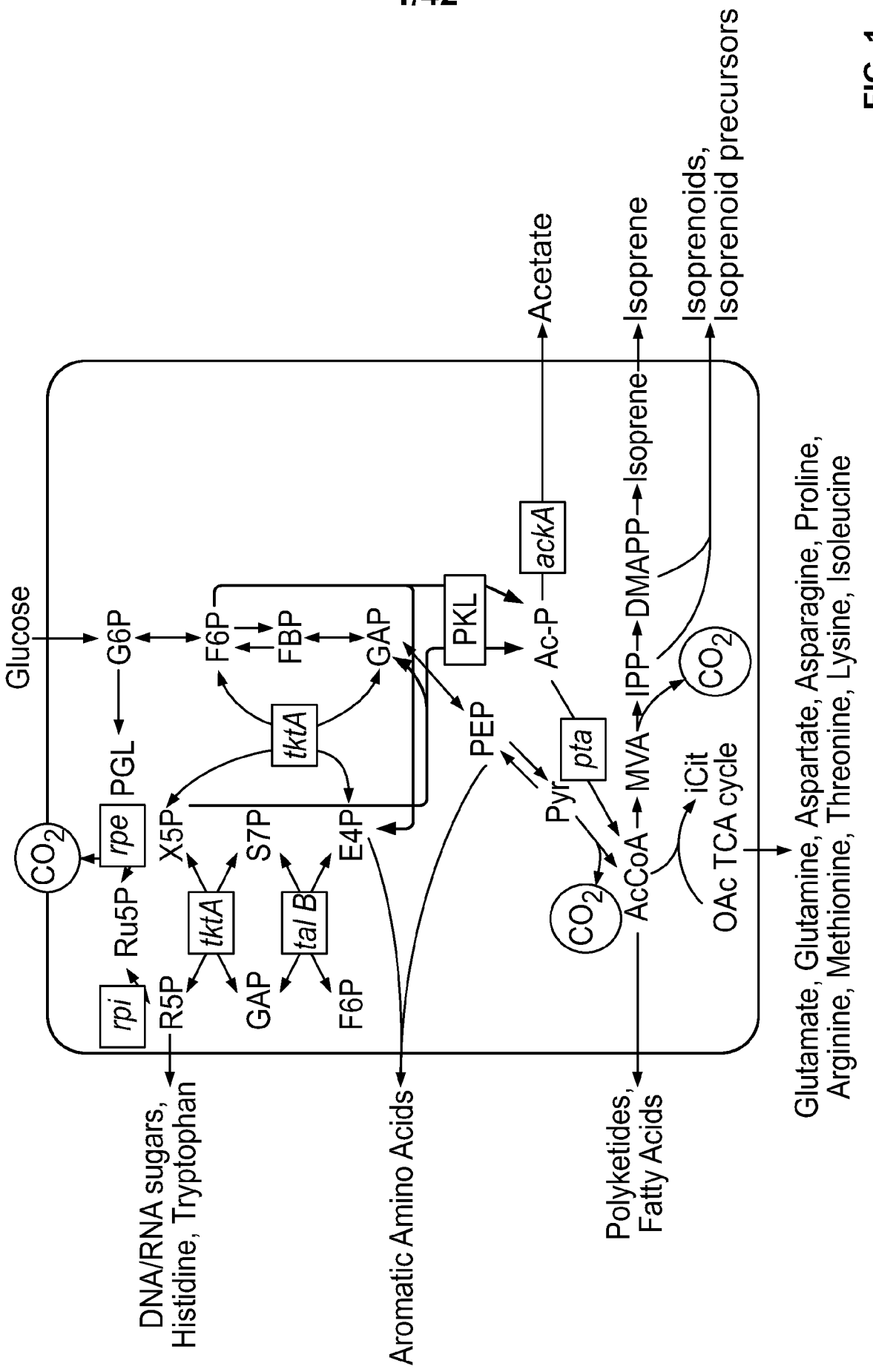

Glucose
G6P
F6P
FBP
GAP
PKL
Ac-P
ackA
Acetate
Isoprene
Isoprenoids,
Isoprenoid precursors
PGL
tktA
PEP
pta
Pyr
IPP
DMAPP
Isoprene
CO2
rpe
X5P
S7P
E4P
MVA
iCit
Ru5P
tktA
tal B
AcCoA
OAc TCA cycle
rpi
R5P
GAP
F6P
CO2
DNA/RNA sugars,
Histidine, Tryptophan
Aromatic Amino Acids
Polyketides,
Fatty Acids
Glutamate, Glutamine, Aspartate, Asparagine, Proline,
Arginine, Methionine, Threonine, Lysine, Isoleucine

FIG. 1

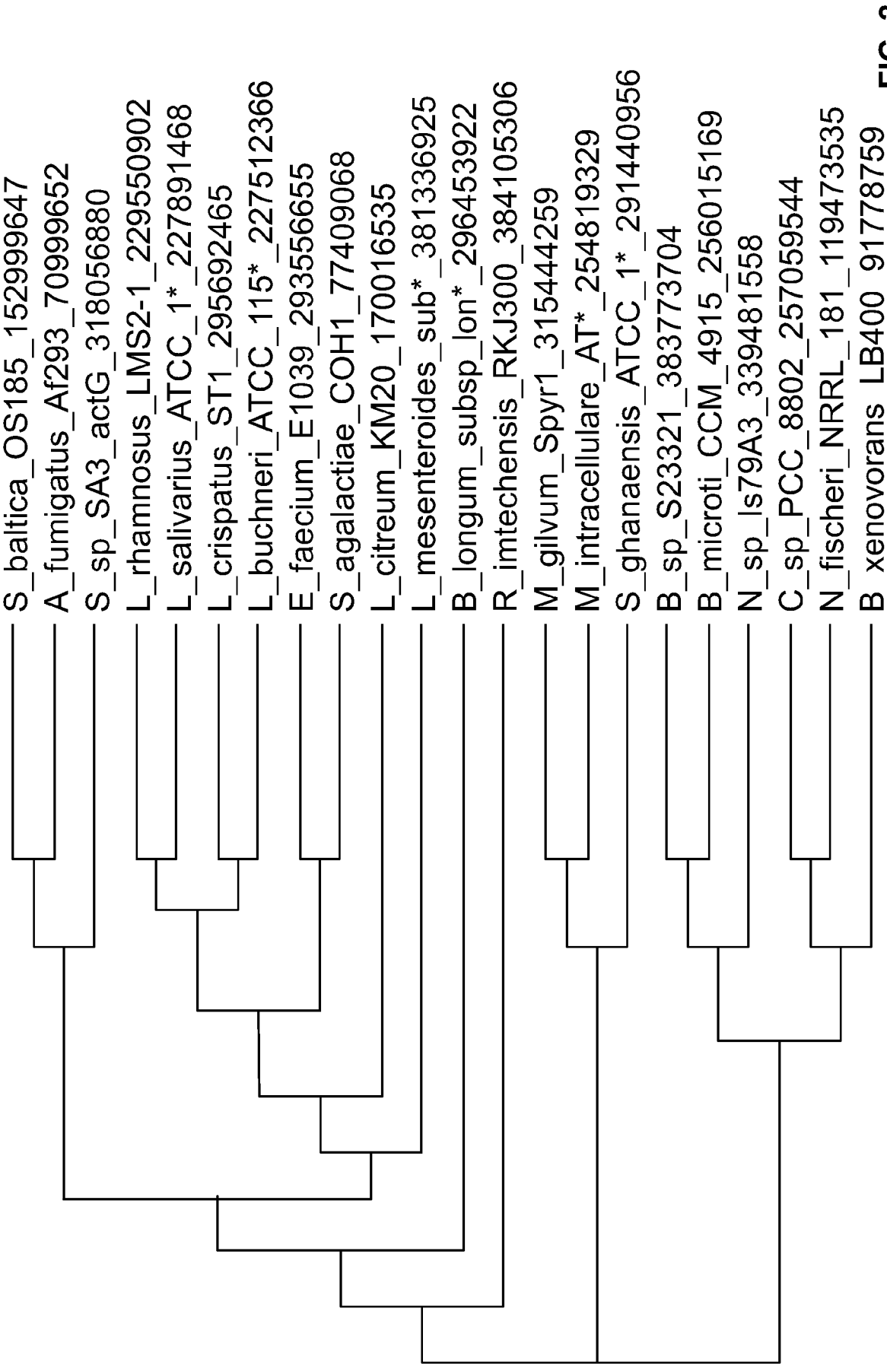

S_baltica_OS185_152999647
A_fumigatus_Af293_70999652
S_sp_SA3_actG_318056880
L_rhamnosus_LMS2-1_229550902
L_salivarius_ATCC_1*_227891468
L_crispatus_ST1_295692465
L_buchneri_ATCC_115*_227512366
E_faecium_E1039_293556655
S_agalactiae_COH1_77409068
L_citreum_KM20_170016535
L_mesenteroides_sub*_381336925
B_longum_subsp_lon*_296453922
R_imtechensis_RKJ300_384105306
M_gilvum_Spyr1_315444259
M_intracellulare_AT*_254819329
S_ghanaensis_ATCC_1*_291440956
B_sp_S23321_383773704
B_microti_CCM_4915_256015169
N_sp_ls79A3_339481558
C_sp_PCC_8802_257059544
N_fischeri_NRRL_181_119473535
B_xenovorans_LB400_91778759

FIG. 2

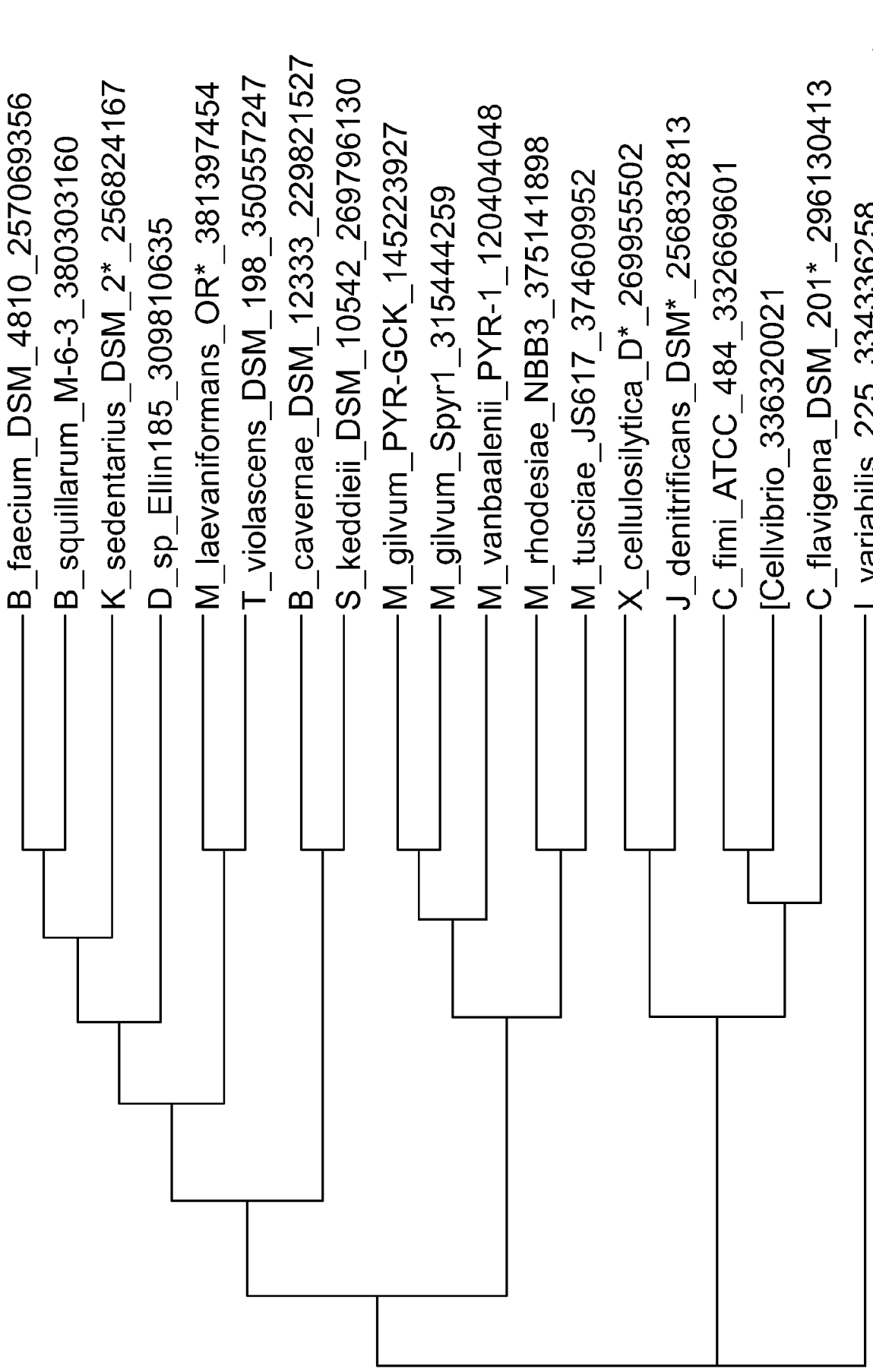

B_faecium_DSM_4810_257069356
B_squillarum_M-6-3_380303160
K_sedentarius_DSM_2*_256824167
D_sp_Ellin185_309810635
M_laevaniformans_OR*_381397454
T_violascens_DSM_198_350557247
B_cavernae_DSM_12333_229821527
S_keddieii_DSM_10542_269796130
M_gilvum_PYR-GCK_145223927
M_gilvum_Spyr1_315444259
M_vanbaalenii_PYR-1_120404048
M_rhodesiae_NBB3_375141898
M_tusciae_JS617_374609952
X_cellulosilytica_D*_269955502
J_denitrificans_DSM*_256832813
C_fimi_ATCC_484_332669601
[Cellvibrio_336320021
C_flavigena_DSM_201*_296130413
I_variabilis_225_334336258

FIG. 3

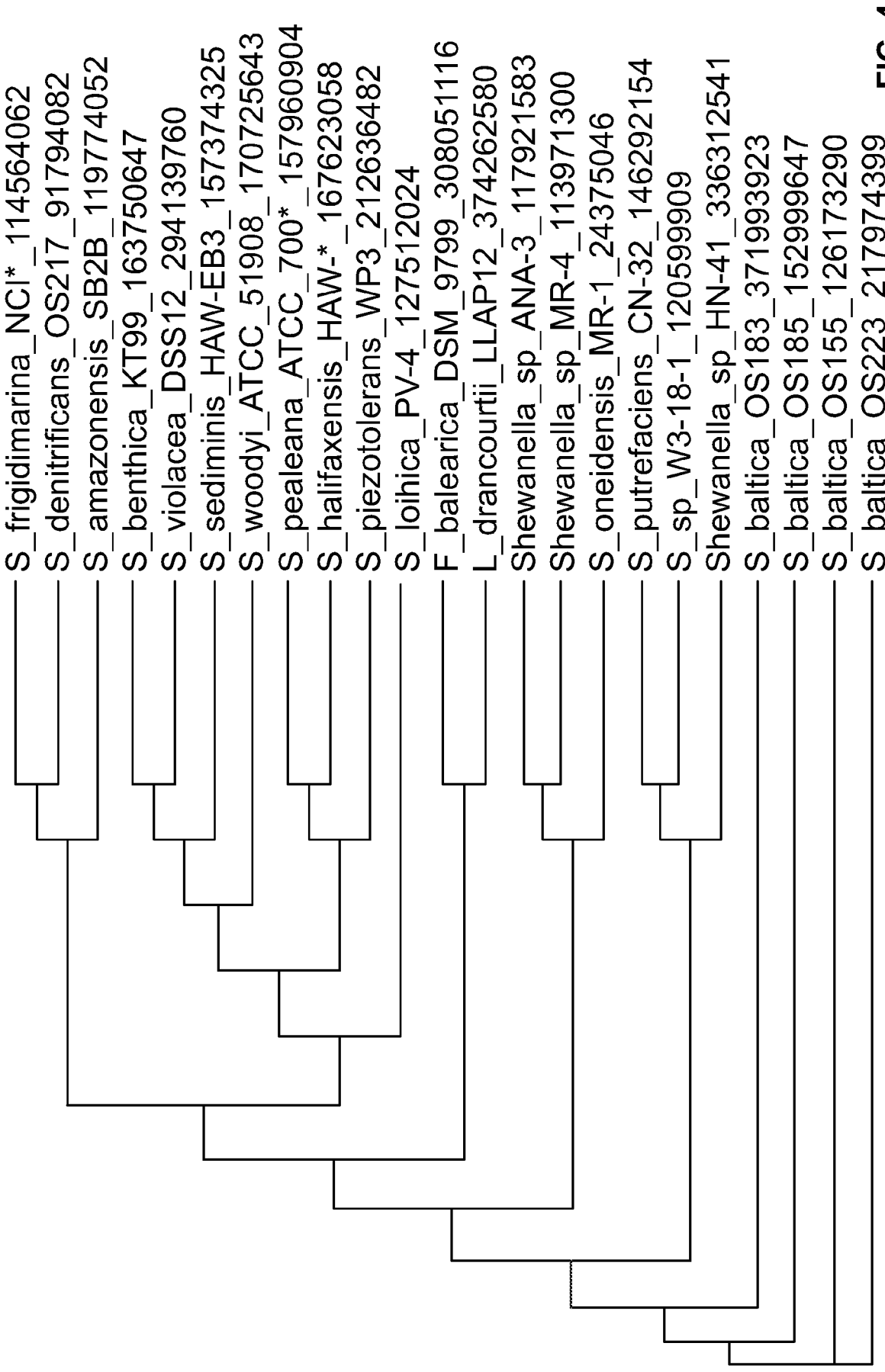

S_frigidimarina_NCI*_114564062
S_denitrificans_OS217_91794082
S_amazonensis_SB2B_119774052
S_benthica_KT99_163750647
S_violacea_DSS12_294139760
S_sediminis_HAW-EB3_157374325
S_woodyi_ATCC_51908_170725643
S_pealeana_ATCC_700*_157960904
S_halifaxensis_HAW-*_167623058
S_piezotolerans_WP3_212636482
S_loihica_PV-4_127512024
F_balearica_DSM_9799_308051116
L_drancourtii_LLAP12_374262580
Shewanella_sp_ANA-3_117921583
Shewanella_sp_MR-4_113971300
S_oneidensis_MR-1_24375046
S_putrefaciens_CN-32_146292154
S_sp_W3-18-1_120599909
Shewanella_sp_HN-41_336312541
S_baltica_OS183_371993923
S_baltica_OS185_152999647
S_baltica_OS155_126173290
S_baltica_OS223_217974399

FIG. 4

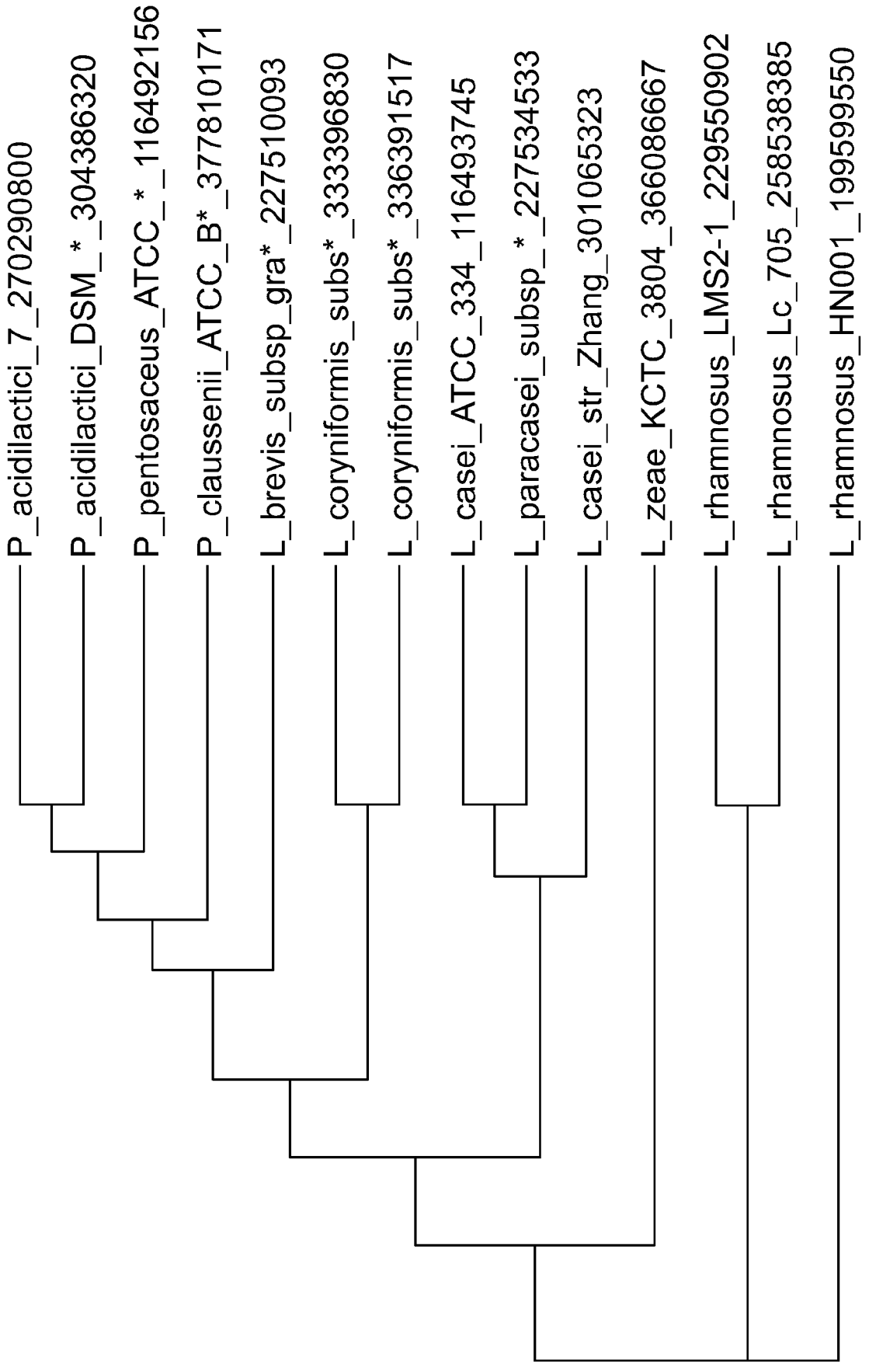

P_acidilactici_7_270290800
P_acidilactici_DSM_*_304386320
P_pentosaceus_ATCC_*_116492156
P_claussenii_ATCC_B*_377810171
L_brevis_subsp_gra*_227510093
L_coryniformis_subs*_333396830
L_coryniformis_subs*_336391517
L_casei_ATCC_334_116493745
L_paracasei_subsp_*_227534533
L_casei_str_Zhang_301065323
L_zeae_KCTC_3804_366086667
L_rhamnosus_LMS2-1_229550902
L_rhamnosus_Lc_705_258538385
L_rhamnosus_HN001_199599550

