

Supplementary Figure 1: Multiple sequence alignment (MSA) of (A) *Plasmodium* von Willebrand factor A domain-related protein (WARP) and (B) *Plasmodium* secreted ookinete adhesive protein (SOAP) protein of *Plasmodium* species infecting gorillas, chimpanzees, humans, birds, monkeys and rodents. The asterisk (*) depicts fully conserved amino acid residues; amino acids showing strongly similar properties are represented by a colon (:); and weakly conserved amino acids by a period (.). The *Plasmodium* species with a short form chitinase have one conserved cysteine residue in the N-terminal structure of the WARP and SOAP proteins compared to all long form chitinases which do not, as indicated with red box.

A. *Plasmodium* von Willebrand factor A domain-related protein (WARP)

P.yoelii_17X_Curated	MKSVKGYIYFFSLASISICMCQNINVVSHN-VIPRV----DSDENLITCVTEYIIKIGDL	55
P.yoelii_YM_Non-Reference	MKSVKGYIYFFSLASISICMCQNINVVSHN-VIPRV----DSDENLITCVTEYIIKIGDL	55
P.berghei	MKSVKGYIYFFSLAFISICMCQKVNVSHPN-VTPRV----DSDEKLITCVTEYIIKIGDL	55
P.vinckei_vinckei_Reference	MRSIKGISYIYFFSLVFIGSCMSEKVNVSHPN-IIPRI----NPDEKLITCVTEYIIKIGDL	55
P.vinckei_petteri_CR_Non-Reference	MKSIRGITYIYFFSLAFIGSCMCKQKVNVSHPN-IIPRV----NPDEKLITCVTEYIIKIGDL	55
P.chabaudi_Curated	MKSIRGITYIYFFSLAFIGSCMCKEINVSHPN-IIPRI----NPDEKLITCVTEYIIKIGDL	55
P.blacklocki_G01_Reference	MKSLRVVFLCLGMISACMLVGYTCYKMNVSHPN-SMKKV-GEEGKDEKIIICVVEYVIKIGDL	58
P.gaboni_SY75_Reference	MKSLRAIFCLGMISACMFVGSYGRMNVSHPN-SMKKV-GEEGNDEKIIICVVEYVIKIGDL	58
P.adleri_G01_Reference	MKSLRAIFCLGMISACMFVGSYGRMNVSHPN-SMKKV-GEEGNDEKIIICVVEYVIKIGDL	58
P.gaboni_G01_Non-Reference	MKSLRAIFCLGMISACMFVGSYGRMNVSHPN-SMKKV-GEEGNDEKIIICVVEYVIKIGDL	58
P.reichenowi_CDC_Curated	MKSLKVVLCCLGMISACMLVGYTCYKMNVSHPN-SMKRV-GEEGKDEKIIICVVEYVIKIGDL	58
P.reichenowi_G01_Non-Reference	MKSLKVVLCCLGMISACMLVGYTCYKMNVSHPN-SMKRV-GEEGKDEKIIICVVEYVIKIGDL	58
P.billcollinsi_G01_Reference	MKSLKVVLCCLGMISACMLVGYTCYKMNVSHPN-SMKKV-GEEGKDEKIIICVVEYVIKIGDL	58
P.falci-parum_3D7_Curated	MKSLKVVLCCLGMISACMLVGYTCYKMNVSHPN-SMKKV-GEEGKDEKIIICVVEYVIKIGDL	58
P.praefalci-parum_G01_Reference	MKSLKVVLCCLGMISACMLVGYTCYKMNVSHPN-SMKKV-GEEGKDEKIIICVVEYVIKIGDL	58
P.gallinaceum_8A_Curated	-----MISYLLMLLSFFAISTYEKLNVISHS-SVSR-LNDEKRNKVIITCVTEYIIKIGDL	53
P.relictum_SGS1-like_Curated	MKSTRIVSFFMLLLAFFTISTYEKMNVSHPN-SASRA-GEGGKNGKVIITCVTEYIIKIGDL	58
P.knowlesi_H_Curated	MKGARVVSCLILLLAYVQSSVSAMNVSANNSAVPRIDGEDGSDEKVIITCVTKYVIKIGDL	60
P.knowlesi_Malayan	MKGARVVSCLILLLAYVQSSVSAMNVSANNSAVPRIDGEDGSDEKVIITCVTKYVIKIGDL	60
P.cynomolgi_B_Non-reference	-----MNLVSHN-SVPRFGGEEGSDKVIITCVTKYVIKIGDL	35
P.cynomolgi_M_Reference	MKGAYVLSCLVLLLAHVHSSASAKMNLVSHN-SVPRFGGEEGSDKVIITCVTKYVIKIGDL	59
P.vivax-like	MKGSHAVFCLTLLALVHNSVSAKINLVSHN-SLPRIGGEEGSDKVIITCVTKYVIKIGDL	59
