**Supporting Information**

**Supplementary Figure 2:** Amino acid sequences alignments for AMA1 (a), MSP1-19 (b), SERA3 (c), TRAP/SSP2 (d) and TSERA2 (e) gene sequences between *P. knowlesi, P. falciparum, P. vivax, P. malariae* and *P. ovale/P. simiovale*. *P. knowlesi*-specific sequences selected for development as constructs are highlighted in yellow. Asterisks indicate fully conserved residues, colons indicates strong residue conservation (>0.5, Gonnet PAM 250 matrix), period indicates weak residue conservation (=<0.5, Gonnet PAM 250 matrix). Conserved cysteine residues are highlighted in green. Blank spaces indicate no residue conservation.

**Supp. Fig 2a: Apical Membrane Antigen 1 (AMA1)**

Pfalciparum\_AMA1\_PF3D7\_1133400 MRKLYCVLLLSAFEFTYMINFGRGQNYWEHPYQNSDVYRPINEHREHPKEYEYPLHQEHT

Pmalariae\_AMA1\_PmUG01\_09042600 MKKLYYILLLST---QYLIHVYA-------------------------------------

Povale\_AMA1\_PocGH01\_09039800 MKKIYYIFLLSA---HYLINVGK-------------------------------------

Pknowlesi\_AMA1\_PKNH\_0931500 MNKIYYILFLSA---QCLVHMGK-------------------------------------

Pvivax\_AMA1\_PVX\_092275 MNKIYYIIFLSA---QCLVHIGK-------------------------------------

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Pfalciparum\_AMA1\_PF3D7\_1133400 YQQEDSGEDENTLQHAYPIDHEGAEPAPQEQNLFSSIEIVERSNYMGNPWTEYMAKYDIE

Pmalariae\_AMA1\_PmUG01\_09042600 -----SPRNAKHGRLNGSG-GTLIEKGQ----------VVERSTRMSNPWKKYMEKYDVE

Povale\_AMA1\_PocGH01\_09039800 -----CTRNQKQGRLTRSG-SAMVEKNP----------TIERSTRMINPWKKYMEKFDVE

Pknowlesi\_AMA1\_PKNH\_0931500 -----CERNQKTTRLTRSANNASLEKGP----------IIERSIRMSNPWKAFMEKYDLE

Pvivax\_AMA1\_PVX\_092275 -----CGRNQKPSRLTRSANNVLLEKGP----------TVERSTRMSNPWKAFMEKYDIE

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Pfalciparum\_AMA1\_PF3D7\_1133400 EVHGSGIRVDLGEDAEVAGTQYRLPSGKCPVFGKGIIIENSNTTFLTPVATGNQYLKDGG

Pmalariae\_AMA1\_PmUG01\_09042600 KTHGAGVRVDLGEDAEVKNSKYRIPGGKCPVFGKGIIIENSNVDFLTPVATGNRNLKSGG

Povale\_AMA1\_PocGH01\_09039800 KTHGSGIRVDLGEDAEVKNSKYRIPSGRCPVFGKGITIENSEVSFLKPVATGNEKLKSGG

Pknowlesi\_AMA1\_PKNH\_0931500 RAHNSGIRIDLGEDAEVGNSKYRIPAGKCPVFGKGIVIENSNVSFLTPVATGAQRLKEGG

Pvivax\_AMA1\_PVX\_092275 RTHSSGVRVDLGEDAEVENAKYRIPAGRCPVFGKGIVIENSDVSFLRPVATGDQKLKDGG

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Pfalciparum\_AMA1\_PF3D7\_1133400 FAFPPTEPLMSPMTLDEMRHFYKDNKYVKNLDELTLCSRHAGNMIPDNDKNSNYKYPAVY

Pmalariae\_AMA1\_PmUG01\_09042600 FAFPATDDHISPVTIEVLRKRYEEHADLMNLNDLSLCSKHASSFVISDDLNTSYRHPAVY

Povale\_AMA1\_PocGH01\_09039800 FAFPLTDYHISPISLQNLKRRYNENVELMKLNDMSLCAKHASSFVISEDQNTTYRHPAVY

Pknowlesi\_AMA1\_PKNH\_0931500 FAFPNADDHISPITIANLKERYKENADLMKLNDIALCKTHAASFVIAEDQNTSYRHPAVY

Pvivax\_AMA1\_PVX\_092275 FAFPNANDHISPMTLANLKERYKDNVEMMKLNDIALCRTHAASFVMAGDQNSSYRHPAVY

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Pfalciparum\_AMA1\_PF3D7\_1133400 DDKDKKCHILYIAAQENNGPRYCNKDESKRNSMFCFRPAKDISFQNYTYLSKNVVDNWEK

