

Supplementary File 4: Phylogenetic reconstructions for the reductase gene family

Aligned amino acid sequences used for the reductase phylogenetic reconstruction:

>Ase_pgFAR

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-----
-----MPV
LTSRED-EKLSVPEFYAGKSIFV-----TGGTGFLGKVFIEKLLYCCPD
IDKIY----MLIREKKNLSIDERMSKFLDDP--LFSRLKEER---PGDL-EKIVLIPGD
ITAPNLGLSAENERILLEKVSVIINSAATVKFNEPLPIAWKINVEGTRMMLALSRRMKR-
IE-----VFIHISTAYSNASSD--RIVV-----DEILYPAPADMMDQVYQLVK--
--DGVTEEETERLLNGLPNTYTFTKALTEHLVAEHQTY--VPTIIRPSV-----
-----VASIK--DEPIRGWLC--NWFGATGISVFTAKGLNRVLLGKASNI
VDVIPVDYVANLVIVAGAKSGG---Q-KSDE-----LKIYNCCSSDCNPVTLKKIHK
EFT-EDTIKNKS--HIMP-LPGWFVFTKYKWLTLTIIQMLPMLADVYRVLTGKIPR
-----YMKLHHLVIQTRLGIDFFTSHSWVMKTDRVRELFGLSLS-LAEKHMFPDCP
SSIDWTD--YLQSYCYG---VRRFLEKK----K-----
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>Hsub_pgFAR

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-----MVV
LTSKE--TKPSVAEFYAGKSVFI-----TGGTGFLGKVFIEKLLYSCPD
IGNIY----MLIREKKGLSVSERIKHFLDDP--LFTRLKEKR---PADL-EKIVLIPGD
ITAPDLGITSENEKMLIEKVSVIIHSAATVKFNEPLPTAWKINVEGTRMMLALSRRMKR-
IE-----VFIHISTAYTN--TN--REV V-----DEILYPAPADIDQVHQYVK--
--DGISEEETEKILNGRPNTYTFTKALTEHLVAENQAY--VPTIIVRPSV-----
-----VAAIK--DEPIKGWLG--NWYGATGLTVFTAKGLNRVIYGHSSNI
VDLIPVDYVANLVIAAGAKS-----S-KSTE-----LKVYNCCSSACNPITIGKLMS
MFA-EDAIKQKS--YAMP-LPGWYIFTKYKWLVLTLTILFQVIPAYITDLRHLIGKNPR
-----YIKLQSLVNQTRSSIDFTNHSWVMKADRRELFASLS-PADKYLFPCDP
VNINWRQ--YIQDYCWG---VRHFLEKK----T-----
-----
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>Has_pgFAR

```
-----
-----MVV
LTSKE--TKPSVAEFYAGKSVFI-----TGGTGFLGKIFIEKLLYSCPD
IGNIY----MLIREKKGLSVSERIKQFLDDP--LFTRLKEKR---PADL-EKIVLIPGD
ITAPDLGITSENEKMLIEKVSVIIHSAATVKFNEPLPTAWKINVEGTRMMLALSRRMKR-
IE-----VFIHISTAYTN--TN--REV V-----DEILYPAPADIDQVHQYVK--
--DGISEEETEKILNGRPNTYTFTKALTEHLVAENQAY--VPTIIVRPSV-----
-----VAAIK--DEPIKGWLG--NWYGATGLTVFTAKGLNRVIYGHSSYI
VDLIPVDYVANLVIAAGAKS-----S-KSTE-----LKVYNCCSSACNPITIGKLMS
MFA-EDAIKQKS--YAMP-LPGWYVFTKYKWLVLTLTILFQVIPAYITDLRHLIGKNPR
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-----YIKLQSLVNQTRSSIDFFTSHSWVMKADRVRELFASLS-PADKYLFPCDP
TDINWTH--YIQDYCWG---VRHFLEKK-----TTNK-----

>Har_pgFAR

-----MVV
LTSKE--TKPSVAEFYAGKSVFI-----TGGTGFLGKVFIEKLLYSCPD
IENIY----MLIREKKGLSVSERIKQFLDDP--LFTRLKDKR---PADL-EKIVLIPGD
ITAPDLGINSENEKMLIEKVSVIIHSAATVKFNEPLPTAWKINVEGTRMMLALSRRMKR-
IE-----VFIHISTAYTN--TN--REV V-----DEILYPAPADIDQVHQYVK--
--DGISEEDTEKILNGRPNTYTFTKALTEHLVAENQAY--VPTIIVRPSV-----
-----VAAIK--DEPLKGWLG--NWFGATGLTVFTAKGLNRVIYGHSSYI
VDLIPVDYVANLVIAAGAKS-----S-KSTE-----LKVYNCCSSSCNPVTIGTLMs
MFA-DDAIKQKS--YAMP-LPGWYIFTKYKWLVL LLLTFLFQVIPAYVTDLSRHLIGKSPR
-----YIKLQSLVNQTRSSIDFFTNSWVMKADRVRELYASLS-PADKYLFPCDP
TDINWTH--YIQDYCWG---VRHFLEKK-----SYE-----

>Hvi_pgFAR

-----MVV
LTSKE--TKPSVAEFYAGKSVFI-----TGGTGFLGKVFIEKLLYSCPD
IVNIY----MLIREKKGLSVSERIKQFLDDP--LFTRLKDKR---PADL-EKIVLIPGD
ITAPDLGITAANEKMLIEKVSVIIHSAATVKFNEPLPTAWKINVEGTRMMLALSRRMKR-
IE-----VFIHISTAYTN--TN--REV V-----DEILYPAPADIDQVYQYVK--
--EGISEEDTEKILNGRPNTYTFTKALTEHLVAENQAY--VPTIIVRPSV-----
-----VAAIK--DEPLKGWLG--NWFGATGLTVFTAKGLNRVIYGHsNYI
VDLIPVDYVANLVIAAGAKS-----N-TSSE-----LKVYNCCSSSCNPVKIGTLMs
MFA-DDAIKQKS--YAMP-LPGWYIFTKYKWLVL LLLTFLFQVIPAYITDLSRHLVGKSPR
-----YIKLQSLVNQTRSSIDFFTNSWVMKADRVRELYASLS-PADKYLFPCDP
VNINWTQ--YLQDYCWG---VRNFLEKK-----T-----

>Dpl-ctg3

-----MYPKIAESYDGQSVFM-----TGGTGFLGKVLLEKLLYSCPG
INKVY----LLVREKQNATVQQRIQKLI EEP--LFARLREER---PEAL-EKISPIAGD
ISEPKLAIKTEDEQLLAEEVSIVFHVAATIKFNEPLDVAMNVNVAGTGRVLNLAQKMKN-
IK-----AFVYVSTAYSN--TD--RKIV-----EEVIYPAPASLNEVKKLE--
--IGITEEQVKELIKGRPNTYTFTKALAENLVADNHGN--IPAVIIRPSI-----
-----VTSSK--VEPVVGWID--NWFGASALLTTISKGLNRVILSDSENS
LDLIPVDYVSNLTIVAAARC-----E-CSKN-----VTVYNCCTSGNNPIKMGH LAK
LII-ADSKEHKF--NDVP-MPTIH-FTQYKWVLILVTL L FQTIPAYIADLFLLLTGKKTR
-----YTKVQAKVLFIRDTLEFFTSNNWSIRAPQTIALANSLS-SSDRILFPFNP
TEIVWNE--YIPTYCQG---IRQYLCKK-----

>Ban_wFAR1

-----MYQAIAECYEGQSVFM-----TGGTGFLGKVLLEKLLYSCPG
IEKVY----LLVREKQGATAQQRVQKLLEQP--LFSRIKEEK---PQAF-EKIPIVGD
ISEPQLGIKAEDEELLAEKVSIVYHVAATIKFNEPFEQAMNVNVAGTGRVLNLSKRMKN-
VK-----AFVYVSTAFSN--TD--RKVI-----EEIYPAPASLNEVKKLE--
--IGITDAQVKELIRGRPNTYTFTKALAENLVADNHGN--VPAVIIRPSI-----
-----VSSSK--REPMVGWID--NWFGASALITTIMKGLNRVLLSSRDNS
LDLIPVDYVSNLIIVAAAKC-----K-CSKN-----VGVYNSSTSGENPLRIGRLAE
LII-ADSNKHKF--YDVP-MPMVY-FTRFKWVLLITLFFQTLPAYIADIFLLIRGKKTR
-----YVKIQSKVSFVRDTLEYFTSNTWSISSRQTTALSQSLS-PSDRYLFPCDP
TDIDWKD--YIPTYCQG--IRQFLCKT-----

>Ban_wFAR2

-----MYRNVNNNYKGHSVYTNGAGSRVKSLLSS
ATDNTN-EYQSIAECYKGQSVFI-----TGGTGFGKVLLEKLLYSCPG
IDKVY----LLVRETQGATAHQRMQKLLEEP--AFSRIKEEN---PQAF-EKVIPIVGD
ITQPQLGIMAENEELLIKEVSFVYHVAATTKFNETLDIAMNVNVAGTGRVLDLSKRMEN-
IK-----AFVYVSTAYSN--TD--REVV-----EEVLYPAPVSLNEVHKLLK--
--IGITDAQVKELIKGRPNTYTFTKALAENLVADNHGH--VPAIIVRPSI-----
-----VSSSK--KEPITGWID--SWYGATFLATVTMKGFNRFVSSYEYN
LDFIPVDYVSNLIIVAAARC-----K-CSDK-----VDVYNSSTSGENPLKIGAFFD
DII-AYSCKHKF--YDIP-LPMAY-LTRYRWVMFLITLLLQTLPAYIADLFLIVGKKPR
-----YVKLASKISAAHEVLDFPSRTWSMSARQTTALFQSLS-PSDRDQFPCDP
TDIDWKE--YIVTYCQG--IRQFLCKS-----

>Ban_GS8R7LM02B1WGH_gene9

-----MSNTFWLFAFLSVVTVYGKRAT
-----~~~VTIPPEYAAELVTASVGCVRNTGVDPNILDQIVQWNFQETDNVKKFI
YCMSLASG~F~GDSGDHLIIDKVARLVSDSNKKKDELINALKECNTLSGSDKYDTLFTV
KCNREKQPIVFSF

>Ban_GS8R7LM03D3OA9_gene11

-----MQDKPQVPLIVLNNGRTCPILGLGTWKQLGNVMLRQSAPGDMRAVKDAIDVG
YRHIDCAFVYGNEKEVGEALKTKFQEGVVKREDMFVTSKLWNTYHRPDLVEGALKASL
AN
LGLEYLDLYLIHWPEAYQEGGDIFPKDAEGKVIPSPVDFVDTWKAMEAQVDKGLVRSIG
L
SNFNKRQTDRVMKAARIKPAVVQIEVNPYINQHKLQHCRLGLAITAYSPLGSPDRPWA
KPGEPHLLDPRLQVIKRYNKTVAQILIRYAIDRWLIVIPKTVTRSRLQQNMEVDFQL
SPQDMELLQKLECNRFQCMDDAHHPDYPFHDEY
>Hmel-ctg1

-----MYKSVAECYEGESVFI-----TGGTGFLGKVILEKLLYSCPG
INKVY----LLVRGKANATVQQRIQNILEQP--LFSRLKKEN---PQAL-EKIVPIVGD
ISEPKLGLKAEDEELLNNTVSI VFHVAATIKFNEPLEVAVNINVGGTARVLNLCQRVPG-
IK-----AFVYVSTAYSN--TD--RKII-----EEVVYPTPASLSEVKKLIE--
--IGITEDQVQQLIKGRPNTYTFTKALAENVVVENKGR--VPTIIVRPSI-----
-----VSSSK--GEPIVGWID--NWFGASALITTIKGLNRVLLASPLNT
LDLIPVDYVANLIIVAAAKC-----E-CTKE-----VAVLNSCTSGENPIVMRRLAD
LLI-ADSHKHKF--YDVP-MPSVH-FTRFRWVFLMTLVLQTIPAYIADIFLLIRGKRTK
-----YMKIQNRVSLVRNTLEYFTSNNWLICAPKTRALAESLS-SEDKKQFPCNP
RDIDWDL--YIPSYCQG---IRQFLCKS-----

>Hmel-ctg7

----MK-IYQPIADCYEGQSVFI-----TGGTGFLGKVLLEKLLYSCPG
INKIY----ILIREKANVSIEERLQIIFEQP--IFKRIKCEN---PEAL-LKIVPIRGD
VSLPDLGMTVEDKHLLIDTVSRVFHLAATVKFNEPLNIALNINVDGTQHTLSFCKNMKN-
IK-----SFVYVSTAFSN--AD--KKII-----EEKTYPVSKTLSEIKNLID--
--NGLDENLIKELIGGKPNNYAFTKAMAENVIVEGHGN--VPVVIVRPSI-----
-----VSPSI--SEPLSGWID--NWFGATSLIVAAGKGFNRVVHTSADNT
LDLIPVDYVSNAIIVAAAKC-----K-WTKD-----VPVYNSSRRNPLRMQKLGD
LTI-ADSYKNKF--YDIP-LPFVR-FTSSKLIVFLIALFMETIPAYIADFFLLLTGKKCR