P.vivax_P01_Curated	MKGSHAVFCLTLLALVHNSVSAKINLVSHN-SVPRIGGEEGSDKVIITCVTKYVIKIGDL	59
P.vivax_Sal-1_Non-Reference	MKGSHAVFCLTLLALVHNSVSAKINLVSHN-SVPRIGGEEGSDKVIITCVTKYVIKIGDL	59
P.malariae_UG01_Curated	---MKKILCFAPFLLEYATITLYAKINNVSN-SVPRIA-KEGENEKIITCVTEYVIKIGDL	55
P.ovale	MKNVKEVLCFLFLAYVNICTYAKMNTVSHS-SVPKIA-EQSNDEKIIITCVTEYVIKIGDL	58
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P.yoelii_17X_Curated	GIDDDGGFCDSINIL--PPPPEPCNSIPE-----KPEGPLNGYCDNYDITLIVNESS	107
P.yoelii_YM_Non-Reference	GIDDDGGFCDSINIL--PPPPEPCNSIPE-----KPEGPLNGYCDNYDITLIVNESS	107
P.berghei	GIDDDGGFCDSINISL--PPTESCNGGSE-----KPEGPTNGYCDNYDITLIVNESS	107
P.vinckei_vinckei_Reference	DIDDDGGFCDSINIL--PPTGSCNNGGSE-----KPDGANPGNYCDNYDITLIVNESS	107
P.vinckei_petteri_CR_Non-Reference	DIDDDGGFCDSINIL--PPTGSCNNGGSE-----KPDGANPGNYCDNYDITLIVNESS	107
P.chabaudi_Curated	DIDDDGGFCDSINIL--PPNGSCNNGGSE-----KPDGPNPGNYCDNYDITLIVNESS	107
P.blacklocki_G01_Reference	GIDDDGDFCDNSIICS--NNPGLCDNG-----QVVVPGDYCSNYDITLIVNESS	105
P.gaboni_SY75_Reference	SIDDDGDFCDNSIICS--NNPGLCDNG-----QVVVPGDYCSNYDITLIVNESS	105
P.adleri_G01_Reference	SIDDDGDFCDNSIICS--NNPGLCDNG-----QVVVPGDYCSNYDITLIVNESS	105
P.gaboni_G01_Non-Reference	SIDDDGDFCDNSIICS--NNPGLCDNG-----QVVVPGDYCSNYDITLIVNESS	105
P.reichenowi_CDC_Curated	SIDDDGDFCDNSIICS--NNPGLCDNG-----QVVVPGDYCSNYDITLIVNESS	105
P.reichenowi_G01_Non-Reference	SIDDDGDFCDNSIICS--NNPGLCDNG-----QVVVPGDYCSNYDITLIVNESS	105
P.billcollinsi_G01_Reference	SIDDDGDFCDNSIICS--NNPGLCDNG-----QVVVPGDYCSNYDITLIVNESS	105
P.falci-parum_3D7_Curated	SIDDDGDFCDNSIICS--NNPGLCDNG-----QVVVPGDYCSNYDITLIVNESS	105
P.praefalci-parum_G01_Reference	SIDDDGDFCDNSIICS--NNPGLCDNG-----QVVVPGDYCSNYDITLIVNESS	105
P.gallinaceum_8A_Curated	EIDDDNLFCENETSCSPSSS-----EASGSDYCDNYDITLIVNESS	95
P.relictum_SGS1-like_Curated	DIDDDGGFCDSQASCSSN-P-----ESDVSNGYCDNYDITLIVNESS	99
P.knowlesi_H_Curated	EIDDDGGFCSSNIGS--ESPPGSC-----NDTGANPGNYCDNYDITLIVNESS	106
P.knowlesi_Malayan	EIDDDGGFCSSNIGS--ESPPGSC-----NDTGANPGNYCDNYDITLIVNESS	106
P.cynomolgi_B_Non-reference	EIDDDGGFCSSSISGS--QSPGSC-----ADGGANTGNYCDNYDITLIVNESS	81
P.cynomolgi_M_Reference	EIDDDGGFCSSSISGS--QSPGSC-----ADGGANTGNYCDNYDITLIVNESS	105
P.vivax-like	EIDDDGGFCSSNIGS--QSPGSC-----ADGGASPGNYCDNYDITLIVNESS	107
P.vivax_P01_Curated	EIDDDGGFCSSNIGS--QSPGSC-----ADGGASPGNYCDNYDITLIVNESS	107
P.vivax_Sal-1_Non-Reference	EIDDDGGFCSSNIGS--QSPGSC-----ADGGASPGNYCDNYDITLIVNESS	107
P.malariae_UG01_Curated	HIDDDGGFCSTSTESS--SNGD-----ESSVDVGVDPNGAYCDNYDITLIVNESS	103
P.ovale	SIDDDGGFCSTTVSS--SKPGSCAEGDSESTAESESTGGTSGNYCDNYDITLIVNESS	116
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P.yoelii_17X_Curated FIQKDYWMKGTIPFLESMVRNARVSKDKAHMAIILFAGRQDLIVPPTDELSQDKEKLIDK 167
