

Figure S3: Multiple sequence alignment of various methanol and alcohol dehydrogenases.

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#1_ACS42169_Methylobacterium_extorquens_AM1_MxaF-type
#2_WP_012589514.1_Methylocella_silvestris_mxaFJGIRSACKLDEH_MxaF-type
#3_xoxF_2_Methylocella_sp._KOX_MxaF-type
#39_Hyphomicrobium_VS_HYPHVSv1_1280001_MxaF-type
#4_WP_036262132.1_Methylocapsa_aurea_XoxF5-type
#5_WP_091681465.1_Methylocapsa_palsarum_XoxF5-type
#6_WP_026607385.1_Methylocapsa_acidiphila_XoxF5-type
#7_WP_012590606.1_Methylocella_silvestris_xoxFGJ_XoxF5-type
#8_ACS40517_Methylobacterium_extorquens_AM1_XoxF5-type
#9_WP_003597620.1|Methylobacterium_extorquens_XoxF5-type
#10_WP_011746370.1|Paracoccus_denitrificans_XoxF5-type
#11_xoxF_4_Methylocella_sp._KOX_XoxF5-type
#12_WP_041367950.1_Methylocella_silvestris_XoxF5-type
#34_WP_092868386.1_xoxF_Hyphomicrobium_facile_XoxF5-type
#33_WP_013215583.1_xoxF_Hyphomicrobium_denitrificans_XoxF5-type
#38_WP_092037086.1_Methylobacterium_pseudosasicola_XoxF5-type
#37_WP_091863466.1_Methylobacterium_brachiatum_XoxF5-type
#17a_AAU90462.1_Methylococcus_capsulatus_str._Bath_XoxF5-type
#13_D14_FHGOONML_01469_Uncultured_Methylococcales_XoxF5_type
#14_E33_NFPLPOKJ_01232_Uncultured_Methylococcales_XoxF5_type
#42_YP_004038451.1_Methylorvorus_sp._MP688_XoxF4-type
#40_YP_003674616.1_Methylotenera_versatilis_301_XoxF4-type
#41_YP_546422.1_Methylobacillus_flagellatus_KT_XoxF4-type
#19_xoxF_1_Methylocella_sp._KOX_XoxF1-type
#17_WP_012251923.1_Methylobacterium_extorquens_XoxF3-type
#18_WP_012592359.1_Methylocella_silvestris_xoxFJG_XoxF3-type
#29_Methylacidimicrobium_fagopyrum_3C_NZ_KB901876_XoxF2-type
#31_Methylacidimicrobium_tartarophylax_4ac_XoxF2-type
#30_Methylacidimicrobium_cyclopophantes_3B_XoxF2-type
#32_NZ_JAFS01000001_Methylacidimicrobium_strain_LP2A_XoxF2-type
#20_Methylacidimicrobium_thermophilum_AP8_MTHMO_v1_1756)_XoxF2-type
#WP_134390782.1_Methylacidiphilum_sp._Yel_XoxF2-type
#TFE68643.1_Methylacidiphilum_sp._Phi_XoxF2-type
#WP_134440131.1_Methylacidiphilum_sp._Phi_XoxF2-type
#MPANT_v1_10387_Methylacidithermus_pantelleria_PQ17_XoxF-type
#25_LM997411_xoxF_Methylacidiphilum_fumariolicum_SolV_XoxF2-type
#26_CP000975_xoxF_Methylacidiphilum_infernorum_V4_XoxF2-type
#28_JQNX01000005_xoxF_Methylacidiphilum_kamchatkense_Kam1_XoxF2-type
#15_xoxF_3_Methylocella_sp._KOX_XoxF3-type
#16_WP_012592127.1_Methylocella_silvestris_xoxFJG_XoxF1-type
#35_RUP10869.1_Hyphomicrobium_sp._XoxF1-type
#36_WP_020084048.1_Hyphomicrobium_zavarzinii_XoxF1-type
#27_Methylacidimicrobium_thermophilum_AP8_(MTHMO_v1_1700)_XoxF1-type
#21_Methylacidimicrobium_cyclopophantes_3B_Xanthomonas_type_XoxF1-type
#22_NZ_JAFS01000001.1:Methylacidimicrobium_Strain_LP2A_XoxF1-type
#23_Methylacidimicrobium_fagopyrum_3C_NZ_KB901876_XoxF1-type
#24_Methylacidimicrobium_tartarophylax_4ac_XoxF1-type
#45_YP_001203590.1_Bradyrhizobium_sp._ORS_278_ADH-type_1
#46_YP_007512722.1_Bradyrhizobium_oligotrophicum_S58_ADH-type_1
#43_YP_003067544.1_Methylobacterium_extorquens_DM4_ADH-type_2b
#44_YP_007915167.1_Hyphomicrobium_denitrificans_1NES1_ADH-type_2b
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The order on the first pages is identical to the identifier in the alignment however with full accession number and identity.

At the right site of the alignment the different types of PQQ-methanol dehydrogenases is indicated.

This alignment combines the five clades of XoxF enzymes, the MxaF-type methanol dehydrogenases and alcohol dehydrogenases. In **red** the aspartate (D) residues that seems to be typical for the XoxF1-type. In **yellow** the cysteine (C) that is present to make space for the aspartate residue in XoxF1, although this cysteine residue also found in some XoxF5 MDHs.

In **green** the specific aspartate (D) identified to coordinate the lanthanide in the active site. The calcium-binding MxaF-type MDHs have an alanine (A) at this position.

In **grey** the typical CC (PQQ binding) which is as CY in the *Methylacidimicrobium* XoxF2-type sequences.

