcc tggtatcttt atagtcctgt cgggtttcgc 3180

caccactgat ttgagcgtca gatttcgtga tgcttgtcag gggggcggag cctatggaaa 3240

aacggctttg ccgcggccct ctcacttccc tgttaagtat cttcctggca tcttccagga 3300

aatctccgcc ccgttcgtaa gccatttccg ctcgccgcag tcgaacgacc gagcgtagcg 3360

agtcagtgag cgaggaagcg gaatatatcc tgtatcacat attctgctga cgcaccggtg 3420

cagccttttt tctcctgcca catgaagcac ttcactgaca ccctcatcag tgccaacata 3480

gtaagccagt atacactccg ctagcgctga ggtcccgcag ccgaacgacc gagcgcagcg 3540

gcgagagtag ggaactgcca ggcatcctgg gcggttctga taacgagtaa tcgttaatcc 3600

gcaaataacg taaaaacccg cttcggcggg ttttttatg gggggagttt agggaaagag 3660

catttgtcag aatatttaag ggcgcctgtc actttgcttg atatatgaga attatttaac 3720

cttataaatg agaaaaaagc aacgcacttt aaataagata cgttgctttt tcgattgatg 3780

aacacctata attaaactat tcatctatta tttatgattt tttgtatata caatatttct 3840

agtttgttaa agagaattaa gaaaataaat ctcgaaaata ataaagggaa aatcagtttt 3900

tgatatcaaa attatacatg tcaacgataa tacaaaatat aatacaaact ataagatgtt 3960

atcagtattt attatgcatt tagaatacct tttgtgtcgc ccttattcga ctccctatag 4020

aagttcctat tctctagtaa gtataggaac ttcccttcat tttctcgagg cggccgcgga 4080

tcctgcagcc ccgcagggcc tgtctcggtc gatcattcag cccggctcat agatatgcgg 4140

gcagtgagcg caacgcaatt aatgtaagtt agctcactca ttaggcaccc caggcttgac 4200

actttatgct tccggctcgt ataatgtgtg gaattgtgag cggataacaa taacaatttc 4260

acacaggatc taggaaccaa ggagagtggc ataatgatca taggggttcc taaagagata 4320

aaaaacaatg aaaaccgtgt cgcattaaca cccgggggcg tttctcagct catttcaaac 4380

ggccaccggg tgctggttga aacaggcgcg ggccttggaa gcggatttga aaatgaagcc 4440

tatgagtcag caggagcgga aatcattgct gatccgaagc aggtctggga cgccgaaatg 4500

gtcatgaaag taaaagaacc gctgccggaa gaatatgttt attttcgcaa aggacttgtg 4560

ctgtttacgt accttcattt agcagctgag cctgagcttg cacaggcctt gaaggataaa 4620

ggagtaactg ccatcgcata tgaaacggtc agtgaaggcc ggacattgcc tcttctgacg 4680

ccaatgtcag aggttgcggg cagaatggca gcgcaaatcg gcgctcaatt cttagaaaag 4740

cctaaaggcg gaaaaggcat tctgcttgcc ggggtgcctg gcgtttcccg cggaaaagta 4800

acaattatcg gaggaggcgt tgtcgggaca aacgcggcga aaatggctgt cggcctcggt 4860

gcagatgtga cgatcattga cttaaacgca gaccgcttgc gccagcttga tgacatcttc 4920

ggccatcaga ttaaaacgtt aatttctaat ccggtcaata ttgctgatgc tgtggcggaa 4980

gcggatctcc tcatttgcgc ggtattaatt ccgggtgcta aagctccgac tcttgtcact 5040

gaggaaatgg taaaacaaat gaaacccggt tcagttattg ttgatgtagc gatcgaccaa 5100

ggcggcatcg tcgaaactgt cgaccatatc acaacacatg atcagccaac atatgaaaaa 5160
cacggggttg tgcattatgc tgtagcgaac atgccaggcg cagtccctcg tacatcaaca 5220
atcgccctga ctaacgttac tgttccatac gcgctgcaaa tcgcgaacaa aggggcagta 5280
aaagcgctcg cagacaatac ggcactgaga gcgggtttaa acaccgcaaa cggacacgtg 5340
acctatgaag ctgtagcaag agatctaggc tatgagtatg ttcctgccga gaaagcttta 5400
caggatgaat catctgtggc gggtgcttaa agctttaagg agatataata tgcagaaaca 5460
gcgtaccacc tctcagtggc gtgaactcga tgcggcgcat catctccatc cgtttaccga 5520
taccgcgagc ctcaatcagg cgggtgcgcg tgtgatgacc cgtggcgaag gcgtgtatct 5580
ctgggatagc gaaggcaaca aaattattga tggcatggcg ggcctctggt gcgtgaacgt 5640
gggctatggc cgtaaagatt ttgcggaagc ggcgcgtcgt cagatggaag aactcccgtt 5700
ttataacacc ttctttaaaa ccacccatcc ggcggtggtg gaactcagca gcctcctcgc 5760
cgaagttacc ccggcaggtt ttgatcgtgt gttttatacc aacagcggca gcgaaagcgt 5820
ggataccatg attcgtatgg tgcgtcgtta ttgggatgtg cagggcaaac cggaaaaaaa 5880
aaccctcatt ggccgttgga acggctatca cggcagcacc attggcggtg cgagcctcgg 5940
cggcatgaaa tatatgcatg aacagggcga tctcccgatt ccgggcatgg cgcatattga 6000
acagccgtgg tggtataaac atggcaaaga tatgaccccg gatgaatttg gcgtggttgc 6060
ggcgcgttgg ctcgaagaaa aaattctcga aatcggcgcg gataaagtgg cggcgtttgt 6120
gggcgaaccg attcagggtg cgggcggtgt gattgttccg ccggcaacct attggccgga 6180
aattgaacgt atttgccgca aatatgatgt gctcctcgtt gcggatgaag tgatttgcgg 6240
ctttggccgt accggcgaat ggtttggcca tcagcatttt ggctttcagc cggacctctt 6300
taccgcggcg aaaggcctca gcagcggcta tctcccgatt ggcgcggtgt ttgtgggcaa 6360
acgtgttgcg gaaggtctca ttgcgggcgg tgattttaac catggcttta cctatagcgg 6420
ccatccggtg tgtgcggcgg tggcgcatgc gaatgttgcg gcgctccgtg atgaaggcat 6480
tgtgcagcgt gtgaaagatg atattggccc gtatatgcag aaacgttggc gtgaaacctt 6540
tagccgtttt gaacatgtgg atgatgtgcg tggcgtgggc atggtgcagg cgtttaccct 6600
cgtgaaaaac aaagcgaaac gtgaactctt tccggatttt ggcgaaattg gcaccctctg 6660
ccgcgatatt ttttttcgca acaacctcat tatgcgtgcg tgcggcgatc acattgtgtc 6720
tgcaccgccg ctcgttatga cccgtgcgga agtggatgaa atgctcgccg tggcggaacg 6780
ttgcctcgaa gaatttgaac agaccctcaa agcgcgtggc ctcgcctaat aatctag 6837

<210> 18
<211> 1065
<212> DNA
<213> Artificial Sequence

<220>
<223> ExpressionConsruct

<400> 18
aacaattacg agcttcatgc acagtgatcg acgctgttga caattaatca tcggctcgta 60

taatgtgtgg atgtggaatt gtgagcgctc acaattccac aacggtttcc ctctagaaat 120

aattttgttt aacaggaggt aaaacatatg ctggaccgca aatccaaacg ccctgacatg 180

ctggtcgaac ctctgggtgt tgatcgtatc gtctacgatg gtgttagctt tcgtcagagc 240

ttcagcattc gcagctacga gatcggcgct gatcgcactg cgtctattga aaccctgatg 300

aacatgtttc aggaaacgtc gctgaatcac tgcaaaatca ttggcctgtt gaacgatggc 360

ttcggccgta ccccggagat gtgtaagcgt gacctgatct gggtcgtcac gaagatgcag 420

attgaagtga atcgttatcc gacctggggt gataccatcg aggtgaatac gtgggtgtcc 480

gccagcggta agcacggtat gggccgtgac tggctgattt ctgactgtca taccggtgag 540

atcctgattc gtgcgaccag cgtgtgggcc atgatgaacc agaaaactcg tcgcctgagc 600

aaaatcccgt acgaagtgcg tcaggagatc gagccgcaat tcgtggacag cgcaccggtt 660

attgttgacg atcgcaaatt ccataaactg gatctgaaaa ccggcgacag catttgcaac 720

ggtctgacgc cgcgttggac ggatctggac gtcaaccaac acgtcaataa tgtgaagtac 780

attggttgga tcttgcagag cgttccgacc gaagtgtttg aaacgcaaga gctgtgcggc 840

ttgaccctgg agtatcgtcg cgagtgtggt cgtgactccg ttttggagtc tgttaccgca 900

atggacccaa gcaaggaagg tgatcgtagc ctgtatcaac acctgctgcg cctggaggac 960

ggtgcggata ttgttaaggg ccgtaccgaa tggcgtccga agaacgcggg tgcgaaaggt 1020

gcaatcctga cgggtaagac cagcaacggc aatagcatca gctaa 1065

<210> 19
<211> 7966
<212> DNA
<213> Artificial Sequence

<220>
<223> Vector

<400> 19
ctagattatt aggcgaggcc acgcgctttg agggtctgtt caaattcttc gaggcaacgt 60

tccgccacgg cgagcatttc atccacttcc gcacgggtca taacgagcgg cggtgcagac 120

acaatgtgat cgccgcacgc acgcataatg aggttgttgc gaaaaaaaat atcgcggcag 180

agggtgccaa tttcgccaaa atccggaaag agttcacgtt tcgctttgtt tttcacgagg 240

gtaaacgcct gcaccatgcc cacgccacgc acatcatcca catgttcaaa acggctaaag 300

gtttcacgcc aacgtttctg catatacggg ccaatatcat ctttcacacg ctgcacaatg 360

ccttcatcac ggagcgccgc aacattcgca tgcgccaccg ccgcacacac cggatggccg 420

ctataggtaa agccatggtt aaaatcaccg cccgcaatga gaccttccgc aacacgtttg 480

cccacaaaca ccgcgccaat cgggagatag ccgctgctga ggcctttcgc cgcggtaaag 540

aggtccggct gaaagccaaa atgctgatgg ccaaaccatt cgccggtacg gccaaagccg 600

caaatcactt catccgcaac gaggagcaca tcatatttgc ggcaaatacg ttcaatttcc 660

ggccaatagg ttgccggcgg aacaatcaca ccgcccgcac cctgaatcgg ttcgcccaca 720

aacgccgcca ctttatccgc gccgatttcg agaatttttt cttcgagcca acgcgccgca 780

accacgccaa attcatccgg ggtcatatct ttgccatgtt tataccacca cggctgttca 840

atatgcgcca tgcccggaat cgggagatcg ccctgttcat gcatatattt catgccgccg 900

aggctcgcac cgccaatggt gctgccgtga tagccgttcc aacggccaat gagggttttt 960

ttttccggtt tgccctgcac atcccaataa cgacgcacca tacgaatcat ggtatccacg 1020

ctttcgctgc cgctgttggt ataaaacaca cgatcaaaac ctgccggggt aacttcggcg 1080

aggaggctgc tgagttccac caccgccgga tgggtggttt taaagaaggt gttataaaac 1140

gggagttctt ccatctgacg acgcgccgct tccgcaaaat ctttacggcc atagcccacg 1200

ttcacgcacc agaggcccgc catgccatca ataattttgt tgccttcgct atcccagaga 1260

tacacgcctt cgccacgggt catcacacgc gcacccgcct gattgaggct cgcggtatcg 1320

gtaaacggat ggagatgatg cgccgcatcg agttcacgcc actgagaggt ggtacgctgt 1380

ttctgcatat tatatctcct taaagcttta agcacccgcc acagatgatt catcctgtaa 1440

agctttctcg gcaggaacat actcatagcc tagatctctt gctacagctt cataggtcac 1500

gtgtccgttt gcggtgttta aacccgctct cagtgccgta ttgtctgcga gcgcttttac 1560

tgccccttg ttcgcgattt gcagcgcgta tggaacagta acgttagtca gggcgattgt 1620

tgatgtacga gggactgcgc ctggcatgtt cgctacagca taatgcacaa ccccgtgttt 1680

ttcatatgtt ggctgatcat gtgttgtgat atggtcgaca gtttcgacga tgccgccttg 1740

gtcgatcgct acatcaacaa taactgaacc gggtttcatt tgttttacca tttcctcagt 1800

gacaagagtc ggagctttag cacccggaat taataccgcg caaatgagga gatccgcttc 1860

cgccacagca tcagcaatat tgaccggatt agaaattaac gttttaatct gatggccgaa 1920

gatgtcatca agctggcgca agcggtctgc gtttaagtca atgatcgtca catctgcacc 1980

gaggccgaca gccatttttcg ccgcgtttgt cccgacaacg cctcctccga taattgttac 2040

ttttccgcgg gaaacgccag gcaccccggc aagcagaatg ccttttccgc ctttaggctt 2100

ttctaagaat tgagcgccga tttgcgctgc cattctgccc gcaacctctg acattggcgt 2160

cagaagaggc aatgtccggc cttcactgac cgtttcatat gcgatggcag ttactccttt 2220

atccttcaag gcctgtgcaa gctcaggctc agctgctaaa tgaaggtacg taaacagcac 2280

aagtcctttg cgaaaataaa catattcttc cggcagcggt tcttttactt tcatgaccat 2340

ttcggcgtcc cagacctgct tcggatcagc aatgatttcc gctcctgctg actcataggc 2400

ttcattttca aatccgcttc caaggcccgc gcctgtttca accagcaccc ggtggccgtt 2460

tgaaatgagc tgagaaacgc ccccgggtgt taatgcgaca cggttttcat tgttttttat 2520

ctctttagga acccctatga tcattatgcc actctccttg gttcctagat cctgtgtgaa 2580

attgttattg ttatccgctc acaattccac acattatacg agccggaagc ataaagtgtc 2640

aagcctgggg tgcctaatga gtgagctaac ttacattaat tgcgttgcgc tcactgcccg 2700

catatctatg agccgggctg aatgatcgac cgagacaggc cctgcggggc tgcaggatcc 2760
aattgtgagc ggataacaat tacgagcttc atgcacagtg atcgacgctg ttgacaatta 2820
atcatcggct cgtataatgt gtggatgtgg aattgtgagc gctcacaatt ccacaacggt 2880
ttccctctag aaataatttt gtttaacagg aggtaaaaca tatgctggac cgcaaatcca 2940
aacgccctga catgctggtc gaacctctgg gtgttgatcg tatcgtctac gatggtgtta 3000
gctttcgtca gagcttcagc attcgcagct acgagatcgg cgctgatcgc actgcgtcta 3060
ttgaaaccct gatgaacatg tttcaggaaa cgtcgctgaa tcactgcaaa atcattggcc 3120
tgttgaacga tggcttcggc cgtaccccgg agatgtgtaa gcgtgacctg atctgggtcg 3180
tcacgaagat gcagattgaa gtgaatcgtt atccgacctg gggtgatacc atcgaggtga 3240
atacgtgggt gtccgccagc ggtaagcacg gtatgggccg tgactggctg atttctgact 3300
gtcataccgg tgagatcctg attcgtgcga ccagcgtgtg ggccatgatg aaccagaaaa 3360
ctcgtcgcct gagcaaaatc ccgtacgaag tgcgtcagga gatcgagccg caattcgtgg 3420
acagcgcacc ggttattgtt gacgatcgca aattccataa actggatctg aaaaccggcg 3480
acagcatttg caacggtctg acgccgcgtt ggacggatct ggacgtcaac caacacgtca 3540
ataatgtgaa gtacattggt tggatcttgc agagcgttcc gaccgaagtg tttgaaacgc 3600
aagagctgtg cggcttgacc ctggagtatc gtcgcgagtg tggtcgtgac tccgttttgg 3660
agtctgttac cgcaatggac ccaagcaagg aaggtgatcg tagcctgtat caacacctgc 3720
tgcgcctgga ggacggtgcg gatattgtta agggccgtac cgaatggcgt ccgaagaacg 3780
cgggtgcgaa aggtgcaatc ctgacgggta agaccagcaa cggcaatagc atcagctaat 3840
agtcaaaagc ctccggtcgg aggcttttga ctttctgctt actgaatttg cggccgcctc 3900
gagaaaatga agggaagttc ctatacttac tagagaatag gaacttctat agggagtcga 3960
ataagggcga cacaaaaggt attctaaatg cataataaat actgataaca tcttatagtt 4020
tgtattatat tttgtattat cgttgacatg tataattttg atatcaaaaa ctgattttcc 4080
ctttattatt ttcgagattt attttcttaa ttctctttaa caaactagaa atattgtata 4140
tacaaaaaat cataaataat agatgaatag tttaattata ggtgttcatc aatcgaaaaa 4200
gcaacgtatc ttatttaaag tgcgttgctt ttttctcatt tataaggtta aataattctc 4260
atatatcaag caaagtgaca ggcgccctta aatattctga caaatgctct ttccctaaac 4320
tccccccata aaaaaacccg ccgaagcggg tttttacgtt atttgcggat taacgattac 4380
tcgttatcag aaccgcccag gatgcctggc agttccctac tctcgccgct gcgctcggtc 4440
gttcggctgc gggacctcag cgctagcgga gtgtatactg gcttactatg ttggcactga 4500
tgagggtgtc agtgaagtgc ttcatgtggc aggagaaaaa aggctgcacc ggtgcgtcag 4560
cagaatatgt gatacaggat atattccgct tcctcgctca ctgactcgct acgctcggtc 4620
gttcgactgc ggcgagcgga aatggcttac gaacggggcg gagatttcct ggaagatgcc 4680
aggaagatac ttaacaggga agtgagaggg ccgcggcaaa gccgtttttc cataggctcc 4740

gccccccctga caagcatcac gaaatctgac gctcaaatca gtggtggcga aacccgacag 4800
gactataaag ataccaggcg tttccccctg gcggctccct cgtgcgctct cctgttcctg 4860
cctttcggtt taccggtgtc attccgctgt tatggccgcg tttgtctcat tccacgcctg 4920
acactcagtt ccgggtaggc agttcgctcc aagctggact gtatgcacga acccccccgtt 4980
cagtccgacc gctgcgcctt atccggtaac tatcgtcttg agtccaaccc ggaaagacat 5040
gcaaaagcac cactggcagc agccactggt aattgattta gaggagttag tcttgaagtc 5100
atgcgccggt taaggctaaa ctgaaaggac aagttttggt gactgcgctc ctccaagcca 5160
gttacctcgg ttcaaagagt tggtagctca gagaaccttc gaaaaaccgc cctgcaaggc 5220
ggttttttcg ttttcagagc aagagattac gcgcagacca aaacgatctc aagaagatca 5280
tcttattaat cactgcccgc tttccagtcg ggaaacctgt cgtgccagct gcattaatga 5340
atcggccaac gcgcggggag aggcggtttg cgtattgggc gccagggtgg tttttctttt 5400
caccagtgag actggcaaca gctgattgcc cttcaccgcc tggccctgag agagttgcag 5460
caagcggtcc acgctggttt gccccagcag gcgaaaatcc tgtttgatgg tggttaacgg 5520
cgggatataa catgagctat cttcggtatc gtcgtatccc actaccgaga tatccgcacc 5580
aacgcgcagc ccggactcgg taatggcgcg cattgcgccc agcgccatct gatcgttggc 5640
aaccagcatc gcagtgggaa cgatgccctc attcagcatt tgcatggttt gttgaaaacc 5700
ggacatggca ctccagtcgc cttcccgttc cgctatcggc tgaatttgat tgcgagtgag 5760
atatttatgc cagccagcca gacgcagacg cgccgagaca gaacttaatg ggcccgctaa 5820
cagcgcgatt tgctggtgac ccaatgcgac cagatgctcc acgcccagtc gcgtaccgtc 5880
ctcatgggag aaaataatac tgttgatggg tgtctggtca gagacatcaa gaaataacgc 5940
cggaacatta gtgcaggcag cttccacagc aatggcatcc tggtcatcca gcggatagtt 6000
aatgatcagc ccactgacgc gttgcgcgag aagattgtgc accgccgctt tacaggcttc 6060
gacgccgctt cgttctacca tcgacaccac cacgctggca cccagttgat cggcgcgaga 6120
tttaatcgcc gcgacaattt gcgacggcgc gtgcagggcc agactggagg tggcaacgcc 6180
aatcagcaac gactgtttgc ccgccagttg ttgtgccacg cggttgggaa tgtaattcag 6240
ctccgccatc gccgcttcca ctttttcccg cgttttcgca gaaacgtggc tggcctggtt 6300
caccacgcgg gaaacggtct gataagagac accggcatac tctgcgacat cgtataacgt 6360
tactggtttc atattcacca ccctgaattg actctcttcc gggcgctatc atgccatacc 6420
gcgaaaggtt ttgcgccatt cgatggcgcg ccgcttttac caatgcttaa tcagtgaggc 6480
acctatctca gcgatctgtc tatttcgttc atccatagtt gcctgactcc ccgtcgtgta 6540
gataactacg atacgggagg gcttaccatc tggccccagc gctgcgatga taccgcgaga 6600
accacgctca ccggctccgg atttatcagc aataaaccag ccagccggaa gggccgagcg 6660
cagaagtggt cctgcaactt tatccgcctc catccagtct attaattgtt gccgggaagc 6720
tagagtaagt agttcgccag ttaatagttt gcgcaacgtt gttgccatcg ctacaggcat 6780

cgtggtgtca cgctcgtcgt ttggtatggc ttcattcagc tccggttccc aacgatcaag 6840

gcgagttaca tgatccccca tgttgtgcaa aaaagcggtt agctccttcg gtcctccgat 6900

cgttgtcaga agtaagttgg ccgcagtgtt atcactcatg gttatggcag cactgcataa 6960

ttctcttact gtcatgccat ccgtaagatg cttttctgtg actggtgagt actcaaccaa 7020

gtcattctga gaatagtgta tgcggcgacc gagttgctct tgcccggcgt caatacggga 7080

taataccgcg ccacatagca gaactttaaa agtgctcatc attggaaaac gttcttcggg 7140

gcgaaaactc tcaaggatct taccgctgtt gagatccagt tcgatgtaac ccactcgtgc 7200

acccaactga tcttcagcat cttttacttt caccagcgtt tctgggtgag caaaaacagg 7260

aaggcaaaat gccgcaaaaa agggaataag ggcgacacgg aaatgttgaa tactcatatt 7320

cttccttttt caatattatt gaagcattta tcagggttat tgtctcatga gcggatacat 7380

atttgaatgt atttagaaaa ataaacaaat aggggtcagt gttacaacca attaaccaat 7440

tctgaacatt atcgcgagcc catttatacc tgaatatggc tcataacacc ccttgtttgc 7500

ctggcggcag tagcgcggtg gtcccacctg accccatgcc gaactcagaa gtgaaacgcc 7560

gtagcgccga tggtagtgtg gggactcccc atgcgagagt agggaactgc caggcatcaa 7620

ataaaacgaa aggctcagtc gaaagactgg gcctttcgcc cgggctaatt atggggtgtc 7680

gcccttattc gactctatag tgaagttcct attctctagt agtataggaa cttctgaagt 7740

ggggctcgag ggccggccca gccgtcaagg ttaaggctgg ccatatcagc gactgaaaag 7800

cggccagcct cggccttgtt tgacgtataa ccaaagccac cgggcaacca atagcccttg 7860

tcacttttga tcaggtagac cgaccctgaa gcgctttttt cgtattccat aaaaccccct 7920

tctgtgcgtg agtactcata gtataacagg cgtgagtacc aacgct 7966

<210> 20
<211> 4985
<212> DNA
<213> Artificial Sequence

<220>
<223> Vector

<400> 20
aaaagcggcg cgccatcgaa tggcgcaaaa cctttcgcgg tatggcatga tagcgcccgg 60

aagagagtca attcagggtg gtgaatatga aaccagtaac gttatacgat gtcgcagagt 120

atgccggtgt ctcttatcag accgtttccc gcgtggtgaa ccaggccagc cacgtttctg 180

cgaaaacgcg ggaaaaagtg gaagcggcga tggcggagct gaattacatt cccaaccgcg 240

tggcacaaca actggcgggc aaacagtcgt tgctgattgg cgttgccacc tccagtctgg 300

ccctgcacgc gccgtcgcaa attgtcgcgg cgattaaatc tcgcgccgat caactgggtg 360

ccagcgtggt ggtgtcgatg gtagaacgaa gcggcgtcga agcctgtaaa gcggcggtgc 420

acaatcttct cgcgcaacgc gtcagtgggc tgatcattaa ctatccgctg gatgaccagg 480

atgccattgc tgtggaagct gcctgcacta atgttccggc gttatttctt gatgtctctg 540

accagacacc catcaacagt attattttct cccatgagga cggtacgcga ctgggcgtgg 600

agcatctggt cgcattgggt caccagcaaa tcgcgctgtt agcgggccca ttaagttctg 660

tctcggcgcg tctgcgtctg gctggctggc ataaatatct cactcgcaat caaattcagc 720

cgatagcgga acgggaaggc gactggagtg ccatgtccgg ttttcaacaa accatgcaaa 780

tgctgaatga gggcatcgtt cccactgcga tgctggttgc caacgatcag atggcgctgg 840

gcgcaatgcg cgccattacc gagtccgggc tgcgcgttgg tgcggatatc tcggtagtgg 900

gatacgacga taccgaagat agctcatgtt atatcccgcc gttaaccacc atcaaacagg 960

attttcgcct gctggggcaa accagcgtgg accgcttgct gcaactctct cagggccagg 1020

cggtgaaggg caatcagctg ttgccagtct cactggtgaa aagaaaaacc accctggcgc 1080

ccaatacgca aaccgcctct ccccgcgcgt tggccgattc attaatgcag ctggcacgac 1140

aggtttcccg actggaaagc gggcagtgat taataagatg atcttcttga gatcgttttg 1200

gtctgcgcgt aatctcttgc tctgaaaacg aaaaaaccgc cttgcagggc ggtttttcga 1260

aggttctctg agctaccaac tctttgaacc gaggtaactg gcttggagga gcgcagtcac 1320

caaaacttgt cctttcagtt tagccttaac cggcgcatga cttcaagact aactcctcta 1380

aatcaattac cagtggctgc tgccagtggt gcttttgcat gtctttccgg gttggactca 1440

agacgatagt taccggataa ggcgcagcgg tcggactgaa cgggggggttc gtgcatacag 1500

tccagcttgg agcgaactgc ctacccggaa ctgagtgtca ggcgtggaat gagacaaacg 1560

cggccataac agcggaatga caccggtaaa ccgaaaggca ggaacaggag agcgcacgag 1620

ggagccgcca gggggaaacg cctggtatct ttatagtcct gtcgggtttc gccaccactg 1680

atttgagcgt cagatttcgt gatgcttgtc agggggggcgg agcctatgga aaaacggctt 1740

tgccgcggcc ctctcacttc cctgttaagt atcttcctgg catcttccag gaaatctccg 1800

ccccgttcgt aagccatttc cgctcgccgc agtcgaacga ccgagcgtag cgagtcagtg 1860

agcgaggaag cggaatatat cctgtatcac atattctgct gacgcaccgg tgcagccttt 1920

tttctcctgc cacatgaagc acttcactga caccctcatc agtgccaaca tagtaagcca 1980

gtatacactc cgctagcgct gaggtcccgc agccgaacga ccgagcgcag cggcgagagt 2040

agggaactgc caggcatcct gggcggttct gataacgagt aatcgttaat ccgcaaataa 2100

cgtaaaaacc cgcttcggcg ggtttttttа tgggggggagt ttagggaaag agcatttgtc 2160

agaatattta agggcgcctg tcactttgct tgatatatga gaattattta accttataaa 2220

tgagaaaaaa gcaacgcact ttaaataaga tacgttgctt tttcgattga tgaacaccta 2280

taattaaact attcatctat tatttatgat tttttgtata tacaatattt ctagtttgtt 2340

aaagagaatt aagaaaataa atctcgaaaa taataaaggg aaaatcagtt tttgatatca 2400

aaattataca tgtcaacgat aatacaaaat ataatacaaa ctataagatg ttatcagtat 2460

ttattatgca tttagaatac cttttgtgtc gcccttattc gactccctat agaagttcct 2520

attctctaga aagtatagga acttcccttc attttggatc caattgtgag cggataacaa 2580

ttacgagctt catgcacagt gatcgacgct gttgacaatt aatcatcggc tcgtataatg 2640

tgtggatgtg gaattgtgag cgctcacaat tccacaacgg tttccctcta gaaataattt 2700

tgtttaacag gaggtaaaac atatgctgga ccgcaaatcc aaacgccctg acatgctggt 2760

cgaacctctg ggtgttgatc gtatcgtcta cgatggtgtt agctttcgtc agagcttcag 2820

cattcgcagc tacgagatcg gcgctgatcg cactgcgtct attgaaaccc tgatgaacat 2880

gtttcaggaa acgtcgctga atcactgcaa aatcattggc ctgttgaacg atggcttcgg 2940

ccgtaccccg gagatgtgta agcgtgacct gatctgggtc gtcacgaaga tgcagattga 3000

agtgaatcgt tatccgacct ggggtgatac catcgaggtg aatacgtggg tgtccgccag 3060

cggtaagcac ggtatgggcc gtgactggct gatttctgac tgtcataccg gtgagatcct 3120

gattcgtgcg accagcgtgt gggccatgat gaaccagaaa actcgtcgcc tgagcaaaat 3180

cccgtacgaa gtgcgtcagg agatcgagcc gcaattcgtg gacagcgcac cggttattgt 3240

tgacgatcgc aaattccata aactggatct gaaaaccggc gacagcattt gcaacggtct 3300

gacgccgcgt tggacggatc tggacgtcaa ccaacacgtc aataatgtga agtacattgg 3360

ttggatcttg cagagcgttc cgaccgaagt gtttgaaacg caagagctgt gcggcttgac 3420

cctggagtat cgtcgcgagt gtggtcgtga ctccgttttg gagtctgtta ccgcaatgga 3480

cccaagcaag gaaggtgatc gtagcctgta tcaacacctg ctgcgcctgg aggacggtgc 3540

ggatattgtt aagggccgta ccgaatggcg tccgaagaac gcgggtgcga aaggtgcaat 3600

cctgacgggt aagaccagca acggcaatag catcagctaa tagtcaaaag cctccggtcg 3660

gaggcttttg actttctgct tactgaattt gcggccgccc ccacttcaga agttcctata 3720

ctttctagag aataggaact tcactataga gtcgaataag ggcgacaccc cataattagc 3780

ccgggcgaaa ggcccagtct ttcgactgag cctttcgttt tatttgatgc ctggcagttc 3840

cctactctcg catggggagt ccccacacta ccatcggcgc tacggcgttt cacttctgag 3900

ttcggcatgg ggtcaggtgg gaccaccgcg ctactgccgc caggcaaaca aggggtgtta 3960

tgagccatat tcaggtataa atgggctcgc gataatgttc agaattggtt aattggttgt 4020

aacactgacc cctatttgtt tatttttcta aatacattca aatatgtatc cgctcatgag 4080

acaataaccc tgataaatgc ttcaataata ttgaaaaagg aagaatatga gtattcaaca 4140

tttccgtgtc gcccttattc cctttttttgc ggcattttgc cttcctgttt ttgctcaccc 4200

agaaacgctg gtgaaagtaa aagatgctga agatcagttg ggtgcacgag tgggttacat 4260

cgaactggat ctcaacagcg gtaagatcct tgagagtttt cgccccgaag aacgttttcc 4320

aatgatgagc acttttaaag ttctgctatg tggcgcggta ttatcccgta ttgacgccgg 4380

gcaagagcaa ctcggtcgcc gcatacacta ttctcagaat gacttggttg agtactcacc 4440

agtcacagaa aagcatctta cggatggcat gacagtaaga gaattatgca gtgctgccat 4500

aaccatgagt gataacactg cggccaactt acttctgaca acgatcggag gaccgaagga 4560

gctaaccgct tttttgcaca acatggggga tcatgtaact cgccttgatc gttgggaacc 4620

ggagctgaat gaagccatac caaacgacga gcgtgacacc acgatgcctg tagcgatggc 4680

aacaacgttg cgcaaactat taactggcga actacttact ctagcttccc ggcaacaatt 4740

aatagactgg atggaggcgg ataaagttgc aggaccactt ctgcgctcgg cccttccggc 4800

tggctggttt attgctgata aatccggagc cggtgagcgt ggttctcgcg gtatcatcgc 4860

agcgctgggg ccagatggta agccctcccg tatcgtagtt atctacacga cggggagtca 4920

ggcaactatg gatgaacgaa atagacagat cgctgagata ggtgcctcac tgattaagca 4980

ttggt 4985

<210> 21
<211> 1752
<212> DNA
<213> Escherichia coli

<400> 21
atgttaacgg catgtatatc atttggggtt gcgatgacga cgaacacgca ttttagaggt 60

gaagaattga agaaggtttg gcttaaccgt tatcccgcgg acgttccgac ggagatcaac 120

cctgaccgtt atcaatctct ggtagatatg tttgagcagt cggtcgcgcg ctacgccgat 180

caacctgcgt ttgtgaatat gggggaggta atgaccttcc gcaagctgga agaacgcagt 240

cgcgcgtttg ccgcttattt gcaacaaggg ttggggctga agaaaggcga tcgcgttgcg 300

ttgatgatgc ctaatttatt gcaatatccg gtggcgctgt ttggcatttt gcgtgccggg 360

atgatcgtcg taaacgttaa cccgttgtat accccgcgtg agcttgagca tcagcttaac 420

gatagcggcg catcggcgat tgttatcgtg tctaactttg ctcacacact ggaaaaagtg 480

gttgataaaa ccgccgttca gcacgtaatt ctgacccgta tgggcgatca gctatctacg 540

gcaaaaggca cggtagtcaa tttcgttgtt aaatacatca agcgtttggt gccgaaatac 600

catctgccag atgccatttc atttcgtagc gcactgcata acggctaccg gatgcagtac 660

gtcaaacccg aactggtgcc ggaagattta gcttttctgc aatacaccgg cggcaccact 720

ggtgtggcga aaggcgcgat gctgactcac cgcaatatgc tggcgaacct ggaacaggtt 780

aacgcgacct atggtccgct gttgcatccg ggcaaagagc tggtggtgac ggcgctgccg 840

ctgtatcaca tttttgccct gaccattaac tgcctgctgt ttatcgaact gggtgggcag 900

aacctgctta tcactaaccc gcgcgatatt ccagggttgg taaaagagtt agcgaaatat 960

ccgtttaccg ctatcacggg cgttaacacc ttgttcaatg cgttgctgaa caataaagag 1020

ttccagcagc tggatttctc cagtctgcat ctttccgcag gcggtgggat gccagtgcag 1080

caagtggtgg cagagcgttg ggtgaaactg accggacagt atctgctgga aggctatggc 1140

cttaccgagt gtgcgccgct ggtcagcgtt aacccatatg atattgatta tcatagtggt 1200

agcatcggtt tgccggtgcc gtcgacggaa gccaaactgg tggatgatga tgataatgaa 1260

gtaccaccag gtcaaccggg tgagctttgt gtcaaaggac cgcaggtgat gctgggttac 1320

tggcagcgtc ccgatgctac cgatgaaatc atcaaaaatg gctggttaca caccggcgac 1380

atcgcggtaa tggatgaaga aggattcctg cgcattgtcg atcgtaaaaa agacatgatt 1440

ctggtttccg gttttaacgt ctatcccaac gagattgaag atgtcgtcat gcagcatcct 1500

ggcgtacagg aagtcgcggc tgttggcgta ccttccggct ccagtggtga agcggtgaaa 1560

atcttcgtag tgaaaaaaga tccatcgctt accgaagagt cactggtgac tttttgccgc 1620

cgtcagctca cgggatacaa agtaccgaag ctggtggagt ttcgtgatga gttaccgaaa 1680

tctaacgtcg gaaaaatttt gcgacgagaa ttacgtgacg aagcgcgcgg caaagtggac 1740

aataaagcct ga 1752

<210> 22
<211> 1377
<212> DNA
<213> Acinetobacter sp.

<400> 22
atgcgcccat tacatccgat tgattttata ttcctgtcac tagaaaaaag acaacagcct 60

atgcatgtag gtggtttatt tttgtttcag attcctgata acgccccaga caccttttatt 120

caagatctgg tgaatgatat ccggatatca aaatcaatcc ctgttccacc attcaacaat 180

aaactgaatg ggctttttg ggatgaagat gaagagtttg atttagatca tcattttcgt 240

catattgcac tgcctcatcc tggtcgtatt cgtgaattgc ttatttatat ttcacaagag 300

cacagtacgc tgctagatcg ggcaaagccc ttgtggacct gcaatattat tgaaggaatt 360

gaaggcaatc gttttgccat gtacttcaaa attcaccatg cgatggtcga tggcgttgct 420

ggtatgcggt taattgaaaa atcactctcc catgatgtaa cagaaaaaag tatcgtgcca 480

ccttggtgtg ttgagggaaa acgtgcaaag cgcttaagag aacctaaaac aggtaaaatt 540

aagaaaatca tgtctggtat taagagtcag cttcaggcga cacccacagt cattcaagag 600

ctttctcaga cagtatttaa agatattgga cgtaatcctg atcatgtttc aagctttcag 660

gcgccttgtt ctattttgaa tcagcgtgtg agctcatcgc gacgttttgc agcacagtct 720

tttgacctag atcgttttcg taatattgcc aaatcgttga atgtgaccat taatgatgtt 780

gtactagcgg tatgttctgg tgcattacgt gcgtatttga tgagtcataa tagtttgcct 840

tcaaaaccat taattgccat ggttccagcc tctattcgca atgacgattc agatgtcagc 900

aaccgtatta cgatgattct ggcaaatttg gcaacccaca aagatgatcc tttacaacgt 960

cttgaaatta tccgccgtag tgttcaaaac tcaaagcaac gcttcaaacg tatgaccagc 1020

gatcagattc taaattatag tgctgtcgta tatggccctg caggactcaa cataatttct 1080

ggcatgatgc caaaacgcca agccttcaat ctggttattt ccaatgtgcc tggcccaaga 1140

gagccacttt actggaatgg tgccaaactt gatgcactct acccagcttc aattgtatta 1200

gacggtcaag cattgaatat tacaatgacc agttatttag ataaacttga agttggtttg 1260

attgcatgcc gtaatgcatt gccaagaatg cagaatttac tgacacattt agaagaagaa 1320

attcaactat ttgaaggcgt aattgcaaag caggaagata ttaaaacagc caattaa 1377

<210> 23
<211> 139
<212> DNA
<213> Artificial Sequence

<220>
<223> Promoter

<400> 23
aacaattacg agcttcatgc acagtgatcg acgctgttga caattaatca tcggctcgta 60

taatgtgtgg atgtggaatt gtgagcgctc acaattccac aacggtttcc ctctagaaat 120

aattttgttt aacaggagg 139

<210> 24
<211> 35
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 24
ttatgcgact cctgcgttta gggaaagagc atttg 35

<210> 25
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 25
gttaacatat gttttacctc ctgttaaaca aa 32

<210> 26
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 26
taaaacatat gttaacggca tgtatatcat tt 32

<210> 27
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 27
tctcctcaga cttaacgctc aggctttatt gt 32

<210> 28
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 28
gttaagtctg aggagatcca cgctatgcgc cc 32

<210> 29
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 29
caattgagat ctgccacgac tgcaatggtt catc 34

<210> 30
<211> 7316
<212> DNA
<213> Artificial Sequence

<220>
<223> Vector

<400> 30
cgggatctcg acgctctccc ttatgcgact cctgcgttta gggaaagagc atttgtcaga 60

atatttaagg gcgcctgtca ctttgcttga tatatgagaa ttatttaacc ttataaatga 120

gaaaaaagca acgcacttta ataagatac gttgcttttt cgattgatga acacctataa 180

ttaaactatt catctattat ttatgatttt ttgtatatac aatatttcta gtttgttaaa 240

gagaattaag aaaataaatc tcgaaaataa taaagggaaa atcagttttt gatatcaaaa 300

ttatacatgt caacgataat acaaaatata atacaaacta taagatgtta tcagtattta 360

ttatgcattt agaatacctt ttgtgtcgcc cttattcgac tccctataga agttcctatt 420

ctctagaaag tataggaact tcccttcatt ttggatccaa ttgtgagcgg ataacaatta 480

cgagcttcat gcacagtgat cgacgctgtt gacaattaat catcggctcg tataatgtgt 540

ggatgtggaa ttgtgagcgc tcacaattcc acaacggttt ccctctagaa ataattttgt 600

ttaacaggag gtaaaacata tgttaacggc atgtatatca tttggggttg cgatgacgac 660

gaacacgcat tttagaggtg aagaattgaa gaaggtttgg cttaaccgtt atcccgcgga 720

cgttccgacg gagatcaacc ctgaccgtta tcaatctctg gtagatatgt ttgagcagtc 780

ggtcgcgcgc tacgccgatc aacctgcgtt tgtgaatatg ggggaggtaa tgaccttccg 840

caagctggaa gaacgcagtc gcgcgtttgc cgcttatttg caacaagggt tggggctgaa 900

gaaaggcgat cgcgttgcgt tgatgatgcc taatttattg caatatccgg tggcgctgtt 960

tggcattttg cgtgccggga tgatcgtcgt aaacgttaac ccgttgtata ccccgcgtga 1020

gcttgagcat cagcttaacg atagcggcgc atcggcgatt gttatcgtgt ctaactttgc 1080

tcacacactg gaaaaagtgg ttgataaaac cgccgttcag cacgtaattc tgacccgtat 1140

gggcgatcag ctatctacgg caaaaggcac ggtagtcaat ttcgttgtta aatacatcaa 1200

gcgtttggtg ccgaaatacc atctgccaga tgccatttca tttcgtagcg cactgcataa 1260

cggctaccgg atgcagtacg tcaaacccga actggtgccg gaagatttag cttttctgca 1320

atacaccggc ggcaccactg gtgtggcgaa aggcgcgatg ctgactcacc gcaatatgct 1380

ggcgaacctg gaacaggtta acgcgaccta tggtccgctg ttgcatccgg gcaaagagct 1440

ggtggtgacg gcgctgccgc tgtatcacat ttttgccctg accattaact gcctgctgtt 1500

tatcgaactg ggtgggcaga acctgcttat cactaacccg cgcgatattc cagggttggt 1560

aaaagagtta gcgaaatatc cgtttaccgc tatcacgggc gttaacacct tgttcaatgc 1620

gttgctgaac aataaagagt tccagcagct ggatttctcc agtctgcatc tttccgcagg 1680

cggtgggatg ccagtgcagc aagtggtggc agagcgttgg gtgaaactga ccggacagta 1740

tctgctggaa ggctatggcc ttaccgagtg tgcgccgctg gtcagcgtta acccatatga 1800

tattgattat catagtggta gcatcggttt gccggtgccg tcgacggaag ccaaactggt 1860

ggatgatgat gataatgaag taccaccagg tcaaccgggt gagctttgtg tcaaaggacc 1920

gcaggtgatg ctgggttact ggcagcgtcc cgatgctacc gatgaaatca tcaaaaatgg 1980

ctggttacac accggcgaca tcgcggtaat ggatgaagaa ggattcctgc gcattgtcga 2040

tcgtaaaaaa gacatgattc tggtttccgg ttttaacgtc tatcccaacg agattgaaga 2100

tgtcgtcatg cagcatcctg gcgtacagga agtcgcggct gttggcgtac cttccggctc 2160

cagtggtgaa gcggtgaaaa tcttcgtagt gaaaaaagat ccatcgctta ccgaagagtc 2220

actggtgact ttttgccgcc gtcagctcac gggatacaaa gtaccgaagc tggtggagtt 2280

tcgtgatgag ttaccgaaat ctaacgtcgg aaaaattttg cgacgagaat tacgtgacga 2340

agcgcgcggc aaagtggaca ataaagcctg agcgttaagt ctgaggagat ccacgctatg 2400

cgcccattac atccgattga ttttatattc ctgtcactag aaaaaagaca acagcctatg 2460

catgtaggtg gtttattttt gtttcagatt cctgataacg ccccagacac ctttattcaa 2520

gatctggtga atgatatccg gatatcaaaa tcaatccctg ttccaccatt caacaataaa 2580

ctgaatgggc ttttttggga tgaagatgaa gagtttgatt tagatcatca ttttcgtcat 2640

attgcactgc ctcatcctgg tcgtattcgt gaattgctta tttatatttc acaagagcac 2700

agtacgctgc tagatcgggc aaagcccttg tggacctgca atattattga aggaattgaa 2760

ggcaatcgtt ttgccatgta cttcaaaatt caccatgcga tggtcgatgg cgttgctggt 2820

atgcggttaa ttgaaaaatc actctcccat gatgtaacag aaaaaagtat cgtgccacct 2880

tggtgtgttg agggaaaacg tgcaaagcgc ttaagagaac ctaaaacagg taaaattaag 2940

aaaatcatgt ctggtattaa gagtcagctt caggcgacac ccacagtcat tcaagagctt 3000

tctcagacag tatttaaaga tattggacgt aatcctgatc atgtttcaag ctttcaggcg 3060

ccttgttcta ttttgaatca gcgtgtgagc tcatcgcgac gttttgcagc acagtctttt 3120

gacctagatc gttttcgtaa tattgccaaa tcgttgaatg tgaccattaa tgatgttgta 3180

ctagcggtat gttctggtgc attacgtgcg tatttgatga gtcataatag tttgccttca 3240

aaaccattaa ttgccatggt tccagcctct attcgcaatg acgattcaga tgtcagcaac 3300

cgtattacga tgattctggc aaatttggca acccacaaag atgatccttt acaacgtctt 3360

gaaattatcc gccgtagtgt tcaaaactca aagcaacgct tcaaacgtat gaccagcgat 3420

cagattctaa attatagtgc tgtcgtatat ggccctgcag gactcaacat aatttctggc 3480

atgatgccaa aacgccaagc cttcaatctg gttatttcca atgtgcctgg cccaagagag 3540

ccactttact ggaatggtgc caaacttgat gcactctacc cagcttcaat tgtattagac 3600

ggtcaagcat tgaatattac aatgaccagt tatttagata aacttgaagt tggtttgatt 3660

gcatgccgta atgcattgcc aagaatgcag aatttactga cacatttaga agaagaaatt 3720

caactatttg aaggcgtaat tgcaaagcag gaagatatta aaacagccaa ttaaaaacaa 3780

taaacttgat tttttaattt atcagataaa actaaagggc taaattagcc ctttagtttt 3840

taacagtacg acactgttta agtaattgat gacacacatg atgaaccatt gcagtcgtgg 3900

cagatctcaa ttggatatcg gccggccacg cgatcgctga cgtcggtacc ctcgagtctg 3960

gtaaagaaac cgctgctgcg aaatttgaac gccagcacat ggactcgtct actagcgcag 4020

cttaattaac ctaggctgct gccaccgctg agcaataact agcataaccc cttggggcct 4080

ctaaacgggt cttgaggggt tttttgctga aacctcaggc atttgagaag cacacggtca 4140

cactgcttcc ggtagtcaat aaaccggtaa accagcaata gacataagcg gctatttaac 4200

gaccctgccc tgaaccgacg accgggtcat cgtggccgga tcttgcggcc cctcggcttg 4260

aacgaattgt tagacattat ttgccgacta ccttggtgat ctcgcctttc acgtagtgga 4320

caaattcttc caactgatct gcgcgcgagg ccaagcgatc ttcttcttgt ccaagataag 4380

cctgtctagc ttcaagtatg acgggctgat actgggccgg caggcgctcc attgcccagt 4440

cggcagcgac atccttcggc gcgattttgc cggttactgc gctgtaccaa atgcgggaca 4500

acgtaagcac tacatttcgc tcatcgccag cccagtcggg cggcgagttc catagcgtta 4560

aggtttcatt tagcgcctca aatagatcct gttcaggaac cggatcaaag agttcctccg 4620

ccgctggacc taccaaggca acgctatgtt ctcttgcttt tgtcagcaag atagccagat 4680

caatgtcgat cgtggctggc tcgaagatac ctgcaagaat gtcattgcgc tgccattctc 4740

caaattgcag ttcgcgctta gctggataac gccacggaat gatgtcgtcg tgcacaacaa 4800

tggtgacttc tacagcgcgg agaatctcgc tctctccagg ggaagccgaa gtttccaaaa 4860

ggtcgttgat caaagctcgc cgcgttgttt catcaagcct tacggtcacc gtaaccagca 4920

aatcaatatc actgtgtggc ttcaggccgc catccactgc ggagccgtac aaatgtacgg 4980

ccagcaacgt cggttcgaga tggcgctcga tgacgccaac tacctctgat agttgagtcg 5040

atacttcggc gatcaccgct tccctcatac tcttcctttt tcaatattat tgaagcattt 5100

atcagggtta ttgtctcatg agcggataca tatttgaatg tatttagaaa aataaacaaa 5160

tagctagctc actcggtcgc tacgctccgg gcgtgagact gcggcgggcg ctgcggacac 5220

atacaaagtt acccacagat tccgtggata agcaggggac taacatgtga ggcaaaacag 5280

cagggccgcg ccggtggcgt ttttccatag gctccgccct cctgccagag ttcacataaa 5340

cagacgcttt tccggtgcat ctgtgggagc cgtgaggctc aaccatgaat ctgacagtac 5400

gggcgaaacc cgacaggact taaagatccc caccgtttcc ggcgggtcgc tccctcttgc 5460

gctctcctgt tccgaccctg ccgtttaccg gatacctgtt ccgcctttct cccttacggg 5520

aagtgtggcg ctttctcata gctcacacac tggtatctcg gctcggtgta ggtcgttcgc 5580

tccaagctgg gctgtaagca agaactcccc gttcagcccg actgctgcgc cttatccggt 5640

aactgttcac ttgagtccaa cccggaaaag cacggtaaaa cgccactggc agcagccatt 5700

ggtaactggg agttcgcaga ggatttgttt agctaaacac gcggttgctc ttgaagtgtg 5760

cgccaaagtc cggctacact ggaaggacag atttggttgc tgtgctctgc gaaagccagt 5820

taccacggtt aagcagttcc ccaactgact taaccttcga tcaaaccacc tccccaggtg 5880

gtttttttcgt ttacagggca aaagattacg cgcagaaaaa aaggatctca agaagatcct 5940

ttgatctttt ctactgaacc gctctagatt tcagtgcaat ttatctcttc aaatgtagca 6000

cctgaagtca gccccatacg atataagttg taattctcat gttagtcatg ccccgcgccc 6060

accggaagga gctgactggg ttgaaggctc tcaagggcat cggtcgagat cccggtgcct 6120

aatgagtgag ctaacttaca ttaattgcgt tgcgctcact gcccgctttc agtcgggaa 6180

acctgtcgtg ccagctgcat taatgaatcg gccaacgcgc ggggagaggc ggtttgcgta 6240

ttgggcgcca gggtggtttt tcttttcacc agtgagacgg gcaacagctg attgcccttc 6300

accgcctggc cctgagagag ttgcagcaag cggtccacgc tggtttgccc cagcaggcga 6360

aaatcctgtt tgatggtggt taacggcggg atataacatg agctgtcttc ggtatcgtcg 6420

tatcccacta ccgagatgtc cgcaccaacg cgcagcccgg actcggtaat ggcgcgcatt 6480

gcgcccagcg ccatctgatc gttggcaacc agcatcgcag tgggaacgat gccctcattc 6540

agcatttgca tggtttgttg aaaaccggac atggcactcc agtcgccttc ccgttccgct 6600

atcggctgaa tttgattgcg agtgagatat ttatgccagc cagccagacg cagacgcgcc 6660

gagacagaac ttaatgggcc cgctaacagc gcgatttgct ggtgacccaa tgcgaccaga 6720

tgctccacgc ccagtcgcgt accgtcttca tgggagaaaa taatactgtt gatgggtgtc 6780

tggtcagaga catcaagaaa taacgccgga acattagtgc aggcagcttc cacagcaatg 6840

gcatcctggt catccagcgg atagttaatg atcagcccac tgacgcgttg cgcgagaaga 6900

ttgtgcaccg ccgctttaca ggcttcgacg ccgcttcgtt ctaccatcga caccaccacg 6960

ctggcaccca gttgatcggc gcgagattta atcgccgcga caatttgcga cggcgcgtgc 7020

agggccagac tggaggtggc aacgccaatc agcaacgact gtttgcccgc cagttgttgt 7080

gccacgcggt tgggaatgta attcagctcc gccatcgccg cttccacttt ttcccgcgtt 7140

ttcgcagaaa cgtggctggc ctggttcacc acgcgggaaa cggtctgata agagacaccg 7200

gcatactctg cgacatcgta taacgttact ggtttcacat tcaccaccct gaattgactc 7260

tcttccgggc gctatcatgc cataccgcga aaggttttgc gccattcgat ggtgtc 7316

<210> 31
<211> 906
<212> DNA
<213> Umbellularia californica

<220>
<221> CDS
<222> (1)..(906)

<400> 31

```
atg act cta gag tgg aaa ccg aaa cca aaa ctg cct caa ctg ctg gat          48
Met Thr Leu Glu Trp Lys Pro Lys Pro Lys Leu Pro Gln Leu Leu Asp
1               5                   10                  15

gat cac ttc ggt ctg cac ggt ctg gtg ttt cgt cgt act ttc gca att          96
Asp His Phe Gly Leu His Gly Leu Val Phe Arg Arg Thr Phe Ala Ile
            20                  25                  30

cgt tct tat gaa gtg ggt cca gat cgt tct acc tcc atc ctg gcc gtc         144
Arg Ser Tyr Glu Val Gly Pro Asp Arg Ser Thr Ser Ile Leu Ala Val
        35                  40                  45

atg aac cac atg cag gaa gcc acc ctg aat cac gcg aaa tct gtt ggt         192
Met Asn His Met Gln Glu Ala Thr Leu Asn His Ala Lys Ser Val Gly
    50                  55                  60

atc ctg ggt gat ggt ttc ggc act act ctg gaa atg tct aaa cgt gac         240
Ile Leu Gly Asp Gly Phe Gly Thr Thr Leu Glu Met Ser Lys Arg Asp
65                  70                  75                  80

ctg atg tgg gta gtg cgt cgc acc cac gta gca gta gag cgc tac cct         288
Leu Met Trp Val Val Arg Arg Thr His Val Ala Val Glu Arg Tyr Pro
                85                  90                  95

act tgg ggt gac act gtg gaa gtc gag tgt tgg att ggc gcg tcc ggt         336
Thr Trp Gly Asp Thr Val Glu Val Glu Cys Trp Ile Gly Ala Ser Gly
            100                 105                 110

aac aat ggt atg cgt cgc gat ttt ctg gtc cgt gac tgt aaa acg ggc         384
Asn Asn Gly Met Arg Arg Asp Phe Leu Val Arg Asp Cys Lys Thr Gly
        115                 120                 125

gaa atc ctg acg cgt tgc acc tcc ctg agc gtt ctg atg aac acc cgc         432
Glu Ile Leu Thr Arg Cys Thr Ser Leu Ser Val Leu Met Asn Thr Arg
    130                 135                 140

act cgt cgc ctg tct acc atc ccg gac gaa gtg cgc ggt gag atc ggt         480
Thr Arg Arg Leu Ser Thr Ile Pro Asp Glu Val Arg Gly Glu Ile Gly
145                 150                 155                 160

cct gct ttc atc gat aac gtg gca gtt aaa gac gac gaa atc aag aaa         528
Pro Ala Phe Ile Asp Asn Val Ala Val Lys Asp Asp Glu Ile Lys Lys
                165                 170                 175

ctg caa aaa ctg aac gac tcc acc gcg gac tac atc cag ggc ggt ctg         576
Leu Gln Lys Leu Asn Asp Ser Thr Ala Asp Tyr Ile Gln Gly Gly Leu
            180                 185                 190

act ccg cgc tgg aac gac ctg gat gtt aat cag cat gtg aac aac ctg         624
Thr Pro Arg Trp Asn Asp Leu Asp Val Asn Gln His Val Asn Asn Leu
        195                 200                 205

aaa tac gtt gct tgg gtc ttc gag act gtg ccg gac agc att ttc gaa         672
Lys Tyr Val Ala Trp Val Phe Glu Thr Val Pro Asp Ser Ile Phe Glu
    210                 215                 220
```

```
agc cat cac att tcc tct ttt act ctg gag tac cgt cgc gaa tgt act        720
Ser His His Ile Ser Ser Phe Thr Leu Glu Tyr Arg Arg Glu Cys Thr
225                 230                 235                 240

cgc gac tcc gtt ctg cgc agc ctg acc acc gta agc ggc ggt tct agc        768
Arg Asp Ser Val Leu Arg Ser Leu Thr Thr Val Ser Gly Gly Ser Ser
                245                 250                 255

gag gca ggt ctg gtc tgc gac cat ctg ctg caa ctg gaa ggc ggc tcc        816
Glu Ala Gly Leu Val Cys Asp His Leu Leu Gln Leu Glu Gly Gly Ser
            260                 265                 270

gaa gtc ctg cgt gcg cgt acg gag tgg cgt cca aag ctg acg gat tct        864
Glu Val Leu Arg Ala Arg Thr Glu Trp Arg Pro Lys Leu Thr Asp Ser
        275                 280                 285

ttc cgc ggc atc tcc gta att ccg gcg gaa cct cgt gtt taa                906
Phe Arg Gly Ile Ser Val Ile Pro Ala Glu Pro Arg Val
    290                 295                 300
```

<210> 32
<211> 301
<212> PRT
<213> Umbellularia californica

<400> 32

```
Met Thr Leu Glu Trp Lys Pro Lys Pro Lys Leu Pro Gln Leu Leu Asp
1               5                   10                  15

Asp His Phe Gly Leu His Gly Leu Val Phe Arg Arg Thr Phe Ala Ile
            20                  25                  30

Arg Ser Tyr Glu Val Gly Pro Asp Arg Ser Thr Ser Ile Leu Ala Val
        35                  40                  45

Met Asn His Met Gln Glu Ala Thr Leu Asn His Ala Lys Ser Val Gly
    50                  55                  60

Ile Leu Gly Asp Gly Phe Gly Thr Thr Leu Glu Met Ser Lys Arg Asp
65                  70                  75                  80

Leu Met Trp Val Val Arg Arg Thr His Val Ala Val Glu Arg Tyr Pro
                85                  90                  95

Thr Trp Gly Asp Thr Val Glu Val Glu Cys Trp Ile Gly Ala Ser Gly
            100                 105                 110

Asn Asn Gly Met Arg Arg Asp Phe Leu Val Arg Asp Cys Lys Thr Gly
        115                 120                 125

Glu Ile Leu Thr Arg Cys Thr Ser Leu Ser Val Leu Met Asn Thr Arg
    130                 135                 140

Thr Arg Arg Leu Ser Thr Ile Pro Asp Glu Val Arg Gly Glu Ile Gly
145                 150                 155                 160
```

```
Pro Ala Phe Ile Asp Asn Val Ala Val Lys Asp Asp Glu Ile Lys Lys
                165                 170                 175

Leu Gln Lys Leu Asn Asp Ser Thr Ala Asp Tyr Ile Gln Gly Gly Leu
            180                 185                 190

Thr Pro Arg Trp Asn Asp Leu Asp Val Asn Gln His Val Asn Asn Leu
        195                 200                 205

Lys Tyr Val Ala Trp Val Phe Glu Thr Val Pro Asp Ser Ile Phe Glu
    210                 215                 220

Ser His His Ile Ser Ser Phe Thr Leu Glu Tyr Arg Arg Glu Cys Thr
225                 230                 235                 240

Arg Asp Ser Val Leu Arg Ser Leu Thr Thr Val Ser Gly Gly Ser Ser
                245                 250                 255

Glu Ala Gly Leu Val Cys Asp His Leu Leu Gln Leu Glu Gly Gly Ser
            260                 265                 270

Glu Val Leu Arg Ala Arg Thr Glu Trp Arg Pro Lys Leu Thr Asp Ser
        275                 280                 285

Phe Arg Gly Ile Ser Val Ile Pro Ala Glu Pro Arg Val
    290                 295                 300


<210>  33
<211>  1137
<212>  DNA
<213>  Bacillus subtilis


<220>
<221>  CDS
<222>  (1)..(1137)

<400>  33
atg atc ata ggg gtt cct aaa gag ata aaa aac aat gaa aac cgt gtc          48
Met Ile Ile Gly Val Pro Lys Glu Ile Lys Asn Asn Glu Asn Arg Val
1               5                   10                  15

gca tta aca ccc ggg ggc gtt tct cag ctc att tca aac ggc cac cgg          96
Ala Leu Thr Pro Gly Gly Val Ser Gln Leu Ile Ser Asn Gly His Arg
            20                  25                  30

gtg ctg gtt gaa aca ggc gcg ggc ctt gga agc gga ttt gaa aat gaa         144
Val Leu Val Glu Thr Gly Ala Gly Leu Gly Ser Gly Phe Glu Asn Glu
        35                  40                  45

gcc tat gag tca gca gga gcg gaa atc att gct gat ccg aag cag gtc         192
Ala Tyr Glu Ser Ala Gly Ala Glu Ile Ile Ala Asp Pro Lys Gln Val
    50                  55                  60

tgg gac gcc gaa atg gtc atg aaa gta aaa gaa ccg ctg ccg gaa gaa         240
Trp Asp Ala Glu Met Val Met Lys Val Lys Glu Pro Leu Pro Glu Glu
65                  70                  75                  80
```

```
tat gtt tat ttt cgc aaa gga ctt gtg ctg ttt acg tac ctt cat tta        288
Tyr Val Tyr Phe Arg Lys Gly Leu Val Leu Phe Thr Tyr Leu His Leu
                85                  90                  95

gca gct gag cct gag ctt gca cag gcc ttg aag gat aaa gga gta act        336
Ala Ala Glu Pro Glu Leu Ala Gln Ala Leu Lys Asp Lys Gly Val Thr
            100                 105                 110

gcc atc gca tat gaa acg gtc agt gaa ggc cgg aca ttg cct ctt ctg        384
Ala Ile Ala Tyr Glu Thr Val Ser Glu Gly Arg Thr Leu Pro Leu Leu
        115                 120                 125

acg cca atg tca gag gtt gcg ggc aga atg gca gcg caa atc ggc gct        432
Thr Pro Met Ser Glu Val Ala Gly Arg Met Ala Ala Gln Ile Gly Ala
    130                 135                 140

caa ttc tta gaa aag cct aaa ggc gga aaa ggc att ctg ctt gcc ggg        480
Gln Phe Leu Glu Lys Pro Lys Gly Gly Lys Gly Ile Leu Leu Ala Gly
145                 150                 155                 160

gtg cct ggc gtt tcc cgc gga aaa gta aca att atc gga gga ggc gtt        528
Val Pro Gly Val Ser Arg Gly Lys Val Thr Ile Ile Gly Gly Gly Val
                165                 170                 175

gtc ggg aca aac gcg gcg aaa atg gct gtc ggc ctc ggt gca gat gtg        576
Val Gly Thr Asn Ala Ala Lys Met Ala Val Gly Leu Gly Ala Asp Val
            180                 185                 190

acg atc att gac tta aac gca gac cgc ttg cgc cag ctt gat gac atc        624
Thr Ile Ile Asp Leu Asn Ala Asp Arg Leu Arg Gln Leu Asp Asp Ile
        195                 200                 205

ttc ggc cat cag att aaa acg tta att tct aat ccg gtc aat att gct        672
Phe Gly His Gln Ile Lys Thr Leu Ile Ser Asn Pro Val Asn Ile Ala
    210                 215                 220

gat gct gtg gcg gaa gcg gat ctc ctc att tgc gcg gta tta att ccg        720
Asp Ala Val Ala Glu Ala Asp Leu Leu Ile Cys Ala Val Leu Ile Pro
225                 230                 235                 240

ggt gct aaa gct ccg act ctt gtc act gag gaa atg gta aaa caa atg        768
Gly Ala Lys Ala Pro Thr Leu Val Thr Glu Glu Met Val Lys Gln Met
                245                 250                 255

aaa ccc ggt tca gtt att gtt gat gta gcg atc gac caa ggc ggc atc        816
Lys Pro Gly Ser Val Ile Val Asp Val Ala Ile Asp Gln Gly Gly Ile
            260                 265                 270

gtc gaa act gtc gac cat atc aca aca cat gat cag cca aca tat gaa        864
Val Glu Thr Val Asp His Ile Thr Thr His Asp Gln Pro Thr Tyr Glu
        275                 280                 285

aaa cac ggg gtt gtg cat tat gct gta gcg aac atg cca ggc gca gtc        912
Lys His Gly Val Val His Tyr Ala Val Ala Asn Met Pro Gly Ala Val
    290                 295                 300

cct cgt aca tca aca atc gcc ctg act aac gtt act gtt cca tac gcg        960
Pro Arg Thr Ser Thr Ile Ala Leu Thr Asn Val Thr Val Pro Tyr Ala
305                 310                 315                 320

ctg caa atc gcg aac aaa ggg gca gta aaa gcg ctc gca gac aat acg       1008
Leu Gln Ile Ala Asn Lys Gly Ala Val Lys Ala Leu Ala Asp Asn Thr
                325                 330                 335

gca ctg aga gcg ggt tta aac acc gca aac gga cac gtg acc tat gaa       1056
Ala Leu Arg Ala Gly Leu Asn Thr Ala Asn Gly His Val Thr Tyr Glu
            340                 345                 350
```

```
gct gta gca aga gat cta ggc tat gag tat gtt cct gcc gag aaa gct       1104
Ala Val Ala Arg Asp Leu Gly Tyr Glu Tyr Val Pro Ala Glu Lys Ala
        355                 360                 365

tta cag gat gaa tca tct gtg gcg ggt gct taa                           1137
Leu Gln Asp Glu Ser Ser Val Ala Gly Ala
    370                 375
```

<210> 34
<211> 378
<212> PRT
<213> Bacillus subtilis

<400> 34

```
Met Ile Ile Gly Val Pro Lys Glu Ile Lys Asn Asn Glu Asn Arg Val
1               5                   10                  15

Ala Leu Thr Pro Gly Gly Val Ser Gln Leu Ile Ser Asn Gly His Arg
            20                  25                  30

Val Leu Val Glu Thr Gly Ala Gly Leu Gly Ser Gly Phe Glu Asn Glu
        35                  40                  45

Ala Tyr Glu Ser Ala Gly Ala Glu Ile Ile Ala Asp Pro Lys Gln Val
    50                  55                  60

Trp Asp Ala Glu Met Val Met Lys Val Lys Glu Pro Leu Pro Glu Glu
65                  70                  75                  80

Tyr Val Tyr Phe Arg Lys Gly Leu Val Leu Phe Thr Tyr Leu His Leu
                85                  90                  95

Ala Ala Glu Pro Glu Leu Ala Gln Ala Leu Lys Asp Lys Gly Val Thr
            100                 105                 110

Ala Ile Ala Tyr Glu Thr Val Ser Glu Gly Arg Thr Leu Pro Leu Leu
        115                 120                 125

Thr Pro Met Ser Glu Val Ala Gly Arg Met Ala Ala Gln Ile Gly Ala
    130                 135                 140

Gln Phe Leu Glu Lys Pro Lys Gly Gly Lys Gly Ile Leu Leu Ala Gly
145                 150                 155                 160

Val Pro Gly Val Ser Arg Gly Lys Val Thr Ile Ile Gly Gly Gly Val
                165                 170                 175

Val Gly Thr Asn Ala Ala Lys Met Ala Val Gly Leu Gly Ala Asp Val
            180                 185                 190

Thr Ile Ile Asp Leu Asn Ala Asp Arg Leu Arg Gln Leu Asp Asp Ile
        195                 200                 205
```

```
Phe Gly His Gln Ile Lys Thr Leu Ile Ser Asn Pro Val Asn Ile Ala
    210                 215                 220

Asp Ala Val Ala Glu Ala Asp Leu Leu Ile Cys Ala Val Leu Ile Pro
225                 230                 235                 240

Gly Ala Lys Ala Pro Thr Leu Val Thr Glu Glu Met Val Lys Gln Met
                245                 250                 255

Lys Pro Gly Ser Val Ile Val Asp Val Ala Ile Asp Gln Gly Gly Ile
            260                 265                 270

Val Glu Thr Val Asp His Ile Thr Thr His Asp Gln Pro Thr Tyr Glu
        275                 280                 285

Lys His Gly Val Val His Tyr Ala Val Ala Asn Met Pro Gly Ala Val
    290                 295                 300

Pro Arg Thr Ser Thr Ile Ala Leu Thr Asn Val Thr Val Pro Tyr Ala
305                 310                 315                 320

Leu Gln Ile Ala Asn Lys Gly Ala Val Lys Ala Leu Ala Asp Asn Thr
                325                 330                 335

Ala Leu Arg Ala Gly Leu Asn Thr Ala Asn Gly His Val Thr Tyr Glu
            340                 345                 350

Ala Val Ala Arg Asp Leu Gly Tyr Glu Tyr Val Pro Ala Glu Lys Ala
        355                 360                 365

Leu Gln Asp Glu Ser Ser Val Ala Gly Ala
    370                 375


<210>  35
<211>  1380
<212>  DNA
<213>  Chromobacterium violaceum


<220>
<221>  CDS
<222>  (1)..(1380)

<400>  35
atg cag aaa cag cgt acc acc tct cag tgg cgt gaa ctc gat gcg gcg          48
Met Gln Lys Gln Arg Thr Thr Ser Gln Trp Arg Glu Leu Asp Ala Ala
1               5                   10                  15

cat cat ctc cat ccg ttt acc gat acc gcg agc ctc aat cag gcg ggt          96
His His Leu His Pro Phe Thr Asp Thr Ala Ser Leu Asn Gln Ala Gly
            20                  25                  30

gcg cgt gtg atg acc cgt ggc gaa ggc gtg tat ctc tgg gat agc gaa         144
Ala Arg Val Met Thr Arg Gly Glu Gly Val Tyr Leu Trp Asp Ser Glu
        35                  40                  45

ggc aac aaa att att gat ggc atg gcg ggc ctc tgg tgc gtg aac gtg         192
```

```
Gly Asn Lys Ile Ile Asp Gly Met Ala Gly Leu Trp Cys Val Asn Val
    50                  55                  60

ggc tat ggc cgt aaa gat ttt gcg gaa gcg gcg cgt cgt cag atg gaa        240
Gly Tyr Gly Arg Lys Asp Phe Ala Glu Ala Ala Arg Arg Gln Met Glu
65                  70                  75                  80

gaa ctc ccg ttt tat aac acc ttc ttt aaa acc acc cat ccg gcg gtg        288
Glu Leu Pro Phe Tyr Asn Thr Phe Phe Lys Thr Thr His Pro Ala Val
                85                  90                  95

gtg gaa ctc agc agc ctc ctc gcc gaa gtt acc ccg gca ggt ttt gat        336
Val Glu Leu Ser Ser Leu Leu Ala Glu Val Thr Pro Ala Gly Phe Asp
            100                 105                 110

cgt gtg ttt tat acc aac agc ggc agc gaa agc gtg gat acc atg att        384
Arg Val Phe Tyr Thr Asn Ser Gly Ser Glu Ser Val Asp Thr Met Ile
        115                 120                 125

cgt atg gtg cgt cgt tat tgg gat gtg cag ggc aaa ccg gaa aaa aaa        432
Arg Met Val Arg Arg Tyr Trp Asp Val Gln Gly Lys Pro Glu Lys Lys
    130                 135                 140

acc ctc att ggc cgt tgg aac ggc tat cac ggc agc acc att ggc ggt        480
Thr Leu Ile Gly Arg Trp Asn Gly Tyr His Gly Ser Thr Ile Gly Gly
145                 150                 155                 160

gcg agc ctc ggc ggc atg aaa tat atg cat gaa cag ggc gat ctc ccg        528
Ala Ser Leu Gly Gly Met Lys Tyr Met His Glu Gln Gly Asp Leu Pro
                165                 170                 175

att ccg ggc atg gcg cat att gaa cag ccg tgg tgg tat aaa cat ggc        576
Ile Pro Gly Met Ala His Ile Glu Gln Pro Trp Trp Tyr Lys His Gly
            180                 185                 190

aaa gat atg acc ccg gat gaa ttt ggc gtg gtt gcg gcg cgt tgg ctc        624
Lys Asp Met Thr Pro Asp Glu Phe Gly Val Val Ala Ala Arg Trp Leu
        195                 200                 205

gaa gaa aaa att ctc gaa atc ggc gcg gat aaa gtg gcg gcg ttt gtg        672
Glu Glu Lys Ile Leu Glu Ile Gly Ala Asp Lys Val Ala Ala Phe Val
    210                 215                 220

ggc gaa ccg att cag ggt gcg ggc ggt gtg att gtt ccg ccg gca acc        720
Gly Glu Pro Ile Gln Gly Ala Gly Gly Val Ile Val Pro Pro Ala Thr
225                 230                 235                 240

tat tgg ccg gaa att gaa cgt att tgc cgc aaa tat gat gtg ctc ctc        768
Tyr Trp Pro Glu Ile Glu Arg Ile Cys Arg Lys Tyr Asp Val Leu Leu
                245                 250                 255

gtt gcg gat gaa gtg att tgc ggc ttt ggc cgt acc ggc gaa tgg ttt        816
Val Ala Asp Glu Val Ile Cys Gly Phe Gly Arg Thr Gly Glu Trp Phe
            260                 265                 270

ggc cat cag cat ttt ggc ttt cag ccg gac ctc ttt acc gcg gcg aaa        864
Gly His Gln His Phe Gly Phe Gln Pro Asp Leu Phe Thr Ala Ala Lys
        275                 280                 285

ggc ctc agc agc ggc tat ctc ccg att ggc gcg gtg ttt gtg ggc aaa        912
Gly Leu Ser Ser Gly Tyr Leu Pro Ile Gly Ala Val Phe Val Gly Lys
    290                 295                 300

cgt gtt gcg gaa ggt ctc att gcg ggc ggt gat ttt aac cat ggc ttt        960
Arg Val Ala Glu Gly Leu Ile Ala Gly Gly Asp Phe Asn His Gly Phe
305                 310                 315                 320

acc tat agc ggc cat ccg gtg tgt gcg gcg gtg gcg cat gcg aat gtt       1008
```

```
Thr Tyr Ser Gly His Pro Val Cys Ala Ala Val Ala His Ala Asn Val
                325                 330                 335

gcg gcg ctc cgt gat gaa ggc att gtg cag cgt gtg aaa gat gat att      1056
Ala Ala Leu Arg Asp Glu Gly Ile Val Gln Arg Val Lys Asp Asp Ile
            340                 345                 350

ggc ccg tat atg cag aaa cgt tgg cgt gaa acc ttt agc cgt ttt gaa      1104
Gly Pro Tyr Met Gln Lys Arg Trp Arg Glu Thr Phe Ser Arg Phe Glu
        355                 360                 365

cat gtg gat gat gtg cgt ggc gtg ggc atg gtg cag gcg ttt acc ctc      1152
His Val Asp Asp Val Arg Gly Val Gly Met Val Gln Ala Phe Thr Leu
    370                 375                 380

gtg aaa aac aaa gcg aaa cgt gaa ctc ttt ccg gat ttt ggc gaa att      1200
Val Lys Asn Lys Ala Lys Arg Glu Leu Phe Pro Asp Phe Gly Glu Ile
385                 390                 395                 400

ggc acc ctc tgc cgc gat att ttt ttt cgc aac aac ctc att atg cgt      1248
Gly Thr Leu Cys Arg Asp Ile Phe Phe Arg Asn Asn Leu Ile Met Arg
                405                 410                 415

gcg tgc ggc gat cac att gtg tct gca ccg ccg ctc gtt atg acc cgt      1296
Ala Cys Gly Asp His Ile Val Ser Ala Pro Pro Leu Val Met Thr Arg
            420                 425                 430

gcg gaa gtg gat gaa atg ctc gcc gtg gcg gaa cgt tgc ctc gaa gaa      1344
Ala Glu Val Asp Glu Met Leu Ala Val Ala Glu Arg Cys Leu Glu Glu
        435                 440                 445

ttt gaa cag acc ctc aaa gcg cgt ggc ctc gcc taa                     1380
Phe Glu Gln Thr Leu Lys Ala Arg Gly Leu Ala
    450                 455
```

<210> 36
<211> 459
<212> PRT
<213> Chromobacterium violaceum

<400> 36

```
Met Gln Lys Gln Arg Thr Thr Ser Gln Trp Arg Glu Leu Asp Ala Ala
1               5                   10                  15

His His Leu His Pro Phe Thr Asp Thr Ala Ser Leu Asn Gln Ala Gly
            20                  25                  30

Ala Arg Val Met Thr Arg Gly Glu Gly Val Tyr Leu Trp Asp Ser Glu
        35                  40                  45

Gly Asn Lys Ile Ile Asp Gly Met Ala Gly Leu Trp Cys Val Asn Val
    50                  55                  60

Gly Tyr Gly Arg Lys Asp Phe Ala Glu Ala Ala Arg Arg Gln Met Glu
65                  70                  75                  80

Glu Leu Pro Phe Tyr Asn Thr Phe Phe Lys Thr Thr His Pro Ala Val
                85                  90                  95

Val Glu Leu Ser Ser Leu Leu Ala Glu Val Thr Pro Ala Gly Phe Asp
```

