

FIG. 1A

type 1 fimbriae D-mannose specific adhesin [Escherichia coli FimH J96 ELL41155.1 [E.coli J96]; 300 aa

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1 MKRVITLFAV LLMGWSVNAW SFACKTANGT AIPIGGGSAN VYVNLAPVVN
  51 VGQNLVVDLS TQIFCHNDYP ETITDYVTLQ RGSAYGGVLS NFSGTVKYSG
 101 SSYPFPTTSE TPRVVYNSRT DKPWPVALYL TPVSSAGGVA IKAGSLIAVL
 151 ILRQTNNYNS DDFQFVWNIY ANNDVVVPTG GCDVSARDVT VTLPDYPGVS
 201 PIPLTVYCAK SQNLGYLISG TTADAGNSIF TNTASFSPAQ GVGVLTRNG
 251 TIIPANNTVS LGAVGTSAVS LGLTANYART GGQVTAGNVQ SIIGVTFVYQ
(SEQ ID NO: 1)

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FimH J96 sequence

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1 MKRVITLFAV LLMGWSVNAW SFACKTANGT AIPIGGGSAN VYVNLAPVVN
  51 VGQNLVVDLS TQIFCHNDYP ETITDYVTLQ RGSAYGGVLS NFSGTVKYSG
 101 SSYPFPTTSE TPRVVYNSRT DKPWPVALYL TPVSSAGGVA IKAGSLIAVL
 151 ILRQTNNYNS DDFQFVWNIY ANNDVVVPTG GCDVSARDVT VTLPDYPGVS
 201 PIPLTVYCAK SQNLGYLISG TTADAGNSIF TNTASFSPAQ GVGVLTRNG
 251 TIIPANNTVS LGAVGTSAVS LGLTANYART GGQVTAGNVQ SIIGVTFVYQ (SEQ ID
NO: 1)

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Fragment of FimH, corresponding to aa residues 22-300 of SEQ ID NO: 1 [mature FimH protein]

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1 facktangt aipiggggsan vyvnlapvvv vgqnlvvdls tqifchndyp etitdyvtlq
rgsayggvls nfsgrtkysg ssypfpttse tprvvynsrt dkpwpvalyl tpvssaggva
ikagsliavl ilrqtnnyns ddfqfvwniy anndvvvptg gcdvsardvt vtldpypgsv
pipltvycak sqnlgyylsg ttadagnsif tntasfspa qvgvqltrng tiipanntvs
lgavgtsavs lglanyart ggqvtagnvq siigvtfvyq 279 (SEQ ID NO: 2)

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FimH lectin domain (SEQ ID NO: 3, which corresponds to aa residues 1–158 of SEQ ID NO: 2)

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1 facktangt aipiggggsan vyvnlapvvv vgqnlvvdls tqifchndyp etitdyvtlq
rgsayggvls nfsgrtkysg ssypfpttse tprvvynsrt dkpwpvalyl tpvssaggva
ikagsliavl ilrqtnnyns ddfqfvwniy anndvvv 158 (SEQ ID NO: 3)

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FIG. 1A continued

FIG. 1A continued

FimH pilin domain (SEQ ID NO: 4, which corresponds to aa residues 160–279 of SEQ ID NO: 2)

160 gcdvsardvt vtlpdypgsv pipltvycak sqnlgyylsg ttadagnsif tntasfspa
gvgvqltrng tiipanntvs lgavgtssavs lgltanyart ggqvtagnvq siigvtfvyq 279
(SEQ ID NO: 4)

pSB02198 - FimH mlgK signal pept / F22..Q300 J96 FimH N28S V48C L55C N91S N249Q / 7 AA linker / FimG A1..K14 / GGH8 in pcDNA3.1(+)

VETDTLLLWVLLLWVPGSTGFACKTASGTAIPIGGGSANVYVNLAPCVNVGQNCVVDLSTQI
FCHNDYPETITDYVTLQRGSAYGGVLSSFSGTVKYSYSSYPFPTTSETPRVVYNSRTDKPW
PVALYLTVPSSAGGVAIKAGSLIAVLILRQTNNYNSDDFQFVWNIYANNDVVVPTGGCDVSA
RDVTVTLPDYPGSVPIPLTVYCAKSQNLGYLSGTTADAGNSIFTNTASFSPAQGVGVQLTR
QGTIIPANNTVSLGAVGTSVSLGLTANYARTGGQVTAGNVQSIIGVTFVYQGGSSGGGAD
VTITVNGKVVAKGGHHHHHHHH (SEQ ID NO: 5)

pSB02307 - FimH mlgK signal pept / F22..Q300 J96 FimH N28S N91S N249Q / His8 in pcDNA3.1(+)

METDT LLLWV LLLWV PGSTG FACKT ASGTA IPIGG GSANV YVNLA PVVNV GQNLV
VDLST QIFCH NDYPE TITDY VTLQR GSAYG GVLSS FSGTV KYSGS SYPFP TTSET
PRVVY NSRTD KPWPV ALYLT PVSSA GGVAI KAGSL IAVLI LRQTN NYNSD DFQFV
WNIYA NNDVV VPTGG CDVSA RDVTV TLPDY PGSVP IPLTV YCAKS QNLGY YLSGT
TADAG NSIFT NTASF SPAQG VGVQL TRQGT IIPAN NTVSL GAVGT SAVSL GLTAN
YARTG GQVTA GNVQS IIGVT FVYQG GSSGG GADVT ITVNG KVVAK GGHHH HHHHH
(SEQ ID NO: 6)

Number of amino acids: 310 Molecular weight: 32095.80 Theoretical pI: 7.25

pSB02083 FimH Lectin Domain Wild Type construct

METDT LLLWV LLLWV PGSTG FACKT ASGTA IPIGG GSANV YVNLA PVVNV GQNLV
VDLST QIFCH NDYPE TITDY VTLQR GSAYG GVLSS FSGTV KYSGS SYPFP TTSET
PRVVY NSRTD KPWPV ALYLT PVSSA GGVAI KAGSL IAVLI LRQTN NYNSD DFQFV
WNIYA NNDVV VPTGG HHHHHHHH (SEQ ID NO: 7)

pSB02158 FimH Lectin Domain Lock Mutant

METDTLLLWVLLLWVPGSTG FACKT ASGTA IPIGG GSANV YVNLA PCVNV GQNCV
VDLST QIFCH NDYPE TITDY VTLQR GSAYG GVLSS FSGTV KYSGS SYPFP TTSET

FIG. 1A continued

FIG. 1A continued

PRVY NSRTD KPWPV ALYLT PVSSA GGVAI KAGSL IAVLI LRQTN NYNSD DFQFV
 WNIYA NNDVV VPTGG HHHHHHHH (SEQ ID NO: 8)

FIG. 1B

FimG A1..K14 sequence

ADVTI TVNGK VVAK (SEQ ID NO: 9)

ADVT ITVNG KVVAK GGHHH HHHHH (SEQ ID NO: 21)

FIG. 1C

FimC sequence

1 MSNKNVNVK SQEITFCLLA GILMFAMMV AGRAEAGVAL GATRVIPAG
 51 QKQVQLAVTN NDENSTYLIQ SWVENADGVK DGRFIVTPPL FAMKGKENT
 101 LRILDATNNQ LPQDRESLFW MNVKAIPSMQ KSKLTENTLQ LAIISRIKLY
 151 YRPAKLALPP DQAAEKLRFK RSANSLTLIN PTPYYLTVTE LNAGTRVLEN
 201 ALVPPMGEST VKLPSDAGSN ITYRTINDYG ALTPKMTGVM E (SEQ ID NO: 10)

FIG. 1D

DNKQ	4 aa	(SEQ ID NO: 11)
GGSGG	5 aa	(SEQ ID NO: 12)
GGSSG G	6 aa	(SEQ ID NO: 13)
GGSSG GG	7 aa	(SEQ ID NO: 14)
GGGSS GGG	8 aa	(SEQ ID NO: 15)
GGGSG SGGG	9 aa	(SEQ ID NO: 16)
GGGSG GSGGG	10 aa	(SEQ ID NO: 17)

FIG. 1E

FimH J96 signal sequence

MKRVI TLFV LLMGW SVNAW S (SEQ ID NO: 18)

pSB02198 - FimH mlgK signal pept / F22..Q300 J96 FimH N28S V48C L55C N91S N249Q / 7 AA linker / FimG A1..K14 / GGHs8 in pcDNA3.1(+) [Number of amino acids: 310
Molecular weight: 32089.79 Theoretical pI: 7.23]

VETDT LLLWV LLLWV PGSTG (SEQ ID NO: 19) FACKT ASGTA IPIGG
GSANV YVNLA PCVNV GQNCV VDLST QIFCH NDYPE TITDY VTLQR
GSAYG GVLSS FSGTV KYSGS SYPFP TTSET PRVVY NSRTD KPWPV
ALYLT PVSSA GGVAI KAGSL IAVLI LRQTN NYNSD DFQFV WNIYA
NNDVV VPTGG CDVSA RDVTV TLPDY PGSVP IPLTV YCAKS QNLGY
YLSGT TADAG NSIFT NTASF SPAQG VGVQL TRQGT IIPAN NTVSL
GAVGT SAVSL GLTAN YARTG GQVTA GNVQS IIGVT FVYQ (SEQ ID NO:
20) GGSSG GG (SEQ ID NO: 14) ADVTI TVNGK VVAK GGGHH HHHHH
(SEQ ID NO: 21)

pSB02307 - FimH mlgK signal pept / F22..Q300 J96 FimH N28S N91S N249Q / His8 in
pcDNA3.1(+)

METDT LLLWV LLLWV PGSTG (SEQ ID NO: 22)
FACKT ASGTA IPIGG GSANV YVNLA PVVNV GQNLV VDLST QIFCH
NDYPE TITDY VTLQR GSAYG GVLSS FSGTV KYSGS SYPFP TTSET
PRVVY NSRTD KPWPV ALYLT PVSSA GGVAI KAGSL IAVLI LRQTN
NYNSD DFQFV WNIYA NNDVV VPTGG CDVSA RDVTV TLPDY PGSVP
IPLTV YCAKS QNLGY YLSGT TADAG NSIFT NTASF SPAQG VGVQL
TRQGT IIPAN NTVSL GAVGT SAVSL GLTAN YARTG GQVTA GNVQS
IIGVT FVYQ (SEQ ID NO: 23) GGSSG GG (SEQ ID NO: 14)
ADVITVNG KVVAK GGGHH HHHHH (SEQ ID NO: 21)

FIG. 1E continued

FIG. 1E continued**pSB02083** FimH Lectin Domain Wild Type construct

METDT LLLWV LLLWV PGSTG (**SEQ ID NO: 22**)
 FACKT ASGTA IPIGG GSANV YVNLA PVVNV GQNLV VDLST QIFCH
 NDYPE TITDY VTLQR GSAYG GVLSS FSGTV KYSGS SYPFP TTSET
 PRVVY NSRTD KPWPV ALYLT PVSSA GGVAI KAGSL IAVLI LRQTN
 NYNSD DFQFV WNIYA NNDVV VPTGG (**SEQ ID NO: 24**) HHHHH HHH
 (**SEQ ID NO: 25**)

pSB02158 FimH Lectin Domain Lock Mutant

METDT LLLWV LLLWV PGSTG (**SEQ ID NO: 22**)
 FACKT ASGTA IPIGG GSANV YVNLA PCVNV GQNCV VDLST QIFCH
 NDYPE TITDY VTLQR GSAYG GVLSS FSGTV KYSGS SYPFP TTSET
 PRVVY NSRTD KPWPV ALYLT PVSSA GGVAI KAGSL IAVLI LRQTN
 NYNSD DFQFV WNIYA NNDVV VPTGG (**SEQ ID NO: 26**) HHHHHHHH
 (**SEQ ID NO: 25**)

FIG. 1F**pSB01878** processed sequence:

FACKT**ANGT**AIPIGGGSANVYVNLAPVVNVGQNLVVDLSTQIFCHNDYP
 ETITDYVTLQRGSAYGGVLS**NF**SGMTVKYSGSSYPFPTTSETPRVVYNSRTD
 KPWPVALYLTVPSSAGGVAIKAGSLIAVLILRQTNNYNSDDFQFVWNIYA
 NNDVVVPTGGHHHHHHHH (**SEQ ID NO: 27**)

NXS/T sites are indicated in bold text as these are potentially glycosylated.

pSB02083 FimH Lectin Domain Wild Type with murine IgK signal peptide

METDTLLLVVLLWVPGSTGFACKTASGTAIPIGGGSANVYVNLAPVVNVGQNLVVDLSTQIFCHNDYP
 ETITDYVTLQRGSAYGGVLSFSGMTVKYSGSSYPFPTTSETPRVVYNSRTDKPWPVALYLTVPSSAGGVAIK
 AGSLIAVLILRQTNNYNSDDFQFVWNIYANNNDVVVPTGGHHHHHHHH (**SEQ ID NO: 7**)

FIG. 1F continued

FIG. 1F continued

pSB02158 FimH Lectin Domain Lock Mutant with murine IgK signal peptide

METDTLLLWVLLWVPGSTGFACKTASGTAIPIGGGSANVYVNLAPCVNVGQNCVVDLSTQIFCHNDYPE
TITDYVTLQRGSAYGGVLSFSFGTVKYSGSSYPFPTTSETPRVVYNSRTDKPWPVALYLPVSSAGGVAIKAG
SLIAVLILRQTNNYNSDDFQFVWNIYANNDVVPTGGHHHHHHHHH (SEQ ID NO: 8)

FIG. 1G

Amino acid sequence of FimH of K12

FACTANGTAIPIGGGSANV YVNLAPVNVGQNLVVDLST QIFCHNDYPETITDYVTLQR
GSAYGGVLSNFSFGTVKYSGS SYFPPTTSETPRVVYNSRTD KPWPVALYLPVSSAGGVAI
KAGSLIAVLILRQTNNYNSD DFQFVWNIYANNDVVPTGG CDVSARDVTVTLPDYPGSVP
IPLTVYCAKSQNLGYLSGT TADAGNSIFTNTASFSPAQG VGVQLTRNGTIIPANNTVSL
GAVGTSAVSLGLTANYARTG GQVTAGNVQSIIGVTFVYQ* (SEQ ID NO: 28)

Amino acid sequence of FimH of UT189, which differs from the FimH of K12

FACTANGTAIPIGGGSANV YVNLAPVNVGQNLVVDLST QIFCHNDYPETITDYVTLQR
GAAYGGVLSNFSFGTVKYNGS SYFPPTTSETPRVVYNSRTD KPWPVALYLPVSSAGGVAI
KAGSLIAVLILRQTNNYNSD DFQFVWNIYANNDVVPTGG CDVSARDVTVTLPDYPGSVP
IPLTVYCAKSQNLGYLSGT TADAGNSIFTNTASFSPAQG VGVQLTRNGTIIPANNTVSL
GAVGTSAVSLGLTANYARTG GQVTAGNVQSIIGVTFVYQ* (SEQ ID NO: 29)

FIG. 1H

Exemplary wzzB sequences include:

>O25b 2401 WzzB

MRVENNNVSGQNHDPEQIDLIDLLVQLWRGKMTIIISVIVAIALAIGYLAVAKEKWTSTAITQP
DVGQIAGYNNAMNVIYGQAAPKVSDLOETLIGRFSSAFSALAETLDNQEEPEKLTIEPSVKN
QQLPLTVSYVGQTAEGAQMCLAQYIQQVDDKVNQELEKDLKDNIALGRKNLQDSLRTQEVV
AQEQKDLRIRIQEALQYANQEQVTKPVQQTEDVTQDTLFLGSEALESMIKHEATRPLVF
SSNYYQTRQNLLDIESLKVDDLDIHAYRYVMKPTLPIRRDSPKKAITLILAVLLGGMVGAGIVL
GRNALRNYNAK (SEQ ID NO: 30)

>O25a:K5:H1 WzzB

MRVENNNVSGQNNDPEQIDLIDLLVQLWRGKMTIIISVIVAIALAIGYLAVAKEKWTSTAITQP
DVGQIAGYNNAMNVIYGQAAPKVSDLOETLIGRFSSAFSALAETLDNQDEPEKLTIEPSVKN
QQLPLTVSYVGQTAEGAQMCLAQYIQQVDDKVNQELEKDLKDNIALGRKNLQDSLRTQEVV

FIG. 1H continued

FIG. 1H continued

AQEQKDLRIRQIQEALQYANQAQVTKPQIQQTGEDITQDTLFLLGSEALESMIKHEATRPLVF
SPNYYQTRQNLLDIESLKVDDLDIHAYRYVMKPTLPIRRDSPKKAITLILAVLLGGMVGAGIVL
GRNALRNYNAK (SEQ ID NO: 31)

>O25a ETEC ATCC WzzB

MRVENNNVSGQNHDPEDIDLLVQLWRGKMTIIISVVVAIALAIGYLAVAKEKWTSTAITQ
PDVGQIAGYNNAMNVIYGQAAPKVSDLOETLIGRFSSAFSALAETLDNQKEPEKLTIEPSVK
NQQLPLTVSYVGQTAEDAQMCLAQYIQQVDDKVNQELEKDLKDNLALGRKNLQDSLRTQE
VVAQEQKDLRIRQIQEALQYANQAQVTKPQIQQTGEDITQDTLFLLGSEALESMIKHEATRPL
VFSPNYYQTRQNLLDIENLKVDDLDIHAYRYVMKPTLPIRRDSPKKAITLILAVLLGGMVGAGI
VLGRNALRNYNSK (SEQ ID NO: 32)

>K12 W3110 WzzB

MRVENNNVSGQNHDPEDIDLLVQLWRGKMTIIISVIVAIALAIGYLAVAKEKWTSTAITQP
DVGQIAGYNNAMNVIYGQAAPKVSDLOETLIGRFSSAFSALAETLDNQEEREKLTIEPSVKN
QQLPLTVSYVGQTAEGAQMCLAQYIQQVDDKVNQELEKDLKDNIALGRKNLQDSLRTQEVV
AQEQKDLRIRQIQEALQYANQAQVTKPQIQQTGEDITQDTLFLLGSEALESMIKHEATRPLVF
SPNYYQTRQNLLDIESLKVDDLDIHAYRYVMKPMPLPIRRDSPKKAITLILAVLLGGMVGAGIVL
GRNALRNYNAK (SEQ ID NO: 33)

>Salmonella LT2 WzzB

MTVDSNTSSGRGNDPEQIDLIELLQLWRGKMTIIVAVIIAILLAVGYLMIAKEKWTSTAITQP
DAAQVATYTNALNVLYGGNAPKISEVQANFISRFSSAFSALSEVLDNQKEREKLTIEQSVKG
QALPLSVSYVSTTAEGAQRRLAEYIQQVDEEVAKELEVLDKDNITLQTKTLQESLETQEVVA
QEQKDLRIKQIEEALRYADEAKITQPQIQQTQDVTQDTMFLLGSDALKSMIQNEATRPLVFS
PAYYQTKQTLDDIKNLKVTADTVHVYRYVMKPTLPVRRDSPKTAITLVAVLLGGMIGAGIVL
GRNALRSYKPKAL (SEQ ID NO: 34)

Exemplary FepE sequences include:

>O25b GAR2401 FepE

MSSLNIKQGSDAHFPDYPLASPSNNEIDLLNLISVLWRAKKTVMAVVFAFACAGLLISFILPQ
KWTSAAVVTPPEPVQWQELEKSFTKLRVLDLDIKIDRTEAFNLFIKKFQSVSLLEEYLRSSPY
VMDQLKEAKIDELDLHRAIVALSEKMKAVDDNASKKKDEPSLYTSWTLSTAPTSEEAAQTVL
SGYIDYISTLVVKESLENVRNKLEIKTQFEKEKLAQDRIKTKNQLDANIQRNLNYSLDIANAAGIK
KPVYSNGQAVKDDPDFSISLGADGIERKLEIEKAVTDVAELNGELRNRQYLVEQLTKAHVND
VNFTPFKYQLSPSLPVKKDGP GKAIIVLSALIGGMVACGGVLLRYAMASRKQDAMMADHLV
(SEQ ID NO: 35)

