

Fig. S5

Flavodoxin-like FMN domain

G.intestinalis OR-1	-----MALSIIVYATVGGTARNLAHKIAA-----LLDSRGIATQLYDVKNIR-TLEDLPT	48
G.intestinalis OR-2	MTRSNEKPIITVMYASATGTIQRLADQLVG-----DLCAREASVSSINMKAFAPYNI PRG	55
S.cerevisiae Tah18	--MSSSKKIVILYGSETGNAHDFATILSH-----RLHRWHFSHTFCSIGDY-DPQDILKC	52
H.sapiens NDOR	---MPSPQLLVLFGSQTGTAQDVSERLGR-----EARRRRLGCRVQALDSY-PVVNLINE	51
R.norvegicus NOS	-----RVRATVLFATETGKSEALARDLAA-----LFSYAFNTKVVCMEOY-KANTLEEE	48
R.norvegicus CPR	-----GRNIIVIFYGSGTGAEEFANRLSKDAHRYGMRGMSADPEEYDLADL-SSLPEIDK	54
E.coli SiR	-----MPGITIIISASQTGNARRVAEALRD-----DLAALKLVNKLVNAGDY-KFKQIASE	49
H.sapiens MSR	-----MRRFLLLYATQQGQAKAIAEEICE-----QAVVHGFSAIDLHCISESDKYDLKTET	50
T.vaginalis Hyd	-----TSLPIVAFGSSSGTASRLARIFAS-----YFNTLPVQLNMVTMQTL-----KS	43
E.coli flavodoxin	-----MAITGIIFFGSDTGNTENIAKMIQK-----QLGKDVADVHDIKSSKED-LEAYD	48

G.intestinalis OR-1	GDLLYLTSITHGLGQHPQSAHALMKSLKQQSKPGPRHWLNKREANP-QLLGSSRRIAVLGI	107
G.intestinalis OR-2	TIIYMTC-TFFAGEHPPASKE-----FIAWLQTVNPSLR--PFRDIRFAVFGM	100
S.cerevisiae Tah18	RYLFIIICSTITGQGELPRNVNALKGE----RPVTFWSFLKRKNLPSN--LLNHIQTAMLGL	106
H.sapiens NDOR	PLVIFVCATITGQGDPPDNMKN-----FWRFI FRKNLPS--TALCQMDFAVLGL	97
R.norvegicus NOS	QLLLIVVTSITFGNGDCPSNGQT-----LKKSLFMMKELG-----HTFRYAVFGL	91
R.norvegicus CPR	SLVVFCMATYEGEDPTDNAQD-----FYDWLQETDVD-----LTGVKFAVFGM	97
E.coli SiR	KLLIVVTSITQEGEPPEEAVA-----LHKFLFSKASK-----LNTAFVAVFSL	93
H.sapiens MSR	APLVVVVSTITGTGDPDPTARKFVK--EIQNQTLPVDFFA-----HLRYGLLGL	96
T.vaginalis Hyd	SQIIIFCSTIFGDGEFPNNAQK-----FVEMLSDSN-----EDLSHLSYGICAL	86
E.coli flavodoxin	-ILLLGIPTWYYGEOCDWDD-----FFPTLEE-----IDFNGKLVALFGC	88