100 105 110

Arg Val Phe Tyr Thr Asn Ser Gly Ser Glu Ser Val Asp Thr Met Ile
115 120 125

Arg Met Val Arg Arg Tyr Trp Asp Val Gln Gly Lys Pro Glu Lys Lys
130 135 140

Thr Leu Ile Gly Arg Trp Asn Gly Tyr His Gly Ser Thr Ile Gly Gly
145 150 155 160

Ala Ser Leu Gly Gly Met Lys Tyr Met His Glu Gln Gly Asp Leu Pro
165 170 175

Ile Pro Gly Met Ala His Ile Glu Gln Pro Trp Trp Tyr Lys His Gly
180 185 190

Lys Asp Met Thr Pro Asp Glu Phe Gly Val Val Ala Ala Arg Trp Leu
195 200 205

Glu Glu Lys Ile Leu Glu Ile Gly Ala Asp Lys Val Ala Ala Phe Val
210 215 220

Gly Glu Pro Ile Gln Gly Ala Gly Gly Val Ile Val Pro Pro Ala Thr
225 230 235 240

Tyr Trp Pro Glu Ile Glu Arg Ile Cys Arg Lys Tyr Asp Val Leu Leu
245 250 255

Val Ala Asp Glu Val Ile Cys Gly Phe Gly Arg Thr Gly Glu Trp Phe
260 265 270

Gly His Gln His Phe Gly Phe Gln Pro Asp Leu Phe Thr Ala Ala Lys
275 280 285

Gly Leu Ser Ser Gly Tyr Leu Pro Ile Gly Ala Val Phe Val Gly Lys
290 295 300

Arg Val Ala Glu Gly Leu Ile Ala Gly Gly Asp Phe Asn His Gly Phe
305 310 315 320

Thr Tyr Ser Gly His Pro Val Cys Ala Ala Val Ala His Ala Asn Val
325 330 335

Ala Ala Leu Arg Asp Glu Gly Ile Val Gln Arg Val Lys Asp Asp Ile
340 345 350

Gly Pro Tyr Met Gln Lys Arg Trp Arg Glu Thr Phe Ser Arg Phe Glu
355 360 365

His Val Asp Asp Val Arg Gly Val Gly Met Val Gln Ala Phe Thr Leu

370 375 380

Val Lys Asn Lys Ala Lys Arg Glu Leu Phe Pro Asp Phe Gly Glu Ile
385 390 395 400

Gly Thr Leu Cys Arg Asp Ile Phe Phe Arg Asn Asn Leu Ile Met Arg
405 410 415

Ala Cys Gly Asp His Ile Val Ser Ala Pro Pro Leu Val Met Thr Arg
420 425 430

Ala Glu Val Asp Glu Met Leu Ala Val Ala Glu Arg Cys Leu Glu Glu
435 440 445

Phe Glu Gln Thr Leu Lys Ala Arg Gly Leu Ala
450 455

<210> 37
<211> 159
<212> DNA
<213> Artificial Sequence

<220>
<223> Promoter

<400> 37
ggatccaatt gtgagcggat aacaattacg agcttcatgc acagtgatcg acgctgttga 60

caattaatca tcggctcgta taatgtgtgg atgtggaatt gtgagcgctc acaattccac 120

aacggtttcc ctctagaaat aattttgttt aacaggagg 159

<210> 38
<211> 7958
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 38
ctagattatt aggcgaggcc acgcgctttg agggtctgtt caaattcttc gaggcaacgt 60

tccgccacgg cgagcatttc atccacttcc gcacgggtca taacgagcgg cggtgcagac 120

acaatgtgat cgccgcacgc acgcataatg aggttgttgc gaaaaaaaat atcgcggcag 180

agggtgccaa tttcgccaaa atccggaaag agttcacgtt tcgctttgtt tttcacgagg 240

gtaaacgcct gcaccatgcc cacgccacgc acatcatcca catgttcaaa acggctaaag 300

gtttcacgcc aacgtttctg catatacggg ccaatatcat ctttcacacg ctgcacaatg 360

ccttcatcac ggagcgccgc aacattcgca tgcgccaccg ccgcacacac cggatggccg 420

ctataggtaa agccatggtt aaaatcaccg cccgcaatga gaccttccgc aacacgtttg 480

cccacaaaca ccgcgccaat cgggagatag ccgctgctga ggcctttcgc cgcggtaaag 540

aggtccggct gaaagccaaa atgctgatgg ccaaaccatt cgccggtacg gccaaagccg 600

caaatcactt catccgcaac gaggagcaca tcatatttgc ggcaaatacg ttcaatttcc 660

ggccaatagg ttgccggcgg aacaatcaca ccgcccgcac cctgaatcgg ttcgcccaca 720

aacgccgcca ctttatccgc gccgatttcg agaatttttt cttcgagcca acgcgccgca 780

accacgccaa attcatccgg ggtcatatct ttgccatgtt tataccacca cggctgttca 840

atatgcgcca tgcccggaat cgggagatcg ccctgttcat gcatatattt catgccgccg 900

aggctcgcac cgccaatggt gctgccgtga tagccgttcc aacggccaat gagggttttt 960

ttttccggtt tgccctgcac atcccaataa cgacgcacca tacgaatcat ggtatccacg 1020

ctttcgctgc cgctgttggt ataaaacaca cgatcaaaac ctgccggggt aacttcggcg 1080

aggaggctgc tgagttccac caccgccgga tgggtggttt taaagaaggt gttataaaac 1140

gggagttctt ccatctgacg acgcgccgct tccgcaaaat ctttacggcc atagcccacg 1200

ttcacgcacc agaggcccgc catgccatca ataattttgt tgccttcgct atcccagaga 1260

tacacgcctt cgccacgggt catcacacgc gcacccgcct gattgaggct cgcggtatcg 1320

gtaaacggat ggagatgatg cgccgcatcg agttcacgcc actgagaggt ggtacgctgt 1380

ttctgcatat tatatctcct taaagcttta agcacccgcc acagatgatt catcctgtaa 1440

agctttctcg gcaggaacat actcatagcc tagatctctt gctacagctt cataggtcac 1500

gtgtccgttt gcggtgttta aacccgctct cagtgccgta ttgtctgcga gcgcttttac 1560

tgcccctttg ttcgcgattt gcagcgcgta tggaacagta acgttagtca gggcgattgt 1620

tgatgtacga gggactgcgc ctggcatgtt cgctacagca taatgcacaa ccccgtgttt 1680

ttcatatgtt ggctgatcat gtgttgtgat atggtcgaca gtttcgacga tgccgccttg 1740

gtcgatcgct acatcaacaa taactgaacc gggtttcatt tgttttacca tttcctcagt 1800

gacaagagtc ggagctttag cacccggaat taataccgcg caaatgagga gatccgcttc 1860

cgccacagca tcagcaatat tgaccggatt agaaattaac gttttaatct gatggccgaa 1920

gatgtcatca agctggcgca agcggtctgc gtttaagtca atgatcgtca catctgcacc 1980

gaggccgaca gccattttcg ccgcgtttgt cccgacaacg cctcctccga taattgttac 2040

ttttccgcgg gaaacgccag gcaccccggc aagcagaatg ccttttccgc ctttaggctt 2100

ttctaagaat tgagcgccga tttgcgctgc cattctgccc gcaacctctg acattggcgt 2160

cagaagaggc aatgtccggc cttcactgac cgtttcatat gcgatggcag ttactccttt 2220

atccttcaag gcctgtgcaa gctcaggctc agctgctaaa tgaaggtacg taaacagcac 2280

aagtcctttg cgaaaataaa catattcttc cggcagcggt tcttttactt tcatgaccat 2340

ttcggcgtcc cagacctgct tcggatcagc aatgatttcc gctcctgctg actcataggc 2400

ttcattttca aatccgcttc caaggcccgc gcctgtttca accagcaccc ggtggccgtt 2460

tgaaatgagc tgagaaacgc ccccgggtgt taatgcgaca cggttttcat tgttttttat 2520

ctctttagga acccctatga tcattatgcc actctccttg gttcctagat cctgtgtgaa 2580

attgttattg ttatccgctc acaattccac acattatacg agccggaagc ataaagtgtc 2640

aagcctgggg tgcctaatga gtgagctaac ttacattaat tgcgttgcgc tcactgcccg 2700

catatctatg agccgggctg aatgatcgac cgagacaggc cctgcggggc tgcaggatcc 2760

aattgtgagc ggataacaat tacgagcttc atgcacagtg atcgacgctg ttgacaatta 2820

atcatcggct cgtataatgt gtggatgtgg aattgtgagc gctcacaatt ccacaacggt 2880

ttccctctag aaataatttt gtttacaagg aggattataa aatgactcta gagtggaaac 2940

cgaaaccaaa actgcctcaa ctgctggatg atcacttcgg tctgcacggt ctggtgtttc 3000

gtcgtacttt cgcaattcgt tcttatgaag tgggtccaga tcgttctacc tccatcctgg 3060

ccgtcatgaa ccacatgcag gaagccaccc tgaatcacgc gaaatctgtt ggtatcctgg 3120

gtgatggttt cggcactact ctggaaatgt ctaaacgtga cctgatgtgg gtagtgcgtc 3180

gcacccacgt agcagtagag cgctacccta cttggggtga cactgtggaa gtcgagtgtt 3240

ggattggcgc gtccggtaac aatggtatgc gtcgcgattt tctggtccgt gactgtaaaa 3300

cgggcgaaat cctgacgcgt tgcacctccc tgagcgttct gatgaacacc cgcactcgtc 3360

gcctgtctac catcccggac gaagtgcgcg gtgagatcgg tcctgctttc atcgataacg 3420

tggcagttaa agacgacgaa atcaagaaac tgcaaaaact gaacgactcc accgcggact 3480

acatccaggg cggtctgact ccgcgctgga acgacctgga tgttaatcag catgtgaaca 3540

acctgaaata cgttgcttgg gtcttcgaga ctgtgccgga cagcattttc gaaagccatc 3600

acatttcctc ttttactctg gagtaccgtc gcgaatgtac tcgcgactcc gttctgcgca 3660

gcctgaccac cgtaagcggc ggttctagcg aggcaggtct ggtctgcgac catctgctgc 3720

aactggaagg cggctccgaa gtcctgcgtg cgcgtacgga gtggcgtcca aagctgacgg 3780

attctttccg cggcatctcc gtaattccgg cggaacctcg tgtttaagct ttagtcaaaa 3840

gcctccggtc ggaggctttt gactttctgc ttactgaatt tgcggccgcc tcgagaaaat 3900

gaagggaagt tcctatactt actagagaat aggaacttct atagggagtc gaataagggc 3960

gacacaaaag gtattctaaa tgcataataa atactgataa catcttatag tttgtattat 4020

attttgtatt atcgttgaca tgtataattt tgatatcaaa aactgatttt ccctttatta 4080

ttttcgagat ttatttttctt aattctcttt aacaaactag aaatattgta tatacaaaaa 4140

atcataaata atagatgaat agtttaatta taggtgttca tcaatcgaaa aagcaacgta 4200

tcttatttaa agtgcgttgc ttttttctca tttataaggt taaataattc tcatatatca 4260

agcaaagtga caggcgccct taaatattct gacaaatgct ctttccctaa actcccccca 4320

taaaaaaacc cgccgaagcg ggtttttacg ttatttgcgg attaacgatt actcgttatc 4380

agaaccgccc aggatgcctg gcagttccct actctcgccg ctgcgctcgg tcgttcggct 4440

gcgggacctc agcgctagcg gagtgtatac tggcttacta tgttggcact gatgagggtg 4500

tcagtgaagt gcttcatgtg gcaggagaaa aaaggctgca ccggtgcgtc agcagaatat 4560

gtgatacagg atatattccg cttcctcgct cactgactcg ctacgctcgg tcgttcgact 4620

gcggcgagcg gaaatggctt acgaacgggg cggagatttc ctggaagatg ccaggaagat 4680

acttaacagg gaagtgagag ggccgcggca aagccgtttt tccataggct ccgccccccct 4740

gacaagcatc acgaaatctg acgctcaaat cagtggtggc gaaacccgac aggactataa 4800

agataccagg cgtttccccc tggcggctcc ctcgtgcgct ctcctgttcc tgcctttcgg 4860

tttaccggtg tcattccgct gttatggccg cgtttgtctc attccacgcc tgacactcag 4920

ttccgggtag gcagttcgct ccaagctgga ctgtatgcac gaacccccg ttcagtccga 4980

ccgctgcgcc ttatccggta actatcgtct tgagtccaac ccggaaagac atgcaaaagc 5040

accactggca gcagccactg gtaattgatt tagaggagtt agtcttgaag tcatgcgccg 5100

gttaaggcta aactgaaagg acaagttttg gtgactgcgc tcctccaagc cagttacctc 5160

ggttcaaaga gttggtagct cagagaacct tcgaaaaacc gccctgcaag gcggtttttt 5220

cgttttcaga gcaagagatt acgcgcagac caaaacgatc tcaagaagat catcttatta 5280

atcactgccc gctttccagt cgggaaacct gtcgtgccag ctgcattaat gaatcggcca 5340

acgcgcgggg agaggcggtt tgcgtattgg gcgccagggt ggtttttctt ttcaccagtg 5400

agactggcaa cagctgattg cccttcaccg cctggccctg agagagttgc agcaagcggt 5460

ccacgctggt ttgccccagc aggcgaaaat cctgtttgat ggtggttaac ggcgggatat 5520

aacatgagct atcttcggta tcgtcgtatc ccactaccga gatatccgca ccaacgcgca 5580

gcccggactc ggtaatggcg cgcattgcgc ccagcgccat ctgatcgttg gcaaccagca 5640

tcgcagtggg aacgatgccc tcattcagca tttgcatggt ttgttgaaaa ccggacatgg 5700

cactccagtc gccttcccgt tccgctatcg gctgaatttg attgcgagtg agatatttat 5760

gccagccagc cagacgcaga cgcgccgaga cagaacttaa tgggcccgct aacagcgcga 5820

tttgctggtg acccaatgcg accagatgct ccacgcccag tcgcgtaccg tcctcatggg 5880

agaaaataat actgttgatg ggtgtctggt cagagacatc aagaaataac gccggaacat 5940

tagtgcaggc agcttccaca gcaatggcat cctggtcatc cagcggatag ttaatgatca 6000

gcccactgac gcgttgcgcg agaagattgt gcaccgccgc tttacaggct tcgacgccgc 6060

ttcgttctac catcgacacc accacgctgg cacccagttg atcggcgcga gatttaatcg 6120

ccgcgacaat ttgcgacggc gcgtgcaggg ccagactgga ggtggcaacg ccaatcagca 6180

acgactgttt gcccgccagt tgttgtgcca cgcggttggg aatgtaattc agctccgcca 6240

tcgccgcttc cactttttcc cgcgttttcg cagaaacgtg gctggcctgg ttcaccacgc 6300

gggaaacggt ctgataagag acaccggcat actctgcgac atcgtataac gttactggtt 6360

tcatattcac caccctgaat tgactctctt ccgggcgcta tcatgccata ccgcgaaagg 6420

ttttgcgcca ttcgatggcg cgccgctttt accaatgctt aatcagtgag gcacctatct 6480

cagcgatctg tctatttcgt tcatccatag ttgcctgact ccccgtcgtg tagataacta 6540

cgatacggga gggcttacca tctggcccca gcgctgcgat gataccgcga gaaccacgct 6600

caccggctcc ggatttatca gcaataaacc agccagccgg aagggccgag cgcagaagtg 6660

gtcctgcaac tttatccgcc tccatccagt ctattaattg ttgccgggaa gctagagtaa 6720

gtagttcgcc agttaatagt ttgcgcaacg ttgttgccat cgctacaggc atcgtggtgt 6780

cacgctcgtc gtttggtatg gcttcattca gctccggttc ccaacgatca aggcgagtta 6840

catgatcccc catgttgtgc aaaaaagcgg ttagctcctt cggtcctccg atcgttgtca 6900

gaagtaagtt ggccgcagtg ttatcactca tggttatggc agcactgcat aattctctta 6960

ctgtcatgcc atccgtaaga tgcttttctg tgactggtga gtactcaacc aagtcattct 7020

gagaatagtg tatgcggcga ccgagttgct cttgcccggc gtcaatacgg gataataccg 7080

cgccacatag cagaacttta aaagtgctca tcattggaaa acgttcttcg gggcgaaaac 7140

tctcaaggat cttaccgctg ttgagatcca gttcgatgta acccactcgt gcacccaact 7200

gatcttcagc atcttttact ttcaccagcg tttctgggtg agcaaaaaca ggaaggcaaa 7260

atgccgcaaa aaagggaata agggcgacac ggaaatgttg aatactcata ttcttccttt 7320

ttcaatatta ttgaagcatt tatcagggtt attgtctcat gagcggatac atatttgaat 7380

gtatttagaa aaataaacaa ataggggtca gtgttacaac caattaacca attctgaaca 7440

ttatcgcgag cccatttata cctgaatatg gctcataaca ccccttgttt gcctggcggc 7500

agtagcgcgg tggtcccacc tgaccccatg ccgaactcag aagtgaaacg ccgtagcgcc 7560

gatggtagtg tggggactcc ccatgcgaga gtagggaact gccaggcatc aaataaaacg 7620

aaaggctcag tcgaaagact gggcctttcg cccgggctaa ttatggggtg tcgcccttat 7680

tcgactctat agtgaagttc ctattctcta gtagtatagg aacttctgaa gtggggctcg 7740

agggccggcc cagccgtcaa ggttaaggct ggccatatca gcgactgaaa agcggccagc 7800

ctcggccttg tttgacgtat aaccaaagcc accgggcaac caatagccct tgtcactttt 7860

gatcaggtag accgaccctg aagcgctttt ttcgtattcc ataaaacccc cttctgtgcg 7920

tgagtactca tagtataaca ggcgtgagta ccaacgct 7958

<210> 39
<211> 4977
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 39
accaatgctt aatcagtgag gcacctatct cagcgatctg tctatttcgt tcatccatag 60

ttgcctgact ccccgtcgtg tagataacta cgatacggga gggcttacca tctggcccca 120

gcgctgcgat gataccgcga gaaccacgct caccggctcc ggatttatca gcaataaacc 180

agccagccgg aagggccgag cgcagaagtg gtcctgcaac tttatccgcc tccatccagt 240

ctattaattg ttgccgggaa gctagagtaa gtagttcgcc agttaatagt ttgcgcaacg 300

ttgttgccat cgctacaggc atcgtggtgt cacgctcgtc gtttggtatg gcttcattca 360

gctccggttc ccaacgatca aggcgagtta catgatcccc catgttgtgc aaaaaagcgg 420

ttagctcctt cggtcctccg atcgttgtca gaagtaagtt ggccgcagtg ttatcactca 480

tggttatggc agcactgcat aattctctta ctgtcatgcc atccgtaaga tgcttttctg 540

tgactggtga gtactcaacc aagtcattct gagaatagtg tatgcggcga ccgagttgct 600

cttgcccggc gtcaatacgg gataataccg cgccacatag cagaacttta aaagtgctca 660

tcattggaaa acgttcttcg gggcgaaaac tctcaaggat cttaccgctg ttgagatcca 720

gttcgatgta acccactcgt gcacccaact gatcttcagc atcttttact ttcaccagcg 780

tttctgggtg agcaaaaaca ggaaggcaaa atgccgcaaa aaagggaata agggcgacac 840

ggaaatgttg aatactcata ttcttccttt ttcaatatta ttgaagcatt tatcagggtt 900

attgtctcat gagcggatac atatttgaat gtatttagaa aaataaacaa ataggggtca 960

gtgttacaac caattaacca attctgaaca ttatcgcgag cccatttata cctgaatatg 1020

gctcataaca ccccttgttt gcctggcggc agtagcgcgg tggtcccacc tgaccccatg 1080

ccgaactcag aagtgaaacg ccgtagcgcc gatggtagtg tggggactcc ccatgcgaga 1140

gtagggaact gccaggcatc aaataaaacg aaaggctcag tcgaaagact gggcctttcg 1200

cccgggctaa ttatggggtg tcgcccttat tcgactctat agtgaagttc ctattctcta 1260

gaaagtatag gaacttctga agtgggggcg gccgcaaatt cagtaagcag aaagtcaaaa 1320

gcctccgacc ggaggctttt gactaaagct taaacacgag gttccgccgg aattacggag 1380

atgccgcgga aagaatccgt cagctttgga cgccactccg tacgcgcacg caggacttcg 1440

gagccgcctt ccagttgcag cagatggtcg cagaccagac ctgcctcgct agaaccgccg 1500

cttacggtgg tcaggctgcg cagaacggag tcgcgagtac attcgcgacg gtactccaga 1560

gtaaaagagg aaatgtgatg gctttcgaaa atgctgtccg gcacagtctc gaagacccaa 1620

gcaacgtatt tcaggttgtt cacatgctga ttaacatcca ggtcgttcca gcgcggagtc 1680

agaccgccct ggatgtagtc cgcggtggag tcgttcagtt tttgcagttt cttgatttcg 1740

tcgtctttaa ctgccacgtt atcgatgaaa gcaggaccga tctcaccgcg cacttcgtcc 1800

gggatggtag acaggcgacg agtgcgggtg ttcatcagaa cgctcaggga ggtgcaacgc 1860

gtcaggattt cgcccgtttt acagtcacgg accagaaaat cgcgacgcat accattgtta 1920

ccggacgcgc caatccaaca ctcgacttcc acagtgtcac cccaagtagg gtagcgctct 1980

actgctacgt gggtgcgacg cactacccac atcaggtcac gtttagacat ttccagagta 2040

gtgccgaaac catcacccag gataccaaca gatttcgcgt gattcagggt ggcttcctgc 2100

atgtggttca tgacggccag gatggaggta gaacgatctg gacccacttc ataagaacga 2160

attgcgaaag tacgacgaaa caccagaccg tgcagaccga agtgatcatc cagcagttga 2220

ggcagttttg gtttcggttt ccactctaga gtcattttat aatcctcctt gtaaacaaaa 2280

ttatttctag agggaaaccg ttgtggaatt gtgagcgctc acaattccac atccacacat 2340

tatacgagcc gatgattaat tgtcaacagc gtcgatcact gtgcatgaag ctcgtaattg 2400

ttatccgctc acaattggat ccaaaatgaa gggaagttcc tatactttct agagaatagg 2460

aacttctata gggagtcgaa taagggcgac acaaaaggta ttctaaatgc ataataaata 2520

ctgataacat cttatagttt gtattatatt ttgtattatc gttgacatgt ataattttga 2580

tatcaaaaac tgattttccc tttattattt tcgagattta ttttcttaat tctctttaac 2640

aaactagaaa tattgtatat acaaaaaatc ataaataata gatgaatagt ttaattatag 2700

gtgttcatca atcgaaaaag caacgtatct tatttaaagt gcgttgcttt tttctcattt 2760

ataaggttaa ataattctca tatatcaagc aaagtgacag gcgcccttaa atattctgac 2820

aaatgctctt tccctaaact ccccccataa aaaaacccgc cgaagcgggt ttttacgtta 2880

tttgcggatt aacgattact cgttatcaga accgcccagg atgcctggca gttccctact 2940

ctcgccgctg cgctcggtcg ttcggctgcg ggacctcagc gctagcggag tgtatactgg 3000

cttactatgt tggcactgat gagggtgtca gtgaagtgct tcatgtggca ggagaaaaaa 3060

ggctgcaccg gtgcgtcagc agaatatgtg atacaggata tattccgctt cctcgctcac 3120

tgactcgcta cgctcggtcg ttcgactgcg gcgagcggaa atggcttacg aacggggcgg 3180

agatttcctg gaagatgcca ggaagatact taacagggaa gtgagagggc cgcggcaaag 3240

ccgtttttcc ataggctccg ccccccctgac aagcatcacg aaatctgacg ctcaaatcag 3300

tggtggcgaa acccgacagg actataaaga taccaggcgt ttcccccctgg cggctccctc 3360

gtgcgctctc ctgttcctgc ctttcggttt accggtgtca ttccgctgtt atggccgcgt 3420

ttgtctcatt ccacgcctga cactcagttc cgggtaggca gttcgctcca agctggactg 3480

tatgcacgaa ccccccgttc agtccgaccg ctgcgcctta tccggtaact atcgtcttga 3540

gtccaacccg gaaagacatg caaaagcacc actggcagca gccactggta attgatttag 3600

aggagttagt cttgaagtca tgcgccggtt aaggctaaac tgaaaggaca agttttggtg 3660

actgcgctcc tccaagccag ttacctcggt tcaaagagtt ggtagctcag agaaccttcg 3720

aaaaaccgcc ctgcaaggcg gttttttcgt tttcagagca agagattacg cgcagaccaa 3780

aacgatctca agaagatcat cttattaatc actgcccgct ttccagtcgg gaaacctgtc 3840

gtgccagctg cattaatgaa tcggccaacg cgcggggaga ggcggtttgc gtattgggcg 3900

ccagggtggt ttttcttttc accagtgaga ctggcaacag ctgattgccc ttcaccgcct 3960

ggccctgaga gagttgcagc aagcggtcca cgctggtttg ccccagcagg cgaaaatcct 4020

gtttgatggt ggttaacggc gggatataac atgagctatc ttcggtatcg tcgtatccca 4080

ctaccgagat atccgcacca acgcgcagcc cggactcggt aatggcgcgc attgcgccca 4140

gcgccatctg atcgttggca accagcatcg cagtgggaac gatgccctca ttcagcattt 4200

gcatggtttg ttgaaaaccg gacatggcac tccagtcgcc ttcccgttcc gctatcggct 4260

gaatttgatt gcgagtgaga tatttatgcc agccagccag acgcagacgc gccgagacag 4320

aacttaatgg gcccgctaac agcgcgattt gctggtgacc caatgcgacc agatgctcca 4380

cgcccagtcg cgtaccgtcc tcatgggaga aaataatact gttgatgggt gtctggtcag 4440

agacatcaag aaataacgcc ggaacattag tgcaggcagc ttccacagca atggcatcct 4500

ggtcatccag cggatagtta atgatcagcc cactgacgcg ttgcgcgaga agattgtgca 4560

ccgccgcttt acaggcttcg acgccgcttc gttctaccat cgacaccacc acgctggcac 4620

ccagttgatc ggcgcgagat ttaatcgccg cgacaatttg cgacggcgcg tgcagggcca 4680

gactggaggt ggcaacgcca atcagcaacg actgtttgcc cgccagttgt tgtgccacgc 4740

ggttgggaat gtaattcagc tccgccatcg ccgcttccac tttttcccgc gttttcgcag 4800

aaacgtggct ggcctggttc accacgcggg aaacggtctg ataagagaca ccggcatact 4860

ctgcgacatc gtataacgtt actggtttca tattcaccac cctgaattga ctctcttccg 4920

ggcgctatca tgccataccg cgaaaggttt tgcgccattc gatggcgcgc cgctttt 4977

<210> 40
<211> 2445
<212> DNA
<213> Escherichia coli

<220>
<221> CDS
<222> (1)..(2445)

<400> 40

```
atg atg att ttg agt att ctc gct acg gtt gtc ctg ctc ggc gcg ttg          48
Met Met Ile Leu Ser Ile Leu Ala Thr Val Val Leu Leu Gly Ala Leu
1               5                  10                  15

ttc tat cac cgc gtg agc tta ttt atc agc agt ctg att ttg ctc gcc          96
Phe Tyr His Arg Val Ser Leu Phe Ile Ser Ser Leu Ile Leu Leu Ala
            20                  25                  30

tgg aca gcc gcc ctc ggc gtt gct ggt ctg tgg tcg gcg tgg gta ctg         144
Trp Thr Ala Ala Leu Gly Val Ala Gly Leu Trp Ser Ala Trp Val Leu
        35                  40                  45

gtg cct ctg gcc att atc ctc gtg cca ttt aac ttt gcg cct atg cgt         192
Val Pro Leu Ala Ile Ile Leu Val Pro Phe Asn Phe Ala Pro Met Arg
    50                  55                  60

aag tcg atg att tcc gcg ccg gta ttt cgc ggt ttc cgt aag gtg atg         240
Lys Ser Met Ile Ser Ala Pro Val Phe Arg Gly Phe Arg Lys Val Met
65                  70                  75                  80

ccg ccg atg tcg cgc act gag aaa gaa gcg att gat gcg ggc acc acc         288
Pro Pro Met Ser Arg Thr Glu Lys Glu Ala Ile Asp Ala Gly Thr Thr
                85                  90                  95

tgg tgg gag ggc gac ttg ttc cag ggc aag ccg gac tgg aaa aag ctg         336
Trp Trp Glu Gly Asp Leu Phe Gln Gly Lys Pro Asp Trp Lys Lys Leu
            100                 105                 110

cat aac tat ccg cag ccg cgc ctg acc gcc gaa gag caa gcg ttt ctc         384
His Asn Tyr Pro Gln Pro Arg Leu Thr Ala Glu Glu Gln Ala Phe Leu
        115                 120                 125

gac ggc ccg gta gaa gaa gcc tgc cgg atg gcg aat gat ttc cag atc         432
Asp Gly Pro Val Glu Glu Ala Cys Arg Met Ala Asn Asp Phe Gln Ile
    130                 135                 140

acc cat gag ctg gcg gat ctg ccg ccg gag ttg tgg gcg tac ctt aaa         480
Thr His Glu Leu Ala Asp Leu Pro Pro Glu Leu Trp Ala Tyr Leu Lys
145                 150                 155                 160

gag cat cgt ttc ttc gcg atg atc atc aaa aaa gag tac ggc ggg ctg         528
Glu His Arg Phe Phe Ala Met Ile Ile Lys Lys Glu Tyr Gly Gly Leu
```

```
                    165                 170                 175

gag ttc tcg gct tat gcc cag tct cgc gtg ctg caa aaa ctc tcc ggc        576
Glu Phe Ser Ala Tyr Ala Gln Ser Arg Val Leu Gln Lys Leu Ser Gly
            180                 185                 190

gtg agc ggg atc ctg gcg att acc gtc ggc gtg cca aac tca tta ggc        624
Val Ser Gly Ile Leu Ala Ile Thr Val Gly Val Pro Asn Ser Leu Gly
        195                 200                 205

ccg ggc gaa ctg ttg caa cat tac ggc act gac gag cag aaa gat cac        672
Pro Gly Glu Leu Leu Gln His Tyr Gly Thr Asp Glu Gln Lys Asp His
    210                 215                 220

tat ctg ccg cgt ctg gcg cgt ggt cag gag atc ccc tgc ttt gca ctg        720
Tyr Leu Pro Arg Leu Ala Arg Gly Gln Glu Ile Pro Cys Phe Ala Leu
225                 230                 235                 240

acc agc ccg gaa gcg ggt tcc gat gcg ggc gcg att ccg gac acc ggg        768
Thr Ser Pro Glu Ala Gly Ser Asp Ala Gly Ala Ile Pro Asp Thr Gly
                245                 250                 255

att gtc tgc atg ggc gaa tgg cag ggc cag cag gtg ctg ggg atg cgt        816
Ile Val Cys Met Gly Glu Trp Gln Gly Gln Gln Val Leu Gly Met Arg
            260                 265                 270

ctg acc tgg aac aaa cgc tac att acg ctg gca ccg att gcg acc gtg        864
Leu Thr Trp Asn Lys Arg Tyr Ile Thr Leu Ala Pro Ile Ala Thr Val
        275                 280                 285

ctt ggg ctg gcg ttt aaa ctc tcc gac ccg gaa aaa tta ctc ggc ggt        912
Leu Gly Leu Ala Phe Lys Leu Ser Asp Pro Glu Lys Leu Leu Gly Gly
    290                 295                 300

gca gaa gat tta ggc att acc tgt gcg ctg atc cca acc acc acg ccg        960
Ala Glu Asp Leu Gly Ile Thr Cys Ala Leu Ile Pro Thr Thr Thr Pro
305                 310                 315                 320

ggc gtg gaa att ggt cgt cgc cac ttc ccg ctg aac gta ccg ttc cag       1008
Gly Val Glu Ile Gly Arg Arg His Phe Pro Leu Asn Val Pro Phe Gln
                325                 330                 335

aac gga ccg acg cgc ggt aaa gat gtc ttc gtg ccg atc gat tac atc       1056
Asn Gly Pro Thr Arg Gly Lys Asp Val Phe Val Pro Ile Asp Tyr Ile
            340                 345                 350

atc ggc ggg ccg aaa atg gcc ggg caa ggc tgg cgg atg ctg gtg gag       1104
Ile Gly Gly Pro Lys Met Ala Gly Gln Gly Trp Arg Met Leu Val Glu
        355                 360                 365

tgc ctc tcg gta ggc cgc ggc atc acc ctg cct tcc aac tca acc ggc       1152
Cys Leu Ser Val Gly Arg Gly Ile Thr Leu Pro Ser Asn Ser Thr Gly
    370                 375                 380

ggc gtg aaa tcg gta gcg ctg gca acc ggc gcg tat gct cac att cgc       1200
Gly Val Lys Ser Val Ala Leu Ala Thr Gly Ala Tyr Ala His Ile Arg
385                 390                 395                 400

cgt cag ttc aaa atc tct att ggt aag atg gaa ggg att gaa gag ccg       1248
Arg Gln Phe Lys Ile Ser Ile Gly Lys Met Glu Gly Ile Glu Glu Pro
                405                 410                 415

ctg gcg cgt att gcc ggt aat gcc tac gtg atg gat gct gcg gca tcg       1296
Leu Ala Arg Ile Ala Gly Asn Ala Tyr Val Met Asp Ala Ala Ala Ser
            420                 425                 430

ctg att acc tac ggc att atg ctc ggc gaa aaa cct gcc gtg ctg tcg       1344
Leu Ile Thr Tyr Gly Ile Met Leu Gly Glu Lys Pro Ala Val Leu Ser
```

```
        435                 440                 445

gct atc gtt aag tat cac tgt acc cac cgc ggg cag cag tcg att att      1392
Ala Ile Val Lys Tyr His Cys Thr His Arg Gly Gln Gln Ser Ile Ile
    450                 455                 460

gat gcg atg gat att acc ggc ggt aaa ggc att atg ctc ggg caa agc      1440
Asp Ala Met Asp Ile Thr Gly Gly Lys Gly Ile Met Leu Gly Gln Ser
465                 470                 475                 480

aac ttc ctg gcg cgt gct tac cag ggc gca ccg att gcc atc acc gtt      1488
Asn Phe Leu Ala Arg Ala Tyr Gln Gly Ala Pro Ile Ala Ile Thr Val
                485                 490                 495

gaa ggg gct aac att ctg acc cgc agc atg atg atc ttc gga caa gga      1536
Glu Gly Ala Asn Ile Leu Thr Arg Ser Met Met Ile Phe Gly Gln Gly
            500                 505                 510

gcg att cgt tgc cat ccg tac gtg ctg gaa gag atg gaa gcg gcg aag      1584
Ala Ile Arg Cys His Pro Tyr Val Leu Glu Glu Met Glu Ala Ala Lys
        515                 520                 525

aac aat gac gtc aac gcg ttc gat aaa ctg ttg ttc aaa cat atc ggt      1632
Asn Asn Asp Val Asn Ala Phe Asp Lys Leu Leu Phe Lys His Ile Gly
    530                 535                 540

cac gtc ggt agc aac aaa gtt cgc agc ttc tgg ctg ggc ctg acg cgc      1680
His Val Gly Ser Asn Lys Val Arg Ser Phe Trp Leu Gly Leu Thr Arg
545                 550                 555                 560

ggt tta acc agc agc acg cca acc ggc gat gcc act aaa cgc tac tat      1728
Gly Leu Thr Ser Ser Thr Pro Thr Gly Asp Ala Thr Lys Arg Tyr Tyr
                565                 570                 575

cag cac ctg aac cgc ctg agc gcc aac ctc gcc ctg ctt tct gat gtc      1776
Gln His Leu Asn Arg Leu Ser Ala Asn Leu Ala Leu Leu Ser Asp Val
            580                 585                 590

tcg atg gca gtg ctg ggc ggc agc ctg aaa cgt cgc gag cgc atc tcg      1824
Ser Met Ala Val Leu Gly Gly Ser Leu Lys Arg Arg Glu Arg Ile Ser
        595                 600                 605

gcc cgt ctg ggg gat att tta agc cag ctc tac ctc gcc tct gcc gtg      1872
Ala Arg Leu Gly Asp Ile Leu Ser Gln Leu Tyr Leu Ala Ser Ala Val
    610                 615                 620

ctg aag cgt tat gac gac gaa ggc cgt aat gaa gcc gac ctg ccg ctg      1920
Leu Lys Arg Tyr Asp Asp Glu Gly Arg Asn Glu Ala Asp Leu Pro Leu
625                 630                 635                 640

gtg cac tgg ggc gta caa gat gcg ctg tat cag gct gaa cag gcg atg      1968
Val His Trp Gly Val Gln Asp Ala Leu Tyr Gln Ala Glu Gln Ala Met
                645                 650                 655

gat gat tta ctg caa aac ttc ccg aac cgc gtg gtt gcc ggg ctg ctg      2016
Asp Asp Leu Leu Gln Asn Phe Pro Asn Arg Val Val Ala Gly Leu Leu
            660                 665                 670

aat gtg gtg atc ttc ccg acc gga cgt cat tat ctg gca cct tct gac      2064
Asn Val Val Ile Phe Pro Thr Gly Arg His Tyr Leu Ala Pro Ser Asp
        675                 680                 685

aag ctg gat cat aaa gtg gcg aag att tta caa gtg ccg aac gcc acc      2112
Lys Leu Asp His Lys Val Ala Lys Ile Leu Gln Val Pro Asn Ala Thr
    690                 695                 700

cgt tcc cgc att ggt cgc ggt cag tac ctg acg ccg agc gag cat aat      2160
Arg Ser Arg Ile Gly Arg Gly Gln Tyr Leu Thr Pro Ser Glu His Asn
```

```
705                 710                 715                 720

ccg gtt ggc ttg ctg gaa gag gcg ctg gtg gat gtg att gcc gcc gac       2208
Pro Val Gly Leu Leu Glu Glu Ala Leu Val Asp Val Ile Ala Ala Asp
                725                 730                 735

cca att cat cag cgg atc tgt aaa gag ctg ggt aaa aac ctg ccg ttt       2256
Pro Ile His Gln Arg Ile Cys Lys Glu Leu Gly Lys Asn Leu Pro Phe
            740                 745                 750

acc cgt ctg gat gaa ctg gcg cac aac gcg ctg gtg aag ggg ctg att       2304
Thr Arg Leu Asp Glu Leu Ala His Asn Ala Leu Val Lys Gly Leu Ile
        755                 760                 765

gat aaa gat gaa gcc gct att ctg gtg aaa gct gaa gaa agc cgt ctg       2352
Asp Lys Asp Glu Ala Ala Ile Leu Val Lys Ala Glu Glu Ser Arg Leu
    770                 775                 780

cgc agt att aac gtt gat gac ttt gat ccg gaa gag ctg gcg acg aag       2400
Arg Ser Ile Asn Val Asp Asp Phe Asp Pro Glu Glu Leu Ala Thr Lys
785                 790                 795                 800

ccg gta aag ttg ccg gag aaa gtg cgg aaa gtt gaa gcc gcg taa           2445
Pro Val Lys Leu Pro Glu Lys Val Arg Lys Val Glu Ala Ala
                805                 810
```

<210> 41
<211> 814
<212> PRT
<213> Escherichia coli

<400> 41

```
Met Met Ile Leu Ser Ile Leu Ala Thr Val Val Leu Leu Gly Ala Leu
1               5                   10                  15

Phe Tyr His Arg Val Ser Leu Phe Ile Ser Ser Leu Ile Leu Leu Ala
            20                  25                  30

Trp Thr Ala Ala Leu Gly Val Ala Gly Leu Trp Ser Ala Trp Val Leu
        35                  40                  45

Val Pro Leu Ala Ile Ile Leu Val Pro Phe Asn Phe Ala Pro Met Arg
    50                  55                  60

Lys Ser Met Ile Ser Ala Pro Val Phe Arg Gly Phe Arg Lys Val Met
65                  70                  75                  80

Pro Pro Met Ser Arg Thr Glu Lys Glu Ala Ile Asp Ala Gly Thr Thr
                85                  90                  95

Trp Trp Glu Gly Asp Leu Phe Gln Gly Lys Pro Asp Trp Lys Lys Leu
            100                 105                 110

His Asn Tyr Pro Gln Pro Arg Leu Thr Ala Glu Glu Gln Ala Phe Leu
        115                 120                 125

Asp Gly Pro Val Glu Glu Ala Cys Arg Met Ala Asn Asp Phe Gln Ile
    130                 135                 140
```

Thr His Glu Leu Ala Asp Leu Pro Pro Glu Leu Trp Ala Tyr Leu Lys
145 150 155 160

Glu His Arg Phe Phe Ala Met Ile Ile Lys Lys Glu Tyr Gly Gly Leu
165 170 175

Glu Phe Ser Ala Tyr Ala Gln Ser Arg Val Leu Gln Lys Leu Ser Gly
180 185 190

Val Ser Gly Ile Leu Ala Ile Thr Val Gly Val Pro Asn Ser Leu Gly
195 200 205

Pro Gly Glu Leu Leu Gln His Tyr Gly Thr Asp Glu Gln Lys Asp His
210 215 220

Tyr Leu Pro Arg Leu Ala Arg Gly Gln Glu Ile Pro Cys Phe Ala Leu
225 230 235 240

Thr Ser Pro Glu Ala Gly Ser Asp Ala Gly Ala Ile Pro Asp Thr Gly
245 250 255

Ile Val Cys Met Gly Glu Trp Gln Gly Gln Gln Val Leu Gly Met Arg
260 265 270

Leu Thr Trp Asn Lys Arg Tyr Ile Thr Leu Ala Pro Ile Ala Thr Val
275 280 285

Leu Gly Leu Ala Phe Lys Leu Ser Asp Pro Glu Lys Leu Leu Gly Gly
290 295 300

Ala Glu Asp Leu Gly Ile Thr Cys Ala Leu Ile Pro Thr Thr Thr Pro
305 310 315 320

Gly Val Glu Ile Gly Arg Arg His Phe Pro Leu Asn Val Pro Phe Gln
325 330 335

Asn Gly Pro Thr Arg Gly Lys Asp Val Phe Val Pro Ile Asp Tyr Ile
340 345 350

Ile Gly Gly Pro Lys Met Ala Gly Gln Gly Trp Arg Met Leu Val Glu
355 360 365

Cys Leu Ser Val Gly Arg Gly Ile Thr Leu Pro Ser Asn Ser Thr Gly
370 375 380

Gly Val Lys Ser Val Ala Leu Ala Thr Gly Ala Tyr Ala His Ile Arg
385 390 395 400

Arg Gln Phe Lys Ile Ser Ile Gly Lys Met Glu Gly Ile Glu Glu Pro
405 410 415

Leu Ala Arg Ile Ala Gly Asn Ala Tyr Val Met Asp Ala Ala Ala Ser
420 425 430

Leu Ile Thr Tyr Gly Ile Met Leu Gly Glu Lys Pro Ala Val Leu Ser
435 440 445

Ala Ile Val Lys Tyr His Cys Thr His Arg Gly Gln Gln Ser Ile Ile
450 455 460

Asp Ala Met Asp Ile Thr Gly Gly Lys Gly Ile Met Leu Gly Gln Ser
465 470 475 480

Asn Phe Leu Ala Arg Ala Tyr Gln Gly Ala Pro Ile Ala Ile Thr Val
485 490 495

Glu Gly Ala Asn Ile Leu Thr Arg Ser Met Met Ile Phe Gly Gln Gly
500 505 510

Ala Ile Arg Cys His Pro Tyr Val Leu Glu Glu Met Glu Ala Ala Lys
515 520 525

Asn Asn Asp Val Asn Ala Phe Asp Lys Leu Leu Phe Lys His Ile Gly
530 535 540

His Val Gly Ser Asn Lys Val Arg Ser Phe Trp Leu Gly Leu Thr Arg
545 550 555 560

Gly Leu Thr Ser Ser Thr Pro Thr Gly Asp Ala Thr Lys Arg Tyr Tyr
565 570 575

Gln His Leu Asn Arg Leu Ser Ala Asn Leu Ala Leu Leu Ser Asp Val
580 585 590

Ser Met Ala Val Leu Gly Gly Ser Leu Lys Arg Arg Glu Arg Ile Ser
595 600 605

Ala Arg Leu Gly Asp Ile Leu Ser Gln Leu Tyr Leu Ala Ser Ala Val
610 615 620

Leu Lys Arg Tyr Asp Asp Glu Gly Arg Asn Glu Ala Asp Leu Pro Leu
625 630 635 640

Val His Trp Gly Val Gln Asp Ala Leu Tyr Gln Ala Glu Gln Ala Met
645 650 655

Asp Asp Leu Leu Gln Asn Phe Pro Asn Arg Val Val Ala Gly Leu Leu
660 665 670

Asn Val Val Ile Phe Pro Thr Gly Arg His Tyr Leu Ala Pro Ser Asp
675 680 685

```
Lys Leu Asp His Lys Val Ala Lys Ile Leu Gln Val Pro Asn Ala Thr
    690                 695                 700

Arg Ser Arg Ile Gly Arg Gly Gln Tyr Leu Thr Pro Ser Glu His Asn
705                 710                 715                 720

Pro Val Gly Leu Leu Glu Glu Ala Leu Val Asp Val Ile Ala Ala Asp
                725                 730                 735

Pro Ile His Gln Arg Ile Cys Lys Glu Leu Gly Lys Asn Leu Pro Phe
            740                 745                 750

Thr Arg Leu Asp Glu Leu Ala His Asn Ala Leu Val Lys Gly Leu Ile
        755                 760                 765

Asp Lys Asp Glu Ala Ala Ile Leu Val Lys Ala Glu Glu Ser Arg Leu
    770                 775                 780

Arg Ser Ile Asn Val Asp Asp Phe Asp Pro Glu Glu Leu Ala Thr Lys
785                 790                 795                 800

Pro Val Lys Leu Pro Glu Lys Val Arg Lys Val Glu Ala Ala
                805                 810
```

<210> 42
<211> 1377
<212> DNA
<213> Acinetobacter sp. ADP1

<220>
<221> CDS
<222> (1)..(1377)

<400> 42

```
atg cgt cct ctg cac ccg atc gac ttc att ttt ctg tcg ctg gag aag          48
Met Arg Pro Leu His Pro Ile Asp Phe Ile Phe Leu Ser Leu Glu Lys
1               5                   10                  15

cgc cag cag cct atg cat gtc ggt ggc ctg ttc ttg ttt caa att ccg          96
Arg Gln Gln Pro Met His Val Gly Gly Leu Phe Leu Phe Gln Ile Pro
            20                  25                  30

gat aat gcg ccg gac acc ttt atc caa gac ctg gtg aat gat atc cgc         144
Asp Asn Ala Pro Asp Thr Phe Ile Gln Asp Leu Val Asn Asp Ile Arg
        35                  40                  45

att agc aaa tct att ccg gtc ccg cca ttc aac aac aaa ctg aac ggc         192
Ile Ser Lys Ser Ile Pro Val Pro Pro Phe Asn Asn Lys Leu Asn Gly
    50                  55                  60

ctg ttt tgg gac gag gac gag gaa ttt gat ctg gat cac cat ttt cgt         240
Leu Phe Trp Asp Glu Asp Glu Glu Phe Asp Leu Asp His His Phe Arg
65                  70                  75                  80

cac atc gca ttg ccg cac cca ggt cgt att cgt gaa ctg ctg atc tac         288
His Ile Ala Leu Pro His Pro Gly Arg Ile Arg Glu Leu Leu Ile Tyr
                85                  90                  95
```

```
att agc caa gag cac agc acc ttg ctg gat cgc gcc aag ccg ctg tgg          336
Ile Ser Gln Glu His Ser Thr Leu Leu Asp Arg Ala Lys Pro Leu Trp
            100                 105                 110

acg tgc aac att att gag ggc att gaa ggt aat cgt ttt gcg atg tat          384
Thr Cys Asn Ile Ile Glu Gly Ile Glu Gly Asn Arg Phe Ala Met Tyr
        115                 120                 125

ttc aag att cac cac gcg atg gtt gat ggt gtt gct ggt atg cgt ctg          432
Phe Lys Ile His His Ala Met Val Asp Gly Val Ala Gly Met Arg Leu
    130                 135                 140

atc gaa aag agc ctg tct cac gat gtg acc gag aaa agc atc gtg ccg          480
Ile Glu Lys Ser Leu Ser His Asp Val Thr Glu Lys Ser Ile Val Pro
145                 150                 155                 160

ccg tgg tgt gtg gag ggt aag cgt gct aaa cgc ctg cgt gaa ccg aaa          528
Pro Trp Cys Val Glu Gly Lys Arg Ala Lys Arg Leu Arg Glu Pro Lys
                165                 170                 175

acg ggt aag atc aaa aag att atg tcc ggt atc aaa tct cag ctg caa          576
Thr Gly Lys Ile Lys Lys Ile Met Ser Gly Ile Lys Ser Gln Leu Gln
            180                 185                 190

gca act ccg acc gtg atc cag gaa ctg tcc cag acc gtc ttt aag gac          624
Ala Thr Pro Thr Val Ile Gln Glu Leu Ser Gln Thr Val Phe Lys Asp
        195                 200                 205

atc ggt cgc aac cct gat cac gtc agc agc ttc cag gca ccg tgc tcc          672
Ile Gly Arg Asn Pro Asp His Val Ser Ser Phe Gln Ala Pro Cys Ser
    210                 215                 220

att ctg aat cag cgt gtc agc agc agc cgt cgc ttt gcg gcg caa agc          720
Ile Leu Asn Gln Arg Val Ser Ser Ser Arg Arg Phe Ala Ala Gln Ser
225                 230                 235                 240

ttc gac ctg gat cgc ttc cgt aac atc gcc aaa agc ctg aat gtc acc          768
Phe Asp Leu Asp Arg Phe Arg Asn Ile Ala Lys Ser Leu Asn Val Thr
                245                 250                 255

att aac gac gtt gtt ctg gcg gtg tgt tcc ggc gct ctg cgt gcg tac          816
Ile Asn Asp Val Val Leu Ala Val Cys Ser Gly Ala Leu Arg Ala Tyr
            260                 265                 270

ctg atg agc cat aat agc ctg ccg agc aaa ccg ttg att gcg atg gtg          864
Leu Met Ser His Asn Ser Leu Pro Ser Lys Pro Leu Ile Ala Met Val
        275                 280                 285

ccg gca agc att cgt aat gac gac agc gac gtt agc aac cgt att acg          912
Pro Ala Ser Ile Arg Asn Asp Asp Ser Asp Val Ser Asn Arg Ile Thr
    290                 295                 300

atg atc ctg gcg aat ctg gca acc cat aaa gat gat cca ttg cag cgt          960
Met Ile Leu Ala Asn Leu Ala Thr His Lys Asp Asp Pro Leu Gln Arg
305                 310                 315                 320

ctg gaa atc att cgt cgc agc gtc caa aac agc aag cag cgt ttc aag         1008
Leu Glu Ile Ile Arg Arg Ser Val Gln Asn Ser Lys Gln Arg Phe Lys
                325                 330                 335

cgc atg acg agc gac cag atc ctg aac tat tcg gcc gtg gtt tac ggt         1056
Arg Met Thr Ser Asp Gln Ile Leu Asn Tyr Ser Ala Val Val Tyr Gly
            340                 345                 350

ccg gca ggc ctg aac atc atc agc ggt atg atg ccg aaa cgt caa gcg         1104
Pro Ala Gly Leu Asn Ile Ile Ser Gly Met Met Pro Lys Arg Gln Ala
        355                 360                 365
```

```
ttc aat ctg gtt att tct aac gtc ccg ggt ccg cgc gag ccg ttg tat       1152
Phe Asn Leu Val Ile Ser Asn Val Pro Gly Pro Arg Glu Pro Leu Tyr
    370                 375                 380

tgg aat ggc gcg aaa ctg gat gct ctg tac ccg gcc agc att gtt ctg       1200
Trp Asn Gly Ala Lys Leu Asp Ala Leu Tyr Pro Ala Ser Ile Val Leu
385                 390                 395                 400

gat ggt cag gcc ctg aat atc acc atg acg tcc tac ttg gac aag ttg       1248
Asp Gly Gln Ala Leu Asn Ile Thr Met Thr Ser Tyr Leu Asp Lys Leu
                405                 410                 415

gag gtt ggc ctg atc gcg tgc cgc aat gcc ctg ccg cgt atg cag aac       1296
Glu Val Gly Leu Ile Ala Cys Arg Asn Ala Leu Pro Arg Met Gln Asn
            420                 425                 430

ttg ctg acc cat ctg gag gaa gag atc caa ctg ttc gaa ggc gtg att       1344
Leu Leu Thr His Leu Glu Glu Glu Ile Gln Leu Phe Glu Gly Val Ile
        435                 440                 445

gca aag caa gag gac atc aaa acg gcg aac taa                           1377
Ala Lys Gln Glu Asp Ile Lys Thr Ala Asn
    450                 455
```

<210> 43
<211> 458
<212> PRT
<213> Acinetobacter sp. ADP1

<400> 43

```
Met Arg Pro Leu His Pro Ile Asp Phe Ile Phe Leu Ser Leu Glu Lys
1               5                   10                  15

Arg Gln Gln Pro Met His Val Gly Gly Leu Phe Leu Phe Gln Ile Pro
            20                  25                  30

Asp Asn Ala Pro Asp Thr Phe Ile Gln Asp Leu Val Asn Asp Ile Arg
        35                  40                  45

Ile Ser Lys Ser Ile Pro Val Pro Pro Phe Asn Asn Lys Leu Asn Gly
    50                  55                  60

Leu Phe Trp Asp Glu Asp Glu Glu Phe Asp Leu Asp His His Phe Arg
65                  70                  75                  80

His Ile Ala Leu Pro His Pro Gly Arg Ile Arg Glu Leu Leu Ile Tyr
                85                  90                  95

Ile Ser Gln Glu His Ser Thr Leu Leu Asp Arg Ala Lys Pro Leu Trp
            100                 105                 110

Thr Cys Asn Ile Ile Glu Gly Ile Glu Gly Asn Arg Phe Ala Met Tyr
        115                 120                 125

Phe Lys Ile His His Ala Met Val Asp Gly Val Ala Gly Met Arg Leu
    130                 135                 140
```

```
Ile Glu Lys Ser Leu Ser His Asp Val Thr Glu Lys Ser Ile Val Pro
145                 150                 155                 160

Pro Trp Cys Val Glu Gly Lys Arg Ala Lys Arg Leu Arg Glu Pro Lys
                165                 170                 175

Thr Gly Lys Ile Lys Lys Ile Met Ser Gly Ile Lys Ser Gln Leu Gln
            180                 185                 190

Ala Thr Pro Thr Val Ile Gln Glu Leu Ser Gln Thr Val Phe Lys Asp
        195                 200                 205

Ile Gly Arg Asn Pro Asp His Val Ser Ser Phe Gln Ala Pro Cys Ser
    210                 215                 220

Ile Leu Asn Gln Arg Val Ser Ser Ser Arg Arg Phe Ala Ala Gln Ser
225                 230                 235                 240

Phe Asp Leu Asp Arg Phe Arg Asn Ile Ala Lys Ser Leu Asn Val Thr
                245                 250                 255

Ile Asn Asp Val Val Leu Ala Val Cys Ser Gly Ala Leu Arg Ala Tyr
            260                 265                 270

Leu Met Ser His Asn Ser Leu Pro Ser Lys Pro Leu Ile Ala Met Val
        275                 280                 285

Pro Ala Ser Ile Arg Asn Asp Asp Ser Asp Val Ser Asn Arg Ile Thr
    290                 295                 300

Met Ile Leu Ala Asn Leu Ala Thr His Lys Asp Asp Pro Leu Gln Arg
305                 310                 315                 320

Leu Glu Ile Ile Arg Arg Ser Val Gln Asn Ser Lys Gln Arg Phe Lys
                325                 330                 335

Arg Met Thr Ser Asp Gln Ile Leu Asn Tyr Ser Ala Val Val Tyr Gly
            340                 345                 350

Pro Ala Gly Leu Asn Ile Ile Ser Gly Met Met Pro Lys Arg Gln Ala
        355                 360                 365

Phe Asn Leu Val Ile Ser Asn Val Pro Gly Pro Arg Glu Pro Leu Tyr
    370                 375                 380

Trp Asn Gly Ala Lys Leu Asp Ala Leu Tyr Pro Ala Ser Ile Val Leu
385                 390                 395                 400

Asp Gly Gln Ala Leu Asn Ile Thr Met Thr Ser Tyr Leu Asp Lys Leu
                405                 410                 415
```

```
Glu Val Gly Leu Ile Ala Cys Arg Asn Ala Leu Pro Arg Met Gln Asn
            420                 425                 430

Leu Leu Thr His Leu Glu Glu Glu Ile Gln Leu Phe Glu Gly Val Ile
        435                 440                 445

Ala Lys Gln Glu Asp Ile Lys Thr Ala Asn
    450                 455
```

<210> 44
<211> 1374
<212> DNA
<213> Alkanivorax borkumensis SK2

<220>
<221> CDS
<222> (1)..(1374)

<400> 44

```
atg aaa gcg ctg tcc ccg gtg gat cag ctg ttc ctg tgg ctg gag aaa          48
Met Lys Ala Leu Ser Pro Val Asp Gln Leu Phe Leu Trp Leu Glu Lys
1               5                   10                  15

cgt cag caa ccg atg cat gtt ggt ggt ctg cag ctg ttt agc ttc cca          96
Arg Gln Gln Pro Met His Val Gly Gly Leu Gln Leu Phe Ser Phe Pro
            20                  25                  30

gag ggt gcg ggt cct aag tac gtt agc gag ttg gct cag caa atg cgt         144
Glu Gly Ala Gly Pro Lys Tyr Val Ser Glu Leu Ala Gln Gln Met Arg
        35                  40                  45

gac tac tgt cac ccg gtg gcc ccg ttc aat cag cgc ctg acc cgt cgc         192
Asp Tyr Cys His Pro Val Ala Pro Phe Asn Gln Arg Leu Thr Arg Arg
    50                  55                  60

ctg ggt caa tac tat tgg acg cgc gac aaa caa ttt gac att gac cac         240
Leu Gly Gln Tyr Tyr Trp Thr Arg Asp Lys Gln Phe Asp Ile Asp His
65                  70                  75                  80

cat ttt cgc cat gaa gcg ctg ccg aag ccg ggt cgc att cgc gaa ctg         288
His Phe Arg His Glu Ala Leu Pro Lys Pro Gly Arg Ile Arg Glu Leu
                85                  90                  95

ctg tcc ttg gtt agc gcg gag cac agc aat ctg ttg gac cgc gag cgc         336
Leu Ser Leu Val Ser Ala Glu His Ser Asn Leu Leu Asp Arg Glu Arg
            100                 105                 110

cct atg tgg gaa gcg cac ctg att gag ggc atc cgt ggc cgc caa ttc         384
Pro Met Trp Glu Ala His Leu Ile Glu Gly Ile Arg Gly Arg Gln Phe
        115                 120                 125

gct ttg tac tat aag atc cac cat agc gtg atg gat ggc atc agc gct         432
Ala Leu Tyr Tyr Lys Ile His His Ser Val Met Asp Gly Ile Ser Ala
    130                 135                 140

atg cgc att gcg tct aaa acg ctg agc acc gac ccg tct gag cgc gaa         480
Met Arg Ile Ala Ser Lys Thr Leu Ser Thr Asp Pro Ser Glu Arg Glu
145                 150                 155                 160

atg gca cca gca tgg gcc ttc aat acc aag aaa cgt agc cgt agc ctg         528
Met Ala Pro Ala Trp Ala Phe Asn Thr Lys Lys Arg Ser Arg Ser Leu
                165                 170                 175
```

```
cct tcc aat cca gtt gat atg gcg agc agc atg gcc cgt ctg acg gct        576
Pro Ser Asn Pro Val Asp Met Ala Ser Ser Met Ala Arg Leu Thr Ala
            180                 185                 190

tct atc agc aaa cag gcg gcg acc gtt ccg ggt ctg gct cgt gaa gtg        624
Ser Ile Ser Lys Gln Ala Ala Thr Val Pro Gly Leu Ala Arg Glu Val
        195                 200                 205

tac aag gtc acc cag aaa gct aag aag gat gag aac tac gtg agc att        672
Tyr Lys Val Thr Gln Lys Ala Lys Lys Asp Glu Asn Tyr Val Ser Ile
    210                 215                 220

ttt caa gcg ccg gat acc atc ttg aac aac acc att acc ggt tcc cgt        720
Phe Gln Ala Pro Asp Thr Ile Leu Asn Asn Thr Ile Thr Gly Ser Arg
225                 230                 235                 240

cgt ttt gca gca cag agc ttt ccg ctg ccg cgt ctg aaa gtt atc gcg        768
Arg Phe Ala Ala Gln Ser Phe Pro Leu Pro Arg Leu Lys Val Ile Ala
                245                 250                 255

aag gcg tat aac tgc acc atc aac acc gtc gtc ctg tct atg tgt ggc        816
Lys Ala Tyr Asn Cys Thr Ile Asn Thr Val Val Leu Ser Met Cys Gly
            260                 265                 270

cac gcg ctg cgt gaa tat ctg att agc caa cac gca ctg ccg gat gag        864
His Ala Leu Arg Glu Tyr Leu Ile Ser Gln His Ala Leu Pro Asp Glu
        275                 280                 285

ccg ctg atc gcg atg gtg ccg atg agc ctg cgt cag gac gac agc acg        912
Pro Leu Ile Ala Met Val Pro Met Ser Leu Arg Gln Asp Asp Ser Thr
    290                 295                 300

ggt ggt aat cag att ggc atg atc ctg gcc aac ctg ggc acc cat atc        960
Gly Gly Asn Gln Ile Gly Met Ile Leu Ala Asn Leu Gly Thr His Ile
305                 310                 315                 320

tgc gat ccg gcg aat cgt ttg cgt gtt att cac gac tcc gtc gag gaa       1008
Cys Asp Pro Ala Asn Arg Leu Arg Val Ile His Asp Ser Val Glu Glu
                325                 330                 335

gcg aaa tcg cgt ttc agc cag atg agc ccg gag gag atc ctg aac ttt       1056
Ala Lys Ser Arg Phe Ser Gln Met Ser Pro Glu Glu Ile Leu Asn Phe
            340                 345                 350

acc gca ctg act atg gcc ccg acg ggc ttg aat ctg ctg acc ggc ctg       1104
Thr Ala Leu Thr Met Ala Pro Thr Gly Leu Asn Leu Leu Thr Gly Leu
        355                 360                 365

gca ccg aaa tgg cgt gcg ttc aac gtc gtc att agc aac att ccg ggt       1152
Ala Pro Lys Trp Arg Ala Phe Asn Val Val Ile Ser Asn Ile Pro Gly
    370                 375                 380

ccg aag gaa ccg ctg tat tgg aat ggc gcc cag ctg caa ggt gtg tac       1200
Pro Lys Glu Pro Leu Tyr Trp Asn Gly Ala Gln Leu Gln Gly Val Tyr
385                 390                 395                 400

ccg gta agc att gcg ttg gac cgt att gca ctg aac atc acg ctg act       1248
Pro Val Ser Ile Ala Leu Asp Arg Ile Ala Leu Asn Ile Thr Leu Thr
                405                 410                 415

agc tac gtg gat cag atg gag ttc ggt ctg atc gca tgc cgt cgc acg       1296
Ser Tyr Val Asp Gln Met Glu Phe Gly Leu Ile Ala Cys Arg Arg Thr
            420                 425                 430

ctg ccg agc atg caa cgt ctg ctg gat tat ctg gaa caa agc att cgt       1344
Leu Pro Ser Met Gln Arg Leu Leu Asp Tyr Leu Glu Gln Ser Ile Arg
        435                 440                 445
```

gag ttg gaa atc ggt gcc ggc atc aag taa 1374
Glu Leu Glu Ile Gly Ala Gly Ile Lys
450 455

<210> 45
<211> 457
<212> PRT
<213> Alkanivorax borkumensis SK2

<400> 45

Met Lys Ala Leu Ser Pro Val Asp Gln Leu Phe Leu Trp Leu Glu Lys
1 5 10 15

Arg Gln Gln Pro Met His Val Gly Gly Leu Gln Leu Phe Ser Phe Pro
20 25 30

Glu Gly Ala Gly Pro Lys Tyr Val Ser Glu Leu Ala Gln Gln Met Arg
35 40 45

Asp Tyr Cys His Pro Val Ala Pro Phe Asn Gln Arg Leu Thr Arg Arg
50 55 60

Leu Gly Gln Tyr Tyr Trp Thr Arg Asp Lys Gln Phe Asp Ile Asp His
65 70 75 80

His Phe Arg His Glu Ala Leu Pro Lys Pro Gly Arg Ile Arg Glu Leu
85 90 95

Leu Ser Leu Val Ser Ala Glu His Ser Asn Leu Leu Asp Arg Glu Arg
100 105 110

Pro Met Trp Glu Ala His Leu Ile Glu Gly Ile Arg Gly Arg Gln Phe
115 120 125

Ala Leu Tyr Tyr Lys Ile His His Ser Val Met Asp Gly Ile Ser Ala
130 135 140

Met Arg Ile Ala Ser Lys Thr Leu Ser Thr Asp Pro Ser Glu Arg Glu
145 150 155 160

Met Ala Pro Ala Trp Ala Phe Asn Thr Lys Lys Arg Ser Arg Ser Leu
165 170 175

Pro Ser Asn Pro Val Asp Met Ala Ser Ser Met Ala Arg Leu Thr Ala
180 185 190

Ser Ile Ser Lys Gln Ala Ala Thr Val Pro Gly Leu Ala Arg Glu Val
195 200 205

Tyr Lys Val Thr Gln Lys Ala Lys Lys Asp Glu Asn Tyr Val Ser Ile
210 215 220

Phe Gln Ala Pro Asp Thr Ile Leu Asn Asn Thr Ile Thr Gly Ser Arg
225 230 235 240

Arg Phe Ala Ala Gln Ser Phe Pro Leu Pro Arg Leu Lys Val Ile Ala
245 250 255

Lys Ala Tyr Asn Cys Thr Ile Asn Thr Val Val Leu Ser Met Cys Gly
260 265 270

His Ala Leu Arg Glu Tyr Leu Ile Ser Gln His Ala Leu Pro Asp Glu
275 280 285

Pro Leu Ile Ala Met Val Pro Met Ser Leu Arg Gln Asp Asp Ser Thr
290 295 300

Gly Gly Asn Gln Ile Gly Met Ile Leu Ala Asn Leu Gly Thr His Ile
305 310 315 320

Cys Asp Pro Ala Asn Arg Leu Arg Val Ile His Asp Ser Val Glu Glu
325 330 335

Ala Lys Ser Arg Phe Ser Gln Met Ser Pro Glu Glu Ile Leu Asn Phe
340 345 350

Thr Ala Leu Thr Met Ala Pro Thr Gly Leu Asn Leu Leu Thr Gly Leu
355 360 365

Ala Pro Lys Trp Arg Ala Phe Asn Val Val Ile Ser Asn Ile Pro Gly
370 375 380

Pro Lys Glu Pro Leu Tyr Trp Asn Gly Ala Gln Leu Gln Gly Val Tyr
385 390 395 400

Pro Val Ser Ile Ala Leu Asp Arg Ile Ala Leu Asn Ile Thr Leu Thr
405 410 415

Ser Tyr Val Asp Gln Met Glu Phe Gly Leu Ile Ala Cys Arg Arg Thr
420 425 430

Leu Pro Ser Met Gln Arg Leu Leu Asp Tyr Leu Glu Gln Ser Ile Arg
435 440 445

Glu Leu Glu Ile Gly Ala Gly Ile Lys
450 455

<210> 46
<211> 3087
<212> DNA
<213> Artificial Sequence

<220>
<223> expressionscassette

<400> 46

atgcgtcctc tgcacccgat cgacttcatt tttctgtcgc tggagaagcg ccagcagcct 60

atgcatgtcg gtggcctgtt cttgtttcaa attccggata atgcgccgga cacctttatc 120

caagacctgg tgaatgatat ccgcattagc aaatctattc cggtcccgcc attcaacaac 180

aaactgaacg gcctgttttg ggacgaggac gaggaatttg atctggatca ccattttcgt 240

cacatcgcat tgccgcaccc aggtcgtatt cgtgaactgc tgatctacat tagccaagag 300

cacagcacct tgctggatcg cgccaagccg ctgtggacgt gcaacattat tgagggcatt 360

gaaggtaatc gttttgcgat gtatttcaag attcaccacg cgatggttga tggtgttgct 420

ggtatgcgtc tgatcgaaaa gagcctgtct cacgatgtga ccgagaaaag catcgtgccg 480

ccgtggtgtg tggagggtaa gcgtgctaaa cgcctgcgtg aaccgaaaac gggtaagatc 540

aaaaagatta tgtccggtat caaatctcag ctgcaagcaa ctccgaccgt gatccaggaa 600

ctgtcccaga ccgtctttaa ggacatcggt cgcaaccctg atcacgtcag cagcttccag 660

gcaccgtgct ccattctgaa tcagcgtgtc agcagcagcc gtcgctttgc ggcgcaaagc 720

ttcgacctgg atcgcttccg taacatcgcc aaaagcctga atgtcaccat taacgacgtt 780

gttctggcgg tgtgttccgg cgctctgcgt gcgtacctga tgagccataa tagcctgccg 840

agcaaaccgt tgattgcgat ggtgccggca agcattcgta atgacgacag cgacgttagc 900

aaccgtatta cgatgatcct ggcgaatctg gcaacccata aagatgatcc attgcagcgt 960

ctggaaatca ttcgtcgcag cgtccaaaac agcaagcagc gtttcaagcg catgacgagc 1020

gaccagatcc tgaactattc ggccgtggtt tacggtccgg caggcctgaa catcatcagc 1080

ggtatgatgc cgaaacgtca agcgttcaat ctggttattt ctaacgtccc gggtccgcgc 1140

gagccgttgt attggaatgg cgcgaaactg gatgctctgt acccggccag cattgttctg 1200

gatggtcagg ccctgaatat caccatgacg tcctacttgg acaagttgga ggttggcctg 1260

atcgcgtgcc gcaatgccct gccgcgtatg cagaacttgc tgacccatct ggaggaagag 1320

atccaactgt tcgaaggcgt gattgcaaag caagaggaca tcaaaacggc gaactaagcg 1380

ttaagtctga gaggtgaaga attgaagaag gtttggctta accgttatcc cgcggacgtt 1440

ccgacggaga tcaaccctga ccgttatcaa tctctggtag atatgtttga gcagtcggtc 1500

gcgcgctacg ccgatcaacc tgcgtttgtg aatatggggg aggtaatgac cttccgcaag 1560

ctggaagaac gcagtcgcgc gtttgccgct tatttgcaac aagggttggg gctgaagaaa 1620

ggcgatcgcg ttgcgttgat gatgcctaat ttattgcaat atccggtggc gctgtttggc 1680

attttgcgtg ccgggatgat cgtcgtaaac gttaacccgt tgtatacccc gcgtgagctt 1740

gagcatcagc ttaacgatag cggcgcatcg gcgattgtta tcgtgtctaa ctttgctcac 1800

acactggaaa aagtggttga taaaaccgcc gttcagcacg taattctgac ccgtatgggc 1860

gatcagctat ctacggcaaa aggcacggta gtcaatttcg ttgttaaata catcaagcgt 1920

ttggtgccga aataccatct gccagatgcc atttcatttc gtagcgcact gcataacggc 1980

taccggatgc agtacgtcaa acccgaactg gtgccggaag atttagcttt tctgcaatac 2040

accggcggca ccactggtgt ggcgaaaggc gcgatgctga ctcaccgcaa tatgctggcg 2100

aacctggaac aggttaacgc gacctatggt ccgctgttgc atccgggcaa agagctggtg 2160

gtgacggcgc tgccgctgta tcacattttt gccctgacca ttaactgcct gctgtttatc 2220

gaactgggtg ggcagaacct gcttatcact aacccgcgcg atattccagg gttggtaaaa 2280

gagttagcga aatatccgtt taccgctatc acgggcgtta acaccttgtt caatgcgttg 2340

ctgaacaata aagagttcca gcagctggat ttctccagtc tgcatctttc cgcaggcggt 2400

gggatgccag tgcagcaagt ggtggcagag cgttgggtga aactgaccgg acagtatctg 2460

ctggaaggct atggccttac cgagtgtgcg ccgctggtca gcgttaaccc atatgatatt 2520

gattatcata gtggtagcat cggtttgccg gtgccgtcga cggaagccaa actggtggat 2580

gatgatgata atgaagtacc accaggtcaa ccgggtgagc tttgtgtcaa aggaccgcag 2640

gtgatgctgg gttactggca gcgtcccgat gctaccgatg aaatcatcaa aaatggctgg 2700

ttacacaccg gcgacatcgc ggtaatggat gaagaaggat tcctgcgcat tgtcgatcgt 2760

aaaaaagaca tgattctggt ttccggtttt aacgtctatc ccaacgagat tgaagatgtc 2820

gtcatgcagc atcctggcgt acaggaagtc gcggctgttg gcgtaccttc cggctccagt 2880

ggtgaagcgg tgaaaatctt cgtagtgaaa aaagatccat cgcttaccga agagtcactg 2940

gtgacttttt gccgccgtca gctcacggga tacaaagtac cgaagctggt ggagtttcgt 3000

gatgagttac cgaaatctaa cgtcggaaaa attttgcgac gagaattacg tgacgaagcg 3060

cgcggcaaag tggacaataa agcctga 3087

<210> 47
<211> 3084
<212> DNA
<213> Artificial Sequence

<220>
<223> expressionscassette

<400> 47
atgaaagcgc tgtccccggt ggatcagctg ttcctgtggc tggagaaacg tcagcaaccg 60

atgcatgttg gtggtctgca gctgtttagc ttcccagagg gtgcgggtcc taagtacgtt 120

agcgagttgg ctcagcaaat gcgtgactac tgtcacccgg tggccccgtt caatcagcgc 180

ctgacccgtc gcctgggtca atactattgg acgcgcgaca aacaatttga cattgaccac 240

cattttcgcc atgaagcgct gccgaagccg ggtcgcattc gcgaactgct gtccttggtt 300

agcgcggagc acagcaatct gttggaccgc gagcgcccta tgtgggaagc gcacctgatt 360

gagggcatcc gtggccgcca attcgctttg tactataaga tccaccatag cgtgatggat 420

ggcatcagcg ctatgcgcat tgcgtctaaa acgctgagca ccgacccgtc tgagcgcgaa 480

atggcaccag catgggcctt caataccaag aaacgtagcc gtagcctgcc ttccaatcca 540

gttgatatgg cgagcagcat ggcccgtctg acggcttcta tcagcaaaca ggcggcgacc 600

gttccgggtc tggctcgtga agtgtacaag gtcacccaga aagctaagaa ggatgagaac 660

tacgtgagca tttttcaagc gccggatacc atcttgaaca acaccattac cggttcccgt 720
cgttttgcag cacagagctt tccgctgccg cgtctgaaag ttatcgcgaa ggcgtataac 780
tgcaccatca acaccgtcgt cctgtctatg tgtggccacg cgctgcgtga atatctgatt 840
agccaacacg cactgccgga tgagccgctg atcgcgatgg tgccgatgag cctgcgtcag 900
gacgacagca cgggtggtaa tcagattggc atgatcctgg ccaacctggg cacccatatc 960
tgcgatccgg cgaatcgttt gcgtgttatt cacgactccg tcgaggaagc gaaatcgcgt 1020
ttcagccaga tgagcccgga ggagatcctg aactttaccg cactgactat ggccccgacg 1080
ggcttgaatc tgctgaccgg cctggcaccg aaatggcgtg cgttcaacgt cgtcattagc 1140
aacattccgg gtccgaagga accgctgtat tggaatggcg cccagctgca aggtgtgtac 1200
ccggtaagca ttgcgttgga ccgtattgca ctgaacatca cgctgactag ctacgtggat 1260
cagatggagt tcggtctgat cgcatgccgt cgcacgctgc cgagcatgca acgtctgctg 1320
gattatctgg aacaaagcat tcgtgagttg gaaatcggtg ccggcatcaa gtaagcgtta 1380
agtctgagag gtgaagaatt gaagaaggtt tggcttaacc gttatcccgc ggacgttccg 1440
acggagatca accctgaccg ttatcaatct ctggtagata tgtttgagca gtcggtcgcg 1500
cgctacgccg atcaacctgc gtttgtgaat atgggggagg taatgacctt ccgcaagctg 1560
gaagaacgca gtcgcgcgtt tgccgcttat ttgcaacaag ggttggggct gaagaaaggc 1620
gatcgcgttg cgttgatgat gcctaattta ttgcaatatc cggtggcgct gtttggcatt 1680
ttgcgtgccg ggatgatcgt cgtaaacgtt aacccgttgt ataccccgcg tgagcttgag 1740
catcagctta acgatagcgg cgcatcggcg attgttatcg tgtctaactt tgctcacaca 1800
ctggaaaaag tggttgataa aaccgccgtt cagcacgtaa ttctgacccg tatgggcgat 1860
cagctatcta cggcaaaagg cacggtagtc aatttcgttg ttaaatacat caagcgtttg 1920
gtgccgaaat accatctgcc agatgccatt tcatttcgta gcgcactgca taacggctac 1980
cggatgcagt acgtcaaacc cgaactggtg ccggaagatt tagcttttct gcaatacacc 2040
ggcggcacca ctggtgtggc gaaaggcgcg atgctgactc accgcaatat gctggcgaac 2100
ctggaacagg ttaacgcgac ctatggtccg ctgttgcatc cgggcaaaga gctggtggtg 2160
acggcgctgc cgctgtatca catttttgcc ctgaccatta actgcctgct gtttatcgaa 2220
ctgggtgggc agaacctgct tatcactaac ccgcgcgata ttccagggtt ggtaaaagag 2280
ttagcgaaat atccgtttac cgctatcacg ggcgttaaca ccttgttcaa tgcgttgctg 2340
aacaataaag agttccagca gctggatttc tccagtctgc atctttccgc aggcggtggg 2400
atgccagtgc agcaagtggt ggcagagcgt tgggtgaaac tgaccggaca gtatctgctg 2460
gaaggctatg gccttaccga gtgtgcgccg ctggtcagcg ttaacccata tgatattgat 2520
tatcatagtg gtagcatcgg tttgccggtg ccgtcgacgg aagccaaact ggtggatgat 2580
gatgataatg aagtaccacc aggtcaaccg ggtgagcttt gtgtcaaagg accgcaggtg 2640
atgctgggtt actggcagcg tcccgatgct accgatgaaa tcatcaaaaa tggctggtta 2700

cacaccggcg acatcgcggt aatggatgaa gaaggattcc tgcgcattgt cgatcgtaaa 2760

aaagacatga ttctggtttc cggttttaac gtctatccca acgagattga agatgtcgtc 2820

atgcagcatc ctggcgtaca ggaagtcgcg gctgttggcg taccttccgg ctccagtggt 2880

gaagcggtga aaatcttcgt agtgaaaaaa gatccatcgc ttaccgaaga gtcactggtg 2940

acttttttgcc gccgtcagct cacgggatac aaagtaccga agctggtgga gtttcgtgat 3000

gagttaccga aatctaacgt cggaaaaatt ttgcgacgag aattacgtga cgaagcgcgc 3060

ggcaaagtgg acaataaagc ctga 3084

<210> 48
<211> 7141
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 48
cgggatctcg acgctctccc ttatgcgact cctgcgttta gggaaagagc atttgtcaga 60

atatttaagg gcgcctgtca ctttgcttga tatatgagaa ttatttaacc ttataaatga 120

gaaaaaagca acgcacttta aataagatac gttgcttttt cgattgatga acacctataa 180

ttaaactatt catctattat ttatgatttt ttgtatatac aatatttcta gtttgttaaa 240

gagaattaag aaaataaatc tcgaaaataa taaagggaaa atcagttttt gatatcaaaa 300

ttatacatgt caacgataat acaaaatata atacaaacta taagatgtta tcagtattta 360

ttatgcattt agaatacctt ttgtgtcgcc cttattcgac tccctataga agttcctatt 420

ctctagaaag tataggaact tcccttcatt ttggatccaa ttgtgagcgg ataacaatta 480

cgagcttcat gcacagtgat cgacgctgtt gacaattaat catcggctcg tataatgtgt 540

ggatgtggaa ttgtgagcgc tcacaattcc acaacggttt ccctctagaa ataattttgt 600

ttaacaggag gtaaaacata tgcgtcctct gcacccgatc gacttcattt ttctgtcgct 660

ggagaagcgc cagcagccta tgcatgtcgg tggcctgttc ttgtttcaaa ttccggataa 720

tgcgccggac acctttatcc aagacctggt gaatgatatc cgcattagca aatctattcc 780

ggtcccgcca ttcaacaaca aactgaacgg cctgttttgg gacgaggacg aggaatttga 840

tctggatcac cattttcgtc acatcgcatt gccgcaccca ggtcgtattc gtgaactgct 900

gatctacatt agccaagagc acagcacctt gctggatcgc gccaagccgc tgtggacgtg 960

caacattatt gagggcattg aaggtaatcg ttttgcgatg tatttcaaga ttcaccacgc 1020

gatggttgat ggtgttgctg gtatgcgtct gatcgaaaag agcctgtctc acgatgtgac 1080

cgagaaaagc atcgtgccgc cgtggtgtgt ggagggtaag cgtgctaaac gcctgcgtga 1140

accgaaaacg ggtaagatca aaaagattat gtccggtatc aaatctcagc tgcaagcaac 1200

tccgaccgtg atccaggaac tgtcccagac cgtctttaag gacatcggtc gcaaccctga 1260

tcacgtcagc agcttccagg caccgtgctc cattctgaat cagcgtgtca gcagcagccg 1320

tcgctttgcg gcgcaaagct tcgacctgga tcgcttccgt aacatcgcca aaagcctgaa 1380
tgtcaccatt aacgacgttg ttctggcggt gtgttccggc gctctgcgtg cgtacctgat 1440
gagccataat agcctgccga gcaaaccgtt gattgcgatg gtgccggcaa gcattcgtaa 1500
tgacgacagc gacgttagca accgtattac gatgatcctg gcgaatctgg caacccataa 1560
agatgatcca ttgcagcgtc tggaaatcat tcgtcgcagc gtccaaaaca gcaagcagcg 1620
tttcaagcgc atgacgagcg accagatcct gaactattcg gccgtggttt acggtccggc 1680
aggcctgaac atcatcagcg gtatgatgcc gaaacgtcaa gcgttcaatc tggttatttc 1740
taacgtcccg ggtccgcgcg agccgttgta ttggaatggc gcgaaactgg atgctctgta 1800
cccggccagc attgttctgg atggtcaggc cctgaatatc accatgacgt cctacttgga 1860
caagttggag gttggcctga tcgcgtgccg caatgccctg ccgcgtatgc agaacttgct 1920
gacccatctg gaggaagaga tccaactgtt cgaaggcgtg attgcaaagc aagaggacat 1980
caaaacggcg aactaagcgt taagtctgag aggtgaagaa ttgaagaagg tttggcttaa 2040
ccgttatccc gcggacgttc cgacggagat caaccctgac cgttatcaat ctctggtaga 2100
tatgtttgag cagtcggtcg cgcgctacgc cgatcaacct gcgtttgtga atatggggga 2160
ggtaatgacc ttccgcaagc tggaagaacg cagtcgcgcg tttgccgctt atttgcaaca 2220
agggttgggg ctgaagaaag gcgatcgcgt tgcgttgatg atgcctaatt tattgcaata 2280
tccggtggcg ctgtttggca ttttgcgtgc cgggatgatc gtcgtaaacg ttaacccgtt 2340
gtataccccg cgtgagcttg agcatcagct taacgatagc ggcgcatcgg cgattgttat 2400
cgtgtctaac tttgctcaca cactggaaaa agtggttgat aaaaccgccg ttcagcacgt 2460
aattctgacc cgtatgggcg atcagctatc tacggcaaaa ggcacggtag tcaatttcgt 2520
tgttaaatac atcaagcgtt tggtgccgaa ataccatctg ccagatgcca tttcatttcg 2580
tagcgcactg cataacggct accggatgca gtacgtcaaa cccgaactgg tgccggaaga 2640
tttagctttt ctgcaataca ccggcggcac cactggtgtg gcgaaaggcg cgatgctgac 2700
tcaccgcaat atgctggcga acctggaaca ggttaacgcg acctatggtc cgctgttgca 2760
tccgggcaaa gagctggtgg tgacggcgct gccgctgtat cacatttttg ccctgaccat 2820
taactgcctg ctgtttatcg aactgggtgg gcagaacctg cttatcacta acccgcgcga 2880
tattccaggg ttggtaaaag agttagcgaa atatccgttt accgctatca cgggcgttaa 2940
caccttgttc aatgcgttgc tgaacaataa agagttccag cagctggatt tctccagtct 3000
gcatctttcc gcaggcggtg ggatgccagt gcagcaagtg gtggcagagc gttgggtgaa 3060
actgaccgga cagtatctgc tggaaggcta tggccttacc gagtgtgcgc cgctggtcag 3120
cgttaaccca tatgatattg attatcatag tggtagcatc ggtttgccgg tgccgtcgac 3180
ggaagccaaa ctggtggatg atgatgataa tgaagtacca ccaggtcaac cgggtgagct 3240
ttgtgtcaaa ggaccgcagg tgatgctggg ttactggcag cgtcccgatg ctaccgatga 3300
aatcatcaaa aatggctggt tacacaccgg cgacatcgcg gtaatggatg aagaaggatt 3360

cctgcgcatt gtcgatcgta aaaaagacat gattctggtt tccggtttta acgtctatcc 3420
caacgagatt gaagatgtcg tcatgcagca tcctggcgta caggaagtcg cggctgttgg 3480
cgtaccttcc ggctccagtg gtgaagcggt gaaaatcttc gtagtgaaaa aagatccatc 3540
gcttaccgaa gagtcactgg tgacttttg ccgccgtcag ctcacgggat acaaagtacc 3600
gaagctggtg gagtttcgtg atgagttacc gaaatctaac gtcggaaaaa ttttgcgacg 3660
agaattacgt gacgaagcgc gcggcaaagt ggacaataaa gcctgagcgt taagtcagtc 3720
gtcagacgcc ggttaatccg gcgttttttt tgacgcccac taaagagaaa acaatctcga 3780
gtctggtaaa gaaaccgctg ctgcgaaatt tgaacgccag cacatggact cgtctactag 3840
cgcagcttaa ttaacctagg ctgctgccac cgctgagcaa taactagcat aacccccttgg 3900
ggcctctaaa cgggtcttga ggggtttttt gctgaaacct caggcatttg agaagcacac 3960
ggtcacactg cttccggtag tcaataaacc ggtaaaccag caatagacat aagcggctat 4020
ttaacgaccc tgccctgaac cgacgaccgg gtcatcgtgg ccggatcttg cggcccctcg 4080
gcttgaacga attgttagac attatttgcc gactaccttg gtgatctcgc ctttcacgta 4140
gtggacaaat tcttccaact gatctgcgcg cgaggccaag cgatcttctt cttgtccaag 4200
ataagcctgt ctagcttcaa gtatgacggg ctgatactgg gccggcaggc gctccattgc 4260
ccagtcggca gcgacatcct tcggcgcgat tttgccggtt actgcgctgt accaaatgcg 4320
ggacaacgta agcactacat ttcgctcatc gccagcccag tcgggcggcg agttccatag 4380
cgttaaggtt tcatttagcg cctcaaatag atcctgttca ggaaccggat caaagagttc 4440
ctccgccgct ggacctacca aggcaacgct atgttctctt gcttttgtca gcaagatagc 4500
cagatcaatg tcgatcgtgg ctggctcgaa gatacctgca agaatgtcat tgcgctgcca 4560
ttctccaaat tgcagttcgc gcttagctgg ataacgccac ggaatgatgt cgtcgtgcac 4620
aacaatggtg acttctacag cgcggagaat ctcgctctct ccaggggaag ccgaagtttc 4680
caaaaggtcg ttgatcaaag ctcgccgcgt tgtttcatca agccttacgg tcaccgtaac 4740
cagcaaatca atatcactgt gtggcttcag gccgccatcc actgcggagc cgtacaaatg 4800
tacggccagc aacgtcggtt cgagatggcg ctcgatgacg ccaactacct ctgatagttg 4860
agtcgatact tcggcgatca ccgcttccct catactcttc ctttttcaat attattgaag 4920
catttatcag ggttattgtc tcatgagcgg atacatattt gaatgtattt agaaaaataa 4980
acaaatagct agctcactcg gtcgctacgc tccgggcgtg agactgcggc gggcgctgcg 5040
gacacataca aagttaccca cagattccgt ggataagcag gggactaaca tgtgaggcaa 5100
aacagcaggg ccgcgccggt ggcgtttttc cataggctcc gccctcctgc cagagttcac 5160
ataaacagac gcttttccgg tgcatctgtg ggagccgtga ggctcaacca tgaatctgac 5220
agtacgggcg aaacccgaca ggacttaaag atccccaccg tttccggcgg gtcgctccct 5280
cttgcgctct cctgttccga ccctgccgtt taccggatac ctgttccgcc tttctccctt 5340
acgggaagtg tggcgctttc tcatagctca cacactggta tctcggctcg gtgtaggtcg 5400

ttcgctccaa gctgggctgt aagcaagaac tccccgttca gcccgactgc tgcgccttat 5460
ccggtaactg ttcacttgag tccaacccgg aaaagcacgg taaaacgcca ctggcagcag 5520
ccattggtaa ctgggagttc gcagaggatt tgtttagcta aacacgcggt tgctcttgaa 5580
gtgtgcgcca aagtccggct acactggaag gacagatttg gttgctgtgc tctgcgaaag 5640
ccagttacca cggttaagca gttccccaac tgacttaacc ttcgatcaaa ccacctcccc 5700
aggtggtttt ttcgtttaca gggcaaaaga ttacgcgcag aaaaaaagga tctcaagaag 5760
atcctttgat cttttctact gaaccgctct agatttcagt gcaatttatc tcttcaaatg 5820
tagcacctga agtcagcccc atacgatata agttgtaatt ctcatgttag tcatgccccg 5880
cgcccaccgg aaggagctga ctgggttgaa ggctctcaag ggcatcggtc gagatcccgg 5940
tgcctaatga gtgagctaac ttacattaat tgcgttgcgc tcactgcccg ctttccagtc 6000
gggaaacctg tcgtgccagc tgcattaatg aatcggccaa cgcgcgggga gaggcggttt 6060
gcgtattggg cgccagggtg gtttttcttt tcaccagtga cgggcaac agctgattgc 6120
ccttcaccgc ctggccctga gagagttgca gcaagcggtc cacgctggtt tgccccagca 6180
ggcgaaaatc ctgtttgatg gtggttaacg gcgggatata acatgagctg tcttcggtat 6240
cgtcgtatcc cactaccgag atgtccgcac caacgcgcag cccggactcg gtaatggcgc 6300
gcattgcgcc cagcgccatc tgatcgttgg caaccagcat cgcagtggga acgatgccct 6360
cattcagcat ttgcatggtt tgttgaaaac cggacatggc actccagtcg ccttcccgtt 6420
ccgctatcgg ctgaatttga ttgcgagtga gatatttatg ccagccagcc agacgcagac 6480
gcgccgagac agaacttaat gggcccgcta acagcgcgat ttgctggtga cccaatgcga 6540
ccagatgctc cacgcccagt cgcgtaccgt cttcatggga gaaaataata ctgttgatgg 6600
gtgtctggtc agagacatca agaaataacg ccggaacatt agtgcaggca gcttccacag 6660
caatggcatc ctggtcatcc agcggatagt taatgatcag cccactgacg cgttgcgcga 6720
gaagattgtg caccgccgct ttacaggctt cgacgccgct tcgttctacc atcgacacca 6780
ccacgctggc acccagttga tcggcgcgag atttaatcgc cgcgacaatt tgcgacggcg 6840
cgtgcagggc cagactggag gtggcaacgc caatcagcaa cgactgtttg cccgccagtt 6900
gttgtgccac gcggttggga atgtaattca gctccgccat cgccgcttcc acttttccc 6960
gcgttttcgc agaaacgtgg ctggcctggt tcaccacgcg ggaaacggtc tgataagaga 7020
caccggcata ctctgcgaca tcgtataacg ttactggttt cacattcacc accctgaatt 7080
gactctcttc cgggcgctat catgccatac cgcgaaaggt tttgcgccat tcgatggtgt 7140
c 7141

