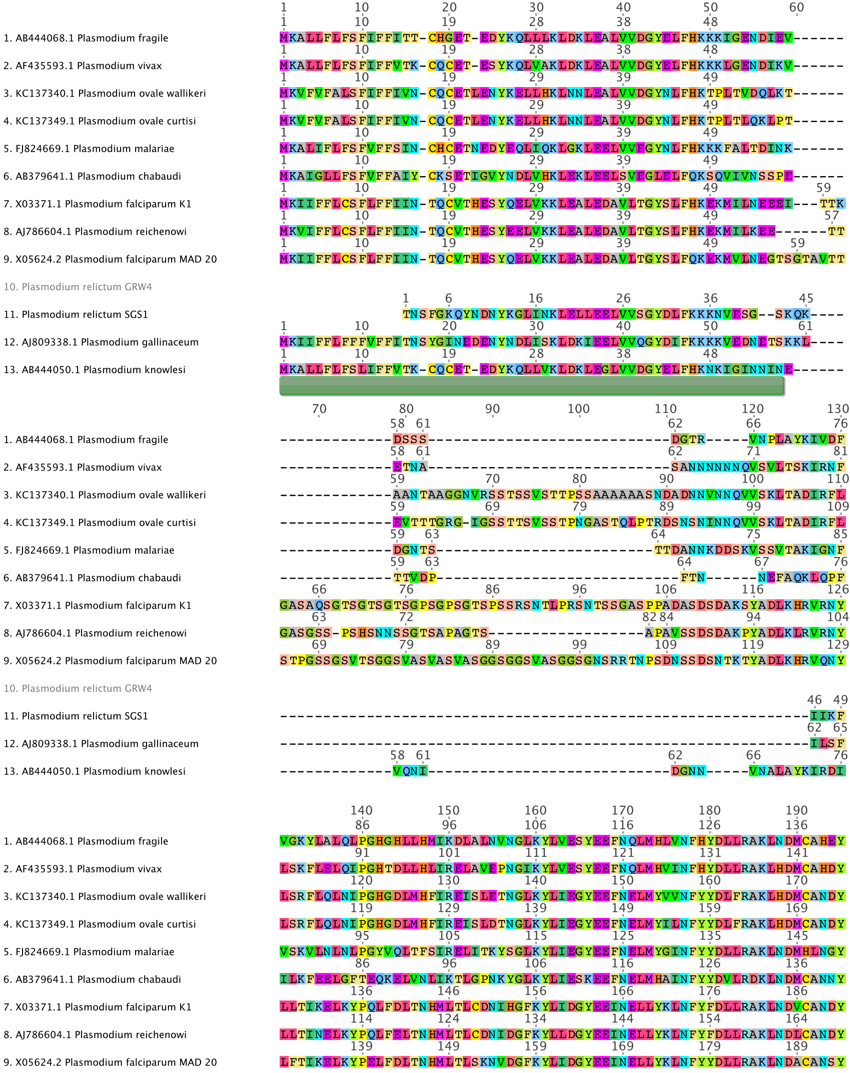
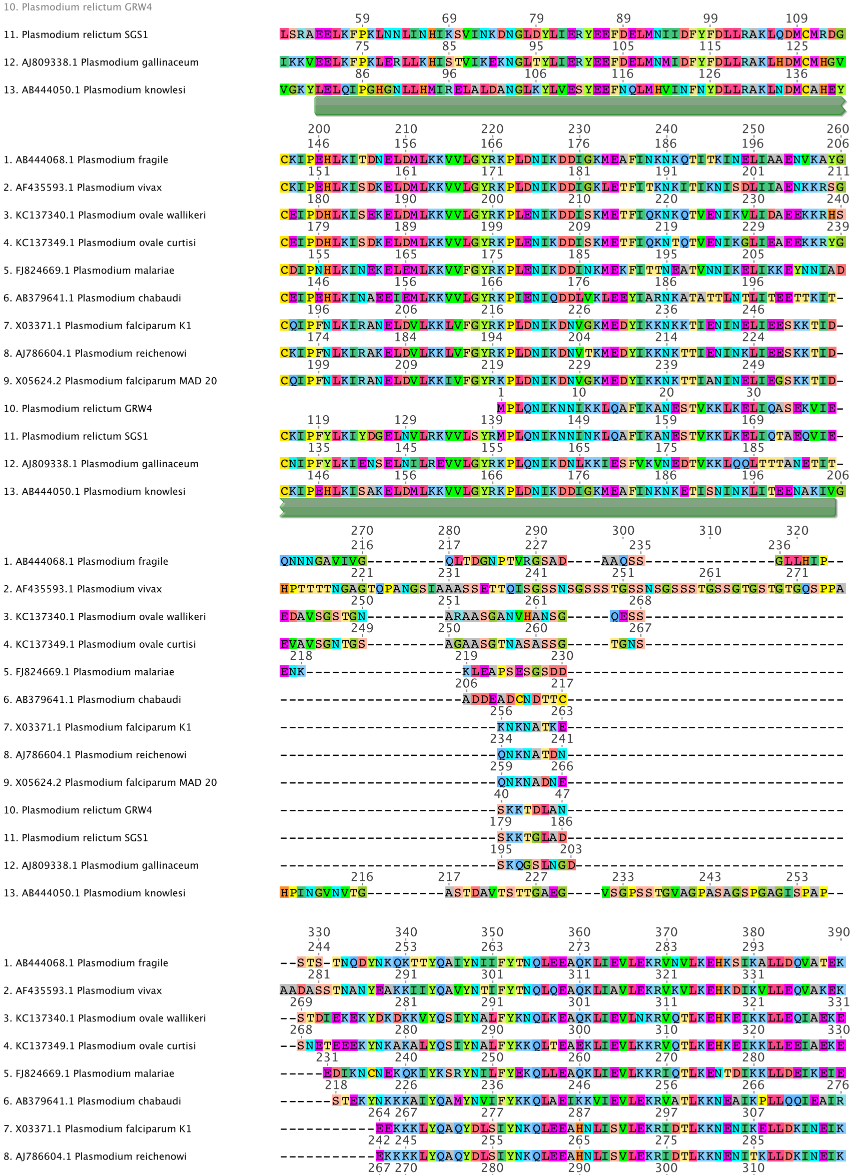
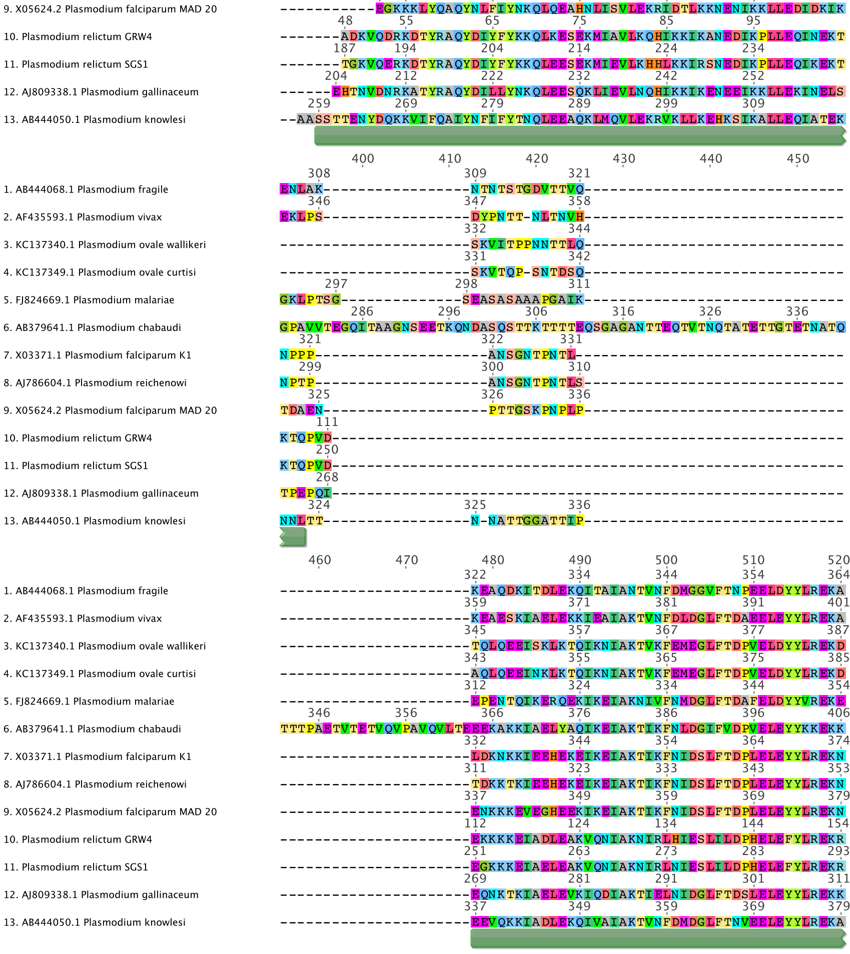


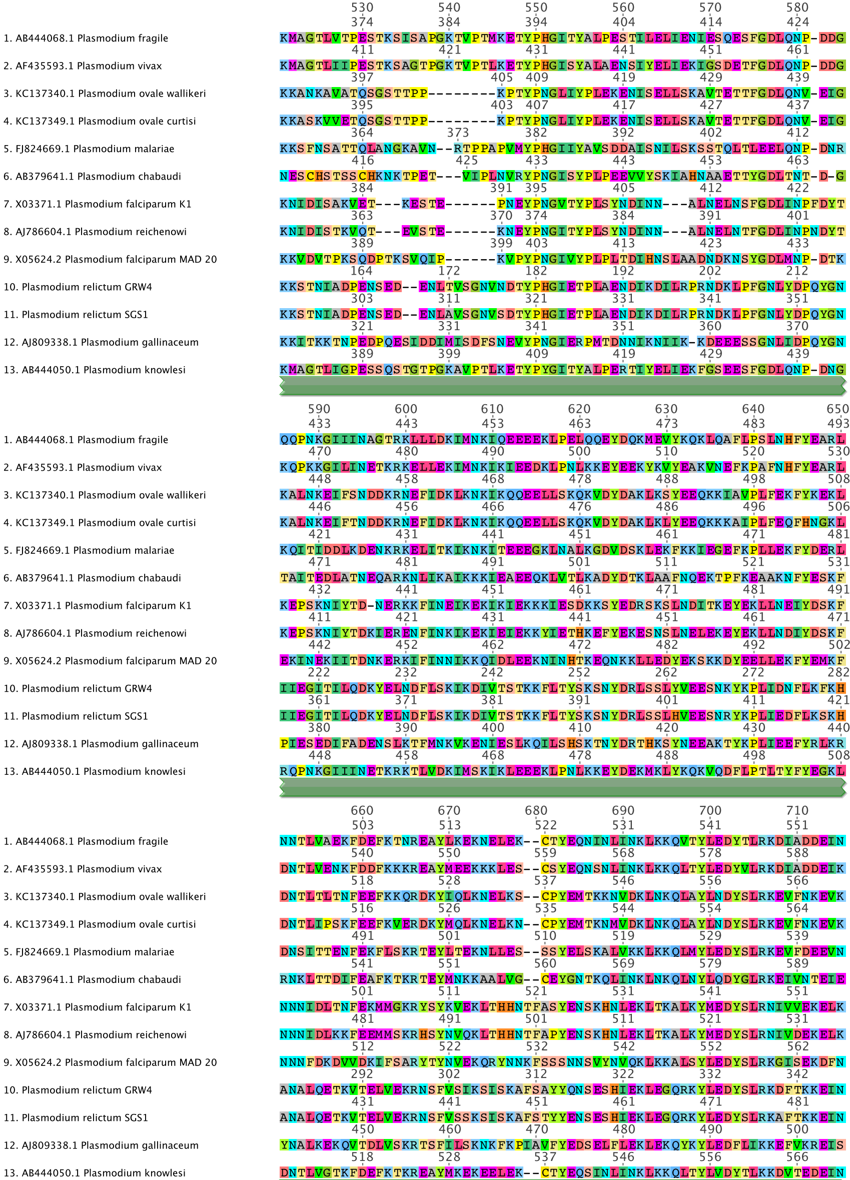
```
                                          1        10        20        30        40        50        60
                                          1        10        19        28        38        48
1. AB444068.1 Plasmodium fragile          MKALLFLFSFIFFITT-CHGET-EDYKQLLLKLDKLEALVVDGYELFHKKKIGENDIEV------
                                          1        10        19        28        38        48
2. AF435593.1 Plasmodium vivax            MKALLFLFSFIFFVTK-CQCET-ESYKQLVAKLDKLEALVVDGYELFHKKKLGENDIKV------
                                          1        10        19        29        39        49
3. KC137340.1 Plasmodium ovale wallikeri  MKVFVFALSFIFFIVN-CQCETLENYKELLHKLNNLEALVVDGYNLFHKTPLTVDQLKT------
                                          1        10        19        29        39        49
4. KC137349.1 Plasmodium ovale curtisi    MKVFVFALSFIFFIVN-CQCETLENYKELLHKLNNLEALVVDGYNLFHKTPLTLQKLPT------
                                          1        10        19        29        39        49
5. FJ824669.1 Plasmodium malariae         MKALIFLFSFVFFSIN-CHCETNEDYEQLIQKLGKLEELVVEGYNLFHKKKFALTDINK------
                                          1        10        19        29        39        49
6. AB379641.1 Plasmodium chabaudi         MKAIGLLFSFVFFAIY-CKSETIGVYNDLVHKLEKLEELSVEGLELFQKSQVIVNSSPE------
                                          1        10        19        29        39        49           59
7. X03371.1 Plasmodium falciparum K1      MKIIFFLCSFLFFIIN-TQCVTHESYQELVKKLEALEDAVLTGYSLFHKEKMILNEEEI---TTK
                                          1        10        19        29        39        49            57
8. AJ786604.1 Plasmodium reichenowi       MKVIFFLCSFLFFIIN-TQCVTHESYEELVKKLEALEDAVLTGYSLFHKEKMILKEE------TT
                                          1        10        19        29        39        49        59
9. X05624.2 Plasmodium falciparum MAD 20  MKIIFFLCSFLFFIIN-TQCVTHESYQELVKKLEALEDAVLTGYSLFQKEKMVLNEGTSGTAVTT
10. Plasmodium relictum GRW4
                                                        1    6         16        26        36         45
11. Plasmodium relictum SGS1                            TNSFGKQYNDNYKGLINKLELLEELVVSGYDLFKKKNVESG--SKQK----
                                          1        10        20        30        40        50         61
12. AJ809338.1 Plasmodium gallinaceum     MKIIFFLFFFVFFITNSYGINEDENYNDLISKLDKIEELVVQGYDIFKKKKVEDNETSKKL----
                                          1        10        19        28        38        48
13. AB444050.1 Plasmodium knowlesi        MKALLFLFSLIFFVTK-CQCET-EDYKQLLVKLDKLEGLVVDGYELFHKNKIGINNINE------

                                              70        80        90        100       110       120       130
                                                       58 61                           62       66        76
1. AB444068.1 Plasmodium fragile          -------------DSSS----------------------------DGTR-----VNPLAYKIVDF
                                                       58 61                           62       71        81
2. AF435593.1 Plasmodium vivax            -------------ETNA----------------------------SANNNNNNQVSVLTSKIRNF
                                                       59         70        80        90        100       110
3. KC137340.1 Plasmodium ovale wallikeri  -------------AANTAAGGNVRSSTSSVSTTPSSAAAAAASNDADNNVNNQVVSKLTADIRFL
                                                       59         69        79        89        99        109
4. KC137349.1 Plasmodium ovale curtisi    -------------EVTTTGRG-IGSSTTSVSSTPNGASTQLPTRDSNSNINNQVVSKLTADIRFL
                                                       59  63                        64         75        85
5. FJ824669.1 Plasmodium malariae         -------------DGNTS-------------------------TTDANNKDDSKVSSVTAKIGNF
                                                       59  63                           64       67       76
6. AB379641.1 Plasmodium chabaudi         -------------TTVDP----------------------------FTN------NEFAQKLQPF
                                              66        76        86        96        106       116       126
7. X03371.1 Plasmodium falciparum K1      GASAQSGTSGTSGTSGPSGPSGTSPSSRSNTLPRSNTSSGASPPADASDSDAKSYADLKHRVRNY
                                              63        72                         82 84        94        104
8. AJ786604.1 Plasmodium reichenowi       GASGSS-PSHSNNSSGTSAPAGTS------------------APAVSSDSDAKPYADLKLRVRNY
                                              69        79        89        99        109       119       129
9. X05624.2 Plasmodium falciparum MAD 20  STPGSSGSVTSGGSVASVASVASGGSGGSVASGGSGNSRRTNPSDNSSDSNTKTYADLKHRVQNY
10. Plasmodium relictum GRW4
                                                                                                       46 49
11. Plasmodium relictum SGS1              -------------------------------------------------------------IIKF
                                                                                                       62 65
12. AJ809338.1 Plasmodium gallinaceum     -------------------------------------------------------------ILSF
                                                       58 61                           62       66        76
13. AB444050.1 Plasmodium knowlesi        -------------VQNI----------------------------DGNN-----VNALAYKIRDI

                                                   140       150       160       170       180       190
                                                   86        96        106       116       126       136
1. AB444068.1 Plasmodium fragile          VGKYLALQLPGHGHLLHMIKDLALNVNGLKYLVESYEEFNQLMHLVNFHYDLLRAKLNDMCAHEY
                                                   91        101       111       121       131       141
2. AF435593.1 Plasmodium vivax            LSKFLELQIPGHTDLLHLIRELAVEPNGIKYLVESYEEFNQLMHVINFHYDLLRAKLHDMCAHDY
                                                   120       130       140       150       160       170
3. KC137340.1 Plasmodium ovale wallikeri  LSRFLQLNIPGHGDLMHFIREISLETNGLKYLIEGYEEFNELMYVVNFYYDLFRAKLHDMCANDY
                                                   119       129       139       149       159       169
4. KC137349.1 Plasmodium ovale curtisi    LSRFLQLNIPGHGDLMHFIREISLDTNGLKYLIEGYEEFNELMYILNFYYDLFRAKLHDMCANDY
                                                   95        105       115       125       135       145
5. FJ824669.1 Plasmodium malariae         VSKVLNLNLPGYVQLTFSIRELITKYSGLKYLIEGYEEFNELMYGINFYYDLLRAKLNDMHLNGY
                                                   86        96        106       116       126       136
6. AB379641.1 Plasmodium chabaudi         ILKFEELGFTEQKELVNLIKTLGPNKYGLKYLIESKEEFNELMHAINFYYDVLRDKLNDMCANNY
                                                   136       146       156       166       176       186
7. X03371.1 Plasmodium falciparum K1      LLTIKELKYPQLFDLTNHMLTLCDNIHGFKYLIDGYEEINELLYKLNFYFDLLRAKLNDVCANDY
                                                   114       124       134       144       154       164
8. AJ786604.1 Plasmodium reichenowi       LLTINELKYPQLFELTNHMLTLCDNIDGFKYLLDGYEEINELLYKLNFYFDLLRAKLNDLCANDY
                                                   139       149       159       169       179       189
9. X05624.2 Plasmodium falciparum MAD 20  LFTIKELKYPELFDLTNHMLTLSKNVDGFKYLIDGYEEINELLYKLNFYYDLLRAKLNDACANSY
```



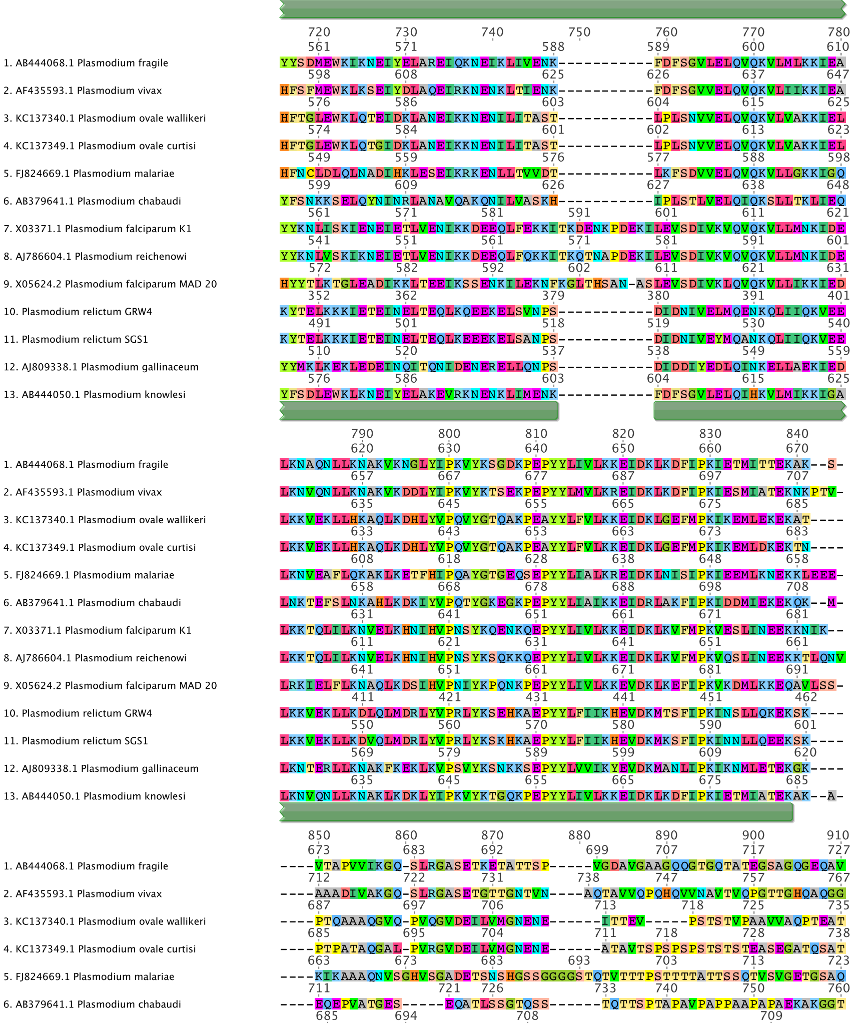
```
10. Plasmodium relictum GRW4
                                                    59        69        79        89        99        109
11. Plasmodium relictum SGS1                LSRAEELKFPKLNNLINHIKSVINKDNGLDYLIERYEEFDELMNIIDFYFDLLRAKLQDMCMRDG
                                                    75        85        95        105       115       125
12. AJ809338.1 Plasmodium gallinaceum       IKKVEELKFPKLERLLKHISTVIKEKNGLTYLIERYEEFDELMNMIDFYFDLLRAKLHDMCMHGV
                                                    86        96        106       116       126       136
13. AB444050.1 Plasmodium knowlesi          VGKYLELQIPGHGNLLHMIRELALDANGLKYLVESYEEFNQLMHVINFNYDLLRAKLNDMCAHEY

                                               200       210       220       230       240       250       260
                                               146       156       166       176       186       196       206
1. AB444068.1 Plasmodium fragile            CKIPEHLKITDNELDMLKKVVLGYRKPLDNIKDDIGKMEAFINKNKQTITKINELIAAENVKAYG
                                               151       161       171       181       191       201       211
2. AF435593.1 Plasmodium vivax              CKIPEHLKISDKELDMLKKVVLGYRKPLDNIKDDIGKLETFITKNKITIKNISDLIIAENKKRSG
                                               180       190       200       210       220       230       240
3. KC137340.1 Plasmodium ovale wallikeri    CEIPDHLKISEKELDMLKKVVLGYRKPLENIKDDISKMETFIQKNKQTVENIKVLIDAEEKKRHS
                                               179       189       199       209       219       229       239
4. KC137349.1 Plasmodium ovale curtisi      CEIPDHLKISDKELDMLKKVVLGYRKPLENIKDDISKMETFIQKNTQTVENIKGLIEAEEKKRYG
                                               155       165       175       185       195       205
5. FJ824669.1 Plasmodium malariae           CDIPNHLKINEKELEMLKKVVFGYRKPLENIKDDINKMEKFITTNEATVNNIKELIKKEYNNIAD
                                               146       156       166       176       186       196
6. AB379641.1 Plasmodium chabaudi           CEIPEHLKINAEEIEMLKKVVLGYRKPIENIQDDLVKLEEYIARNKATATTLNTLITEETTKIT-
                                               196       206       216       226       236       246
7. X03371.1 Plasmodium falciparum K1        CQIPFNLKIRANELDVLKKLVFGYRKPLDNIKDNVGKMEDYIKKNKKTIENINELIEESKKTID-
                                               174       184       194       204       214       224
8. AJ786604.1 Plasmodium reichenowi         CKIPFNLKIRAKELDVLKKLVFGYRKPLDNIKDNVTKMEDYIKKNKTTIENINKLIEESKKTID-
                                               199       209       219       229       239       249
9. X05624.2 Plasmodium falciparum MAD 20    CQIPFNLKIRANELDVLKKIVFGYRKPLDNIKDNVGKMEDYIKKNKTTIANINELIEGSKKTID-
                                                                     1        10        20        30
10. Plasmodium relictum GRW4                                         MPLQNIKNNIKKLQAFIKANESTVKKLKELIQASEKVIE-
                                               119       129       139       149       159       169
11. Plasmodium relictum SGS1                CKIPFYLKIYDGELNVLRKVVLSYRMPLQNIKNNINKLQAFIKANESTVKKLKELIQTAEQVIE-
                                               135       145       155       165       175       185
12. AJ809338.1 Plasmodium gallinaceum       CNIPFYLKIENSELNILREVVLGYRKPLQNIKDNLKKIESFVKVNEDTVKKLQQLTTTANETIT-
                                               146       156       166       176       186       196       206
13. AB444050.1 Plasmodium knowlesi          CKIPEHLKISAKELDMLKKVVLGYRKPLDNIKDDIGKMEAFINKNKETISNINKLITEENAKIVG

                                                    270       280       290       300       310       320
                                                    216       217       227         235             236
1. AB444068.1 Plasmodium fragile            QNNNGAVIVG---------QLTDGNPTVRGSAD----AAQSS---------------GLLHIP--