Pmalariae\_AMA1\_PmUG01\_09042600 DEKTKTCYILYLSAQENIGPRYCSKDAADKDTMFCFKPAKTDNFKHYAYLSKNVVSDWDV

Povale\_AMA1\_PocGH01\_09039800 DEKEQTCYILYLSAQENLGPRYCSNDAADKDSIFCFKPEKNESFQNYVYLSKNLRDDWSS

Pknowlesi\_AMA1\_PKNH\_0931500 DEKNKTCYMLYLSAQENMGPRYCSPDSQNKDAMFCFKPDKNEKFDNLVYLSKNVSNDWEN

Pvivax\_AMA1\_PVX\_092275 DEKEKTCHMLYLSAQENMGPRYCSPDAQNRDAVFCFKPDKNESFENLVYLSKNVRNDWDK

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Pfalciparum\_AMA1\_PF3D7\_1133400 VCPRKNLQNAKFGLWVDGNCEDIPHVNEFPAIDLFECNKLVFELSASDQPKQYEQHLTDY

Pmalariae\_AMA1\_PmUG01\_09042600 KCPRKSLGVAKFGLWVDGNCEEIPSVKAFYADNLTECNRIVFEASASDQPTQYEENMTDY

Povale\_AMA1\_PocGH01\_09039800 KCPRNNLTNSKFGLWVDGNCEDIPYVKEFQANTLRECNRIVFEASASDQPRQYEEELTDY

Pknowlesi\_AMA1\_PKNH\_0931500 KCPRKNLGNAKFGLWVDGNCEEIPYVNEVEARSLRECNRIVFEASASDQPRQYEEELTDY

Pvivax\_AMA1\_PVX\_092275 KCPRKNLGNAKFGLWVDGNCEEIPYVKEVEAEDLRECNRIVFGASASDQPTQYEEEMTDY

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Pfalciparum\_AMA1\_PF3D7\_1133400 EKIKEGFKNKNASMIKSAFLPTGAFKADRYKSHGKGYNWGNYNTETQKCEIFNVKPTCLI

Pmalariae\_AMA1\_PmUG01\_09042600 KKLEQGFRDNNPDMIKGAFLPVGAFNANFNKSKGKGFNWGNYDKINKKCFIFNVKPTCLI

Povale\_AMA1\_PocGH01\_09039800 EKIQEGFRQNNPDMIKGAFFPVGAYKSDNFKSRGKGFNWGNFDIVNKKCYIFSAKPTCLI

Pknowlesi\_AMA1\_PKNH\_0931500 EKIQEGFRQNNRDMIKSAFLPVGAFNSDNFKSKGRGYNWANFDSVNNKCYIFNTKPTCLI

Pvivax\_AMA1\_PVX\_092275 QKIQQGFRQNNREMIKSAFLPVGAFNSDNFKSKGRGFNWANFDSVKKKCYIFNTKPTCLI

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Pfalciparum\_AMA1\_PF3D7\_1133400 NNSSYIATTALSHPIEVENNFPCSLYKDEIMKEIERESKRIKLNDNDDEGNKKIIAPRIF

Pmalariae\_AMA1\_PmUG01\_09042600 NNKDFIATTALSHPEEVQEDFPCDIYKNEIEKELKRNSGNVKLYSLDGE---KIVLPRIF

Povale\_AMA1\_PocGH01\_09039800 NDKNYIATTALSHPEDVERNFPCEIYKNEIEKEIEKQNRKAKLYSTDGD---RVVLPRIF

Pknowlesi\_AMA1\_PKNH\_0931500 NDKNFFATTALSHPQEVDNEFPCSIYKDEIEREIKKQSRNMNLYSVDKE---RIVLPRIF

Pvivax\_AMA1\_PVX\_092275 NDKNFIATTALSHPQEVDLEFPCSIYKDEIEREIKKQSRNMNLYSVDGE---RIVLPRIF

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Pfalciparum\_AMA1\_PF3D7\_1133400 ISDDKDSLKCPCDPEMVSNSTCRFFVCKCVERRAEVTSNNEVVVKEEYKDEYADIPEHKP