1_ACS42169	-----	-N-DKLVLELS	KSDDNWVMPG	KNYDSNDFSD	LKQINKGNVK	QLRPAWTFST	G--LLNGHEG	APLVV-----	DGKMYIHTSF	-P-----NNT	FALGLDD--P	---
2_WP_01258	-----	-N-DKLNQLS	QSDDNWVMPG	KDYKSDNFSK	LTQINASNK	QLKPAWSFST	G--VLNGHEG	APLVV-----	DGKMFISSPF	-P-----NTT	FALDLDE--P	---
3_xoxF_2_M	-----	-N-DKLDQLS	QSDENWVMPG	KNYHSDNFSK	LTQINADNVK	DLKAAWSFST	G--VLNGHEG	APLVI-----	DGTMYVHTSF	-P-----NIT	YALDLDN--P	MxaF
39_Hyphomi	-----	-N-DKLIELS	KSNENWVMPG	KNYDSNNYSE	STQVNAENVK	QLKHAWSFST	G--ELHGHEG	APLVI-----	GDMMYVHSSF	-P-----NKT	FALNLND--P	---
4_WP_03626	-----	-N-DGLIALS	KDPKQWALPT	GDYANRRYSE	LSQITSENVK	TLVPVWSFST	G--VLRGHEG	APLVI-----	GNVMYLSTPF	-P-----NIV	YALDLNN--D	---
5_WP_09168	-----	-N-DELAQAS	KDPKQWVLP	GDYANRRYSE	LSQINSSNVK	NLVPAWSFST	G--VLRGHEG	GPLVV-----	GNVMYFSTPF	-P-----NIV	YALDLNN--D	---
6_WP_02660	-----	-N-DELIALS	KDAKQWALPT	GDYANRRYSE	LDQINSDNVK	NLVPVWSFST	G--VLRGHEG	GPLVI-----	GDVMYFNTPF	-P-----NII	YALDLNH--D	---
7_WP_01259	-----	-N-EELITLQ	KNAKNWALPT	GDYSNHRFSE	LNQITNKNVK	DLVPVWTFST	G--VLRGHEG	NPLVI-----	GDVMYFSTPF	-P-----NIV	YALDLNN--D	---
8_ACS40517	-----	-N-EDVLKRT	QDPNQVQLQT	LDYANTRYSK	LDQINASNK	NLQVAWTFST	G--VLRGHEG	SPLVV-----	GDIMYVHTPF	-P-----NIV	YALDLNN--D	---
9_WP_00359	-----	-N-ESVLKGV	ANPAEQVLQT	VDYANTRYSK	LDQINASNK	NLQVAWTFST	G--VLRGHEG	SPLVV-----	GNIMYVHTPF	-P-----NIV	YALDLDQ--G	---
10_WP_0117	-----	-N-DSVLAEI	AKPQQWAIQM	GDYANTRYST	LDQINKDNVK	DLRVAVTFST	G--VLRGHEG	SPLVI-----	GDVMYVHTPF	-P-----NRV	FALDLND--N	---
11_xoxF_4_	-----	-----EAAA	PDLANLRYSP	LKEITTENVS	RLTVPWTFST	G--VLRGHEG	APLVV-----	GGVIYVHTPF	-P-----NIV	YALDLDH--D	---	XoxF5
12_WP_0413	-----	-----GSAANAD	SDYANLRYSS	LSEINVDIVQ	NLAPVWTFST	G--VLRGHEG	APLVA-----	GGALYLVTPF	-P-----NRV	MALDIAH--E	---	---
34_WP_0928	-----	-N-RDVIAHS	NDPDAWAVQS	GDYSGQRYSK	LAEINKDNVG	DLKVAWTFST	G--VLRGHEG	GPLVI-----	GDTMYLVTPF	-P-----NAV	MALDLAH--D	---
33_WP_0132	-----	-N-ESAIKAA	SDPNNWAIQS	QDYAGTRYST	LHQITFENVG	DLKVAWTFST	G--VLRGHEG	GPLVI-----	GDTMWLHSAF	-P-----NIV	FALNLAD--E	---
38_WP_0920	-----	-----VASA	QEPP--VLQT	LDYANTRYSE	LAQIDAGNVS	RLKVAWTFST	G--VLRGHEG	APIVV-----	GSRMFVHTPF	-P-----NLV	YALDLDH--D	---
37_WP_0918	-----	-----VASA	KEPP--VLQT	LDYANTRYSD	LAQIDAGNVS	RLKVAWTFST	G--VLRGHEG	APIVV-----	GSRMFVHTPF	-P-----NLV	YALDLDH--D	---
17a_AAU904	-----	-N-AEVEALT	KDPKNFATWG	GNVYAGTRYST	LDQINFKNK	HLQPVWTFST	G--MLRGHEG	GPLVV-----	NDVIYIHTGY	-P-----HKV	YALDQA---T	---
13_D14_FHG	-----	-N-SGVESLT	KNPANWATAL	GDYAGTRYSK	LDQINTKNVK	NLQPAWSFST	G--VLRGHEG	GPLVV-----	DDIYIHTPF	-P-----NTV	YALDQA---T	---
14_E33_NFP	-----	-N-SGVESLT	KNPANWATAL	GDYAGTRYSK	LDQINTKNVK	NLQPAWSFST	G--VLRGHEG	GPLVV-----	DDIYIHTPF	-P-----NTV	YALDQA---T	---
42_YP_0040	-----	-A-TELENLM	KDDNQWAHPR	KDYANTGYSR	LSQINKGNVK	NLKMAWSFAT	G--VNRGHEG	APLVI-----	NDVMYVHTAF	-P-----NNV	YALDLND--N	---
40_YP_0036	-----	-S-DDLQKHL	SDNKQWTHPR	KDYANTGYSG	LHQIQAKNIN	KLKLAWTFST	G--VNRGHEG	SPIVL-----	GSTMVLTAF	-P-----NNI	YALDLNN--N	XoxF4
41_YP_5464	-----	-A-ADQEAAM	KDPNNVWVHPR	GQHNNQGYST	LNQINKSNVK	NVKAQWQFAT	G--VNRGHEG	SPVVI-----	GNNMYVHTAF	-P-----NNV	YALDLND--N	---
17_WP_0122	QGATVSGRSE	HPKPPSSAAP	RDDGQWMPA	KNFASTRYSD	LAEITPDSVK	NLRVNFVTSV	G--VNRGQES	SPLVI-----	DGTMFVLSPY	-P-----NIL	YALDLTK--P	---
18_WP_0125	-----	-QTPPPFVKA	DAAKEWMPA	KDVASTRYSS	LDQINAGNAR	DLKVAFSFSL	G--TDRGAEA	APLVV-----	GDTMYVVTPY	-P-----NTL	FALDLKQ--S	XoxF3
19_xoxF_1_	-----	-QSPPSFAKA	DQDQWMPA	KDVASTRYSS	LDQINAQNVK	DLKVAFTFST	G--TDRGVES	APLVV-----	GDTMYIVAPY	-P-----NTL	FALDLKN--D	---
29_Methyla	-----	-N-EELLRLG	ADPGQWMPQA	KNYEATRYSE	LDQISSRTVE	KLHVVSFST	G--ALRGHEG	GPLVI-----	DNTMYVHSPF	-P-----NTV	YALDLRQ-KP	---
31_Methyla	-----	-N-EELLRLG	ADPGQWMPQA	KNYEATRYSE	LDQISARTVE	RMHVVSFST	G--ALRGHEG	GPLVI-----	GSTMVHSPF	-P-----NTI	YALDLRQ-KP	---
30_Methyla	-----	-N-EELLRLG	SDPGQWMPQA	KNYAATRYSE	LDQINTRTVE	RLHVAWSFST	G--ALRGHEG	GPLVV-----	GSTMVHSPF	-P-----NTV	YALDLAQ-KP	---
32_NZ_JAFS	-----	-N-EELLRLG	ADPGQWMPQA	KNYAATRYSE	LDQINARTVE	RLRVAVSFST	G--ALRGHEG	GPLVV-----	GGIMYVHSPF	-P-----NTV	YALDLAK-KP	---
20_Methyla	-----	-N-EELVRLG	ADPGQWMPAG	KNYAATRYSE	LDQINTRTVE	RLHVAWSFCT	G--ALRGHEG	GPLVV-----	GSTMVHSPF	-P-----NTV	YALDLAR-KP	---