FIG. 5

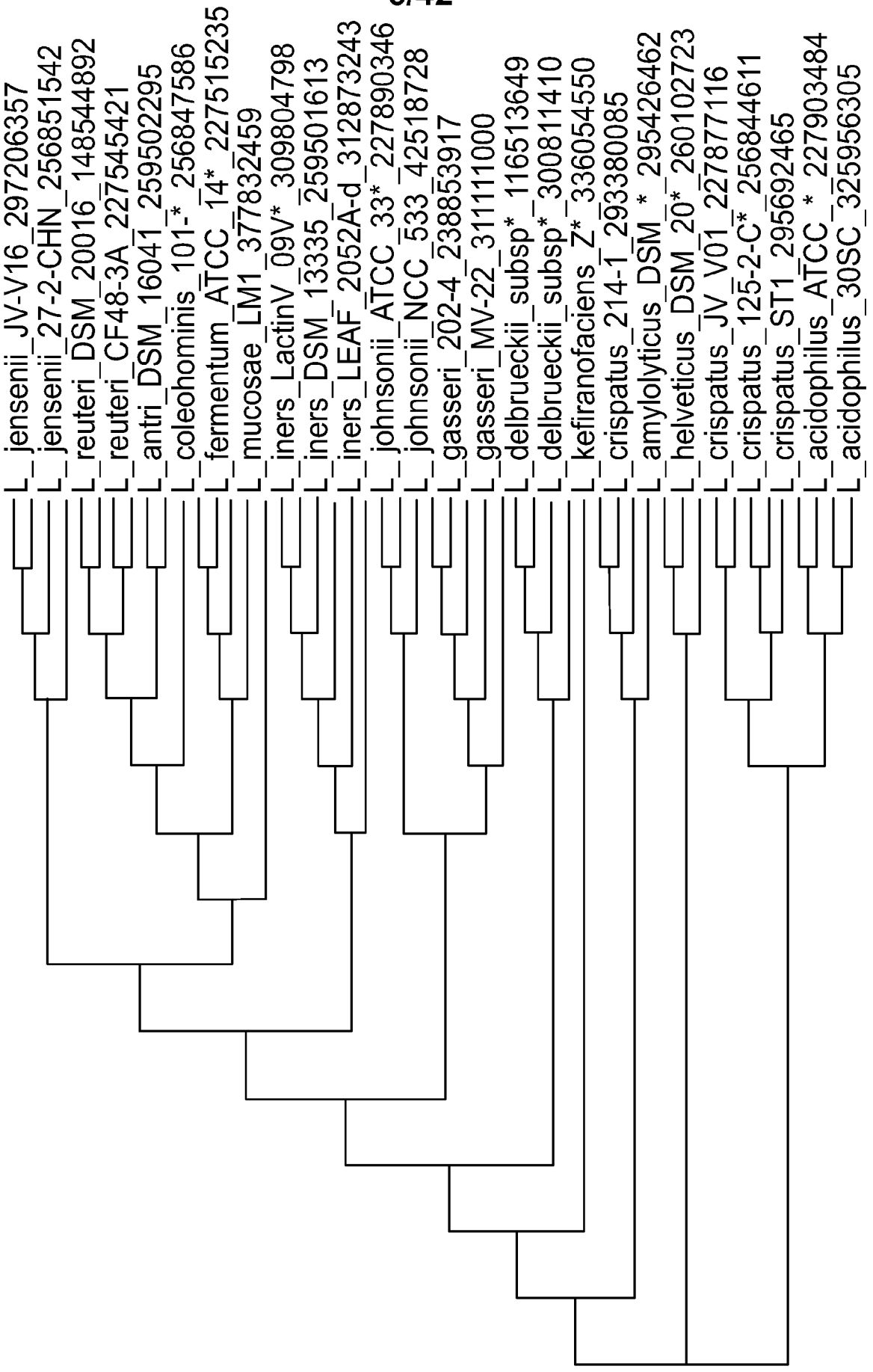

L_jensenii_JV-V16_297206357
L_jensenii_27-2-CHN_256851542
L_reuteri_DSM_20016_148544892
L_reuteri_CF48-3A_227545421
L_antri_DSM_16041_259502295
L_coleohominis_101-* 256847586
L_fermentum_ATCC_14* 227515235
L_mucosae_LM1_377832459
L_iners_LactinV_09V* 309804798
L_iners_DSM_13335_259501613
L_iners_LEAF_2052A-d_312873243
L_johnsonii_ATCC_33* 227890346
L_johnsonii_NCC_533_42518728
L_gasseri_202-4_238853917
L_gasseri_MV-22_311111000
L_delbrueckii_subsp* 116513649
L_delbrueckii_subsp* 300811410
L_kefiranofaciens_Z* 336054550
L_crispatus_214-1_293380085
L_amylolyticus_DSM_* 295426462
L_helveticus_DSM_20* 260102723
L_crispatus_JV_V01_227877116
L_crispatus_125-2-C* 256844611
L_crispatus_ST1_295692465
L_acidophilus_ATCC_* 227903484
L_acidophilus_30SC_325956305

FIG. 6

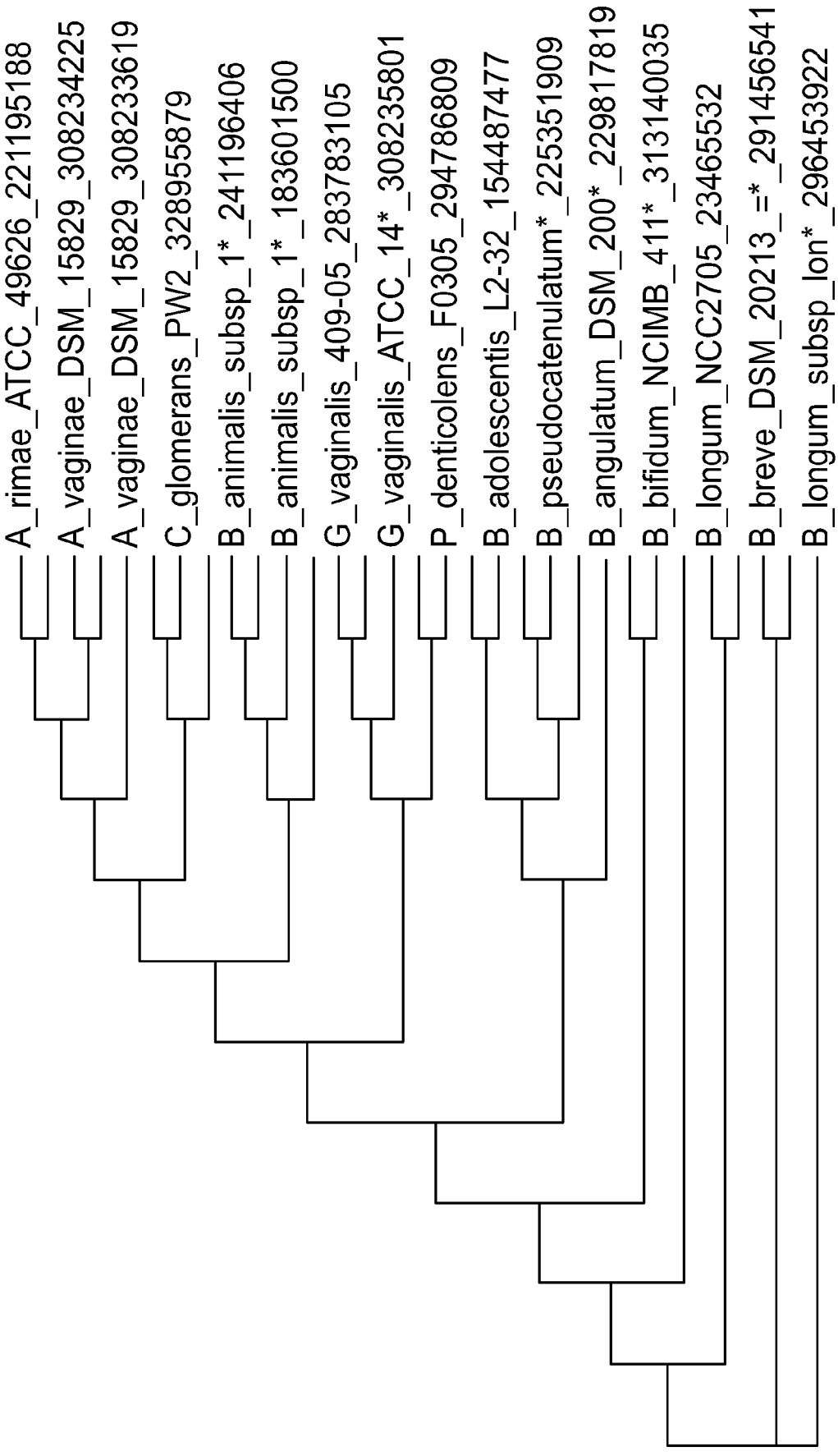

A_rimae_ATCC_49626_221195188
A_vaginae_DSM_15829_308234225
A_vaginae_DSM_15829_308233619
C_glomerans_PW2_328955879
B_animalis_subsp_1*_241196406
B_animalis_subsp_1*_183601500
G_vaginalis_409-05_283783105
G_vaginalis_ATCC_14*_308235801
P_denticolens_F0305_294786809
B_adolescentis_L2-32_154487477
B_pseudocatenulatum*_225351909
B_angulatum_DSM_200*_229817819
B_bifidum_NCIMB_411*_313140035
B_longum_NCC2705_23465532
B_breve_DSM_20213_=*_291456541
B_longum_subsp_lon*_296453922

FIG. 7

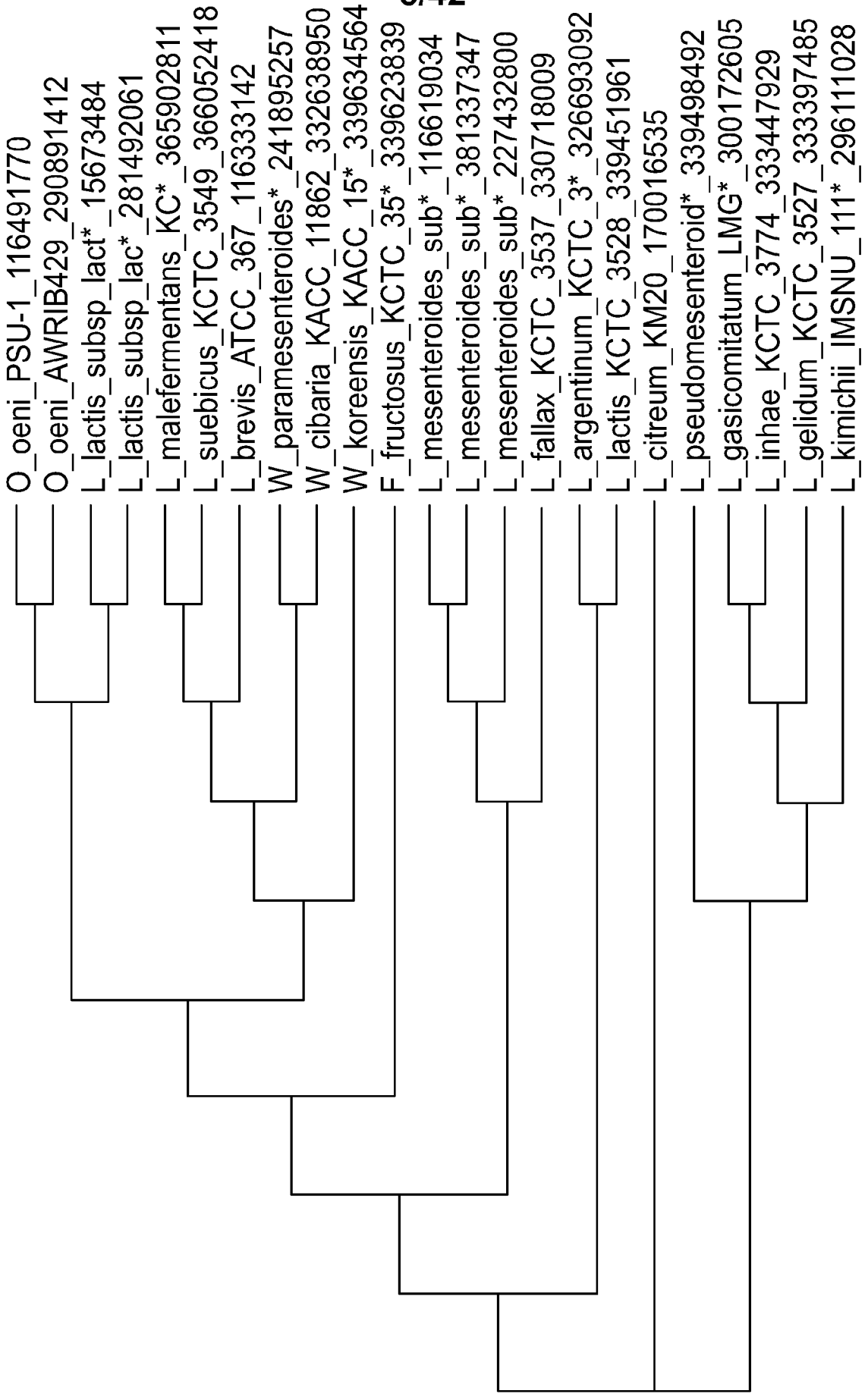

O_oeni_PSU-1_116491770
O_oeni_AWRIB429_290891412
L_lactis_subsp_lact*_15673484
L_lactis_subsp_lac*_281492061
L_malefermentans_KC*_365902811
L_suebicus_KCTC_3549_366052418
L_brevis_ATCC_367_116333142
W_paramesenteroides*_241895257
W_cibaria_KACC_11862_332638950
W_koreensis_KACC_15*_339634564
F_fructosus_KCTC_35*_339623839
L_mesenteroides_sub*_116619034
L_mesenteroides_sub*_381337347
L_mesenteroides_sub*_227432800
L_fallax_KCTC_3537_330718009
L_argentinum_KCTC_3*_326693092
L_lactis_KCTC_3528_339451961
L_citreum_KM20_170016535
L_pseudomesenteroid*_339498492
L_gasicomitatum_LMG*_300172605
L_inhae_KCTC_3774_333447929
L_gelidum_KCTC_3527_333397485
L_kimichii_IMSNU_111*_296111028

FIG. 8

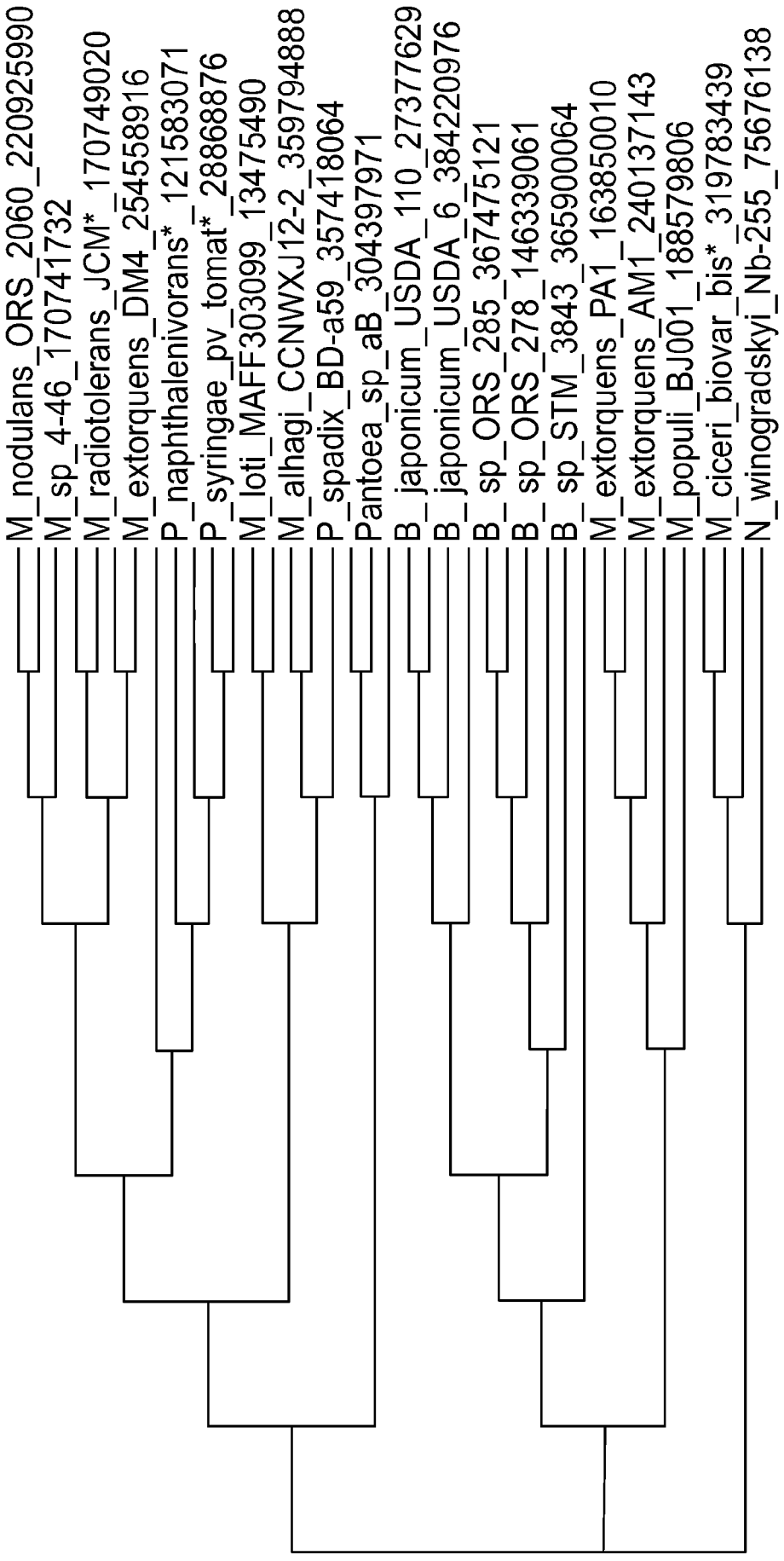

M_nodulans_ORS_2060_220925990
M_sp_4-46_170741732
M_radiotolerans_JCM*_170749020
M_extorquens_DM4_254558916
P_naphthalenivorans*_121583071
P_syringae_pv_tomat*_28868876
M_loti_MAFF303099_13475490
M_alhagi_CCNWXJ12-2_359794888
P_spadix_BD-a59_357418064
Pantoea_sp_aB_304397971
B_japonicum_USDA_110_27377629
B_japonicum_USDA_6_384220976
B_sp_ORS_285_367475121
B_sp_ORS_278_146339061
B_sp_STM_3843_365900064
M_extorquens_PA1_163850010
M_extorquens_AM1_240137143
M_populi_BJ001_188579806
M_ciceri_biovar_bis*_319783439
N_winogradskyi_Nb-255_75676138

FIG. 9

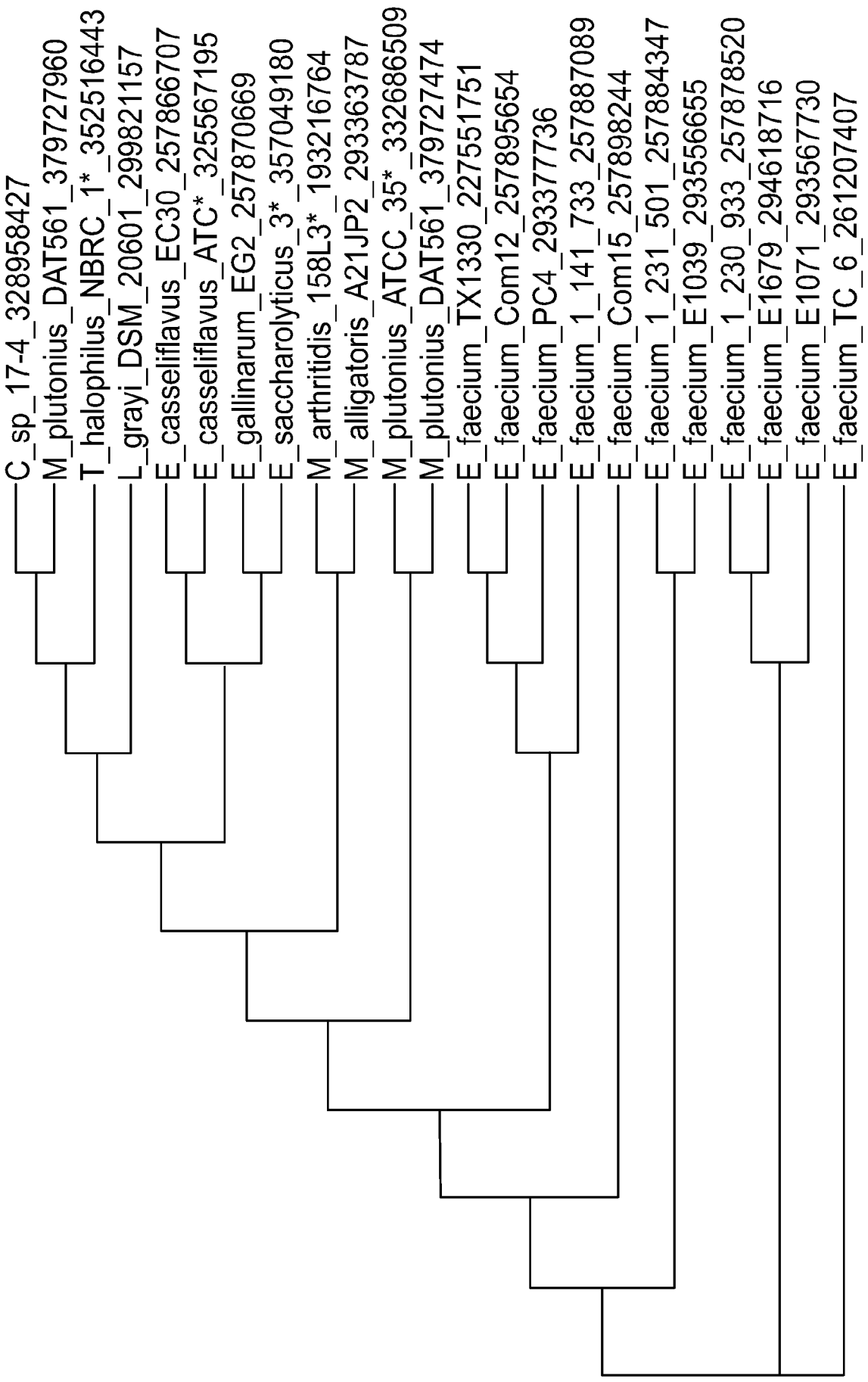

C_sp_17-4_328958427
M_plutonius_DAT561_379727960
T_halophilus_NBRC_1*_352516443
L_grayi_DSM_20601_299821157
E_casseliflavus_EC30_257866707
E_casseliflavus_ATC*_325567195
E_gallinarum_EG2_257870669
E_saccharolyticus_3*_357049180
M_arthritidis_158L3*_193216764
M_alligatoris_A21JP2_293363787
M_plutonius_ATCC_35*_332686509
M_plutonius_DAT561_379727474
E_faecium_TX1330_227551751
E_faecium_Com12_257895654
E_faecium_PC4_293377736
E_faecium_1_141_733_257887089
E_faecium_Com15_257898244
E_faecium_1_231_501_257884347
E_faecium_E1039_293556655
E_faecium_1_230_933_257878520
E_faecium_E1679_294618716
E_faecium_E1071_293567730
E_faecium_TC_6_261207407