P.yoelii_YM_Non-Reference FIQKDYWMKGTIPFLESMVRNARVSKDKAHMAIILFAGRQDLIVPPTDELSQDKEKLIDK 167
P.berghei FVQKDYWMKGTIPFLESMARNARVSKDKAHMSIILFAGTQNLIVPPTDEISQDKEKLIEK 167
P.vinckei_vinckei_Reference FVQKDYWMKGTIPFLESMARNARVSKDKAHMSIILFAERQDLIVPPTDELSQDKEKLIDK 167
P.vinckei_petteri_CR_Non-Reference FVQKDYWMKGTIPFLESMARNARVSKDKAHMSIILFAERQNLIVPPTDEMSQDKEKLIDK 167
P.chabaudi_Curated FVQKDYWMKGTIPFLESMARNARVSKDKAHMSIILFAERQNLIVPPTDEMSQDKEKLIDK 167
P.blacklocki_G01_Reference FVQKDYWLKGTIPFLESMVINSNVSKDKAHMSVILFAGKQRFVFPPTDESSQDKNMILLEK 165
P.gaboni_SY75_Reference FVQKDYWLKGTIPFLESMVINSNVSKDKAHMSIILFAGKQRFVFPPTDESSQDKNMILLEK 165
P.adleri_G01_Reference FVQKDYWLKGTIPFLESMVINSNVSKDKAHMSVILFAGKQRFVFPPTDESSQDKNMILLEK 165
P.gaboni_G01_Non-Reference FVQKDYWLKGTIPFLESMVINSNVSKDKAHMSVILFAGKQRFVFPPTDESSQDKNMILLEK 165
P.reichenowi_CDC_Curated FVQKDYWLKGTIPFLESMVINSNVSKDKAHMSVILFAGKQRFVFPPTDESSQDKNMILLEK 165
P.reichenowi_G01_Non-Reference FVQKDYWLKGTIPFLESMVINSNVSKDKAHMSVILFAGKQRFVFPPTDESSQDKNMILLEK 165
P.billcollinsi_G01_Reference FVQKDYWLKGTIPFLESMVINSNVSKDKAHMSVILFAGKQRFVFPPTDESSQDKNMILLEK 165
P.falciiparum_3D7_Curated FVQKDYWLKGTIPFLESMVINSNVSKDKAHMSVILFAGKQRFVFPPTDESSQDKNMILLEK 165
P.praefalciiparum_G01_Reference FVQKDYWLKGTIPFLESMVINSNVSKDKAHMSVILFAGKQRFVFPPTDESSQDKNMILLEK 165
P.gallinaceum_8A_Curated FVQKDYWLKGTIPFLESMIRNVRVSKDKAHMSIILFDRDQRLIVPPTDEISQDKQLIEK 155
P.relictum_SGS1-like_Curated FVQKDYWLKGTIPFLESMIRNVRVSKDKAHMSIILFDRDQRFVFPPTDEISQDKQLIEK 159
P.knowlesi_H_Curated FIQKDYWKKGTTIPFLESMVRNARVSKDKAHMSIIVLFARDSRVIVPPTDELSQDKDLIEK 166
P.knowlesi_Malayan FIQKDYWKKGTTIPFLESMVRNARVSKDKAHMSIIVLFARDSRVIVPPTDELSQDKDLIEK 166
P.cynomolgi_B_Non-reference FVQKDYWKKGTTIPFLESMVRNARVSKDKAHMSVILFARDPRVIVPPTDEVSQDKDLIER 141
P.cynomolgi_M_Reference FVQKDYWKKGTTIPFLESMVRNARVSKDKAHMSVILFARDPRVIVPPTDEVSQDKDLIER 165
P.vivax-like FVQKDYWQKGTIPFLESMVRNARVSKDKAHMSVILFARDPRVIVPPTDEASQDKDLIER 167
P.vivax_P01_Curated FVQKDYWQKGTIPFLESMVRNARVSKDKAHMSVILFARDPRVIVPPTDEASQDKDLIER 167
P.vivax_Sal-1_Non-Reference FVQKDYWQKGTIPFLESMVRNARVSKDKAHMSVILFARDPRVIVPPTDEASQDKDLIER 167
P.malariae_UG01_Curated FVQKDYWLKGTIPFLESMIRNTRISKDKAHMSLILFAYDQRFVFPPTDEISQDKDFIEK 163
P.ovale FIQKDYWLKGTIPFLESMVRNARVSKDKAHMSIILFAYDQRFVFPPTDEISQDKDLIEK 176
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P.yoelii_17X_Curated IRTLND-AATDSNTLYVYALEYAFEKVIIFGEGTRSDAPKVAFLFYGFYDGSNTSLIPDV 226
P.yoelii_YM_Non-Reference IRTLND-AATDSNTLYVYALEYAFEKVIIFGEGTRSDAPKVAFLFYGFYDGSNTSLIPDV 226
P.berghei IRTLDD-AGTDSNTLYVYALEYAFEKVIIFGEGTRSDAPKVAFLFYGFYDYGANKSLIPDV 226
P.vinckei_vinckei_Reference IRLSLDD-AATNPHTLYVYALEYALEKVIIFGEGTRSDAPKVAFLFYGFYDYGANKSLIPDV 226
P.vinckei_petteri_CR_Non-Reference IRLSLDD-AATNPHTLYVYALEYALEKVIIFGEGTRSDAPKVAFLFYGFYDYGANKSLIPDV 226