WP_1343907	-----	-N-DELIKLE	KEPGQWVMQN	KNYANTRYSE	LNQINTKNVS	RLRLAWSFST	G--ALRGHEG	GPLVV-----	GTTMYVHSAY	-P-----NHV	YALDLTQ-KP	XoxF2
TFE68643.1	-----	-N-DELVKLE	KDPAQWVMQN	KNYANTRFSE	LTQINTKNVS	RLRLAWSFST	G--ALRGHEG	GPLVV-----	GSTMVHSAY	-P-----NHV	YALDLTQ-KP	---
WP_1344401	-----	-N-DELVKLE	KDPAQWVMQN	KNYANTRFSE	LTQINTKNVS	RLRLAWSFST	G--ALRGHEG	GPLVV-----	GSTMVHSAY	-P-----NHV	YALDLTQ-KP	---
MPANT_v1_1	-----	-N-EELIRLS	KNPGDWMPR	KNYSATAYSE	LNQINTRNVG	KLTQVWSFAT	G--ALRGHEG	SPLKI-----	GDTLYVHSAF	-P-----NHV	YALDLTK-KP	---
25_LM99741	-----	-N-DELIKLE	KEPGQWVMQN	KNYANTRYSE	LNQINTKNVS	RLRLAWSFST	G--ALRGHEG	GPLVV-----	GTTMYVHSAY	-P-----NHV	YALDLTQ-KP	---
26_CP00097	-----	-N-DELIKLE	KDPAQWVMQN	KNYANTRFSE	LTQINTKNVS	RLRLAWSFST	G--ALRGHEG	GPLVV-----	GSTMVHSAY	-P-----NHV	YALDLTQ-KP	---
28_JQNX010	-----	-N-DELIKLE	KEPGQWVMQN	KNYANTRYSE	LNQINTKNVS	HLRLAWSFST	G--ALRGHEG	GPLVV-----	GTTMYVHSAY	-P-----NHV	YALDLTQ-KP	---
15_xoxF_3_	-----	GSDEEIVRNS	KNPDLWPGMG	QNLALQRHSD	LKDLNKDNIG	NLQLAWSQST	G--ALRGHEG	QPVVV-DVDG	KPMMFFVSAW	-P-----NIV	QALDLSNPDN	---
16_WP_0125	-----	GSDEEIIKNS	KNPDLWPGMG	QNLGLQRHSE	LKDINKDNVS	NLQMSWSQSS	G--ALRGHEG	QPVVV-DVGG	KPMMFFVSAW	-P-----NIV	QALDLSDPDN	---
35_RUP1086	-----	-E-DEVAHRA	ANPNEWAAPG	RDNALTRHSP	LKDINTDNVS	KLQMVWSQST	G--ALRGHEG	QPVVIEDVGG	KPMMFFVSGC	-PEMSKCNIV	QGLDLSDPDN	---
36_WP_0200	-----	-N-DEVDKRA	ADPNWAAAPG	RDNHLTRHSP	LKDINTDNVG	KLQMVWSQST	G--ALRGHEG	QPLFIEDVGG	KPMLFFVSGC	-PNMAQCNI	QGLDLSDPDN	---
27_Methyla	-----	-N-DDVLKLT	ENPKNWAAAPG	KDYANTRHSP	LKQINTQNVK	SLHMAWSFST	G--VLRGHEG	QPLVI-----	GDRMYVTPY	-P-----NIV	WALDISKGN	XoxF1
21_Methyla	-----	-N-DDVLKLT	ENPKNWAAAPG	KDYANTRHST	LKQINTQNVK	SLHMAWSFST	G--TLRGHEG	QPLVI-----	GDRMYVSSY	-P-----NIV	WALDLSK-GA	---
22_NZ_JAFS	-----	-N-DDVLKLT	ENPKNWAAAPG	KDYANTRHSS	LKQINTQNVK	SLHMAWSFST	G--TLRGHEG	QPLVV-----	GDRMYVSSY	-P-----NIV	WALDLSKGG	---
23_Methyla	-----	-N-EEVLKLT	ENPKNWAAAPG	KDYGNTRHSS	LKQINTQNVK	SLHMAWSFST	G--TLRGHEG	QPLVI-----	GDRMYVSSY	-P-----NIV	WALDLSKGG	---
24_Methyla	-----	-N-DDVLKLT	ENPKNWAAAPG	KDYANTRHSS	LKQINTQNAK	SLHMAWSFST	G--TLRGHEG	QPLVV-----	GDRMYVSSY	-P-----NIV	WALDLSKGG	---
45_YP_0012	-----	-N-DSAMKAA	AEPGAWAMAG	HDYGNTRFSP	LKEISTENAG	KLKSLVYSFSL	A--SLRSNEA	SPIVI-----	GNTLYVSTSW	GP-----KYV	YALDAA---T	---
46_YP_0075	-----	-N-ESARKAA	SEPGAWAMAG	HDYGNTRFSP	LKEISTENAG	KLKSLVYSFSL	A--SLRSNEA	SPIVI-----	GNTLYVSTSW	GP-----KYV	YALDAA---T	ADH's
43_YP_0030	-----	-E-VTEQDILNDA	KTTDDVVTYG	LGPQAQRFSP	IKTLNRDNK	GLVPAWSFST	GGEKQRGQES	QALVK-----	DGVLYVTGSY	-----SRL	YAVDAR---T	---
44_YP_0079	-----	-D-VSIDDILNDA	KTTQDVVTAG	LGGQGRYSP	LNEINKDNAA	SLVPAWAMSL	GGEKMRGQES	QALVK-----	DGIMYVTSY	-----SRV	WAIDTK---T	---

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GTIL-WQDKP	K----	QNPAA	-RAVACCDLV	NRGLAYWPGD	GKTPALILKT	QLDGNVAALN	AETGETVWKV	ENSDIKVGST	LTIAPYVVKD	K-----	VIIG	SSGAELGVRG	---	
GVIL-WEDKP	K----	QNPAA	-RAVACCDV	NRGLAYWPGD	GKTPSLILKT	QLDGHVVALN	AATGEVYWKV	ENSDIKVGST	LTIAPYVVKD	I-----	VLVG	SSGAELGVRG		
TRIL-WQDKP	K----	QNPAA	-RSVACCDLV	NRGLAYWPGD	SKTPPLILKT	LLDGHIEALN	AKTGELVWKM	ENSDIKVGST	LTVAPYVVKD	N-----	VLVG	SSGAELGVRG	MxaF	
GHIL-WQHSP	K----	QDPAA	-RSVACCDLV	NRGLAYWPGD	DKTPALVIKT	QLDGHVVALN	AKTGEFVWKV	ENGDIKVGST	LTQAPYVVKD	L-----	AIVG	SSGAELGVRG		
GKIL-WKYEP	K----	QDPNV	-IPVMCCDTV	TRGVAY--AD	GK----	IFLY	QADTTLVALN	AATGAHIWST	KNGDPAKGET	GTSAPQVVKD	K-----	VLVG	ISGGFEGVRG	
GKIL-WKYEP	K----	QDPNV	-IPVMCCDTV	TRGVAY--GD	GK----	IFLY	QADATLVALD	AHTGAHIWSA	KNGDPSKGET	GTSAPQVVKD	K-----	VLVG	ISGGFEGVRG	
GKIL-WKYEP	K----	QDPNV	-IPVMCCDTV	NRGVAY--AD	GK----	IIQY	QADTTLVAVD	AKTGAVVWSV	KNGDPAKGET	GTSAPQVIKN	K-----	VLVG	ISGGFEGVRG	
GKIL-WKYEP	K----	QDPSV	-IPVMCCDTV	TRGVAY--GD	GK----	ILLG	QADTTLVALD	AKTGPVWSV	KNGDPAKGET	NTSAPQVIKD	N-----	VIIG	ISGGFEGVRG	
SKIL-WKYEP	K----	QDPSV	-IPVMCCDTV	NRGLAY--AD	GA----	IILH	QADTTLVSLD	AKTGKVNWSV	KNGDSKVGET	NTATVLPVKD	K-----	IIVG	ISGAEYGRG	
AKIV-WKYEP	K----	QDPSV	-IPVMCCDTV	NRGLAY--AD	GA----	ILLH	QADTTLVSLD	AKSGKVNWSV	KNGDPSKGET	NTATVLPVKD	K-----	VIVG	ISGGFEGVQC	
GKIL-WRYEP	Q----	QDPNV	-IAVMCCDTV	YRGLSY--AD	GM----	ILLG	QADTTVVALD	ATSGEVWKST	KIGDPGIGET	LTATVVPVKD	K-----	VLVG	ISGGFEGVRG	
