Supplementary information, Data S1 Experimental Procedures

Oocyte Electrophysiology

The full-length cDNAs of *AtCSC1*, *HsCSC1* and *ScCSC1* were subcloned into vector pGEMHE [1]. cRNA was synthesized from 1 µg of linearized plasmid DNA template using an mMessage mMachine *in vitro* transcription kit (Ambion, Austin, TX) according to the manufacturer's recommendations. Defolliculated *Xenopus laevis* oocytes were injected with 23 ng and incubated in ND96 at 18 °C for 4 days prior to electrophysiological assays. Oocytes were voltage-clamped at a holding potential of –60 mV using a TEV 200 amplifier (Dagan, Minneapolis, MN) and monitored by computer through a Digidata 1440A/D converter and pCLAMP 10.2 software (Axon Instruments, Foster City, CA). The pipette solution contained 3 M KCl. The oocytes were perfused with a standard ND96 solution containing (in mM) 96 NaCl, 2.0 KCl, 1.0 $MgCl_2$, 1.8 $CaCl_2$ and 10 HEPES, pH 7.5, at room temperature. For cation substitution experiments, 96 mM NaCl was replaced with equal molarity KCl or $CaCl_2$. In calcium-free bath solution, 1.8 mM $CaCl_2$ was replaced with 0.5 mM EGTA. Hyperosmotic stimuli were applied by perfusion with bath solution containing the indicated concentrations of mannitol.

Cell Lines and Ca^{2+}-imaging Experiments

The complete cDNAs of *AtCSC1*, *HsCSC1* and *ScCSC1* were subcloned into eukaryotic expression vector pcDNA3.0 and transfected into CHO-K1 cells using Fugene 6 (Roche Applied Science, Indianapolis, IN). The transfected cells were cultured in DMEM containing 10% FBS (GIBCO, Grand Island, NY) and 1 mg/ml pen-strep (Sigma-Aldrich, St. Louis, MO) in 10% CO_2 and selected with 800 µg/ml G418. Stable clones that expressed the proteins were confirmed by western blot.

Cells were plated on glass-bottom dishes with DMEM culture medium containing 10% FBS (GIBCO, Grand Island, NY) and 1 mg/ml pen-strep (Sigma-Aldrich, St. Louis, MO) in 10% CO_2 and incubated for 48 hours at 37° C. The Ca^{2+}-imaging experiments were performed following procedures similar to Liedtke *et al.* (2000) [2], with minor modifications as described.

After removal of culture medium, cells were loaded with Fura-2 by incubation at room temperature with 10 μM Fura-2 acetoxymethyl ester dissolved in isosmotic saline solution, which contains (in mM) 130 NaCl, 2.5 KCl, 2 $CaCl_2$, 1 $MgCl_2$, 20 D-glucose, 10 HEPES, pH 7.4, and 0.02% pleuronic acid (Molecular Probes, Eugene, OR). Following loading with Fura-2, cells were washed four times with saline solution and allowed to recover in 1 mL saline solution for 15 minutes at 37° C. After recovery, cells were imaged at 2-second intervals for 480 seconds in total to monitor cytosolic calcium status. At 120 seconds, hyperosmotic shock was applied by addition of 1 mL saline solution containing 600 mM mannitol (300 mM final mannitol concentration). At 360 seconds, the medium was restored to near-isosmotic conditions by addition of 2 mL H_20. The Ca^{2+} concentration of all solutions was held constant at 2 mM. Images of Fura-2 loaded cells with the excitation wavelength alternating between 340 nm and 380 nm were captured with a cooled CCD camera. Following subtraction of background fluorescence, the ratio of fluorescence intensity at the two wavelengths was calculated. The ratio of 340/380 nm fluorescence intensity in groups of 10-20 individual cells with the strongest responses were analyzed using MetaFluor (Universal Imaging Corporation). All graphs are the averaged responses from groups of individual cells from representative single experiments.

Mammalian Cell Electrophysiology

CHO cells were plated onto poly-D-lysine-coated coverslips for recording purposes, and recordings were performed 24 h later. Experiments were carried out at room temperature using whole-cell voltage clamp technique, with an Axopatch 2B amplifier filtered at 5 kHz and pClamp suite of software (Axon Instruments, Foster City, CA). Series-resistant compensation was 80% for all experiments, using 2–5 MΩ fire-polished pipettes. Pipette solution contained, in mM, 140 CsCl, 1 EGTA, 10 HEPES, 2 MgATP, pH 7.4 (adjusted with CsOH). The isosmotic bath solution contained (mM) 140 NaCl, 5 KCl, 1 $MgCl_2$, 2 $CaCl_2$, 10 HEPES, 10 glucose, pH 7.4 (adjusted with NaOH). During whole-cell recording, cells were maintained in isosmotic bath solution.

