



APPENDIX C

สำนักหอสมุด

Amino acid table

	T			C			A			G		
T	TTT	Phe	F	TCT	Ser	S	TAT	Tyr	Y	TGT	Cys	C
	TTC	Phe	F	TCC	Ser	S	TAC	Tyr	Y	TGC	Cys	C
	TTA	Leu	L	TCA	Ser	S	TAA	stop	*	TGA	stop	*
	TTG	Leu	L	TCG	Ser	S	TAG	stop	*	TGG	Trp	W
C	CTT	Leu	L	CCT	Pro	P	CAT	His	H	CGT	Arg	R
	CTC	Leu	L	CCC	Pro	P	CAC	His	H	CGC	Arg	R
	CTA	Leu	L	CCA	Pro	P	CAA	Gln	Q	CGA	Arg	R
	CTG	Leu	L	CCG	Pro	P	CAG	Gln	Q	CGG	Arg	R
A	ATT	Ile	I	ACT	Thr	T	AAT	Asn	N	AGT	Ser	S
	ATC	Ile	I	ACC	Thr	T	AAC	Asn	N	AGC	Ser	S
	ATA	Ile	I	ACA	Thr	T	AAA	Lys	K	AGA	Arg	R
	ATG	Met	M	ACG	Thr	T	AAG	Lys	K	AGG	Arg	R
G	GTT	Val	V	GCT	Ala	A	GAT	Asp	D	GGT	Gly	G
	GTC	Val	V	GCC	Ala	A	GAC	Asp	D	GGC	Gly	G
	GTA	Val	V	GCA	Ala	A	GAA	Glu	E	GGA	Gly	G
	GTG	Val	V	GCG	Ala	A	GAG	Glu	E	GGG	Gly	G