GKIL-WKYEP	R----	QDAGV	-VPLMCCDTI	SRGLAY--GD	GK----	IFLY	QADTTLVALD	AKTGAPVWSV	KNGDPAKGAT	GTSAPALIKD	K-----	VLVG	VSGGFEFGRG	XoxF5
GKIL-WQYEP	R----	QDAGV	-VAVMCCDVV	SRGLAY--GF	GK----	IFLY	QADATLVALD	AVTGKPAWSV	KNGDPAKAT	GTSAPIVVKD	K-----	VLVG	VAGGFEFLRG	
QKIL-WKYQP	K----	QDPSV	-IGVMCCDSV	NRGVQY--AE	GK----	ILVH	TADTSLIALD	AKTGMELWVK	TDDDPKKGAT	GTGAPLIVKD	K-----	VIVG	VSGGFEFVRC	
QKII-WKYEP	K----	QDPSV	-IPVMCCDTV	NRGLAY--AD	GK----	IFLH	QADTTLVALD	AKTGKELWVD	KVNDPKKGET	GTQAPMVVKD	K-----	VVIG	ISGAEFVRC	
GKIL-WRYAP	R----	QDASV	-IAVMCCDTV	SRGLAY--AE	GR----	LFLQ	LADTTVVALD	PETGRVLWSV	KNGDPARGET	NTATVLPVHG	K-----	LIVG	IAGGEYGARC	
GKIL-WRYAP	R----	QDAGV	-IAVMCCDTV	SRGLAY--AD	GR----	LFLQ	LADTTVVALD	PETGRVLWSA	RNGDPAKGET	NTATVLPVHG	K-----	LIVG	IAGGEYGARC	
QSVI-WEYVY	APDKGTDQSQ	VISVMCCDVV	NRGLAY--GD	GK----	IFLA	QGDATLVALD	AKTGKIVWKV	KNGDPKTGMT	ATNAPLVVKD	K-----	VLTG	ISGGFEGVRG		
QSVI-WEYTP	T----	MDADV	TIPVMCCDTV	NRGLAY--GD	GK----	IFLQ	QSDTVLTALD	AKTGKRVWSV	QNGDPKLGMT	NTQAPLVVKD	K-----	VITG	ISGGFEGVRG	
QSVI-WEYTP	T----	MDADV	TIPVMCCDTV	NRGLAY--GD	GK----	IFLQ	QSDTVLTALD	AKTGKRVWSV	QNGDPKLGMT	NTQAPLVVKD	K-----	VITG	ISGGFEGVRG	
QKII-WSYFP	K----	QDPSV	-QALLCCDNV	NRGLGY--GD	GK----	IFLQ	QNDGTLVALD	AKNGNKLWVD	KVVDTKTGAS	NTNAPHVIKD	K-----	VITG	CSGGEYVRC	
QKIL-WSYFP	K----	QNPQT	-QALLCCDNV	NRGLGY--GD	GK----	IFLQ	QNDGTLVALD	AKTGKLIWQT	KVNDIKTGAS	NTNAPHVMKD	K-----	VITG	CSGGEYVRC	XoxF4
QKIV-WAYFP	K----	QDPSV	-QAVLCCDNV	SRGLGY--GD	GK----	IFLQ	QNDGVLVALD	AKTGAKVWVD	KVNDPKVGAT	NTNAPHVIKD	K-----	VLTG	CSGAEFVRC	
GAPLKWQYNP	K----	PEAAA	-QGVACCDV	NRGPTF--AD	GH----	IFFN	TLDGNVVSVD	AATGQEAWKT	KVGNIHVGET	MTMAPLVARG	K-----	VFVG	NSGGFEGVRG	
GALK-WRYDP	L----	PSAAS	-QGEACCDV	NRGAVF--AD	GK----	LIYN	TLDDYTIADV	AASGKEVWRT	KMGDINMGET	MTMAPLLMKD	K-----	VLVG	DSGGEMGVRG	XoxF3
GALK-WRYDP	K----	PSRAS	-QGVACCDV	NRGAVF--AD	GK----	LIYN	TLDDYTVAVA	ADTQGEVWRT	KMGEINKGET	MTMAPLLARD	K-----	VLVG	DSGGEMGVRG	
YTIL-WRYTP	E----	QKPSA	-VTAACYDTV	SRGVAY--GM	GK----	IFLG	TLDGQLIALD	AHTGDEVWVKV	KQGEISRGET	ITGAPIVIKD	M-----	VIIG	ISGGFEGVRG	
YTIL-WKYTP	E----	QKPSA	-IAAACYDTV	SRGVAY--GM	GK----	IFLG	TLDGQLIALD	AHTGNEVWVKV	KQGEIARGET	ITGAPIVIKD	M-----	VIIG	ISGGFEGVRG	
YSIL-WKYTP	A----	QKASA	-VTEACYDTV	SRGVAY--GM	GK----	IFLG	TLDGQLIALD	ARTGAEVWVKV	KQGEIARGET	ITGAPMVIKD	M-----	VLVG	ISGGFEGVRG	
YAIL-WKYTP	E----	QKPTA	-VTEACYDTV	NRGVAY--GM	GK----	IFLG	ALDGEIADL	AHTGAEVWKA	KQGEIGRGET	ITGAPIVIKD	M-----	VLVG	ISGGFEGVRG	
YAIL-WKYTP	A----	QKPGA	-ITEACYDTV	NRGVAY--GM	GK----	IFLG	TLDGQLIALD	AHTGDEIWKV	KQGEIGRGET	ITGAPIVIKD	M-----	VLVG	ISGGFEGVRG	
YAIK-WQYTP	V----	QNSQA	-VAVACCDV	NRGLAY--AN	GK----	IFMV	TLDGQIIALD	ANTGKELWKT	KHADVTKGET	LTGAPLVVKD	K-----	ILVG	VSGGFEFVRG	XoxF2
YAIK-WQYTP	V----	QNSQA	-VAVACCDV	NRGLAY--AN	GK----	LFLA	TLDGQIIALD	ANTGKELWKT	KHADVTKGET	ITGAPLVVKD	K-----	VLVG	VSGGFEFVRG	
YAIK-WQYTP	V----	QNSQA	-VAVACCDV	NRGLAY--AN	GK----	LFLA	TLDGQIIALD	ANTGKELWKT	KHADVTKGET	ITGAPLVVKD	K-----	VLVG	VSGGFEFVRG	
YAIK-WQYTP	V----	QNSQA	-VAVACCDV	NRGLAY--AN	GK----	IFMT	TLDGQIIALD	ANTGKELWKM	KHADVTKGET	ITGAPLVVKD	K-----	VLVG	VSGGFEFVRG	
YAIK-WQYTP	V----	QNSQA	-VAVACCDV	NRGLAY--AN	GK----	LFLA	TLDGQIIALD	ANTGKELWKA	KHADVTKGET	ITGAPLVVKD	K-----	VLVG	VSGGFEFVRG	
YAIK-WQYTP	V----	QNSQA	-VAVACCDV	NRGLAY--AN	GK----	IFMV	TLDGQVIALD	ANTGKELWKA	KHADVTKGET	ITGAPLVVKD	K-----	VLVG	VSGGFEFVRG	
PVQV-WSYNK	GTD--	RDLSA	-VPRACCDV	NRGVNY--AD	GK----	VFFN	TLDGFLIALD	AKTGKEVWV	KHAFPEHGET	VTNAPLIAKD	K-----	VIVG	FGGDEFAARG	
PVQV-WSYNK	GTD--	RDVSA	-VPRACCDV	NRGVNY--AD	GK----	LLFN	TLDGFLIALD	AKTGQELWV	KHAFPEHGET	VTNAPLIAKD	K-----	VIVG	FGGDEFAARG	
PKQI-WNYVK	QTD--	RDETA	-VPRACCDV	NRGPAY--GD	GK----	VVFG	TLDGFLIALD	AQTGKEAVV	KHAWPEKGET	ITNAPLIADG	L-----	VIIG	FGGDEFAARG	
PKQI-WNYVK	TTD--	RDESA	-VPRACCDV	NRGPAF--AD	GK----	LYYG	TLDGFLIALD	AATGKEVWV	KHAWPEKGET	STSAPLIADN	V-----	VILG	FGGDEFAARG	
YEVL-WKYAP	R----	QDDKA	-VSTACCDTV	NRGASY--AD	GK----	IVFN	TLDGYVCLD	ANTGKELWKT	KFADVNKGET	STPAPIIVKD	K-----	VVTG	YGGDEFGARG	XoxF1
YEVL-WKYVP	R----	QDDKA	-VSTACCDTV	NRGASY--AD	GK----	IVFN	TLDGYVCLD	ANTGKELWKT	KFADVNKGET	STPAPIIAKD	K-----	VFTG	YGGDEFGARG	