P.chabaudi_Curated IRLSLDD-AATNQHTLYVYALEYALEKVIIFGEGTRSDAPKVAFLFYGFYDYGANKSLIPDV 226
P.blacklocki_G01_Reference INSIDEGIAASSDTLYVNALKYAIENVIIFGDGTRKDAPKVAFLFYGFYDYGANKNMIPDV 225
P.gaboni_SY75_Reference INSIDEGIATSSDTLYVNALKYAIENVIIFGDGTRKDAPKVAFLFYGFYDYGANKNMIPDV 225
P.adleri_G01_Reference INSIDEGIATSSDTLYVNALKYAIENVIIFGDGTRKDAPKVAFLFYGFYDYGANKNMIPDV 225
P.gaboni_G01_Non-Reference INSIDEGIATSSDTLYVNALKYAIENVIIFGDGTRKDAPKVAFLFYGFYDYGANKNMIPDV 225
P.reichenowi_CDC_Curated INSIDEGIATSSDTLYVNALKYAIENVIIFGDGTRKDAPKVAFLFYGFYDYGANKSMIPDV 225
P.reichenowi_G01_Non-Reference INSIDEGIATSSDTLYVNALKYAIENVIIFGDGTRKDAPKVAFLFYGFYDYGANKSMIPDV 225
P.billcollinsi_G01_Reference INSIDEGIATSSDTLYVNALKYAIENVIIFGDGTRKDAPKVAFLFYGFYDYGANKNMIPDV 225
P.falciiparum_3D7_Curated INSIDEGIATSSDTLYVNALKYAIENVIIFGDGTRKDAPKVAFLFYGFYDYGANKNMIPDV 225
P.praefalciiparum_G01_Reference INSIDEGIATSSDTLYVNALKYAIENVIIFGDGTRKDAPKVAFLFYGFYDYGANKNMIPDV 225
P.gallinaceum_8A_Curated VKGIND-VARGPDTLYVYALEYALENVIIFGDGTRSDAPKVAFLFYGYDYGANKSLIPDI 214
P.relictum_SGS1-like_Curated VKTIND-VGRSPDALYVYALEYALENVIIFGDGTRSDAPKVAFLFYGYDYGANKHLIPDV 218
P.knowlesi_H_Curated VRAINDD-VATSPDTLYVYALEHAFEHVIFGEGTRKDAPKVVVLFYGFYDYGANKSLIPDV 225
P.knowlesi_Malayan VRAINDD-VATSPDTLYVYALEHAFEHVIFGEGTRKDAPKVVVLFYGFYDYGANKSLIPDV 225
P.cynomolgi_B_Non-reference VRAIDD-VGTSPDTLYVYALEHAFEHVIFGEGTRKDAPKVAFLFYGFYDYGANKSLIPDV 200
P.cynomolgi_M_Reference VRAIDD-VGTSPDTLYVYALEHAFEHVIFGEGTRKDAPKVAFLFYGFYDYGANKSLIPDV 224
P.vivax-like VRAIDD-VGTSPDTLYVYALEHTLEHVIFGEGTRKDAPKVVVLFYGFYDYGANKSLIPDV 226
P.vivax_P01_Curated VRAIDD-VGTSPDTLYVYALEHTLEHVIFGEGTRKDAPKVVVLFYGFYDYGANKSLIPDV 226
P.vivax_Sal-1_Non-Reference VRAIDD-VGTRPDTLYVYALEHTLEHVIFGEGTRKDAPKVVVLFYGFYDYGANKSLIPDV 226
P.malariae_UG01_Curated IRTIDD-VGKSADTLYVYALEYAMEKVIIFGNGTRDNAPKVAFLFYGFYDYGANKSLIPDV 222
P.ovale IRTIDD-TSKSPHILYVHALQYAIKVIIFGKTRGDAPKVVVLFYGYDNGTNSKSLIPDV 235
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P.yoelii_17X_Curated	VEDYKQNNIKLIIVGIALGNKQNAFILADCK-SDGDCPNLILEPWDYVIRAAEQVKGKIC	285
P.yoelii_YM_Non-Reference	VEDYKQNNIKLIIVGIALGNKQNAFILADCK-SDGDCPNLILEPWDYVIRAAEQVKGKIC	285
P.berghei	VEDYKQSNIKLIIVGIGLTLRENALLADCK-SEGDCQNAIFQPWDFVIPAEEQVKEKIC	285
P.vinckei_vinckei_Reference	VEDYKQNNIKLIIVGIGLANRENAFLLGDCK-GESDCQNVIFKPWDFVIPAEEQVKEKIC	285
P.vinckei_petteri_CR_Non-Reference	VEDYKQNNIKLIIVGIGLANRENAFLLGDCK-SESDCQNVIFKPWDFVIPAEEQVKEKIC	285
P.chabaudi_Curated	VEDYKQNNIKLIIVGIGLANRENAFLLGDCK-GESDCQNVIFKPWDFVIPAEEQVKEKIC	285
P.blacklocki_G01_Reference	VQAYKEQNVKLIIVGIALGIRDNAYLLAGCSIGDENCNVVFKPWDFVIPAADVNQKIC	285
P.gaboni_SY75_Reference	VQSYKEQNVKLIIVGIALGIRDNAYLLADCSIGDENCNVVFKPWDFVIPAADVDQKIC	285
P.adleri_G01_Reference	VQSYKEQNVKLIIVGIALGIRDNAYLLADCSIGDENCNVVFKPWDFVIPAADVDQKIC	285