Osmotic shock was accomplished by perfusion with hypertonic solution (the bath solution plus 500 mM mannitol)..

Bioinformatics

Using the amino acid sequence of AtCSC1 (UniProt: Q5XEZ5) as a query, homologous sequences were identified in UniProt and NCBI protein databases using the BLASTp algorithm. Sequences were aligned to create a multiple sequence alignment (MSA) using MAFFT v1.3 [3] with the BLOSUM62 scoring matrix and E-INS-i algorithm. The resulting MSA was edited manually and ambiguously aligned regions were masked. The edited and masked MSA was used to generate a maximum likelihood (ML) phylogenetic tree using PhyML v2.2.0 [4] with the following parameters: WAG+G model, best of NNI + SPR search, and X^2-like approximate likelihood ratio test (aLRT) clade support statistics [5]. Membrane topology for DUF221-containing proteins was predicted using MetaTM [6]. Bioinformatic analyses were conducted using Geneious v6.1.4 created by Biomatters (76 Anzac Ave, Auckland, 1001, New Zealand).

Multiple Sequence Alignment

Note: Alignment is in FASTA format. Sequences labelled by [Genus]_[Species]_[ID]. IDs with 6 characters are UniProt IDs; others are NCBI Protein IDs.

>Aedes_aegypti_Q16T32
ILLNLYEGIPETLLLNVIAWVFLILLFTLLRQQAWDYG----RLLSHG--------
RGFFSWIIATWRLTREQILTHSGPDAIHYLSFQRHLMTVMAIITFISITIILPINFSGTLS--
KNSFGHTTISNLDPNSGSMWAHVLFAIAYVPMVVLIMRRASGRNAF----------
KTAPTRTVMVMNIAPSDCEKGVIRTYLQQVGIEDVQMAYNISSLIKAAEEYERIADARIYCEVHR
GRDREQARIKC----QTVDALEYYKEEEARLAGQVSRLRASA-
LNEPLGIAFVTLNSAQEAQHVILHFK---
PGTNWDLAYAPAPSDIFWENLNIDTAQWYFKWIAVNLVLFLFLFFLTTPVIIVNQLDTLSLT--------
-----
KKISPLISEFLPTLLLWSMSALMPVIVAYSDTWLSHWTRSRQNYVIMTKTFGYLLFMILILPSLGLT
SAEAFLQWTNE---
TYRWECIFLPDKGAFFVNYIITAAFIGTALELIRFPDLICYIWKLAPYIKSILITFPFGIHYAWMVMVF
TMSTVYSLACPLIMPFAMVYIMLKHFVDKHNLFFAFAPSNGSGGKIHSTAVTMTKVSVVLLLSIM
AALAWVRSGALEMRALILVLALCVTLVMFT---------FMSPKKC---------PSHLSY---
>Ailuropoda_melanoleuca_D2GZA8