FIG. 10

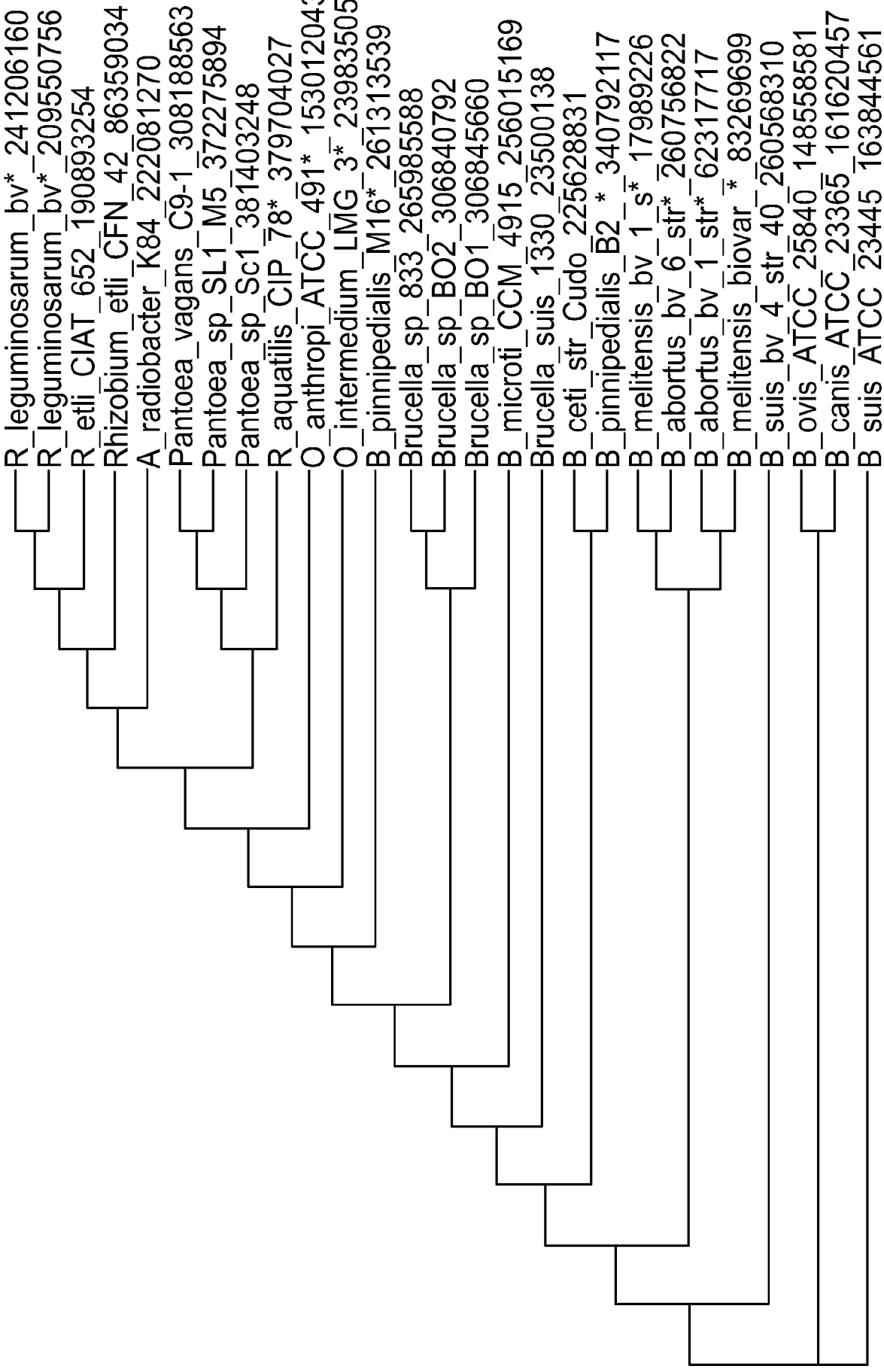

R_leguminosarum_bv*_241206160
R_leguminosarum_bv*_209550756
R_etli_CIAT_652_190893254
Rhizobium_etli_CFN_42_86359034
A_radiobacter_K84_222081270
Pantoea_vagans_C9-1_308188563
Pantoea_sp_SL1_M5_372275894
Pantoea_sp_Sc1_381403248
R_aquatilis_CIP_78*_379704027
O_anthropi_ATCC_491*_153012043
O_intermedium_LMG_3*_239835057
B_pinnipedialis_M16*_261313539
Brucella_sp_833_265985588
Brucella_sp_BO2_306840792
Brucella_sp_BO1_306845660
B_microti_CCM_4915_256015169
Brucella_suis_1330_23500138
B_ceti_str_Cudo_225628831
B_pinnipedialis_B2_*_340792117
B_melitensis_bv_1_s*_17989226
B_abortus_bv_6_str*_260756822
B_abortus_bv_1_str*_62317717
B_melitensis_biovar_*_83269699
B_suis_bv_4_str_40_260568310
B_ovis_ATCC_25840_148558581
B_canis_ATCC_23365_161620457
B_suis_ATCC_23445_163844561

FIG. 11

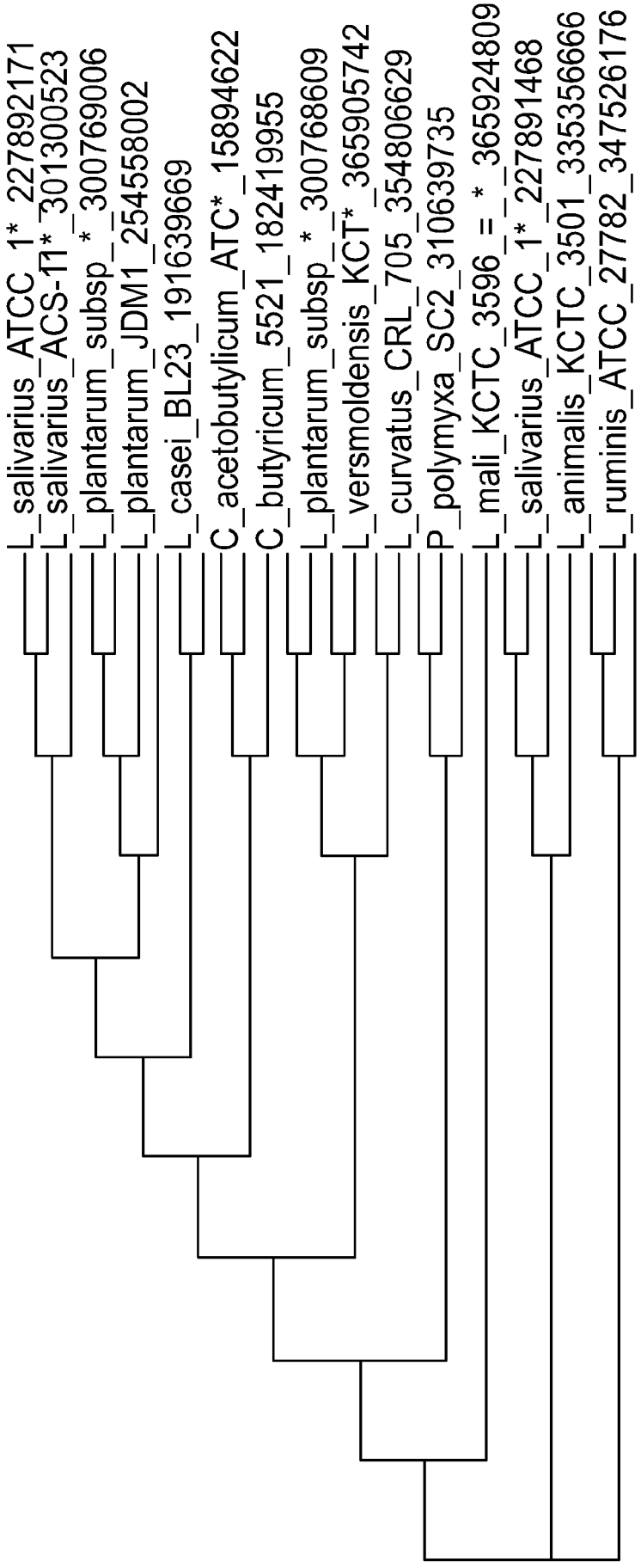

L_salivarius_ATCC_1*_227892171
L_salivarius_ACS-11*_301300523
L_plantarum_subsp_*_300769006
L_plantarum_JDM1_254558002
L_casei_BL23_191639669
C_acetobutylicum_ATC*_15894622
C_butyricum_5521_182419955
L_plantarum_subsp_*_300768609
L_versmoldensis_KCT*_365905742
L_curvatus_CRL_705_354806629
P_polymyxa_SC2_310639735
L_mali_KCTC_3596_=_*_365924809
L_salivarius_ATCC_1*_227891468
L_animalis_KCTC_3501_335356666
L_ruminis_ATCC_27782_347526176

FIG. 12

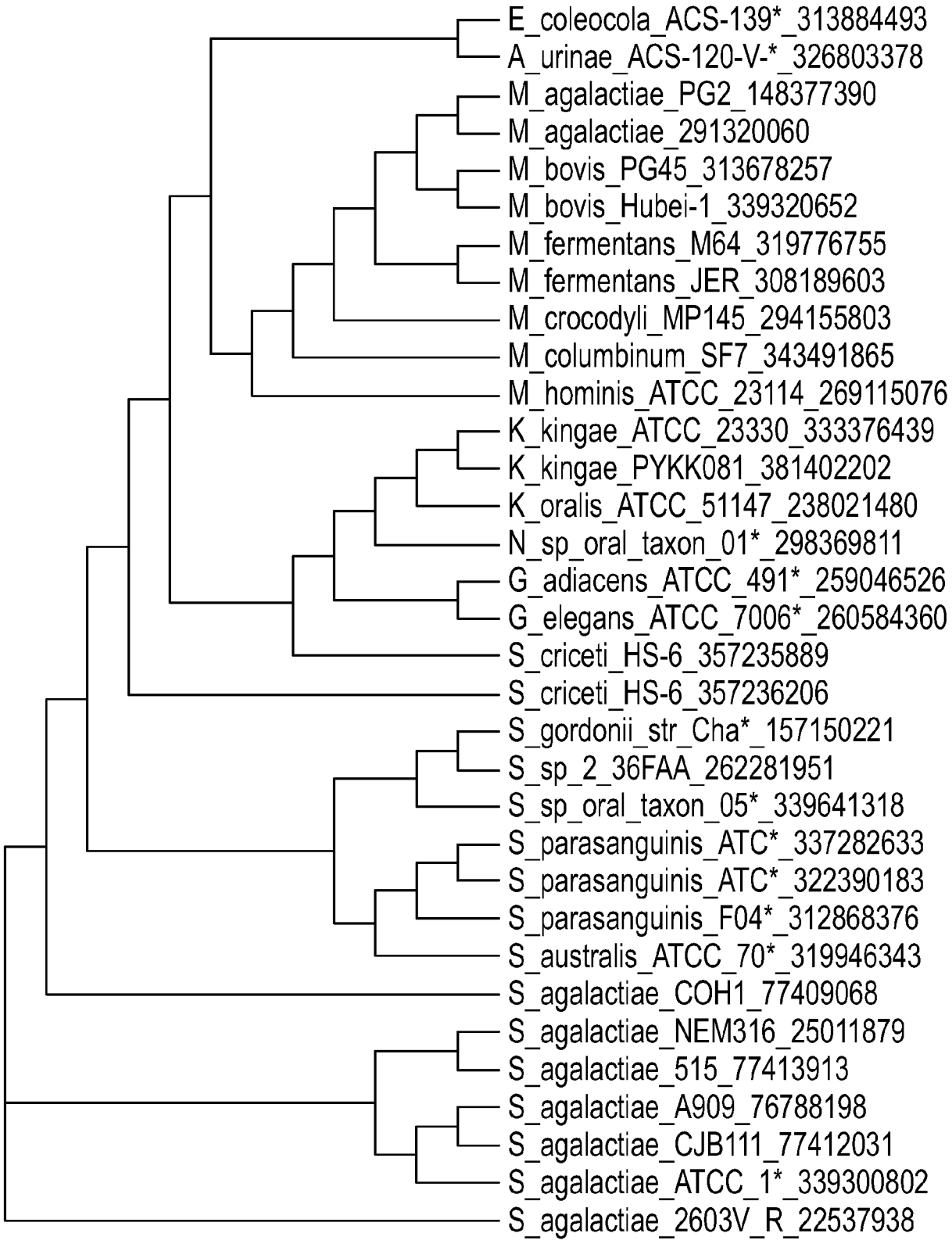

E_coleocola_ACS-139*_313884493
A_urinae_ACS-120-V-*_326803378
M_agalactiae_PG2_148377390
M_agalactiae_291320060
M_bovis_PG45_313678257
M_bovis_Hubei-1_339320652
M_fermentans_M64_319776755
M_fermentans_JER_308189603
M_crocodyli_MP145_294155803
M_columbinum_SF7_343491865
M_hominis_ATCC_23114_269115076
K_kingae_ATCC_23330_333376439
K_kingae_PYKK081_381402202
K_oralis_ATCC_51147_238021480
N_sp_oral_taxon_01*_298369811
G_adiacens_ATCC_491*_259046526
G_elegans_ATCC_7006*_260584360
S_criceti_HS-6_357235889
S_criceti_HS-6_357236206
S_gordonii_str_Cha*_157150221
S_sp_2_36FAA_262281951
S_sp_oral_taxon_05*_339641318
S_parasanguinis_ATC*_337282633
S_parasanguinis_ATC*_322390183
S_parasanguinis_F04*_312868376
S_australis_ATCC_70*_319946343
S_agalactiae_COH1_77409068
S_agalactiae_NEM316_25011879
S_agalactiae_515_77413913
S_agalactiae_A909_76788198
S_agalactiae_CJB111_77412031
S_agalactiae_ATCC_1*_339300802
S_agalactiae_2603V_R_22537938

FIG. 13

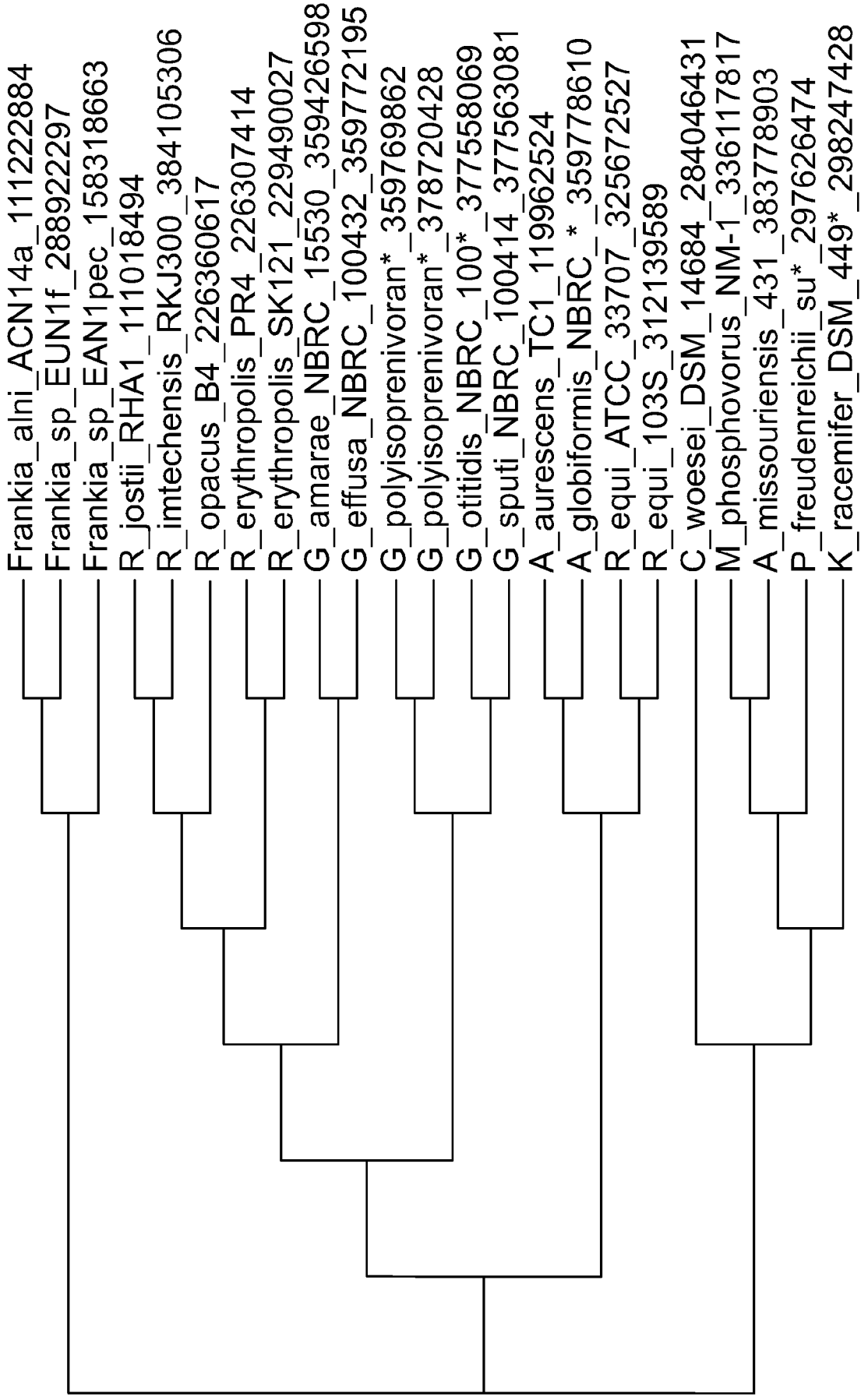

Frankia_alni_ACN14a_111222884
Frankia_sp_EUN1f_288922297
Frankia_sp_EAN1pec_158318663
R_jostii_RHA1_111018494
R_imtechensis_RKJ300_384105306
R_opacus_B4_226360617
R_erythropolis_PR4_226307414
R_erythropolis_SK121_229490027
G_amarae_NBRC_15530_359426598
G_effusa_NBRC_100432_359772195
G_polyisoprenivoran*_359769862
G_polyisoprenivoran*_378720428
G_otitidis_NBRC_100*_377558069
G_sputi_NBRC_100414_377563081
A_aurescens_TC1_119962524
A_globiformis_NBRC_*_359778610
R_equi_ATCC_33707_325672527
R_equi_103S_312139589
C_woesei_DSM_14684_284046431
M_phosphovorus_NM-1_336117817
A_missouriensis_431_383778903
P_freudenreichii_su*_297626474
K_racemifer_DSM_449*_298247428

FIG. 14

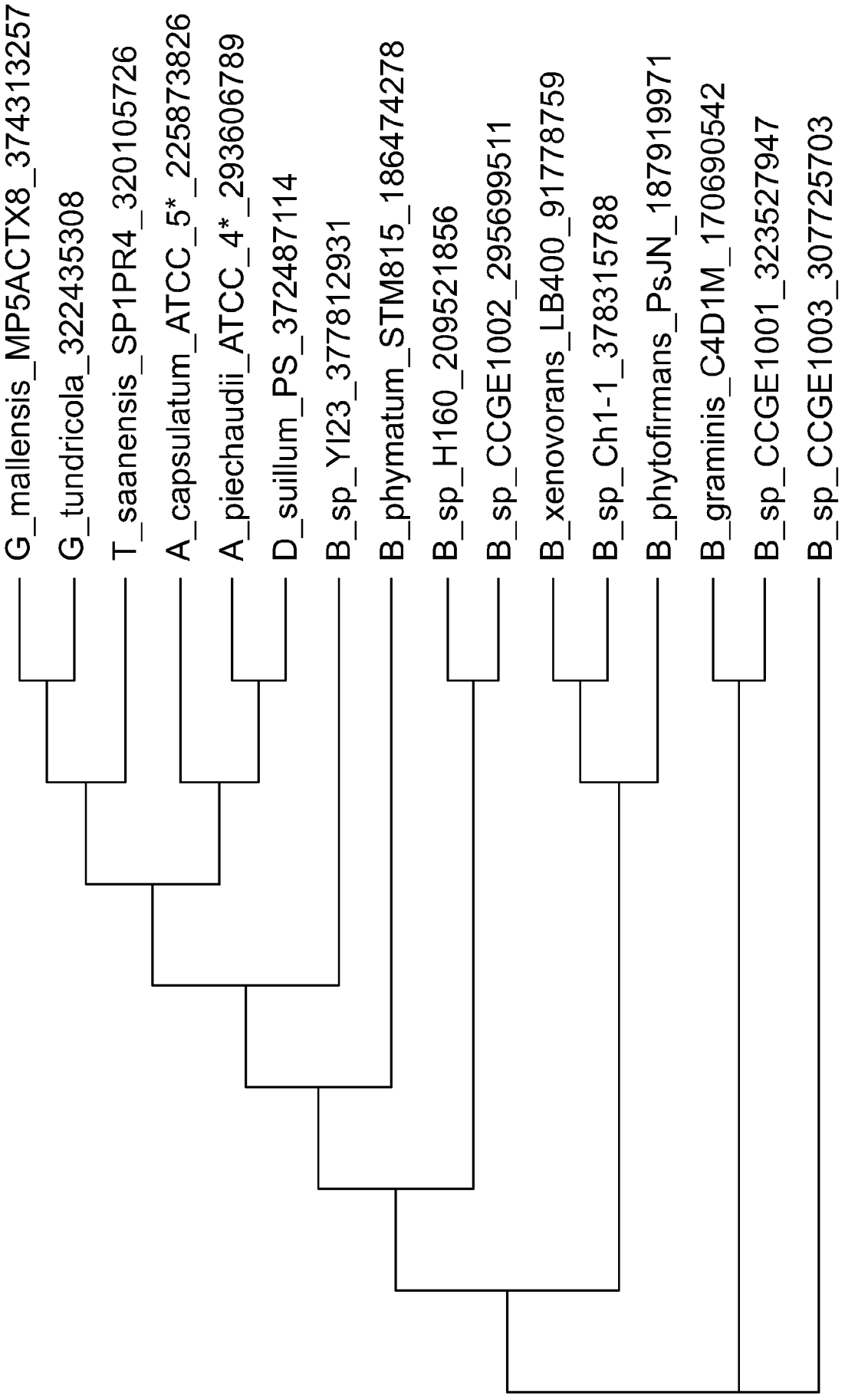

G_mallensis_MP5ACTX8_374313257
G_tundricola_322435308
T_saanensis_SP1PR4_320105726
A_capsulatum_ATCC_5*_225873826
A_piechaudii_ATCC_4*_293606789
D_suillum_PS_372487114
B_sp_YI23_377812931
B_phymatum_STM815_186474278
B_sp_H160_209521856
B_sp_CCGE1002_295699511
B_xenovorans_LB400_91778759
B_sp_Ch1-1_378315788
B_phytofirmans_PsJN_187919971
B_graminis_C4D1M_170690542
B_sp_CCGE1001_323527947
B_sp_CCGE1003_307725703