P.gaboni_G01_Non-Reference	VQSYKEQNVKLIIVGIALGIRDNAYLLADCSIGDENCNVVFKPWDFVIPAADVDQKIC	285
P.reichenowi_CDC_Curated	VQAYKEQNVKLIIVGIALGIRDNAYLLADCSIGDENCNVVFKPWDFVIPAADVNEKIC	285
P.reichenowi_G01_Non-Reference	VQAYKEQNVKLIIVGIALGIRDNAYLLADCSIGDENCNVVFKPWDFVIPAADVNEKIC	285
P.billcollinsi_G01_Reference	VQTYKEQNVKLIIVGIALGIRDNAYLLADCSIGDENCNVVFKPWDFVIPAADVNQKIC	285
P.falciparum_3D7_Curated	VQTYKEQNVKLIIVGIALGIRDNAYLLADCSIGDENCNVVFKPWDFVIPAADVNQKIC	285
P.praefalciparum_G01_Reference	VQAYKEQNVKLIIVGIALGIRDNAYLLADCTIGDENCNVVFKPWDFVIPAADVNQKIC	285
P.gallinaceum_8A_Curated	VEDYKNNIKLIIVGIGLGNKDNAYLLADCSIDDNNCANVIFKPWDFVIPAEEQVKEKIC	274
P.relictum_SGS1-like_Curated	VEDYKKNIKLIIVGIALSNRDNAYLLADCSINDNCTNVVFPWDFVIPAEEQVKEIIC	278
P.knowlesi_H_Curated	VEDYKKNIKLIIVGIALGNRDNAYLLGGCAIGDNNCANVIFKPWDFVIPAEEVKNKIC	285
P.knowlesi_Malayan	VEDYKKNIKLIIVGIALGNRDNAYLLGGCAIGDNNCANVIFKPWDFVIPAEEVKNKIC	285
P.cynomolgi_B_Non-reference	VEDYRDRNVKLIIVGIALGNRDNAYLLGGCAIGDNCANVIFKPWDFVIPAADVKEKIC	260
P.cynomolgi_M_Reference	VEDYRDRNVKLIIVGIALGNRDNAYLLGGCAIGDNCANVIFKPWDFVIPAADVKEKIC	284
P.vivax-like	VEDYRERNVKLIIVGIALGNRDNAYLLGGCAIGDQNCANVIFKPWDFVIPAEEVKEKIC	286
P.vivax_P01_Curated	VEDYRERNVKLIIVGIALGNRDNAYLLGGCAIGDQNCANVIFKPWDFVIPAEEVKEKIC	286
P.vivax_Sal-1_Non-Reference	VEDYRERNVKLIIVGIALGNRDNAYLLGGCAIGDQNCANVIFKPWDFVIPAEEVKEKIC	286
P.malariae_UG01_Curated	VKDYRDKNIKLIIVGIALGNTDNAYLLANCSIGEANCANVIFKPWDFVIPAEEQVKAIC	282
P.ovale	VEEYRKNNIKLIIVGIALGNRDNAYLLANCSIGDENCANVIFKPWDFVIAAAEKVNEKIC	295

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P.yoelii_17X_Curated	NKNNLSSLTPESKTMIKN-	303
P.yoelii_YM_Non-Reference	NKNNLSSLTPESKTMIKN-	303
P.berghei	NKNNPSSLTSEKTTIKN-	303
P.vinckei_vinckei_Reference	NKNDPSQTA-----	294
P.vinckei_petteri_CR_Non-Reference	NKNDPSSQAA-----	295
P.chabaudi_Curated	NKNDPSSQTA-----	295
P.blacklocki_G01_Reference	DKNES-----	290
P.gaboni_SY75_Reference	DKNES-----	290
P.adleri_G01_Reference	DKNES-----	290
P.gaboni_G01_Non-Reference	DKNES-----	290
P.reichenowi_CDC_Curated	DKNKS-----	290
P.reichenowi_G01_Non-Reference	DKNNS-----	290
P.billcollinsi_G01_Reference	DKNES-----	290
P.falciparum_3D7_Curated	DKNKS-----	290
P.praefalciparum_G01_Reference	DKNKS-----	290
P.gallinaceum_8A_Curated	NKNKSKGK-SSMIQKVYK	292
P.relictum_SGS1-like_Curated	NKDKSENQSPSMIQKIVYK	297
P.knowlesi_H_Curated	NKDDPASTN-----	294
P.knowlesi_Malayan	NKDDPASTN-----	294
P.cynomolgi_B_Non-reference	SKGNSEEGSASTD-----	273
P.cynomolgi_M_Reference	SKGNSEEGSASTD-----	297
P.vivax-like	SKGESDSTD-----	295
P.vivax_P01_Curated	SKGSDSTD-----	295
P.vivax_Sal-1_Non-Reference	SKGSDSTD-----	295
P.malariae_UG01_Curated	SKDNSA-----	288
P.ovale	DKYNIEE-----	302

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B) Plasmodium secreted ookinete adhesive protein (SOAP)