-----YVKA VGKLVIIREKLHFFITNSIIQSQKTRNLAESLS-PSDKRIFPFNP
IDIDWDN--YIPIYCHG---IREFLKK-----

>Hmel-ctg2

---MC-EYTPVADFYNGESILI-----TGGTGFLGKVVLEKLLYSCPG
INKIY----ILIREKQNSDGPHRVQGILNQQ--IFDRVKNAR---PLAP-VKVIPIVGD
ISEPDLGLSVADDKNIRDNVLSILFHVAANIRFNEPLEIAMNVNLMGTSRTLELFRLEN-
KK-----AFVYVSTAYTN--LD--RKYI-----EEIYPAPFSIKELKTLLD--
--IGIDEDQVKELTKCKLNTYIFTKAMAESLVAQN-CD--LPVTVVRPSI-----
-----ISASI--SEPKPGWID--TWMGASGVMTTIAKGFN RVLLSNPNF
LDLIPVDYVSNLMIVA AAKG-----I-KTGE-----VAVYNASTSGENPISIKEFMA
LNI-SDSVKNKF--NDFP-KPGVY-YTTKKWIVILITVLLQVLPAYIADLLLFIMRKNT
-----YVKLQAKVTLARDIVEFFTLNNWRIRATKTCTLAHSLS-PADRNEFPFNP
SDINWKD--YIPLYCYG---IRN FLLNV---K-----

>Hmel-ctg4

-----MLRTKYKLCS
ILLRE--KHTSVAECYEGQSAFI-----TGGTG FVGKVLVEKLLYQCPG
IEKIY----LLLREKKNVAPHLRLQQTLEEP--IFSIRNEK---PEVL-DKIVPIIGD
IAKPELAMRIEDQKLLFEKVTTVFHVAASVSFDDPLDVAMNINVGGLERV FHLCHQMTA
-
LR-----VLLHVSTAYCN--TD--KKVI-----EEIVYPPPASLDKVNDMIA--
--KGINNDQVKMLINKQPNTYAFAKAIAETMIVEKRGV--IPTVIVRPTI-----
-----VSASK--NEPFVGWVD--NWFGMTGLMAL TLLGRNRVLMCKSENV
MDLTPVDYVSNLIIVAAAMKST---S-NDNS-----LSVYNCATSKENPLKAEKVRK
LVV-DYSYKNKI--YDVP-YPYLH-YTTSKWVEWLIITTFNTIPAYLTDTVLLWRGKKPR
-----YINFHISKISRMNRNVLEFFSSNSWEISASRTRALSASLT-PKDKENFKFDP
IDIDWND--YFPKYCGG---VSR YMLKR---ER-----

>Hmel-ctg5

-----MFRLKQRFSG
VSARF--IHTPVAKCYDGQSVFI-----TGATGFLGKVLLEKILYSCPG
INKVY----LLIRENRESDVHQRIKKILDQP--LFSRLRNDY---PNAI-QKIVPIAGN
ISKPQLGIKNEDIRILQNNVSIVFHS AATVKFDEPLDVSTNVNVNGTQRVNLCHSMKY-
IK-----ALVYVSTAFIN--KY--CDGL-----DEKLYEPPISVTILQEIIK--
--AGVSEDQLQKLLEGRPNTYTFTKAVAESLVAEQHGN--IPTAIRPSA-----
-----ITCSK--SEPIAGWLD--NWFAVNTILMMIGNGWIRCLLSKPEN
YDIIPVDYVANLMMVA AAVRC-----D-GKNG-----VEVFNCTSSRENPLTTQVFIN
SII-QHSSKHKN--YDFP--PHVY-LTSSKTIWNLITLIFETLPVNVADLYLTVKGKKPR
-----YKKIQNKMNQVRGVLEYFSKHNSWLPATRTRALAKNLS-PNDRETFFPDP
RSFNWEE--YMPMYCES---VRKYLLKK-----

>Hmel-ctg6

-----MFRLKQRFSG
VSARF--IHTPVAKCYDGQSVFI-----TGATGFLGKVLLEKILYSCPG

INKVY----LLIRENQESDVHQRIKKILDQP--LFNRLKNDY---PHAI-QKIVPVAGN
ISKPQLGIKDEDIQILQDKVSIVFHSAATVKFDEPLDVSTNVNVNGTQRVNLCHSMKH-
IK-----ALVHVSTAFIN--KN--SDGL-----DEKLYDSLISVTKLQEMID--
--AGVSEDQLQKLLDGRPNTYTFTKAMAE SLVAEQHGN--IPTAIIRPSA-----
-----ITCSK--SEPIVGWLD--NWFV VNAFLMMIGNGWLRCLLSKPEHV
MDIIPVEYVANLMIVA AVRC-----D-GKNG-----VEVFNCTSSRENPLTTQVFIN
SII-QHSSKHKN--YDFP--PHVY-LTSSKTIWNLITLIFETLPVNVADLYLTVKGKQPR
-----YKKIQNKMNQVRGILED FLKYNWSLPAPRTRALAKSLS-PNDRETFFPDP
RSFNWEE--YMPMYCES---VRKYLLKK-----

>Bmo_swdb1

-MIAHD-SYKSIPDFYAGKTVFI-----TGGTGFLGKVLVEKLVYSCPA
LNKVY----VLIRETPKQNVLQKLKQLLDSP--IFTRLKNER---PEDL-NKIVPIAGD
LCKPNLGLEPSDEEKLIDEVS VVIHSGATVKFNDALEYAMKINYQGTEQVMRLCRKIKN-
IK-----VFVYISTTYAH--TQ--LDII-----EEVIYPPPARVAE VYETIKRH
G--NNEKNISKILNGQPNTYAFTKALAENLVAENHGD--IPTVVIRPSI-----
-----ITAGI--TEPLEGWVD--TWNGATGIMHLIGKGLCRVLPGNEQNI
LDLIPVDFVCNLALVAAAKCNR-----

-----FFRTQSKLYSIVKTLRCFIFKSWVFKCERV CALNAELS-DLDRAVFNCDP
STIHWEQ--YAQIYFDG---VTKF LLEK----PKNLRTDASNN-----

>Dpl-ctg2

-MVPTS-NYTPVSDFYNGKTIFV-----TGGTGFLGKVLIEKLLYSCPG
ISKIY----MLVREKRNL TATDRMKKFFDCP--VFDRLKKEK---PENL-KKLKPVNGD
LSQPCLGIDPKELQVIKDEV TIVFHFAATVKFNEPLSIAMKINVEGTEQVIDLCHSLKK-
IE-----VFVYMSTIFSN--TDDKLNSV-----EERLYRSPKEVDEIYKMIKE-
--NDPREVFNPEVLDGRPNTYTFTKAVAENIVAQKRG N--LPTIMIRPSV-----
-----VTPAK--EEPVRGWVA--NWMGPTATLLYLSRGWIRCHYGEDDFT
FEIIPVDYVVNLTIISA AKFS-----SSNHQVESWPTFCF
FIV-GVIITPSI---DIPFPWIT-FSRSLWFLGIISFFMQLLPAYIADLYLFICGHPTR
-----YVKMLKKYSQNMSALHYFSSRTWYMTANRSQELIDGLS-AEDQKIFPCSP
ASIDWSE--YMATYLHG---VYRFL LKS---HY-----

>Hmel-ctg3

-----MAS
LSNTIP-NNSSISQYYANKSIFI-----TGGTGFLGMILIEKLLYSCPD
IKKIY----ILIRRKKS VLP EERLKLQLINGK--IFDRIRKKC---PDNL-SKIVLVKGD

LIEFDLGLNPKELKMLQDEVSVVFHLAATLKFNEPLSVAMKVNVEGTREVLRVSQSMK
N-
IE-----IFVYMSTIFSN--ADHERSTI-----VEELYPSPKDINEVYEMINQ-
--NNPNETFCPELLDRRPNTYTFSKAIAENIVAENRGA--LPTIIIRPSV-----
-----VTSCY--NEPMEGWIA--NWMGPTPIFTLVGQGLIRCLYGKTHYT
FEIIPADYVVNLTLCATAKH-----Q-GGKE-----LSIYHSCSTADNPITLAETSE
YVS-KESVKQKF--NLLP-YPGMM-LIENNWLLYLLHFIFHVCPAFIADLLLFI SGHPLR
-----YVKLLQKMTYCMKVLKYFSSRSWAMKATNARGLLNSLS-DVDKREFPCDP
VNIKWDE--YFPIYLFG---IRKYLLKM----K-----

>Yro_pgFAR

--MVQL-KEDSVAAFYAEKSIFI-----TGGTGFLGKVLIEKLLYSCKA
VDQIY-----VLIRKKKDQTPSERIAQLLESE--LFSRLRKDD---PSAL-KKVVPVVG
LTMPNLGLSAAVEDLIVSKVTVIFHVAATVKFNERMKNALVNNVEATREVINLCHRLEK
-
VD-----AFIHVSTAYSN--TD--QKVV-----EERVYPPPAPLSEVYAFVKN-
--YGDDMDIIQNLLNGRPNTYTYTKALAEDIVLKEHGG--IPTAIIRPSI-----
-----VLSVL--KEPIPGWLD--NWN GPTGLLHASSQGVHCSMLGSGSNV
ADLIPVDIVTNLMIVVASRC-----R-KSNG-----LKVYNSCSGTTNPITYQAFTK
MFL-DSCISRGW--NKVP-FPLLI-FVKWAFLNRVLKFLLVIVPFFLIDVYLRFFGK-PN
-----YMRMITYTKKAEDLMTFFTSHEWQFKDGNVRDLINMMS-PEDRKIFYCDP
EEIQWKP--YFDDYCVG---VFKYLLKR----KV-----

>Ypa_pgFAR

--MVQL-KEDSVAAFYAEKSIFI-----TGGTGFLGKVLIEKLLYSCKA
VDQFY-----VLIRKKKDQTPSERIAQLLESE--LFSRLRKDD---PSAL-KKVVPVVG
LTMPNLGLSAAVEDLIVSKVSVIFHVAATVKFNERMKNALANNVEATREVINLCHRLEK
-
VD-----AFIHVSTAYSN--TD--QKVV-----EERVYPPPAPLSEVYAFVKN-
--YGDDMDIIQNLLNGRPNTYTYTKALAEDIVLKEHGG--IPTAIIRPSI-----
-----VLSVL--KEPIPGWLD--NWN GPTGLLHASSQGVHCSMLGSGSNV
ADLIPVDIVTNLMIVVASRC-----K-KSNG-----LKVYNSCSGTTNPITYQAFTK
MFL-DSCISRGW--NKVP-FPMLI-FVKWAFLNRVLKFLLVIVPFFLIDVYLRFFGK-PN
-----YMRMITYTKKAEDLMTFFTSHEWQFKDGNVRDLINMMS-PEDRKIFYCDP
VEIQWKP--YFDDYCVG---VFKYLLKR----KV-----

>Yev_pgFAR

--MVQL-KEDSVAAFYAEKSIFI-----TGGTGFLGKVLIEKLLYSCKA

VDQIY----VLIRKKKDQTPSERIAQLLESE--LFSRLRKDD---PSAL-KKVVPVVGDLT
LTMPNLGLSAAVQDLIVSKVSIIFHVAATVKFNERMKNALANNVEATREVINLCHRLEK-
VD-----AFIHVSTAYSN--TD--QKVV-----EERVYPPAPLSEVYAFVTN-
--NGDDMDIIQNLLNGRPNTYTYTKALAEDIVLKEHGG--IPTAIIRPSI-----
-----VLSVL--KEPIGWLD--NWNGPTGLLHASSQGVHCSMLGSGSNV
ADLIPVDIVTNLMIVVASRC-----K-KSNG-----LKVYNCSGTTNPITYQAFTK
MFL-DSCISRGW--NKVP-FPMLL-FVKWAFLNRVLKFFLVIVPFFLIDVYLRFFGK-PN
-----YMRMITYTKKAEDLMTFFTSHEWQFKDGNVRDLINMMS-PEDRKIFYCDP
VEIQWKP--YFDDYCVG---VFKYLLKR----KV-----

>Dpl-ctg1

-----MASCLGG
HFGLNQ-DYIPVADFYADKSIFV-----TGGTGFMGKVLVEKLLRSCPK
IKKIY----LLMRPKRGQDVASRLTELTQSP--LFESLRKER---PQEL-NKIVPIVGD
ITEPELGISPADQEMLCQKVSVFHSAATVKFDEKLKLSVTINMLGTQQLVQLCHRMLG-
LE-----ALVHVSTAYCN--CE--RERV-----EETVYSPPAQPEHVVTLVQTL
N-DELVDRIPTDLVGDRPNTYTFTKALAEDMLIKECGN--LPVAIVRPSI-----
-----VLSSV--REPVKGWVD--NWNGPNGIIAAVGKGVFRTMLGNGTRV
ADLVPVDTVINLMIVCAWRTHL---R-RGDG-----VVVYNCCTGQQNPITWQRFVK
TSF-KYMRKHPF--SEVVWYPGGD-ITSSRFQHGILSLQHLPAVLIDLVARITGSKPV
-----MVRVQNKLEKASACLEYFTTRQWAFADNNVQALCRSLS-PEDRDTDFDFV
TNINWDG--YIESYVLG---IRRFLFKE----SPHTLPKSRTIMRRLHIVHVLGQVLAV
LFLWRFVFLRSASLRSVWRSIVELLTRAARMLAVA-----

>Bmo_swdb12

-----MASCVGA
NYSSGS-DYTPVAEFYAEKSVFV-----TGGTGFMGKLFVEKLLRSCPK
IKKIY----LLMRPKRGQDVASRLTELTQSP--VFETLRKER---PQEL-NKIVPIVGD
ITEPELGISQTDQMLLCQMVS AIFHSAATVKFDEKLKLSVTINMLGTQQLVQLCHRMLG-
LV-----ALVHVSTAYCN--CE--RERV-----EETVYAPPADPGHVVALVQTL
