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At1g30700      1  -----MKYALILVLFVVF IWQSSSSSANSSETFTQCLTSNSDPKHPISPAIFFSG
Ha-CHOX       1  -MANITSSFNMQTSILTLTLLSTQSSATSRSITDRFIQCLHADRADPSFPITGEVYTPG
At5g44440    1  -----MEFSSFTFILLFSLNISPLVSAHGSNHEDFLKCLSYRMDNTVEPKVHTSK
At1g26390    1  -----MKGTSVLCVLVLSVLEAAVTKPKFGDFIGCLR YRTPSPENPITDAISFAD
At1g11770    1  -----
At1g26380    1  -----MKEAIFGLYLVLVSGLEAAVTKPNSGNFIECLRYOASPENPITDAIFTVD
At1g26420    1  -----MKEASILCLALVSVSEAEVTKPNSENFIECLRYRTPSPENPITDSISIAD
At5g44380    1  MGNSKPLPTISCIIVSVLYFSFYCITPTSSSASIQDQFINCVKRNTHVSFPLEKTLFTPA
At1g30720    1  -----MEKLVISLLELSTSVTTSQSVTDPIAFRLCLDRQPTDPTSPNSAVAYIP
At1g30730    1  -----MEKLLIICMLLISVLVATSQSDTDPETFLRCLVREGSNPQVVISDVYIIP
At2g46740    1  -MAFGYSPSYCSFWRLLGLYCLFTLVHTVISTPPEDPVKCVSGNTNCIVTNSLGAFPDR
EcBBE        1  -----MENKTPIFFSLSIFLSLLNCALGGNDLLSCLTFNG-----VRNHTVFSA

At1g30700    51  -NG-SYSSVLQANTRNLRFNNTTSTPKP-FLITIAATHESHVQAAITCGKRH-NLQMKIRSG
Ha-CHOX      60  -NS-SFPTVLQNYTRNLRFNETTTPKP-FLITIAEHVSHQAAVVCCKQN-RLLLKTRSG
At5g44440    54  DSS--FFSILDSSIQNPRFSVSETPKP-VSITTPVKASDVQTVIRCAQLH-GIHVRTRSA
At1g26390    52  NTT-TFLSSYVSYTKNKRFPSTPNYRKL-LATVAAKHVSHVQATVVCAKSN-GIQIRIRSG
At1g11770    1  -----
At1g26380    52  NTT-TFLSSYVSYTKNTRFSNPNNKNL-LATVVAKDVSHVQATVVCAKSN-GIQIRIRSG
At1g26420    52  NTT-TFLSSYLSYTKNKRYSSPNFKKL-LATVAAKHVSHVQATVVCAKTN-GIQIRIRSG
At5g44380    61  KNVSLFNQVLESQAONLQFLAKSMKKP-GFIFRPIHOSQVOASIIICSKKL-GIHFRVRSR
At1g30720    52  TNS-SFTTVLRSRTPNLRFDKPTTPKP-ISVVAATWHTQAAVGCAREL-SLOVIRIRSG
At1g30730    51  SNS-SFTTVLRRRTPNLRFDKPTTPKP-IATITPTTWSHISPVLACARLF-PVQVIRIRSG
At2g46740    60  STCRANVAYPTTEAELVSI VAAATKAGRKRMRVTTRYSHSIPKLTCTDGNDCGLFISTKFL
EcBBE        45  DSDSDENRFLHLSTQNPFLFQNSLISKP-SATILPGSKEELSNTIRCIIRKG-SWITIRIRSG

At1g30700    107  GHDVDEGLSYVTYSGKP-FFVLDMFNLRSDVDVASKTAWVQTGAILGEVYYYIWEKSKTL
Ha-CHOX     116  GHDVEGLSYLTNTNQP-FFIVDMFNLRSDVDVIEQETAWVOAGATLGEVYYRIAEKSNKH
At5g44440    110  GHCVEGLSYIAYN-KP-FAVIDLRNLRSDVDVDRNTGWNVQTGATAGELYEIEGKTTKSL
At1g26390    109  GHDVEGLSYMS--SVP-FVILDMYFNLRSDVDVSSKKAHWQAGATLGEVYTNVNDVSOQL
At1g11770    1  -----MSNLRNITVDPATESAWVQAGATLGEVYYRIWEKTKSH
At1g26380    109  GHDNEGLSYVS--SVP-FVILDMHKLKLDITVDVSSKKAHWQAGATLGEVYVKIDBASQTL
At1g26420    109  GHDLEGLSYRS--SVP-FVILDMFNLRSDITVNVLSKKAHWQAGATLGEVYVKINEASQTL
At5g44380    119  GHDFEALSIVSRIEKP-FILLDLKQLKQINVDIESNSAWVQPGATLGEVYRIAEKSKIH
At1g30720    109  GHDVEGLSYTS--TVP-FFVLDMFGFKTVDVNLTERTAWVDSGATLGEVYRISSEKSNVL
At1g30730    108  GHDVEGLSYTS--TAP-FFLIDLLNFKSVDVNLTEGTAWVDTGATLGEVYKIAEKSNVL
At2g46740    120  NHTVQADAKAMTLVVEGVTLRQLIAEAAKVGLALPYPYVWGVTVCGMMGTGAHGSSSLW
EcBBE     103  GHSVEGLSYTS--DTP-FILIDLMNLRVSDIDLESETAWVESGSLGELYVATPESSSKL