LQGLPFGGVPTVLALDFMCFLALLFLFSILRKVAWDYG----RLLDADTS-
VSSSVNGFCSWLTAIFRIKDDEIRDKCGGDAVHYLSFQRHIIGLLVVVGVLSVGIVLPVNFSGDLL
--AYSFGRTTIANLKSGNNLLWLHTSFAFLYLLLTVYSMRRHTSKMRY----------
KEDDLVKRTLFINGISKYAES-
EKIKKHFEECTVLEARPCYNVARLMFLDAERKKAERGKLYFTNLQSKENVNPKPCG-H--
EQVEAIEYYTKLEQKLKEDYKREKEKV-
NEKPLGMAFVTFHNETITAIILKDFNVSSSLHNWTVSYAPDPQNIYWEHLSIRGFIWWLRCLVIN
VVLFILLFFLTTPAIIITTMDKFNVT----------
KLNNPIITQFFPTLLLWCFSALLPTIVYYSAFFEAHWTRSGENRTTMHKCYTFLIFMVLLLPSLGL
SSLDLFFRWLEA---
AIRFECVFLPDNGAFFVNYVIASAFIGNAMDLLRIPGLLMYMIRLCRNVRHQAYEFQFGAAYAW
MMCVFTVVMTYSITCPIIVPFGLMYMLLKHLVDRYNLYYAYLPA-
KLDKKIHSGAVNQVVAAPILCLFWLLFFSTMRTGFLAPTSMFTFVVLVITIVICLCHVCFGHFKYL
SANYK---S----SGDEPPL---
>Ailuropoda_melanoleuca_D2HUR2
LQGQPFGGIPTVLLLNIFLWVVIILAYSFLRKAAWDYG----
RLLHNDTSPSDISLKGFYSWFFNTVTMKNEDLISKCGDDARIYITFQYHLIIFVLILCIPSLGIILPIN
YTGTVL--NSHFGRTTIVNVSIDC--------FSFLYFLLNLVFMAHHCLGFVP----------
KRSYKVTRTLMITYVPTDIQDPEIIIKHFHECVVTRVHFCYDVRTLIELDDQRRHAMRGRLYYTAK
AKKSGKKVHPCS-R--KEVDAEQYYSELEEQLTDEFNAELNRV-
RLKRLDLIFVTFQDARMTKHIREDYKYSSVVKRWRVTLAPHPKDIIWKHLSVRRFHWWARFIAIN
TFLFFLFFFLTTPAIIINTMDMYNVT----------
RLQSPVVTQFFPSLLLWAFTVIMPLIVYLSAFLEAHWTRSSQNLIIVNKCYIFLVFMVIILPSMGLT
SLDVFFRWLQA---
SVRFQCVFLPDNGAFFVNYVITAALLGTGMELLRLGSLFLYSTRLFVHIKSQAMDFQYGREYAW
MMNVFSVVVAYSITCPIIVPFGLLYLCMKHVTDRYNMYYSYAPT-
KLNEQIHMAAVYQAIFAPLLGLFWMLFFSILRLGTLHSITFFSLSTLIISMIIAFVSTLLGKLQGVSD
EP---------SPARHTY---
>Ailuropoda_melanoleuca_D2HVN1
LQGVTFGGVPTVLLIDVGCFLCLILVFSIIRRRFWDYG----
RILEADSSSSSFGQLGCCPWLTAIFRLHDDQILEWCGEDAIHYLSFQRHIIVLLVVVSCLSLCIILP
VNLSGDLL--PYSFGRTTIANLQTDNDLLWLHTIFAVLYLILTVGFMRHHTQSIRY----------
KEESLVRRTLFITGLPRDTKK-
ETVENHFRDCEVLDVQLCYNVARLLYLCKERKKTEKSLSYYTNLRAKTGQNSKPCG-Q--
EWEDAVAYYTRLKDRLTERIAEEECRV-
QERPLGMAFVTFQEKSMATYVLKDFNASSELRKWTVAFATYPEDICWKNLSIQGFRWWFQWL
GINFTLFVGLFFLTTPSIILSTIDKFNVT----------
KLNDPIISQFFPTLLLWSFSALLPTIVCYSTLLESHWTRSGENRIMMSKVYIFLIFMVLILPSLGLTS
LDFFFRWLET---
YIRLECVFLPDQGAFFVNYVIASAFIGNGMELLRLPGLVLYTFRMFRNVQNQAFQYEFGAMYA
WMLCVFTVIMAYSITCPIIAPFGLVYTLLKHMVDRHNLYFAYLPA-
KLEKRIHVAAVNQALAAPILCLFWLCFFSFLRLGLKAPLTLFTLLVVLLTIVVCVAYTCFGCFKHLS
PSYK---------QQQQTY---
>Ajellomyces_capsulata_A6QRK6
SAAFQLNAFWASFGTSLGLTIVLALCFSFV--RPRNSLVYAPKIH---
DRKHSPPPKGLLAWLTPVIQTKESNLVDCIGLDATVFLRFTRMCRNMFLVLSVIGCLVMIPVNVS
QSSS--ISAFATMTPQFVST-R-
AMWSHVVCLWIFDVVVAYFLWRNYKAVSALRRHYFESSDYQKSLHAKTLLIRHVPPDFRTDDG
LLRLVDDSSVPLTSIGRNMKQLPKLIAEHEKTVRQLEEVLAKYFKNPDVKRPTCRPGSDRIDAID
YLTARIGDLEAEIKHVRESI-NTVAMPYGFASWESIEAAHFVAYTARNKHP-
RGSSITLAPRPNDIIWENLALSRKSRKWKRIINFFWSTVLTVLWIAPNALIAVLSNLSNLGKVWPP