P-DELVDRIPTPLVVHRPNTYTFTKALAEDMLIKESGN--LPVAIVRPSI-----
-----VLSSV--REPVKGWVD--NWNGPNGIVAAVGKGIFRTMLGSGDKV
ADLVPVDTVINLMIVCAWRTHL---R-RDQG-----VVVYNCCTGQQNPITWKRFBK
SSF-KYMRKHPF--TEVVWYPGGD-ITSNRLKHNVLTLMQHRAPAVLMDLVSRRTGNKPM
-----MVRVQNKLEKAAACLEYFTTRQWSFADDNVQALCLLS-PEDRRTDFDFV
KNIDWDA--YIESYVLG---IRRFLFKE----SPETLPKSRSLLKRLHIIHILTQVA AV
FFIWRFLFSRSEVLRGLWRRIVDLLTRAARLLAIA-----

>Dpl_FAR3

-----MSLD
DNDLDS-LPDRIAETFAGLTLLV-----TGGTGFMGKVLVEKLLRKCPD
IAKIM----LLVRPKKGKSPKQRLEEMLNDE--LFAKLRSRGGVEPLL-EKLQIVTGD
VSAPDLAISDTDRLDVIENVHIVVHAAATIRFDEELKKAVFLNVRGTKLILDLAKQCKK-

LK-----LFIHISTAYCH--LH--EKLL-----EEKPYPPPANPHKIIIEAMEWM
T-DEAVATITPNLLSKLPNSYAFTKALGEALAVEAMEH--IPVIVLRPSI-----
-----GAGKGVIRTMYCKSNSY
ADYLPVDVFINIGIMICVWNYIK---L-GDTK-----SNVINFTSSAEIKVTWLEMID
AGREIIMNRVPL--NNVWVYPGGS-MKHSRLYHNICALFFHWIPAIIDTLLFCLGYKPV
-----LMRVHRRISKGFVFEYYTNNQWDFKSDIAQTVRQKLN-PRERRDYKVDA
IGLDISK--YFEDCIRA---ARIFILKE-----SDDTLPSARRHMKIMWFVDIVAQFLFW
ALMMYWISGWMAFYSFVVGSSNITPKAIVE-----

>Hmel-ctg10

-----MASEGYS
SSELES-MPDRIAETFTGLHLLV-----TGGTGFMGKVLVEKLLRKCPD
IGKIM----LLVRPKKGKTPKQRLEEMLNDE--LFGKLRALRGGVEPLL-EKLEIVNGD
ASAPDLAISEADRQTIIDNVNIIHAAATIRFDEELKKA VLLNVRGTKLVFELGKKCKN-
LQ-----LFIHISTAYCH--LH--EKLL-----EERPYPADPHKIIDAMEWM
D-EETIATITPKLLSKLPNSYAFTKALGEALAVEAMEH--IPVILRPSI-----
-----VIPIW--QEPLPGWTD--NINGPTGLLIGAGKGVIRTMYCKSNSY
ADYLPVDVFINIGIMICTWNYIK---N-GDTQ-----RTVVNFTSSAEIKVTWLEMID
AGREIIMKRVPL--NGVWVYPGGS-MKHSRLYHNICALFFHWIPAILIDTLLFCLGYKPV
-----LMRVHRRISKGFDVFEYYTNNQWDFKSDIAQTVRKSLN-PKERRDYKVDA
IGLDILK--YFEDCIKA---ARIYILKE-----TDDTLPAARRHMLM-----

>Ban_EST6

-----MSSEGYT
SSELES-MPDRIAETFSGMNLII-----TGGTGFMGKVLVEKLLRKVPD
IGKIM----ILVRPKKGKTPKQRLEEMLNDA--LFEKLRTLGRGSIAPLL-EKMQUIIDGD
MSAPDLAISEANRQMIYDEVDMIHAAATVRFDEELKKA VLLNVRGTKLILEIAKKCKN-
LK-----LFIHISTAYCH--LH--EKLL-----EERPYPADPHKIIDAMEWM
D-DDTIATITPKLLSKLPNSYAFTKALGEALAVEAMEH--IPAVILRPSI-----
-----VIPIW--QEPVPGWTD--NINGPTGLLIGAGKGVIRTMYCKGNSY
ADYLPVDVFINIGIMIVAWHYL-----

>OnuZ3

-----MSSEGYS
ASEVDA-MTDRIAATYAGLSVFF-----TGGTGFMGKVLIEKLLRKCTE
IRQIY----LLVRPKKGKTPKQRLEELFQGE--LFEQLRNLRGGVEPIL-EKVTLISGD
VSEPDLAMSEADRQLLIENVDIHAAATIRFDEELKKA VLLNVRGTKLIVELAKTCKK-
LK-----LFIHISTAYCH--LH--EKLL-----EEKPYPPADPHQIIQAMEWM
D-EETVAQLTPKLLDKLPNSYAFTKALGEAVVVEAMEADLIPAMILRPSI-----

-----VIPIW--QEPLPGWTD--NINGPTGLLIGAGKGVIRTMYCKSNSY
ADYLPVDVFINGIMISAWNYIT---Y-GDKK-----SRVVNFTSSAEIKVTWLEMID
AGREIIMNRVPL--NGVWVYPGGS-MKHSRLYHNICALFFHWIPAILIDILLFCLGYKPI
-----LMRVHRRISKGFVFEYYTNNQWDFKSDIAQTVRLRLN-TRERRDYKVDA
VGLDIMK--YFEDCIKA---ARIYILKE----YDDTLPAARRHMRVMYWVDVIAQCLFW
GLILYWISGWFPSITSVFATSDPAPTVMMA-----

>Her_EST1

-----MASEGYS
PSELES-MPDRIAETFTGLHLLV-----TGGTGFMGKVLVEKLLRKCPD
IGKIM----LLVRPKKGKTPKQRLEEMLNDE--LFGKLRLRGGVEPLL-EKLEIVNGD
ASAPDLAISEADRQAIVDNVNIIHAAATIRFDEELKKAVLLNVRGTKLVFELGKKCKN-
LQ-----LFIHISTAYCH--LH--EKLL-----EERPYPADPHKIIDAMEWM
D-EETIATITPKLLSKLPNSYAFTKALGKALAVEAMEH--IPVILRPVY-----
-----WXYHT--GRTVTGLEG--KSNGATGMLMGGCKGFEXEAVFRKG---

-----TRNQLDAAKDIGAIAIKTH-----

>Bmo_swdb6

-----MSSEGYS
AEEVDS-MPDRIAASFSNMTVLI-----TGGTGFMGKVLVEKLLRKCD
VKNII----LLVRPKKSKNPKQRLQQMFNGE--LFEQVRNMRGGVQGLL-KKVCLVSGD
ASAPDLAISPEDRQSLVENVDIIHAAATIRFDEELKKAVLLNVRGTKLMVELAKECKK-
LQ-----LFIHISTSYPCH--LH--EKLL-----EEKPYPPADPHQVIQAVEWM
D-EETIAAMTPKILNKLNSYAFTKALGEALAVEAMDH--IPVMILRPSI-----
-----VIPIW--QEPIPGWTD--NINGPTGLLIDD----QCVFTQLNL-
--LGPV--MVNLSIKDLRGHIA---R-PDKK-----SSVINFTSSAEIKVTWSEMID
AGREIIMNRVPL--NGVWVYPGGS-MKHSRLYHNICVFFFHWIPAVFIDILLFCLGYKPV
-----LMRVQRRINKGFVFEYYTNNQWDFKSDIAQTVRQRLN-TRERRDYKVDA
GGLDISK--YFEDCIRA---ARIYILKE----YDDTLPAARRHMKVMWFVDLVTRCLFW
GFVFWLYSWTTSFGSSATTSNVFPAAVVMES-----

>Dpl_FAR4

MQFIGD-MSRSVTEFYDGKCIFV-----TGATGFVGKVLVEKILRSLPG
VKNVY----LLMRQKKGTSRDDRLKDLWNSR--IFDNLRANN---PDAF-NKIKLISGD
LLKEDLGICNDDRGVIQENCNIVFHSAAACVRFDQKLKDAVETNTTATLRLKLAETMKF-
SK-----SQLNPYKIFAS--NF--ICLI-----
-----PPTKHSS-----

MGR-VHVQEFPF--SVCLWYPGGS-AKSSKVQHLLALFFTHLLPAYFVDLLMFLMGKKT
-----MVKIQKRVSYGLNVLQYYTTKEWFFDNDYYRSLSKRIS-KDDNDVFYTNL
KTINWSA--YIRNYIKG---AREFCCKE-----DPSTLPQARKLQRQLFWLDKAVQVVIY
FLIAYFIYIIRFFVM-----

>OnuZ4

----MA-PSMTVPEYYAGKTLFI-----TGSTGFMGKVLIEKLLRSCPD
IKKIY----LLMRPKKGHGSKERLDGFMNCR--VFDKLKSEH---PEQF-HKLQVVP
ILMEDLGLSVEDRDTLQRECQVLMHCAACVRFD MFIRDAVNMTVGT
KRVLDVASGMKQ-
IE-----VVFHVSTAYCR--CE--VEVL-----EERLYPAK
HRPKHVIETVNWM
D-DELLTHLQPKIIEPQNTYAYTKSLTEDLVAQHAGK--FPIVIARPSI-----
-----VTAAY--KEPMPGWVD--NLNGPTGLLVGAGKGVIRTMHCNENYA
ADIVPVDMMVNACILLGYTTAL---E-KPKE-----VQFCNIAQSGINGFTWGEALA
LGR-IHVMEYPF--SICLWYPGGA-PSASRLRHQVTLFLTHTLPAYTVDLLARALQK
PF-----MVKMQRISGLEVLQYYTTKEWHFRNENLRALRTKVT-EEDDET
FYTDL
TVIDWNT--YIRDYIKG---AREFVMEKE-----DPSTLPQARRLNRLYLD
TFTKIFIY
SIIASSWMKRSISNILKMFVAA-----

>Bmo_swdb5

----MA-PSASVAEYYAGKSIFI-----TGATGFMGKVLVEKLLKSCPG
LNKLY----LLMRPKKGQSSKERLDDFLGFK--LFGPLQKEN---PKCF-EKLHV
VPGLILMDDLGISIADRELIRECQVIFHCAACVSFGPELKKIVKLNTVATKRVLE
LAKDFNN-LE-----AFIHVSTSYCR--CE--LDLL-----EEKLYPS
PHRPEHIMDCMRWMD-DKLVAHMQPK-----

-----PQK-----IQICNITQSGLN
PITWGEALD
MGR-VHVREYPF--SVCLWYPGGS-PKKT
RIQHEIALFFTHLLPAYFVDLLLFL
LGKKT-----MIKVQKRIN
YGLEVLQYYTTKKWLFKNDNFLALRT
KIS-AEDDRIFYTDI
QEIHWND--YIREYIKG---AREFC
CDE-----DPSTLPQARRLQKQ-----

>Hmel-ctg12

-----MQPSVTEYYEGKSVLI-----TGATG
FVGKTLVEKLLRSCPG
VKTIY----LLMRKKKGVSQERIRDLCSNI--IFDHLREKQ---PEAF-EKIKLVAGD
ILEEGLGISNDDRQELQKNCNIVYHSAACVRFDQKLKIAIHINTVGTERVLKLAETMEN-
LE-----SFLHLSTAYCR--CD--LPVL-----DEFLYP
AVHDPNKIMELVEWMD-DDTLDFLEPR
LISSEPNTYSYTKAITEDLVAEYSPK--LP
IAIGRPSI-----VTASW--KEPMPGWVD--NLNGPTG
LLTASGKGVLR
TMLCNPSYT
ADAVPVDVVVNGCILAYLTAI---D-KPKK-----MPIY
NITLSGVQRLTWGEIIE
LGK-HWVLKYPY--TVALWYPGGN-IKSNRLYHYTMVFLTHLIPAYLIDMLLFL
LGRKKT

-----MVNVYKRISHGMKVLQFYTTKEWHFRNSNFLSLKNRIN-KNENEIFYTDL
SELNLDA--YLKDYILG---TRKYIVKE-----DESTLPRARKLLKM-----

>Ban_EST4

-----MAPTVAEFYEGKHFVI-----TGATGFVGKALVEKLLRSCPG
IQTIIY----LLMRPKKGMSGEDRLKELCNL--IFDYLRDKQ---PECF-MKVKLIAGD
VLEELGISNDDRQELQKNCNIVIHSAAACVRFDKNLKDAVHMNTRGTLRVLKLAETMEK
-
IE-----AFVHLSTAYCR--CQ--LDEL-----EEKLYPAAHDPEKLMDLLEWL
D-DDTLAYLEPKLISSEPNTYSYT-----

>Ban_EST1

----M-TSMGVREFYAGKKIFI-----TGATGFMGKVLVEKLLRSCPD
VETIY----ILVRRKKGQSPEARLEAFKCG--AFEKLLEQD---AKAF-RKVRLVPGD
IPEDNLGIPDIIIEQELQKECQIVVNNAACVSFNLVPRKAVQMNTMGTQKVLQLAEKMKK-
LE-----VFLHVSTSFCH--DY--IDVL-----EEKIYKAKHNPLDIINMLKWM
D-DDTLAALQPELIKPYPNTYGYTKSLSEDLVSQYSGK--FPIALA-----

>Dpl-ctg17

-----MDLML-----
-----Q--LFEKLLEMN---PKVV-DKIKVINGD
IMEEGLGLSPQHLEELRNECQIVFNNAASVSFNLSLKEAVKTNVMGTQKVLALADTMKK
-
LE-----AFVHVSTSFCH--DH--LKVV-----EEKVYPAPHSPKNVIDIISWM
D-DETLATLEKKLVSPFPNTYGYTKCLTEQLISDHGAT--YPIAIARPSI-----
-----VIPAF--KDPMPGWVD--NVNGPNGIMYAASRGVLHTIYCKQTTK
TDSIPVDMAINGLIILGCLTATE-----

AIIEVGP--YIETCMIG---GKLFCLKE----KLENLPKARLQNNM-----