Pmalariae\_AMA1\_PmUG01\_09042600 ISNNKDSLNCPCEPEKITNSSCDFYLCNCVEKRAEIKENNEVVIKDEFKEEYEYNEGNS-

Povale\_AMA1\_PocGH01\_09039800 ISDDKDSLKCPCEPERITNSTCNYYVCNCVEKRAEIKENNEVIIKDEFKEDYENEEGENT

Pknowlesi\_AMA1\_PKNH\_0931500 ISTDKESIKCPCEPEHISNSTCNFYVCNCVEKRAEIKENNEVIIKEEFKEDYENPDGKH-

Pvivax\_AMA1\_PVX\_092275 ISNDKESIKCPCEPERISNSTCNFYVCNCVEKRAEIKENNQVVIKEEFRDYYENGEEKS-

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Pfalciparum\_AMA1\_PF3D7\_1133400 TYDKMKIIIASSAAVAVLATILMVYLYKRKGNAEKYDKMDEPQDYGKS-NSRNDEMLDPE

Pmalariae\_AMA1\_PmUG01\_09042600 NNKKTLIIIGLAGGVGILALASSFFFFKKKTENEKYDKMDQADVYGKS-TTRKDEMLDPE

Povale\_AMA1\_PocGH01\_09039800 NRQRTIIIIGLAGGVAVLGCASFFFFFKKKAQGKEYDKMDQTDGYGKP-KSRKDEMLDPE

Pknowlesi\_AMA1\_PKNH\_0931500 KKKMLLIIIGVTGAVCVVAVASLFY-FRKKAQDDKYDKMDQAEAYGKTANTRKDEMLDPE

Pvivax\_AMA1\_PVX\_092275 NKQMLLIIIGITGGVCVVALASMAY-FRKKANNDKYDKMDQAEGYGKP-TTRKDEMLDPE

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Pfalciparum\_AMA1\_PF3D7\_1133400 ASFWGEEKRASHTTPVLMEKPYY

Pmalariae\_AMA1\_PmUG01\_09042600 ASFWGEEKRASHTTPVLMEKPYY

Povale\_AMA1\_PocGH01\_09039800 ASFWGEEKRASHTTPVLMEKPYY

Pknowlesi\_AMA1\_PKNH\_0931500 ASFWGEDKRASHTTPVLMEKPYY

Pvivax\_AMA1\_PVX\_092275 ASFWGEDKRASHTTPVLMEKPYY

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**Supp. Fig 2b: Merozoite Surface Protein (MSP) 1-19**

Pfalciparum\_MSP1\_19\_FCR3 -NISQHQCVKKQCPQNSGCFRHLDEREECKCLLNYKQEGDKCVENPNPTCNENNGGCDAD

Pmalariae\_MSP1\_19 NISAKHACTETKYPENAGCYRYEDGKEVWRCLLNYKLVDGGCVEDEEPSCQVNNGGCAPE

Povale\_MSP1\_19 -MGSKHKCIDITYPDNAGCYRFSDGREEWRCLLNFKKVGETCVPNNNPTCAENNGGCDPT

Pknowlesi\_MSP1\_19 NMSSAHKCIDTNVPENAACYRYLDGTEEWRCLLGFKEVGGKCVPAS-ITCEENNGGCAPE

Pvivax\_MSP1\_19 -MSSEHTCIDTNVPDNAACYRYLDGTEEWRCLLTFKEEGGKCVPASNVTCKDNNGGCAPE

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Pfalciparum\_MSP1\_19\_FCR3 AKCTEEDSGSNGKKITCECTKPDSYPLFDGIFCSSSN

Pmalariae\_MSP1\_19 ANCTKGDD----NKIVCACNAPYSEPIFEGVFCGSSS

Povale\_MSP1\_19 ADCAESEN----NKITCTCTGQ-NESFFEGVFCGSSS

Pknowlesi\_MSP1\_19 AECTMDDK----KEVECKCTKEGSEPLFEGVFCSSSS

Pvivax\_MSP1\_19 AECKMTDS----NKIVCKCTKEGSEPLFEGVFCSSSS

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**Supp. Fig 2c: Serine Repeat Antigen (SERA) 3 protein**