Nucleotide and deduced amino acid sequence of the Plasmodium vivax DHFR-TS gene (GenBank Accession No. X98123). (de Pecoulas *et al.*, 1998a)

```

-713                                     CTGAGCAAGCGG
-721 GGAGAAACGCACACGGGGGAAACTCTCACGGGGGAAACGGCTCACTGGGGGAAATGCTCACTGGGGGAAATCCCTCACTGGGGGAAATTTGCCACTCGCTTAAAGCGGCCCTCC
-601 TCCCCACGTGACCAGATGCCACGTGGACTTCATTACACCTCCGCTTTGAACGCGCACACAAAGGGCCACAAAAAAGGGGCAACTCTGGAGATATTGCACTTTGGCATGTGAGCGA
-481 GGGGACGCAATTGCAATGTGGCTCAGTTTCTCCCGTATTTGACGCGGAGTACGCTCGCGAAGCCAAATTTGTGCGCCGAAAGAAAACCCATTGACGGTGAACCAACCGGGAG
-361 CAAATAACGCGCTGAACGAGCGTGGCTTCTCCCAAAGTGGTATGAAAAAATAAAAAAAAAAAAAAAAAAAAAAAAAAATATGCACTCCCCATTTTGCAGTTTACCTTACATCACGTGGTGA
-241 AAAATAGGTTCTTGGTCCACCGCTAACAAAAACAGAACATTTTGTGAGGCAAAATTTGACCTTCCATAGGGAGTCCACTTTTGGAGTGGGACCGGTAGTACCATCACACCAGTGG
-121 GAGCTATATAACGGCGGTGCGATCGCGGTGTATGCATCTTTTCCACGCCACAGTGTGATCTTACGGCGCACTGGCGGCACCCACCAATAACGAAATAGGAGTAACCGCTTAAACC

1      ATGAGGACCTTTCAGATGTATTGATATTTATGCAATTTGCGCTGTGCAAGGTCGCCCCACCAGTGAAGGACAAAGAATGAACCGTTCAGCCCGGGACCTTTAGGGTCTGGGC
1      M E D L S D V F D I Y A I C A C C K V A P T S E G T K N E P F S P R T F R G L G
121     AATAAGGGACTCTCCCTGGAATGCAACTCCGTCGATATGAAGTACTTCAGCTCCGCTGACGACCTACGTCGATGAGTCAAAGTATGAGAACTAAAGTGGAAAGGGAGAGGTACCTA
41     N K G T L P W K C N S V D M K Y F S S V T T Y V D E S K Y E K L X W K S E R Y L
241     CGAATGGAGCCCTCACAGGGGGGGGTGACAAACACAGCGGTGGTGAACACACAGCGGTGGTGAACAAAGCGCAAGCTGCAAAAAGCTCGTGGTCAAGGGAGAACGAGCTGGAGAGC
81     R M E A S Q G G G D N T S G G D N T H G G D N A D K L Q N V V V N G R S S W R S
361     ATCCCCAAGCAGTACAAGCGCTCCCAACAGAAATCAACGTCGTCCTTCCCAAGCGCTAACAAAGGAAGACGTGAAGGAAAGGCTTTCATTAATGACAGCATAGATGACCTACTGCTG
121     I P K Q Y K P L P N R I N V V L S K T L T K E D V K E K V F I I D S I D D L L L
481     CTCCTAAAGAACTGAACTACTACAATGCTTCAATGCGGGGAGCAAGTTTATAGGAAATGCTTAACTAGCAAACTTAATCAAGCAGATCTACTCCAGGAGGATCAACGGCGCTTAC
161     L L K K L K Y Y K C F I I G G A Q V Y R E C L S R H L I K Q I Y P T R I N G A Y
601     CCGTGTGACCTCTTCTCCCGAGTTTGCAGAAAGCCAGTTTCGGGTGACGTCCTGTCAGTGAAGTGTACAACAGCAAGGCAACCACTCTGGACTTTTGGTTTACAGCAAGTGGGGGG
201     F C D V F P F P E F D E S Q F R V T S V S E V Y N S X G T T L D F L V V Y S K V G G
721     GGAGTTGACGGGGGGCTTCCAACGGGAGCACTGGGACAGCGCTTCGGAGAACTGCAATGCGTTCAACTGCAATGCGCGAAATGTAGCGCCCGCAACTCCCGCTCCCAATGGGACCG
241     G V D G G A S N G S T A T A L R R T A H R S T A M R R N V A P R T A A P P M G F
841     CACAGCAGGCGAATGGGAAAGGGCCCGCGCTGCCGTGGGAGAAAGCAACGCGGAGGAGAGGAGACGACCTCGTGTACTTCAAGTTTAAACAAGTGGGGGAGAAAACC
281     H S R A N G E R A P P R A R A R R E T P R Q R K T T S C T S A L T T K W G R K T
961     CGSAGCCTTCAAGATTTTAAATTTTACAACAGCCCTCAAGATTAATGCAGCACCCAGAGTACCAATACCTAGGCATCATATACGACATCATCATGAATGGAACAACAAGGAGACAGA
321     R S T C K I L K F T T A S R L M Q H P E Y Q Y L G I I Y D I I M N G N K Q G D R
1081    ACAGTGTGGGAGTGTGAGCAATTTGGCTACATGATGAATTTAATTTAAGTGAATCTTCCCGCTTAAACAACAAGAGTATTTTGGAGGGAATAATGAGGAACTGCTTTGG
361    T G V G V M S N F G Y M M K F N L S E Y F P L L T T K K L F L R G I I E E L L W
1201    TTCATTGAGGAGAAACAACGGAACACTTTGTTAAATAAAAACGTGAGGATATGGAAGCAATGGAACGAGGAGTTCCTCGACAACAGGAAATATTCCACAGAGAAGTGAATGAC
401    F I R G E T N G N T L L N K N V R I W E A N G T R E F L D N R K L P H R E V N D
1321    TTGGGGCCCATATATGGCTTCCAGTGGAGACACTTCGGTGTGAAATACACAAATATGCAATGCAATACGAAGATAAGGTGTAGACCAATTAATAATGTTATTCATTAATAAAAAAT
441    L G P I Y G F Q W R H F G A E Y T N M H D N Y E D K G V D Q L K N V I H L I K N
1441    GAACCAACAGTAGGAGAAATTTTGTGTCATGGAATGAAAAGATTTGGATCAAATGGCTTACCTCCTGTGTCATTTTATGCCAAATTTACGTTTTCATGCGGAAACTATCATGC
481    E P T S R R I I L C A W N V K D L D Q M A L P P C H I L C Q P Y V F D G K L S C
1561    ATTATGTACCAGAGGCTTGTGACTTGGTCTTGGGGTCCCGCTCAACATCGCTCGTATTCATATTACACACATGATGGCGAGGTGTGCAATTTGCAGCCTGCACAGTTCATACAC
521    I M Y Q R S C D L G L G V P F N I A S Y S I P T H M I A Q V C N L Q P A Q F I H
1681    ATTTGGCAACCGCACGCTTACAACACCATTTGACAGCTTGAAGTGCAGCTGAACAGGATCCCTACCGTTCCCAACGCTTAAACTGAACCGGAGTGAAGAACATTTAGGAT
561    I L G N A H V Y N N H V D S L K V Q L N R I P Y P P P T L K L N P E V K N I E D
1801    TTTACCATTCGATTTCAATAGAGAAATACGTGCACCACGATAAATACCATGGAGATGGCCCGCTAA
621    F T I S D F T I E N Y V H H D K I T M E M A A *