FRKELYANKTWAAVQGIAAPAVTSFVYLVLPIIFRRLSIRAGDITKTSRECHVIHSLYAFFVFNNLV
VFSIFSAIWTFVATVIEAKNNFFFQVATALCNVSPFWVTWILQRNL-
GATLDLLQIFNLTWIWFAKRAIEWTAPPPFQFASYYNYFLFYATIALCFSTLQPIILPVTALYFALD
SWLKKYLLLYVFVTKTESGGQFWRVLFNRLVFAVILANFAIALVVKAKGTWTMVFCLVPLPFLML
AFKWFCKRSFDDSLTYYSRRIPT--KK-ASERIASKFGHP
>Ajellomyces_capsulata_A6QU75
NTSNSASGLVSTLIPTLIISGAMVLLFIIL--RQSQRRQYAPRTYLGSE-
QERTPASGIFGWITSMAKLSDEYVLRHHSLDAYLLLRYLKIATTICLVGCFITWPVLFPVNATGG
G--G-KQLDILTFGNV--
NLNRFYAHTFVAWIFVGFVFFMITREMLFFINLRQAYFLSPLYASRISSKTVLFTSVPQEYLNEAK
IRRIYGDDKVKNVWIPTDTKELVDLVEERDETAFRLEAAETKLIKLANSNRPTHKLIGKKVDTINW
SRTEIERLNPEIEALQAKHRDAKKISAVFVEFYTQNEAQAAYQMVAHNQP-
LHMAPRIGLNPNDIIWSNLRIKWWELIIRNAATIGAVVTLIIFWAIPVAVVGAISNINFLTEKVPFLGF
INDCPVILGLITSLLPAVLLAVLMALLPIILRLMARLGGCPTTAAAELRTQNFYFGFQVVQVFLVTT
LSSAASSVVQKVIQKPESAATLLAQNIPKASNFYIAYFILQGLTFSAGALLQIAGLIVSKILGTMYK
WSTLSGLGWGTVLPVLTNLCVIAITYGAIAPLVLGFATIGLFLFYVAYRYNMLYVTNSNIDTKGMI
YPRALQQTAVGCYLLILCLVGLFAISTALGPLILMIVFLVFVVIYHVSLNAAVTPLLEYLPRNLEAEE
-SYTPEVEQNAYFHP
>Ajellomyces_capsulata_C0NQE5
DVSTSATALLTTFVPAFILFTLWTLVFIIC--RRSQQRFYAPRSYLGNE-
HERSPESGWINWIGAFFNLSDTYVLQHSSLDGYFFLRFLRLMSVTCFVGCLVVWPILFPIHATG
GA--G-TQLDALSFSNV---
PNRYYAHVLVAWMFFSFIFYMVTREGMFYATLRQAYFLSPLYASRISSRTVLFMAVPKALLTGS
KMTKVFG-
KSIRRIWITTDCKKLDELVQRRDKLALRLERLETDLIKSANVKRPTHRLTGKKVDSIEWLRSELEK
VLPEVEKLQKKHRGAKPIPAVFIEFDSQASAQTAYQMLSHHQP-