**Antigen 1**

Pfalciparum\_SERA5 MKSYISLFFILCVIFNKNVIKCT--GESQTGNTG---------GGQAGNTGGDQAGSTGG

Pmalariae\_SERAlike MKYGILYIFMICISFGSNTIKCTTVSVSDNRGNEASEQPLQPAQPGPQTHEPSNSQVQNS

Pknowlesi\_SERA3 MKSSFLLLLALCATYGNNLAICTTEGTAQSGVSSDSQHSLSSSETETGSHGAPGAEAQSV

Pvivax\_SERAlike MKSSVLLLLALGATYGNNVAMCT--ATPPSGGPHASLPNPGGPGTGAENQGQSQAGQQLP

Psimiovale\_SERAlike MKSSFLLLLALGTAYGNNVVICTTGQTPSSGESGVASSSSSGPGTGSDNQQESGQGPQPE

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Pfalciparum\_SERA5 SPQGSTG---------------ASPQGSTGASPQGSTGASQPGSSEPS---NPVSSGHSV

Pmalariae\_SERAlike SNPNISDLTVTTPPVAQNLSHETPKNGSSQSPPQNGPLLSSPSAVNNGQ--PNVSSGGAV

Pknowlesi\_SERA3 SPEGGQD---AVHSTN-ESAESDAESPTEPNPPQEDGTSNEDGNGGHSESSAPSVPGGSA

Pvivax\_SERAlike SPSGEPG---AASPTHTPSPGPLPPNPAQPNSLPAVETLSQQGGGAPAASSNALTAGGNV

Psimiovale\_SERAlike SAGNGQN---VEESTNHQQPVPGAPNSAGSNLSQGGATIKSNGDGNPSAISPAPNAEGSV

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Pfalciparum\_SERA5 STVSVSQTSTSSEK-------------------QDTIQVKSALLKDYMGLKVTGPCNENF

Pmalariae\_SERAlike SP-NLSSAGNSNGATQLSAESQNGAVSPKVPNYHNMAKIESALLKNHTGVRITGPCNEEV

Pknowlesi\_SERA3 SPSSVENSNEQAAGTQLQVA-------------PQKAQVKSALLKNFTGVKVTGPCDTEV

Pvivax\_SERAlike PPGSQVNSGEQGGATQLQAT-------------PKKAELQSSLLKNFTGVKVTGPCDTEV

Psimiovale\_SERAlike SPSSSGSTRGPGGATQLQAS-------------HKKAELQSALLKNFTGVKVTGPCDTEV

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**Antigen 2**

Pfalciparum\_SERA5 IYDYYLKASPEFYHNLYFKNFNVGKKNLFSEKEDNENN---KKLGNNYIIFGQDT-----

Pmalariae\_SERAlike LYNYYLKTSPDFYSNLYFNSLSAEKANDLST----------NKVLDQMTVHGQAVEESSE

Pknowlesi\_SERA3 LHSYYLKNSPDFYKNLYYNALDGECGNAPCNTVEGQDA-PGEKATDQVGASGAGVATVTT

Pvivax\_SERAlike LYSYHLKTSPDFYKNLYYNAVGGEKGSVLSNAVQGQDTPPGEEALPGAKVDGGGT-----

Psimiovale\_SERAlike LYSYHLNSSPDFYKNLYYNALGEKSGSALSHAVHGQDA-PQEEGESLGTVVGEGISESTV

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Pfalciparum\_SERA5 ----------------------------------------------------AGSGQSGK

Pmalariae\_SERAlike ----------------------------------------------------GTSGQHGQ

Pknowlesi\_SERA3 ----------------------------------------------TGTGAAPGTGAEAK

Pvivax\_SERAlike ------------------------------------------------------PGPTGP

Psimiovale\_SERAlike QEVQQTQLQVPSVMSTNPRVEGQQEQAVVVDQASSHQRAEQVEASTLGAANTQESGPKVT

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Pfalciparum\_SERA5 ESNT--------------------------------------------------------

Pmalariae\_SERAlike HGQP--------------------------------------------------------

Pknowlesi\_SERA3 AGAEAGAGAETE--ATKATEVLEPKEQQAQSQVTVVENSVSKDQPQPQPQPQPQPQPQLQ

Pvivax\_SERAlike EGQPQPHASSVG--------GQIP----QESRQEVEEKQVVDGQ----------------

Psimiovale\_SERAlike EGAQNGDAQSTGIAGVQTAPGTAPAIGAQTAQNTVGGETAAGGQGEGSVVSQLAADGTDS

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Pfalciparum\_SERA5 ---------------------------------------------------------ALE