```

***Plasmodium vivax* hydroxymethylpterin pyrophosphokinase-dihydropteroate synthetase (*pppk-dhps*) gene (GenBank Accession No. AY186730)**

```

1 aaaaaaaagc gtagcgacag aagaacgcat ataacagaa cagcagcagt aacgatagcg
61 gaccaccatg gaggattcaa acacgggggg cactacccca aggaatatcg ccgtttttaa
121 cttcggaacg aatgacaaaa agaactgcgt aacgatttta gaaacggcgc tctatctgac
181 ggagaagtac cttggttaag gcgaaaggag gggacacttt agggggaatt taacctctc
241 tttgaaaagg ggcaacattht aagaagcgtg agagtccgc tttgccatt tcttctacc
301 ggcttatgta cattgagggg tgcataccat cccccagtag taaacacaca cagtgtaga
361 cacataggtc caaatgccgc cactataggt gtgaccatt acccattttt ttotcccc
421 tttttcctaa aacatggtag gcaaaatcat caacagttcg tacatttacg aaaccgtccc
481 ggagtacatc gtcctggatg aagaaaacaa aatggagag gtgacggagg gggagcccc
541 gagggacatc tcttgatag gcgatttgat cccaactgtg gaaaactcca gatacgaaga
601 aagtgaagat ttaatttatg agtgcaaaga gttggaggtg ttttataaaa atgaaaagt
661 aaacgaaagc attattaggg aagtcagcgt agaggattac gaaaatgagg caagaaggat
721 aatcaaacgg aatgacgaaa taatgaagaa aaatthagaa cagtcgaaag ataaatacta
781 caccagttat ttttttaact taacggttgt agttaggacc tttggtgaa accccctcgc
841 cactctcgta attttaagat acatgagca aatcatgaaa agaagggaaa gcaaaaaggg
901 tcagggagaa atatttcaaa atcgcatgat agccattgac attttatttt ttaacaacta
961 cccaattttt gaaaagagca tatctttaa aggggaagat atttataaaa tcatcaciaa
1021 gtatattcac ataaaccaca caagtgatca gaaccgtcta gatattatcc aaaatttggg
1081 agacaaaata gaattcttat gtatccctca tgtgtacag aaatacaggt atagatcct
1141 cctctgctta aatgatatca ttccagagta taagcacagc acatttgagg aagccattcg
1201 ctcaacttat aacagttatg ttgaaagttt tgaggagaag taccacatta atattaggaa
1261 gaataataag aggctatacg tattgaaaga taaagtgtca tatttataaa aaagaactca
1321 tattgtgggc attttgaatg ttaactatga ttccctttca gatggcggtg tatttgcga
1381 tcctgtgaaa gctgtggaga ggtgttcga aatggcaagt gatggggcga gctgtattga
1441 catcgggggg gaatcgtccg ccccttatgt ggtcccacat ccgagcgtca ctgaacggga
1501 tttggatcat cctgttttga agctctttaa ggaggagtgg cataagttgg agtgtgaggt
1561 tggcgggtgg gccgtgtgct gcgctgcagc aagtgatgcc aggaaaaaac gcagagctc
1621 cctacagggg aaactacaaa aagtgagggg cgcaaaaccg atcataagca tcgacacggg
1681 caattatgat ctctcaagg agtgcgtgga aggcgagttg gtggacatcc taaacgatat
1741 cagcgcgtgc acgcacaacc cagagattat aaaattgttg agggagaaaa caaagtctca
1801 tagcgtcgtt ttaatgcaca agcggggaaa tccacacacc atggataagt taacaaatta
1861 cgatgacctt ataagtgaca ttaaaaggta tttagaagat cggctacatt ttctcgttct
1921 aatgggggta ccacgctacc gagttctctt tgatgtcggc ctgggggttg ccaaaaagca
1981 cgaccagtct attaagctgt tgcagcatat tcacgtttac gatgagtacc cgtgttttct
2041 tggctactcg aggaagcgtt ttattgtcca ctgcatgggg aagggtggcg cggccatcgg
2101 ggagtgcaga ctgatgagcg gggagggcaa actgaccaac ggggagggta aactgacga
2161 tggggaggcc aaactgacca acggggaggg taaactgacg aatggggagg ccaaactgac
2221 caacggggag ggtaaactga cgaatggtga cgccaaactg actaacggtg actccaaact
2281 gactaacggg gaggccaagc tgaccaacgg agaccatca caactgtgga ggttcaaat
2341 gaccacatg cgtcaagaca aagatcagct tttgtaccag aaaaatattt gcggtaggaa
2401 ttogtctctt ctctgatttg caaaacgtgc atgtagagtg tccctacat gtgctgtaca
2461 tttgtttatc ctttcatcaa ctctaagtta tgtatgagtc cccatgttta acacctcccc
2521 ctttttctc ctttttctc aggcgggcta gccattgctt cctacagctt ttacaaaaag
2581 tttggacctta tcagagttca cgacgtgta gaaacgaagg ccgttctgga tgtgctcaca
2641 aggatacatc aacctaggg taatctcctg gcagtgacg aaaaggcaaa ataatcccc
2701 cccccctcc cccctttaga gagtatcacc cttttgaatt cgtctctcct aatataacg
2761 ataccataat gcgtgtttca aataagcaaa tctgcagctt tcatttactt tgcccctgtg
2821 tactttttaa gcttttgcct tatatgcgc tttgtagttc ctctcctgt gtggtttgca
2881 gcgttcaga ggggctcgc ggtctgtatc tgcttgcta tctgaacgtt cagatgatcc
2941 cttgtgcatc tatgtatgtg ggtgtatcaa tccacttttt ntgcaggcaa gcacaaattg
3001 cgcacgnca ttttgagcat ttcgctgaaa t