FIG. 1H continued

FIG. 1H continued

>O25a:K5:H1 FepE

MSSLNIKQGSEAHFPEYPLASPSNNEIDLLNLIEVLWRAKKTVMVVFACAGLLISFILPQK
WTSAAVVTPPEPVQWQELEKTFTKLRVLDLDIKIDRTEAFNLFIKKFQSVSLLEEYLRSSPYV
MDQLKEAKIDPLDLHRAIVALSEKMKAVDDNASKKKDESALYTSWTLSTAPTSEEQAQKVL
GYIDYISALVVKESIENVRNKLEIKTOFEKEKLAQDRIKTKNQLDANIQRNLNYSLDIANAAGIKK
PVYSNGQAVKDDPDFSISLGADGIERKLEIEKAVTDVAELNGELRNROYLVEQLTKTNINDV
NFTPFKYQLRPSLPVKKDGQGKAIIVILSALVGGMVACGGVLLRHAMASRKQDAMMADHLV
(SEQ ID NO: 36)

> O25a ETEC ATCC FepE

MSSLNIKQGSDAHFPDYPLASPSNNEIDLLNLISVLWRAKKTVMVVFACAGLLISFILPQ
KWTSAAVVTPPEPVQWQELEKSFTKLRVLDLDIKIDRTEAFNLFIKKFQSVSLLEEYLRSSPY
VMDQLKEAKIDELDLHRAIVALSEKMKAVDDNASKKKDEPSLYTSWTLSTAPTSEEQAQTVL
SGYIDYISTLVVKESLENVRNKLEIKTOFEKEKLAQDRIKTKNQLDANIQRNLNYSLDIANAAGIK
KPVYSNGQAVKDDPDFSISLGADGIERKLEIEKAVTDVAELNGELRNROYLVEQLTKAHVND
VNFTPFKYQLSPSLPVKKDGPGKAIIVILSALIGGMVACGGVLLRYAMASRKQDAMMADHLV
(SEQ ID NO: 37)

> O157 FepE

MSSLNIKQGSDAHFPDYPLASPSNNEIDLLNLISVLWRAKKTVMVVFACAGLLISFILPQ
KWTSAAVVTPPEPVQWQELEKTFTKLRVLDLDIKIDRTEAFNLFIKKFQSVSLLEEYLRSSPY
VMDQLKEAKIDELDLHRAIVALSEKMKAVDDNASKKKDEPSLYTSWTLSTAPTSEEQAQTVL
SGYIDYISALVVKESIENVRNKLEIKTOFEKEKLAQDRIKMKNQLDANIQRNLNYSLDIANAAGIK
KPVYSNGQAVKDDPDFSISLGADGIERKLEIEKAVTDVAELNGELRNROYLVEQLTKANIND
VNFTPFKYQLSPSLPVKKDGPGKAIIVILSALIGGMVACGGSVLLRYAMASRKQDAMMADHLV
(SEQ ID NO: 38)

>Salmonella LT2 FepE

MPSLNVKQEKQSFAGYSLPPANSHEIDLFSLEIWLWQAKRRILATVFAFACVGLLSFLLPQ
KWTSAIVTPAESVQWQGLERTLTALRVLDMEVSVDKGSVFNLFIKKFSSPSLLEEYLRSSP
YVMDQLKGAQIDEQDLHRAIVLLSEKMKAVDSNVGKKNETSLFTSWTLSTAPTREEAQKV
LAGYIQYISDIVVKETLENIRNQLEIKTRYEQEKLAMDRVRLKNQLDANIQRNLHYSLEIANAAGI
KRPVYSNGQAVKDDPDFSISLGADGISRKLEIEKGVTDVAEIDGDLRNROYHVEQLAAMNV
SDVKFTPFKYQLSPSLPVKKDGPGKAIIVILSALIGGMMACGGVLLRHAMVSRKMENALAIDE
RLV (SEQ ID NO: 39)

FIG. 2A

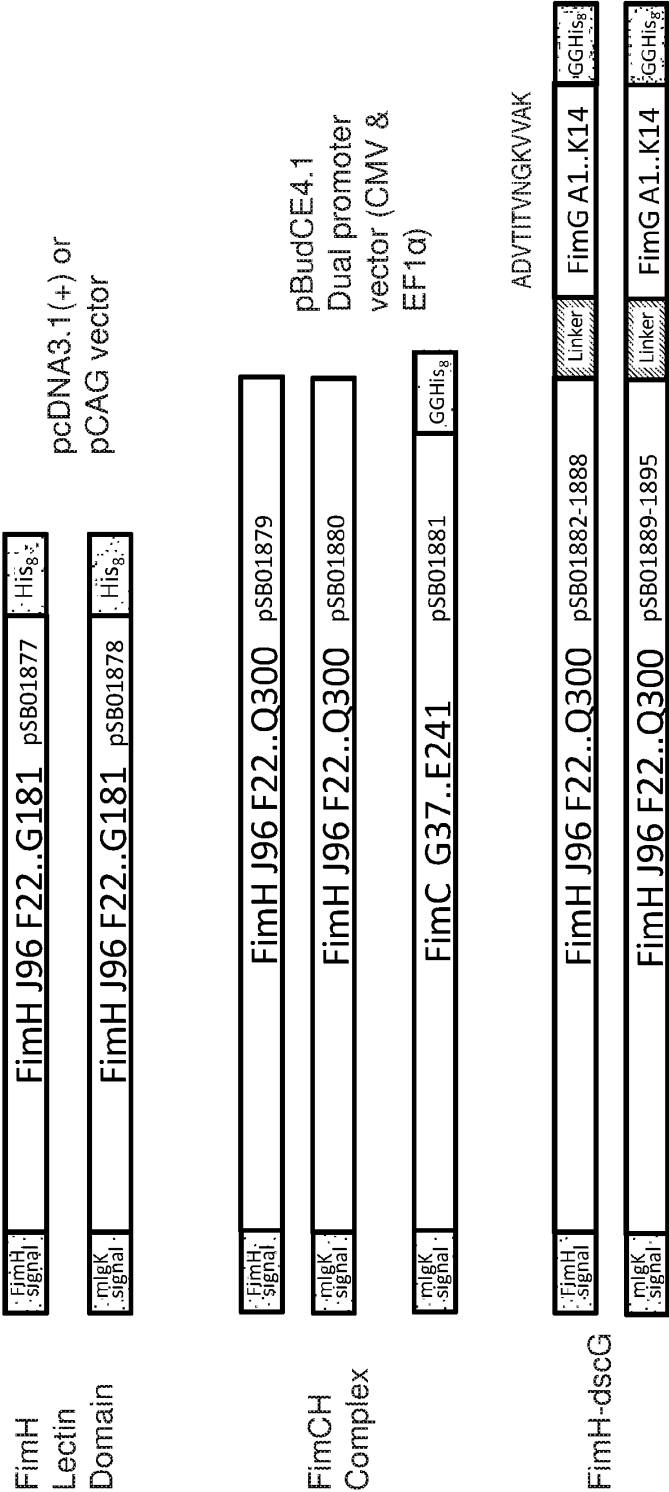


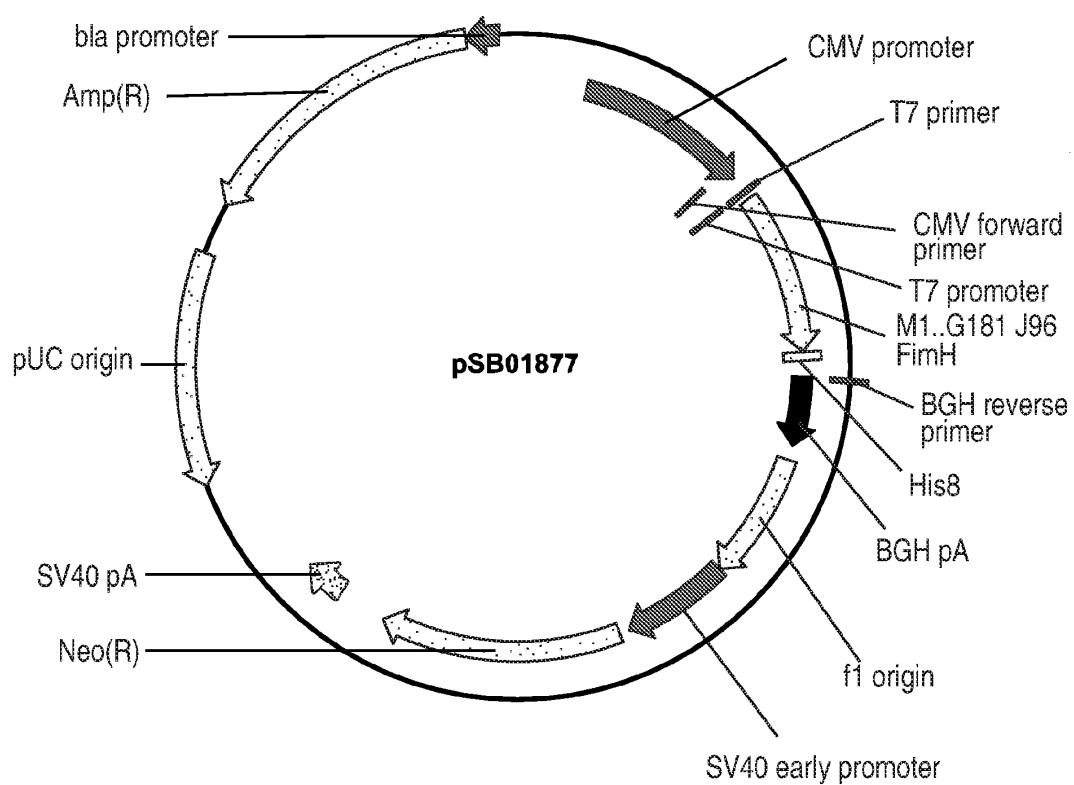
FIG. 2B

FIG. 2C

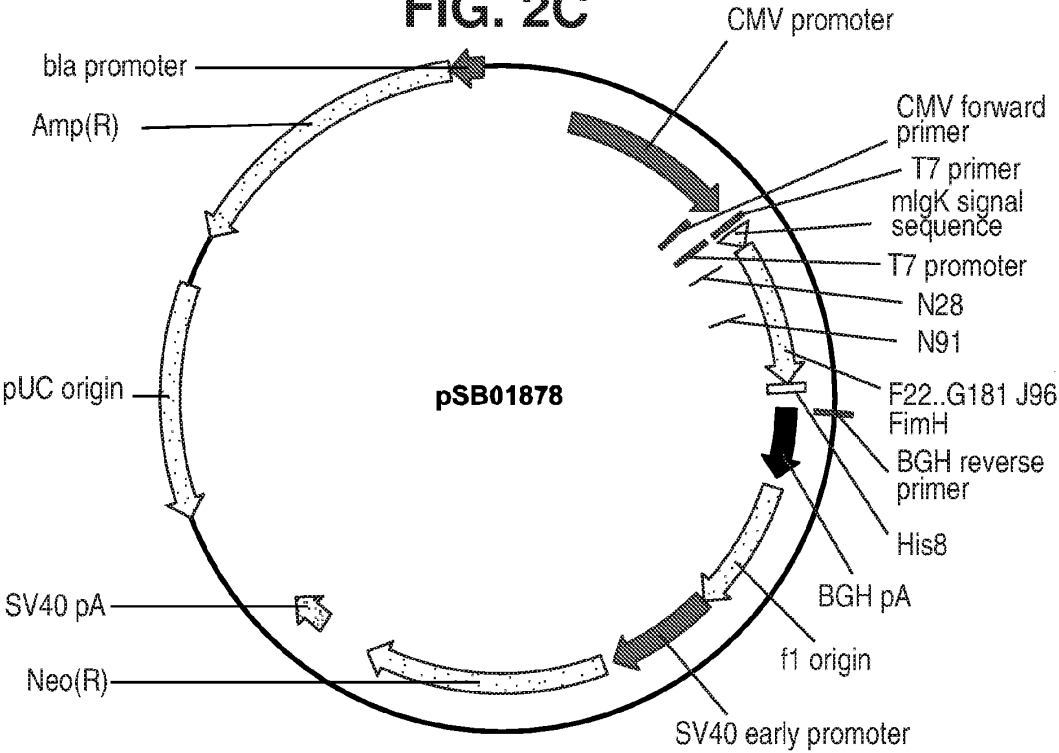


FIG. 2D

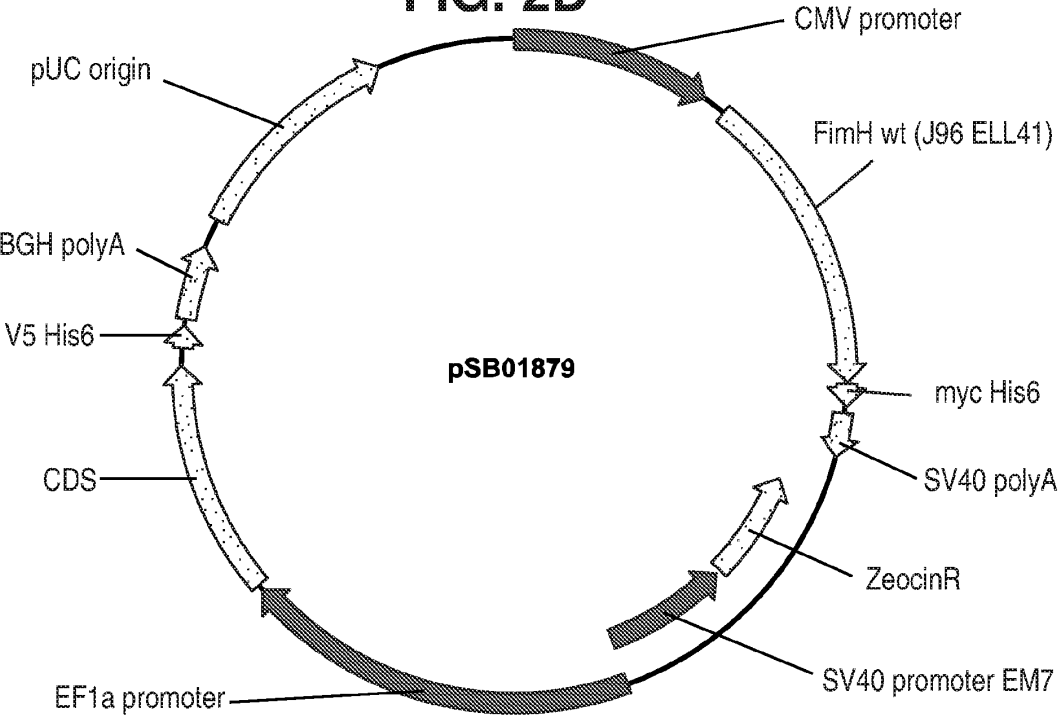


FIG. 2E

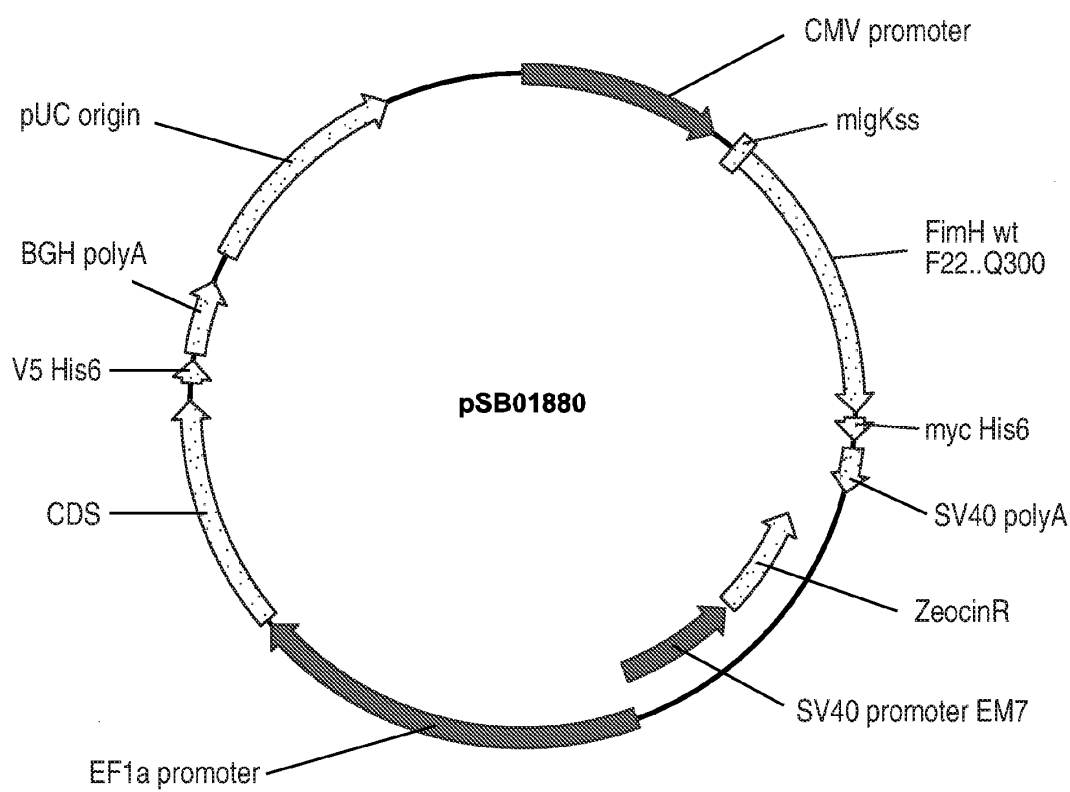


FIG. 2F

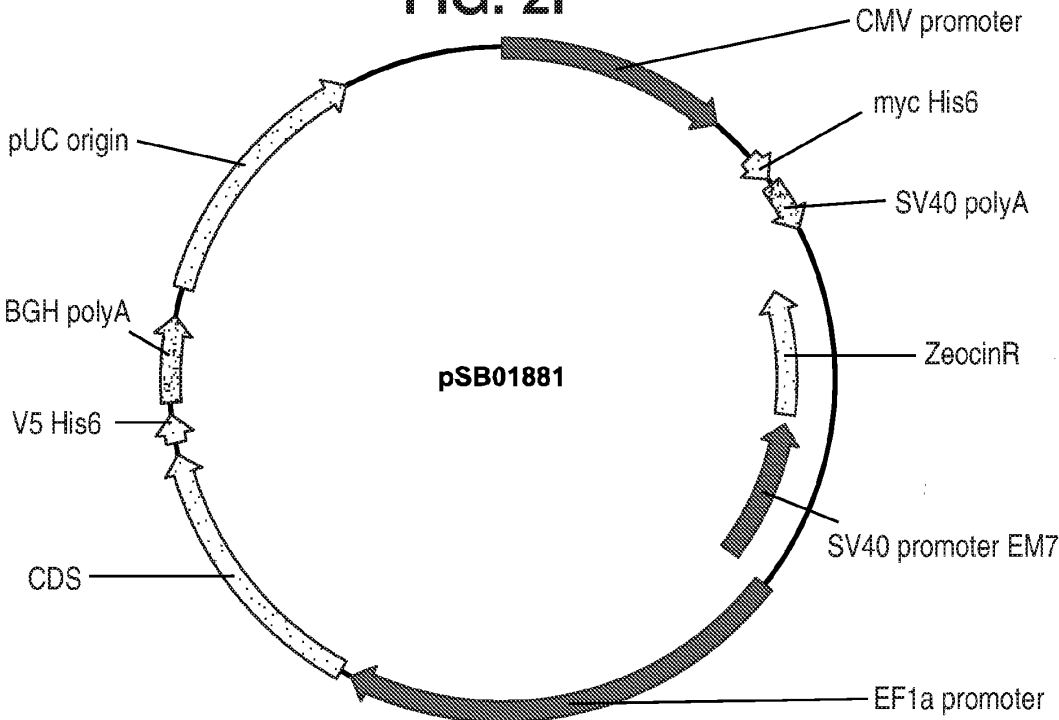
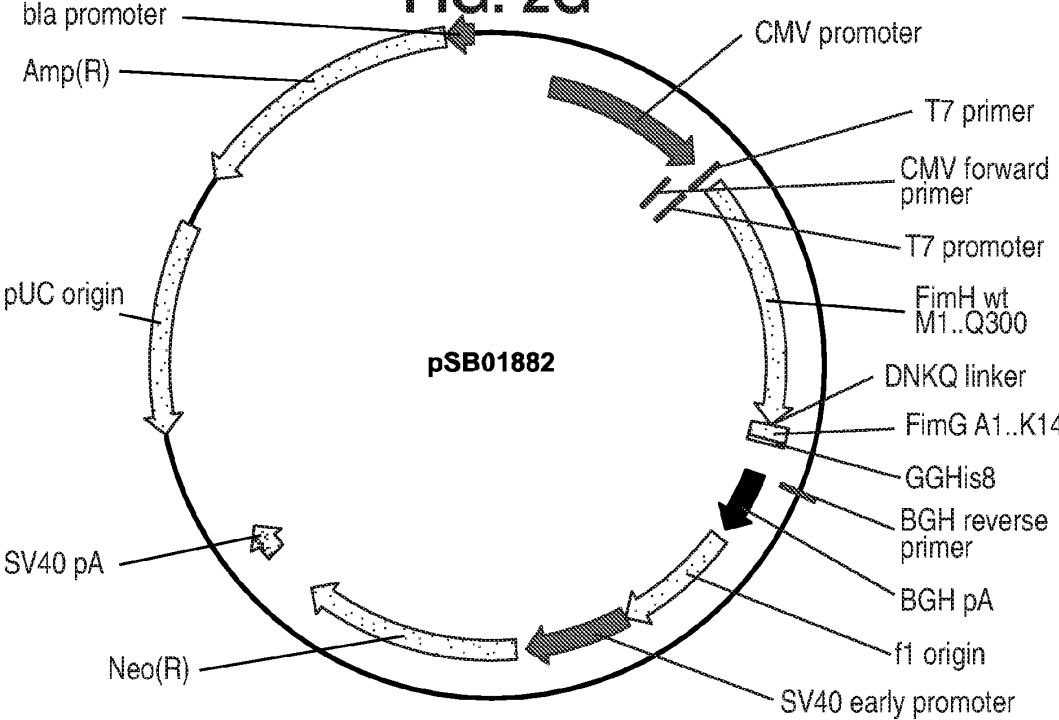