>Her_EST2

-----MASEVNEWYRGRKVLV-----TGASGLMGKVLIEKLLYSVSD
IGCVY----ALVRSKRGKSPESRIEDMWKLP--LFSRIREEK---PHVM-KKLIPVVG
ILYDNLGIEKNQLEEIYNEVSIVFHFAATLRLEAPLKEGLEMNTKGTLRVLAIAKRMKN-
LV-----SFVHLSTAFCY--PD--HGRM-----AEKVHDPADPHEVLRAASWL
S-EEQLNLLASSMMQQHPNSYTYSKRLAEALVKESYAE--IPTVVVRPSI-----
-----VTPAY--KEPTPGWVD--NLNGPIGLMIGAGKGVIRTMHCYGHYH
AEVIPVDIAINAILIPYYINTKI--E-RPAD-----IPVFNLTSGDDRDTTWKEVLD
VGK-ATVRKFPF--EGPLWYPNGN-IRHNKLIHEL CVFFYHIIPAYLIDFLMLIFGQKRF
-----MVRIQNRISVGLEVLQYFT-----

>Ban_EST5

-----MASEVNEWYRGRKVLV-----TGASGLMGKVLIEKLLYSVPD
IGCVY----ALVRSKRGKTPESRIEDMWKLP--LFSRIREEK---PHAM-KKLVPVTGD
IMYDELGIEKAQLEEIYDEVSI VFHFAASLRLEAPLREGLEMNTKGTLRVLDMAKKMKK-
LV-----SFVHLSTAFCY--PD--YERM-----AEKVHDPANPHEVLRAASWL
T-DDQLNALAPSLMQLHPNSYTYSKRLAEALVRESYAE--IPTVVVRPSI-----
-----VTPSH--KEPTPGWVD--NLNGPIGLMIGAGKGVIRTMHRYGHYH
AEVIPVDIAINAILIPHYIHTKI--D-RPTE-----IPVFNLTSGDDRDTTWKEVLD
VGK-ATVRKFPF--EGPLWYPN-----

>Bmo_swd7

-----MTSQINNEWYKGRKVLV-----TGSSGLMGKVLIEKLLYSVPD
IGCVY----ALVRSKRGKSPESRIEDMWKLP--LFTRIREEK---PHVM-KKLVAVPGD
IICDKLGIEKTKLEQIYNEVSVVFHFAASLRLEAPLKEGLEMNTKGTMRVLELSKNIKN-
LV-----AFVHLSTAFCY--PD--YERL-----AEKVHDPPTDPENVLQAASWL
T-EQQLNILAPSIYKKHPNSYTYSKRLAEALVKESYPQ--LPAVVVRPSI-----
-----VTPAY--KEPIAGWVD--NLNGPIGLMVGAGKGVIRSMHCYGHYH
AEVIPIDIAINAIIVISYKIGNQS--E-RPPE-----IPTFNLTGDDRNTTWKEVLD
IGK-ATVRKYPF--EGPLWYPNGN-IRHNKFIHDL CVFFYHLVPAYFIDFLMFLFMQKRF
-----MVRIQNRISVGLEVLQYFTTREWTFDNDNFKALATMLN-PVDKEVFPMDL
SVIEDEP--YIESCMIG---GKLYCMKE----KLENLPKARLQNNILYVLDKITTFFY

LILLYWVVLVYCAPVREVLVSYGGPFVRYLPLVVILKCNCNKCNCCKKRHAESEPKIEAAHF
G

TIWVSLAMIKIKCLIL

>Dpl-ctg9

-----MTFL
EDRDLD-NVPTIPEYYRGKVVFV-----TGGSGFMGKVLIEKLLYSCPD
LEKIY----LLLRPKKGVQPEERLSAIYSSH--CFDRLRNER---PGVFDSKVFFVAGD
VSDIGLGLSEDDRAILLKQTQILFHVAASVRFDDPLKVAVRLNLFGTKQVVDLAKDMKN

-
LE-----SFVHVSTSYAN--TN--REVI-----EEILYPALGDWRETLEICETA
D-DHTLKVLTTPKFIGELPNTYVFTKQLAEHVVYEQKGK--MPIVIVRPSI-----
-----VISSH--LEPVPGWID--NFNGPAGLMAASGKGILRTILSSPEIV
SDYIPVDVAIKACIVASWVRGTTKL-E-ATDD-----IPIYNDCVGKLNHMTMQDMVS
VGS-EIAQILPL--KNALWAYGVS-ITTSKFKYNLEVLLFHMLPALLVDMILWIIGKNPM
-----LVRVQRRITYTANMALHYLTKQWTFSNRNLIALRSKIK-DDDMRDFYYEI
ENIDKYE--FYKQCCFG---GRKYLLKE----TDDSLEESQAQYKRMVVLDKLVKMTFY
GCLIWVIMRREFIRDFIQIHH-----

>Dpl-ctg14

-----FMGKVLIEKLLYSCPD
LEKIY----LLLRPKKGVQPEERLSAIYSSH--CFDRLRNER---PGVFDSKVFFVAGD
VSDTGLGLSEDDRAILLNQTQILFHVAASVRFDDPLKVAVRLNLFGTKQVVDLAKDMK
N-

LE-----SFVHVSTSYAN--TN--REVI-----EEILYPALGDWRETLEICETA
D-DHTLKVLTTPKFIGELPNTYVFTKQLAEHVVYEQKGK--MPIVIVRPSI-----
-----VISSH--LEPVPGWID--NFNGPAGLMAASGKGILRTILSSPEIV
SDYIPVDVAIKACIVASWVRGTTKL-E-ATDD-----IPIYNDCVGKLNHMTMQDMVS
VGS-EIAQILPL--KNALWAYGVS-ITTSKFKYNLEVLLFHMLPALLVDMILWIIGKNPM
-----LVRVQRRITYTANMALHYLTKQWTFSNRNLIALRSKIK-DDDMRHFYYEI
ENIDKYE--FYKQCCFG---GRKYLLKE----TDDSLEESQAQYKR-----

>Hmel-ctg15

-----MTFL
EDRDFD-DVPTIPEYYRGKTIFL-----TGGSGFMGKVLLEKLLYSCTD
LDRIY----LLLRNKKGVPPPEHRLAAIYKSP--CFDRLRNEK---PGVFDSKVFFIAGD
VSEIGLGLSDDDRTLINRTHIIFHVAASVRFDDHLKAAIKLNLRGTKQILELATEVRN-
LE-----CFTHVSTSYSN--TN--RELV-----EEIMYPPLADWRDTLKICDEL
D-DRVLQVLTAKYIGEMPNTYVFSKQLAEHVVYEQKGK--LPVVIIRPSI-----
-----VVSSV--KDPIPGWIE--NFNGPTGIIVACGKGILRTIYSKPDII
SDYIPVDVAIKCFIASTWSRGTTKL-E-PTDD-----VPIYNCSAGSLNNITVHELIS
IGK-QIIASMPL--SNMIWCFGAT-ITSSLFIFNVQVLFLHLLPAVIIDMLLWIFGQKTM
-----LVKIQRRITYVANLALHYTTHQWTFSNVNFVTLRSKIK-DKDQEDFYIDL

ENVDRYE--FFRQCCNA--GRKYLLHE----TEDDIPKNRAHYARYLFLLYDCKHDRF
WVLFPLENIKYLTFSLRSVSRGKVPR-----

>OnuZ1

-----MGFL
EERNFE-DVPEIPEYYKGKTIFI-----TGGSGFMGKALIEKLLYSCSD
LDRIY----LLLRTKKG VKAEDRLAELYSTG--CFDRLREEK---PDIFSSKV FVVAGD
VMDPGLGLSEEDRALLVNRVNIIHFVAASVRFDDPLPFATKLN LGGTKEVVTLAKEVRN-
LS-----ALVHVSTVYSN--TN--RDVI-----EEVMYPPHADWKDTLEVCDVI
D-EHSLRVLT PKYLG DIPNTYTFTKQLAEHV VYE QKGQ--LPAVIIGPSI-----
-----VISSV--EEPVPGWIE--NFNGPVGMLVACGKGIMRSIYTDPNLI
SDYMPVDVSIKSIVTAAWIRGTKKL-E-PPDD-----VQIYNCCAGKLN NITMQELVD
IGK-RLAASLPL--NDTLWNIGGS-ITTSRTIHYIKVLILHCLPAIFVDAILLLL GK KPL
-----LLKVQRR IYIANLALRY YITKEWTFDNTNFIQLRSRIK-EQDKKHFFYYDI
ENVDKEE--YFRKSCIG--GRKYLLKE----KDEDLPKAKAHHKRMVILDKTVQCIFY
GYLFWWWV VNTHYIKGLT-DFLYEIFTM-----

>Bmo_swdb3

-----MGLS
EERDMT-HVPTIPEYYKGKSIFI-----TGGSGFIGKIVIEKLLYSCTD
LDRIY----LLMRPKKSVSPDKRLAQLYSTP--CFDRLRKEK---PGVFQSKVLV VPGD
VMEDGLGVSD EDRKLLAERVNIVFHSAASVRFDDPLKYAVRLNLNGTKEVVELAKSMH
N-
LS-----SFVHVSTSYSN--TN--REVI-----EEVMYPPHADWRDTLEICEKL
D-EHTLRVMT PKYLGELPNTYTFSKQLAEHAVYEQRGQ--LPAVIVRPSI-----
-----VIASA--DEPISGWIE--NFNGPVGIFVACGKGE-----

>Dpl-ctg13

-----MGF
LDRDFR-DVPGIAEYYKDKTIFI-----TGGSGFMGKVLVEKLLYSCPD
LDRIY----LLLRNKG VDAEDRLKNLYSSR--CFDRLRNEK---PDVFDKKVSFIAGD
VGELGLGICDEDRALIINRVHIVFHVAASVRFNDSLKVAARLNLRGTREAVELAKEIRN-
LE-----AFVHVSTSYAN--TN--RQCI-----DEVIYPASGDWRDTLEVIENV
D-EHTLNVLT PKYLDKLPNTYVFTKQLAEHV VNEQKGK--LPIVIMRPSI-----
-----VISSV--REPMVGWIE--NLNGPVAILIASGKGILHTMYTDPNLI
SDYMPVDIAIKAFIAAAWARGTKKL-E-PTDD-----IHL YNCSSSEIKALTMGQIVE
LGM-EISKKIPL--DSL VWHPCGG-LTSSKLVNYVKVLLLHLLPALLVDGILKLIGKKPM
-----LTKVQRR IYVANLALEY YVTQQWTFKNVNIVKLRSKIK-EEDLKEFFYEM
ETIDIHE--YFMNSCYG--GKLYILKE----KLEDLPAARIHYRRMELLHKVVM IIFK

LSVLWFIYNTSFFRDVM-NMLYAVFVG-----

>Hmel-ctg16

-----MGFL
EECDLN-NVPDIPEYYK GK TLLI-----TGGSGFMGKVLIEKLLYSCPD
LDKIY----MLLRSKKGVPEDRLSAIYSSR--CFDRLRRER---SDIFKKKVFFISGD
VSEIGLGISDDDKALIVRTTNIIHFVAASVRFDDSLKVAANLNLRGTRELVELAKNMKN-
LE-----VLVHVSTSYAN--TN--RQCI-----DEVIYPAFADWRDTLEICEKL
D-NNTLNLVLT PKYL GELPNTYVFTKQLAEHVLWEEKGK--LPIIIMRPSI-----
-----VISSV--NEPLVGWVE--NLNGPVGMLVASGKGILRTLTYTDPDLV
SDYIPVDVAIKAFIAGAWIRGTKKL-E-PTDD-----IEVYNCSTSHMKTMTIGEIVE
YGRNMIVHEVPL--EGMLWYVGGS-LTTSRLEYNLKVILLHLLPAIFVDLILWISGRKPM
-----LVKLQRRIYSANLALHYVVTQQWTFKNTTS-----

>Bmo_pgFAR

-----MSH
NGTLDE-HYQTVSEFYDGKSVFI-----TGATGFLGKAYVEKLAYSCPG
IVSIY----ILIRNKKGSNTEERM RKYLDQP--IFSRIKYE H---PEYF-KKIIPISGD
IAAPKLGLCDEERNILINEVSIVIHSAA SVKLN DHLKFTLNTNVGGTMKVLELVKEMKN-
LA-----MFVYVSTAYSN--TS--QRIL-----EEKLYPQSLNLSEIQKFAEEH
YILGKDDDEMIKFIGNHPNTYAYTKALAENLVAEEHGE--IPTIIIRPSI-----
-----ITASA--EEPVRGFVD--SWGATAMA AASTLKGWNYIMYSTGEEN
IDLIPLDYVVNLTLVAIAKN-----K-PTKE-----VTVYHVTTSDLNPISIRRFI
KLS-EFASKNPT--SNAAPFAATTLLTKQKPLIKLVTFLMQTTPAFLADFWMKTQRKEAK
-----FVKQHNLVVRSRDQLEFFPSQSWLLRCERARVLSAGLG-DSGRAVFRCDP
SPIDWDQ--YLPITYFEG---INKHLFKN-----KF-----

>Dpl_FAR1

-----TC-N
VKKIY----LLLRPKKGKTAIQRLNQILEDP--VYGILRSEQ---PDFA-SKLIPVEGD
VVDLNLGIEEESRKKIIEEVNIIFHGAATINFEETIKIAALTNIRGTREILNLAKSCKQ-
LK-----GPLNLQLGRKS--LA--LLKLLSLHHGRGTRTVESSRRLDQLVTTEDVE
E-EGTRVQINAKK-----
-----ILSNI-----

>Dpl-ctg7

-----MEIARRIEEKGLEKSLRV
KQALES-GNSEVVTVYDGAVLFI-----TGGSGFIGKQLVEKILRTC-N
VKKIY----LLLRPKKGKTAIQRLNQILEDP--VYGILRSEQ---PDFA-SKLIPVEGD
VVDNLNGIEEESRKKIIEEVNIIFHGAATINFEETIKVAALTNIRGTREILNLA KSCKQ-