G.intestinalis OR-1	GSI--KYHQFCAASQDAVA---VFKSHSIPTLVPEPIHLDTSELETG-----LQLWVKK	155
G.intestinalis OR-2	GSK--NYTTFCAASKNADKSII-FGG---TRILDALHLDRDEFKSDDSA---YIHWKKD	150
S.cerevisiae Tah18	GDS--SYPKENYGIKRLHQRIVTQLGA-NELFDRLEADDQAMAGSNKGTGL-GIESVYFE	162
H.sapiens NDOR	GDS--SYAKENFVAKKLHRRLL-QLGG-SALLPVCLGDDQHELGPDA-----VDPWLRD	148
R.norvegicus NOS	GSS--MYPQFCFAFAHDIDQKLSH-LGA-SQLAPT--GEGDELSGQEDA-----FRSWAVQ	140
R.norvegicus CPR	GNK--TYEHFNAMGKYVDQRL-EQLGA--QRIFELGLGDDDG-NLEED-----FITWREQ	146
E.coli SiR	GDS--SYEFFCQSGKDFDSKLAELGG--ERLLDR-VDAD---VEYQAA---ASEWRAR	140
H.sapiens MSR	GDS--EYTYFCNGGKIIDKRLQE-LGA--RHFYDTGHADDCVG---LELV---VEPWIAQ	145
T.vaginalis Hyd	GSK--DYQKYCFEGHQLDKLQVQHK--SKRLIEMVELDSS-SPDHGECLF---ELWAAK	137
E.coli flavodoxin	GDQEDYAEYFCDALGTIRDIIEPRGATIVGHWPTAGYHFEASKGLADDDHFVGLAIDEDR	148

G.intestinalis OR-1	FLTAIGTTDS-----HVLDPVVRKLGEE-----NLADL	183
G.intestinalis OR-2	LFKVLGLSEQPVISTN-----KIIVTKNTSLPDK-----WVCDV	184
S.cerevisiae Tah18	YEKKVLSFLLSKYPNRKVNGQIIKREELDPEVYLEPASYLQLSDEHANEFKFT--STKVIF	220
H.sapiens NDOR	LWDRVLGLYPPPPGLTEIPPGVPLPSKFT---LLFLQEA PSTGSEGQ RVAHP--GSQPEP	203
R.norvegicus NOS	TFRAACETFDVRSKHCIQIPKRYTSNATWE---PEQYKLTQSPESLDLN---KALSSI	192
R.norvegicus CPR	FWPAVCEFFGVEATGEESSIRQYELVVH---EDMDVAKVY--TGEMGRLKSYEN-QKPPF	200
E.coli SiR	VVDALKSRAPVAAPS-----QSVATGTVNE-----IHTSPY	171
H.sapiens MSR	LWPALRKHFRSSRQEEISGALPVASPASSRTDLVKSELLHIESQVELLRFDSDGRK DSE	205
T.vaginalis Hyd	CGTMLGFKMPDLAIS-----TNYTVKVSKNPDD-----IIHKEKEQPLG	176
E.coli flavodoxin	QPELTAERVEKWKQISEELHLDEILNA-----	176

G.intestinalis OR-1	-SENTLFDPRITESTLLSATMLSSFGWIYHLHVPSTL-----	219
G.intestinalis OR-2	SPLG-YKRGIMSKVKVLSDGKVDGVVHLYEITPCPM-----	219
S.cerevisiae Tah18	EGDESLKVGRVNIKRIITSEGHFQDVRQFKFSNVVDKI-----	257
H.sapiens NDOR	SESK-PFLAPMISNQRVTGPSHFQDVRRLIEFDILGS-----	238
R.norvegicus NOS	HAKN-VFTMRLKSLQNLQSEKSSRTLLVQLTFEGSR-----	228
R.norvegicus CPR	DAKN-PFLAAVTANRKLNQG-TERHLMHLELDISDS-K-----	235
E.coli SiR	SKDA-PLVASLSVNQKITGRNSEKDVRHIEIDLGDS-----	206
H.sapiens MSR	VLK---QNAVNSNQSNVVIDEFESSLTRSVPLSQASLNIPGLPPEYLQVHLQESLGQE	261
T.vaginalis Hyd	YEY-----GILVTSQVITP-EGFEPKMHKYQIKLPP-----	206

G.intestinalis OR-1 -----SPMLVPGAHIIVYPRIEE 237
 G.intestinalis OR-2 -----KYEAGGHCAILPRNRA 235
 S.cerevisiae Tah18 -----QENYEPGDTVTTIYPCNTD 275
 H.sapiens NDOR -----GISFAAGDVVLIQPSNSA 256
 R.norvegicus NOS -----GPSYLPGEHLGIFPGNQT 246
 R.norvegicus CPR -----IRYESGDHVAVYPANDS 252
 E.coli SiR -----GLRYQPGDALGVWYQNDP 224
 H.sapiens MSR ESQVSVTSADPVFQVPISKAVQLTTNDAIKTLLLEVELDISNTDFSYQPGDAFSVICPNSD 321
 T.vaginalis Hyd -----GVIIYQTGDLVGLPENDE 224