                                                    221       231       241       251       261       271
2. AF435593.1 Plasmodium vivax              HPTTTTNGAGTQPANGSIAAASSETTQISGSSNSGSSSTGSSNSGSSSTGSSGTGSTGTGQSPPA
                                                    250       251       261         268
3. KC137340.1 Plasmodium ovale wallikeri    EDAVSGSTGN---------ARAASGANVHANSG-----QESS-----------------------
                                                    249       250       260         267
4. KC137349.1 Plasmodium ovale curtisi      EVAVSGNTGS---------AGAASGTNASASSG-----TGNS-----------------------
                                             218                219        230
5. FJ824669.1 Plasmodium malariae           ENK------------------KLEAPSESGSDD--------------------------------
                                                                206        217
6. AB379641.1 Plasmodium chabaudi           ---------------------ADDEADCNDTTC--------------------------------
                                                                    256    263
7. X03371.1 Plasmodium falciparum K1        -------------------------KNKNATKE--------------------------------
                                                                    234    241
8. AJ786604.1 Plasmodium reichenowi         -------------------------QNKNATDN--------------------------------
                                                                    259    266
9. X05624.2 Plasmodium falciparum MAD 20    -------------------------QNKNADNE--------------------------------
                                                                    40     47
10. Plasmodium relictum GRW4                -------------------------SKKTDLAN--------------------------------
                                                                    179    186
11. Plasmodium relictum SGS1                -------------------------SKKTGLAD--------------------------------
                                                                    195     203
12. AJ809338.1 Plasmodium gallinaceum       -------------------------SKQGSLNGD-------------------------------
                                                    216       217       227       233       243       253
13. AB444050.1 Plasmodium knowlesi          HPINGVNVTG---------ASTDAVTSTTGAEG----VSGPSSTGVAGPASAGSPGAGISPAP--

                                               330       340       350       360       370       380       390
                                               244       253       263       273       283       293
1. AB444068.1 Plasmodium fragile            --STS-TNQDYNKQKTTYQAIYNIIFYTNQLEEAQKLIEVLEKRVNVLKEHKSIKALLDQVATEK
                                               281       291       301       311       321       331
2. AF435593.1 Plasmodium vivax              AADASSTNANYEAKKIIYQAVYNTIFYTNQLQEAQKLIAVLEKRVKVLKEHKDIKVLLEQVAKEK
                                             269         281       291       301       311       321       331
3. KC137340.1 Plasmodium ovale wallikeri    --STDIEKEKYDKDKKVYQSIYNALFYKNQLKEAQKLIEVLNKRVQTLKEHKEIKKLLEQIAEKE
                                             268         280       290       300       310       320       330
4. KC137349.1 Plasmodium ovale curtisi      --SNETEEEKYNKAKALYQSIYNALFYKKQLTEAEKLIEVLKKRVQTLKEHKEIKKLLEEIAEKE
                                                231      240       250       260       270       280
5. FJ824669.1 Plasmodium malariae           -----EDIKNCNEKQKIYKSRYNILFYEKQLLEAQKLIEVLKKRIQTLKENTDIKKLLDEIKEIE
                                                 218     226       236       246       256       266       276
6. AB379641.1 Plasmodium chabaudi           ------STEKYNKKKAIYQAMYNVIFYKKQLAEIKKVIEVLEKRVATLKKNEAIKPLLQQIEAIR
                                                      264 267      277       287       297       307
7. X03371.1 Plasmodium falciparum K1        -----------EEKKKLYQAQYDLSIYNKQLEEAHNLISVLEKRIDTLKKNENIKELLDKINEIK
                                                      242 245      255       265       275       285
8. AJ786604.1 Plasmodium reichenowi         -----------EKKKKLYQAQYDLSIYNKQLEEAHNLISVLEKRIDTLKKNENITKLLDKINEIK
                                                      267 270      280       290       300       310
```



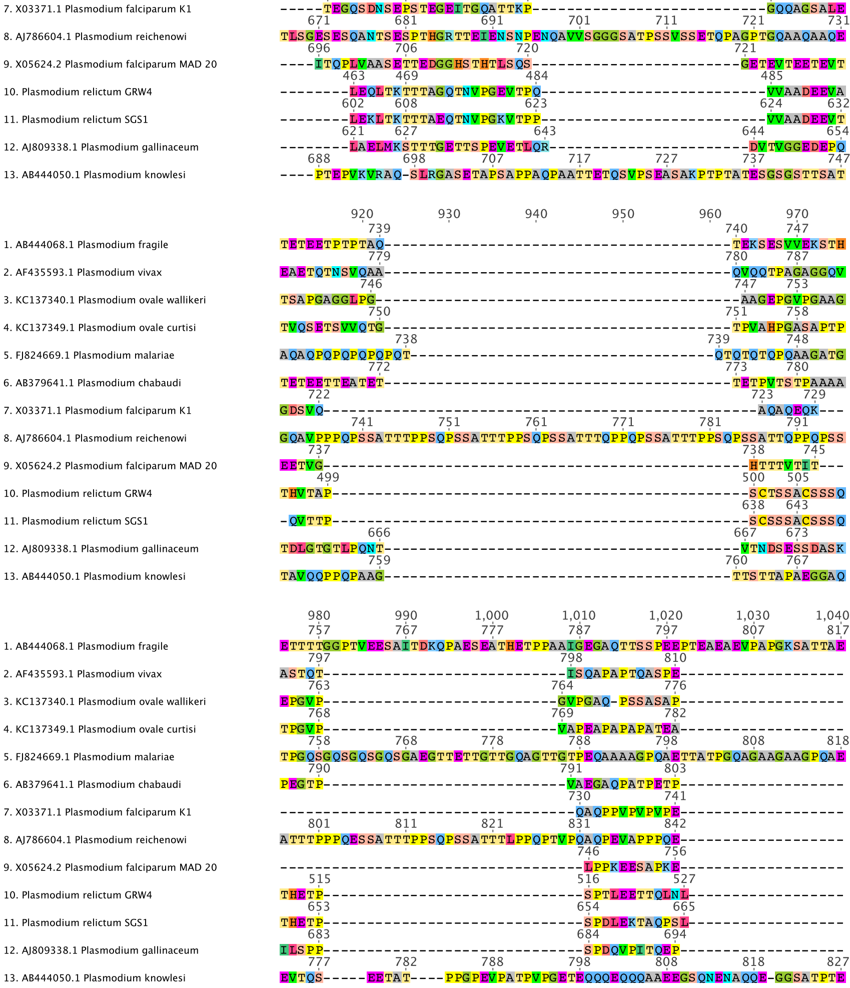
```
9. X05624.2 Plasmodium falciparum MAD 20  -----------EGKKKLYQAQYNLFIYNKQLQEAHNLISVLEKRIDTLKKNENIKKLLEDIDKIK
                                                 48     55        65        75        85        95
10. Plasmodium relictum GRW4              -------ADKVQDRKDTYRAQYDIYFYKKQLKESEKMIAVLKQHIKKIKANEDIKPLLEQINEKT
                                                187    194       204       214       224       234
11. Plasmodium relictum SGS1              -------TGKVQERKDTYRAQYDIYFYKKQLEESEKMIEVLKHHLKKIRSNEDIKPLLEQIKEKT
                                               204      212       222       232       242       252
12. AJ809338.1 Plasmodium gallinaceum     ------EHTNVDNRKATYRAQYDILLYNKQLEESQKLIEVLNQHIKKIKENEEIKKLLEKINELS
                                             259       269       279       289       299       309
13. AB444050.1 Plasmodium knowlesi        --AASSTTENYDQKKVIFQAIYNFIFYTNQLEEAQKLMQVLEKRVKLLKEHKSIKALLEQIATEK

                                                  400       410       420       430       440       450
                                             308               309         321
1. AB444068.1 Plasmodium fragile          ENLAK-----------------NTNTSTGDVTTVQ------------------------------
                                             346               347         358
2. AF435593.1 Plasmodium vivax            EKLPS-----------------DYPNTT-NLTNVH------------------------------
                                                               332         344
3. KC137340.1 Plasmodium ovale wallikeri  ----------------------SKVITPPNNTTLQ------------------------------
                                                               331         342
4. KC137349.1 Plasmodium ovale curtisi    ----------------------SKVTQP-SNTDSQ------------------------------
                                               297            298          311
5. FJ824669.1 Plasmodium malariae         GKLPTSG--------------SEASASAAAPGAIK------------------------------
                                                  286       296       306       316       326       336
6. AB379641.1 Plasmodium chabaudi         GPAVVTEGQITAAGNSEETKQNDASQSTTKTTTTEQSGAGANTTEQTVTNQTATETTGTETNATQ
                                            321                 322      331
7. X03371.1 Plasmodium falciparum K1      NPPP--------------------ANSGNTPNTL-------------------------------
                                            299                 300       310
8. AJ786604.1 Plasmodium reichenowi       NPTP--------------------ANSGNTPNTLS------------------------------
                                             325                326       336
9. X05624.2 Plasmodium falciparum MAD 20  TDAEN-------------------PTTGSKPNPLP------------------------------
                                              111
10. Plasmodium relictum GRW4              KTQPVD-----------------------------------------------------------
                                              250
11. Plasmodium relictum SGS1              KTQPVD-----------------------------------------------------------
                                              268
12. AJ809338.1 Plasmodium gallinaceum     TPEPQI-----------------------------------------------------------
                                             324               325         336
13. AB444050.1 Plasmodium knowlesi        NNLTT-----------------N-NATTGGATTIP------------------------------

                                             460       470       480       490       500       510       520
                                                               322         334       344       354       364
1. AB444068.1 Plasmodium fragile          ----------------------KEAQDKITDLEKQITAIANTVNFDMGGVFTNPEELDYYLREKA
                                                               359         371       381       391       401
2. AF435593.1 Plasmodium vivax            ----------------------KEAESKIAELEKKIEAIAKTVNFDLDGLFTDAEELEYYLREKA
                                                               345         357       367       377       387
3. KC137340.1 Plasmodium ovale wallikeri  ----------------------TQLQEEISKLKTQIKNIAKTVKFEMEGLFTDPVELDYYLREKD
                                                               343         355       365       375       385
4. KC137349.1 Plasmodium ovale curtisi    ----------------------AQLQEEINKLKTQIKNIAKTVKFEMEGLFTDPVELDYYLREKD
                                                               312         324       334       344       354
5. FJ824669.1 Plasmodium malariae         ----------------------EPENTQIKERQEKIKEIAKNIVFNMDGLFTDAFELDYYVREKE
                                             346       356       366       376       386       396       406
6. AB379641.1 Plasmodium chabaudi         TTTPAETVTETVQVPAVQVLTEEEKAKKIAELYAQIKEIAKTIKFNLDGIFVDPVELEYYKKEKK
                                                               332         344       354       364       374
7. X03371.1 Plasmodium falciparum K1      ----------------------LDKNKKIEEHEKEIKEIAKTIKFNIDSLFTDPLELEYYLREKN
                                                               311         323       333       343       353
8. AJ786604.1 Plasmodium reichenowi       ----------------------TDKKTKIEEHEKEIKEIAKTIKFNIDSLFTDPLELEYYLREKN
                                                               337         349       359       369       379
9. X05624.2 Plasmodium falciparum MAD 20  ----------------------ENKKKEVEGHEEKIKEIAKTIKFNIDSLFTDPLELEYYLREKN
                                                               112         124       134       144       154
10. Plasmodium relictum GRW4              ----------------------EKKKKEIADLEAKVQNIAKNIRLHIESLILDPHELEFYLREKR
                                                               251         263       273       283       293
11. Plasmodium relictum SGS1              ----------------------EGKKKEIAELEAKVQNIAKNIRLNIESLILDPHELEFYLREKR
                                                               269         281       291       301       311
12. AJ809338.1 Plasmodium gallinaceum     ----------------------EQNKTKIAELEVKIQDIAKTIELNIDGLFTDSLELEYYLREKK
                                                               337         349       359       369       379
13. AB444050.1 Plasmodium knowlesi        ----------------------EEVQKKIADLEKQIVAIAKTVNFDMDGLFTNVEELEYYLREKA
```



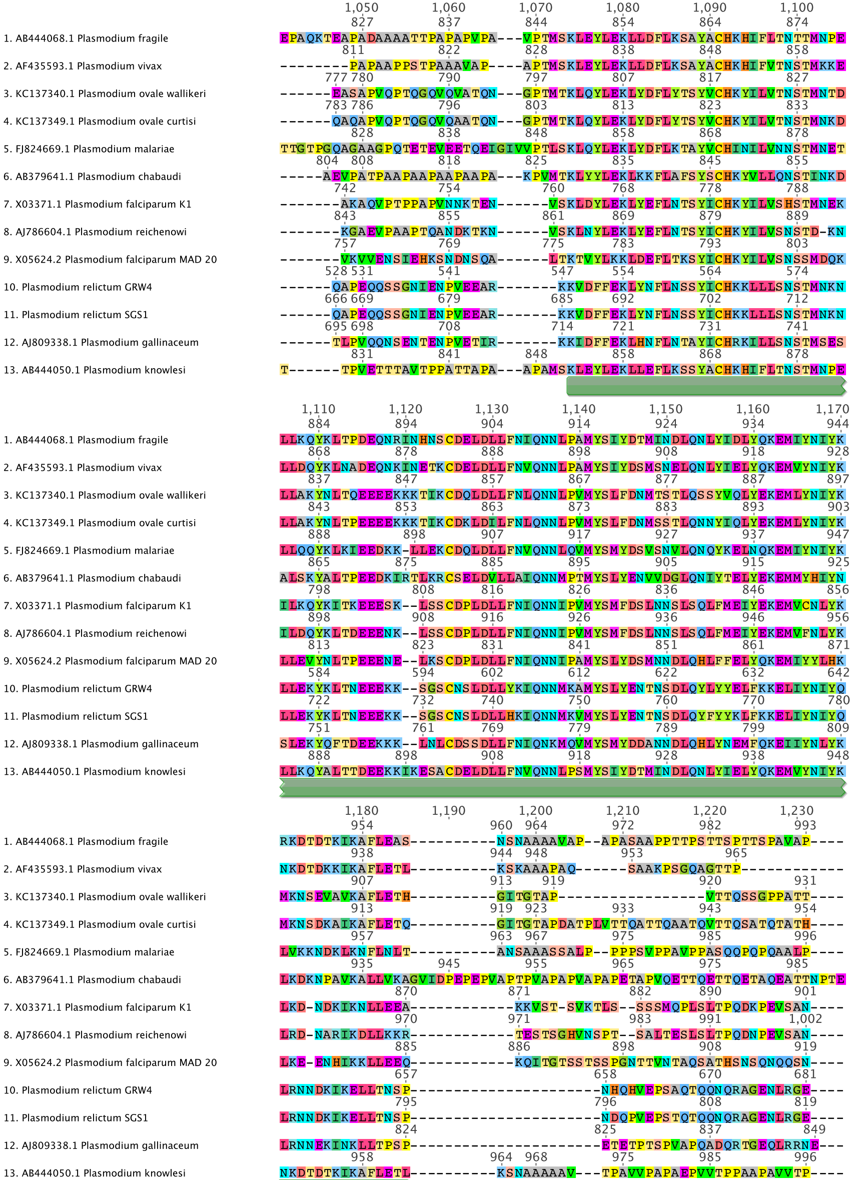
```
                                                  530       540       550       560       570       580
                                                  374       384       394       404       414       424
1. AB444068.1 Plasmodium fragile           KMAGTLVTPESTKSISAPGKTVPTMKETYPHGITYALPESTILELIENIESQESFGDLQNP-DDG
                                                  411       421       431       441       451       461
2. AF435593.1 Plasmodium vivax             KMAGTLIIPESTKSAGTPGKTVPTLKETYPHGISYALAENSIYELIEKIGSDETFGDLQNP-DDG
                                                  397             405 409       419       429       439
3. KC137340.1 Plasmodium ovale wallikeri   KKANKAVATQSGSTTPP--------KPTYPNGLIYPLEKENISELLSKAVTETTFGDLQNV-EIG