LK-----SLVHISTAYAH--AT--RSRI--KTEIKEDFYDSPLPPDALIQLAEDL
E-NEQLEKVIEPLRRDWPNTYTFTKAITEELVRQTATD--LPVCIVRPAI-----
-----VISAY--KEPVPGWVDIKNAYGPSGMVLGVSLGVTHTVHADEDIM
LDFVPVDIVNNALIVA AWTTHQSYI-A-GEKQ-----IKIY-FVTGHRNPIYYRDVVN
VVK-EQARPLVS--PKAIWHSFAV-VTKYKLIYLLLTWLLHYIPGYIIDGVCVMIGEKPQ
-----FIKVYKKVYSVSSVFVYFTNNDWVFLDDNALRLYDQLN-SADKELFTCDM
QQVDMPA--MLMTWFGY--VSKFIIKD----DVTQYEYAVRKQWWLRIANVMFLTLYF
YALYKLVAVTFACLFYFFNLSAGVYQTSV-----

>Dpl-ctg15

-----TC-N
VKKIY----LLLRPKKGKTAIQRLNQILEDP--VYGILRSEQ---PDFA-SKLIPVEGD
VVELNLGMEEESRKKIIEEVNIIFHGAATINFEETIKIAALTNIRGTREILNLA KSCKQ-
LK-----SLVHISTAYAH--AT--RSRI--KTEIKEDFYDSPLPPDALIQFAEDL
E-NEQLEKVIEPLRRDWPNTYTFTKAITEELVRQTATD--LPVCIVRPAI-----
-----VISAY--KEPVPGWVDIKNAYGPSGMVLGVSLGVTHTVHADEDIM
LDFVPVDIVNNALIVA AWTTHQSYI-A-GEKQ-----IKIY-FVTGHRNPIYYRDHQL
HQF-LVARPLVS--PKAIWHSFAV-VTKYKLIYLLLTWLLHYIPGYIIDGVCVMIGEKPQ
-----FIKVYKKVYSVSSVFVYFTNNDWVFLDDNALRLYDQLN-SADKELFTCDM
QQVDMPA--MLMTWFGY--VSKFIIKD----DVTQYEYAVRKQWWLRIANVMFLTLYF
YALYKLVAVTFACLFYFFNLSAGVYQTSV-----

>Dpl_FAR5

-----MANQCGETKTLGIENKHSVGCNM
ETDKEVPKMSEVQNIFYNGKNVLI-----TGATGFLGKILVEKLLRSCSG
VENLY----LLVRQKRGKDIYTRIEEFEDP--VFDRLKAEV---PKFR-HKIVVIPAD
CEAAGLGLTISDRQTLIEKVN VVFHSAATVKFDEHLRAALATNVCAPLYLLGLAREIKK-
LE-----VFIHISTAYSN--SH--LSFI-----EEKFYPC EANSGLQK MIDKM
S-DEQINKISPAVLG SWPNTYTFTKALAEKELRENSKN--IPLGIFRPAI-----
-----VTSTL--KEPLKCWLD--NMYGPTGVA VGTATGMLRTVQC DKTVT
ADLVPVDSVVNCLIVA AYNVHREFVKS-PPQE-----PPIFNYVSSVENRITWGDFTD
LNM-ARIDKHPF--SNAVWYVSLT-LNKSSFVN A VCVLFLHLLPAALVDGLAVCVGKKPKQ
-----MLKVYRKIHKFSSVLSYFCTKEIKFCNKR TRELWDNTS-QTDKQIFPFSM
AEVSWSS--YFDDYLAG---IRRYLFKE----SDDTLPRARRKWTRLYYLHQIVRIVFC
LFAIYVICKLMLSHGNLHSLVYGQSLSLKCLVPDVA VRIKHTYINIKRS-----

>Hmel-ctg20

-----VFDRLKEEV---PKFR-HKIVAIPAD
CEAAGLGLTISDRQTLIEKVHVIFHSAATVKFDEHLRAALVINVKAPLYLLQLAKDMKG-
LK-----VFMHISTAYSN--CH--LSHV-----EKKIYPCEANSEKLHSIVDKL
T-DNEVNDILPTILGKWPNTYTFTKALAENEIKLNSKN--VPVAIFRPAI-----
-----VTSTV--KEPLKCWLD--NMYGPTGVAVGTVTGMLRTVQCDPSVT
ADLVPVDSVVNCLMVAARNVSRQYEER-AVIE-----PPIFNYVSSVENRITWGDFT
LNM-ARIDKQPF--SNAVWYASVT-LNKSTFMNQLYIFFLHLLPAALVDALAICIGKKPK
-----MLKVYRKIHKFSSVLMYFCTREITFCNQHTRSLWEKTS-ESDKQIFPFSM
GEVNWDD--YFDSYLPG---IRRYLFKE----SDDTVPQARIKWKRYLLLY-----

>OnuZ5

-----MAPLLDSTPGDDAAFKIPAMAYSNDNDNDASLKTNNNDI
DTRNNV-ELTQIQKFYNGKNILI-----TGATGFLGKILVQKLLRCCPG
VENLY----LLVRQKRGKDIYTRIEEIFDDP--VFDRLKEEV---PKFR-HKIVVIPAD
CEAAGLGLTISDRQTLTEKVNVIHSAATVKFDEQLRLAFNVNVKASLHVLRLARDIKG-
LD-----VLMHISTAYSN--SH--LDQV-----EEKFYPCNMDLETNLNQTIEKM
T-DEEINSQSKLLGEYPNTYTMTKALAEINLRINSKG--IPLAIFRPAV-----
-----VVSSA--KEPVKCWLD--NMNGPNGIVVSGTGILRTLQCDMQGT
ADPVPVDMVVNCLMAAAVNVNAAYAQSNNPPE-----PPIFNYVSSVENKITWGEFMT
LNM-EQVDKYPF--SNAVWYISLR-LTKSWLLNRFYMFLLHLIPAVLMDGLTVCVGGKKPK
-----MLKVYKKIHKFSDVLSYFCTKDIEFCNRRTQELWQKTS-EEDKQLFPFSM
AELDWRD--YFQDYLYG---IRRYLFKE----NDDNLPQARIKWKRLYYLHQLVTMLFY
FLALYALWSTFSSFL-----

>Bmo_swdb9

-----MAPVAIEENYIKTNELSTKISRIMEDYKESNYCGDCEHNIYVNE
DTNQDV-NMSEVQRFYSGKNVLI-----TGGTGFLGKVLIEKLLRSCPG
VENLY----LLVRQKKGKDIYTRIEEIFEDP--VFDRLKTQV---PKFR-HKIVVVPAD
CEAAGLGLTISDRHMLTEKVNIIHSAATVKFDEHLRAALTNNVRAPLHLLRLARDMRK
-
LD-----VLMHISTAYSN--SH--LPKI-----EEKFYACEPTCQQLETTISK
S-DEQINAMLPKILGPWPNTYTFTKALAEKEIRVNANG--VPVGIFRPAI-----
-----VTSTC--KEPLKSWVD--NMYGPTGVAVGSGT-----

-----FPCV-----

>Yev_FARI

-----MSTETVDVANQRNSN
ANMADKKTLAKTTHLSLSNITKIENKLNIFEENLEKSRVCLDCSEKRLADTDQNSNDLEI

TENGRR-SNTDIQEFYNGKSILV-----TGATGFLGKVLVEKLLRCCPG
VENIY----LLVRQKKGKDIYTRIDDIFDDP--VFERLKREA---PKFR-HKIVAIPGD
CGAAGLGLTLNDRQTLTEKVNIIFHSAATVKFDEHLRTALVTNVCAPLHMLRLVRDMK
G-
LD-----VLMHISTAYSN--CH--LSQV-----RERFYPCSVDCDQLSGLVDKF
T-DSEIDSLPTILGSWPNTYAHT-----
-----ID--NMCGLRGVVVGAATGVLRTLLCDKEVT
AEIVPVDMMVNCLLASARDVHLSYKQSPPPAE-----PPIFNYVSSVEQRITWGGFME
HNV-EQIGWSPL--NSAIWYFCLT-LNTSPLVNTLYEVFLHLVPAVLIDGLALCVGQSPK
-----MLKLYRKIRKFSSVLSYFSTKEIKFCNKRTRELWERTS-EDDKQLFPFSM
AQMDWSK--YFQGYILG---IRKYIFKE----EDDSLPAQAKRKWTRLYYFHQIVRVIFI
LFAVYLVWHIFSSVF-----

>Dpl-ctg16

-----MALSEQTDVKGLK
-IEEKM-EESQIQKAFAGSTILL-----TGGTGFLGKLLVEKLLRSCPD
VKKIY----LLTRPKKNKDIKRLQEQFDDC--LYDKLRKER---PDFI-QKIQVVDGD
VSKIGLGINDEDNRKNIINEVEYIFHGAATVRFDEALKTAVLINVRGTREMLVLARACTK-
LR-----ALVHISTAYSN--CP--LKEI-----DEKFYESPLSAEKMIDLVESM
D-DKTLNTITPGILGEFPNTYAYTKFLAEDIVQKNSYG--LPVAVNRPSI-----
-----VVGTA--KEPLLGWID--NVYGPTGVVVGAGVGLIHTLNCDPKAV
ADLVPGDYVVNSVIAAAWKMARHDP-G-NHEEAPMDQL-
PVIYNYVSSEQKPLTWEMFMK
YNE-LYGIETPP--LQAVWAYLLI-LTPNIFYKFCCLLMHWFPAVVDGVCFLIGKKLM

>Hmel-ctg14

-----MEVHTKTDIKSDK
HIMDNI-EDSQIQKTFAGSTIFL-----TGGTGFLGKLMVDKLLRCCPK
IKKLY----LLTRPKKNKEIMKRLQEQFDDV--LYDKLRKQM---PDFM-EKIGIIQGD
MGQPDLGISEEDRNKIINEVEFIFHGAATVRFDEALKTAVAINVRGTREILLARSCTK-
LR-----AHVHISTAYSN--CP--LREI-----DEKFYDSNFSGDKLIDLVENI
D-EKTLDSITLGLLGEYPNTYAYTKSAAEDIVQKYSQG--LPVAVFRPSI-----
-----VISTA--HEPVPGWID--NVYGPTGAVVGAAAGLLHVLLCNPSVI
ADLVPGDFVVNGCIATAWKTARDYP-G-NHEEAPVDNL-
PMTYNYVSSEQNPLTWEMFMK
YSE-VYGLRVPS--MQAIWMYLLW-LTPSTVMYNFYFFLLHWIPAYIIDFFLMIIGKKPI
-----LKKAYVKIKKFSAVIGYFAQREWKFHNGNTLKLKEMD-ETDKQMFNFDM
ESLVWEE--YFQDYVKG---VRIYLLKD----PLDTIPQSRRKHFKLMLIHYFLLSLIC
FGLFKFVW---FIAKLFI-----

>Hmel-ctg17

-----MEVQTKTDIKSDK
HIMDNI-EDSQIQAMFAGSTIFL-----TGGTGFLGKLMVEKLLRCCPK
IKKLY----LLTRPKKNQEIMTRLQEQFEDV--LYDKLRKQM---PDFM-KKIDLIQGD
MGKPDLDISDEDNRNKIINEVEFIFHGAATVRFDEALKTAVAINVRGTREILLARSCTK-
LR-----AHVHISTAYSN--CP--LREI-----DEKFYDSNLPGDKLIDLVENI
N-KETLASITPGLLGEFPNTYSYTKSAAEDIVRKYSQG--LPVAVFRPSI-----
-----VISTA--QEPVPGWID--NVYGPTGVAVGAGVGLLHVLLCNPSAI
ADLVPSDFVVNGCIAIAWKTARDYP-G-NHEEAPEDNL-PIYNYVSSEQNPMTWELFLK
KCE-VHRARAPL--MQATWMYLFW-LTSSEFMYNIYFVILHWVPAYITDFFLVIIGKKPI
-----LKKTYVKIKKFSAVIAYFAQREWKFHNGNILNLYKEMH-ETDKQMFNFDI
ESFVWEE--YFYEYVKG---IRLFLMKD----SLDTIPQSRKKHFKLMLIHYLLSLIS
IGLKFVWCIAIFLCKLFR-----

>Hmel-ctg18

-----MFAGSTIFL-----TGGTGFLGKLMVEKLLRCCPK
IKKLY----LLTRPKKNKEIMTRLQQQFED---LYDKLKKQM---PDFM-EKIDIIQGD
MGKPDLGISEEDNRNKIINEVEFIFHGAATVRFDEALKTAVAINVRGTREILLARSCTK-
LR-----AHVHISTAYSN--CP--LREI-----DEKFYDSNLPGDKLIDLVENI
N-EETLASITPGLLGEFPNTYSYTKSAAEDIVRKYSQG--LPVAVFRPSI-----
-----AASSAVFVEPSGTFVY--G-YFKVLVVVGAGVGILHVVLNPSVI
ADMVPGDFVVNGCIATAWKTARDYP-G-NHEDAPVDNL-
PITYNYVSSEQNPMTWKLFMK
YIE-VYGMRVPS--IQAIWMCLCL-ITPYEFIYNFYFLVLHWIPAYITDFFLVIIGKKPI
-----LKKAYAKIKNFSAVIAAYFAQREWKFHNGNTLNLYKEMD-ETDKQMFNFDM
ESLIWEE--YMEKYVMG---VRIYLLKD----PVD TIPQGRKKQFKLMFKLLYITSYFH

>Ban_EST2

MMEDKY-KESQIQKLFSGASVLL-----TGGTGFLGKLLVEKLLRSCPD
IKKLY----LLTRPKKNKEIKRLQEQFDDP--LYDKLRKVL---PDFI-EKIGIIEGD
VGQIGLGIGEEEDRTTITKEVDFIFHGAATVRFDEALKTAVEINVRGTREMLHLARSCTK-
LR-----AYVHISTAYSN--CP--LKEI-----DEKFYDALLAGDKLIDLVENM
D-VKTLD SITPGLLGEFPNTYAYTKSAAEDIVQKYSKG--LPVAVFRPSI-----
-----VIGTA--RE-----

>Hmel-ctg22