<210> 49
<211> 7138
<212> DNA
<213> Artificial Sequence

<220>

<223> vector

<400> 49

cgggatctcg acgctctccc ttatgcgact cctgcgttta gggaaagagc atttgtcaga 60

atatttaagg gcgcctgtca ctttgcttga tatatgagaa ttatttaacc ttataaatga 120

gaaaaaagca acgcacttta ataagatac gttgcttttt cgattgatga acacctataa 180

ttaaactatt catctattat ttatgatttt ttgtatatac aatatttcta gtttgttaaa 240

gagaattaag aaaataaatc tcgaaaataa taaagggaaa atcagttttt gatatcaaaa 300

ttatacatgt caacgataat acaaaatata atacaaacta taagatgtta tcagtattta 360

ttatgcattt agaatacctt ttgtgtcgcc cttattcgac tccctataga agttcctatt 420

ctctagaaag tataggaact tcccttcatt ttggatccaa ttgtgagcgg ataacaatta 480

cgagcttcat gcacagtgat cgacgctgtt gacaattaat catcggctcg tataatgtgt 540

ggatgtggaa ttgtgagcgc tcacaattcc acaacggttt ccctctagaa ataattttgt 600

ttaacaggag gtaaaacata tgaaagcgct gtccccggtg gatcagctgt tcctgtggct 660

ggagaaacgt cagcaaccga tgcatgttgg tggtctgcag ctgtttagct tcccagaggg 720

tgcgggtcct aagtacgtta gcgagttggc tcagcaaatg cgtgactact gtcacccggt 780

ggccccgttc aatcagcgcc tgacccgtcg cctgggtcaa tactattgga cgcgcgacaa 840

acaatttgac attgaccacc attttcgcca tgaagcgctg ccgaagccgg gtcgcattcg 900

cgaactgctg tccttggtta gcgcggagca cagcaatctg ttggaccgcg agcgccctat 960

gtgggaagcg cacctgattg agggcatccg tggccgccaa ttcgctttgt actataagat 1020

ccaccatagc gtgatggatg gcatcagcgc tatgcgcatt gcgtctaaaa cgctgagcac 1080

cgacccgtct gagcgcgaaa tggcaccagc atgggccttc aataccaaga aacgtagccg 1140

tagcctgcct tccaatccag ttgatatggc gagcagcatg gcccgtctga cggcttctat 1200

cagcaaacag gcggcgaccg ttccgggtct ggctcgtgaa gtgtacaagg tcacccagaa 1260

agctaagaag gatgagaact acgtgagcat ttttcaagcg ccggatacca tcttgaacaa 1320

caccattacc ggttcccgtc gttttgcagc acagagcttt ccgctgccgc gtctgaaagt 1380

tatcgcgaag gcgtataact gcaccatcaa caccgtcgtc ctgtctatgt gtggccacgc 1440

gctgcgtgaa tatctgatta gccaacacgc actgccggat gagccgctga tcgcgatggt 1500

gccgatgagc ctgcgtcagg acgacagcac gggtggtaat cagattggca tgatcctggc 1560

caacctgggc acccatatct gcgatccggc gaatcgtttg cgtgttattc acgactccgt 1620

cgaggaagcg aaatcgcgtt tcagccagat gagcccggag gagatcctga actttaccgc 1680

actgactatg gccccgacgg gcttgaatct gctgaccggc ctggcaccga aatggcgtgc 1740

gttcaacgtc gtcattagca acattccggg tccgaaggaa ccgctgtatt ggaatggcgc 1800

ccagctgcaa ggtgtgtacc cggtaagcat tgcgttggac cgtattgcac tgaacatcac 1860

gctgactagc tacgtggatc agatggagtt cggtctgatc gcatgccgtc gcacgctgcc 1920

gagcatgcaa cgtctgctgg attatctgga acaaagcatt cgtgagttgg aaatcggtgc 1980

cggcatcaag taagcgttaa gtctgagagg tgaagaattg aagaaggttt ggcttaaccg 2040

ttatcccgcg gacgttccga cggagatcaa ccctgaccgt tatcaatctc tggtagatat 2100

gtttgagcag tcggtcgcgc gctacgccga tcaacctgcg tttgtgaata tgggggaggt 2160

aatgaccttc cgcaagctgg aagaacgcag tcgcgcgttt gccgcttatt tgcaacaagg 2220

gttggggctg aagaaaggcg atcgcgttgc gttgatgatg cctaatttat tgcaatatcc 2280

ggtggcgctg tttggcattt tgcgtgccgg gatgatcgtc gtaaacgtta acccgttgta 2340

taccccgcgt gagcttgagc atcagcttaa cgatagcggc gcatcggcga ttgttatcgt 2400

gtctaacttt gctcacacac tggaaaaagt ggttgataaa accgccgttc agcacgtaat 2460

tctgacccgt atgggcgatc agctatctac ggcaaaaggc acggtagtca atttcgttgt 2520

taaatacatc aagcgtttgg tgccgaaata ccatctgcca gatgccattt catttcgtag 2580

cgcactgcat aacggctacc ggatgcagta cgtcaaaccc gaactggtgc cggaagattt 2640

agcttttctg caatacaccg gcggcaccac tggtgtggcg aaaggcgcga tgctgactca 2700

ccgcaatatg ctggcgaacc tggaacaggt taacgcgacc tatggtccgc tgttgcatcc 2760

gggcaaagag ctggtggtga cggcgctgcc gctgtatcac atttttgccc tgaccattaa 2820

ctgcctgctg tttatcgaac tgggtgggca gaacctgctt atcactaacc cgcgcgatat 2880

tccagggttg gtaaaagagt tagcgaaata tccgtttacc gctatcacgg gcgttaacac 2940

cttgttcaat gcgttgctga acaataaaga gttccagcag ctggatttct ccagtctgca 3000

tctttccgca ggcggtggga tgccagtgca gcaagtggtg gcagagcgtt gggtgaaact 3060

gaccggacag tatctgctgg aaggctatgg ccttaccgag tgtgcgccgc tggtcagcgt 3120

taacccatat gatattgatt atcatagtgg tagcatcggt ttgccggtgc cgtcgacgga 3180

agccaaactg gtggatgatg atgataatga agtaccacca ggtcaaccgg gtgagctttg 3240

tgtcaaagga ccgcaggtga tgctgggtta ctggcagcgt cccgatgcta ccgatgaaat 3300

catcaaaaat ggctggttac acaccggcga catcgcggta atggatgaag aaggattcct 3360

gcgcattgtc gatcgtaaaa aagacatgat tctggtttcc ggttttaacg tctatcccaa 3420

cgagattgaa gatgtcgtca tgcagcatcc tggcgtacag gaagtcgcgg ctgttggcgt 3480

accttccggc tccagtggtg aagcggtgaa aatcttcgta gtgaaaaaag atccatcgct 3540

taccgaagag tcactggtga ctttttgccg ccgtcagctc acgggataca aagtaccgaa 3600

gctggtggag tttcgtgatg agttaccgaa atctaacgtc ggaaaaattt tgcgacgaga 3660

attacgtgac gaagcgcgcg gcaaagtgga caataaagcc tgagcgttaa gtcagtcgtc 3720

agacgccggt taatccggcg tttttttga cgcccactaa agagaaaaca atctcgagtc 3780

tggtaaagaa accgctgctg cgaaatttga acgccagcac atggactcgt ctactagcgc 3840

agcttaatta acctaggctg ctgccaccgc tgagcaataa ctagcataac cccttggggc 3900

ctctaaacgg gtcttgaggg gttttttgct gaaacctcag gcatttgaga agcacacggt 3960

cacactgctt ccggtagtca ataaaccggt aaaccagcaa tagacataag cggctattta 4020

acgaccctgc cctgaaccga cgaccgggtc atcgtggccg gatcttgcgg cccctcggct 4080

tgaacgaatt gttagacatt atttgccgac taccttggtg atctcgcctt tcacgtagtg 4140

gacaaattct tccaactgat ctgcgcgcga ggccaagcga tcttcttctt gtccaagata 4200

agcctgtcta gcttcaagta tgacgggctg atactgggcc ggcaggcgct ccattgccca 4260

gtcggcagcg acatccttcg gcgcgatttt gccggttact gcgctgtacc aaatgcggga 4320

caacgtaagc actacatttc gctcatcgcc agcccagtcg ggcggcgagt tccatagcgt 4380

taaggtttca tttagcgcct caaatagatc ctgttcagga accggatcaa agagttcctc 4440

cgccgctgga cctaccaagg caacgctatg ttctcttgct tttgtcagca agatagccag 4500

atcaatgtcg atcgtggctg gctcgaagat acctgcaaga atgtcattgc gctgccattc 4560

tccaaattgc agttcgcgct tagctggata acgccacgga atgatgtcgt cgtgcacaac 4620

aatggtgact tctacagcgc ggagaatctc gctctctcca ggggaagccg aagtttccaa 4680

aaggtcgttg atcaaagctc gccgcgttgt ttcatcaagc cttacggtca ccgtaaccag 4740

caaatcaata tcactgtgtg gcttcaggcc gccatccact gcggagccgt acaaatgtac 4800

ggccagcaac gtcggttcga gatggcgctc gatgacgcca actacctctg atagttgagt 4860

cgatacttcg gcgatcaccg cttccctcat actcttcctt tttcaatatt attgaagcat 4920

ttatcagggt tattgtctca tgagcggata catatttgaa tgtatttaga aaaataaaca 4980

aatagctagc tcactcggtc gctacgctcc gggcgtgaga ctgcggcggg cgctgcggac 5040

acatacaaag ttacccacag attccgtgga taagcagggg actaacatgt gaggcaaaac 5100

agcagggccg cgccggtggc gtttttccat aggctccgcc ctcctgccag agttcacata 5160

aacagacgct tttccggtgc atctgtggga gccgtgaggc tcaaccatga atctgacagt 5220

acgggcgaaa cccgacagga cttaaagatc cccaccgttt ccggcgggtc gctccctctt 5280

gcgctctcct gttccgaccc tgccgtttac cggatacctg ttccgccttt ctcccttacg 5340

ggaagtgtgg cgctttctca tagctcacac actggtatct cggctcggtg taggtcgttc 5400

gctccaagct gggctgtaag caagaactcc ccgttcagcc cgactgctgc gccttatccg 5460

gtaactgttc acttgagtcc aacccggaaa agcacggtaa aacgccactg gcagcagcca 5520

ttggtaactg ggagttcgca gaggatttgt ttagctaaac acgcggttgc tcttgaagtg 5580

tgcgccaaag tccggctaca ctggaaggac agatttggtt gctgtgctct gcgaaagcca 5640

gttaccacgg ttaagcagtt ccccaactga cttaaccttc gatcaaacca cctccccagg 5700

tggttttttc gtttacaggg caaaagatta cgcgcagaaa aaaaggatct caagaagatc 5760

ctttgatctt ttctactgaa ccgctctaga tttcagtgca atttatctct tcaaatgtag 5820

cacctgaagt cagccccata cgatataagt tgtaattctc atgttagtca tgccccgcgc 5880

ccaccggaag gagctgactg ggttgaaggc tctcaagggc atcggtcgag atcccggtgc 5940

ctaatgagtg agctaactta cattaattgc gttgcgctca ctgcccgctt tccagtcggg 6000

aaacctgtcg tgccagctgc attaatgaat cggccaacgc gcggggagag gcggtttgcg 6060

tattgggcgc cagggtggtt tttcttttca ccagtgagac gggcaacagc tgattgccct 6120

tcaccgcctg gccctgagag agttgcagca agcggtccac gctggtttgc cccagcaggc 6180

gaaaatcctg tttgatggtg gttaacggcg ggatataaca tgagctgtct tcggtatcgt 6240

cgtatcccac taccgagatg tccgcaccaa cgcgcagccc ggactcggta atggcgcgca 6300

ttgcgcccag cgccatctga tcgttggcaa ccagcatcgc agtgggaacg atgccctcat 6360

tcagcatttg catggtttgt tgaaaaccgg acatggcact ccagtcgcct tcccgttccg 6420

ctatcggctg aatttgattg cgagtgagat atttatgcca gccagccaga cgcagacgcg 6480

ccgagacaga acttaatggg cccgctaaca gcgcgatttg ctggtgaccc aatgcgacca 6540

gatgctccac gcccagtcgc gtaccgtctt catgggagaa aataatactg ttgatgggtg 6600

tctggtcaga gacatcaaga aataacgccg gaacattagt gcaggcagct tccacagcaa 6660

tggcatcctg gtcatccagc ggatagttaa tgatcagccc actgacgcgt tgcgcgagaa 6720

gattgtgcac cgccgcttta caggcttcga cgccgcttcg ttctaccatc gacaccacca 6780

cgctggcacc cagttgatcg gcgcgagatt taatcgccgc gacaatttgc gacggcgcgt 6840

gcagggccag actggaggtg gcaacgccaa tcagcaacga ctgtttgccc gccagttgtt 6900

gtgccacgcg gttgggaatg taattcagct ccgccatcgc cgcttccact ttttcccgcg 6960

ttttcgcaga aacgtggctg gcctggttca ccacgcggga aacggtctga taagagacac 7020

cggcatactc tgcgacatcg tataacgtta ctggtttcac attcaccacc ctgaattgac 7080

tctcttccgg gcgctatcat gccataccgc gaaaggtttt gcgccattcg atggtgtc 7138

<210> 50
<211> 7316
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 50
cgggatctcg acgctctccc ttatgcgact cctgcgttta gggaaagagc atttgtcaga 60

atatttaagg gcgcctgtca ctttgcttga tatatgagaa ttatttaacc ttataaatga 120

gaaaaaagca acgcacttta ataagatac gttgcttttt cgattgatga acacctataa 180

ttaaactatt catctattat ttatgatttt ttgtatatac aatatttcta gtttgttaaa 240

gagaattaag aaaataaatc tcgaaaataa taaagggaaa atcagttttt gatatcaaaa 300

ttatacatgt caacgataat acaaaatata atacaaacta taagatgtta tcagtattta 360

ttatgcattt agaatacctt ttgtgtcgcc cttattcgac tccctataga agttcctatt 420

ctctagaaag tataggaact tcccttcatt ttggatccaa ttgtgagcgg ataacaatta 480

cgagcttcat gcacagtgat cgacgctgtt gacaattaat catcggctcg tataatgtgt 540

ggatgtggaa ttgtgagcgc tcacaattcc acaacggttt ccctctagaa ataattttgt 600

ttaacaggag gtaaaacata tgttaacggc atgtatatca tttggggttg cgatgacgac 660

gaacacgcat tttagaggtg aagaattgaa gaaggtttgg cttaaccgtt atcccgcgga 720

cgttccgacg gagatcaacc ctgaccgtta tcaatctctg gtagatatgt ttgagcagtc 780

ggtcgcgcgc tacgccgatc aacctgcgtt tgtgaatatg ggggaggtaa tgaccttccg 840

caagctggaa gaacgcagtc gcgcgtttgc cgcttatttg caacaagggt tggggctgaa 900

gaaaggcgat cgcgttgcgt tgatgatgcc taatttattg caatatccgg tggcgctgtt 960

tggcattttg cgtgccggga tgatcgtcgt aaacgttaac ccgttgtata ccccgcgtga 1020

gcttgagcat cagcttaacg atagcggcgc atcggcgatt gttatcgtgt ctaactttgc 1080

tcacacactg gaaaaagtgg ttgataaaac cgccgttcag cacgtaattc tgacccgtat 1140

gggcgatcag ctatctacgg caaaaggcac ggtagtcaat ttcgttgtta aatacatcaa 1200

gcgtttggtg ccgaaatacc atctgccaga tgccatttca tttcgtagcg cactgcataa 1260

cggctaccgg atgcagtacg tcaaacccga actggtgccg gaagatttag cttttctgca 1320

atacaccggc ggcaccactg gtgtggcgaa aggcgcgatg ctgactcacc gcaatatgct 1380

ggcgaacctg gaacaggtta acgcgaccta tggtccgctg ttgcatccgg gcaaagagct 1440

ggtggtgacg gcgctgccgc tgtatcacat ttttgccctg accattaact gcctgctgtt 1500

tatcgaactg ggtgggcaga acctgcttat cactaacccg cgcgatattc cagggttggt 1560

aaaagagtta gcgaaatatc cgtttaccgc tatcacgggc gttaacacct tgttcaatgc 1620

gttgctgaac aataaagagt tccagcagct ggatttctcc agtctgcatc tttccgcagg 1680

cggtgggatg ccagtgcagc aagtggtggc agagcgttgg gtgaaactga ccggacagta 1740

tctgctggaa ggctatggcc ttaccgagtg tgcgccgctg gtcagcgtta acccatatga 1800

tattgattat catagtggta gcatcggttt gccggtgccg tcgacggaag ccaaactggt 1860

ggatgatgat gataatgaag taccaccagg tcaaccgggt gagctttgtg tcaaaggacc 1920

gcaggtgatg ctgggttact ggcagcgtcc cgatgctacc gatgaaatca tcaaaaatgg 1980

ctggttacac accggcgaca tcgcggtaat ggatgaagaa ggattcctgc gcattgtcga 2040

tcgtaaaaaa gacatgattc tggtttccgg ttttaacgtc tatcccaacg agattgaaga 2100

tgtcgtcatg cagcatcctg gcgtacagga agtcgcggct gttggcgtac cttccggctc 2160

cagtggtgaa gcggtgaaaa tcttcgtagt gaaaaaagat ccatcgctta ccgaagagtc 2220

actggtgact ttttgccgcc gtcagctcac gggatacaaa gtaccgaagc tggtggagtt 2280

tcgtgatgag ttaccgaaat ctaacgtcgg aaaaattttg cgacgagaat tacgtgacga 2340

agcgcgcggc aaagtggaca ataaagcctg agcgttaagt ctgaggagat ccacgctatg 2400

cgcccattac atccgattga ttttatattc ctgtcactag aaaaaagaca acagcctatg 2460

catgtaggtg gtttattttt gtttcagatt cctgataacg ccccagacac ctttattcaa 2520

gatctggtga atgatatccg gatatcaaaa tcaatccctg ttccaccatt caacaataaa 2580

ctgaatgggc ttttttggga tgaagatgaa gagtttgatt tagatcatca ttttcgtcat 2640

attgcactgc ctcatcctgg tcgtattcgt gaattgctta tttatatttc acaagagcac 2700

agtacgctgc tagatcgggc aaagcccttg tggacctgca atattattga aggaattgaa 2760
ggcaatcgtt ttgccatgta cttcaaaatt caccatgcga tggtcgatgg cgttgctggt 2820
atgcggttaa ttgaaaaatc actctcccat gatgtaacag aaaaaagtat cgtgccacct 2880
tggtgtgttg agggaaaacg tgcaaagcgc ttaagagaac ctaaaacagg taaaattaag 2940
aaaatcatgt ctggtattaa gagtcagctt caggcgacac ccacagtcat tcaagagctt 3000
tctcagacag tatttaaaga tattggacgt aatcctgatc atgtttcaag ctttcaggcg 3060
ccttgttcta ttttgaatca gcgtgtgagc tcatcgcgac gttttgcagc acagtctttt 3120
gacctagatc gttttcgtaa tattgccaaa tcgttgaatg tgaccattaa tgatgttgta 3180
ctagcggtat gttctggtgc attacgtgcg tatttgatga gtcataatag tttgccttca 3240
aaaccattaa ttgccatggt tccagcctct attcgcaatg acgattcaga tgtcagcaac 3300
cgtattacga tgattctggc aaatttggca acccacaaag atgatccttt acaacgtctt 3360
gaaattatcc gccgtagtgt tcaaaactca aagcaacgct tcaaacgtat gaccagcgat 3420
cagattctaa attatagtgc tgtcgtatat ggccctgcag gactcaacat aatttctggc 3480
atgatgccaa aacgccaagc cttcaatctg gttatttcca atgtgcctgg cccaagagag 3540
ccactttact ggaatggtgc caaacttgat gcactctacc cagcttcaat tgtattagac 3600
ggtcaagcat tgaatattac aatgaccagt tatttagata aacttgaagt tggtttgatt 3660
gcatgccgta atgcattgcc aagaatgcag aatttactga cacatttaga agaagaaatt 3720
caactatttg aaggcgtaat tgcaaagcag gaagatatta aaacagccaa ttaaaaacaa 3780
taaacttgat tttttaattt atcagataaa actaaagggc taaattagcc ctttagtttt 3840
taacagtacg acactgttta agtaattgat gacacacatg atgaaccatt gcagtcgtgg 3900
cagatctcaa ttggatatcg gccggccacg cgatcgctga cgtcggtacc ctcgagtctg 3960
gtaaagaaac cgctgctgcg aaatttgaac gccagcacat ggactcgtct actagcgcag 4020
cttaattaac ctaggctgct gccaccgctg agcaataact agcataaccc cttggggcct 4080
ctaaacgggt cttgaggggt tttttgctga aacctcaggc atttgagaag cacacggtca 4140
cactgcttcc ggtagtcaat aaaccggtaa accagcaata gacataagcg gctatttaac 4200
gaccctgccc tgaaccgacg accgggtcat cgtggccgga tcttgcggcc cctcggcttg 4260
aacgaattgt tagacattat ttgccgacta ccttggtgat ctcgcctttc acgtagtgga 4320
caaattcttc caactgatct gcgcgcgagg ccaagcgatc ttcttcttgt ccaagataag 4380
cctgtctagc ttcaagtatg acgggctgat actgggccgg caggcgctcc attgcccagt 4440
cggcagcgac atccttcggc gcgattttgc cggttactgc gctgtaccaa atgcgggaca 4500
acgtaagcac tacatttcgc tcatcgccag cccagtcggg cggcgagttc catagcgtta 4560
aggtttcatt tagcgcctca aatagatcct gttcaggaac cggatcaaag agttcctccg 4620
ccgctggacc taccaaggca acgctatgtt ctcttgcttt tgtcagcaag atagccagat 4680
caatgtcgat cgtggctggc tcgaagatac ctgcaagaat gtcattgcgc tgccattctc 4740

caaattgcag ttcgcgctta gctggataac gccacggaat gatgtcgtcg tgcacaacaa 4800

tggtgacttc tacagcgcgg agaatctcgc tctctccagg ggaagccgaa gtttccaaaa 4860

ggtcgttgat caaagctcgc cgcgttgttt catcaagcct tacggtcacc gtaaccagca 4920

aatcaatatc actgtgtggc ttcaggccgc catccactgc ggagccgtac aaatgtacgg 4980

ccagcaacgt cggttcgaga tggcgctcga tgacgccaac tacctctgat agttgagtcg 5040

atacttcggc gatcaccgct tccctcatac tcttcctttt tcaatattat tgaagcattt 5100

atcagggtta ttgtctcatg agcggataca tatttgaatg tatttagaaa aataaacaaa 5160

tagctagctc actcggtcgc tacgctccgg gcgtgagact gcggcgggcg ctgcggacac 5220

atacaaagtt acccacagat tccgtggata agcaggggac taacatgtga ggcaaaacag 5280

cagggccgcg ccggtggcgt ttttccatag gctccgccct cctgccagag ttcacataaa 5340

cagacgcttt tccggtgcat ctgtgggagc cgtgaggctc aaccatgaat ctgacagtac 5400

gggcgaaacc cgacaggact taaagatccc caccgtttcc ggcgggtcgc tccctcttgc 5460

gctctcctgt tccgaccctg ccgtttaccg gatacctgtt ccgcctttct cccttacggg 5520

aagtgtggcg ctttctcata gctcacacac tggtatctcg gctcggtgta ggtcgttcgc 5580

tccaagctgg gctgtaagca agaactcccc gttcagcccg actgctgcgc cttatccggt 5640

aactgttcac ttgagtccaa cccggaaaag cacggtaaaa cgccactggc agcagccatt 5700

ggtaactggg agttcgcaga ggatttgttt agctaaacac gcggttgctc ttgaagtgtg 5760

cgccaaagtc cggctacact ggaaggacag atttggttgc tgtgctctgc gaaagccagt 5820

taccacggtt aagcagttcc ccaactgact taaccttcga tcaaaccacc tccccaggtg 5880

gtttttttcgt ttacagggca aaagattacg cgcagaaaaa aaggatctca agaagatcct 5940

ttgatctttt ctactgaacc gctctagatt tcagtgcaat ttatctcttc aaatgtagca 6000

cctgaagtca gccccatacg atataagttg taattctcat gttagtcatg ccccgcgccc 6060

accggaagga gctgactggg ttgaaggctc tcaagggcat cggtcgagat cccggtgcct 6120

aatgagtgag ctaacttaca ttaattgcgt tgcgctcact gcccgctttc cagtcgggaa 6180

acctgtcgtg ccagctgcat taatgaatcg gccaacgcgc ggggagaggc ggtttgcgta 6240

ttgggcgcca gggtggtttt tcttttcacc agtgagacgg gcaacagctg attgcccttc 6300

accgcctggc cctgagagag ttgcagcaag cggtccacgc tggtttgccc cagcaggcga 6360

aaatcctgtt tgatggtggt taacggcggg atataacatg agctgtcttc ggtatcgtcg 6420

tatcccacta ccgagatgtc cgcaccaacg cgcagcccgg actcggtaat ggcgcgcatt 6480

gcgcccagcg ccatctgatc gttggcaacc agcatcgcag tgggaacgat gccctcattc 6540

agcatttgca tggtttgttg aaaaccggac atggcactcc agtcgccttc ccgttccgct 6600

atcggctgaa tttgattgcg agtgagatat ttatgccagc cagccagacg cagacgcgcc 6660

gagacagaac ttaatgggcc cgctaacagc gcgatttgct ggtgacccaa tgcgaccaga 6720

tgctccacgc ccagtcgcgt accgtcttca tgggagaaaa taatactgtt gatgggtgtc 6780

tggtcagaga catcaagaaa taacgccgga acattagtgc aggcagcttc cacagcaatg 6840

gcatcctggt catccagcgg atagttaatg atcagcccac tgacgcgttg cgcgagaaga 6900

ttgtgcaccg ccgctttaca ggcttcgacg ccgcttcgtt ctaccatcga caccaccacg 6960

ctggcaccca gttgatcggc gcgagattta atcgccgcga caatttgcga cggcgcgtgc 7020

agggccagac tggaggtggc aacgccaatc agcaacgact gtttgcccgc cagttgttgt 7080

gccacgcggt tgggaatgta attcagctcc gccatcgccg cttccacttt ttcccgcgtt 7140

ttcgcagaaa cgtggctggc ctggttcacc acgcgggaaa cggtctgata agagacaccg 7200

gcatactctg cgacatcgta taacgttact ggtttcacat tcaccaccct gaattgactc 7260

tcttccgggc gctatcatgc cataccgcga aaggttttgc gccattcgat ggtgtc 7316

<210> 51
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 51
acaggaggta aaacatatgc gtcctctgca cccg 34

<210> 52
<211> 44
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 52
gtttctttac cagactcgag attgttttct ctttagtggg cgtc 44

<210> 53
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 53
acaggaggta aaacatatga aagcgctgtc cc 32

<210> 54
<211> 41
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 54
gtttctttac cagactcgag attgttttct ctttagtggg c 41

<210> 55
<211> 1016
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 55
gcggccgcaa cgtcagaaat agcaatcgcc gggtagcccg gacggttttc acggtagcga 60

ccggtcaact cttcggcaaa gtgcatagcg tcgcaatggg aaccgccgtt gccgcaggaa 120

agcactttgc caccggcttt aaagctgtct gctaacagga ccgccgcgcg ctgaatggcg 180

tgaatattgg cgtcatcttt taaaaagtta gccagcgttt ccgccgcttc gttcagttcg 240

ttacgaataa gatcctggta catgaggata tccttcagca taaatgtaat agacaaaatg 300

cagtgtaccg gataccgcca aaagcgagaa gtacgggcag gtgctatgac caggactttt 360

tgacctgaag tgcggataaa aacagcaaca atgtgagctt tgttgtaatt atattgtaaa 420

catattgcta aatgttttta catccactac aaccatatca tcacaagtgg tcagacctcc 480

tacaagtaag gggcttttcg ttatgatgcg gaaagttgaa gccgcgtaaa tgaataacgg 540

agccgaaagg ctccgtttct ttatccgcta attatttaaa attaaagcca tccggatggt 600

tttccaggct gccggtcaac gccgcgaaca acaccgtttt accatcaatc gaaagcgcat 660

cgttcacatt cagccaggtg agtttctctt gcgacgtttt ctcatcaata gtcgagaaca 720

gccccgtcat ctgattagat ttctcggacc acatcacagc gatacgttgc gagccacagt 780

catgcggttt gcacgcgctc atcacctgat acgtctcatc tcccaacgtt acggtttgtg 840

cgggagtata agtaccgcct ttcatcaccc aggcaggcag cttatgccct tgtaccatct 900

gattaaatgc agctttggtg gtttcgccct ttgcaaggct gctaatggtt aaatcatcct 960

gcgccattgc actggtggcg atgaccagag cggcgactgt cgttattggc ggccgc 1016

<210> 56
<211> 6647
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 56
ccctttcgtc ttcgaataaa tacctgtgac ggaagatcac ttcgcagaat aaataaatcc 60

tggtgtccct gttgataccg ggaagccctg ggccaacttt tggcgaaaat gagacgttga 120

tcggcacgta agaggttcca actttcacca taatgaaata agatcactac cgggcgtatt 180

ttttgagtta tcgagatttt caggagctaa ggaagctaaa atggagaaaa aaatcactgg 240

atataccacc gttgatatat cccaatggca tcgtaaagaa cattttgagg catttcagtc 300

agttgctcaa tgtacctata accagaccgt tcagctggat attacggcct ttttaaagac 360

cgtaaagaaa aataagcaca agttttatcc ggcctttatt cacattcttg cccgcctgat 420

gaatgctcat ccggaattcc gtatggcaat gaaagacggt gagctggtga tatgggatag 480

tgttcaccct tgttacaccg ttttccatga gcaaactgaa acgttttcat cgctctggag 540

tgaataccac gacgatttcc ggcagtttct acacatatat tcgcaagatg tggcgtgtta 600

cggtgaaaac ctggcctatt tccctaaagg gtttattgag aatatgtttt tcgtctcagc 660

caatccctgg gtgagtttca ccagttttga tttaaacgtg gccaatatgg acaacttctt 720

cgcccccgtt ttcaccatgg gcaaatatta tacgcaaggc gacaaggtgc tgatgccgct 780

ggcgattcag gttcatcatg ccgtttgtga tggcttccat gtcggcagaa tgcttaatga 840

attacaacag tactgcgatg agtggcaggg cggggcgtaa ttttttaag gcagttattg 900

gtgcccttaa acgcctggtt gctacgcctg aataagtgat aataagcgga tgaatggcag 960

aaattcgaaa gcaaattcga cccggtcgtc ggttcagggc agggtcgtta aatagccgct 1020

tatgtctatt gctggtctcg gtacccgggg atcgcggccg caacgtcaga aatagcaatc 1080

gccgggtagc ccggacggtt ttcacggtag cgaccggtca actcttcggc aaagtgcata 1140

gcgtcgcaat gggaaccgcc gttgccgcag gaaagcactt tgccaccggc tttaaagctg 1200

tctgctaaca ggaccgccgc gcgctgaatg gcgtgaatat tggcgtcatc ttttaaaaag 1260

ttagccagcg tttccgccgc ttcgttcagt tcgttacgaa taagatcctg gtacatgagg 1320

atatccttca gcataaatgt aatagacaaa atgcagtgta ccggataccg ccaaaagcga 1380

gaagtacggg caggtgctat gaccaggact ttttgacctg aagtgcggat aaaaacagca 1440

acaatgtgag ctttgttgta attatattgt aaacatattg ctaaatgttt ttacatccac 1500

tacaaccata tcatcacaag tggtcagacc tcctacaagt aaggggcttt tcgttatgat 1560

gcggaaagtt gaagccgcgt aaatgaataa cggagccgaa aggctccgtt tctttatccg 1620

ctaattattt aaaattaaag ccatccggat ggttttccag gctgccggtc aacgccgcga 1680

acaacaccgt tttaccatca atcgaaagcg catcgttcac attcagccag gtgagtttct 1740

cttgcgacgt tttctcatca atagtcgaga acagccccgt catctgatta gatttctcgg 1800

accacatcac agcgatacgt tgcgagccac agtcatgcgg tttgcacgcg ctcatcacct 1860

gatacgtctc atctcccaac gttacggttt gtgcgggagt ataagtaccg cctttcatca 1920

cccaggcagg cagcttatgc ccttgtacca tctgattaaa tgcagctttg gtggtttcgc 1980

cctttgcaag gctgctaatg gttaaatcat cctgcgccat tgcactggtg gcgatgacca 2040

gagcggcgac tgtcgttatt ggcggccgcg atcctctaga gtcgaccggt ggcgaatggg 2100

acgcgccctg tagcggcgca ttaagcgcgg cgggtgtggt ggttacgcgc agcgtgaccg 2160

ctacacttgc cagcgcccta gcgcccgctc ctttcgcttt cttcccttcc tttctcgcca 2220

cgttcgccgg ctttccccgt caagctctaa atcgggggct ccctttaggg ttccgattta 2280

gtgctttacg gcacctcgac cccaaaaaac ttgattaggg tgatggttca cgtagtgggc 2340

catcgccctg atagacggtt tttcgccctt tgacgttgga gtccacgttc tttaatagtg 2400

gactcttgtt ccaaactgga acaacactca accctatctc ggtctattct tttgatttat 2460

aagggatttt gccgatttcg gcctattggt taaaaaatga gctgatttaa caaaaattta 2520

acgcgaattt taacaaaata ttaacgctta caatttaggt ggcacttttc ggggaaatgt 2580
gcgcggaacc cctatttgtt tatttttcta aatacattca aatatgtatc cgctcaccgc 2640
gatccttttt aacccatcac atatacctgc cgttcactat tatttagtga aatgagatat 2700
tatgatattt tctgaattgt gattaaaaag gcaactttat gcccatgcaa cagaaactat 2760
aaaaaataca gagaatgaaa agaaacagat agatttttta gttctttagg cccgtagtct 2820
gcaaatcctt ttatgatttt ctatcaaaca aaagaggaaa atagaccagt tgcaatccaa 2880
acgagagtct aatagaatga ggtcgaaaag taaatcgcgc gggtttgtta ctgataaagc 2940
aggcaagacc taaaatgtgt aaagggcaaa gtgtatactt tggcgtcacc ccttacatat 3000
tttaggtctt tttttattgt gcgtaactaa cttgccatct tcaaacagga gggctggaag 3060
aagcagaccg ctaacacagt acataaaaaa ggagacatga acgatgaaca tcaaaaagtt 3120
tgcaaaacaa gcaacagtat taacctttac taccgcactg ctggcaggag gcgcaactca 3180
agcgtttgcg aaagaaacga accaaaagcc atataaggaa acatacggca tttcccatat 3240
tacacgccat gatatgctgc aaatccctga acagcaaaaa aatgaaaaat atcaagttcc 3300
tgattcgtcc acaattaaaa atatctcttc tgcaaaaggc ctggacgttt gggacagctg 3360
gccattacaa aacgctgacg gcactgtcgc aaactatcac ggctaccaca tcgtctttgc 3420
attagccgga gatcctaaaa atgcggatga cacatcgatt tacatgttct atcaaaaagt 3480
cggcgaaact tctattgaca gctggaaaaa cgctggccgc gtctttaaag acagcgacaa 3540
attcgatgca aatgattcta tcctaaaaga ccaaacacaa gaatggtcag gttcagccac 3600
atttacatct gacggaaaaa tccgtttatt ctacactgat ttctccggta aacattacgg 3660
caaacaaaca ctgacaactg cacaagttaa cgtatcagca tcagacagct ctttgaacat 3720
caacggtgta gaggattata aatcaatctt tgacggtgac ggaaaaacgt atcaaaatgt 3780
acagcagttc atcgatgaag gcaactacag ctcaggcgac aaccatacgc tgagagatcc 3840
tcactacgta gaagataaag gccacaaata cttagtattt gaagcaaaca ctggaactga 3900
agatggctac caaggcgaag aatctttatt taacaaagca tactatggca aaagcacatc 3960
attcttccgt caagaaagtc aaaaacttct gcaaagcgat aaaaaacgca cggctgagtt 4020
agcaaacggc gctctcggta tgattgagct aaacgatgat tacacactga aaaaagtgat 4080
gaaaccgctg attgcatcta acacagtaac agatgaaatt gaacgcgcga acgtctttaa 4140
aatgaacggc aaatggtacc tgttcactga ctcccgcgga tcaaaaatga cgattgacgg 4200
cattacgtct aacgatattt acatgcttgg ttatgtttct aattctttaa ctggcccata 4260
caagccgctg aacaaaactg gccttgtgtt aaaaatggat cttgatccta acgatgtaac 4320
ctttacttac tcacacttcg ctgtacctca agcgaaagga aacaatgtcg tgattacaag 4380
ctatatgaca aacagaggat tctacgcaga caaacaatca acgtttgcgc caagcttcct 4440
gctgaacatc aaaggcaaga aaacatctgt tgtcaaagac agcatccttg aacaaggaca 4500
attaacagtt aacaaataaa aacgcaaaag aaaatgccga tccggtttat tgactaccgg 4560

aagcagtgtg accgtgtgct tctcaaatgc ctcaggctgt ctatgtgtga ctgttgagct 4620

gtaacaagtt gtctcaggtg ttcaatttca tgttctagtt gctttgtttt actggtttca 4680

cctgttctat taggtgttac atgctgttca tctgttacat tgtcgatctg ttcatggtga 4740

acagctttaa atgcaccaaa aactcgtaaa agctctgatg tatctatctt ttttacaccg 4800

ttttcatctg tgcatatgga cagttttccc tttgatatct aacggtgaac agttgttcta 4860

cttttgtttg ttagtcttga tgcttcactg atagatacaa gagccataag aacctcagat 4920

ccttccgtat ttagccagta tgttctctag tgtggttcgt tgtttttgcg tgagccatga 4980

gaacgaacca ttgagatcat gcttactttg catgtcactc aaaaattttg cctcaaaact 5040

ggtgagctga atttttgcag ttaaagcatc gtgtagtgtt tttcttagtc cgttacgtag 5100

gtaggaatct gatgtaatgg ttgttggtat tttgtcacca ttcattttta tctggttgtt 5160

ctcaagttcg gttacgagat ccatttgtct atctagttca acttggaaaa tcaacgtatc 5220

agtcgggcgg cctcgcttat caaccaccaa tttcatattg ctgtaagtgt ttaaatcttt 5280

acttattggt ttcaaaaccc attggttaag ccttttaaac tcatggtagt tattttcaag 5340

cattaacatg aacttaaatt catcaaggct aatctctata tttgccttgt gagttttctt 5400

ttgtgttagt tcttttaata accactcata aatcctcata gagtatttgt tttcaaaaga 5460

cttaacatgt tccagattat attttatgaa ttttttttaac tggaaaagat aaggcaatat 5520

ctcttcacta aaaactaatt ctaatttttc gcttgagaac ttggcatagt ttgtccactg 5580

gaaaatctca aagcctttaa ccaaaggatt cctgatttcc acagttctcg tcatcagctc 5640

tctggttgct ttagctaata caccataagc attttcccta ctgatgttca tcatctgagc 5700

gtattggtta taagtgaacg ataccgtccg ttctttcctt gtagggtttt caatcgtggg 5760

gttgagtagt gccacacagc ataaaattag cttggtttca tgctccgtta agtcatagcg 5820

actaatcgct agttcatttg ctttgaaaac aactaattca gacatacatc tcaattggtc 5880

taggtgattt taatcactat accaattgag atgggctagt caatgataat tactagtcct 5940

tttcctttga gttgtgggta tctgtaaatt ctgctagacc tttgctggaa aacttgtaaa 6000

ttctgctaga ccctctgtaa attccgctag acctttgtgt gttttttttg tttatattca 6060

agtggttata atttatagaa taaagaaaga ataaaaaaag ataaaaagaa tagatcccag 6120

ccctgtgtat aactcactac tttagtcagt tccgcagtat tacaaaagga tgtcgcaaac 6180

gctgtttgct cctctacaaa acagacctta aaaccctaaa ggcttaagta gcaccctcgc 6240

aagctcgggc aaatcgctga atattccttt tgtctccgac catcaggcac ctgagtcgct 6300

gtctttttcg tgacattcag ttcgctgcgc tcacggctct ggcagtgaat gggggtaaat 6360

ggcactacag gcgccttta tggattcatg caaggaaact acccataata caagaaaagc 6420

ccgtcacggg cttctcaggg cgttttatgg cgggtctgct atgtggtgct atctgacttt 6480

ttgctgttca gcagttcctg ccctctgatt ttccagtctg accacttcgg attatcccgt 6540

gacaggtcat tcagactggc taatgcaccc agtaaggcag cggtatcatc aacaggctta 6600

cccgtcttac tgtcggatcg acgctctccc ttatgcgact cctgcat 6647

<210> 57
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 57
atgcggaaag ttgaagccgc gtaa 24

<210> 58
<211> 918
<212> DNA
<213> Cuphea hookeriana

<220>
<221> CDS
<222> (1)..(918)

<400> 58

```
atg cac gac cgc aaa tcc aaa cgc ccg gac atg ctg gta gac tcg ttt          48
Met His Asp Arg Lys Ser Lys Arg Pro Asp Met Leu Val Asp Ser Phe
1               5                   10                  15

ggt ctg gaa agc acg gtc cag gac ggc ctg gtg ttt cgt caa tcc ttt          96
Gly Leu Glu Ser Thr Val Gln Asp Gly Leu Val Phe Arg Gln Ser Phe
            20                  25                  30

agc atc cgc agc tac gag att ggc acg gat cgt acc gcg agc atc gaa         144
Ser Ile Arg Ser Tyr Glu Ile Gly Thr Asp Arg Thr Ala Ser Ile Glu
        35                  40                  45

acc ctg atg aac cac ctg cag gaa acc agc ttg aac cac tgt aaa tct         192
Thr Leu Met Asn His Leu Gln Glu Thr Ser Leu Asn His Cys Lys Ser
    50                  55                  60

acc ggt atc ctg ttg gat ggt ttc ggt cgc acc ctg gag atg tgt aag         240
Thr Gly Ile Leu Leu Asp Gly Phe Gly Arg Thr Leu Glu Met Cys Lys
65                  70                  75                  80

cgt gat ttg att tgg gtg gtg att aag atg cag atc aaa gtt aac cgt         288
Arg Asp Leu Ile Trp Val Val Ile Lys Met Gln Ile Lys Val Asn Arg
                85                  90                  95

tac ccg gcc tgg ggt gac acc gtt gag att aac acg cgt ttc agc cgt         336
Tyr Pro Ala Trp Gly Asp Thr Val Glu Ile Asn Thr Arg Phe Ser Arg
            100                 105                 110

ctg ggt aag att ggt atg ggt cgc gac tgg ctg att agc gat tgc aat         384
Leu Gly Lys Ile Gly Met Gly Arg Asp Trp Leu Ile Ser Asp Cys Asn
        115                 120                 125

acg ggc gaa atc ctg gtg cgt gcg acc agc gcg tat gcc atg atg aat         432
Thr Gly Glu Ile Leu Val Arg Ala Thr Ser Ala Tyr Ala Met Met Asn
    130                 135                 140

cag aaa act cgt cgc ctg agc aag ctg ccg tac gag gtg cat cag gaa         480
Gln Lys Thr Arg Arg Leu Ser Lys Leu Pro Tyr Glu Val His Gln Glu
145                 150                 155                 160

atc gtc cct ctg ttc gtt gac tct ccg gtt atc gag gat agc gat ctg         528
```

```
Ile Val Pro Leu Phe Val Asp Ser Pro Val Ile Glu Asp Ser Asp Leu
                165                 170                 175

aag gtc cat aag ttc aag gtt aag acc ggt gac agc atc caa aaa ggc        576
Lys Val His Lys Phe Lys Val Lys Thr Gly Asp Ser Ile Gln Lys Gly
            180                 185                 190

ttg acc cca ggc tgg aac gat ctg gat gtg aat caa cat gtc agc aac        624
Leu Thr Pro Gly Trp Asn Asp Leu Asp Val Asn Gln His Val Ser Asn
        195                 200                 205

gtc aaa tac att ggc tgg att ctg gag agc atg ccg acc gag gtc ctg        672
Val Lys Tyr Ile Gly Trp Ile Leu Glu Ser Met Pro Thr Glu Val Leu
    210                 215                 220

gaa acg cag gag ctg tgc agc ctg gct ctg gaa tat cgt cgc gag tgc        720
Glu Thr Gln Glu Leu Cys Ser Leu Ala Leu Glu Tyr Arg Arg Glu Cys
225                 230                 235                 240

ggc cgt gac agc gtt ttg gaa agc gtg acg gcg atg gac ccg tcc aaa        768
Gly Arg Asp Ser Val Leu Glu Ser Val Thr Ala Met Asp Pro Ser Lys
                245                 250                 255

gtt ggt gtg cgt agc caa tat caa cac ctg ctg cgt ctg gag gat ggt        816
Val Gly Val Arg Ser Gln Tyr Gln His Leu Leu Arg Leu Glu Asp Gly
            260                 265                 270

act gca atc gtc aat ggt gca acc gag tgg cgt ccg aaa aat gca ggt        864
Thr Ala Ile Val Asn Gly Ala Thr Glu Trp Arg Pro Lys Asn Ala Gly
        275                 280                 285

gcg aat ggt gct att agc acc ggc aag acg tct aat ggc aac agc gtt        912
Ala Asn Gly Ala Ile Ser Thr Gly Lys Thr Ser Asn Gly Asn Ser Val
    290                 295                 300

tcc taa                                                               918
Ser
305
```

<210> 59
<211> 305
<212> PRT
<213> Cuphea hookeriana

<400> 59

```
Met His Asp Arg Lys Ser Lys Arg Pro Asp Met Leu Val Asp Ser Phe
1               5                   10                  15

Gly Leu Glu Ser Thr Val Gln Asp Gly Leu Val Phe Arg Gln Ser Phe
            20                  25                  30

Ser Ile Arg Ser Tyr Glu Ile Gly Thr Asp Arg Thr Ala Ser Ile Glu
        35                  40                  45

Thr Leu Met Asn His Leu Gln Glu Thr Ser Leu Asn His Cys Lys Ser
    50                  55                  60

Thr Gly Ile Leu Leu Asp Gly Phe Gly Arg Thr Leu Glu Met Cys Lys
65                  70                  75                  80

Arg Asp Leu Ile Trp Val Val Ile Lys Met Gln Ile Lys Val Asn Arg
```

85 90 95

Tyr Pro Ala Trp Gly Asp Thr Val Glu Ile Asn Thr Arg Phe Ser Arg
100 105 110

Leu Gly Lys Ile Gly Met Gly Arg Asp Trp Leu Ile Ser Asp Cys Asn
115 120 125

Thr Gly Glu Ile Leu Val Arg Ala Thr Ser Ala Tyr Ala Met Met Asn
130 135 140

Gln Lys Thr Arg Arg Leu Ser Lys Leu Pro Tyr Glu Val His Gln Glu
145 150 155 160

Ile Val Pro Leu Phe Val Asp Ser Pro Val Ile Glu Asp Ser Asp Leu
165 170 175

Lys Val His Lys Phe Lys Val Lys Thr Gly Asp Ser Ile Gln Lys Gly
180 185 190

Leu Thr Pro Gly Trp Asn Asp Leu Asp Val Asn Gln His Val Ser Asn
195 200 205

Val Lys Tyr Ile Gly Trp Ile Leu Glu Ser Met Pro Thr Glu Val Leu
210 215 220

Glu Thr Gln Glu Leu Cys Ser Leu Ala Leu Glu Tyr Arg Arg Glu Cys
225 230 235 240

Gly Arg Asp Ser Val Leu Glu Ser Val Thr Ala Met Asp Pro Ser Lys
245 250 255

Val Gly Val Arg Ser Gln Tyr Gln His Leu Leu Arg Leu Glu Asp Gly
260 265 270

Thr Ala Ile Val Asn Gly Ala Thr Glu Trp Arg Pro Lys Asn Ala Gly
275 280 285

Ala Asn Gly Ala Ile Ser Thr Gly Lys Thr Ser Asn Gly Asn Ser Val
290 295 300

Ser
305

<210> 60
<211> 984
<212> DNA
<213> Cocos nucifera

<220>
<221> CDS
<222> (1)..(984)

<400> 60

```
ttg cca gac tgg agc atg ttg ttg gcc gct att cgt acg atc ttt tcc          48
Leu Pro Asp Trp Ser Met Leu Leu Ala Ala Ile Arg Thr Ile Phe Ser
1               5                  10                  15

gca gcc gaa aaa cag tgg acc ctg ctg gat agc aag aaa cgc ggt gcg          96
Ala Ala Glu Lys Gln Trp Thr Leu Leu Asp Ser Lys Lys Arg Gly Ala
            20                  25                  30

gat gca gtt gcg gac gcg tct ggc gtg ggc aag atg gtg aaa aac ggt         144
Asp Ala Val Ala Asp Ala Ser Gly Val Gly Lys Met Val Lys Asn Gly
        35                  40                  45

ctg gtc tac cgt cag aat ttc agc atc cgt agc tat gag att ggt gtg         192
Leu Val Tyr Arg Gln Asn Phe Ser Ile Arg Ser Tyr Glu Ile Gly Val
    50                  55                  60

gac aag cgt gcg agc gtt gag gct ctg atg aat cat ttt caa gaa acg         240
Asp Lys Arg Ala Ser Val Glu Ala Leu Met Asn His Phe Gln Glu Thr
65                  70                  75                  80

agc ttg aat cac tgc aaa tgc atc ggt ctg atg cat ggc ggt ttt ggt         288
Ser Leu Asn His Cys Lys Cys Ile Gly Leu Met His Gly Gly Phe Gly
                85                  90                  95

tgc acc ccg gaa atg acg cgt cgt aat ctg atc tgg gtc gtt gcc aag         336
Cys Thr Pro Glu Met Thr Arg Arg Asn Leu Ile Trp Val Val Ala Lys
            100                 105                 110

atg ctg gtt cac gtg gag cgt tat ccg tgg tgg ggt gac gta gtg cag         384
Met Leu Val His Val Glu Arg Tyr Pro Trp Trp Gly Asp Val Val Gln
        115                 120                 125

att aac acc tgg att agc agc agc ggt aag aac ggc atg ggt cgc gac         432
Ile Asn Thr Trp Ile Ser Ser Ser Gly Lys Asn Gly Met Gly Arg Asp
    130                 135                 140

tgg cac gtg cac gac tgt cag acg ggc ctg ccg att atg cgt ggc acc         480
Trp His Val His Asp Cys Gln Thr Gly Leu Pro Ile Met Arg Gly Thr
145                 150                 155                 160

tct gtg tgg gtc atg atg gat aaa cac act cgc cgt ctg agc aag ctg         528
Ser Val Trp Val Met Met Asp Lys His Thr Arg Arg Leu Ser Lys Leu
                165                 170                 175

ccg gaa gag gtt cgc gca gaa atc acc ccg ttc ttc agc gaa cgc gac         576
Pro Glu Glu Val Arg Ala Glu Ile Thr Pro Phe Phe Ser Glu Arg Asp
            180                 185                 190

gcg gtc ctg gat gat aac ggc cgt aaa ctg ccg aaa ttt gac gat gat         624
Ala Val Leu Asp Asp Asn Gly Arg Lys Leu Pro Lys Phe Asp Asp Asp
        195                 200                 205

agc gcg gca cac gtc cgc cgt ggt ttg acc cct cgt tgg cat gat ttc         672
Ser Ala Ala His Val Arg Arg Gly Leu Thr Pro Arg Trp His Asp Phe
    210                 215                 220

gac gtc aat cag cat gtc aac aac gtg aaa tac gtc ggt tgg att ctg         720
Asp Val Asn Gln His Val Asn Asn Val Lys Tyr Val Gly Trp Ile Leu
225                 230                 235                 240

gag agc gtt ccg gtt tgg atg ctg gac ggt tac gag gtt gcc act atg         768
Glu Ser Val Pro Val Trp Met Leu Asp Gly Tyr Glu Val Ala Thr Met
                245                 250                 255

tct ctg gaa tat cgt cgc gag tgt cgt atg gat agc gtg gtt cag tcc         816
Ser Leu Glu Tyr Arg Arg Glu Cys Arg Met Asp Ser Val Val Gln Ser
```

260 265 270

ctg acc gcg gtt agc tcg gat cac gcg gac ggc agc ccg atc gtt tgt 864
Leu Thr Ala Val Ser Ser Asp His Ala Asp Gly Ser Pro Ile Val Cys
275 280 285

caa cac ctg ctg cgc ctg gaa gat ggt acg gag atc gtg cgt ggt caa 912
Gln His Leu Leu Arg Leu Glu Asp Gly Thr Glu Ile Val Arg Gly Gln
290 295 300

acc gag tgg cgt ccg aag caa caa gca cgc gac ctg ggc aat atg ggt 960
Thr Glu Trp Arg Pro Lys Gln Gln Ala Arg Asp Leu Gly Asn Met Gly
305 310 315 320

ttg cat ccg acc gag tcc aag taa 984
Leu His Pro Thr Glu Ser Lys
325

<210> 61
<211> 327
<212> PRT
<213> Cocos nucifera

<400> 61

Leu Pro Asp Trp Ser Met Leu Leu Ala Ala Ile Arg Thr Ile Phe Ser
1 5 10 15

Ala Ala Glu Lys Gln Trp Thr Leu Leu Asp Ser Lys Lys Arg Gly Ala
20 25 30

Asp Ala Val Ala Asp Ala Ser Gly Val Gly Lys Met Val Lys Asn Gly
35 40 45

Leu Val Tyr Arg Gln Asn Phe Ser Ile Arg Ser Tyr Glu Ile Gly Val
50 55 60

Asp Lys Arg Ala Ser Val Glu Ala Leu Met Asn His Phe Gln Glu Thr
65 70 75 80

Ser Leu Asn His Cys Lys Cys Ile Gly Leu Met His Gly Gly Phe Gly
85 90 95

Cys Thr Pro Glu Met Thr Arg Arg Asn Leu Ile Trp Val Val Ala Lys
100 105 110

Met Leu Val His Val Glu Arg Tyr Pro Trp Trp Gly Asp Val Val Gln
115 120 125

Ile Asn Thr Trp Ile Ser Ser Ser Gly Lys Asn Gly Met Gly Arg Asp
130 135 140

Trp His Val His Asp Cys Gln Thr Gly Leu Pro Ile Met Arg Gly Thr
145 150 155 160

Ser Val Trp Val Met Met Asp Lys His Thr Arg Arg Leu Ser Lys Leu
165 170 175

```
Pro Glu Glu Val Arg Ala Glu Ile Thr Pro Phe Phe Ser Glu Arg Asp
            180                 185                 190

Ala Val Leu Asp Asp Asn Gly Arg Lys Leu Pro Lys Phe Asp Asp Asp
        195                 200                 205

Ser Ala Ala His Val Arg Arg Gly Leu Thr Pro Arg Trp His Asp Phe
    210                 215                 220

Asp Val Asn Gln His Val Asn Asn Val Lys Tyr Val Gly Trp Ile Leu
225                 230                 235                 240

Glu Ser Val Pro Val Trp Met Leu Asp Gly Tyr Glu Val Ala Thr Met
                245                 250                 255

Ser Leu Glu Tyr Arg Arg Glu Cys Arg Met Asp Ser Val Val Gln Ser
            260                 265                 270

Leu Thr Ala Val Ser Ser Asp His Ala Asp Gly Ser Pro Ile Val Cys
        275                 280                 285

Gln His Leu Leu Arg Leu Glu Asp Gly Thr Glu Ile Val Arg Gly Gln
    290                 295                 300

Thr Glu Trp Arg Pro Lys Gln Gln Ala Arg Asp Leu Gly Asn Met Gly
305                 310                 315                 320

Leu His Pro Thr Glu Ser Lys
                325
```

<210> 62
<211> 741
<212> DNA
<213> Clostridium perfringens

<220>
<221> CDS
<222> (1)..(741)

<400> 62

```
atg ggg aaa gct tat gaa aaa gtt tat gaa gtt act tat gga gaa aca          48
Met Gly Lys Ala Tyr Glu Lys Val Tyr Glu Val Thr Tyr Gly Glu Thr
1               5                   10                  15

gat gga aga aaa gac tgt aga ata act tca atg atg aac ttc ttt tca          96
Asp Gly Arg Lys Asp Cys Arg Ile Thr Ser Met Met Asn Phe Phe Ser
            20                  25                  30

gac tgt tgc tta agt caa gaa gaa aag aat tca atg aac tat gca gat         144
Asp Cys Cys Leu Ser Gln Glu Glu Lys Asn Ser Met Asn Tyr Ala Asp
        35                  40                  45

aat agc agt gaa act act tgg gta ttt ttt gat tat gaa ata ata gtt         192
Asn Ser Ser Glu Thr Thr Trp Val Phe Phe Asp Tyr Glu Ile Ile Val
    50                  55                  60
```

```
aat aga tat cca aga tat aga gag aaa att aag gta aaa act tat gtt        240
Asn Arg Tyr Pro Arg Tyr Arg Glu Lys Ile Lys Val Lys Thr Tyr Val
65                  70                  75                  80

gaa tct ata aga aag ttt tat tct aac aga gta ttt gag gct tat gat        288
Glu Ser Ile Arg Lys Phe Tyr Ser Asn Arg Val Phe Glu Ala Tyr Asp
                85                  90                  95

atg gat ggg gcc tta gta gct agg gct gat gta tta gcc ttc tta ata        336
Met Asp Gly Ala Leu Val Ala Arg Ala Asp Val Leu Ala Phe Leu Ile
            100                 105                 110

aac aaa aaa act aga aga cca gct aga ata agc gat gaa gaa tat gag        384
Asn Lys Lys Thr Arg Arg Pro Ala Arg Ile Ser Asp Glu Glu Tyr Glu
        115                 120                 125

att cat gga tta agt aag gag tct tca aaa tta tta aga aaa aaa tta        432
Ile His Gly Leu Ser Lys Glu Ser Ser Lys Leu Leu Arg Lys Lys Leu
    130                 135                 140

aac ttt gag aaa ttt gat aaa gaa gat tta gag atg aat ttt cac ata        480
Asn Phe Glu Lys Phe Asp Lys Glu Asp Leu Glu Met Asn Phe His Ile
145                 150                 155                 160

aga tat tta gat ata gat cta aat atg cat gta agt aat att aag tat        528
Arg Tyr Leu Asp Ile Asp Leu Asn Met His Val Ser Asn Ile Lys Tyr
                165                 170                 175

gta gag tgg att tta gaa aca gta cca gtt gat att gtt cta aat tac        576
Val Glu Trp Ile Leu Glu Thr Val Pro Val Asp Ile Val Leu Asn Tyr
            180                 185                 190

aaa atg aaa aaa ata aaa ata aaa ttt gaa aaa gaa att aca tat ggt        624
Lys Met Lys Lys Ile Lys Ile Lys Phe Glu Lys Glu Ile Thr Tyr Gly
        195                 200                 205

cat aat gta att ata aag tca aaa ata att aag ggt gaa gat gaa gta        672
His Asn Val Ile Ile Lys Ser Lys Ile Ile Lys Gly Glu Asp Glu Val
    210                 215                 220

aag gtt ctt cat aaa gta gaa aat gaa gag gga gaa agc att act tta        720
Lys Val Leu His Lys Val Glu Asn Glu Glu Gly Glu Ser Ile Thr Leu
225                 230                 235                 240

gca gaa act tat tgg tat taa                                        741
Ala Glu Thr Tyr Trp Tyr
                245
```

<210> 63
<211> 246
<212> PRT
<213> Clostridium perfringens

<400> 63

```
Met Gly Lys Ala Tyr Glu Lys Val Tyr Glu Val Thr Tyr Gly Glu Thr
1               5                   10                  15

Asp Gly Arg Lys Asp Cys Arg Ile Thr Ser Met Met Asn Phe Phe Ser
            20                  25                  30

Asp Cys Cys Leu Ser Gln Glu Glu Lys Asn Ser Met Asn Tyr Ala Asp
        35                  40                  45
```

```
Asn Ser Ser Glu Thr Thr Trp Val Phe Phe Asp Tyr Glu Ile Ile Val
    50                  55                  60

Asn Arg Tyr Pro Arg Tyr Arg Glu Lys Ile Lys Val Lys Thr Tyr Val
65                  70                  75                  80

Glu Ser Ile Arg Lys Phe Tyr Ser Asn Arg Val Phe Glu Ala Tyr Asp
                85                  90                  95

Met Asp Gly Ala Leu Val Ala Arg Ala Asp Val Leu Ala Phe Leu Ile
            100                 105                 110

Asn Lys Lys Thr Arg Arg Pro Ala Arg Ile Ser Asp Glu Glu Tyr Glu
        115                 120                 125

Ile His Gly Leu Ser Lys Glu Ser Ser Lys Leu Leu Arg Lys Lys Leu
    130                 135                 140

Asn Phe Glu Lys Phe Asp Lys Glu Asp Leu Glu Met Asn Phe His Ile
145                 150                 155                 160

Arg Tyr Leu Asp Ile Asp Leu Asn Met His Val Ser Asn Ile Lys Tyr
                165                 170                 175

Val Glu Trp Ile Leu Glu Thr Val Pro Val Asp Ile Val Leu Asn Tyr
            180                 185                 190

Lys Met Lys Lys Ile Lys Ile Lys Phe Glu Lys Glu Ile Thr Tyr Gly
        195                 200                 205

His Asn Val Ile Ile Lys Ser Lys Ile Ile Lys Gly Glu Asp Glu Val
    210                 215                 220

Lys Val Leu His Lys Val Glu Asn Glu Glu Gly Glu Ser Ile Thr Leu
225                 230                 235                 240

Ala Glu Thr Tyr Trp Tyr
                245
```

<210> 64
<211> 1164
<212> DNA
<213> Escherichia coli

<220>
<221> CDS
<222> (1)..(1164)

<400> 64

```
atg gaa cag gtt gtc att gtc gat gca att cgc acc ccg atg ggc cgt        48
Met Glu Gln Val Val Ile Val Asp Ala Ile Arg Thr Pro Met Gly Arg
1               5                   10                  15
```

```
tcg aag ggc ggt gct ttt cgt aac gtg cgt gca gaa gat ctc tcc gct          96
Ser Lys Gly Gly Ala Phe Arg Asn Val Arg Ala Glu Asp Leu Ser Ala
            20                  25                  30

cat tta atg cgt agc ctg ctg gcg cgt aac ccg gcg ctg gaa gcg gcg         144
His Leu Met Arg Ser Leu Leu Ala Arg Asn Pro Ala Leu Glu Ala Ala
        35                  40                  45

gcc ctc gac gat att tac tgg ggt tgt gtg cag cag acg ctg gag cag         192
Ala Leu Asp Asp Ile Tyr Trp Gly Cys Val Gln Gln Thr Leu Glu Gln
    50                  55                  60

ggt ttt aat atc gcc cgt aac gcg gcg ctg ctg gca gaa gta cca cac         240
Gly Phe Asn Ile Ala Arg Asn Ala Ala Leu Leu Ala Glu Val Pro His
65                  70                  75                  80

tct gtc ccg gcg gtt acc gtt aat cgc ttg tgt ggt tca tcc atg cag         288
Ser Val Pro Ala Val Thr Val Asn Arg Leu Cys Gly Ser Ser Met Gln
                85                  90                  95

gca ctg cat gac gca gca cga atg atc atg act ggc gat gcg cag gca         336
Ala Leu His Asp Ala Ala Arg Met Ile Met Thr Gly Asp Ala Gln Ala
            100                 105                 110

tgt ctg gtt ggc ggc gtg gag cat atg ggc cat gtg ccg atg agt cac         384
Cys Leu Val Gly Gly Val Glu His Met Gly His Val Pro Met Ser His
        115                 120                 125

ggc gtc gat ttt cac ccc ggc ctg agc cgc aat gtc gcc aaa gcg gcg         432
Gly Val Asp Phe His Pro Gly Leu Ser Arg Asn Val Ala Lys Ala Ala
    130                 135                 140

ggc atg atg ggc tta acg gca gaa atg ctg gcg cgt atg cac ggt atc         480
Gly Met Met Gly Leu Thr Ala Glu Met Leu Ala Arg Met His Gly Ile
145                 150                 155                 160

agc cgt gaa atg cag gat gcc ttt gcc gcg cgg tca cac gcc cgc gcc         528
Ser Arg Glu Met Gln Asp Ala Phe Ala Ala Arg Ser His Ala Arg Ala
                165                 170                 175

tgg gcc gcc acg cag tcg gcc gca ttt aaa aat gaa atc atc ccg acc         576
Trp Ala Ala Thr Gln Ser Ala Ala Phe Lys Asn Glu Ile Ile Pro Thr
            180                 185                 190

ggt ggt cac gat gcc gac ggc gtc ctg aag cag ttt aat tac gac gaa         624
Gly Gly His Asp Ala Asp Gly Val Leu Lys Gln Phe Asn Tyr Asp Glu
        195                 200                 205

gtg att cgc ccg gaa acc acc gtg gaa gcc ctc gcc acg ctg cgt ccg         672
Val Ile Arg Pro Glu Thr Thr Val Glu Ala Leu Ala Thr Leu Arg Pro
    210                 215                 220

gcg ttt gat cca gta aac ggt atg gta acg gcg ggc aca tct tct gca         720
Ala Phe Asp Pro Val Asn Gly Met Val Thr Ala Gly Thr Ser Ser Ala
225                 230                 235                 240

ctt tcc gat ggc gca gct gcc atg ctg gtg atg agt gaa agc cgc gcc         768
Leu Ser Asp Gly Ala Ala Ala Met Leu Val Met Ser Glu Ser Arg Ala
                245                 250                 255

cat gaa tta ggt ctt aag ccg cgc gct cgt gtg cgt tcg atg gcg gtc         816
His Glu Leu Gly Leu Lys Pro Arg Ala Arg Val Arg Ser Met Ala Val
            260                 265                 270

gtt ggt tgt gac cca tcg att atg ggt tac ggc ccg gtt ccg gcc tcg         864
Val Gly Cys Asp Pro Ser Ile Met Gly Tyr Gly Pro Val Pro Ala Ser
        275                 280                 285
```

```
aaa ctg gcg ctg aaa aaa gcg ggg ctt tct gcc agc gat atc ggc gtg        912
Lys Leu Ala Leu Lys Lys Ala Gly Leu Ser Ala Ser Asp Ile Gly Val
    290                 295                 300

ttt gaa atg aac gaa gcc ttt gcc gcg cag atc ctg cca tgt att aaa        960
Phe Glu Met Asn Glu Ala Phe Ala Ala Gln Ile Leu Pro Cys Ile Lys
305                 310                 315                 320

gat ctg gga cta att gag cag att gac gag aag atc aac ctc aac ggt       1008
Asp Leu Gly Leu Ile Glu Gln Ile Asp Glu Lys Ile Asn Leu Asn Gly
                325                 330                 335

ggc gcg atc gcg ctg ggt cat ccg ctg ggt tgt tcc ggt gcg cgt atc       1056
Gly Ala Ile Ala Leu Gly His Pro Leu Gly Cys Ser Gly Ala Arg Ile
            340                 345                 350

agc acc acg ctg ctg aat ctg atg gaa cgc aaa gac gtt cag ttt ggt       1104
Ser Thr Thr Leu Leu Asn Leu Met Glu Arg Lys Asp Val Gln Phe Gly
        355                 360                 365

ctg gcg acg atg tgt atc ggt ctg ggt cag ggt att gcg acg gtg ttt       1152
Leu Ala Thr Met Cys Ile Gly Leu Gly Gln Gly Ile Ala Thr Val Phe
    370                 375                 380

gag cgg gtt taa                                                      1164
Glu Arg Val
385
```

<210> 65
<211> 387
<212> PRT
<213> Escherichia coli

<400> 65

```
Met Glu Gln Val Val Ile Val Asp Ala Ile Arg Thr Pro Met Gly Arg
1               5                   10                  15

Ser Lys Gly Gly Ala Phe Arg Asn Val Arg Ala Glu Asp Leu Ser Ala
            20                  25                  30

His Leu Met Arg Ser Leu Leu Ala Arg Asn Pro Ala Leu Glu Ala Ala
        35                  40                  45

Ala Leu Asp Asp Ile Tyr Trp Gly Cys Val Gln Gln Thr Leu Glu Gln
    50                  55                  60

Gly Phe Asn Ile Ala Arg Asn Ala Ala Leu Leu Ala Glu Val Pro His
65                  70                  75                  80

Ser Val Pro Ala Val Thr Val Asn Arg Leu Cys Gly Ser Ser Met Gln
                85                  90                  95

Ala Leu His Asp Ala Ala Arg Met Ile Met Thr Gly Asp Ala Gln Ala
            100                 105                 110

Cys Leu Val Gly Gly Val Glu His Met Gly His Val Pro Met Ser His
        115                 120                 125
```

```
Gly Val Asp Phe His Pro Gly Leu Ser Arg Asn Val Ala Lys Ala Ala
    130                 135                 140

Gly Met Met Gly Leu Thr Ala Glu Met Leu Ala Arg Met His Gly Ile
145                 150                 155                 160

Ser Arg Glu Met Gln Asp Ala Phe Ala Ala Arg Ser His Ala Arg Ala
                165                 170                 175

Trp Ala Ala Thr Gln Ser Ala Ala Phe Lys Asn Glu Ile Ile Pro Thr
            180                 185                 190

Gly Gly His Asp Ala Asp Gly Val Leu Lys Gln Phe Asn Tyr Asp Glu
        195                 200                 205

Val Ile Arg Pro Glu Thr Thr Val Glu Ala Leu Ala Thr Leu Arg Pro
    210                 215                 220

Ala Phe Asp Pro Val Asn Gly Met Val Thr Ala Gly Thr Ser Ser Ala
225                 230                 235                 240

Leu Ser Asp Gly Ala Ala Ala Met Leu Val Met Ser Glu Ser Arg Ala
                245                 250                 255

His Glu Leu Gly Leu Lys Pro Arg Ala Arg Val Arg Ser Met Ala Val
            260                 265                 270

Val Gly Cys Asp Pro Ser Ile Met Gly Tyr Gly Pro Val Pro Ala Ser
        275                 280                 285

Lys Leu Ala Leu Lys Lys Ala Gly Leu Ser Ala Ser Asp Ile Gly Val
    290                 295                 300

Phe Glu Met Asn Glu Ala Phe Ala Ala Gln Ile Leu Pro Cys Ile Lys
305                 310                 315                 320

Asp Leu Gly Leu Ile Glu Gln Ile Asp Glu Lys Ile Asn Leu Asn Gly
                325                 330                 335

Gly Ala Ile Ala Leu Gly His Pro Leu Gly Cys Ser Gly Ala Arg Ile
            340                 345                 350

Ser Thr Thr Leu Leu Asn Leu Met Glu Arg Lys Asp Val Gln Phe Gly
        355                 360                 365

Leu Ala Thr Met Cys Ile Gly Leu Gly Gln Gly Ile Ala Thr Val Phe
    370                 375                 380

Glu Arg Val
385
```

<210> 66
<211> 2190
<212> DNA
<213> Escherichia coli

<220>
<221> CDS
<222> (1)..(2190)

<400> 66

```
atg ctt tac aaa ggc gac acc ctg tac ctt gac tgg ctg gaa gat ggc          48
Met Leu Tyr Lys Gly Asp Thr Leu Tyr Leu Asp Trp Leu Glu Asp Gly
1               5                   10                  15

att gcc gaa ctg gta ttt gat gcc cca ggt tca gtt aat aaa ctc gac          96
Ile Ala Glu Leu Val Phe Asp Ala Pro Gly Ser Val Asn Lys Leu Asp
            20                  25                  30

act gcg acc gtc gcc agc ctc ggc gag gcc atc ggc gtg ctg gaa cag         144
Thr Ala Thr Val Ala Ser Leu Gly Glu Ala Ile Gly Val Leu Glu Gln
        35                  40                  45

caa tca gat cta aaa ggg ctg ctg ctg cgt tcg aac aaa gca gcc ttt         192
Gln Ser Asp Leu Lys Gly Leu Leu Leu Arg Ser Asn Lys Ala Ala Phe
    50                  55                  60

atc gtc ggt gct gat atc acc gaa ttt ttg tcc ctg ttc ctc gtt cct         240
Ile Val Gly Ala Asp Ile Thr Glu Phe Leu Ser Leu Phe Leu Val Pro
65                  70                  75                  80

gaa gaa cag tta agt cag tgg ctg cac ttt gcc aat agc gtg ttt aat         288
Glu Glu Gln Leu Ser Gln Trp Leu His Phe Ala Asn Ser Val Phe Asn
                85                  90                  95

cgc ctg gaa gat ctg ccg gtg ccg acc att gct gcc gtc aat ggc tat         336
Arg Leu Glu Asp Leu Pro Val Pro Thr Ile Ala Ala Val Asn Gly Tyr
            100                 105                 110

gcg ctg ggc ggt ggc tgc gaa tgc gtg ctg gcg acc gat tat cgt ctg         384
Ala Leu Gly Gly Gly Cys Glu Cys Val Leu Ala Thr Asp Tyr Arg Leu
        115                 120                 125

gcg acg ccg gat ctg cgc atc ggt ctg ccg gaa acc aaa ctg ggc atc         432
Ala Thr Pro Asp Leu Arg Ile Gly Leu Pro Glu Thr Lys Leu Gly Ile
    130                 135                 140

atg cct ggc ttt ggc ggt tct gta cgt atg cca cgt atg ctg ggc gct         480
Met Pro Gly Phe Gly Gly Ser Val Arg Met Pro Arg Met Leu Gly Ala
145                 150                 155                 160

gac agt gcg ctg gaa atc att gcc gcc ggt aaa gat gtc ggc gcg gat         528
Asp Ser Ala Leu Glu Ile Ile Ala Ala Gly Lys Asp Val Gly Ala Asp
                165                 170                 175

cag gcg ctg aaa atc ggt ctg gtg gat ggc gta gtc aaa gca gaa aaa         576
Gln Ala Leu Lys Ile Gly Leu Val Asp Gly Val Val Lys Ala Glu Lys
            180                 185                 190

ctg gtt gaa ggc gca aag gcg gtt tta cgc cag gcc att aac ggc gac         624
Leu Val Glu Gly Ala Lys Ala Val Leu Arg Gln Ala Ile Asn Gly Asp
        195                 200                 205

ctc gac tgg aaa gca aaa cgt cag ccg aag ctg gaa cca cta aaa ctg         672
Leu Asp Trp Lys Ala Lys Arg Gln Pro Lys Leu Glu Pro Leu Lys Leu
    210                 215                 220

agc aag att gaa gcc acc atg agc ttc acc atc gct aaa ggg atg gtc         720
```

```
Ser Lys Ile Glu Ala Thr Met Ser Phe Thr Ile Ala Lys Gly Met Val
225                 230                 235                 240

gca caa aca gcg ggg aaa cat tat ccg gcc ccc atc acc gca gta aaa        768
Ala Gln Thr Ala Gly Lys His Tyr Pro Ala Pro Ile Thr Ala Val Lys
                245                 250                 255

acc att gaa gct gcg gcc cgt ttt ggt cgt gaa gaa gcc tta aac ctg        816
Thr Ile Glu Ala Ala Ala Arg Phe Gly Arg Glu Glu Ala Leu Asn Leu
            260                 265                 270

gaa aac aaa agt ttt gtc ccg ctg gcg cat acc aac gaa gcc cgc gca        864
Glu Asn Lys Ser Phe Val Pro Leu Ala His Thr Asn Glu Ala Arg Ala
        275                 280                 285

ctg gtc ggc att ttc ctt aac gat caa tat gta aaa ggc aaa gcg aag        912
Leu Val Gly Ile Phe Leu Asn Asp Gln Tyr Val Lys Gly Lys Ala Lys
    290                 295                 300

aaa ctc acc aaa gac gtt gaa acc ccg aaa cag gcc gcg gtg ctg ggt        960
Lys Leu Thr Lys Asp Val Glu Thr Pro Lys Gln Ala Ala Val Leu Gly
305                 310                 315                 320

gca ggc att atg ggc ggc ggc atc gct tac cag tct gcg tgg aaa ggc       1008
Ala Gly Ile Met Gly Gly Gly Ile Ala Tyr Gln Ser Ala Trp Lys Gly
                325                 330                 335

gtg ccg gtt gtc atg aaa gat atc aac gac aag tcg tta acc ctc ggc       1056
Val Pro Val Val Met Lys Asp Ile Asn Asp Lys Ser Leu Thr Leu Gly
            340                 345                 350

atg acc gaa gcc gcg aaa ctg ctg aac aag cag ctt gag cgc ggc aag       1104
Met Thr Glu Ala Ala Lys Leu Leu Asn Lys Gln Leu Glu Arg Gly Lys
        355                 360                 365

atc gat ggt ctg aaa ctg gct ggc gtg atc tcc aca atc cac cca acg       1152
Ile Asp Gly Leu Lys Leu Ala Gly Val Ile Ser Thr Ile His Pro Thr
    370                 375                 380

ctc gac tac gcc gga ttt gac cgc gtg gat att gtg gta gaa gcg gtt       1200
Leu Asp Tyr Ala Gly Phe Asp Arg Val Asp Ile Val Val Glu Ala Val
385                 390                 395                 400

gtt gaa aac ccg aaa gtg aaa aaa gcc gta ctg gca gaa acc gaa caa       1248
Val Glu Asn Pro Lys Val Lys Lys Ala Val Leu Ala Glu Thr Glu Gln
                405                 410                 415

aaa gta cgc cag gat acc gtg ctg gcg tct aac act tca acc att cct       1296
Lys Val Arg Gln Asp Thr Val Leu Ala Ser Asn Thr Ser Thr Ile Pro
            420                 425                 430

atc agc gaa ctg gcc aac gcg ctg gaa cgc ccg gaa aac ttc tgc ggg       1344
Ile Ser Glu Leu Ala Asn Ala Leu Glu Arg Pro Glu Asn Phe Cys Gly
        435                 440                 445

atg cac ttc ttt aac ccg gtc cac cga atg ccg ttg gta gaa att att       1392
Met His Phe Phe Asn Pro Val His Arg Met Pro Leu Val Glu Ile Ile
    450                 455                 460

cgc ggc gag aaa agc tcc gac gaa acc atc gcg aaa gtt gtc gcc tgg       1440
Arg Gly Glu Lys Ser Ser Asp Glu Thr Ile Ala Lys Val Val Ala Trp
465                 470                 475                 480

gcg agc aag atg ggc aag acg ccg att gtg gtt aac gac tgc ccc ggc       1488
Ala Ser Lys Met Gly Lys Thr Pro Ile Val Val Asn Asp Cys Pro Gly
                485                 490                 495

ttc ttt gtt aac cgc gtg ctg ttc ccg tat ttc gcc ggt ttc agc cag       1536
```

```
Phe Phe Val Asn Arg Val Leu Phe Pro Tyr Phe Ala Gly Phe Ser Gln
            500                 505                 510

ctg ctg cgc gac ggc gcg gat ttc cgc aag atc gac aaa gtg atg gaa        1584
Leu Leu Arg Asp Gly Ala Asp Phe Arg Lys Ile Asp Lys Val Met Glu
        515                 520                 525

aaa cag ttt ggc tgg ccg atg ggc ccg gca tat ctg ctg gac gtt gtg        1632
Lys Gln Phe Gly Trp Pro Met Gly Pro Ala Tyr Leu Leu Asp Val Val
    530                 535                 540

ggc att gat acc gcg cat cac gct cag gct gtc atg gca gca ggc ttc        1680
Gly Ile Asp Thr Ala His His Ala Gln Ala Val Met Ala Ala Gly Phe
545                 550                 555                 560

ccg cag cgg atg cag aaa gat tac cgc gat gcc atc gac gcg ctg ttt        1728
Pro Gln Arg Met Gln Lys Asp Tyr Arg Asp Ala Ile Asp Ala Leu Phe
                565                 570                 575

gat gcc aac cgc ttt ggt cag aag aac ggc ctc ggt ttc tgg cgt tat        1776
Asp Ala Asn Arg Phe Gly Gln Lys Asn Gly Leu Gly Phe Trp Arg Tyr
            580                 585                 590

aaa gaa gac agc aaa ggt aag ccg aag aaa gaa gaa gac gcc gcc gtt        1824
Lys Glu Asp Ser Lys Gly Lys Pro Lys Lys Glu Glu Asp Ala Ala Val
        595                 600                 605

gaa gac ctg ctg gca gaa gtg agc cag ccg aag cgc gat ttc agc gaa        1872
Glu Asp Leu Leu Ala Glu Val Ser Gln Pro Lys Arg Asp Phe Ser Glu
    610                 615                 620

gaa gag att atc gcc cgc atg atg atc ccg atg gtc aac gaa gtg gtg        1920
Glu Glu Ile Ile Ala Arg Met Met Ile Pro Met Val Asn Glu Val Val
625                 630                 635                 640

cgc tgt ctg gag gaa ggc att atc gcc act ccg gcg gaa gcg gat atg        1968
Arg Cys Leu Glu Glu Gly Ile Ile Ala Thr Pro Ala Glu Ala Asp Met
                645                 650                 655

gcg ctg gtc tac ggc ctg ggc ttc cct ccg ttc cac ggc ggc gcg ttc        2016
Ala Leu Val Tyr Gly Leu Gly Phe Pro Pro Phe His Gly Gly Ala Phe
            660                 665                 670

cgc tgg ctg gac acc ctc ggt agc gca aaa tac ctc gat atg gca cag        2064
Arg Trp Leu Asp Thr Leu Gly Ser Ala Lys Tyr Leu Asp Met Ala Gln
        675                 680                 685

caa tat cag cac ctc ggc ccg ctg tat gaa gtg ccg gaa ggt ctg cgt        2112
Gln Tyr Gln His Leu Gly Pro Leu Tyr Glu Val Pro Glu Gly Leu Arg
    690                 695                 700

aat aaa gcg cgt cat aac gaa ccg tac tat cct ccg gtt gag cca gcc        2160
Asn Lys Ala Arg His Asn Glu Pro Tyr Tyr Pro Pro Val Glu Pro Ala
705                 710                 715                 720

cgt ccg gtt ggc gac ctg aaa acg gct taa                              2190
Arg Pro Val Gly Asp Leu Lys Thr Ala
                725
```

<210> 67
<211> 729
<212> PRT
<213> Escherichia coli

<400> 67

```
Met Leu Tyr Lys Gly Asp Thr Leu Tyr Leu Asp Trp Leu Glu Asp Gly
```

1 5 10 15

Ile Ala Glu Leu Val Phe Asp Ala Pro Gly Ser Val Asn Lys Leu Asp
20 25 30

Thr Ala Thr Val Ala Ser Leu Gly Glu Ala Ile Gly Val Leu Glu Gln
35 40 45

Gln Ser Asp Leu Lys Gly Leu Leu Leu Arg Ser Asn Lys Ala Ala Phe
50 55 60

Ile Val Gly Ala Asp Ile Thr Glu Phe Leu Ser Leu Phe Leu Val Pro
65 70 75 80

Glu Glu Gln Leu Ser Gln Trp Leu His Phe Ala Asn Ser Val Phe Asn
85 90 95

Arg Leu Glu Asp Leu Pro Val Pro Thr Ile Ala Ala Val Asn Gly Tyr
100 105 110

Ala Leu Gly Gly Gly Cys Glu Cys Val Leu Ala Thr Asp Tyr Arg Leu
115 120 125

Ala Thr Pro Asp Leu Arg Ile Gly Leu Pro Glu Thr Lys Leu Gly Ile
130 135 140

Met Pro Gly Phe Gly Gly Ser Val Arg Met Pro Arg Met Leu Gly Ala
145 150 155 160

Asp Ser Ala Leu Glu Ile Ile Ala Ala Gly Lys Asp Val Gly Ala Asp
165 170 175

Gln Ala Leu Lys Ile Gly Leu Val Asp Gly Val Val Lys Ala Glu Lys
180 185 190

Leu Val Glu Gly Ala Lys Ala Val Leu Arg Gln Ala Ile Asn Gly Asp
195 200 205

Leu Asp Trp Lys Ala Lys Arg Gln Pro Lys Leu Glu Pro Leu Lys Leu
210 215 220

Ser Lys Ile Glu Ala Thr Met Ser Phe Thr Ile Ala Lys Gly Met Val
225 230 235 240

Ala Gln Thr Ala Gly Lys His Tyr Pro Ala Pro Ile Thr Ala Val Lys
245 250 255

Thr Ile Glu Ala Ala Ala Arg Phe Gly Arg Glu Glu Ala Leu Asn Leu
260 265 270

Glu Asn Lys Ser Phe Val Pro Leu Ala His Thr Asn Glu Ala Arg Ala

275 280 285

Leu Val Gly Ile Phe Leu Asn Asp Gln Tyr Val Lys Gly Lys Ala Lys
290 295 300

Lys Leu Thr Lys Asp Val Glu Thr Pro Lys Gln Ala Ala Val Leu Gly
305 310 315 320

Ala Gly Ile Met Gly Gly Gly Ile Ala Tyr Gln Ser Ala Trp Lys Gly
325 330 335

Val Pro Val Val Met Lys Asp Ile Asn Asp Lys Ser Leu Thr Leu Gly
340 345 350

Met Thr Glu Ala Ala Lys Leu Leu Asn Lys Gln Leu Glu Arg Gly Lys
355 360 365

Ile Asp Gly Leu Lys Leu Ala Gly Val Ile Ser Thr Ile His Pro Thr
370 375 380

Leu Asp Tyr Ala Gly Phe Asp Arg Val Asp Ile Val Val Glu Ala Val
385 390 395 400

Val Glu Asn Pro Lys Val Lys Lys Ala Val Leu Ala Glu Thr Glu Gln
405 410 415

Lys Val Arg Gln Asp Thr Val Leu Ala Ser Asn Thr Ser Thr Ile Pro
420 425 430

Ile Ser Glu Leu Ala Asn Ala Leu Glu Arg Pro Glu Asn Phe Cys Gly
435 440 445

Met His Phe Phe Asn Pro Val His Arg Met Pro Leu Val Glu Ile Ile
450 455 460

Arg Gly Glu Lys Ser Ser Asp Glu Thr Ile Ala Lys Val Val Ala Trp
465 470 475 480

Ala Ser Lys Met Gly Lys Thr Pro Ile Val Val Asn Asp Cys Pro Gly
485 490 495

Phe Phe Val Asn Arg Val Leu Phe Pro Tyr Phe Ala Gly Phe Ser Gln
500 505 510

Leu Leu Arg Asp Gly Ala Asp Phe Arg Lys Ile Asp Lys Val Met Glu
515 520 525

Lys Gln Phe Gly Trp Pro Met Gly Pro Ala Tyr Leu Leu Asp Val Val
530 535 540

Gly Ile Asp Thr Ala His His Ala Gln Ala Val Met Ala Ala Gly Phe

545 550 555 560

Pro Gln Arg Met Gln Lys Asp Tyr Arg Asp Ala Ile Asp Ala Leu Phe
565 570 575

Asp Ala Asn Arg Phe Gly Gln Lys Asn Gly Leu Gly Phe Trp Arg Tyr
580 585 590

Lys Glu Asp Ser Lys Gly Lys Pro Lys Lys Glu Glu Asp Ala Ala Val
595 600 605

Glu Asp Leu Leu Ala Glu Val Ser Gln Pro Lys Arg Asp Phe Ser Glu
610 615 620

Glu Glu Ile Ile Ala Arg Met Met Ile Pro Met Val Asn Glu Val Val
625 630 635 640

Arg Cys Leu Glu Glu Gly Ile Ile Ala Thr Pro Ala Glu Ala Asp Met
645 650 655

Ala Leu Val Tyr Gly Leu Gly Phe Pro Pro Phe His Gly Gly Ala Phe
660 665 670

Arg Trp Leu Asp Thr Leu Gly Ser Ala Lys Tyr Leu Asp Met Ala Gln
675 680 685

Gln Tyr Gln His Leu Gly Pro Leu Tyr Glu Val Pro Glu Gly Leu Arg
690 695 700

Asn Lys Ala Arg His Asn Glu Pro Tyr Tyr Pro Pro Val Glu Pro Ala
705 710 715 720

Arg Pro Val Gly Asp Leu Lys Thr Ala
725

<210> 68
<211> 1341
<212> DNA
<213> Escherichia coli

<220>
<221> CDS
<222> (1)..(1341)