At1g30700    166  AYPAGTCPTVGVGGHISGG----GYGNLMRKYGLTVDNITDARMVDVNG-----
Ha-CHOX     175  GFPAGVCPTVGVGGHFSGG----GYGNLMRKYGLSVDNIVDAQIIDVNG-----
At5g44440    168  AFPAGTHTPTVGVGGQFSGG----GYGTLRKYGLAADNITDALVVDASG-----
At1g26390    166  AFPAGVCATVGVGGHISGG----GYGNLMRKYGITVDHVIDAQIIDVNG-----
At1g11770    39  GFPAGVCPTVGVGGHISGG----GYGNLMRKYGLSVDVYVDAKIVDNG-----
At1g26380    166  AFPAGTCATVGVGGHISGG----GYGNLMRKFGTVDHVIDAELVDVNG-----
At1g26420    166  AFPAGVCPTVGVGGHISGG----GYGNLMRKFGITVDHVIDAQLVDVNG-----
At5g44380    178  GFPAGLCTSVGIGGYMTGG----GYGTLRKYGLAGDNVLDVKMVDANG-----
At1g30720    166  GFPAGLSTTLGVGGHISGG----GYGNLMRKYGLSVDNVFSGIIVDSNGN-----
At1g30730    165  GFPAGLCTTLGVGGHISGG----GYGTLRKYGLSVDNVVGSRIIDVSNGN-----
At2g46740    180  GKGSVVDHYVTEIRMVSPGVSVDNCGFAKIRVLSETTTPNFFNAAKVSLGVLGVISEVTFEL
EcBBE     160  GFTAGWCPTVGTGGHISGG----GFGMMSRKYGLAADNVVDAILIDANG-----

At1g30700    211  -----KILDRKLMGEDLYWAINGGGGGSVGVVLAYKINLVEVP
Ha-CHOX     220  -----KILDRKSMGEDLFWAINGGGGVSFGVVLAYKIKLVRVP
At5g44440    213  -----RILDRQAMGEDYFWAIRGGGGSSFGVILSWKVLVDVP
At1g26390    211  -----KLLNRAAMGEDLFWAIRGGGGSSFGVILSWKINLVDVP
At1g11770    84  -----QVLDKRMGEDMFWAINGGGGASFGVILAFKIKLVPVP
At1g26380    211  -----KLLNRSAMGEDLFWAIRGGGGASFGVILSWKINLVEVP
At1g26420    211  -----KLLNRASMGEDLFWAIRGGGGASFGVILSWKINLVKVP
At5g44380    223  -----KLLDRAAMGEDLFWAIRGGGGASFGVILAWKIKLVPVP
At1g30720    212  -----IFTDRVSMGEDRFWAIRGGGAASVGVVLGYKIQLVVPV
At1g30730    211  -----TYFDRMSMGEDLFWAIRGGGAASFGIVMGYKIKLVPVP
At2g46740    240  QPMFKRSLKYVMRNDLDFNDEALTFGKKHEFADFVWLP SQGKVVYRMDRVAVNTGNGL
EcBBE     205  -----AILDRQAMGEDVFWAIRGGGGGVWCAIYAWKIKLVPVP

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Supplemental Fig. S1. Boxshade alignment of FAD binding domain proteins.

At1g30700 249 ENVTVFRI~~SR~~LEQNA-TDIIHRWQVAPKLPDELFI~~RT~~VIDVVNGTVSSQKTV~~RT~~FIA
 Ha-CHOX 258 EVVTVF~~TIERRE~~EQNL-STIAERWQVADKLD~~RD~~FL~~RM~~TFSVIN-DTNG~~CK~~TVRAIFPT
 At5g44440 251 STITV~~VFKV~~QKTSKKEA-VRI~~IKK~~WQYADKVP~~DD~~LFIR~~TT~~LE~~RS~~----NKN~~AV~~HALFTG
 At1g26390 249 KIVTV~~VFKV~~NK~~TL~~EQGG-TDVLY~~KW~~LVASK~~FP~~ESL~~FVR~~AMPQV~~ANG~~TKR~~GE~~RTIT~~VV~~FYA
 At1g11770 122 PTVTV~~FR~~VEK~~N~~LVENA-TEMV~~HK~~WQV~~F~~APK~~TD~~PC~~LF~~M~~RL~~LLQ~~P~~VT--RNK~~Q~~T~~V~~RASVVA
 At1g26380 249 KIFTV~~FQ~~VNK~~TL~~EQGG-TDVVY~~KW~~LVAN~~K~~FP~~DN~~LF~~L~~RAM~~PQ~~V~~NG~~TKH~~GE~~RTIA~~IV~~FWA
 At1g26420 249 KILT~~VFKV~~NK~~TL~~EQGG-TDVLY~~KW~~LVAT~~K~~FP~~ED~~LF~~M~~RAW~~PQ~~I~~NG~~AER~~GD~~RTIA~~VV~~FYA
 At5g44380 261 KT~~VTV~~F~~TV~~K~~TL~~EQDAR~~LK~~TISK~~WQ~~I~~SS~~K~~IE~~E~~EH~~IR~~VV~~LRAAGND--GNK~~T~~V~~MT~~LLG
 At1g30720 250 EK~~VTV~~F~~VK~~V~~KT~~VGE~~GA~~-VDL~~IM~~K~~WQ~~S~~F~~A~~H~~ST~~DR~~N~~L~~F~~V~~RL~~T~~L~~T~~L~~V~~NG~~T~~K~~P~~GE~~NT~~V~~L~~AT~~F~~IG
 At1g30730 249 EK~~VTV~~F~~S~~V~~G~~K~~T~~VGE~~GA~~-VDL~~IM~~K~~WQ~~N~~F~~S~~H~~ST~~DR~~N~~L~~F~~V~~KL~~T~~L~~T~~L~~V~~NG~~A~~K~~P~~GE~~K~~V~~L~~AT~~F~~IG
 At2g46740 300 YD~~FF~~P~~FR~~S~~Q~~L~~S~~AV~~L~~AT~~TR~~S~~SE~~ET~~Q~~E~~T~~LR~~DA~~H~~G~~K~~C~~V~~T~~AT~~T~~IS~~T~~L~~F~~TS~~Y~~GL~~T~~NN~~G~~IT~~F~~TG
 EcBBE 243 EK~~VTV~~F~~RV~~RT~~K~~N~~V~~A~~I~~D~~E~~A~~T~~S~~L~~L~~H~~K~~WQ~~~~F~~V~~A~~E~~E~~E~~E~~D~~F~~T~~L~~S~~V~~L~~G~~----GA~~D~~E~~K~~Q~~V~~W~~L~~T~~M~~L~~G~~
 EcBBE 1 -----MENK~~T~~P~~I~~F~~F~~S~~L~~S~~I~~F~~L~~S~~L~~N~~C~~A~~L~~G~~G~~N~~D~~L~~L~~S~~C~~L~~F~~N~~G~~----VR~~N~~H~~T~~V~~F~~S~~A~~