FQMTPRIGITPQQIIWPALQYSWWSRIVRKFLAQAAITALIIFWSIPSAFVGMISNVAYLSNLLPFL
SFINKLPVIQGVISGLLPAVGLALLMSLVPVLLRFLARQTGLPTTVHVELFTQNAHFCFQVVQVFL
VTTLTSAASAATSQIIKDPMSVKDLLAKNLPKASNFYISYFLLQGLVLSAGAVVQVVGFLIFKIFVA
LYEWTSMNGLRWATVFPVFTNMVVIAITYSCIAPLILGFSSFGLYLVYQAYRYNLLFVYDSDVDT
KGLIYPRALQQVLTGVYLSSVCMIGLFAIKGAIGPVIMMVLFIILMILAHISLNDALRPLLSALPRTL
EQAE-EYSDEVADNAYYPP
>Anolis_carolinensis_XP_003214481.1
LQGLPFGGIPTVLSLNFIVWMILLLIFSCLRKAAWDYG----RLLDNDS--
EHSPQVGFCSWLVSIYQMKDEEIQSKCGIDATTYLSFQRHVLVLLTIICVLSVAVILPVNFSGDLL-
-PSNFGRTTIVNVPKEDRLLWLHSIFALLYFIITVLCMAHHSIQLDY----------
KEHEKVARTLMVTKIPKEITDPSLVIKHFHECTVTSVQFCFDVHKLMKLDSKRRKAMKGRLYFTT
KAQKEGKRIHPCS-R--EEVDAEQYYGELEEKLTDEFNAERSRI-
ALKRLDMAFVTFQDERMTATILKDYNQSSVVKSWGVSYAPSPNDIIWENLSVHGASWWVRFIL
LNICLFILLFFLTTPAIIVNTIDLFNVT----------
RLQNPVVTQFLPTLLLWGFSVLLPFIVYYSAYLESHWTRSNKNQITMHKCYFFLVFMVIILPSLGL
TSLDLFFRWLHA---
DIRFQCVFLPDNGAFFVNYVITTSLIGTAMALMRIPGLVVYATRICLHIRNQAYDFQFGLEYAWIC
CVFAVVMTYSITCPIIVPFGLLYMMLKHMVDRYNIYYVYLPT-
KLNQHIHLAAVSQMVMAPMLCMFSLLFFSILRLGYSHPITIFTCVVLLCCIFSSIFGLCFRKLHPRK
PSYQ--------SPAHQSY---
>Anolis_carolinensis_XP_003215953.1
LQGLPFGGVPTVLALDFMCFLALLFVFSILRKVAWDYG----RLLDADTS-
VSSSVNGFCSWLTAIFRIKDDEIRDKCGADAVHYLSFQRHIIGLLVAVGVLSVGIVLPVNFSGDLL
--PYSFGRTTIANLNSGNNLLWLHTSFAFLYLLLTVYSMRRHTSKMRY----------
KEDDLVKRTLFINGISKYAEP-