Pmalariae\_SERAlike -------------------GQPESTS-----------------SSETVAESSA---QGLD

Pknowlesi\_SERA3 QEQQQEQQQEQQQEQQQEQQQQQEQQQQQPQPPQPALQDLTNEHSPHIGETEVKVEPEGE

Pvivax\_SERAlike ---------PQPVTVE---GHPPSQPLQPTSPLQQSTQPGVGGAASTPLSQGT---PGQA

Psimiovale\_SERAlike RGITTDISSPQAQTLQPPGGQGVSTPAQPPSP-QQPTEP---VHASTSLVTGT---PGAA

Pfalciparum\_SERA5 SAGTSNEVSERVHVYHILKHIKDGKIRMGMRKYIDTQDVNKKHSCTRSYAFNPENYEKCV

Pmalariae\_SERAlike SAASDVPDVQKFEVVHILKHIKNSKSKTTLVKYDYYYDFG-DHACSRTQASNPEKLGDCI

Pknowlesi\_SERA3 NSNAELQKAKMVQIIHVLKHIKQTKMVTRVVTYQGNYELG-EHSCSRTEASSVEKLDECI

Pvivax\_SERAlike NSNGEAENANISQIIHVLKHIKKTKMVTRIVTYEGEYDLG-DHSCSRTQASSLEKLDDCI

Psimiovale\_SERAlike NPNAGVQSAKISQIIHVLKHIKQTKMVTRVVTYEGEYELG-DQSCSRTQALSLEKLDECI

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**Supp. Fig 2d: Sporozoite Surface Protein (SSP) 2**

Pfalciparum\_SSP2 ENPPNPD--IPEQEPNIPEDSEKEVPSD------VPKNPEDD---RE-------------

Pknowlesi\_SSP2 TVPDESN--VIPVPPTVPGGSNSEFSSDVENAAQYPENPENPEN-PENSENPENPENQ--

Pvivax\_SSP2 SVPDESN--VLPLPPAVPGGSSEEFPAD------VQNNPD--------------------

Pmalariae\_SSP2 PNSESKDKLLPSDKEDEENKNNSNLPEG------LEERPQEGESLPVEPEGNENVEDNFP

PovaleWallikeri\_SSP2 FVPDEEV--LPEAPANVPEERGNDVPEE------FPQNPENEQNVPE-------------

PovaleCurtisi\_SSP2 FILDEEN--LPEAPANVPEG-GNDVPEE------FPQNPENEQNVPE-------------

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Pfalciparum\_SSP2 -ENFDIPKKPENKH-------DN--QNNLPNDKSDR---SIPYSPLPPKVLDNERKQSDP

Pknowlesi\_SSP2 NNPEDFPMEPDMSA-------DN--KINEPTNPSDSGQ-GIPENVIPTPINNEKDIINKN

Pvivax\_SSP2 -SPEELPMEQEVPQ-------DN--NVNEPERSDSNGY-GVNEKVIPNPLDNERDMANKN

Pmalariae\_SSP2 QAPNDLPGKQGQPDILNPDGGPNFGNNEHPGSPSNNDYSGKAYTHIPSPIGNEKNRSNYN

PovaleWallikeri\_SSP2 -KPNDLPIEQEKPQDDGNNKVDY--KKNDMYKPEKGGYVIENDHRAPKPSNSYSDSKGKA

PovaleCurtisi\_SSP2 -KPNDLPIEQEKPQDDGNNKGDH--KKSDIHVPETAGYVIENGHRVPKPLVNYSDDKGKA

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Pfalciparum\_SSP2 QSQDNNGNRHVPNSEDRETRPHGRNNENRSYNRKYNDTP---KHPEREEHEKPDNNKKKG

Pknowlesi\_SSP2 KAVYPNGS---NQSHDRYPKPHRNAGGYDNNPNANSDIP---EGPFSSEEEQPEDKGKK-

Pvivax\_SSP2 KTVHPDRK---DSARDRYARPHGSTHVNNNRANENSDIP---NNPVPSDYEQPEDKAKK-

Pmalariae\_SSP2 H--NYSKSPNNNGPEDRVARPHKVDTNTESPRDSYNANPEYDETRESPNYEQREDNGKR-

PovaleWallikeri\_SSP2 QSMNYSSNQYNNIPEERYPKPHKSIGRKDNSRNNYPSAP---YTPEEPTDDEYANKGKK-

PovaleCurtisi\_SSP2 QSMNNEGNKNKNTSEERYPKPHKSIGRNDNSRKNYPSAP---YTPEEPTDDEYANKGKK-

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**Supp. Fig 2e: Truncated Serine Repeat Antigen (TSERA) 2 protein**