<400> 68
atg agc cag aaa acc ctg ttt aca aag tct gct ctc gca gtc gca gtg 48
Met Ser Gln Lys Thr Leu Phe Thr Lys Ser Ala Leu Ala Val Ala Val
1 5 10 15

gca ctt atc tcc acc cag gcc tgg tcg gca ggc ttt cag tta aac gaa 96
Ala Leu Ile Ser Thr Gln Ala Trp Ser Ala Gly Phe Gln Leu Asn Glu
20 25 30

ttt tct tcc tct ggc ctg ggc cgg gct tat tca ggg gaa ggc gca att 144
Phe Ser Ser Ser Gly Leu Gly Arg Ala Tyr Ser Gly Glu Gly Ala Ile

```
        35                  40                  45

gcc gat gat gca ggt aac gtc agc cgt aac ccc gca ttg att act atg        192
Ala Asp Asp Ala Gly Asn Val Ser Arg Asn Pro Ala Leu Ile Thr Met
    50                  55                  60

ttt gac cgc ccg aca ttt tct gcg ggt gcg gtt tat att gac ccg gat        240
Phe Asp Arg Pro Thr Phe Ser Ala Gly Ala Val Tyr Ile Asp Pro Asp
65                  70                  75                  80

gta aat atc agc gga acg tct cca tct ggt cgt agc ctg aaa gcc gat        288
Val Asn Ile Ser Gly Thr Ser Pro Ser Gly Arg Ser Leu Lys Ala Asp
                85                  90                  95

aac atc gcg cct acg gca tgg gtt ccg aac atg cac ttt gtt gca ccg        336
Asn Ile Ala Pro Thr Ala Trp Val Pro Asn Met His Phe Val Ala Pro
            100                 105                 110

att aac gac caa ttt ggt tgg ggc gct tct att acc tct aac tat ggt        384
Ile Asn Asp Gln Phe Gly Trp Gly Ala Ser Ile Thr Ser Asn Tyr Gly
        115                 120                 125

ctg gct aca gag ttt aac gat act tat gca ggc ggc tct gtc ggg ggt        432
Leu Ala Thr Glu Phe Asn Asp Thr Tyr Ala Gly Gly Ser Val Gly Gly
    130                 135                 140

aca acc gac ctt gaa acc atg aac ctg aac tta agc ggt gcg tat cgc        480
Thr Thr Asp Leu Glu Thr Met Asn Leu Asn Leu Ser Gly Ala Tyr Arg
145                 150                 155                 160

tta aat aat gca tgg agc ttt ggt ctt ggt ttc aac gcc gtc tac gct        528
Leu Asn Asn Ala Trp Ser Phe Gly Leu Gly Phe Asn Ala Val Tyr Ala
                165                 170                 175

cgc gcg aaa att gaa cgt ttc gca ggc gat ctg ggg cag ttg gtt gct        576
Arg Ala Lys Ile Glu Arg Phe Ala Gly Asp Leu Gly Gln Leu Val Ala
            180                 185                 190

ggc caa att atg caa tct cct gct ggc caa act cag caa ggg caa gca        624
Gly Gln Ile Met Gln Ser Pro Ala Gly Gln Thr Gln Gln Gly Gln Ala
        195                 200                 205

ttg gca gct acc gcc aac ggt att gac agt aat acc aaa atc gct cat        672
Leu Ala Ala Thr Ala Asn Gly Ile Asp Ser Asn Thr Lys Ile Ala His
    210                 215                 220

ctg aac ggt aac cag tgg ggc ttt ggc tgg aac gcc gga atc ctg tat        720
Leu Asn Gly Asn Gln Trp Gly Phe Gly Trp Asn Ala Gly Ile Leu Tyr
225                 230                 235                 240

gaa ctg gat aaa aat aac cgc tat gca ctg acc tac cgt tct gaa gtg        768
Glu Leu Asp Lys Asn Asn Arg Tyr Ala Leu Thr Tyr Arg Ser Glu Val
                245                 250                 255

aaa att gac ttc aaa ggt aac tac agc agc gat ctt aat cgt gcg ttt        816
Lys Ile Asp Phe Lys Gly Asn Tyr Ser Ser Asp Leu Asn Arg Ala Phe
            260                 265                 270

aat aac tac ggt ttg cca att cct acc gcg aca ggt ggc gca acg caa        864
Asn Asn Tyr Gly Leu Pro Ile Pro Thr Ala Thr Gly Gly Ala Thr Gln
        275                 280                 285

tcg ggt tat ctg acg ctg aac ctg cct gaa atg tgg gaa gtg tca ggt        912
Ser Gly Tyr Leu Thr Leu Asn Leu Pro Glu Met Trp Glu Val Ser Gly
    290                 295                 300

tat aac cgt gtt gat cca cag tgg gcg att cac tat agc ctg gct tac        960
Tyr Asn Arg Val Asp Pro Gln Trp Ala Ile His Tyr Ser Leu Ala Tyr
```

```
305                 310                 315                 320

acc agc tgg agt cag ttc cag cag ctg aaa gcg acc tca acc agt ggc       1008
Thr Ser Trp Ser Gln Phe Gln Gln Leu Lys Ala Thr Ser Thr Ser Gly
                325                 330                 335

gac acg ctg ttc cag aaa cat gaa ggc ttt aaa gat gct tac cgc atc       1056
Asp Thr Leu Phe Gln Lys His Glu Gly Phe Lys Asp Ala Tyr Arg Ile
            340                 345                 350

gcg ttg ggt acc act tat tac tac gat gat aac tgg acc ttc cgt acc       1104
Ala Leu Gly Thr Thr Tyr Tyr Tyr Asp Asp Asn Trp Thr Phe Arg Thr
        355                 360                 365

ggt atc gcc ttt gat gac agc cca gtt cct gca cag aat cgt tct atc       1152
Gly Ile Ala Phe Asp Asp Ser Pro Val Pro Ala Gln Asn Arg Ser Ile
    370                 375                 380

tcc att ccg gac cag gac cgt ttc tgg ctg agt gca ggt acg act tac       1200
Ser Ile Pro Asp Gln Asp Arg Phe Trp Leu Ser Ala Gly Thr Thr Tyr
385                 390                 395                 400

gca ttt aat aaa gat gct tca gtc gac gtt ggt gtt tct tat atg cac       1248
Ala Phe Asn Lys Asp Ala Ser Val Asp Val Gly Val Ser Tyr Met His
                405                 410                 415

ggt cag agc gtg aaa att aac gaa ggc cca tac cag ttc gag tct gaa       1296
Gly Gln Ser Val Lys Ile Asn Glu Gly Pro Tyr Gln Phe Glu Ser Glu
            420                 425                 430

ggt aaa gcc tgg ctg ttc ggt act aac ttt aac tac gcg ttc tga           1341
Gly Lys Ala Trp Leu Phe Gly Thr Asn Phe Asn Tyr Ala Phe
        435                 440                 445
```

<210> 69
<211> 446
<212> PRT
<213> Escherichia coli

<400> 69

```
Met Ser Gln Lys Thr Leu Phe Thr Lys Ser Ala Leu Ala Val Ala Val
1               5                   10                  15

Ala Leu Ile Ser Thr Gln Ala Trp Ser Ala Gly Phe Gln Leu Asn Glu
            20                  25                  30

Phe Ser Ser Ser Gly Leu Gly Arg Ala Tyr Ser Gly Glu Gly Ala Ile
        35                  40                  45

Ala Asp Asp Ala Gly Asn Val Ser Arg Asn Pro Ala Leu Ile Thr Met
    50                  55                  60

Phe Asp Arg Pro Thr Phe Ser Ala Gly Ala Val Tyr Ile Asp Pro Asp
65                  70                  75                  80

Val Asn Ile Ser Gly Thr Ser Pro Ser Gly Arg Ser Leu Lys Ala Asp
                85                  90                  95

Asn Ile Ala Pro Thr Ala Trp Val Pro Asn Met His Phe Val Ala Pro
            100                 105                 110
```

```
Ile Asn Asp Gln Phe Gly Trp Gly Ala Ser Ile Thr Ser Asn Tyr Gly
        115                 120                 125

Leu Ala Thr Glu Phe Asn Asp Thr Tyr Ala Gly Gly Ser Val Gly Gly
    130                 135                 140

Thr Thr Asp Leu Glu Thr Met Asn Leu Asn Leu Ser Gly Ala Tyr Arg
145                 150                 155                 160

Leu Asn Asn Ala Trp Ser Phe Gly Leu Gly Phe Asn Ala Val Tyr Ala
                165                 170                 175

Arg Ala Lys Ile Glu Arg Phe Ala Gly Asp Leu Gly Gln Leu Val Ala
            180                 185                 190

Gly Gln Ile Met Gln Ser Pro Ala Gly Gln Thr Gln Gln Gly Gln Ala
        195                 200                 205

Leu Ala Ala Thr Ala Asn Gly Ile Asp Ser Asn Thr Lys Ile Ala His
    210                 215                 220

Leu Asn Gly Asn Gln Trp Gly Phe Gly Trp Asn Ala Gly Ile Leu Tyr
225                 230                 235                 240

Glu Leu Asp Lys Asn Asn Arg Tyr Ala Leu Thr Tyr Arg Ser Glu Val
                245                 250                 255

Lys Ile Asp Phe Lys Gly Asn Tyr Ser Ser Asp Leu Asn Arg Ala Phe
            260                 265                 270

Asn Asn Tyr Gly Leu Pro Ile Pro Thr Ala Thr Gly Gly Ala Thr Gln
        275                 280                 285

Ser Gly Tyr Leu Thr Leu Asn Leu Pro Glu Met Trp Glu Val Ser Gly
    290                 295                 300

Tyr Asn Arg Val Asp Pro Gln Trp Ala Ile His Tyr Ser Leu Ala Tyr
305                 310                 315                 320

Thr Ser Trp Ser Gln Phe Gln Gln Leu Lys Ala Thr Ser Thr Ser Gly
                325                 330                 335

Asp Thr Leu Phe Gln Lys His Glu Gly Phe Lys Asp Ala Tyr Arg Ile
            340                 345                 350

Ala Leu Gly Thr Thr Tyr Tyr Tyr Asp Asp Asn Trp Thr Phe Arg Thr
        355                 360                 365

Gly Ile Ala Phe Asp Asp Ser Pro Val Pro Ala Gln Asn Arg Ser Ile
    370                 375                 380
```

Ser Ile Pro Asp Gln Asp Arg Phe Trp Leu Ser Ala Gly Thr Thr Tyr
385 390 395 400

Ala Phe Asn Lys Asp Ala Ser Val Asp Val Gly Val Ser Tyr Met His
405 410 415

Gly Gln Ser Val Lys Ile Asn Glu Gly Pro Tyr Gln Phe Glu Ser Glu
420 425 430

Gly Lys Ala Trp Leu Phe Gly Thr Asn Phe Asn Tyr Ala Phe
435 440 445

<210> 70
<211> 7970
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 70
ctagattatt aggcgaggcc acgcgctttg agggtctgtt caaattcttc gaggcaacgt 60

tccgccacgg cgagcatttc atccacttcc gcacgggtca taacgagcgg cggtgcagac 120

acaatgtgat cgccgcacgc acgcataatg aggttgttgc gaaaaaaaat atcgcggcag 180

agggtgccaa tttcgccaaa atccggaaag agttcacgtt tcgctttgtt tttcacgagg 240

gtaaacgcct gcaccatgcc cacgccacgc acatcatcca catgttcaaa acggctaaag 300

gtttcacgcc aacgtttctg catatacggg ccaatatcat ctttcacacg ctgcacaatg 360

ccttcatcac ggagcgccgc aacattcgca tgcgccaccg ccgcacacac cggatggccg 420

ctataggtaa agccatggtt aaaatcaccg cccgcaatga gaccttccgc aacacgtttg 480

cccacaaaca ccgcgccaat cgggagatag ccgctgctga ggcctttcgc cgcggtaaag 540

aggtccggct gaaagccaaa atgctgatgg ccaaaccatt cgccggtacg gccaaagccg 600

caaatcactt catccgcaac gaggagcaca tcatatttgc ggcaaatacg ttcaatttcc 660

ggccaatagg ttgccggcgg aacaatcaca ccgcccgcac cctgaatcgg ttcgcccaca 720

aacgccgcca ctttatccgc gccgatttcg agaatttttt cttcgagcca acgcgccgca 780

accacgccaa attcatccgg ggtcatatct ttgccatgtt tataccacca cggctgttca 840

atatgcgcca tgcccggaat cgggagatcg ccctgttcat gcatatattt catgccgccg 900

aggctcgcac cgccaatggt gctgccgtga tagccgttcc aacggccaat gagggttttt 960

ttttccggtt tgccctgcac atcccaataa cgacgcacca tacgaatcat ggtatccacg 1020

ctttcgctgc cgctgttggt ataaaacaca cgatcaaaac ctgccggggt aacttcggcg 1080

aggaggctgc tgagttccac caccgccgga tgggtggttt taaagaaggt gttataaaac 1140

gggagttctt ccatctgacg acgcgccgct tccgcaaaat ctttacggcc atagcccacg 1200

ttcacgcacc agaggcccgc catgccatca ataattttgt tgccttcgct atcccagaga 1260

tacacgcctt cgccacgggt catcacacgc gcacccgcct gattgaggct cgcggtatcg 1320
gtaaacggat ggagatgatg cgccgcatcg agttcacgcc actgagaggt ggtacgctgt 1380
ttctgcatat tatatctcct taaagcttta agcacccgcc acagatgatt catcctgtaa 1440
agctttctcg gcaggaacat actcatagcc tagatctctt gctacagctt cataggtcac 1500
gtgtccgttt gcggtgttta aacccgctct cagtgccgta ttgtctgcga gcgcttttac 1560
tgccccttg ttcgcgattt gcagcgcgta tggaacagta acgttagtca gggcgattgt 1620
tgatgtacga gggactgcgc ctggcatgtt cgctacagca taatgcacaa ccccgtgttt 1680
ttcatatgtt ggctgatcat gtgttgtgat atggtcgaca gtttcgacga tgccgccttg 1740
gtcgatcgct acatcaacaa taactgaacc gggtttcatt tgttttacca tttcctcagt 1800
gacaagagtc ggagctttag cacccggaat taataccgcg caaatgagga gatccgcttc 1860
cgccacagca tcagcaatat tgaccggatt agaaattaac gttttaatct gatggccgaa 1920
gatgtcatca agctggcgca agcggtctgc gtttaagtca atgatcgtca catctgcacc 1980
gaggccgaca gccatttcg ccgcgtttgt cccgacaacg cctcctccga taattgttac 2040
ttttccgcgg gaaacgccag gcaccccggc aagcagaatg ccttttccgc ctttaggctt 2100
ttctaagaat tgagcgccga tttgcgctgc cattctgccc gcaacctctg acattggcgt 2160
cagaagaggc aatgtccggc cttcactgac cgtttcatat gcgatggcag ttactccttt 2220
atccttcaag gcctgtgcaa gctcaggctc agctgctaaa tgaaggtacg taaacagcac 2280
aagtcctttg cgaaaataaa catattcttc cggcagcggt tcttttactt tcatgaccat 2340
ttcggcgtcc cagacctgct tcggatcagc aatgatttcc gctcctgctg actcataggc 2400
ttcattttca aatccgcttc caaggcccgc gcctgtttca accagcaccc ggtggccgtt 2460
tgaaatgagc tgagaaacgc ccccgggtgt taatgcgaca cggttttcat tgttttttat 2520
ctctttagga acccctatga tcattatgcc actctccttg gttcctagat cctgtgtgaa 2580
attgttattg ttatccgctc acaattccac acattatacg agccggaagc ataaagtgtc 2640
aagcctgggg tgcctaatga gtgagctaac ttacattaat tgcgttgcgc tcactgcccg 2700
catatctatg agccgggctg aatgatcgac cgagacaggc cctgcggggc tgcaggatcc 2760
aattgtgagc ggataacaat tacgagcttc atgcacagtg atcgacgctg ttgacaatta 2820
atcatcggct cgtataatgt gtggatgtgg aattgtgagc gctcacaatt ccacaacggt 2880
ttccctctag aaataatttt gtttacaagg aggattataa aatgcacgac cgcaaatcca 2940
aacgcccgga catgctggta gactcgtttg gtctggaaag cacggtccag gacggcctgg 3000
tgtttcgtca atcctttagc atccgcagct acgagattgg cacggatcgt accgcgagca 3060
tcgaaaccct gatgaaccac ctgcaggaaa ccagcttgaa ccactgtaaa tctaccggta 3120
tcctgttgga tggtttcggt cgcaccctgg agatgtgtaa gcgtgatttg atttgggtgg 3180
tgattaagat gcagatcaaa gttaaccgtt acccggcctg gggtgacacc gttgagatta 3240
acacgcgttt cagccgtctg ggtaagattg gtatgggtcg cgactggctg attagcgatt 3300

gcaatacggg cgaaatcctg gtgcgtgcga ccagcgcgta tgccatgatg aatcagaaaa 3360
ctcgtcgcct gagcaagctg ccgtacgagg tgcatcagga aatcgtccct ctgttcgttg 3420
actctccggt tatcgaggat agcgatctga aggtccataa gttcaaggtt aagaccggtg 3480
acagcatcca aaaaggcttg accccaggct ggaacgatct ggatgtgaat caacatgtca 3540
gcaacgtcaa atacattggc tggattctgg agagcatgcc gaccgaggtc ctggaaacgc 3600
aggagctgtg cagcctggct ctggaatatc gtcgcgagtg cggccgtgac agcgttttgg 3660
aaagcgtgac ggcgatggac ccgtccaaag ttggtgtgcg tagccaatat caacacctgc 3720
tgcgtctgga ggatggtact gcaatcgtca atggtgcaac cgagtggcgt ccgaaaaatg 3780
caggtgcgaa tggtgctatt agcaccggca agacgtctaa tggcaacagc gtttcctaag 3840
ctttagtcaa aagcctccgg tcggaggctt ttgactttct gcttactgaa tttgcggccg 3900
cctcgagaaa atgaagggaa gttcctatac ttactagaga ataggaactt ctatagggag 3960
tcgaataagg gcgacacaaa aggtattcta aatgcataat aaatactgat aacatcttat 4020
agtttgtatt atattttgta ttatcgttga catgtataat tttgatatca aaaactgatt 4080
ttccctttat tattttcgag atttattttc ttaattctct ttaacaaact agaaatattg 4140
tatatacaaa aaatcataaa taatagatga atagtttaat tataggtgtt catcaatcga 4200
aaaagcaacg tatcttattt aaagtgcgtt gctttttct catttataag gttaaataat 4260
tctcatatat caagcaaagt gacaggcgcc cttaaatatt ctgacaaatg ctctttccct 4320
aaactccccc cataaaaaaa cccgccgaag cgggttttta cgttatttgc ggattaacga 4380
ttactcgtta tcagaaccgc ccaggatgcc tggcagttcc ctactctcgc cgctgcgctc 4440
ggtcgttcgg ctgcgggacc tcagcgctag cggagtgtat actggcttac tatgttggca 4500
ctgatgaggg tgtcagtgaa gtgcttcatg tggcaggaga aaaaaggctg caccggtgcg 4560
tcagcagaat atgtgataca ggatatattc cgcttcctcg ctcactgact cgctacgctc 4620
ggtcgttcga ctgcggcgag cggaaatggc ttacgaacgg ggcggagatt tcctggaaga 4680
tgccaggaag atacttaaca gggaagtgag agggccgcgg caaagccgtt tttccatagg 4740
ctccgccccc ctgacaagca tcacgaaatc tgacgctcaa atcagtggtg gcgaaacccg 4800
acaggactat aaagatacca ggcgtttccc cctggcggct ccctcgtgcg ctctcctgtt 4860
cctgcctttc ggtttaccgg tgtcattccg ctgttatggc cgcgtttgtc tcattccacg 4920
cctgacactc agttccgggt aggcagttcg ctccaagctg gactgtatgc acgaaccccc 4980
cgttcagtcc gaccgctgcg ccttatccgg taactatcgt cttgagtcca acccggaaag 5040
acatgcaaaa gcaccactgg cagcagccac tggtaattga tttagaggag ttagtcttga 5100
agtcatgcgc cggttaaggc taaactgaaa ggacaagttt tggtgactgc gctcctccaa 5160
gccagttacc tcggttcaaa gagttggtag ctcagagaac cttcgaaaaa ccgccctgca 5220
aggcggtttt ttcgttttca gagcaagaga ttacgcgcag accaaaacga tctcaagaag 5280
atcatcttat taatcactgc ccgctttcca gtcgggaaac ctgtcgtgcc agctgcatta 5340

atgaatcggc caacgcgcgg ggagaggcgg tttgcgtatt gggcgccagg gtggtttttc 5400

ttttcaccag tgagactggc aacagctgat tgcccttcac cgcctggccc tgagagagtt 5460

gcagcaagcg gtccacgctg gtttgcccca gcaggcgaaa atcctgtttg atggtggtta 5520

acggcgggat ataacatgag ctatcttcgg tatcgtcgta tcccactacc gagatatccg 5580

caccaacgcg cagcccggac tcggtaatgg cgcgcattgc gcccagcgcc atctgatcgt 5640

tggcaaccag catcgcagtg ggaacgatgc cctcattcag catttgcatg gtttgttgaa 5700

aaccggacat ggcactccag tcgccttccc gttccgctat cggctgaatt tgattgcgag 5760

tgagatattt atgccagcca gccagacgca gacgcgccga gacagaactt aatgggcccg 5820

ctaacagcgc gatttgctgg tgacccaatg cgaccagatg ctccacgccc agtcgcgtac 5880

cgtcctcatg ggagaaaata atactgttga tgggtgtctg gtcagagaca tcaagaaata 5940

acgccggaac attagtgcag gcagcttcca cagcaatggc atcctggtca tccagcggat 6000

agttaatgat cagcccactg acgcgttgcg cgagaagatt gtgcaccgcc gctttacagg 6060

cttcgacgcc gcttcgttct accatcgaca ccaccacgct ggcacccagt tgatcggcgc 6120

gagatttaat cgccgcgaca atttgcgacg gcgcgtgcag ggccagactg gaggtggcaa 6180

cgccaatcag caacgactgt ttgcccgcca gttgttgtgc cacgcggttg ggaatgtaat 6240

tcagctccgc catcgccgct tccacttttt cccgcgtttt cgcagaaacg tggctggcct 6300

ggttcaccac gcgggaaacg gtctgataag agacaccggc atactctgcg acatcgtata 6360

acgttactgg tttcatattc accaccctga attgactctc ttccgggcgc tatcatgcca 6420

taccgcgaaa ggttttgcgc cattcgatgg cgcgccgctt ttaccaatgc ttaatcagtg 6480

aggcacctat ctcagcgatc tgtctatttc gttcatccat agttgcctga ctccccgtcg 6540

tgtagataac tacgatacgg gagggcttac catctggccc cagcgctgcg atgataccgc 6600

gagaaccacg ctcaccggct ccggatttat cagcaataaa ccagccagcc ggaagggccg 6660

agcgcagaag tggtcctgca actttatccg cctccatcca gtctattaat tgttgccggg 6720

aagctagagt aagtagttcg ccagttaata gtttgcgcaa cgttgttgcc atcgctacag 6780

gcatcgtggt gtcacgctcg tcgtttggta tggcttcatt cagctccggt tcccaacgat 6840

caaggcgagt tacatgatcc cccatgttgt gcaaaaaagc ggttagctcc ttcggtcctc 6900

cgatcgttgt cagaagtaag ttggccgcag tgttatcact catggttatg gcagcactgc 6960

ataattctct tactgtcatg ccatccgtaa gatgcttttc tgtgactggt gagtactcaa 7020

ccaagtcatt ctgagaatag tgtatgcggc gaccgagttg ctcttgcccg gcgtcaatac 7080

gggataatac cgcgccacat agcagaactt taaaagtgct catcattgga aaacgttctt 7140

cggggcgaaa actctcaagg atcttaccgc tgttgagatc cagttcgatg taacccactc 7200

gtgcacccaa ctgatcttca gcatctttta ctttcaccag cgtttctggg tgagcaaaaa 7260

caggaaggca aaatgccgca aaaaagggaa taagggcgac acggaaatgt tgaatactca 7320

tattcttcct ttttcaatat tattgaagca tttatcaggg ttattgtctc atgagcggat 7380

acatatttga atgtatttag aaaaataaac aaataggggt cagtgttaca accaattaac 7440

caattctgaa cattatcgcg agcccattta tacctgaata tggctcataa caccccttgt 7500

ttgcctggcg gcagtagcgc ggtggtccca cctgacccca tgccgaactc agaagtgaaa 7560

cgccgtagcg ccgatggtag tgtggggact ccccatgcga gagtagggaa ctgccaggca 7620

tcaaataaaa cgaaaggctc agtcgaaaga ctgggccttt cgcccgggct aattatgggg 7680

tgtcgccctt attcgactct atagtgaagt tcctattctc tagtagtata ggaacttctg 7740

aagtggggct cgagggccgg cccagccgtc aaggttaagg ctggccatat cagcgactga 7800

aaagcggcca gcctcggcct tgtttgacgt ataaccaaag ccaccgggca accaatagcc 7860

cttgtcactt ttgatcaggt agaccgaccc tgaagcgctt ttttcgtatt ccataaaacc 7920

cccttctgtg cgtgagtact catagtataa caggcgtgag taccaacgct 7970

<210> 71
<211> 8036
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 71
ctagattatt aggcgaggcc acgcgctttg agggtctgtt caaattcttc gaggcaacgt 60

tccgccacgg cgagcatttc atccacttcc gcacgggtca taacgagcgg cggtgcagac 120

acaatgtgat cgccgcacgc acgcataatg aggttgttgc gaaaaaaaat atcgcggcag 180

agggtgccaa tttcgccaaa atccggaaag agttcacgtt tcgctttgtt tttcacgagg 240

gtaaacgcct gcaccatgcc cacgccacgc acatcatcca catgttcaaa acggctaaag 300

gtttcacgcc aacgtttctg catatacggg ccaatatcat ctttcacacg ctgcacaatg 360

ccttcatcac ggagcgccgc aacattcgca tgcgccaccg ccgcacacac cggatggccg 420

ctataggtaa agccatggtt aaaatcaccg cccgcaatga gaccttccgc aacacgtttg 480

cccacaaaca ccgcgccaat cgggagatag ccgctgctga ggcctttcgc cgcggtaaag 540

aggtccggct gaaagccaaa atgctgatgg ccaaaccatt cgccggtacg gccaaagccg 600

caaatcactt catccgcaac gaggagcaca tcatatttgc ggcaaatacg ttcaatttcc 660

ggccaatagg ttgccggcgg aacaatcaca ccgcccgcac cctgaatcgg ttcgcccaca 720

aacgccgcca ctttatccgc gccgatttcg agaatttttt cttcgagcca acgcgccgca 780

accacgccaa attcatccgg ggtcatatct ttgccatgtt tataccacca cggctgttca 840

atatgcgcca tgcccggaat cgggagatcg ccctgttcat gcatatattt catgccgccg 900

aggctcgcac cgccaatggt gctgccgtga tagccgttcc aacggccaat gagggttttt 960

ttttccggtt tgccctgcac atcccaataa cgacgcacca tacgaatcat ggtatccacg 1020

ctttcgctgc cgctgttggt ataaaacaca cgatcaaaac ctgccggggt aacttcggcg 1080

aggaggctgc tgagttccac caccgccgga tgggtggttt taaagaaggt gttataaaac 1140

gggagttctt ccatctgacg acgcgccgct tccgcaaaat ctttacggcc atagcccacg 1200

ttcacgcacc agaggcccgc catgccatca ataattttgt tgccttcgct atcccagaga 1260

tacacgcctt cgccacgggt catcacacgc gcacccgcct gattgaggct cgcggtatcg 1320

gtaaacggat ggagatgatg cgccgcatcg agttcacgcc actgagaggt ggtacgctgt 1380

ttctgcatat tatatctcct taaagcttta agcacccgcc acagatgatt catcctgtaa 1440

agctttctcg gcaggaacat actcatagcc tagatctctt gctacagctt cataggtcac 1500

gtgtccgttt gcggtgttta aacccgctct cagtgccgta ttgtctgcga gcgcttttac 1560

tgccccttg ttcgcgattt gcagcgcgta tggaacagta acgttagtca gggcgattgt 1620

tgatgtacga gggactgcgc ctggcatgtt cgctacagca taatgcacaa ccccgtgttt 1680

ttcatatgtt ggctgatcat gtgttgtgat atggtcgaca gtttcgacga tgccgccttg 1740

gtcgatcgct acatcaacaa taactgaacc gggtttcatt tgttttacca tttcctcagt 1800

gacaagagtc ggagctttag cacccggaat taataccgcg caaatgagga gatccgcttc 1860

cgccacagca tcagcaatat tgaccggatt agaaattaac gttttaatct gatggccgaa 1920

gatgtcatca agctggcgca agcggtctgc gtttaagtca atgatcgtca catctgcacc 1980

gaggccgaca gccattttcg ccgcgtttgt cccgacaacg cctcctccga taattgttac 2040

ttttccgcgg gaaacgccag gcaccccggc aagcagaatg ccttttccgc ctttaggctt 2100

ttctaagaat tgagcgccga tttgcgctgc cattctgccc gcaacctctg acattggcgt 2160

cagaagaggc aatgtccggc cttcactgac cgtttcatat gcgatggcag ttactccttt 2220

atccttcaag gcctgtgcaa gctcaggctc agctgctaaa tgaaggtacg taaacagcac 2280

aagtcctttg cgaaaataaa catattcttc cggcagcggt tcttttactt tcatgaccat 2340

ttcggcgtcc cagacctgct tcggatcagc aatgatttcc gctcctgctg actcataggc 2400

ttcattttca aatccgcttc caaggcccgc gcctgtttca accagcaccc ggtggccgtt 2460

tgaaatgagc tgagaaacgc ccccgggtgt taatgcgaca cggttttcat tgttttttat 2520

ctctttagga acccctatga tcattatgcc actctccttg gttcctagat cctgtgtgaa 2580

attgttattg ttatccgctc acaattccac acattatacg agccggaagc ataaagtgtc 2640

aagcctgggg tgcctaatga gtgagctaac ttacattaat tgcgttgcgc tcactgcccg 2700

catatctatg agccgggctg aatgatcgac cgagacaggc cctgcggggc tgcaggatcc 2760

aattgtgagc ggataacaat tacgagcttc atgcacagtg atcgacgctg ttgacaatta 2820

atcatcggct cgtataatgt gtggatgtgg aattgtgagc gctcacaatt ccacaacggt 2880

ttccctctag aaataatttt gtttacaagg aggattataa aatgccagac tggagcatgt 2940

tgttggccgc tattcgtacg atcttttccg cagccgaaaa acagtggacc ctgctggata 3000

gcaagaaacg cggtgcggat gcagttgcgg acgcgtctgg cgtgggcaag atggtgaaaa 3060

acggtctggt ctaccgtcag aatttcagca tccgtagcta tgagattggt gtggacaagc 3120

gtgcgagcgt tgaggctctg atgaatcatt ttcaagaaac gagcttgaat cactgcaaat 3180

gcatcggtct gatgcatggc ggttttggtt gcaccccgga aatgacgcgt cgtaatctga 3240

tctgggtcgt tgccaagatg ctggttcacg tggagcgtta tccgtggtgg ggtgacgtag 3300

tgcagattaa cacctggatt agcagcagcg gtaagaacgg catgggtcgc gactggcacg 3360

tgcacgactg tcagacgggc ctgccgatta tgcgtggcac ctctgtgtgg gtcatgatgg 3420

ataaacacac tcgccgtctg agcaagctgc cggaagaggt tcgcgcagaa atcaccccgt 3480

tcttcagcga acgcgacgcg gtcctggatg ataacggccg taaactgccg aaatttgacg 3540

atgatagcgc ggcacacgtc cgccgtggtt tgacccctcg ttggcatgat ttcgacgtca 3600

atcagcatgt caacaacgtg aaatacgtcg gttggattct ggagagcgtt ccggtttgga 3660

tgctggacgg ttacgaggtt gccactatgt ctctggaata tcgtcgcgag tgtcgtatgg 3720

atagcgtggt tcagtccctg accgcggtta gctcggatca cgcggacggc agcccgatcg 3780

tttgtcaaca cctgctgcgc ctggaagatg gtacggagat cgtgcgtggt caaaccgagt 3840

ggcgtccgaa gcaacaagca cgcgacctgg gcaatatggg tttgcatccg accgagtcca 3900

agtaagcttt agtcaaaagc ctccggtcgg aggcttttga ctttctgctt actgaatttg 3960

cggccgcctc gagaaaatga agggaagttc ctatacttac tagagaatag gaacttctat 4020

agggagtcga ataagggcga cacaaaaggt attctaaatg cataataaat actgataaca 4080

tcttatagtt tgtattatat tttgtattat cgttgacatg tataattttg atatcaaaaa 4140

ctgattttcc ctttattatt ttcgagattt attttcttaa ttctctttaa caaactagaa 4200

atattgtata tacaaaaaat cataaataat agatgaatag tttaattata ggtgttcatc 4260

aatcgaaaaa gcaacgtatc ttatttaaag tgcgttgctt ttttctcatt tataaggtta 4320

aataattctc atatatcaag caaagtgaca ggcgccctta aatattctga caaatgctct 4380

ttccctaaac tccccccata aaaaaacccg ccgaagcggg tttttacgtt atttgcggat 4440

taacgattac tcgttatcag aaccgcccag gatgcctggc agttccctac tctcgccgct 4500

gcgctcggtc gttcggctgc gggacctcag cgctagcgga gtgtatactg gcttactatg 4560

ttggcactga tgagggtgtc agtgaagtgc ttcatgtggc aggagaaaaa aggctgcacc 4620

ggtgcgtcag cagaatatgt gatacaggat atattccgct tcctcgctca ctgactcgct 4680

acgctcggtc gttcgactgc ggcgagcgga aatggcttac gaacggggcg gagatttcct 4740

ggaagatgcc aggaagatac ttaacaggga agtgagaggg ccgcggcaaa gccgtttttc 4800

cataggctcc gccccccctga caagcatcac gaaatctgac gctcaaatca gtggtggcga 4860

aacccgacag gactataaag ataccaggcg tttccccctg gcggctccct cgtgcgctct 4920

cctgttcctg cctttcggtt taccggtgtc attccgctgt tatggccgcg tttgtctcat 4980

tccacgcctg acactcagtt ccgggtaggc agttcgctcc aagctggact gtatgcacga 5040

acccccgtt cagtccgacc gctgcgcctt atccggtaac tatcgtcttg agtccaaccc 5100

ggaaagacat gcaaaagcac cactggcagc agccactggt aattgattta gaggagttag 5160

tcttgaagtc atgcgccggt taaggctaaa ctgaaaggac aagttttggt gactgcgctc 5220

ctccaagcca gttacctcgg ttcaaagagt tggtagctca gagaaccttc gaaaaaccgc 5280

cctgcaaggc ggtttttttcg ttttcagagc aagagattac gcgcagacca aaacgatctc 5340

aagaagatca tcttattaat cactgcccgc tttccagtcg ggaaacctgt cgtgccagct 5400

gcattaatga atcggccaac gcgcggggag aggcggtttg cgtattgggc gccagggtgg 5460

tttttctttt caccagtgag actggcaaca gctgattgcc cttcaccgcc tggccctgag 5520

agagttgcag caagcggtcc acgctggttt gccccagcag gcgaaaatcc tgtttgatgg 5580

tggttaacgg cgggatataa catgagctat cttcggtatc gtcgtatccc actaccgaga 5640

tatccgcacc aacgcgcagc ccggactcgg taatggcgcg cattgcgccc agcgccatct 5700

gatcgttggc aaccagcatc gcagtgggaa cgatgccctc attcagcatt tgcatggttt 5760

gttgaaaacc ggacatggca ctccagtcgc cttcccgttc cgctatcggc tgaatttgat 5820

tgcgagtgag atatttatgc cagccagcca gacgcagacg cgccgagaca gaacttaatg 5880

ggcccgctaa cagcgcgatt tgctggtgac ccaatgcgac cagatgctcc acgcccagtc 5940

gcgtaccgtc ctcatgggag aaaataatac tgttgatggg tgtctggtca gagacatcaa 6000

gaaataacgc cggaacatta gtgcaggcag cttccacagc aatggcatcc tggtcatcca 6060

gcggatagtt aatgatcagc ccactgacgc gttgcgcgag aagattgtgc accgccgctt 6120

tacaggcttc gacgccgctt cgttctacca tcgacaccac cacgctggca cccagttgat 6180

cggcgcgaga tttaatcgcc gcgacaattt gcgacggcgc gtgcagggcc agactggagg 6240

tggcaacgcc aatcagcaac gactgtttgc ccgccagttg ttgtgccacg cggttgggaa 6300

tgtaattcag ctccgccatc gccgcttcca ctttttcccg cgttttcgca gaaacgtggc 6360

tggcctggtt caccacgcgg gaaacggtct gataagagac accggcatac tctgcgacat 6420

cgtataacgt tactggtttc atattcacca ccctgaattg actctcttcc gggcgctatc 6480

atgccatacc gcgaaaggtt ttgcgccatt cgatggcgcg ccgcttttac caatgcttaa 6540

tcagtgaggc acctatctca gcgatctgtc tatttcgttc atccatagtt gcctgactcc 6600

ccgtcgtgta gataactacg atacgggagg gcttaccatc tggccccagc gctgcgatga 6660

taccgcgaga accacgctca ccggctccgg atttatcagc aataaaccag ccagccggaa 6720

gggccgagcg cagaagtggt cctgcaactt tatccgcctc catccagtct attaattgtt 6780

gccgggaagc tagagtaagt agttcgccag ttaatagttt gcgcaacgtt gttgccatcg 6840

ctacaggcat cgtggtgtca cgctcgtcgt ttggtatggc ttcattcagc tccggttccc 6900

aacgatcaag gcgagttaca tgatccccca tgttgtgcaa aaaagcggtt agctccttcg 6960

gtcctccgat cgttgtcaga agtaagttgg ccgcagtgtt atcactcatg gttatggcag 7020

cactgcataa ttctcttact gtcatgccat ccgtaagatg cttttctgtg actggtgagt 7080

actcaaccaa gtcattctga gaatagtgta tgcggcgacc gagttgctct tgcccggcgt 7140

caatacggga taataccgcg ccacatagca gaactttaaa agtgctcatc attggaaaac 7200

gttcttcggg gcgaaaactc tcaaggatct taccgctgtt gagatccagt tcgatgtaac 7260

ccactcgtgc acccaactga tcttcagcat cttttacttt caccagcgtt tctgggtgag 7320

caaaaacagg aaggcaaaat gccgcaaaaa agggaataag ggcgacacgg aaatgttgaa 7380

tactcatatt cttccttttt caatattatt gaagcattta tcagggttat tgtctcatga 7440

gcggatacat atttgaatgt atttagaaaa ataaacaaat aggggtcagt gttacaacca 7500

attaaccaat tctgaacatt atcgcgagcc catttatacc tgaatatggc tcataacacc 7560

ccttgtttgc ctggcggcag tagcgcggtg gtcccacctg accccatgcc gaactcagaa 7620

gtgaaacgcc gtagcgccga tggtagtgtg gggactcccc atgcgagagt agggaactgc 7680

caggcatcaa ataaaacgaa aggctcagtc gaaagactgg gcctttcgcc cgggctaatt 7740

atggggtgtc gcccttattc gactctatag tgaagttcct attctctagt agtataggaa 7800

cttctgaagt ggggctcgag ggccggccca gccgtcaagg ttaaggctgg ccatatcagc 7860

gactgaaaag cggccagcct cggccttgtt tgacgtataa ccaaagccac cgggcaacca 7920

atagcccttg tcacttttga tcaggtagac cgaccctgaa gcgctttttt cgtattccat 7980

aaaaccccct tctgtgcgtg agtactcata gtataacagg cgtgagtacc aacgct 8036

<210> 72
<211> 7793
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 72
ctagattatt aggcgaggcc acgcgctttg agggtctgtt caaattcttc gaggcaacgt 60

tccgccacgg cgagcatttc atccacttcc gcacgggtca taacgagcgg cggtgcagac 120

acaatgtgat cgccgcacgc acgcataatg aggttgttgc gaaaaaaaat atcgcggcag 180

agggtgccaa tttcgccaaa atccggaaag agttcacgtt tcgctttgtt tttcacgagg 240

gtaaacgcct gcaccatgcc cacgccacgc acatcatcca catgttcaaa acggctaaag 300

gtttcacgcc aacgtttctg catatacggg ccaatatcat ctttcacacg ctgcacaatg 360

ccttcatcac ggagcgccgc aacattcgca tgcgccaccg ccgcacacac cggatggccg 420

ctataggtaa agccatggtt aaaatcaccg cccgcaatga gaccttccgc aacacgtttg 480

cccacaaaca ccgcgccaat cgggagatag ccgctgctga ggcctttcgc cgcggtaaag 540

aggtccggct gaaagccaaa atgctgatgg ccaaaccatt cgccggtacg gccaaagccg 600

caaatcactt catccgcaac gaggagcaca tcatatttgc ggcaaatacg ttcaatttcc 660

ggccaatagg ttgccggcgg aacaatcaca ccgcccgcac cctgaatcgg ttcgcccaca 720

aacgccgcca ctttatccgc gccgatttcg agaatttttt cttcgagcca acgcgccgca 780

accacgccaa attcatccgg ggtcatatct ttgccatgtt tataccacca cggctgttca 840

atatgcgcca tgcccggaat cgggagatcg ccctgttcat gcatatattt catgccgccg 900

aggctcgcac cgccaatggt gctgccgtga tagccgttcc aacggccaat gagggttttt 960

ttttccggtt tgccctgcac atcccaataa cgacgcacca tacgaatcat ggtatccacg 1020

ctttcgctgc cgctgttggt ataaaacaca cgatcaaaac ctgccggggt aacttcggcg 1080

aggaggctgc tgagttccac caccgccgga tgggtggttt taaagaaggt gttataaaac 1140

gggagttctt ccatctgacg acgcgccgct tccgcaaaat ctttacggcc atagcccacg 1200

ttcacgcacc agaggcccgc catgccatca ataattttgt tgccttcgct atcccagaga 1260

tacacgcctt cgccacgggt catcacacgc gcacccgcct gattgaggct cgcggtatcg 1320

gtaaacggat ggagatgatg cgccgcatcg agttcacgcc actgagaggt ggtacgctgt 1380

ttctgcatat tatatctcct taaagcttta agcacccgcc acagatgatt catcctgtaa 1440

agctttctcg gcaggaacat actcatagcc tagatctctt gctacagctt cataggtcac 1500

gtgtccgttt gcggtgttta aacccgctct cagtgccgta ttgtctgcga gcgcttttac 1560

tgccccttg ttcgcgattt gcagcgcgta tggaacagta acgttagtca gggcgattgt 1620

tgatgtacga gggactgcgc ctggcatgtt cgctacagca taatgcacaa ccccgtgttt 1680

ttcatatgtt ggctgatcat gtgttgtgat atggtcgaca gtttcgacga tgccgccttg 1740

gtcgatcgct acatcaacaa taactgaacc gggtttcatt tgttttacca tttcctcagt 1800

gacaagagtc ggagctttag cacccggaat taataccgcg caaatgagga gatccgcttc 1860

cgccacagca tcagcaatat tgaccggatt agaaattaac gttttaatct gatggccgaa 1920

gatgtcatca agctggcgca agcggtctgc gtttaagtca atgatcgtca catctgcacc 1980

gaggccgaca gccattttcg ccgcgtttgt cccgacaacg cctcctccga taattgttac 2040

ttttccgcgg gaaacgccag gcaccccggc aagcagaatg ccttttccgc ctttaggctt 2100

ttctaagaat tgagcgccga tttgcgctgc cattctgccc gcaacctctg acattggcgt 2160

cagaagaggc aatgtccggc cttcactgac cgtttcatat gcgatggcag ttactccttt 2220

atccttcaag gcctgtgcaa gctcaggctc agctgctaaa tgaaggtacg taaacagcac 2280

aagtcctttg cgaaaataaa catattcttc cggcagcggt tcttttactt tcatgaccat 2340

ttcggcgtcc cagacctgct tcggatcagc aatgatttcc gctcctgctg actcataggc 2400

ttcattttca aatccgcttc caaggcccgc gcctgtttca accagcaccc ggtggccgtt 2460

tgaaatgagc tgagaaacgc ccccgggtgt taatgcgaca cggttttcat tgttttttat 2520

ctctttagga acccctatga tcattatgcc actctccttg gttcctagat cctgtgtgaa 2580

attgttattg ttatccgctc acaattccac acattatacg agccggaagc ataaagtgtc 2640

aagcctgggg tgcctaatga gtgagctaac ttacattaat tgcgttgcgc tcactgcccg 2700

catatctatg agccgggctg aatgatcgac cgagacaggc cctgcggggc tgcaggatcc 2760

aattgtgagc ggataacaat tacgagcttc atgcacagtg atcgacgctg ttgacaatta 2820

atcatcggct cgtataatgt gtggatgtgg aattgtgagc gctcacaatt ccacaacggt 2880

ttccctctag aaataatttt gtttacaagg aggattataa aatggggaaa gcttatgaaa 2940

aagtttatga agttacttat ggagaaacag atggaagaaa agactgtaga ataacttcaa 3000

tgatgaactt cttttcagac tgttgcttaa gtcaagaaga aaagaattca atgaactatg 3060
cagataatag cagtgaaact acttgggtat tttttgatta tgaaataata gttaatagat 3120
atccaagata tagagagaaa attaaggtaa aaacttatgt tgaatctata agaaagtttt 3180
attctaacag agtatttgag gcttatgata tggatggggc cttagtagct agggctgatg 3240
tattagcctt cttaataaac aaaaaaacta gaagaccagc tagaataagc gatgaagaat 3300
atgagattca tggattaagt aaggagtctt caaaattatt aagaaaaaaa ttaaactttg 3360
agaaatttga taaagaagat ttagagatga attttcacat aagatattta gatatagatc 3420
taaatatgca tgtaagtaat attaagtatg tagagtggat tttagaaaca gtaccagttg 3480
atattgttct aaattacaaa atgaaaaaaa taaaaataaa atttgaaaaa gaaattacat 3540
atggtcataa tgtaattata aagtcaaaaa taattaaggg tgaagatgaa gtaaaggttc 3600
ttcataaagt agaaaatgaa gagggagaaa gcattacttt agcagaaact tattggtatt 3660
aagctttagt caaaagcctc cggtcggagg cttttgactt tctgcttact gaatttgcgg 3720
ccgcctcgag aaaatgaagg gaagttccta tacttactag agaataggaa cttctatagg 3780
gagtcgaata agggcgacac aaaaggtatt ctaaatgcat aataaatact gataacatct 3840
tatagtttgt attatatttt gtattatcgt tgacatgtat aattttgata tcaaaaactg 3900
attttccctt tattattttc gagatttatt ttcttaattc tctttaacaa actagaaata 3960
ttgtatatac aaaaaatcat aaataataga tgaatagttt aattataggt gttcatcaat 4020
cgaaaaagca acgtatctta tttaaagtgc gttgcttttt tctcatttat aaggttaaat 4080
aattctcata tatcaagcaa agtgacaggc gcccttaaat attctgacaa atgctctttc 4140
cctaaactcc ccccataaaa aaacccgccg aagcgggttt ttacgttatt tgcggattaa 4200
cgattactcg ttatcagaac cgcccaggat gcctggcagt tccctactct cgccgctgcg 4260
ctcggtcgtt cggctgcggg acctcagcgc tagcggagtg tatactggct tactatgttg 4320
gcactgatga gggtgtcagt gaagtgcttc atgtggcagg agaaaaaagg ctgcaccggt 4380
gcgtcagcag aatatgtgat acaggatata ttccgcttcc tcgctcactg actcgctacg 4440
ctcggtcgtt cgactgcggc gagcggaaat ggcttacgaa cggggcggag atttcctgga 4500
agatgccagg aagatactta acagggaagt gagagggccg cggcaaagcc gtttttccat 4560
aggctccgcc cccctgacaa gcatcacgaa atctgacgct caaatcagtg gtggcgaaac 4620
ccgacaggac tataaagata ccaggcgttt ccccctggcg gctccctcgt gcgctctcct 4680
gttcctgcct ttcggtttac cggtgtcatt ccgctgttat ggccgcgttt gtctcattcc 4740
acgcctgaca ctcagttccg ggtaggcagt tcgctccaag ctggactgta tgcacgaacc 4800
ccccgttcag tccgaccgct gcgccttatc cggtaactat cgtcttgagt ccaacccgga 4860
aagacatgca aaagcaccac tggcagcagc cactggtaat tgatttagag gagttagtct 4920
tgaagtcatg cgccggttaa ggctaaactg aaaggacaag ttttggtgac tgcgctcctc 4980
caagccagtt acctcggttc aaagagttgg tagctcagag aaccttcgaa aaaccgccct 5040

gcaaggcggt tttttcgttt tcagagcaag agattacgcg cagaccaaaa cgatctcaag 5100

aagatcatct tattaatcac tgcccgcttt ccagtcggga aacctgtcgt gccagctgca 5160

ttaatgaatc ggccaacgcg cggggagagg cggtttgcgt attgggcgcc agggtggttt 5220

ttcttttcac cagtgagact ggcaacagct gattgccctt caccgcctgg ccctgagaga 5280

gttgcagcaa gcggtccacg ctggtttgcc ccagcaggcg aaaatcctgt ttgatggtgg 5340

ttaacggcgg gatataacat gagctatctt cggtatcgtc gtatcccact accgagatat 5400

ccgcaccaac gcgcagcccg gactcggtaa tggcgcgcat tgcgcccagc gccatctgat 5460

cgttggcaac cagcatcgca gtgggaacga tgccctcatt cagcatttgc atggtttgtt 5520

gaaaaccgga catggcactc cagtcgcctt cccgttccgc tatcggctga atttgattgc 5580

gagtgagata tttatgccag ccagccagac gcagacgcgc cgagacagaa cttaatgggc 5640

ccgctaacag cgcgatttgc tggtgaccca atgcgaccag atgctccacg cccagtcgcg 5700

taccgtcctc atgggagaaa ataatactgt tgatgggtgt ctggtcagag acatcaagaa 5760

ataacgccgg aacattagtg caggcagctt ccacagcaat ggcatcctgg tcatccagcg 5820

gatagttaat gatcagccca ctgacgcgtt gcgcgagaag attgtgcacc gccgctttac 5880

aggcttcgac gccgcttcgt tctaccatcg acaccaccac gctggcaccc agttgatcgg 5940

cgcgagattt aatcgccgcg acaatttgcg acggcgcgtg cagggccaga ctggaggtgg 6000

caacgccaat cagcaacgac tgtttgcccg ccagttgttg tgccacgcgg ttgggaatgt 6060

aattcagctc cgccatcgcc gcttccactt tttcccgcgt tttcgcagaa acgtggctgg 6120

cctggttcac cacgcgggaa acggtctgat aagagacacc ggcatactct gcgacatcgt 6180

ataacgttac tggtttcata ttcaccaccc tgaattgact ctcttccggg cgctatcatg 6240

ccataccgcg aaaggttttg cgccattcga tggcgcgccg cttttaccaa tgcttaatca 6300

gtgaggcacc tatctcagcg atctgtctat ttcgttcatc catagttgcc tgactccccg 6360

tcgtgtagat aactacgata cgggagggct taccatctgg ccccagcgct gcgatgatac 6420

cgcgagaacc acgctcaccg gctccggatt tatcagcaat aaaccagcca gccggaaggg 6480

ccgagcgcag aagtggtcct gcaactttat ccgcctccat ccagtctatt aattgttgcc 6540

gggaagctag agtaagtagt tcgccagtta atagtttgcg caacgttgtt gccatcgcta 6600

caggcatcgt ggtgtcacgc tcgtcgtttg gtatggcttc attcagctcc ggttcccaac 6660

gatcaaggcg agttacatga tcccccatgt tgtgcaaaaa agcggttagc tccttcggtc 6720

ctccgatcgt tgtcagaagt aagttggccg cagtgttatc actcatggtt atggcagcac 6780

tgcataattc tcttactgtc atgccatccg taagatgctt ttctgtgact ggtgagtact 6840

caaccaagtc attctgagaa tagtgtatgc ggcgaccgag ttgctcttgc ccggcgtcaa 6900

tacgggataa taccgcgcca catagcagaa ctttaaaagt gctcatcatt ggaaaacgtt 6960

cttcggggcg aaaactctca aggatcttac cgctgttgag atccagttcg atgtaaccca 7020

ctcgtgcacc caactgatct tcagcatctt ttactttcac cagcgtttct gggtgagcaa 7080

aaacaggaag gcaaaatgcc gcaaaaaagg gaataagggc gacacggaaa tgttgaatac 7140

tcatattctt ccttttttcaa tattattgaa gcatttatca gggttattgt ctcatgagcg 7200

gatacatatt tgaatgtatt tagaaaaata aacaaatagg ggtcagtgtt acaaccaatt 7260

aaccaattct gaacattatc gcgagcccat ttatacctga atatggctca taacacccct 7320

tgtttgcctg gcggcagtag cgcggtggtc ccacctgacc ccatgccgaa ctcagaagtg 7380

aaacgccgta gcgccgatgg tagtgtgggg actccccatg cgagagtagg gaactgccag 7440

gcatcaaata aaacgaaagg ctcagtcgaa agactgggcc tttcgcccgg gctaattatg 7500

gggtgtcgcc cttattcgac tctatagtga agttcctatt ctctagtagt ataggaactt 7560

ctgaagtggg gctcgagggc cggcccagcc gtcaaggtta aggctggcca tatcagcgac 7620

tgaaaagcgg ccagcctcgg ccttgtttga cgtataacca aagccaccgg gcaaccaata 7680

gcccttgtca cttttgatca ggtagaccga ccctgaagcg ctttttttcgt attccataaa 7740

acccccttct gtgcgtgagt actcatagta taacaggcgt gagtaccaac gct 7793

<210> 73
<211> 1365
<212> DNA
<213> Pseudomonas syringae

<220>
<221> CDS
<222> (1)..(1365)

<400> 73

```
atg agc gcg aat aac cct caa acc ctg gaa tgg caa gca ctg agc agc          48
Met Ser Ala Asn Asn Pro Gln Thr Leu Glu Trp Gln Ala Leu Ser Ser
1               5                   10                  15

gag cac cac ttg gcc ccg ttc agc gac tat aaa caa ctg aaa gag aaa          96
Glu His His Leu Ala Pro Phe Ser Asp Tyr Lys Gln Leu Lys Glu Lys
            20                  25                  30

ggt ccg cgt atc atc acg cgc gca gag ggt gtc tac ctg tgg gac tct         144
Gly Pro Arg Ile Ile Thr Arg Ala Glu Gly Val Tyr Leu Trp Asp Ser
        35                  40                  45

gaa ggc aat aag att ctg gat ggc atg tcc ggc ctg tgg tgc gtg gcg         192
Glu Gly Asn Lys Ile Leu Asp Gly Met Ser Gly Leu Trp Cys Val Ala
    50                  55                  60

atc ggc tac ggt cgt gaa gag ctg gcg gac gcg gcg agc aaa caa atg         240
Ile Gly Tyr Gly Arg Glu Glu Leu Ala Asp Ala Ala Ser Lys Gln Met
65                  70                  75                  80

cgt gaa ctg ccg tac tat aac ttg ttt ttc cag acc gcc cat ccg cct         288
Arg Glu Leu Pro Tyr Tyr Asn Leu Phe Phe Gln Thr Ala His Pro Pro
                85                  90                  95

gtt ctg gaa ctg gcc aag gcg att agc gac att gcg ccg gaa ggt atg         336
Val Leu Glu Leu Ala Lys Ala Ile Ser Asp Ile Ala Pro Glu Gly Met
            100                 105                 110

aat cac gtt ttc ttc acg ggt agc ggt agc gaa ggt aac gac acg atg         384
Asn His Val Phe Phe Thr Gly Ser Gly Ser Glu Gly Asn Asp Thr Met
        115                 120                 125
```

```
ttg cgt atg gtc cgt cac tac tgg gca ctg aaa ggt caa ccg aac aaa          432
Leu Arg Met Val Arg His Tyr Trp Ala Leu Lys Gly Gln Pro Asn Lys
    130                 135                 140

aag acc att atc agc cgt gtt aac ggc tac cat ggc tct acc gtg gca          480
Lys Thr Ile Ile Ser Arg Val Asn Gly Tyr His Gly Ser Thr Val Ala
145                 150                 155                 160

ggc gca agc ctg ggc ggc atg acc tat atg cat gag caa ggt gac ctg          528
Gly Ala Ser Leu Gly Gly Met Thr Tyr Met His Glu Gln Gly Asp Leu
                165                 170                 175

ccg att ccg ggc gtg gtc cac atc ccg cag ccg tat tgg ttc ggc gag          576
Pro Ile Pro Gly Val Val His Ile Pro Gln Pro Tyr Trp Phe Gly Glu
            180                 185                 190

ggt ggc gac atg acg ccg gac gag ttt ggt att tgg gcg gct gag cag          624
Gly Gly Asp Met Thr Pro Asp Glu Phe Gly Ile Trp Ala Ala Glu Gln
        195                 200                 205

ttg gag aag aag atc ctg gag ctg ggt gta gag aat gtg ggc gcc ttc          672
Leu Glu Lys Lys Ile Leu Glu Leu Gly Val Glu Asn Val Gly Ala Phe
    210                 215                 220

atc gct gag ccg att cag ggc gct ggt ggt gtt atc gtt ccg ccg gac          720
Ile Ala Glu Pro Ile Gln Gly Ala Gly Gly Val Ile Val Pro Pro Asp
225                 230                 235                 240

tcc tac tgg ccg aag att aaa gaa att ctg agc cgc tac gat att ctg          768
Ser Tyr Trp Pro Lys Ile Lys Glu Ile Leu Ser Arg Tyr Asp Ile Leu
                245                 250                 255

ttt gcg gcg gac gaa gta att tgc ggt ttc ggt cgc acc agc gag tgg          816
Phe Ala Ala Asp Glu Val Ile Cys Gly Phe Gly Arg Thr Ser Glu Trp
            260                 265                 270

ttt ggt agc gac ttc tat ggt ctg cgt ccg gat atg atg act atc gca          864
Phe Gly Ser Asp Phe Tyr Gly Leu Arg Pro Asp Met Met Thr Ile Ala
        275                 280                 285

aag ggt ctg acg tct ggt tac gtc ccg atg ggt ggc ctg atc gtg cgt          912
Lys Gly Leu Thr Ser Gly Tyr Val Pro Met Gly Gly Leu Ile Val Arg
    290                 295                 300

gat gag atc gtt gct gtg ctg aat gag ggt ggt gac ttt aat cac ggt          960
Asp Glu Ile Val Ala Val Leu Asn Glu Gly Gly Asp Phe Asn His Gly
305                 310                 315                 320

ttt acc tac agc ggc cat ccg gtc gcc gca gcg gtt gca ctg gaa aac         1008
Phe Thr Tyr Ser Gly His Pro Val Ala Ala Ala Val Ala Leu Glu Asn
                325                 330                 335

atc cgc att ctg cgt gaa gag aag att gtc gag cgt gtc cgt tcg gaa         1056
Ile Arg Ile Leu Arg Glu Glu Lys Ile Val Glu Arg Val Arg Ser Glu
            340                 345                 350

acc gcg cca tat ctg cag aaa cgt ctg cgc gag ctg tcc gat cac ccg         1104
Thr Ala Pro Tyr Leu Gln Lys Arg Leu Arg Glu Leu Ser Asp His Pro
        355                 360                 365

ttg gtc ggc gaa gtg cgc ggt gtg ggt ctg ctg ggc gcg att gag ctg         1152
Leu Val Gly Glu Val Arg Gly Val Gly Leu Leu Gly Ala Ile Glu Leu
    370                 375                 380

gtt aag gat aaa acc acg cgt gaa cgt tat acc gac aag ggt gcc ggc         1200
Val Lys Asp Lys Thr Thr Arg Glu Arg Tyr Thr Asp Lys Gly Ala Gly
385                 390                 395                 400
```

```
atg atc tgt cgc acg ttt tgt ttt gat aac ggt ctg atc atg cgc gct        1248
Met Ile Cys Arg Thr Phe Cys Phe Asp Asn Gly Leu Ile Met Arg Ala
                405                 410                 415

gtg ggc gat acc atg atc att gcc cca ccg ttg gtt atc agc ttc gcg        1296
Val Gly Asp Thr Met Ile Ile Ala Pro Pro Leu Val Ile Ser Phe Ala
            420                 425                 430

cag att gat gaa ctg gtt gag aaa gcg cgt acc tgc ctg gat ctg act        1344
Gln Ile Asp Glu Leu Val Glu Lys Ala Arg Thr Cys Leu Asp Leu Thr
        435                 440                 445

ttg gcg gtg ctg cag ggt taa                                           1365
Leu Ala Val Leu Gln Gly
    450
```

<210> 74
<211> 454
<212> PRT
<213> Pseudomonas syringae

<400> 74

```
Met Ser Ala Asn Asn Pro Gln Thr Leu Glu Trp Gln Ala Leu Ser Ser
1               5                   10                  15

Glu His His Leu Ala Pro Phe Ser Asp Tyr Lys Gln Leu Lys Glu Lys
            20                  25                  30

Gly Pro Arg Ile Ile Thr Arg Ala Glu Gly Val Tyr Leu Trp Asp Ser
        35                  40                  45

Glu Gly Asn Lys Ile Leu Asp Gly Met Ser Gly Leu Trp Cys Val Ala
    50                  55                  60

Ile Gly Tyr Gly Arg Glu Glu Leu Ala Asp Ala Ala Ser Lys Gln Met
65                  70                  75                  80

Arg Glu Leu Pro Tyr Tyr Asn Leu Phe Phe Gln Thr Ala His Pro Pro
                85                  90                  95

Val Leu Glu Leu Ala Lys Ala Ile Ser Asp Ile Ala Pro Glu Gly Met
            100                 105                 110

Asn His Val Phe Phe Thr Gly Ser Gly Ser Glu Gly Asn Asp Thr Met
        115                 120                 125

Leu Arg Met Val Arg His Tyr Trp Ala Leu Lys Gly Gln Pro Asn Lys
    130                 135                 140

Lys Thr Ile Ile Ser Arg Val Asn Gly Tyr His Gly Ser Thr Val Ala
145                 150                 155                 160

Gly Ala Ser Leu Gly Gly Met Thr Tyr Met His Glu Gln Gly Asp Leu
                165                 170                 175
```

Pro Ile Pro Gly Val Val His Ile Pro Gln Pro Tyr Trp Phe Gly Glu
180 185 190

Gly Gly Asp Met Thr Pro Asp Glu Phe Gly Ile Trp Ala Ala Glu Gln
195 200 205

Leu Glu Lys Lys Ile Leu Glu Leu Gly Val Glu Asn Val Gly Ala Phe
210 215 220

Ile Ala Glu Pro Ile Gln Gly Ala Gly Gly Val Ile Val Pro Pro Asp
225 230 235 240

Ser Tyr Trp Pro Lys Ile Lys Glu Ile Leu Ser Arg Tyr Asp Ile Leu
245 250 255

Phe Ala Ala Asp Glu Val Ile Cys Gly Phe Gly Arg Thr Ser Glu Trp
260 265 270

Phe Gly Ser Asp Phe Tyr Gly Leu Arg Pro Asp Met Met Thr Ile Ala
275 280 285

Lys Gly Leu Thr Ser Gly Tyr Val Pro Met Gly Gly Leu Ile Val Arg
290 295 300

Asp Glu Ile Val Ala Val Leu Asn Glu Gly Gly Asp Phe Asn His Gly
305 310 315 320

Phe Thr Tyr Ser Gly His Pro Val Ala Ala Ala Val Ala Leu Glu Asn
325 330 335

Ile Arg Ile Leu Arg Glu Glu Lys Ile Val Glu Arg Val Arg Ser Glu
340 345 350

Thr Ala Pro Tyr Leu Gln Lys Arg Leu Arg Glu Leu Ser Asp His Pro
355 360 365

Leu Val Gly Glu Val Arg Gly Val Gly Leu Leu Gly Ala Ile Glu Leu
370 375 380

Val Lys Asp Lys Thr Thr Arg Glu Arg Tyr Thr Asp Lys Gly Ala Gly
385 390 395 400

Met Ile Cys Arg Thr Phe Cys Phe Asp Asn Gly Leu Ile Met Arg Ala
405 410 415

Val Gly Asp Thr Met Ile Ile Ala Pro Pro Leu Val Ile Ser Phe Ala
420 425 430

Gln Ile Asp Glu Leu Val Glu Lys Ala Arg Thr Cys Leu Asp Leu Thr
435 440 445

```
Leu Ala Val Leu Gln Gly
    450


<210>  75
<211>  1365
<212>  DNA
<213>  Pseudomonas protegens Pf-5


<220>
<221>  CDS
<222>  (1)..(1365)

<400>  75
atg acc cac aaa aac ccg cag acc cgt gaa tgg caa acc ctg agc agc          48
Met Thr His Lys Asn Pro Gln Thr Arg Glu Trp Gln Thr Leu Ser Ser
1               5                   10                  15

gac cac cac ttg gcc ccg ttt agc gac ttc aag cag ctg aaa gag aaa          96
Asp His His Leu Ala Pro Phe Ser Asp Phe Lys Gln Leu Lys Glu Lys
            20                  25                  30

ggt ccg cgc att atc acc cac gcg aaa ggt gtg tat ttg tgg gat agc         144
Gly Pro Arg Ile Ile Thr His Ala Lys Gly Val Tyr Leu Trp Asp Ser
        35                  40                  45

gag ggt aat caa att ctg gat ggc atg gcg ggt ctg tgg tgc gtc gcc         192
Glu Gly Asn Gln Ile Leu Asp Gly Met Ala Gly Leu Trp Cys Val Ala
    50                  55                  60

atc ggt tac ggc cgt gat gag ctg gca gag gcg gct agc aag cag atg         240
Ile Gly Tyr Gly Arg Asp Glu Leu Ala Glu Ala Ala Ser Lys Gln Met
65                  70                  75                  80

cgt gag ctg cca tat tac aat ctg ttc ttt caa acc gcg cat ccg ccg         288
Arg Glu Leu Pro Tyr Tyr Asn Leu Phe Phe Gln Thr Ala His Pro Pro
                85                  90                  95

gtc ctg gaa ctg agc aaa gcg att gcg gat att gcg cca gaa ggc atg         336
Val Leu Glu Leu Ser Lys Ala Ile Ala Asp Ile Ala Pro Glu Gly Met
            100                 105                 110

aac cac gtt ttc ttc acc ggc agc ggc tct gag ggc aat gat acc atg         384
Asn His Val Phe Phe Thr Gly Ser Gly Ser Glu Gly Asn Asp Thr Met
        115                 120                 125

ctg cgc atg gtc cgt cac tat tgg gcc atc aag ggc caa ccg aac aag         432
Leu Arg Met Val Arg His Tyr Trp Ala Ile Lys Gly Gln Pro Asn Lys
    130                 135                 140

aaa acg atc att agc cgc gtg aac ggt tat cac ggt agc act gtt gca         480
Lys Thr Ile Ile Ser Arg Val Asn Gly Tyr His Gly Ser Thr Val Ala
145                 150                 155                 160

ggt gct agc ctg ggc ggt atg acc tac atg cac gag cag ggt gac ctg         528
Gly Ala Ser Leu Gly Gly Met Thr Tyr Met His Glu Gln Gly Asp Leu
                165                 170                 175

ccg att ccg ggt att gtc cat att ccg cag ccg tac tgg ttc gcg gaa         576
Pro Ile Pro Gly Ile Val His Ile Pro Gln Pro Tyr Trp Phe Ala Glu
            180                 185                 190

ggt ggt gat atg agc ccg gaa gaa ttt ggc att tgg gcc gca aac cag         624
Gly Gly Asp Met Ser Pro Glu Glu Phe Gly Ile Trp Ala Ala Asn Gln
        195                 200                 205
```

```
ttg gaa gag aag atc ctg gag ctg ggc gtg gac aat gtc ggc gcg ttc        672
Leu Glu Glu Lys Ile Leu Glu Leu Gly Val Asp Asn Val Gly Ala Phe
    210                 215                 220

atc gca gag ccg atc cag ggc gct ggt ggt gta atc gtg ccg cct gat        720
Ile Ala Glu Pro Ile Gln Gly Ala Gly Gly Val Ile Val Pro Pro Asp
225                 230                 235                 240

tcc tat tgg cct cgt atc aaa gaa att ctg gcg aag tac gac att ctg        768
Ser Tyr Trp Pro Arg Ile Lys Glu Ile Leu Ala Lys Tyr Asp Ile Leu
                245                 250                 255

ttc gtc gcg gac gaa gtg atc tgt ggc ttt ggt cgc acg ggt gaa tgg        816
Phe Val Ala Asp Glu Val Ile Cys Gly Phe Gly Arg Thr Gly Glu Trp
            260                 265                 270

ttt ggc agc gac ttt tac gac ctg aag ccg gac atg atg acc atc gca        864
Phe Gly Ser Asp Phe Tyr Asp Leu Lys Pro Asp Met Met Thr Ile Ala
        275                 280                 285

aag ggt ctg acg tcg ggt tac att cct atg ggc ggt ctg atc gtt cgt        912
Lys Gly Leu Thr Ser Gly Tyr Ile Pro Met Gly Gly Leu Ile Val Arg
    290                 295                 300

gat gaa gtg gtg gcc gtg ctg aac gag ggt ggt gac ttt aat cac ggt        960
Asp Glu Val Val Ala Val Leu Asn Glu Gly Gly Asp Phe Asn His Gly
305                 310                 315                 320

ttc act tac tct ggt cat ccg gtc gcc gca gcg gtg gcc ctg gag aac       1008
Phe Thr Tyr Ser Gly His Pro Val Ala Ala Ala Val Ala Leu Glu Asn
                325                 330                 335

att cgc atc atg cgc gaa gag aaa atc att caa cgt gca cat gaa aag       1056
Ile Arg Ile Met Arg Glu Glu Lys Ile Ile Gln Arg Ala His Glu Lys
            340                 345                 350

gca gcg ccg tac ctg caa aaa cgt ttg cgt gag ttg tcc gat cat ccg       1104
Ala Ala Pro Tyr Leu Gln Lys Arg Leu Arg Glu Leu Ser Asp His Pro
        355                 360                 365

ctg gtc ggc gag gtt cgt ggc gtt ggc ctg ctg ggt gcg atc gag ctg       1152
Leu Val Gly Glu Val Arg Gly Val Gly Leu Leu Gly Ala Ile Glu Leu
    370                 375                 380

gtg aaa gat aaa gcg acg cgt gca cgt tat gag ggt cgt ggt gtt ggt       1200
Val Lys Asp Lys Ala Thr Arg Ala Arg Tyr Glu Gly Arg Gly Val Gly
385                 390                 395                 400

atg att tgt cgc cag ttc tgc ttt gat aat ggc ctg att atg cgt gca       1248
Met Ile Cys Arg Gln Phe Cys Phe Asp Asn Gly Leu Ile Met Arg Ala
                405                 410                 415

gtt ggt gac acg atg atc att gct ccg ccg ctg gtt atc tcc gag gcg       1296
Val Gly Asp Thr Met Ile Ile Ala Pro Pro Leu Val Ile Ser Glu Ala
            420                 425                 430

gaa atc gac gag ctg gtt gcg aag gct cgc aag tgc ttg gac ctg acc       1344
Glu Ile Asp Glu Leu Val Ala Lys Ala Arg Lys Cys Leu Asp Leu Thr
        435                 440                 445

ttg agc gtt ctg gaa ggt taa                                          1365
Leu Ser Val Leu Glu Gly
    450
```

<210> 76
<211> 454
<212> PRT

<213> Pseudomonas protegens Pf-5

<400> 76

```
Met Thr His Lys Asn Pro Gln Thr Arg Glu Trp Gln Thr Leu Ser Ser
1               5                  10                  15

Asp His His Leu Ala Pro Phe Ser Asp Phe Lys Gln Leu Lys Glu Lys
            20                  25                  30

Gly Pro Arg Ile Ile Thr His Ala Lys Gly Val Tyr Leu Trp Asp Ser
        35                  40                  45

Glu Gly Asn Gln Ile Leu Asp Gly Met Ala Gly Leu Trp Cys Val Ala
    50                  55                  60

Ile Gly Tyr Gly Arg Asp Glu Leu Ala Glu Ala Ala Ser Lys Gln Met
65                  70                  75                  80

Arg Glu Leu Pro Tyr Tyr Asn Leu Phe Phe Gln Thr Ala His Pro Pro
                85                  90                  95

Val Leu Glu Leu Ser Lys Ala Ile Ala Asp Ile Ala Pro Glu Gly Met
            100                 105                 110

Asn His Val Phe Phe Thr Gly Ser Gly Ser Glu Gly Asn Asp Thr Met
        115                 120                 125

Leu Arg Met Val Arg His Tyr Trp Ala Ile Lys Gly Gln Pro Asn Lys
    130                 135                 140

Lys Thr Ile Ile Ser Arg Val Asn Gly Tyr His Gly Ser Thr Val Ala
145                 150                 155                 160

Gly Ala Ser Leu Gly Gly Met Thr Tyr Met His Glu Gln Gly Asp Leu
                165                 170                 175

Pro Ile Pro Gly Ile Val His Ile Pro Gln Pro Tyr Trp Phe Ala Glu
            180                 185                 190

Gly Gly Asp Met Ser Pro Glu Glu Phe Gly Ile Trp Ala Ala Asn Gln
        195                 200                 205

Leu Glu Glu Lys Ile Leu Glu Leu Gly Val Asp Asn Val Gly Ala Phe
    210                 215                 220

Ile Ala Glu Pro Ile Gln Gly Ala Gly Gly Val Ile Val Pro Pro Asp
225                 230                 235                 240

Ser Tyr Trp Pro Arg Ile Lys Glu Ile Leu Ala Lys Tyr Asp Ile Leu
                245                 250                 255
```

Phe Val Ala Asp Glu Val Ile Cys Gly Phe Gly Arg Thr Gly Glu Trp
260 265 270

Phe Gly Ser Asp Phe Tyr Asp Leu Lys Pro Asp Met Met Thr Ile Ala
275 280 285

Lys Gly Leu Thr Ser Gly Tyr Ile Pro Met Gly Gly Leu Ile Val Arg
290 295 300

Asp Glu Val Val Ala Val Leu Asn Glu Gly Gly Asp Phe Asn His Gly
305 310 315 320

Phe Thr Tyr Ser Gly His Pro Val Ala Ala Ala Val Ala Leu Glu Asn
325 330 335

Ile Arg Ile Met Arg Glu Glu Lys Ile Ile Gln Arg Ala His Glu Lys
340 345 350

Ala Ala Pro Tyr Leu Gln Lys Arg Leu Arg Glu Leu Ser Asp His Pro
355 360 365

Leu Val Gly Glu Val Arg Gly Val Gly Leu Leu Gly Ala Ile Glu Leu
370 375 380

Val Lys Asp Lys Ala Thr Arg Ala Arg Tyr Glu Gly Arg Gly Val Gly
385 390 395 400

Met Ile Cys Arg Gln Phe Cys Phe Asp Asn Gly Leu Ile Met Arg Ala
405 410 415

Val Gly Asp Thr Met Ile Ile Ala Pro Pro Leu Val Ile Ser Glu Ala
420 425 430

Glu Ile Asp Glu Leu Val Ala Lys Ala Arg Lys Cys Leu Asp Leu Thr
435 440 445

Leu Ser Val Leu Glu Gly
450

<210> 77
<211> 1368
<212> DNA
<213> Pseudomonas syringae

<220>
<221> CDS
<222> (1)..(1368)

<400> 77
atg tcg gcc cac aat aac ccg caa acc ctg gaa tgg caa gca ctg agc 48
Met Ser Ala His Asn Asn Pro Gln Thr Leu Glu Trp Gln Ala Leu Ser
1 5 10 15

agc gag cat cac ctg gcg ccg ttc agc gac tac aaa caa ctg aaa gag 96

```
Ser Glu His His Leu Ala Pro Phe Ser Asp Tyr Lys Gln Leu Lys Glu
            20                  25                  30

aaa ggt cct cgc atc att acc cgt gcg gaa ggc gtc tac ctg tgg gat        144
Lys Gly Pro Arg Ile Ile Thr Arg Ala Glu Gly Val Tyr Leu Trp Asp
        35                  40                  45

agc gag ggt aac aag atc ctg gat ggt atg tcc ggt ctg tgg tgt gtc        192
Ser Glu Gly Asn Lys Ile Leu Asp Gly Met Ser Gly Leu Trp Cys Val
    50                  55                  60

gcg atc ggt tat ggc cgt gaa gag ctg gcg gac gcg gcg agc aag cag        240
Ala Ile Gly Tyr Gly Arg Glu Glu Leu Ala Asp Ala Ala Ser Lys Gln
65                  70                  75                  80

atg cgt gag ctg ccg tac tac aat ctg ttt ttc cag act gcg cat ccg        288
Met Arg Glu Leu Pro Tyr Tyr Asn Leu Phe Phe Gln Thr Ala His Pro
                85                  90                  95

ccg gtt ttg gag ctg gca aag gcg att tcc gaa att gct ccg cag ggt        336
Pro Val Leu Glu Leu Ala Lys Ala Ile Ser Glu Ile Ala Pro Gln Gly
            100                 105                 110

atg aat cac gtg ttc ttt acc ggt agc ggc agc gaa ggt aat gac acg        384
Met Asn His Val Phe Phe Thr Gly Ser Gly Ser Glu Gly Asn Asp Thr
        115                 120                 125

atg ttg cgt atg gtc cgt cac tat tgg gcc ctg aaa ggt cag ccg gac        432
Met Leu Arg Met Val Arg His Tyr Trp Ala Leu Lys Gly Gln Pro Asp
    130                 135                 140

aag aaa acc atc atc tcc cgt gtt aat ggc tat cac ggc tct acc gtg        480
Lys Lys Thr Ile Ile Ser Arg Val Asn Gly Tyr His Gly Ser Thr Val
145                 150                 155                 160

gct ggt gcg agc ctg ggt ggt atg acc tac atg cac gag cag ggc gat        528
Ala Gly Ala Ser Leu Gly Gly Met Thr Tyr Met His Glu Gln Gly Asp
                165                 170                 175

ctg ccg att cca ggt gtg gtg cat atc ccg caa ccg tac tgg ttc ggt        576
Leu Pro Ile Pro Gly Val Val His Ile Pro Gln Pro Tyr Trp Phe Gly
            180                 185                 190

gaa ggt ggt gat atg act cct gat gag ttc ggc gtt tgg gcc gca gag        624
Glu Gly Gly Asp Met Thr Pro Asp Glu Phe Gly Val Trp Ala Ala Glu
        195                 200                 205

cag ctg gag aag aaa atc atc gag ctg ggt gtg gaa aac gtc ggt gcg        672
Gln Leu Glu Lys Lys Ile Ile Glu Leu Gly Val Glu Asn Val Gly Ala
    210                 215                 220

ttt att gcg gaa ccg atc cag ggt gca ggc ggc gtc atc gtg cca ccg        720
Phe Ile Ala Glu Pro Ile Gln Gly Ala Gly Gly Val Ile Val Pro Pro
225                 230                 235                 240

gat agc tat tgg ccg aag att aaa gaa att ctg agc cgt tat gat atc        768
Asp Ser Tyr Trp Pro Lys Ile Lys Glu Ile Leu Ser Arg Tyr Asp Ile
                245                 250                 255

ctg ttt gct gcc gac gag gtg atc tgt ggt ttt ggc cgt acg agc gag        816
Leu Phe Ala Ala Asp Glu Val Ile Cys Gly Phe Gly Arg Thr Ser Glu
            260                 265                 270

tgg ttc ggc agc gac ttc tac ggt ctg aag ccg gat atg atg acg att        864
Trp Phe Gly Ser Asp Phe Tyr Gly Leu Lys Pro Asp Met Met Thr Ile
        275                 280                 285

gcg aaa ggc ctg acg agc ggt tac gtg ccg atg ggc ggt ctg att gtt        912
```

```
Ala Lys Gly Leu Thr Ser Gly Tyr Val Pro Met Gly Gly Leu Ile Val
    290                 295                 300

cgc gac gag att gtt gcg gtc ctg aac gag ggt ggc gac ttc aac cac        960
Arg Asp Glu Ile Val Ala Val Leu Asn Glu Gly Gly Asp Phe Asn His
305                 310                 315                 320

ggt ttt acc tat tct ggc cat cca gtg gca gcg gcc gtt gca ctg gag       1008
Gly Phe Thr Tyr Ser Gly His Pro Val Ala Ala Ala Val Ala Leu Glu
                325                 330                 335

aat atc cgc att ttg cgt gaa gaa cgt att gtt gag cgc gtc aaa agc       1056
Asn Ile Arg Ile Leu Arg Glu Glu Arg Ile Val Glu Arg Val Lys Ser
            340                 345                 350

gaa acc gca ccg tat ttg caa aag cgt ctg cgc gaa ctg tct aac cat       1104
Glu Thr Ala Pro Tyr Leu Gln Lys Arg Leu Arg Glu Leu Ser Asn His
        355                 360                 365

ccg ctg gtc ggt gaa gtt cgc ggt gta ggc ctg ctg ggt gcg atc gag       1152
Pro Leu Val Gly Glu Val Arg Gly Val Gly Leu Leu Gly Ala Ile Glu
    370                 375                 380

ttg gtc aag gat aaa gtt acc cgt gaa cgc tac acg gac aag ggc gca       1200
Leu Val Lys Asp Lys Val Thr Arg Glu Arg Tyr Thr Asp Lys Gly Ala
385                 390                 395                 400

ggt atg att tgc cgc acg ttc tgc ttt gac aac ggc ctg atc atg cgt       1248
Gly Met Ile Cys Arg Thr Phe Cys Phe Asp Asn Gly Leu Ile Met Arg
                405                 410                 415

gcc gtt ggc gac acc atg att att gca ccg ccg ttg gtt att agc ttt       1296
Ala Val Gly Asp Thr Met Ile Ile Ala Pro Pro Leu Val Ile Ser Phe
            420                 425                 430

gct gag atc gac gag ttg gtg gaa aaa gcc cgt aag tgc ctg gat ctg       1344
Ala Glu Ile Asp Glu Leu Val Glu Lys Ala Arg Lys Cys Leu Asp Leu
        435                 440                 445

acc ctg gcg gtg ctg ctg ggt taa                                      1368
Thr Leu Ala Val Leu Leu Gly
    450                 455


<210>  78
<211>  455
<212>  PRT
<213>  Pseudomonas syringae

<400>  78

Met Ser Ala His Asn Asn Pro Gln Thr Leu Glu Trp Gln Ala Leu Ser
1               5                   10                  15

Ser Glu His His Leu Ala Pro Phe Ser Asp Tyr Lys Gln Leu Lys Glu
            20                  25                  30

Lys Gly Pro Arg Ile Ile Thr Arg Ala Glu Gly Val Tyr Leu Trp Asp
        35                  40                  45

Ser Glu Gly Asn Lys Ile Leu Asp Gly Met Ser Gly Leu Trp Cys Val
    50                  55                  60

Ala Ile Gly Tyr Gly Arg Glu Glu Leu Ala Asp Ala Ala Ser Lys Gln
```

65 70 75 80

Met Arg Glu Leu Pro Tyr Tyr Asn Leu Phe Phe Gln Thr Ala His Pro
85 90 95

Pro Val Leu Glu Leu Ala Lys Ala Ile Ser Glu Ile Ala Pro Gln Gly
100 105 110

Met Asn His Val Phe Phe Thr Gly Ser Gly Ser Glu Gly Asn Asp Thr
115 120 125

Met Leu Arg Met Val Arg His Tyr Trp Ala Leu Lys Gly Gln Pro Asp
130 135 140

Lys Lys Thr Ile Ile Ser Arg Val Asn Gly Tyr His Gly Ser Thr Val
145 150 155 160

Ala Gly Ala Ser Leu Gly Gly Met Thr Tyr Met His Glu Gln Gly Asp
165 170 175

Leu Pro Ile Pro Gly Val Val His Ile Pro Gln Pro Tyr Trp Phe Gly
180 185 190

Glu Gly Gly Asp Met Thr Pro Asp Glu Phe Gly Val Trp Ala Ala Glu
195 200 205

Gln Leu Glu Lys Lys Ile Ile Glu Leu Gly Val Glu Asn Val Gly Ala
210 215 220

Phe Ile Ala Glu Pro Ile Gln Gly Ala Gly Gly Val Ile Val Pro Pro
225 230 235 240

Asp Ser Tyr Trp Pro Lys Ile Lys Glu Ile Leu Ser Arg Tyr Asp Ile
245 250 255

Leu Phe Ala Ala Asp Glu Val Ile Cys Gly Phe Gly Arg Thr Ser Glu
260 265 270

Trp Phe Gly Ser Asp Phe Tyr Gly Leu Lys Pro Asp Met Met Thr Ile
275 280 285

Ala Lys Gly Leu Thr Ser Gly Tyr Val Pro Met Gly Gly Leu Ile Val
290 295 300

Arg Asp Glu Ile Val Ala Val Leu Asn Glu Gly Gly Asp Phe Asn His
305 310 315 320

Gly Phe Thr Tyr Ser Gly His Pro Val Ala Ala Ala Val Ala Leu Glu
325 330 335

Asn Ile Arg Ile Leu Arg Glu Glu Arg Ile Val Glu Arg Val Lys Ser

340 345 350

Glu Thr Ala Pro Tyr Leu Gln Lys Arg Leu Arg Glu Leu Ser Asn His
355 360 365

Pro Leu Val Gly Glu Val Arg Gly Val Gly Leu Leu Gly Ala Ile Glu
370 375 380

Leu Val Lys Asp Lys Val Thr Arg Glu Arg Tyr Thr Asp Lys Gly Ala
385 390 395 400

Gly Met Ile Cys Arg Thr Phe Cys Phe Asp Asn Gly Leu Ile Met Arg
405 410 415

Ala Val Gly Asp Thr Met Ile Ile Ala Pro Pro Leu Val Ile Ser Phe
420 425 430

Ala Glu Ile Asp Glu Leu Val Glu Lys Ala Arg Lys Cys Leu Asp Leu
435 440 445

Thr Leu Ala Val Leu Leu Gly
450 455

<210> 79
<211> 1368
<212> DNA
<213> Pseudomonas syringae

<220>
<221> CDS
<222> (1)..(1368)

<400> 79

```
atg tcg gcg aac aat aac cct caa acc ctg gaa tgg caa gca ctg agc          48
Met Ser Ala Asn Asn Asn Pro Gln Thr Leu Glu Trp Gln Ala Leu Ser
1               5                   10                  15

agc gag cac cat ctg gcg ccg ttc agc gac tat aag cag ctg aaa gag          96
Ser Glu His His Leu Ala Pro Phe Ser Asp Tyr Lys Gln Leu Lys Glu
            20                  25                  30

aag ggt cca cgt att atc acc cgc gct gaa ggt gtt tac ctg tgg gat         144
Lys Gly Pro Arg Ile Ile Thr Arg Ala Glu Gly Val Tyr Leu Trp Asp
        35                  40                  45

agc gag ggc cat aag ata ttg gat ggt atg agc ggc ctg tgg tgt gtt         192
Ser Glu Gly His Lys Ile Leu Asp Gly Met Ser Gly Leu Trp Cys Val
    50                  55                  60

gca atc ggt tat ggt cgc gaa gag ctg gcg gac gcg gcc agc aag cag         240
Ala Ile Gly Tyr Gly Arg Glu Glu Leu Ala Asp Ala Ala Ser Lys Gln
65                  70                  75                  80

atg cgt gaa ctg ccg tat tac aat ctg ttc ttc caa acg gcg cat ccg         288
Met Arg Glu Leu Pro Tyr Tyr Asn Leu Phe Phe Gln Thr Ala His Pro
                85                  90                  95

ccg gtt ctg gag ctg gcc aaa gct atc agc gaa att gca ccg caa ggc         336
Pro Val Leu Glu Leu Ala Lys Ala Ile Ser Glu Ile Ala Pro Gln Gly
```