EKIKKHFEECTVLEARPCYDVARLMFLDAERKKAERGKIYFTNLQSKENTNPKPCG-H--
EEVEAIEYYTKLEEKLKEDYKKEKEKV-
NEKPLGMAFVTFHNEAITAIILKDFNVSSSLHNWTVSYAPDPQNIYWEHLSIRGFIWWFRCLIINV
VLFILLFFLTTPAIIITTMDKFNVT----------
KLNNPIITQFFPTLLLWCFSALLPTIVYYSAFFEAHWTRSGENRTTMHKCYTFLIFMVLLLPSLGL
SSLDVFFRWLEA---
AVRFECVFLPDNGAFFVNYVIASAFIGNAMDLLRIPGLLMYMIRLCRNVRHQAYEFQFGAAYAW
MMCVFTVVMTYSITCPIIVPFGLMYMLLKHLVDRYNLYYAYLPA-
KLDKKIHSGAVNQVVAAPILCLFWLLFFSTVRTGFLALTSMFTFVVLVITIVICLCHVCFGHFKYLS
ANYK---------VAESEE---
>Anolis_carolinensis_XP_003216139.1
LQGVTFGGIPTVLLLDVTCFLMLMLIFSFIRRRFWDYG----RILEADSV-
SSSIPEGFCSWMASAFRMHEEEINEKCGNDAITYLAFQRHLICLLVVVSMLSLCIILPVNLSGNLL
--PYSFGRTTIANLKTGDNLLWLHTIFAVVYLILTVVFMKHHTSSIKY----------
KDESVVKRTLFITGIPTNAKT-
TLIENHFLSCHVQEVQLCYDVSKLTYLYQERKQAEKSVDYYTQMFLRFGKHTKPCG-Q--
EKEDAVEYYTRVSDKYLEEYMKEKEII-
YNKPLGMAFVTFLEKSMATHVIKDFNASAELCRWNVTYATYPEDICWSNLSVRGIRWWFWCL
CINLLLFLVLFFLTTPSIIITTMDKFNVT----------
KLNNPVVSQFFPTVLLWSFSALLPTIVYYSTIFESHWTRSGENRIMMHKVYIFLIFMVLILPSLGLT
SLDFFFRWVES---
RIRLECVFLPDQGAFFVNYVIASSFIGNGMELLRLPGLMLYTIRMIKNVQQQAYQFEFGAMYAG
TLCVFSVIMAYSITCPIIVPFGLIYMLLKHTVDRHNLYYAFLPA-
KLERELHVAAVNQALAAPILCLFWLYFFSFLRLGFKAPTTLFTFLVLGIAIAVCLGYTCFNCLKFLS
PNYK--------RMDQRYY---
>Anopheles_gambiae_Q7Q7M1
ILINLYEGIPETLLLNVIAWFFLILLFTLLRQQAWDYG----RLLSHG--------
RGCFSWIVATFRLTKEQILTHSGPDAVHYLSFQRHLIVVMGIMTVISIAIILPINFSGTLS--
KNSFGHTTISNLEPDSPSMWAHVVFAIAYVPMVVLIMRRASGRNAF----------
KTAPTRTIMATNISQGDCSKTIIRTYLQQVTIEDIQLAYNISSLIKAAEEYERTVEARIYCEAHRNR
D--QAQPSC----EKVDALEYYKDHEVQLAGEVARMRASA-
LNEPLGIAFVTLNSAHEAQHVMLHFK---
PGTEWNLSFAPAPSDIFWENLNIDTAQWYCKWATVNFALFLFLFFLTTPVIIVNQLDTLSLT--------
------
KKISPLVSEFLPTLLLWSLSALMPVIVAYSDTWLSHWTRSRQNYLIMTKTFGYLLFMILILPSLGLT
SAQALLQWTND---
TYRWECIFLPDKGAFFVNYIITAAFIGTALELIRFPDLICYLWKLAPYIKSILITFPFGIHYAWMVMV
FTTSTVYSLACPLIMPFAMVYITLKHFVDKHNLFFAFAPSNGSGGKIHSTAVTMTKFSVVLLLIIM
AALAVVRTGQVELRAVVLILALCATLVMFA---------CMSPKRC---------PSHLSY---
>Arabidopsis_lyrata_D7KET4
----EFGSFLVSLGTSFVVFVVLMLLFTWLSRKSGNAPIYYPNRILKG--------
RNPFAWMREALTSSEQDVVNLSGVDTAVHFVFLTTVLGIFACSGLLLLPTLLPLAATDHNLKNF
SQLDNLSMANITKKSPRLWAFLGAVYWISLVTYFFLWKAYKHVSTLRAQALMSAA--
VKPEQFAILVRDMPSGQTQKEFIDSYFREETFYRSLVATENSKVNKIWGKLEGYKKKLARAEAIL
AATNN--RPTNKTVGKQVDSIEYYTELINESVANLETEQKAVLKQ--
QTAAVVFFTTRVAAASAAQSLHCQMV-
DKWTVTEAPEPRQLLWQNLNIKLFSRIIRQYFIYFFVALTILFYMIPIAFVSAITTLENLQKIIPFIKPV
VEITAIRTVLESFLPQIALLVFLAMLPKLLLFLSKAEGIPSQSHAIRAASGKYFYFSVFNVFIGVTLA
GTLFNTVKDIAKNPKMIINLLATSLPKSATFFLTYVALKFFIGYGLELSRIIPLIIFHLKKKVKEAWYP
GDLTYATRVPGDLLVLTITFCYSVIAPLILIFGIIYFGLGWLVLRNQALKVYVPSYESYGRMWPHIH