```

translation="MEDSNTGGTTPRNIAVLNFGTNDKKNVCVITLETALYLTEKYLGKIINSSYIYETVPEYIVLDEENKIGIEVTEGEPPRDISWIGDLIPTVENSRYEESDLYECKELEVFLKNEKINESIIREVSVEDYENEARRIIRKRNDEIMKKLEQSKDKY YTSYFFNLTVVVVRTFVEDPLAMLVILKYIEQIMKRRESKKGQGEIFQNRMIADILFNNYPIFEKISLKGEDIYKIIITKYIH INHTSDQNRLDIIQNLGDKIEFLCIPHVYTKYRYSILLCLNDIPEYKHSTFEEAIRSTYNSYVESFEEKYHINIRKNNKRLYV LKDKVSYLKERTHIVGILNVNYSFSDGGLFVDPKAVRMFEMASDGASVIDIGGESSAPYVVPNPVSVTERDLVMPVLKLFKE EWHKLECEVGGAVCCAAASDARKNAQSSLQGLKQVRDAKPIISIDTVNYDLFKCEVEGELVDILNDISACTHNPEIIKLLRR KNKFYSVVLMHKRGPNHTMDKLTNYDDLISDIKRYLEDRLHLFVLNGVPRYRVLFDVGLGFAKKHQDSIKLLQHIHVYDEYPLF LGYSRKRFLIVHMCMGKGAAGIIGECRLMSGEAKLTNGEGLTNGEAKLTNGEGLTNGEAKLTNGEGLTNGDACLNGDLSKLTNG EAKLTNGDPSQLWRFKMSHRQDKDQLLYQKNICGLAIASYSFYKVDLIRVHDVLETKAVLDVLTIRIHQP"