100 105 110

atg aac cat gtg ttc ttc acg ggt tct ggc tcc gag ggc aac gat acc 384
Met Asn His Val Phe Phe Thr Gly Ser Gly Ser Glu Gly Asn Asp Thr
115 120 125

atg ctg cgt atg gtc cgt cac tac tgg gcg ctg aaa ggt caa ccg aat 432
Met Leu Arg Met Val Arg His Tyr Trp Ala Leu Lys Gly Gln Pro Asn
130 135 140

aag aaa act att atc agc cgt gtc aac ggt tac cac ggt agc acg gtc 480
Lys Lys Thr Ile Ile Ser Arg Val Asn Gly Tyr His Gly Ser Thr Val
145 150 155 160

gca ggc gcc agc ctg ggt ggt atg acc tac atg cat gag cag ggt gac 528
Ala Gly Ala Ser Leu Gly Gly Met Thr Tyr Met His Glu Gln Gly Asp
165 170 175

ttg ccg att ccg ggt att gcg cac att ccg cag ccg tat tgg ttc ggc 576
Leu Pro Ile Pro Gly Ile Ala His Ile Pro Gln Pro Tyr Trp Phe Gly
180 185 190

gag ggc ggt gat atg acc ccg gat gag ttt ggc gtg tgg gca gcg gaa 624
Glu Gly Gly Asp Met Thr Pro Asp Glu Phe Gly Val Trp Ala Ala Glu
195 200 205

cag ctg gag aag aag atc ctg gaa ctg ggt gta gaa aat gtt gcg gcc 672
Gln Leu Glu Lys Lys Ile Leu Glu Leu Gly Val Glu Asn Val Ala Ala
210 215 220

ttt atc gcg gaa ccg gtc cag ggt gcg ggt ggt gtg att gtg ccg cct 720
Phe Ile Ala Glu Pro Val Gln Gly Ala Gly Gly Val Ile Val Pro Pro
225 230 235 240

gaa agc tat tgg ccg aag atc aaa gaa att ctg tcc cgc tac gac atc 768
Glu Ser Tyr Trp Pro Lys Ile Lys Glu Ile Leu Ser Arg Tyr Asp Ile
245 250 255

ctg ttt gcg gcg gat gag gtg att tgc ggt ttc ggt cgt acc ggc gag 816
Leu Phe Ala Ala Asp Glu Val Ile Cys Gly Phe Gly Arg Thr Gly Glu
260 265 270

tgg ttt ggt agc gac ttc tac ggt ctg aag cca gat atg atg acg att 864
Trp Phe Gly Ser Asp Phe Tyr Gly Leu Lys Pro Asp Met Met Thr Ile
275 280 285

gct aaa ggc ctg acc tct ggc tat gtt ccg atg ggc ggt ctg atc gtt 912
Ala Lys Gly Leu Thr Ser Gly Tyr Val Pro Met Gly Gly Leu Ile Val
290 295 300

cgt gac gag atc gtg gca gtg ctg aac gag ggt ggt gac ttt aat cac 960
Arg Asp Glu Ile Val Ala Val Leu Asn Glu Gly Gly Asp Phe Asn His
305 310 315 320

ggc ttt acg tat agc ggc cac cca gtg gct gcg gcg gtt gcc ctg gag 1008
Gly Phe Thr Tyr Ser Gly His Pro Val Ala Ala Ala Val Ala Leu Glu
325 330 335

aat att cgt atc ttg cgt gaa gag cgc atc gtg gag cgt gtc aag tcc 1056
Asn Ile Arg Ile Leu Arg Glu Glu Arg Ile Val Glu Arg Val Lys Ser
340 345 350

gaa act gca ccg tac ctg cag aaa cgt ctg cgt gaa ttg aat gat cac 1104
Glu Thr Ala Pro Tyr Leu Gln Lys Arg Leu Arg Glu Leu Asn Asp His
355 360 365

ccg ctg gtc ggt gaa gtt cgc ggt gtc ggc ttg ctg ggc gcc att gag 1152
Pro Leu Val Gly Glu Val Arg Gly Val Gly Leu Leu Gly Ala Ile Glu

370 375 380

ctg gtc aaa gac aaa gtt acc cgc gag cgt tac acc gac aaa ggt gct 1200
Leu Val Lys Asp Lys Val Thr Arg Glu Arg Tyr Thr Asp Lys Gly Ala
385 390 395 400

ggc atg att tgc cgc acc ttt tgt ttc gag aac ggc ctg att atg cgt 1248
Gly Met Ile Cys Arg Thr Phe Cys Phe Glu Asn Gly Leu Ile Met Arg
405 410 415

gcg gtt ggt gac acg atg att atc gca ccg ccg ctg gtc atc agc ttt 1296
Ala Val Gly Asp Thr Met Ile Ile Ala Pro Pro Leu Val Ile Ser Phe
420 425 430

gcc caa atc gac gag ctg gtg gaa aaa gcg cgc acg tgc ctg gat ctg 1344
Ala Gln Ile Asp Glu Leu Val Glu Lys Ala Arg Thr Cys Leu Asp Leu
435 440 445

acc ttg gca gtt ttg cag agc taa 1368
Thr Leu Ala Val Leu Gln Ser
450 455

<210> 80
<211> 455
<212> PRT
<213> Pseudomonas syringae

<400> 80

Met Ser Ala Asn Asn Asn Pro Gln Thr Leu Glu Trp Gln Ala Leu Ser
1 5 10 15

Ser Glu His His Leu Ala Pro Phe Ser Asp Tyr Lys Gln Leu Lys Glu
20 25 30

Lys Gly Pro Arg Ile Ile Thr Arg Ala Glu Gly Val Tyr Leu Trp Asp
35 40 45

Ser Glu Gly His Lys Ile Leu Asp Gly Met Ser Gly Leu Trp Cys Val
50 55 60

Ala Ile Gly Tyr Gly Arg Glu Glu Leu Ala Asp Ala Ala Ser Lys Gln
65 70 75 80

Met Arg Glu Leu Pro Tyr Tyr Asn Leu Phe Phe Gln Thr Ala His Pro
85 90 95

Pro Val Leu Glu Leu Ala Lys Ala Ile Ser Glu Ile Ala Pro Gln Gly
100 105 110

Met Asn His Val Phe Phe Thr Gly Ser Gly Ser Glu Gly Asn Asp Thr
115 120 125

Met Leu Arg Met Val Arg His Tyr Trp Ala Leu Lys Gly Gln Pro Asn
130 135 140

Lys Lys Thr Ile Ile Ser Arg Val Asn Gly Tyr His Gly Ser Thr Val
145 150 155 160

Ala Gly Ala Ser Leu Gly Gly Met Thr Tyr Met His Glu Gln Gly Asp
165 170 175

Leu Pro Ile Pro Gly Ile Ala His Ile Pro Gln Pro Tyr Trp Phe Gly
180 185 190

Glu Gly Gly Asp Met Thr Pro Asp Glu Phe Gly Val Trp Ala Ala Glu
195 200 205

Gln Leu Glu Lys Lys Ile Leu Glu Leu Gly Val Glu Asn Val Ala Ala
210 215 220

Phe Ile Ala Glu Pro Val Gln Gly Ala Gly Gly Val Ile Val Pro Pro
225 230 235 240

Glu Ser Tyr Trp Pro Lys Ile Lys Glu Ile Leu Ser Arg Tyr Asp Ile
245 250 255

Leu Phe Ala Ala Asp Glu Val Ile Cys Gly Phe Gly Arg Thr Gly Glu
260 265 270

Trp Phe Gly Ser Asp Phe Tyr Gly Leu Lys Pro Asp Met Met Thr Ile
275 280 285

Ala Lys Gly Leu Thr Ser Gly Tyr Val Pro Met Gly Gly Leu Ile Val
290 295 300

Arg Asp Glu Ile Val Ala Val Leu Asn Glu Gly Gly Asp Phe Asn His
305 310 315 320

Gly Phe Thr Tyr Ser Gly His Pro Val Ala Ala Ala Val Ala Leu Glu
325 330 335

Asn Ile Arg Ile Leu Arg Glu Glu Arg Ile Val Glu Arg Val Lys Ser
340 345 350

Glu Thr Ala Pro Tyr Leu Gln Lys Arg Leu Arg Glu Leu Asn Asp His
355 360 365

Pro Leu Val Gly Glu Val Arg Gly Val Gly Leu Leu Gly Ala Ile Glu
370 375 380

Leu Val Lys Asp Lys Val Thr Arg Glu Arg Tyr Thr Asp Lys Gly Ala
385 390 395 400

Gly Met Ile Cys Arg Thr Phe Cys Phe Glu Asn Gly Leu Ile Met Arg
405 410 415

Ala Val Gly Asp Thr Met Ile Ile Ala Pro Pro Leu Val Ile Ser Phe
420 425 430

Ala Gln Ile Asp Glu Leu Val Glu Lys Ala Arg Thr Cys Leu Asp Leu
435 440 445

Thr Leu Ala Val Leu Gln Ser
450 455

<210> 81
<211> 7943
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 81
ctagattatt aaccctgcag caccgccaaa gtcagatcca ggcaggtacg cgctttctca 60

accagttcat caatctgcgc gaagctgata accaacggtg gggcaatgat catggtatcg 120

cccacagcgc gcatgatcag accgttatca aaacaaaacg tgcgacagat catgccggca 180

cccttgtcgg tataacgttc acgcgtggtt ttatccttaa ccagctcaat cgcgcccagc 240

agacccacac cgcgcacttc gccgaccaac gggtgatcgg acagctcgcg cagacgtttc 300

tgcagatatg gcgcggtttc cgaacggaca cgctcgacaa tcttctcttc acgcagaatg 360

cggatgtttt ccagtgcaac cgctgcggcg accggatggc cgctgtaggt aaaaccgtga 420

ttaaagtcac caccctcatt cagcacagca acgatctcat cacgcacgat caggccaccc 480

atcgggacgt aaccagacgt cagacccttt gcgatagtca tcatatccgg acgcagacca 540

tagaagtcgc taccaaacca ctcgctggtg cgaccgaaac cgcaaattac ttcgtccgcc 600

gcaaacagaa tatcgtagcg gctcagaatt tctttaatct tcggccagta ggagtccggc 660

ggaacgataa caccaccagc gccctgaatc ggctcagcga tgaaggcgcc cacattctct 720

acacccagct ccaggatctt cttctccaac tgctcagccg cccaaatacc aaactcgtcc 780

ggcgtcatgt cgccaccctc gccgaaccaa tacggctgcg ggatgtggac cacgcccgga 840

atcggcaggt caccttgctc atgcatatag gtcatgccgc ccaggcttgc gcctgccacg 900

gtagagccat ggtagccgtt aacacggctg ataatggtct ttttgttcgg ttgacctttc 960

agtgcccagt agtgacggac catacgcaac atcgtgtcgt taccttcgct accgctaccc 1020

gtgaagaaaa cgtgattcat accttccggc gcaatgtcgc taatcgcctt ggccagttcc 1080

agaacaggcg gatgggcggt ctggaaaaac aagttatagt acggcagttc acgcatttgt 1140

ttgctcgccg cgtccgccag ctcttcacga ccgtagccga tcgccacgca ccacaggccg 1200

gacatgccat ccagaatctt attgccttca gagtcccaca ggtagacacc ctctgcgcgc 1260

gtgatgatac gcggaccttt ctctttcagt tgtttatagt cgctgaacgg ggccaagtgg 1320

tgctcgctgc tcagtgcttg ccattccagg gtttgagggt tattcgcgct catattatat 1380

ctccttaaag ctttaagcac ccgccacaga tgattcatcc tgtaaagctt tctcggcagg 1440

aacatactca tagcctagat ctcttgctac agcttcatag gtcacgtgtc cgtttgcggt 1500

gtttaaaccc gctctcagtg ccgtattgtc tgcgagcgct tttactgccc ctttgttcgc 1560

gatttgcagc gcgtatggaa cagtaacgtt agtcagggcg attgttgatg tacgagggac 1620

tgcgcctggc atgttcgcta cagcataatg cacaaccccg tgtttttcat atgttggctg 1680

atcatgtgtt gtgatatggt cgacagtttc gacgatgccg ccttggtcga tcgctacatc 1740

aacaataact gaaccgggtt tcatttgttt taccatttcc tcagtgacaa gagtcggagc 1800

tttagcaccc ggaattaata ccgcgcaaat gaggagatcc gcttccgcca cagcatcagc 1860

aatattgacc ggattagaaa ttaacgtttt aatctgatgg ccgaagatgt catcaagctg 1920

gcgcaagcgg tctgcgttta agtcaatgat cgtcacatct gcaccgaggc cgacagccat 1980

tttcgccgcg tttgtcccga caacgcctcc tccgataatt gttacttttc cgcgggaaac 2040

gccaggcacc ccggcaagca gaatgccttt tccgccttta ggcttttcta agaattgagc 2100

gccgatttgc gctgccattc tgcccgcaac ctctgacatt ggcgtcagaa gaggcaatgt 2160

ccggccttca ctgaccgttt catatgcgat ggcagttact cctttatcct tcaaggcctg 2220

tgcaagctca ggctcagctg ctaaatgaag gtacgtaaac agcacaagtc ctttgcgaaa 2280

ataaacatat tcttccggca gcggttcttt tactttcatg accatttcgg cgtcccagac 2340

ctgcttcgga tcagcaatga tttccgctcc tgctgactca taggcttcat tttcaaatcc 2400

gcttccaagg cccgcgcctg tttcaaccag cacccggtgg ccgtttgaaa tgagctgaga 2460

aacgcccccg ggtgttaatg cgacacggtt ttcattgttt tttatctctt taggaacccc 2520

tatgatcatt atgccactct ccttggttcc tagatcctgt gtgaaattgt tattgttatc 2580

cgctcacaat tccacacatt atacgagccg gaagcataaa gtgtcaagcc tggggtgcct 2640

aatgagtgag ctaacttaca ttaattgcgt tgcgctcact gcccgcatat ctatgagccg 2700

ggctgaatga tcgaccgaga caggccctgc ggggctgcag gatccaattg tgagcggata 2760

acaattacga gcttcatgca cagtgatcga cgctgttgac aattaatcat cggctcgtat 2820

aatgtgtgga tgtggaattg tgagcgctca caattccaca acggtttccc tctagaaata 2880

attttgttta caaggaggat tataaaatga ctctagagtg gaaaccgaaa ccaaaactgc 2940

ctcaactgct ggatgatcac ttcggtctgc acggtctggt gtttcgtcgt actttcgcaa 3000

ttcgttctta tgaagtgggt ccagatcgtt ctacctccat cctggccgtc atgaaccaca 3060

tgcaggaagc caccctgaat cacgcgaaat ctgttggtat cctgggtgat ggtttcggca 3120

ctactctgga aatgtctaaa cgtgacctga tgtgggtagt gcgtcgcacc cacgtagcag 3180

tagagcgcta ccctacttgg ggtgacactg tggaagtcga gtgttggatt ggcgcgtccg 3240

gtaacaatgg tatgcgtcgc gattttctgg tccgtgactg taaaacgggc gaaatcctga 3300

cgcgttgcac ctccctgagc gttctgatga acacccgcac tcgtcgcctg tctaccatcc 3360

cggacgaagt gcgcggtgag atcggtcctg ctttcatcga taacgtggca gttaaagacg 3420

acgaaatcaa gaaactgcaa aaactgaacg actccaccgc ggactacatc cagggcggtc 3480

tgactccgcg ctggaacgac ctggatgtta atcagcatgt gaacaacctg aaatacgttg 3540

cttgggtctt cgagactgtg ccggacagca ttttcgaaag ccatcacatt tcctctttta 3600

ctctggagta ccgtcgcgaa tgtactcgcg actccgttct gcgcagcctg accaccgtaa 3660

gcggcggttc tagcgaggca ggtctggtct gcgaccatct gctgcaactg gaaggcggct 3720

ccgaagtcct gcgtgcgcgt acggagtggc gtccaaagct gacggattct ttccgcggca 3780

tctccgtaat tccggcggaa cctcgtgttt aagctttagt caaaagcctc cggtcggagg 3840

cttttgactt tctgcttact gaatttgcgg ccgcctcgag aaaatgaagg gaagttccta 3900

tacttactag agaataggaa cttctatagg gagtcgaata agggcgacac aaaaggtatt 3960

ctaaatgcat aataaatact gataacatct tatagtttgt attatatttt gtattatcgt 4020

tgacatgtat aattttgata tcaaaaactg attttccctt tattattttc gagatttatt 4080

ttcttaattc tctttaacaa actagaaata ttgtatatac aaaaaatcat aaataataga 4140

tgaatagttt aattataggt gttcatcaat cgaaaaagca acgtatctta tttaaagtgc 4200

gttgcttttt tctcatttat aaggttaaat aattctcata tatcaagcaa agtgacaggc 4260

gcccttaaat attctgacaa atgctctttc cctaaactcc ccccataaaa aaacccgccg 4320

aagcgggttt ttacgttatt tgcggattaa cgattactcg ttatcagaac cgcccaggat 4380

gcctggcagt tccctactct cgccgctgcg ctcggtcgtt cggctgcggg acctcagcgc 4440

tagcggagtg tatactggct tactatgttg gcactgatga gggtgtcagt gaagtgcttc 4500

atgtggcagg agaaaaaagg ctgcaccggt gcgtcagcag aatatgtgat acaggatata 4560

ttccgcttcc tcgctcactg actcgctacg ctcggtcgtt cgactgcggc gagcggaaat 4620

ggcttacgaa cggggcggag atttcctgga agatgccagg aagatactta acagggaagt 4680

gagagggccg cggcaaagcc gtttttccat aggctccgcc cccctgacaa gcatcacgaa 4740

atctgacgct caaatcagtg gtggcgaaac ccgacaggac tataaagata ccaggcgttt 4800

ccccctggcg gctccctcgt gcgctctcct gttcctgcct ttcggtttac cggtgtcatt 4860

ccgctgttat ggccgcgttt gtctcattcc acgcctgaca ctcagttccg ggtaggcagt 4920

tcgctccaag ctggactgta tgcacgaacc ccccgttcag tccgaccgct gcgccttatc 4980

cggtaactat cgtcttgagt ccaacccgga aagacatgca aaagcaccac tggcagcagc 5040

cactggtaat tgatttagag gagttagtct tgaagtcatg cgccggttaa ggctaaactg 5100

aaaggacaag ttttggtgac tgcgctcctc caagccagtt acctcggttc aaagagttgg 5160

tagctcagag aaccttcgaa aaaccgccct gcaaggcggt tttttcgttt tcagagcaag 5220

agattacgcg cagaccaaaa cgatctcaag aagatcatct tattaatcac tgcccgcttt 5280

ccagtcggga aacctgtcgt gccagctgca ttaatgaatc ggccaacgcg cggggagagg 5340

cggtttgcgt attgggcgcc agggtggttt ttcttttcac cagtgagact ggcaacagct 5400

gattgccctt caccgcctgg ccctgagaga gttgcagcaa gcggtccacg ctggtttgcc 5460

ccagcaggcg aaaatcctgt ttgatggtgg ttaacggcgg gatataacat gagctatctt 5520

cggtatcgtc gtatcccact accgagatat ccgcaccaac gcgcagcccg gactcggtaa 5580

tggcgcgcat tgcgcccagc gccatctgat cgttggcaac cagcatcgca gtgggaacga 5640

tgccctcatt cagcatttgc atggtttgtt gaaaaccgga catggcactc cagtcgcctt 5700

cccgttccgc tatcggctga atttgattgc gagtgagata tttatgccag ccagccagac 5760

gcagacgcgc cgagacagaa cttaatgggc ccgctaacag cgcgatttgc tggtgaccca 5820

atgcgaccag atgctccacg cccagtcgcg taccgtcctc atgggagaaa ataatactgt 5880

tgatgggtgt ctggtcagag acatcaagaa ataacgccgg aacattagtg caggcagctt 5940

ccacagcaat ggcatcctgg tcatccagcg gatagttaat gatcagccca ctgacgcgtt 6000

gcgcgagaag attgtgcacc gccgctttac aggcttcgac gccgcttcgt tctaccatcg 6060

acaccaccac gctggcaccc agttgatcgg cgcgagattt aatcgccgcg acaatttgcg 6120

acggcgcgtg cagggccaga ctggaggtgg caacgccaat cagcaacgac tgtttgcccg 6180

ccagttgttg tgccacgcgg ttgggaatgt aattcagctc cgccatcgcc gcttccactt 6240

tttcccgcgt tttcgcagaa acgtggctgg cctggttcac cacgcgggaa acggtctgat 6300

aagagacacc ggcatactct gcgacatcgt ataacgttac tggtttcata ttcaccaccc 6360

tgaattgact ctcttccggg cgctatcatg ccataccgcg aaaggttttg cgccattcga 6420

tggcgcgccg cttttaccaa tgcttaatca gtgaggcacc tatctcagcg atctgtctat 6480

ttcgttcatc catagttgcc tgactccccg tcgtgtagat aactacgata cgggagggct 6540

taccatctgg ccccagcgct gcgatgatac cgcgagaacc acgctcaccg gctccggatt 6600

tatcagcaat aaaccagcca gccggaaggg ccgagcgcag aagtggtcct gcaactttat 6660

ccgcctccat ccagtctatt aattgttgcc gggaagctag agtaagtagt tcgccagtta 6720

atagtttgcg caacgttgtt gccatcgcta caggcatcgt ggtgtcacgc tcgtcgtttg 6780

gtatggcttc attcagctcc ggttcccaac gatcaaggcg agttacatga tcccccatgt 6840

tgtgcaaaaa agcggttagc tccttcggtc ctccgatcgt tgtcagaagt aagttggccg 6900

cagtgttatc actcatggtt atggcagcac tgcataattc tcttactgtc atgccatccg 6960

taagatgctt ttctgtgact ggtgagtact caaccaagtc attctgagaa tagtgtatgc 7020

ggcgaccgag ttgctcttgc ccggcgtcaa tacgggataa taccgcgcca catagcagaa 7080

ctttaaaagt gctcatcatt ggaaaacgtt cttcggggcg aaaactctca aggatcttac 7140

cgctgttgag atccagttcg atgtaaccca ctcgtgcacc caactgatct tcagcatctt 7200

ttactttcac cagcgtttct gggtgagcaa aaacaggaag gcaaaatgcc gcaaaaaagg 7260

gaataagggc gacacggaaa tgttgaatac tcatattctt cctttttcaa tattattgaa 7320

gcatttatca gggttattgt ctcatgagcg gatacatatt tgaatgtatt tagaaaaata 7380

aacaaatagg ggtcagtgtt acaaccaatt aaccaattct gaacattatc gcgagcccat 7440

ttatacctga atatggctca taacacccct tgtttgcctg gcggcagtag cgcggtggtc 7500

ccacctgacc ccatgccgaa ctcagaagtg aaacgccgta gcgccgatgg tagtgtgggg 7560

actccccatg cgagagtagg gaactgccag gcatcaaata aaacgaaagg ctcagtcgaa 7620

agactgggcc tttcgcccgg gctaattatg gggtgtcgcc cttattcgac tctatagtga 7680

agttcctatt ctctagtagt ataggaactt ctgaagtggg gctcgagggc cggcccagcc 7740

gtcaaggtta aggctggcca tatcagcgac tgaaaagcgg ccagcctcgg ccttgtttga 7800

cgtataacca aagccaccgg gcaaccaata gcccttgtca cttttgatca ggtagaccga 7860

ccctgaagcg ctttttttcgt attccataaa acccccttct gtgcgtgagt actcatagta 7920

taacaggcgt gagtaccaac gct 7943

<210> 82
<211> 7943
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 82
ctagattatt aaccttccag aacgctcaag gtcaggtcca agcacttgcg agccttcgca 60

accagctcgt cgatttccgc ctcggagata accagcggcg gagcaatgat catcgtgtca 120

ccaactgcac gcataatcag gccattatca aagcagaact ggcgacaaat cataccaaca 180

ccacgaccct cataacgtgc acgcgtcgct ttatctttca ccagctcgat cgcacccagc 240

aggccaacgc cacgaacctc gccgaccagc ggatgatcgg acaactcacg caaacgtttt 300

tgcaggtacg gcgctgcctt ttcatgtgca cgttgaatga ttttctcttc gcgcatgatg 360

cgaatgttct ccagggccac cgctgcggcg accggatgac cagagtaagt gaaaccgtga 420

ttaaagtcac caccctcgtt cagcacggcc accacttcat cacgaacgat cagaccgccc 480

ataggaatgt aacccgacgt cagacccttt gcgatggtca tcatgtccgg cttcaggtcg 540

taaaagtcgc tgccaaacca ttcacccgtg cgaccaaagc cacagatcac ttcgtccgcg 600

acgaacagaa tgtcgtactt cgccagaatt tctttgatac gaggccaata ggaatcaggc 660

ggcacgatta caccaccagc gccctggatc ggctctgcga tgaacgcgcc gacattgtcc 720

acgcccagct ccaggatctt ctcttccaac tggtttgcgg cccaaatgcc aaattcttcc 780

gggctcatat caccaccttc cgcgaaccag tacggctgcg gaatatggac aatacccgga 840

atcggcaggt caccctgctc gtgcatgtag gtcataccgc ccaggctagc acctgcaaca 900

gtgctaccgt gataaccgtt cacgcggcta atgatcgttt tcttgttcgg ttggcccttg 960

atggcccaat agtgacggac catgcgcagc atggtatcat tgccctcaga gccgctgccg 1020

gtgaagaaaa cgtggttcat gccttctggc gcaatatccg caatcgcttt gctcagttcc 1080

aggaccggcg gatgcgcggt ttgaaagaac agattgtaat atggcagctc acgcatctgc 1140

ttgctagccg cctctgccag ctcatcacgg ccgtaaccga tggcgacgca ccacagaccc 1200

gccatgccat ccagaatttg attaccctcg ctatcccaca aatacacacc tttcgcgtgg 1260

gtgataatgc gcggaccttt ctctttcagc tgcttgaagt cgctaaacgg ggccaagtgg 1320

tggtcgctgc tcagggtttg ccattcacgg gtctgcgggt ttttgtgggt catattatat 1380

ctccttaaag ctttaagcac ccgccacaga tgattcatcc tgtaaagctt tctcggcagg 1440

aacatactca tagcctagat ctcttgctac agcttcatag gtcacgtgtc cgtttgcggt 1500

gtttaaaccc gctctcagtg ccgtattgtc tgcgagcgct tttactgccc ctttgttcgc 1560

gatttgcagc gcgtatggaa cagtaacgtt agtcagggcg attgttgatg tacgagggac 1620

tgcgcctggc atgttcgcta cagcataatg cacaaccccg tgtttttcat atgttggctg 1680

atcatgtgtt gtgatatggt cgacagtttc gacgatgccg ccttggtcga tcgctacatc 1740

aacaataact gaaccgggtt tcatttgttt taccatttcc tcagtgacaa gagtcggagc 1800

tttagcaccc ggaattaata ccgcgcaaat gaggagatcc gcttccgcca cagcatcagc 1860

aatattgacc ggattagaaa ttaacgtttt aatctgatgg ccgaagatgt catcaagctg 1920

gcgcaagcgg tctgcgttta agtcaatgat cgtcacatct gcaccgaggc cgacagccat 1980

tttcgccgcg tttgtcccga caacgcctcc tccgataatt gttacttttc cgcgggaaac 2040

gccaggcacc ccggcaagca gaatgccttt tccgccttta ggcttttcta agaattgagc 2100

gccgatttgc gctgccattc tgcccgcaac ctctgacatt ggcgtcagaa gaggcaatgt 2160

ccggccttca ctgaccgttt catatgcgat ggcagttact cctttatcct tcaaggcctg 2220

tgcaagctca ggctcagctg ctaaatgaag gtacgtaaac agcacaagtc ctttgcgaaa 2280

ataaacatat tcttccggca gcggttcttt tactttcatg accatttcgg cgtcccagac 2340

ctgcttcgga tcagcaatga tttccgctcc tgctgactca taggcttcat tttcaaatcc 2400

gcttccaagg cccgcgcctg tttcaaccag cacccggtgg ccgtttgaaa tgagctgaga 2460

aacgcccccg ggtgttaatg cgacacggtt ttcattgttt tttatctctt taggaacccc 2520

tatgatcatt atgccactct ccttggttcc tagatcctgt gtgaaattgt tattgttatc 2580

cgctcacaat tccacacatt atacgagccg gaagcataaa gtgtcaagcc tggggtgcct 2640

aatgagtgag ctaacttaca ttaattgcgt tgcgctcact gcccgcatat ctatgagccg 2700

ggctgaatga tcgaccgaga caggccctgc ggggctgcag gatccaattg tgagcggata 2760

acaattacga gcttcatgca cagtgatcga cgctgttgac aattaatcat cggctcgtat 2820

aatgtgtgga tgtggaattg tgagcgctca caattccaca acggtttccc tctagaaata 2880

attttgttta caaggaggat tataaaatga ctctagagtg gaaaccgaaa ccaaaactgc 2940

ctcaactgct ggatgatcac ttcggtctgc acggtctggt gtttcgtcgt actttcgcaa 3000

ttcgttctta tgaagtgggt ccagatcgtt ctacctccat cctggccgtc atgaaccaca 3060

tgcaggaagc caccctgaat cacgcgaaat ctgttggtat cctgggtgat ggtttcggca 3120

ctactctgga aatgtctaaa cgtgacctga tgtgggtagt gcgtcgcacc cacgtagcag 3180

tagagcgcta ccctacttgg ggtgacactg tggaagtcga gtgttggatt ggcgcgtccg 3240

gtaacaatgg tatgcgtcgc gattttctgg tccgtgactg taaaacgggc gaaatcctga 3300

cgcgttgcac ctccctgagc gttctgatga acacccgcac tcgtcgcctg tctaccatcc 3360

cggacgaagt gcgcggtgag atcggtcctg ctttcatcga taacgtggca gttaaagacg 3420

acgaaatcaa gaaactgcaa aaactgaacg actccaccgc ggactacatc cagggcggtc 3480

tgactccgcg ctggaacgac ctggatgtta atcagcatgt gaacaacctg aaatacgttg 3540

cttgggtctt cgagactgtg ccggacagca ttttcgaaag ccatcacatt tcctctttta 3600

ctctggagta ccgtcgcgaa tgtactcgcg actccgttct gcgcagcctg accaccgtaa 3660

gcggcggttc tagcgaggca ggtctggtct gcgaccatct gctgcaactg gaaggcggct 3720

ccgaagtcct gcgtgcgcgt acggagtggc gtccaaagct gacggattct ttccgcggca 3780

tctccgtaat tccggcggaa cctcgtgttt aagctttagt caaaagcctc cggtcggagg 3840

cttttgactt tctgcttact gaatttgcgg ccgcctcgag aaaatgaagg gaagttccta 3900

tacttactag agaataggaa cttctatagg gagtcgaata agggcgacac aaaaggtatt 3960

ctaaatgcat aataaatact gataacatct tatagtttgt attatatttt gtattatcgt 4020

tgacatgtat aattttgata tcaaaaactg attttccctt tattattttc gagatttatt 4080

ttcttaattc tctttaacaa actagaaata ttgtatatac aaaaaatcat aaataataga 4140

tgaatagttt aattataggt gttcatcaat cgaaaaagca acgtatctta tttaaagtgc 4200

gttgcttttt tctcatttat aaggttaaat aattctcata tatcaagcaa agtgacaggc 4260

gcccttaaat attctgacaa atgctctttc cctaaactcc ccccataaaa aaacccgccg 4320

aagcgggttt ttacgttatt tgcggattaa cgattactcg ttatcagaac cgcccaggat 4380

gcctggcagt tccctactct cgccgctgcg ctcggtcgtt cggctgcggg acctcagcgc 4440

tagcggagtg tatactggct tactatgttg gcactgatga gggtgtcagt gaagtgcttc 4500

atgtggcagg agaaaaaagg ctgcaccggt gcgtcagcag aatatgtgat acaggatata 4560

ttccgcttcc tcgctcactg actcgctacg ctcggtcgtt cgactgcggc gagcggaaat 4620

ggcttacgaa cggggcggag atttcctgga agatgccagg aagatactta acagggaagt 4680

gagagggccg cggcaaagcc gtttttccat aggctccgcc cccctgacaa gcatcacgaa 4740

atctgacgct caaatcagtg gtggcgaaac ccgacaggac tataaagata ccaggcgttt 4800

cccccctggcg gctccctcgt gcgctctcct gttcctgcct ttcggtttac cggtgtcatt 4860

ccgctgttat ggccgcgttt gtctcattcc acgcctgaca ctcagttccg ggtaggcagt 4920

tcgctccaag ctggactgta tgcacgaacc ccccgttcag tccgaccgct gcgccttatc 4980

cggtaactat cgtcttgagt ccaacccgga aagacatgca aaagcaccac tggcagcagc 5040

cactggtaat tgatttagag gagttagtct tgaagtcatg cgccggttaa ggctaaactg 5100

aaaggacaag ttttggtgac tgcgctcctc caagccagtt acctcggttc aaagagttgg 5160

tagctcagag aaccttcgaa aaaccgccct gcaaggcggt tttttcgttt tcagagcaag 5220

agattacgcg cagaccaaaa cgatctcaag aagatcatct tattaatcac tgcccgcttt 5280

ccagtcggga aacctgtcgt gccagctgca ttaatgaatc ggccaacgcg cggggagagg 5340

cggtttgcgt attgggcgcc agggtggttt ttcttttcac cagtgagact ggcaacagct 5400

gattgccctt caccgcctgg ccctgagaga gttgcagcaa gcggtccacg ctggtttgcc 5460

ccagcaggcg aaaatcctgt ttgatggtgg ttaacggcgg gatataacat gagctatctt 5520

cggtatcgtc gtatcccact accgagatat ccgcaccaac gcgcagcccg gactcggtaa 5580

tggcgcgcat tgcgcccagc gccatctgat cgttggcaac cagcatcgca gtgggaacga 5640

tgccctcatt cagcatttgc atggtttgtt gaaaaccgga catggcactc cagtcgcctt 5700

cccgttccgc tatcggctga atttgattgc gagtgagata tttatgccag ccagccagac 5760

gcagacgcgc cgagacagaa cttaatgggc ccgctaacag cgcgatttgc tggtgaccca 5820

atgcgaccag atgctccacg cccagtcgcg taccgtcctc atgggagaaa ataatactgt 5880

tgatgggtgt ctggtcagag acatcaagaa ataacgccgg aacattagtg caggcagctt 5940

ccacagcaat ggcatcctgg tcatccagcg gatagttaat gatcagccca ctgacgcgtt 6000

gcgcgagaag attgtgcacc gccgctttac aggcttcgac gccgcttcgt tctaccatcg 6060

acaccaccac gctggcaccc agttgatcgg cgcgagattt aatcgccgcg acaatttgcg 6120

acggcgcgtg cagggccaga ctggaggtgg caacgccaat cagcaacgac tgtttgcccg 6180

ccagttgttg tgccacgcgg ttgggaatgt aattcagctc cgccatcgcc gcttccactt 6240

tttcccgcgt tttcgcagaa acgtggctgg cctggttcac cacgcgggaa acggtctgat 6300

aagagacacc ggcatactct gcgacatcgt ataacgttac tggtttcata ttcaccaccc 6360

tgaattgact ctcttccggg cgctatcatg ccataccgcg aaaggttttg cgccattcga 6420

tggcgcgccg cttttaccaa tgcttaatca gtgaggcacc tatctcagcg atctgtctat 6480

ttcgttcatc catagttgcc tgactccccg tcgtgtagat aactacgata cgggagggct 6540

taccatctgg ccccagcgct gcgatgatac cgcgagaacc acgctcaccg gctccggatt 6600

tatcagcaat aaaccagcca gccggaaggg ccgagcgcag aagtggtcct gcaactttat 6660

ccgcctccat ccagtctatt aattgttgcc gggaagctag agtaagtagt tcgccagtta 6720

atagtttgcg caacgttgtt gccatcgcta caggcatcgt ggtgtcacgc tcgtcgtttg 6780

gtatggcttc attcagctcc ggttcccaac gatcaaggcg agttacatga tcccccatgt 6840

tgtgcaaaaa agcggttagc tccttcggtc ctccgatcgt tgtcagaagt aagttggccg 6900

cagtgttatc actcatggtt atggcagcac tgcataattc tcttactgtc atgccatccg 6960

taagatgctt ttctgtgact ggtgagtact caaccaagtc attctgagaa tagtgtatgc 7020

ggcgaccgag ttgctcttgc ccggcgtcaa tacgggataa taccgcgcca catagcagaa 7080

ctttaaaagt gctcatcatt ggaaaacgtt cttcggggcg aaaactctca aggatcttac 7140

cgctgttgag atccagttcg atgtaaccca ctcgtgcacc caactgatct tcagcatctt 7200

ttactttcac cagcgtttct gggtgagcaa aaacaggaag gcaaaatgcc gcaaaaaagg 7260

gaataagggc gacacggaaa tgttgaatac tcatattctt cctttttcaa tattattgaa 7320

gcatttatca gggttattgt ctcatgagcg gatacatatt tgaatgtatt tagaaaaata 7380

aacaaatagg ggtcagtgtt acaaccaatt aaccaattct gaacattatc gcgagcccat 7440

ttatacctga atatggctca taacacccct tgtttgcctg gcggcagtag cgcggtggtc 7500

ccacctgacc ccatgccgaa ctcagaagtg aaacgccgta gcgccgatgg tagtgtgggg 7560

actccccatg cgagagtagg gaactgccag gcatcaaata aaacgaaagg ctcagtcgaa 7620

agactgggcc tttcgcccgg gctaattatg gggtgtcgcc cttattcgac tctatagtga 7680

agttcctatt ctctagtagt ataggaactt ctgaagtggg gctcgagggc cggcccagcc 7740

gtcaaggtta aggctggcca tatcagcgac tgaaaagcgg ccagcctcgg ccttgtttga 7800

cgtataacca aagccaccgg gcaaccaata gcccttgtca cttttgatca ggtagaccga 7860

ccctgaagcg ctttttttcgt attccataaa acccccttct gtgcgtgagt actcatagta 7920

taacaggcgt gagtaccaac gct 7943

<210> 83
<211> 7946
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 83
ctagattatt aacccagcag caccgccagg gtcagatcca ggcacttacg ggctttttcc 60

accaactcgt cgatctcagc aaagctaata accaacggcg gtgcaataat catggtgtcg 120

ccaacggcac gcatgatcag gccgttgtca aagcagaacg tgcggcaaat catacctgcg 180

cccttgtccg tgtagcgttc acgggtaact ttatccttga ccaactcgat cgcacccagc 240

aggcctacac cgcgaacttc accgaccagc ggatggttag acagttcgcg cagacgcttt 300

tgcaaatacg gtgcggtttc gcttttgacg cgctcaacaa tacgttcttc acgcaaaatg 360

cggatattct ccagtgcaac ggccgctgcc actggatggc cagaataggt aaaaccgtgg 420

ttgaagtcgc caccctcgtt caggaccgca acaatctcgt cgcgaacaat cagaccgccc 480

atcggcacgt aaccgctcgt caggcctttc gcaatcgtca tcatatccgg cttcagaccg 540

tagaagtcgc tgccgaacca ctcgctcgta cggccaaaac cacagatcac ctcgtcggca 600

gcaaacagga tatcataacg gctcagaatt tctttaatct tcggccaata gctatccggt 660

ggcacgatga cgccgcctgc accctggatc ggttccgcaa taaacgcacc gacgttttcc 720

acacccagct cgatgatttt cttctccagc tgctctgcgg cccaaacgcc gaactcatca 780

ggagtcatat caccaccttc accgaaccag tacggttgcg ggatatgcac cacacctgga 840

atcggcagat cgccctgctc gtgcatgtag gtcataccac ccaggctcgc accagccacg 900

gtagagccgt gatagccatt aacacgggag atgatggttt tcttgtccgg ctgacctttc 960

agggcccaat agtgacggac catacgcaac atcgtgtcat taccttcgct gccgctaccg 1020

gtaaagaaca cgtgattcat accctgcgga gcaatttcgg aaatcgcctt tgccagctcc 1080

aaaaccggcg gatgcgcagt ctggaaaaac agattgtagt acggcagctc acgcatctgc 1140

ttgctcgccg cgtccgccag ctcttcacgg ccataaccga tcgcgacaca ccacagaccg 1200

gacataccat ccaggatctt gttaccctcg ctatcccaca ggtagacgcc ttccgcacgg 1260

gtaatgatgc gaggaccttt ctctttcagt tgtttgtagt cgctgaacgg cgccaggtga 1320

tgctcgctgc tcagtgcttg ccattccagg gtttgcgggt tattgtgggc cgacatatta 1380

tatctcctta aagctttaag cacccgccac agatgattca tcctgtaaag ctttctcggc 1440

aggaacatac tcatagccta gatctcttgc tacagcttca taggtcacgt gtccgtttgc 1500

ggtgtttaaa cccgctctca gtgccgtatt gtctgcgagc gcttttactg ccccttgtt 1560

cgcgatttgc agcgcgtatg gaacagtaac gttagtcagg gcgattgttg atgtacgagg 1620

gactgcgcct ggcatgttcg ctacagcata atgcacaacc ccgtgttttt catatgttgg 1680

ctgatcatgt gttgtgatat ggtcgacagt ttcgacgatg ccgccttggt cgatcgctac 1740

atcaacaata actgaaccgg gtttcatttg ttttaccatt tcctcagtga caagagtcgg 1800

agctttagca cccggaatta ataccgcgca aatgaggaga tccgcttccg ccacagcatc 1860

agcaatattg accggattag aaattaacgt tttaatctga tggccgaaga tgtcatcaag 1920

ctggcgcaag cggtctgcgt ttaagtcaat gatcgtcaca tctgcaccga ggccgacagc 1980

cattttcgcc gcgtttgtcc cgacaacgcc tcctccgata attgttactt ttccgcggga 2040

aacgccaggc accccggcaa gcagaatgcc ttttccgcct ttaggctttt ctaagaattg 2100

agcgccgatt tgcgctgcca ttctgcccgc aacctctgac attggcgtca gaagaggcaa 2160

tgtccggcct tcactgaccg tttcatatgc gatggcagtt actcctttat ccttcaaggc 2220

ctgtgcaagc tcaggctcag ctgctaaatg aaggtacgta aacagcacaa gtcctttgcg 2280

aaaataaaca tattcttccg gcagcggttc ttttactttc atgaccattt cggcgtccca 2340

gacctgcttc ggatcagcaa tgatttccgc tcctgctgac tcataggctt cattttcaaa 2400

tccgcttcca aggcccgcgc ctgtttcaac cagcacccgg tggccgtttg aaatgagctg 2460

agaaacgccc ccgggtgtta atgcgacacg gttttcattg ttttttatct ctttaggaac 2520

ccctatgatc attatgccac tctccttggt tcctagatcc tgtgtgaaat tgttattgtt 2580

atccgctcac aattccacac attatacgag ccggaagcat aaagtgtcaa gcctggggtg 2640

cctaatgagt gagctaactt acattaattg cgttgcgctc actgcccgca tatctatgag 2700

ccgggctgaa tgatcgaccg agacaggccc tgcggggctg caggatccaa ttgtgagcgg 2760

ataacaatta cgagcttcat gcacagtgat cgacgctgtt gacaattaat catcggctcg 2820

tataatgtgt ggatgtggaa ttgtgagcgc tcacaattcc acaacggttt ccctctagaa 2880

ataattttgt ttacaaggag gattataaaa tgactctaga gtggaaaccg aaaccaaaac 2940

tgcctcaact gctggatgat cacttcggtc tgcacggtct ggtgtttcgt cgtactttcg 3000

caattcgttc ttatgaagtg ggtccagatc gttctacctc catcctggcc gtcatgaacc 3060

acatgcagga agccaccctg aatcacgcga aatctgttgg tatcctgggt gatggtttcg 3120

gcactactct ggaaatgtct aaacgtgacc tgatgtgggt agtgcgtcgc acccacgtag 3180

cagtagagcg ctaccctact tggggtgaca ctgtggaagt cgagtgttgg attggcgcgt 3240

ccggtaacaa tggtatgcgt cgcgattttc tggtccgtga ctgtaaaacg ggcgaaatcc 3300

tgacgcgttg cacctccctg agcgttctga tgaacacccg cactcgtcgc ctgtctacca 3360

tcccggacga agtgcgcggt gagatcggtc ctgctttcat cgataacgtg gcagttaaag 3420

acgacgaaat caagaaactg caaaaactga acgactccac cgcggactac atccagggcg 3480

gtctgactcc gcgctggaac gacctggatg ttaatcagca tgtgaacaac ctgaaatacg 3540

ttgcttgggt cttcgagact gtgccggaca gcattttcga aagccatcac atttcctctt 3600

ttactctgga gtaccgtcgc gaatgtactc gcgactccgt tctgcgcagc ctgaccaccg 3660

taagcggcgg ttctagcgag gcaggtctgg tctgcgacca tctgctgcaa ctggaaggcg 3720

gctccgaagt cctgcgtgcg cgtacggagt ggcgtccaaa gctgacggat tctttccgcg 3780

gcatctccgt aattccggcg gaacctcgtg tttaagcttt agtcaaaagc ctccggtcgg 3840

aggcttttga ctttctgctt actgaatttg cggccgcctc gagaaaatga agggaagttc 3900

ctatacttac tagagaatag gaacttctat agggagtcga ataagggcga cacaaaaggt 3960

attctaaatg cataataaat actgataaca tcttatagtt tgtattatat tttgtattat 4020

cgttgacatg tataattttg atatcaaaaa ctgattttcc ctttattatt ttcgagattt 4080

attttcttaa ttctctttaa caaactagaa atattgtata tacaaaaaat cataaataat 4140

agatgaatag tttaattata ggtgttcatc aatcgaaaaa gcaacgtatc ttatttaaag 4200

tgcgttgctt ttttctcatt tataaggtta aataattctc atatatcaag caaagtgaca 4260

ggcgccctta aatattctga caaatgctct ttccctaaac tccccccata aaaaaacccg 4320

ccgaagcggg tttttacgtt atttgcggat taacgattac tcgttatcag aaccgcccag 4380

gatgcctggc agttccctac tctcgccgct gcgctcggtc gttcggctgc gggacctcag 4440

cgctagcgga gtgtatactg gcttactatg ttggcactga tgagggtgtc agtgaagtgc 4500

ttcatgtggc aggagaaaaa aggctgcacc ggtgcgtcag cagaatatgt gatacaggat 4560

atattccgct tcctcgctca ctgactcgct acgctcggtc gttcgactgc ggcgagcgga 4620

aatggcttac gaacggggcg gagatttcct ggaagatgcc aggaagatac ttaacaggga 4680

agtgagaggg ccgcggcaaa gccgtttttc cataggctcc gccccccctga caagcatcac 4740

gaaatctgac gctcaaatca gtggtggcga aacccgacag gactataaag ataccaggcg 4800

tttccccctg gcggctccct cgtgcgctct cctgttcctg cctttcggtt taccggtgtc 4860

attccgctgt tatggccgcg tttgtctcat tccacgcctg acactcagtt ccgggtaggc 4920

agttcgctcc aagctggact gtatgcacga acccccccgtt cagtccgacc gctgcgcctt 4980

atccggtaac tatcgtcttg agtccaaccc ggaaagacat gcaaaagcac cactggcagc 5040

agccactggt aattgattta gaggagttag tcttgaagtc atgcgccggt taaggctaaa 5100

ctgaaaggac aagttttggt gactgcgctc ctccaagcca gttacctcgg ttcaaagagt 5160

tggtagctca gagaaccttc gaaaaaccgc cctgcaaggc ggtttttttcg ttttcagagc 5220

aagagattac gcgcagacca aaacgatctc aagaagatca tcttattaat cactgcccgc 5280

tttccagtcg ggaaacctgt cgtgccagct gcattaatga atcggccaac gcgcggggag 5340

aggcggtttg cgtattgggc gccagggtgg tttttctttt caccagtgag actggcaaca 5400

gctgattgcc cttcaccgcc tggccctgag agagttgcag caagcggtcc acgctggttt 5460

gccccagcag gcgaaaatcc tgtttgatgg tggttaacgg cgggatataa catgagctat 5520

cttcggtatc gtcgtatccc actaccgaga tatccgcacc aacgcgcagc ccggactcgg 5580

taatggcgcg cattgcgccc agcgccatct gatcgttggc aaccagcatc gcagtgggaa 5640

cgatgccctc attcagcatt tgcatggttt gttgaaaacc ggacatggca ctccagtcgc 5700

cttcccgttc cgctatcggc tgaatttgat tgcgagtgag atatttatgc cagccagcca 5760

gacgcagacg cgccgagaca gaacttaatg ggcccgctaa cagcgcgatt tgctggtgac 5820

ccaatgcgac cagatgctcc acgcccagtc gcgtaccgtc ctcatgggag aaaataatac 5880

tgttgatggg tgtctggtca gagacatcaa gaaataacgc cggaacatta gtgcaggcag 5940

cttccacagc aatggcatcc tggtcatcca gcggatagtt aatgatcagc ccactgacgc 6000

gttgcgcgag aagattgtgc accgccgctt tacaggcttc gacgccgctt cgttctacca 6060

tcgacaccac cacgctggca cccagttgat cggcgcgaga tttaatcgcc gcgacaattt 6120

gcgacggcgc gtgcagggcc agactggagg tggcaacgcc aatcagcaac gactgtttgc 6180

ccgccagttg ttgtgccacg cggttgggaa tgtaattcag ctccgccatc gccgcttcca 6240

ctttttcccg cgttttcgca gaaacgtggc tggcctggtt caccacgcgg gaaacggtct 6300

gataagagac accggcatac tctgcgacat cgtataacgt tactggtttc atattcacca 6360

ccctgaattg actctcttcc gggcgctatc atgccatacc gcgaaaggtt ttgcgccatt 6420

cgatggcgcg ccgcttttac caatgcttaa tcagtgaggc acctatctca gcgatctgtc 6480

tatttcgttc atccatagtt gcctgactcc ccgtcgtgta gataactacg atacgggagg 6540

gcttaccatc tggccccagc gctgcgatga taccgcgaga accacgctca ccggctccgg 6600

atttatcagc aataaaccag ccagccggaa gggccgagcg cagaagtggt cctgcaactt 6660

tatccgcctc catccagtct attaattgtt gccgggaagc tagagtaagt agttcgccag 6720

ttaatagttt gcgcaacgtt gttgccatcg ctacaggcat cgtggtgtca cgctcgtcgt 6780

ttggtatggc ttcattcagc tccggttccc aacgatcaag gcgagttaca tgatccccca 6840

tgttgtgcaa aaaagcggtt agctccttcg gtcctccgat cgttgtcaga agtaagttgg 6900

ccgcagtgtt atcactcatg gttatggcag cactgcataa ttctcttact gtcatgccat 6960

ccgtaagatg cttttctgtg actggtgagt actcaaccaa gtcattctga gaatagtgta 7020

tgcggcgacc gagttgctct tgcccggcgt caatacggga taataccgcg ccacatagca 7080

gaactttaaa agtgctcatc attggaaaac gttcttcggg gcgaaaactc tcaaggatct 7140

taccgctgtt gagatccagt tcgatgtaac ccactcgtgc acccaactga tcttcagcat 7200

cttttacttt caccagcgtt tctgggtgag caaaaacagg aaggcaaaat gccgcaaaaa 7260

agggaataag ggcgacacgg aaatgttgaa tactcatatt cttccttttt caatattatt 7320

gaagcattta tcagggttat tgtctcatga gcggatacat atttgaatgt atttagaaaa 7380

ataaacaaat aggggtcagt gttacaacca attaaccaat tctgaacatt atcgcgagcc 7440

catttatacc tgaatatggc tcataacacc ccttgtttgc ctggcggcag tagcgcggtg 7500

gtcccacctg accccatgcc gaactcagaa gtgaaacgcc gtagcgccga tggtagtgtg 7560

gggactcccc atgcgagagt agggaactgc caggcatcaa ataaaacgaa aggctcagtc 7620

gaaagactgg gcctttcgcc cgggctaatt atggggtgtc gcccttattc gactctatag 7680

tgaagttcct attctctagt agtataggaa cttctgaagt ggggctcgag ggccggccca 7740

gccgtcaagg ttaaggctgg ccatatcagc gactgaaaag cggccagcct cggccttgtt 7800

tgacgtataa ccaaagccac cgggcaacca atagcccttg tcacttttga tcaggtagac 7860

cgaccctgaa gcgctttttt cgtattccat aaaaccccct tctgtgcgtg agtactcata 7920

gtataacagg cgtgagtacc aacgct 7946

<210> 84
<211> 7946
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 84
ctagattatt agctctgcaa aactgccaag gtcagatcca ggcacgtgcg cgctttttcc 60

accagctcgt cgatttgggc aaagctgatg accagcggcg gtgcgataat catcgtgtca 120

ccaaccgcac gcataatcag gccgttctcg aaacaaaagg tgcggcaaat catgccagca 180

cctttgtcgg tgtaacgctc gcgggtaact ttgtctttga ccagctcaat ggcgcccagc 240

aagccgacac cgcgaacttc accgaccagc gggtgatcat tcaattcacg cagacgtttc 300

tgcaggtacg gtgcagtttc ggacttgaca cgctccacga tgcgctcttc acgcaagata 360

cgaatattct ccagggcaac cgccgcagcc actgggtggc cgctatacgt aaagccgtga 420

ttaaagtcac caccctcgtt cagcactgcc acgatctcgt cacgaacgat cagaccgccc 480

atcggaacat agccagaggt caggccttta gcaatcgtca tcatatctgg cttcagaccg 540

tagaagtcgc taccaaacca ctcgccggta cgaccgaaac cgcaaatcac ctcatccgcc 600

gcaaacagga tgtcgtagcg ggacagaatt tctttgatct tcggccaata gctttcaggc 660

ggcacaatca caccacccgc accctggacc ggttccgcga taaaggccgc aacattttct 720

acacccagtt ccaggatctt cttctccagc tgttccgctg cccacacgcc aaactcatcc 780

ggggtcatat caccgccctc gccgaaccaa tacggctgcg gaatgtgcgc aatacccgga 840

atcggcaagt caccctgctc atgcatgtag gtcataccac ccaggctggc gcctgcgacc 900

gtgctaccgt ggtaaccgtt gacacggctg ataatagttt tcttattcgg ttgacctttc 960

agcgcccagt agtgacggac catacgcagc atggtatcgt tgccctcgga gccagaaccc 1020

gtgaagaaca catggttcat gccttgcggt gcaatttcgc tgatagcttt ggccagctcc 1080

agaaccggcg gatgcgccgt ttggaagaac agattgtaat acggcagttc acgcatctgc 1140

ttgctggccg cgtccgccag ctcttcgcga ccataaccga ttgcaacaca ccacaggccg 1200

ctcataccat ccaagatctt atggccctcg ctatcccaca ggtaaacacc ttcagcgcgg 1260

gtgataatac gtggaccctt ctctttcagc tgcttatagt cgctgaacgg cgccagatgg 1320

tgctcgctgc tcagtgcttg ccattccagg gtttgagggt tattgttcgc cgacatatta 1380

tatctcctta aagctttaag cacccgccac agatgattca tcctgtaaag ctttctcggc 1440

aggaacatac tcatagccta gatctcttgc tacagcttca taggtcacgt gtccgtttgc 1500

ggtgtttaaa cccgctctca gtgccgtatt gtctgcgagc gcttttactg ccccttttgtt 1560

cgcgatttgc agcgcgtatg gaacagtaac gttagtcagg gcgattgttg atgtacgagg 1620

gactgcgcct ggcatgttcg ctacagcata atgcacaacc ccgtgttttt catatgttgg 1680

ctgatcatgt gttgtgatat ggtcgacagt ttcgacgatg ccgccttggt cgatcgctac 1740

atcaacaata actgaaccgg gtttcatttg ttttaccatt tcctcagtga caagagtcgg 1800

agctttagca cccggaatta ataccgcgca aatgaggaga tccgcttccg ccacagcatc 1860

agcaatattg accggattag aaattaacgt tttaatctga tggccgaaga tgtcatcaag 1920

ctggcgcaag cggtctgcgt ttaagtcaat gatcgtcaca tctgcaccga ggccgacagc 1980

cattttcgcc gcgtttgtcc cgacaacgcc tcctccgata attgttactt ttccgcggga 2040

aacgccaggc accccggcaa gcagaatgcc ttttccgcct ttaggctttt ctaagaattg 2100

agcgccgatt tgcgctgcca ttctgcccgc aacctctgac attggcgtca gaagaggcaa 2160

tgtccggcct tcactgaccg tttcatatgc gatggcagtt actcctttat ccttcaaggc 2220

ctgtgcaagc tcaggctcag ctgctaaatg aaggtacgta aacagcacaa gtcctttgcg 2280

aaaataaaca tattcttccg gcagcggttc ttttactttc atgaccattt cggcgtccca 2340

gacctgcttc ggatcagcaa tgatttccgc tcctgctgac tcataggctt cattttcaaa 2400

tccgcttcca aggcccgcgc ctgtttcaac cagcacccgg tggccgtttg aaatgagctg 2460

agaaacgccc ccgggtgtta atgcgacacg gttttcattg ttttttatct ctttaggaac 2520

ccctatgatc attatgccac tctccttggt tcctagatcc tgtgtgaaat tgttattgtt 2580

atccgctcac aattccacac attatacgag ccggaagcat aaagtgtcaa gcctggggtg 2640

cctaatgagt gagctaactt acattaattg cgttgcgctc actgcccgca tatctatgag 2700

ccgggctgaa tgatcgaccg agacaggccc tgcggggctg caggatccaa ttgtgagcgg 2760

ataacaatta cgagcttcat gcacagtgat cgacgctgtt gacaattaat catcggctcg 2820

tataatgtgt ggatgtggaa ttgtgagcgc tcacaattcc acaacggttt ccctctagaa 2880

ataattttgt ttacaaggag gattataaaa tgactctaga gtggaaaccg aaaccaaaac 2940

tgcctcaact gctggatgat cacttcggtc tgcacggtct ggtgtttcgt cgtactttcg 3000

caattcgttc ttatgaagtg ggtccagatc gttctacctc catcctggcc gtcatgaacc 3060

acatgcagga agccaccctg aatcacgcga aatctgttgg tatcctgggt gatggtttcg 3120

gcactactct ggaaatgtct aaacgtgacc tgatgtgggt agtgcgtcgc acccacgtag 3180

cagtagagcg ctaccctact tggggtgaca ctgtggaagt cgagtgttgg attggcgcgt 3240
ccggtaacaa tggtatgcgt cgcgattttc tggtccgtga ctgtaaaacg ggcgaaatcc 3300
tgacgcgttg cacctccctg agcgttctga tgaacacccg cactcgtcgc ctgtctacca 3360
tcccggacga agtgcgcggt gagatcggtc ctgctttcat cgataacgtg gcagttaaag 3420
acgacgaaat caagaaactg caaaaactga acgactccac cgcggactac atccagggcg 3480
gtctgactcc gcgctggaac gacctggatg ttaatcagca tgtgaacaac ctgaaatacg 3540
ttgcttgggt cttcgagact gtgccggaca gcattttcga aagccatcac atttcctctt 3600
ttactctgga gtaccgtcgc gaatgtactc gcgactccgt tctgcgcagc ctgaccaccg 3660
taagcggcgg ttctagcgag gcaggtctgg tctgcgacca tctgctgcaa ctggaaggcg 3720
gctccgaagt cctgcgtgcg cgtacggagt ggcgtccaaa gctgacggat tctttccgcg 3780
gcatctccgt aattccggcg gaacctcgtg tttaagcttt agtcaaaagc ctccggtcgg 3840
aggcttttga ctttctgctt actgaatttg cggccgcctc gagaaaatga agggaagttc 3900
ctatacttac tagagaatag gaacttctat agggagtcga ataagggcga cacaaaaggt 3960
attctaaatg cataataaat actgataaca tcttatagtt tgtattatat tttgtattat 4020
cgttgacatg tataattttg atatcaaaaa ctgattttcc ctttattatt ttcgagattt 4080
attttcttaa ttctctttaa caaactagaa atattgtata tacaaaaaat cataaataat 4140
agatgaatag tttaattata ggtgttcatc aatcgaaaaa gcaacgtatc ttatttaaag 4200
tgcgttgctt ttttctcatt tataaggtta aataattctc atatatcaag caaagtgaca 4260
ggcgccctta aatattctga caaatgctct ttccctaaac tccccccata aaaaaacccg 4320
ccgaagcggg tttttacgtt atttgcggat taacgattac tcgttatcag aaccgcccag 4380
gatgcctggc agttccctac tctcgccgct gcgctcggtc gttcggctgc gggacctcag 4440
cgctagcgga gtgtatactg gcttactatg ttggcactga tgagggtgtc agtgaagtgc 4500
ttcatgtggc aggagaaaaa aggctgcacc ggtgcgtcag cagaatatgt gatacaggat 4560
atattccgct tcctcgctca ctgactcgct acgctcggtc gttcgactgc ggcgagcgga 4620
aatggcttac gaacggggcg gagatttcct ggaagatgcc aggaagatac ttaacaggga 4680
agtgagaggg ccgcggcaaa gccgtttttc cataggctcc gccccctga caagcatcac 4740
gaaatctgac gctcaaatca gtggtggcga aacccgacag gactataaag ataccaggcg 4800
tttccccctg gcggctccct cgtgcgctct cctgttcctg cctttcggtt taccggtgtc 4860
attccgctgt tatggccgcg tttgtctcat tccacgcctg acactcagtt ccgggtaggc 4920
agttcgctcc aagctggact gtatgcacga acccccgtt cagtccgacc gctgcgcctt 4980
atccggtaac tatcgtcttg agtccaaccc ggaaagacat gcaaaagcac cactggcagc 5040
agccactggt aattgattta gaggagttag tcttgaagtc atgcgccggt taaggctaaa 5100
ctgaaaggac aagttttggt gactgcgctc ctccaagcca gttacctcgg ttcaaagagt 5160
tggtagctca gagaaccttc gaaaaaccgc cctgcaaggc ggtttttcg ttttcagagc 5220

aagagattac gcgcagacca aaacgatctc aagaagatca tcttattaat cactgcccgc 5280

tttccagtcg ggaaacctgt cgtgccagct gcattaatga atcggccaac gcgcggggag 5340

aggcggtttg cgtattgggc gccagggtgg tttttctttt caccagtgag actggcaaca 5400

gctgattgcc cttcaccgcc tggccctgag agagttgcag caagcggtcc acgctggttt 5460

gccccagcag gcgaaaatcc tgtttgatgg tggttaacgg cgggatataa catgagctat 5520

cttcggtatc gtcgtatccc actaccgaga tatccgcacc aacgcgcagc ccggactcgg 5580

taatggcgcg cattgcgccc agcgccatct gatcgttggc aaccagcatc gcagtgggaa 5640

cgatgccctc attcagcatt tgcatggttt gttgaaaacc ggacatggca ctccagtcgc 5700

cttcccgttc cgctatcggc tgaatttgat tgcgagtgag atatttatgc cagccagcca 5760

gacgcagacg cgccgagaca gaacttaatg ggcccgctaa cagcgcgatt tgctggtgac 5820

ccaatgcgac cagatgctcc acgcccagtc gcgtaccgtc ctcatgggag aaaataatac 5880

tgttgatggg tgtctggtca gagacatcaa gaaataacgc cggaacatta gtgcaggcag 5940

cttccacagc aatggcatcc tggtcatcca gcggatagtt aatgatcagc ccactgacgc 6000

gttgcgcgag aagattgtgc accgccgctt tacaggcttc gacgccgctt cgttctacca 6060

tcgacaccac cacgctggca cccagttgat cggcgcgaga tttaatcgcc gcgacaattt 6120

gcgacggcgc gtgcagggcc agactggagg tggcaacgcc aatcagcaac gactgtttgc 6180

ccgccagttg ttgtgccacg cggttgggaa tgtaattcag ctccgccatc gccgcttcca 6240

ctttttcccg cgttttcgca gaaacgtggc tggcctggtt caccacgcgg gaaacggtct 6300

gataagagac accggcatac tctgcgacat cgtataacgt tactggtttc atattcacca 6360

ccctgaattg actctcttcc gggcgctatc atgccatacc gcgaaaggtt ttgcgccatt 6420

cgatggcgcg ccgcttttac caatgcttaa tcagtgaggc acctatctca gcgatctgtc 6480

tatttcgttc atccatagtt gcctgactcc ccgtcgtgta gataactacg atacgggagg 6540

gcttaccatc tggccccagc gctgcgatga taccgcgaga accacgctca ccggctccgg 6600

atttatcagc aataaaccag ccagccggaa gggccgagcg cagaagtggt cctgcaactt 6660

tatccgcctc catccagtct attaattgtt gccgggaagc tagagtaagt agttcgccag 6720

ttaatagttt gcgcaacgtt gttgccatcg ctacaggcat cgtggtgtca cgctcgtcgt 6780

ttggtatggc ttcattcagc tccggttccc aacgatcaag gcgagttaca tgatccccca 6840

tgttgtgcaa aaaagcggtt agctccttcg gtcctccgat cgttgtcaga agtaagttgg 6900

ccgcagtgtt atcactcatg gttatggcag cactgcataa ttctcttact gtcatgccat 6960

ccgtaagatg cttttctgtg actggtgagt actcaaccaa gtcattctga gaatagtgta 7020

tgcggcgacc gagttgctct tgcccggcgt caatacggga taataccgcg ccacatagca 7080

gaactttaaa agtgctcatc attggaaaac gttcttcggg gcgaaaactc tcaaggatct 7140

taccgctgtt gagatccagt tcgatgtaac ccactcgtgc acccaactga tcttcagcat 7200

cttttacttt caccagcgtt tctgggtgag caaaaacagg aaggcaaaat gccgcaaaaa 7260

agggaataag ggcgacacgg aaatgttgaa tactcatatt cttccttttt caatattatt 7320

gaagcattta tcagggttat tgtctcatga gcggatacat atttgaatgt atttagaaaa 7380

ataaacaaat aggggtcagt gttacaacca attaaccaat tctgaacatt atcgcgagcc 7440

catttatacc tgaatatggc tcataacacc ccttgtttgc ctggcggcag tagcgcggtg 7500

gtcccacctg accccatgcc gaactcagaa gtgaaacgcc gtagcgccga tggtagtgtg 7560

gggactcccc atgcgagagt agggaactgc caggcatcaa ataaaacgaa aggctcagtc 7620

gaaagactgg gcctttcgcc cgggctaatt atggggtgtc gcccttattc gactctatag 7680

tgaagttcct attctctagt agtataggaa cttctgaagt ggggctcgag ggccggccca 7740

gccgtcaagg ttaaggctgg ccatatcagc gactgaaaag cggccagcct cggccttgtt 7800

tgacgtataa ccaaagccac cgggcaacca atagcccttg tcacttttga tcaggtagac 7860

cgaccctgaa gcgctttttt cgtattccat aaaaccccct tctgtgcgtg agtactcata 7920

gtataacagg cgtgagtacc aacgct 7946

<210> 85
<211> 1092
<212> DNA
<213> Nostoc sp. PCC 7120

<220>
<221> CDS
<222> (1)..(1092)

<400> 85

```
atg gaa atc ggc gtt cct aaa gaa act aaa gat caa gaa ttt cgt gtg        48
Met Glu Ile Gly Val Pro Lys Glu Thr Lys Asp Gln Glu Phe Arg Val
1               5                   10                  15

ggg tta agt cct gct agc gtg cgg gtg ttg aag gaa aat ggt cat agt        96
Gly Leu Ser Pro Ala Ser Val Arg Val Leu Lys Glu Asn Gly His Ser
            20                  25                  30

ata ttt gtt cag act caa gct ggt agt ggt gct ggg ttt aca gat gat       144
Ile Phe Val Gln Thr Gln Ala Gly Ser Gly Ala Gly Phe Thr Asp Asp
        35                  40                  45

gat tat cgc agt gta ggg gcg gat att gtc cca aca gca gag gca gtt       192
Asp Tyr Arg Ser Val Gly Ala Asp Ile Val Pro Thr Ala Glu Ala Val
    50                  55                  60

tgg agt cga gag tta gta gtc aaa gtt aaa gaa cca ctg acg agt gag       240
Trp Ser Arg Glu Leu Val Val Lys Val Lys Glu Pro Leu Thr Ser Glu
65                  70                  75                  80

tac aac ttt tta cag aaa ggg cag ata ttg ttt act tat ctg cat tta       288
Tyr Asn Phe Leu Gln Lys Gly Gln Ile Leu Phe Thr Tyr Leu His Leu
                85                  90                  95

gca gcc gat cgc aaa tta aca gag cat tta att gat tgt ggc att tgt       336
Ala Ala Asp Arg Lys Leu Thr Glu His Leu Ile Asp Cys Gly Ile Cys
            100                 105                 110

gcg atc gct tac gaa acc gta gaa caa cca ggc gct aac aga cta cca       384
Ala Ile Ala Tyr Glu Thr Val Glu Gln Pro Gly Ala Asn Arg Leu Pro
        115                 120                 125
```

```
cta ctg acc ccc atg agc att att gcc ggt cgg tta gca gta caa ttt          432
Leu Leu Thr Pro Met Ser Ile Ile Ala Gly Arg Leu Ala Val Gln Phe
    130                 135                 140

ggc gca cgc tat tta gaa cgc caa caa ggt ggt aga ggt gta ctg ctg          480
Gly Ala Arg Tyr Leu Glu Arg Gln Gln Gly Gly Arg Gly Val Leu Leu
145                 150                 155                 160

ggt ggt gtt cct gga gtt aaa cca gga aaa gta gtt att ctc ggt ggc          528
Gly Gly Val Pro Gly Val Lys Pro Gly Lys Val Val Ile Leu Gly Gly
                165                 170                 175

ggt gta gtt ggt aca gaa gct gcc aga att gcc gta ggt atg ggt gca          576
Gly Val Val Gly Thr Glu Ala Ala Arg Ile Ala Val Gly Met Gly Ala
            180                 185                 190

acc gta caa ata tta gat gta aat gtt gaa cgt tta tct tat tta gaa          624
Thr Val Gln Ile Leu Asp Val Asn Val Glu Arg Leu Ser Tyr Leu Glu
        195                 200                 205

act ttg ttt ggt tct aga gtg gaa tta ctt tac agc agt tct gcc cat          672
Thr Leu Phe Gly Ser Arg Val Glu Leu Leu Tyr Ser Ser Ser Ala His
    210                 215                 220

atc gaa gcc gca gtt aaa gaa gca gat tta ctt gtt ggt gct gtt ttg          720
Ile Glu Ala Ala Val Lys Glu Ala Asp Leu Leu Val Gly Ala Val Leu
225                 230                 235                 240

gta cta gga cgc aga gcg cca att cta gta tct cgt gaa tta gtt aaa          768
Val Leu Gly Arg Arg Ala Pro Ile Leu Val Ser Arg Glu Leu Val Lys
                245                 250                 255

caa atg cac cca ggt tcg gta ata gtt gat gtg gct gta gat caa ggt          816
Gln Met His Pro Gly Ser Val Ile Val Asp Val Ala Val Asp Gln Gly
            260                 265                 270

ggt tgt gtg gaa acc tta cac gcc aca tcc cac acc aac cca aca tac          864
Gly Cys Val Glu Thr Leu His Ala Thr Ser His Thr Asn Pro Thr Tyr
        275                 280                 285

cta gaa gag ggc gta gta cat tac ggc gtt ccc aat atg cca ggt gca          912
Leu Glu Glu Gly Val Val His Tyr Gly Val Pro Asn Met Pro Gly Ala
    290                 295                 300

gta cct tgg aca gcc act caa gct ctt aac aac agt aca ttg cct tac          960
Val Pro Trp Thr Ala Thr Gln Ala Leu Asn Asn Ser Thr Leu Pro Tyr
305                 310                 315                 320

gtt gtg cag ttg gca aat caa gga ctc aaa gcg ttg gaa gtg aat caa         1008
Val Val Gln Leu Ala Asn Gln Gly Leu Lys Ala Leu Glu Val Asn Gln
                325                 330                 335

gta ctc gcc aag ggt ttg aat gtg cag aat cat cgc ctt gta cac ccg         1056
Val Leu Ala Lys Gly Leu Asn Val Gln Asn His Arg Leu Val His Pro
            340                 345                 350

gct gta caa gag gtt ttt cct gat tta gtc cat tga                        1092
Ala Val Gln Glu Val Phe Pro Asp Leu Val His
        355                 360
```

<210> 86
<211> 363
<212> PRT
<213> Nostoc sp. PCC 7120

<400> 86

```
Met Glu Ile Gly Val Pro Lys Glu Thr Lys Asp Gln Glu Phe Arg Val
1               5                  10                  15

Gly Leu Ser Pro Ala Ser Val Arg Val Leu Lys Glu Asn Gly His Ser
            20                  25                  30

Ile Phe Val Gln Thr Gln Ala Gly Ser Gly Ala Gly Phe Thr Asp Asp
        35                  40                  45

Asp Tyr Arg Ser Val Gly Ala Asp Ile Val Pro Thr Ala Glu Ala Val
    50                  55                  60

Trp Ser Arg Glu Leu Val Val Lys Val Lys Glu Pro Leu Thr Ser Glu
65                  70                  75                  80

Tyr Asn Phe Leu Gln Lys Gly Gln Ile Leu Phe Thr Tyr Leu His Leu
                85                  90                  95

Ala Ala Asp Arg Lys Leu Thr Glu His Leu Ile Asp Cys Gly Ile Cys
            100                 105                 110

Ala Ile Ala Tyr Glu Thr Val Glu Gln Pro Gly Ala Asn Arg Leu Pro
        115                 120                 125

Leu Leu Thr Pro Met Ser Ile Ile Ala Gly Arg Leu Ala Val Gln Phe
    130                 135                 140

Gly Ala Arg Tyr Leu Glu Arg Gln Gln Gly Gly Arg Gly Val Leu Leu
145                 150                 155                 160

Gly Gly Val Pro Gly Val Lys Pro Gly Lys Val Val Ile Leu Gly Gly
                165                 170                 175

Gly Val Val Gly Thr Glu Ala Ala Arg Ile Ala Val Gly Met Gly Ala
            180                 185                 190

Thr Val Gln Ile Leu Asp Val Asn Val Glu Arg Leu Ser Tyr Leu Glu
        195                 200                 205

Thr Leu Phe Gly Ser Arg Val Glu Leu Leu Tyr Ser Ser Ser Ala His
    210                 215                 220

Ile Glu Ala Ala Val Lys Glu Ala Asp Leu Leu Val Gly Ala Val Leu
225                 230                 235                 240

Val Leu Gly Arg Arg Ala Pro Ile Leu Val Ser Arg Glu Leu Val Lys
                245                 250                 255

Gln Met His Pro Gly Ser Val Ile Val Asp Val Ala Val Asp Gln Gly
            260                 265                 270
```

```
Gly Cys Val Glu Thr Leu His Ala Thr Ser His Thr Asn Pro Thr Tyr
        275                 280                 285

Leu Glu Glu Gly Val Val His Tyr Gly Val Pro Asn Met Pro Gly Ala
    290                 295                 300

Val Pro Trp Thr Ala Thr Gln Ala Leu Asn Asn Ser Thr Leu Pro Tyr
305                 310                 315                 320

Val Val Gln Leu Ala Asn Gln Gly Leu Lys Ala Leu Glu Val Asn Gln
                325                 330                 335

Val Leu Ala Lys Gly Leu Asn Val Gln Asn His Arg Leu Val His Pro
            340                 345                 350

Ala Val Gln Glu Val Phe Pro Asp Leu Val His
        355                 360


<210>  87
<211>  1119
<212>  DNA
<213>  Rhizobium leguminosarum


<220>
<221>  CDS
<222>  (1)..(1119)

<400>  87
atg cgt gtc ggt tgc ccg aag gaa atc aag aat cat gaa tat cgc gtc          48
Met Arg Val Gly Cys Pro Lys Glu Ile Lys Asn His Glu Tyr Arg Val
1               5                   10                  15

ggt ctg acg ccg gct tcg gtg cga gaa tat gtt gcc cac ggc cac gat          96
Gly Leu Thr Pro Ala Ser Val Arg Glu Tyr Val Ala His Gly His Asp
            20                  25                  30

gtc tgg gtg gag acc aag gca ggc gtc ggt atc ggc gct gat gat gcc         144
Val Trp Val Glu Thr Lys Ala Gly Val Gly Ile Gly Ala Asp Asp Ala
        35                  40                  45

gcc tat gcc gcg gct ggc gcc aag atc gcc gcc tcc gcc aag gat atc         192
Ala Tyr Ala Ala Ala Gly Ala Lys Ile Ala Ala Ser Ala Lys Asp Ile
    50                  55                  60

ttc gaa aag tgc gat atg atc gtc aag gtg aag gag ccg cag ccc gcc         240
Phe Glu Lys Cys Asp Met Ile Val Lys Val Lys Glu Pro Gln Pro Ala
65                  70                  75                  80

gaa tgg gcg cag ctc cgt gac ggc cag ctt ctc tac acc tat ctg cat         288
Glu Trp Ala Gln Leu Arg Asp Gly Gln Leu Leu Tyr Thr Tyr Leu His
                85                  90                  95

ctg gcg ccg gat cct gaa cag acc aag ggt ctc atc gcc tcc ggc gtt         336
Leu Ala Pro Asp Pro Glu Gln Thr Lys Gly Leu Ile Ala Ser Gly Val
            100                 105                 110

acc gcg atc gcc tat gag acg gtg acc gac gag cgc ggc ggt ctg ccg         384
Thr Ala Ile Ala Tyr Glu Thr Val Thr Asp Glu Arg Gly Gly Leu Pro
        115                 120                 125
```

```
ttg ctg gcg ccg atg tcg gag gtc gcc gga cgc ctg tcg atc cag gca        432
Leu Leu Ala Pro Met Ser Glu Val Ala Gly Arg Leu Ser Ile Gln Ala
    130                 135                 140

ggg gcg acc gcg ctc cag aag gcc aat ggt ggc ctc ggc gtc ctg ctc        480
Gly Ala Thr Ala Leu Gln Lys Ala Asn Gly Gly Leu Gly Val Leu Leu
145                 150                 155                 160

ggc ggc gta cct ggt gtg ctg ccg gcc aag gtc gcg gtc atc ggc ggc        528
Gly Gly Val Pro Gly Val Leu Pro Ala Lys Val Ala Val Ile Gly Gly
                165                 170                 175

ggc gtt gtc ggc ctg cat gcc gcc agg atg gcc gcc ggc ctc ggc gcc        576
Gly Val Val Gly Leu His Ala Ala Arg Met Ala Ala Gly Leu Gly Ala
            180                 185                 190

gat gtc agc atc ctc gac aag tcg ctg ccg cgc ttg cgc cag ctt gac        624
Asp Val Ser Ile Leu Asp Lys Ser Leu Pro Arg Leu Arg Gln Leu Asp
        195                 200                 205

gat atc ttc gcc ggc cgc atc cac acc cgt tat tcc agc atc cag gcg        672
Asp Ile Phe Ala Gly Arg Ile His Thr Arg Tyr Ser Ser Ile Gln Ala
    210                 215                 220

ctg gag gag gaa gtc ttc tcg gcc gat ctc att atc ggc gcc gtg ctg        720
Leu Glu Glu Glu Val Phe Ser Ala Asp Leu Ile Ile Gly Ala Val Leu
225                 230                 235                 240

att ccc ggc gct gcc gct ccg aag ctc gtc acc cgc gag atg ctc tcc        768
Ile Pro Gly Ala Ala Ala Pro Lys Leu Val Thr Arg Glu Met Leu Ser
                245                 250                 255

ggc atg aag aag ggc tcc gtc atc gtc gac gtc gcc atc gac cag ggc        816
Gly Met Lys Lys Gly Ser Val Ile Val Asp Val Ala Ile Asp Gln Gly
            260                 265                 270

ggc tgc ttc gag acc tcg cat gcg acg acc cat tcc gat ccg acc tat        864
Gly Cys Phe Glu Thr Ser His Ala Thr Thr His Ser Asp Pro Thr Tyr
        275                 280                 285

gaa gtc gac ggc gtc gtg cat tat tgc gtc gcc aac atg ccg ggc gcc        912
Glu Val Asp Gly Val Val His Tyr Cys Val Ala Asn Met Pro Gly Ala
    290                 295                 300

gtg ccg gtc acc tcg gcg cac gcg ctg aac aat gcc aca ttg gtt cat        960
Val Pro Val Thr Ser Ala His Ala Leu Asn Asn Ala Thr Leu Val His
305                 310                 315                 320

ggc ctg gcg ctt gcc gat cgc ggc ctg cgc gct att gcc gaa gac aag       1008
Gly Leu Ala Leu Ala Asp Arg Gly Leu Arg Ala Ile Ala Glu Asp Lys
                325                 330                 335

cac ctg agg aac ggc ctc aac gtg cac aag ggc cgc att acc agc aag       1056
His Leu Arg Asn Gly Leu Asn Val His Lys Gly Arg Ile Thr Ser Lys
            340                 345                 350

ccc gtc gcc gac gcg ctg ggc tac gaa gcc ttt gcg ccg gag agc gta       1104
Pro Val Ala Asp Ala Leu Gly Tyr Glu Ala Phe Ala Pro Glu Ser Val
        355                 360                 365

ctg aac gta gcg taa                                                  1119
Leu Asn Val Ala
    370
```

<210> 88
<211> 372
<212> PRT

<213> Rhizobium leguminosarum

<400> 88

```
Met Arg Val Gly Cys Pro Lys Glu Ile Lys Asn His Glu Tyr Arg Val
1               5                  10                  15

Gly Leu Thr Pro Ala Ser Val Arg Glu Tyr Val Ala His Gly His Asp
            20                  25                  30

Val Trp Val Glu Thr Lys Ala Gly Val Gly Ile Gly Ala Asp Asp Ala
        35                  40                  45

Ala Tyr Ala Ala Ala Gly Ala Lys Ile Ala Ala Ser Ala Lys Asp Ile
    50                  55                  60

Phe Glu Lys Cys Asp Met Ile Val Lys Val Lys Glu Pro Gln Pro Ala
65                  70                  75                  80

Glu Trp Ala Gln Leu Arg Asp Gly Gln Leu Leu Tyr Thr Tyr Leu His
                85                  90                  95

Leu Ala Pro Asp Pro Glu Gln Thr Lys Gly Leu Ile Ala Ser Gly Val
            100                 105                 110

Thr Ala Ile Ala Tyr Glu Thr Val Thr Asp Glu Arg Gly Gly Leu Pro
        115                 120                 125

Leu Leu Ala Pro Met Ser Glu Val Ala Gly Arg Leu Ser Ile Gln Ala
    130                 135                 140

Gly Ala Thr Ala Leu Gln Lys Ala Asn Gly Gly Leu Gly Val Leu Leu
145                 150                 155                 160

Gly Gly Val Pro Gly Val Leu Pro Ala Lys Val Ala Val Ile Gly Gly
                165                 170                 175

Gly Val Val Gly Leu His Ala Ala Arg Met Ala Ala Gly Leu Gly Ala
            180                 185                 190

Asp Val Ser Ile Leu Asp Lys Ser Leu Pro Arg Leu Arg Gln Leu Asp
        195                 200                 205

Asp Ile Phe Ala Gly Arg Ile His Thr Arg Tyr Ser Ser Ile Gln Ala
    210                 215                 220

Leu Glu Glu Glu Val Phe Ser Ala Asp Leu Ile Ile Gly Ala Val Leu
225                 230                 235                 240

Ile Pro Gly Ala Ala Ala Pro Lys Leu Val Thr Arg Glu Met Leu Ser
                245                 250                 255
```

Gly Met Lys Lys Gly Ser Val Ile Val Asp Val Ala Ile Asp Gln Gly
260 265 270

Gly Cys Phe Glu Thr Ser His Ala Thr Thr His Ser Asp Pro Thr Tyr
275 280 285

Glu Val Asp Gly Val Val His Tyr Cys Val Ala Asn Met Pro Gly Ala
290 295 300

Val Pro Val Thr Ser Ala His Ala Leu Asn Asn Ala Thr Leu Val His
305 310 315 320

Gly Leu Ala Leu Ala Asp Arg Gly Leu Arg Ala Ile Ala Glu Asp Lys
325 330 335

His Leu Arg Asn Gly Leu Asn Val His Lys Gly Arg Ile Thr Ser Lys
340 345 350

Pro Val Ala Asp Ala Leu Gly Tyr Glu Ala Phe Ala Pro Glu Ser Val
355 360 365

Leu Asn Val Ala
370

<210> 89
<211> 1113
<212> DNA
<213> Bradyrhizobium japonicum

<220>
<221> CDS
<222> (1)..(1113)