                                                  395             403 407       417       427       437
4. KC137349.1 Plasmodium ovale curtisi     KKASKVVETQSGSTTPP--------KPTYPNGLIYPLEKENISELLSKAVTETTFGDLQNV-EIG
                                                  364        373      382       392       402       412
5. FJ824669.1 Plasmodium malariae          KKSFNSATTQLANGKAVN--RTPPAPVMYPHGIIYAVSDDAISNILSKSSTQLTLEELQNP-DNR
                                                  416         425     433       443       453       463
6. AB379641.1 Plasmodium chabaudi          NESCHSTSSCHKNKTPET---VIPLNVRYPNGISYPLPEEVVYSKIAHNAAETTYGDLTNT-D-G
                                                  384             391 395       405       412       422
7. X03371.1 Plasmodium falciparum K1       KNIDISAKVET---KESTE------PNEYPNGVTYPLSYNDINN---ALNELNSFGDLINPFDYT
                                                  363             370 374       384       391       401
8. AJ786604.1 Plasmodium reichenowi        KNIDISTKVQT---EVSTE------KNEYPNGITYPLSYNDINN---ALNELNTFGDLINPNDYT
                                                  389             399 403       413       423       433
9. X05624.2 Plasmodium falciparum MAD 20   KKVDVTPKSQDPTKSVQIP------KVPYPNGIVYPLPLTDIHNSLAADNDKNSYGDLMNP-DTK
                                                  164       172       182       192       202       212
10. Plasmodium relictum GRW4               KKSTNIADPENSED--ENLTVSGNVNDTYPHGIETPLAENDIKDILRPRNDKLPFGNLYDPQYGN
                                                  303       311       321       331       341       351
11. Plasmodium relictum SGS1               KKSTNIADPENSED--ENLAVSGNVSDTYPHGIETPLAENDIKDILRPRNDKLPFGNLYDPQYGN
                                                  321       331       341       351       360       370
12. AJ809338.1 Plasmodium gallinaceum      KKITKKTNPEDPQESIDDIMISDFSNEVYPNGIERPMTDNNIKNIIK-KDEEESSGNLIDPQYGN
                                                  389       399       409       419       429       439
13. AB444050.1 Plasmodium knowlesi         KMAGTLIGPESSQSTGTPGKAVPTLKETYPYGITYALPERTIYELIEKFGSEESFGDLQNP-DNG

                                             590       600       610       620       630       640       650
                                             433       443       453       463       473       483       493
1. AB444068.1 Plasmodium fragile           QQPNKGIIINAGTRKLLLDKIMNKIQEEEEKLPELQQEYDQKMEVYKQKLQAFLPSLNHFYEARL
                                             470       480       490       500       510       520       530
2. AF435593.1 Plasmodium vivax             KQPKKGILINETKRKELLEKIMNKIKIEEDKLPNLKKEYEEKYKVYEAKVNEFKPAFNHFYEARL
                                             448       458       468       478       488       498       508
3. KC137340.1 Plasmodium ovale wallikeri   KALNKEIFSNDDKRNEFIDKLKNKIKQQEELLSKQKVDYDAKLKSYEEQKKIAVPLFEKFYKEKL
                                             446       456       466       476       486       496       506
4. KC137349.1 Plasmodium ovale curtisi     KALNKEIFTNDDKRNEFIDKLKNKIKQQEELLSKQKVDYDAKLKLYEEQKKKAIPLFEQFHNGKL
                                             421       431       441       451       461       471       481
5. FJ824669.1 Plasmodium malariae          KQITIDDLKDENKRKELITKIKNKITEEEGKLNALKGDVDSKLEKFKKIEGEFKPLLEKFYDERL
                                             471       481       491       501       511       521       531
6. AB379641.1 Plasmodium chabaudi          TAITEDLATNEQARKNLIKAIKKKIEAEEQKLVTLKADYDTKLAAFNQEKTPFKEAAKNFYESKF
                                             432       441       451       461       471       481       491
7. X03371.1 Plasmodium falciparum K1       KEPSKNIYTD-NERKKFINEIKEKIKIEKKKIESDKKSYEDRSKSLNDITKEYEKLLNEIYDSKF
                                             411       421       431       441       451       461       471
8. AJ786604.1 Plasmodium reichenowi        KEPSKNIYTDKIERENFINKIKEKIEIEKKYIETHKEFYEKESNSLNELEKEYEKLLNDIYDSKF
                                             442       452       462       472       482       492       502
9. X05624.2 Plasmodium falciparum MAD 20   EKINEKIITDNKERKIFINNIKKQIDLEEKNINHTKEQNKKLLEDYEKSKKDYEELLEKFYEMKF
                                             222       232       242       252       262       272       282
10. Plasmodium relictum GRW4               IIEGITILQDKYELNDFLSKIKDIVTSTKKFLTYSKSNYDRLSSLYVEESNKYKPLIDNFLKFKH
                                             361       371       381       391       401       411       421
11. Plasmodium relictum SGS1               IIEGITILQDKYELNDFLSKIKDIVTSTKKFLTYSKSNYDRLSSLHVEESNRYKPLIEDFLKSKH
                                             380       390       400       410       420       430       440
12. AJ809338.1 Plasmodium gallinaceum      PIESEDIFADENSLKTFMNKVKENIESLKQILSHSKTNYDRTHKSYNEEAKTYKPLIEEFYRLKR
                                             448       458       468       478       488       498       508
13. AB444050.1 Plasmodium knowlesi         RQPNKGIIINETKRKTLVDKIMSKIKLEEEKLPNLKKEYDEKMKLYKQKVQDFLPTLTYFYEGKL

                                                  660       670       680       690       700       710
                                                  503       513        522      531       541       551
1. AB444068.1 Plasmodium fragile           NNTLVAEKFDEFKTNREAYLKEKNELEK--CTYEQNINLINKLKKQVTYLEDYTLRKDIADDEIN
                                                  540       550        559      568       578       588
2. AF435593.1 Plasmodium vivax             DNTLVENKFDDFKKKREAYMEEKKKLES--CSYEQNSNLINKLKKQLTYLEDYVLRKDIADDEIK
                                                  518       528        537      546       556       566
3. KC137340.1 Plasmodium ovale wallikeri   DNTLTLTNFEEFKKQRDKYIQLKNELKS--CPYEMTKKNVDKLNKQLAYLNDYSLRKEVFNKEVK
                                                  516       526        535      544       554       564
4. KC137349.1 Plasmodium ovale curtisi     DNTLIPSKFEEFKVERDKYMQLKNELKN--CPYEMTKNMVDKLNKQLAYLNDYSLRKEVFNKEVK
                                                  491       501        510      519       529       539
5. FJ824669.1 Plasmodium malariae          DNSITTENFEKFLSKRTEYLTEKNLLES--SSYELSKALVKKLKKQLMYLEDYSLRKEVFDEEVN
                                                  541       551        560      569       579       589
6. AB379641.1 Plasmodium chabaudi          RNKLTTDIFEAFKTKRTEYMNKKAALVG--CEYGNTKQLINKLNKQLNYLQDYGLRKEIVNTEIE
                                                  501       511       521       531       541       551
7. X03371.1 Plasmodium falciparum K1       NNNIDLTNFEKMMGKRYSYKVEKLTHHNTFASYENSKHNLEKLTKALKYMEDYSLRNIVVEKELK
                                                  481       491       501       511       521       531
8. AJ786604.1 Plasmodium reichenowi        NNNIDLKKFEEMMSKRHSYNVQKLTHHNTFAPYENSKHNLEKLTKALKYMEDYSLRNIVDEKELK
                                                  512       522       532       542       552       562
9. X05624.2 Plasmodium falciparum MAD 20   NNNFDKDVVDKIFSARYTYNVEKQRYNNKFSSSNNSVYNVQKLKKALSYLEDYSLRKGISEKDFN
                                                  292       302       312       322       332       342
10. Plasmodium relictum GRW4               ANALQETKVTELVEKRNSFVSIKSISKAFSAYYQNSESHIEKLEGQRKYLEDYSLRKDFTKKEIN
                                                  431       441       451       461       471       481
11. Plasmodium relictum SGS1               ANALQETKVTELVEKRNSFVSSKSISKAFSTYYENSESHIEKLEGQRKYLEDYSLRKAFTKKEIN
                                                  450       460       470       480       490       500
12. AJ809338.1 Plasmodium gallinaceum      YNALKEKQVTDLVSKRTSFILSKNKFKPIAVFYEDSELFLEKLEKQYKYLEDFLIKKEFVKREIS
                                                  518       528        537      546       556       566
13. AB444050.1 Plasmodium knowlesi         DNTLVGTKFDEFKTKREAYMKEKEELEK--CTYEQSINLINKLKKQLTYLVDYTLKKDVTEDEIN
```



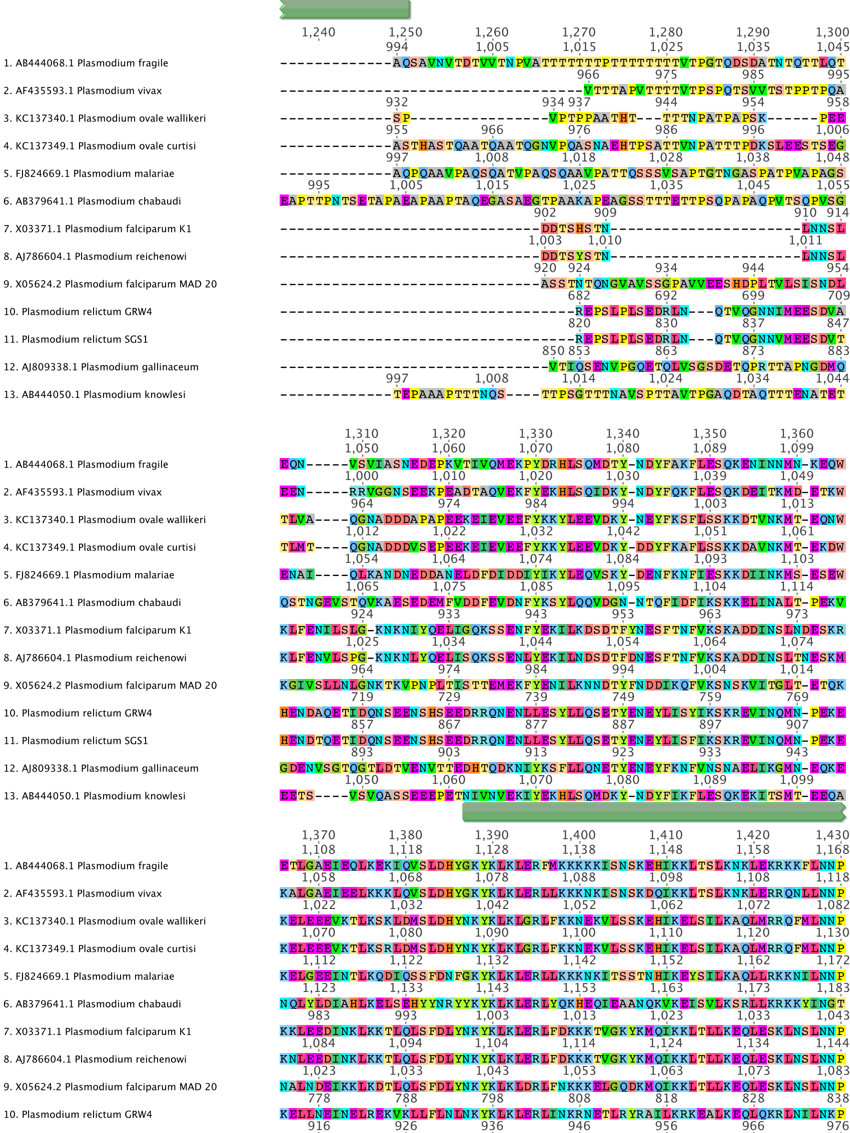
```
                                             720       730       740       750       760       770       780
                                             561       571              588         589        600       610
1. AB444068.1 Plasmodium fragile          YYSDMEWKIKNEIYELAREIQKNEIKLIVENK-----------FDFSGVLELQVQKVLMLKKIEA
                                             598       608              625         626        637       647
2. AF435593.1 Plasmodium vivax            HFSFMEWKLKSEIYDLAQEIRKNENKLTIENK-----------FDFSGVVELQVQKVLIIKKIEA
                                             576       586              603         604        615       625
3. KC137340.1 Plasmodium ovale wallikeri  HFTGLEWKLQTEIDKLANEIKKNENILITAST-----------LPLSNVVELQVQKVLVAKKIEL
                                             574       584              601         602        613       623
4. KC137349.1 Plasmodium ovale curtisi    HFTGLEWKLQTGIDKLANEIKKNENILITAST-----------LPLSNVVELQVQKVLVAKKIEL
                                             549       559              576         577        588       598
5. FJ824669.1 Plasmodium malariae         HFNCLDLQLNADIHKLESEIKRKENLLTVVDT-----------LKFSDVVELQVQKVLLGKKIGQ
                                             599       609              626         627        638       648
6. AB379641.1 Plasmodium chabaudi         YFSNKKSELQYNINRLANAVQAKQNILVASKH-----------IPLSTLVELQIQKSLLTKLIEQ
                                             561       571       581       591       601       611       621
7. X03371.1 Plasmodium falciparum K1      YYKNLISKIENEIETLVENIKKDEEQLFEKKITKDENKPDEKILEVSDIVKVQVQKVLLMNKIDE
                                             541       551       561       571       581       591       601
8. AJ786604.1 Plasmodium reichenowi       YYKNLVSKIKNEIETLVENIKKDEEQLFQKKITKQTNAPDEKILEVSDIVKVQVQKVLLMNKIDE
                                             572       582       592       602       611       621       631
9. X05624.2 Plasmodium falciparum MAD 20  HYYTLKTGLEADIKKLTEEIKSSENKILEKNFKGLTHSAN-ASLEVSDIVKLQVQKVLLIKKIED
                                             352       362              379         380        391       401
10. Plasmodium relictum GRW4              KYTELKKKIETEINELTEQLKQEEKELSVNPS-----------DIDNIVELMQENKQLIIQKVEE
                                             491       501              518         519        530       540
11. Plasmodium relictum SGS1              KYTELKKKIETEINELTEQLKEEEKELSANPS-----------DIDNIVEYMQANKQLIIQKVEE
                                             510       520              537         538        549       559
12. AJ809338.1 Plasmodium gallinaceum     YYMKLKEKLEDEINQITQNIDENERELLQNPS-----------DIDDIYEDLQINKELLAEKIED
                                             576       586              603         604        615       625
13. AB444050.1 Plasmodium knowlesi        YFSDLEWKLKNEIYELAKEVRKNENKLIMENK-----------FDFSGVLELQIHKVLMIKKIGA

                                                  790       800       810       820       830       840
                                                  620       630       640       650       660       670
1. AB444068.1 Plasmodium fragile          LKNAQNLLKNAKVKNGLYIPKVYKSGDKPEPYYLIVLKKEIDKLKDFIPKIETMITTEKAK--S-
                                                  657       667       677       687       697       707
2. AF435593.1 Plasmodium vivax            LKNVQNLLKNAKVKDDLYIPKVYKTSEKPEPYYLMVLKREIDKLKDFIPKIESMIATEKNKPTV-