FIG. 2G



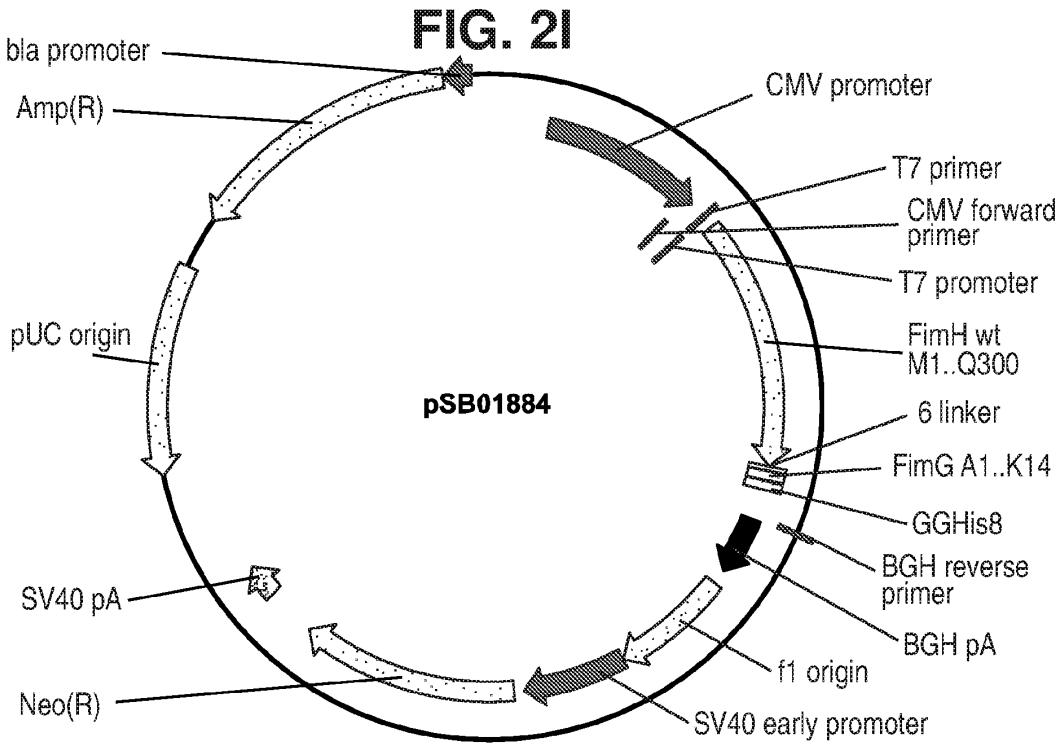
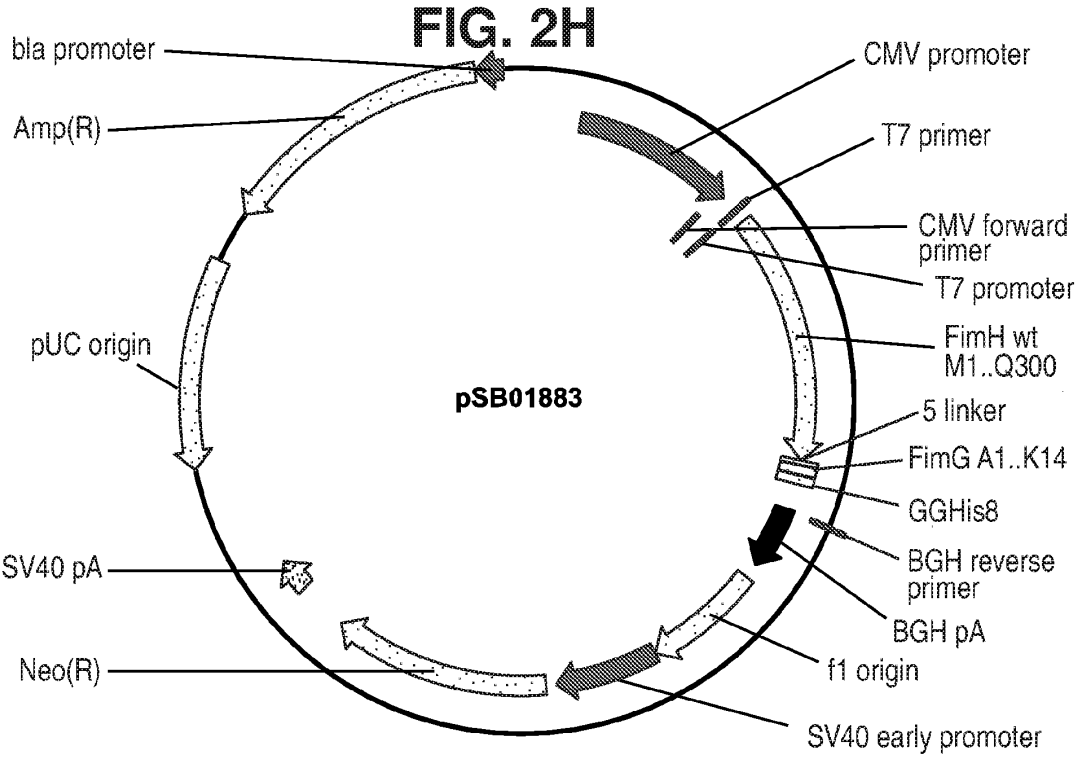