<400> 89
atg aag gtc gga gtt cca aag gaa atc aag gcg cac gaa tat cgc gtg 48
Met Lys Val Gly Val Pro Lys Glu Ile Lys Ala His Glu Tyr Arg Val
1 5 10 15

ggc ctt acc cca gga gct gcc cgt gaa tac gtg gca gcg ggc cac cgc 96
Gly Leu Thr Pro Gly Ala Ala Arg Glu Tyr Val Ala Ala Gly His Arg
20 25 30

gtg atg atc gag acc aat gcc ggc gct ggc att ggt gca acc gat ggc 144
Val Met Ile Glu Thr Asn Ala Gly Ala Gly Ile Gly Ala Thr Asp Gly
35 40 45

gat tat cgc aat gcc ggc gca acg atc tta act tcg gca gct gag gta 192
Asp Tyr Arg Asn Ala Gly Ala Thr Ile Leu Thr Ser Ala Ala Glu Val
50 55 60

ttc gca tcg agc gag atg atc gta aag gtc aag gag cct cag ccg gcc 240
Phe Ala Ser Ser Glu Met Ile Val Lys Val Lys Glu Pro Gln Pro Ala
65 70 75 80

gaa tgg tcc cag ctg cgt gag gat caa atc ctg ttc acc tat ttg cac 288
Glu Trp Ser Gln Leu Arg Glu Asp Gln Ile Leu Phe Thr Tyr Leu His
85 90 95

ttg gcc ccg gac ccg gaa cag gct gcc ggc ctc ttg aaa tct gga tgc 336

```
Leu Ala Pro Asp Pro Glu Gln Ala Ala Gly Leu Leu Lys Ser Gly Cys
            100                 105                 110

att gca atc gcc tat gag acc gta act gat gct cat ggt ggt ctt cca  384
Ile Ala Ile Ala Tyr Glu Thr Val Thr Asp Ala His Gly Gly Leu Pro
        115                 120                 125

ctg ctg gcg ccg atg agc gag gtc gcg ggc agg ctt tcg atc gaa gcg  432
Leu Leu Ala Pro Met Ser Glu Val Ala Gly Arg Leu Ser Ile Glu Ala
    130                 135                 140

gcg ggt agc gct cta aag cgg agt aca ggg ggg cga ggg ctg ctg atc  480
Ala Gly Ser Ala Leu Lys Arg Ser Thr Gly Gly Arg Gly Leu Leu Ile
145                 150                 155                 160

ggt ggg gtg ccc ggg gtt cag cct gcc cga atc gtg gtg att gga ggt  528
Gly Gly Val Pro Gly Val Gln Pro Ala Arg Ile Val Val Ile Gly Gly
                165                 170                 175

ggg gtc gtc ggt acg cac gcc gcg cgc atg gcg gct ggt ctg ggc gca  576
Gly Val Val Gly Thr His Ala Ala Arg Met Ala Ala Gly Leu Gly Ala
            180                 185                 190

gag gtg acc atc atc gat cgt tcg atc atc cgg ctc cgt gag ctg gac  624
Glu Val Thr Ile Ile Asp Arg Ser Ile Ile Arg Leu Arg Glu Leu Asp
        195                 200                 205

gag cta ttc gaa gga cgg gtt cgc act agg ttt tcg acc atc gaa tcc  672
Glu Leu Phe Glu Gly Arg Val Arg Thr Arg Phe Ser Thr Ile Glu Ser
    210                 215                 220

gtg gag gaa gag gta ttt gcg gcg gac gtg gtg att ggt gcg gtg ctc  720
Val Glu Glu Glu Val Phe Ala Ala Asp Val Val Ile Gly Ala Val Leu
225                 230                 235                 240

gtc cca ggg gca agc gct ccg aag ctg gtc cgc cgg agc atg ctg agc  768
Val Pro Gly Ala Ser Ala Pro Lys Leu Val Arg Arg Ser Met Leu Ser
                245                 250                 255

tca atg cgc aag aga gcc gta ctc gtg gac gtc gct atc gat cag ggc  816
Ser Met Arg Lys Arg Ala Val Leu Val Asp Val Ala Ile Asp Gln Gly
            260                 265                 270

ggc tgc ttt gag aca tcg cgc cca acc act cac gct gat cca aca tac  864
Gly Cys Phe Glu Thr Ser Arg Pro Thr Thr His Ala Asp Pro Thr Tyr
        275                 280                 285

gaa gta gat ggc atc att cat tat tgt gtg gcc aat atg ccg ggt gcc  912
Glu Val Asp Gly Ile Ile His Tyr Cys Val Ala Asn Met Pro Gly Ala
    290                 295                 300

gtg ccg cta acc tcg agc cag gca ctg aat aac gcg acc ctg ccg ttt  960
Val Pro Leu Thr Ser Ser Gln Ala Leu Asn Asn Ala Thr Leu Pro Phe
305                 310                 315                 320

ggt ttg gct ctg gcc aac aag ggt ttt tcc gcc gta ctc gag aat cca 1008
Gly Leu Ala Leu Ala Asn Lys Gly Phe Ser Ala Val Leu Glu Asn Pro
                325                 330                 335

cat ctg cgc gca ggc ctc aac gtc cat cgg ggc cgg cta aca tac aag 1056
His Leu Arg Ala Gly Leu Asn Val His Arg Gly Arg Leu Thr Tyr Lys
            340                 345                 350

gcg gtg gcc gag agc ctc ggg ctg ccc ttc tcc ccg atc gaa cag gct 1104
Ala Val Ala Glu Ser Leu Gly Leu Pro Phe Ser Pro Ile Glu Gln Ala
        355                 360                 365

gcg gcc tga                                                     1113
```

Ala Ala
370

<210> 90
<211> 370
<212> PRT
<213> Bradyrhizobium japonicum

<400> 90

Met Lys Val Gly Val Pro Lys Glu Ile Lys Ala His Glu Tyr Arg Val
1 5 10 15

Gly Leu Thr Pro Gly Ala Ala Arg Glu Tyr Val Ala Ala Gly His Arg
20 25 30

Val Met Ile Glu Thr Asn Ala Gly Ala Gly Ile Gly Ala Thr Asp Gly
35 40 45

Asp Tyr Arg Asn Ala Gly Ala Thr Ile Leu Thr Ser Ala Ala Glu Val
50 55 60

Phe Ala Ser Ser Glu Met Ile Val Lys Val Lys Glu Pro Gln Pro Ala
65 70 75 80

Glu Trp Ser Gln Leu Arg Glu Asp Gln Ile Leu Phe Thr Tyr Leu His
85 90 95

Leu Ala Pro Asp Pro Glu Gln Ala Ala Gly Leu Leu Lys Ser Gly Cys
100 105 110

Ile Ala Ile Ala Tyr Glu Thr Val Thr Asp Ala His Gly Gly Leu Pro
115 120 125

Leu Leu Ala Pro Met Ser Glu Val Ala Gly Arg Leu Ser Ile Glu Ala
130 135 140

Ala Gly Ser Ala Leu Lys Arg Ser Thr Gly Gly Arg Gly Leu Leu Ile
145 150 155 160

Gly Gly Val Pro Gly Val Gln Pro Ala Arg Ile Val Val Ile Gly Gly
165 170 175

Gly Val Val Gly Thr His Ala Ala Arg Met Ala Ala Gly Leu Gly Ala
180 185 190

Glu Val Thr Ile Ile Asp Arg Ser Ile Ile Arg Leu Arg Glu Leu Asp
195 200 205

Glu Leu Phe Glu Gly Arg Val Arg Thr Arg Phe Ser Thr Ile Glu Ser
210 215 220

Val Glu Glu Glu Val Phe Ala Ala Asp Val Val Ile Gly Ala Val Leu

225 230 235 240

Val Pro Gly Ala Ser Ala Pro Lys Leu Val Arg Arg Ser Met Leu Ser
245 250 255

Ser Met Arg Lys Arg Ala Val Leu Val Asp Val Ala Ile Asp Gln Gly
260 265 270

Gly Cys Phe Glu Thr Ser Arg Pro Thr Thr His Ala Asp Pro Thr Tyr
275 280 285

Glu Val Asp Gly Ile Ile His Tyr Cys Val Ala Asn Met Pro Gly Ala
290 295 300

Val Pro Leu Thr Ser Ser Gln Ala Leu Asn Asn Ala Thr Leu Pro Phe
305 310 315 320

Gly Leu Ala Leu Ala Asn Lys Gly Phe Ser Ala Val Leu Glu Asn Pro
325 330 335

His Leu Arg Ala Gly Leu Asn Val His Arg Gly Arg Leu Thr Tyr Lys
340 345 350

Ala Val Ala Glu Ser Leu Gly Leu Pro Phe Ser Pro Ile Glu Gln Ala
355 360 365

Ala Ala
370

<210> 91
<211> 1134
<212> DNA
<213> Bacillus megaterium

<220>
<221> CDS
<222> (1)..(1134)

<400> 91
atg att att ggc gta cca aaa gaa atc aaa aac aac gaa aac cga gta 48
Met Ile Ile Gly Val Pro Lys Glu Ile Lys Asn Asn Glu Asn Arg Val
1 5 10 15

gcg att aca cca gca ggc gta gca tca ttt gtt ggt aca ggt cat cgt 96
Ala Ile Thr Pro Ala Gly Val Ala Ser Phe Val Gly Thr Gly His Arg
20 25 30

gta tta att gaa aat gaa gcg ggt att gga agt aac ttc aca aac gaa 144
Val Leu Ile Glu Asn Glu Ala Gly Ile Gly Ser Asn Phe Thr Asn Glu
35 40 45

gat tat gta aag gct gga gct gaa att gtt gag aca gca gct gac gtt 192
Asp Tyr Val Lys Ala Gly Ala Glu Ile Val Glu Thr Ala Ala Asp Val
50 55 60

tgg gca caa gct gaa atg gtt atg aaa gta aaa gaa cca cta gca agt 240
Trp Ala Gln Ala Glu Met Val Met Lys Val Lys Glu Pro Leu Ala Ser

```
65                  70                  75                  80

gaa tac ggc tat ttt aga cca ggt ctt atc tta ttc aca tac ctt cac  288
Glu Tyr Gly Tyr Phe Arg Pro Gly Leu Ile Leu Phe Thr Tyr Leu His
                85                  90                  95

tta gca gct gaa cca gca cta gca aaa gca tta aaa gat agc ggc gta  336
Leu Ala Ala Glu Pro Ala Leu Ala Lys Ala Leu Lys Asp Ser Gly Val
            100                 105                 110

aca gcc att gct tat gaa aca gta gca gta aat cgt aca ttg cct cta  384
Thr Ala Ile Ala Tyr Glu Thr Val Ala Val Asn Arg Thr Leu Pro Leu
        115                 120                 125

tta acg cct atg agc gaa gta gca gga cgt atg gct gct caa atc ggt  432
Leu Thr Pro Met Ser Glu Val Ala Gly Arg Met Ala Ala Gln Ile Gly
    130                 135                 140

gca caa ttc ctt caa aaa tca aac ggt gga aaa gga att tta cta gcg  480
Ala Gln Phe Leu Gln Lys Ser Asn Gly Gly Lys Gly Ile Leu Leu Ala
145                 150                 155                 160

ggt gtt cct gga gtt agc cgc gga aaa gta acg att atc gga ggc ggc  528
Gly Val Pro Gly Val Ser Arg Gly Lys Val Thr Ile Ile Gly Gly Gly
                165                 170                 175

ggt gtt ggt aca aat gct gca aaa atc gca atc ggt ctc ggt gct gat  576
Gly Val Gly Thr Asn Ala Ala Lys Ile Ala Ile Gly Leu Gly Ala Asp
            180                 185                 190

gta aca att att gat tta agt cct gaa cgc tta cgt caa tta gac gat  624
Val Thr Ile Ile Asp Leu Ser Pro Glu Arg Leu Arg Gln Leu Asp Asp
        195                 200                 205

atc ttt ggc aac caa atc aat acg cta gtg tca aac cct tat aat att  672
Ile Phe Gly Asn Gln Ile Asn Thr Leu Val Ser Asn Pro Tyr Asn Ile
    210                 215                 220

gcg gat gca gta gcg gag tca gat tta gtg att ggc gca gta tta atc  720
Ala Asp Ala Val Ala Glu Ser Asp Leu Val Ile Gly Ala Val Leu Ile
225                 230                 235                 240

cca ggt gca aaa gct cca aaa cta gta aca gaa gaa atg gtg aaa aca  768
Pro Gly Ala Lys Ala Pro Lys Leu Val Thr Glu Glu Met Val Lys Thr
                245                 250                 255

atg aag cca ggt tct gtt att gtt gac gta gca atc gac caa ggt ggt  816
Met Lys Pro Gly Ser Val Ile Val Asp Val Ala Ile Asp Gln Gly Gly
            260                 265                 270

atc gtt gaa aca atc gac cac att aca aca cac gat cat cca act tat  864
Ile Val Glu Thr Ile Asp His Ile Thr Thr His Asp His Pro Thr Tyr
        275                 280                 285

gaa aag cac ggc gtt gta cac tat gca gtt gca aat atg ccg gga gca  912
Glu Lys His Gly Val Val His Tyr Ala Val Ala Asn Met Pro Gly Ala
    290                 295                 300

gtt cct cgc aca tca aca att gct tta aca aac gta acc gta cct tac  960
Val Pro Arg Thr Ser Thr Ile Ala Leu Thr Asn Val Thr Val Pro Tyr
305                 310                 315                 320

gca ctt caa att gct tct aaa ggt gtt cac aaa gca atc gct caa aac 1008
Ala Leu Gln Ile Ala Ser Lys Gly Val His Lys Ala Ile Ala Gln Asn
                325                 330                 335

gaa gcg tta aaa tta gga gtg aac gtt gcc aac gga gcc att acg tac 1056
Glu Ala Leu Lys Leu Gly Val Asn Val Ala Asn Gly Ala Ile Thr Tyr
```

340 345 350

gaa gca gtt gca cat gat tta ggt tat gat tat gta tca gta gac gta 1104
Glu Ala Val Ala His Asp Leu Gly Tyr Asp Tyr Val Ser Val Asp Val
355 360 365

gct ctt gaa aaa gaa tta gct tct atc taa 1134
Ala Leu Glu Lys Glu Leu Ala Ser Ile
370 375

<210> 92
<211> 377
<212> PRT
<213> Bacillus megaterium

<400> 92

Met Ile Ile Gly Val Pro Lys Glu Ile Lys Asn Asn Glu Asn Arg Val
1 5 10 15

Ala Ile Thr Pro Ala Gly Val Ala Ser Phe Val Gly Thr Gly His Arg
20 25 30

Val Leu Ile Glu Asn Glu Ala Gly Ile Gly Ser Asn Phe Thr Asn Glu
35 40 45

Asp Tyr Val Lys Ala Gly Ala Glu Ile Val Glu Thr Ala Ala Asp Val
50 55 60

Trp Ala Gln Ala Glu Met Val Met Lys Val Lys Glu Pro Leu Ala Ser
65 70 75 80

Glu Tyr Gly Tyr Phe Arg Pro Gly Leu Ile Leu Phe Thr Tyr Leu His
85 90 95

Leu Ala Ala Glu Pro Ala Leu Ala Lys Ala Leu Lys Asp Ser Gly Val
100 105 110

Thr Ala Ile Ala Tyr Glu Thr Val Ala Val Asn Arg Thr Leu Pro Leu
115 120 125

Leu Thr Pro Met Ser Glu Val Ala Gly Arg Met Ala Ala Gln Ile Gly
130 135 140

Ala Gln Phe Leu Gln Lys Ser Asn Gly Gly Lys Gly Ile Leu Leu Ala
145 150 155 160

Gly Val Pro Gly Val Ser Arg Gly Lys Val Thr Ile Ile Gly Gly Gly
165 170 175

Gly Val Gly Thr Asn Ala Ala Lys Ile Ala Ile Gly Leu Gly Ala Asp
180 185 190

Val Thr Ile Ile Asp Leu Ser Pro Glu Arg Leu Arg Gln Leu Asp Asp
195 200 205

Ile Phe Gly Asn Gln Ile Asn Thr Leu Val Ser Asn Pro Tyr Asn Ile
210 215 220

Ala Asp Ala Val Ala Glu Ser Asp Leu Val Ile Gly Ala Val Leu Ile
225 230 235 240

Pro Gly Ala Lys Ala Pro Lys Leu Val Thr Glu Glu Met Val Lys Thr
245 250 255

Met Lys Pro Gly Ser Val Ile Val Asp Val Ala Ile Asp Gln Gly Gly
260 265 270

Ile Val Glu Thr Ile Asp His Ile Thr Thr His Asp His Pro Thr Tyr
275 280 285

Glu Lys His Gly Val Val His Tyr Ala Val Ala Asn Met Pro Gly Ala
290 295 300

Val Pro Arg Thr Ser Thr Ile Ala Leu Thr Asn Val Thr Val Pro Tyr
305 310 315 320

Ala Leu Gln Ile Ala Ser Lys Gly Val His Lys Ala Ile Ala Gln Asn
325 330 335

Glu Ala Leu Lys Leu Gly Val Asn Val Ala Asn Gly Ala Ile Thr Tyr
340 345 350

Glu Ala Val Ala His Asp Leu Gly Tyr Asp Tyr Val Ser Val Asp Val
355 360 365

Ala Leu Glu Lys Glu Leu Ala Ser Ile
370 375

<210> 93
<211> 7913
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 93
ctagattatt aggcgaggcc acgcgctttg agggtctgtt caaattcttc gaggcaacgt 60

tccgccacgg cgagcatttc atccacttcc gcacgggtca taacgagcgg cggtgcagac 120

acaatgtgat cgccgcacgc acgcataatg aggttgttgc gaaaaaaaat atcgcggcag 180

agggtgccaa tttcgccaaa atccggaaag agttcacgtt tcgctttgtt tttcacgagg 240

gtaaacgcct gcaccatgcc cacgccacgc acatcatcca catgttcaaa acggctaaag 300

gtttcacgcc aacgtttctg catatacggg ccaatatcat ctttcacacg ctgcacaatg 360

ccttcatcac ggagcgccgc aacattcgca tgcgccaccg ccgcacacac cggatggccg 420

ctataggtaa agccatggtt aaaatcaccg cccgcaatga gaccttccgc aacacgtttg 480
cccacaaaca ccgcgccaat cgggagatag ccgctgctga ggcctttcgc cgcggtaaag 540
aggtccggct gaaagccaaa atgctgatgg ccaaaccatt cgccggtacg gccaaagccg 600
caaatcactt catccgcaac gaggagcaca tcatatttgc ggcaaatacg ttcaatttcc 660
ggccaatagg ttgccggcgg aacaatcaca ccgcccgcac cctgaatcgg ttcgcccaca 720
aacgccgcca ctttatccgc gccgatttcg agaatttttt cttcgagcca acgcgccgca 780
accacgccaa attcatccgg ggtcatatct ttgccatgtt tataccacca cggctgttca 840
atatgcgcca tgcccggaat cgggagatcg ccctgttcat gcatatattt catgccgccg 900
aggctcgcac cgccaatggt gctgccgtga tagccgttcc aacggccaat gagggttttt 960
ttttccggtt tgccctgcac atcccaataa cgacgcacca tacgaatcat ggtatccacg 1020
ctttcgctgc cgctgttggt ataaaacaca cgatcaaaac ctgccggggt aacttcggcg 1080
aggaggctgc tgagttccac caccgccgga tgggtggttt taaagaaggt gttataaaac 1140
gggagttctt ccatctgacg acgcgccgct tccgcaaaat ctttacggcc atagcccacg 1200
ttcacgcacc agaggcccgc catgccatca ataattttgt tgccttcgct atcccagaga 1260
tacacgcctt cgccacgggt catcacacgc gcacccgcct gattgaggct cgcggtatcg 1320
gtaaacggat ggagatgatg cgccgcatcg agttcacgcc actgagaggt ggtacgctgt 1380
ttctgcatat tatatctcct taaagcttca atggactaaa tcaggaaaaa cctcttgtac 1440
agccgggtgt acaaggcgat gattctgcac attcaaaccc ttggcgagta cttgattcac 1500
ttccaacgct ttgagtcctt gatttgccaa ctgcacaacg taaggcaatg tactgttgtt 1560
aagagcttga gtggctgtcc aaggtactgc acctggcata ttgggaacgc cgtaatgtac 1620
tacgccctct tcaaggtatg ttgggttggt gtgggatgtg gcgtgtaagg tttccacaca 1680
accaccttga tctacagcca catcaactat taccgaacct gggtgcattt gtttaactaa 1740
ttcacgagat actagaattg gcgctctgcg tcctagtacc aaaacagcac caacaagtaa 1800
atctgcttct ttaactgcgg cttcgatatg ggcagaactg ctgtaaagta attccactct 1860
agaaccaaac aaagtttcta aataagataa acgttcaaca tttacatcta atatttgtac 1920
ggttgcaccc atacctacgg caattctggc agcttctgta ccaactacac cgccaccgag 1980
aataactact tttcctggtt taactccagg aacaccaccc agcagtacac ctctaccacc 2040
ttgttggcgt tctaaatagc gtgcgccaaa ttgtactgct aaccgaccgg caataatgct 2100
catgggggtc agtagtggta gtctgttagc gcctggttgt tctacggttt cgtaagcgat 2160
cgcacaaatg ccacaatcaa ttaaatgctc tgttaatttg cgatcggctg ctaaatgcag 2220
ataagtaaac aatatctgcc ctttctgtaa aaagttgtac tcactcgtca gtggttcttt 2280
aactttgact actaactctc gactccaaac tgcctctgct gttgggacaa tatccgcccc 2340
tacactgcga taatcatcat ctgtaaaccc agcaccacta ccagcttgag tctgaacaaa 2400
tatactatga ccattttcct tcaacacccg cacgctagca ggacttaacc ccacacgaaa 2460

ttcttgatct ttagtttctt taggaacgcc gatttccatt atgccactct ccttggttcc 2520

tagatcctgt gtgaaattgt tattgttatc cgctcacaat tccacacatt atacgagccg 2580

gaagcataaa gtgtcaagcc tggggtgcct aatgagtgag ctaacttaca ttaattgcgt 2640

tgcgctcact gcccgcatat ctatgagccg ggctgaatga tcgaccgaga caggccctgc 2700

ggggctgcag gatccaattg tgagcggata acaattacga gcttcatgca cagtgatcga 2760

cgctgttgac aattaatcat cggctcgtat aatgtgtgga tgtggaattg tgagcgctca 2820

caattccaca acggtttccc tctagaaata attttgttta caaggaggat tataaaatga 2880

ctctagagtg gaaaccgaaa ccaaaactgc ctcaactgct ggatgatcac ttcggtctgc 2940

acggtctggt gtttcgtcgt actttcgcaa ttcgttctta tgaagtgggt ccagatcgtt 3000

ctacctccat cctggccgtc atgaaccaca tgcaggaagc caccctgaat cacgcgaaat 3060

ctgttggtat cctgggtgat ggtttcggca ctactctgga aatgtctaaa cgtgacctga 3120

tgtgggtagt gcgtcgcacc cacgtagcag tagagcgcta ccctacttgg ggtgacactg 3180

tggaagtcga gtgttggatt ggcgcgtccg gtaacaatgg tatgcgtcgc gattttctgg 3240

tccgtgactg taaaacgggc gaaatcctga cgcgttgcac ctccctgagc gttctgatga 3300

acacccgcac tcgtcgcctg tctaccatcc cggacgaagt gcgcggtgag atcggtcctg 3360

ctttcatcga taacgtggca gttaaagacg acgaaatcaa gaaactgcaa aaactgaacg 3420

actccaccgc ggactacatc cagggcggtc tgactccgcg ctggaacgac ctggatgtta 3480

atcagcatgt gaacaacctg aaatacgttg cttgggtctt cgagactgtg ccggacagca 3540

ttttcgaaag ccatcacatt tcctctttta ctctggagta ccgtcgcgaa tgtactcgcg 3600

actccgttct gcgcagcctg accaccgtaa gcggcggttc tagcgaggca ggtctggtct 3660

gcgaccatct gctgcaactg gaaggcggct ccgaagtcct gcgtgcgcgt acggagtggc 3720

gtccaaagct gacggattct ttccgcggca tctccgtaat tccggcggaa cctcgtgttt 3780

aagctttagt caaaagcctc cggtcggagg cttttgactt tctgcttact gaatttgcgg 3840

ccgcctcgag aaaatgaagg gaagttccta tacttactag agaataggaa cttctatagg 3900

gagtcgaata agggcgacac aaaaggtatt ctaaatgcat aataaatact gataacatct 3960

tatagtttgt attatatttt gtattatcgt tgacatgtat aattttgata tcaaaaactg 4020

attttccctt tattattttc gagatttatt ttcttaattc tctttaacaa actagaaata 4080

ttgtatatac aaaaaatcat aaataataga tgaatagttt aattataggt gttcatcaat 4140

cgaaaaagca acgtatctta tttaaagtgc gttgcttttt tctcatttat aaggttaaat 4200

aattctcata tatcaagcaa agtgacaggc gcccttaaat attctgacaa atgctctttc 4260

cctaaactcc ccccataaaa aaacccgccg aagcgggttt ttacgttatt tgcggattaa 4320

cgattactcg ttatcagaac cgcccaggat gcctggcagt tccctactct cgccgctgcg 4380

ctcggtcgtt cggctgcggg acctcagcgc tagcggagtg tatactggct tactatgttg 4440

gcactgatga gggtgtcagt gaagtgcttc atgtggcagg agaaaaaagg ctgcaccggt 4500

gcgtcagcag aatatgtgat acaggatata ttccgcttcc tcgctcactg actcgctacg 4560

ctcggtcgtt cgactgcggc gagcggaaat ggcttacgaa cggggcggag atttcctgga 4620

agatgccagg aagatactta acagggaagt gagagggccg cggcaaagcc gtttttccat 4680

aggctccgcc cccctgacaa gcatcacgaa atctgacgct caaatcagtg gtggcgaaac 4740

ccgacaggac tataaagata ccaggcgttt ccccctggcg gctccctcgt gcgctctcct 4800

gttcctgcct ttcggtttac cggtgtcatt ccgctgttat ggccgcgttt gtctcattcc 4860

acgcctgaca ctcagttccg ggtaggcagt tcgctccaag ctggactgta tgcacgaacc 4920

ccccgttcag tccgaccgct gcgccttatc cggtaactat cgtcttgagt ccaacccgga 4980

aagacatgca aaagcaccac tggcagcagc cactggtaat tgatttagag gagttagtct 5040

tgaagtcatg cgccggttaa ggctaaactg aaaggacaag ttttggtgac tgcgctcctc 5100

caagccagtt acctcggttc aaagagttgg tagctcagag aaccttcgaa aaaccgccct 5160

gcaaggcggt tttttcgttt tcagagcaag agattacgcg cagaccaaaa cgatctcaag 5220

aagatcatct tattaatcac tgcccgcttt ccagtcggga aacctgtcgt gccagctgca 5280

ttaatgaatc ggccaacgcg cggggagagg cggtttgcgt attgggcgcc agggtggttt 5340

ttcttttcac cagtgagact ggcaacagct gattgccctt caccgcctgg ccctgagaga 5400

gttgcagcaa gcggtccacg ctggtttgcc ccagcaggcg aaaatcctgt ttgatggtgg 5460

ttaacggcgg gatataacat gagctatctt cggtatcgtc gtatcccact accgagatat 5520

ccgcaccaac gcgcagcccg gactcggtaa tggcgcgcat tgcgcccagc gccatctgat 5580

cgttggcaac cagcatcgca gtgggaacga tgccctcatt cagcatttgc atggtttgtt 5640

gaaaaccgga catggcactc cagtcgcctt cccgttccgc tatcggctga atttgattgc 5700

gagtgagata tttatgccag ccagccagac gcagacgcgc cgagacagaa cttaatgggc 5760

ccgctaacag cgcgatttgc tggtgaccca atgcgaccag atgctccacg cccagtcgcg 5820

taccgtcctc atgggagaaa ataatactgt tgatgggtgt ctggtcagag acatcaagaa 5880

ataacgccgg aacattagtg caggcagctt ccacagcaat ggcatcctgg tcatccagcg 5940

gatagttaat gatcagccca ctgacgcgtt gcgcgagaag attgtgcacc gccgctttac 6000

aggcttcgac gccgcttcgt tctaccatcg acaccaccac gctggcaccc agttgatcgg 6060

cgcgagattt aatcgccgcg acaatttgcg acggcgcgtg cagggccaga ctggaggtgg 6120

caacgccaat cagcaacgac tgtttgcccg ccagttgttg tgccacgcgg ttgggaatgt 6180

aattcagctc cgccatcgcc gcttccactt tttcccgcgt tttcgcagaa acgtggctgg 6240

cctggttcac cacgcgggaa acggtctgat aagagacacc ggcatactct gcgacatcgt 6300

ataacgttac tggtttcata ttcaccaccc tgaattgact ctcttccggg cgctatcatg 6360

ccataccgcg aaaggttttg cgccattcga tggcgcgccg cttttaccaa tgcttaatca 6420

gtgaggcacc tatctcagcg atctgtctat ttcgttcatc catagttgcc tgactccccg 6480

tcgtgtagat aactacgata cgggagggct taccatctgg ccccagcgct gcgatgatac 6540

cgcgagaacc acgctcaccg gctccggatt tatcagcaat aaaccagcca gccggaaggg 6600

ccgagcgcag aagtggtcct gcaactttat ccgcctccat ccagtctatt aattgttgcc 6660

gggaagctag agtaagtagt tcgccagtta atagtttgcg caacgttgtt gccatcgcta 6720

caggcatcgt ggtgtcacgc tcgtcgtttg gtatggcttc attcagctcc ggttcccaac 6780

gatcaaggcg agttacatga tcccccatgt tgtgcaaaaa agcggttagc tccttcggtc 6840

ctccgatcgt tgtcagaagt aagttggccg cagtgttatc actcatggtt atggcagcac 6900

tgcataattc tcttactgtc atgccatccg taagatgctt ttctgtgact ggtgagtact 6960

caaccaagtc attctgagaa tagtgtatgc ggcgaccgag ttgctcttgc ccggcgtcaa 7020

tacgggataa taccgcgcca catagcagaa ctttaaaagt gctcatcatt ggaaaacgtt 7080

cttcggggcg aaaactctca aggatcttac cgctgttgag atccagttcg atgtaaccca 7140

ctcgtgcacc caactgatct tcagcatctt ttactttcac cagcgtttct gggtgagcaa 7200

aaacaggaag gcaaaatgcc gcaaaaaagg gaataagggc gacacggaaa tgttgaatac 7260

tcatattctt cctttttcaa tattattgaa gcatttatca gggttattgt ctcatgagcg 7320

gatacatatt tgaatgtatt tagaaaaata aacaaatagg ggtcagtgtt acaaccaatt 7380

aaccaattct gaacattatc gcgagcccat ttatacctga atatggctca taacacccct 7440

tgtttgcctg gcggcagtag cgcggtggtc ccacctgacc ccatgccgaa ctcagaagtg 7500

aaacgccgta gcgccgatgg tagtgtgggg actccccatg cgagagtagg gaactgccag 7560

gcatcaaata aaacgaaagg ctcagtcgaa agactgggcc tttcgcccgg gctaattatg 7620

gggtgtcgcc cttattcgac tctatagtga agttcctatt ctctagtagt ataggaactt 7680

ctgaagtggg gctcgagggc cggcccagcc gtcaaggtta aggctggcca tatcagcgac 7740

tgaaaagcgg ccagcctcgg ccttgtttga cgtataacca aagccaccgg gcaaccaata 7800

gcccttgtca cttttgatca ggtagaccga ccctgaagcg ctttttttcgt attccataaa 7860

acccccttct gtgcgtgagt actcatagta taacaggcgt gagtaccaac gct 7913

<210> 94
<211> 7940
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 94
ctagattatt aggcgaggcc acgcgctttg agggtctgtt caaattcttc gaggcaacgt 60

tccgccacgg cgagcatttc atccacttcc gcacgggtca taacgagcgg cggtgcagac 120

acaatgtgat cgccgcacgc acgcataatg aggttgttgc gaaaaaaaat atcgcggcag 180

agggtgccaa tttcgccaaa atccggaaag agttcacgtt tcgctttgtt tttcacgagg 240

gtaaacgcct gcaccatgcc cacgccacgc acatcatcca catgttcaaa acggctaaag 300

gtttcacgcc aacgtttctg catatacggg ccaatatcat ctttcacacg ctgcacaatg 360

ccttcatcac ggagcgccgc aacattcgca tgcgccaccg ccgcacacac cggatggccg 420

ctataggtaa agccatggtt aaaatcaccg cccgcaatga gaccttccgc aacacgtttg 480

cccacaaaca ccgcgccaat cgggagatag ccgctgctga ggcctttcgc cgcggtaaag 540

aggtccggct gaaagccaaa atgctgatgg ccaaaccatt cgccggtacg gccaaagccg 600

caaatcactt catccgcaac gaggagcaca tcatatttgc ggcaaatacg ttcaatttcc 660

ggccaatagg ttgccggcgg aacaatcaca ccgcccgcac cctgaatcgg ttcgcccaca 720

aacgccgcca ctttatccgc gccgatttcg agaatttttt cttcgagcca acgcgccgca 780

accacgccaa attcatccgg ggtcatatct ttgccatgtt tataccacca cggctgttca 840

atatgcgcca tgcccggaat cgggagatcg ccctgttcat gcatatattt catgccgccg 900

aggctcgcac cgccaatggt gctgccgtga tagccgttcc aacggccaat gagggttttt 960

ttttccggtt tgccctgcac atcccaataa cgacgcacca tacgaatcat ggtatccacg 1020

ctttcgctgc cgctgttggt ataaaacaca cgatcaaaac ctgccggggt aacttcggcg 1080

aggaggctgc tgagttccac caccgccgga tgggtggttt taaagaaggt gttataaaac 1140

gggagttctt ccatctgacg acgcgccgct tccgcaaaat ctttacggcc atagcccacg 1200

ttcacgcacc agaggcccgc catgccatca ataattttgt tgccttcgct atcccagaga 1260

tacacgcctt cgccacgggt catcacacgc gcacccgcct gattgaggct cgcggtatcg 1320

gtaaacggat ggagatgatg cgccgcatcg agttcacgcc actgagaggt ggtacgctgt 1380

ttctgcatat tatatctcct taaagcttta cgctacgttc agtacgctct ccggcgcaaa 1440

ggcttcgtag cccagcgcgt cggcgacggg cttgctggta atgcggccct tgtgcacgtt 1500

gaggccgttc ctcaggtgct tgtcttcggc aatagcgcgc aggccgcgat cggcaagcgc 1560

caggccatga accaatgtgg cattgttcag cgcgtgcgcc gaggtgaccg gcacggcgcc 1620

cggcatgttg gcgacgcaat aatgcacgac gccgtcgact tcataggtcg gatcggaatg 1680

ggtcgtcgca tgcgaggtct cgaagcagcc gccctggtcg atggcgacgt cgacgatgac 1740

ggagcccttc ttcatgccgg agagcatctc gcgggtgacg agcttcggag cggcagcgcc 1800

gggaatcagc acggcgccga taatgagatc ggccgagaag acttcctcct ccagcgcctg 1860

gatgctggaa taacgggtgt ggatgcggcc ggcgaagata tcgtcaagct ggcgcaagcg 1920

cggcagcgac ttgtcgagga tgctgacatc ggcgccgagg ccggcggcca tcctggcggc 1980

atgcaggccg acaacgccgc cgccgatgac cgcgaccttg gccggcagca caccaggtac 2040

gccgccgagc aggacgccga ggccaccatt ggccttctgc agcgcggtcg cccctgcctg 2100

gatcgacagg cgtccggcga cctccgacat cggcgccagc aacggcagac cgccgcgctc 2160

gtcggtcacc gtctcatagg cgatcgcggt aacgccggag gcgatgagac ccttggtctg 2220

ttcaggatcc ggcgccagat gcagataggt gtagagaagc tggccgtcac ggagctgcgc 2280

ccattcggcg ggctgcggct ccttcacctt gacgatcata tcgcactttt cgaagatatc 2340

cttggcggag gcggcgatct tggcgccagc cgcggcatag gcggcatcat cagcgccgat 2400

accgacgcct gccttggtct ccacccagac atcgtggccg tgggcaacat attctcgcac 2460
cgaagccggc gtcagaccga cgcgatattc atgattcttg atttccttcg ggcaaccgac 2520
acgcattatg ccactctcct tggttcctag atcctgtgtg aaattgttat tgttatccgc 2580
tcacaattcc acacattata cgagccggaa gcataaagtg tcaagcctgg ggtgcctaat 2640
gagtgagcta acttacatta attgcgttgc gctcactgcc cgcatatcta tgagccgggc 2700
tgaatgatcg accgagacag gccctgcggg gctgcaggat ccaattgtga gcggataaca 2760
attacgagct tcatgcacag tgatcgacgc tgttgacaat taatcatcgg ctcgtataat 2820
gtgtggatgt ggaattgtga gcgctcacaa ttccacaacg gtttccctct agaaataatt 2880
ttgtttacaa ggaggattat aaaatgactc tagagtggaa accgaaacca aaactgcctc 2940
aactgctgga tgatcacttc ggtctgcacg gtctggtgtt tcgtcgtact ttcgcaattc 3000
gttcttatga agtgggtcca gatcgttcta cctccatcct ggccgtcatg aaccacatgc 3060
aggaagccac cctgaatcac gcgaaatctg ttggtatcct gggtgatggt ttcggcacta 3120
ctctggaaat gtctaaacgt gacctgatgt gggtagtgcg tcgcacccac gtagcagtag 3180
agcgctaccc tacttggggt gacactgtgg aagtcgagtg ttggattggc gcgtccggta 3240
acaatggtat gcgtcgcgat tttctggtcc gtgactgtaa aacgggcgaa atcctgacgc 3300
gttgcacctc cctgagcgtt ctgatgaaca cccgcactcg tcgcctgtct accatcccgg 3360
acgaagtgcg cggtgagatc ggtcctgctt tcatcgataa cgtggcagtt aaagacgacg 3420
aaatcaagaa actgcaaaaa ctgaacgact ccaccgcgga ctacatccag ggcggtctga 3480
ctccgcgctg gaacgacctg gatgttaatc agcatgtgaa caacctgaaa tacgttgctt 3540
gggtcttcga gactgtgccg gacagcattt tcgaaagcca tcacatttcc tcttttactc 3600
tggagtaccg tcgcgaatgt actcgcgact ccgttctgcg cagcctgacc accgtaagcg 3660
gcggttctag cgaggcaggt ctggtctgcg accatctgct gcaactggaa ggcggctccg 3720
aagtcctgcg tgcgcgtacg gagtggcgtc caaagctgac ggattctttc cgcggcatct 3780
ccgtaattcc ggcggaacct cgtgtttaag ctttagtcaa aagcctccgg tcggaggctt 3840
ttgactttct gcttactgaa tttgcggccg cctcgagaaa atgaagggaa gttcctatac 3900
ttactagaga ataggaactt ctatagggag tcgaataagg gcgacacaaa aggtattcta 3960
aatgcataat aaatactgat aacatcttat agtttgtatt atattttgta ttatcgttga 4020
catgtataat tttgatatca aaaactgatt ttccctttat tattttcgag atttattttc 4080
ttaattctct ttaacaaact agaaatattg tatatacaaa aaatcataaa taatagatga 4140
atagtttaat tataggtgtt catcaatcga aaaagcaacg tatcttattt aaagtgcgtt 4200
gctttttttct catttataag gttaaataat tctcatatat caagcaaagt gacaggcgcc 4260
cttaaatatt ctgacaaatg ctctttccct aaactccccc cataaaaaaa cccgccgaag 4320
cgggttttta cgttatttgc ggattaacga ttactcgtta tcagaaccgc ccaggatgcc 4380
tggcagttcc ctactctcgc cgctgcgctc ggtcgttcgg ctgcgggacc tcagcgctag 4440

cggagtgtat actggcttac tatgttggca ctgatgaggg tgtcagtgaa gtgcttcatg 4500

tggcaggaga aaaaaggctg caccggtgcg tcagcagaat atgtgataca ggatatattc 4560

cgcttcctcg ctcactgact cgctacgctc ggtcgttcga ctgcggcgag cggaaatggc 4620

ttacgaacgg ggcggagatt tcctggaaga tgccaggaag atacttaaca gggaagtgag 4680

agggccgcgg caaagccgtt tttccatagg ctccgccccc ctgacaagca tcacgaaatc 4740

tgacgctcaa atcagtggtg gcgaaacccg acaggactat aaagatacca ggcgtttccc 4800

cctggcggct ccctcgtgcg ctctcctgtt cctgcctttc ggtttaccgg tgtcattccg 4860

ctgttatggc cgcgtttgtc tcattccacg cctgacactc agttccgggt aggcagttcg 4920

ctccaagctg gactgtatgc acgaaccccc cgttcagtcc gaccgctgcg ccttatccgg 4980

taactatcgt cttgagtcca acccggaaag acatgcaaaa gcaccactgg cagcagccac 5040

tggtaattga tttagaggag ttagtcttga agtcatgcgc cggttaaggc taaactgaaa 5100

ggacaagttt tggtgactgc gctcctccaa gccagttacc tcggttcaaa gagttggtag 5160

ctcagagaac cttcgaaaaa ccgccctgca aggcggtttt ttcgttttca gagcaagaga 5220

ttacgcgcag accaaaacga tctcaagaag atcatcttat taatcactgc ccgctttcca 5280

gtcgggaaac ctgtcgtgcc agctgcatta atgaatcggc caacgcgcgg ggagaggcgg 5340

tttgcgtatt gggcgccagg gtggtttttc ttttcaccag tgagactggc aacagctgat 5400

tgcccttcac cgcctggccc tgagagagtt gcagcaagcg gtccacgctg gtttgcccca 5460

gcaggcgaaa atcctgtttg atggtggtta acggcgggat ataacatgag ctatcttcgg 5520

tatcgtcgta tcccactacc gagatatccg caccaacgcg cagcccggac tcggtaatgg 5580

cgcgcattgc gcccagcgcc atctgatcgt tggcaaccag catcgcagtg ggaacgatgc 5640

cctcattcag catttgcatg gtttgttgaa aaccggacat ggcactccag tcgccttccc 5700

gttccgctat cggctgaatt tgattgcgag tgagatattt atgccagcca gccagacgca 5760

gacgcgccga gacagaactt aatgggcccg ctaacagcgc gatttgctgg tgacccaatg 5820

cgaccagatg ctccacgccc agtcgcgtac cgtcctcatg ggagaaaata atactgttga 5880

tgggtgtctg gtcagagaca tcaagaaata acgccggaac attagtgcag gcagcttcca 5940

cagcaatggc atcctggtca tccagcggat agttaatgat cagcccactg acgcgttgcg 6000

cgagaagatt gtgcaccgcc gctttacagg cttcgacgcc gcttcgttct accatcgaca 6060

ccaccacgct ggcacccagt tgatcggcgc gagatttaat cgccgcgaca atttgcgacg 6120

gcgcgtgcag ggccagactg gaggtggcaa cgccaatcag caacgactgt ttgcccgcca 6180

gttgttgtgc cacgcggttg ggaatgtaat tcagctccgc catcgccgct tccacttttt 6240

cccgcgtttt cgcagaaacg tggctggcct ggttcaccac gcgggaaacg gtctgataag 6300

agacaccggc atactctgcg acatcgtata acgttactgg tttcatattc accaccctga 6360

attgactctc ttccgggcgc tatcatgcca taccgcgaaa ggttttgcgc cattcgatgg 6420

cgcgccgctt ttaccaatgc ttaatcagtg aggcacctat ctcagcgatc tgtctatttc 6480

gttcatccat agttgcctga ctccccgtcg tgtagataac tacgatacgg gagggcttac 6540

catctggccc cagcgctgcg atgataccgc gagaaccacg ctcaccggct ccggatttat 6600

cagcaataaa ccagccagcc ggaagggccg agcgcagaag tggtcctgca actttatccg 6660

cctccatcca gtctattaat tgttgccggg aagctagagt aagtagttcg ccagttaata 6720

gtttgcgcaa cgttgttgcc atcgctacag gcatcgtggt gtcacgctcg tcgtttggta 6780

tggcttcatt cagctccggt tcccaacgat caaggcgagt tacatgatcc cccatgttgt 6840

gcaaaaaagc ggttagctcc ttcggtcctc cgatcgttgt cagaagtaag ttggccgcag 6900

tgttatcact catggttatg gcagcactgc ataattctct tactgtcatg ccatccgtaa 6960

gatgcttttc tgtgactggt gagtactcaa ccaagtcatt ctgagaatag tgtatgcggc 7020

gaccgagttg ctcttgcccg gcgtcaatac gggataatac cgcgccacat agcagaactt 7080

taaaagtgct catcattgga aaacgttctt cggggcgaaa actctcaagg atcttaccgc 7140

tgttgagatc cagttcgatg taacccactc gtgcacccaa ctgatcttca gcatctttta 7200

ctttcaccag cgtttctggg tgagcaaaaa caggaaggca aaatgccgca aaaaagggaa 7260

taagggcgac acggaaatgt tgaatactca tattcttcct ttttcaatat tattgaagca 7320

tttatcaggg ttattgtctc atgagcggat acatatttga atgtatttag aaaaataaac 7380

aaataggggt cagtgttaca accaattaac caattctgaa cattatcgcg agcccattta 7440

tacctgaata tggctcataa cacccttgt ttgcctggcg gcagtagcgc ggtggtccca 7500

cctgacccca tgccgaactc agaagtgaaa cgccgtagcg ccgatggtag tgtggggact 7560

ccccatgcga gagtagggaa ctgccaggca tcaaataaaa cgaaaggctc agtcgaaaga 7620

ctgggccttt cgcccgggct aattatgggg tgtcgccctt attcgactct atagtgaagt 7680

tcctattctc tagtagtata ggaacttctg aagtggggct cgagggccgg cccagccgtc 7740

aaggttaagg ctggccatat cagcgactga aaagcggcca gcctcggcct tgtttgacgt 7800

ataaccaaag ccaccgggca accaatagcc cttgtcactt ttgatcaggt agaccgaccc 7860

tgaagcgctt ttttcgtatt ccataaaacc cccttctgtg cgtgagtact catagtataa 7920

caggcgtgag taccaacgct 7940

<210> 95
<211> 7934
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 95
ctagattatt aggcgaggcc acgcgctttg agggtctgtt caaattcttc gaggcaacgt 60

tccgccacgg cgagcatttc atccacttcc gcacgggtca taacgagcgg cggtgcagac 120

acaatgtgat cgccgcacgc acgcataatg aggttgttgc gaaaaaaaat atcgcggcag 180

agggtgccaa tttcgccaaa atccggaaag agttcacgtt tcgctttgtt tttcacgagg 240

gtaaacgcct gcaccatgcc cacgccacgc acatcatcca catgttcaaa acggctaaag 300
gtttcacgcc aacgtttctg catatacggg ccaatatcat ctttcacacg ctgcacaatg 360
ccttcatcac ggagcgccgc aacattcgca tgcgccaccg ccgcacacac cggatggccg 420
ctataggtaa agccatggtt aaaatcaccg cccgcaatga gaccttccgc aacacgtttg 480
cccacaaaca ccgcgccaat cgggagatag ccgctgctga ggcctttcgc cgcggtaaag 540
aggtccggct gaaagccaaa atgctgatgg ccaaaccatt cgccggtacg gccaaagccg 600
caaatcactt catccgcaac gaggagcaca tcatatttgc ggcaaatacg ttcaatttcc 660
ggccaatagg ttgccggcgg aacaatcaca ccgcccgcac cctgaatcgg ttcgcccaca 720
aacgccgcca ctttatccgc gccgatttcg agaatttttt cttcgagcca acgcgccgca 780
accacgccaa attcatccgg ggtcatatct ttgccatgtt tataccacca cggctgttca 840
atatgcgcca tgcccggaat cgggagatcg ccctgttcat gcatatattt catgccgccg 900
aggctcgcac cgccaatggt gctgccgtga tagccgttcc aacggccaat gagggttttt 960
ttttccggtt tgccctgcac atcccaataa cgacgcacca tacgaatcat ggtatccacg 1020
ctttcgctgc cgctgttggt ataaaacaca cgatcaaaac ctgccggggt aacttcggcg 1080
aggaggctgc tgagttccac caccgccgga tgggtggttt taaagaaggt gttataaaac 1140
gggagttctt ccatctgacg acgcgccgct tccgcaaaat ctttacggcc atagcccacg 1200
ttcacgcacc agaggcccgc catgccatca ataattttgt tgccttcgct atcccagaga 1260
tacacgcctt cgccacgggt catcacacgc gcacccgcct gattgaggct cgcggtatcg 1320
gtaaacggat ggagatgatg cgccgcatcg agttcacgcc actgagaggt ggtacgctgt 1380
ttctgcatat tatatctcct taaagcttca ggccgcagcc tgttcgatcg gggagaaggg 1440
cagcccgagg ctctcggcca ccgccttgta tgttagccgg ccccgatgga cgttgaggcc 1500
tgcgcgcaga tgtggattct cgagtacggc ggaaaaaccc ttgttggcca gagccaaacc 1560
aaacggcagg gtcgcgttat tcagtgcctg gctcgaggtt agcggcacgg cacccggcat 1620
attggccaca caataatgaa tgatgccatc tacttcgtat gttggatcag cgtgagtggt 1680
tgggcgcgat gtctcaaagc agccgccctg atcgatagcg acgtccacga gtacggctct 1740
cttgcgcatt gagctcagca tgctccggcg gaccagcttc ggagcgcttg cccctgggac 1800
gagcaccgca ccaatcacca cgtccgccgc aaatacctct tcctccacgg attcgatggt 1860
cgaaaaccta gtgcgaaccc gtccttcgaa tagctcgtcc agctcacgga gccggatgat 1920
cgaacgatcg atgatggtca cctctgcgcc cagaccagcc gccatgcgcg cggcgtgcgt 1980
accgacgacc ccacctccaa tcaccacgat tcgggcaggc tgaaccccgg gcaccccacc 2040
gatcagcagc cctcgccccc ctgtactccg ctttagagcg ctacccgccg cttcgatcga 2100
aagcctgccc gcgacctcgc tcatcggcgc cagcagtgga agaccaccat gagcatcagt 2160
tacggtctca taggcgattg caatgcatcc agatttcaag aggccggcag cctgttccgg 2220
gtccggggcc aagtgcaaat aggtgaacag gatttgatcc tcacgcagct gggaccattc 2280

ggccggctga ggctccttga cctttacgat catctcgctc gatgcgaata cctcagctgc 2340
cgaagttaag atcgttgcgc cggcattgcg ataatcgcca tcggttgcac caatgccagc 2400
gccggcattg gtctcgatca tcacgcggtg gcccgctgcc acgtattcac gggcagctcc 2460
tggggtaagg cccacgcgat attcgtgcgc cttgatttcc tttggaactc cgaccttcat 2520
tatgccactc tccttggttc ctagatcctg tgtgaaattg ttattgttat ccgctcacaa 2580
ttccacacat tatacgagcc ggaagcataa agtgtcaagc ctggggtgcc taatgagtga 2640
gctaacttac attaattgcg ttgcgctcac tgcccgcata tctatgagcc gggctgaatg 2700
atcgaccgag acaggccctg cggggctgca ggatccaatt gtgagcggat aacaattacg 2760
agcttcatgc acagtgatcg acgctgttga caattaatca tcggctcgta taatgtgtgg 2820
atgtggaatt gtgagcgctc acaattccac aacggtttcc ctctagaaat aattttgttt 2880
acaaggagga ttataaaatg actctagagt ggaaaccgaa accaaaactg cctcaactgc 2940
tggatgatca cttcggtctg cacggtctgg tgtttcgtcg tactttcgca attcgttctt 3000
atgaagtggg tccagatcgt tctacctcca tcctggccgt catgaaccac atgcaggaag 3060
ccaccctgaa tcacgcgaaa tctgttggta tcctgggtga tggtttcggc actactctgg 3120
aaatgtctaa acgtgacctg atgtgggtag tgcgtcgcac ccacgtagca gtagagcgct 3180
accctacttg gggtgacact gtggaagtcg agtgttggat tggcgcgtcc ggtaacaatg 3240
gtatgcgtcg cgattttctg gtccgtgact gtaaaacggg cgaaatcctg acgcgttgca 3300
cctccctgag cgttctgatg aacacccgca ctcgtcgcct gtctaccatc ccggacgaag 3360
tgcgcggtga gatcggtcct gctttcatcg ataacgtggc agttaaagac gacgaaatca 3420
agaaactgca aaaactgaac gactccaccg cggactacat ccagggcggt ctgactccgc 3480
gctggaacga cctggatgtt aatcagcatg tgaacaacct gaaatacgtt gcttgggtct 3540
tcgagactgt gccggacagc attttcgaaa gccatcacat ttcctctttt actctggagt 3600
accgtcgcga atgtactcgc gactccgttc tgcgcagcct gaccaccgta agcggcggtt 3660
ctagcgaggc aggtctggtc tgcgaccatc tgctgcaact ggaaggcggc tccgaagtcc 3720
tgcgtgcgcg tacggagtgg cgtccaaagc tgacggattc tttccgcggc atctccgtaa 3780
ttccggcgga acctcgtgtt taagctttag tcaaaagcct ccggtcggag gcttttgact 3840
ttctgcttac tgaatttgcg gccgcctcga gaaaatgaag ggaagttcct atacttacta 3900
gagaatagga acttctatag ggagtcgaat aagggcgaca caaaaggtat tctaaatgca 3960
taataaatac tgataacatc ttatagtttg tattatattt tgtattatcg ttgacatgta 4020
taattttgat atcaaaaact gattttccct ttattatttt cgagatttat tttcttaatt 4080
ctctttaaca aactagaaat attgtatata caaaaaatca taaataatag atgaatagtt 4140
taattatagg tgttcatcaa tcgaaaaagc aacgtatctt atttaaagtg cgttgctttt 4200
ttctcattta taaggttaaa taattctcat atatcaagca aagtgacagg cgcccttaaa 4260
tattctgaca aatgctcttt ccctaaactc cccccataaa aaaacccgcc gaagcgggtt 4320

tttacgttat ttgcggatta acgattactc gttatcagaa ccgcccagga tgcctggcag 4380

ttccctactc tcgccgctgc gctcggtcgt tcggctgcgg gacctcagcg ctagcggagt 4440

gtatactggc ttactatgtt ggcactgatg agggtgtcag tgaagtgctt catgtggcag 4500

gagaaaaaag gctgcaccgg tgcgtcagca gaatatgtga tacaggatat attccgcttc 4560

ctcgctcact gactcgctac gctcggtcgt tcgactgcgg cgagcggaaa tggcttacga 4620

acggggcgga gatttcctgg aagatgccag gaagatactt aacagggaag tgagagggcc 4680

gcggcaaagc cgtttttcca taggctccgc cccctgaca agcatcacga aatctgacgc 4740

tcaaatcagt ggtggcgaaa cccgacagga ctataaagat accaggcgtt tccccctggc 4800

ggctccctcg tgcgctctcc tgttcctgcc tttcggttta ccggtgtcat tccgctgtta 4860

tggccgcgtt tgtctcattc cacgcctgac actcagttcc gggtaggcag ttcgctccaa 4920

gctggactgt atgcacgaac cccccgttca gtccgaccgc tgcgccttat ccggtaacta 4980

tcgtcttgag tccaacccgg aaagacatgc aaaagcacca ctggcagcag ccactggtaa 5040

ttgatttaga ggagttagtc ttgaagtcat gcgccggtta aggctaaact gaaaggacaa 5100

gttttggtga ctgcgctcct ccaagccagt tacctcggtt caaagagttg gtagctcaga 5160

gaaccttcga aaaaccgccc tgcaaggcgg ttttttcgtt ttcagagcaa gagattacgc 5220

gcagaccaaa acgatctcaa gaagatcatc ttattaatca ctgcccgctt tccagtcggg 5280

aaacctgtcg tgccagctgc attaatgaat cggccaacgc gcggggagag gcggtttgcg 5340

tattgggcgc cagggtggtt tttcttttca ccagtgagac tggcaacagc tgattgccct 5400

tcaccgcctg gccctgagag agttgcagca agcggtccac gctggtttgc cccagcaggc 5460

gaaaatcctg tttgatggtg gttaacggcg ggatataaca tgagctatct tcggtatcgt 5520

cgtatcccac taccgagata tccgcaccaa cgcgcagccc ggactcggta atggcgcgca 5580

ttgcgcccag cgccatctga tcgttggcaa ccagcatcgc agtgggaacg atgccctcat 5640

tcagcatttg catggtttgt tgaaaaccgg acatggcact ccagtcgcct tcccgttccg 5700

ctatcggctg aatttgattg cgagtgagat atttatgcca gccagccaga cgcagacgcg 5760

ccgagacaga acttaatggg cccgctaaca gcgcgatttg ctggtgaccc aatgcgacca 5820

gatgctccac gcccagtcgc gtaccgtcct catgggagaa aataatactg ttgatgggtg 5880

tctggtcaga gacatcaaga aataacgccg gaacattagt gcaggcagct tccacagcaa 5940

tggcatcctg gtcatccagc ggatagttaa tgatcagccc actgacgcgt tgcgcgagaa 6000

gattgtgcac cgccgcttta caggcttcga cgccgcttcg ttctaccatc gacaccacca 6060

cgctggcacc cagttgatcg gcgcgagatt taatcgccgc gacaatttgc gacggcgcgt 6120

gcagggccag actggaggtg gcaacgccaa tcagcaacga ctgtttgccc gccagttgtt 6180

gtgccacgcg gttgggaatg taattcagct ccgccatcgc cgcttccact ttttcccgcg 6240

ttttcgcaga aacgtggctg gcctggttca ccacgcggga aacggtctga taagagacac 6300

cggcatactc tgcgacatcg tataacgtta ctggtttcat attcaccacc ctgaattgac 6360

tctcttccgg gcgctatcat gccataccgc gaaaggtttt gcgccattcg atggcgcgcc 6420

gcttttacca atgcttaatc agtgaggcac ctatctcagc gatctgtcta tttcgttcat 6480

ccatagttgc ctgactcccc gtcgtgtaga taactacgat acgggagggc ttaccatctg 6540

gccccagcgc tgcgatgata ccgcgagaac cacgctcacc ggctccggat ttatcagcaa 6600

taaaccagcc agccggaagg gccgagcgca gaagtggtcc tgcaacttta tccgcctcca 6660

tccagtctat taattgttgc cgggaagcta gagtaagtag ttcgccagtt aatagtttgc 6720

gcaacgttgt tgccatcgct acaggcatcg tggtgtcacg ctcgtcgttt ggtatggctt 6780

cattcagctc cggttcccaa cgatcaaggc gagttacatg atcccccatg ttgtgcaaaa 6840

aagcggttag ctccttcggt cctccgatcg ttgtcagaag taagttggcc gcagtgttat 6900

cactcatggt tatggcagca ctgcataatt ctcttactgt catgccatcc gtaagatgct 6960

tttctgtgac tggtgagtac tcaaccaagt cattctgaga atagtgtatg cggcgaccga 7020

gttgctcttg cccggcgtca atacgggata ataccgcgcc acatagcaga actttaaaag 7080

tgctcatcat tggaaaacgt tcttcggggc gaaaactctc aaggatctta ccgctgttga 7140

gatccagttc gatgtaaccc actcgtgcac ccaactgatc ttcagcatct tttactttca 7200

ccagcgtttc tgggtgagca aaaacaggaa ggcaaaatgc cgcaaaaaag ggaataaggg 7260

cgacacggaa atgttgaata ctcatattct tccttttca atattattga agcatttatc 7320

agggttattg tctcatgagc ggatacatat ttgaatgtat ttagaaaaat aaacaaatag 7380

gggtcagtgt tacaaccaat taaccaattc tgaacattat cgcgagccca tttatacctg 7440

aatatggctc ataacacccc ttgtttgcct ggcggcagta gcgcggtggt cccacctgac 7500

cccatgccga actcagaagt gaaacgccgt agcgccgatg gtagtgtggg gactccccat 7560

gcgagagtag ggaactgcca ggcatcaaat aaaacgaaag gctcagtcga aagactgggc 7620

ctttcgcccg ggctaattat ggggtgtcgc ccttattcga ctctatagtg aagttcctat 7680

tctctagtag tataggaact tctgaagtgg ggctcgaggg ccggcccagc cgtcaaggtt 7740

aaggctggcc atatcagcga ctgaaaagcg gccagcctcg gccttgtttg acgtataacc 7800

aaagccaccg ggcaaccaat agcccttgtc acttttgatc aggtagaccg accctgaagc 7860

gctttttttcg tattccataa aacccccttc tgtgcgtgag tactcatagt ataacaggcg 7920

tgagtaccaa cgct 7934

<210> 96
<211> 7955
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 96
ctagattatt aggcgaggcc acgcgctttg agggtctgtt caaattcttc gaggcaacgt 60

tccgccacgg cgagcatttc atccacttcc gcacgggtca taacgagcgg cggtgcagac 120

acaatgtgat cgccgcacgc acgcataatg aggttgttgc gaaaaaaaat atcgcggcag 180

agggtgccaa tttcgccaaa atccggaaag agttcacgtt tcgctttgtt tttcacgagg 240

gtaaacgcct gcaccatgcc cacgccacgc acatcatcca catgttcaaa acggctaaag 300

gtttcacgcc aacgtttctg catatacggg ccaatatcat ctttcacacg ctgcacaatg 360

ccttcatcac ggagcgccgc aacattcgca tgcgccaccg ccgcacacac cggatggccg 420

ctataggtaa agccatggtt aaaatcaccg cccgcaatga gaccttccgc aacacgtttg 480

cccacaaaca ccgcgccaat cgggagatag ccgctgctga ggcctttcgc cgcggtaaag 540

aggtccggct gaaagccaaa atgctgatgg ccaaaccatt cgccggtacg gccaaagccg 600

caaatcactt catccgcaac gaggagcaca tcatatttgc ggcaaatacg ttcaatttcc 660

ggccaatagg ttgccggcgg aacaatcaca ccgcccgcac cctgaatcgg ttcgcccaca 720

aacgccgcca ctttatccgc gccgatttcg agaatttttt cttcgagcca acgcgccgca 780

accacgccaa attcatccgg ggtcatatct ttgccatgtt tataccacca cggctgttca 840

atatgcgcca tgcccggaat cgggagatcg ccctgttcat gcatatattt catgccgccg 900

aggctcgcac cgccaatggt gctgccgtga tagccgttcc aacggccaat gagggttttt 960

ttttccggtt tgccctgcac atcccaataa cgacgcacca tacgaatcat ggtatccacg 1020

ctttcgctgc cgctgttggt ataaaacaca cgatcaaaac ctgccggggt aacttcggcg 1080

aggaggctgc tgagttccac caccgccgga tgggtggttt taaagaaggt gttataaaac 1140

gggagttctt ccatctgacg acgcgccgct tccgcaaaat ctttacggcc atagcccacg 1200

ttcacgcacc agaggcccgc catgccatca ataattttgt tgccttcgct atcccagaga 1260

tacacgcctt cgccacgggt catcacacgc gcacccgcct gattgaggct cgcggtatcg 1320

gtaaacggat ggagatgatg cgccgcatcg agttcacgcc actgagaggt ggtacgctgt 1380

ttctgcatat tatatctcct taaagcttta gatagaagct aattcttttt caagagctac 1440

gtctactgat acataatcat aacctaaatc atgtgcaact gcttcgtacg taatggctcc 1500

gttggcaacg ttcactccta attttaacgc ttcgttttga gcgattgctt tgtgaacacc 1560

tttagaagca atttgaagtg cgtaaggtac ggttacgttt gttaaagcaa ttgttgatgt 1620

gcgaggaact gctcccggca tatttgcaac tgcatagtgt acaacgccgt gcttttcata 1680

agttggatga tcgtgtgttg taatgtggtc gattgtttca acgataccac cttggtcgat 1740

tgctacgtca acaataacag aacctggctt cattgttttc accatttctt ctgttactag 1800

ttttggagct tttgcacctg ggattaatac tgcgccaatc actaaatctg actccgctac 1860

tgcatccgca atattataag ggtttgacac tagcgtattg atttggttgc caaagatatc 1920

gtctaattga cgtaagcgtt caggacttaa atcaataatt gttacatcag caccgagacc 1980

gattgcgatt tttgcagcat ttgtaccaac accgccgcct ccgataatcg ttacttttcc 2040

gcggctaact ccaggaacac ccgctagtaa aattcctttt ccaccgtttg atttttgaag 2100

gaattgtgca ccgatttgag cagccatacg tcctgctact tcgctcatag gcgttaatag 2160

aggcaatgta cgatttactg ctactgtttc ataagcaatg gctgttacgc cgctatcttt 2220

taatgctttt gctagtgctg gttcagctgc taagtgaagg tatgtgaata agataagacc 2280

tggtctaaaa tagccgtatt cacttgctag tggttctttt actttcataa ccatttcagc 2340

ttgtgcccaa acgtcagctg ctgtctcaac aatttcagct ccagccttta cataatcttc 2400

gtttgtgaag ttacttccaa tacccgcttc attttcaatt aatacacgat gacctgtacc 2460

aacaaatgat gctacgcctg ctggtgtaat cgctactcgg ttttcgttgt ttttgatttc 2520

ttttggtacg ccaataatca ttatgccact ctccttggtt cctagatcct gtgtgaaatt 2580

gttattgtta tccgctcaca attccacaca ttatacgagc cggaagcata aagtgtcaag 2640

cctggggtgc ctaatgagtg agctaactta cattaattgc gttgcgctca ctgcccgcat 2700

atctatgagc cgggctgaat gatcgaccga gacaggccct gcggggctgc aggatccaat 2760

tgtgagcgga taacaattac gagcttcatg cacagtgatc gacgctgttg acaattaatc 2820

atcggctcgt ataatgtgtg gatgtggaat tgtgagcgct cacaattcca caacggtttc 2880

cctctagaaa taattttgtt tacaaggagg attataaaat gactctagag tggaaaccga 2940

aaccaaaact gcctcaactg ctggatgatc acttcggtct gcacggtctg gtgtttcgtc 3000

gtactttcgc aattcgttct tatgaagtgg gtccagatcg ttctacctcc atcctggccg 3060

tcatgaacca catgcaggaa gccaccctga atcacgcgaa atctgttggt atcctgggtg 3120

atggtttcgg cactactctg gaaatgtcta aacgtgacct gatgtgggta gtgcgtcgca 3180

cccacgtagc agtagagcgc taccctactt ggggtgacac tgtggaagtc gagtgttgga 3240

ttggcgcgtc cggtaacaat ggtatgcgtc gcgattttct ggtccgtgac tgtaaaacgg 3300

gcgaaatcct gacgcgttgc acctccctga gcgttctgat gaacacccgc actcgtcgcc 3360

tgtctaccat cccggacgaa gtgcgcggtg agatcggtcc tgctttcatc gataacgtgg 3420

cagttaaaga cgacgaaatc aagaaactgc aaaaactgaa cgactccacc gcggactaca 3480

tccagggcgg tctgactccg cgctggaacg acctggatgt taatcagcat gtgaacaacc 3540

tgaaatacgt tgcttgggtc ttcgagactg tgccggacag cattttcgaa agccatcaca 3600

tttcctcttt tactctggag taccgtcgcg aatgtactcg cgactccgtt ctgcgcagcc 3660

tgaccaccgt aagcggcggt tctagcgagg caggtctggt ctgcgaccat ctgctgcaac 3720

tggaaggcgg ctccgaagtc ctgcgtgcgc gtacggagtg gcgtccaaag ctgacggatt 3780

ctttccgcgg catctccgta attccggcgg aacctcgtgt ttaagcttta gtcaaaagcc 3840

tccggtcgga ggcttttgac tttctgctta ctgaatttgc ggccgcctcg agaaaatgaa 3900

gggaagttcc tatacttact agagaatagg aacttctata gggagtcgaa taagggcgac 3960

acaaaaggta ttctaaatgc ataataaata ctgataacat cttatagttt gtattatatt 4020

ttgtattatc gttgacatgt ataattttga tatcaaaaac tgattttccc tttattattt 4080

tcgagattta ttttcttaat tctctttaac aaactagaaa tattgtatat acaaaaaatc 4140

ataaataata gatgaatagt ttaattatag gtgttcatca atcgaaaaag caacgtatct 4200

tatttaaagt gcgttgcttt tttctcattt ataaggttaa ataattctca tatatcaagc 4260
aaagtgacag gcgcccttaa atattctgac aaatgctctt tccctaaact ccccccataa 4320
aaaaacccgc cgaagcgggt ttttacgtta tttgcggatt aacgattact cgttatcaga 4380
accgcccagg atgcctggca gttccctact ctcgccgctg cgctcggtcg ttcggctgcg 4440
ggacctcagc gctagcggag tgtatactgg cttactatgt tggcactgat gagggtgtca 4500
gtgaagtgct tcatgtggca ggagaaaaaa ggctgcaccg gtgcgtcagc agaatatgtg 4560
atacaggata tattccgctt cctcgctcac tgactcgcta cgctcggtcg ttcgactgcg 4620
gcgagcggaa atggcttacg aacggggcgg agatttcctg gaagatgcca ggaagatact 4680
taacagggaa gtgagagggc cgcggcaaag ccgtttttcc ataggctccg ccccccctgac 4740
aagcatcacg aaatctgacg ctcaaatcag tggtggcgaa acccgacagg actataaaga 4800
taccaggcgt ttcccccctgg cggctccctc gtgcgctctc ctgttcctgc ctttcggttt 4860
accggtgtca ttccgctgtt atggccgcgt ttgtctcatt ccacgcctga cactcagttc 4920
cgggtaggca gttcgctcca agctggactg tatgcacgaa ccccccgttc agtccgaccg 4980
ctgcgcctta tccggtaact atcgtcttga gtccaacccg gaaagacatg caaaagcacc 5040
actggcagca gccactggta attgatttag aggagttagt cttgaagtca tgcgccggtt 5100
aaggctaaac tgaaaggaca agttttggtg actgcgctcc tccaagccag ttacctcggt 5160
tcaaagagtt ggtagctcag agaaccttcg aaaaaccgcc ctgcaaggcg gttttttcgt 5220
tttcagagca agagattacg cgcagaccaa aacgatctca agaagatcat cttattaatc 5280
actgcccgct ttccagtcgg gaaacctgtc gtgccagctg cattaatgaa tcggccaacg 5340
cgcggggaga ggcggtttgc gtattgggcg ccagggtggt ttttcttttc accagtgaga 5400
ctggcaacag ctgattgccc ttcaccgcct ggccctgaga gagttgcagc aagcggtcca 5460
cgctggtttg ccccagcagg cgaaaatcct gtttgatggt ggttaacggc gggatataac 5520
atgagctatc ttcggtatcg tcgtatccca ctaccgagat atccgcacca acgcgcagcc 5580
cggactcggt aatggcgcgc attgcgccca gcgccatctg atcgttggca accagcatcg 5640
cagtgggaac gatgccctca ttcagcattt gcatggtttg ttgaaaaccg gacatggcac 5700
tccagtcgcc ttcccgttcc gctatcggct gaatttgatt gcgagtgaga tatttatgcc 5760
agccagccag acgcagacgc gccgagacag aacttaatgg gcccgctaac agcgcgattt 5820
gctggtgacc caatgcgacc agatgctcca cgcccagtcg cgtaccgtcc tcatgggaga 5880
aaataatact gttgatgggt gtctggtcag agacatcaag aaataacgcc ggaacattag 5940
tgcaggcagc ttccacagca atggcatcct ggtcatccag cggatagtta atgatcagcc 6000
cactgacgcg ttgcgcgaga agattgtgca ccgccgcttt acaggcttcg acgccgcttc 6060
gttctaccat cgacaccacc acgctggcac ccagttgatc ggcgcgagat ttaatcgccg 6120
cgacaatttg cgacggcgcg tgcagggcca gactggaggt ggcaacgcca atcagcaacg 6180
actgtttgcc cgccagttgt tgtgccacgc ggttgggaat gtaattcagc tccgccatcg 6240

ccgcttccac tttttcccgc gttttcgcag aaacgtggct ggcctggttc accacgcggg 6300

aaacggtctg ataagagaca ccggcatact ctgcgacatc gtataacgtt actggtttca 6360

tattcaccac cctgaattga ctctcttccg ggcgctatca tgccataccg cgaaaggttt 6420

tgcgccattc gatggcgcgc cgcttttacc aatgcttaat cagtgaggca cctatctcag 6480

cgatctgtct atttcgttca tccatagttg cctgactccc cgtcgtgtag ataactacga 6540

tacgggaggg cttaccatct ggccccagcg ctgcgatgat accgcgagaa ccacgctcac 6600

cggctccgga tttatcagca ataaaccagc cagccggaag ggccgagcgc agaagtggtc 6660

ctgcaacttt atccgcctcc atccagtcta ttaattgttg ccgggaagct agagtaagta 6720

gttcgccagt taatagtttg cgcaacgttg ttgccatcgc tacaggcatc gtggtgtcac 6780

gctcgtcgtt tggtatggct tcattcagct ccggttccca acgatcaagg cgagttacat 6840

gatcccccat gttgtgcaaa aaagcggtta gctccttcgg tcctccgatc gttgtcagaa 6900

gtaagttggc cgcagtgtta tcactcatgg ttatggcagc actgcataat tctcttactg 6960

tcatgccatc cgtaagatgc ttttctgtga ctggtgagta ctcaaccaag tcattctgag 7020

aatagtgtat gcggcgaccg agttgctctt gcccggcgtc aatacgggat aataccgcgc 7080

cacatagcag aactttaaaa gtgctcatca ttggaaaacg ttcttcgggg cgaaaactct 7140

caaggatctt accgctgttg agatccagtt cgatgtaacc cactcgtgca cccaactgat 7200

cttcagcatc ttttactttc accagcgttt ctgggtgagc aaaaacagga aggcaaaatg 7260

ccgcaaaaaa gggaataagg gcgacacgga aatgttgaat actcatattc ttccttttc 7320

aatattattg aagcatttat cagggttatt gtctcatgag cggatacata tttgaatgta 7380

tttagaaaaa taaacaaata ggggtcagtg ttacaaccaa ttaaccaatt ctgaacatta 7440

tcgcgagccc atttatacct gaatatggct cataacaccc cttgtttgcc tggcggcagt 7500

agcgcggtgg tcccacctga ccccatgccg aactcagaag tgaaacgccg tagcgccgat 7560

ggtagtgtgg ggactcccca tgcgagagta gggaactgcc aggcatcaaa taaaacgaaa 7620

ggctcagtcg aaagactggg cctttcgccc gggctaatta tggggtgtcg cccttattcg 7680

actctatagt gaagttccta ttctctagta gtataggaac ttctgaagtg gggctcgagg 7740

gccggcccag ccgtcaaggt taaggctggc catatcagcg actgaaaagc ggccagcctc 7800

ggccttgttt gacgtataac caaagccacc gggcaaccaa tagcccttgt cacttttgat 7860

caggtagacc gaccctgaag cgcttttttc gtattccata aaacccccctt ctgtgcgtga 7920

gtactcatag tataacaggc gtgagtacca acgct 7955

<210> 97
<211> 7208
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 97

ctagattatt aggcgaggcc acgcgctttg agggtctgtt caaattcttc gaggcaacgt 60

tccgccacgg cgagcatttc atccacttcc gcacgggtca taacgagcgg cggtgcagac 120

acaatgtgat cgccgcacgc acgcataatg aggttgttgc gaaaaaaaat atcgcggcag 180

agggtgccaa tttcgccaaa atccggaaag agttcacgtt tcgctttgtt tttcacgagg 240

gtaaacgcct gcaccatgcc cacgccacgc acatcatcca catgttcaaa acggctaaag 300

gtttcacgcc aacgtttctg catatacggg ccaatatcat ctttcacacg ctgcacaatg 360

ccttcatcac ggagcgccgc aacattcgca tgcgccaccg ccgcacacac cggatggccg 420

ctataggtaa agccatggtt aaaatcaccg cccgcaatga gaccttccgc aacacgtttg 480

cccacaaaca ccgcgccaat cgggagatag ccgctgctga ggcctttcgc cgcggtaaag 540

aggtccggct gaaagccaaa atgctgatgg ccaaaccatt cgccggtacg gccaaagccg 600

caaatcactt catccgcaac gaggagcaca tcatatttgc ggcaaatacg ttcaatttcc 660

ggccaatagg ttgccggcgg aacaatcaca ccgcccgcac cctgaatcgg ttcgcccaca 720

aacgccgcca ctttatccgc gccgatttcg agaatttttt cttcgagcca acgcgccgca 780

accacgccaa attcatccgg ggtcatatct ttgccatgtt tataccacca cggctgttca 840

atatgcgcca tgcccggaat cgggagatcg ccctgttcat gcatatattt catgccgccg 900

aggctcgcac cgccaatggt gctgccgtga tagccgttcc aacggccaat gagggttttt 960

ttttccggtt tgccctgcac atcccaataa cgacgcacca tacgaatcat ggtatccacg 1020

ctttcgctgc cgctgttggt ataaaacaca cgatcaaaac ctgccggggt aacttcggcg 1080

aggaggctgc tgagttccac caccgccgga tgggtggttt taaagaaggt gttataaaac 1140

gggagttctt ccatctgacg acgcgccgct tccgcaaaat ctttacggcc atagcccacg 1200

ttcacgcacc agaggcccgc catgccatca ataattttgt tgccttcgct atcccagaga 1260

tacacgcctt cgccacgggt catcacacgc gcacccgcct gattgaggct cgcggtatcg 1320

gtaaacggat ggagatgatg cgccgcatcg agttcacgcc actgagaggt ggtacgctgt 1380

ttctgcatat tatatctcct taaagcttta agcacccgcc acagatgatt catcctgtaa 1440

agctttctcg gcaggaacat actcatagcc tagatctctt gctacagctt cataggtcac 1500

gtgtccgttt gcggtgtttg taaacagcac aagtcctttg cgaaaataaa catattcttc 1560

cggcagcggt tcttttactt tcatgaccat ttcggcgtcc cagacctgct tcggatcagc 1620

aatgatttcc gctcctgctg actcataggc ttcattttca aatccgcttc caaggcccgc 1680

gcctgtttca accagcaccc ggtggccgtt tgaaatgagc tgagaaacgc ccccgggtgt 1740

taatgcgaca cggttttcat tgtttttttat ctctttagga acccctatga tcattatgcc 1800

actctccttg gttcctagat cctgtgtgaa attgttattg ttatccgctc acaattccac 1860

acattatacg agccggaagc ataaagtgtc aagcctgggg tgcctaatga gtgagctaac 1920

ttacattaat tgcgttgcgc tcactgcccg catatctatg agccgggctg aatgatcgac 1980

cgagacaggc cctgcggggc tgcaggatcc aattgtgagc ggataacaat tacgagcttc 2040

atgcacagtg atcgacgctg ttgacaatta atcatcggct cgtataatgt gtggatgtgg 2100
aattgtgagc gctcacaatt ccacaacggt ttccctctag aaataatttt gtttacaagg 2160
aggattataa aatgactcta gagtggaaac cgaaaccaaa actgcctcaa ctgctggatg 2220
atcacttcgg tctgcacggt ctggtgtttc gtcgtacttt cgcaattcgt tcttatgaag 2280
tgggtccaga tcgttctacc tccatcctgg ccgtcatgaa ccacatgcag gaagccaccc 2340
tgaatcacgc gaaatctgtt ggtatcctgg gtgatggttt cggcactact ctggaaatgt 2400
ctaaacgtga cctgatgtgg gtagtgcgtc gcacccacgt agcagtagag cgctacccta 2460
cttggggtga cactgtggaa gtcgagtgtt ggattggcgc gtccggtaac aatggtatgc 2520
gtcgcgattt tctggtccgt gactgtaaaa cgggcgaaat cctgacgcgt tgcacctccc 2580
tgagcgttct gatgaacacc cgcactcgtc gcctgtctac catcccggac gaagtgcgcg 2640
gtgagatcgg tcctgctttc atcgataacg tggcagttaa agacgacgaa atcaagaaac 2700
tgcaaaaact gaacgactcc accgcggact acatccaggg cggtctgact ccgcgctgga 2760
acgacctgga tgttaatcag catgtgaaca acctgaaata cgttgcttgg gtcttcgaga 2820
ctgtgccgga cagcattttc gaaagccatc acatttcctc ttttactctg gagtaccgtc 2880
gcgaatgtac tcgcgactcc gttctgcgca gcctgaccac cgtaagcggc ggttctagcg 2940
aggcaggtct ggtctgcgac catctgctgc aactggaagg cggctccgaa gtcctgcgtg 3000
cgcgtacgga gtggcgtcca aagctgacgg attctttccg cggcatctcc gtaattccgg 3060
cggaacctcg tgtttaagct ttagtcaaaa gcctccggtc ggaggctttt gactttctgc 3120
ttactgaatt tgcggccgcc tcgagaaaat gaagggaagt tcctatactt actagagaat 3180
aggaacttct atagggagtc gaataagggc gacacaaaag gtattctaaa tgcataataa 3240
atactgataa catcttatag tttgtattat attttgtatt atcgttgaca tgtataattt 3300
tgatatcaaa aactgatttt ccctttatta ttttcgagat ttattttctt aattctcttt 3360
aacaaactag aaatattgta tatacaaaaa atcataaata atagatgaat agtttaatta 3420
taggtgttca tcaatcgaaa aagcaacgta tcttatttaa agtgcgttgc ttttttctca 3480
tttataaggt taaataattc tcatatatca agcaaagtga caggcgccct taaatattct 3540
gacaaatgct ctttccctaa actcccccca taaaaaaacc cgccgaagcg ggtttttacg 3600
ttatttgcgg attaacgatt actcgttatc agaaccgccc aggatgcctg gcagttccct 3660
actctcgccg ctgcgctcgg tcgttcggct gcgggacctc agcgctagcg gagtgtatac 3720
tggcttacta tgttggcact gatgagggtg tcagtgaagt gcttcatgtg gcaggagaaa 3780
aaaggctgca ccggtgcgtc agcagaatat gtgatacagg atatattccg cttcctcgct 3840
cactgactcg ctacgctcgg tcgttcgact gcggcgagcg gaaatggctt acgaacgggg 3900
cggagatttc ctggaagatg ccaggaagat acttaacagg gaagtgagag ggccgcggca 3960
aagccgtttt tccataggct ccgcccccct gacaagcatc acgaaatctg acgctcaaat 4020
cagtggtggc gaaacccgac aggactataa agataccagg cgtttccccc tggcggctcc 4080

ctcgtgcgct ctcctgttcc tgcctttcgg tttaccggtg tcattccgct gttatggccg 4140
cgtttgtctc attccacgcc tgacactcag ttccgggtag gcagttcgct ccaagctgga 4200
ctgtatgcac gaacccccg ttcagtccga ccgctgcgcc ttatccggta actatcgtct 4260
tgagtccaac ccggaaagac atgcaaaagc accactggca gcagccactg gtaattgatt 4320
tagaggagtt agtcttgaag tcatgcgccg gttaaggcta aactgaaagg acaagttttg 4380
gtgactgcgc tcctccaagc cagttacctc ggttcaaaga gttggtagct cagagaacct 4440
tcgaaaaacc gccctgcaag gcggtttttt cgttttcaga gcaagagatt acgcgcagac 4500
caaaacgatc tcaagaagat catcttatta atcactgccc gctttccagt cgggaaacct 4560
gtcgtgccag ctgcattaat gaatcggcca acgcgcgggg agaggcggtt tgcgtattgg 4620
gcgccagggt ggtttttctt ttcaccagtg agactggcaa cagctgattg cccttcaccg 4680
cctggccctg agagagttgc agcaagcggt ccacgctggt ttgccccagc aggcgaaaat 4740
cctgtttgat ggtggttaac ggcgggatat aacatgagct atcttcggta tcgtcgtatc 4800
ccactaccga gatatccgca ccaacgcgca gcccggactc ggtaatggcg cgcattgcgc 4860
ccagcgccat ctgatcgttg gcaaccagca tcgcagtggg aacgatgccc tcattcagca 4920
tttgcatggt ttgttgaaaa ccggacatgg cactccagtc gccttcccgt tccgctatcg 4980
gctgaatttg attgcgagtg agatatttat gccagccagc cagacgcaga cgcgccgaga 5040
cagaacttaa tgggcccgct aacagcgcga tttgctggtg acccaatgcg accagatgct 5100
ccacgcccag tcgcgtaccg tcctcatggg agaaaataat actgttgatg ggtgtctggt 5160
cagagacatc aagaaataac gccggaacat tagtgcaggc agcttccaca gcaatggcat 5220
cctggtcatc cagcggatag ttaatgatca gcccactgac gcgttgcgcg agaagattgt 5280
gcaccgccgc tttacaggct tcgacgccgc ttcgttctac catcgacacc accacgctgg 5340
cacccagttg atcggcgcga gatttaatcg ccgcgacaat ttgcgacggc gcgtgcaggg 5400
ccagactgga ggtggcaacg ccaatcagca acgactgttt gcccgccagt tgttgtgcca 5460
cgcggttggg aatgtaattc agctccgcca tcgccgcttc cactttttcc cgcgttttcg 5520
cagaaacgtg gctggcctgg ttcaccacgc gggaaacggt ctgataagag acaccggcat 5580
actctgcgac atcgtataac gttactggtt tcatattcac caccctgaat tgactctctt 5640
ccgggcgcta tcatgccata ccgcgaaagg ttttgcgcca ttcgatggcg cgccgctttt 5700
accaatgctt aatcagtgag gcacctatct cagcgatctg tctatttcgt tcatccatag 5760
ttgcctgact ccccgtcgtg tagataacta cgatacggga gggcttacca tctggcccca 5820
gcgctgcgat gataccgcga gaaccacgct caccggctcc ggatttatca gcaataaacc 5880
agccagccgg aagggccgag cgcagaagtg gtcctgcaac tttatccgcc tccatccagt 5940
ctattaattg ttgccgggaa gctagagtaa gtagttcgcc agttaatagt ttgcgcaacg 6000
ttgttgccat cgctacaggc atcgtggtgt cacgctcgtc gtttggtatg gcttcattca 6060
gctccggttc ccaacgatca aggcgagtta catgatcccc catgttgtgc aaaaaagcgg 6120

ttagctcctt cggtcctccg atcgttgtca gaagtaagtt ggccgcagtg ttatcactca 6180

tggttatggc agcactgcat aattctctta ctgtcatgcc atccgtaaga tgcttttctg 6240

tgactggtga gtactcaacc aagtcattct gagaatagtg tatgcggcga ccgagttgct 6300

cttgcccggc gtcaatacgg gataataccg cgccacatag cagaacttta aaagtgctca 6360

tcattggaaa acgttcttcg gggcgaaaac tctcaaggat cttaccgctg ttgagatcca 6420

gttcgatgta acccactcgt gcacccaact gatcttcagc atcttttact ttcaccagcg 6480

tttctgggtg agcaaaaaca ggaaggcaaa atgccgcaaa aaagggaata agggcgacac 6540

ggaaatgttg aatactcata ttcttccttt ttcaatatta ttgaagcatt tatcagggtt 6600

attgtctcat gagcggatac atatttgaat gtatttagaa aaataaacaa ataggggtca 6660

gtgttacaac caattaacca attctgaaca ttatcgcgag cccatttata cctgaatatg 6720

gctcataaca ccccttgttt gcctggcggc agtagcgcgg tggtcccacc tgaccccatg 6780

ccgaactcag aagtgaaacg ccgtagcgcc gatggtagtg tggggactcc ccatgcgaga 6840

gtagggaact gccaggcatc aaataaaacg aaaggctcag tcgaaagact gggcctttcg 6900

cccgggctaa ttatggggtg tcgcccttat tcgactctat agtgaagttc ctattctcta 6960

gtagtatagg aacttctgaa gtggggctcg agggccggcc cagccgtcaa ggttaaggct 7020

ggccatatca gcgactgaaa agcggccagc ctcggccttg tttgacgtat aaccaaagcc 7080

accgggcaac caatagccct tgtcactttt gatcaggtag accgaccctg aagcgctttt 7140

ttcgtattcc ataaaacccc cttctgtgcg tgagtactca tagtataaca ggcgtgagta 7200

ccaacgct 7208

<210> 98
<211> 5384
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 98
gtaaacagca caagtccttt gcgaaaataa acatattctt ccggcagcgg ttcttttact 60

ttcatgacca tttcggcgtc ccagacctgc ttcggatcag caatgatttc cgctcctgct 120

gactcatagg cttcattttc aaatccgctt ccaaggcccg cgcctgtttc aaccagcacc 180

cggtggccgt ttgaaatgag ctgagaaacg cccccgggtg ttaatgcgac acggttttca 240

ttgtttttta tctctttagg aacccctatg atcattatgc cactctcctt ggttcctaga 300

tcctgtgtga aattgttatt gttatccgct cacaattcca cacattatac gagccggaag 360

cataaagtgt caagcctggg gtgcctaatg agtgagctaa cttacattaa ttgcgttgcg 420

ctcactgccc gcatatctat gagccgggct gaatgatcga ccgagacagg ccctgcgggg 480

ctgcaggatc caattgtgag cggataacaa ttacgagctt catgcacagt gatcgacgct 540

gttgacaatt aatcatcggc tcgtataatg tgtggatgtg gaattgtgag cgctcacaat 600

tccacaacgg tttccctcta gaaataattt tgtttacaag gaggattata aaatgactct 660
agagtggaaa ccgaaaccaa aactgcctca actgctggat gatcacttcg gtctgcacgg 720
tctggtgttt cgtcgtactt tcgcaattcg ttcttatgaa gtgggtccag atcgttctac 780
ctccatcctg gccgtcatga accacatgca ggaagccacc ctgaatcacg cgaaatctgt 840
tggtatcctg ggtgatggtt tcggcactac tctggaaatg tctaaacgtg acctgatgtg 900
ggtagtgcgt cgcacccacg tagcagtaga gcgctaccct acttggggtg acactgtgga 960
agtcgagtgt tggattggcg cgtccggtaa caatggtatg cgtcgcgatt ttctggtccg 1020
tgactgtaaa acgggcgaaa tcctgacgcg ttgcacctcc ctgagcgttc tgatgaacac 1080
ccgcactcgt cgcctgtcta ccatcccgga cgaagtgcgc ggtgagatcg gtcctgcttt 1140
catcgataac gtggcagtta aagacgacga aatcaagaaa ctgcaaaaac tgaacgactc 1200
caccgcggac tacatccagg gcggtctgac tccgcgctgg aacgacctgg atgttaatca 1260
gcatgtgaac aacctgaaat acgttgcttg ggtcttcgag actgtgccgg acagcatttt 1320
cgaaagccat cacatttcct cttttactct ggagtaccgt cgcgaatgta ctcgcgactc 1380
cgttctgcgc agcctgacca ccgtaagcgg cggttctagc gaggcaggtc tggtctgcga 1440
ccatctgctg caactggaag gcggctccga agtcctgcgt gcgcgtacgg agtggcgtcc 1500
aaagctgacg gattctttcc gcggcatctc cgtaattccg gcggaacctc gtgtttaagc 1560
tttagtcaaa agcctccggt cggaggcttt tgactttctg cttactgaat ttgcggccgc 1620
ctcgagaaaa tgaagggaag ttcctatact tactagagaa taggaacttc tatagggagt 1680
cgaataaggg cgacacaaaa ggtattctaa atgcataata aatactgata acatcttata 1740
gtttgtatta tattttgtat tatcgttgac atgtataatt ttgatatcaa aaactgattt 1800
tccctttatt attttcgaga tttattttct taattctctt taacaaacta gaaatattgt 1860
atatacaaaa aatcataaat aatagatgaa tagtttaatt ataggtgttc atcaatcgaa 1920
aaagcaacgt atcttattta aagtgcgttg ctttttttctc atttataagg ttaaataatt 1980
ctcatatatc aagcaaagtg acaggcgccc ttaaatattc tgacaaatgc tctttcccta 2040
aactcccccc ataaaaaaac ccgccgaagc gggtttttac gttatttgcg gattaacgat 2100
tactcgttat cagaaccgcc caggatgcct ggcagttccc tactctcgcc gctgcgctcg 2160
gtcgttcggc tgcgggacct cagcgctagc ggagtgtata ctggcttact atgttggcac 2220
tgatgagggt gtcagtgaag tgcttcatgt ggcaggagaa aaaaggctgc accggtgcgt 2280
cagcagaata tgtgatacag gatatattcc gcttcctcgc tcactgactc gctacgctcg 2340
gtcgttcgac tgcggcgagc ggaaatggct tacgaacggg gcggagattt cctggaagat 2400
gccaggaaga tacttaacag ggaagtgaga gggccgcggc aaagccgttt ttccataggc 2460
tccgcccccc tgacaagcat cacgaaatct gacgctcaaa tcagtggtgg cgaaacccga 2520
caggactata aagataccag gcgtttcccc ctggcggctc cctcgtgcgc tctcctgttc 2580
ctgcctttcg gtttaccggt gtcattccgc tgttatggcc gcgtttgtct cattccacgc 2640

ctgacactca gttccgggta ggcagttcgc tccaagctgg actgtatgca cgaacccccc 2700

gttcagtccg accgctgcgc cttatccggt aactatcgtc ttgagtccaa cccggaaaga 2760

catgcaaaag caccactggc agcagccact ggtaattgat ttagaggagt tagtcttgaa 2820

gtcatgcgcc ggttaaggct aaactgaaag gacaagtttt ggtgactgcg ctcctccaag 2880

ccagttacct cggttcaaag agttggtagc tcagagaacc ttcgaaaaac cgccctgcaa 2940

ggcggttttt tcgttttcag agcaagagat tacgcgcaga ccaaaacgat ctcaagaaga 3000

tcatcttatt aatcactgcc cgctttccag tcgggaaacc tgtcgtgcca gctgcattaa 3060

tgaatcggcc aacgcgcggg gagaggcggt ttgcgtattg ggcgccaggg tggtttttct 3120

tttcaccagt gagactggca acagctgatt gcccttcacc gcctggccct gagagagttg 3180

cagcaagcgg tccacgctgg tttgccccag caggcgaaaa tcctgtttga tggtggttaa 3240

cggcgggata taacatgagc tatcttcggt atcgtcgtat cccactaccg agatatccgc 3300

accaacgcgc agcccggact cggtaatggc gcgcattgcg cccagcgcca tctgatcgtt 3360

ggcaaccagc atcgcagtgg gaacgatgcc ctcattcagc atttgcatgg tttgttgaaa 3420

accggacatg gcactccagt cgccttcccg ttccgctatc ggctgaattt gattgcgagt 3480

gagatattta tgccagccag ccagacgcag acgcgccgag acagaactta atgggcccgc 3540

taacagcgcg atttgctggt gacccaatgc gaccagatgc tccacgccca gtcgcgtacc 3600

gtcctcatgg gagaaaataa tactgttgat gggtgtctgg tcagagacat caagaaataa 3660

cgccggaaca ttagtgcagg cagcttccac agcaatggca tcctggtcat ccagcggata 3720

gttaatgatc agcccactga cgcgttgcgc gagaagattg tgcaccgccg ctttacaggc 3780

ttcgacgccg cttcgttcta ccatcgacac caccacgctg gcacccagtt gatcggcgcg 3840

agatttaatc gccgcgacaa tttgcgacgg cgcgtgcagg gccagactgg aggtggcaac 3900

gccaatcagc aacgactgtt tgcccgccag ttgttgtgcc acgcggttgg gaatgtaatt 3960

cagctccgcc atcgccgctt ccacttttc ccgcgttttc gcagaaacgt ggctggcctg 4020

gttcaccacg cgggaaacgg tctgataaga gacaccggca tactctgcga catcgtataa 4080

cgttactggt ttcatattca ccaccctgaa ttgactctct tccgggcgct atcatgccat 4140

accgcgaaag gttttgcgcc attcgatggc gcgccgcttt taccaatgct taatcagtga 4200

ggcacctatc tcagcgatct gtctatttcg ttcatccata gttgcctgac tccccgtcgt 4260

gtagataact acgatacggg agggcttacc atctggcccc agcgctgcga tgataccgcg 4320

agaaccacgc tcaccggctc cggatttatc agcaataaac cagccagccg gaagggccga 4380

gcgcagaagt ggtcctgcaa ctttatccgc ctccatccag tctattaatt gttgccggga 4440

agctagagta agtagttcgc cagttaatag tttgcgcaac gttgttgcca tcgctacagg 4500

catcgtggtg tcacgctcgt cgtttggtat ggcttcattc agctccggtt cccaacgatc 4560

aaggcgagtt acatgatccc ccatgttgtg caaaaaagcg gttagctcct tcggtcctcc 4620

gatcgttgtc agaagtaagt tggccgcagt gttatcactc atggttatgg cagcactgca 4680

taattctctt actgtcatgc catccgtaag atgcttttct gtgactggtg agtactcaac 4740

caagtcattc tgagaatagt gtatgcggcg accgagttgc tcttgcccgg cgtcaatacg 4800

ggataatacc gcgccacata gcagaacttt aaaagtgctc atcattggaa aacgttcttc 4860

ggggcgaaaa ctctcaagga tcttaccgct gttgagatcc agttcgatgt aacccactcg 4920

tgcacccaac tgatcttcag catcttttac tttcaccagc gtttctgggt gagcaaaaac 4980

aggaaggcaa aatgccgcaa aaaagggaat aagggcgaca cggaaatgtt gaatactcat 5040

attcttcctt tttcaatatt attgaagcat ttatcagggt tattgtctca tgagcggata 5100

catatttgaa tgtatttaga aaaataaaca aataggggtc agtgttacaa ccaattaacc 5160

aattctgaac attatcgcga gcccatttat acctgaatat ggctcataac acccttgtt 5220

tgcctggcgg cagtagcgcg gtggtcccac ctgaccccat gccgaactca gaagtgaaac 5280

gccgtagcgc cgatggtagt gtggggactc cccatgcgag agtagggaac tgccaggcat 5340

caaataaaac gaaaggctca gtcgaaagac tgggcctttc gccc 5384

<210> 99
<211> 1107
<212> DNA
<213> Mycobacterium marinum

<220>
<221> CDS
<222> (1)..(1107)