                                                  635       645       655       665       675       685
3. KC137340.1 Plasmodium ovale wallikeri  LKKVEKLLHKAQLKDHLYVPQVYGTQAKPEAYYLFVLKKEIDKLGEFMPKIKEMLEKEKAT----
                                                  633       643       653       663       673       683
4. KC137349.1 Plasmodium ovale curtisi    LKKVEKLLHKAQLKDHLYVPQVYGTQAKPEAYYLFVLKKEIDKLGEFMPKIKEMLDKEKTN----
                                                  608       618       628       638       648       658
5. FJ824669.1 Plasmodium malariae         LKNVEAFLQKAKLKETFHIPQAYGTGEQSEPYYLIALKREIDKLNISIPKIEEMLKNEKKLEEE-
                                                  658       668       678       688       698       708
6. AB379641.1 Plasmodium chabaudi         LNKTEFSLNKAHLKDKIYVPQTYGKEGKPEPYYLIAIKKEIDRLAKFIPKIDDMIEKEKQK--M-
                                                  631       641       651       661       671       681
7. X03371.1 Plasmodium falciparum K1      LKKTQLILKNVELKHNIHVPNSYKQENKQEPYYLIVLKKEIDKLKVFMPKVESLINEEKKNIK--
                                                  611       621       631       641       651       661
8. AJ786604.1 Plasmodium reichenowi       LKKTQLILKNVELKHNIHVPNSYKSQKKQEPYYLIVLKKEIDKLKVFMPKVQSLINEEKKTLQNV
                                                  641       651       661       671       681       691
9. X05624.2 Plasmodium falciparum MAD 20  LRKIELFLKNAQLKDSIHVPNIYKPQNKPEPYYLIVLKKEVDKLKEFIPKVKDMLKKEQAVLSS-
                                                  411       421       431       441       451        462
10. Plasmodium relictum GRW4              LKKVEKLLKDLQLMDRLYVPRLYKSEHKAEPYYLFIIKHEVDKMTSFIPKINSLLQKEKSK----
                                                  550       560       570       580       590        601
11. Plasmodium relictum SGS1              LKKVEKLLKDVQLMDRLYVPRLYKSKHKAEPYYLFIIKHEVDKMKSFIPKINNLLQEEKSK----
                                                  569       579       589       599       609        620
12. AJ809338.1 Plasmodium gallinaceum     LKNTERLLKNAKFKEKLKVPSVYKSNKKSEPYYLVVIKYEVDKMANLIPKIKNMLETEKGK----
                                                  635       645       655       665       675       685
13. AB444050.1 Plasmodium knowlesi        LKNVQNLLKNAKLKDKLYIPKVYKTGQKPEPYYLIVLKKEIDKLKDFIPKIETMIATEKAK--A-

                                             850       860       870       880       890       900       910
                                             673        683      692         699     707       717       727
1. AB444068.1 Plasmodium fragile          ----VTAPVVIKGQ-SLRGASETKETATTSP-----VGDAVGAAGQQGTGQTATEGSAGQGEQAV
                                             712        722      731        738      747       757       767
2. AF435593.1 Plasmodium vivax            ----AAADIVAKGQ-SLRGASETGTTGNTVN----AQTAVVQPQHQVVNAVTVQPGTTGHQAQGG
                                             687        697      706          713       718    725       735
3. KC137340.1 Plasmodium ovale wallikeri  ----PTQAAAQGVQ-PVQGVDEILVMGNENE------ITTEV-----PSTSTVPAAVVAQPTEAT
                                             685        695      704          711    718       728       738
4. KC137349.1 Plasmodium ovale curtisi    ----PTPATAQGAL-PVRGVDEILVMGNENE------ATAVTSPSPSPSTSTSTEASEGATQSAT
                                             663       673       683       693       703       713       723
5. FJ824669.1 Plasmodium malariae         ----KIKAAAQNVSGHVSGADETSNSHGSSGGGGSTQTVTTTPSTTTTATTSSQTVSVGETGSAQ
                                             711            721  726          733    740       750       760
6. AB379641.1 Plasmodium chabaudi         ----EQEPVATGES-----EQATLSSGTQSS------TQTTSPTAPAVPAPPAAPAPAEKAKGGT
                                              685      694           708                        709
```



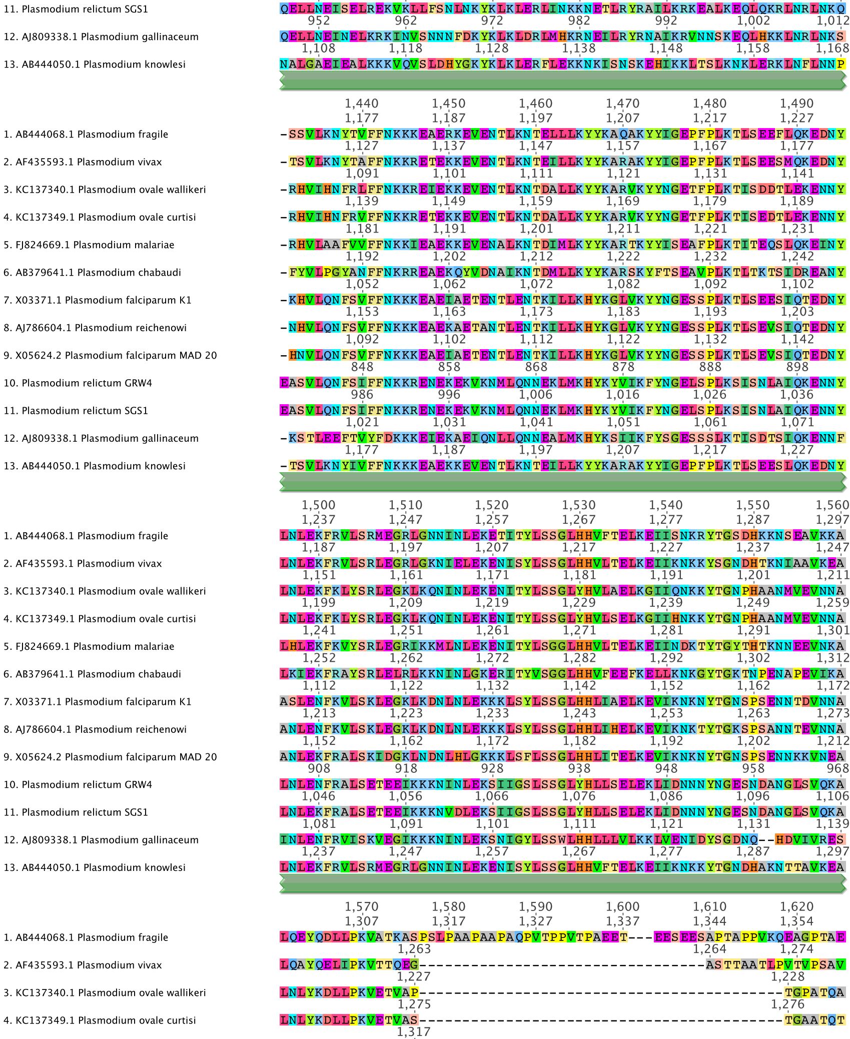
```
7. X03371.1 Plasmodium falciparum K1      -----TEGQSDNSEPSTEGEITGQATTKP---------------------------GQQAGSALE
                                             671       681       691       701       711       721       731
8. AJ786604.1 Plasmodium reichenowi       TLSGESESQANTSESPTHGRTTEIENSNPENQAVVSGGGSATPSSVSSETQPAGPTGQAAQAAQE
                                             696       706           720                        721
9. X05624.2 Plasmodium falciparum MAD 20  ----ITQPLVAASETTEDGGHSTHTLSQS------------------------GETEVTEETEVT
                                                 463   469            484                        485
10. Plasmodium relictum GRW4              --------LEQLTKTTTAGQTNVPGEVTPQ--------------------------VVAADEEVA
                                                 602   608            623                        624     632
11. Plasmodium relictum SGS1              --------LEKLTKTTTAEQTNVPGKVTPP--------------------------VVAADEEVT
                                                 621   627             643                     644       654
12. AJ809338.1 Plasmodium gallinaceum     --------LAELMKSTTTGETTSPEVETLQR-----------------------DVTVGGEDEPQ
                                             688        698      707       717       727       737       747
13. AB444050.1 Plasmodium knowlesi        ----PTEPVKVRAQ-SLRGASETAPSAPPAQPAATTETQSVPSEASAKPTPTATESGSGSTTSAT

                                                  920       930       940       950       960       970
                                                    739                                      740    747
1. AB444068.1 Plasmodium fragile          TETEETPTPTAQ----------------------------------------TEKSESVVEKSTH
                                                    779                                      780    787
2. AF435593.1 Plasmodium vivax            EAETQTNSVQAA----------------------------------------QVQQTPAGAGGQV
                                                   746                                        747   753
3. KC137340.1 Plasmodium ovale wallikeri  TSAPGAGGLPG------------------------------------------AAGEPGVPGAAG
                                                    750                                      751    758
4. KC137349.1 Plasmodium ovale curtisi    TVQSETSVVQTG----------------------------------------TPVAHPGASAPTP
                                                       738                                 739      748
5. FJ824669.1 Plasmodium malariae         AQAQPQPQPQPQPQT-----------------------------------QTQTQTQPQAAGATG
                                                    772                                      773    780
6. AB379641.1 Plasmodium chabaudi         TETEETTEATET----------------------------------------TETPVTSTPAAAA
                                             722                                                723   729
7. X03371.1 Plasmodium falciparum K1      GDSVQ--------------------------------------------------AQAQEQK---
                                                  741       751       761       771       781       791
8. AJ786604.1 Plasmodium reichenowi       GQAVPPPQPSSATTTPPSQPSSATTTPPSQPSSATTTQPPQPSSATTTPPSQPSSATTQPPQPSS
                                             737                                               738    745
9. X05624.2 Plasmodium falciparum MAD 20  EETVG-------------------------------------------------HTTTVTIT---
                                              499                                              500  505
10. Plasmodium relictum GRW4              THVTAP------------------------------------------------SCTSSACSSSQ
                                                                                               638  643
11. Plasmodium relictum SGS1              -QVTTP------------------------------------------------SCSSSACSSSQ
                                                    666                                       667   673
12. AJ809338.1 Plasmodium gallinaceum     TDLGTGTLPQNT-----------------------------------------VTNDSESSDASK
                                                    759                                      760    767
13. AB444050.1 Plasmodium knowlesi        TAVQQPPQPAAG----------------------------------------TTSTTAPAEGGAQ

                                             980       990      1,000     1,010     1,020     1,030     1,040
                                             757       767       777       787       797       807       817
1. AB444068.1 Plasmodium fragile          ETTTTGGPTVEESAITDKQPAESEATHETPPAAIGEGAQTTSSPEEPTEAEAEVPAPGKSATTAE
                                             797                          798         810
2. AF435593.1 Plasmodium vivax            ASTQT----------------------------ISQAPAPTQASPE-------------------
                                             763                         764          776
3. KC137340.1 Plasmodium ovale wallikeri  EPGVP---------------------------GVPGAQ-PSSASAP-------------------
                                             768                         769          782
4. KC137349.1 Plasmodium ovale curtisi    TPGVP---------------------------VAPEAPAPAPATEA-------------------
                                             758       768       778       788       798       808       818
5. FJ824669.1 Plasmodium malariae         TPGQSGQSGQSGQSGAEGTTETTGTTGQAGTTGTPEQAAAAGPQAETTATPGQAGAAGAAGPQAE
                                             790                          791         803
6. AB379641.1 Plasmodium chabaudi         PEGTP----------------------------VAEGAQPATPETP-------------------
                                                                           730        741
7. X03371.1 Plasmodium falciparum K1      ----------------------------------QAQPPVPVPVPE-------------------
                                             801       811       821       831        842
8. AJ786604.1 Plasmodium reichenowi       ATTTPPPQESSATTTPPSQPSSATTTLPPQPTVPQAQPEVAPPPQE-------------------
                                                                            746       756
9. X05624.2 Plasmodium falciparum MAD 20  -----------------------------------LPPKEESAPKE-------------------
                                             515                            516        527
10. Plasmodium relictum GRW4              THETP------------------------------SPTLEETTQLNL------------------
                                             653                            654        665
11. Plasmodium relictum SGS1              THETP------------------------------SPDLEKTAQPSL------------------
                                             683                            684       694
12. AJ809338.1 Plasmodium gallinaceum     ILSPP------------------------------SPDQVPITQEP-------------------
                                             777       782       788       798       808       818       827
13. AB444050.1 Plasmodium knowlesi        EVTQS-----EETAT----PPGPEVPATPVPGETEQQQEQQQAAEEGSQNENAQQE-GGSATPTE
```



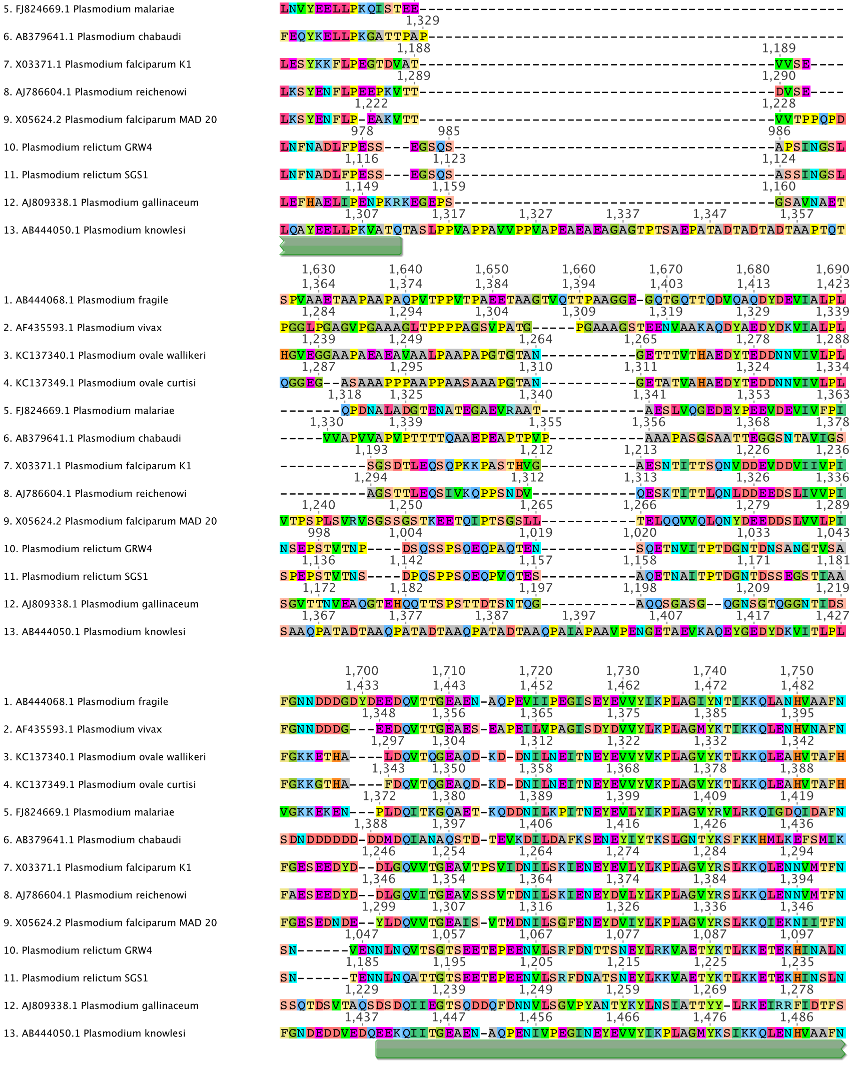
```
                                                 1,050     1,060     1,070     1,080     1,090     1,100
                                                  827       837       844       854       864       874
1. AB444068.1 Plasmodium fragile          EPAQKTEAPADAAAATTPAPAPVPA---VPTMSKLEYLEKLLDFLKSAYACHKHIFLTNTTMNPE
                                                 811        822       828       838       848       858
2. AF435593.1 Plasmodium vivax            --------PAPAAPPSTPAAAVAP----APTMSKLEYLEKLLDFLKSAYACHKHIFVTNSTMKKE
                                              777 780       790       797       807       817       827