Pknowlesi\_PKNH\_0413500\_TSERA2 MKARLSLILILCAVCRECTVRCTDTAIN-------QGQDAVQQPEESLSQDASDNSLPGQ

Pvivax\_PVP01\_0417700\_SERA MKARLSLILILCVVCRDCAVRCTGTTEA------QGAVEGAKGPKPEAEEAGAGKEEGAN

PovaleCurtisi\_PocGH01\_04022100\_S MKSHVSIIVTLYGIFSIHVTQCTGGGAHWPPHNMHTSNPGNGNKTGDSAIPPSSGNLST-

Pfalciparum\_PF3D7\_0207800\_SERA3 MKFSISLFLILCVLFCKNDIKCTTVDES--------TKEGSQNPKNSSSTTPASGSQKG-

Pmalariae\_PmUG01\_04024900\_SERAli MRSCISLLLTIA---------CASDSNN--------GAPGSTG--NSSTTISSSNSERS-

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Pknowlesi\_PKNH\_0413500\_ TSERA2 PVASPNGADQA----EVSQLQEGAVESSSNSADASNPNANADVTDVEGEKAATPSEGS--

Pvivax\_PVP01\_0417700\_SERA VGEAGTGGPGADGGTEAGARAEEGEGAGTEAEPARGPEPEAGGEGINRDAAGNQREGQLE

PovaleCurtisi\_PocGH01\_04022100\_S --SA-SGSTGS----ILPECTGESKGEDVKGGACSNSAPIEDLTLDRIEVVSIDKDGE--

Pfalciparum\_PF3D7\_0207800\_SERA3 --SS-SESPGS----SVEKQSQESNKESTNGGNVVSQGTPANTFGQNSNNPSDSPQGT--

Pmalariae\_PmUG01\_04024900\_SERAli --ASPSESPSS------------GGQATSNGG--------SNLVGSSTAVPSNPQPSQ--

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Pknowlesi\_PKNH\_0413500\_ TSERA2 -------------------------------------------------------KEGMQ

Pvivax\_PVP01\_0417700\_SERA APSDSARPGAIPQVAPRDTVETSSDAADSSSPDQNPLPGADNTKVGNAATPPEGAKEETQ

PovaleCurtisi\_PocGH01\_04022100\_S -----------------DVEEGQNNEEKTENYIQKIIHSRTHSTVSHIRERTTDEPNIIE

Pfalciparum\_PF3D7\_0207800\_SERA3 -----------------ST--------------------------------LPSPPKSID

Pmalariae\_PmUG01\_04024900\_SERAli -----------------DV--------------------------------STSIANKAK

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Pknowlesi\_PKNH\_0413500\_ TSERA2 VKSSLLKGYKGVKVTGPCSASFLVFFAPYLFIDVDADSSNIYLGTDLNDLE---------

Pvivax\_PVP01\_0417700\_SERA VKSSLLKGHKGVKVTGPCGASFLVFFAPYLFIDVDTDSSNVYLGTDLSDLE---------

PovaleCurtisi\_PocGH01\_04022100\_S IKSALLRDYNGVKVTGPCKAVFQMFLVPHITVNVETNKNSITLGPKLVQAHKKERVTTDG

Pfalciparum\_PF3D7\_0207800\_SERA3 VKSAFLKHYKGVKVTGSCNANFQLFLVPHIFINVETKENNIQLDVKFLK-----------

Pmalariae\_PmUG01\_04024900\_SERAli IQSALLTDSNGVMVTGPCNEIFQVFFVPNIFINVQTDKNTVEMGNKFKS-----------

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Pknowlesi\_PKNH\_0413500\_ TSERA2 -------ITEKMGKGKDE---KNKCQEGKT--FKFVAFVVNDHLTIKWKVYDSEDQTPTP

Pvivax\_PVP01\_0417700\_SERA -------VTEKMGIQDNG---KNKCEDKKT--FKFVALIGEDHLTIKWKVYDPSVKTPTP

PovaleCurtisi\_PocGH01\_04022100\_S VDAYTEHIEKGLMFEKEEKKLLNKCADGKS--FKFVLFIEGNKLTVKWKVYD-ATEAENS

Pfalciparum\_PF3D7\_0207800\_SERA3 -------LTKRIDFAKDKSMLKNKCESGKNQTFKFVLYFKDDILTIKWKVYEEKSATPQK

Pmalariae\_PmUG01\_04024900\_SERAli -------LSNSITLKTFEYS-KNECAGGKT--FKFVALIQENKLTLKWKVYDAPNQNKTT

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