<400> 99

```
atg cca aga gag att aga tta cca gaa tcg tca gta gta gta aga cca          48
Met Pro Arg Glu Ile Arg Leu Pro Glu Ser Ser Val Val Val Arg Pro
1               5                  10                  15

gca ccg atg gag agc gcg acc tat agc caa tcc agc cgt ctg cag gca          96
Ala Pro Met Glu Ser Ala Thr Tyr Ser Gln Ser Ser Arg Leu Gln Ala
            20                  25                  30

gcg ggt ctg agc ccg gca att acc ttg ttc gag aaa gcg gcc cag acg         144
Ala Gly Leu Ser Pro Ala Ile Thr Leu Phe Glu Lys Ala Ala Gln Thr
        35                  40                  45

gtt ccg ctg ccg gac gca ccg caa ccg gtg gtc att gcc gac tac ggt         192
Val Pro Leu Pro Asp Ala Pro Gln Pro Val Val Ile Ala Asp Tyr Gly
    50                  55                  60

gtg gcg acc ggc cac aac agc ctg aag ccg atg atg gcg gcg atc aac         240
Val Ala Thr Gly His Asn Ser Leu Lys Pro Met Met Ala Ala Ile Asn
65                  70                  75                  80

gcg ctg cgt cgc cgc atc cgt gaa gat cgt gct att atg gtg gcc cac         288
Ala Leu Arg Arg Arg Ile Arg Glu Asp Arg Ala Ile Met Val Ala His
                85                  90                  95

acc gac gtg ccg gac aac gac ttt acg gcg ctg ttc cgt acc ttg gca         336
Thr Asp Val Pro Asp Asn Asp Phe Thr Ala Leu Phe Arg Thr Leu Ala
            100                 105                 110

gat gat ccg gac agc tat ctg cac cat gat agc gca agc ttc gcg agc         384
Asp Asp Pro Asp Ser Tyr Leu His His Asp Ser Ala Ser Phe Ala Ser
        115                 120                 125
```

```
gcg gtg ggt cgc agc ttt tac acg caa atc ctg ccg agc aat act gtt        432
Ala Val Gly Arg Ser Phe Tyr Thr Gln Ile Leu Pro Ser Asn Thr Val
    130                 135                 140

agc ctg ggc tgg tcc tct tgg gcg atc cag tgg ctg tct cgc atc cct        480
Ser Leu Gly Trp Ser Ser Trp Ala Ile Gln Trp Leu Ser Arg Ile Pro
145                 150                 155                 160

gcc ggt gcg ccg gaa ctg act gac cat gtc caa gtc gct tac agc aag        528
Ala Gly Ala Pro Glu Leu Thr Asp His Val Gln Val Ala Tyr Ser Lys
                165                 170                 175

gat gag cgt gcg cgt gcg gcc tat gcg cat cag gca gcg acc gac tgg        576
Asp Glu Arg Ala Arg Ala Ala Tyr Ala His Gln Ala Ala Thr Asp Trp
            180                 185                 190

caa gac ttc ctg gct ttt cgt ggc cgt gaa ctg tgc ccg ggt ggc cgt        624
Gln Asp Phe Leu Ala Phe Arg Gly Arg Glu Leu Cys Pro Gly Gly Arg
        195                 200                 205

ctg gtc gtc ctg acc atg gcg ctg gat gag cac ggc cac ttt ggt tac        672
Leu Val Val Leu Thr Met Ala Leu Asp Glu His Gly His Phe Gly Tyr
    210                 215                 220

cgc ccg atg aat gac gct ctg gtt gcg gca ctg aat gac cag gtt cgt        720
Arg Pro Met Asn Asp Ala Leu Val Ala Ala Leu Asn Asp Gln Val Arg
225                 230                 235                 240

gat ggc ctg ttg cgt ccg gaa gag ttg cgc cgc atg gcg att ccg gtt        768
Asp Gly Leu Leu Arg Pro Glu Glu Leu Arg Arg Met Ala Ile Pro Val
                245                 250                 255

gtg gct cgt gcg gag aaa gat ctg cgc gca ccg ttc gca ccg cgt ggt        816
Val Ala Arg Ala Glu Lys Asp Leu Arg Ala Pro Phe Ala Pro Arg Gly
            260                 265                 270

tgg ttt gag ggt ctg acg atc gaa caa ctg gat gtg ttt aac gcc gag        864
Trp Phe Glu Gly Leu Thr Ile Glu Gln Leu Asp Val Phe Asn Ala Glu
        275                 280                 285

gat cgc ttc tgg gcg gct ttt cag agc gat ggt gac gca gag agc ttc        912
Asp Arg Phe Trp Ala Ala Phe Gln Ser Asp Gly Asp Ala Glu Ser Phe
    290                 295                 300

ggt gcg cag tgg gct ggc ttc gca cgt gca gcc ctg ttc ccg acc ctg        960
Gly Ala Gln Trp Ala Gly Phe Ala Arg Ala Ala Leu Phe Pro Thr Leu
305                 310                 315                 320

gca gcc gcc ctg gac tgt ggc acg ggt gac ccg cgt gcg acc gcg ttt       1008
Ala Ala Ala Leu Asp Cys Gly Thr Gly Asp Pro Arg Ala Thr Ala Phe
                325                 330                 335

att gag cag ctg gaa gcg tcc gtt gcg gat cgc ctg gca tct caa cct       1056
Ile Glu Gln Leu Glu Ala Ser Val Ala Asp Arg Leu Ala Ser Gln Pro
            340                 345                 350

gaa ccg atg cgt atc ccg ttg gcc agc ttg gtt ctg gcg aaa cgt gcc       1104
Glu Pro Met Arg Ile Pro Leu Ala Ser Leu Val Leu Ala Lys Arg Ala
        355                 360                 365

taa                                                                  1107
```

<210> 100
<211> 368
<212> PRT
<213> Mycobacterium marinum

<400> 100

Met Pro Arg Glu Ile Arg Leu Pro Glu Ser Ser Val Val Val Arg Pro
1 5 10 15

Ala Pro Met Glu Ser Ala Thr Tyr Ser Gln Ser Ser Arg Leu Gln Ala
20 25 30

Ala Gly Leu Ser Pro Ala Ile Thr Leu Phe Glu Lys Ala Ala Gln Thr
35 40 45

Val Pro Leu Pro Asp Ala Pro Gln Pro Val Val Ile Ala Asp Tyr Gly
50 55 60

Val Ala Thr Gly His Asn Ser Leu Lys Pro Met Met Ala Ala Ile Asn
65 70 75 80

Ala Leu Arg Arg Arg Ile Arg Glu Asp Arg Ala Ile Met Val Ala His
85 90 95

Thr Asp Val Pro Asp Asn Asp Phe Thr Ala Leu Phe Arg Thr Leu Ala
100 105 110

Asp Asp Pro Asp Ser Tyr Leu His His Asp Ser Ala Ser Phe Ala Ser
115 120 125

Ala Val Gly Arg Ser Phe Tyr Thr Gln Ile Leu Pro Ser Asn Thr Val
130 135 140

Ser Leu Gly Trp Ser Ser Trp Ala Ile Gln Trp Leu Ser Arg Ile Pro
145 150 155 160

Ala Gly Ala Pro Glu Leu Thr Asp His Val Gln Val Ala Tyr Ser Lys
165 170 175

Asp Glu Arg Ala Arg Ala Ala Tyr Ala His Gln Ala Ala Thr Asp Trp
180 185 190

Gln Asp Phe Leu Ala Phe Arg Gly Arg Glu Leu Cys Pro Gly Gly Arg
195 200 205

Leu Val Val Leu Thr Met Ala Leu Asp Glu His Gly His Phe Gly Tyr
210 215 220

Arg Pro Met Asn Asp Ala Leu Val Ala Ala Leu Asn Asp Gln Val Arg
225 230 235 240

Asp Gly Leu Leu Arg Pro Glu Glu Leu Arg Arg Met Ala Ile Pro Val
245 250 255

Val Ala Arg Ala Glu Lys Asp Leu Arg Ala Pro Phe Ala Pro Arg Gly

260 265 270

Trp Phe Glu Gly Leu Thr Ile Glu Gln Leu Asp Val Phe Asn Ala Glu
275 280 285

Asp Arg Phe Trp Ala Ala Phe Gln Ser Asp Gly Asp Ala Glu Ser Phe
290 295 300

Gly Ala Gln Trp Ala Gly Phe Ala Arg Ala Ala Leu Phe Pro Thr Leu
305 310 315 320

Ala Ala Ala Leu Asp Cys Gly Thr Gly Asp Pro Arg Ala Thr Ala Phe
325 330 335

Ile Glu Gln Leu Glu Ala Ser Val Ala Asp Arg Leu Ala Ser Gln Pro
340 345 350

Glu Pro Met Arg Ile Pro Leu Ala Ser Leu Val Leu Ala Lys Arg Ala
355 360 365

<210> 101
<211> 552
<212> DNA
<213> Escherichia coli

<220>
<221> CDS
<222> (1)..(552)

<400> 101

```
atg gcg gac acg tta ttg att ctg ggt gat tgt ctg agc gcc ggg tat   48
Met Ala Asp Thr Leu Leu Ile Leu Gly Asp Cys Leu Ser Ala Gly Tyr
1               5                   10                  15

cga atg tct gcc agc gcg gcc tgg cct gcc ttg ttg aat gat aag tgg   96
Arg Met Ser Ala Ser Ala Ala Trp Pro Ala Leu Leu Asn Asp Lys Trp
            20                  25                  30

cag agt aaa acg tcg gta gtt aat gcc agc atc agc ggc gac acc tcg  144
Gln Ser Lys Thr Ser Val Val Asn Ala Ser Ile Ser Gly Asp Thr Ser
        35                  40                  45

caa caa gga ctg gcg cgc ctt ccg gct ctg ctg aaa cag cat cag ccg  192
Gln Gln Gly Leu Ala Arg Leu Pro Ala Leu Leu Lys Gln His Gln Pro
    50                  55                  60

cgt tgg gtg ctg gtt gaa ctg ggc ggc aat gac ggt ttg cgt ggt ttt  240
Arg Trp Val Leu Val Glu Leu Gly Gly Asn Asp Gly Leu Arg Gly Phe
65                  70                  75                  80

cag cca cag caa acc gag caa acg ctg cgc cag att ttg cag gat gtc  288
Gln Pro Gln Gln Thr Glu Gln Thr Leu Arg Gln Ile Leu Gln Asp Val
                85                  90                  95

aaa gcc gcc aac gct gaa cca ttg tta atg caa ata cgt ctg cct gca  336
Lys Ala Ala Asn Ala Glu Pro Leu Leu Met Gln Ile Arg Leu Pro Ala
            100                 105                 110

aac tat ggt cgc cgt tat aat gaa gcc ttt agc gcc att tac ccc aaa  384
Asn Tyr Gly Arg Arg Tyr Asn Glu Ala Phe Ser Ala Ile Tyr Pro Lys
```

115 120 125

ctc gcc aaa gag ttt gat gtt ccg ctg ctg ccc ttt ttt atg gaa gag 432
Leu Ala Lys Glu Phe Asp Val Pro Leu Leu Pro Phe Phe Met Glu Glu
130 135 140

gtc tac ctc aag cca caa tgg atg cag gat gac ggt att cat ccc aac 480
Val Tyr Leu Lys Pro Gln Trp Met Gln Asp Asp Gly Ile His Pro Asn
145 150 155 160

cgc gac gcc cag ccg ttt att gcc gac tgg atg gcg aag cag ttg cag 528
Arg Asp Ala Gln Pro Phe Ile Ala Asp Trp Met Ala Lys Gln Leu Gln
165 170 175

cct tta gta aat cat gac tca taa 552
Pro Leu Val Asn His Asp Ser
180

<210> 102
<211> 183
<212> PRT
<213> Escherichia coli

<400> 102

Met Ala Asp Thr Leu Leu Ile Leu Gly Asp Cys Leu Ser Ala Gly Tyr
1 5 10 15

Arg Met Ser Ala Ser Ala Ala Trp Pro Ala Leu Leu Asn Asp Lys Trp
20 25 30

Gln Ser Lys Thr Ser Val Val Asn Ala Ser Ile Ser Gly Asp Thr Ser
35 40 45

Gln Gln Gly Leu Ala Arg Leu Pro Ala Leu Leu Lys Gln His Gln Pro
50 55 60

Arg Trp Val Leu Val Glu Leu Gly Gly Asn Asp Gly Leu Arg Gly Phe
65 70 75 80

Gln Pro Gln Gln Thr Glu Gln Thr Leu Arg Gln Ile Leu Gln Asp Val
85 90 95

Lys Ala Ala Asn Ala Glu Pro Leu Leu Met Gln Ile Arg Leu Pro Ala
100 105 110

Asn Tyr Gly Arg Arg Tyr Asn Glu Ala Phe Ser Ala Ile Tyr Pro Lys
115 120 125

Leu Ala Lys Glu Phe Asp Val Pro Leu Leu Pro Phe Phe Met Glu Glu
130 135 140

Val Tyr Leu Lys Pro Gln Trp Met Gln Asp Asp Gly Ile His Pro Asn
145 150 155 160

Arg Asp Ala Gln Pro Phe Ile Ala Asp Trp Met Ala Lys Gln Leu Gln
165 170 175

Pro Leu Val Asn His Asp Ser
180

<210> 103
<211> 5161
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 103
cgggatctcg acgctctccc ttatgcgact cctgcgttta gggaaagagc atttgtcaga 60

atatttaagg gcgcctgtca ctttgcttga tatatgagaa ttatttaacc ttataaatga 120

gaaaaaagca acgcacttta ataagatac gttgcttttt cgattgatga acacctataa 180

ttaaactatt catctattat ttatgatttt ttgtatatac aatatttcta gtttgttaaa 240

gagaattaag aaaataaatc tcgaaaataa taaagggaaa atcagttttt gatatcaaaa 300

ttatacatgt caacgataat acaaaatata atacaaacta taagatgtta tcagtattta 360

ttatgcattt agaatacctt ttgtgtcgcc cttattcgac tccctataga agttcctatt 420

ctctagaaag tataggaact tcccttcatt ttggatccaa ttgtgagcgg ataacaatta 480

cgagcttcat gcacagtgat cgacgctgtt gacaattaat catcggctcg tataatgtgt 540

ggatgtggaa ttgtgagcgc tcacaattcc acaacggttt ccctctagaa ataattttgt 600

ttaacaggag gtaaaacata tgccaagaga gattagatta ccagaatcgt cagtagtagt 660

aagaccagca ccgatggaga gcgcgaccta tagccaatcc agccgtctgc aggcagcggg 720

tctgagcccg gcaattacct tgttcgagaa agcggcccag acggttccgc tgccggacgc 780

accgcaaccg gtggtcattg ccgactacgg tgtggcgacc ggccacaaca gcctgaagcc 840

gatgatggcg gcgatcaacg cgctgcgtcg ccgcatccgt gaagatcgtg ctattatggt 900

ggcccacacc gacgtgccgg acaacgactt tacggcgctg ttccgtacct tggcagatga 960

tccggacagc tatctgcacc atgatagcgc aagcttcgcg agcgcggtgg gtcgcagctt 1020

ttacacgcaa atcctgccga gcaatactgt tagcctgggc tggtcctctt gggcgatcca 1080

gtggctgtct cgcatccctg ccggtgcgcc ggaactgact gaccatgtcc aagtcgctta 1140

cagcaaggat gagcgtgcgc gtgcggccta tgcgcatcag gcagcgaccg actggcaaga 1200

cttcctggct tttcgtggcc gtgaactgtg cccgggtggc cgtctggtcg tcctgaccat 1260

ggcgctggat gagcacggcc actttggtta ccgcccgatg aatgacgctc tggttgcggc 1320

actgaatgac caggttcgtg atggcctgtt gcgtccggaa gagttgcgcc gcatggcgat 1380

tccggttgtg gctcgtgcgg agaaagatct gcgcgcaccg ttcgcaccgc gtggttggtt 1440

tgagggtctg acgatcgaac aactggatgt gtttaacgcc gaggatcgct tctgggcggc 1500

ttttcagagc gatggtgacg cagagagctt cggtgcgcag tgggctggct tcgcacgtgc 1560

agccctgttc ccgaccctgg cagccgccct ggactgtggc acgggtgacc cgcgtgcgac 1620

cgcgtttatt gagcagctgg aagcgtccgt tgcggatcgc ctggcatctc aacctgaacc 1680
gatgcgtatc ccgttggcca gcttggttct ggcgaaacgt gcctaagcgt taagtcagtc 1740
gtcagacgcc ggttaatccg gcgttttttt tgacgcccac taaagagaaa acaatctcga 1800
gtctggtaaa gaaaccgctg ctgcgaaatt tgaacgccag cacatggact cgtctactag 1860
cgcagcttaa ttaacctagg ctgctgccac cgctgagcaa taactagcat aacccccttgg 1920
ggcctctaaa cgggtcttga ggggtttttt gctgaaacct caggcatttg agaagcacac 1980
ggtcacactg cttccggtag tcaataaacc ggtaaaccag caatagacat aagcggctat 2040
ttaacgaccc tgccctgaac cgacgaccgg gtcatcgtgg ccggatcttg cggcccctcg 2100
gcttgaacga attgttagac attatttgcc gactaccttg gtgatctcgc ctttcacgta 2160
gtggacaaat tcttccaact gatctgcgcg cgaggccaag cgatcttctt cttgtccaag 2220
ataagcctgt ctagcttcaa gtatgacggg ctgatactgg gccggcaggc gctccattgc 2280
ccagtcggca gcgacatcct tcggcgcgat tttgccggtt actgcgctgt accaaatgcg 2340
ggacaacgta agcactacat ttcgctcatc gccagcccag tcgggcggcg agttccatag 2400
cgttaaggtt tcatttagcg cctcaaatag atcctgttca ggaaccggat caaagagttc 2460
ctccgccgct ggacctacca aggcaacgct atgttctctt gcttttgtca gcaagatagc 2520
cagatcaatg tcgatcgtgg ctggctcgaa gatacctgca agaatgtcat tgcgctgcca 2580
ttctccaaat tgcagttcgc gcttagctgg ataacgccac ggaatgatgt cgtcgtgcac 2640
aacaatggtg acttctacag cgcggagaat ctcgctctct ccaggggaag ccgaagtttc 2700
caaaaggtcg ttgatcaaag ctcgccgcgt tgtttcatca agccttacgg tcaccgtaac 2760
cagcaaatca atatcactgt gtggcttcag gccgccatcc actgcggagc cgtacaaatg 2820
tacggccagc aacgtcggtt cgagatggcg ctcgatgacg ccaactacct ctgatagttg 2880
agtcgatact tcggcgatca ccgcttccct catactcttc ctttttcaat attattgaag 2940
catttatcag ggttattgtc tcatgagcgg atacatattt gaatgtattt agaaaaataa 3000
acaaatagct agctcactcg gtcgctacgc tccgggcgtg agactgcggc gggcgctgcg 3060
gacacataca aagttaccca cagattccgt ggataagcag gggactaaca tgtgaggcaa 3120
aacagcaggg ccgcgccggt ggcgtttttc cataggctcc gccctcctgc cagagttcac 3180
ataaacagac gcttttccgg tgcatctgtg ggagccgtga ggctcaacca tgaatctgac 3240
agtacgggcg aaacccgaca ggacttaaag atccccaccg tttccggcgg gtcgctccct 3300
cttgcgctct cctgttccga ccctgccgtt taccggatac ctgttccgcc tttctccctt 3360
acgggaagtg tggcgctttc tcatagctca cacactggta tctcggctcg gtgtaggtcg 3420
ttcgctccaa gctgggctgt aagcaagaac tccccgttca gcccgactgc tgcgccttat 3480
ccggtaactg ttcacttgag tccaacccgg aaaagcacgg taaaacgcca ctggcagcag 3540
ccattggtaa ctgggagttc gcagaggatt tgtttagcta aacacgcggt tgctcttgaa 3600
gtgtgcgcca aagtccggct acactggaag gacagatttg gttgctgtgc tctgcgaaag 3660

ccagttacca cggttaagca gttccccaac tgacttaacc ttcgatcaaa ccacctcccc 3720

aggtggtttt ttcgtttaca gggcaaaaga ttacgcgcag aaaaaaagga tctcaagaag 3780

atcctttgat cttttctact gaaccgctct agatttcagt gcaatttatc tcttcaaatg 3840

tagcacctga agtcagcccc atacgatata agttgtaatt ctcatgttag tcatgccccg 3900

cgcccaccgg aaggagctga ctgggttgaa ggctctcaag ggcatcggtc gagatcccgg 3960

tgcctaatga gtgagctaac ttacattaat tgcgttgcgc tcactgcccg ctttccagtc 4020

gggaaacctg tcgtgccagc tgcattaatg aatcggccaa cgcgcgggga gaggcggttt 4080

gcgtattggg cgccagggtg gtttttcttt tcaccagtga gacgggcaac agctgattgc 4140

ccttcaccgc ctggccctga gagagttgca gcaagcggtc cacgctggtt tgccccagca 4200

ggcgaaaatc ctgtttgatg gtggttaacg gcgggatata acatgagctg tcttcggtat 4260

cgtcgtatcc cactaccgag atgtccgcac caacgcgcag cccggactcg gtaatggcgc 4320

gcattgcgcc cagcgccatc tgatcgttgg caaccagcat cgcagtggga acgatgccct 4380

cattcagcat ttgcatggtt tgttgaaaac cggacatggc actccagtcg ccttcccgtt 4440

ccgctatcgg ctgaatttga ttgcgagtga gatatttatg ccagccagcc agacgcagac 4500

gcgccgagac agaacttaat gggcccgcta acagcgcgat ttgctggtga cccaatgcga 4560

ccagatgctc cacgcccagt cgcgtaccgt cttcatggga gaaaataata ctgttgatgg 4620

gtgtctggtc agagacatca agaaataacg ccggaacatt agtgcaggca gcttccacag 4680

caatggcatc ctggtcatcc agcggatagt taatgatcag cccactgacg cgttgcgcga 4740

gaagattgtg caccgccgct ttacaggctt cgacgccgct tcgttctacc atcgacacca 4800

ccacgctggc acccagttga tcggcgcgag atttaatcgc cgcgacaatt tgcgacggcg 4860

cgtgcagggc cagactggag gtggcaacgc caatcagcaa cgactgtttg cccgccagtt 4920

gttgtgccac gcggttggga atgtaattca gctccgccat cgccgcttcc acttttccc 4980

gcgttttcgc agaaacgtgg ctggcctggt tcaccacgcg ggaaacggtc tgataagaga 5040

caccggcata ctctgcgaca tcgtataacg ttactggttt cacattcacc accctgaatt 5100

gactctcttc cgggcgctat catgccatac cgcgaaaggt tttgcgccat tcgatggtgt 5160

c 5161

<210> 104
<211> 4606
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 104
cgggatctcg acgctctccc ttatgcgact cctgcgttta gggaaagagc atttgtcaga 60

atatttaagg gcgcctgtca ctttgcttga tatatgagaa ttatttaacc ttataaatga 120

gaaaaaagca acgcacttta ataagatac gttgcttttt cgattgatga acacctataa 180

ttaaactatt catctattat ttatgatttt ttgtatatac aatatttcta gtttgttaaa 240
gagaattaag aaaataaatc tcgaaaataa taaagggaaa atcagttttt gatatcaaaa 300
ttatacatgt caacgataat acaaaatata atacaaacta taagatgtta tcagtattta 360
ttatgcattt agaatacctt ttgtgtcgcc cttattcgac tccctataga agttcctatt 420
ctctagaaag tataggaact tcccttcatt ttggatccaa ttgtgagcgg ataacaatta 480
cgagcttcat gcacagtgat cgacgctgtt gacaattaat catcggctcg tataatgtgt 540
ggatgtggaa ttgtgagcgc tcacaattcc acaacggttt ccctctagaa ataattttgt 600
ttaacaggag gtaaaacata tggcggacac gttattgatt ctgggtgatt gtctgagcgc 660
cgggtatcga atgtctgcca gcgcggcctg gcctgccttg ttgaatgata agtggcagag 720
taaaacgtcg gtagttaatg ccagcatcag cggcgacacc tcgcaacaag gactggcgcg 780
ccttccggct ctgctgaaac agcatcagcc gcgttgggtg ctggttgaac tgggcggcaa 840
tgacggtttg cgtggttttc agccacagca aaccgagcaa acgctgcgcc agattttgca 900
ggatgtcaaa gccgccaacg ctgaaccatt gttaatgcaa atacgtctgc ctgcaaacta 960
tggtcgccgt tataatgaag cctttagcgc catttacccc aaactcgcca aagagtttga 1020
tgttccgctg ctgccctttt ttatggaaga ggtctacctc aagccacaat ggatgcagga 1080
tgacggtatt catcccaacc gcgacgccca gccgtttatt gccgactgga tggcgaagca 1140
gttgcagcct ttagtaaatc atgactcata agcgttaagt cagtcgtcag acgccggtta 1200
atccggcgtt ttttttgacg cccactaaag agaaaacaat ctcgagtctg gtaaagaaac 1260
cgctgctgcg aaatttgaac gccagcacat ggactcgtct actagcgcag cttaattaac 1320
ctaggctgct gccaccgctg agcaataact agcataaccc cttggggcct ctaaacgggt 1380
cttgaggggt tttttgctga aacctcaggc atttgagaag cacacggtca cactgcttcc 1440
ggtagtcaat aaaccggtaa accagcaata gacataagcg gctatttaac gaccctgccc 1500
tgaaccgacg accgggtcat cgtggccgga tcttgcggcc cctcggcttg aacgaattgt 1560
tagacattat ttgccgacta ccttggtgat ctcgcctttc acgtagtgga caaattcttc 1620
caactgatct gcgcgcgagg ccaagcgatc ttcttcttgt ccaagataag cctgtctagc 1680
ttcaagtatg acgggctgat actgggccgg caggcgctcc attgcccagt cggcagcgac 1740
atccttcggc gcgattttgc cggttactgc gctgtaccaa atgcgggaca acgtaagcac 1800
tacatttcgc tcatcgccag cccagtcggg cggcgagttc catagcgtta aggtttcatt 1860
tagcgcctca aatagatcct gttcaggaac cggatcaaag agttcctccg ccgctggacc 1920
taccaaggca acgctatgtt ctcttgcttt tgtcagcaag atagccagat caatgtcgat 1980
cgtggctggc tcgaagatac ctgcaagaat gtcattgcgc tgccattctc caaattgcag 2040
ttcgcgctta gctggataac gccacggaat gatgtcgtcg tgcacaacaa tggtgacttc 2100
tacagcgcgg agaatctcgc tctctccagg ggaagccgaa gtttccaaaa ggtcgttgat 2160
caaagctcgc cgcgttgttt catcaagcct tacggtcacc gtaaccagca aatcaatatc 2220

actgtgtggc ttcaggccgc catccactgc ggagccgtac aaatgtacgg ccagcaacgt 2280

cggttcgaga tggcgctcga tgacgccaac tacctctgat agttgagtcg atacttcggc 2340

gatcaccgct tccctcatac tcttcctttt tcaatattat tgaagcattt atcagggtta 2400

ttgtctcatg agcggataca tatttgaatg tatttagaaa aataaacaaa tagctagctc 2460

actcggtcgc tacgctccgg gcgtgagact gcggcgggcg ctgcggacac atacaaagtt 2520

acccacagat tccgtggata agcaggggac taacatgtga ggcaaaacag cagggccgcg 2580

ccggtggcgt ttttccatag gctccgccct cctgccagag ttcacataaa cagacgcttt 2640

tccggtgcat ctgtgggagc cgtgaggctc aaccatgaat ctgacagtac gggcgaaacc 2700

cgacaggact taaagatccc caccgtttcc ggcgggtcgc tccctcttgc gctctcctgt 2760

tccgaccctg ccgtttaccg gatacctgtt ccgcctttct cccttacggg aagtgtggcg 2820

ctttctcata gctcacacac tggtatctcg gctcggtgta ggtcgttcgc tccaagctgg 2880

gctgtaagca agaactcccc gttcagcccg actgctgcgc cttatccggt aactgttcac 2940

ttgagtccaa cccggaaaag cacggtaaaa cgccactggc agcagccatt ggtaactggg 3000

agttcgcaga ggatttgttt agctaaacac gcggttgctc ttgaagtgtg cgccaaagtc 3060

cggctacact ggaaggacag atttggttgc tgtgctctgc gaaagccagt taccacggtt 3120

aagcagttcc ccaactgact taaccttcga tcaaaccacc tccccaggtg gtttttcgt 3180

ttacagggca aaagattacg cgcagaaaaa aaggatctca agaagatcct ttgatctttt 3240

ctactgaacc gctctagatt tcagtgcaat ttatctcttc aaatgtagca cctgaagtca 3300

gccccatacg atataagttg taattctcat gttagtcatg ccccgcgccc accggaagga 3360

gctgactggg ttgaaggctc tcaagggcat cggtcgagat cccggtgcct aatgagtgag 3420

ctaacttaca ttaattgcgt tgcgctcact gcccgctttc cagtcgggaa acctgtcgtg 3480

ccagctgcat taatgaatcg gccaacgcgc ggggagaggc ggtttgcgta ttgggcgcca 3540

gggtggtttt tcttttcacc agtgagacgg gcaacagctg attgcccttc accgcctggc 3600

cctgagagag ttgcagcaag cggtccacgc tggtttgccc cagcaggcga aaatcctgtt 3660

tgatggtggt taacggcggg atataacatg agctgtcttc ggtatcgtcg tatcccacta 3720

ccgagatgtc cgcaccaacg cgcagcccgg actcggtaat ggcgcgcatt gcgcccagcg 3780

ccatctgatc gttggcaacc agcatcgcag tgggaacgat gccctcattc agcatttgca 3840

tggtttgttg aaaaccggac atggcactcc agtcgccttc ccgttccgct atcggctgaa 3900

tttgattgcg agtgagatat ttatgccagc cagccagacg cagacgcgcc gagacagaac 3960

ttaatgggcc cgctaacagc gcgatttgct ggtgacccaa tgcgaccaga tgctccacgc 4020

ccagtcgcgt accgtcttca tgggagaaaa taatactgtt gatgggtgtc tggtcagaga 4080

catcaagaaa taacgccgga acattagtgc aggcagcttc cacagcaatg gcatcctggt 4140

catccagcgg atagttaatg atcagcccac tgacgcgttg cgcgagaaga ttgtgcaccg 4200

ccgctttaca ggcttcgacg ccgcttcgtt ctaccatcga caccaccacg ctggcaccca 4260

gttgatcggc gcgagattta atcgccgcga caatttgcga cggcgcgtgc agggccagac 4320

tggaggtggc aacgccaatc agcaacgact gtttgcccgc cagttgttgt gccacgcggt 4380

tgggaatgta attcagctcc gccatcgccg cttccacttt ttcccgcgtt ttcgcagaaa 4440

cgtggctggc ctggttcacc acgcgggaaa cggtctgata agagacaccg gcatactctg 4500

cgacatcgta taacgttact ggtttcacat tcaccaccct gaattgactc tcttccgggc 4560

gctatcatgc cataccgcga aaggttttgc gccattcgat ggtgtc 4606

<210> 105
<211> 3654
<212> DNA
<213> Acinetobacter sp. ADP1

<400> 105
caagcatatg gaattttaga aaacatatga cgcaccaaga ctgagaatga aaggatcaac 60

ctcaatttta gtagaaacag gaaccgggcc aagagtacct gtgacgtccg ttttgaaagg 120

aatataacgc acatctgaat ttagcatcca tgagttacca aggtcatatc taaggccaac 180

ctgaaaagca ggcgcccatt tatccttaat atcaaacgaa ctcaaagcac cgtcggtttt 240

atcaaaaaat agcacccgac caacaccaac cccaacatat ggataaagtc gctcaaagct 300

atcgtaatga tattgaagcg aaagaattgc agggccgtaa tcaacttcac tgactcttcc 360

cagcgaggag attgatttct caccttgaaa tttagcccta gctggcaccc caacaaaaaa 420

atccaccgct atatttgagc taacaaaata ggcgatatca aacgtaagtg ttgtatcatt 480

accaatactt acatcagcat ttggcaaagc ccccctcca acatttagat cgccaagctc 540

ctcacccaca tagaccttag aaaaattgaa gctagcgacc cagtcaccct gattatagcc 600

agcagatttc gccggataat tttcattcgc ccatgcagtg gccgccccca aaacaaaatt 660

agcaaccaac accggcatcg cgattacttt ataattagaa aaactcattg tgctaccctc 720

gttttgttgt cgttacaggt cgttaaagct gtgcgggaat caagtctgga accagtttgg 780

tgagtgtcag gcgctgttta cccgccgtag cacctaatag tacaaaacct ctgagtgtat 840

cggtattgtc gatagctttg gcaagcatac catcttcaaa ttcttctgtt tcccagttta 900

catctacatc cacaggtaca ggaagtacgg tgagcggggc tgcaggcgtt tttacagcaa 960

ctggcatggc aggatagtga acatgtgttg tttcaccact caaggttttc gcgagggcgc 1020

gggcctgctg catgatcggc atcacgtagg ggagcaaggt tccattaact tcagcacagt 1080

cgcctattgc atagatgtct tcaaggttgg tttctaggag gctattagtc aaaatacctc 1140

gactggtatg cacgcctgcg tgttttgcca gatcaatgtt tggttgtaat ccgattgcag 1200

ataaaacaat gtcggccact agcgtctgac catttgccag tgtgacagca taatcttgac 1260

catcgttaat tttagatact ttttctactg tggttgaaag tacaaagtga ataccgcttt 1320

cttccagatt tttctgaaaa gcatctgcaa tatgcgcagg taatagacga cccagtgggc 1380

gaggagacaa gtcgatgact gtcacctgat gcccagtatg ctgtaaatca ttggcaaatt 1440

cacaaccaat aagacctgca cctagaatga caacacgctt atcttgacgt tttgcaagat 1500

tttcacgaaa ggcgcgataa tcgataagag agttcaccac atgaatatca tcactaccat 1560

caccggcaat ggctaaacgg gttggattgg cgcctacagc cagaaccagt ttggaatagg 1620

gctgaatcgt ttcctgacca ttttttttcta attttaattc atgagtttct ggattaatgg 1680

cttttaccca agtttctgac aaaatttgca gcttgagctg ggtactcatt ttttctgcat 1740

cacctaatgg aatctgttct ggtgctttgt tgccagaaag cgcattagat aaggttggtt 1800

ttgcataatt cactgcatcg tcagcacaaa tcatgacaag ttcatgttca ggattaagct 1860

tgcgaaattc acgagcaagg gtataacctg ccattcctga tccgataatg acgattgggt 1920

gcattattat tctccgtagt aaggtaataa aaactaagat taaattaaaa agaccatgtt 1980

tcatggacat ggtcttttga aataccgatt aaacttcgat catttcaaaa tcaacttttg 2040

aaacgccgca gtcagggcaa gtccagtcat caggaatatc ttcccatttt gtccctggtg 2100

caatgccgtc ttgtggccag ccttcggctt catcataaat ccaaccacaa acgatacatt 2160

gatacttttt catttgattc tccaacctga taagttcgct tcagctgcct ttcagtaaaa 2220

caattccata taattacttg ccgttttcta tattcgggtc agtcaaacca aacttggcca 2280

atatcttggc acgacgtttt ggatagatat tggctttggt caaatcctct ttataatgct 2340

caaatactcg tttatccatc attttaaacc aaagtggcgg aatcatagca ggcaacaaca 2400

tactggcata accacttggt aactcaggtg cttcatcaaa atgacgcaat gcctgaaatg 2460

gacgcgtcgg ataagcgtga tgatctgaat gtcgttgtaa ctggtataaa aacagattcg 2520

tcacgatatt gttattattc cagctatgct ctggcatggt acgttcgtaa ttgccatccg 2580

ctcttttctg gcgttttaga ccataatgct cgatataatt aatgatctca aataaactaa 2640

tcccgtaaaa agcttgcgta accagataag gaatcgttcc tttaccaaat atcgcaatta 2700

tcgaactatg aaaagcagca ctcatccccc agccctgtaa tagttcatta tcttttgacc 2760

aaaacttttt gcctttacgt ttcagacgat gtgtctcaat ttcgattgca gattttaatg 2820

aaccaaagac cgttcttggc caaaactcat aaaatgtttc acccatttgc gacgaagctg 2880

gatcttcagg agtcgctgca cgcttgtgat gtccgtaagg atgttctata cgaaagtgat 2940

tgtatcctgt aggaacgagc gccaaatgag acaggatatg atcgagtcga tctgctttat 3000

ggctcaattc atgcgcggta ttcactgcaa taccattgat tgcacccatc gaaatgccta 3060

aaagaatttt atcaataaaa gatgtctttt tacggctcac caaataacag gcataaacat 3120

tggcaatata ctgtaatgga atgaagcttt tcaccaaacg tgcgtaataa ggatcatttt 3180

caagctgctt gatttcttca gacgttggat tgctggcatc ttttccaata atcgtatcaa 3240

tcaccggaat aataatgtgt agaacaatag ggccacctag cgcaaatatt tttttgattg 3300

gacggggtga aaactgataa cctgccaaaa tcccgatccc aatgactggt aatgcaggac 3360

taatcatcca taagtaacgt ttacgatcaa tttcacgcat tgatcttgca gcattgatca 3420

cttcttcaaa gttttgatcg acatgtacag gtgcattcat agtgaatcct ttcttgttat 3480

cctctattca tactgctcat aatcatccat cttatatatt aaaaacagtt gtgatcgtcc 3540

aaaaaaccta tgtcaaagtc tttggcattt tcaaccatgt caatgtccta aaatcacatg 3600

tataagctac aatctcattc tatactcttg ctcaaataag aatttttaac gcgc 3654

<210> 106
<211> 6622
<212> DNA
<213> Marinobacter aquaeoli VT8

<400> 106
ttaaaagcga tatgcgacac cgatgctcac gatagtgggg tccacttcca cttctgcctg 60

aacaggggcc gggcctaggt taccggtgat atccgctttg aagggtgcat atctaacgtc 120

aaaatttgcc gaccagttat tgtgtatcct ccagcgaaaa ccagcctgaa tcgcaggggc 180

ccatgtatct tcgacgtcga agtcggttag tgcgcgatcc ttctcatcta aaaagagaat 240

ccgtcctaca cccgctccaa agtacggaga gaagttgcta cccgttaaga catgatactg 300

aagcgaaaga attaccggac cataatctgt ttgaccaaga aaaagaccgg agagagactc 360

ttcgccctgg aggtccgcac tagcgggaat gccgccaaaa atgttaaatg ccagctgatt 420

actcagaaaa tacgacacgt cgaatgaaac ggtcgtatcg ttgttaatag acaggttgga 480

atttggaacg ggggcacccc ccgcagaggc tgatcgcaaa tcttcatcgg ttaaaactct 540

agtggcattc agtccaacca cccagtcgcc tctactgtaa accggctcag attgagcgtt 600

ggccaggctc gcagcaagtg aaagtaaaag gaacgccact aacgagactt tactaattat 660

tttaggtttc attttttat tatccttttt ggtctagtct tcatagagga catagtcctc 720

ttttgtggca ccacagtccg gacagcacca atcgtctgga atatcttcaa aacgagtgcc 780

ggcagggaag ccttcggctt catctccgag agcttcatcg tagatatggc cgcaagtgat 840

gcagacccac ttccgatagg tatcttttg agtcgagtct ttcggcgatt ttgaagagtt 900

aggcttgggt ttcgctttgg gctttgtttt atttttagct gaaggagtag atgcgcccgt 960

tgctttctgc gatgctccct cggtcttagc ttggctggca gggcggaccg ctgtattggt 1020

tgcggacacc gaaagttccg ggttcgcttc ttgaagcgca acgaagtcaa ccttatccct 1080

gacggcacag tctggacagg accagtcttc aggaattttt tcccatgtcg ttcctgcagg 1140

aaagccttcg tgcggatcac caaccacttc gtcgtataca taaccacaat cagggcattg 1200

atatttagcc atttagagca cctttcaaac gatattattg tctttgtttt ggtagcgccc 1260

gacgcgcacc ctctttcagg tgcacgtcag aggctctttt tctgcaacgt aaataaagta 1320

aacgaggtat ataagttccg attagccgat catttagccg cggcggtatc gactgattca 1380

gaatcagtcc caccaaattt acgctcatag aattcacgct tgccgggttg aatctgaatc 1440

ttatcgagat ctcctttagc ccaatccagc acccggtggt ccattatcga acgaaaccat 1500

gagggaaaca ttgcggccag gaacatcccg ggatatcccg atggtaagga aggcaggtct 1560

ttgaagtcgc gaagcgattg ataggacctt gtaggatggg cgtgatggtc ggaatgtcgt 1620

tgcaaatgaa acagaatcag gttcgacata atatggtttg agttccatga gtggtgcggt 1680

tgttgacgct cataacgtcc atccgacatc ttctcgcgca gcaatccgta atgctcaatg 1740

tagttggcgc tggtcagctg ccaccagcca aaggccattt gaatgggcaa aaagatcagc 1800

attaagggac caaaaaacgc cagcaatccc gcataaagca cagcggtcaa aatcataggc 1860

tgaagaactt cgttctccag gctccagaca ctttttccac aacgactgag gcgctgttcc 1920

tctaaatccc atgcccgctt gaaagcaccg ggaatttcac gcagtgagaa tgagtaaatg 1980

gactcaccca tgcgggatgt cgccgggtcc atcggcgtag ccacatcacg gtgatgcccc 2040

ttattgtgct caatgaagaa atgaccatat ccgaccacgg cgaggacaag cttcgccatc 2100

caacggtcaa acgtttcttt tttatggcca agttcgtggc ctgtgttcag ggccagacca 2160

ttcacgattc ccagggaaag ggctaatgcc agaaactcga aaacattcat tggttgcgtg 2220

gatacccacc aggcactgac aaccaaggcg gcatagtgaa taggaaccgt caagtaggtc 2280

agtacccggt agtaacgatc ctgttcaagc cgaggcacgg ccgactcggg ggggttggaa 2340

aaatcctctc caaacatggc atcaatcaag ggaactgcgc cataccaaag gatcaacacc 2400

aatccgtacc aaatgctcca tccagtttgg gataccaaat aaaggccaat aagaggcgtc 2460

gctggccaca gcacagaaag gacccacagg tggcgttttc tgtccacata accttcggca 2520

tcagggtctc tctgaagaga ctctgttgtt aagacatttt ctgacattga cattaggatc 2580

accttattgt ttttcagctt gatcattttt ctacattgtg cgaacaccga gtccctcagg 2640

tgaacggaca agttgtaggc atgaacaggt ttggccagaa ccggagatca aacaactact 2700

ctaaggggta gttttcgcac tagacatcta tcaatatgct ttcaccccat agcgccctcg 2760

cgtttcgggg agacgaagca ggagatcgga ttgtcatgac ccgccatagc ttggaagact 2820

ggtgtcggag gatgtctgaa aagatgtggg ctcgtcagta tttcattact caagggtgtt 2880

tagaccgcta ttgcctgagc gcttctgcta cgcctgaatc aaaggtagtt ctgtatcggg 2940

ccccgccagg ctatggaaaa tctgtacaag tggccttggc agcaaacact cgcgaactgg 3000

aacgtgagag cgccgtttat atcaataccc ggtcgtgccc tgactcatgt gacgttaatg 3060

gcagtttgtt tgcagcgtta gttttatatc aactcgaagg agttgaatcc tggcgcacga 3120

taaaaagtga catcgacacc atcgaagttc ttcgaaacgc actgtgtaat gcaaaaaaga 3180

cgataagaat ttgccttgat ggggttggcg aggctaaaca taccgcggat ttgattgagg 3240

atttaatctg tgaaacaccg agcaatgtga aatttttcat tgcaccgagt cgcgtcgggg 3300

cgttgccacg tttgtctatg atggcgggtg ttgtaacgta tggtgctgat gaacttgtat 3360

ttacagaaga ggaggttagt gaattatcgg gtatgggtgg ccccgaagcc agcaacatca 3420

taaaagcgat cggtggatgg ccagcacttg tcaggcttat gtgccgaacc ccaaacccaa 3480

atctccccgc agcgacttgg ccggaaactc gctcgtattt cagggacaac ctcttaactg 3540

cgttacccaa tagtacgagg acctttcttt gcaatgcagc gatgctcgaa gtaatcagcg 3600

ctgaatgcta tggctatgtc tataagacag aagaggccga ccgggaaatt acgtttctta 3660

acgaacatta tgctctttta gctcccaccg ggacttctgc tgatcgtatg gatatgcacc 3720

ctgtgctgcg agagtatttg cgtagtttat ttaacaccac ccaacgagaa cgtcgctcgt 3780

atgtactgaa acgggtcgcg ttctggcatt ggcgtagggg agagtacctc cattcaatca 3840

atgcagctct ggaagccagt gaccatcgat gggctcgcgg cgtaagtgac agcattatcc 3900

tggacgtggc actcagacag ggtgaaatcg aagtacttcg cacctggttt ggaaaagtac 3960

cggctcgcac gataaaaaaa attgccgcct tgagcatagg ttacgcgtgg attttgtatt 4020

tcagccaaca agctcgtcaa gcagacgaaa tactggctag ttcgcttcat ccgagctcca 4080

gggggggcgg caatcttgat gaggaaggat ggcgggaatt ggttaatgcg ataggcaaag 4140

ctacacagga tgaattactg gagagtcagg ttctctgtca aaaatggata gacgcctttg 4200

gcgaccgtaa catggttggc aaaggcgcag cacttacgtg ccaggcattc attgcctcca 4260

gtggacgcca ttttgaagag ttggagcgat tgtcccatcg agcggctgtg gccatccagt 4320

catccaatca acattacgct tttatttggc ttaaaactgc agaaattcag ggtgaactgt 4380

tcaaggggga catcgcccga gcaaggagtg tgctgcttca agcgaataaa acagcagaaa 4440

agattcaggt gccaaaaact tttttaaata aaatgtttgg caccccttgag ttacaaatcc 4500

tacacgaaca gaaccatcac ctggttaccc aggaatccgc acaggcttcg ttggatttcg 4560

ctttgaatta tggcgttaca gatattctgt gggggtgtac acaggcctac agccgttttc 4620

tgtaccacca agggttccaa gatagagcca tggccttgtt ggaacaatcc cgcttagccg 4680

cctgcgagcg agagctgtct cgtctaaata tcctgactaa agttcagtta gctgagttta 4740

ctctcctgaa caacgaggaa ttgggtccac ctatactccc cgatgaatgt gagctgacgt 4800

tcctgccaaa tcaaaaccag gccattcaag cccgtatggc cctggtaaac tcaatgtata 4860

gactacggct tgggaaacag tttggtgtcg ccgaaaaata tgccaaacaa gcactacaaa 4920

gcgccagcgc aatttcagac gctagaacca agatcgcggc ccactattgt caggccctgg 4980

cagcgtttgc cctcggttca tcaaaatcgg cgaagcgcac gattcttgat gcaaacctac 5040

tttcggaaca tttgaactgt cacttcacac ggctctggat caaagaagcg ctactttctc 5100

ttagcccccc tgctcaggat ctttttaacg atctgccaga cgactctgaa gctaaagcta 5160

cgaaggatcc cgatgtcaga atagaagact ccagcgtgcc acctgtgccc ggcaatgccc 5220

actcaaccat cacgataaag cagatttctc tgttgaaatg cgtaagcaac ggaatgacca 5280

acagagaaat cgctgaacgg cttcttgtga cggaggatac cgtcaaatgg catatgaaga 5340

agattttcag cgaacttaaa gtaaccaacc gggttcaggc agtcactgaa gctcgactgc 5400

gcggactttt atagtgctac aaaaacaaaa gaggaatcga gcgaatatgc aaaaaatagt 5460

tatcattggc gctggaatag ccagcctgac cgccgcagag gctctccgcc agaatggatt 5520

cgacggaacg attaccattt tgggcgagga aaacacgctg ccttaccagc gtcccccgtt 5580

gtccaaagcc tatttgacct cagatgagtt gccctcgcca actccgatcc gttctcctaa 5640

tttctttcgg gacaacaaag ttgaatttga acaaggcggt aaagtaatag cgcttgaacg 5700

atcggcaaag caagtagtga ttcaaggcgg caggaaaatt aaatacgaca cgctgatttt 5760

ggcaacagga gcgaggccac gtcctattga tttacctggt gagagcgcaa aaaatgtttt 5820

ctatctcagg aatcttgacc actccaccgc attacgtaat gccctgttag ccccggaatg 5880

cgagaaggtg gccattctcg gcgcgggtgt tatcgggctt gaagtcgcct ccgctgccaa 5940

tctacaggga aaacaagtct ctgtgtttga ggccaacagc cgagcgatgt gtcgagtagc 6000

gtcaccatta acaagtaatt ttgtcagaaa ccgcatggcc tccgccggcg taatgttcta 6060

cttcaatgct agcgtcaacc aaattctcac tgagggagac cgagtttccg gtatccgttt 6120

gtccgacggc actaccaaac ccgcagacgt cgttgttatc ggtataggag ccatccccaa 6180

tgctgaactt gcgcaagacg caaacctgga ttgcgacggt ggtattatag tagacagcgg 6240

catgcgtagc tccgaccctg acatatttgc gatcggagat tgcgctaaag ccgtcaacgt 6300

ttccaccaat acacccatcc gaatagaaac tattcacaat gccatgcttc aagcacaaat 6360

tgcggcggct catatttgtg gcaaaccgtc tccgcctgcc tctcctcccc gtttttggtc 6420

agatctcaac ggcatgaaag tccagtgtat tggaatcgcc actggatacg accgaattca 6480

gcggcgtccc acagagagtg acaatgcctg tgaattctgg ctcttttccg gagaccggat 6540

gatcgcaact gaaacagtca atcttcccac ccggcaagcc aagctatcta aagctctctc 6600

cgggtaatcg agctcatagt cc 6622

<210> 107
<211> 11326
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 107
caagcatatg gaattttaga aaacatatga cgcaccaaga ctgagaatga aaggatcaac 60

ctcaatttta gtagaaacag gaaccgggcc aagagtacct gtgacgtccg ttttgaaagg 120

aatataacgc acatctgaat ttagcatcca tgagttacca aggtcatatc taaggccaac 180

ctgaaaagca ggcgcccatt tatccttaat atcaaacgaa ctcaaagcac cgtcggtttt 240

atcaaaaaat agcacccgac caacaccaac cccaacatat ggataaagtc gctcaaagct 300

atcgtaatga tattgaagcg aaagaattgc agggccgtaa tcaacttcac tgactcttcc 360

cagcgaggag attgatttct caccttgaaa tttagcccta gctggcaccc caacaaaaaa 420

atccaccgct atatttgagc taacaaaata ggcgatatca aacgtaagtg ttgtatcatt 480

accaatactt acatcagcat ttggcaaagc ccccctcca acatttagat cgccaagctc 540

ctcacccaca tagaccttag aaaaattgaa gctagcgacc cagtcaccct gattatagcc 600

agcagatttc gccggataat tttcattcgc ccatgcagtg gccgccccca aaacaaaatt 660

agcaaccaac accggcatcg cgattacttt ataattagaa aaactcattg tgctaccctc 720

gttttgttgt cgttacaggt cgttaaagct gtgcgggaat caagtctgga accagtttgg 780

tgagtgtcag gcgctgttta cccgccgtag cacctaatag tacaaaacct ctgagtgtat 840

cggtattgtc gatagctttg gcaagcatac catcttcaaa ttcttctgtt tcccagttta 900

catctacatc cacaggtaca ggaagtacgg tgagcggggc tgcaggcgtt tttacagcaa 960

ctggcatggc aggatagtga acatgtgttg tttcaccact caaggttttc gcgagggcgc 1020

gggcctgctg catgatcggc atcacgtagg ggagcaaggt tccattaact tcagcacagt 1080

cgcctattgc atagatgtct tcaaggttgg tttctaggag gctattagtc aaaatacctc 1140

gactggtatg cacgcctgcg tgttttgcca gatcaatgtt tggttgtaat ccgattgcag 1200

ataaaacaat gtcggccact agcgtctgac catttgccag tgtgacagca taatcttgac 1260

catcgttaat tttagatact ttttctactg tggttgaaag tacaaagtga ataccgcttt 1320

cttccagatt tttctgaaaa gcatctgcaa tatgcgcagg taatagacga cccagtgggc 1380

gaggagacaa gtcgatgact gtcacctgat gcccagtatg ctgtaaatca ttggcaaatt 1440

cacaaccaat aagacctgca cctagaatga caacacgctt atcttgacgt tttgcaagat 1500

tttcacgaaa ggcgcgataa tcgataagag agttcaccac atgaatatca tcactaccat 1560

caccggcaat ggctaaacgg gttggattgg cgcctacagc cagaaccagt ttggaatagg 1620

gctgaatcgt ttcctgacca tttttttcta attttaattc atgagtttct ggattaatgg 1680

cttttaccca agtttctgac aaaatttgca gcttgagctg ggtactcatt ttttctgcat 1740

cacctaatgg aatctgttct ggtgctttgt tgccagaaag cgcattagat aaggttggtt 1800

ttgcataatt cactgcatcg tcagcacaaa tcatgacaag ttcatgttca ggattaagct 1860

tgcgaaattc acgagcaagg gtataacctg ccattcctga tccgataatg acgattgggt 1920

gcattattat tctccgtagt aaggtaataa aaactaagat taaattaaaa agaccatgtt 1980

tcatggacat ggtcttttga aataccgatt aaacttcgat catttcaaaa tcaacttttg 2040

aaacgccgca gtcagggcaa gtccagtcat caggaatatc ttcccatttt gtccctggtg 2100

caatgccgtc ttgtggccag ccttcggctt catcataaat ccaaccacaa acgatacatt 2160

gatacttttt catttgattc tccaacctga taagttcgct tcagctgcct ttcagtaaaa 2220

caattccata taattacttg ccgttttcta tattcgggtc agtcaaacca aacttggcca 2280

atatcttggc acgacgtttt ggatagatat tggctttggt caaatcctct ttataatgct 2340

caaatactcg tttatccatc attttaaacc aaagtggcgg aatcatagca ggcaacaaca 2400

tactggcata accacttggt aactcaggtg cttcatcaaa atgacgcaat gcctgaaatg 2460

gacgcgtcgg ataagcgtga tgatctgaat gtcgttgtaa ctggtataaa aacagattcg 2520

tcacgatatt gttattattc cagctatgct ctggcatggt acgttcgtaa ttgccatccg 2580

ctcttttctg gcgttttaga ccataatgct cgatataatt aatgatctca aataaactaa 2640

tcccgtaaaa agcttgcgta accagataag gaatcgttcc tttaccaaat atcgcaatta 2700

tcgaactatg aaaagcagca ctcatccccc agccctgtaa tagttcatta tcttttgacc 2760

aaaacttttt gcctttacgt ttcagacgat gtgtctcaat ttcgattgca gattttaatg 2820

aaccaaagac cgttcttggc caaaactcat aaaatgtttc acccatttgc gacgaagctg 2880

gatcttcagg agtcgctgca cgcttgtgat gtccgtaagg atgttctata cgaaagtgat 2940

tgtatcctgt aggaacgagc gccaaatgag acaggatatg atcgagtcga tctgctttat 3000

ggctcaattc atgcgcggta ttcactgcaa taccattgat tgcacccatc gaaatgccta 3060

aaagaatttt atcaataaaa gatgtctttt tacggctcac caaataacag gcataaacat 3120

tggcaatata ctgtaatgga atgaagcttt tcaccaaacg tgcgtaataa ggatcatttt 3180

caagctgctt gatttcttca gacgttggat tgctggcatc ttttccaata atcgtatcaa 3240

tcaccggaat aataatgtgt agaacaatag ggccacctag cgcaaatatt tttttgattg 3300

gacggggtga aaactgataa cctgccaaaa tcccgatccc aatgactggt aatgcaggac 3360

taatcatcca taagtaacgt ttacgatcaa tttcacgcat tgatcttgca gcattgatca 3420

cttcttcaaa gttttgatcg acatgtacag gtgcattcat agtgaatcct ttcttgttat 3480

cctctattca tactgctcat aatcatccat cttatatatt aaaaacagtt gtgatcgtcc 3540

aaaaaaccta tgtcaaagtc tttggcattt tcaaccatgt caatgtccta aaatcacatg 3600

tataagctac aatctcattc tatactcttg ctcaaataag aatttttaac gcgctatgga 3660

aattctccaa tttttattaa attagtcgct acgagattta agacgtaatt ttatgcctaa 3720

ctgagaaagt taagccgccc actctcactc tcgacatctt aaacctgagc taatcggacg 3780

cttgcgccaa ctacacctac gggtagtttt tgctccgtcg tctgctggaa aaacacgagc 3840

tggccgcaag catgccaggt accgcgagct actcgcgacg gctgaaagca ccgaaatgag 3900

cgagctatct ggtcgatttt gacccggtgc ccgtcttcaa aatcggcgaa ggccgaagtc 3960

ggccagaaat agcggcctac ttcagacctt ccctagtaaa tattttgcac caccgatcat 4020

gccgactaca cttaagtgta gttttaatat ttaacaccgt aacctatggt gaaaatttcc 4080

agtcagctgg cgcgagaata gcataatgaa aataataata aataatgatt tcccggtcgc 4140

taaggtcgga gcggatcaaa ttacgactct agtaagtgcc aaagttcata gttgcatata 4200

tcggccaaga ttgagtatcg cggatggagc cgctcccaga gtatgccttt acagagcccc 4260

acctggatat gggaaaaccg ttgctcttgc gttcgagtgg ctacgccaca gaacagccgg 4320

acgtcctgca gtgtggcttt ctttaagagc cagttcttac agtgaatttg atatctgcgc 4380

agagattatt gagcagcttg aaactttcga aatggtaaaa ttcagccgtg tgagagaggg 4440

tgtgagcaag cctgcgctct tgcgagacct tgcatctagt ctttggcaga gcacctcgaa 4500

taacgagata gaaacgctag tttgtttgga taatattaat catgacttag acttgccgtt 4560

gttgcacgca cttatggagt ttatgttaaa tacaccaaaa aatatcaggt ttgcagttgc 4620

aggcaataca ataaaagggt tctcgcagct taaacttgca ggcgctatgc gggagtacac 4680

cgagaaagac ttggccttta gcgcagaaga ggcggtggcg ttagcggagg cagagtctgt 4740

tcttggagtt cctgaagaac agatagagac cttggtgcaa gaagttgagg ggtggcctgc 4800

tcttgtagtt tttttgttaa agcgtgagtt gccggccaag catatttcag cagtagttga 4860

agtagacaat tactttaggg atgaaatatt tgaggcgatt cccgagcgct atcgtgtttt 4920

tcttgcaaat tcttcattgc tcgatttcgt gacgcctgat caatacaatt atgtattcaa 4980
atgcgtcaat ggggtctcat gtattaagta tttaagcact aattacatgt tgcttcgcca 5040
tgtgagcggt gagccagcgc agtttacact gcatccagta ctgcgtaatt ttctacgaga 5100
aattacttgg actgaaaatc ctgctaaaag atcctacctg cttaagcgtg cagctttctg 5160
gcattggcgt agaggtgaat accagtatgc aatacgaata tccctacggg cgaatgactg 5220
tcgctgggca gtcagcatgt ctgagagaat aattttagat ttgtcatttc gtcagggcga 5280
aatagatgcg ctgagacagt ggctgttaga gctgccgaag caggcctggc accaaaaacc 5340
catagtgctt attagttacg cgtgggtatt gtatttcagt cagcaaggcg cgcgagcaga 5400
gaagttaatt aaagacctat cttcacaatc cgataaaaaa aataaatggc aagaaaagga 5460
atggctgcag cttgtgcttg caataggtaa agcaaccaaa gatgaaatgc tttcgagtga 5520
ggagctctgt aataagtgga ttagtttatt tggggattca aacgcagttg gaaaaggggc 5580
cgcgctaacc tgtttggctt ttatttttgc cagtgagtat agatttgcag agttggagaa 5640
ggtgctggct caggcccaag ccgtgaataa atttgcaaaa caaaattttg cttttggttg 5700
gctgtatgtc gcgaggtttc aacaagccct agcaagcgga aaaatgggct gggcgaggca 5760
gattataact caagcacgca cagacagtcg cgcgcagatg atggaatccg agtttacttc 5820
gaaaatgttt gacgctctag agcttgagtt acattatgaa ttgcgctgct tggacacctc 5880
agaagaaaag ctctccaaaa ttttagagtt catttccaat cacggggtga cagacgtgtt 5940
tttttccgta tgccgtgctg tgtcagcttg gcggcttgga aggagtgacc taaatggctc 6000
cattgagata ttggagtggg cgaaggcgca tgcggttgaa aaaaatctac caagattgga 6060
agttatgagc caaattgaga tctatcagcg cttagtctgt caaggcataa cgggcataaa 6120
taatttaaaa actcttgaag atcataagat tttctccgga cagcactcag ccccctaaa 6180
agcacgcctg ctgcttgttc aatcactagt gctttcccga gatcggaact ttcatagtgc 6240
cgcgcacaga gcgttattgg ctattcagca agcccgtaaa attaacgcgg gccagctgga 6300
agtccgtgga ttattgtgtt tggccggagc gcaggcaggt gccggtgatt taaaaaaggc 6360
tcagcttaac attgtttatg cagtggagat agcaaaacag cttcaatgct ttcaaacagt 6420
tcttgatgaa gtatgtttaa ttgagcgaat aataccggct tcatgtgaag ccttcacagc 6480
agttaattta gatcaagcga ttggggcttt tagtcttccg cgaatagttg agattggaaa 6540
gtccgcagag aataaagctg acgctttatt gacacggaag cagattgctg tcttgaggct 6600
tgtaaaagag gggtgctcaa acaaacaaat agcaacaaat atgcatgtca ccgaagatgc 6660
tataaagtgg cacatgagga aaatatttgc caccttgaat gtagtgaatc gcacgcaagc 6720
aacaattgaa gctgagcgtc aaggaattat ctaaaataat cggcattaag tgatatagtg 6780
aaaagtatac tcgagctcat agtccacgac gcccgtgatt ttgtagccct ggccgacggc 6840
cagcaggtag gccgacaggc tcatgccggc cgccgccgcc ttttcctcaa tcgctcttcg 6900
ttcgtctgga aggcagtaca ccttgatagg tgggctgccc ttcctggttg gcttggtttc 6960

atcagccatc cgcttgccct catctgttac gccggcggta gccggccagc ctcgcagagc 7020
aggattcccg ttgagcaccg ccaggtgcga ataagggaca gtgaagaagg aacacccgct 7080
cgcgggtggg cctacttcac ctatcctgcc cggctgacgc cgttggatac accaaggaaa 7140
gtctacacga acccttggc aaaatcctgt atatcgtgcg aaaaaggatg gatataccga 7200
aaaaatcgct ataatgaccc cgaagcaggg ttatgcagcg gaaaagcgct gcttccctgc 7260
tgttttgtgg aatatctacc gactggaaac aggcaaatgc aggaaattac tgaactgagg 7320
ggacaggcga gagaggatca atggctatct gggggaccga gggctgtcgc tgcgccaagg 7380
cacgattgga gatcccctat gcggtgtgaa ataccgcaca gatgcgtaag gagaaaatac 7440
cgcatcaggc gctcttccgc ttcctcgctc actgactcgc tgcgctcggt cgttcggctg 7500
cggcgagcgg tatcagctca ctcaaaggcg gtaatacggt tatccacaga atcaggggat 7560
aacgcaggaa agaacatgtg agcaaaaggc cagcaaaagg ccaggaaccg taaaaaggcc 7620
gcgttgctgg cgtttttcca taggctccgc cccctgacg agcatcacaa aaatcgacgc 7680
tcaagtcaga ggtggcgaaa cccgacagga ctataaagat accaggcgtt tcccccctgga 7740
agctccctcg tgcgctctcc tgttccgacc ctgccgctta ccggatacct gtccgccttt 7800
ctcccttcgg gaagcgtggc gctttctcat agctcacgct gtaggtatct cagttcggtg 7860
taggtcgttc gctccaagct gggctgtgtg cacgaacccc ccgttcagcc cgaccgctgc 7920
gccttatccg gtaactatcg tcttgagtcc aacccggtaa gacacgactt atcgccactg 7980
gcagcagcca ctggtaacag gattagcaga gcgaggtatg taggcggtgc tacagagttc 8040
ttgaagtggt ggcctaacta cggctacact agaaggacag tatttggtat ctgcgctctg 8100
ctgaagccag ttaccttcgg aaaaagagtt ggtagctctt gatccggcaa acaaaccacc 8160
gctggtagcg gtggtttttt tgtttgcaag cagcagatta cgcgcagaaa aaaaggatct 8220
caagaagatc ctttgatctt ttctacgggg tctgacgctc agtggaacga aaactcacgt 8280
taagggattt tggtcatgag attatcaaaa aggatcttca cctagatcct tttaaattaa 8340
aaatgaagtt ttaaatcaat ctaaagtata tatgagtaaa cttggtctga cagttaccaa 8400
tcgattggtc ggtcatttcg aaccccagag tcccgctcag aagaactcgt caagaaggcg 8460
atagaaggcg atgcgctgcg aatcgggagc ggcgataccg taaagcacga ggaagcggtc 8520
agcccattcg ccgccaagct cttcagcaat atcacgggta gccaacgcta tgtcctgata 8580
gcggtccgcc acacccagcc ggccacagtc gatgaatcca gaaaagcggc cattttccac 8640
catgatattc ggcaagcagg catcgccatg ggtcacgacg agatcctcgc cgtcgggcat 8700
gcgcgccttg agcctggcga acagttcggc tggcgcgagc ccctgatgct cttcgtccag 8760
atcatcctga tcgacaagac cggcttccat ccgagtacgt gctcgctcga tgcgatgttt 8820
cgcttggtgg tcgaatgggc aggtagccgg atcaagcgta tgcagccgcc gcattgcatc 8880
agccatgatg gatactttct cggcaggagc aaggtgagat gacaggagat cctgccccgg 8940
cacttcgccc aatagcagcc agtcccttcc cgcttcagtg acaacgtcga gcacagctgc 9000

gcaaggaacg cccgtcgtgg ccagccacga tagccgcgct gcctcgtcct gcagttcatt 9060

cagggcaccg gacaggtcgg tcttgacaaa aagaaccggg cgcccctgcg ctgacagccg 9120

gaacacggcg gcatcagagc agccgattgt ctgttgtgcc cagtcatagc cgaatagcct 9180

ctccacccaa gcggccggag aacctgcgtg caatccatct tgttcaatca tgcgaaacga 9240

tcctcatcct gtctcttgat cagatcttga tcccctgcgc catcagatcc ttggcggcaa 9300

gaaagccatc cagtttactt tgcagggctt cccatcgatt ggatgcccga ggcatagact 9360

gtacaaaaaa acagtcataa caagccatga aaaccgccac tgcgccgtta ccaccgctgc 9420

gttcggtcaa ggttctggac cagttgcgtg agcgcatacg ctacttgcat tacagtttac 9480

gaaccgaaca ggcttatgtc aattcgcctc tcaggcgccg ctggtgccgc tggttggacg 9540

ccaagggtga atccgcctcg ataccctgat tactcgcttc ctgcgccctc tcaggcggcg 9600

ataggggact ggtaaaacgg ggattgccca gacgcctccc ccgccccttc aggggcacaa 9660

atgcggcccc aacggggcca cgtagtggtg cgtttttgc gtttccaccc ttttcttcct 9720

tttccctttt aaaccttta ggacgtctac aggccacgta atccgtggcc tgtagagttt 9780

aaaaagggac ggatttgttg ccattaaggg acggatttgt tgttaagaag ggacggattt 9840

gttgttgtaa agggacggat ttgttgtatt gtgggacgca gatacagtgt ccccttatac 9900

acaaggaatg tcgaacgtgg cctcaccccc aatggtttac aaaagcaatg ccctggtcga 9960

ggccgcgtat cgcctcagtg ttcaggaaca gcggatcgtt ctggcctgta ttagccaggt 10020

gaagaggagc gagcctgtca ccgatgaagt gatgtattca gtgacggcgg aggacatagc 10080

gacgatggcg ggtgtcccta tcgaatcttc ctacaaccag ctcaaagaag cggccctgcg 10140

cctgaaacgg cgggaagtcc ggttaaccca agagcccaat ggcaagggga aaagaccgag 10200

tgtgatgatt accggctggg tgcaaacaat catctaccgg gagggtgagg gccgtgtaga 10260

actcaggttc accaaagaca tgctgccgta cctgacggaa ctcaccaaac agttcaccaa 10320

atacgccttg gctgacgtgg ccaagatgga cagcacccac gcgatcaggc tttacgagct 10380

gctcatgcaa tgggacagca tcggccagcg cgaaatagaa attgaccagc tgcgaaagtg 10440

gtttcaactg gaaggccggt atccctcgat caaggacttc aagttgcgag tgcttgatcc 10500

agccgtgacg cagatcaacg agcacagccc gctacaggtg gagtgggcgc agcgaaagac 10560

cgggcgcaag gtcacacatc tgttgttcag ttttggaccg aagaagcccg ccaaggcggt 10620

gggtaaggcc ccagcgaagc gcaaggccgg gaagatttca gatgctgaga tcgcgaaaca 10680

ggctcgccct ggtgagacat gggaagcggc ccgcgctcga ctaacccaga tgccgctgga 10740

tctggcctag aggccgtggc caccacggcc cggcctgcct ttcaggctgc attattgaag 10800

catttatcag ggttattgtc tcatgagcgg atacatattt gaatgtattt agaaaaataa 10860

acaaaagagt ttgtagaaac gcaaaaaggc catccgtcag gatggccttc tgcttaattt 10920

gatgcctggc agtttatggc gggcgtcctg cccgccaccc tccgggccgt tgcttcgcaa 10980

cgttcaaatc cgctcccggc ggatttgtcc tactcaggag agcgttcacc gacaaacaac 11040

agataaaacg aaaggcccag tctttcgact gagcctttcg ttttatttga tgcctggcag 11100

ttccctactc tcgcatgggg agaccccaca ctaccatcgg cgctacggcg tttcacttct 11160

gagttcggca tggggtcagg tgggaccacc gcgctactgc cgccaggcaa attctgtttt 11220

atcagaccgc ttctgcgttc tgatttaatc tgtatcaggc tgaaaatctt ctctcatccg 11280

ccaaaacagc caagcttggc tgcaggtcga cggatcccgg gcgcgc 11326

<210> 108
<211> 11133
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 108
acgacgcccg tgattttgta gccctggccg acggccagca ggtaggccga caggctcatg 60

ccggccgccg ccgccttttc ctcaatcgct cttcgttcgt ctggaaggca gtacaccttg 120

ataggtgggc tgcccttcct ggttggcttg gtttcatcag ccatccgctt gccctcatct 180

gttacgccgg cggtagccgg ccagcctcgc agagcaggat tcccgttgag caccgccagg 240

tgcgaataag ggacagtgaa gaaggaacac ccgctcgcgg gtgggcctac ttcacctatc 300

ctgcccggct gacgccgttg gatacaccaa ggaaagtcta cacgaaccct ttggcaaaat 360

cctgtatatc gtgcgaaaaa ggatggatat accgaaaaaa tcgctataat gaccccgaag 420

cagggttatg cagcggaaaa gcgctgcttc cctgctgttt tgtggaatat ctaccgactg 480

gaaacaggca aatgcaggaa attactgaac tgaggggaca ggcgagagag gatcaatggc 540

tatctggggg accgagggct gtcgctgcgc caaggcacga ttggagatcc cctatgcggt 600

gtgaaatacc gcacagatgc gtaaggagaa aataccgcat caggcgctct tccgcttcct 660

cgctcactga ctcgctgcgc tcggtcgttc ggctgcggcg agcggtatca gctcactcaa 720

aggcggtaat acggttatcc acagaatcag gggataacgc aggaaagaac atgtgagcaa 780

aaggccagca aaaggccagg aaccgtaaaa aggccgcgtt gctggcgttt ttccataggc 840

tccgcccccc tgacgagcat cacaaaaatc gacgctcaag tcagaggtgg cgaaacccga 900

caggactata aagataccag gcgtttcccc ctggaagctc cctcgtgcgc tctcctgttc 960

cgaccctgcc gcttaccgga tacctgtccg cctttctccc ttcgggaagc gtggcgcttt 1020

ctcatagctc acgctgtagg tatctcagtt cggtgtaggt cgttcgctcc aagctgggct 1080

gtgtgcacga acccccccgtt cagcccgacc gctgcgcctt atccggtaac tatcgtcttg 1140

agtccaaccc ggtaagacac gacttatcgc cactggcagc agccactggt aacaggatta 1200

gcagagcgag gtatgtaggc ggtgctacag agttcttgaa gtggtggcct aactacggct 1260

acactagaag gacagtattt ggtatctgcg ctctgctgaa gccagttacc ttcggaaaaa 1320

gagttggtag ctcttgatcc ggcaaacaaa ccaccgctgg tagcggtggt ttttttgttt 1380

gcaagcagca gattacgcgc agaaaaaaag gatctcaaga agatcctttg atcttttcta 1440

cggggtctga cgctcagtgg aacgaaaact cacgttaagg gattttggtc atgagattat 1500

caaaaaggat cttcacctag atccttttaa attaaaaatg aagttttaaa tcaatctaaa 1560

gtatatatga gtaaacttgg tctgacagtt accaatcgat tggtcggtca tttcgaaccc 1620

cagagtcccg ctcagaagaa ctcgtcaaga aggcgataga aggcgatgcg ctgcgaatcg 1680

ggagcggcga taccgtaaag cacgaggaag cggtcagccc attcgccgcc aagctcttca 1740

gcaatatcac gggtagccaa cgctatgtcc tgatagcggt ccgccacacc cagccggcca 1800

cagtcgatga atccagaaaa gcggccattt tccaccatga tattcggcaa gcaggcatcg 1860

ccatgggtca cgacgagatc ctcgccgtcg ggcatgcgcg ccttgagcct ggcgaacagt 1920

tcggctggcg cgagcccctg atgctcttcg tccagatcat cctgatcgac aagaccggct 1980

tccatccgag tacgtgctcg ctcgatgcga tgtttcgctt ggtggtcgaa tgggcaggta 2040

gccggatcaa gcgtatgcag ccgccgcatt gcatcagcca tgatggatac tttctcggca 2100

ggagcaaggt gagatgacag gagatcctgc cccggcactt cgcccaatag cagccagtcc 2160

cttcccgctt cagtgacaac gtcgagcaca gctgcgcaag gaacgcccgt cgtggccagc 2220

cacgatagcc gcgctgcctc gtcctgcagt tcattcaggg caccggacag gtcggtcttg 2280

acaaaaagaa ccgggcgccc ctgcgctgac agccggaaca cggcggcatc agagcagccg 2340

attgtctgtt gtgcccagtc atagccgaat agcctctcca cccaagcggc cggagaacct 2400

gcgtgcaatc catcttgttc aatcatgcga aacgatcctc atcctgtctc ttgatcagat 2460

cttgatcccc tgcgccatca gatccttggc ggcaagaaag ccatccagtt tactttgcag 2520

ggcttcccat cgattggatg cccgaggcat agactgtaca aaaaaacagt cataacaagc 2580

catgaaaacc gccactgcgc cgttaccacc gctgcgttcg gtcaaggttc tggaccagtt 2640

gcgtgagcgc atacgctact tgcattacag tttacgaacc gaacaggctt atgtcaattc 2700

gcctctcagg cgccgctggt gccgctggtt ggacgccaag ggtgaatccg cctcgatacc 2760

ctgattactc gcttcctgcg ccctctcagg cggcgatagg ggactggtaa aacggggatt 2820

gcccagacgc ctcccccgcc ccttcagggg cacaaatgcg gccccaacgg ggccacgtag 2880

tggtgcgttt tttgcgtttc cacccttttc ttccttttcc cttttaaacc ttttaggacg 2940

tctacaggcc acgtaatccg tggcctgtag agtttaaaaa gggacggatt tgttgccatt 3000

aagggacgga tttgttgtta agaagggacg gatttgttgt tgtaaaggga cggatttgtt 3060

gtattgtggg acgcagatac agtgtcccct tatacacaag gaatgtcgaa cgtggcctca 3120

cccccaatgg tttacaaaag caatgccctg gtcgaggccg cgtatcgcct cagtgttcag 3180

gaacagcgga tcgttctggc ctgtattagc caggtgaaga ggagcgagcc tgtcaccgat 3240

gaagtgatgt attcagtgac ggcggaggac atagcgacga tggcgggtgt ccctatcgaa 3300

tcttcctaca accagctcaa agaagcggcc ctgcgcctga aacggcggga agtccggtta 3360

acccaagagc ccaatggcaa ggggaaaaga ccgagtgtga tgattaccgg ctgggtgcaa 3420

acaatcatct accgggaggg tgagggccgt gtagaactca ggttcaccaa agacatgctg 3480

ccgtacctga cggaactcac caaacagttc accaaatacg ccttggctga cgtggccaag 3540
atggacagca cccacgcgat caggctttac gagctgctca tgcaatggga cagcatcggc 3600
cagcgcgaaa tagaaattga ccagctgcga aagtggtttc aactggaagg ccggtatccc 3660
tcgatcaagg acttcaagtt gcgagtgctt gatccagccg tgacgcagat caacgagcac 3720
agcccgctac aggtggagtg ggcgcagcga aagaccgggc gcaaggtcac acatctgttg 3780
ttcagttttg gaccgaagaa gcccgccaag gcggtgggta aggccccagc gaagcgcaag 3840
gccgggaaga tttcagatgc tgagatcgcg aaacaggctc gccctggtga gacatgggaa 3900
gcggcccgcg ctcgactaac ccagatgccg ctggatctgg cctagaggcc gtggccacca 3960
cggcccggcc tgcctttcag gctgcattat tgaagcattt atcagggtta ttgtctcatg 4020
agcggataca tatttgaatg tatttagaaa aataaacaaa agagtttgta gaaacgcaaa 4080
aaggccatcc gtcaggatgg ccttctgctt aatttgatgc ctggcagttt atggcgggcg 4140
tcctgcccgc caccctccgg gccgttgctt cgcaacgttc aaatccgctc ccggcggatt 4200
tgtcctactc aggagagcgt tcaccgacaa acaacagata aaacgaaagg cccagtcttt 4260
cgactgagcc tttcgtttta tttgatgcct ggcagttccc tactctcgca tggggagacc 4320
ccacactacc atcggcgcta cggcgtttca cttctgagtt cggcatgggg tcaggtggga 4380
ccaccgcgct actgccgcca ggcaaattct gttttatcag accgcttctg cgttctgatt 4440
taatctgtat caggctgaaa atcttctctc atccgccaaa acagccaagc ttggctgcag 4500
gtcgacggat cttaaaagcg atatgcgaca ccgatgctca cgatagtggg gtccacttcc 4560
acttctgcct gaacaggggc cgggcctagg ttaccggtga tatccgcttt gaagggtgca 4620
tatctaacgt caaaatttgc cgaccagtta ttgtgtatcc tccagcgaaa accagcctga 4680
atcgcagggg cccatgtatc ttcgacgtcg aagtcggtta gtgcgcgatc cttctcatct 4740
aaaaagagaa tccgtcctac acccgctcca aagtacggag agaagttgct acccgttaag 4800
acatgatact gaagcgaaag aattaccgga ccataatctg tttgaccaag aaaaagaccg 4860
gagagagact cttcgccctg gaggtccgca ctagcgggaa tgccgccaaa aatgttaaat 4920
gccagctgat tactcagaaa atacgacacg tcgaatgaaa cggtcgtatc gttgttaata 4980
gacaggttgg aatttggaac gggggcaccc cccgcagagg ctgatcgcaa atcttcatcg 5040
gttaaaactc tagtggcatt cagtccaacc acccagtcgc ctctactgta aaccggctca 5100
gattgagcgt tggccaggct cgcagcaagt gaaagtaaaa ggaacgccac taacgagact 5160
ttactaatta ttttaggttt catttttta ttatcctttt tggtctagtc ttcatagagg 5220
acatagtcct cttttgtggc accacagtcc ggacagcacc aatcgtctgg aatatcttca 5280
aaacgagtgc cggcagggaa gccttcggct tcatctccga gagcttcatc gtagatatgg 5340
ccgcaagtga tgcagaccca cttccgatag gtatcttttt gagtcgagtc tttcggcgat 5400
tttgaagagt taggcttggg tttcgctttg ggctttgttt tatttttagc tgaaggagta 5460
gatgcgcccg ttgctttctg cgatgctccc tcggtcttag cttggctggc agggcggacc 5520