3. KC137340.1 Plasmodium ovale wallikeri  ------EASAPVQPTQGQVQVATQN---GPTMTKLQYLEKLYDFLYTSYVCHKYILVTNSTMNTD
                                              783 786       796       803       813       823       833
4. KC137349.1 Plasmodium ovale curtisi    ------QAQAPVQPTQGQVQAATQN---GPTMTKLQYLEKLYDFLYTSYVCHKYILVTNSTMNKD
                                                  828       838       848       858       868       878
5. FJ824669.1 Plasmodium malariae         TTGTPGQAGAAGPQTETEVEETQEIGIVVPTLSKLQYLEKLYDFLKTAYVCHINILVNNSTMNET
                                              804 808       818       825       835       845       855
6. AB379641.1 Plasmodium chabaudi         -----AEVPATPAAPAAPAAPAAPA---KPVMTKLYYLEKLKKFLAFSYSCHKYVLLQNSTINKD
                                                742         754         760     768       778       788
7. X03371.1 Plasmodium falciparum K1      -------AKAQVPTPPAPVNNKTEN------VSKLDYLEKLYEFLNTSYICHKYILVSHSTMNEK
                                                843         855         861     869       879       889
8. AJ786604.1 Plasmodium reichenowi       -------KGAEVPAAPTQANDKTKN------VSKLNYLEKLYEFLNTSYICHKYILVSNSTD-KN
                                                757         769         775     783       793       803
9. X05624.2 Plasmodium falciparum MAD 20  -------VKVVENSIEHKSNDNSQA------LTKTVYLKKLDEFLTKSYICHKYILVSNSSMDQK
                                              528 531       541          547    554       564       574
10. Plasmodium relictum GRW4              ------QAPEQQSSGNIENPVEEAR-------KKVDFFEKLYNFLNSSYICHKKLLLSNSTMNKN
                                              666 669       679          685    692       702       712
11. Plasmodium relictum SGS1              ------QAPEQQSSGNIENPVEEAR-------KKVDFFEKLYNFLNSSYICHKKLLLSNSTMNKN
                                              695 698       708          714    721       731       741
12. AJ809338.1 Plasmodium gallinaceum     ------TLPVQQNSENTENPVETIR-------KKIDFFEKLHNFLNTAYICHRKILLSNSTMSES
                                                  831       841       848       858       868       878
13. AB444050.1 Plasmodium knowlesi        T------TPVETTTAVTPPATTAPA---APAMSKLEYLEKLLEFLKSSYACHKHIFLTNSTMNPE

                                            1,110     1,120     1,130     1,140     1,150     1,160     1,170
                                             884       894       904       914       924       934       944
1. AB444068.1 Plasmodium fragile          LLKQYKLTPDEQNRINHNSCDELDLLFNIQNNLPAMYSIYDTMINDLQNLYIDLYQKEMIYNIYK
                                             868       878       888       898       908       918       928
2. AF435593.1 Plasmodium vivax            LLDQYKLNADEQNKINETKCDELDLLFNVQNNLPAMYSIYDSMSNELQNLYIELYQKEMVYNIYK
                                             837       847       857       867       877       887       897
3. KC137340.1 Plasmodium ovale wallikeri  LLAKYNLTQEEEEKKKTIKCDQLDLLFNLQNNLPVMYSLFDNMTSTLQSSYVQLYEKEMLYNIYK
                                             843       853       863       873       883       893       903
4. KC137349.1 Plasmodium ovale curtisi    LLAKYNLTPEEEEKKKTIKCDKLDILFNLQNNLPVMYSLFDNMSSTLQNNYIQLYEKEMLYNIYK
                                             888        898      907       917       927       937       947
5. FJ824669.1 Plasmodium malariae         LLQQYKLKIEEDKK-LLEKCDQLDLLFNVQNNLQVMYSMYDSVSNVLQNQYKELNQKEMIYNIYK
                                             865       875       885       895       905       915       925
6. AB379641.1 Plasmodium chabaudi         ALSKYALTPEEDKIRTLKRCSELDVLLAIQNNMPTMYSLYENVVDGLQNIYTELYEKEMMYHIYN
                                             798         808     816       826       836       846       856
7. X03371.1 Plasmodium falciparum K1      ILKQYKITKEEESK--LSSCDPLDLLFNIQNNIPVMYSMFDSLNNSLSQLFMEIYEKEMVCNLYK
                                             898         908     916       926       936       946       956
8. AJ786604.1 Plasmodium reichenowi       ILDQYKLTDEEENK--LSSCDPLDLLFNIQNNIPVMYSMFDSLNNSLSQLFMEIYEKEMVFNLYK
                                             813         823     831       841       851       861       871
9. X05624.2 Plasmodium falciparum MAD 20  LLEVYNLTPEEENE--LKSCDPLDLLFNIQNNIPAMYSLYDSMNNDLQHLFFELYQKEMIYYLHK
                                             584         594     602       612       622       632       642
10. Plasmodium relictum GRW4              LLEKYKLTNEEEKK--SGSCNSLDLLYKIQNNMKAMYSLYENTNSDLQYLYYELFKKELIYNIYQ
                                             722         732     740       750       760       770       780
11. Plasmodium relictum SGS1              LLEKYKLTNEEEKK--SGSCNSLDLLHKIQNNMKVMYSLYENTNSDLQYFYYKLFKKELIYNIYQ
                                             751         761     769       779       789       799       809
12. AJ809338.1 Plasmodium gallinaceum     SLEKYQFTDEEKKK--LNLCDSSDLLFNIQNKMQVMYSMYDDANNDLQHLYNEMFQKEIIYNLYK
                                             888       898       908       918       928       938       948
13. AB444050.1 Plasmodium knowlesi        LLKQYALTTDEEKKIKESACDELDLLFNVQNNLPSMYSIYDTMINDLQNLYIELYQKEMVYNIYK

                                                 1,180     1,190     1,200     1,210     1,220     1,230
                                                  954             960 964       972       982        993
1. AB444068.1 Plasmodium fragile          RKDTDTKIKAFLEAS----------NSNAAAAVAP--APASAAPPTTPSTTSPTTSPAVAP----
                                                  938             944 948        953         965
2. AF435593.1 Plasmodium vivax            NKDTDKKIKAFLETL----------KSKAAAPAQ------SAAKPSGQAGTTP------------
                                                  907             913   919               920        931
3. KC137340.1 Plasmodium ovale wallikeri  MKNSEVAVKAFLETH----------GITGTAP-----------------VTTQSSGPPATT----
                                                  913             919 923       933       943        954
4. KC137349.1 Plasmodium ovale curtisi    MKNSDKAIKAFLETQ----------GITGTAPDATPLVTTQATTQAATQVTTQSATQTATH----
                                                  957             963 967       975       985        996
5. FJ824669.1 Plasmodium malariae         LVKKNDKLKNFLNLT----------ANSAAASSALP--PPPSVPPAVPPASQQPQPQAALP----
                                                  935       945       955       965       975       985
6. AB379641.1 Plasmodium chabaudi         LKDKNPAVKALLVKAGVIDPEPEPVAPTPVAPAPVAPAPETAPVQETTQETTQETAQEATTNPTE
                                                       870          871           882     890        901
7. X03371.1 Plasmodium falciparum K1      LKD-NDKIKNLLEEA------------KKVST-SVKTLS--SSSMQPLSLTPQDKPEVSAN----
                                                       970          971           983     991      1,002
8. AJ786604.1 Plasmodium reichenowi       LRD-NARIKDLLKKR------------TESTSGHVNSPT--SALTESLSLTPQDNPEVSAN----
                                                       885          886         898       908        919
9. X05624.2 Plasmodium falciparum MAD 20  LKE-ENHIKKLLEEQ------------KQITGTSSTSSPGNTTVNTAQSATHSNSQNQQSN----
                                                       657                    658         670        681
10. Plasmodium relictum GRW4              LRNNDKIKELLTNSP----------------------NHQHVEPSAQTQQNQRAGENLRGE----
                                                       795                    796         808        819
11. Plasmodium relictum SGS1              LRNNDKIKELLTNSP----------------------NDQPVEPSTQTQQNQRAGENLRGE----
                                                       824                    825         837         849
12. AJ809338.1 Plasmodium gallinaceum     LRNNEKINKLLTPSP----------------------ETETPTSPVAPQADQRTGEQLRRNE---
                                                  958             964 968       975       985        996
13. AB444050.1 Plasmodium knowlesi        NKDTDTKIKAFLETL----------KSNAAAAAV---TPAVVPAPAEPVVTPPAAPAVVTP----
```



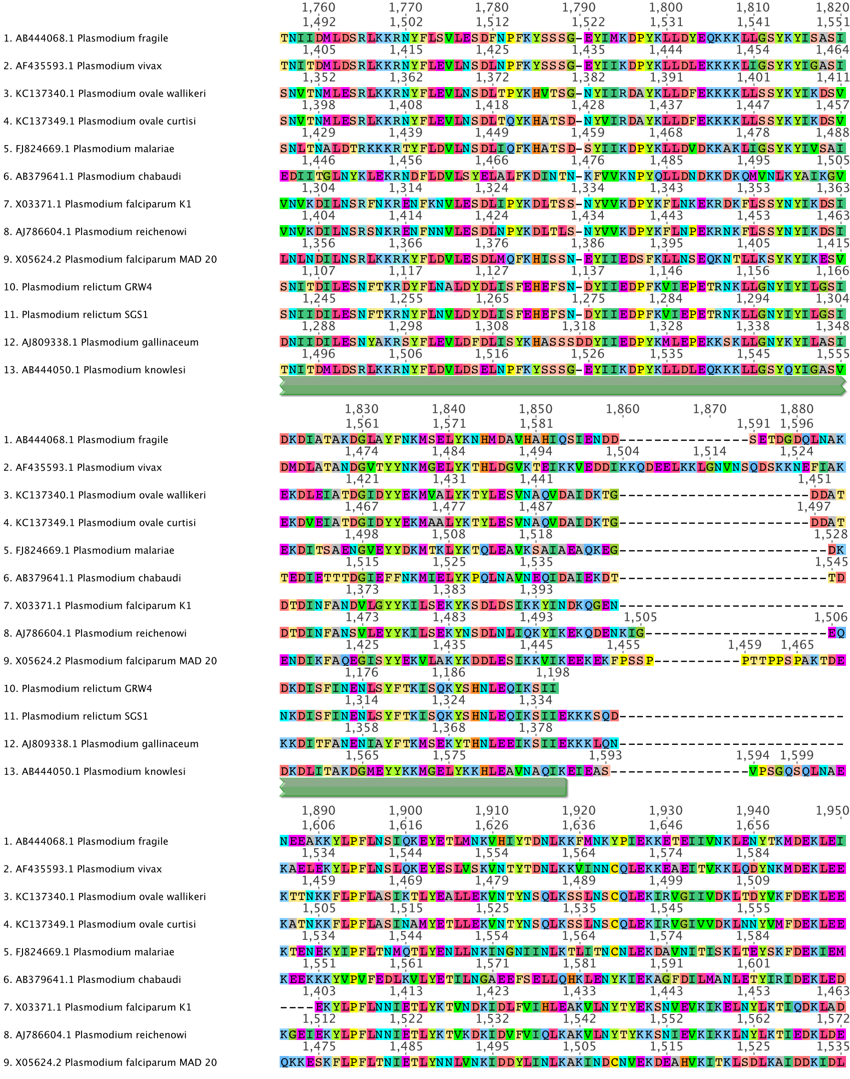
```
                                            1,240     1,250     1,260     1,270     1,280     1,290     1,300
                                                      994       1,005     1,015     1,025     1,035     1,045
1. AB444068.1 Plasmodium fragile          -------------AQSAVNVTDTVVTNPVATTTTTTTPTTTTTTTTVTPGTQDSDATNTQTTLQT
                                                                            966      975       985       995
2. AF435593.1 Plasmodium vivax            -----------------------------------VTTTAPVTTTTVTPSPQTSVVTSTPPTPQA
                                                      932               934 937      944       954       958
3. KC137340.1 Plasmodium ovale wallikeri  -------------SP----------------VPTPPAATHT---TTTNPATPAPSK------PEE
                                                      955        966       976       986       996      1,006
4. KC137349.1 Plasmodium ovale curtisi    -------------ASTHASTQAATQAATQGNVPQASNAEHTPSATTVNPATTTPDKSLEESTSEG
                                                      997       1,008     1,018     1,028     1,038     1,048
5. FJ824669.1 Plasmodium malariae         -------------AQPQAAVPAQSQATVPAQSQAAVPATTQSSSVSAPTGTNGASPATPVAPAGS
                                             995      1,005     1,015     1,025     1,035     1,045     1,055
6. AB379641.1 Plasmodium chabaudi         EAPTTPNTSETAPAEAPAAPTAQEGASAEGTPAAKAPEAGSSTTTETTPSQPAPAQPVTSQPVSG
                                                                       902    909                    910 914
7. X03371.1 Plasmodium falciparum K1      ------------------------------DDTSHSTN----------------------LNNSL
                                                                      1,003  1,010                  1,011
8. AJ786604.1 Plasmodium reichenowi       ------------------------------DDTSYSTN----------------------LNNSL
                                                                       920 924       934       944       954
9. X05624.2 Plasmodium falciparum MAD 20  ------------------------------ASSTNTQNGVAVSSGPAVVEESHDPLTVLSISNDL
                                                                           682       692       699       709
10. Plasmodium relictum GRW4              ----------------------------------REPSLPLSEDRLN---QTVQGNNIMEESDVA
                                                                           820       830       837       847
11. Plasmodium relictum SGS1              ----------------------------------REPSLPLSEDRLN---QTVQGNNVMEESDVT
                                                                        850 853      863       873       883
12. AJ809338.1 Plasmodium gallinaceum     -------------------------------VTIQSENVPGQETQLVSGSDETQPRTTAPNGDMQ
                                                      997       1,008     1,014     1,024     1,034     1,044
13. AB444050.1 Plasmodium knowlesi        -------------TEPAAAPTTTNQS----TTPSGTTTNAVSPTTAVTPGAQDTAQTTTENATET

                                                 1,310     1,320     1,330     1,340     1,350     1,360
                                                 1,050     1,060     1,070     1,080     1,089     1,099
1. AB444068.1 Plasmodium fragile          EQN-----VSVIASNEDEPKVTIVQMEKPYDRHLSQMDTY-NDYFAKFLESQKENINNMN-KEQW
                                                 1,000     1,010     1,020     1,030     1,039     1,049