FIG. 15

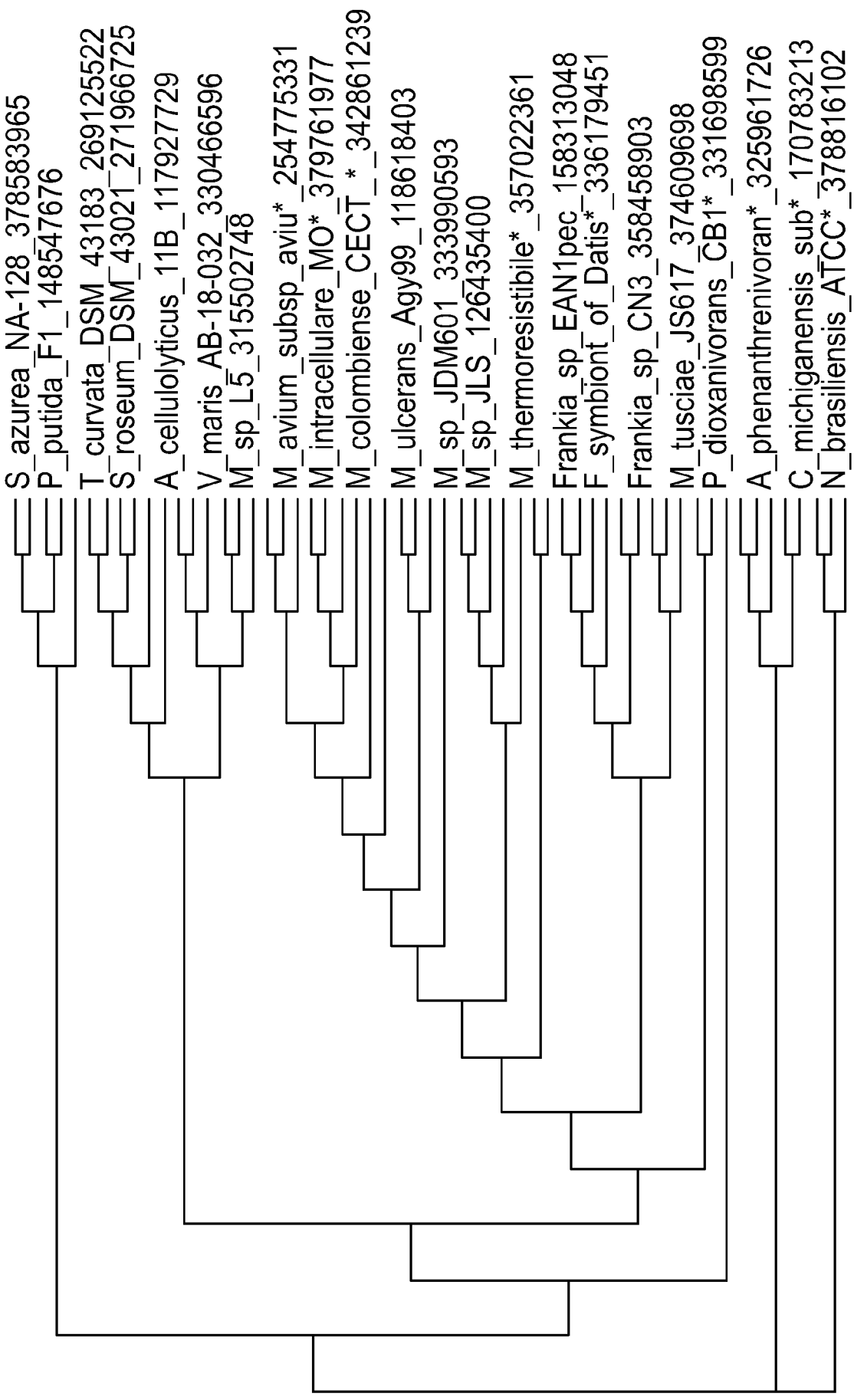

S_azurea_NA-128_378583965
P_putida_F1_148547676
T_curvata_DSM_43183_269125522
S_roseum_DSM_43021_271966725
A_cellulolyticus_11B_117927729
V_maris_AB-18-032_330466596
M_sp_L5_315502748
M_avium_subsp_aviu*_254775331
M_intracellulare_MO*_379761977
M_colombiense_CECT_*_342861239
M_ulcerans_Agy99_118618403
M_sp_JDM601_333990593
M_sp_JLS_126435400
M_thermoresistibile*_357022361
Frankia_sp_EAN1pec_158313048
F_symbiont_of_Datis*_336179451
Frankia_sp_CN3_358458903
M_tusciae_JS617_374609698
P_dioxanivorans_CB1*_331698599
A_phenanthrenivoran*_325961726
C_michiganensis_sub*_170783213
N_brasiliensis_ATCC*_378816102

FIG. 16

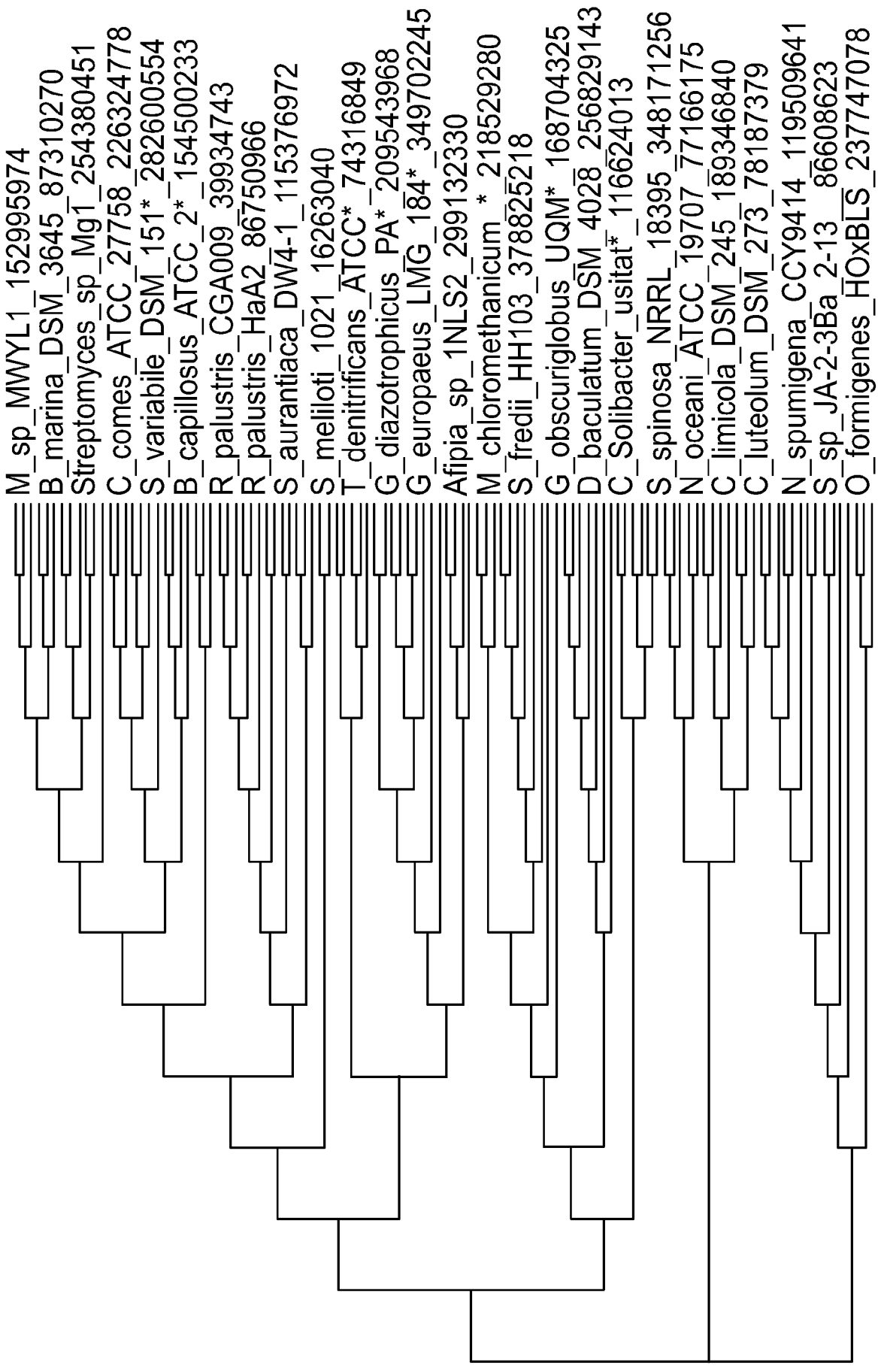

M_sp_MWYL1_152995974
B_marina_DSM_3645_87310270
Streptomyces_sp_Mg1_254380451
C_comes_ATCC_27758_226324778
S_variabile_DSM_151*_282600554
B_capillosus_ATCC_2*_154500233
R_palustris_CGA009_39934743
R_palustris_HaA2_86750966
S_aurantiaca_DW4-1_115376972
S_melliloti_1021_16263040
T_denitrificans_ATCC*_74316849
G_diazotrophicus_PA*_209543968
G_europaeus_LMG_184*_349702245
Afipia_sp_1NLS2_299132330
M_chloromethanicum_*_218529280
S_fredii_HH103_378825218
G_obscuriglobus_UQM*_168704325
D_baculatum_DSM_4028_256829143
C_Solibacter_usitat*_116624013
S_spinosa_NRRL_18395_348171256
N_oceani_ATCC_19707_77166175
C_limicola_DSM_245_189346840
C_luteolum_DSM_273_78187379
N_spumigena_CCY9414_119509641
S_sp_JA-2-3Ba_2-13__86608623
O_formigenes_HOxBLS_237747078

FIG. 17

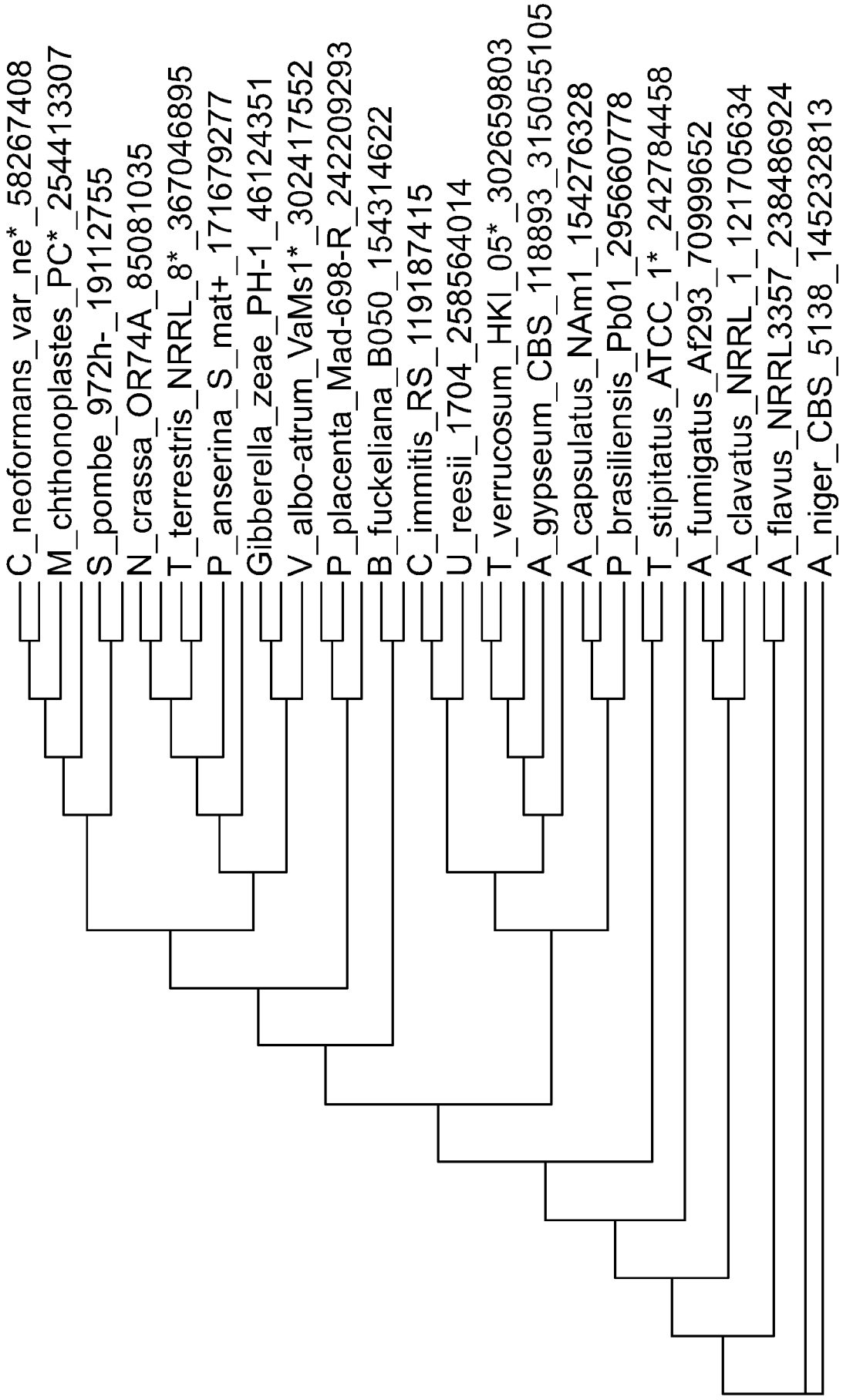

C_neoformans_var_ne*_58267408
M_chthonoplastes_PC*_254413307
S_pombe_972h-_19112755
N_crassa_OR74A_85081035
T_terrestris_NRRL_8*_367046895
P_anserina_S_mat+_171679277
Gibberella_zeae_PH-1_46124351
V_albo-atrum_VaMs1*_302417552
P_placenta_Mad-698-R_242209293
B_fuckeliana_B050_154314622
C_immitis_RS_119187415
U_reesii_1704_258564014
T_verrucosum_HKI_05*_302659803
A_gypseum_CBS_118893_315055105
A_capsulatus_NAm1_154276328
P_brasiliensis_Pb01_295660778
T_stipitatus_ATCC_1*_242784458
A_fumigatus_Af293_70999652
A_clavatus_NRRL_1_121705634
A_flavus_NRRL3357_238486924
A_niger_CBS_5138_145232813

FIG. 18

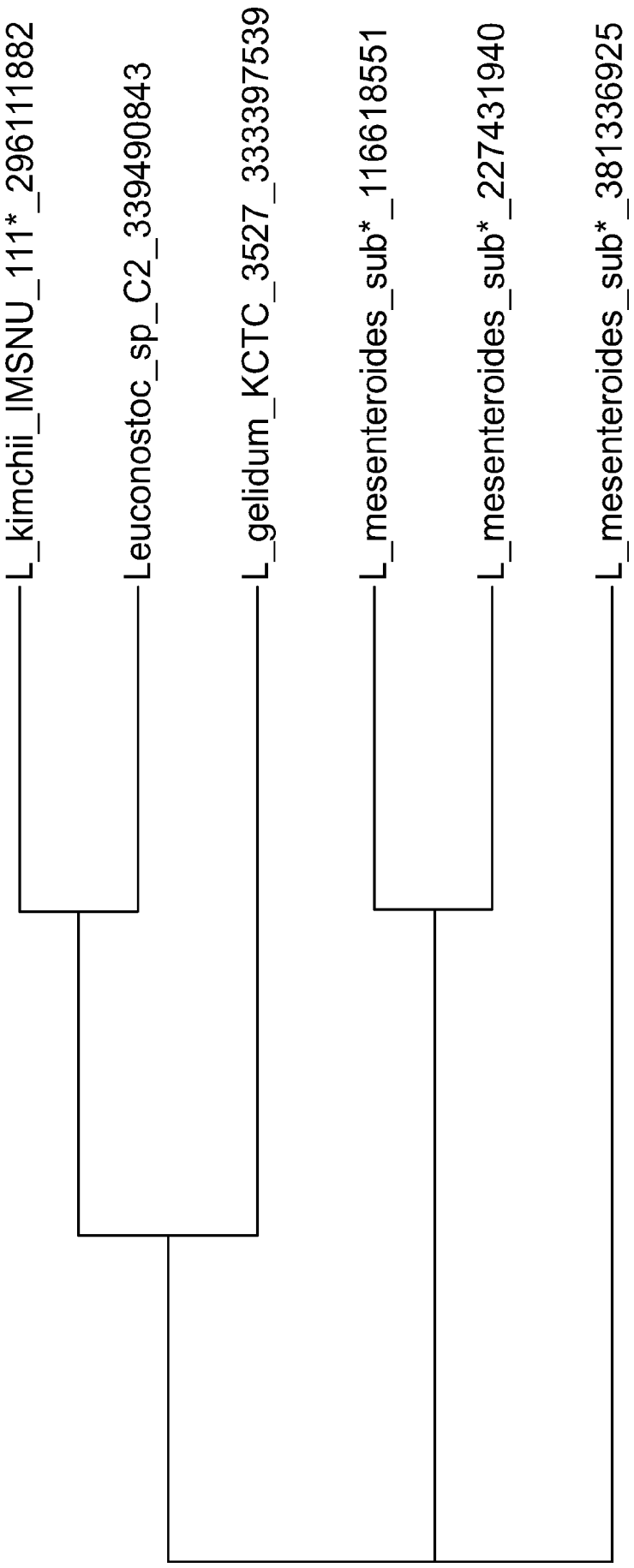

L_kimchii_IMSNU_111*_296111882
Leuconostoc_sp_C2_339490843
L_gelidum_KCTC_3527_333397539
L_mesenteroides_sub*_116618551
L_mesenteroides_sub*_227431940
L_mesenteroides_sub*_381336925

FIG. 19

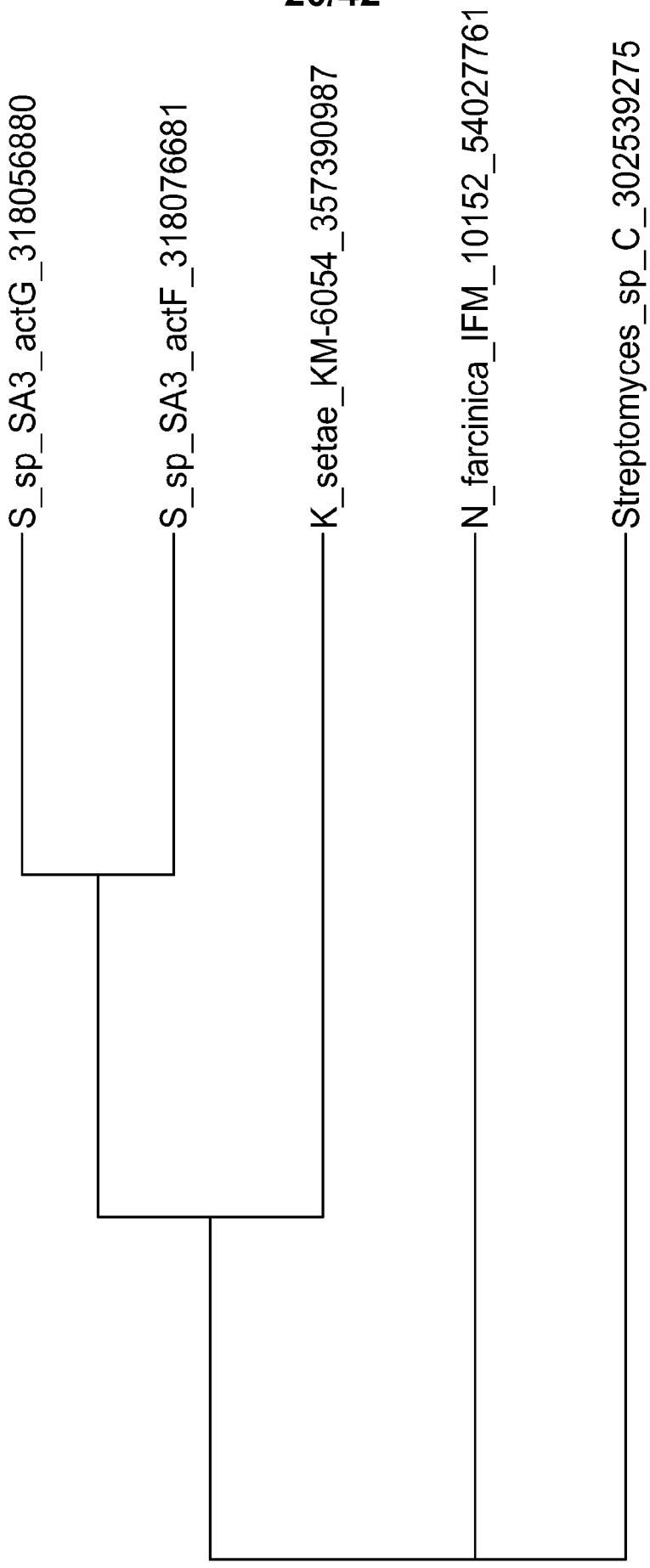

S_sp_SA3_actG_318056880
S_sp_SA3_actF_318076681
K_setae_KM-6054_357390987
N_farcinica_IFM_10152_54027761
Streptomyces_sp_C_302539275