gctgtattgg ttgcggacac cgaaagttcc gggttcgctt cttgaagcgc aacgaagtca 5580

accttatccc tgacggcaca gtctggacag gaccagtctt caggaatttt ttcccatgtc 5640

gttcctgcag gaaagccttc gtgcggatca ccaaccactt cgtcgtatac ataaccacaa 5700

tcagggcatt gatatttagc catttagagc acctttcaaa cgatattatt gtctttgttt 5760

tggtagcgcc cgacgcgcac cctctttcag gtgcacgtca gaggctcttt ttctgcaacg 5820

taaataaagt aaacgaggta tataagttcc gattagccga tcatttagcc gcggcggtat 5880

cgactgattc agaatcagtc ccaccaaatt tacgctcata gaattcacgc ttgccgggtt 5940

gaatctgaat cttatcgaga tctcctttag cccaatccag cacccggtgg tccattatcg 6000

aacgaaacca tgagggaaac attgcggcca ggaacatccc gggatatccc gatggtaagg 6060

aaggcaggtc tttgaagtcg cgaagcgatt gataggacct tgtaggatgg gcgtgatggt 6120

cggaatgtcg ttgcaaatga aacagaatca ggttcgacat aatatggttt gagttccatg 6180

agtggtgcgg ttgttgacgc tcataacgtc catccgacat cttctcgcgc agcaatccgt 6240

aatgctcaat gtagttggcg ctggtcagct gccaccagcc aaaggccatt tgaatgggca 6300

aaaagatcag cattaaggga ccaaaaaacg ccagcaatcc cgcataaagc acagcggtca 6360

aaatcatagg ctgaagaact tcgttctcca ggctccagac acttttttcca caacgactga 6420

ggcgctgttc ctctaaatcc catgcccgct tgaaagcacc gggaatttca cgcagtgaga 6480

atgagtaaat ggactcaccc atgcgggatg tcgccgggtc catcggcgta gccacatcac 6540

ggtgatgccc cttattgtgc tcaatgaaga aatgaccata tccgaccacg gcgaggacaa 6600

gcttcgccat ccaacggtca aacgtttctt ttttatggcc aagttcgtgg cctgtgttca 6660

gggccagacc attcacgatt cccagggaaa gggctaatgc cagaaactcg aaaacattca 6720

ttggttgcgt ggatacccac caggcactga caaccaaggc ggcatagtga ataggaaccg 6780

tcaagtaggt cagtacccgg tagtaacgat cctgttcaag ccgaggcacg gccgactcgg 6840

gggggttgga aaaatcctct ccaaacatgg catcaatcaa gggaactgcg ccataccaaa 6900

ggatcaacac caatccgtac caaatgctcc atccagtttg ggataccaaa taaaggccaa 6960

taagaggcgt cgctggccac agcacagaaa ggacccacag gtggcgtttt ctgtccacat 7020

aaccttcggc atcagggtct ctctgaagag actctgttgt taagacattt tctgacattg 7080

acattaggat caccttattg tttttcagct tgatcatttt tctacattgt gcgaacaccg 7140

agtccctcag gtgaacggac aagttgtagg catgaacagg tttggccaga accggagatc 7200

aaacaactac tctaaggggt agttttcgca ctagacatct atcaatatgc tttcacccca 7260

tagcgccctc gcgtttcggg gagacgaagc aggagatcgg attgtcatga cccgccatag 7320

cttggaagac tggtgtcgga ggatgtctga aaagatgtgg gctcgtcagt atttcattac 7380

tcaagggtgt ttagaccgct attgcctgag cgcttctgct acgcctgaat caaaggtagt 7440

tctgtatcgg gccccgccag gctatggaaa atctgtacaa gtggccttgg cagcaaacac 7500

tcgcgaactg gaacgtgaga gcgccgttta tatcaatacc cggtcgtgcc ctgactcatg 7560

tgacgttaat ggcagtttgt ttgcagcgtt agttttatat caactcgaag gagttgaatc 7620
ctggcgcacg ataaaaagtg acatcgacac catcgaagtt cttcgaaacg cactgtgtaa 7680
tgcaaaaaag acgataagaa tttgccttga tggggttggc gaggctaaac ataccgcgga 7740
tttgattgag gatttaatct gtgaaacacc gagcaatgtg aaatttttca ttgcaccgag 7800
tcgcgtcggg gcgttgccac gtttgtctat gatggcgggt gttgtaacgt atggtgctga 7860
tgaacttgta tttacagaag aggaggttag tgaattatcg ggtatgggtg gccccgaagc 7920
cagcaacatc ataaaagcga tcggtggatg gccagcactt gtcaggctta tgtgccgaac 7980
cccaaaccca aatctccccg cagcgacttg gccggaaact cgctcgtatt tcagggacaa 8040
cctcttaact gcgttaccca atagtacgag gacctttctt tgcaatgcag cgatgctcga 8100
agtaatcagc gctgaatgct atggctatgt ctataagaca gaagaggccg accgggaaat 8160
tacgtttctt aacgaacatt atgctctttt agctcccacc gggacttctg ctgatcgtat 8220
ggatatgcac cctgtgctgc gagagtattt gcgtagttta tttaacacca cccaacgaga 8280
acgtcgctcg tatgtactga aacgggtcgc gttctggcat tggcgtaggg gagagtacct 8340
ccattcaatc aatgcagctc tggaagccag tgaccatcga tgggctcgcg gcgtaagtga 8400
cagcattatc ctggacgtgg cactcagaca gggtgaaatc gaagtacttc gcacctggtt 8460
tggaaaagta ccggctcgca cgataaaaaa aattgccgcc ttgagcatag gttacgcgtg 8520
gattttgtat ttcagccaac aagctcgtca agcagacgaa atactggcta gttcgcttca 8580
tccgagctcc agggggcgcg gcaatcttga tgaggaagga tggcgggaat tggttaatgc 8640
gataggcaaa gctacacagg atgaattact ggagagtcag gttctctgtc aaaaatggat 8700
agacgccttt ggcgaccgta acatggttgg caaaggcgca gcacttacgt gccaggcatt 8760
cattgcctcc agtggacgcc attttgaaga gttggagcga ttgtcccatc gagcggctgt 8820
ggccatccag tcatccaatc aacattacgc ttttatttgg cttaaaactg cagaaattca 8880
gggtgaactg ttcaaggggg acatcgcccg agcaaggagt gtgctgcttc aagcgaataa 8940
aacagcagaa aagattcagg tgccaaaaac ttttttaaat aaaatgtttg gcacccttga 9000
gttacaaatc ctacacgaac agaaccatca cctggttacc caggaatccg cacaggcttc 9060
gttggatttc gctttgaatt atggcgttac agatattctg tgggggtgta cacaggccta 9120
cagccgtttt ctgtaccacc aagggttcca agatagagcc atggccttgt tggaacaatc 9180
ccgcttagcc gcctgcgagc gagagctgtc tcgtctaaat atcctgacta aagttcagtt 9240
agctgagttt actctcctga acaacgagga attgggtcca cctatactcc ccgatgaatg 9300
tgagctgacg ttcctgccaa atcaaaacca ggccattcaa gcccgtatgg ccctggtaaa 9360
ctcaatgtat agactacggc ttgggaaaca gtttggtgtc gccgaaaaat atgccaaaca 9420
agcactacaa agcgccagcg caatttcaga cgctagaacc aagatcgcgg cccactattg 9480
tcaggccctg gcagcgtttg ccctcggttc atcaaaatcg gcgaagcgca cgattcttga 9540
tgcaaaccta ctttcggaac atttgaactg tcacttcaca cggctctgga tcaaagaagc 9600

gctactttct cttagccccc ttgctcagga tctttttaac gatctgccag acgactctga 9660

agctaaagct acgaaggatc ccgatgtcag aatagaagac tccagcgtgc cacctgtgcc 9720

cggcaatgcc cactcaacca tcacgataaa gcagatttct ctgttgaaat gcgtaagcaa 9780

cggaatgacc aacagagaaa tcgctgaacg gcttcttgtg acggaggata ccgtcaaatg 9840

gcatatgaag aagattttca gcgaacttaa agtaaccaac cgggttcagg cagtcactga 9900

agctcgactg cgcggacttt tatagtgcta caaaaacaaa agaggaatcg agcgaatatg 9960

caaaaaatag ttatcattgg cgctggaata gccagcctga ccgccgcaga ggctctccgc 10020

cagaatggat tcgacggaac gattaccatt ttgggcgagg aaaacacgct gccttaccag 10080

cgtcccccgt tgtccaaagc ctatttgacc tcagatgagt tgccctcgcc aactccgatc 10140

cgttctccta atttctttcg ggacaacaaa gttgaatttg aacaaggcgg taaagtaata 10200

gcgcttgaac gatcggcaaa gcaagtagtg attcaaggcg gcaggaaaat taaatacgac 10260

acgctgattt tggcaacagg agcgaggcca cgtcctattg atttacctgg tgagagcgca 10320

aaaaatgttt tctatctcag gaatcttgac cactccaccg cattacgtaa tgccctgtta 10380

gccccggaat gcgagaaggt ggccattctc ggcgcgggtg ttatcgggct tgaagtcgcc 10440

tccgctgcca atctacaggg aaaacaagtc tctgtgtttg aggccaacag ccgagcgatg 10500

tgtcgagtag cgtcaccatt aacaagtaat tttgtcagaa accgcatggc ctccgccggc 10560

gtaatgttct acttcaatgc tagcgtcaac caaattctca ctgagggaga ccgagtttcc 10620

ggtatccgtt tgtccgacgg cactaccaaa cccgcagacg tcgttgttat cggtatagga 10680

gccatcccca atgctgaact tgcgcaagac gcaaacctgg attgcgacgg tggtattata 10740

gtagacagcg gcatgcgtag ctccgaccct gacatatttg cgatcggaga ttgcgctaaa 10800

gccgtcaacg tttccaccaa tacacccatc cgaatagaaa ctattcacaa tgccatgctt 10860

caagcacaaa ttgcggcggc tcatatttgt ggcaaaccgt ctccgcctgc ctctcctccc 10920

cgtttttggt cagatctcaa cggcatgaaa gtccagtgta ttggaatcgc cactggatac 10980

gaccgaattc agcggcgtcc cacagagagt gacaatgcct gtgaattctg gctcttttcc 11040

ggagaccgga tgatcgcaac tgaaacagtc aatcttccca cccggcaagc caagctatct 11100

aaagctctct ccgggtaatc gagctcatag tcc 11133

<210> 109
<211> 7675
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 109
atcgattgga tgcccgaggc atagactgta caaaaaaaca gtcataacaa gccatgaaaa 60

ccgccactgc gccgttacca ccgctgcgtt cggtcaaggt tctggaccag ttgcgtgagc 120

gcatacgcta cttgcattac agtttacgaa ccgaacaggc ttatgtcaat tcgcctctca 180

ggcgccgctg gtgccgctgg ttggacgcca agggtgaatc cgcctcgata ccctgattac 240

tcgcttcctg cgccctctca ggcggcgata ggggactggt aaaacgggga ttgcccagac 300

gcctcccccg ccccttcagg ggcacaaatg cggccccaac ggggccacgt agtggtgcgt 360

tttttgcgtt tccacccttt tcttcctttt ccctttttaaa ccttttagga cgtctacagg 420

ccacgtaatc cgtggcctgt agagtttaaa aagggacgga tttgttgcca ttaagggacg 480

gatttgttgt taagaaggga cggatttgtt gttgtaaagg gacggatttg ttgtattgtg 540

ggacgcagat acagtgtccc cttatacaca aggaatgtcg aacgtggcct caccccccaat 600

ggtttacaaa agcaatgccc tggtcgaggc cgcgtatcgc ctcagtgttc aggaacagcg 660

gatcgttctg gcctgtatta gccaggtgaa gaggagcgag cctgtcaccg atgaagtgat 720

gtattcagtg acggcggagg acatagcgac gatggcgggt gtccctatcg aatcttccta 780

caaccagctc aaagaagcgg ccctgcgcct gaaacggcgg gaagtccggt taacccaaga 840

gcccaatggc aaggggaaaa gaccgagtgt gatgattacc ggctgggtgc aaacaatcat 900

ctaccgggag ggtgagggcc gtgtagaact caggttcacc aaagacatgc tgccgtacct 960

gacggaactc accaaacagt tcaccaaata cgccttggct gacgtggcca agatggacag 1020

cacccacgcg atcaggcttt acgagctgct catgcaatgg gacagcatcg gccagcgcga 1080

aatagaaatt gaccagctgc gaaagtggtt tcaactggaa ggccggtatc cctcgatcaa 1140

ggacttcaag ttgcgagtgc ttgatccagc cgtgacgcag atcaacgagc acagcccgct 1200

acaggtggag tgggcgcagc gaaagaccgg gcgcaaggtc acacatctgt tgttcagttt 1260

tggaccgaag aagcccgcca aggcggtggg taaggcccca gcgaagcgca aggccgggaa 1320

gatttcagat gctgagatcg cgaaacaggc tcgccctggt gagacatggg aagcggcccg 1380

cgctcgacta acccagatgc cgctggatct ggcctagagg ccgtggccac cacggcccgg 1440

cctgcctttc aggctgcatt attgaagcat ttatcagggt tattgtctca tgagcggata 1500

catatttgaa tgtatttaga aaaataaaca aaagagtttg tagaaacgca aaaaggccat 1560

ccgtcaggat ggccttctgc ttaatttgat gcctggcagt ttatggcggg cgtcctgccc 1620

gccaccctcc gggccgttgc ttcgcaacgt tcaaatccgc tcccggcgga tttgtcctac 1680

tcaggagagc gttcaccgac aaacaacaga taaaacgaaa ggcccagtct ttcgactgag 1740

cctttcgttt tatttgatgc ctggcagttc cctactctcg catggggaga ccccacacta 1800

ccatcggcgc tacggcgttt cacttctgag ttcggcatgg ggtcaggtgg gaccaccgcg 1860

ctactgccgc caggcaaatt ctgttttatc agaccgcttc tgcgttctga tttaatctgt 1920

atcaggctga aaatcttctc tcatccgcca aaacagaagc ttggctgcag gtcgacggat 1980

cccgggcgcg ccaagcatat ggaattctcc aatttttatt aaattagtcg ctacgagatt 2040

taagacgtaa ttttatgcct aactgagaaa gttaagccgc ccactctcac tctcgacatc 2100

ttaaacctga gctaatcgga cgcttgcgcc aactacacct acgggtagtt tttgctccgt 2160

cgtctgctgg aaaaacacga gctggccgca agcatgccag gtaccgcgag ctactcgcga 2220

cggctgaaag caccgaaatg agcgagctat ctggtcgatt ttgacccggt gcccgtcttc 2280
aaaatcggcg aaggccgaag tcggccagaa atagcggcct acttcagacc ttccctagta 2340
aatattttgc accaccgatc atgccgacta cacttaagtg tagttttaat atttaacacc 2400
gtaacctatg gtgaaaattt ccagtcagct ggcgcgagaa tagcataatg aaaataataa 2460
taaataatga tttcccggtc gctaaggtcg gagcggatca aattacgact ctagtaagtg 2520
ccaaagttca tagttgcata tatcggccaa gattgagtat cgcggatgga gccgctccca 2580
gagtatgcct ttacagagcc ccacctggat atgggaaaac cgttgctctt gcgttcgagt 2640
ggctacgcca cagaacagcc ggacgtcctg cagtgtggct ttctttaaga gccagttctt 2700
acagtgaatt tgatatctgc gcagagatta ttgagcagct tgaaactttc gaaatggtaa 2760
aattcagccg tgtgagagag ggtgtgagca agcctgcgct cttgcgagac cttgcatcta 2820
gtctttggca gagcacctcg aataacgaga tagaaacgct agtttgtttg gataatatta 2880
atcatgactt agacttgccg ttgttgcacg cacttatgga gtttatgtta aatacaccaa 2940
aaaatatcag gtttgcagtt gcaggcaata caataaaagg gttctcgcag cttaaacttg 3000
caggcgctat gcgggagtac accgagaaag acttggcctt tagcgcagaa gaggcggtgg 3060
cgttagcgga ggcagagtct gttcttggag ttcctgaaga acagatagag accttggtgc 3120
aagaagttga ggggtggcct gctcttgtag ttttttttgtt aaagcgtgag ttgccggcca 3180
agcatatttc agcagtagtt gaagtagaca attactttag ggatgaaata tttgaggcga 3240
ttcccgagcg ctatcgtgtt tttcttgcaa attcttcatt gctcgatttc gtgacgcctg 3300
atcaatacaa ttatgtattc aaatgcgtca atggggtctc atgtattaag tatttaagca 3360
ctaattacat gttgcttcgc catgtgagcg gtgagccagc gcagtttaca ctgcatccag 3420
tactgcgtaa ttttctacga gaaattactt ggactgaaaa tcctgctaaa agatcctacc 3480
tgcttaagcg tgcagctttc tggcattggc gtagaggtga ataccagtat gcaatacgaa 3540
tatccctacg ggcgaatgac tgtcgctggg cagtcagcat gtctgagaga ataattttag 3600
atttgtcatt tcgtcagggc gaaatagatg cgctgagaca gtggctgtta gagctgccga 3660
agcaggcctg gcaccaaaaa cccatagtgc ttattagtta cgcgtgggta ttgtatttca 3720
gtcagcaagg cgcgcgagca gagaagttaa ttaaagacct atcttcacaa tccgataaaa 3780
aaaataaatg gcaagaaaag gaatggctgc agcttgtgct tgcaataggt aaagcaacca 3840
aagatgaaat gctttcgagt gaggagctct gtaataagtg gattagttta tttggggatt 3900
caaacgcagt tggaaaaggg gccgcgctaa cctgtttggc ttttatttttt gccagtgagt 3960
atagatttgc agagttggag aaggtgctgg ctcaggccca agccgtgaat aaatttgcaa 4020
aacaaaattt tgcttttggt tggctgtatg tcgcgaggtt tcaacaagcc ctagcaagcg 4080
gaaaaatggg ctgggcgagg cagattataa ctcaagcacg cacagacagt cgcgcgcaga 4140
tgatggaatc cgagtttact tcgaaaatgt ttgacgctct agagcttgag ttacattatg 4200
aattgcgctg cttggacacc tcagaagaaa agctctccaa aattttagag ttcatttcca 4260

atcacggggt gacagacgtg ttttttccg tatgccgtgc tgtgtcagct tggcggcttg 4320
gaaggagtga cctaaatggc tccattgaga tattggagtg ggcgaaggcg catgcggttg 4380
aaaaaaatct accaagattg gaagttatga gccaaattga gatctatcag cgcttagtct 4440
gtcaaggcat aacgggcata aataatttaa aaactcttga agatcataag attttctccg 4500
gacagcactc agccccccta aaagcacgcc tgctgcttgt tcaatcacta gtgctttccc 4560
gagatcggaa ctttcatagt gccgcgcaca gagcgttatt ggctattcag caagcccgta 4620
aaattaacgc gggccagctg gaagtccgtg gattattgtg tttggccgga gcgcaggcag 4680
gtgccggtga tttaaaaaag gctcagctta acattgttta tgcagtggag atagcaaaac 4740
agcttcaatg ctttcaaaca gttcttgatg aagtatgttt aattgagcga ataataccgg 4800
cttcatgtga agccttcaca gcagttaatt tagatcaagc gattggggct tttagtcttc 4860
cgcgaatagt tgagattgga aagtccgcag agaataaagc tgacgcttta ttgacacgga 4920
agcagattgc tgtcttgagg cttgtaaaag aggggtgctc aaacaaacaa atagcaacaa 4980
atatgcatgt caccgaagat gctataaagt ggcacatgag gaaaatattt gccaccttga 5040
atgtagtgaa tcgcacgcaa gcaacaattg aagctgagcg tcaaggaatt atctaaaata 5100
atcggcatta agtgatatag tgaaaagtat actcgagctc atagtccacg acgcccgtga 5160
ttttgtagcc ctggccgacg gccagcaggt aggccgacag gctcatgccg gccgccgccg 5220
ccttttcctc aatcgctctt cgttcgtctg gaaggcagta caccttgata ggtgggctgc 5280
ccttcctggt tggcttggtt tcatcagcca tccgcttgcc ctcatctgtt acgccggcgg 5340
tagccggcca gcctcgcaga gcaggattcc cgttgagcac cgccaggtgc gaataaggga 5400
cagtgaagaa ggaacacccg ctcgcgggtg ggcctacttc acctatcctg cccggctgac 5460
gccgttggat acaccaagga aagtctacac gaacccttg gcaaaatcct gtatatcgtg 5520
cgaaaaagga tggatatacc gaaaaaatcg ctataatgac cccgaagcag ggttatgcag 5580
cggaaaagcg ctgcttccct gctgttttgt ggaatatcta ccgactggaa acaggcaaat 5640
gcaggaaatt actgaactga ggggacaggc gagagaggat caatggctat ctgggggacc 5700
gagggctgtc gctgcgccaa ggcacgattg gagatcccct atgcggtgtg aaataccgca 5760
cagatgcgta aggagaaaat accgcatcag gcgctcttcc gcttcctcgc tcactgactc 5820
gctgcgctcg gtcgttcggc tgcggcgagc ggtatcagct cactcaaagg cggtaatacg 5880
gttatccaca gaatcagggg ataacgcagg aaagaacatg tgagcaaaag gccagcaaaa 5940
ggccaggaac cgtaaaaagg ccgcgttgct ggcgtttttc cataggctcc gccccctga 6000
cgagcatcac aaaaatcgac gctcaagtca gaggtggcga aacccgacag gactataaag 6060
ataccaggcg tttcccctg gaagctccct cgtgcgctct cctgttccga ccctgccgct 6120
taccggatac ctgtccgcct ttctcccttc gggaagcgtg gcgctttctc atagctcacg 6180
ctgtaggtat ctcagttcgg tgtaggtcgt tcgctccaag ctgggctgtg tgcacgaacc 6240
ccccgttcag cccgaccgct gcgccttatc cggtaactat cgtcttgagt ccaacccggt 6300

aagacacgac ttatcgccac tggcagcagc cactggtaac aggattagca gagcgaggta 6360

tgtaggcggt gctacagagt tcttgaagtg gtggcctaac tacggctaca ctagaaggac 6420

agtatttggt atctgcgctc tgctgaagcc agttaccttc ggaaaaagag ttggtagctc 6480

ttgatccggc aaacaaacca ccgctggtag cggtggtttt tttgtttgca agcagcagat 6540

tacgcgcaga aaaaaaggat ctcaagaaga tcctttgatc ttttctacgg ggtctgacgc 6600

tcagtggaac gaaaactcac gttaagggat tttggtcatg agattatcaa aaaggatctt 6660

cacctagatc cttttaaatt aaaaatgaag ttttaaatca atctaaagta tatatgagta 6720

aacttggtct gacagttacc aatcgattgg tcggtcattt cgaaccccag agtcccgctc 6780

agaagaactc gtcaagaagg cgatagaagg cgatgcgctg cgaatcggga gcggcgatac 6840

cgtaaagcac gaggaagcgg tcagcccatt cgccgccaag ctcttcagca atatcacggg 6900

tagccaacgc tatgtcctga tagcggtccg ccacacccag ccggccacag tcgatgaatc 6960

cagaaaagcg gccattttcc accatgatat tcggcaagca ggcatcgcca tgggtcacga 7020

cgagatcctc gccgtcgggc atgcgcgcct tgagcctggc gaacagttcg gctggcgcga 7080

gcccctgatg ctcttcgtcc agatcatcct gatcgacaag accggcttcc atccgagtac 7140

gtgctcgctc gatgcgatgt ttcgcttggt ggtcgaatgg gcaggtagcc ggatcaagcg 7200

tatgcagccg ccgcattgca tcagccatga tggatacttt ctcggcagga gcaaggtgag 7260

atgacaggag atcctgcccc ggcacttcgc ccaatagcag ccagtccctt cccgcttcag 7320

tgacaacgtc gagcacagct gcgcaaggaa cgcccgtcgt ggccagccac gatagccgcg 7380

ctgcctcgtc ctgcagttca ttcagggcac cggacaggtc ggtcttgaca aaaagaaccg 7440

ggcgcccctg cgctgacagc cggaacacgg cggcatcaga gcagccgatt gtctgttgtg 7500

cccagtcata gccgaatagc ctctccaccc aagcggccgg agaacctgcg tgcaatccat 7560

cttgttcaat catgcgaaac gatcctcatc ctgtctcttg atcagatctt gatcccctgc 7620

gccatcagat ccttggcggc aagaaagcca tccagtttac tttgcagggc ttccc 7675

<210> 110
<211> 408
<212> PRT
<213> Acinetobacter sp. ADP1

<400> 110

Met Asn Ala Pro Val His Val Asp Gln Asn Phe Glu Glu Val Ile Asn
1 5 10 15

Ala Ala Arg Ser Met Arg Glu Ile Asp Arg Lys Arg Tyr Leu Trp Met
20 25 30

Ile Ser Pro Ala Leu Pro Val Ile Gly Ile Gly Ile Leu Ala Gly Tyr
35 40 45

Gln Phe Ser Pro Arg Pro Ile Lys Lys Ile Phe Ala Leu Gly Gly Pro

50 55 60

Ile Val Leu His Ile Ile Ile Pro Val Ile Asp Thr Ile Ile Gly Lys
65 70 75 80

Asp Ala Ser Asn Pro Thr Ser Glu Glu Ile Lys Gln Leu Glu Asn Asp
85 90 95

Pro Tyr Tyr Ala Arg Leu Val Lys Ser Phe Ile Pro Leu Gln Tyr Ile
100 105 110

Ala Asn Val Tyr Ala Cys Tyr Leu Val Ser Arg Lys Lys Thr Ser Phe
115 120 125

Ile Asp Lys Ile Leu Leu Gly Ile Ser Met Gly Ala Ile Asn Gly Ile
130 135 140

Ala Val Asn Thr Ala His Glu Leu Ser His Lys Ala Asp Arg Leu Asp
145 150 155 160

His Ile Leu Ser His Leu Ala Leu Val Pro Thr Gly Tyr Asn His Phe
165 170 175

Arg Ile Glu His Pro Tyr Gly His His Lys Arg Ala Ala Thr Pro Glu
180 185 190

Asp Pro Ala Ser Ser Gln Met Gly Glu Thr Phe Tyr Glu Phe Trp Pro
195 200 205

Arg Thr Val Phe Gly Ser Leu Lys Ser Ala Ile Glu Ile Glu Thr His
210 215 220

Arg Leu Lys Arg Lys Gly Lys Lys Phe Trp Ser Lys Asp Asn Glu Leu
225 230 235 240

Leu Gln Gly Trp Gly Met Ser Ala Ala Phe His Ser Ser Ile Ile Ala
245 250 255

Ile Phe Gly Lys Gly Thr Ile Pro Tyr Leu Val Thr Gln Ala Phe Tyr
260 265 270

Gly Ile Ser Leu Phe Glu Ile Ile Asn Tyr Ile Glu His Tyr Gly Leu
275 280 285

Lys Arg Gln Lys Arg Ala Asp Gly Asn Tyr Glu Arg Thr Met Pro Glu
290 295 300

His Ser Trp Asn Asn Asn Asn Ile Val Thr Asn Leu Phe Leu Tyr Gln
305 310 315 320

Leu Gln Arg His Ser Asp His His Ala Tyr Pro Thr Arg Pro Phe Gln

325 330 335

Ala Leu Arg His Phe Asp Glu Ala Pro Glu Leu Pro Ser Gly Tyr Ala
340 345 350

Ser Met Leu Leu Pro Ala Met Ile Pro Pro Leu Trp Phe Lys Met Met
355 360 365

Asp Lys Arg Val Phe Glu His Tyr Lys Glu Asp Leu Thr Lys Ala Asn
370 375 380

Ile Tyr Pro Lys Arg Arg Ala Lys Ile Leu Ala Lys Phe Gly Leu Thr
385 390 395 400

Asp Pro Asn Ile Glu Asn Gly Lys
405

<210> 111
<211> 54
<212> PRT
<213> Acinetobacter sp. ADP1

<400> 111

Met Lys Lys Tyr Gln Cys Ile Val Cys Gly Trp Ile Tyr Asp Glu Ala
1 5 10 15

Glu Gly Trp Pro Gln Asp Gly Ile Ala Pro Gly Thr Lys Trp Glu Asp
20 25 30

Ile Pro Asp Asp Trp Thr Cys Pro Asp Cys Gly Val Ser Lys Val Asp
35 40 45

Phe Glu Met Ile Glu Val
50

<210> 112
<211> 415
<212> PRT
<213> Acinetobacter sp. ADP1

<400> 112

Met Ser Met Lys His Gly Leu Phe Asn Leu Ile Leu Val Phe Ile Thr
1 5 10 15

Leu Leu Arg Arg Ile Ile Met His Pro Ile Val Ile Ile Gly Ser Gly
20 25 30

Met Ala Gly Tyr Thr Leu Ala Arg Glu Phe Arg Lys Leu Asn Pro Glu
35 40 45

His Glu Leu Val Met Ile Cys Ala Asp Asp Ala Val Asn Tyr Ala Lys
50 55 60

```
Pro Thr Leu Ser Asn Ala Leu Ser Gly Asn Lys Ala Pro Glu Gln Ile
65                  70                  75                  80

Pro Leu Gly Asp Ala Glu Lys Met Ser Thr Gln Leu Lys Leu Gln Ile
                85                  90                  95

Leu Ser Glu Thr Trp Val Lys Ala Ile Asn Pro Glu Thr His Glu Leu
            100                 105                 110

Lys Leu Glu Lys Asn Gly Gln Glu Thr Ile Gln Pro Tyr Ser Lys Leu
        115                 120                 125

Val Leu Ala Val Gly Ala Asn Pro Thr Arg Leu Ala Ile Ala Gly Asp
    130                 135                 140

Gly Ser Asp Asp Ile His Val Val Asn Ser Leu Ile Asp Tyr Arg Ala
145                 150                 155                 160

Phe Arg Glu Asn Leu Ala Lys Arg Gln Asp Lys Arg Val Val Ile Leu
                165                 170                 175

Gly Ala Gly Leu Ile Gly Cys Glu Phe Ala Asn Asp Leu Gln His Thr
            180                 185                 190

Gly His Gln Val Thr Val Ile Asp Leu Ser Pro Arg Pro Leu Gly Arg
        195                 200                 205

Leu Leu Pro Ala His Ile Ala Asp Ala Phe Gln Lys Asn Leu Glu Glu
    210                 215                 220

Ser Gly Ile His Phe Val Leu Ser Thr Thr Val Glu Lys Val Ser Lys
225                 230                 235                 240

Ile Asn Asp Gly Gln Asp Tyr Ala Val Thr Leu Ala Asn Gly Gln Thr
                245                 250                 255

Leu Val Ala Asp Ile Val Leu Ser Ala Ile Gly Leu Gln Pro Asn Ile
            260                 265                 270

Asp Leu Ala Lys His Ala Gly Val His Thr Ser Arg Gly Ile Leu Thr
        275                 280                 285

Asn Ser Leu Leu Glu Thr Asn Leu Glu Asp Ile Tyr Ala Ile Gly Asp
    290                 295                 300

Cys Ala Glu Val Asn Gly Thr Leu Leu Pro Tyr Val Met Pro Ile Met
305                 310                 315                 320

Gln Gln Ala Arg Ala Leu Ala Lys Thr Leu Ser Gly Glu Thr Thr His
                325                 330                 335
```

Val His Tyr Pro Ala Met Pro Val Ala Val Lys Thr Pro Ala Ala Pro
340 345 350

Leu Thr Val Leu Pro Val Pro Val Asp Val Asp Val Asn Trp Glu Thr
355 360 365

Glu Glu Phe Glu Asp Gly Met Leu Ala Lys Ala Ile Asp Asn Thr Asp
370 375 380

Thr Leu Arg Gly Phe Val Leu Leu Gly Ala Thr Ala Gly Lys Gln Arg
385 390 395 400

Leu Thr Leu Thr Lys Leu Val Pro Asp Leu Ile Pro Ala Gln Leu
405 410 415

<210> 113
<211> 892
<212> PRT
<213> Marinobacter aquaeoli VT8

<400> 113

Met Leu Ser Pro His Ser Ala Leu Ala Phe Arg Gly Asp Glu Ala Gly
1 5 10 15

Asp Arg Ile Val Met Thr Arg His Ser Leu Glu Asp Trp Cys Arg Arg
20 25 30

Met Ser Glu Lys Met Trp Ala Arg Gln Tyr Phe Ile Thr Gln Gly Cys
35 40 45

Leu Asp Arg Tyr Cys Leu Ser Ala Ser Ala Thr Pro Glu Ser Lys Val
50 55 60

Val Leu Tyr Arg Ala Pro Pro Gly Tyr Gly Lys Ser Val Gln Val Ala
65 70 75 80

Leu Ala Ala Asn Thr Arg Glu Leu Glu Arg Glu Ser Ala Val Tyr Ile
85 90 95

Asn Thr Arg Ser Cys Pro Asp Ser Cys Asp Val Asn Gly Ser Leu Phe
100 105 110

Ala Ala Leu Val Leu Tyr Gln Leu Glu Gly Val Glu Ser Trp Arg Thr
115 120 125

Ile Lys Ser Asp Ile Asp Thr Ile Glu Val Leu Arg Asn Ala Leu Cys
130 135 140

Asn Ala Lys Lys Thr Ile Arg Ile Cys Leu Asp Gly Val Gly Glu Ala
145 150 155 160

```
Lys His Thr Ala Asp Leu Ile Glu Asp Leu Ile Cys Glu Thr Pro Ser
                165                 170                 175

Asn Val Lys Phe Phe Ile Ala Pro Ser Arg Val Gly Ala Leu Pro Arg
            180                 185                 190

Leu Ser Met Met Ala Gly Val Val Thr Tyr Gly Ala Asp Glu Leu Val
        195                 200                 205

Phe Thr Glu Glu Glu Val Ser Glu Leu Ser Gly Met Gly Gly Pro Glu
    210                 215                 220

Ala Ser Asn Ile Ile Lys Ala Ile Gly Gly Trp Pro Ala Leu Val Arg
225                 230                 235                 240

Leu Met Cys Arg Thr Pro Asn Pro Asn Leu Pro Ala Ala Thr Trp Pro
                245                 250                 255

Glu Thr Arg Ser Tyr Phe Arg Asp Asn Leu Leu Thr Ala Leu Pro Asn
            260                 265                 270

Ser Thr Arg Thr Phe Leu Cys Asn Ala Ala Met Leu Glu Val Ile Ser
        275                 280                 285

Ala Glu Cys Tyr Gly Tyr Val Tyr Lys Thr Glu Glu Ala Asp Arg Glu
    290                 295                 300

Ile Thr Phe Leu Asn Glu His Tyr Ala Leu Leu Ala Pro Thr Gly Thr
305                 310                 315                 320

Ser Ala Asp Arg Met Asp Met His Pro Val Leu Arg Glu Tyr Leu Arg
                325                 330                 335

Ser Leu Phe Asn Thr Thr Gln Arg Glu Arg Arg Ser Tyr Val Leu Lys
            340                 345                 350

Arg Val Ala Phe Trp His Trp Arg Arg Gly Glu Tyr Leu His Ser Ile
        355                 360                 365

Asn Ala Ala Leu Glu Ala Ser Asp His Arg Trp Ala Arg Gly Val Ser
    370                 375                 380

Asp Ser Ile Ile Leu Asp Val Ala Leu Arg Gln Gly Glu Ile Glu Val
385                 390                 395                 400

Leu Arg Thr Trp Phe Gly Lys Val Pro Ala Arg Thr Ile Lys Lys Ile
                405                 410                 415

Ala Ala Leu Ser Ile Gly Tyr Ala Trp Ile Leu Tyr Phe Ser Gln Gln
            420                 425                 430
```

```
Ala Arg Gln Ala Asp Glu Ile Leu Ala Ser Ser Leu His Pro Ser Ser
        435                 440                 445

Arg Gly Ala Gly Asn Leu Asp Glu Glu Gly Trp Arg Glu Leu Val Asn
    450                 455                 460

Ala Ile Gly Lys Ala Thr Gln Asp Glu Leu Leu Glu Ser Gln Val Leu
465                 470                 475                 480

Cys Gln Lys Trp Ile Asp Ala Phe Gly Asp Arg Asn Met Val Gly Lys
                485                 490                 495

Gly Ala Ala Leu Thr Cys Gln Ala Phe Ile Ala Ser Ser Gly Arg His
            500                 505                 510

Phe Glu Glu Leu Glu Arg Leu Ser His Arg Ala Ala Val Ala Ile Gln
        515                 520                 525

Ser Ser Asn Gln His Tyr Ala Phe Ile Trp Leu Lys Thr Ala Glu Ile
    530                 535                 540

Gln Gly Glu Leu Phe Lys Gly Asp Ile Ala Arg Ala Arg Ser Val Leu
545                 550                 555                 560

Leu Gln Ala Asn Lys Thr Ala Glu Lys Ile Gln Val Pro Lys Thr Phe
                565                 570                 575

Leu Asn Lys Met Phe Gly Thr Leu Glu Leu Gln Ile Leu His Glu Gln
            580                 585                 590

Asn His His Leu Val Thr Gln Glu Ser Ala Gln Ala Ser Leu Asp Phe
        595                 600                 605

Ala Leu Asn Tyr Gly Val Thr Asp Ile Leu Trp Gly Cys Thr Gln Ala
    610                 615                 620

Tyr Ser Arg Phe Leu Tyr His Gln Gly Phe Gln Asp Arg Ala Met Ala
625                 630                 635                 640

Leu Leu Glu Gln Ser Arg Leu Ala Ala Cys Glu Arg Glu Leu Ser Arg
                645                 650                 655

Leu Asn Ile Leu Thr Lys Val Gln Leu Ala Glu Phe Thr Leu Leu Asn
            660                 665                 670

Asn Glu Glu Leu Gly Pro Pro Ile Leu Pro Asp Glu Cys Glu Leu Thr
        675                 680                 685

Phe Leu Pro Asn Gln Asn Gln Ala Ile Gln Ala Arg Met Ala Leu Val
    690                 695                 700
```

Asn Ser Met Tyr Arg Leu Arg Leu Gly Lys Gln Phe Gly Val Ala Glu
705 710 715 720

Lys Tyr Ala Lys Gln Ala Leu Gln Ser Ala Ser Ala Ile Ser Asp Ala
725 730 735

Arg Thr Lys Ile Ala Ala His Tyr Cys Gln Ala Leu Ala Ala Phe Ala
740 745 750

Leu Gly Ser Ser Lys Ser Ala Lys Arg Thr Ile Leu Asp Ala Asn Leu
755 760 765

Leu Ser Glu His Leu Asn Cys His Phe Thr Arg Leu Trp Ile Lys Glu
770 775 780

Ala Leu Leu Ser Leu Ser Pro Leu Ala Gln Asp Leu Phe Asn Asp Leu
785 790 795 800

Pro Asp Asp Ser Glu Ala Lys Ala Thr Lys Asp Pro Asp Val Arg Ile
805 810 815

Glu Asp Ser Ser Val Pro Pro Val Pro Gly Asn Ala His Ser Thr Ile
820 825 830

Thr Ile Lys Gln Ile Ser Leu Leu Lys Cys Val Ser Asn Gly Met Thr
835 840 845

Asn Arg Glu Ile Ala Glu Arg Leu Leu Val Thr Glu Asp Thr Val Lys
850 855 860

Trp His Met Lys Lys Ile Phe Ser Glu Leu Lys Val Thr Asn Arg Val
865 870 875 880

Gln Ala Val Thr Glu Ala Arg Leu Arg Gly Leu Leu
885 890

<210> 114
<211> 386
<212> PRT
<213> Marinobacter aquaeoli VT8

<400> 114

Met Gln Lys Ile Val Ile Ile Gly Ala Gly Ile Ala Ser Leu Thr Ala
1 5 10 15

Ala Glu Ala Leu Arg Gln Asn Gly Phe Asp Gly Thr Ile Thr Ile Leu
20 25 30

Gly Glu Glu Asn Thr Leu Pro Tyr Gln Arg Pro Pro Leu Ser Lys Ala
35 40 45

Tyr Leu Thr Ser Asp Glu Leu Pro Ser Pro Thr Pro Ile Arg Ser Pro

50 55 60

Asn Phe Phe Arg Asp Asn Lys Val Glu Phe Glu Gln Gly Gly Lys Val
65 70 75 80

Ile Ala Leu Glu Arg Ser Ala Lys Gln Val Val Ile Gln Gly Gly Arg
85 90 95

Lys Ile Lys Tyr Asp Thr Leu Ile Leu Ala Thr Gly Ala Arg Pro Arg
100 105 110

Pro Ile Asp Leu Pro Gly Glu Ser Ala Lys Asn Val Phe Tyr Leu Arg
115 120 125

Asn Leu Asp His Ser Thr Ala Leu Arg Asn Ala Leu Leu Ala Pro Glu
130 135 140

Cys Glu Lys Val Ala Ile Leu Gly Ala Gly Val Ile Gly Leu Glu Val
145 150 155 160

Ala Ser Ala Ala Asn Leu Gln Gly Lys Gln Val Ser Val Phe Glu Ala
165 170 175

Asn Ser Arg Ala Met Cys Arg Val Ala Ser Pro Leu Thr Ser Asn Phe
180 185 190

Val Arg Asn Arg Met Ala Ser Ala Gly Val Met Phe Tyr Phe Asn Ala
195 200 205

Ser Val Asn Gln Ile Leu Thr Glu Gly Asp Arg Val Ser Gly Ile Arg
210 215 220

Leu Ser Asp Gly Thr Thr Lys Pro Ala Asp Val Val Val Ile Gly Ile
225 230 235 240

Gly Ala Ile Pro Asn Ala Glu Leu Ala Gln Asp Ala Asn Leu Asp Cys
245 250 255

Asp Gly Gly Ile Ile Val Asp Ser Gly Met Arg Ser Ser Asp Pro Asp
260 265 270

Ile Phe Ala Ile Gly Asp Cys Ala Lys Ala Val Asn Val Ser Thr Asn
275 280 285

Thr Pro Ile Arg Ile Glu Thr Ile His Asn Ala Met Leu Gln Ala Gln
290 295 300

Ile Ala Ala Ala His Ile Cys Gly Lys Pro Ser Pro Pro Ala Ser Pro
305 310 315 320

Pro Arg Phe Trp Ser Asp Leu Asn Gly Met Lys Val Gln Cys Ile Gly

325 330 335

Ile Ala Thr Gly Tyr Asp Arg Ile Gln Arg Arg Pro Thr Glu Ser Asp
340 345 350

Asn Ala Cys Glu Phe Trp Leu Phe Ser Gly Asp Arg Met Ile Ala Thr
355 360 365

Glu Thr Val Asn Leu Pro Thr Arg Gln Ala Lys Leu Ser Lys Ala Leu
370 375 380

Ser Gly
385

<210> 115
<211> 418
<212> PRT
<213> Marinobacter aquaeoli VT8

<400> 115

Met Ile Lys Leu Lys Asn Asn Lys Val Ile Leu Met Ser Met Ser Glu
1 5 10 15

Asn Val Leu Thr Thr Glu Ser Leu Gln Arg Asp Pro Asp Ala Glu Gly
20 25 30

Tyr Val Asp Arg Lys Arg His Leu Trp Val Leu Ser Val Leu Trp Pro
35 40 45

Ala Thr Pro Leu Ile Gly Leu Tyr Leu Val Ser Gln Thr Gly Trp Ser
50 55 60

Ile Trp Tyr Gly Leu Val Leu Ile Leu Trp Tyr Gly Ala Val Pro Leu
65 70 75 80

Ile Asp Ala Met Phe Gly Glu Asp Phe Ser Asn Pro Pro Glu Ser Ala
85 90 95

Val Pro Arg Leu Glu Gln Asp Arg Tyr Tyr Arg Val Leu Thr Tyr Leu
100 105 110

Thr Val Pro Ile His Tyr Ala Ala Leu Val Val Ser Ala Trp Trp Val
115 120 125

Ser Thr Gln Pro Met Asn Val Phe Glu Phe Leu Ala Leu Ala Leu Ser
130 135 140

Leu Gly Ile Val Asn Gly Leu Ala Leu Asn Thr Gly His Glu Leu Gly
145 150 155 160

His Lys Lys Glu Thr Phe Asp Arg Trp Met Ala Lys Leu Val Leu Ala
165 170 175

Val Val Gly Tyr Gly His Phe Phe Ile Glu His Asn Lys Gly His His
180 185 190

Arg Asp Val Ala Thr Pro Met Asp Pro Ala Thr Ser Arg Met Gly Glu
195 200 205

Ser Ile Tyr Ser Phe Ser Leu Arg Glu Ile Pro Gly Ala Phe Lys Arg
210 215 220

Ala Trp Asp Leu Glu Glu Gln Arg Leu Ser Arg Cys Gly Lys Ser Val
225 230 235 240

Trp Ser Leu Glu Asn Glu Val Leu Gln Pro Met Ile Leu Thr Ala Val
245 250 255

Leu Tyr Ala Gly Leu Leu Ala Phe Phe Gly Pro Leu Met Leu Ile Phe
260 265 270

Leu Pro Ile Gln Met Ala Phe Gly Trp Trp Gln Leu Thr Ser Ala Asn
275 280 285

Tyr Ile Glu His Tyr Gly Leu Leu Arg Glu Lys Met Ser Asp Gly Arg
290 295 300

Tyr Glu Arg Gln Gln Pro His His Ser Trp Asn Ser Asn His Ile Met
305 310 315 320

Ser Asn Leu Ile Leu Phe His Leu Gln Arg His Ser Asp His His Ala
325 330 335

His Pro Thr Arg Ser Tyr Gln Ser Leu Arg Asp Phe Lys Asp Leu Pro
340 345 350

Ser Leu Pro Ser Gly Tyr Pro Gly Met Phe Leu Ala Ala Met Phe Pro
355 360 365

Ser Trp Phe Arg Ser Ile Met Asp His Arg Val Leu Asp Trp Ala Lys
370 375 380

Gly Asp Leu Asp Lys Ile Gln Ile Gln Pro Gly Lys Arg Glu Phe Tyr
385 390 395 400

Glu Arg Lys Phe Gly Gly Thr Asp Ser Glu Ser Val Asp Thr Ala Ala
405 410 415

Ala Lys

<210> 116
<211> 172

<212> PRT
<213> Marinobacter aquaeoli VT8

<400> 116

Met Ala Lys Tyr Gln Cys Pro Asp Cys Gly Tyr Val Tyr Asp Glu Val
1 5 10 15

Val Gly Asp Pro His Glu Gly Phe Pro Ala Gly Thr Thr Trp Glu Lys
20 25 30

Ile Pro Glu Asp Trp Ser Cys Pro Asp Cys Ala Val Arg Asp Lys Val
35 40 45

Asp Phe Val Ala Leu Gln Glu Ala Asn Pro Glu Leu Ser Val Ser Ala
50 55 60

Thr Asn Thr Ala Val Arg Pro Ala Ser Gln Ala Lys Thr Glu Gly Ala
65 70 75 80

Ser Gln Lys Ala Thr Gly Ala Ser Thr Pro Ser Ala Lys Asn Lys Thr
85 90 95

Lys Pro Lys Ala Lys Pro Lys Pro Asn Ser Ser Lys Ser Pro Lys Asp
100 105 110

Ser Thr Gln Lys Asp Thr Tyr Arg Lys Trp Val Cys Ile Thr Cys Gly
115 120 125

His Ile Tyr Asp Glu Ala Leu Gly Asp Glu Ala Glu Gly Phe Pro Ala
130 135 140

Gly Thr Arg Phe Glu Asp Ile Pro Asp Asp Trp Cys Cys Pro Asp Cys
145 150 155 160

Gly Ala Thr Lys Glu Asp Tyr Val Leu Tyr Glu Asp
165 170

<210> 117
<211> 3758
<212> DNA
<213> Alkanivorax borkumensis SK2

<400> 117
tacagacttt tggtaggaga atgcagctgt gggaaaaatc acctttattg agaatgataa 60

aactgaacat gtaacagaat ttgaggcagg tattactttg atgcaagttg ccttagacaa 120

cgccgttccc ggtattgatg gggattgcgg cggggagtgt gcctgtggta cctgtcacct 180

gattgttcca gaagaatggt tcgataaaac cgggccgatt aatgatgctg aagaacaaat 240

gttgtccatg acacctgagc gtgcaaaaac ctctcggttg gggtgtcagg ttaaggccac 300

tgaggcaatg gacggaatga ctgttcaatt gccagaattt caaatgtaag tgcggagagc 360

gacatgtcaa cgagttcaag tacaagtaat gacatccagg caaaaataat taacgccaca 420

tccaaagtcg tgccaatgca tctacagatc aaggcactaa aaaacttgat gaaggtgaag 480
cggaagacca ttggcacttc ccgccctcag gtgcactttg ttgaaaccga tttgcctgac 540
gtcaatgatt tggcgataga agatatcgat acgagtaacc ctttttttata ccgacaaggt 600
aaggcgaatg cgtactttaa gcggttgcgt gatgaagcgc cggtgcacta tcagaagaac 660
agtgctttcg ggccgttctg gtcggtaaca cgctacgaag atatcgtctt cgtggacaag 720
agccatgatt tgttttccgc cgaaccccaa attatcttgg gtgatcctcc ggaaggcctg 780
tcggttgaaa tgttcatcgc tatggatcct cccaagcacg acgtacagcg tcgggcagtc 840
cagggtgttg ttgcgcccaa gaacctgaaa gaaatggaag gactgatccg caagcgcacc 900
ggggacgtac tggatagcct gccgttggac actccgttca actgggtgcc ggtggtgtcg 960
aaagagctga ccgggcgcat gctagcctca ctgttagatt tcccgtatga cgaacgcgaa 1020
aaactggttg gctggtcgga tcgattgtcc ggcgcgtcct cggcaaccgg cggcgagttt 1080
acgaatgaag atgtgttttt tgatgacgcg gcagatatgg cgtgggcttt ctccaagctt 1140
tggcgtgata aagaagcccg tcaaaaagca ggtgaagagc cgggtttcga tttgatcagc 1200
atgcttcagt ccaatgaaga cacaaaagat ctgatcaatc gtcctttgga attcattggt 1260
aatctcgcgt tgttgattgt tggcggtaat gacaccacgc gtaactcaat gagcgggggg 1320
gtgctggctt taaatcagtt cccagagcaa ttcgagaagc taaaggcgaa cccaaagctt 1380
atccccaata tggtctctga aatcattcgc tggcaaacgc cgcttgcgta tatgcgccgg 1440
gttgccaagc aggatgtgga gctgaacgga cagaccatca agaagggtga tcgcgtgctg 1500
atgtggtatg cgtcgggcaa ccaggatgag agaaaatttg agaatcctga gcaattcatc 1560
atcgaccgca aagatacgcg taaccatgtg tcgtttggtt atggggttca ccgttgtatg 1620
ggcaaccgcc ttgccgaact gcagctgcgt attctgtggg aagagcttct ccctcgcttt 1680
gaaaacatcg aagtgatcgg tgagccggag cgcgtgcaat cgaactttgt gcggggctat 1740
tccaagatga tggttaagtt gacggctaaa aaataagccc aaggcacaga taaagagaga 1800
agcatggaaa acgaaaaaca agatgccact gtcatcgttg gaggcgggca cgcagcaggt 1860
gcgttgatga cagccttgat acaaaagaaa tatccacacg aggtggttct ggtgggcgaa 1920
gagccttatc cgccctacca gcgcccgcct ttatccaaaa cgtatctgtc aggagaggtt 1980
aacgaggaat ctctctattt gaaaccgcgc tcggtgtatg aaggtgcggg gcatcagttg 2040
cgacttggtg tgcgcgttga gaacattgat cgagacaaca aaacccttac attgtcagat 2100
cagagcacac tgaaatatgg ccgactgatt cttgccacag gttcacacgt taggcgtctt 2160
aatgcgcctg gatctgaatt aaaaggcatc cattatctgc atgacattgc tgatacggat 2220
acattgcgcg atcaactgtc accaggtgcc cgtttggtta ttgtcggtgg cggctacatt 2280
ggccttgagg ttgcagccag tgcgagcaag aaaggcgtta atgttacggt gctggaaggc 2340
gctgagcgtc taatgcagcg agttacgggc gttgagatgt cttcgttcct gtatgctaag 2400
cacagtggtt ctggcgtgga cgtgcgtctt aatactgctg tcaccggctt caaagctgga 2460

gatcaggggc gagtggctgg cgtaacgtta gcaaatggcg aaacggttga cgcagatgtt 2520

gtgcttgtct cgattggcgt tatacccgaa acggctttgg ctgaggctgc cggcctatcc 2580

tgtgaagacg gtatcctggt ggacgaatat gtccgcactt ctgacccaag catcctggcg 2640

ataggtgatt gcactcgtca ccgaaacctt ttcttcgaga aaatgcagag gctcgagtcc 2700

gttgctaacg ctgtcgatca agcacgtact gcggcagcga ccttgatggg agaggataag 2760

ccctacgata gcgctccatg gttttggtcg aatcaatatg atgttcgttt gcaaatggtg 2820

gggctctcgc aggaccatga tgaacgagtc atgcgtggca gcacggaaga caaagcgttt 2880

gcggtgttct atctccgtga gggctgtgtg attgccgttg atgcggtgaa tatgcccatt 2940

gcgtttatgg ttggaaagca gttggttcag caccgtaaga gtattagcgc tgacgtgttg 3000

agtgatctgg atgttgaatt aaagtctttg atctgaagga tctaggaacc aaggagagtg 3060

gcatatgagt ttttctaatt ataaagtaat cgcgatgccg gtgttggttg ctaattttgt 3120

tttgggggcg gccactgcat gggcgaatga aaattatccg gcgaaatctg ctggctataa 3180

tcagggtgac tgggtcgcta gcttcaattt ttctaaggtc tatgtgggtg aggagcttgg 3240

cgatctaaat gttggagggg gggctttgcc aaatgctgat gtaagtattg gtaatgatac 3300

aacacttacg tttgatatcg cctattttgt tagctcaaat atagcggtgg attttttttgt 3360

tggggtgcca gctagggcta aatttcaagg tgagaaatca atctcctcgc tgggaagagt 3420

cagtgaagtt gattacggcc ctgcaattct ttcgcttcaa tatcattacg atagctttga 3480

gcgactttat ccatatgttg gggttggtgt tggtcgggtg ctatttttttg ataaaaccga 3540

cggtgctttg agttcgtttg atattaagga taaatgggcg cctgcttttc aggttggcct 3600

tagatatgac cttggtaact catggatgct aaattcagat gtgcgttata ttcctttcaa 3660

aacggacgtc acaggtactc ttggcccggt tcctgtttct actaaaattg aggttgatcc 3720

tttcattctc agtcttggtg cgtcatatgt tttctaat 3758

<210> 118
<211> 106
<212> PRT
<213> Alkanivorax borkumensis SK2

<400> 118

Val Gly Lys Ile Thr Phe Ile Glu Asn Asp Lys Thr Glu His Val Thr
1 5 10 15

Glu Phe Glu Ala Gly Ile Thr Leu Met Gln Val Ala Leu Asp Asn Ala
20 25 30

Val Pro Gly Ile Asp Gly Asp Cys Gly Gly Glu Cys Ala Cys Gly Thr
35 40 45

Cys His Leu Ile Val Pro Glu Glu Trp Phe Asp Lys Thr Gly Pro Ile
50 55 60

Asn Asp Ala Glu Glu Gln Met Leu Ser Met Thr Pro Glu Arg Ala Lys
65 70 75 80

Thr Ser Arg Leu Gly Cys Gln Val Lys Ala Thr Glu Ala Met Asp Gly
85 90 95

Met Thr Val Gln Leu Pro Glu Phe Gln Met
100 105

<210> 119
<211> 470
<212> PRT
<213> Alkanivorax borkumensis SK2

<400> 119

Met Ser Thr Ser Ser Ser Thr Ser Asn Asp Ile Gln Ala Lys Ile Ile
1 5 10 15

Asn Ala Thr Ser Lys Val Val Pro Met His Leu Gln Ile Lys Ala Leu
20 25 30

Lys Asn Leu Met Lys Val Lys Arg Lys Thr Ile Gly Thr Ser Arg Pro
35 40 45

Gln Val His Phe Val Glu Thr Asp Leu Pro Asp Val Asn Asp Leu Ala
50 55 60

Ile Glu Asp Ile Asp Thr Ser Asn Pro Phe Leu Tyr Arg Gln Gly Lys
65 70 75 80

Ala Asn Ala Tyr Phe Lys Arg Leu Arg Asp Glu Ala Pro Val His Tyr
85 90 95

Gln Lys Asn Ser Ala Phe Gly Pro Phe Trp Ser Val Thr Arg Tyr Glu
100 105 110

Asp Ile Val Phe Val Asp Lys Ser His Asp Leu Phe Ser Ala Glu Pro
115 120 125

Gln Ile Ile Leu Gly Asp Pro Pro Glu Gly Leu Ser Val Glu Met Phe
130 135 140

Ile Ala Met Asp Pro Pro Lys His Asp Val Gln Arg Arg Ala Val Gln
145 150 155 160

Gly Val Val Ala Pro Lys Asn Leu Lys Glu Met Glu Gly Leu Ile Arg
165 170 175

Lys Arg Thr Gly Asp Val Leu Asp Ser Leu Pro Leu Asp Thr Pro Phe
180 185 190

```
Asn Trp Val Pro Val Val Ser Lys Glu Leu Thr Gly Arg Met Leu Ala
        195                 200                 205

Ser Leu Leu Asp Phe Pro Tyr Asp Glu Arg Glu Lys Leu Val Gly Trp
    210                 215                 220

Ser Asp Arg Leu Ser Gly Ala Ser Ser Ala Thr Gly Gly Glu Phe Thr
225                 230                 235                 240

Asn Glu Asp Val Phe Phe Asp Asp Ala Ala Asp Met Ala Trp Ala Phe
                245                 250                 255

Ser Lys Leu Trp Arg Asp Lys Glu Ala Arg Gln Lys Ala Gly Glu Glu
            260                 265                 270

Pro Gly Phe Asp Leu Ile Ser Met Leu Gln Ser Asn Glu Asp Thr Lys
        275                 280                 285

Asp Leu Ile Asn Arg Pro Leu Glu Phe Ile Gly Asn Leu Ala Leu Leu
    290                 295                 300

Ile Val Gly Gly Asn Asp Thr Thr Arg Asn Ser Met Ser Gly Gly Val
305                 310                 315                 320

Leu Ala Leu Asn Gln Phe Pro Glu Gln Phe Glu Lys Leu Lys Ala Asn
                325                 330                 335

Pro Lys Leu Ile Pro Asn Met Val Ser Glu Ile Ile Arg Trp Gln Thr
            340                 345                 350

Pro Leu Ala Tyr Met Arg Arg Val Ala Lys Gln Asp Val Glu Leu Asn
        355                 360                 365

Gly Gln Thr Ile Lys Lys Gly Asp Arg Val Leu Met Trp Tyr Ala Ser
    370                 375                 380

Gly Asn Gln Asp Glu Arg Lys Phe Glu Asn Pro Glu Gln Phe Ile Ile
385                 390                 395                 400

Asp Arg Lys Asp Thr Arg Asn His Val Ser Phe Gly Tyr Gly Val His
                405                 410                 415

Arg Cys Met Gly Asn Arg Leu Ala Glu Leu Gln Leu Arg Ile Leu Trp
            420                 425                 430

Glu Glu Leu Leu Pro Arg Phe Glu Asn Ile Glu Val Ile Gly Glu Pro
        435                 440                 445

Glu Arg Val Gln Ser Asn Phe Val Arg Gly Tyr Ser Lys Met Met Val
    450                 455                 460
```

Lys Leu Thr Ala Lys Lys
465 470

<210> 120
<211> 410
<212> PRT
<213> Alkanivorax borkumensis SK2

<400> 120

Met Glu Asn Glu Lys Gln Asp Ala Thr Val Ile Val Gly Gly Gly His
1 5 10 15

Ala Ala Gly Ala Leu Met Thr Ala Leu Ile Gln Lys Lys Tyr Pro His
20 25 30

Glu Val Val Leu Val Gly Glu Glu Pro Tyr Pro Pro Tyr Gln Arg Pro
35 40 45

Pro Leu Ser Lys Thr Tyr Leu Ser Gly Glu Val Asn Glu Glu Ser Leu
50 55 60

Tyr Leu Lys Pro Arg Ser Val Tyr Glu Gly Ala Gly His Gln Leu Arg
65 70 75 80

Leu Gly Val Arg Val Glu Asn Ile Asp Arg Asp Asn Lys Thr Leu Thr
85 90 95

Leu Ser Asp Gln Ser Thr Leu Lys Tyr Gly Arg Leu Ile Leu Ala Thr
100 105 110

Gly Ser His Val Arg Arg Leu Asn Ala Pro Gly Ser Glu Leu Lys Gly
115 120 125

Ile His Tyr Leu His Asp Ile Ala Asp Thr Asp Thr Leu Arg Asp Gln
130 135 140

Leu Ser Pro Gly Ala Arg Leu Val Ile Val Gly Gly Gly Tyr Ile Gly
145 150 155 160

Leu Glu Val Ala Ala Ser Ala Ser Lys Lys Gly Val Asn Val Thr Val
165 170 175

Leu Glu Gly Ala Glu Arg Leu Met Gln Arg Val Thr Gly Val Glu Met
180 185 190

Ser Ser Phe Leu Tyr Ala Lys His Ser Gly Ser Gly Val Asp Val Arg
195 200 205

Leu Asn Thr Ala Val Thr Gly Phe Lys Ala Gly Asp Gln Gly Arg Val
210 215 220

Ala Gly Val Thr Leu Ala Asn Gly Glu Thr Val Asp Ala Asp Val Val

225 230 235 240

Leu Val Ser Ile Gly Val Ile Pro Glu Thr Ala Leu Ala Glu Ala Ala
245 250 255

Gly Leu Ser Cys Glu Asp Gly Ile Leu Val Asp Glu Tyr Val Arg Thr
260 265 270

Ser Asp Pro Ser Ile Leu Ala Ile Gly Asp Cys Thr Arg His Arg Asn
275 280 285

Leu Phe Phe Glu Lys Met Gln Arg Leu Glu Ser Val Ala Asn Ala Val
290 295 300

Asp Gln Ala Arg Thr Ala Ala Ala Thr Leu Met Gly Glu Asp Lys Pro
305 310 315 320

Tyr Asp Ser Ala Pro Trp Phe Trp Ser Asn Gln Tyr Asp Val Arg Leu
325 330 335

Gln Met Val Gly Leu Ser Gln Asp His Asp Glu Arg Val Met Arg Gly
340 345 350

Ser Thr Glu Asp Lys Ala Phe Ala Val Phe Tyr Leu Arg Glu Gly Cys
355 360 365

Val Ile Ala Val Asp Ala Val Asn Met Pro Ile Ala Phe Met Val Gly
370 375 380

Lys Gln Leu Val Gln His Arg Lys Ser Ile Ser Ala Asp Val Leu Ser
385 390 395 400

Asp Leu Asp Val Glu Leu Lys Ser Leu Ile
405 410

<210> 121
<211> 11401
<212> DNA
<213> Artificial Sequence

<220>
<223> vector

<400> 121
tgggaagccc tgcaaagtaa actggatggc tttcttgccg ccaaggatct gatggcgcag 60

gggatcaaga tctgatcaag agacaggatg aggatcgttt cgcatgattg aacaagatgg 120

attgcacgca ggttctccgg ccgcttgggt ggagaggcta ttcggctatg actgggcaca 180

acagacaatc ggctgctctg atgccgccgt gttccggctg tcagcgcagg ggcgcccggt 240

tctttttgtc aagaccgacc tgtccggtgc cctgaatgaa ctgcaggacg aggcagcgcg 300

gctatcgtgg ctggccacga cgggcgttcc ttgcgcagct gtgctcgacg ttgtcactga 360

agcgggaagg gactggctgc tattgggcga agtgccgggg caggatctcc tgtcatctca 420

ccttgctcct gccgagaaag tatccatcat ggctgatgca atgcggcggc tgcatacgct 480

tgatccggct acctgcccat tcgaccacca agcgaaacat cgcatcgagc gagcacgtac 540

tcggatggaa gccggtcttg tcgatcagga tgatctggac gaagagcatc aggggctcgc 600

gccagccgaa ctgttcgcca ggctcaaggc gcgcatgccc gacggcgagg atctcgtcgt 660

gacccatggc gatgcctgct tgccgaatat catggtggaa aatggccgct tttctggatt 720

catcgactgt ggccggctgg gtgtggcgga ccgctatcag gacatagcgt tggctacccg 780

tgatattgct gaagagcttg gcggcgaatg ggctgaccgc ttcctcgtgc tttacggtat 840

cgccgctccc gattcgcagc gcatcgcctt ctatcgcctt cttgacgagt tcttctgagc 900

gggactctgg ggttcgaaat gaccgaccaa tcgattggta actgtcagac caagtttact 960

catatatact ttagattgat ttaaaacttc atttttaatt taaaaggatc taggtgaaga 1020

tccttttga taatctcatg accaaaatcc cttaacgtga gttttcgttc cactgagcgt 1080

cagaccccgt agaaaagatc aaaggatctt cttgagatcc tttttttctg cgcgtaatct 1140

gctgcttgca aacaaaaaaa ccaccgctac cagcggtggt ttgtttgccg gatcaagagc 1200

taccaactct ttttccgaag gtaactggct tcagcagagc gcagatacca aatactgtcc 1260

ttctagtgta gccgtagtta ggccaccact tcaagaactc tgtagcaccg cctacatacc 1320

tcgctctgct aatcctgtta ccagtggctg ctgccagtgg cgataagtcg tgtcttaccg 1380

ggttggactc aagacgatag ttaccggata aggcgcagcg gtcgggctga acgggggttt 1440

cgtgcacaca gcccagcttg gagcgaacga cctacaccga actgagatac ctacagcgtg 1500

agctatgaga aagcgccacg cttcccgaag ggagaaaggc ggacaggtat ccggtaagcg 1560

gcagggtcgg aacaggagag cgcacgaggg agcttccagg gggaaacgcc tggtatcttt 1620

atagtcctgt cgggtttcgc cacctctgac ttgagcgtcg atttttgtga tgctcgtcag 1680

gggggcggag cctatggaaa aacgccagca acgcggcctt tttacggttc ctggcctttt 1740

gctggccttt tgctcacatg ttctttcctg cgttatcccc tgattctgtg gataaccgta 1800

ttaccgcctt tgagtgagct gataccgctc gccgcagccg aacgaccgag cgcagcgagt 1860

cagtgagcga ggaagcggaa gagcgcctga tgcggtattt tctccttacg catctgtgcg 1920

gtatttcaca ccgcataggg gatctccaat cgtgccttgg cgcagcgaca gccctcggtc 1980

ccccagatag ccattgatcc tctctcgcct gtcccctcag ttcagtaatt tcctgcattt 2040

gcctgtttcc agtcggtaga tattccacaa aacagcaggg aagcagcgct tttccgctgc 2100

ataaccctgc ttcggggtca ttatagcgat tttttcggta tatccatcct ttttcgcacg 2160

atatacagga ttttgccaaa gggttcgtgt agactttcct tggtgtatcc aacggcgtca 2220

gccgggcagg ataggtgaag taggcccacc cgcgagcggg tgttccttct tcactgtccc 2280

ttattcgcac ctggcggtgc tcaacgggaa tcctgctctg cgaggctggc cggctaccgc 2340

cggcgtaaca gatgagggca agcggatggc tgatgaaacc aagccaacca ggaagggcag 2400

cccacctatc aaggtgtact gccttccaga cgaacgaaga gcgattgagg aaaaggcggc 2460

ggcggccggc atgagcctgt cggcctacct gctggccgtc ggccagggct acaaaatcac 2520

gggcgtcgtg gactatgagc tcgagtatac ttttcactat atcacttaat gccgattatt 2580

ttagataatt ccttgacgct cagcttcaat tgttgcttgc gtgcgattca ctacattcaa 2640

ggtggcaaat attttcctca tgtgccactt tatagcatct tcggtgacat gcatatttgt 2700

tgctatttgt ttgtttgagc acccctcttt tacaagcctc aagacagcaa tctgcttccg 2760

tgtcaataaa gcgtcagctt tattctctgc ggactttcca atctcaacta ttcgcggaag 2820

actaaaagcc ccaatcgctt gatctaaatt aactgctgtg aaggcttcac atgaagccgg 2880

tattattcgc tcaattaaac atacttcatc aagaactgtt tgaaagcatt gaagctgttt 2940

tgctatctcc actgcataaa caatgttaag ctgagccttt tttaaatcac cggcacctgc 3000

ctgcgctccg gccaaacaca ataatccacg gacttccagc tggcccgcgt taattttacg 3060

ggcttgctga atagccaata acgctctgtg cgcggcacta tgaaagttcc gatctcggga 3120

aagcactagt gattgaacaa gcagcaggcg tgcttttagg ggggctgagt gctgtccgga 3180

gaaaatctta tgatcttcaa gagtttttaa attatttatg cccgttatgc cttgacagac 3240

taagcgctga tagatctcaa tttggctcat aacttccaat cttggtagat ttttttcaac 3300

cgcatgcgcc ttcgcccact ccaatatctc aatggagcca tttaggtcac tccttccaag 3360

ccgccaagct gacacagcac ggcatacgga aaaaaacacg tctgtcaccc cgtgattgga 3420

aatgaactct aaaattttgg agagcttttc ttctgaggtg tccaagcagc gcaattcata 3480

atgtaactca agctctagag cgtcaaacat tttcgaagta aactcggatt ccatcatctg 3540

cgcgcgactg tctgtgcgtg cttgagttat aatctgcctc gcccagccca tttttccgct 3600

tgctagggct tgttgaaacc tcgcgacata cagccaacca aaagcaaaat tttgttttgc 3660

aaatttattc acggcttggg cctgagccag caccttctcc aactctgcaa atctatactc 3720

actggcaaaa ataaaagcca aacaggttag cgcggcccct tttccaactg cgtttgaatc 3780

cccaaataaa ctaatccact tattacagag ctcctcactc gaaagcattt catctttggt 3840

tgctttacct attgcaagca caagctgcag ccattccttt tcttgccatt tatttttttt 3900

atcggattgt gaagataggt ctttaattaa cttctctgct cgcgcgcctt gctgactgaa 3960

atacaatacc cacgcgtaac taataagcac tatgggtttt tggtgccagg cctgcttcgg 4020

cagctctaac agccactgtc tcagcgcatc tatttcgccc tgacgaaatg acaaatctaa 4080

aattattctc tcagacatgc tgactgccca gcgacagtca ttcgcccgta gggatattcg 4140

tattgcatac tggtattcac ctctacgcca atgccagaaa gctgcacgct taagcaggta 4200

ggatctttta gcaggatttt cagtccaagt aatttctcgt agaaaattac gcagtactgg 4260

atgcagtgta aactgcgctg gctcaccgct cacatggcga agcaacatgt aattagtgct 4320

taaatactta atacatgaga ccccattgac gcatttgaat acataattgt attgatcagg 4380

cgtcacgaaa tcgagcaatg aagaatttgc aagaaaaaca cgatagcgct cgggaatcgc 4440

ctcaaatatt tcatccctaa agtaattgtc tacttcaact actgctgaaa tatgcttggc 4500

cggcaactca cgctttaaca aaaaaactac aagagcaggc cacccctcaa cttcttgcac 4560

caaggtctct atctgttctt caggaactcc aagaacagac tctgcctccg ctaacgccac 4620

cgcctcttct gcgctaaagg ccaagtcttt ctcggtgtac tcccgcatag cgcctgcaag 4680

tttaagctgc gagaaccctt ttattgtatt gcctgcaact gcaaacctga tatttttgg 4740

tgtatttaac ataaactcca taagtgcgtg caacaacggc aagtctaagt catgattaat 4800

attatccaaa caaactagcg tttctatctc gttattcgag gtgctctgcc aaagactaga 4860

tgcaaggtct cgcaagagcg caggcttgct cacaccctct ctcacacggc tgaattttac 4920

catttcgaaa gtttcaagct gctcaataat ctctgcgcag atatcaaatt cactgtaaga 4980

actggctctt aaagaaagcc acactgcagg acgtccggct gttctgtggc gtagccactc 5040

gaacgcaaga gcaacggttt tcccatatcc aggtggggct ctgtaaaggc atactctggg 5100

agcggctcca tccgcgatac tcaatcttgg ccgatatatg caactatgaa ctttggcact 5160

tactagagtc gtaatttgat ccgctccgac cttagcgacc gggaaatcat tatttattat 5220

tattttcatt atgctattct cgcgccagct gactggaaat tttcaccata ggttacggtg 5280

ttaaatatta aaactacact taagtgtagt cggcatgatc ggtggtgcaa aatatttact 5340

agggaaggtc tgaagtaggc cgctatttct ggccgacttc ggccttcgcc gattttgaag 5400

acgggcaccg ggtcaaaatc gaccagatag ctcgctcatt tcggtgcttt cagccgtcgc 5460

gagtagctcg cggtacctgg catgcttgcg gccagctcgt gtttttccag cagacgacgg 5520

agcaaaaact acccgtaggt gtagttggcg caagcgtccg attagctcag gtttaagatg 5580

tcgagagtga gagtgggcgg cttaactttc tcagttaggc ataaaattac gtcttaaatc 5640

tcgtagcgac taatttaata aaaattggag tacagacttt tggtaggaga atgcagctgt 5700

gggaaaaatc acctttattg agaatgataa aactgaacat gtaacagaat ttgaggcagg 5760

tattactttg atgcaagttg ccttagacaa cgccgttccc ggtattgatg gggattgcgg 5820

cggggagtgt gcctgtggta cctgtcacct gattgttcca gaagaatggt tcgataaaac 5880

cgggccgatt aatgatgctg aagaacaaat gttgtccatg acacctgagc gtgcaaaaac 5940

ctctcggttg gggtgtcagg ttaaggccac tgaggcaatg gacggaatga ctgttcaatt 6000

gccagaattt caaatgtaag tgcggagagc gacatgtcaa cgagttcaag tacaagtaat 6060

gacatccagg caaaaataat taacgccaca tccaaagtcg tgccaatgca tctacagatc 6120

aaggcactaa aaaacttgat gaaggtgaag cggaagacca ttggcacttc ccgccctcag 6180

gtgcactttg ttgaaaccga tttgcctgac gtcaatgatt tggcgataga agatatcgat 6240

acgagtaacc ctttttata ccgacaaggt aaggcgaatg cgtactttaa gcggttgcgt 6300

gatgaagcgc cggtgcacta tcagaagaac agtgctttcg ggccgttctg gtcggtaaca 6360

cgctacgaag atatcgtctt cgtggacaag agccatgatt tgttttccgc cgaaccccaa 6420

attatcttgg gtgatcctcc ggaaggcctg tcggttgaaa tgttcatcgc tatggatcct 6480

cccaagcacg acgtacagcg tcgggcagtc cagggtgttg ttgcgcccaa gaacctgaaa 6540
gaaatggaag gactgatccg caagcgcacc ggggacgtac tggatagcct gccgttggac 6600
actccgttca actgggtgcc ggtggtgtcg aaagagctga ccgggcgcat gctagcctca 6660
ctgttagatt tcccgtatga cgaacgcgaa aaactggttg gctggtcgga tcgattgtcc 6720
ggcgcgtcct cggcaaccgg cggcgagttt acgaatgaag atgtgttttt tgatgacgcg 6780
gcagatatgg cgtgggcttt ctccaagctt tggcgtgata aagaagcccg tcaaaaagca 6840
ggtgaagagc cgggtttcga tttgatcagc atgcttcagt ccaatgaaga cacaaaagat 6900
ctgatcaatc gtcctttgga attcattggt aatctcgcgt tgttgattgt tggcggtaat 6960
gacaccacgc gtaactcaat gagcgggggg gtgctggctt taaatcagtt cccagagcaa 7020
ttcgagaagc taaaggcgaa cccaaagctt atccccaata tggtctctga aatcattcgc 7080
tggcaaacgc cgcttgcgta tatgcgccgg gttgccaagc aggatgtgga gctgaacgga 7140
cagaccatca agaagggtga tcgcgtgctg atgtggtatg cgtcgggcaa ccaggatgag 7200
agaaaatttg agaatcctga gcaattcatc atcgaccgca aagatacgcg taaccatgtg 7260
tcgtttggtt atggggttca ccgttgtatg ggcaaccgcc ttgccgaact gcagctgcgt 7320
attctgtggg aagagcttct ccctcgcttt gaaaacatcg aagtgatcgg tgagccggag 7380
cgcgtgcaat cgaactttgt gcggggctat tccaagatga tggttaagtt gacggctaaa 7440
aaataagccc aaggcacaga taaagagaga agcatggaaa acgaaaaaca agatgccact 7500
gtcatcgttg gaggcgggca cgcagcaggt gcgttgatga cagccttgat acaaaagaaa 7560
tatccacacg aggtggttct ggtgggcgaa gagccttatc cgccctacca gcgcccgcct 7620
ttatccaaaa cgtatctgtc aggagaggtt aacgaggaat ctctctattt gaaaccgcgc 7680
tcggtgtatg aaggtgcggg gcatcagttg cgacttggtg tgcgcgttga gaacattgat 7740
cgagacaaca aaacccttac attgtcagat cagagcacac tgaaatatgg ccgactgatt 7800
cttgccacag gttcacacgt taggcgtctt aatgcgcctg gatctgaatt aaaaggcatc 7860
cattatctgc atgacattgc tgatacggat acattgcgcg atcaactgtc accaggtgcc 7920
cgtttggtta ttgtcggtgg cggctacatt ggccttgagg ttgcagccag tgcgagcaag 7980
aaaggcgtta atgttacggt gctggaaggc gctgagcgtc taatgcagcg agttacgggc 8040
gttgagatgt cttcgttcct gtatgctaag cacagtggtt ctggcgtgga cgtgcgtctt 8100
aatactgctg tcaccggctt caaagctgga gatcaggggc gagtggctgg cgtaacgtta 8160
gcaaatggcg aaacggttga cgcagatgtt gtgcttgtct cgattggcgt tatacccgaa 8220
acggctttgg ctgaggctgc cggcctatcc tgtgaagacg gtatcctggt ggacgaatat 8280
gtccgcactt ctgacccaag catcctggcg ataggtgatt gcactcgtca ccgaaacctt 8340
ttcttcgaga aaatgcagag gctcgagtcc gttgctaacg ctgtcgatca agcacgtact 8400
gcggcagcga ccttgatggg agaggataag ccctacgata gcgctccatg gttttggtcg 8460
aatcaatatg atgttcgttt gcaaatggtg gggctctcgc aggaccatga tgaacgagtc 8520

atgcgtggca gcacggaaga caaagcgttt gcggtgttct atctccgtga gggctgtgtg 8580
attgccgttg atgcggtgaa tatgcccatt gcgtttatgg ttggaaagca gttggttcag 8640
caccgtaaga gtattagcgc tgacgtgttg agtgatctgg atgttgaatt aaagtctttg 8700
atctgaagga tctaggaacc aaggagagtg gcatatgagt ttttctaatt ataaagtaat 8760
cgcgatgccg gtgttggttg ctaattttgt tttgggggcg gccactgcat gggcgaatga 8820
aaattatccg gcgaaatctg ctggctataa tcagggtgac tgggtcgcta gcttcaattt 8880
ttctaaggtc tatgtgggtg aggagcttgg cgatctaaat gttggagggg gggctttgcc 8940
aaatgctgat gtaagtattg gtaatgatac aacacttacg tttgatatcg cctattttgt 9000
tagctcaaat atagcggtgg atttttttgt tggggtgcca gctagggcta aatttcaagg 9060
tgagaaatca atctcctcgc tgggaagagt cagtgaagtt gattacggcc ctgcaattct 9120
ttcgcttcaa tatcattacg atagctttga gcgactttat ccatatgttg gggttggtgt 9180
tggtcgggtg ctatttttg ataaaaccga cggtgctttg agttcgtttg atattaagga 9240
taaatgggcg cctgcttttc aggttggcct tagatatgac cttggtaact catggatgct 9300
aaattcagat gtgcgttata ttccttttcaa aacggacgtc acaggtactc ttggcccggt 9360
tcctgtttct actaaaattg aggttgatcc tttcattctc agtcttggtg cgtcatatgt 9420
tttctaatcg acctgcagcc aagcttctgt tttggcggat gagagaagat tttcagcctg 9480
atacagatta aatcagaacg cagaagcggt ctgataaaac agaatttgcc tggcggcagt 9540
agcgcggtgg tcccacctga ccccatgccg aactcagaag tgaaacgccg tagcgccgat 9600
ggtagtgtgg ggtctcccca tgcgagagta gggaactgcc aggcatcaaa taaaacgaaa 9660
ggctcagtcg aaagactggg cctttcgttt tatctgttgt ttgtcggtga acgctctcct 9720
gagtaggaca aatccgccgg gagcggattt gaacgttgcg aagcaacggc ccggagggtg 9780
gcgggcagga cgcccgccat aaactgccag gcatcaaatt aagcagaagg ccatcctgac 9840
ggatggcctt tttgcgtttc tacaaactct tttgtttatt tttctaaata cattcaaata 9900
tgtatccgct catgagacaa taaccctgat aaatgcttca ataatgcagc ctgaaaggca 9960
ggccgggccg tggtggccac ggcctctagg ccagatccag cggcatctgg gttagtcgag 10020
cgcgggccgc ttcccatgtc tcaccagggc gagcctgttt cgcgatctca gcatctgaaa 10080
tcttcccggc cttgcgcttc gctggggcct tacccaccgc cttggcgggc ttcttcggtc 10140
caaaactgaa caacagatgt gtgaccttgc gcccggtctt tcgctgcgcc cactccacct 10200
gtagcgggct gtgctcgttg atctgcgtca cggctggatc aagcactcgc aacttgaagt 10260
ccttgatcga gggataccgg ccttccagtt gaaaccactt tcgcagctgg tcaatttcta 10320
tttcgcgctg gccgatgctg tcccattgca tgagcagctc gtaaagcctg atcgcgtggg 10380
tgctgtccat cttggccacg tcagccaagg cgtatttggt gaactgtttg gtgagttccg 10440
tcaggtacgg cagcatgtct ttggtgaacc tgagttctac acggccctca ccctcccggt 10500
agatgattgt ttgcacccag ccggtaatca tcacactcgg tcttttcccc ttgccattgg 10560

gctcttgggt taaccggact tcccgccgtt tcaggcgcag ggccgcttct ttgagctggt 10620

tgtaggaaga ttcgataggg acacccgcca tcgtcgctat gtcctccgcc gtcactgaat 10680

acatcacttc atcggtgaca ggctcgctcc tcttcacctg gctaatacag gccagaacga 10740

tccgctgttc ctgaacactg aggcgatacg cggcctcgac cagggcattg cttttgtaaa 10800

ccattggggg tgaggccacg ttcgacattc cttgtgtata aggggacact gtatctgcgt 10860

cccacaatac aacaaatccg tccctttaca acaacaaatc cgtcccttct taacaacaaa 10920

tccgtccctt aatggcaaca aatccgtccc tttttaaact ctacaggcca cggattacgt 10980

ggcctgtaga cgtcctaaaa ggtttaaaag ggaaaaggaa gaaaagggtg gaaacgcaaa 11040

aaacgcacca ctacgtggcc ccgttggggc cgcatttgtg cccctgaagg ggcgggggag 11100

gcgtctgggc aatccccgtt ttaccagtcc cctatcgccg cctgagaggg cgcaggaagc 11160

gagtaatcag ggtatcgagg cggattcacc cttggcgtcc aaccagcggc accagcggcg 11220

cctgagaggc gaattgacat aagcctgttc ggttcgtaaa ctgtaatgca agtagcgtat 11280

gcgctcacgc aactggtcca gaaccttgac cgaacgcagc ggtggtaacg gcgcagtggc 11340

ggttttcatg gcttgttatg actgtttttt tgtacagtct atgcctcggg catccaatcg 11400

a 11401