FIG. 2J

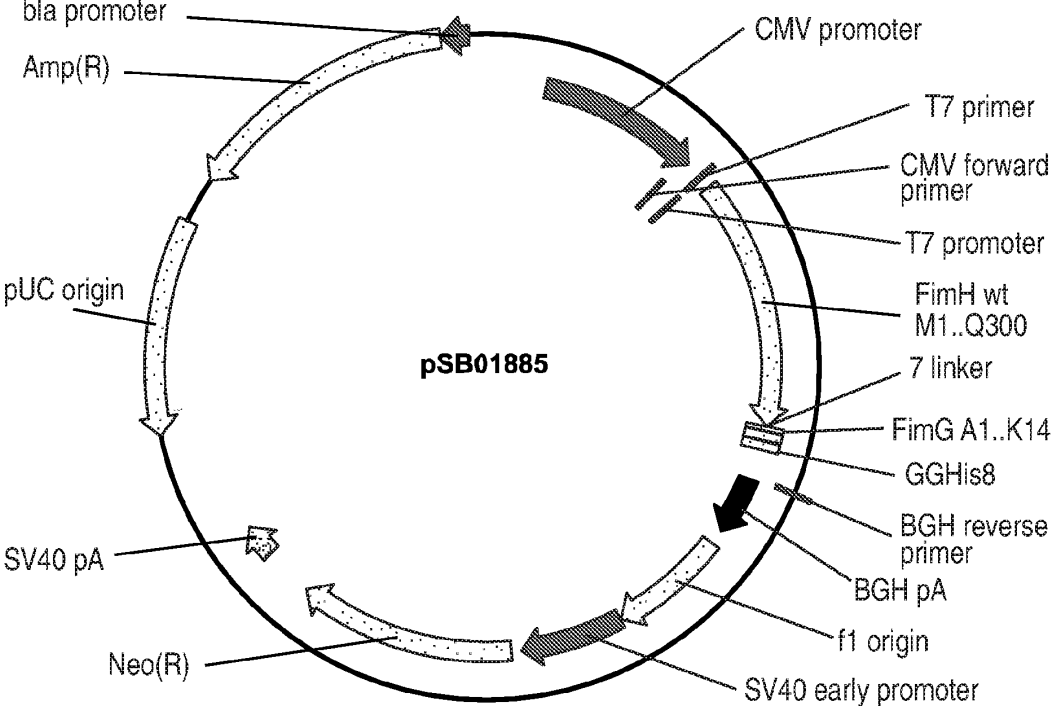


FIG. 2K

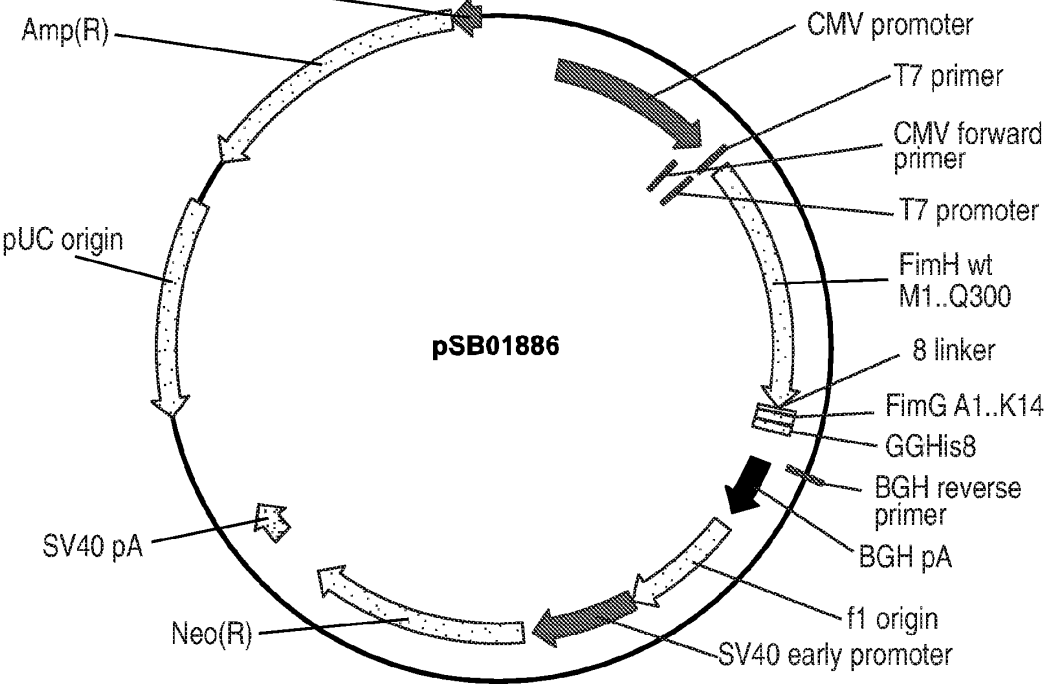


FIG. 2L

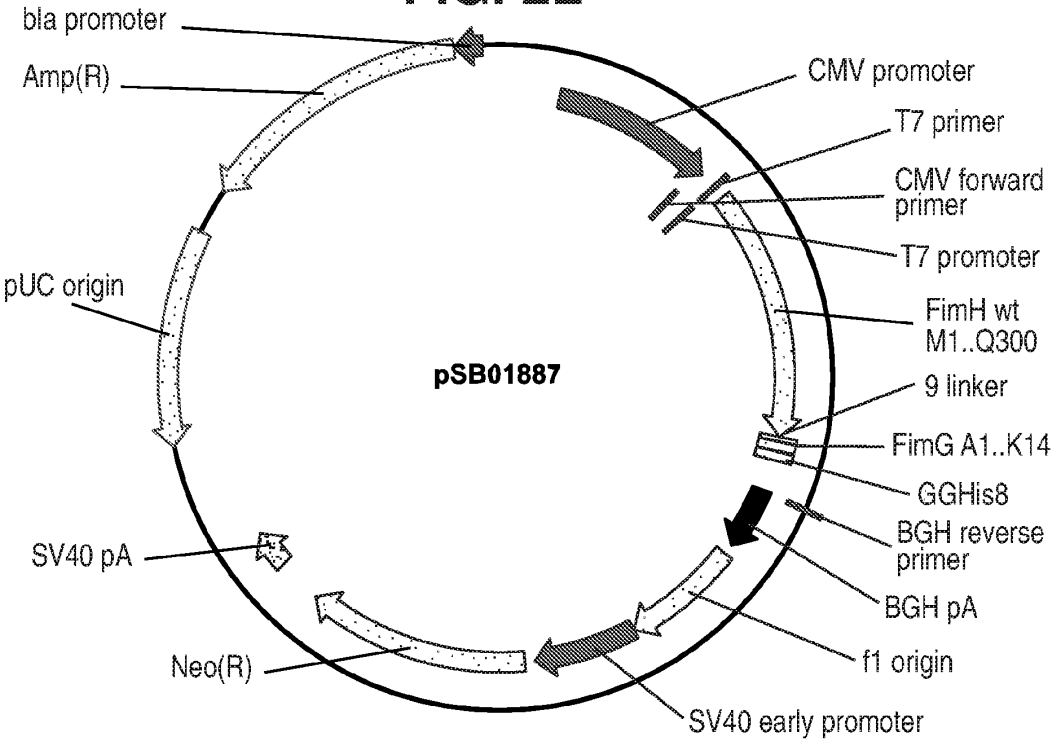


FIG. 2M

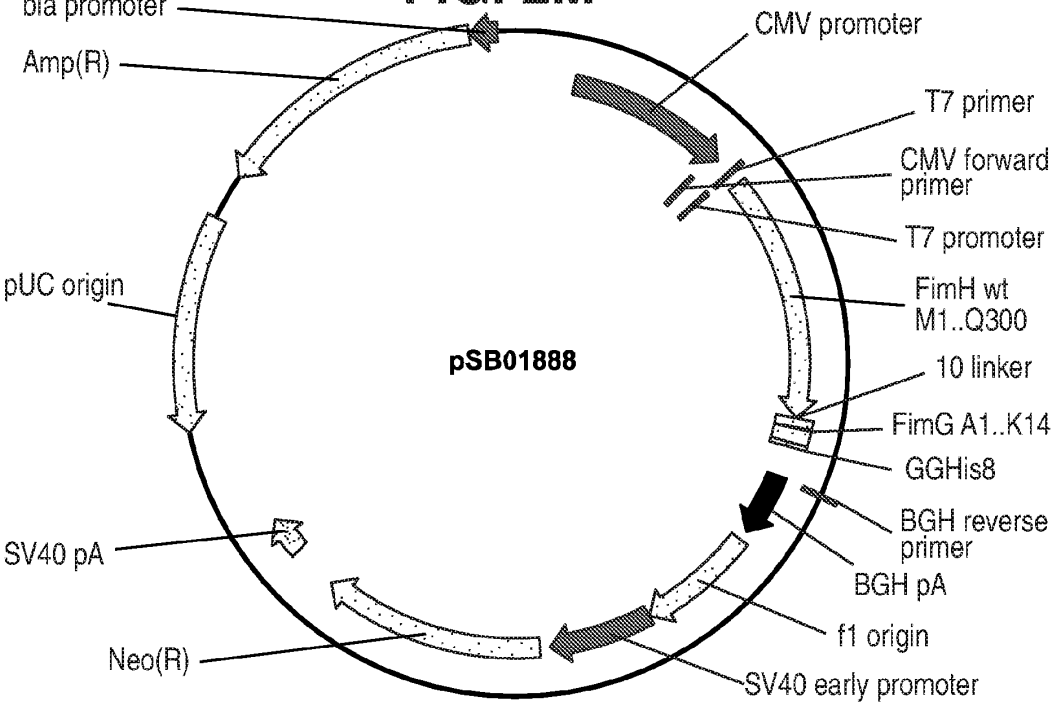


FIG. 2N

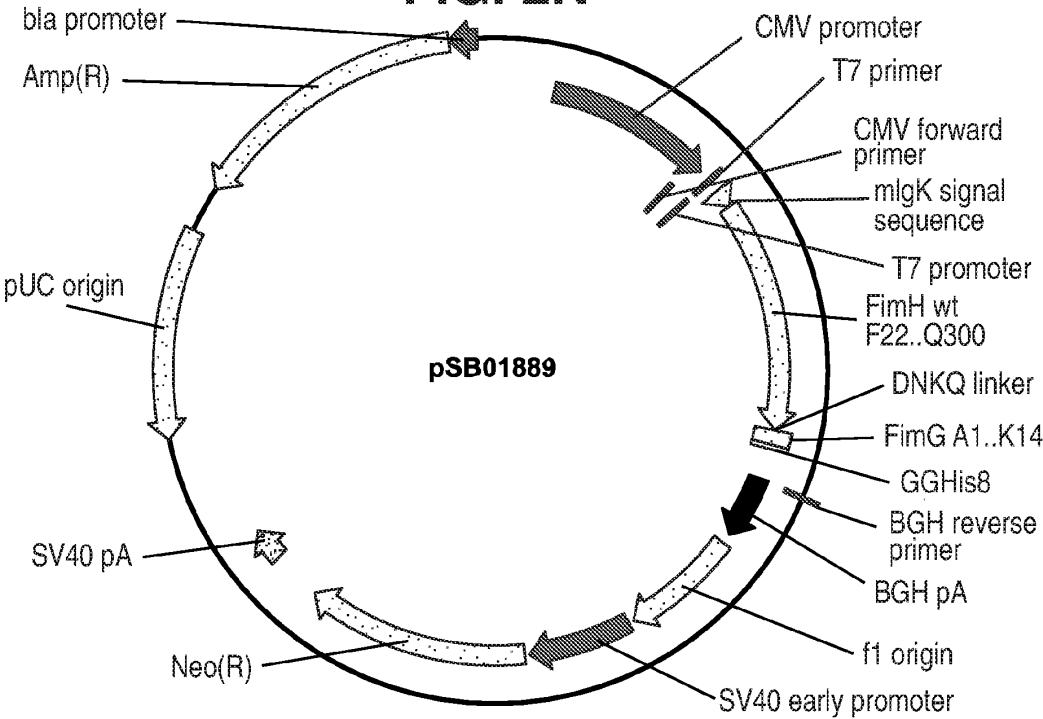


FIG. 2O

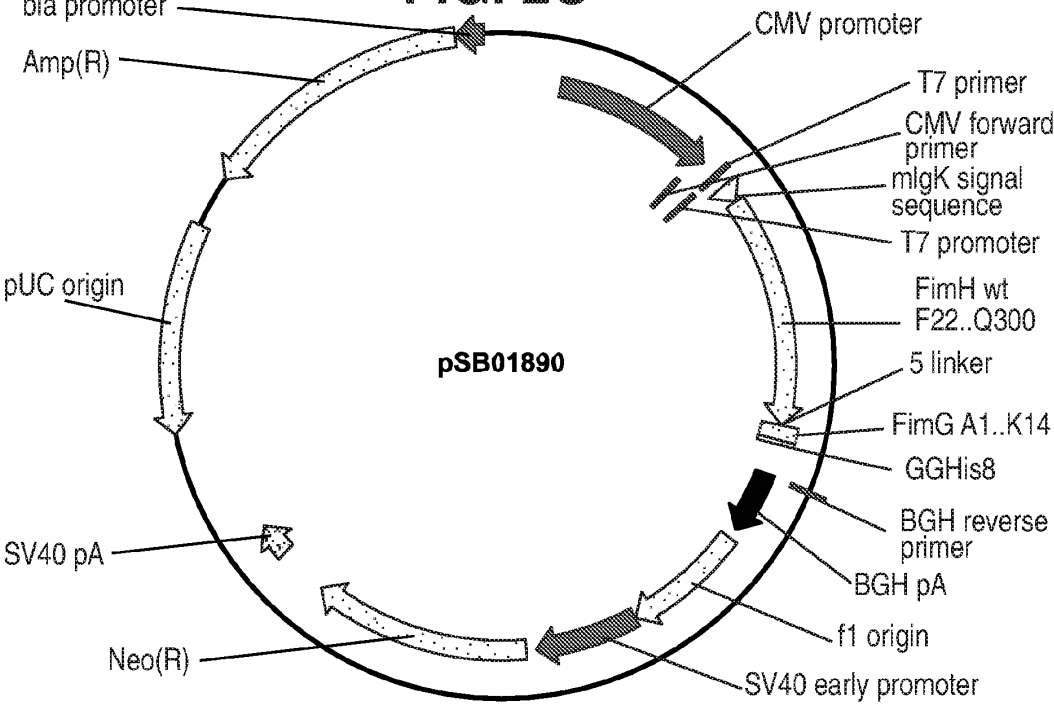


FIG. 2P

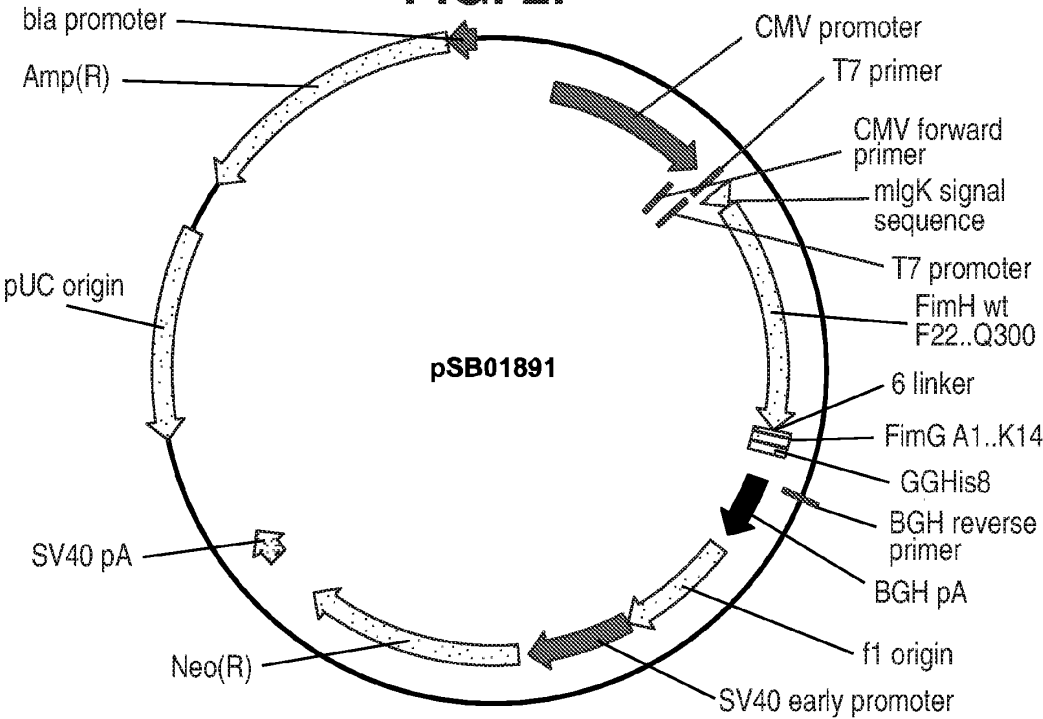


FIG. 2Q

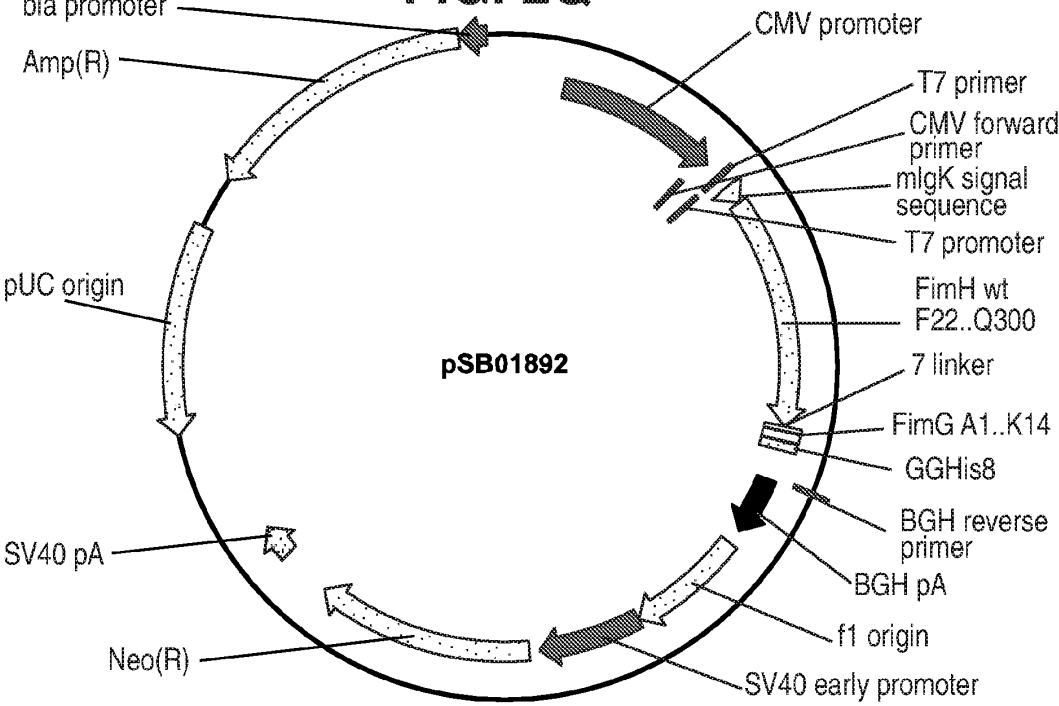


FIG. 2R

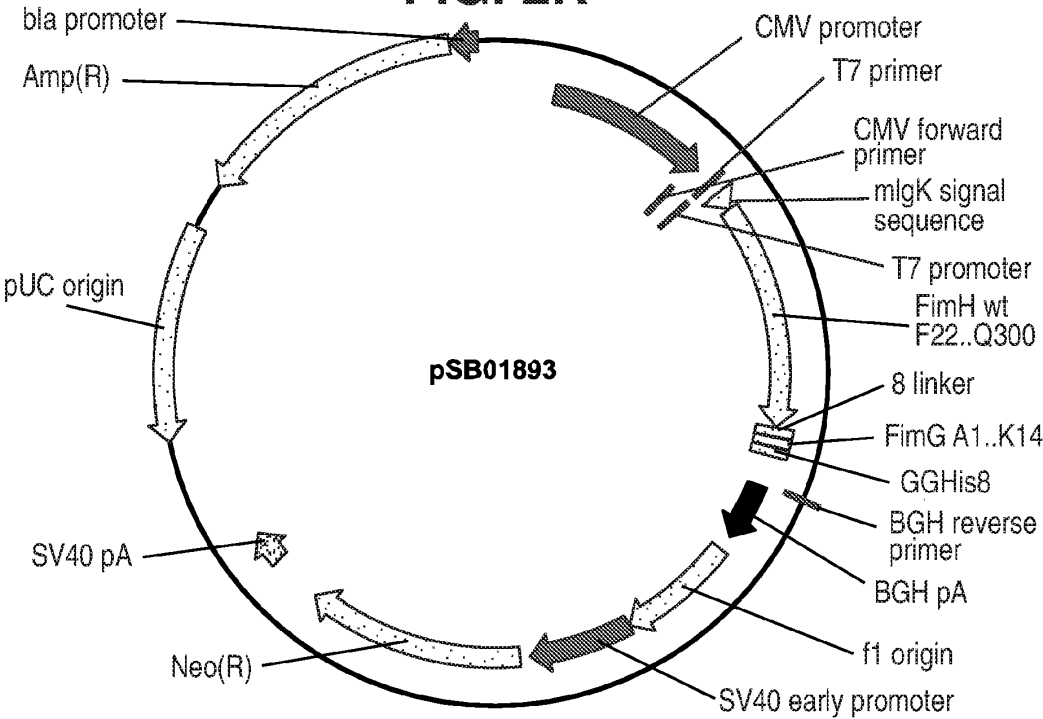


FIG. 2S

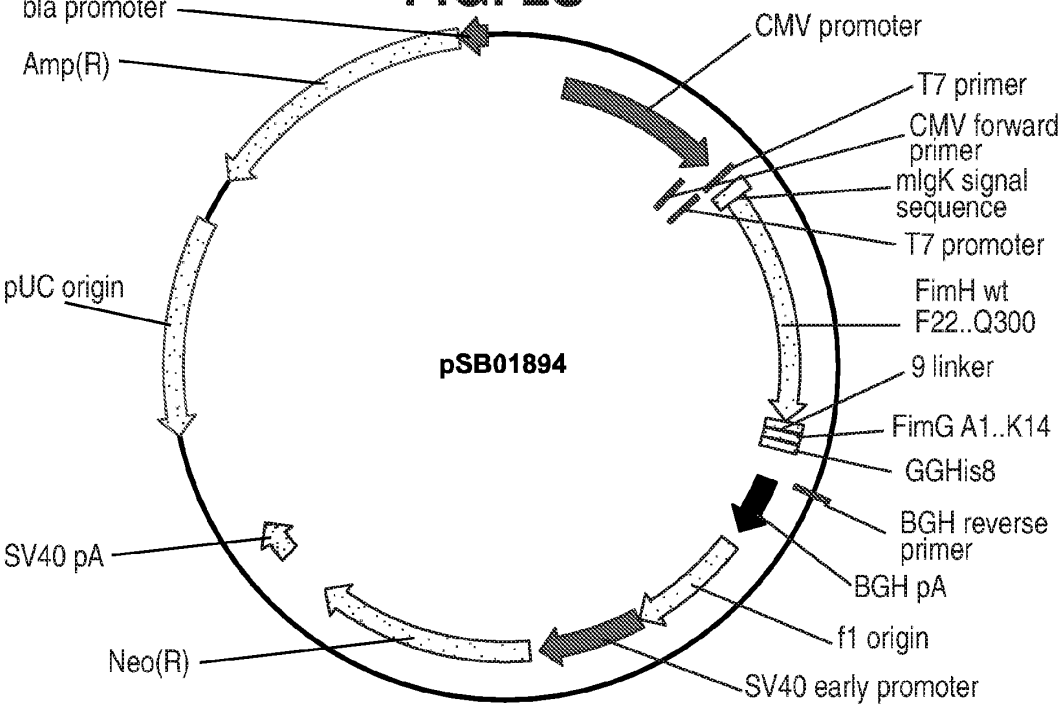


FIG. 2T

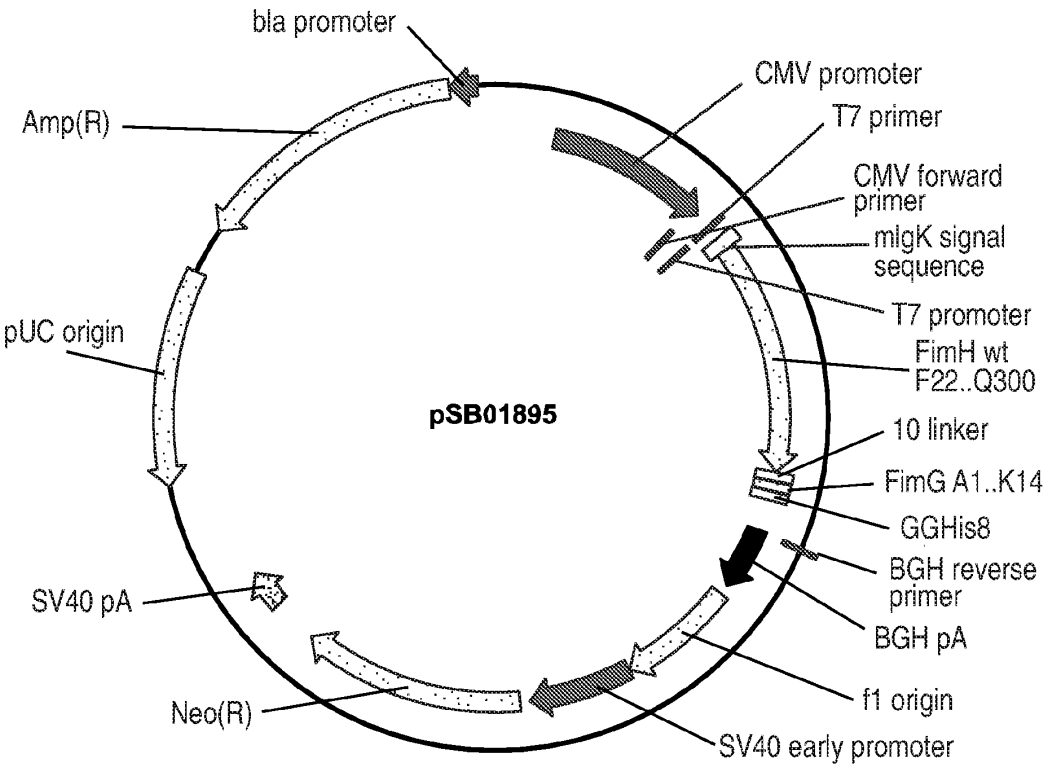


FIG. 3

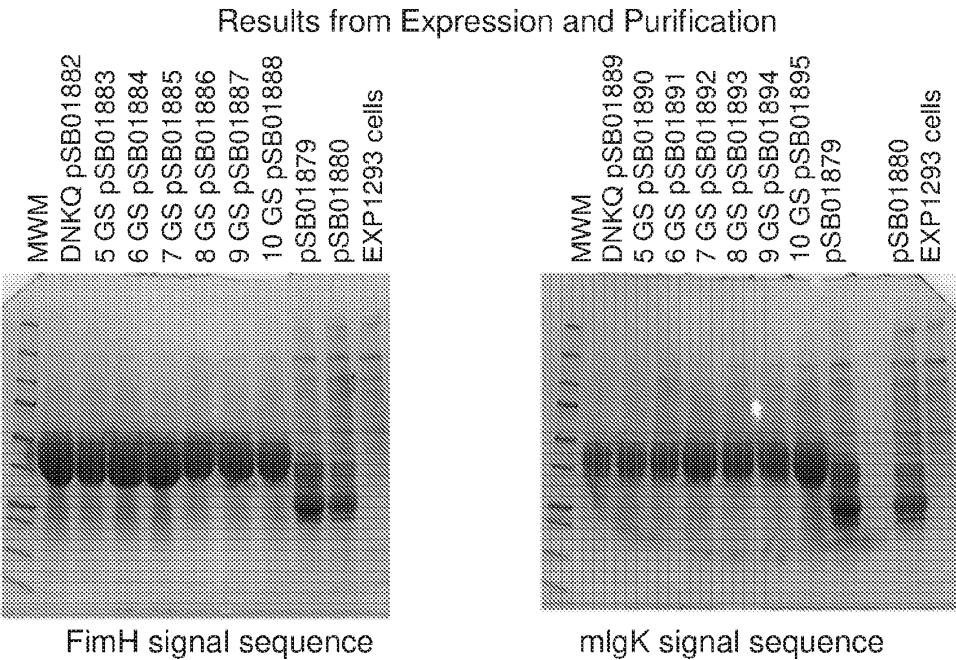


FIG. 4

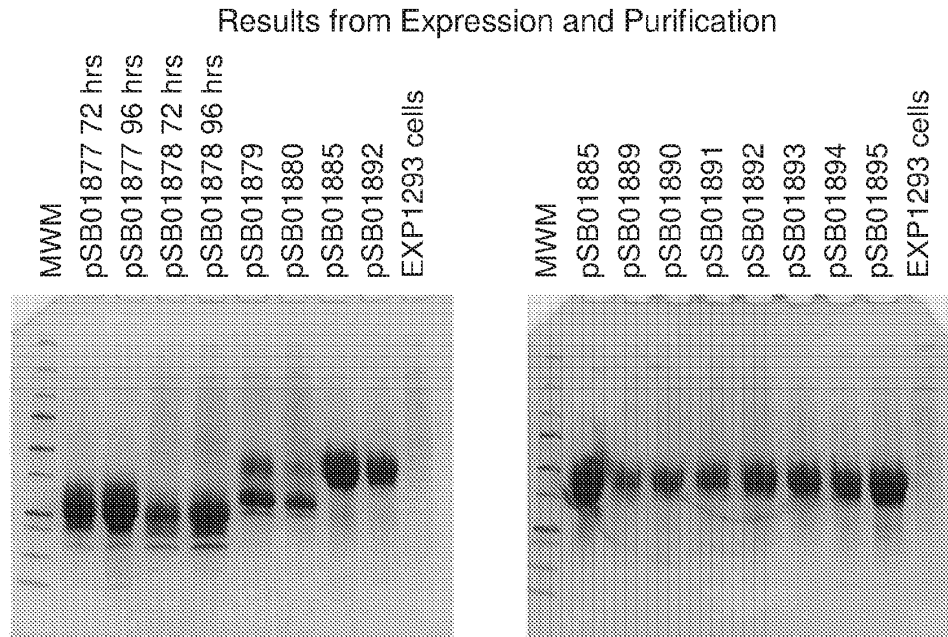


FIG. 5

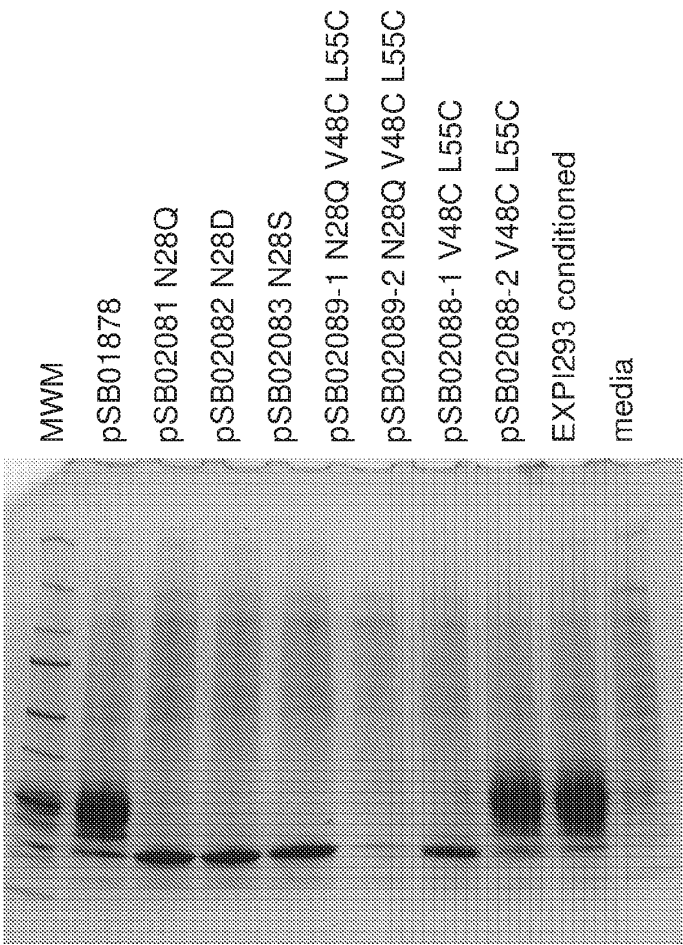
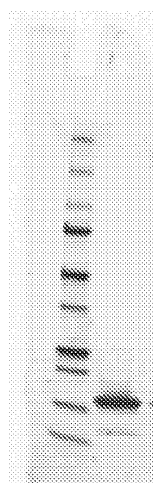