---YT-----ILTRPKKNKEIMKRLQEQLDDV--LYDKLRKQM---PNFI-QKISIIQGD
IEQPYLGISEEDRNKIINEVEFIFHGAATVRFDEALKTAVAINVRGTREILLARSCTKT
AH-----AHVHISTAYSN--CP--LTEI-----DEKFYDRNLSGDKLIDLVENL
D-EKTLDSITPGLLGEPNTYAYTKSAAEDIVRKYSQG--LPVAVFRPSI-----
-----VISTA--HEPVPGWID--NVYGPTGVVVG-GVGILRVLLCNPSLI
ADLVPGDFVVNGCIATAWKTARDYP---EEGAPVDNL-PITYNYVSSEQNPLTWERFTN
YSE-MNRRKMPL--MQATWMCIFW-LEPSKFLYNFYFVILHWIPAYIIDFFLVIIGKKPI
-----LKKTYVKIKKFSVSTYFTQREWKFHNGNTLKLYKEMN-KTDKQLFNFD
KSLVWED--YFYEYVKG---IRIYLMKD-----PLDTIPQSRKKQFKLMLIHYFLLSVIC
FGLFKLVW---FIAKLFISVNPLSFRLQCDFFNRYKGFDDV-----

>Bmo_swdb10

-----MVADIQKYSPKMMPVGEVTGFDAMD
-KLEAL-GESQIGKMFAGTTVLL-----TGGTGFLGKLMVDKLLRCCPD
LKKLF----LLARPKKNKDIKRLQEQLDDV--LYDKLRKER---PNFI-EKICIVEGD
VGAINLGLSQEDRTKIANEVEFIFHGAATVRFDEALKTAVEINVRGTREMCILARSCGK-
LK-----ALVHISTAYSN--CT--VMEI-----EERFYESSLPGDKLIDL VETM
D-EKVINSITPGLLGDFPNTYAYTKSVAEDVVQKYSKG--LPVALFRPSI-----
-----VIGTA--KEPVAGWID--NVYGPTGVVVGAAVGLLHALICKPNAV
ADLVPGDMVNVNACIATAWKTAKDYP-G-
NHEDAPPPDLTPPVYNFVSSTQKPLTWSKFMK
YNE-IYGLEVPT--VQAIYYVFM-LTSSRFAYTLYCFFLHWIPAYIIDGVAVLIGKKPM
-----LRKAYTKISKFSEVISYFATREWKFHSGNTEGLVRELC-PADRQTFDFDL
SRLDWSE--YFYNVVRG---VRVYLLKD-----PVETVPAGLRRHNILKYSHYIFCAVLT
FVLVRLW---AAWSLLDL-----

>Bmo_swdb14

-----MDSALALEIEQVSRQKAL
EEEALR-GESAVRQFYAGTTALI-----TGGTGFIGKQLIEKLLRSC-D
VKRIY----ILARSKKGLSMEERLQLQFKDP--VYDNLRSQQ---PDFA-QKVIPVEGD
ISELGVGLNDEDRMKLEQEVNVIFHVAATTRFVEPLKKATFINVRGTREILELAKCKN-
LR-----CFVHVSTAFFN--AT--KSKI---NHTIEEKFYESPVPPEVMIQLAETV
E-ECRLNAITADLIRDWPNTYCFTKAIAEDVVRTMGKD--LPVAIVRPPV-----
-----VICTL--NEPTGWVDMSSVIGPSGIILTILLGVMHVLLMS-DIN
IPLAPLDYVNNAVIAAASEANKRYN-N-NEKE-----IKVYNISCSGCKIETSCLSDL
MNN-PNTQQYAT--PKAVWYCYGF-
ETGSDVVFWLSTWLLHYIPAYVADFVFNVTSMKRP
EG----IKSFVKMYEKIYKMSLLYGYFLRNQWNLVDDNTVAMLNQMS-KTDRILFNFDI
SKIDWPR--YMLIWCIG---LRKFIVKD-----GLKDSEYGMKKQRWLKIAHISFYTLFF
GVVFSLLYLACRIFMYLCNLNTIAAQTLKI-----

>Bmo_swdb15

-----MDIALALEIEQVSRQKAL

EEEALR-GESAVRQFYAGTTALI-----TGGTGFIGKQLIEKLLRSC-D
VKRIY----ILMRSKKGKSMPERLQSQFNEP--VYDNLRSQQ---PDFA-RKVIPVEGD
ISELGVGLNDEDRMKLAQEVNVIFHVAATTRFEEPLKKATFINVRGTREILELAKCKD-
LR-----SFVHVSTAFSN--AT--KSRI--NHNLEEKIYESPVPPEVMINLAKTV
E-ECRLNAITADLIRDWPNTYCFTKAIAEDVVRTMGKD--LPVVIV-----
-----LLTLMLGVMHVVLTSDIS
IPIVPVDYVNNAVIATASDTNVRYN-K-NEKE-----IKVYNISCSGSKIETSCMSDF
LKN-PNTLEYAT--PKAVWYCYGF-GTGSDVFWLSTWLLHYIPAYVADFVFNVTSMKRP
EG----IKSFVKLYEKIYKMSMLYGYFLRNQWNFVDDNTVAMLNQMS-KTDRILFNFDV
AKIDCSR--FMAIWCIG---LRKFILKD-----GLKNSEYAK-----

>Bmo_swdb16

-----MDSALALEIEQVSRQKAL
EEEALR-GESAVRQFYAGTTALI-----TGGTGFIGKQLIEKLLRSC-D
VKRIY----LLIRSKKGKSMQERLKSQNDP--VYDNLRSQQ---PDFT-RKVIPVEGD
ISELGVGLNNEDEDRMKLAQEVNVIFHVAATTRFEEPLKKATFINVRGTREIMELAKCKD-
LR-----SFVHVSTAFSN--AT--KSRI--NHDLEEKIYESPVPPEVMIQLAETV
E-ECRLNAITADLIRDWPNTYCFTKAIAEDVVRTMGKD--LPVAII-----
-----ILTILGVMHVLLMS-DIN
IPLAPLDYVNNAVIAAASEANKRYN-N-NEKE-----IKVYNISCSGCKIETSCLSDL
MNN-PNTQQYVT--PKAVWYCYAF-STGSDVIFWLLTWLLHYIPAYVADFVFNVTSMKRP
EG----IKSYC-----IAFITGFE-RDDRIRHSVTK
IKPNASHSAYRVARVQHIHTLRLCGVCE-----

>Bmo_swdb17

-----MDSALALEIEQVSRQKAL
EEEALR-GESAVRQFYAGTTALI-----TGGTGFIGKQLIEKLLRSC-D
VKRIY----ILIRSKKGLSMEERLQLQFKDP--VYDNLRSQQ---PDFA-RKVIPVEGD
ISELGVGLNDEDRMKLAQEANVIFHVAATTRFEEPLKKATFINVRGTREIMELAKCKN-
LR-----SFVHVSTAFFN--AT--KSRI--NHTIEEFYESPVPPEVMIQLAETV
E-ECRLNAITADLIRDWPNTYCFTKAIAEDVVRTMGKA--LPVAIVRPPVGKYSRALLSE
IAKVETYKYVVTGHMFACTL--NEPTPGWLDMSVIGPSGILLTAGLGVTHVVLIG-DIT
IALAPVDYVNNTVLATAWETDKRFK-T-NEKE-----SKIYNISNSRCTLEKIA----

>Hmel-ctg13

-----MNPTAPLLDFSEDHEFVSANHLDDYYSQEDQNDAKEAEKQR
LTKGKA-AKTDIQKFYKDQCIFL-----TGGTGFLGKVIIEKLLRACGE
IDTIY----VLVRSKKGKDPMTRIHEMLDDF--IFHAAHKIN---PKGJ-HKVVPIVGD

MELPGIGLSDEDRLLVSRVTIINSAATVKFDEKLSIATGINVKGTKEVIKLAKECKN-
LI-----AITHVSTAFSN--TH--VDFI-----EEKFYESPMSVEAL-EAVSQL
D-DNVIESILPALLGNRPNTYCLTKAVAEAAIRTYGEG--MPICIIRPSI-----
-----VISTY--EEPVRGWTD--SVYGPTGLVVGIGTGVLRTMYFDVNKV
ADMVPVDLTVNAIIVSAYQTAMNFKEN-QTSD-----IPIYNFVSGAQNPLKWGEFIK
YNM-KYGMNDPT--IKAVWYYGLT-PTNNFYFFVFLDFFLHYLPALLMDVFSAVTGKRRV
-----MLKFYTKLRKLANIMFYFSTQHWKFSDENVKDMWSSIS-AQDRAVFPFSI
GEISWDY--MAETFLLGKNTIRFSIRNK-----

>OnuZ2

MNHSLEASPLIPTEVTRDKMERWVEAQNKGEKTEVDVYGKPSEKQIKELNIRSLSRELQ
DNLHELENSVRIADVENQAMNPTAKILDYSEDHEFVSANQLDNYYAEEDKVDAKEEEK
RR
LTKGKA-GKTDIQQFYKDQCVFL-----TGGTGFLGKVLIEKLLRSCTD
VDTIY----VLIRNKKGKDARVRLHDMLEDF--LFHRALDEN---PKGI-HKVVPPIGD
MELPGLGISDEDRRTITSKVSIIINAAATVKFDEKLSVSTGINVRGTKEVLRLAKECRN-
LR-----AITHVSTAFSN--TH--VPYI-----EEKFYDPPMSVEAL-EAVSEI
N-EDLIDAILPTLIGKRPNTYCFTKAVAEAAVRKYGEG--LPICIVRPSI-----
-----VVSTY--EEPVRGWTD--SVYGPTGLVVGTTGTGVLRTMYMDLNKV
ADMVPVDLTVNAILASAWHAAKNFKEN-QTSD-----IPIYNFVSGAQNPIKWGKFIE
LNR-KYGIDKPT--TKAVWYYGLN-PTNSYFMFLFYNNFLHYLPALMVDAYCAVTGRRRA
-----MLKLYSKVMKMANILFYFSTRDWRFSDRGVRAMWASLS-EADRAVFPFSM
GDMSWDR--LCETFLIG--LRVYLIKD----DLSTLPEARKKWNRLFYLHQLLKVVTF
ALVLNLAYLVLRPILSLVFGL-----

>Dpl-ctg4

-----MEWLNNGNDPKIPNFN----DL
NEPRNL-CEERIADYFQDSIILV-----TGGTGFGVGKALLEKLLRSCPG
IDTIY----ILMRPKRGLSVEQRYKELLKNQ--VFDHIRTRW---PDRL-SKLYPITGD
VSAPNLGVSAEQ-
QQLLNKCHTVFHSAAATVRFTDPLHAAAALNVQGTASLLQLAEDMPF-
LK-----ALVHVSTAYSN--AP--RSHI-----EERVYAPPYDPESIVRCTKML
P-AETVEVIAESLQGEHPNPTLTALKALAESIVYSHTN---LPVCIVRPSI-----
-----VTAAY--QEPFPGWID--NIYGVTGIIMEISRGTYRSGYCRERYV
VDLVPVDMVNVNSCILAAWRQGS---K-KPGR-----CPVYNVTSGSINPLQWGHFTK
LCV-KWARENPT--K-----
-----MMKLARRFKMAAATGEYFANHEWQFSVSELTALHDEASVASDAGAFSHWP
GHFNWES--YIGSYMLG---IRRFILKD----SIDSLPQARNKLNRLYVWHRLFQVATG
YYLFKFLAGRLR-----

>Ban_EST3

-----MECLNGND--LLSPNFNEIGTE
HFNQAY-PEERIADYFHNSIILV-----TGGTGFGVGKALLEKLLRSCPG
INTIY----ILMRPKRGLSVDQRYKELLKNQ--VFDRIKAKW---PERL-SKLYPITGD

VSASNLGVSADQ-QLLLKKCHTIFHSAATVKFTEPLHAATTLNVQGTATLLKLAEDMPL-
LK-----ALVHVSTAYSN--AP--RSYI-----EERVYPPPYDPESIVKCTKML
P-AETVNIIAESLQGDHPNPYTLTKSLAESIVYSHTE---LPVCIIRPSI-----
-----VTAAF--QEPFPGWID--NVYGVTGIIMEISRGTYRSGYCRERYV
VDLVPVDMVNVNSCILAAWRQGS---K-KPGH-----CPVYNVTSGSINPLQWGHFTK
LCV-KWARENPT--KYVMWYPNFA-FTESRFVNTFWEVSCT-----
-----FYRLSFMICYSEHRVEKL-----

>Bmo_swdb20

-----MDDITLLTTTDKMEAFQKQMEFLNGNDPNMVNRNQECLPNY
QLLSSC-PAEAVADFYDGSVILV-----TGGTGFGVKGALLEKLLRSCPG
IETVY----ILMRPKRGLTVEQRYKELLKNQ--VFDHIRTRW---PERL-SKLHPITGD
VSVQNLGVSVDQ-RELLRRVTTVFHSAATVRFTEPLHVATTNLVQGTASLLKLAEDMPK-
LK-----ALVHVSTAYSN--AP--RSYI-----EERVYPPPHDPDNIVRCTRML
P-PETVEVIADSLQGDHPNPYTLTKALAESIVYSHTE---LPVCIVRPSI-----
-----VTAAS--QEPYPGWID--NIYGVTGIIMEISRGTYRSGYCRERYV
VDLVPVDMVNVNSCILAAWRQGV---K-----
-----QYVMWYPNFS-FTESRLINTFWITCHVLP AFLYDLLLLRAQGRKAI
-----MMKIARRFKMAAATGEYFANNEWQFGVAELQALQGEASSTRDAGQFPFWP
AGFDWDT--YIGAYMSG---IRKFILKD-----TVDSLPHYARTKLKRLFWIHKLLQAATG
YYVFRLLAGRLR-----

>Dpl_FAR6

-MGPPD-LFRLSARRHSEYGTFI-----N-----LFKV LIERLLSTCPD
VGKLH----LLLRPKKGV APEKRLQQLKSSQ--VFDLIRQNN---PRQL-DKLCIIPGD