QRILAALFLFQVVMFGYLGAKTFFYT-ALVIPLIITSLIFGYVCRQKFYGGFKHTALEVA-CR------
EIFRAYIPH
>Arabidopsis_lyrata_D7KHF7
---ATLQDIGVSALINLFGAFLFLIAFAVLRIQPINDRVYFPKWYLTG--
ERNSPRFTFLNWMPQAMKMSESEIIRHAGLDSAIFLRIYTLGLKIFAPVMVLALVVLVPVNVSSG
TLFFVSNIDKLSISNVQPKSSKFFFHIGVEYIFTFWACFMLYREYNNVAIMRLQYLASQR--
RRPEQFTVVVRNVPDH-
SVPDTVDQFFKTEHYLCHQAVYNANTYAKLVKQRAKLQRWFDYYVLKHQRNPHK-
QPTCRTWGKKVDSIEYYKQQIKEFDHNMSLERQKVLSKLMLPVAFVSFDSRWGAAVCAQTQQ
SKNP-
TLWLTSSAPEPRDIYWQNLAIPFISLTIRKLVIGVSVFALVFFYMIPIAFVQSLANLEGLERVAPFL
RPVTRLDFIKSFLQGFLPGLALKIFLWILPSVLLIMSKIEGYIALSTLERRAAAKYYYFMLVNVFLG
SIIAGTAFEQLHSFLQSPTQIPRTIGVSIPMKATFFITYIMVDGWAGIAGEILRLKPLVIFHLKNMRV
RAMDPGFVDFKETLPSLQLYFLLGIVYTAVTPILLPFICIFFAFAYFVYRHQIINVYNQQYESCGAF
WPHVHGRIIASLLISQLLLMGLLASKKAADSTPLLIILPILTLSFHKYCKHRFEPAFRQYPLEEAMA
KELNMKADLADAYLHP
>Arabidopsis_lyrata_D7KKL9
----DVSSLLTSAGINIGTCVVLVSLYSILRKQPANYCVYFGRLLSD-G-RVK---
APSPSWLVKAWETTEDEMLASAGLDAVVFIRMVICSIRIFSIVAVVCIAFVLPVNYYGQKT--
LESLVIFTIENLNQRSRWLWVHCLALYIISSAACALLYFEYKNIAKRRLAHITGSA--
SKQSHFTVLIRAIPQQ-SYSETVSKYFTNPSYVSHLMVYRDGFIHRLMNETDRMCQAIKHVSP---
DL----SCNPSLCGAATNSFQILSNETDSVKG--QLGELTLTEE-
ERPVAFVFFKSRYDALVVSEVLQTPNP-
MLWVADLAPEPHDVHWRNLRIPYRQLWMRRIATLVGAVAFMFVFLFPVAFVQGLTQLQTLSKN
FPFLRDLLHKGFMKQVITGYLPSVILVLFFYAVPPLMMYFSTLEGCVSRSLRKKSACIKILYFTIW
NVFFVNILSGSVIRQLSVLS-
SVRDIPAQLAKVVPAQVGFFMTYCFTSGWAGLACEIMQPVGLIWNLIAKVSYETL---
RFPYHTEIPRLLLFGLLGFTNSVIAPLILPFLLIYFFFAYLIYKNQIINVYITKYESGGQYWPVFHNTT
IFSLILSQIIALGFFGLKLSTVASGFTIPLIFLTLLFSEYCRQRFAPIFKKYPAEILIAMMEEIHNNLKA
AYSQI
>Arabidopsis_lyrata_D7KN76
---ATLEDIGVAATINILTAIIFLLAFAILRIQPFNDRVYFPKWYLKG--
IRSSPLLRFLNWMPAALNMPEPELIDHAGLDSAVYLRIYLIGLKIFVPIALLAWSILVPVNWTSDGL
QLSSDIDKLSISNIERGSDRFWTHLVMAYAFTFWTCYVLMKEYEKVAAMRLAFLQNEQ--
RRPDQFTVLVRNVPAE-
SISESVEHFFLVDHYLTHQVVYNANDLAALVEQKKSTQNWLDYYQLKYTRNQEH-
KPRIKTWGQKVDAIDHYIAEIEKLNEQ---
ERKKVKDTSVMPAAFVSFKTRWGAAVCAQTQQSSDP-
TEWLTEWAPEAREVFWSNLAIPYVSLTVRRLIMHIAFFFLTFFFMIPIAFVQSLASIEGIEKSAPFL
KSIIEKKLVKSVIQGFLPGIVLKLFLIFLPSILMVMSKFEGFVSLSSLERRAASRYYIFNLVNVFLGSI
IAGSAFEQLESFLQSAKEIPKTVGVAIPIKATFFITYIMVDGWAGIAGEILRLKPLIFFHIKNFREEA
MNPGQINYHATEPRIQLYFLLGLVYAPVTPVLLPFIIIFFALAYLVFRHQIINVYNQEYESAARFWP
DVHGRIISALIISQILLMGLLSTKGAAQSTPFLLVLPILTFFFHRFCKGRYEPAFLRHPLKEAMVKN
FNLKPYLQKAYIHP
>Arabidopsis_lyrata_D7KUS0
---ATLADIGVAAAINILSALIFLLLFAILRIQPFNDRVYFPKWYLKG--
VRSSPVVRFLNWMPAALKMPEPELIDHAGLDSAVYLRIYLIGLKIFVPIALLSWSILVPVNWTSDG
LQLSSNIDKLSISNVERGSDRFWAHLVMAYAFTFWTCYVLMKEYEKIAAMRLSFLQSEK--
RRADQFTVLVRNVPPE-
SIRENVQHFFLVDHYLTHQVVYNANELAKLVEEKKKMQNWLDYYQLKYTRNKEQ-
RPRVKLWGKKVDAMDHYTAEIEKLSEQIMEERKRIKDKSVMPAAFVSFKTRWGAAVCAQTQQ