FIG. 20

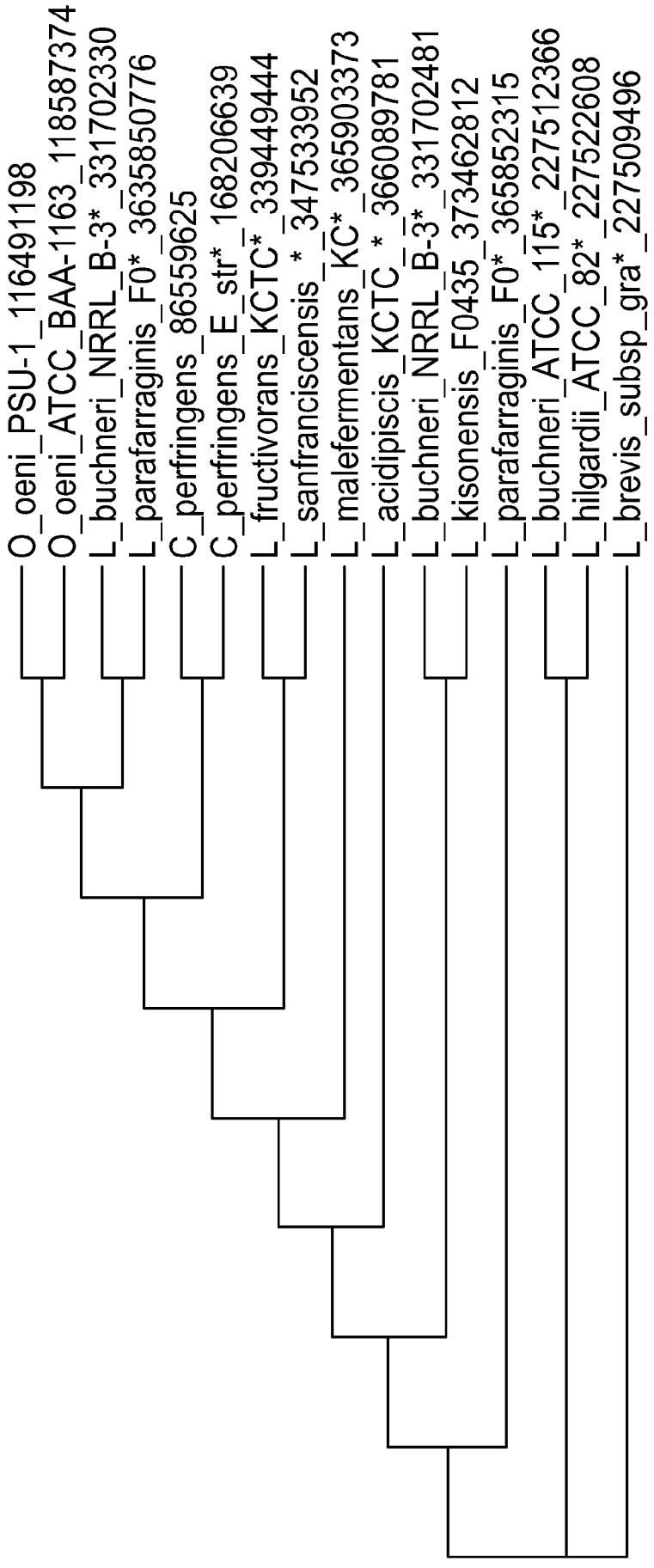

O_oeni_PSU-1_116491198
O_oeni_ATCC_BAA-1163_118587374
L_buchneri_NRRL_B-3*_331702330
L_parafarraginis_F0*_363850776
C_perfringens_86559625
C_perfringens_E_str*_168206639
L_fructivorans_KCTC*_339449444
L_sanfranciscensis_*_347533952
L_malefermentans_KC*_365903373
L_acidipiscis_KCTC_*_366089781
L_buchneri_NRRL_B-3*_331702481
L_kisonensis_F0435_373462812
L_parafarraginis_F0*_365852315
L_buchneri_ATCC_115*_227512366
L_hilgardii_ATCC_82*_227522608
L_brevis_subsp_gra*_227509496

FIG. 21

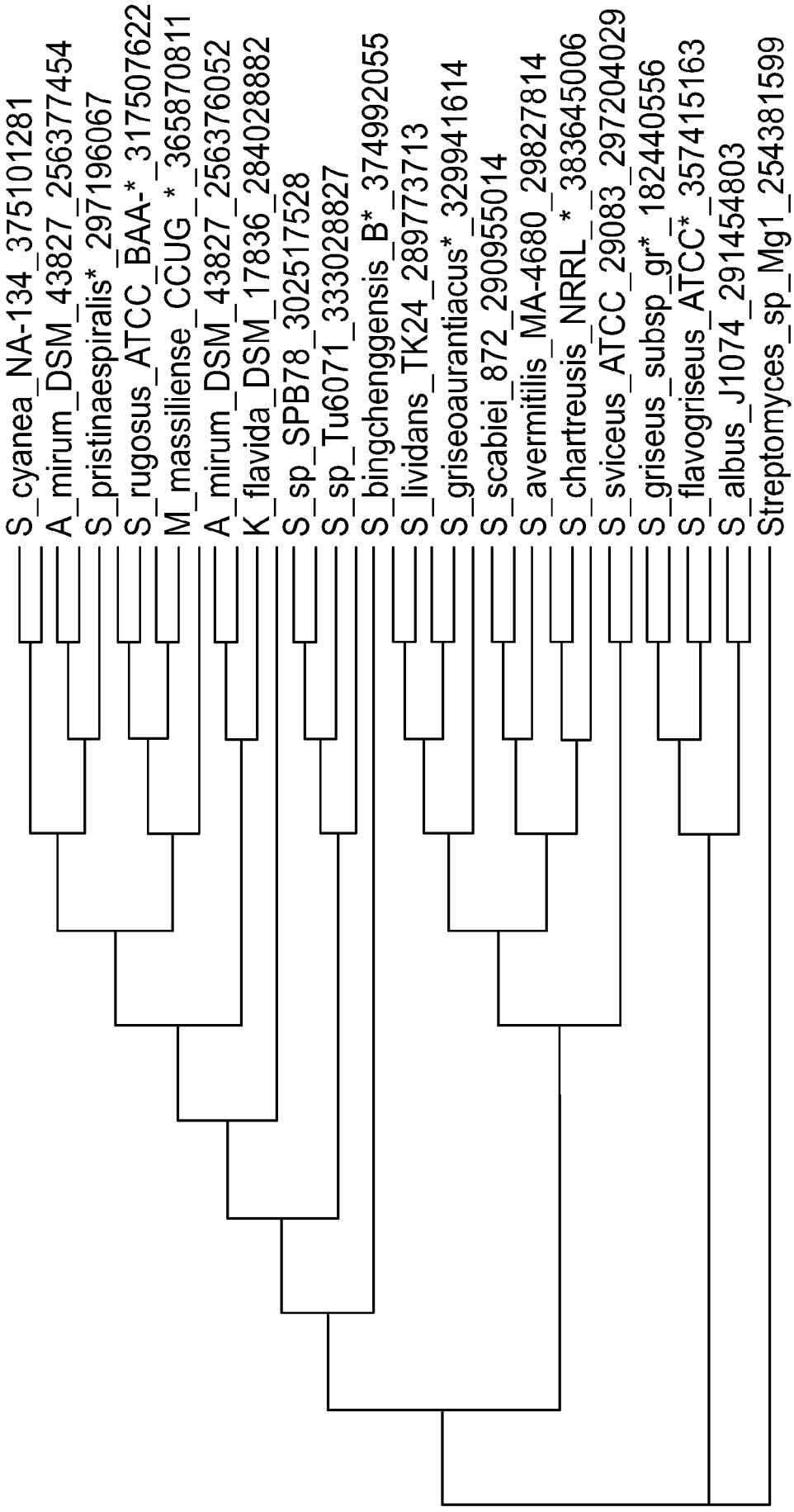

S_cyanea_NA-134_375101281
A_mirum_DSM_43827_256377454
S_pristinaespiralis*_297196067
S_rugosus_ATCC_BAA-*_317507622
M_massiliense_CCUG_*_365870811
A_mirum_DSM_43827_256376052
K_flavida_DSM_17836_284028882
S_sp_SPB78_302517528
S_sp_Tu6071_333028827
S_bingchenggensis_B*_374992055
S_lividans_TK24_289773713
S_griseoaurantiacus*_329941614
S_scabiei_872_290955014
S_avermitilis_MA-4680_29827814
S_chartreusis_NRRL_*_383645006
S_sviceus_ATCC_29083_297204029
S_griseus_subsp_gr*_182440556
S_flavogriseus_ATCC*_357415163
S_albus_J1074_291454803
Streptomyces_sp_Mg1_254381599

FIG. 22

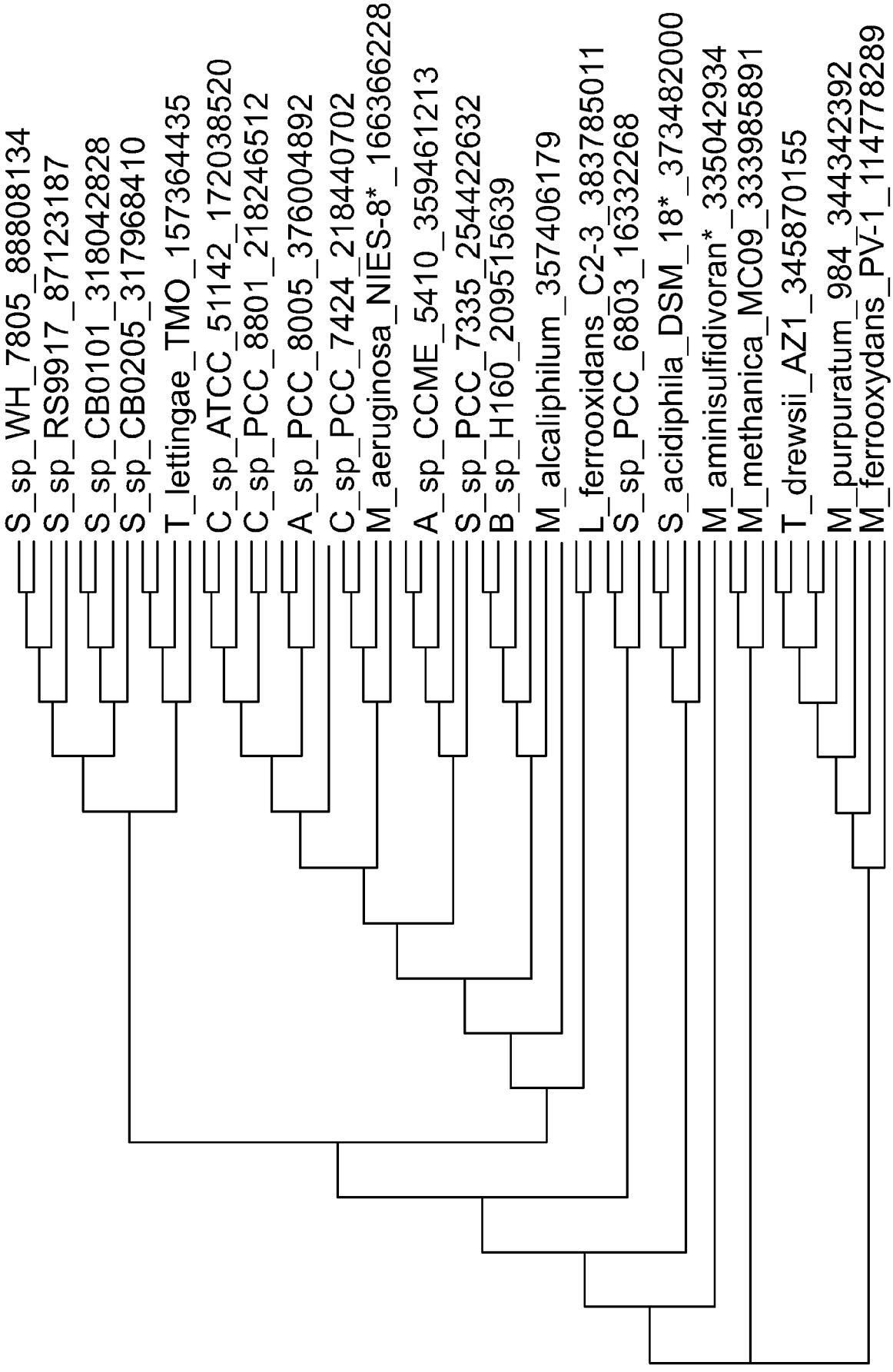

S_sp_WH_7805_88808134
S_sp_RS9917_87123187
S_sp_CB0101_318042828
S_sp_CB0205_317968410
T_lettingae_TMO_157364435
C_sp_ATCC_51142_172038520
C_sp_PCC_8801_218246512
A_sp_PCC_8005_376004892
C_sp_PCC_7424_218440702
M_aeruginosa_NIES-8*_166366228
A_sp_CCME_5410_359461213
S_sp_PCC_7335_254422632
B_sp_H160_209515639
M_alcaliphilum_357406179
L_ferrooxidans_C2-3_383785011
S_sp_PCC_6803_16332268
S_acidiphila_DSM_18*_373482000
M_aminisulfidivoran*_335042934
M_methanica_MC09_333985891
T_drewsii_AZ1_345870155
M_purpuratum_984_344342392
M_ferrooxydans_PV-1_114778289

FIG. 23

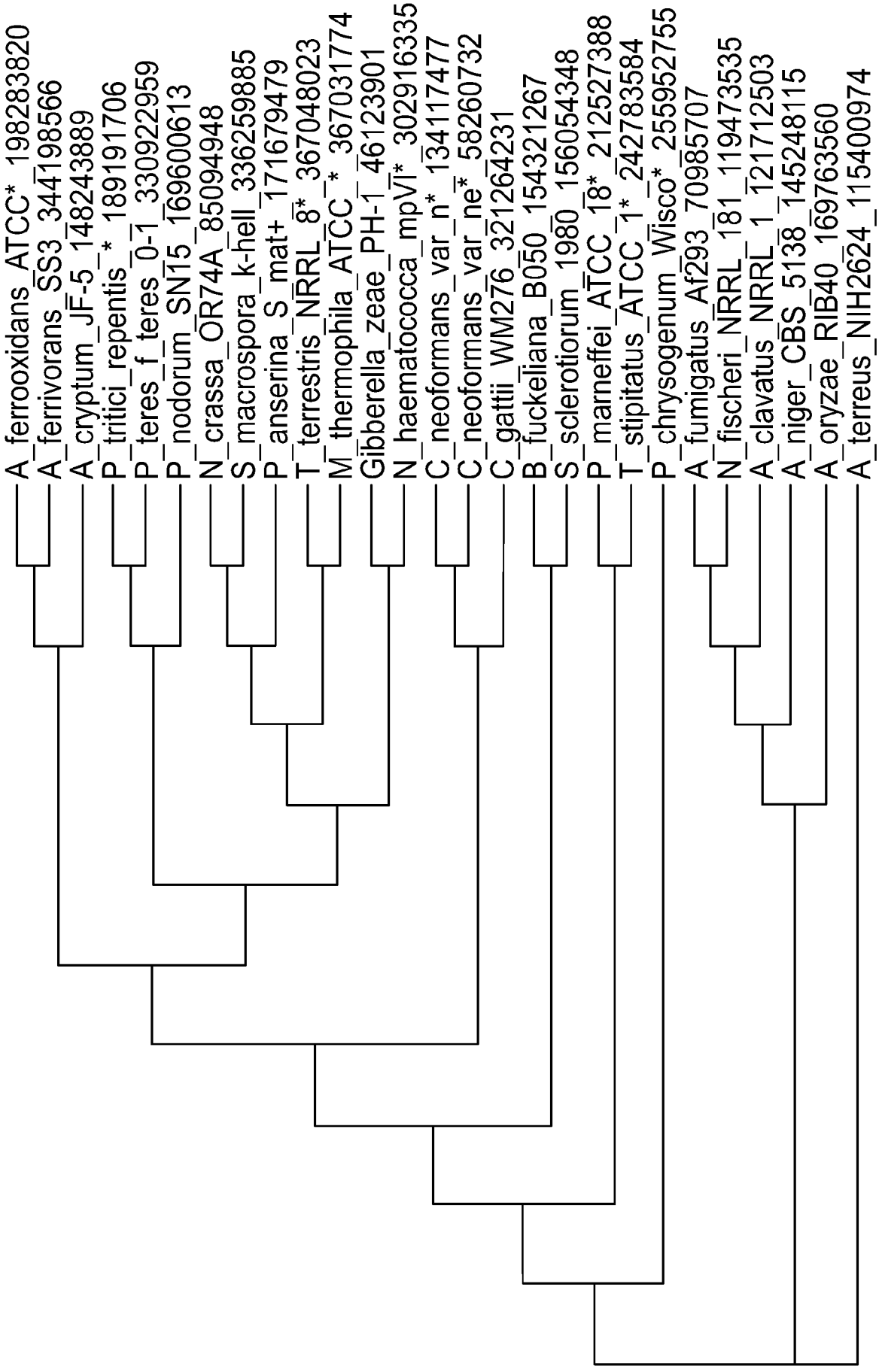

A_ferrooxidans_ATCC* 198283820
A_ferrivorans_SS3_344198566
A_cryptum_JF-5_148243889
P_tritici_repentis_* 189191706
P_teres_f_teres_0-1_330922959
P_nodorum_SN15_169600613
N_crassa_OR74A_85094948
S_macrospora_k-hell_336259885
P_anserina_S_mat+_171679479
T_terrestris_NRRL_8* 367048023
M_thermophila_ATCC_* 367031774
Gibberella_zeae_PH-1_46123901
N_haematococca_mpVI* 302916335
C_neoformans_var_n* 134117477
C_neoformans_var_ne* 58260732
C_gattii_WM276_321264231
B_fuckeliana_B050_154321267
S_sclerotiorum_1980_156054348
P_marneffei_ATCC_18* 212527388
T_stipitatus_ATCC_1* 242783584
P_chrysogenum_Wisco_* 255952755
A_fumigatus_Af293_70985707
N_fischeri_NRRL_181_119473535
A_clavatus_NRRL_1_121712503
A_niger_CBS_5138_145248115
A_oryzae_RIB40_169763560
A_terreus_NIH2624_115400974