P.knowlesi_Malayan_Non-Reference	MKRV-LILLLSLLLWAYAHGESSNII-----P---HMVERKKDTSATKIFSPRTTDDK	49
P.knowlesi_H_Curated	MKRV-LILLLSLLLWAYAHGESSNII-----P---HMVERKKDTSATKIFSPRTTDDK	49
P.fragile_Nilgiri_Reference	MKRV-LIFLLPLFLTAYVHGRSSSIT-----S---HIHQQTKNASAAEIFSPKTTDDK	49
P.coatneyi_Hackeri_Reference	-----	0
P.cynomolgi_B_Non-Reference	MKRV-LIFLLPL-LALTYAHGRSSDIT-----S---HIHQRTKNASATEIFSPKTTDQ	48
P.cynomolgi_M_Reference	MKRV-LIFLLPL-LALTYAHGRSSDIT-----S---HIHQRTKNASATEIFSPKTTDQ	48
P.vivax_P01_Curated	MKRV-LILLLPLLLALAYAQGRSSDIT-----S---HVHQRTKNASAAEIFSPKTTDDK	49
P.vivax_Sal-1_Non-Reference	MKRV-LILLLPLLLALAYAQGRSSDIT-----S---HVHQRTKNASAAEIFSPKTTDDK	49
P.vivax-like	MKRV-LILLLPLFLALAYAQGRSSDIT-----S---HFHQRTKNASAAEIFSPKTTDDK	49
P.praefalciparum_G01_Reference	MKNFTCFPLLTL-LTIAYGKGVNRKSENRTPYVHY---HNNSNIKNYSAVDIFSPKKTGK	56
P.reichenowi_G01_Non-Reference	MKNFTCFPLLTLTLTAYGKGVNRKSENRTPYVHY---HNNSNIKNYSAIDIFSPKKTGK	57
P.reichenowi_CDC_Curated	MKNFTCFPLLTLTLTAYGKGVNRKSENRTPYIHY---HNNSNIKNYSAIDIFSPKKTGK	57
P.falciparum_3D7_Reference	MKNFTCFPLLTLTLTAYGKGVNRKSENRTPYVHY---HNNSNIKNYSAVDIFSPKKTGK	57
P.adleri_G01_Reference	MKKSTCFPLLTLTLTAYGKGVNRKSENRTSYVHY---HNNSNIKNYSAIDIFSPKKTGK	57
P.gaboni_SY75_Reference	MKKYTCFPLLTLTLTAYGKGVNRKSENRTSYVHY---HNNSNIRNYSAVDIFSPKKTGK	57
P.gaboni_G01_Non-Reference	MKKYTCFPLLTLTLTAYGKGVNRKSENRTSYVHY---HNNSNIRNYSAVDIFSPKKTGK	57
P.billcollinsi	MKKFTCFPLLTLTLTAYGKGVNRKSESRTPYVHY---HNNSNIKNYSAVDIFSPKKTGK	57
P.blacklocki_G01	MKKFTCFPLLTLTLTAYGKGVNRKSENRTPYVHY---HNNSNIKNYSAVDIFSPKKTGK	57
P.gallinaceum_8A	MKKI-FIIFVSLFCAFIYGKGVNRNISR-KSSVAHP---HNQHKVKNVSALEIFSPREKTEK	55
P.relictum_SGS1-like_Curated	MKKI-LIIFVPLFCAPAFYKGVNRVST-KSSIARP---HDQSNVKNFSAEIVFSPKKTGK	55
P.ovale_curtisi_GH01_Curated	MKKV-LFMFIPLLCALIQGKGIKNLSM-RSAVASP---HNHKKVTFNSATDIFEPRTTQK	55
P.malariae_UG01_Curated	MKKI-LIVFIPLLFALICAHEERKFSL-KRSVTNAHNNNNNSVRNYSAVDIFSPKTTQK	58
P.yoelii_17X_Curated	MKRI-LLFLIPLFLIIKIEGARKNSI-RNVVSAY---PHNNVKNFSAEIVFSPKTTGQ	55
P.yoelii_YM_Non-Reference	MKRI-LLFLIPLFLIIKIEGARKNSI-RNVVSAY---PHNNVKNFSAEIVFSPKTTGQ	55
P.berghei_ANKA_Curated	MKRI-LLFLIPLFLIIKIEGARKNSI-RNVVSAY---PHNNVKNFSAEIVFSPKTTGQ	55
P.chabaudi_Curated	MKRI-LLFLIPLFLIIKIEGTRKHSI-RNIVSTY---PHNNVKNFSAEIVFEPQTGQ	55
P.vinckeii_petteri_CR_Non-Reference	MKRI-LLFLIPLFLIIKIEGTRKHSI-RNIVSAY---PHNNVKNFSAEIVFEPQTGQ	55
P.knowlesi_Malayan_Non-Reference	ECIKCLPDNFCECECSCKNKTGFTMKYRHASKGSKQARYNVPTTKKNTSSGQST-NMNTK	108
P.knowlesi_H_Curated	ECIKCLPDNFCECECSCKNKTGFTMKYRHASKGSKQARYNVPTTKKNTSSGQST-NMNTK	108
P.fragile_Nilgiri_Reference	ECIKCLPDNFCECECSCKNKTGFTMKYRHASKGPKVQRDNLFTRSKHTSSGQSA-DMYTK	108
P.coatneyi_Hackeri_Reference	-----MKYRHASKGPKLERSNLLKNKNTSSGQSS-DMHTK	35