At1g30700 308 M~~FL~~G~~D~~T~~T~~T~~L~~S~~I~~L~~N~~R~~R~~F~~P~~E~~L~~G~~L~~V~~R~~S-D~~C~~T~~E~~T~~S~~W~~I~~Q~~S~~V~~L~~F~~W~~T~~N~~--I~~O~~V~~G~~S~~S~~E~~T~~L~~L~~L~~O~~R~~N~~-Q
 Ha-CHOX 316 L~~Y~~L~~G~~N~~S~~R~~N~~L~~V~~T~~L~~L~~N~~K~~D~~F~~P~~E~~L~~G~~L~~O~~E~~S-D~~C~~T~~E~~M~~S~~W~~V~~E~~S~~V~~L~~Y~~Y~~T~~G~~--F~~P~~S~~G~~T~~P~~T~~A~~L~~L~~S~~R~~T~~P~~Q
 At5g44440 305 L~~Y~~I~~G~~P~~V~~N~~N~~L~~A~~L~~M~~E~~E~~K~~F~~P~~E~~L~~G~~L~~E~~K~~E~~-G~~C~~E~~E~~M~~S~~W~~I~~E~~S~~V~~L~~W~~F~~A~~D~~--F~~P~~K~~G~~E~~S~~L~~G~~V~~L~~T~~N~~R~~E~~T
 At1g26390 308 Q~~F~~L~~G~~R~~T~~D~~A~~L~~M~~A~~I~~M~~N~~Q~~N~~W~~P~~E~~L~~G~~L~~K~~K~~E-D~~C~~O~~E~~M~~S~~W~~L~~N~~S~~T~~L~~F~~W~~A~~D~~--Y~~P~~A~~G~~T~~P~~T~~S~~I~~L~~L~~D~~R~~P~~S~~T~~
 At1g11770 179 L~~F~~L~~G~~D~~Q~~N~~T~~V~~M~~S~~M~~L~~T~~K~~E~~F~~P~~E~~L~~G~~L~~K~~K~~E-N~~C~~T~~E~~M~~T~~W~~I~~Q~~S~~V~~M~~W~~W~~A~~N~~D~~N~~A~~T~~O~~I~~K~~E~~I~~L~~L~~D~~R~~N~~D
 At1g26380 308 Q~~F~~L~~G~~R~~T~~D~~E~~L~~M~~E~~I~~M~~N~~Q~~S~~F~~P~~E~~L~~G~~L~~R~~R~~E-D~~C~~O~~E~~M~~S~~W~~L~~N~~T~~T~~L~~F~~W~~A~~M~~--L~~P~~A~~G~~T~~P~~K~~T~~V~~L~~L~~G~~R~~P~~D
 At1g26420 308 Q~~F~~L~~G~~P~~A~~D~~K~~L~~A~~I~~M~~N~~R~~L~~P~~E~~L~~G~~L~~R~~R~~E-D~~C~~H~~E~~M~~S~~W~~F~~N~~T~~L~~F~~W~~A~~D--Y~~P~~A~~G~~T~~P~~T~~S~~V~~L~~L~~D~~R~~P~~T~~N~~
 At5g44380 319 Q~~F~~L~~G~~E~~K~~G~~T~~L~~L~~K~~V~~M~~E~~K~~A~~F~~P~~E~~L~~G~~L~~T~~O~~K-D~~C~~T~~E~~M~~S~~W~~I~~E~~A~~A~~L~~F~~H~~G~~G~~--F~~P~~T~~G~~S~~P~~I~~E~~I~~L~~L~~O~~L~~K~~S~~P~~
 At1g30720 309 M~~Y~~L~~G~~R~~S~~D~~K~~L~~L~~T~~V~~M~~N~~R~~D~~F~~P~~E~~L~~K~~L~~K~~K~~T-D~~C~~T~~E~~M~~R~~W~~I~~D~~S~~V~~L~~F~~W~~D~~D~~--Y~~P~~V~~G~~T~~P~~T~~S~~V~~L~~L~~N~~P~~L~~V~~A~~
 At1g30730 308 M~~N~~L~~G~~G~~F~~D~~K~~T~~L~~N~~V~~M~~N~~R~~D~~F~~P~~E~~L~~K~~L~~K~~K~~T-D~~C~~T~~E~~M~~R~~W~~I~~D~~S~~V~~L~~F~~W~~A~~G~~--Y~~P~~V~~G~~T~~P~~T~~S~~V~~L~~L~~N~~P~~T~~V~~T~~
 At2g46740 360 Y~~P~~V~~I~~G~~S~~Q~~N~~R~~M~~S~~S~~G~~S~~C~~L~~D~~G~~E~~D~~K~~L~~T~~S~~A~~C~~A~~W~~D~~S~~R~~V~~K~~G~~V~~F~~Y~~H~~Q~~T~~F~~S~~I~~P~~L~~T~~O~~V~~K~~S~~F~~I~~N~~D~~I~~K~~S
 EcBBE 297 F~~H~~F~~G~~L~~K~~T~~V~~A~~K~~S~~T~~F~~D~~L~~L~~F~~P~~E~~L~~G~~L~~V~~E~~-D~~Y~~L~~E~~M~~S~~W~~G~~E~~S~~F~~A~~Y~~L~~A~~G~~----L~~E~~T~~V~~S~~O~~L~~N~~N~~R~~F~~L~~K
 EcBBE 45 D~~S~~D~~S~~D~~F~~N~~R~~F~~I~~H~~L~~S~~T~~Q~~N~~P~~L~~E~~Q~~N~~S~~I~~S~~E-~~S~~A~~I~~L~~L~~P~~G~~S~~K~~E~~E~~L~~S~~N~~T~~I~~R~~C~~I~~R~~K~~G-~~S~~W~~T~~I~~R~~S~~G~~