FIG. 24

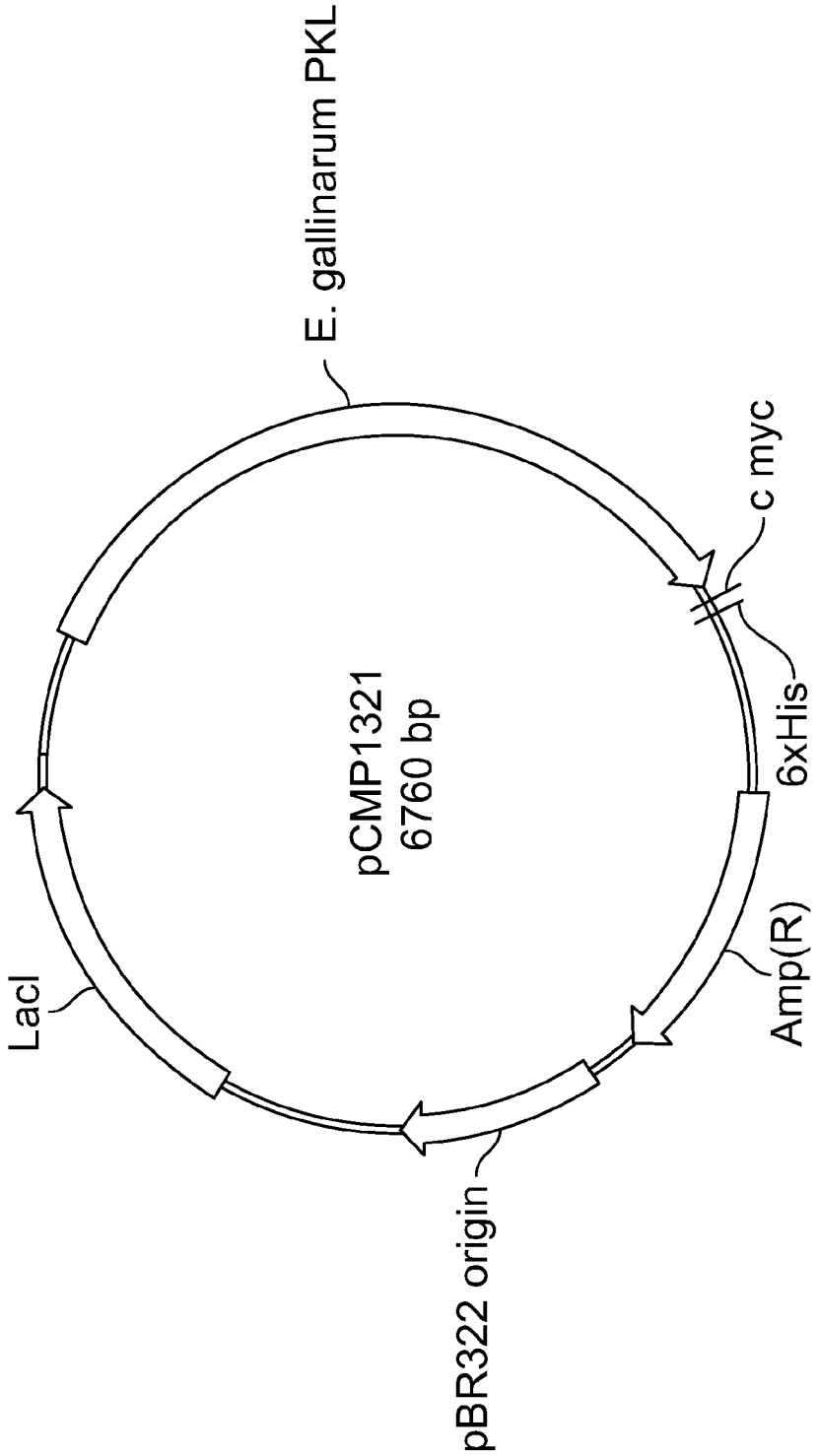

E. gallinarum PKL
c myc
6xHis
Amp(R)
pBR322 origin
LacI
pCMP1321
6760 bp

FIG. 25

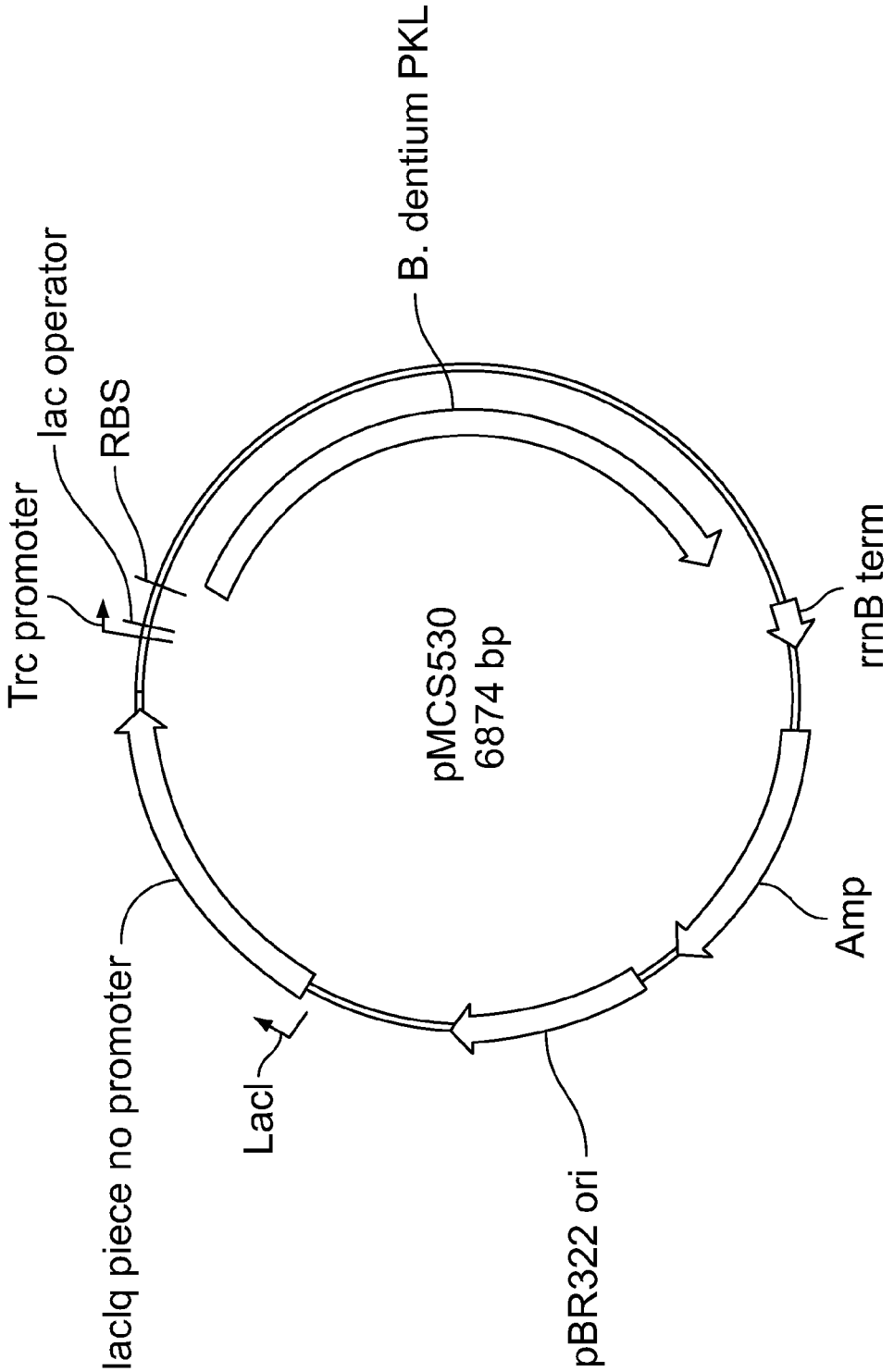

B. dentium PKL
lac operator
RBS
Trc promoter
pMCS530
6874 bp
rrnB term
Amp
pBR322 ori
LacI
laclq piece no promoter

FIG. 26

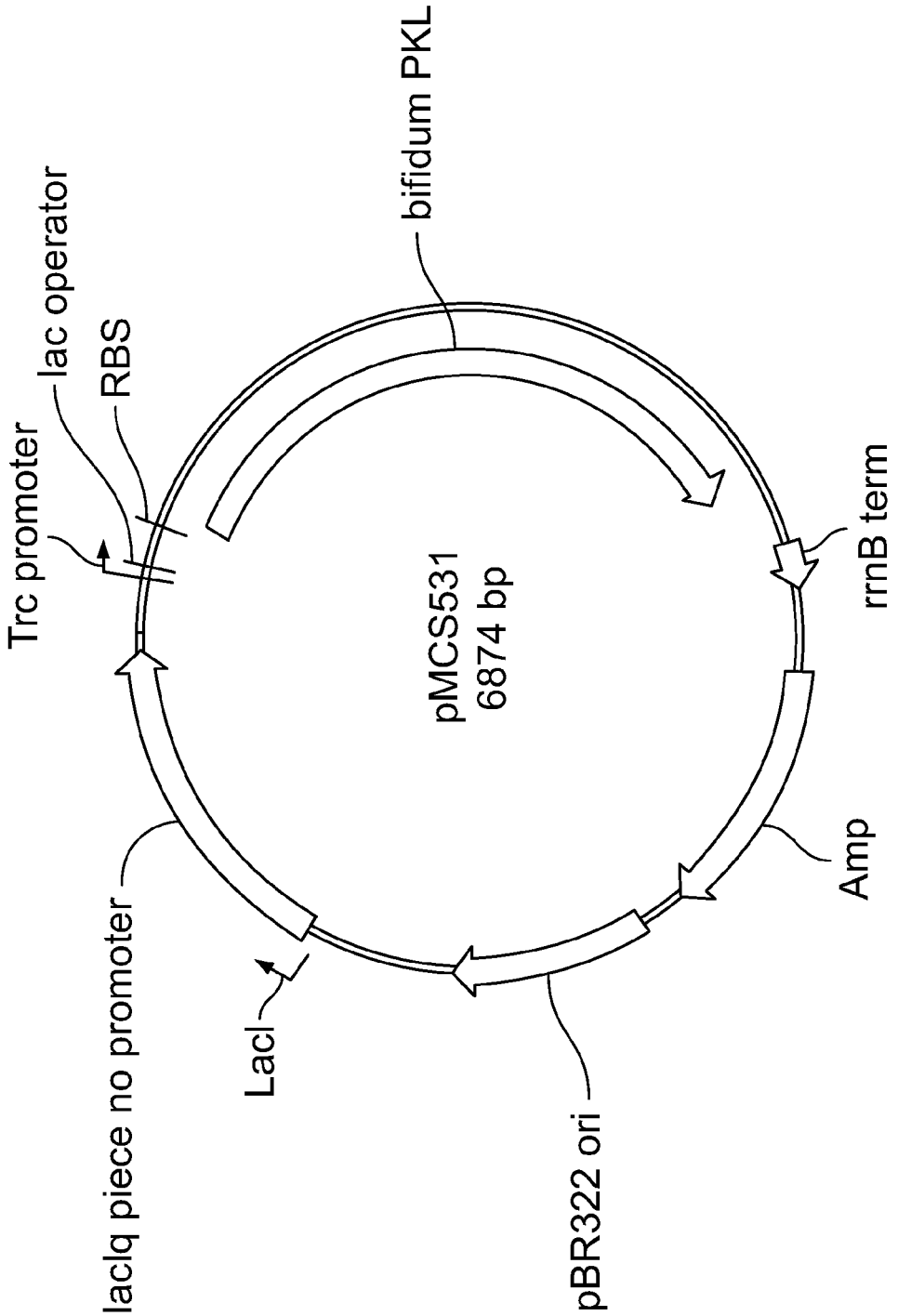

bifidum PKL
lac operator
RBS
Trc promoter
pMCS531
6874 bp
rrnB term
Amp
pBR322 ori
LacI
laclq piece no promoter

FIG. 27

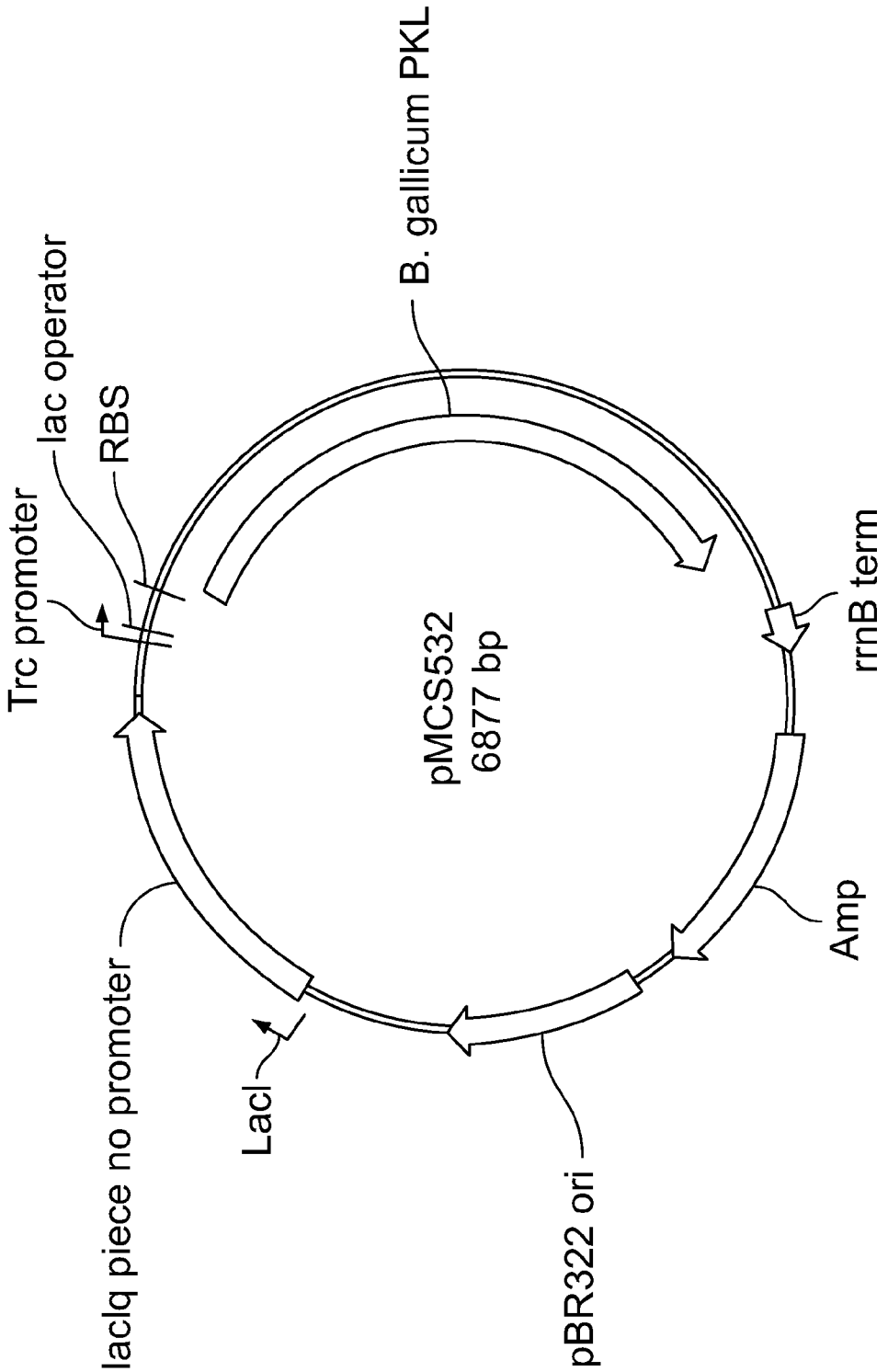

B. gallicum PKL
lac operator
RBS
Trc promoter
pMCS532
6877 bp
rrnB term
Amp
pBR322 ori
LacI
laclq piece no promoter

FIG. 28

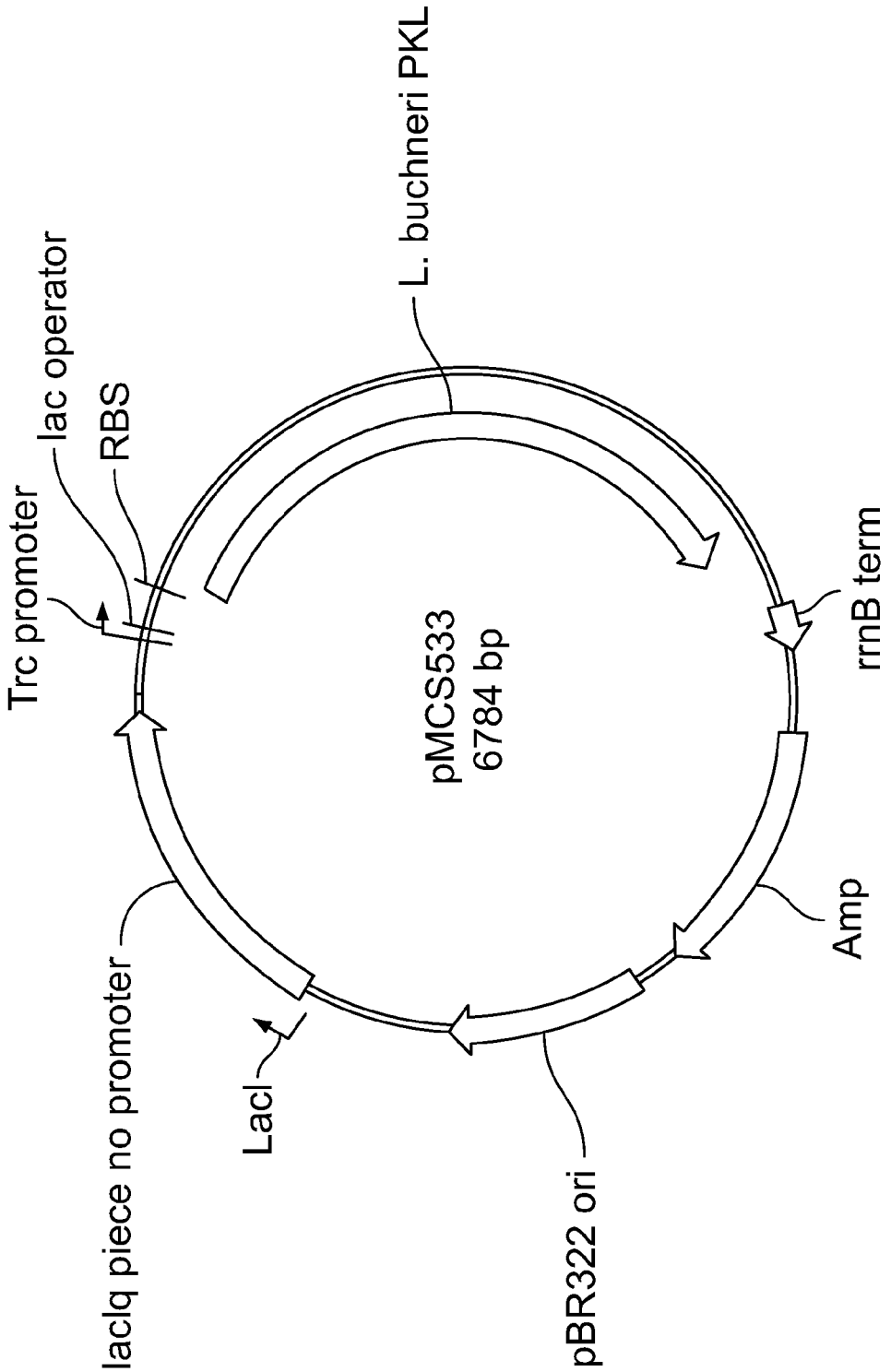

L. buchneri PKL
lac operator
RBS
Trc promoter
pMCS533
6784 bp
rrnB term
Amp
pBR322 ori
LacI
laclq piece no promoter

FIG. 29

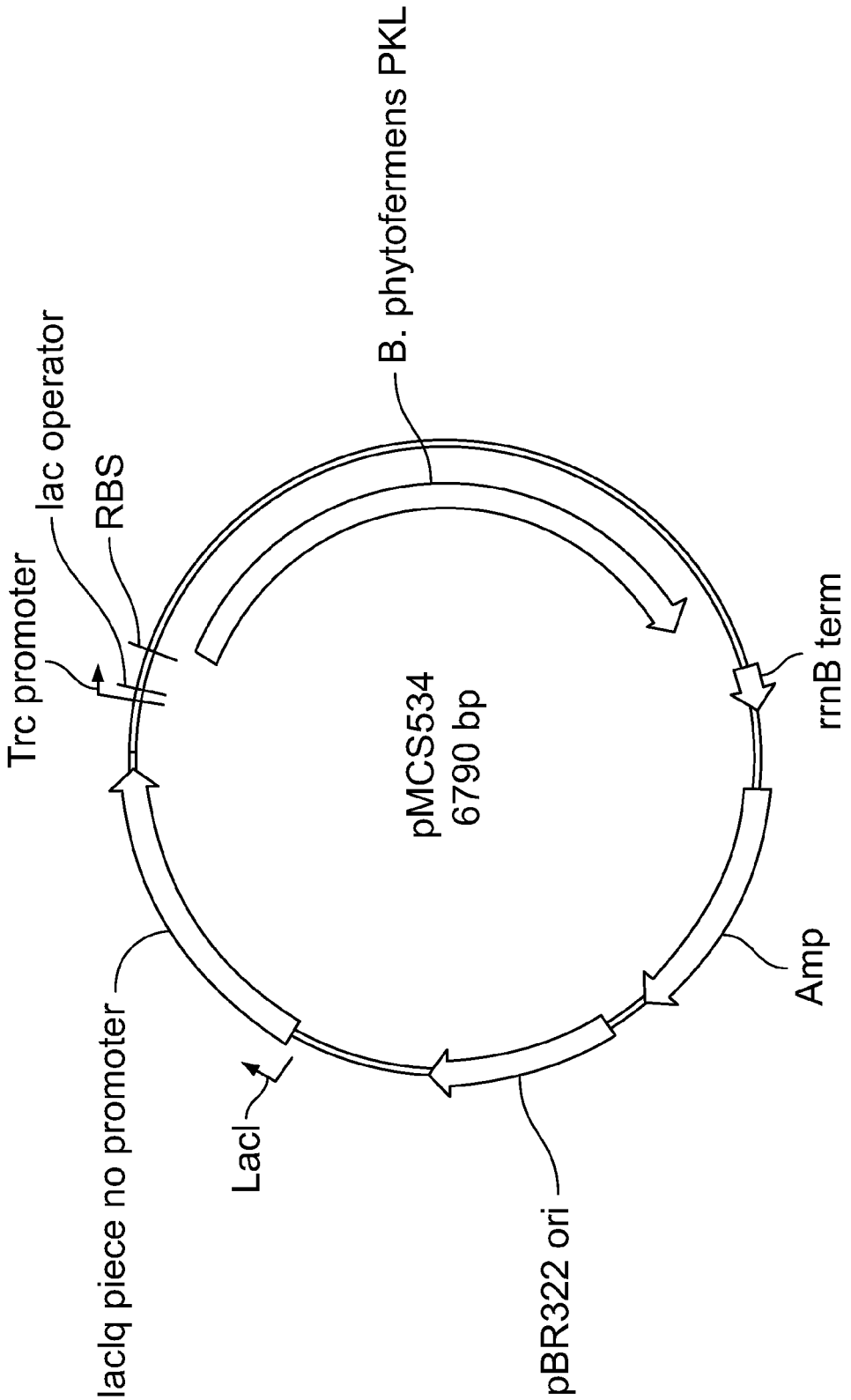

B. phytofermens PKL
lac operator
RBS
Trc promoter
pMCS534
6790 bp
rrnB term
Amp
pBR322 ori
LacI
laclq piece no promoter

FIG. 30

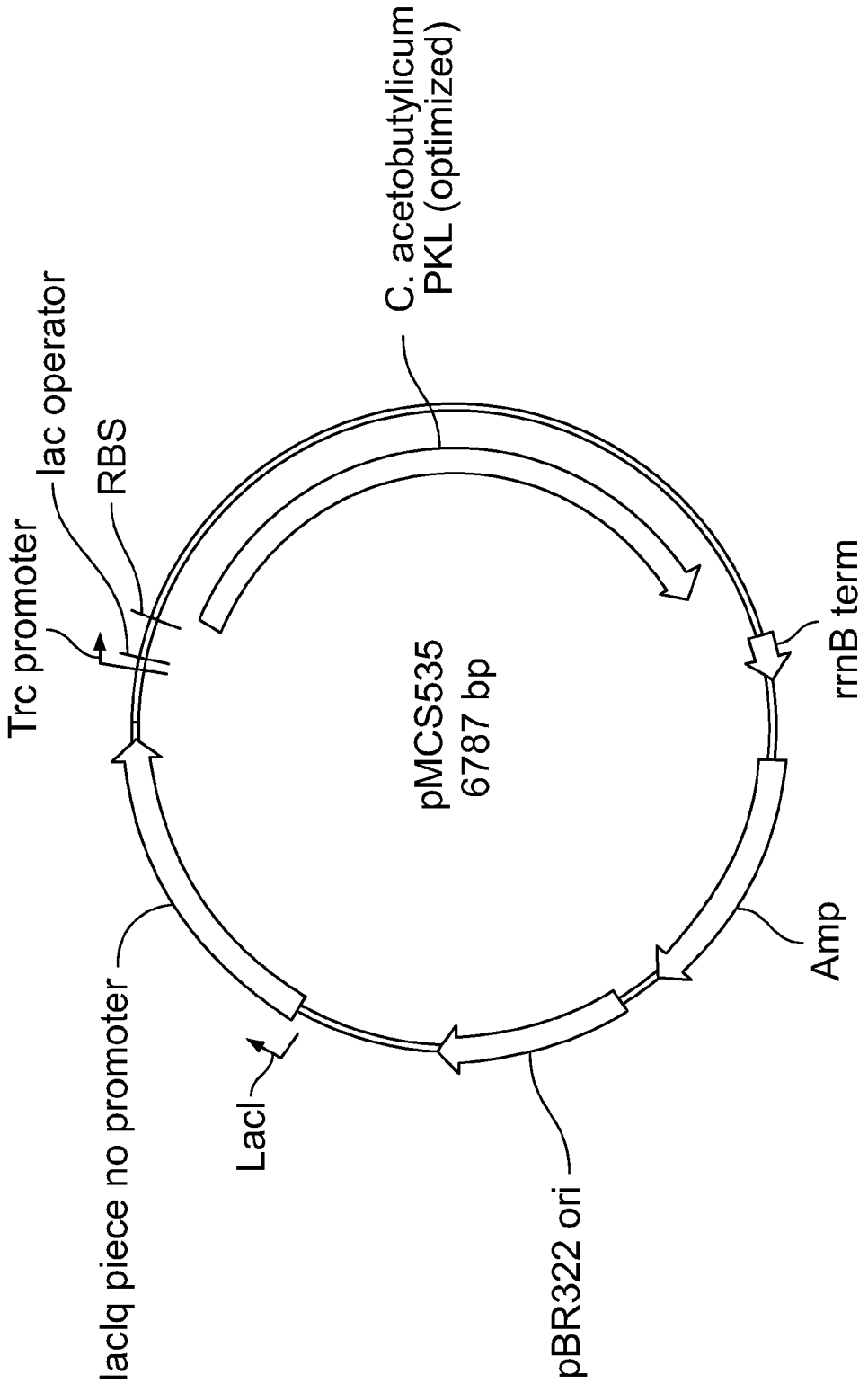

C. acetobutylicum
PKL (optimized)
lac operator
RBS
Trc promoter
pMCS535
6787 bp
rrnB term
Amp
pBR322 ori
LacI
laclq piece no promoter