P.cynomolgi_B_Non-Reference	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKLQRYNLLTSKKNNTSSGQST-DMHTK	107
P.cynomolgi_M_Reference	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKLQRYNLLTSKKNNTSSGQST-DMHTK	107
P.vivax_P01_Curated	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKLQRYNLLTSKKNNTSSGQST-GMHTK	108
P.vivax_Sal-1_Non-Reference	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKLQRYNLLTSKKNNTSSGQST-GMHTK	108
P.vivax-like	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKLQRYNLLTSKKNNTSSGQST-SMHTK	108
P.praefalciparum_G01_Reference	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKRYRK--KMTKTSARSRCN-DLPLE	113
P.reichenowi_G01_Non-Reference	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKRYRK--KMTKTSARSRCN-DLPLE	113
P.reichenowi_CDC_Curated	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKRYRK--KMTKTSARSRCN-DLPLE	114
P.falciparum_3D7_Reference	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKRYRK--KMTKTSARSRCN-DLPLE	114
P.adleri_G01_Reference	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKRYRK--KMTKTSARSRCN-DLPLE	114
P.gaboni_SY75_Reference	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKRYRK--KMTKTSARSRCN-DLPLE	114
P.gaboni_G01_Non-Reference	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKRYRK--KMTKTSARSRCN-DLPLE	114
P.billcollinsi	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKRYRK--KMTKTSARSRCN-DLPLE	114
P.blacklocki_G01	ECIKCLPDNFCECECSCKNKTGFSMKYRHASKGSKRYRK--KMTKTSARSRCN-DLPLE	114
P.gallinaceum_8A	DCIKCLPENFCECECSCKNKTGFSMKYRNASLGSNSKRKSMNVNKKISRSRCKN-DLPIE	114
P.relictum_SGS1-like_Curated	ECIKCLPENFCECECSCKNKTGFSMKYRNASLGNIKR-KSRNMPKKSARSRTCK-DLPIK	113
P.ovale_curtisi_GH01_Curated	ECIKCLPDNFCECECSCKNKTGFSMKYRNASTGTKLMERGMKKNKTSARSRCN-DLPIE	114
P.malariae_UG01_Curated	ECIKCLPENFCECECSCKNKTGFSMKYRHASIGSKLTKSDMNTQKKSSPSRQNSDSSNV	118
P.yoelii_17X_Curated	ECVKCLPENFCECECSCKNKTGFSMKYRNASKGYKYLGDGGSNPLTDVKAS-SRSD-NNQ	113
P.yoelii_YM_Non-Reference	ECVKCLPENFCECECSCKNKTGFSMKYRNASKGYKYLGDGGSNPLTDVKAS-SRSD-NNQ	113
P.berghei_ANKA_Curated	ECVKCLPENFCECECSCKNKTGFSMKYRNASKGYKYLDSNNSNPLADVKAS-SRSDSNNQ	114
P.chabaudi_Curated	ECVKCLPENFCECECSCKNKTGFSMKYRNASKGYKYLEGDSNPLAGAKAS-SRSDNNSQ	114
P.vinckeii_petteri_CR_Non-Reference	ECVKCLPENFCECECSCKNKTGFSMKYRNASKGYKYLEGDSNPLAGTAKAS-SRSDNNSQ	114

Supplementary Table 1: Short and long form of *Plasmodium* chitinases and their corresponding WARP and SOAP proteins with conserved Cysteines (short chitinases), Serine and Threonine (long chitinases)

Host	<i>Plasmodium</i> Chitinases	Chitinase Protein Length (aa) Putative	<i>Plasmodium von Willebrand factor A domain-related protein</i> (N-Terminal Conserved Cysteine/ C→S)	<i>Plasmodium secreted ookinete adhesive protein</i> (Conserved Cysteine/ C→S)