G.intestinalis OR-1 SMINRLLDLGVLTLHDTSIDSTAFIQIDSP--HDPDLPAD-----PISIVDLLSRV 286
 G.intestinalis OR-2 EDIKALLAK-GHISLDHGCKVVAEASDIVVVEHASWVRSAVNAVLPLGRPIYVLDLLSQY 294
 S.cerevisiae Tah18 EDVSRFLAN-QSHWLEIADKPLNFTSG----VPNDLKDGGGL-----VRPMTLRNLLKYH 324
 H.sapiens NDOR AHVQRFCQV-LGLDPD-QLFMLQPRE-----PDVSSPTRL-----PQPCSMRHLVSHY 302
 R.norvegicus NOS GLVQGILER-VVDCSS-PDQTVCLEVLDES--GSYWVKDKR-----LPPCSLRQALTYF 296
 R.norvegicus CPR ALVNQIGEI-LGADLD-VIMSLNN-LD----EESNKKHPF-----PCPTTYRTALTY 298
 E.coli SiR ALVKELVEL-LWLKGD-EPVTVG-----KTLPLNEALQWH 258
 H.sapiens MSR SEVQSLQR-LQLEDK-REHCVLLKIKADTKKKGATLP-----QHIPAGCSLQFIFTWC 373
 T.vaginalis Hyd DAVKAVLDE-LKLPD-DIITVSSMP-----EGYNIIPRVTMQLFSQY 268

FAD binding pocket

G.intestinalis OR-1 CNVNAKPSYNLISFLAPYATTSE-----DKFKLKYLTEDAVLFD-----ILSY 329
 G.intestinalis OR-2 LDFSTVIDFTSFKELVPYVTDGAQ-----YRQALHMLEDPTLFKTVF-----LD 338
 S.cerevisiae Tah18 CDFMSIPRTSFFLKIWTFATDVTKMERGQEQLNDQREKLRQFATDQDMQDLYDY---CNR 381
 H.sapiens NDOR LDIASVPRRSFFELLACLSLHEL-----EREKLLFSSAQQEELFEY---CNR 348
 R.norvegicus NOS LDITTPPTQLQLHKLARFATEET-----HRQRLEALCQPSEYNDWK-----FS 339
 R.norvegicus CPR LDITNPPRTNVLYELAQYASEPS-----EQEHLHKMASSSGEGKE-LYLSWVVE 346
 E.coli SiR FELTVNTANIVENYATLTR-----SETLLPLVGDKAKLQH-----YA 295
 H.sapiens MSR LEIRAI PKKAFLRALVDYTSDSA EKRRQLQELCSKQGAADYSRFVVDACA----- 422
 T.vaginalis Hyd LDLNGI PSRNLLRAFRQFCDDQFAVERLDRLNPSDSRLFDEFVKDISISEFILEYSR-- 326
 L.interrogans FRN MHSMLKPTREPQINLFKKSNPYKAKVISNVLLTPETGTGKRPKKEGEALVHRIVLAIDHS 60