FIG. 31

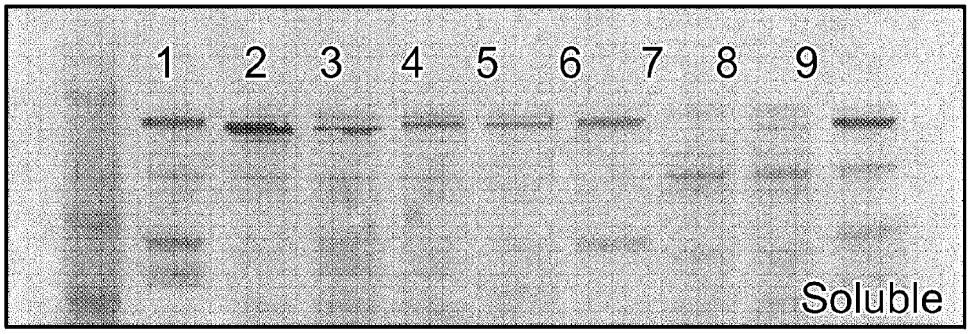


FIG. 32A

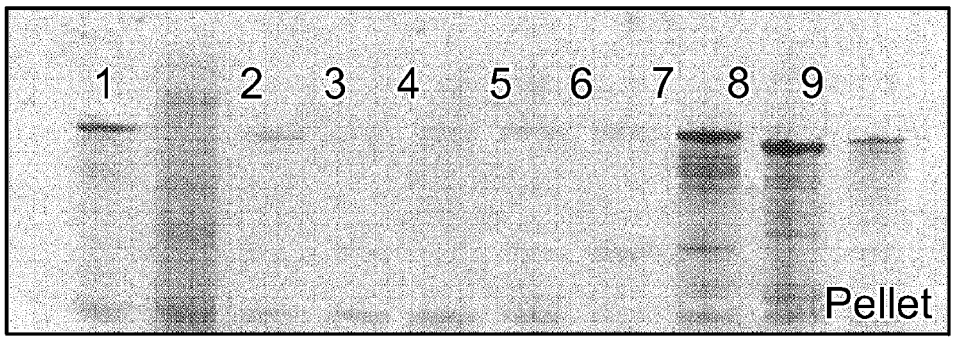


FIG. 32B

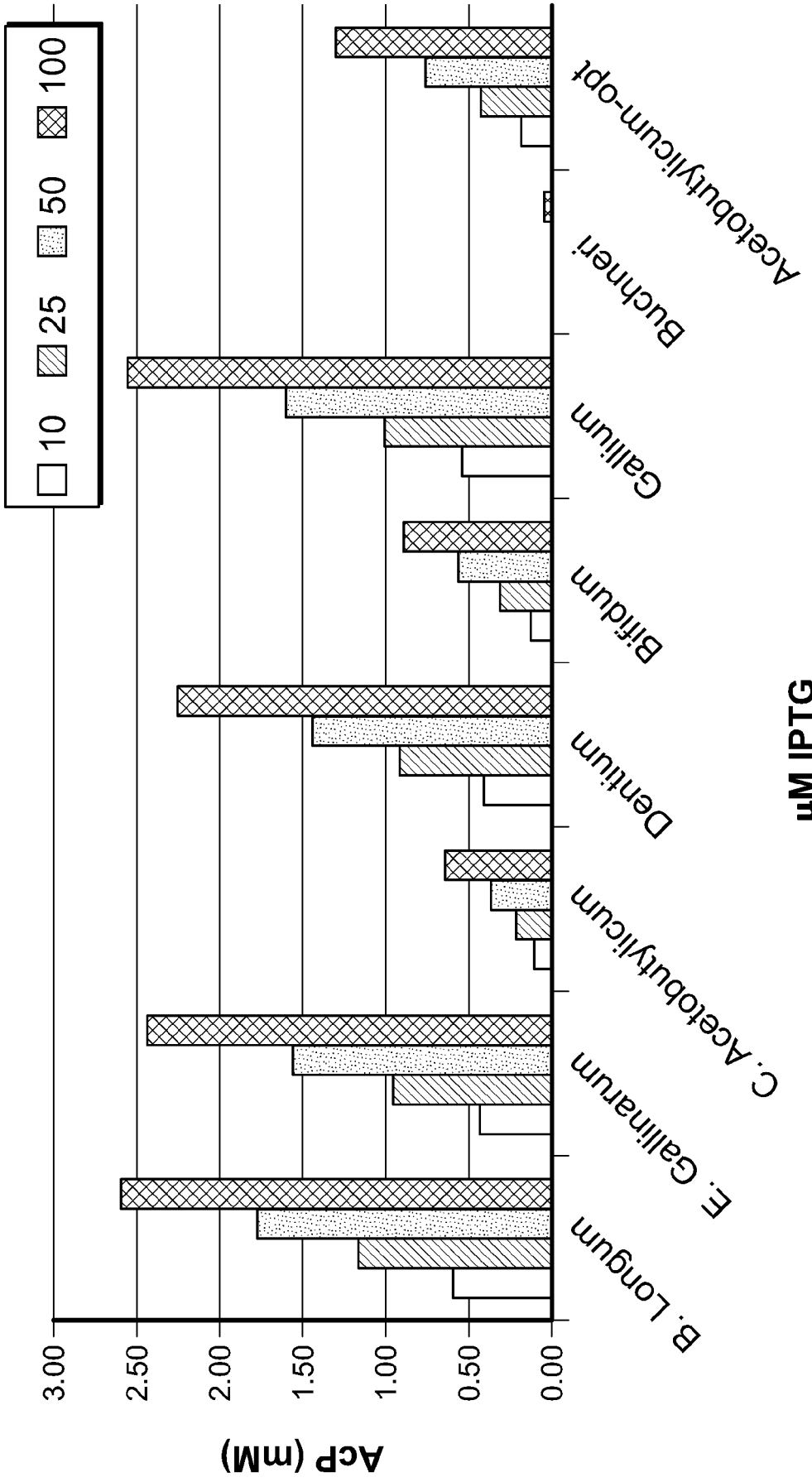

10
25
50
100
Acetobutylicum-opt
Buchneri
Gallium
Bifidum
Dentium
C. Acetobutylicum
E. Gallinarum
B. Longum
3.00
2.50
2.00
1.50
1.00
0.50
0.00
AcP (mM)
µM IPTG

FIG. 33

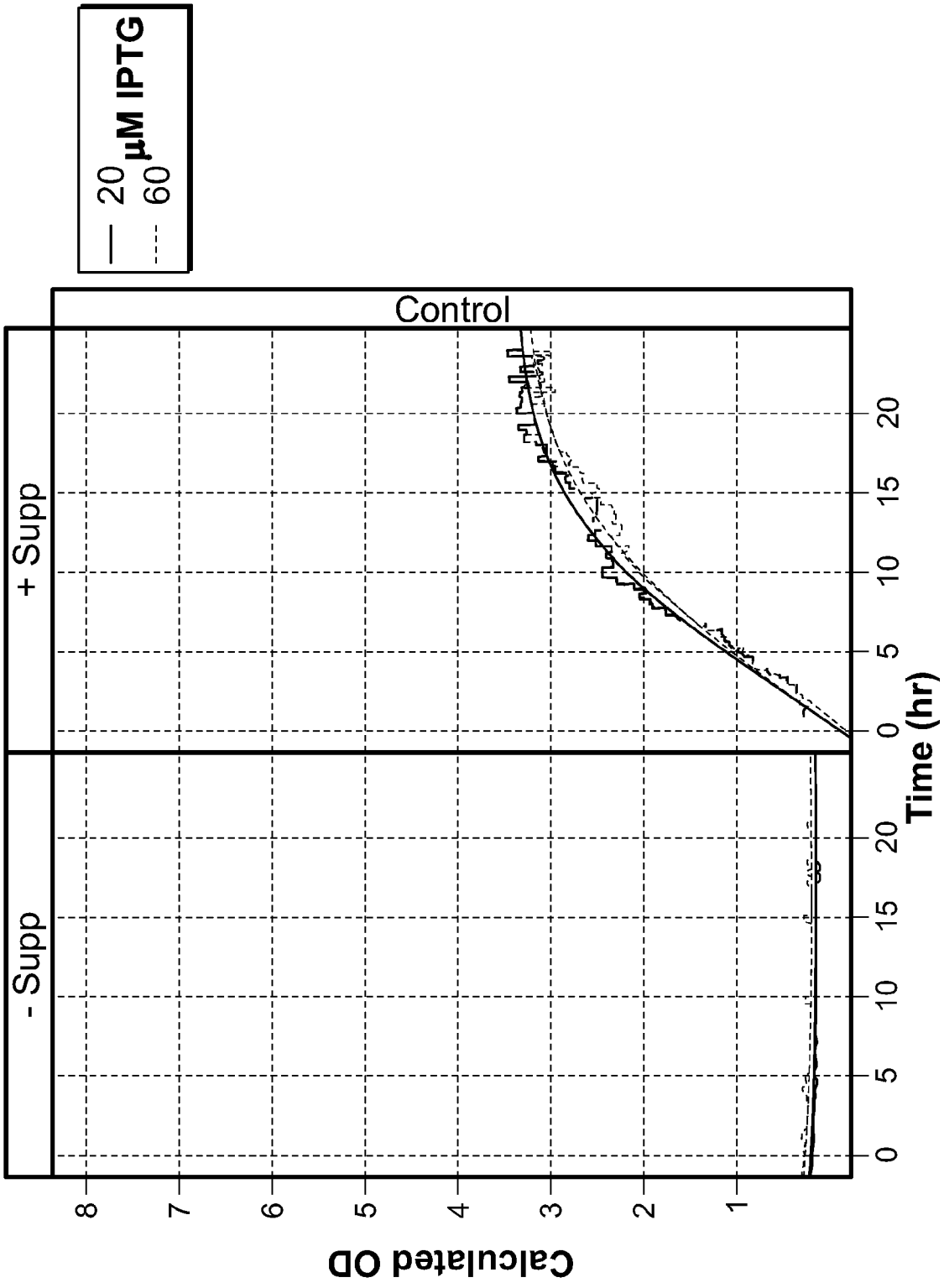

20 µM IPTG
60
Control
+ Supp
- Supp
Calculated OD
Time (hr)
0
5
10
15
20
1
2
3
4
5
6
7
8

FIG. 34

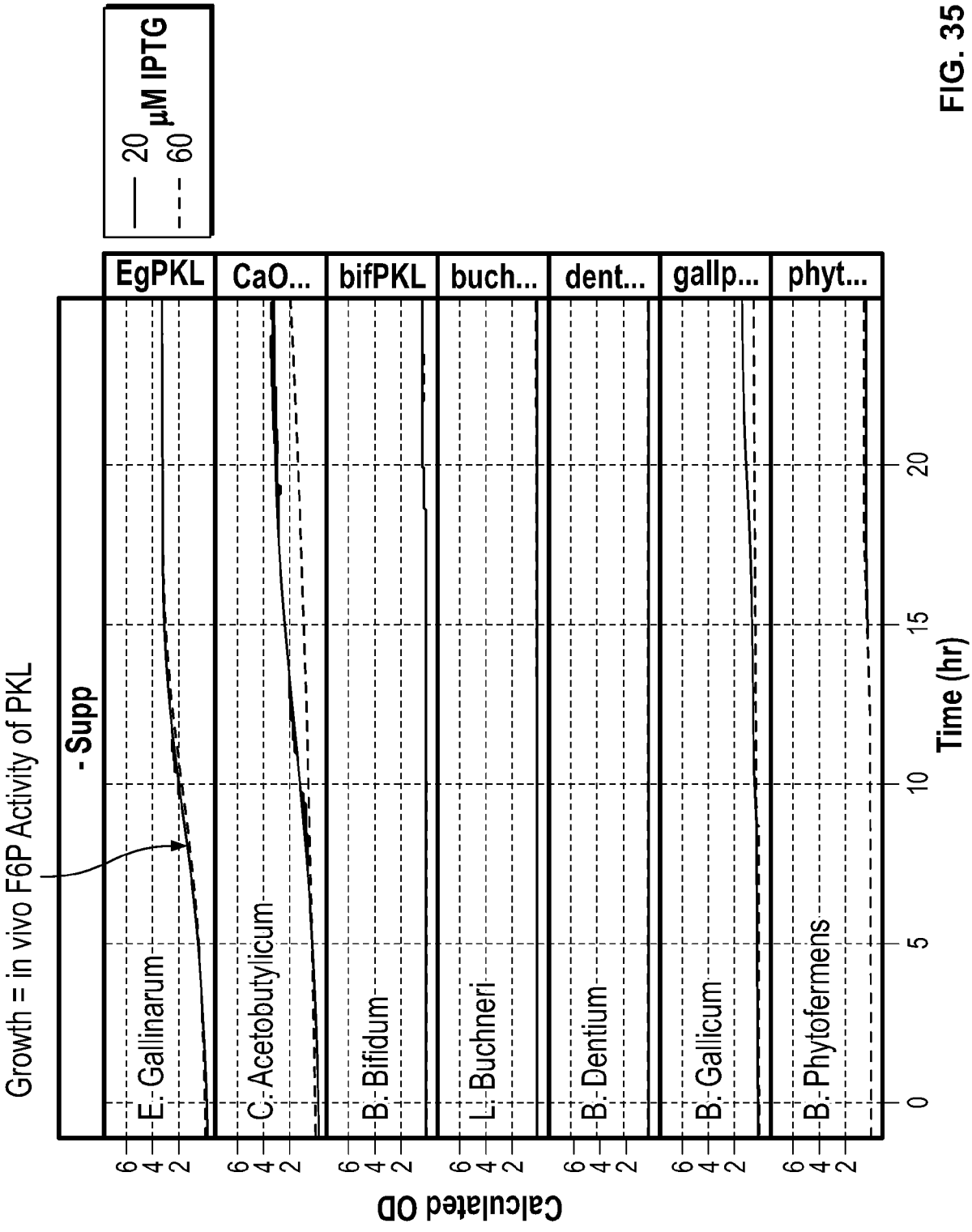

20 µM IPTG
60
EgPKL
CaO...
bifPKL
buch...
dent...
gallp...
phyt...
- Supp
Growth = in vivo F6P Activity of PKL
E. Gallinarum
C. Acetobutylicum
B. Bifidum
L. Buchneri
B. Dentium
B. Gallicum
B. Phytofermens
Calculated OD
Time (hr)
0
5
10
15
20
2
4
6

FIG. 35

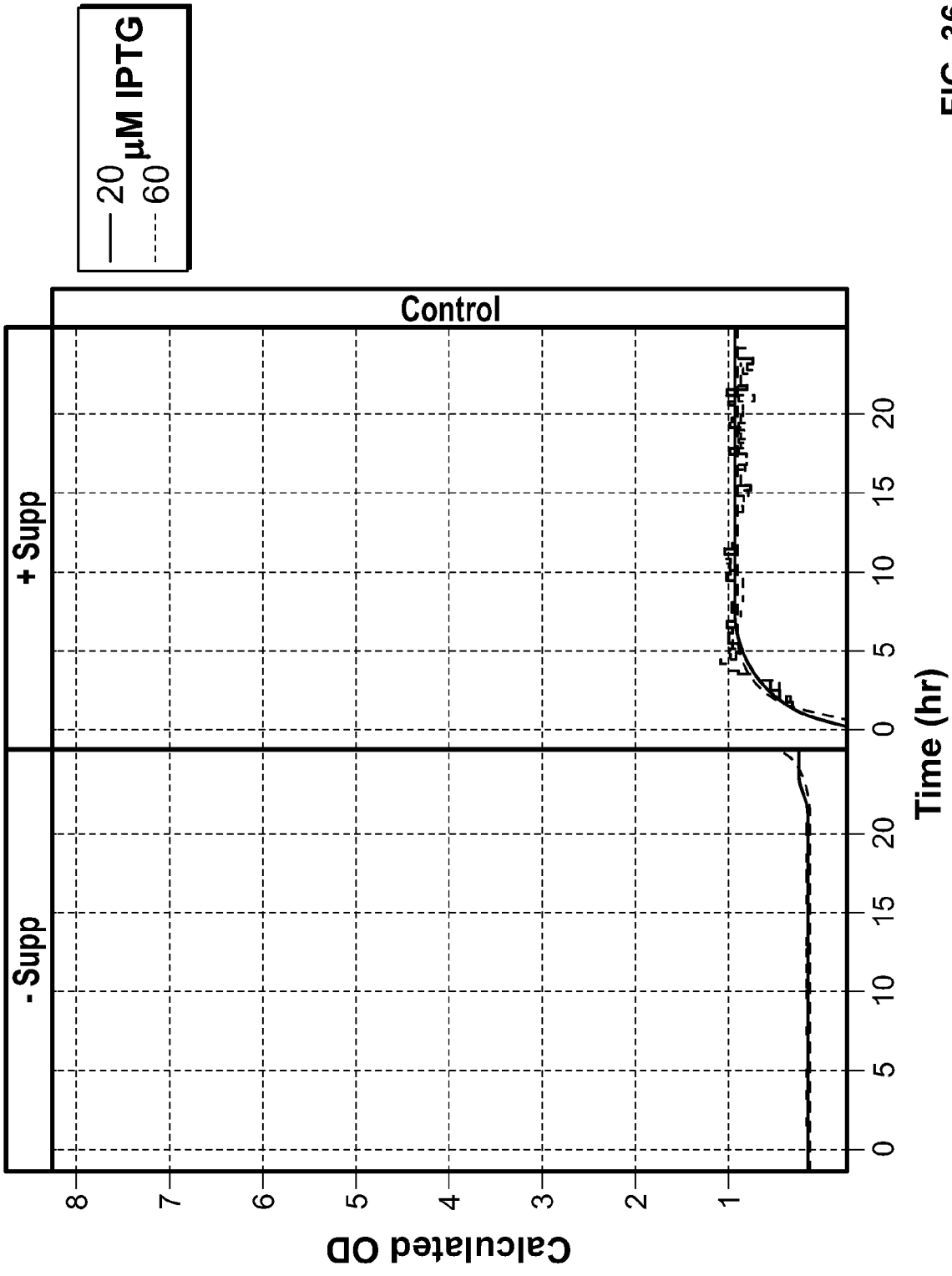

20 µM IPTG
60
Control
+ Supp
- Supp
Calculated OD
Time (hr)
0
5
10
15
20
1
2
3
4
5
6
7
8

FIG. 36

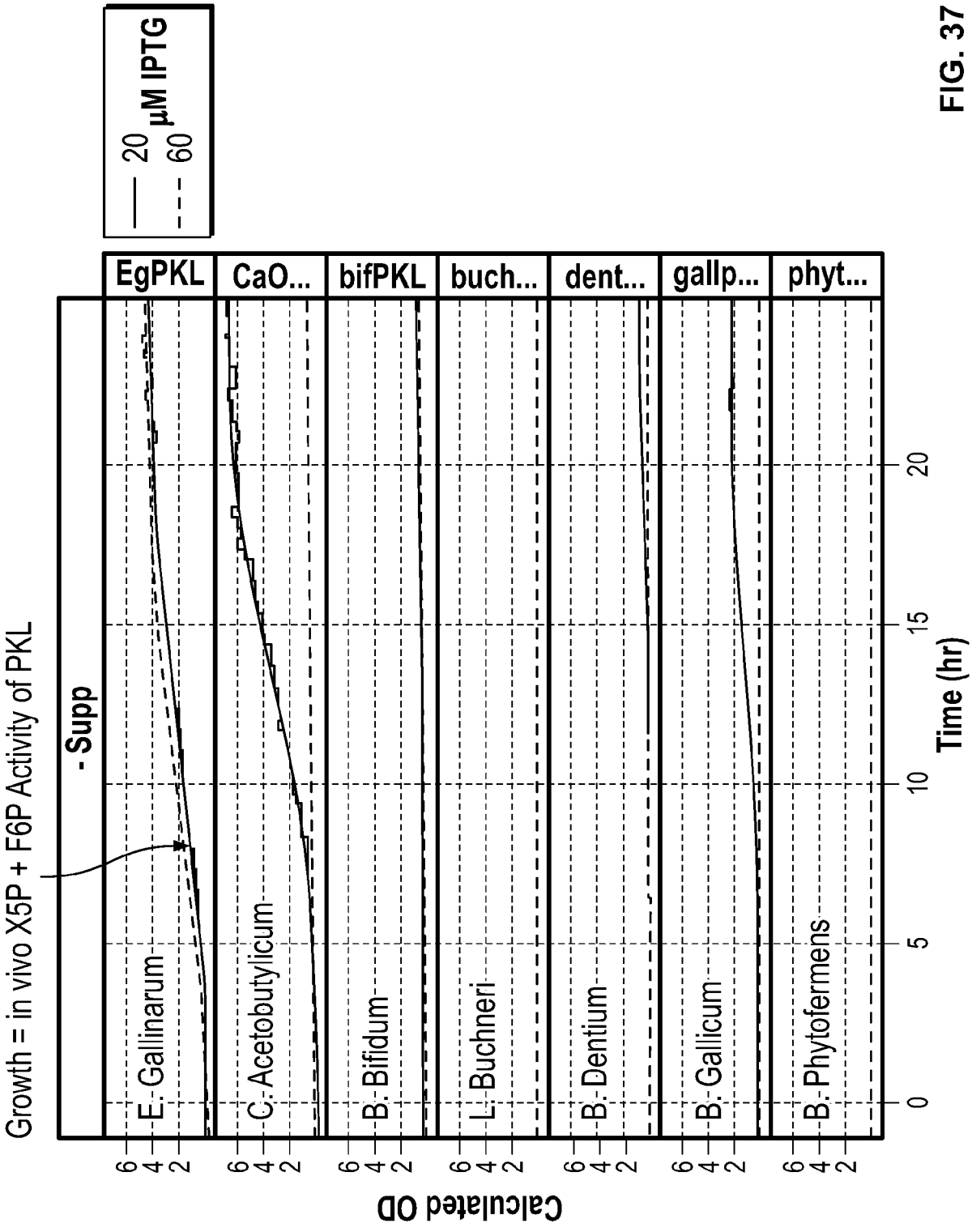

20 µM IPTG
60
EgPKL
CaO...
bifPKL
buch...
dent...
gallp...
phyt...
Growth = in vivo X5P + F6P Activity of PKL
- Supp
E. Gallinarum
C. Acetobutylicum
B. Bifidum
L. Buchneri
B. Dentium
B. Gallicum
B. Phytofermens
Calculated OD
Time (hr)
0
5
10
15
20
2
4
6