Short form of chitinase				
Gorilla	<i>P. adleri_G01</i> PADL01_1252400	378	Cysteine PADL01_0800700	Cysteine PADL01_1403900
	<i>P. blacklocki_G01</i> PBLACG01_1252100	378	Cysteine PBLACG01_0801500	Cysteine PBLACG01_1402900
	<i>P. praefalciparum_strain_G01</i> PPRFG01_1203200	378	Cysteine PPRFG01_0802300	Cysteine PPRFG01_1404700
Chimpanzee	<i>P. reichenowi_CDC</i> PRG01_1255500	378	Cysteine PRCDC_0800900	Cysteine PRCDC_1403600
	<i>P. gaboni_strain_SY75</i> PGSY75_1252200	378	Cysteine PGSY75_0801300	Cysteine PGSY75_1404300
	<i>P. billcollinsi_G01</i> PBILCG01_1251600	378	Cysteine PBILCG01_0802000	Cysteine PBILCG01_1404900
Human	<i>P. falciparum_3D7</i> PF3D7_1252200	378	Cysteine PF3D7_0801300	Cysteine PF3D7_1404300
Short and Long form of chitinases				
Birds	<i>P. gallinaceum_8A</i> PGAL8A_00321200 PGAL8A_00321200	377 587	Cysteine PGAL8A_00077400	Cysteine PGAL8A_00276100
	<i>P. relictum_SGS1-like</i> PRELSG_1467600 PRELSG_0100100	377 587	Cysteine PRELSG_0116700	Cysteine PRELSG_1346700
Human	<i>P. ovale_curtisi_GH01</i> PocGH01_14076700 PocGH01_01010400	360 664	Serine PocGH01_01026500	Cysteine PocGH01_13055300
Long form of chitinase				
Human	<i>P. vivax_like_Pvl01</i> PVL_010005600	656	Serine PVL_000082800	Serine PVL_130032400
	<i>P. vivax_Sal-1</i> PVX_087680	650	Serine PVX_093675	Serine PVX_086220
	<i>P. vivax_P01_Strain</i> PVP01_0102800	650	Serine PVP01_0118900	Serine PVP01_1344500
	<i>P. knowlesi_Malayan Strain Pk1 A</i> PKNOH_S01009100	699	Serine PKNOH_S01026100	Serine PKNOH_S05397700
	<i>P. knowlesi_strain H</i> PKNH_0100800	699	Serine PKNH_0117600	Serine PKNH_1353800
	<i>P. malariae_UG01_Strain</i> PmUG01_01014100	652	Serine PmUG01_01030600	Glutamine PmUG01_13054000

Monkeys	<i>P. coatneyi_Hackeri</i> <i>PCOAH_00000160</i>	651	Serine <i>PCOAH_00002130</i>	Serine <i>PCOAH_00050920</i>
	<i>P. fragile_strain nilgiri</i> <i>AK88_00948</i>	592	Serine <i>AK88_04713</i>	Serine <i>AK88_01823</i>
	<i>P. inui_San Antonio 1</i> <i>C922_03037</i>	642	Serine <i>C922_05041</i>	-
	<i>P. vinckei_petteri_strain CR</i> <i>YYG_01138</i>	611	Threonine <i>YYG_02286</i>	Serine <i>YYG_00730</i>
	<i>P. cynomolgi_strain_B</i> <i>PCYB_011010</i>	443	Serine <i>PCYB_012570</i>	Serine <i>PcyM_1351800</i>
Rodents	<i>P. berghei_ANKA</i> <i>PBANKA_0800500</i>	648	Serine <i>PBANKA_1228900</i>	Serine <i>PBANKA_1037800</i>
	<i>P. yoelii_17XNL</i> <i>PY00008</i>	697	Threonine <i>PY07681</i>	-
	<i>P. yoelii_17X</i> <i>PY17X_0803000</i>	720	Threonine <i>PY17X_1232400</i>	Serine <i>PY17X_1040200</i>
	<i>P. yoelii_YM</i> <i>PYYM_0802900</i>	700	Threonine <i>PYYM_1231600</i>	Serine <i>PYYM_1039900</i>
	<i>P. chabaudi</i> <i>PCHAS_0800800</i>	710	Threonine <i>PCHAS_1229600</i>	Serine <i>PCHAS_1038600</i>