FIG. 6A

pSB02083



17 mg total yield

FIG. 6B

pSB02158



10.8 mg total yield

FIG. 6C

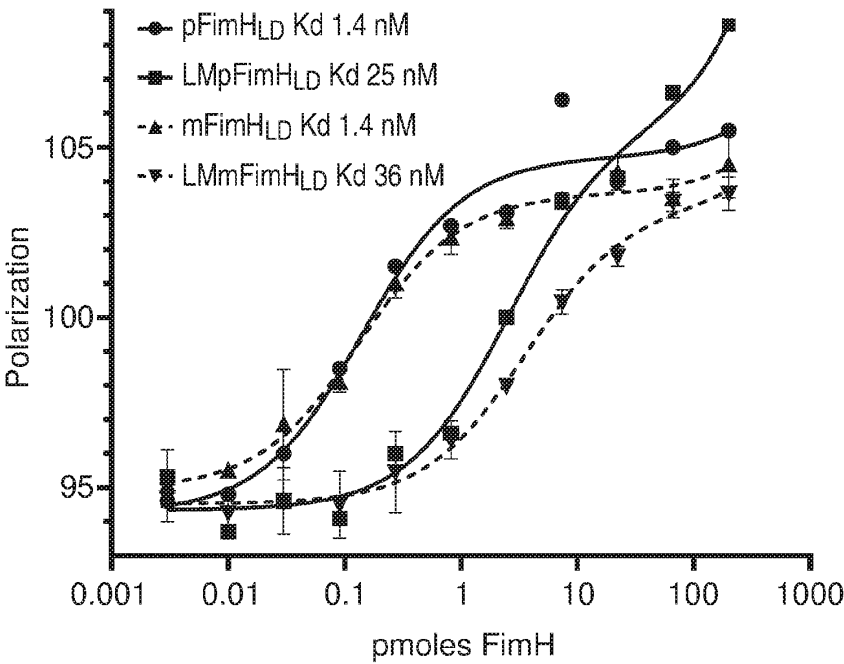


FIG. 7

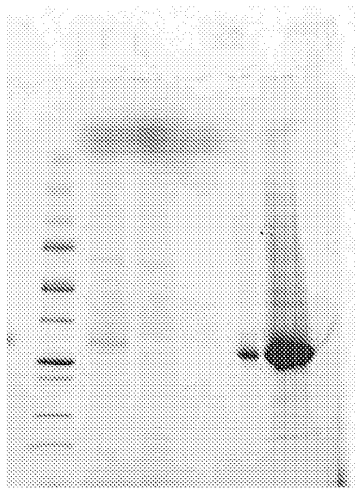


FIG. 8

Expression of pSB2307 FimH dscG wild type

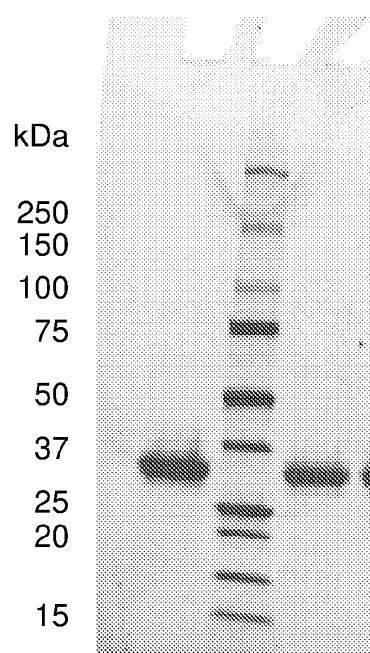
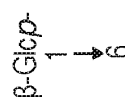


FIG. 9A

Serogroup	Structure
O1A, O1A1	→3)-α-L-Rha-(1→3)-α-L-Rha-(1→3)-β-L-Rha-(1→4)-β-D-GlcNAc-(1→ β-D-ManNAc-(1→2)
O1B	→3)-α-L-Rha-(1→2)-α-L-Rha-(1→2)-α-D-Gal-(1→3)-β-D-GlcNAc-(1→ β-D-ManNAc-(1→2)
O1C	→3)-α-L-Rha-(1→2)-α-L-Rha-(1→3)-α-D-Gal-(1→3)-β-D-GlcNAc-(1→ β-D-ManNAc-(1→2)
O2	→3)-α-L-Rha-(1→2)-α-L-Rha-(1→3)-β-L-Rha-(1→4)-β-D-GlcNAc-(1→ α-D-Fuc3NAc-(1→2)
O3	β-L-RhaNAc(1→4)α-D-Glc-(1→4) →3)-β-D-GlcNAc-(1→3)-α-D-Gal-(1→3)-β-D-GlcNAc-(1→2)-α-L-Rha-(1→6)-α-D-Glc-(1→3)-α-L-FucNAc(1→3)-β-D-GlcNAc(1→
O4:K52	α-D-Glc-(1→3) →2)-α-L-Rha-(1→6)-α-D-Glc-(1→3)-α-L-FucNAc(1→3)-β-D-GlcNAc(1→
O4:K6	→4)-β-D-Qui3NAc-(1→3)-β-D-Ribf-(1→4)-β-D-Gal-(1→3)-α-D-GalNAc(1→
O5ab	→2)-β-D-Qui3NAc-(1→3)-β-D-Ribf-(1→4)-β-D-Gal-(1→3)-α-D-GalNAc(1→
O5ac(strain 180/C3)	→4)-α-D-GalNAc-(1→3)-β-D-Man-(1→4)-β-D-Man-(1→3)-α-D-GlcNAc-(1→ β-D-Glc-(1→2)
O6:K2, K13, K15	→4)-α-D-GalNAc-(1→3)-β-D-Man-(1→4)-β-D-Man-(1→3)-α-D-GlcNAc-(1→ β-D-GlcNAc-(1→2)
O6:K54	α-L-Rha-(1→3) →3)-β-D-Qui4NAc-(1→2)-α-D-Man-(1→4)-β-D-Gal-(1→3)-α-D-GlcNAc-(1→
O7	→3)-α-L-Rha-(1→3)-α-D-Gal-(1→3)-β-D-GlcNAc-(1→ α-D-Fuc4NAcyl-(1→2)
O10	Acyl=acetyl (60%) or (R)-3-hydroxybutyryl (40%)
O16	→2)-β-D-Galf-(1→6)-α-D-Glc-(1→3)-α-L-Rha2Ac-(1→3)-α-D-GlcNAc-(1→
O17	α-D-Glc-(1→6) →6)-α-D-Man-(1→2)-α-D-Man-(1→2)-β-D-Man-(1→3)-α-D-GlcNAc(1→
O18A, O18ac	→2)-α-L-Rha-(1→6)-α-D-Glc-(1→4)-α-D-Gal-(1→3)-α-D-GlcNAc-(1→ β-D-GlcNAc-(1→3)
O18A1	α-D-Glc-(1→6) →2)-α-L-Rha-(1→6)-α-D-Glc-(1→4)-α-D-Gal-(1→3)-α-D-GlcNAc-(1→ β-D-GlcNAc-(1→3)
O18B	→3)-α-L-Rha-(1→6)-α-D-Glc-(1→4)-α-D-Gal-(1→3)-α-D-GlcNAc-(1→ β-D-Glc-(1→3)
O18B1	α-D-Glc-(1→4) →3)-α-L-Rha-(1→6)-α-D-Glc-(1→4)-α-D-Gal-(1→3)-α-D-GlcNAc-(1→ β-D-Glc-(1→3)
O21	β-D-Gal-(1→4) →3)-β-D-Gal-(1→4)-β-D-Glc-(1→3)-β-D-GalNAc-(1→ β-D-GlcNAc-(1→2)
O23A	α-D-Glc-(1→6) →6)-α-D-Glc-(1→4)-β-D-Gal-(1→3)-α-D-GalNAc-(1→3)-β-D-GlcNAc-(1→ β-D-GlcNAc(1→3)
O24	→7)-α-Neu5Ac-(2→3)-β-D-Glc-(1→3)-β-D-GalNAc-(1→ α-D-Glc-(1→2)

FIG. 9B



O25b	$\alpha\text{-Rhap-(1}\rightarrow\text{3)-}\alpha\text{-GlcP-(1}\rightarrow\text{3)-Rhap20Ac-(1}\rightarrow\text{3)-}\beta\text{-GlcPNAc-}$
O25	$\beta\text{-D-Glc-(1}\rightarrow\text{6)}\mid\rightarrow\text{4)-}\alpha\text{-D-Glc-(1}\rightarrow\text{3)-}\alpha\text{-L-FucNAc-(1}\rightarrow\text{3)-}\beta\text{-D-GlcNAc-(1}\rightarrow\mid\alpha\text{-L-Rha-(1}\rightarrow\text{3)}$
O26	$\rightarrow\text{3)-}\alpha\text{-L-Rha-(1}\rightarrow\text{4)-}\alpha\text{-L-FucNAc-(1}\rightarrow\text{3)-}\beta\text{-D-GlcNAc-(1}\rightarrow\text{3)}$
O28	$\rightarrow\text{2)-(R)-Gro-1-P}\rightarrow\text{4)-}\beta\text{-D-GlcNAc-(1}\rightarrow\text{3)-}\beta\text{-D-Galf2Ac-(1}\rightarrow\text{3)-}\alpha\text{-D-GlcNAc-(1}\rightarrow\text{3)}$
O44	$\alpha\text{-D-Glc-(1}\rightarrow\text{4)}\mid\rightarrow\text{6)-}\alpha\text{-D-Man-(1}\rightarrow\text{2)-}\alpha\text{-D-Man-(1}\rightarrow\text{2)-b-D-Man-(1}\rightarrow\text{3)-}\alpha\text{-D-GlcNAc-(1}\rightarrow\text{3)}$
O45	$\rightarrow\text{2)-b-D-Glc-(1}\rightarrow\text{3)-}\alpha\text{-L-6dTal2Ac-(1}\rightarrow\text{3)-}\alpha\text{-D-FucNAc-(1}\rightarrow\text{3)}$
O45rel	$\rightarrow\text{2)-b-D-Glc-(1}\rightarrow\text{3)-}\alpha\text{-L-6dTal2Ac-(1}\rightarrow\text{3)-b-D-GlcNAc-(1}\rightarrow\text{3)}$
O55	$\rightarrow\text{6)-b-D-GlcNAc-(1}\rightarrow\text{3)-}\alpha\text{-D-Gal-(1}\rightarrow\text{3)-b-D-GalNAc-(1}\rightarrow\mid\alpha\text{-Col-(1}\rightarrow\text{2)-b-D-Gal-(1}\rightarrow\text{3)}$
O56	$\rightarrow\text{7)-}\alpha\text{-Neu5Ac-(2}\rightarrow\text{3)-b-D-Glc-(1}\rightarrow\text{3)-b-D-GlcNAc-(1}\rightarrow\mid\alpha\text{-D-Gal-(1}\rightarrow\text{2)}$
O58	$3\text{-O-}[(\text{R)-1-carboxylethyl-}\alpha\text{-L-Rha-(1}\rightarrow\text{3)}\mid\rightarrow\text{4)-}\alpha\text{-D-Man-(1}\rightarrow\text{4)-}\alpha\text{-D-Man2Ac-(1}\rightarrow\text{3)-b-D-GlcNAc-(1}\rightarrow\text{3)}$
O64	$\text{b-D-Gal-(1}\rightarrow\text{6)}\mid\rightarrow\text{3)-}\alpha\text{-D-ManNAc-(1}\rightarrow\text{3)-b-D-GlcA-(1}\rightarrow\text{3)-b-D-Gal-(1}\rightarrow\text{3)-b-D-GlcNAc-(1}\rightarrow\text{3)}$
O69	$\rightarrow\text{2)-}\alpha\text{-L-Rha-(1}\rightarrow\text{2)-}\alpha\text{-D-Gal-(1}\rightarrow\text{2)-b-D-GlcNAc-(1}\rightarrow\text{3)-b-D-GlcNAc-(1}\rightarrow\text{3)-Erbing et al. (1977)}$
O73 (Strain 73-1)	$\alpha\text{-D-Glc-(1}\rightarrow\text{3)}\mid\rightarrow\text{4)-}\alpha\text{-D-Man-(1}\rightarrow\text{2)-}\alpha\text{-D-Man-(1}\rightarrow\text{2)-b-D-Man-(1}\rightarrow\text{3)-}\alpha\text{-D-GalNAc-(1}\rightarrow\text{3)}$
O75	$\text{b-D-Man-(1}\rightarrow\text{4)}\mid\rightarrow\text{3)-}\alpha\text{-D-Gal-(1}\rightarrow\text{4)-}\alpha\text{-L-Rha-(1}\rightarrow\text{3)-b-D-GlcNAc-(1}\rightarrow\text{3)}$
O77	$\rightarrow\text{6)-}\alpha\text{-D-Man-(1}\rightarrow\text{2)-}\alpha\text{-D-Man-(1}\rightarrow\text{2)-b-D-Man-(1}\rightarrow\text{3)-}\alpha\text{-D-GlcNAc-(1}\rightarrow\text{3)}$
O78	$\rightarrow\text{4)-b-D-GlcNAc-(1}\rightarrow\text{4)-b-D-Man-(1}\rightarrow\text{4)-}\alpha\text{-D-Man-(1}\rightarrow\text{3)-b-D-GlcNAc-(1}\rightarrow\text{3)}$
O86	$\alpha\text{-D-Gal-(1}\rightarrow\text{3)}\mid\rightarrow\text{4)-}\alpha\text{-L-Fuc-(1}\rightarrow\text{2)-b-D-Gal-(1}\rightarrow\text{3)-}\alpha\text{-D-GalNAc-(1}\rightarrow\text{3)-b-D-GalNAc-(1}\rightarrow\text{3)}$
O88	$\alpha\text{-L-6dTal-(1}\rightarrow\text{3)}\mid\rightarrow\text{4)-}\alpha\text{-D-Man-(1}\rightarrow\text{3)-}\alpha\text{-D-Man-(1}\rightarrow\text{3)-b-D-GlcNAc-(1}\rightarrow\text{3)}$
O90	$\rightarrow\text{4)-}\alpha\text{-L-Fuc2/3Ac-(1}\rightarrow\text{2)-b-D-Gal-(1}\rightarrow\text{3)-}\alpha\text{-D-GalNAc-(1}\rightarrow\text{3)-b-D-GalNAc-(1}\rightarrow\text{3)}$
O98	$\rightarrow\text{3)-}\alpha\text{-L-QuiNAc-(1}\rightarrow\text{4)-}\alpha\text{-D-GalNAcA-(1}\rightarrow\text{3)-}\alpha\text{-L-QuiNAc-(1}\rightarrow\text{3)-b-D-GlcNAc-(1}\rightarrow\text{3)}$
O104	$\rightarrow\text{4)-}\alpha\text{-D-Gal-(1}\rightarrow\text{4)-}\alpha\text{-Neu5,7,9Ac3-(2}\rightarrow\text{3)-b-D-Gal-(1}\rightarrow\text{3)-b-D-GalNAc-(1}\rightarrow\text{3)}$
O111	$\alpha\text{-Col-(1}\rightarrow\text{6)}\mid\rightarrow\text{4)-}\alpha\text{-D-Glc-(1}\rightarrow\text{4)-}\alpha\text{-D-Gal-(1}\rightarrow\text{3)-b-D-GlcNAc-(1}\rightarrow\mid\alpha\text{-Col-(1}\rightarrow\text{3)}$
O113	$\rightarrow\text{4)-}\alpha\text{-D-GalNAc-(1}\rightarrow\text{4)-}\alpha\text{-D-GalA-(1}\rightarrow\text{3)-}\alpha\text{-D-Gal-(1}\rightarrow\text{3)-b-D-GlcNAc-(1}\rightarrow\mid\text{b-D-Gal-(1}\rightarrow\text{3)}$
O114	$\rightarrow\text{4)-b-D-Qui3N(N-acetyl-L-seryl)-(1}\rightarrow\text{3)-b-D-Ribf-(1}\rightarrow\text{4)-b-D-Gal-(1}\rightarrow\text{3)-}\alpha\text{-D-GlcNAc-(1}\rightarrow\text{3)}$

FIG. 10A

O22	→6)-α-D-Glc-(1→4)-β-D-GlcA-(1→4)-β-D-GalNAc3Ac-(1→3)-α-D-Gal-(1→3)-β-D-GalNAc-(1→
O35	→3)-α-L-Rha-(1→2)-α-L-Rha-(1→3)-α-L-Rha-(1→3)-β-D-GlcNAc-(1→ α-D-GalNAcA6N-(1→2)
O65	→2)-β-D-GlcNAc-(1→4)-α-D-GalA6N-(1→4)-α-D-GalNAc-(1→4)-β-D-GalA-(1→3)-α-D-GlcNAc-(1→
O66	→2)-β-D-Man-(1→3)-α-D-GlcNAc-(1→2)-β-D-Glc3Ac-(1→3)-α-L-6dTal-(1→3)-α-D-GlcNAc-(1→
O83	→6)-α-D-Glc-(1→4)-β-D-GlcA-(1→6)-β-D-Gal-(1→4)-β-D-Gal-(1→4)-β-D-GlcNAc-(1→
O91	→4)-α-D-GlcNAc-(1→4)-β-D-Gal-(1→4)-β-D-GlcNAc-(1→4)-β-D-GlcA6NGly-(1→3)-β-D-GlcNAc-(1→
O105	β-D-Ribf-(1→3) →4)-α-D-GlcA2Ac3Ac-(1→2)-α-L-Rha4Ac-(1→3)-β-L-Rha-(1→4)-β-L-Rha-(1→3)-β-D-GlcNAc6Ac-(1→
O116	→2)-β-D-GlcNAc-(1→6)-α-D-GlcNAc-(1→4)-α-D-GalNAc-(1→4)-α-D-GalA-(1→3)-β-D-GlcNAc-(1→
O117	→4)-β-D-GalNAc-(1→3)-α-L-Rha-(1→4)-α-D-Glc-(1→4)-β-D-Gal-(1→3)-α-D-GalNAc-(1→
O139	β-D-Glc-(1→3) →3)-α-L-Rha-(1→4)-α-D-GalA-(1→2)-α-L-Rha-(1→3)-α-L-Rha-(1→2)-α-L-Rha-(1→3)-α-D-GlcNAc-(1→
O153	→2)-β-D-Ribf-(1→4)-β-D-Gal-(1→4)-α-D-GlcNAc-(1→4)-β-D-Gal-(1→3)-α-D-GlcNAc-(1→Ratnayake (1994a)
O167	α-D-Galf-(1→4) →2)-β-D-GalA6N(L)Ala-(1→3)-α-D-GlcNAc-(1→2)-β-D-Galf-(1→5)-β-D-Galf-(1→3)-β-D-GlcNAc-(1→
O172	→3)-α-L-FucNAc-(1→4)-α-D-Glc-(1-P→4)-α-D-Glc-(1→3)-α-L-FucNAc-(1→3)-α-D-GlcNAc-(1→

FIG. 10B

O8	→2)-α-D-Man-(1→2)-α-D-Man-(1→3)-β-D-Man-(1→
O9a	→2)-α-D-Man-(1→2)-α-D-Man-(1→3)-α-D-Man-(1→3)-α-D-Man-(1→
O9	→2)-[α-D-Man-(1→2)]2-α-D-Man-(1→3)-α-D-Man-(1→3)-α-D-Man-(1→
O20ab	→2)-β-D-Ribf-(1→4)-α-D-Gal-(1→Vasiliev & Zakharova (1976)
O20ac	α-D-Gal-(1→3) →2)-β-D-Ribf-(1→4)-α-D-Gal-(1→
O52	→3)-β-D-Fucf-(1→3)-β-D-6dmanHep2Ac-(1→
O97	→3)-α-L-Rha-(1→3)-β-L-Rha-(1→ β-D-Xulif-(2→2)β-D-Xulif-(2→2)
O101	→6)-α-D-GlcNAc-(1→4)-α-D-GalNAc-(1→