YEVL-WKYVP	R----	QDDKA	-VSTACCDTV	NRGASY--AD	GK----	VVFN	TLDGYVCLD	ANTGKELWKT	KFADLNKGET	STPAPIIVKD	K-----	VFTG	YGGDEFGARG	
YEVL-WKYVP	K----	QDDKA	-VSTACCDTV	NRGASY--AD	GK----	VVFN	TLDGYVCLD	ANTGKELWKT	KFADLDKGET	STPAPIIVRD	K-----	VFTG	YGGDEFGARG	
YEVL-WKYVP	R----	QDDKA	-VSTACCDTV	NRGASY--AD	GK----	VVFN	TLDGYVCLD	ANTGKELWKT	KFAEVNKGET	STPAPIIAKD	K-----	VFTG	YGGDEFGARG	
GARK-WTYEP	E----	IPDDT	-LQYACCDVN	SRGITY--AD	GK----	LFVG	RLDGKLTALD	AATGKELWTA	KVVDYKQGSV	ITSPLLVVRD	K-----	VITG	FGGGEYVVRG	
GARK-WTYEP	D----	IPDDV	-LQYACCDVN	NRGVTY--AD	GK----	LFVG	RLDGKLTALD	AVTGKELWTS	KVVDYKQGSV	ITSAPLVVRD	K-----	VITG	FGGGEYVVRG	ADH's
GEKK-WEYNA	R----	LPEGI	---LPCCDVV	NRGAAL--YK	DK----	VYFG	TLDAKLVALD	QKTGKVVWRK	DIVDFKSGYS	YTAAPMIVKG	K-----	IITG	VSGGFEFVVG	
GHEI-WEYDA	R----	LPEGI	---LPCCDVV	NRGAAL--IG	DK----	VIFG	TLDAKLVALN	QKTGKVVWVK	EIDDFKGGYS	YTAPPLIVPT	KTFGPLIITG	VSGGFEFIVG		

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TGNPAPWNET	MRPG-----	-----DNK	WTMTIFGRDA	DTGEAKFGYQ	KTPHDEWDYA	GVNVMLSEQ	KD---KDGKA	RKLLTHPDRN	GIVYTLDRTD	GALVSANKLD	---
TGNPAPWNET	MRPG-----	-----DNK	WTMTIFGRDV	DTGKAHFGYQ	KTPHDEWDF	GVNVMLSDQ	KD---KDGKL	RKLLTHPDRN	GIVYTLDRTN	GDLVSANKID	
TGNPSPWNET	MRPG-----	-----DNK	WTMTIFGRDA	DTGLAKFGYQ	KTPHDEWDYA	GVNVMLSEQ	KD---KDGQV	RSLLTHPDRN	GIYTLDRTN	GDLVSANKID	MxaF
SGNPAPWNET	MRPG-----	-----DNK	WTMTIWARD	DTGKMKFGYQ	KTPHDEWDF	GVNVIMLSEQ	TD---KEGKK	RKLLTHPDRN	GIVYTLDRN	GDLISADKLD	
SGNPSTWNP	QRP-----	-----DNR	WSMAIWARD	DTGVAKWIYQ	MTPHDEWDY	GINEMIL---	-----VGQEA	RKVLVHFDRN	GFGYTLDRVS	GELLVAEKFD	
SGNPSTWNP	QRP-----	-----DNR	WSMTIWARD	DDGKVKVWYQ	MTPHDQWDY	GINEMIL---	-----VNQEA	RKVLVHFDRN	GFAYTLDRVT	GEPLVAEKFD	
SGNPSTWNP	QRP-----	-----DNR	WSMTIWARD	DTGVAKVWYQ	LTPHDQWDY	SINESIL---	-----VGQEA	RKVLVHFDRN	GFGYTLDRVT	GEPLVAEKFD	
SGNPSTWNP	QRP-----	-----DNR	WSMSVWARD	DSGKVKWIYQ	MTPHDEWDY	GINEMILTEQ	K----IGGKE	RKLLTHFDRN	GFGYTLDRVT	GELLVAEKYD	
TANPSTWNP	QRP-----	-----DNK	WTMAIFARNP	DTGQAKWIYQ	MTPHDEWDY	GINEMILTDQ	K----VDGKE	RPLLTHFDRN	GFAYTLDRAN	GEVLVAEKFD	
SGNPSTWNP	QRP-----	-----DNK	WSMTIWARNP	DTGMAKVVYQ	MTPHDEWDF	GINEMILTDQ	K----FDGKD	RPLLTHFDRN	GFGYTLDRAT	GEVLVAEKFD	
TGNPSTWNP	QRP-----	-----DNK	WSMTIMARDA	DTGMAKWFYQ	MTPHDEWDY	GVNEMILTNQ	T----VDGQE	RKLLTHFDRN	GLAYTMDRET	GELLVAEKYD	
TGNPSTWNP	QRP-----	-----DNK	WSMAIFARDV	DTGVARVWYQ	MTPHDEWDY	GVNEMILTDA	S-----GG	RKVLTHFDRN	GFAYVLDRAD	GDLISADKYD	XoxF5
TGNPSTWNP	QRP-----	-----DNK	WAMTILARNA	DTGEAAWLYQ	MIPHDQWDY	GVNEMILGEA	A----IDGRA	RKTLTHFDRN	GFVYVLDRAD	GELLSADKYD	
TGNPSTWNP	QRAGPDRKPI	-----DQK	WAMTMFARDV	DTGIARWAYQ	MTPFDQWDY	GINEPILADE	E----INGFP	RKTVTHFDRN	GFAYTWRAT	GDLVAEKFD	
TGNPSTWNP	QRAGPDGKPI	-----DQL	YSMTMFARDV	DTGVAKWAYQ	MTPHDEWDY	GINEPILADE	D----FDGTK	RAIATHFDRN	GFGYTLDRAT	GELLVAEKYD	
TGNPATWNP	QRP-----	-----DNR	WTMAI IARDP	DTGLARVWYQ	MTPHDQWDY	GVNEMILTEQ	V----IDGRP	RRVLTHFDRN	GFGYTIDRAT	GDLLVAEKFD	
TGNPATWNP	QRP-----	-----DNR	WTMAI IARDP	DTGMARVWYQ	MTPHDQWDY	GVNEMILTEQ	V----IDGRP	RRVLTHFDRN	GFGYTLDRAT	GEVLVAEKFD	
SGNPSTWNP	QRP-----	-----DNK	WSMTIWARDV	DTGEAKVWYQ	MTPHDEWDY	GINEMMLIDQ	EMTAKDGSKH	SKLLTHFDRN	GFGYTLDRVT	GELLVAEKFD	
SGNPSTWNP	QRP-----	-----DNK	WSMSLWARD	DTGAVKVVYQ	MTPHDEWDY	GINETVLVDQ	K----VKGKM	RKLIVHFDRN	GFGYTLDRVT	GELMVAEKFD	
SGNPSTWNP	QRP-----	-----DNK	WSMSLWARD	DTGEVWVVYQ	MTPHDEWDF	GINETVLVDQ	K----VKGKM	RKLIVHFDRN	GFGYTLDRVT	GELMVAEKFD	
TGNPSTWNP	VRPG-----	-----DNK	WSMTIFARDV	DTGMARWYQ	MTPHDEWDY	GMNEIVL---	-----WEAKG	KKLATHFDRN	GFGYTFDRTN	GTLVAEKMN	
TGNPSVWNP	VRPG-----	-----DNK	WAMTIFARDL	DTGMAKGYQ	MTPHDEWDY	GINEVIL---	-----WDANN	RKLAHFDRN	GFGYTFDRTN	GSLLVAKMH	XoxF4
TGNPSVWNP	VRPG-----	-----DNK	WSMTIFARDV	DTGIAKWYQ	MTPHDEWDY	GINEVIL---	-----FDKGG	KTYAWHHDN	GFAYTFDAHT	GSIIAAEKVH	
TGNPGWNP	QRP-----	-----DNK	WTSGIFARDA	ETGQARWFYQ	WSPHDLYDW	GINEQILLDM	T----WKGQP	RKVLVHPDRN	GYVYILDRTT	GEVLSAKPF-	
VSNPWPNS	MRPG-----	-----DNK	WTSGIFARDA	DTGQARWFYQ	YSPHDLYDY	GVNEIILLDM	P----WKGQP	RKVLVHPDRN	GYVYVLDVRN	GEVLSAEPF-	XoxF3
VSNPWPNS	IRPG-----	-----DNK	WTSGIFARDA	DTGQARWFYQ	YSPHDLYDY	GVNEIILLDL	T----WKGQP	RKVLVHPDRN	GYVYVIDRNT	GEVLSAEPF-	
TGNPGSWNAE	ERKGG-----	-----DNK	WSCTLWGRRP	TTGKARWAFQ	MTPWDSWGYD	GTNELILVLDL	P----IGNAK	RKCAVHFDKN	GFVYTLDRGT	GEVLSAVPF-	