At1g30700 364 P-V~~N~~Y~~L~~K~~R~~K~~S~~D~~Y~~V~~R~~E~~P~~I~~S~~R~~T~~G~~L~~E~~S~~T~~W~~K~~K~~M~~I~~E~~L~~E~~I~~--P~~T~~M~~A~~F~~N~~P~~Y~~G~~G~~E~~M~~G~~R~~I~~S~~S~~T~~V~~T~~P~~F~~F~~Y~~
 Ha-CHOX 373 R-L~~N~~P~~F~~K~~I~~K~~S~~D~~Y~~V~~Q~~N~~P~~I~~S~~K~~R~~O~~F~~E~~F~~I~~F~~E~~R~~M~~K~~E~~L~~E~~N~~--Q~~M~~L~~A~~F~~N~~P~~Y~~G~~G~~R~~M~~S~~E~~I~~S~~E~~F~~A~~K~~P~~F~~P~~H~~
 At5g44440 362 S--L~~S~~F~~K~~G~~K~~D~~D~~F~~V~~O~~E~~P~~I~~E~~A~~A~~I~~O~~E~~I~~W~~R~~R~~L~~E~~A~~P~~E~~A~~R~~L~~G~~K~~I~~I~~L~~T~~P~~F~~G~~G~~K~~M~~S~~E~~M~~A~~E~~Y~~E~~T~~P~~F~~P~~H~~
 At1g26390 365 P-G~~D~~F~~F~~K~~S~~K~~S~~D~~Y~~V~~K~~K~~P~~I~~P~~K~~E~~G~~L~~E~~K~~L~~W~~K~~T~~M~~L~~K~~F~~N~~N~~I~~V~~W~~M~~O~~F~~N~~P~~Y~~G~~G~~V~~M~~D~~R~~L~~E~~A~~T~~A~~T~~A~~F~~F~~H
 At1g11770 238 M-A~~T~~F~~G~~K~~R~~K~~S~~D~~V~~E~~K~~E~~I~~K~~D~~G~~L~~D~~F~~L~~F~~K~~K~~M~~I~~E~~V~~G~~K~~--I~~G~~L~~V~~F~~N~~P~~Y~~G~~G~~I~~M~~S~~T~~V~~A~~T~~T~~K~~T~~F~~F~~H
 At1g26380 365 P--V~~F~~F~~K~~S~~K~~S~~D~~Y~~V~~K~~K~~P~~I~~P~~K~~E~~G~~L~~E~~K~~L~~W~~K~~T~~M~~L~~K~~F~~N~~--I~~V~~W~~L~~H~~F~~N~~P~~Y~~G~~G~~M~~D~~R~~I~~P~~S~~N~~A~~T~~A~~F~~F~~H~~
 At1g26420 365 P-G-~~F~~F~~K~~S~~K~~S~~D~~Y~~V~~K~~K~~P~~I~~P~~K~~E~~G~~L~~E~~K~~L~~W~~K~~T~~M~~F~~K~~F~~N~~--I~~V~~W~~M~~O~~F~~N~~P~~Y~~G~~G~~V~~M~~D~~O~~I~~P~~S~~T~~A~~T~~A~~F~~F~~H
 At5g44380 376 L~~G~~K~~D~~Y~~F~~K~~A~~T~~S~~D~~V~~E~~K~~E~~I~~P~~V~~I~~G~~L~~K~~G~~L~~F~~K~~R~~L~~I~~E~~G~~N~~T--T~~F~~L~~N~~W~~T~~P~~Y~~G~~G~~M~~K~~I~~P~~S~~S~~A~~I~~P~~F~~F~~H~~
 At1g30720 366 K-K~~L~~F~~M~~K~~R~~K~~S~~D~~Y~~V~~K~~R~~L~~I~~S~~R~~T~~D~~L~~G~~L~~L~~K~~K~~L~~V~~E~~V~~E~~K--V~~K~~M~~N~~W~~N~~P~~Y~~G~~G~~R~~M~~G~~E~~I~~P~~S~~S~~R~~T~~P~~F~~F~~H~~
 At1g30730 365 K-K~~L~~F~~M~~K~~R~~K~~S~~D~~Y~~V~~K~~R~~P~~V~~S~~R~~T~~G~~L~~G~~L~~L~~K~~K~~L~~V~~E~~L~~E~~K--V~~E~~M~~N~~W~~N~~P~~Y~~G~~G~~R~~M~~G~~E~~I~~P~~S~~S~~R~~T~~P~~F~~F~~H~~
 At2g46740 420 L~~L~~K~~I~~D~~S~~K~~S~~L~~C~~G~~E~~L~~E~~Y~~G~~I~~L~~M~~R~~Y~~V~~T~~S~~S~~P~~A~~Y~~L~~G~~K~~E~~T~~E~~A~~I~~D~~F~~D~~I~~T~~Y~~V~~R~~A~~N~~D~~P~~L~~T~~E~~R~~L~~Y~~E~~D~~F~~I~~E
 EcBBE 351 F~~D~~E~~R~~A~~F~~K~~T~~K~~V~~D~~L~~T~~K~~E~~P~~L~~S~~K~~A~~F~~Y~~G~~L~~L~~E~~R~~L~~S~~K~~E~~P~~N--G~~F~~I~~A~~L~~N~~G~~F~~G~~G~~O~~M~~S~~K~~I~~S~~S~~D~~F~~T~~P~~F~~F~~H~~
 EcBBE 103 G~~H~~S~~Y~~E~~G~~L~~S~~Y~~T~~S--D~~T~~P--F~~I~~L~~I~~D~~L~~M~~N~~L~~R~~V~~S~~I~~D~~L~~E~~S~~E~~T~~A~~W~~V~~E~~S~~C~~S~~T~~L~~G~~E~~L~~Y~~A~~I~~T~~E~~S~~S~~K~~L~~