FIG. 11

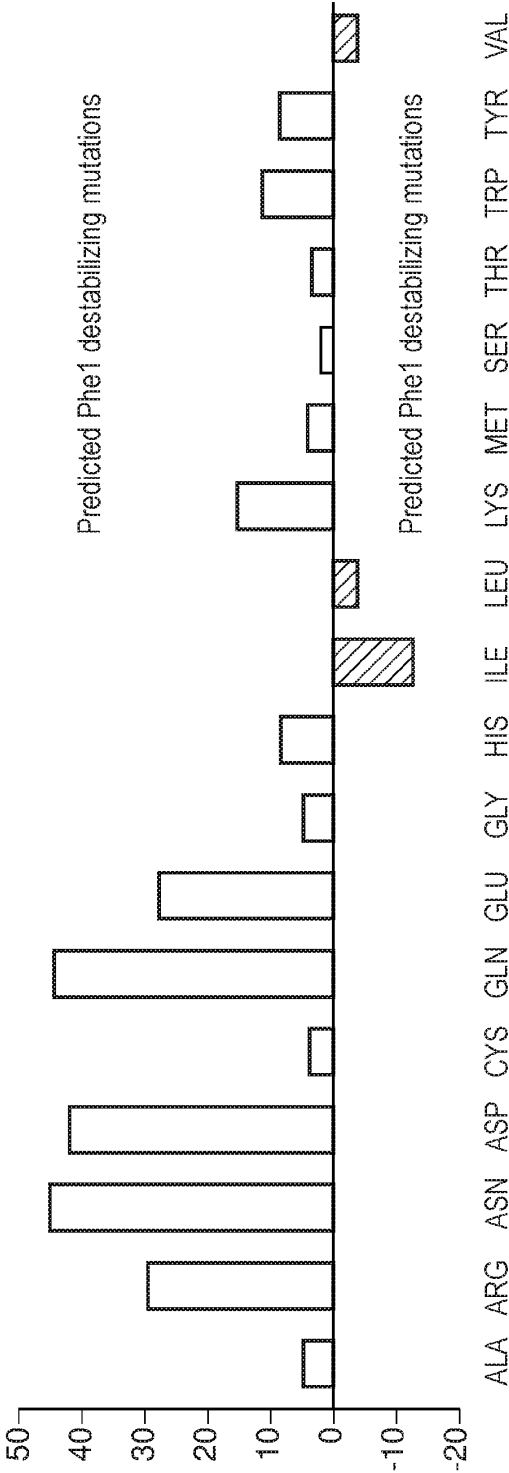


FIG. 12A

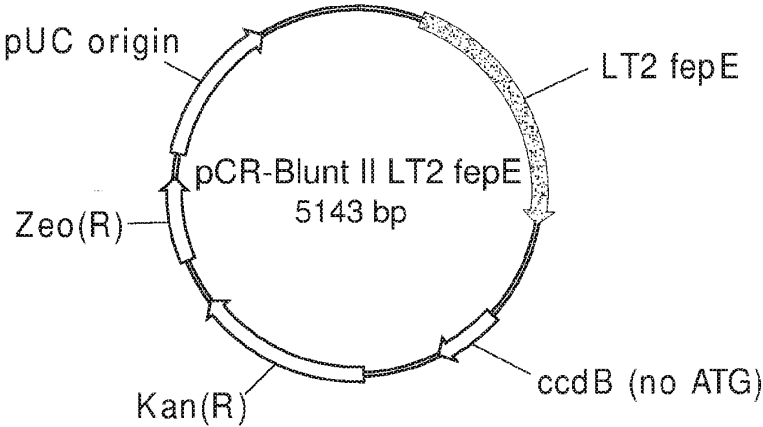


FIG. 12B

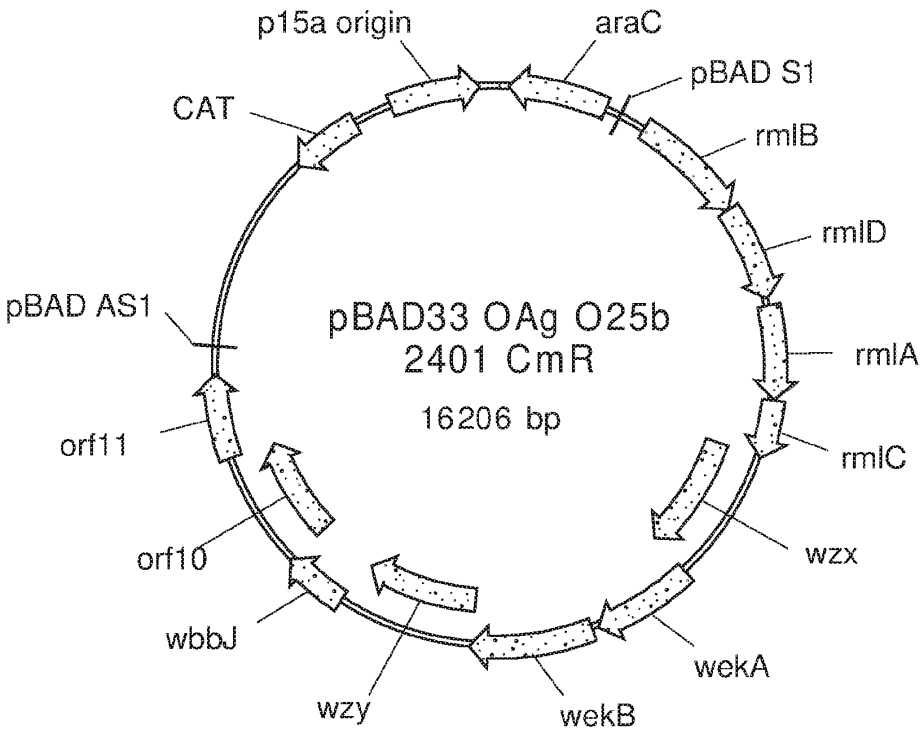


FIG. 13A

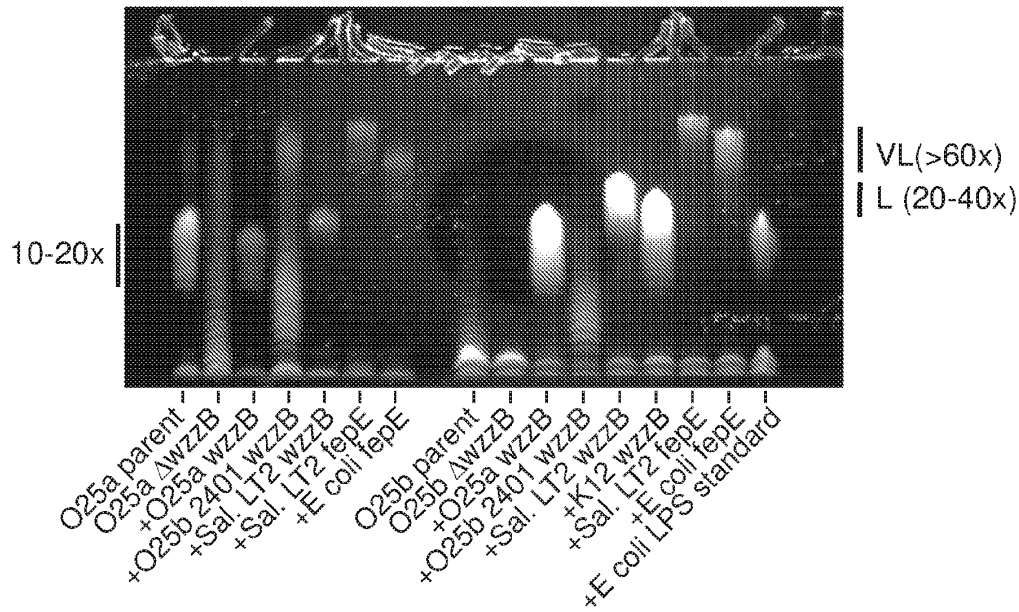


FIG. 13B

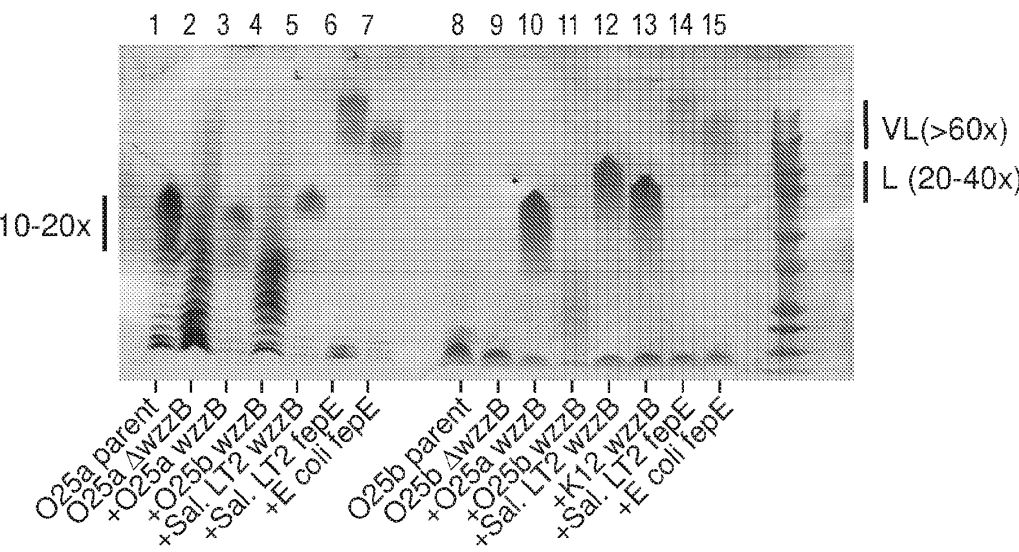


FIG. 14

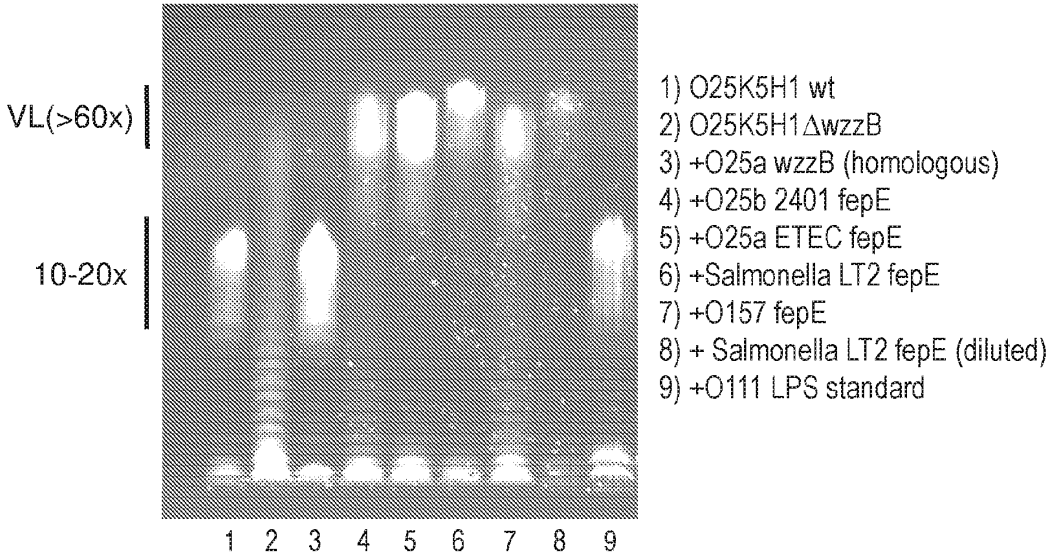


FIG. 15

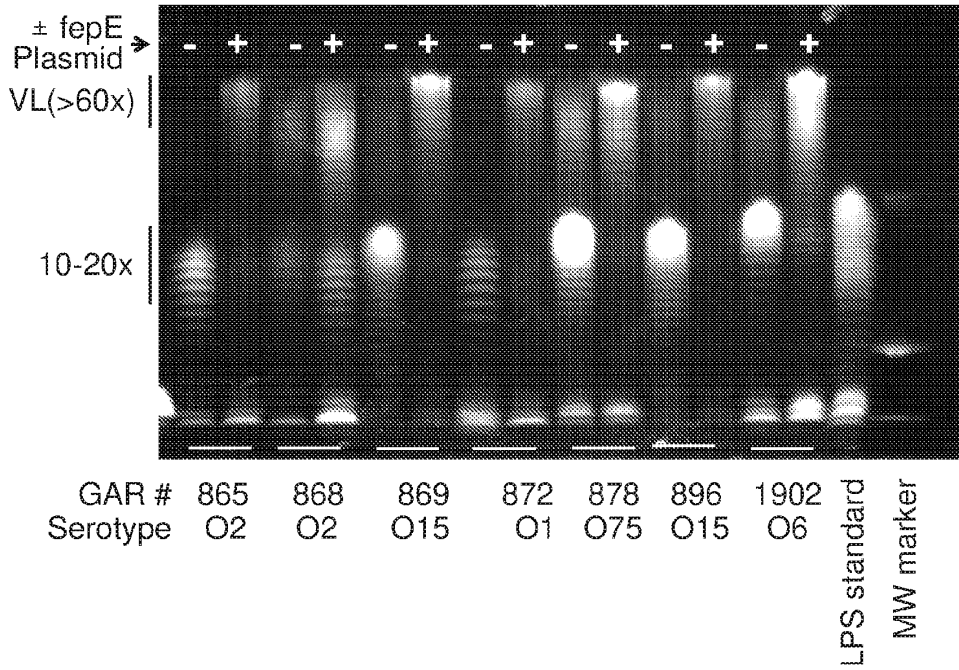


FIG. 16A

FIG. 16B

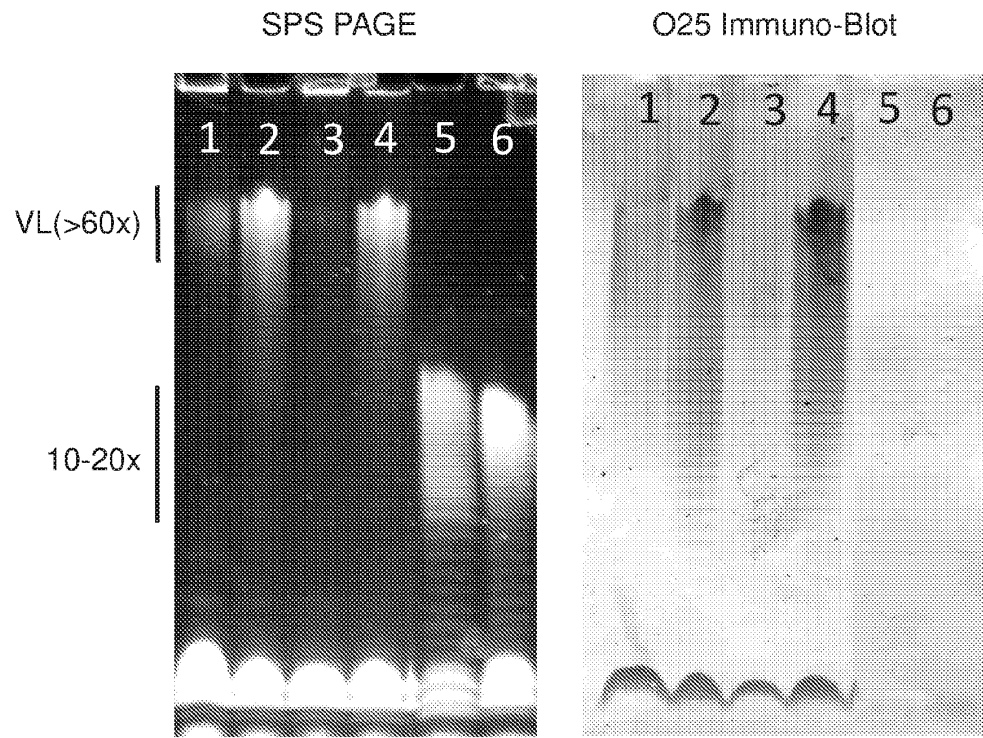


FIG. 17

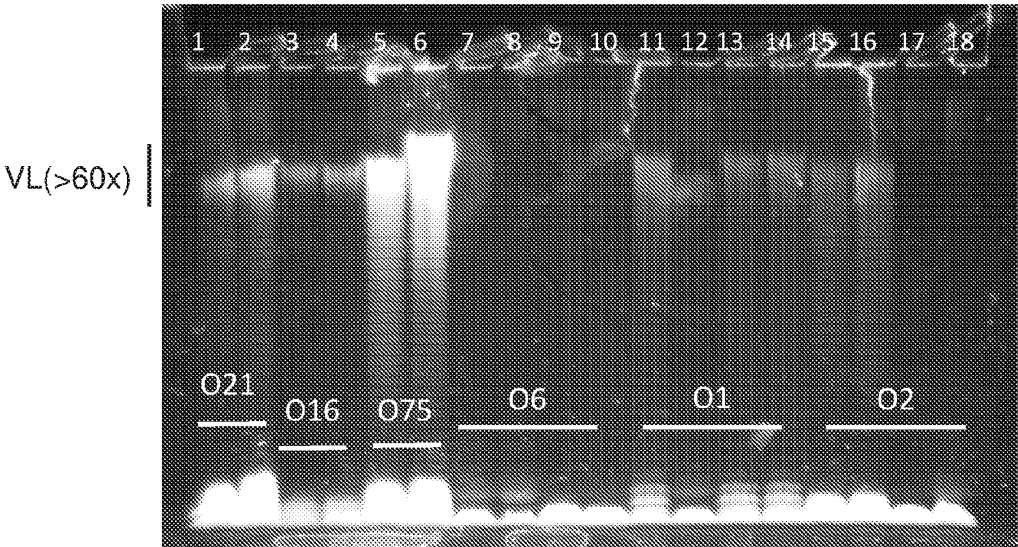


FIG. 18

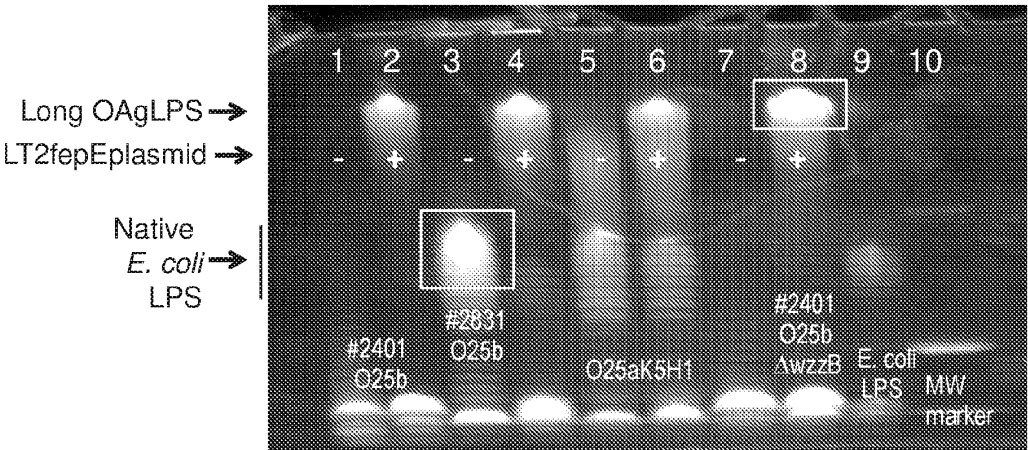


FIG. 19A

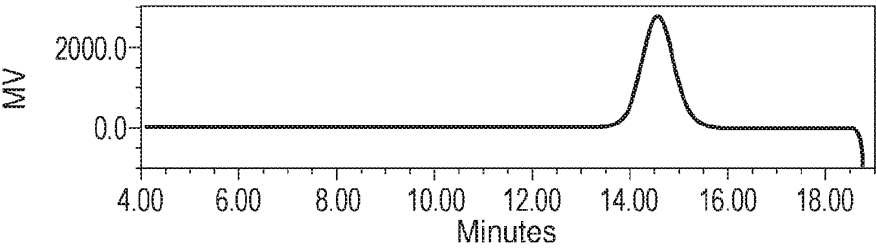


FIG. 19B

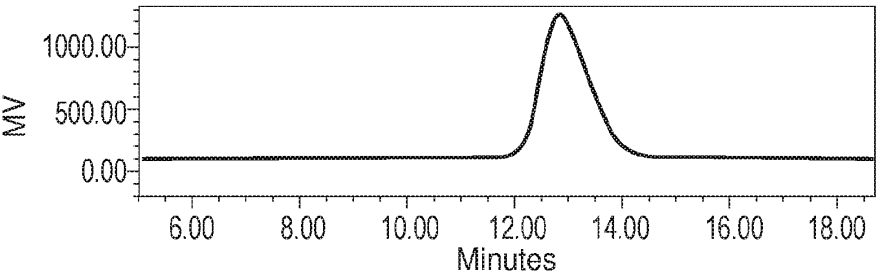


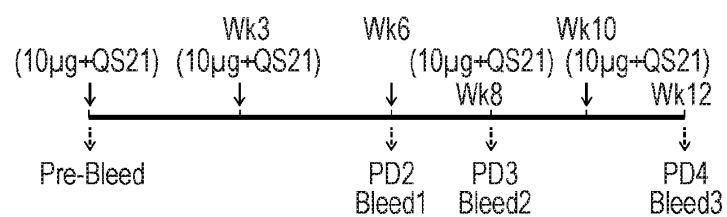
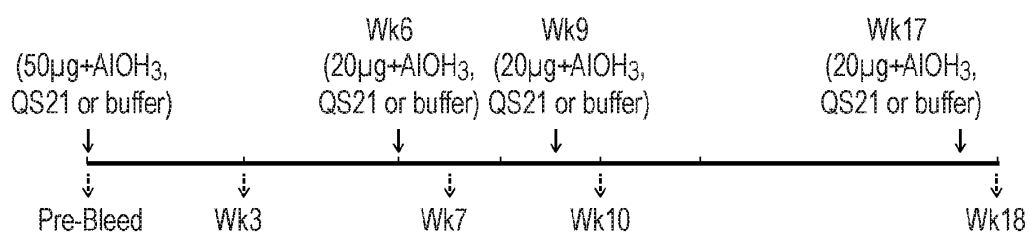
FIG. 20A**FIG. 20B**