2. AF435593.1 Plasmodium vivax            EEN-----RRVGGNSEEKPEADTAQVEKFYEKHLSQIDKY-NDYFQKFLESQKDEITKMD-ETKW
                                                  964       974       984       994      1,003     1,013
3. KC137340.1 Plasmodium ovale wallikeri  TLVA----QGNADDDAPAPEEKEIEVEEFYKKYLEEVDKY-NEYFKSFLSSKKDTVNKMT-EQNW
                                                 1,012     1,022     1,032     1,042     1,051     1,061
4. KC137349.1 Plasmodium ovale curtisi    TLMT----QGNADDDVSEPEEKEIEVEEFYKKYLEEVDKY-DDYFKAFLSSKKDAVNKMT-EKDW
                                                 1,054     1,064     1,074     1,084     1,093     1,103
5. FJ824669.1 Plasmodium malariae         ENAI----QLKANDNEDDANELDFDIDDIYIKYLEQVSKY-DENFKNFIESKKDIINKMS-ESEW
                                                 1,065     1,075     1,085     1,095     1,104     1,114
6. AB379641.1 Plasmodium chabaudi         QSTNGEVSTQVKAESEDEMFVDDFEVDNFYKSYLQQVDGN-NTQFIDFIKSKKELINALT-PEKV
                                                  924       933       943       953       963       973
7. X03371.1 Plasmodium falciparum K1      KLFENILSLG-KNKNIYQELIGQKSSENFYEKILKDSDTFYNESFTNFVKSKADDINSLNDESKR
                                                 1,025     1,034     1,044     1,054     1,064     1,074
8. AJ786604.1 Plasmodium reichenowi       KLFENVLSPG-KNKNLYQELISQKSSENLYEKILNDSDTFDNESFTNFVKSKADDINSLTNESKM
                                                  964       974       984       994      1,004     1,014
9. X05624.2 Plasmodium falciparum MAD 20  KGIVSLLNLGNKTKVPNPLTISTTEMEKFYENILKNNDTYFNDDIKQFVKSNSKVITGLT-ETQK
                                                  719       729       739       749       759       769
10. Plasmodium relictum GRW4              HENDAQETIDQNSEENSHSEEDRRQNENLLESYLLQSETYENEYLISYIKSKREVINQMN-PEKE
                                                  857       867       877       887       897       907
11. Plasmodium relictum SGS1              HENDTQETIDQNSEENSHSEEDRRQNENLLESYLLQSETYENEYLISFIKSKREVINQMN-PEKE
                                                  893       903       913       923       933       943
12. AJ809338.1 Plasmodium gallinaceum     GDENVSGTQGTLDTVENVTTEDHTQDKNIYKSFLLQNETYENEYFKNFVNSNAELIKGMN-EQKE
                                                 1,050     1,060     1,070     1,080     1,089     1,099
13. AB444050.1 Plasmodium knowlesi        EETS----VSVQASSEEEPETNIVNVEKIYEKHLSQMDKY-NDYFIKFLESQKEKITSMT-EEQA

                                            1,370     1,380     1,390     1,400     1,410     1,420     1,430
                                            1,108     1,118     1,128     1,138     1,148     1,158     1,168
1. AB444068.1 Plasmodium fragile          ETLGAEIEQLKEKIQVSLDHYGKYKLKLERFMKKKKKISNSKEHIKKLTSLKNKLEKRKKFLNNP
                                            1,058     1,068     1,078     1,088     1,098     1,108     1,118
2. AF435593.1 Plasmodium vivax            KALGAEIEELKKKLQVSLDHYGKYKLKLERLLKKKNKISNSKDQIKKLTSLKNKLERRQNLLNNP
                                            1,022     1,032     1,042     1,052     1,062     1,072     1,082
3. KC137340.1 Plasmodium ovale wallikeri  KELEEEVKTLKSKLDMSLDHYNKYKLKLGRLFKKNEKVLSSKEHIKELSILKAQLMRRQFMLNNP
                                            1,070     1,080     1,090     1,100     1,110     1,120     1,130
4. KC137349.1 Plasmodium ovale curtisi    KELEEEVKTLKSRLDMSLDHYNKYKLKLGRLFKKNEKVLSSKEHIKELSILKAQLMRRQFMLNNP
                                            1,112     1,122     1,132     1,142     1,152     1,162     1,172
5. FJ824669.1 Plasmodium malariae         KELGEEINTLKQDIQSSFDNFGKYKLKLERLLKKKNKITSSTNHIKEYSILKAQLLRKKNILNNP
                                            1,123     1,133     1,143     1,153     1,163     1,173     1,183
6. AB379641.1 Plasmodium chabaudi         NQLYLDIAHLKELSEHYYNRYYKYKLKLERLYQKHEQIEAANQKVKEISVLKSRLLKRKKYINGT
                                             983       993      1,003     1,013     1,023     1,033     1,043
7. X03371.1 Plasmodium falciparum K1      KKLEEDINKLKKTLQLSFDLYNKYKLKLERLFDKKKTVGKYKMQIKKLTLLKEQLESKLNSLNNP
                                            1,084     1,094     1,104     1,114     1,124     1,134     1,144
8. AJ786604.1 Plasmodium reichenowi       KNLEEDINKLKKTLQLSFDLYNKYKLKLERLFDKKKTVGKYKMQIKKLTLLKEQLESKLNSLNNP
                                            1,023     1,033     1,043     1,053     1,063     1,073     1,083
9. X05624.2 Plasmodium falciparum MAD 20  NALNDEIKKLKDTLQLSFDLYNKYKLKLDRLFNKKKELGQDKMQIKKLTLLKEQLESKLNSLNNP
                                             778       788       798       808       818       828       838
10. Plasmodium relictum GRW4              KELLNEINELREKVKLLFLNLNKYKLKLERLINKRNETLRYRAILKRKEALKEQLQKRLNILNKP
                                             916       926       936       946       956       966       976
```



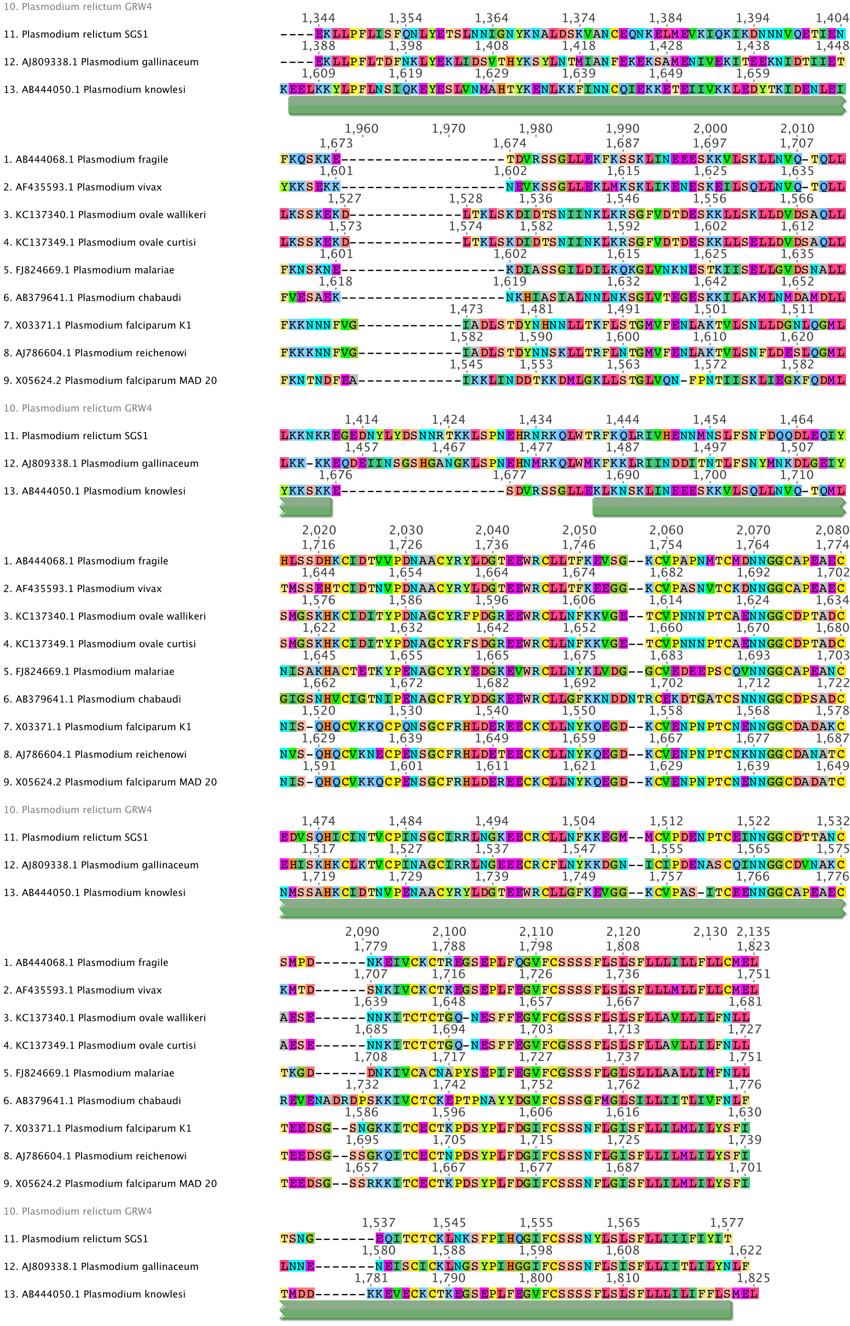
```
11. Plasmodium relictum SGS1              QELLNEISELREKVKLLFSNLNKYKLKLERLINKKNETLRYRAILKRKEALKEQLQKRLNRLNKQ
                                              952       962       972       982       992     1,002     1,012
12. AJ809338.1 Plasmodium gallinaceum     QELLNEINELKRKINVSNNNFDKYKLKLDRLMHKRNEILRYRNAIKRVNNSKEQLHKKLNRLNKS
                                            1,108     1,118     1,128     1,138     1,148     1,158     1,168
13. AB444050.1 Plasmodium knowlesi        NALGAEIEALKKKVQVSLDHYGKYKLKLERFLEKKNKISNSKEHIKKLTSLKNKLERKLNFLNNP

                                                   1,440     1,450     1,460     1,470     1,480     1,490
                                                   1,177     1,187     1,197     1,207     1,217     1,227
1. AB444068.1 Plasmodium fragile          -SSVLKNYTVFFNKKKEAERKEVENTLKNTELLLKYYKAQAKYYIGEPFPLKTLSEEFLQKEDNY
                                                   1,127     1,137     1,147     1,157     1,167     1,177
2. AF435593.1 Plasmodium vivax            -TSVLKNYTAFFNKKRETEKKEVENTLKNTEILLKYYKARAKYYIGEPFPLKTLSEESMQKEDNY
                                                   1,091     1,101     1,111     1,121     1,131     1,141
3. KC137340.1 Plasmodium ovale wallikeri  -RHVIHNFRLFFNKKREIEKKEVENTLKNTDALLKYYKARVKYYNGETFPLKTISDDTLEKENNY
                                                   1,139     1,149     1,159     1,169     1,179     1,189
4. KC137349.1 Plasmodium ovale curtisi    -RHVIHNFRVFFNKKRETEKKEVENTLKNTDALLKYYKARVKYYNGETFPLKTISEDTLEKENNY
                                                   1,181     1,191     1,201     1,211     1,221     1,231
5. FJ824669.1 Plasmodium malariae         -RHVLAAFVVFFNKKIEAEKKEVENALKNTDIMLKYYKARTKYYISEAFPLKTITEQSLQKEINY
                                                   1,192     1,202     1,212     1,222     1,232     1,242
6. AB379641.1 Plasmodium chabaudi         -FYVLPGYANFFNKRREAEKQYVDNAIKNTDMLLKYYKARSKYFTSEAVPLKTLTKTSIDREANY
                                                   1,052     1,062     1,072     1,082     1,092     1,102
7. X03371.1 Plasmodium falciparum K1      -KHVLQNFSVFFNKKKEAEIAETENTLENTKILLKHYKGLVKYYNGESSPLKTLSEESIQTEDNY
                                                   1,153     1,163     1,173     1,183     1,193     1,203
8. AJ786604.1 Plasmodium reichenowi       -NHVLQNFSVFFNKKKEAEKAETANTLENTKILLKHYKGLVKYYNGESSPLKTLSEVSIQTEDNY
                                                   1,092     1,102     1,112     1,122     1,132     1,142
9. X05624.2 Plasmodium falciparum MAD 20  -HNVLQNFSVFFNKKKEAEIAETENTLENTKILLKHYKGLVKYYNGESSPLKTLSEVSIQTEDNY
                                                     848       858       868       878       888       898
10. Plasmodium relictum GRW4              EASVLQNFSIFFNKKRENEKEKVKNMLQNNEKLMKHYKYVIKFYNGELSPLKSISNLAIQKENNY
                                                     986       996     1,006     1,016     1,026     1,036
11. Plasmodium relictum SGS1              EASVLQNFSIFFNKKRENEKEKVKNMLQNNEKLMKHYKYVIKFYNGELSPLKSISNLAIQKENNY
                                                   1,021     1,031     1,041     1,051     1,061     1,071
12. AJ809338.1 Plasmodium gallinaceum     -KSTLEEFTVYFDKKKEIEKAEIQNLLQNNEALMKHYKSIIKFYSGESSSLKTISDTSIQKENNF
                                                   1,177     1,187     1,197     1,207     1,217     1,227
13. AB444050.1 Plasmodium knowlesi        -TSVLKNYIVFFNKKKEAEKKEVENTLKNTEILLKYYKARAKYYIGEPFPLKTLSEESLQKEDNY

                                            1,500     1,510     1,520     1,530     1,540     1,550     1,560
                                            1,237     1,247     1,257     1,267     1,277     1,287     1,297
1. AB444068.1 Plasmodium fragile          LNLEKFRVLSRMEGRLGNNINLEKETITYLSSGLHHVFTELKEIISNKRYTGSDHKKNSEAVKKA
                                            1,187     1,197     1,207     1,217     1,227     1,237     1,247
2. AF435593.1 Plasmodium vivax            LNLEKFRVLSRLEGRLGKNIELEKENISYLSSGLHHVLTELKEIIKNKKYSGNDHTKNIAAVKEA
                                            1,151     1,161     1,171     1,181     1,191     1,201     1,211
3. KC137340.1 Plasmodium ovale wallikeri  LNLEKFKLYSRLEGKLKQNINLEKENITYLSSGLYHVLAELKGIIQNKKYTGNPHAANMVEVNNA
                                            1,199     1,209     1,219     1,229     1,239     1,249     1,259
4. KC137349.1 Plasmodium ovale curtisi    LNLEKFKLYSRLEGKLKQNINLEKENITYLSSGLYHVLSELKGIIHNKKYTGNPHAANMVEVNNA
                                            1,241     1,251     1,261     1,271     1,281     1,291     1,301
5. FJ824669.1 Plasmodium malariae         LHLEKFKVYSRLEGRIKKMLNLEKENITYLSGGLHHVLTELKEIINDKTYTGYTHTKNNEEVNKA
                                            1,252     1,262     1,272     1,282     1,292     1,302     1,312
6. AB379641.1 Plasmodium chabaudi         LKIEKFRAYSRLELRLKKNINLGKERITYVSGGLHHVFEEFKELLKNKGYTGKTNPENAPEVIKA
                                            1,112     1,122     1,132     1,142     1,152     1,162     1,172
7. X03371.1 Plasmodium falciparum K1      ASLENFKVLSKLEGKLKDNLNLEKKKLSYLSSGLHHLIAELKEVIKNKNYTGNSPSENNTDVNNA
                                            1,213     1,223     1,233     1,243     1,253     1,263     1,273
8. AJ786604.1 Plasmodium reichenowi       ANLENFKVLSKLEGKLKDNLNLEKKKLSYLSSGLHHLIHELKEVIKNKTYTGKSPSANNTEVNNA
                                            1,152     1,162     1,172     1,182     1,192     1,202     1,212
9. X05624.2 Plasmodium falciparum MAD 20  ANLEKFRALSKIDGKLNDNLHLGKKKLSFLSSGLHHLITELKEVIKNKNYTGNSPSENNKKVNEA
                                              908       918       928       938       948       958       968
10. Plasmodium relictum GRW4              LNLENFRALSETEEIKKKNINLEKSIIGSLSSGLYHLLSELEKLIDNNNYNGESNDANGLSVQKA
                                            1,046     1,056     1,066     1,076     1,086     1,096     1,106
11. Plasmodium relictum SGS1              LNLEKFRALSETEEIKKKNVDLEKSIIGSLSSGLYHLLSELEKLIDNNNYNGESNDANGLSVQKA
                                            1,081     1,091     1,101     1,111     1,121     1,131     1,139
12. AJ809338.1 Plasmodium gallinaceum     INLENFRVISKVEGIKKKNINLEKSNIGYLSSWLHHLLLVLKKLVENIDYSGDNQ--HDVIVRES
                                            1,237     1,247     1,257     1,267     1,277     1,287     1,297
13. AB444050.1 Plasmodium knowlesi        LNLEKFRVLSRMEGRLGNNINLEKENISYLSSGLHHVFTELKEIIKNKKYTGNDHAKNTTAVKEA

                                                   1,570     1,580     1,590     1,600     1,610     1,620
                                                   1,307     1,317     1,327     1,337     1,344     1,354