VSQPGLAIDAEHLKNL-QDVSIVFHSAATLKFDEALPNAVDQNVLSVTRLMDICDTIPN-
LQ-----ALVHVSTAYSN--SE--LTCV-----EEKVYTPPADLGRL LALVEAV
P-KPLLANITPEYIKPKPNTYTFTKAMAEAVRCRTQR--YPVAIFRPTI-----
-----VISSL--RHPFPGWIE--NLNGPSGVIAAAGKGLLHV FVRRPDAR
ADLLPVDIAIDTLLAVAWETAV---D-RLPT-----VRVYNC-STNSNPTTWRQFET
ALK-KHLLNYPL--DACLWYPCGS-GVQNR YAHKALEFLLQTIPLHIAEYIIRGLGIKMK
-----LSLITAEQKMRAMNEVL AFFALREWKFNTDNVDKLRARLS-PADAAIYNLDP
KSISWDE--QYYNFIRG---TRKYLLKE-----KDENLDEARKHMNRMYYLHKG VIFFIM
VLVFRLLVQNKNVRQVVYGT LRLLLSLSFAAYKNVIESI-----

>Hmel-ctg19

-----VLIERLLSTCPD
VGRLH----LLMRHKKGEAPEKRL LV LKQSQ--VFDILRQSN---PSQL-DKLCIIPGD
VSQPGLGITGSYLKEL-QEVSIVFHSAATLKFDEALPTAVEQNVLSVMRLMDICDTLPN-
LQ-----ALVHVSTAYSN--PE--RNVI-----EEKVYSAPAPLPRLLALVDAV

P-PPLMASITSQYIKPKPNTYTFTKAMAEAINTRPNK-TYPIAIFRPTI-----
-----VVCSL--RHPYPGWIE--NLNGPSGVVAAAGKGLLHVFRRKPDAR
ADLLPVDIAIDTMLAVAWETAV---D-KIPE-----VRVYNC-STFENPTTWLAFEN
SLQ-KFLPVNPM--DGCMWYPSGF-GVETKYAYKLLEMFLQTIPLHVAEYIIRTLGFKMK
-----LSLITADKKIRAMSGVLAFFALREWHFKTDNVAKLRARLT-PSDSAIYNLDP
KSIE-----

>Ban_EST7

-----M
VARPRSPCGALLPQFYAGRDIFI-----TGATGFMGKVLIERLLATXPD
IGRLH----LLMRQKKGVTPPEKRLQQLIQSQ--VFDVIRQTN---PSQL-DKLCMIPGD
VSQPELGIPLQCLRQL-QEVSIVFHSAATLKFDCELLSTAVEQNVLSIIRVMDLCDTLPN-
IQ-----ALVHVSTAYSN--PE--LNVV-----EEKVYDAPASLPRLLALVEAV
P-TPLLANITPDI-----

>OnuZ6

-----M
VSCKDD-VTAQIPQFYAGRSIFI-----TGATGFMGKVLVERLLTTCPD
VDQLF----LLMRTKRVDVGPEKRLQQLKESQ--VFDNVRQCS---PAQL-DKLCIVPGD
ITKPQLGMTGESIAQL-RNVSVVFHSAATLKFDALGLAVDQNVRSVVRLMELCDMLPN-
MQ-----AFVYVSTGYSN--AE--LSVV-----EERVYPPAPLEQVLALTEAM
P-EDLMASVTRKYIHPKPNTYTFTKAIAEVAVQQHNSS--YPRAIFRPTI-----
-----VVSAL--RTPFPGWVE--NLNGPTGVIAGVGKGLLHFFSCRDRAR
ADMVPVDIVIDALLAVGWETAI---D-RSSE-----VRVYNC-SSYNNPTTWRTFEA
ALS-RYIREHPM--DQVFWYPYGS-IVENGVAQKCLELLQTMPLHLADYCSRIFGIKTK
-----LSFIMVSNRLQAMNTVLQFFSQREWKFITNNMERLRQRLT-PADAAIFNLDV
KTINWEE--LCTNFIKG---TKKYIFKE-----KAENTPEAKKHLQRMKLLPPWCNLFHF
NPASTTHL-----

>Bmo_swdb18

-----MTIREGSETIYTRLLNMVPR
PVSPYA-REPLIPQFYAGKSIFI-----TGATGFMGKVLVERLLWTCPE
IERIF----LLMREKKEVSPEKRLAQLKQSQ--VFDVIREYC---PGQL-EKLYLIPGD
TTAPNLGLSVESIGLL-KEVSVVFHSAATLKFDALNKAVDQNVRSVLSLMDICDGMN-
IE-----ALVHVSTAYSN--AE--LSTV-----EERVYAAPVPLQQLALADAL
P-DQLAADLTPRLISPKPNTYTFTKALAENAVAERTNR-KYPVAIFRPTI-----
-----VISAL--RHPFPGWIE--NLNGPSGVLAAGKGLLHFFCCKRSAK

ADMIPVDIAIDTLIAAAWETAV---D-KLDE-----IRVYNC-SSGRNSTTWAQFEM
AIK-KLLIEHPL--DKTYWYPSGA-AVEN-----E
-----LSLITISERLQGMCKVLTFFSMREWDFKSDNVRKLQARLS-PQDALIYNLDP
NTIDWDA--LYVDFVKG---TRKYLLKE----KDQDIDEAKRHLRKMIFYVHNGFLVFVT
ALLRSLHAPLVRSLVLGTLRLLFTIVSSTYSRVSS-----

>Yev_FARIII

-----MVAR
RLSGEF-PAPTIPAFYAGKSVFI-----TGATGFMGKVLIERILATCPN
VGCLY----LLMREKKDQSPEKRLLQLKQSQ--VFDVLRRTQ---PAQL-DKLRSLSGD
TSREQLGMDNSNLQQL-REVSIVFHVAATLKFDEELRKAVEENLRSIMRLLNICDSLPH-
IE-----ALVHVSTAYCM--AE--LAEV-----EERVYTPIVPLPTLEALVDHA
D-EAMRQQLVQLLLGDKPNTYTFTKAMAHAHVVEHKAQ--YPVAIFRPTV-----
-----VISSL--RSPVPGWIE--YLNGPSGVVVGAGKGLLHTFRCTKSAR
ADLLPVDIAIGTMITCAWDVAT---N-RQAT-----PRVYNC-STYENPTTWSDFER
CIR-KEIEQPL--DAPLWYPCAF-IAENKYVHKLYELVLQTGPLHLAEWSARAVGMKPK
-----INLITVSRKLRAMSDVLMFFSLREWFRFTENVQRLRDRLS-PQDAAIYNLNDV
NTIDWRQ--HMKNFMMG---VRKYLLKE----KDQDIEAAKKHLRKMVWVHTGVKLLLL
GLTLRLLLRGPAAQSLA-GALRLLLSLCTAVYSRLLPAA-----

>Bmo_swdb19

-----MFVTDSTLHEGCVLQERGGT
MADMSE-EAPILPRFYAGRSVFI-----TGGTGFMGKYTRVICVVS KPS
LKTCNETARSVPPRPLPGPLCSGRSVGLCVQ--IFEKVRERC---PWQL-DKLRVLPGN
LERPLLGLEPVTIARL-HQVS VVFHNAATLKFDEALRKAVDQNV RGLLSLVDVCDALPN-
LE-----ALVHVSTAYS N--AE--LSRV-----EERVYAAPVPLQQLALADAL
P-DQLAADLTPRYIHPKPNTYTFTKAMAECVLQERTSR-RYPVAIFRPTI-----
-----VISAD--RHPVPGWIE--NLNGPSGVVVGVGKGLMHVFRAKLALR
ADFIPVDVVVDNMIAVAWETGS---E-PCGS-----LRVYNCASG-EHATRLSDFRA
TAV-RVLRSLPL--DSGLSYPFLI-VVQNR FVYRLL EFLVLTAPLHVAECLRQTDGQKAR
YHNVPCVQLKVLVVQQNRN RGLRLVHYTTIVFLVLLSYKLIK F-----
-----FLNLFMNN-----

>Dpl-ctg10

-----M-EESQIKAFYSGKNLFI-----TGGTG FVGLCLIEKILRTIPD
VGKIY----LLMRPKKGKEIADRLQEFPANP--VFEHLLQNT--SKDIF-NKLIPISGD
VGVENLGINDNDRQILIDEVNIVIHSAATLDFEENLRPTVKINVLGTRYVMDLCQQIKN-
LK-----VMIHVSSAYVN--SY--LKEV-----DEKVYDRPADPENIINMVNTL
T-NDALNDVERLILKNHPNTYTFTKHLAEHEVKKCEAM--FPISIVRPTM-----
-----IVAAL--KEPVPGWTC--SKVG PQGFLMGAAKG VVRRLPLAKENI
ADYIPVDIVVNQLLAAGWNAAR-----QNSG-----LQVYHCSTSTQNPFRWSILES
VVN-KILTNYPL--KSAVWYPHLA-FVRSLWLFRLSAIFIHFFPAVLDMLLRITGGKPI

-----CM-----
--LQWEE--YFVKLHLG---VRRYLNKE----TEKTLAAAKTKNNM-----

>Dpl-ctg12

----M-EESQIKAFYNGKNLFI-----TGGTGFVGLCLIEKILRTIPD
VGKIY----LLMRPKKGKEIADRLQEFPGNP--VFEHLLQNT--SKDIF-NKLVPISGD
VGVENLGINDNDRQILIDEVNIVIHSAATLDFEENLRPTVKINVLGTRYVMDLCQQIKN-
LK-----VMIHVSSAYVN--SY--LKEV-----DEKVYDRPADPENIINMVNTL
T-DDALNDVERLILKNHPNTYTFTKHLAEHEVKKCEAM--FPISIVRPTM-----
-----IVAAL--KEPVPGWTC--SKVGPQGFLMGAAKGVVRRLPIAKENI
ADYIPVDIVVNQLLAAGWNAAR-----QNSG-----LQVYHCSTSTQNPFRWSILES
VVN-KILTNYPL--KSAVWYPHLA-FVRSLWLFRLSAIFIHFFPAVLLDMLLRITGGKPI
-----LFRLHKNVWNSLSRLEVFI FTEWKFNPNRTRELSAMMN-KTDSelfdIDV
SKIYWEE--YFVKLHLG---VRRYLNKE----TEKTLAAAKTKNNILYYVHIIWQVMIL
GLLWVIISWVTGLGLTQTSWVPIPYLLYSML-----

>Hmel-ctg21

----MS-EESQVRSFYSGKNFFI-----TGGTGFVGLCLIEKILRTIPD
VGKLY----LLIRPKKGKDITSRIQEFKHP--VFEKLLETN--TNDIF-NKLIPISGD
VGTKDLGISEEDRQILIENVNVVHSAATLDFEESLKPTVQINVLGTRQIMELCDQMKN-
LK-----VMIHVSSAYVN--SY--LKEA-----HEKVYDTPADVESVIDLSRKL
S-EQALVDMEKILKEHPNTYTFTKHLAEHEVKKYSEK--FPCTIVRPTM-----
-----IVAAW--KEPVVGWTC--SKVGPQGFLMGAAARGVVRRLPLSKDNV
ADYIPVDVVVNQLLAAGWNAGV-----SGPG-----LTVYHCSSSTQKPKWSMLEN
VVN-KMLQNYPL--KSAVWYPYLD-FVSSLWLFRISAIFIHFLPAILLDMLLRITGKKPI
-----LFRLHKNVWNSLSRLET FIFSEWKFHNTNTREL NQKL N-KVDKEIYFIDI
QTIVWEQ--YFVNLHLG---VRKYLNHE----SEKTLPAACKNKHSM-----

>Bmo_swdb11

----MT-EESLVRAFYSKGKNFFI-----TGGTGFVGLCLIEKILRCIPD
VGKVY----LLMRPKKGKEISQRLEEFKPNL--VFEKLLETN--TTDIF-KKLVPISGD
VGEANLGLSPQDRQLLIENVNVVIHSAATLDFQENLRPTVRINLLGTRQVMGLCKEIKN-
LK-----VMIHVSSAYVN--SY--LTEV-----HEKVYPEPEEVEKVISLVGTL
S-DEALDEIEPKILKDHPNTYTFTKHLAEHEVAKCAEL--FPCTIVRPTM-----
-----IVASW--KEPVPGWTC--SKVGPQGFLMGASKGVVRRLPLAKENI
ADYIPVDVVVNQLLVAGWHAAS-----ARSG-----LTVYHCSSSTQKPKWSMIES
SIN-GMLHKYPL--KSAVWYPHLK-FVPSLWLFRLSAIFVHFFPALLLDMMLRVTGGRPI
-----LIRLHKNVWNSLSNRLEKFIFSEWKFHNTNTQQLAKELN-KTDAQTFIDI
SKLYWEE--YFMNLHLG---VRRYLNNE----KEGNLKAARNKDTM-----

>Hmel-ctg8

-----MSHVPSGNSLNNCLYALLYERPLFS
FSENKL-KYRSIKESYSGKSIFL-----TGGTGFLGKVLIEKLLRST-D
VEKIF----VLIREKKGIDSDKRLKQMLNIP--IFEDLKENK---PNAL-NKLVAIGGD
VTKKDLGISPEDEQKIIDNVSLVFHSAATVKFTDPFSNIMNINYEGTKKVLKLSKKIKN-
LE-----TFVYISTAFCQ--GD--RTHI-----NESMYPRFYEEGEVYKFIDAY
G-DNPTEVV--KFLDGKPNNTYTLSSKSLCESYIKEEHKP--LSTIVLRPSI-----
-----VTPVY--KGPVPGWVD--SWVAATALFSDVARGLTKVMYGDKNVI
CDMIPVDYVINLAIVAGARG-----N-KTDD-----ILVFNSSSGTANPITWKEGAD
LYL-EESLKYGK--SELK--PRKVMVLSSPLLMDFLSFTLQTTPAFLADMLRIKGEQPK
-----YLNMQKRAILLRDILRTFSSISFQIKSQKTEGLYTTLS-EEDKVQFPFDP