At1g30700 421 R~~A~~G~~N~~L~~W~~K~~I~~O~~Y~~G~~A~~N--W~~R~~---D~~E~~T~~L~~T~~D~~R--Y~~M~~E~~L~~T~~R~~K~~L~~Y~~O~~F~~M~~T~~P~~F~~V~~S~~K~~N~~P~~R~~O~~S~~F~~F~~N~~Y~~R~~D~~V~~D
 Ha-CHOX 430 R~~S~~G~~N~~I~~A~~K~~I~~O~~Y~~E~~V~~N--W~~E~~---D~~L~~S~~D~~E~~A~~E~~N~~R~~Y~~L~~N~~F~~T~~R~~M~~Y~~D~~Y~~M~~T~~P~~F~~V~~S~~K~~N~~P~~R~~E~~A~~F~~L~~N~~Y~~R~~D~~I~~D
 At5g44440 420 R~~G~~G~~N~~L~~Y~~E~~I~~O~~Y~~V~~A~~T--W~~R~~E~~E~~D~~K~~N~~K~~E~~T~~D~~K~~Y~~L~~K~~W~~D~~S~~V~~Y~~E~~F~~M~~T~~P~~V~~S~~K~~N~~P~~R~~E~~A~~V~~N~~E~~K~~D~~M
 At1g26390 424 R~~K~~G~~N~~L~~F~~K~~I~~O~~Y~~F~~T~~T--W~~F~~---N~~A~~N~~A~~T~~M~~S~~S~~--L~~S~~O~~M~~K~~E~~L~~Y~~E~~V~~A~~E~~P~~V~~S~~S~~N~~P~~R~~E~~A~~F~~F~~N~~Y~~R~~D~~I~~D
 At1g11770 295 R-K~~K~~L~~Y~~K~~I~~O~~H~~S~~M~~N--W~~K~~---D~~P~~G~~T~~E~~A~~E~~T~~S~~F~~L~~O~~K~~A~~K~~S~~F~~Y~~S~~Y~~M~~A~~P~~F~~V~~T~~K~~N~~P~~R~~E~~T~~Y~~I~~N~~Y~~R~~D~~I~~D~~
 At1g26380 422 R~~K~~G~~N~~L~~F~~K~~V~~O~~Y~~T~~T~~--W~~L~~---D~~P~~N~~A~~T~~E~~S~~N~~--L~~S~~I~~M~~K~~E~~L~~Y~~E~~V~~A~~E~~P~~V~~S~~S~~N~~P~~R~~E~~A~~F~~F~~N~~Y~~R~~D~~I~~D
 At1g26420 422 R~~K~~G~~N~~M~~F~~K~~V~~O~~Y~~S~~T~~T--W~~L~~---A~~A~~N~~A~~T~~E~~I~~S~~--L~~S~~M~~M~~K~~E~~L~~Y~~K~~V~~A~~E~~P~~V~~S~~S~~N~~P~~R~~E~~A~~F~~F~~N~~Y~~R~~D~~I~~D
 At5g44380 434 R~~N~~G~~T~~L~~F~~K~~I~~L~~Y~~A~~N~~--W~~L~~---E-~~N~~D~~K~~T~~S~~S~~R~~K~~I~~N~~W~~I~~K~~E~~I~~N~~Y~~M~~A~~P~~V~~S~~S~~N~~P~~R~~O~~A~~V~~N~~Y~~R~~D~~I~~D~~
 At1g30720 423 R~~A~~G~~N~~L~~F~~N~~I~~E~~Y~~I~~D~~--W~~S~~---E~~A~~G~~D~~N~~V~~E~~K~~K~~Y~~L~~A~~L~~A~~N~~E~~F~~Y~~R~~F~~M~~T~~P~~V~~S~~S~~N~~P~~R~~E~~A~~F~~L~~N~~Y~~R~~D~~I~~D
 At1g30730 422 R~~G~~G~~N~~L~~F~~N~~I~~E~~Y~~I~~D~~--W~~S~~---E~~A~~G~~D~~N~~V~~E~~K~~K~~Y~~L~~A~~L~~A~~N~~E~~F~~Y~~R~~F~~M~~T~~P~~V~~S~~S~~N~~P~~R~~E~~A~~F~~L~~N~~Y~~R~~D~~I~~D
 At2g46740 480 E~~I~~E~~O~~I~~A~~L~~L~~K~~Y~~N~~A~~L~~P~~H~~W~~G--K~~N~~R~~N~~L~~A~~F~~D~~G~~V~~I~~K~~K~~Y~~K~~N~~A~~P~~A~~F~~L~~K~~V~~K~~E~~S~~Y~~D~~N~~P~~G~~L~~F~~S~~S~~E~~W~~T~~D~~O~~
 EcBBE 409 R~~S~~G~~T~~R~~L~~M~~V~~E~~Y~~I~~V~~A--W~~N~~---O~~S~~E~~Q~~K~~K~~T~~E~~F~~L~~D~~W~~L~~E~~K~~V~~Y~~E~~F~~M~~K~~P~~F~~V~~S~~K~~N~~P~~R~~L~~G~~Y~~V~~N~~H~~I~~D~~L~~D
 EcBBE 160 G~~F~~T~~A~~G~~W~~C~~P~~T~~V~~G~~T~~G~~G~~H~~I~~S~~G~~G--G~~F~~G~~M~~M~~S~~R~~K~~Y~~G~~L~~A~~A~~D~~N~~V~~V~~D~~A~~L~~I~~D~~A~~N~~G-----