1. AB444068.1 Plasmodium fragile          LQEYQDLLPKVATKASPSLPAAPAAPAQPVTPPVTPAEET---EESEESAPTAPPVKQEAGPTAE
                                                         1,263                          1,264     1,274
2. AF435593.1 Plasmodium vivax            LQAYQELIPKVTTQEG---------------------------------ASTTAATLPVTVPSAV
                                                         1,227                                1,228
3. KC137340.1 Plasmodium ovale wallikeri  LNLYKDLLPKVETVAP------------------------------------------TGPATQA
                                                         1,275                                1,276
4. KC137349.1 Plasmodium ovale curtisi    LNLYKDLLPKVETVAS------------------------------------------TGAATQT
                                                         1,317
```



```
5. FJ824669.1 Plasmodium malariae         LNVYEELLPKQISTEE-------------------------------------------------
                                                      1,329
6. AB379641.1 Plasmodium chabaudi         FEQYKELLPKGATTPAP------------------------------------------------
                                                     1,188                                     1,189
7. X03371.1 Plasmodium falciparum K1      LESYKKFLPEGTDVAT-----------------------------------------VVSE----
                                                     1,289                                     1,290
8. AJ786604.1 Plasmodium reichenowi       LKSYENFLPEEPKVTT-----------------------------------------DVSE----
                                                1,222                                          1,228
9. X05624.2 Plasmodium falciparum MAD 20  LKSYENFLP-EAKVTT-----------------------------------------VVTPPQPD
                                                 978       985                                   986
10. Plasmodium relictum GRW4              LNFNADLFPESS---EGSQS-------------------------------------APSINGSL
                                               1,116     1,123                                 1,124
11. Plasmodium relictum SGS1              LNFNADLFPESS---EGSQS-------------------------------------ASSINGSL
                                               1,149     1,159                                 1,160
12. AJ809338.1 Plasmodium gallinaceum     LEFHAELIPENPKRKEGEPS-------------------------------------GSAVNAET
                                               1,307     1,317     1,327     1,337     1,347     1,357
13. AB444050.1 Plasmodium knowlesi        LQAYEELLPKVATQTASLPPVAPPAVVPPVAPEAEAEAGAGTPTSAEPATADTADTADTAAPTQT

                                          1,630     1,640     1,650     1,660     1,670     1,680     1,690
                                          1,364     1,374     1,384     1,394     1,403     1,413     1,423
1. AB444068.1 Plasmodium fragile          SPVAAETAAPAAPAQPVTPPVTPAEETAAGTVQTTPAAGGE-GQTGQTTQDVQAQDYDEVIALPL
                                          1,284     1,294     1,304     1,309     1,319     1,329     1,339
2. AF435593.1 Plasmodium vivax            PGGLPGAGVPGAAAGLTPPPPAGSVPATG-----PGAAAGSTEENVAAKAQDYAEDYDKVIALPL
                                          1,239     1,249          1,264       1,265        1,278     1,288
3. KC137340.1 Plasmodium ovale wallikeri  HGVEGGAAPAEAEAVAALPAAPAPGTGTAN-----------GETTTVTHAEDYTEDDNNVIVLPL
                                          1,287     1,295          1,310       1,311        1,324     1,334
4. KC137349.1 Plasmodium ovale curtisi    QGGEG--ASAAAPPPAAPPAASAAAPGTAN-----------GETATVAHAEDYTEDDNNVIVLPL
                                             1,318  1,325          1,340        1,341       1,353     1,363
5. FJ824669.1 Plasmodium malariae         -------QPDNALADGTENATEGAEVRAAT------------AESLVQGEDEYPEEVDEVIVFPI
                                           1,330    1,339           1,355       1,356       1,368     1,378
6. AB379641.1 Plasmodium chabaudi         -----VVAPVVAPVPTTTTQAAEPEAPTPVP-----------AAAPASGSAATTEGGSNTAVIGS
                                                1,193              1,212       1,213        1,226     1,236
7. X03371.1 Plasmodium falciparum K1      ----------SGSDTLEQSQPKKPASTHVG-----------AESNTITTSQNVDDEVDDVIIVPI
                                                1,294             1,312        1,313        1,326     1,336
8. AJ786604.1 Plasmodium reichenowi       ----------AGSTTLEQSIVKQPPSNDV------------QESKTITTLQNLDDEEDSLIVVPI
                                          1,240     1,250          1,265       1,266        1,279     1,289
9. X05624.2 Plasmodium falciparum MAD 20  VTPSPLSVRVSGSSGSTKEETQIPTSGSLL-----------TELQQVVQLQNYDEEDDSLVVLPI
                                            998     1,004          1,019       1,020        1,033     1,043
10. Plasmodium relictum GRW4              NSEPSTVTNP----DSQSSPSQEQPAQTEN-----------SQETNVITPTDGNTDNSANGTVSA
                                          1,136     1,142          1,157       1,158        1,171     1,181
11. Plasmodium relictum SGS1              SPEPSTVTNS----DPQSPPSQEQPVQTES-----------AQETNAITPTDGNTDSSEGSTIAA
                                          1,172     1,182          1,197       1,198        1,209     1,219
12. AJ809338.1 Plasmodium gallinaceum     SGVTTNVEAQGTEHQQTTSPSTTDTSNTQG-----------AQQSGASG--QGNSGTQGGNTIDS
                                          1,367     1,377     1,387     1,397     1,407     1,417     1,427
13. AB444050.1 Plasmodium knowlesi        SAAQPATADTAAQPATADTAAQPATADTAAQPAIAPAAVPENGETAEVKAQEYGEDYDKVITLPL

                                               1,700     1,710     1,720     1,730     1,740     1,750
                                               1,433     1,443     1,452     1,462     1,472     1,482
1. AB444068.1 Plasmodium fragile          FGNNDDDGDYDEEDQVTTGEAEN-AQPEVIIPEGISEYEVVYIKPLAGIYNTIKKQLANHVAAFN
                                                 1,348   1,356     1,365     1,375     1,385     1,395
2. AF435593.1 Plasmodium vivax            FGNNDDDG---EEDQVTTGEAES-EAPEILVPAGISDYDVVYLKPLAGMYKTIKKQLENHVNAFN
                                                  1,297  1,304     1,312     1,322     1,332     1,342
3. KC137340.1 Plasmodium ovale wallikeri  FGKKETHA----LDQVTQGEAQD-KD-DNILNEITNEYEVVYVKPLAGVYKTLKKQLEAHVTAFH
                                                  1,343  1,350     1,358     1,368     1,378     1,388
4. KC137349.1 Plasmodium ovale curtisi    FGKKGTHA----FDQVTQGEAQD-KD-DNILNEITNEYEVVYVKPLAGVYKTLKKQLEAHVTAFH
                                                 1,372   1,380     1,389     1,399     1,409     1,419
5. FJ824669.1 Plasmodium malariae         VGKKEKEN---PLDQITKGQAET-KQDDNILKPITNEYEVLYIKPLAGVYRVLRKQIGDQIDAFN
                                                1,388    1,397     1,406     1,416     1,426     1,436
6. AB379641.1 Plasmodium chabaudi         SDNDDDDDD-DDMDQIANAQSTD-TEVKDILDAFKSENEYIYTKSLGNTYKSFKKHMLKEFSMIK
                                                 1,246   1,254     1,264     1,274     1,284     1,294
7. X03371.1 Plasmodium falciparum K1      FGESEEDYD--DLGQVVTGEAVTPSVIDNILSKIENEYEVLYLKPLAGVYRSLKKQLENNVMTFN
                                                 1,346   1,354     1,364     1,374     1,384     1,394
8. AJ786604.1 Plasmodium reichenowi       FAESEEDYD--DLGQVITGEAVSSSVTDNILSKIENEYDVLYLKPLAGVYRSLKKQLENNVMTFN
                                                 1,299   1,307     1,316     1,326     1,336     1,346
9. X05624.2 Plasmodium falciparum MAD 20  FGESEDNDE--YLDQVVTGEAIS-VTMDNILSGFENEYDVIYLKPLAGVYRSLKKQIEKNIITFN
                                               1,047     1,057     1,067     1,077     1,087     1,097
10. Plasmodium relictum GRW4              SN------VENNLNQVTSGTSEETEPEENVLSRFDNTTSNEYLRKVAETYKTLKKETEKHINALN
                                               1,185     1,195     1,205     1,215     1,225     1,235
11. Plasmodium relictum SGS1              SN------TENNLNQATTGTSEETEPEENVLSRFDNATSNEYLKKVAETYKTLKKETEKHINSLN
                                               1,229     1,239     1,249     1,259     1,269     1,278
12. AJ809338.1 Plasmodium gallinaceum     SSQTDSVTAQSDSDQIIEGTSQDDQFDNNVLSGVPYANTYKYLNSIATTYY-LRKEIRRFIDTFS
                                               1,437     1,447     1,456     1,466     1,476     1,486
13. AB444050.1 Plasmodium knowlesi        FGNDEDDVEDQEEKQIITGEAEN-AQPENIVPEGINEYEVVYIKPLAGMYKSIKKQLENHVAAFN
```



```
                                            1,760     1,770     1,780     1,790     1,800     1,810     1,820
                                            1,492     1,502     1,512     1,522     1,531     1,541     1,551
1. AB444068.1 Plasmodium fragile          TNIIDMLDSRLKKRNYFLSVLESDFNPFKYSSSG-EYIMKDPYKLLDYEQKKKLLGSYKYISASI
                                            1,405     1,415     1,425     1,435     1,444     1,454     1,464
2. AF435593.1 Plasmodium vivax            TNITDMLDSRLKKRNYFLEVLNSDLNPFKYSSSG-EYIIKDPYKLLDLEKKKKLIGSYKYIGASI
                                            1,352     1,362     1,372     1,382     1,391     1,401     1,411
3. KC137340.1 Plasmodium ovale wallikeri  SNVTNMLESRLKKRNYFLEVLNSDLTPYKHVTSG-NYIIRDAYKLLDFEKKKKLLSSYKYIKDSV
                                            1,398     1,408     1,418     1,428     1,437     1,447     1,457
4. KC137349.1 Plasmodium ovale curtisi    SNVTNMLESRLKKRNYFLEVLNSDLTQYKHATSD-NYVIRDAYKLLDFEKKKKLLSSYKYIKDSV
                                            1,429     1,439     1,449     1,459     1,468     1,478     1,488
5. FJ824669.1 Plasmodium malariae         SNLTNALDTRKKKRTYFLDVLNSDLIQFKHATSD-SYIIKDPYKLLDVDKKAKLIGSYKYIVSAI
                                            1,446     1,456     1,466     1,476     1,485     1,495     1,505
6. AB379641.1 Plasmodium chabaudi         EDIITGLNYKLEKRNDFLDVLSYELALFKDINTN-KFVVKNPYQLLDNDKKDKQMVNLKYAIKGV
                                            1,304     1,314     1,324     1,334     1,343     1,353     1,363
7. X03371.1 Plasmodium falciparum K1      VNVKDILNSRFNKRENFKNVLESDLIPYKDLTSS-NYVVKDPYKFLNKEKRDKFLSSYNYIKDSI
                                            1,404     1,414     1,424     1,434     1,443     1,453     1,463
8. AJ786604.1 Plasmodium reichenowi       VNVKDILNSRSNKRENFNNVLESDLNPYKDLTLS-NYVVKDPYKFLNPEKRNKFLSSYNYIKDSI
                                            1,356     1,366     1,376     1,386     1,395     1,405     1,415
9. X05624.2 Plasmodium falciparum MAD 20  LNLNDILNSRLKKRKYFLDVLESDLMQFKHISSN-EYIIEDSFKLLNSEQKNTLLKSYKYIKESV
                                            1,107     1,117     1,127     1,137     1,146     1,156     1,166
10. Plasmodium relictum GRW4              SNITDILESNFTKRDYFLNALDYDLISFEHEFSN-DYIIEDPFKVIEPETRNKLLGNYIYILGSI
                                            1,245     1,255     1,265     1,275     1,284     1,294     1,304
11. Plasmodium relictum SGS1              SNIIDILESNFTKRNYFLNVLDYDLISFEHEFSN-DYIIEDPFKVIEPETRNKLLGNYIYILGSI
                                            1,288     1,298     1,308     1,318     1,328     1,338     1,348
12. AJ809338.1 Plasmodium gallinaceum     DNIIDILESNYAKRSYFLEVLDFDLISYKHASSSDDYIIEDPYKMLEPEKKSKLLGNYKYILASI
                                            1,496     1,506     1,516     1,526     1,535     1,545     1,555
13. AB444050.1 Plasmodium knowlesi        TNITDMLDSRLKKRNYFLDVLDSELNPFKYSSSG-EYIIKDPYKLLDLEQKKKLLGSYQYIGASV

                                                 1,830     1,840     1,850     1,860     1,870     1,880
                                                 1,561     1,571     1,581                    1,591 1,596