FIG. 37

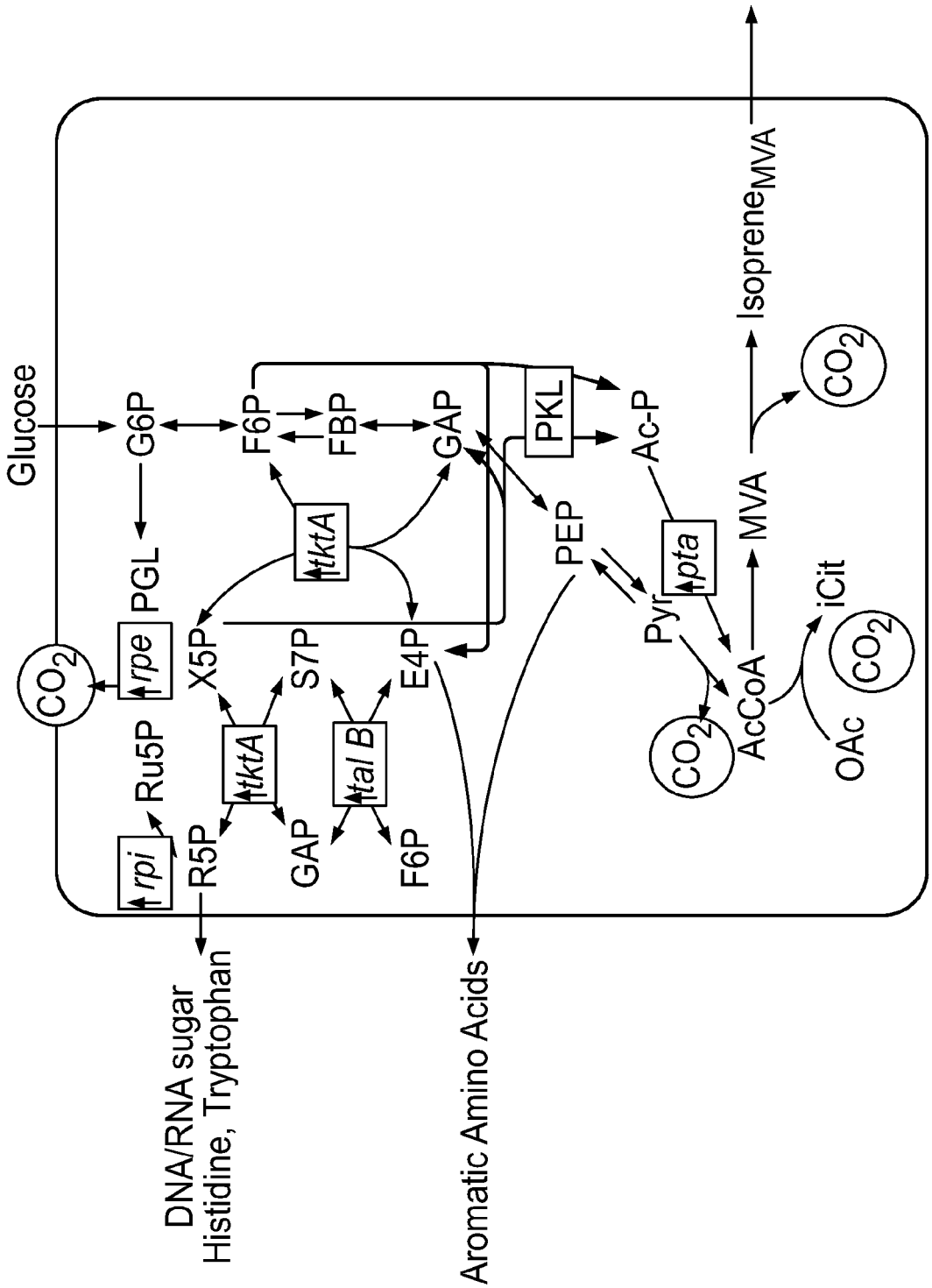

Glucose
G6P
F6P
FBP
GAP
PKL
Ac-P
Isoprene
MVA
CO2
PGL
rpe
X5P
tktA
PEP
pta
Pyr
AcCoA
iCit
CO2
CO2
CO2
Ru5P
rpi
R5P
tktA
S7P
tal B
GAP
F6P
E4P
OAc
DNA/RNA sugar
Histidine, Tryptophan
Aromatic Amino Acids

FIG. 38

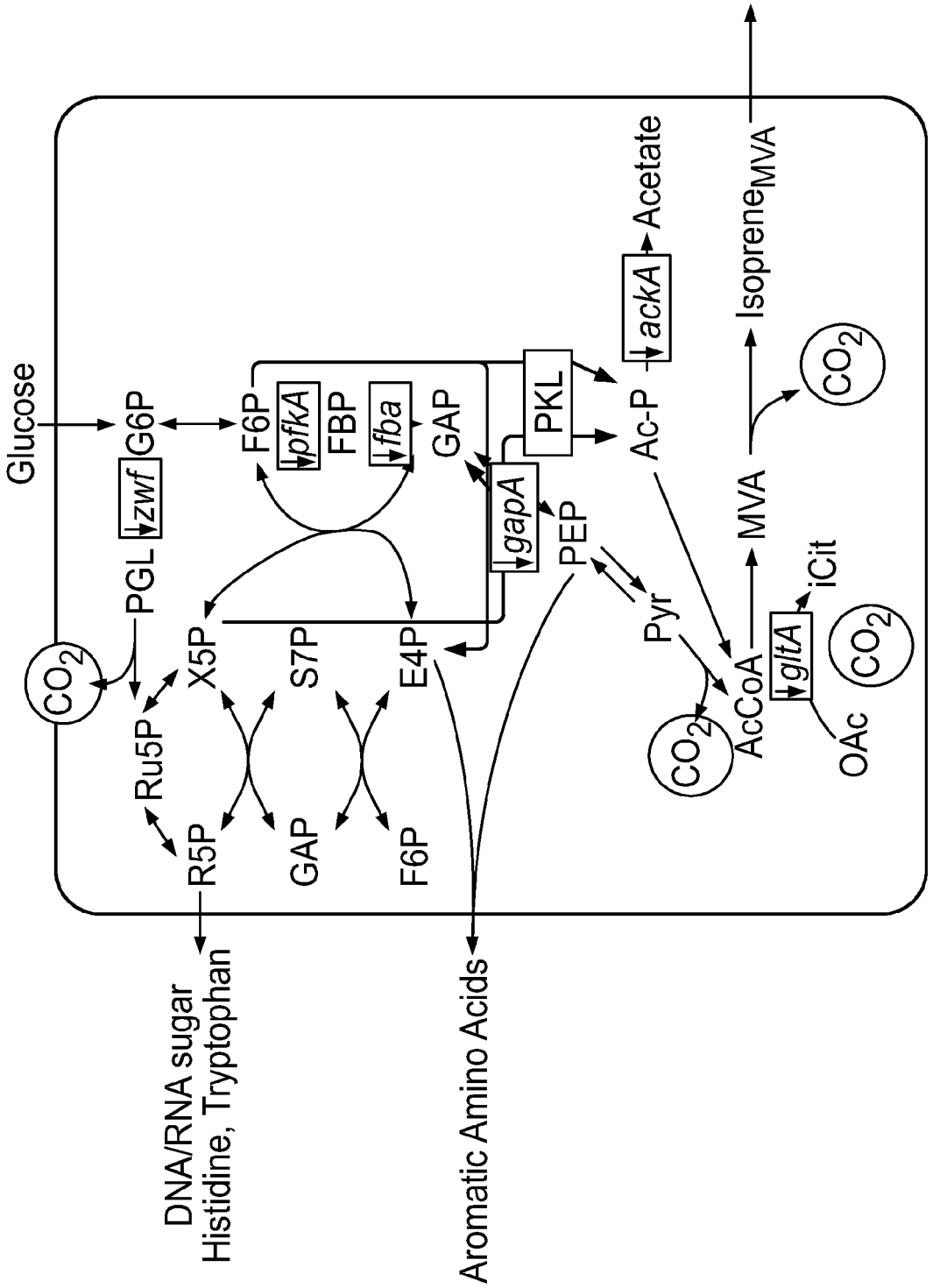

Glucose
G6P
zwf
PGL
CO2
X5P
Ru5P
R5P
S7P
GAP
E4P
F6P
pfkA
FBP
fba
GAP
F6P
gapA
PEP
PKL
Ac-P
ackA
Acetate
Isoprene
MVA
MVA
CO2
Pyr
CO2
AcCoA
gltA
iCit
CO2
OAc
DNA/RNA sugar
Histidine, Tryptophan
Aromatic Amino Acids

FIG. 39

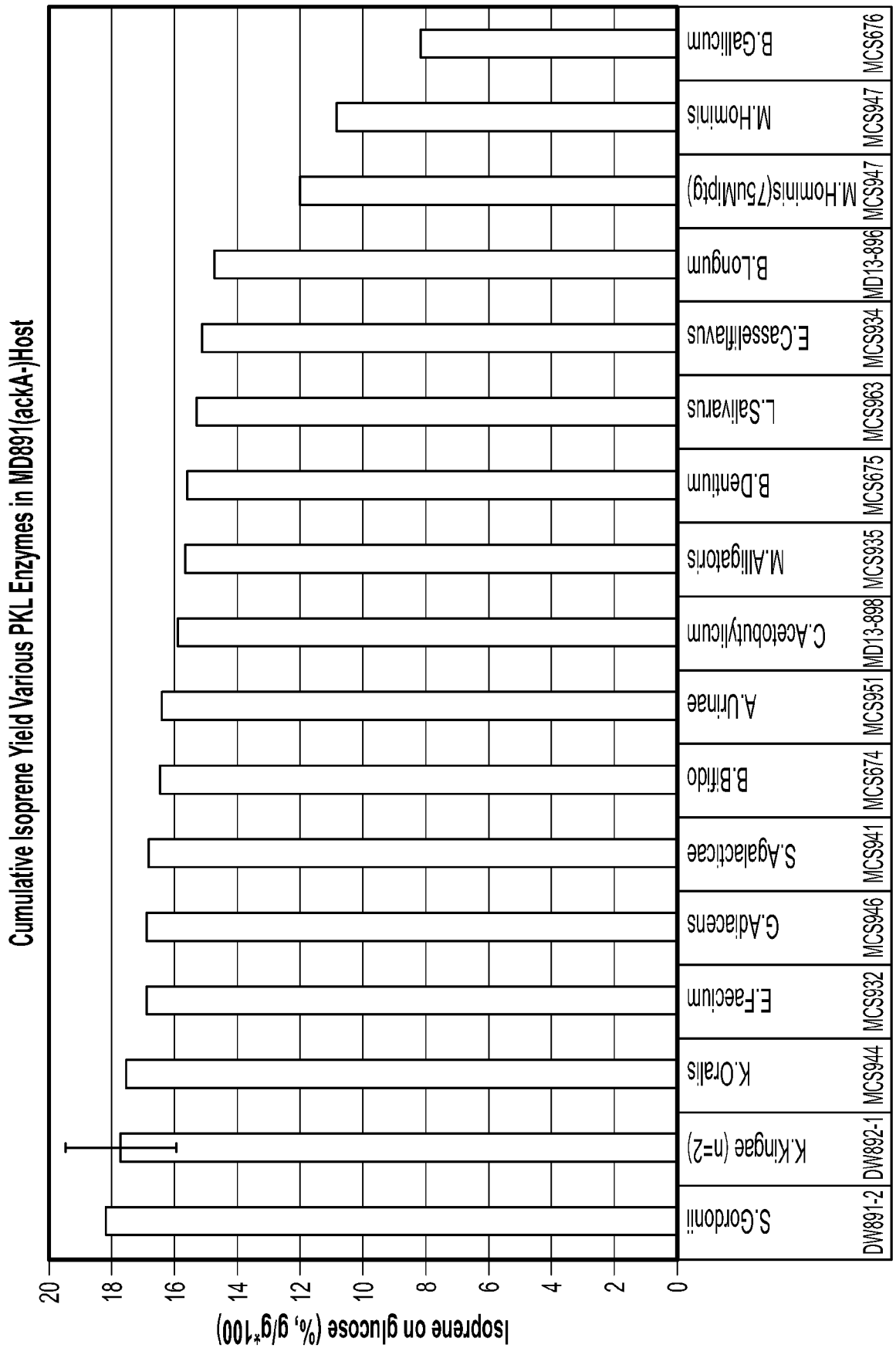

Cumulative Isoprene Yield Various PKL Enzymes in MD891(ackA-)Host
Isoprene on glucose (%, g/g*100)
0
2
4
6
8
10
12
14
16
18
20
S.Gordonii DW891-2
K.Kingae (n=2) DW892-1
K.Oralis MCS944
E.Faecium MCS932
G.Adiacens MCS946
S.Agalacticae MCS941
B.Bifido MCS674
A.Urinae MCS951
C.Acetobutylicum MD13-898
M.Alligatoris MCS935
B.Dentium MCS675
L.Salivarus MCS963
E.Casseliflavus MCS934
B.Longum MD13-896
M.Hominis(75uMIptg) MCS947
M.Hominis MCS947
B.Gallicum MCS676

FIG. 40

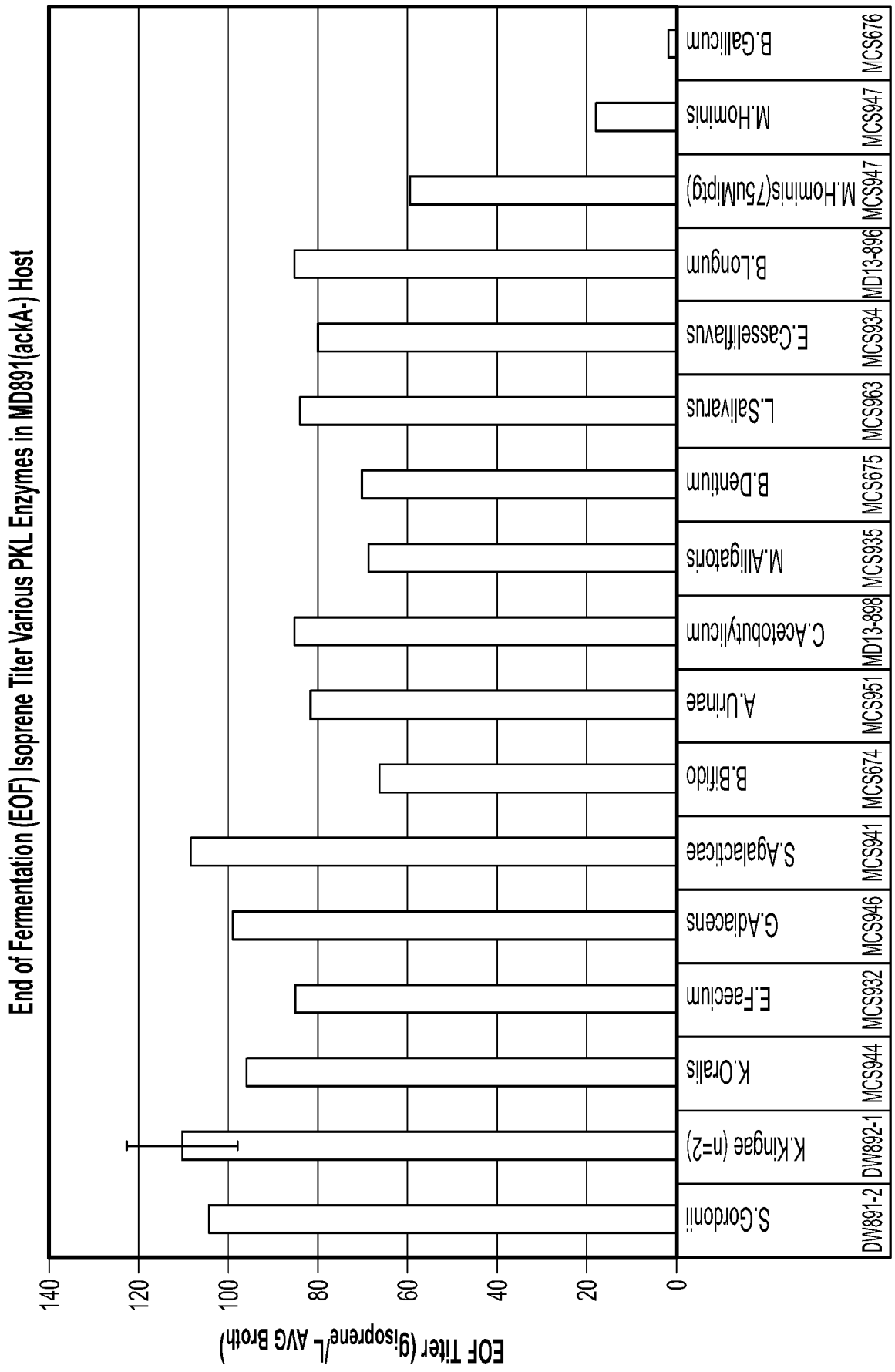

End of Fermentation (EOF) Isoprene Titer Various PKL Enzymes in MD891(ackA-) Host
EOF Titer (gIsoprene/L AVG Broth)
0
20
40
60
80
100
120
140
DW891-2 S.Gordonii
DW892-1 K.Kingae (n=2)
MCS944 K.Oralis
MCS932 E.Faecium
MCS946 G.Adiacens
MCS941 S.Agalacticae
MCS674 B.Bifido
MCS951 A.Urinae
MD13-898 C.Acetobutylicum
MCS935 M.Alligatoris
MCS675 B.Dentium
MCS963 L.Salivarus
MCS934 E.Casseliflavus
MD13-896 B.Longum
MCS947 M.Hominis(75uM/ptg)
MCS947 M.Hominis
MCS676 B.Gallicum

FIG. 41

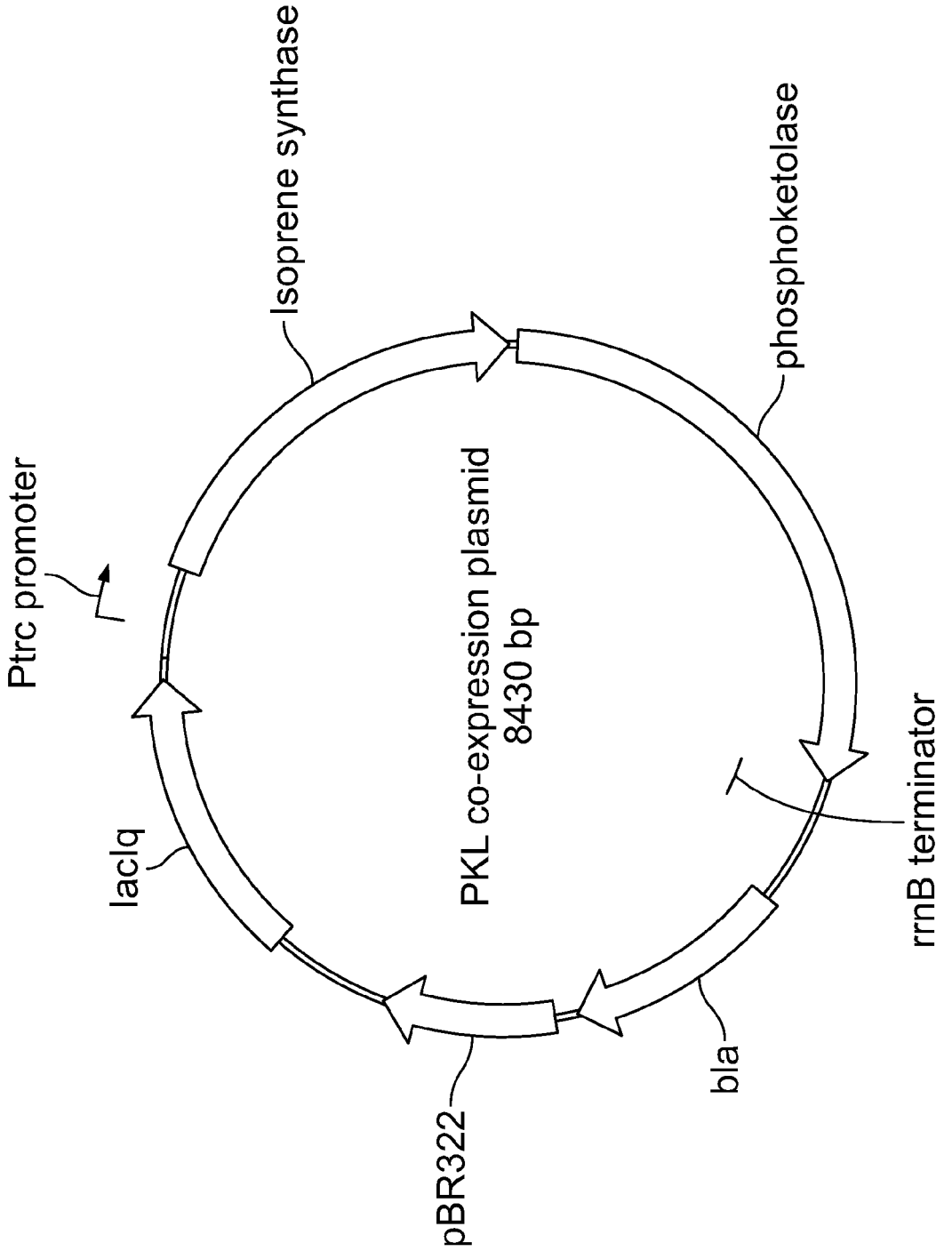

Isoprene synthase
phosphoketolase
Ptrc promoter
PKL co-expression plasmid
8430 bp
laclq
rrnB terminator
pBR322
bla

FIG. 42