At1g30700 474 L~~G~~I~~N~~S~~H~~N~~G~~---K~~I~~S~~S~~Y~~V~~E~~G~~K~~R~~Y~~G~~K~~K~~Y~~F~~A~~G~~N-F~~E~~R~~L~~V~~K~~I~~K~~T~~R~~V~~D~~S~~G~~N~~F~~F~~R~~N~~E~~Q~~S~~I~~P~~V~~L~~P--
 Ha-CHOX 485 L~~G~~I~~N~~S~~H~~N~~G~~----R~~N~~A~~Y~~T~~E~~G~~M~~V~~Y~~G~~H~~K~~Y~~F~~K~~E~~T~~N~~Y~~K~~R~~L~~V~~S~~V~~K~~T~~V~~D~~P~~D~~N~~F~~F~~R~~N~~E~~Q~~S~~I~~P~~T~~L~~S--
 At5g44440 478 L~~G~~M~~Y~~L~~G~~K----K~~K~~T~~K~~Y~~E~~G~~K~~S~~W~~G~~V~~K~~Y~~F~~K~~N~~N~~-F~~E~~R~~L~~V~~R~~V~~K~~T~~R~~V~~D~~P~~T~~D~~F~~F~~C~~D~~E~~Q~~S~~I~~P~~L~~V~~N~~K~~V
 At1g26390 477 V~~G~~S~~N~~P~~S~~G----E~~T~~N~~V~~D~~E~~A~~K~~I~~Y~~G~~S~~K~~Y~~F~~L~~G~~N~~-L~~K~~R~~L~~M~~D~~V~~K~~A~~K~~Y~~D~~P~~D~~N~~F~~F~~K~~N~~E~~Q~~S~~I~~P~~P~~V~~R~~V~~M
 At1g11770 349 I~~G~~V~~N~~T~~P~~G----P~~N~~S~~V~~R~~V~~A~~E~~V~~F~~C~~R~~M~~Y~~F~~G~~E~~N~~-F~~D~~R~~L~~V~~K~~V~~K~~T~~A~~V~~D~~P~~O~~N~~F~~F~~R~~D~~E~~Q~~S~~I~~P~~T~~L~~P~~G~~K
 At1g26380 475 I~~G~~S~~N~~P~~S~~G----E~~T~~D~~V~~D~~E~~A~~K~~I~~Y~~G~~Y~~F~~L~~G~~N~~-L~~K~~R~~L~~M~~D~~V~~K~~A~~K~~S~~D~~P~~E~~N~~F~~F~~K~~N~~E~~Q~~S~~I~~P~~L~~L~~S~~R~~
 At1g26420 475 I~~G~~S~~N~~P~~S~~D----E~~T~~N~~V~~D~~E~~A~~K~~I~~Y~~G~~Y~~F~~L~~G~~N~~-L~~K~~R~~L~~M~~O~~V~~K~~A~~K~~Y~~D~~P~~E~~N~~F~~F~~K~~N~~E~~Q~~S~~I~~P~~P~~V~~R~~V~~I
 At5g44380 488 F~~G~~O~~N~~K~~N~~N----A~~K~~V~~N~~F~~I~~E~~A~~K~~I~~W~~G~~P~~K~~Y~~F~~K~~G~~N-F~~D~~R~~L~~V~~K~~I~~K~~T~~K~~V~~D~~E~~N~~F~~F~~R~~E~~Q~~S~~I~~P~~P~~M~~P~~Y~~
 At1g30720 478 I~~G~~S~~S~~V~~K~~S----T~~Y~~O~~E~~G~~K~~I~~Y~~A~~K~~Y~~F~~K~~E~~N-F~~E~~R~~L~~V~~D~~I~~K~~T~~I~~D~~A~~E~~N~~F~~W~~K~~N~~E~~Q~~S~~I~~P~~V~~R~~R~~--
 At1g30730 477 I~~G~~S~~S~~G~~S~~N----T~~Y~~E~~G~~K~~I~~Y~~A~~K~~Y~~F~~K~~E~~N~~-F~~E~~R~~L~~V~~D~~I~~K~~T~~K~~F~~D~~E~~I~~N~~F~~W~~R~~N~~E~~Q~~S~~I~~P~~V~~R~~K--
 At2g46740 537 L~~L~~G~~I~~K~~G~~N----P~~T~~I~~V~~K~~D~~C~~A~~L~~E~~G~~L~~C~~I~~C~~S~~D~~D~~A~~H~~C~~A~~P~~S~~K~~G~~Y~~L~~C~~R~~P~~G~~K~~V~~Y~~K~~E~~A~~R~~V~~C~~T~~H~~V~~P~~K~~
 EcBBE 464 L~~G~~G~~I~~D~~W~~G~~N~~K~~T~~V~~V~~N~~N~~A~~I~~E~~I~~S~~R~~S~~W~~G~~E~~S~~V~~L~~S~~N-Y~~E~~R~~L~~I~~R~~A~~K~~T~~L~~I~~D~~E~~N~~N~~V~~F~~N~~H~~P~~Q~~S~~I~~P~~P~~M~~A~~N~~F
 EcBBE 205 -----A~~I~~L~~D~~R~~O~~A~~M~~G~~E~~D~~V~~F~~W~~A~~I~~R~~G~~G~~G~~G~~V~~W~~G~~A~~I~~Y~~A~~W~~K~~I~~K~~L~~L~~P~~V~~P