1. AB444068.1 Plasmodium fragile          DKDIATAKDGLAYFNKMSELYKNHMDAVHAHIQSIENDD---------------SETDGDQLNAK
                                                 1,474     1,484     1,494     1,504     1,514     1,524
2. AF435593.1 Plasmodium vivax            DMDLATANDGVTYYNKMGELYKTHLDGVKTEIKKVEDDIKKQDEELKKLGNVNSQDSKKNEFIAK
                                                 1,421     1,431     1,441                         1,451
3. KC137340.1 Plasmodium ovale wallikeri  EKDLEIATDGIDYYEKMVALYKTYLESVNAQVDAIDKTG----------------------DDAT
                                                 1,467     1,477     1,487                         1,497
4. KC137349.1 Plasmodium ovale curtisi    EKDVEIATDGIDYYEKMAALYKTYLESVNAQVDAIDKTG----------------------DDAT
                                                 1,498     1,508     1,518                           1,528
5. FJ824669.1 Plasmodium malariae         EKDITSAENGVEYYDKMTKLYKTQLEAVKSAIAEAQKEG------------------------DK
                                                 1,515     1,525     1,535                           1,545
6. AB379641.1 Plasmodium chabaudi         TEDIETTTDGIEFFNKMIELYKPQLNAVNEQIDAIEKDT------------------------TD
                                                 1,373     1,383     1,393
7. X03371.1 Plasmodium falciparum K1      DTDINFANDVLGYYKILSEKYKSDLDSIKKYINDKQGEN--------------------------
                                                 1,473     1,483     1,493       1,505                 1,506
8. AJ786604.1 Plasmodium reichenowi       DTDINFANSVLEYYKILSEKYNSDLNLIQKYIKEKQDENKIG---------------------EQ
                                                 1,425     1,435     1,445     1,455         1,459 1,465
9. X05624.2 Plasmodium falciparum MAD 20  ENDIKFAQEGISYYEKVLAKYKDDLESIKKVIKEEKEKFPSSP----------PTTPPSPAKTDE
                                                 1,176     1,186       1,198
10. Plasmodium relictum GRW4              DKDISFINENLSYFTKISQKYSHNLEQIKSII
                                                 1,314     1,324     1,334
11. Plasmodium relictum SGS1              NKDISFINENLSYFTKISQKYSHNLEQIKSIIEKKKSQD--------------------------
                                                 1,358     1,368     1,378
12. AJ809338.1 Plasmodium gallinaceum     KKDITFANENIAYFTKMSEKYTHNLEEIKSIIEKKKLQN--------------------------
                                                 1,565     1,575             1,593            1,594 1,599
13. AB444050.1 Plasmodium knowlesi        DKDLITAKDGMEYYKKMGELYKKHLEAVNAQIKEIEAS----------------VPSGQSQLNAE

                                            1,890     1,900     1,910     1,920     1,930     1,940     1,950
                                            1,606     1,616     1,626     1,636     1,646     1,656
1. AB444068.1 Plasmodium fragile          NEEAKKYLPFLNSIQKEYETLMNKVHIYTDNLKKFMNKYPIEKKETEIIVNKLENYTKMDEKLEI
                                            1,534     1,544     1,554     1,564     1,574     1,584
2. AF435593.1 Plasmodium vivax            KAELEKYLPFLNSLQKEYESLVSKVNTYTDNLKKVINNCQLEKKEAEITVKKLQDYNKMDEKLEE
                                            1,459     1,469     1,479     1,489     1,499     1,509
3. KC137340.1 Plasmodium ovale wallikeri  KTTNKKFLPFLASIKTLYEALLEKVNTYNSQLKSSLNSCQLEKIRVGIIVDKLTDYVKFDEKLEE
                                            1,505     1,515     1,525     1,535     1,545     1,555
4. KC137349.1 Plasmodium ovale curtisi    KATNKKFLPFLASINAMYETLLEKVNTYNSQLKSSLNSCQLEKIRVGIVVDKLNNYVMFDEKLEE
                                            1,534     1,544     1,554     1,564     1,574     1,584
5. FJ824669.1 Plasmodium malariae         KTENEKYIPFLTNMQTLYENLLNKINGNIINLKTLITNCNLEKDAVNITISKLTEYSKFDEKIEM
                                            1,551     1,561     1,571     1,581     1,591     1,601
6. AB379641.1 Plasmodium chabaudi         KEEKKKYVPVFEDLKVLYETILNGAEEFSELLQHKLENYKIEKAGFDILMANLETYIRIDEKLED
                                            1,403     1,413     1,423     1,433     1,443     1,453     1,463
7. X03371.1 Plasmodium falciparum K1      ----EKYLPFLNNIETLYKTVNDKIDLFVIHLEAKVLNYTYEKSNVEVKIKELNYLKTIQDKLAD
                                            1,512     1,522     1,532     1,542     1,552     1,562     1,572
8. AJ786604.1 Plasmodium reichenowi       KGEIEKYLPFLNNIETLYKTVKDKIDVFVIQLKAKVLNYTYKKSNIEVKIKKLNYLKTIEDKLDE
                                            1,475     1,485     1,495     1,505     1,515     1,525     1,535
9. X05624.2 Plasmodium falciparum MAD 20  QKKESKFLPFLTNIETLYNNLVNKIDDYLINLKAKINDCNVEKDEAHVKITKLSDLKAIDDKIDL
```



```
10. Plasmodium relictum GRW4
                               1,344 1,354 1,364 1,374 1,384 1,394 1,404
11. Plasmodium relictum SGS1             ----EKLLPFLISFQNLYETSLNNIGNYKNALDSKVANCEQNKELMEVKIQKIKDNNNVQETIEN
                               1,388 1,398 1,408 1,418 1,428 1,438 1,448
12. AJ809338.1 Plasmodium gallinaceum    ----EKLLPFLTDFNKLYEKLIDSVTHYKSYLNTMIANFEKEKSAMENIVEKITEEKNIDTIIET
                               1,609 1,619 1,629 1,639 1,649 1,659
13. AB444050.1 Plasmodium knowlesi       KEELKKYLPFLNSIQKEYESLVNMAHTYKENLKKFINNCQIEKKETEIIVKKLEDYTKIDENLEI

                               1,960 1,970 1,980 1,990 2,000 2,010
                               1,673 1,674 1,687 1,697 1,707
1. AB444068.1 Plasmodium fragile         FKQSKKE-------------------TDVRSSGLLEKFKSSKLINEEESKKVLSKLLNVQ-TQLL
                               1,601 1,602 1,615 1,625 1,635
2. AF435593.1 Plasmodium vivax           YKKSEKK-------------------NEVKSSGLLEKLMKSKLIKENESKEILSQLLNVQ-TQLL
                               1,527 1,528 1,536 1,546 1,556 1,566
3. KC137340.1 Plasmodium ovale wallikeri LKSSKEKD-------------LTKLSKDIDTSNIINKLKRSGFVDTDESKKLLSKLLDVDSAQLL
                               1,573 1,574 1,582 1,592 1,602 1,612
4. KC137349.1 Plasmodium ovale curtisi   LKSSKEKD-------------LTKLSKDIDTSNIINKLKRSGFVDTDESKKLLSELLDVDSAQLL
                               1,601 1,602 1,615 1,625 1,635
5. FJ824669.1 Plasmodium malariae        FKNSKNE-------------------KDIASSGILDILKQKGLVNKNESTKIISELLGVDSNALL
                               1,618 1,619 1,632 1,642 1,652
6. AB379641.1 Plasmodium chabaudi        FVESAEK-------------------NKHIASIALNNLNKSGLVTEGESKKILAKMLNMDAMDLL
                               1,473 1,481 1,491 1,501 1,511
7. X03371.1 Plasmodium falciparum K1     FKKNNNFVG------------IADLSTDYNHNNLLTKFLSTGMVFENLAKTVLSNLLDGNLQGML
                               1,582 1,590 1,600 1,610 1,620
8. AJ786604.1 Plasmodium reichenowi      FKKKNNFVG------------IADLSTDYNNSKLLTRFLNTGMVFENLAKTVLSNFLDESLQGML
                               1,545 1,553 1,563 1,572 1,582
9. X05624.2 Plasmodium falciparum MAD 20 FKNTNDFEA------------IKKLINDDTKKDMLGKLLSTGLVQN-FPNTIISKLIEGKFQDML
10. Plasmodium relictum GRW4
                               1,414 1,424 1,434 1,444 1,454 1,464
11. Plasmodium relictum SGS1             LKKNKREGEDNYLYDSNNRTKKLSPNEHRNRKQLWTRFKQLRIVHENNMNSLFSNFDQQDLEQIY
                               1,457 1,467 1,477 1,487 1,497 1,507
12. AJ809338.1 Plasmodium gallinaceum    LKK-KKEQDEIINSGSHGANGKLSPNEHNMRKQLWMKFKKLRIINDDITNTLFSNYMNKDLGEIY
                               1,676 1,677 1,690 1,700 1,710
13. AB444050.1 Plasmodium knowlesi       YKKSKKE-------------------SDVRSSGLLEKLKNSKLINEEESKKVLSQLLNVQ-TQML

                               2,020 2,030 2,040 2,050 2,060 2,070 2,080
                               1,716 1,726 1,736 1,746 1,754 1,764 1,774
1. AB444068.1 Plasmodium fragile         HLSSDHKCIDTVVPDNAACYRYLDGTEEWRCLLTFKEVSG--KCVPAPNMTCMDNNGGCAPEAEC
                               1,644 1,654 1,664 1,674 1,682 1,692 1,702
2. AF435593.1 Plasmodium vivax           TMSSEHTCIDTNVPDNAACYRYLDGTEEWRCLLTFKEEGG--KCVPASNVTCKDNNGGCAPEAEC
                               1,576 1,586 1,596 1,606 1,614 1,624 1,634
3. KC137340.1 Plasmodium ovale wallikeri SMGSKHKCIDITYPDNAGCYRFPDGREEWRCLLNFKKVGE--TCVPNNNPTCAENNGGCDPTADC
                               1,622 1,632 1,642 1,652 1,660 1,670 1,680
4. KC137349.1 Plasmodium ovale curtisi   SMGSKHKCIDITYPDNAGCYRFSDGREEWRCLLNFKKVGE--TCVPNNNPTCAENNGGCDPTADC
                               1,645 1,655 1,665 1,675 1,683 1,693 1,703
5. FJ824669.1 Plasmodium malariae        NISAKHACTETKYPENAGCYRYEDGKEVWRCLLNYKLVDG--GCVEDEEPSCQVNNGGCAPEANC
                               1,662 1,672 1,682 1,692 1,702 1,712 1,722
6. AB379641.1 Plasmodium chabaudi        GIGSNHVCIGTNIPENAGCFRYDDGKEEWRCLLGFKKNDDNTRCEKDTGATCSNNNGGCDPSADC
                               1,520 1,530 1,540 1,550 1,558 1,568 1,578
7. X03371.1 Plasmodium falciparum K1     NIS-QHQCVKKQCPQNSGCFRHLDEREECKCLLNYKQEGD--KCVENPNPTCNENNGGCDADAKC
                               1,629 1,639 1,649 1,659 1,667 1,677 1,687
8. AJ786604.1 Plasmodium reichenowi      NVS-QHQCVKNECPENSGCFRHLDETEECKCLLNYKQEGD--KCVENPNPTCNKNNGGCDANATC
                               1,591 1,601 1,611 1,621 1,629 1,639 1,649
9. X05624.2 Plasmodium falciparum MAD 20 NIS-QHQCVKKQCPENSGCFRHLDEREECKCLLNYKQEGD--KCVENPNPTCNENNGGCDADATC
10. Plasmodium relictum GRW4
                               1,474 1,484 1,494 1,504 1,512 1,522 1,532
11. Plasmodium relictum SGS1             EDVSQHICINTVCPINSGCIRRLNGKEECRCLLNFKKEGM--MCVPDENPTCEINNGGCDTTANC
                               1,517 1,527 1,537 1,547 1,555 1,565 1,575
12. AJ809338.1 Plasmodium gallinaceum    EHISKHKCLKTVCPINAGCIRRLNGEEECRCFLNYKKDGN--ICIPDENASCQINNGGCDVNAKC
                               1,719 1,729 1,739 1,749 1,757 1,766 1,776
13. AB444050.1 Plasmodium knowlesi       NMSSAHKCIDTNVPENAACYRYLDGTEEWRCLLGFKEVGG--KCVPAS-ITCEENNGGCAPEAEC

                               2,090 2,100 2,110 2,120 2,130 2,135
                               1,779 1,788 1,798 1,808 1,823
1. AB444068.1 Plasmodium fragile         SMPD------NKEIVCKCTREGSEPLFQGVFCSSSSFLSLSFLLLILLFLLCMEL
                               1,707 1,716 1,726 1,736 1,751
2. AF435593.1 Plasmodium vivax           KMTD------SNKIVCKCTKEGSEPLFEGVFCSSSSFLSLSFLLLMLLFLLCMEL
                               1,639 1,648 1,657 1,667 1,681
3. KC137340.1 Plasmodium ovale wallikeri AESE------NNKITCTCTGQ-NESFFEGVFCGSSSFLSLSFLLAVLLILFNLL
                               1,685 1,694 1,703 1,713 1,727
4. KC137349.1 Plasmodium ovale curtisi   AESE------NNKITCTCTGQ-NESFFEGVFCGSSSFLSLSFLLAVLLILFNLL
                               1,708 1,717 1,727 1,737 1,751
5. FJ824669.1 Plasmodium malariae        TKGD------DNKIVCACNAPYSEPIFEGVFCGSSSFLGLSLLLAALLIMFNLL
                               1,732 1,742 1,752 1,762 1,776
6. AB379641.1 Plasmodium chabaudi        REVENADRDPSKKIVCTCKEPTPNAYYDGVFCSSSGFMGLSILLIITLIVFNLF
                               1,586 1,596 1,606 1,616 1,630
7. X03371.1 Plasmodium falciparum K1     TEEDSG--SNGKKITCECTKPDSYPLFDGIFCSSSNFLGISFLLILMLILYSFI
                               1,695 1,705 1,715 1,725 1,739
8. AJ786604.1 Plasmodium reichenowi      TEEDSG--SSGKQITCECTNPDSYPLFDGIFCSSSNFLGISFLLILMLILYSFI
                               1,657 1,667 1,677 1,687 1,701
9. X05624.2 Plasmodium falciparum MAD 20 TEEDSG--SSRKKITCECTKPDSYPLFDGIFCSSSNFLGISFLLILMLILYSFI
10. Plasmodium relictum GRW4
                               1,537 1,545 1,555 1,565 1,577
11. Plasmodium relictum SGS1             TSNG-------EQITCTCKLNKSFPIHQGIFCSSSNYLSLSFLLIIIFIYIT
                               1,580 1,588 1,598 1,608 1,622
12. AJ809338.1 Plasmodium gallinaceum    LNNE-------NEISCICKLNGSYPIHGGIFCSSSNFLSISFLLIITLILYNLF
                               1,781 1,790 1,800 1,810 1,825
13. AB444050.1 Plasmodium knowlesi       TMDD------KKEVECKCTKEGSEPLFEGVFCSSSSFLSLSFLLLILIFFLSMEL
```