FIG. 21A

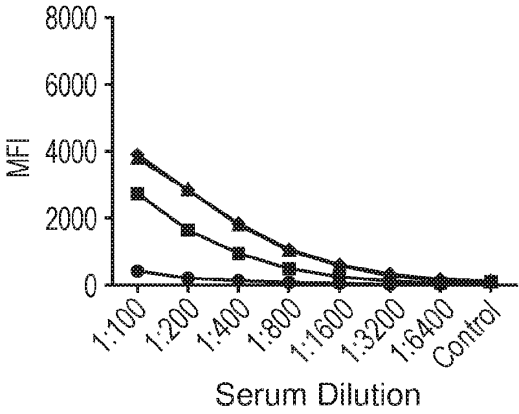


FIG. 21B

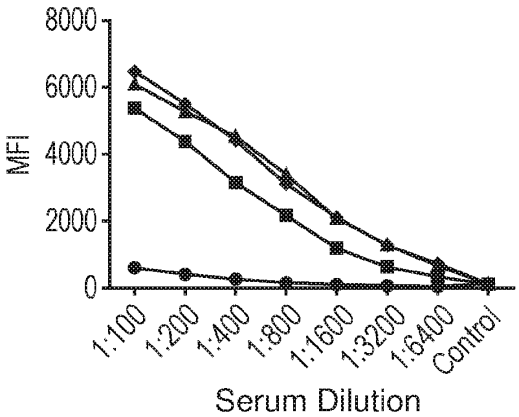


FIG. 21C

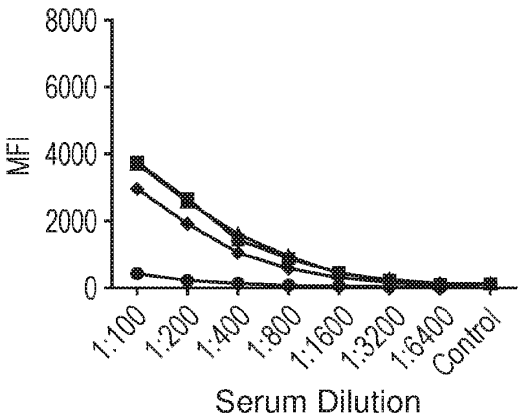


FIG. 22A

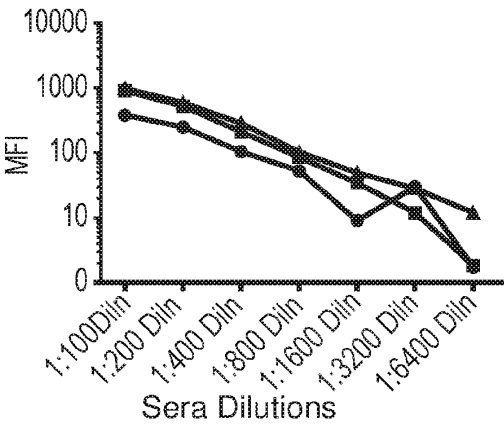


FIG. 22B

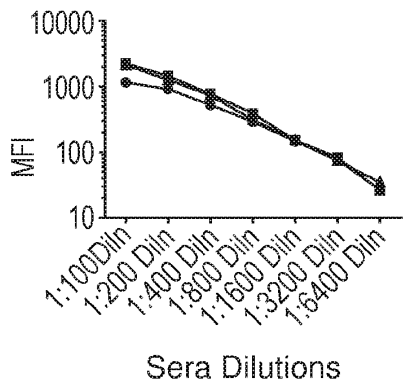


FIG. 22C

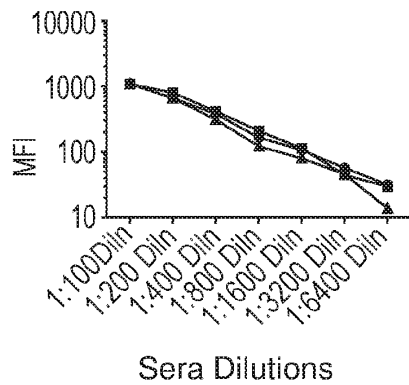


FIG. 22D

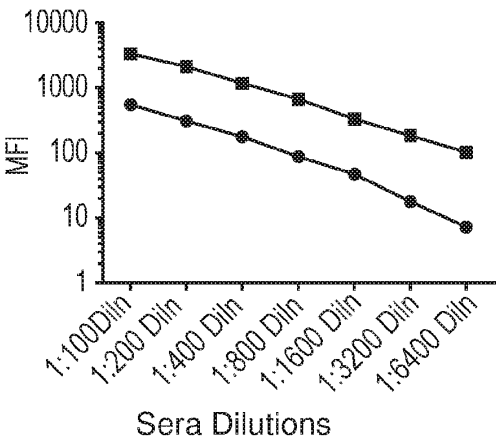


FIG. 22E

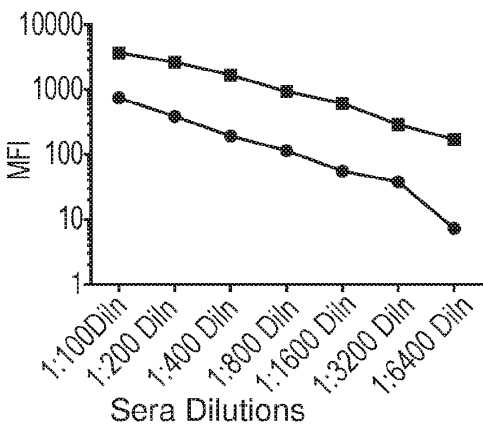


FIG. 22F

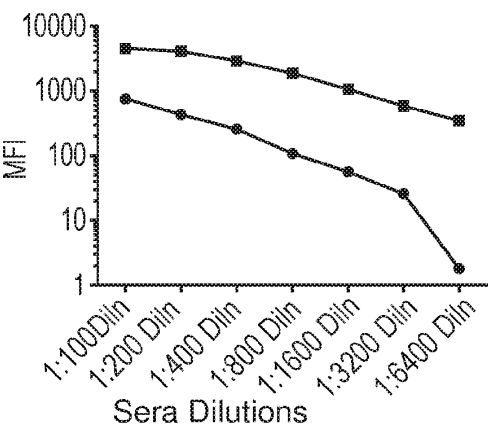


FIG. 23A

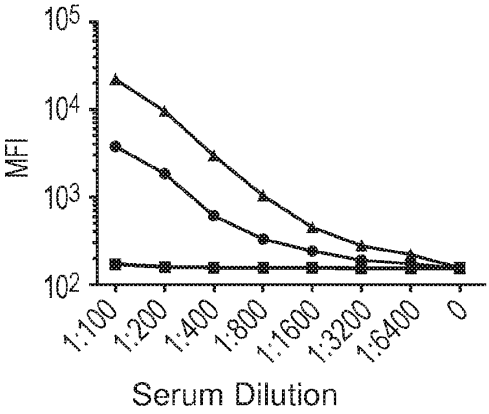


FIG. 23B

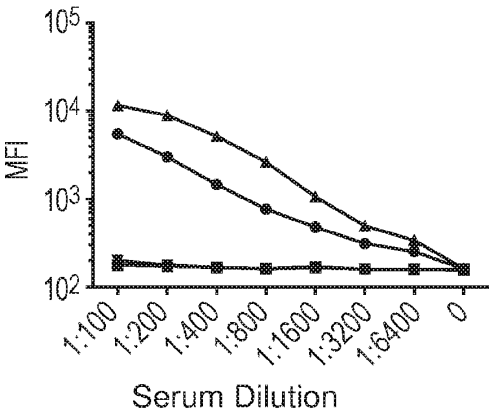


FIG. 23C

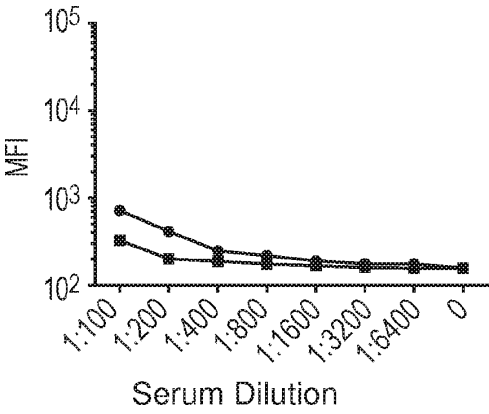


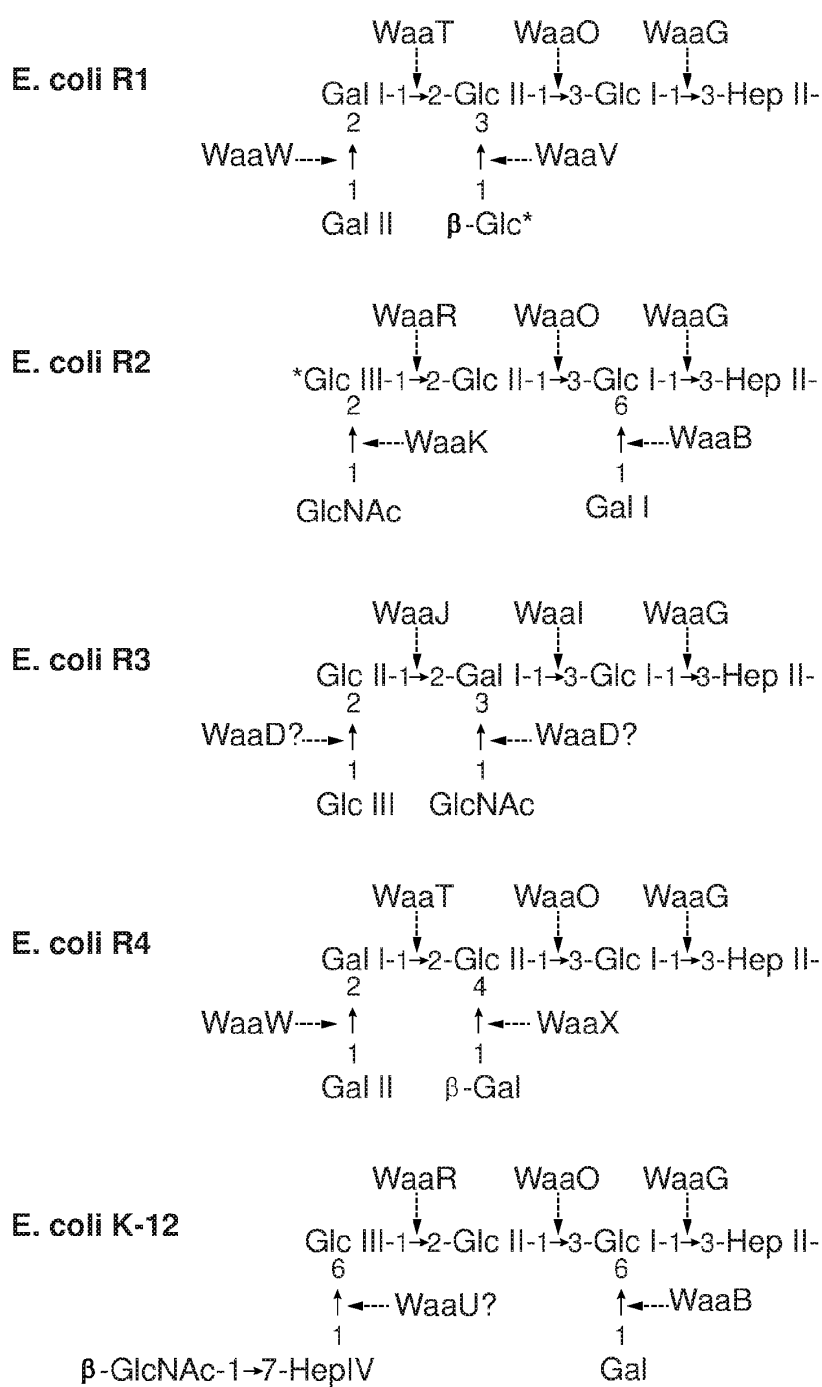
FIG. 24

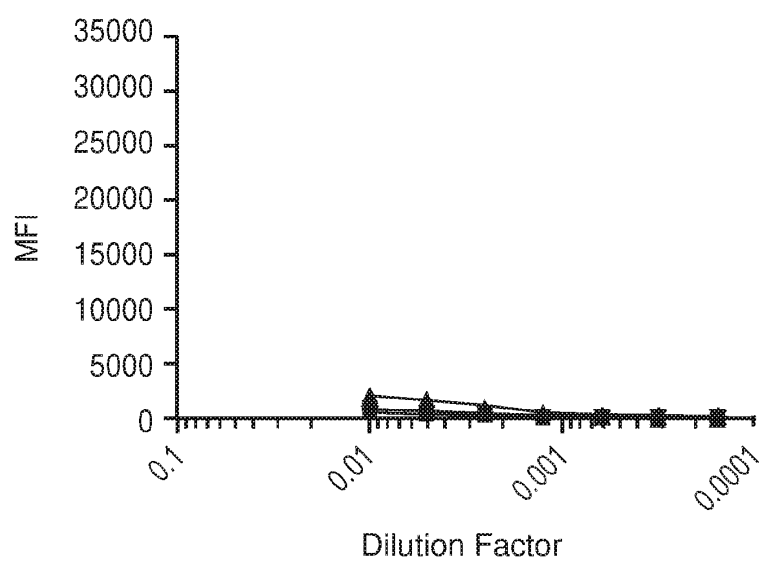
FIG. 25

FIG. 26A

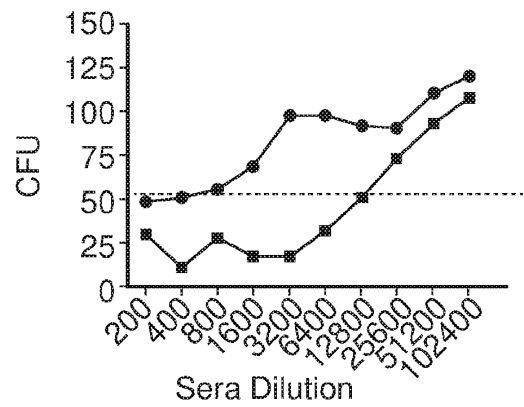


FIG. 26B

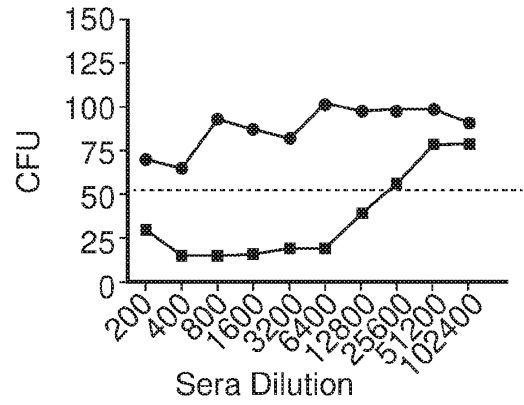


FIG. 26C

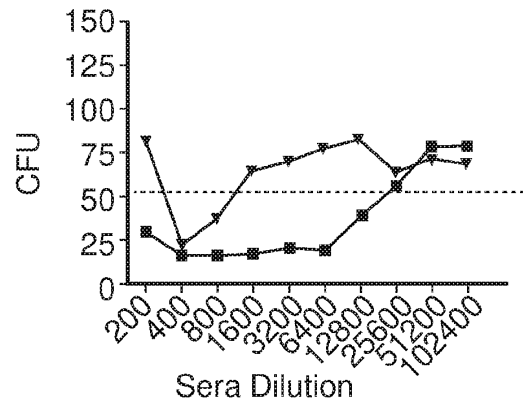