Fig. S1. (continued)

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At1g30700 -----TDIIHRWQVAPKLPDELFIKRTVIDVVGTVSSQKTVRTFFIA
Ha-CHOX -----STIAERWVQVADKLDLDRDLFLRMFVSVIN-DTNGGKTVRAIFPT
At5g44440 533 T-----VRIKWKQYAADKVPDDLFIKRTFLERS-----NKNAVHALFTG
At1g26390 531 -----TDVLYKWQLVASKFPESLFRVAMPQVANGTKRGERTITVVVFYA
At1g11770 403 PARR-----TEMVHKQVFPVAKTDPGLFMRLLLQPVTV--RNKMQTVRASVVA
At1g26380 529 VRRDDEL-----TDVVYKWQLVANKFPDNLFRLAMPQVNVGPKHGERTIAIVFWA
At1g26420 529 E-----TDVLYKWQLVATKFPEDLFMRAMPQIINGAERGDRTIAVVFYA
At5g44380 -----RLKTSIKWQVSISSKIEEIHIRVVLRAAGND--GNKVTVMTVYLG
At1g30720 -----VDLIMKWQSFVHSTDRNLFVRLTLTLVNGTKPGENTVLTATFIG
At1g30730 -----VDLIMKWQNFVSHSTDRNLFVRLTLTLVNGAKPGKVKVLTATFIG
At2g46740 -----TRSEETQETLRDAHGKCVTATTSSTLFTSSTYGLTNNGTFTG
EcBBE 523 DYLEKTLGSDGGVEVIAHSLHKKWQVFAEELEEDFTLSVLG-----GADEKQVWLDMLG
EcBBE 1 -----MENKTPIFFSLSIFLSLLNLCALGGNDLLSCLTTFNG-----VRNHVTFSA

At1g30700 308 MFLGDTTLLSILNRRFPPELGLVRS-DCTETSWSIQSVLFWTN--IQVGSSETLTLORN-Q
Ha-CHOX 316 LYLGNRNLLVTLNKKDFPELGLQES-DCTEMSWVESVLYYTG--FPSCTPTALLSRTPO
At5g44440 305 LYIGPVNLLALMEEKFPPELGLQEK-CEEMSWIESVLFVAD--FPRGESLVTNRERT
At1g26390 308 QFLGRDALLMAMNQNWPPELGLKHE-DCOEMSWLNSLTFWAD--YPACTPISILLDRPTD
At1g11770 179 LFLGDQNTVMSMLTKFPPELGLKKE-NCTEMFWIQSVMNWANNNDNAIQKPEILLDRNPD
At1g26380 308 QFLGRDDELMEIMNOSFPPELGLRRE-DCOEMSWLNTLTFWAM--LPAGTPKTVLLGRPTD
At1g26420 308 QFLGPADKLLAIMNORLPELGLRRE-DCEMSWFNTLTFWAD--YPACTPKSVLLDRPTN
At5g44380 319 QFLGKGTLLKVMKAFPELGLTQK-DCTEMSWIEAALFHGG--FPRGSPIEIILLQKSP
At1g30720 309 MYLGRSDKLLTVMNRDFPELGLKKT-DCTEMRWIDSVLFWDD--YVGTPTSVLLNPLVA
At1g30730 308 MNLGGFDKTLNVMNRDFPELGLKKT-DCTEMRWIDSVLFWAG--YVGTPTSVLLNPTVT
At2g46740 360 YPVIGSQNRMMSSGSLDGLDKLTSACANDSRVKGVFYHQTTFSIPLTQVKSFDNDIKS
EcBBE 297 FHFGLKTVAKSTFDLLFPPELGLVEE-DYLEMSWGESFAYLAG----LETVSQVNNRFLK
EcBBE 45 DSDSDNRRFLHLSIQNPLFQNSLISKP-SAILPLPGSKEELSNTIRCIKRG-SWTRIRRSK