G.intestinalis OR-1 QWPTIYDFLLDFS--SLRIPLGKFLRVCPRIDPRLYSVASLPHPD-EDSNTVCTVDLLVG 386
 G.intestinalis OR-2 TRLNMI DIFTKFS--SLKVPIHTLIEHMPAMTHRMYSIASAPSYVGETRLQFIVSDVDFE 396
 S.cerevisiae Tah18 PRRSILEVLEDFI--SVKLPWKYVLDYLP I IKPRYYSISSG-PGD-PN-IELTVAIVKYK 436
 H.sapiens NDOR PRRTILEVLCDFPHTAAAI PPDYLLDLIPVIRPRAFSIASSLLTH-PSRLQILVAVVQFQ 407
 R.norvegicus NOS NNPTFLEVLEEF--SLRVPAAFLLSQLPILKPRYYSISSSLDHT-PSEVHLTVAVVTYR 396
 R.norvegicus CPR ARRHILAILQDYP--SLRPPIDHLCCELLPRLQARYYSIASSSKVH-PNSVHICAVAVEYE 403
 E.coli SiR ATTPIVDMVRFSP--AQLDAEALIN-LLRPLTPRLYSIASSQAEV-ENEVHVTVGVVRC 351
 H.sapiens MSR ---CLLDLLLAFF--SCQPPLSLLLEHLPKLQPRPYS CASSSLFHPGKLHFVNIVEFLS 477
 T.vaginalis Hyd HCKPPLDILM-----SCIPHIWPRLYCIASA-----PTNSSVIDLIISDR 366
 L.interrogans FRN AYPYVIGQSGGVIPPGEDPEKKAKGLADVGYTVRLYSIASPSYSFGMKEDNIEFI IKRDN 120

G.intestinalis OR-1 NPKPRNGHSIQNSLGPSYLQRALISN-----EPIRIAILQNFSDSGLTMLLG 435
 G.intestinalis OR-2 CETLSKTIEKRPGLSTGYLSRLQEGS-----AVFFQTFSSPVRGDEFRG 441
 S.cerevisiae Tah18 TI----LRKIRRGICTNYIARLQEGE-----QIRYKLQNNH-I IKKEFLN 476
 H.sapiens NDOR TR----LKEPRRGLCSSWLASLDPGQ-----GPVRVPLWVRPGS-LAFPETPD 450
 R.norvegicus NOS TRD--GQGPLHHGVCSTWINNLKPED-----PVPCFVRSVSGFQLPEDPS 439
 R.norvegicus CPR AK----SGRVNKGVATSWLRAKEPAG-----ENGGRALVPMFVRK-SQFRLPEFKST 449
 E.coli SiR V----EGRARAGGASSFLADRVEEE-----GEVRVFI EHNDNFRLPTNPE 392
 H.sapiens MSR TATTEVLRKGVCTGWLALLVASVLQPNIHASHEDSGKALAPKISISPRTTNSFHLPDDPS 537
 T.vaginalis Hyd IFG---DGNSRNLCTSYLKRIPEMS-----KIALKTQHGIIFYPKNVD 407
 L.interrogans FRN IYDENGNIQF-KGVCSNYMCDLKP GD-----EVTMTGPSGKKFLLPNTDFS 165

NADP(H)binding side

G.intestinalis OR-1	GKTALIGVAFGSGFAPFRAYHELRSATIASMDGVETLA-----PYLLLLSIPHAEP--QL	487
G.intestinalis OR-2	VPSITVGLGTGLAPCRSRLQHRALRLEQLKRAAPGEFIQPLDPYMTFIGLRRESDLKEL	501
S.cerevisiae Tah18	KPMILVGPVGLAPLLSVVKAIEISKDIK-----LLFGCRYKDKDYIY	518
H.sapiens NDOR	TPVIMVGPPTGVAPFRAAIQERVAQQQTGNF-----LFFGCRWRDQDFYW	495
R.norvegicus NOS	QPCILIGPPTGIAPFRSFWQRLHDSQHRGLKG-G-----RMTLVFGCRHPEEDHLY	490
R.norvegicus CPR	TPVIMVGPPTGIAPFMGFIQERAWLREQGKE--VG-----ETLLYYGCRRSDEEDYLY	499
E.coli SiR	TPVIMIGPPTGIAPFRAFMQORAADEAPGKN-----WLFYFGNPHFTEDFLY	438
H.sapiens MSR	IPIIMVGPPTGIAPFIFGLQHREKLQEQHPDGNFG-----AMWLFYFGCRHKDRDYLF	589
T.vaginalis Hyd	TPIIMVAIGCGIAPMMSMLQHRQALYIEDKLN-IG-----SASLFFGCRNKGTYPYL	458
L.interrogans FRN	GDIMFLATGTGIAPFIFGMSEELLEHKLIKFTG-----NITLVYGAPYSDELVMM	214