TGNPGSWNT	VRKGG-----	-----DNK	WSCTLWGRRP	GTGKARWAFQ	MTPWDSWGYD	GTNELILVLDL	P----IGNAK	RKCAVHFDKN	GFAYTLDRGT	GEVLSAVPF-	
SGNPGSWNP	ERKGG-----	-----DNK	WSCTLWGRRP	ATGKARWAFQ	MTPWDSWGYD	GTSELILIDL	P----IGKTM	RKCAVHFDKN	GFAYTLDRGT	GEVLLATPF-	
SGNPGSWNP	ERKGG-----	-----DNK	WACTLWGRRP	ATGKARWAFQ	MTPWDSWGYD	GTSELVLDL	R----IGSTL	RKCAVHFDKN	GYAYTVDRGT	GELLSAAPF-	
SGNPGSWNP	ERKGG-----	-----DNK	WACTLWGRRP	ATGKARWAFQ	MTPWDSWGYD	GTSELVLDL	R----IGEGV	RKCAVHFDKN	GFAYTLDRAT	GEVLSAAPF-	
TGNPGTWNAE	QRKGG-----	-----DNK	WSCTIFARRP	DTGKARWAYQ	MTPWDAWDYD	GINEMILPDL	T----VKGKK	TPCLVHFDRN	GFGYVLDRRT	GQLIEAQP-	XoxF2
TGNPGTWNAE	QRKGG-----	-----DNK	WSCSI IARRP	DTGKARWAYQ	MTPWDSWDYD	GINEMILPDL	T----VKGKK	TPCLVHFDRN	GFGYVLDRRT	GQLIEAQP-	
TGNPGTWNAE	QRKGG-----	-----DNK	WSCSI IARRP	DTGKARWAYQ	MTPWDSWDYD	GINEMILPDL	T----VKGKK	TPCLVHFDRN	GFGYVLDRRT	GQLIEAQP-	
TGNPGTWNAE	QRKGG-----	-----DNK	WSCSI IARRP	DTGKARWAYQ	MTPWDSWDYD	GINEMILPDL	T----VKGKK	TPCLVHFDRN	GFGYVLDRRT	GQLIEAQP-	
TGNPGTWNAE	QRKGG-----	-----DNK	WSCSI IARRP	DTGKARWAYQ	MTPWDAWDYD	GINEMILPDL	T----VKGKK	TPCLVHFDRN	GFAYVLDRRT	GQLIEAQP-	
TGNPGWNSPT	TRCGADTQEE	CNSG-KWDNK	WSMTIFARKV	DTGEVVWAYQ	MTPFDQWDYD	GVNENILVDF	PN---VDGKP	VKGLVHFDRN	GFAYVLDRTD	GNLLRANKF-	
TGNPGWNSPT	TRCGADTDAE	CNSG-KWDNK	WSMTIFARKV	DTGEVVWAYQ	MTPFDQWDYD	GVNENILVDM	PN---VDGKP	VKALVHFDRN	GFAYVLDRTD	GNLLRAHKF-	
TGNPGLWSPA	YRCAKTHEE	CNTG-EFDNK	WSMTIFGRKV	DTGEAVFAYQ	MTPFDQWDYD	GVNENILVDM	N----VDGKD	RKTLVHFDRN	GFNYVLDRTD	GTLLRANKY-	
TGNPGLWSPA	YRCSKTHEE	CNTG-EFDNK	WSMTIFARKV	DTGEAVWAYQ	MTPFDQWDYD	GVNENILVDM	D----VDGKK	RKALVHFDRN	GFAYVLDRAD	GTLLRANKY-	
TGNPGLWSPS	YRTEAKTHEE	ANEPKWWDNK	WSMTIFARKP	DTGEAVWYQ	MTPFDQWDYD	GINEDVLVDI	T----VDGSK	KPCLVHFDRN	GFCYVLRNTD	GTLIRANKF-	XoxF1
TGNPGLWSPS	YRTEAKTHEE	ANEPKWWDNK	WSMTIFARKP	DTGEAVWYQ	MTPFDQWDYD	GINEDVLVDI	N----VDGAK	KPCLVHFDRN	GFCYVLRNTD	GTLIRANKF-	
TGNPGLWSPS	YRTEAKTHEE	ANEPKWWDNK	WSMTVFARKP	DTGEAVWYQ	LTPFDQWDYD	AINEDVLVDI	T----VDGAK	KPCLVHFDRN	GFAYVLSRTD	GTLIRANKF-	
TGNPGLWSPS	YRTEAKTFEE	ANEPKWWDNK	WSMTVFARKP	DTGAAVWYQ	LTPFDEWDYD	AINEDVLVDI	N----VDGAK	KPCLVHFDRN	GFCYVLRNTD	GTLIRANKF-	
TGNPGLWSPS	YRTEAKTHEE	ANEPKWWDNK	WSMTVFARKP	DTGEAVWYQ	MTPFDQWDYD	GINEDVLVDI	N----VDGAK	KPCLVHFDRN	GFCYVLDRTD	GTLIRANKF-	
TGNPWPNTA	VRSTGNGDFG	-----KLTNL	YTASTLALDP	NTGKIKWHIQ	TTPADAWDYD	GVNEAVLADL	N----VGGAA	VPTLMKADRN	GFFFVANRET	GKVISAKEY-	
TGNPWPNTA	VRSTGNGDFG	-----KLTNL	YTASTLAIDP	NNGAIKWHIQ	GTPADAWDYD	GVNEALLADL	K----IGGAS	VPTLMKADRN	GFFFVANRET	GKVISAKEY-	ADH's
TGNPWPNSA	LRPG-----	-----DNK	WSASRLAINP	DNGEIVWGFQ	TTPHDGWDYD	GVNEFVFPDM	Q----KDGKT	VKAGATADRN	GFFYVLDRTN	GAFLSATPFV	
TGNPAPWNSH	MRPG-----	-----DNR	WSCSRLAIDP	ETGNIKWGFQ	TTPNDGWDFD	GVNEVVS---	-----FDLDG	TKAVATADRN	GFFYVLRNEN	GKFIIRGPFV	

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DTVNVFKSVD	LKT-----GQ	PVRDPEYGTR	M-----DHL	AKDI--CPSA	MGYHNQGHDS	YDPKR-ELFF	MGINHICMDW	EPFMLPYR-A	GQFFVGGATLN	MYPG-----	---
DTVNVFKQVD	LKS-----GT	PVRDPEFGTR	M-----DHL	AREV--CPSA	MGYHNQGHDS	YDANK-QLFY	MGINHICMDW	EPFMLPYR-A	GQFFVGGATLN	MYPG-----	---
DTVNEFKSVD	MKT-----GQ	PIRDPEYGTR	M-----DHL	AKDI--CPSA	MGYHNQGHDS	YDPQK-QLFF	MGVNHICMDW	EPFMLPYR-A	GQFFVGGATLN	MYPG-----	MxaF
DTVNVFKHVD	LKS-----GL	PVRDPEFGTR	M-----DHL	GTEI--CPSA	MGYHNQGHDS	YDPTK-QLFF	MGINHICMDW	EPFMLPYR-A	GQFFVGGATLN	MYPG-----	---
PAVNWATKVD	MDKNSKTYGR	PLVVPAFSTE	HN-----GED	VNSQGIMPAA	LGVKDQQPAA	YSPLT-GLFY	IPANHVAMDY	EPFRVSYT-A	GQPYIGATLS	MYP-----	---
PAVNWATKVD	LDKNSKTYGR	PLVVKEFSTE	SN-----GED	VNSQGIFPAA	LGVKDQQPAA	YSPIT-NLFY	VPANHVAMDY	EPFRVSYT-A	GQPFVGGATLS	MYP-----	---
PAVNWATKVD	LDKNSKTYGR	PLVVKEFSTE	AN-----GED	VNTQGVMPAA	LGVKDQQPAA	YSPLT-NLFY	IPANHVAMDY	EPFRVSYA-A	GQPYVGGATLS	MYP-----	---
PAVNWATKVD	MDKSSKSYGR	PLVVPQFSTA	HG-----GED	VNTKGCIPAA	LGSKDQPSA	YSPLT-ELHY	VPTNHVCMYD	EPFRVSYT-A	GQPYVGGATLS	MYP-----	---
PVVNWASKVD	LDKGSKNYGR	PLVVSXYSTD	QN-----GED	VNSKGICPAA	LGTKDQQPAA	FSPKT-QLFY	VPTNHVCMYD	EPFKVTTYT-P	GQPYVGGATLS	MYPA-----	---
PVVNWATKVD	LDKGSKTYGR	PLVVSXYSTE	QN-----GED	VNSKGICPAA	LGTKDQQPAA	FSPKT-GLFY	VPTNHVCMYD	EPFRVTTYT-P	GQPYVGGATLS	MYPA-----	---