FIG. 27A

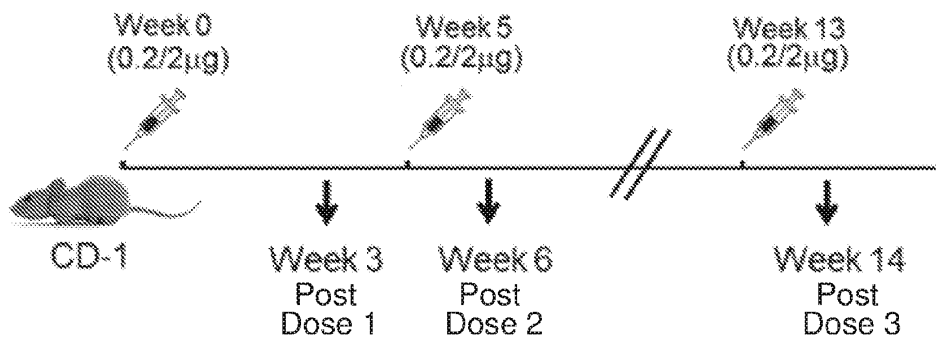


FIG. 27B

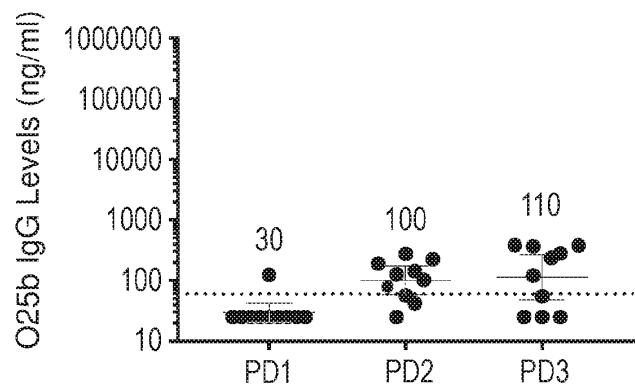


FIG. 27C

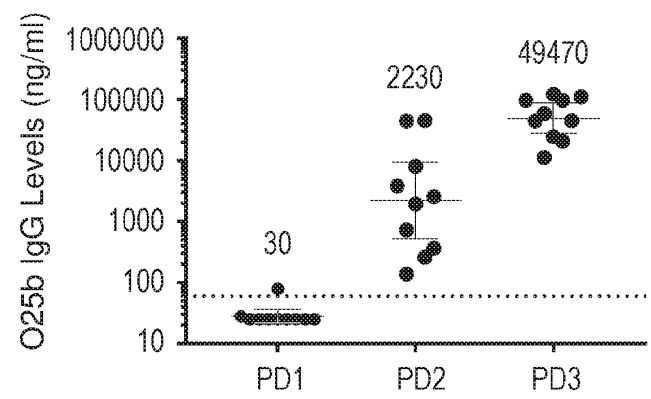


FIG. 28A

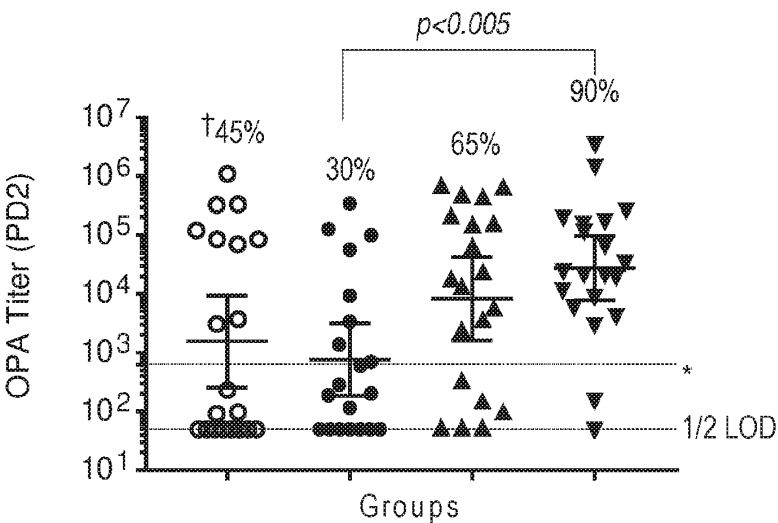


FIG. 28B

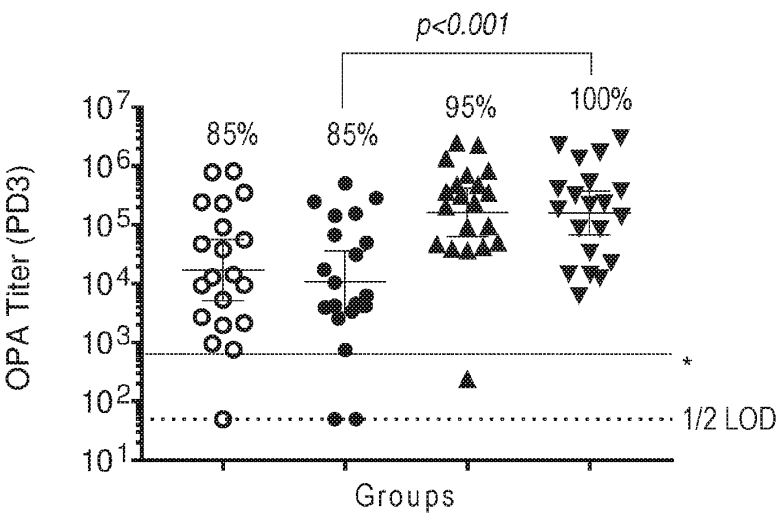


FIG. 29

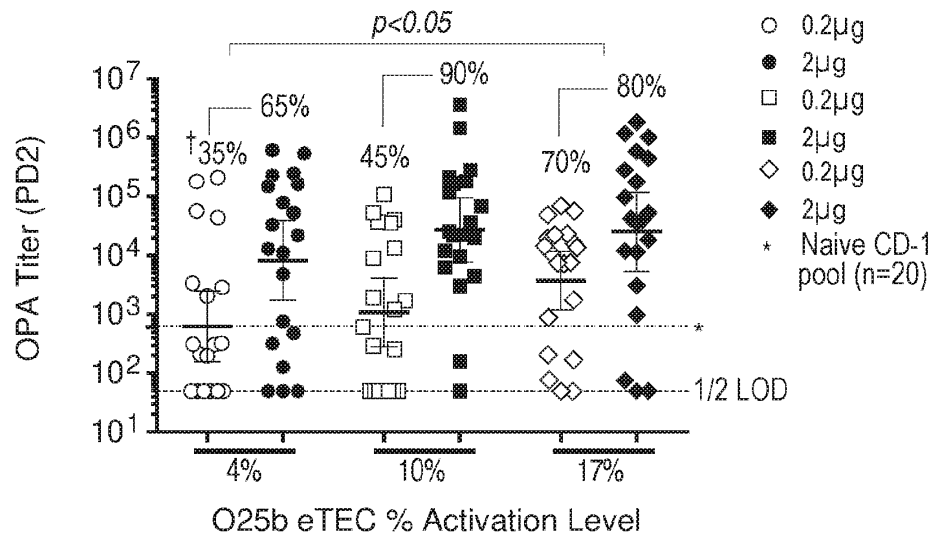


FIG. 30A

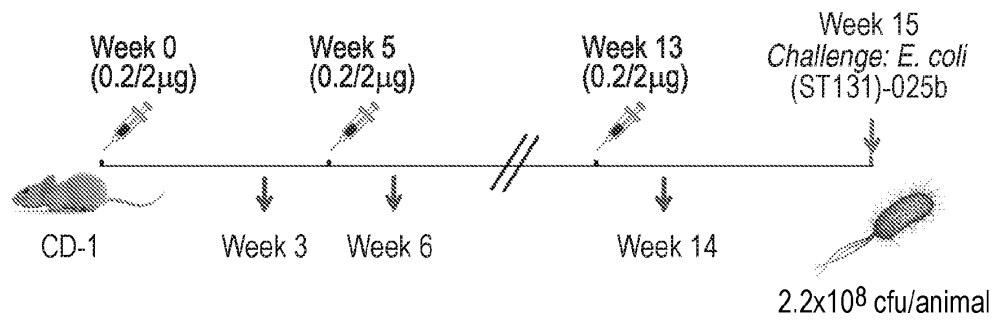
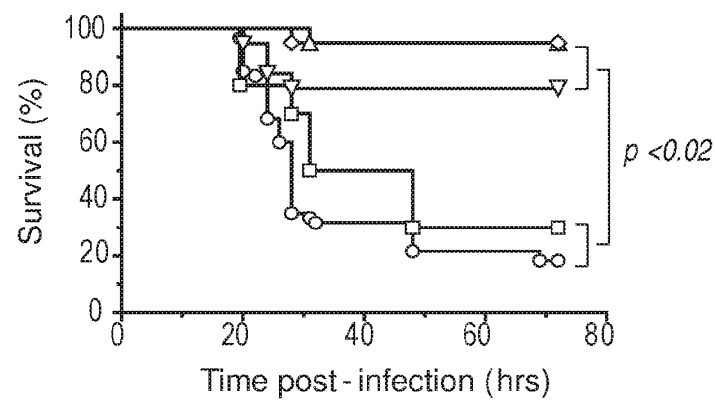


FIG. 30B



தமிழ்

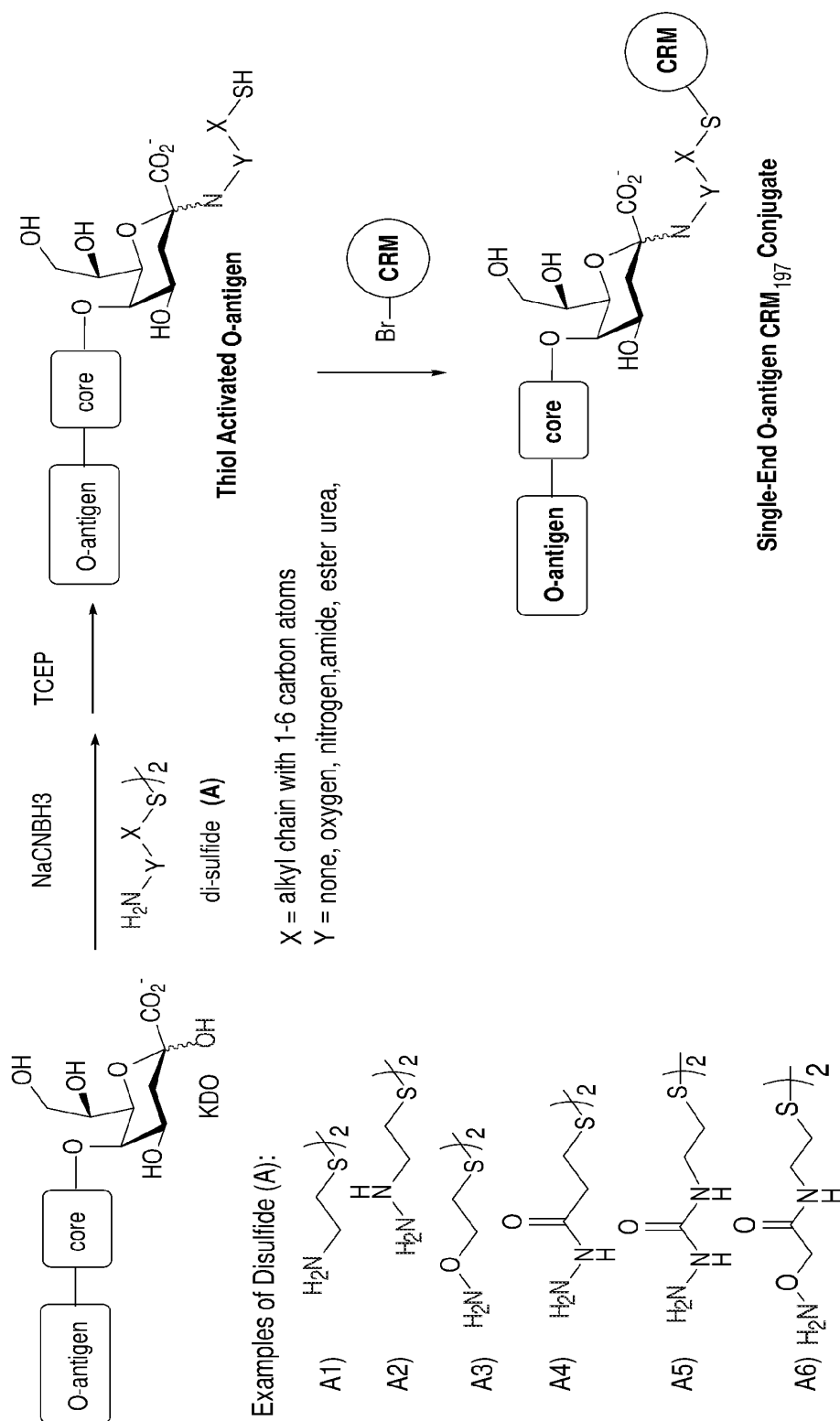


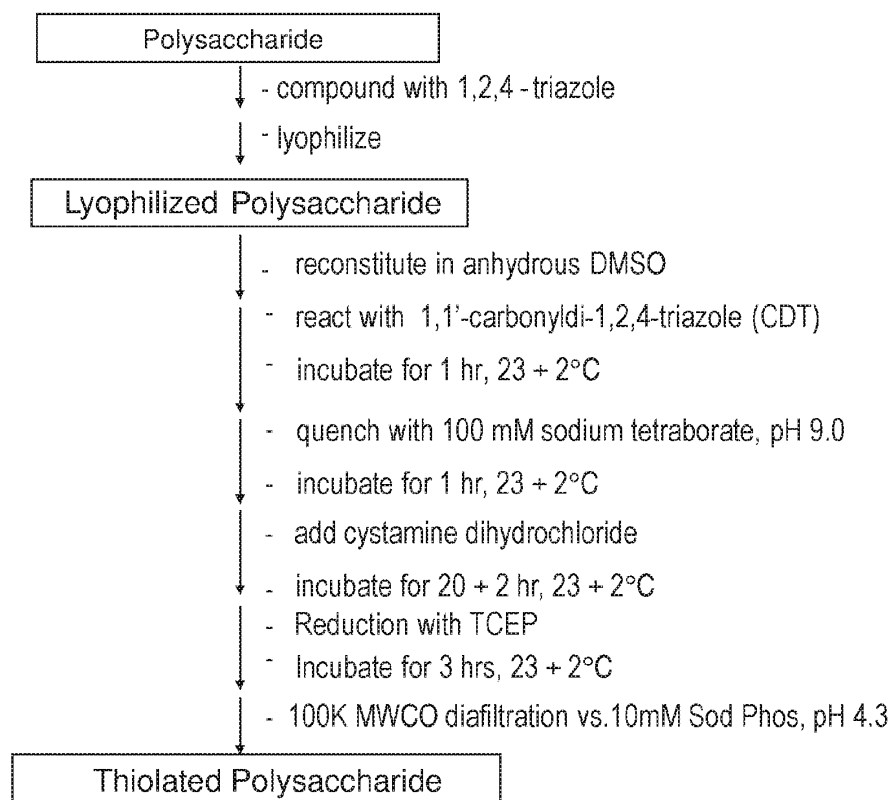
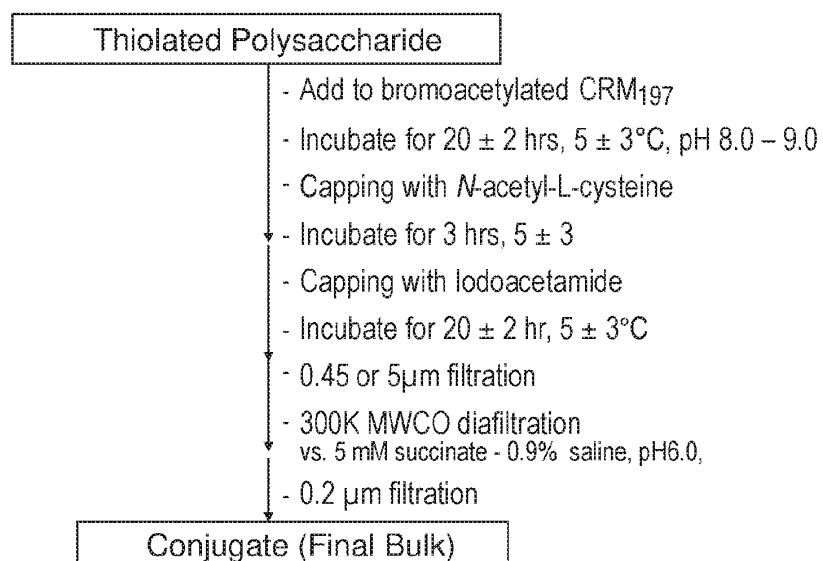
FIG. 32A**FIG. 32B**

FIG. 33

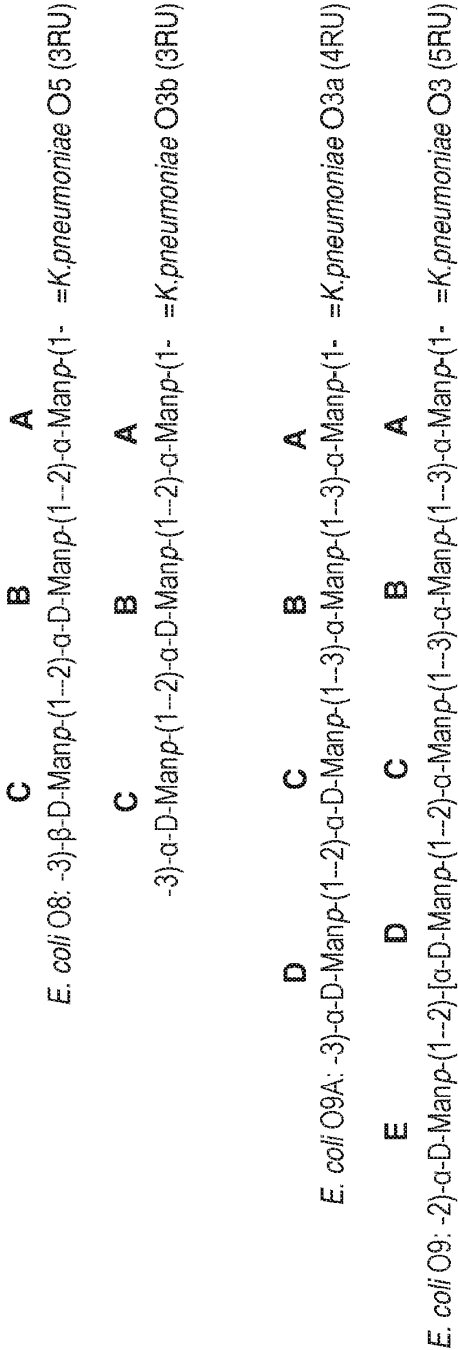
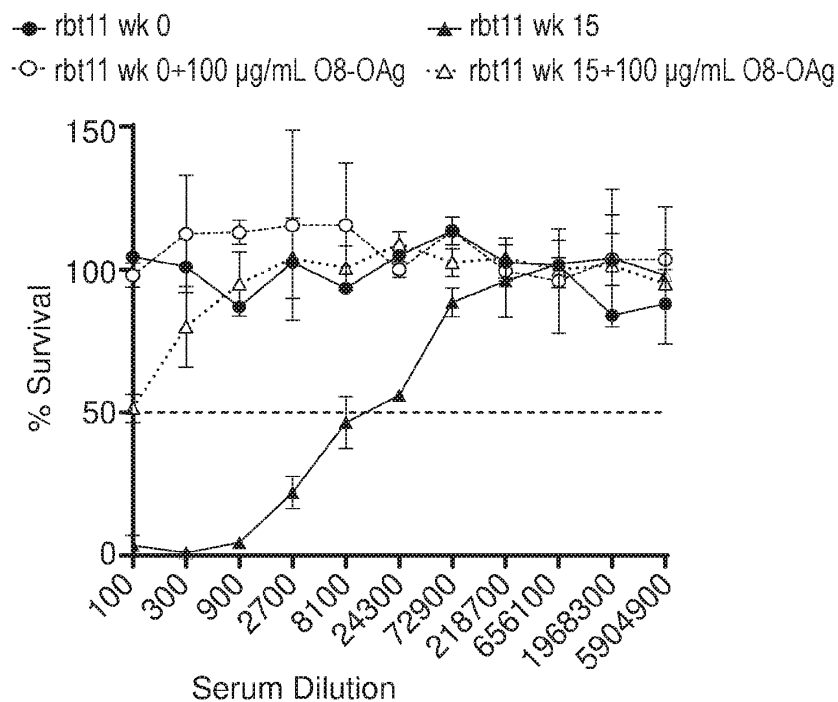


FIG. 34A

Ec O8 OPA with 3% BRC

**FIG. 34B**

Kp O5 hSBA with 10% hC

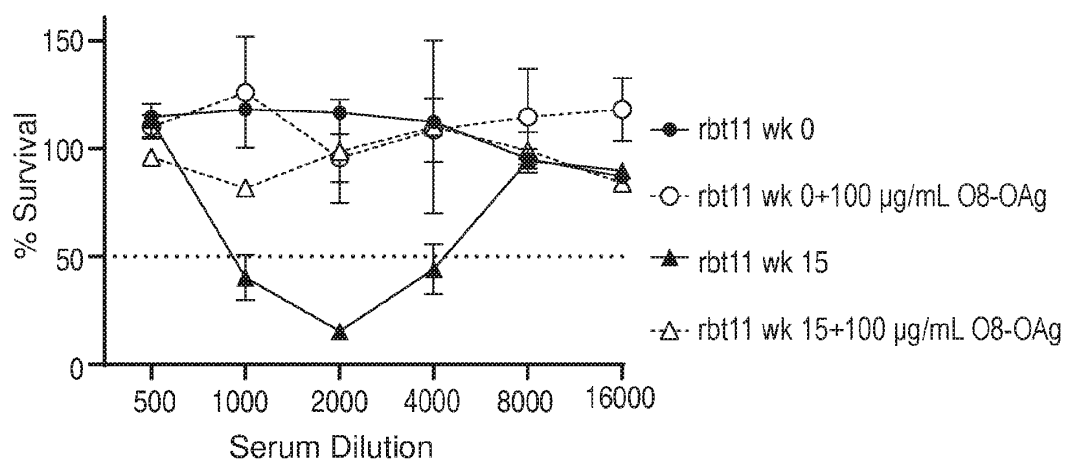
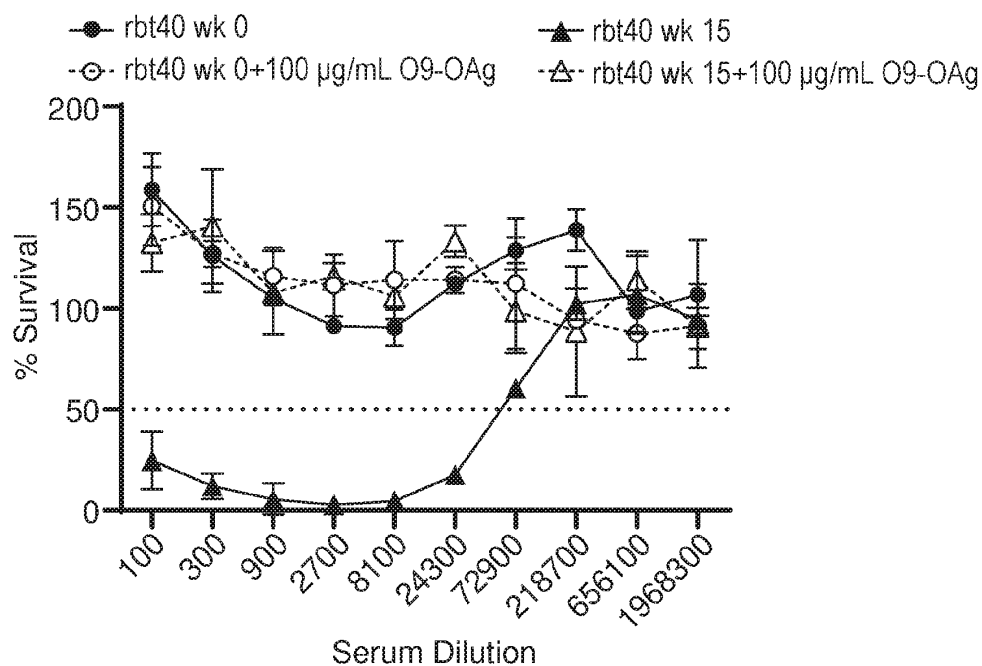


FIG. 35A Ec O9 OPA with 3% BRC**FIG. 35B** Kp O3 OPA with 15% hC