G.intestinalis OR-1	LEELRRDVENGVIN-VVLCLTRDDGTD--NQKGLDIDS-----FTSAHGTFHLHIYKKGK	538
G.intestinalis OR-2	IDELRDFVRKG-IATIFVAFSREEKSREWFEIIPNDADGHALADVDKTAFCAEYKCYVTR	560
S.cerevisiae Tah18	KDMLLEDWFRKGIKIALHS-SFSRDEENS-----PGVKYVQD	552
H.sapiens NDOR	EAEWQELEKRDCLTLP-AFSREQEQ-----KIYVQH	526
R.norvegicus NOS	QEEMQEMVRKGVLFQVHTGYSLPQKP-----KVYVQD	523
R.norvegicus CPR	REELARFHKGALQNLNVAFSREQAH-----KVYVQH	531
E.coli SiR	QVEWQRYVKEGVLTRIDLAWSRDQKE-----KIYVQD	470
H.sapiens MSR	RKELRHFLKHGILTHLKVFSRSDAPVG-----EEEAPAKYVQD	627
T.vaginalis Hyd	DDVLNNFVENKCLQNLVAVYSREGTT-----NPYVTS	490
L.interrogans FRN	DYLGLESKHKNFKLVT-AISREEKNSFD-----GGRMYISH	250

G.intestinalis OR-1	RMGDVIHSSSIPDRLLRDLNRPDLVSVYCGPANDAVDTSNKVIENTMVGAEKYRTMRSENR	598
G.intestinalis OR-2	LMGEYANNIRNFVTSKDT-CVI----TYCGKAGNVPQIEIEGVILRSLVSSGMTE--KDAK	613
S.cerevisiae Tah18	YLWRLGEEITNLVNVKD--AVF----FLCGSSGKMPIQVRLTFIEMLKKGWGNFSDEETAK	606
H.sapiens NDOR	RLRELGLSLVWELLDRQG--AYF----YLAGNAKSMADVSEALMSIFQEEGLC-SPDAA	579
R.norvegicus NOS	ILQKELADEVFSVLHGEQ-GHL----YVCGDVR-MARDVATTLKKLVAAKLNLS-EEQVE	576
R.norvegicus CPR	LLKRDREHLWKLIEGG--AHI----YVCGDARNMAKDVQNTFYDIVAEFGPME-HTQAV	584
E.coli SiR	KLREQGAELWRWINDG--AHI----YVCGDANRMAKDVQALLEVIAEFGGMD-TEAAD	522
H.sapiens MSR	NIQLHGQQVARILLQEN--GHI----YVCGDAKNMAKDVHDALVQIISKEVGVE-KLEAM	680
T.vaginalis Hyd	ALMDRMDEVWESWKDPN--CVIM---Y-CGPPIGVPDQIKTIMVRI SMKKGEMSREEAEK	544
L.interrogans FRN	RVREQ-AEAVKKILNGG--GRF----YICGGPKGMEKGVIEEIQKISGNTGTY-EEFKHH	302

G.intestinalis OR-1	VHVEAY-----	604
G.intestinalis OR-2	ARWEKLRADQNLI FEAW-----	630
S.cerevisiae Tah18	KYLKEMEKS DRYIQETW-----	623
H.sapiens NDOR	AYLARLQQTRRFQETWA-----	597
R.norvegicus NOS	DYFFQLKSQKRYHEDIFGAVFSYGAKKGNTLEEPKGTSL	615
R.norvegicus CPR	DYVKKLMTKGRYSLDVWS-----	602
E.coli SiR	EFLSELRVERRYQRDVY-----	539
H.sapiens MSR	KTLATLKEEKRYLQDIWS-----	698
T.vaginalis Hyd	FCALHP----HLFESF-----	556
L.interrogans FRN	LEGAHQLFVETY-----	314