At1g30700 364 P-VNYLKRKSDYVREPIISRTGLSISWKKMIELEI--PTMAFNPYGGEMGRISSTVTPFPY
Ha-CHOX 373 R-LNPFKIKSDYVQNPISKROFEFIFERMKLELEN--QMLAFNPGYGRMSEISEFAKPFPH
At5g44440 362 S--LSFKGKDDFVQBPPIPEAAIQEIIWRRLEAPEARLGIILTPFGGKMSMAEYTPFPFH
At1g26390 365 P-GDFPKSKSDYVKKPIPKKEGLEKLVKTMKLFNNNIWVQFNPGYGVMDRIPATATAPFH
At1g11770 238 M-ATFGKRKSDFVEKEITKGLDGLFLFKKMIIVGK--IGLVFNPGYGMSTVATTKTPFPFH
At1g26380 365 P--VFFKSKSDYVKKPIPKKEGLEKLVKTMKLFNN-IVWLHFNPGYGMMDRIPSNATAPFH
At1g26420 365 P-G-FFKSKSDYVKKPIPKKEGLEKLVKTMKLFNN-IVWQFNPGYGVMDRIPSNATAPFH
At5g44380 376 LGKDYFKATSDFVKEPIPIVIGLKGIFKRLIEGNT--TFLNWTPIYGGMMSKIPESATAPFH
At1g30720 366 K-KLFMKRKS DYVKRLISRTDGLILKLVVEVEK--VKMNWNPYGGRMGEIPSSRTFPFH
At1g30730 365 K-KLFMKRKS DYVKREVSRTGLGLILKLVVELEK--VMNWNPNYGGRMGEIPSSRTFPFH
At2g46740 420 LLKIDSKSLCGLLEYGYILMRVYVSSPAYLGEKTEAIDFDITYYRANDPLTRLYEDFIE
EcBBE 351 FDERAFKTKVDLTKPELPSKAFYGLLERLSKEPN--GFIALNGFGGGKMSKISSDFTPFPFH
EcBBE 103 GHSVEGLSYTS--DTP-FILIDLMLNLRVSIIDLESETAVWVESGTLGELYAIPTSSSKL

At1g30700 421 RAGNLWKIQYGAN--WR---DETLTDR--YMLTRKLYQFMTFFVSKNPROSFVNYRDVD
Ha-CHOX 430 RSGNIAKIQYEVN--WE---DLSDEAENRYLNFTRLMYDYMTFFVSKNPREAFVNYRDLD
At5g44440 420 RGGNLYEIQYVAY--WREEDRNKNTETDKYKQVDSVVEFMTFVSKNPRGAYVNFKDM
At1g26390 424 RKGNLFKIQYFTT--WF---NANATMSS--LSQMKELYVAEAPYVSSNPREAFVNYRDID
At1g11770 295 R-KKLVKIQHSMN--WK---DPGTEAETSFLQAKSFSYMAPVFTVKNRPHTYVNYRDLD
At1g26380 422 RKGNLFKIQYFTT--WL---DPNATESN--LSIMKELYVAEAPYVSSNPREAFVNYRDID
At1g26420 422 RKGNLFKIQYSTT--WL---AANATEIS--LSMMKELYVAEAPYVSSNPREAFVNYRDID
At5g44380 434 RAGNLFKILYYAN--WL---E-NDKTSSRKLNIWIKELIYNYMAPYVSSNPRQAVNYRDLD
At1g30720 423 RAGNLFNIEYIID--WS---EAGDNVEKKYLALANEFYRFMTFVYVSSNPREAFVNYRDLD
At1g30730 422 RGGNLFNIEYIID--WS---EAGDNVEKKYLALANEFYRFMTFVYVSSNPREAFVNYRDID
At2g46740 480 EIEQIALLKYNALPHWG---KRNRLAFDGVIKKYKNAPAFLLKVKESYDPLNGLFSSEWTDQ
EcBBE 409 RSGTRLMVEYIVA--WN---QSEQKKKTEFDWLEKVFEMKPFVSKNPRGLGVNHHIDLD
EcBBE 160 GFTAGWCFVGTGGHISGG---GFGMMSRKYGLAADNVVDAILIDANG-----

At1g30700 474 LGINSHNG---KISSVVEGKRYCKKYFAGN-FERLVKIKTRVDSGNFFRNEQSIPLVLP--
Ha-CHOX 485 LGINSHG----RNAYTEGMVYGHKYFKETNYKRLVSVKTKVDPDNFFRNEQSIPTLSS-
At5g44440 478 LGMYLK-----KTKVYEGKSWGVKYFKNN-FERLVRVKTRVDPDFFCDEQSIPLVNVK
At1g26390 477 VGSNPSG----ETNVDEAKIYGSKYFLGN-LKRLMDVKAQYDPPDNFFKNEQSIPLVRVM
At1g11770 349 IGVNTPG----PNSVYRVAEVEFRMYFGEN-FDRLVKVKTAVDPQNFRRDEQSIPTLPGK
At1g26380 475 IGSNPSG----ETDVDEAKIYGYKYFLGN-LKRLMDVKAQSDPENFFKNEQSIPLLSR
At1g26420 475 IGSNPSD----ETNVDEAKIYGYKYFLGN-LKRLMDVKAQYDPPDNFFKNEQSIPLVRI
At5g44380 488 FGQNKNN----AKVNFIEAKINCPKYFKGN-FDRLVKIKTKVDPDNFFRNEQSIPLPMPY-
At1g30720 478 IGSSVKS-----TYOEGKIYGAKYFKEN-FERLVDIKTIDAENFWKNEQSIPLVRR--
At1g30730 477 IGSSGNS-----TYEKGKIYGAKYFKDN-FERLVDIKTKFDEINFWRNEQSIPLVRK--
At2g46740 537 LLGIKGN-----PTIVKDCALEGLCICSDDAHCAPSKYGLCRPQKVKYKEARVCTHVPK-
EcBBE 464 LGGIDWGNKTVVNAIEISRWGESYFLSN-YERLIRAKTLDIPNVVNHPOSTIPPMANF
EcBBE 205 -----AILDRQAMGEDVFWAIRGGGGGVGCAIYAWKIKLPLVP

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Fig. S1. (continued)