KTIVWRK--YMRIFYKG--VQKYMLND----K-----

>Bmo_swdb2

-----GLIEKLLYSCVG
IENIY----VLIREKEEESADQRLKKIIDS---VFDRVKKQD---INVL-NKIVTVPGN
ISEKNLGLTTEHLKIIQEKVSVVFHVAATVKFNEELSKAMAVNVNGTLEIISLCRRINK-
LESDEHTAYLMALIQVSTAFSN--SD--RKHI-----EEIVYCINNVD FEGLKSLTDFW
S---GDEDDVKRLLGKKPNNTYTYTKALAE EYVMKYGKD--LPIAIIRPSI-----
-----IISAI--KEPSQGWID--SWNGSTGTFGGMSSGVMKVMFGSGSNV
ADLVPLDIVVNLIIVAATKC-----KRSS-----LKVYNCCTGTSNPITYSRAEV
IIR-RATYKYSL---NQLPFPFMV-FTNSRLVYTLLRFILQIVPAFLIDLWSLFNGKKAI
-----QMKIQHRITRTLDLMKFFMIN EWHFEDSNTRELFENMS-EEDKNVFNFDL
KSIDWDS--CIENYVVG---RRAYGPPDGEWL PSPMDFSNARGRAKPLPTAQAAAYLLIY
RLGYISFVLTCR-----

>Ola_pgFAR

-----MAANTIE
TDEQFT-YN SPIVNFYSGKSVFV-----TGATGFLGTVLVEKLLFSCKG
INNIY----VLIKQTKDLTIEGRVLNYLNSK--AFHRVRNTN---PELM-KKIIPICGN
LEHKNLGISDS DIKTLQEEVSIVFHVAAKLLFKMSLATAVNINTKPTEQLIVICKKMRR-
NP-----IFIYVSSAYS N--VN--KQII-----DEKVYSNGVPLETIYDTLEAE
N----TRLMDMFLDKRPNTYIYSKALAE E VVGKEFDE--SAAAIVRPSI-----
-----ILSSI-REPIGWLT--GSHGFPQLVGAACRGFLLRWHGDGTVV
FDVIPVDH VANLIIAAAWETNERRL-V-GNKG-----VKVYNCCSSLRNPIDVITVMN
TCL-KYRK YFGTERTMSIFTPRYI-MKKNYFIYKLLYFTYHTIPAAIIDAFFWITGRTPM
-----MLKTLNKLGLSSVLEYFTHHQFLFLDSNVRG LLRRMD-DTDRQTFNFDV
TEIEWEM--YLQNFVRG--IANNYDSC-----

>Opa_pgFAR

-----MSANTIE
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INNIY-----VLIQSKDLTIEGRILNYLNSK--AFHRVRNAN---PEFM-KKIIPICGN
LEENNLGISDSMDKTLQAEVSIVFHVAAKLLFKMSLATAVNINTKPTQELIAICKKMRR-
NP-----IFIYVSSAYSNN--VN--KQII-----DEKLYTTGVPLKTIYDTLETE
N-----TRLIDIFLDKRPNTYIYSKALAEVVGKEFDE--SAAIIVRPSI-----
-----ILSSI--REPIGWLT--GSHGFQPLVGAACRGLLLRWHGDGTVV
FDIIPVDHIVANLIIAAAWETNERKL-V-GNKG-----VKVYNCCSSLRNPIDVITVMN
TCL-KYRKYFGTERTMSIFTPRYI-MKKNYFIYKLLYFTYHTIPAAIIDAFFWLTGRTPM
-----MLKTLNKLSSVLKYFTHHQFLFLDSNVRGLLGRME-DIDRKTFFNFDV
TEIEWEM--YLQNFVRG---IASNYDSC-----

>Ofu_pgFAR

-----MSANTME
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LEDKNLGISDSMDKTLLEEVSIVFHVAAKLIFKMSLTA AVNINTKPTQELIAICKKMRR-
NP-----IFIYVSSAYSNN--VN--EQII-----DEKVYSTGVPLETIYDTLDAK
N-----TRLMDIFLDKRPNTYTYSKALAEVVVEKEFDE---SAAIIVRPSI-----
-----IASSI--REPIGWLS--GSHGFPRVVEAACKGLLLRWHGDGTVA
FDVIPVDHIVANLIIAAAWESNERRL-M-GNKG-----VKVYNCCSGLRNPIDVSTVMN
TCL-KYRKYFGT-RTMSIITPRFI-MKKNYFLYKLLYFTYHTIPAAIIDGFFWLTGQTPM
-----MLNTLHKLRLKSSVLEYFTLHQFLFLDSNVRGLLRRME-STDRQTFNFDV
TEIEWEP--YLQNFVRG---IANNYD-----

>OscZ_pgFAR

-----MSANTME
TDEQFT-DNSPIVNFYSGKSVFV-----TGATGFLGTVLVEKLLFSCCKG
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LEDKNLGISDSMDKTLLEEVSIVFHLAAKLLFKMSLAAAVNINTKSTEQLIAICKKMRR-
NP-----IFIYVSSAYSNN--VN--KQII-----DEKVYSTGVPLETIYDTLDAK
N-----TRLVDIFLDKRPNTYTYSKALAEVLVEKEFDE---SAAIIVRPSI-----
-----IASSI--REPIGWLS--GSHGFPRVVEAACKGLLLRWHGNGTVA
FDIIPVDHIVANLIIAAAWESNERRL-I-GNKG-----VKVYNCCSGLRNPIDVSTVMN
TCL-KYRKYFGT-RTMSIITPRFI-MKKNYFLYKLLYFTYHTIPAAIIDGFFWLTGRTPM
-----MLNTLHKLRLKSSVLEYFTLRQFLFLDSNVRGLLRRME-GTDRQTFNFDV
TEIEWEP--FLQNCVRG---IANNYD-----

>OnuZ_pgFAR

-----MSANTME
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LEDKNLGISDSMDKTLLEEVSVFHLAAKLLFKMSLAAAVNINTKSTEQLIAICKKMRR-
NP-----IFIYVSSAYSNN--VN--KQII-----DEKVYSTGVPLETIYDTLDAK
N----TRLMDIFLDKRPNTYTYSKALAEVLVENEFEDE---SAAIVRPSI-----
-----IASSI--REPIGWLS--GSHGFPRVVEAACKGLLLRWHGDGTVA
FGIIPVDHVNLIIAAAWESNERRL-I-GNKG-----VKVYNCCSGLRNPIDVSTVMN
TCL-KYRKYFGT-RTMSIITPRFI-MKKNYFLYKLLYFTYHTIPAAIIDGFFWLTGRTPM
-----MLNTLHKLRLSSVLEYFTLRQFLFLDSNVRGLLRRME-GTDRQTFNFDV
TEIEWEP--FLQNCVRG---IANNYD-----

>Oze_pgFAR

-----MAANTIE
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LEDKNLGISDSMDKTLLEEVSVFHVAAKLLFKMNLTA AVNINTKPT EQLIAICKKMRR-
NP-----IFIYVSSAYSNN--VN--EQII-----DEKVYSTRVPLETVYDTLDIE
N----TRITDIFLDKRPNTYTYSKALAEVVVEKEFNE---SAAIVRPSI-----
-----ILSSI--REPIGWLS--GSHGFPRVVGAAACKGLLLRWHGDGTVV
CDVIPVDHVNLSIAVAWESNERRL-M-GNKG-----VKVYNCCSSLRNPIDVSTVLN
TCL-KYRKYFGT-RTMSIFTPRFI-MKKNYFLYKLLYFTYHTIPAAIIDGFFWLTGRTP
-----MLKTLDKLRKLSSVLEYFTHHQFLFLDSNVRGLLRRME-GTDRQTFNFDV
TEIEWEP--YLQNFVRG---IANNYDNS---M-----

>OscE_pgFAR

-----MSANTME
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LEDKNLGISDSMDKTLLEEVSVFHVAAKLLFKMSLTA AVNINTKPT EQLIAICKKMRR-
NP-----IFIYVSSAYSNN--VN--EQII-----DEKVYNTGVPLETIYDTLDTE
N----TRITDIFLDKRPNTYTYSKALAEVVVEKEFEDE---SAAIVRPSI-----
-----IVSSI--REPIGWLS--GSHGFPRVVGAAACKGLLLRWHGDGTVV
CDLIPVDHVNLIIAAAWESNERRL-M-GNKG-----VKVYNCCSSLRNPIDVITVVK
TCI-KYRKYFGT-RTMSIFTPRFI-MKKNYFIYKLLYFTCHTIPAAIIDGFFWLTGRTP
-----MLKTLDKLSKISSVLEYFTHHQFIFLDSNVRGLLRRME-GTDRQTFNFDV
TEIEWEP--YLQNFVRG---IANNYDYS---M-----

>OnuE_pgFAR

-----MSANTME
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LEDKNLGISDSMDKTLLEEVSIVFHVAACKLLFKMSLTAAVNINTKPTEQLIAICKKMRR-
NP-----IFIYVSSAYSNN--VN--EQII-----DEKVYNTGVPLETIYDTLDTE
N----TRITDIFLDKRPNTYTYSKALAEVVVEKEFDE---SAAIVRPSI-----
-----IVSSI--REPIPGWLS--GSHGFPRVVGAACKGLLLRWHGDGTVV
CDLIPVDHVNLIIAAAWESNERRL-M-GNKG-----VKVYNCCSSLRNPIDVITVVK
TCI-KYRKYFGT-RTMSIFTPRFI-MKKNYFIYKLLYFTYHTIPAAIIDGFFWLTRTPI
-----MLKTLDKLGKISSVLEYFTHHQFIFLDSNVRGLLRRME-GTDRQTFNFDV
TEIEWEP--YLQNFVRG---IANNYDYS---M-----

>Oza_pgFAR

-----MSANTVE
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LEDKNLGISDSMDKTLLEEVSIVFHVLAACKLLFKMSLTAAVNINTKPTEQLIAICKKMRR-
NP-----IFIYVSSAYSNN--VN--KQII-----DEKVYSTGVPLETIYDTLNTE
N----TRITDILLDKRPNTYTYSKALAEVVVEKEFDE---SAAIVRPSI-----
-----IVSSI--REPIPGWMS--GSHGFPRVVGAACEGLLLRWHGDSTVV
FDVIPVDHVNLIIAAAWESNERRL-M-GNKG-----VKVYNCCSGLRNPIDVSTIMN
TCL-KYRKYFGT-RTLSIFTPRFI-VKKNYFIYKLLYFTYHTIPAAIVDGFFWLTRRTPM
-----MLNTLHKLSKLSSVLEYFTLHQFLFLDSNVRGLLRRME-STDRQTFNFDV
TEIEWEP--YLQNCVRG---IANNCDYS---M-----

>Onr.za_pgFAR

-----MSANTVE
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INNIY----ILIKQTEDLTIEARILNYLNSK--AFHRVKNTN---PELM-KKIIPICGN
LEDKNLGISDSMDKTLLEEVSIVFHVLAACKLLFKMSLTAAVNINTKPTEQLIAICKKMRR-
NP-----IFIYVSSAYSNN--VN--KQII-----DEKVYSTGVPLETIYDTLDTE
N----TRITDILLDKRPNTYTYSKALAEVVVEKEFDE---SAAIVRPSI-----
-----IVSSI--REPIPGWMS--GSHGFPRVVGAACKGLLLRWHGDSTVV
FDVIPVDHVNLIIAAAWESNERRL-M-GNKG-----VKVYNCCSGLRNPIDVSTIMN
TCL-KYRKYFGT-RTLSIFPPRFI-VKKNYFIYKLLYFTYHTIPAAIVDGFFWLTRRTPM
-----MLNTLHKLSKLSSVLEYFTLHQFLFLDSNVRGLLRRME-STDRQTFNFDV
TEIEWEP--YLQNCVRG---IANNCDYS---M-----

>Dpl-ctg8

-----MVKCNRRLLFNRNKSFYNAYSNNMRSPSHCVT
EDDLNK-KTSSIVDFYNGKSIFI-----TGGTGFLGKMYIRNHLRCPG
ICKIY----MLIRPTSKNSVESRLEDMIKNSMNLFEGLN-----ENHF-MKLVPIEGD
VTAPNLGIHPDKKRLQLQEQVSIIVHSAATLDINATLREAYHVNVIKTENLLAVAKDMKK-

LH-----AFLHLSTFYCCMTNE--KNAI-----EEKVYSPPLYVKDVPKTLEKY
G---HMRFPQSLKKNKQNTYIFTKAISEYLVSTHGD--IPTAIRPSL-----
-----IGCSN--KDPYKGWID--VFNIHSFILTAISNGFLRILNINKNTV
WDFIPVDYVANLMILAATKC-----K-KSTQ-----VDIYNCASSGINPVTILSACS
IFISDFVT-----NKKSSKKIRLLNPFVHLIPAFINDVRYILTGRKAN
-----IKKLLKIKDQIKFFGGHWSWKAKSDHVTSLINSLS-DEDRKKFPCDP
SDIDWVE--YFREYSKG---IRNYLSKN-----