PVVNWTTGVD	MDPNSETYGR	PAVVAEYSTA	QN-----GED	ENTTGVCPPA	LGTKDQQPAA	FSPKT-NLFY	VPTNHVCMYD	EPFRVAYT-A	GQPYVGGATLS	MYPA-----	---
PAVNWASRID	MDKSSKSYGR	PIVDGAYSTQ	QN-----GEE	TVTHGVCPST	VGAKNANPAA	YSALT-GLFY	APMIRLCMDY	EPFQITYA-A	GQPYTGADTA	VYPE-----	XoxF5
PAVNWASRVD	LGKSSKAYGR	PVLDNAYSTE	AN-----GEE	TVTHNICPAT	VGAKNANPAA	YSEQT-GLFY	APMIRLCMDY	EPFHAIYA-Q	GQPYTGADTA	VYPQ-----	---
PAANWATSIV	MDKNDPHYGR	PAVVKKYAPF	ET-----GTD	ETTKGICPSS	LGSKNQPPAS	YSLAT-GLFY	VPTTRMCMYD	EPFKVSYT-V	GQPYVGGATLT	MYPV-----	---
PAVNWATGVD	MDKSSKSYGR	PIRVAKYSTF	KDGL-----GAD	VNTKGCIPAA	LGSKDQPPAS	FSKLT-GLFY	VPTNHVCMYD	EPFKVSYT-A	GQPYVGGATLS	MHPA-----	---
PSVNWARRID	LDRASPTYGR	PVVDPRFAPG	EA-----DEE	EVTKNICPGA	LGAKNQPPAA	YSPVT-RLFY	VPTNHVCMYD	EAFRVSYT-P	GQPYVGGATLT	LHP-----	---
PSVNWARRID	LDRASPGYGR	PVLDTRYAPG	EA-----DEE	EVTKNICPGA	LGAKNQPPAA	YSPVT-RLFY	VPTNHVCMYD	EAFRVSYT-P	GQPYVGGATLT	LHP-----	---
KAVNWATHVD	MKT-----GR	PQVNPKYSTQ	HG-----GQD	VDTKGCIPSA	MGAKNEPPVT	YSPRT-KLIY	IPGNHTCMNY	EPFEVEYT-A	GQPYVGGATLN	IFPARANVKT	---
KSVNWATHVD	MHT-----GR	PQVVPPEMSTE	QN-----GED	VNTVGVCPAA	LGSKNQPPVS	FSPKT-GLFY	ISGNHLCMEY	EPFEVSYT-A	GQPYVGGATLT	MQPAGADVMT	---
KSVNWATHVD	MHT-----GR	PQVVPPEMSTE	QN-----GED	VNTVGVCPAA	LGSKNQPPVS	FSPKT-GLFY	ISGNHLCMEY	EPFEVSYT-A	GQPYVGGATLT	MQPAGADVMT	---
PFVNWATKVD	LKS-----GV	PVKDKPFSTH	Q-----DYN	A--KGICPAA	LGVKDEQPSA	FSPKT-GMFY	VLNHLVCMYD	EPVESKYI-A	GQPWVGADLT	MFAG-----	---
PFVNWATSVD	LST-----GI	PQKDKPKYSAH	Q-----DTT	TKNV--CPAA	LGKDKQPPAA	YSPRT-KLFY	VPLNHLVCMYD	DVVEAKYT-A	GQPWVGAGLT	MHPG-----	XoxF4
PFVNWATHVD	KAT-----GI	PHKDGKYSTH	Q-----DYN	T--KGICPAA	LGTKDQQPAA	YSPRT-GLVY	SPLNHLVCMYD	EPVESKYI-A	GQPWVGATLT	MFAG-----	---
HAITTTTGV	LKT-----GR	LQYIPEKKPQ	M-----GKV	MRDI--CPNA	SGAKDWSPPA	YSPRT-GLIY	LPHTNLCMDE	EHMQANYI-A	GTPYLGSETR	MKAG-----	---
QKITSSTGVD	LKT-----GR	LQYVAAKQPK	L-----GET	VRDI--CPAP	PGAKDWQPSA	FSNKT-KLLY	LPHNNLCFDT	EEDVGYI-A	GTPYVGGASIH	MHAG-----	XoxF3
QAITSSTGVD	LKT-----GR	LQYVEAKRPK	T-----GET	VRDI--CPAP	PGAKDWQPTA	FSHKT-GLLY	IPHNNLCFDT	EELDVGYI-E	GTPYVGGANIH	MKAG-----	---
VYLNWAKGIN	RGD-----DR	PIEVPEKRAK	L-----GID	V--KRVCPSS	MGGKNQPPAA	YDPET-HLFY	VGTTNNLCMDI	QDMEARYN-P	GSPYVGGADLL	IYSGH-----	---
VYENWAKGIN	RGD-----DR	PIEVPEKRAK	L-----GVD	V--KGVCPSS	MGGKNQPPAA	YDPET-HLFY	VGTTNNLCMDI	QAMEAKYN-P	GTPYVGGADLL	IYSGH-----	---
VYVNWAKGIN	RGD-----DR	PIEVPEKRTK	A-----GIE	V--KGVCPSS	MGGKNQPPAA	YDPQT-HLLY	VGTTNNLCMDI	EPVEARYI-P	GSPYIGADLI	IYSGH-----	---
VYVNWAKGIS	RGD-----DR	PIEVPEKRAK	A-----GVD	I--KGVCPSS	MGGKNQPPAA	YDPET-HLFY	VGTTNNLCMDI	LATEVRYI-S	GSPYIGADLK	IYSGH-----	---
VYVNWAKGIN	RGD-----DR	PIEVPEKRAK	A-----GID	I--KGVCPSS	MGGKNQPPAA	YAPQT-HLFY	LGTTNNLCMDI	EATEARYV-L	GLPYIGANLT	IYSGH-----	---
VYVNWAKEIS	KEN-----DR	PVEIPEKRTK	Q-----GVD	T--KGICPNS	MGGKDQPPAA	FSPQT-GLFY	VPTNNMCMNY	EGVEATYT-A	GAPYVGGANVL	MYSGH-----	XoxF2
VYENWAKEIS	KEN-----DR	PVEIPEKRTK	Q-----GVD	T--KGICPNS	MGGKDQPPAA	FNPQT-GLFY	VPTNNMCMNY	EGVEATYT-A	GAPYVGGANVL	MYSGH-----	---
VYVNWAKGID	KNT-----DR	PIEVPEKLTK	Q-----GVD	T--KNICPCA	MGGKDQPPSA	YSPQT-GLLY	AGTTNNMCMNY	EGVEVKYA-A	GAPYVGGANVL	MFSGH-----	---
VYVNWAKEIS	KEN-----DR	PVEIPEKRTK	Q-----GVD	--TKGICPNS	MGGKDQPPAA	FSPQT-GLFY	VPTNNMCMNY	EGVEATYT-A	GAPYVGGANVL	MYSGH-----	---
VYENWAKEIS	KEN-----DR	PVEIPEKRTK	Q-----GVD	T--KGICPNS	MGGKDQPPAA	YNPQT-GLFY	VPTNNMCMNY	EGVEATYT-A	GAPYVGGANVL	MYSGH-----	---
VYENWAKEIS	KEN-----DR	PVEIPEKRTK	Q-----GVD	T--KGICPNS	MGGKDQPPAA	FSPQT-GLFY	VPTNNMCMNY	EGVEATYT-A	GAPYVGGANVL	MYSGH-----	---
VTVNWAEKVD	LKT-----GR	PVKVPEHSPF	KI-----GVN	TQA---CPSA	MGGKDQPPAS	VDPKDPTNFY	VPTNNWCMED	EPQARTHTQQ	GTVYVVFANVY	MYPEK-----	---
VTVNWAEKVD	LKT-----GR	PVKVPEHSPF	KI-----GVN	TQA---CPSA	MGGKDQPPAS	VDPKDPTNFY	VPTNNWCMED	EPQARTHTQQ	GTVYVVFANVY	MYPEK-----	---
VTVNWAEKID	LKT-----GR	PVKVREHSPL	ER-----GRN	VNA---CPSA	MGGKDQPPCS	VDPAEPNKFY	CPTNNWCMEL	EPQERSHTQQ	GTVYVVFANVY	MYPEK-----	---
VTVDWAEKVD	LKT-----GR	PVKVREHSPL	ER-----GRN	VSA---CPSA	MGGKDQPPCA	VDPAEPTKFY	CPTNNWCMEL	EPQERTHTQQ	GTVYVVFANVY	MYPEK-----	---
VTVNWAEKID	MKT-----GR	PVKVKEHSPF	EV-----GKA	VQA---YPSA	MGGKDQPPVA	VDPKEPNVYF	APTNNWGMTL	EPMERAHTNQ	GSVYVVFANVL	MKPEK-----	XoxF1
VTVNWAEKID	FKT-----GR	PVKVKEHSPF	EV-----GKA	VQA---YPSA	QGGKDQPPVA	VDPKEANVYF	APTNNWGMTL	EPQERAHTNQ	GSVYVVFANVL	MKAKEK-----	---
VTVNWAEKID	MKT-----GR	PVKVKEHSPF	EV-----GKA	VQA---YPSA	QGGKDQPPVA	VDPKEANVYF	APTNNWGMTL	EPMERAHTNQ	GSVYVVFANVL	MKPEK-----	---
VTANWAEKID	MKT-----GR	PVKVKEHSPF	EV-----GKA	VQA---YPSA	QGGKDQPPVA	VDPKEANVYF	APTNNWGMTL	EPMERAHTNQ	GSVYVVFANVL	MKPEK-----	---
VTVNWAEKID	MKT-----GR	PVKVKEHSPF	EV-----GKA	VQA---YPSA	QGGKDQPPVA	VDPKEANVYF	APTNNWGMTL	EPMERAHTNQ	GSVYVVFANVL	MKAKEK-----	---
VFANWAQKWD	TST-----LR	AVEDPDKRPG	P-----GHP	VKDV--CPNL	IGGKNWQPMS	YSPDT-GLVY	IPANNVCMYD	SVGDVSYK-R	GVFYLGAEPF	TKEG-----	---
VFANWAQKVD	IAT-----SR	AVEDPDKRPG	P-----GHP	AKDI--CPNL	IGGKNWQPMS	YSPDT-GLVY	IPANNVCMYD	SVGDVSYK-R	GVFYLGAEPF	TKEG-----	ADH's
SNINWAKGID	EN-----GR	PIYDDANRPG	DPAKSEDGKK	GKSUYATPGF	LGGKNWNPIA	YSPDT-RLFY	IPANNVCMYD	WNEPVNYK-K	GAAYLGAGFT	IKPT-----	---
EKITWATGLD	EN-----GR	PKFVADNRPG	DPKDSKDGKQ	GKSVFAVPSF	LGGKNQPPMA	YSPDT-KLFY	VPSNEWGMDI	HNEPVTYK-K	GAAYLGAGFT	IKPI-----	---

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ADPTA-----	GLGAVGAFKK	LA--NYTQMG	GGVVVFSLDG	KGPYDDPNVG	EWKSAAK	---
QDPTA-----	GLGAVGAFKK	LA--HYTQMG	GGTMVFSLDG	KGPYDDVNLG	EFASSK-	
QDPTA-----	GLGAVGAFKQ	LA--NYTQQG	GGVLVFSLNG	KGPYDDPNVG	EYQSAN-	MxaF
QDPTA-----	GLGAVGAFKN	LQ--RYTQMG	GSLEVFSLDG	KNPYDDVNVG	EWTKG--	---
TNPTA-----	GLGAVGGYSS	LA--NYTALG	GQLTVFALPE	Q-----	-----	
TKGTE-----	GLGAVGGYAS	LA--NYTALG	GQLTVFALPN	-----	-----	
SKGTE-----	GLGAVGGYAS	LA--NYTALG	GQLTVFALPG	K-----	-----	
TDPNA-----	GLGAVGGYAA	LS--NYTALG	GQLTVFALHG	K-----	-----	
TDPNA-----	GLGAVGGYAA	LS--QYTNLG	GQLTVFALPN	-----	-----	
TDPNA-----	GLGAVGGYAA	LS--SYTNLG	GQLTVFSLPN	N-----	-----	
TNPNND-----	GLGAVGGYAS	LS--QYTELG	GQLTVFELPG	-----	-----	
THSDE-----	GANSPPGVYAA	LA--NYTALG	GQLTVFALK-	-----	-----	XoxF5
TQTPE-----	GANSPEVYAA	LA--QYTALG	GQLTVFALP-	-----	-----	
TNPPDD-----	GSGAVGGFAS	LS--GYTSLG	GSLTVFALP-	-----	-----	
TNPTD-----	GLGAVGGYAG	LK--QYTNLG	GSLTVFALP-	-----	-----	
TDPAD-----	GSGAVGGYAA	LS--QYTAPG	GQLTVFALPE	-----	-----	
TDPAD-----	GSGAVGGYAA	LS--QYTAPG	GQLTVFALPE	-----	-----	
EGDTE-----	GLGAVGAYKG	LS--SHTKLG	GVFTVFALP-	-----	-----	
DDGSDSTNTE	GLGAVGAYRS	LS--SFTKLG	GTFTVFALPG	K-----	-----	
DDGSDSTNTE	GLGAVGAYRS	LS--SFTKLG	GTFTVFALPG	K-----	-----	---
TNETD-----	GLGAAGGYKE	LTKWNAAPGG	GAMNVFSL--	-----	-----	
TEDSD-----	GAGAAGAYRE	LTKWNAAPGG	GAVSAFSL--	-----	-----	XoxF4
ENETD-----	ALGAAGGYKE	LTKYNAAPGG	GALNVFSL--	-----	-----	---
DPRDATG---	ALGFLNAMRD	LK--KVTTKG	GMLYDFVLP-	-----	-----	
DKRDGTA---	ALGFVNAMKD	LP--EVTTKG	GELYVFALP-	-----	-----	XoxF3
NKMDGTA---	ALGFVNAMKD	LP--DVTTKG	GMLYVFALP-	-----	-----	---
PKDDPRA---	AMGANGAADD	SGLPQSTTPG	GELVVFGLD-	-----	-----	
PKDDPRA---	AMGANGAADN	SGLPQSTTPG	GELVVFGLD-	-----	-----	
PKSDPRA---	AMGADGAAYA	SHLPESTTPG	GELVVFGLD-	-----	-----	
PKGDPRA---	AMGAAGAAYD	SGLPESTTPG	GELVVFGLE-	-----	-----	
PRGDRQG---	AMGASGAAYD	SGLPGSTTPG	GELVVFGLE-	-----	-----	
PPDDPYA---	GLGAVGVAYQ	AGLPKATTIG	GELYVFSLE-	-----	-----	XoxF2
PPDDPYA---	GLGAVGVAYQ	AGLPKATTIG	GELYVFSLE-	-----	-----	
PPDDPYA---	GLGAVGVAYQ	AGLPKATTIG	GELYVFSLE-	-----	-----	
PPDDPFG---	ALGAIGAAYQ	SGLDKATSVG	GELVVFALP-	-----	-----	
PPDDPYA---	GLGAVGVAYQ	AGLPKATTVG	GELYVFALE-	-----	-----	
PPDDPYA---	GLGAVGVAYQ	AGLPKATTIG	GELYVFSLE-	-----	-----	
PPDDPYA---	GLGAVGVAYQ	AGLPKATTIG	GELYVFSLE-	-----	-----	---
DLDDKFG---	AIGSTALTKV	GGF-NKIPQG	GTLYTFRVPD	KAASTQ----	-----	
DLEDKFG---	AIGSTALTKV	IGL-NKIPQG	GALYTFRVPD	KEATAH----	-----	
DLNDKFG---	AIGATAMTKA	ANL-DKIPQA	GTLFTFRVME	-----	-----	
DLNDKFG---	AIGATAMTKA	ANL-DKIPQA	GTLFTFRVFE	-----	-----	
DPADPYG---	ALGVSGMAAE	NGF-YNIPMG	GTLYTFCVQ-	-----	-----	XoxF1
DPSDPYG---	ALGCSGMAAE	NGF-YNIPMG	GTVYTFCVQ-	-----	-----	
DPADPYG---	ALGVAGMAGE	NGF-YNIPMG	GTLYTFCVQ-	-----	-----	
DPADPYG---	ALGVAGMAGE	NGF-YNVPMG	GTLYTFCVQ-	-----	-----	
DPSDPYG---	ALGDSGLAAD	NGF-YNIPMG	GTLYTFCVQ-	-----	-----	---
-----	-LGEIGK---	-KMTNAAPEG	GALFVFAVQ-	-----	-----	
-----	-LGEIGK---	-KMTNAAPEG	GALFVFAVQ-	-----	-----	ADH's
VAKTT-----	-----	----AGINQG	GSFWAFRLPK	ALASR-----	-----	
VAKTV-----	-----	----QHLNQG	GMVWTFKIPK	KTASN-----	-----	---

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