TKNP-
TEWLTEWAPEAREMYWENLAMPYVSLTVRRFVMHIAFFFLTFFFIIPIAFVQSLASIEGIQKSAPF
LSPIVEKKFMKSLIQGFLPGIVLKLFLIFLPTILMIMSKFEGFISISSLERRAAFRYYIFNLVNVFLGSI
ITGSAFEQLDSFLQSANDIPRTVGVAIPIKATFFITYIMVDGWAGVAGEIFRLKPLVIFHLKNFREE
AMDPGQIDFYATEPRIQLYFLLGLVYAPVTPVLLPFIIFFFGFAYLVFRHQIINVYDQKYESAAAF
WPDVHGRIISALIISQILLLGLMSTKGKVQSTPFLLVLAIVTFGFHRFCKGRYESAFVINPLQEAMI
KNLNLKGFLQNAYIHP
>Arabidopsis_lyrata_D7KX16
----LLSALLMSVGINSCLCVLFFILYSVLRKQPRNYEVFLPRRLAD-G-TSKR--
IPSVKWIWKSWRPTEKELMESSGLDGVVFMRMITFSLKVFFFAGIIGVFVLLPVNCFGDQLTVA
NSLDLFSVANLKIRSQWLWVHFGAIYLVTAFVCCLLYFEFRYIALKRIEHFYSSK--
PQPEQFTILVRNIPSS-
SVSDTVDRFFGESTYLSHVVIHRTSKLRSVVDKAKKLYKQVKHKKPVKKKP----------
FSRRDTPEGHYENVLQEMEQNIRLGQAEVSGK-EVRAAFVSFKSRYGAATALHMPQSINP-
TYWLTEPAPEPHDVHWPFFSASFMQKWLAKILVVFACLLLTILFLVPVVLVQGLTNLPALEFMFP
FLTLILSMKVVSQIITGYLPSLILQTSLKVVPPIMEFLSSIQGHICHSDIQKSACNKVIWFTIWNVFF
ATVFSGSAFYKLSVVL-
DPKEIPVKLAVAVPAQASFFIAYVVTTGWTDTLTELFRVVPFMVSYIKRSEFVVP---
PMRYHRDTPRVLFFGLLGITYFFLAPLILPFILLYFCLAYIIYRNQFMNVYAPKFDTGGMFWPMIH
YTMIFSLVLMHAIAIGLFALKKMELATYLLVPLPVCTLLFNEFCRKRFMPIFTAYPAEVLTKRMPE
FYNNLVSAYQDP
>Arabidopsis_lyrata_D7KXW9
----EISALLTSAGINISICIVLLSLYSILRKQPSNYCVYFGRRLVC-G-GAR---
VPSPSWLVKAWETSEDELLAAAGLDAVVFLRMVLFSIRIFFIVAVICIAFVLPVNYYGQPM--
LESSEVFTIENLKEGSKWLWVHCLALYIITSAACLLLYFEYRTIAKMRLGHITGCA--
SKPSQFTVLIRAIPWQ-SYSDTLSKFFTNSSYVSHQMVYHNGIIQRLLREAERMCQTLKHVSP---
EI----NCKPSLCGTATNSFHILSNEADSVKG-MELGELTMTEQ-
ERPAAFVFFKTRYDALVVSEVLQSSNP-
MLWVTDLAPEPHDVYWKNLNIPYRQLWIRKIATLVGAVAFMFVFLIPVTFIQGLTQLEQLSHAFP
FLRGILRKQFISQVITGYLPSVILILFFYAVPPLMMYFSALEGCISRSIRKKSACIKVLYFTIWNVFF
VNILSGSVIRQLNVFS-
SVRDIPAQLARSVPTQAGFFMTYCFTSGWASLACEIMQPMALIWNLVAKVSYETL---
RFPYHTEIPRLLLFGLLGFTNSVIAPLILPFLLIYFFLAYLIYKNQILNVYITKYESGGQYWPIFHNTT
IFSLILTQIIALGFFGLKLSTVASGFTIPLILLTLLFSEYCRQRFAPIFNKNPAQVLIDMMEELHKKLH
NVYSQI
>Arabidopsis_lyrata_D7L0U9
---ATLNDIGVAAAINILTAFAFFIAFAILRLQPVNDRVYFPKWYLKG--
LRSSPIIRFLNWMPQALRMPEPELIDHAGLDSVVYLRIYLLGLKIFFPIACIAFTVMVPVNWTNSTL
DQFSDIDKLSISNIPTGSSRFWVHLCMAYVITFWTCFVLQREYKNIGSMRLQFLASEQ--
RRPDQFTVLVRNIPPE-
SVSELVEHFFKVDYYLTYQAVYNANKLSELVQKRKKLQNWLDYYQNKHSRNPTK-
RPLIKIWGEEVDAIDHYIEKIEGLTRKISEEKETVMTKSLVPAAFVSFKRRWGAVVCSQTQQSRN
P-
TEWLTEWAPEPRDIYWDNLALPYVQLTIRRLVIAVAFFFLTFFFMIPIAFVQTLANIEGIEKAVPFL
KPLIEVKTVKSFIQGFLPGIALKIFLIVLPSILMLMSKFEGFISKSSLERRCASRYYMFQFINVFLCSI
IAGTALQQLNSFLQSATEIPKTIGVSIPMKATFFITYIMVDGWAGVAGEILRLKPLIIYHLKNFREEA
MDPGTIGFNTGEPQIQLYFILGLVYAAVSPILLPFILVFFALAYVVYRHQVINVYNQEYESAAAFW
PDVHRRVVIALIVSQLLLMGLLSTKRAARSTPLLFILPVLTIGFHKFCQGRYQPIFVRYPLQDAMV
KNLNLKTFLQNAYAHP
>Arabidopsis_lyrata_D7LUU6

----TPESLLASASINIGLAVVALWLFSVLKKQPRNAVVYYARRLSD-R-
HHHRPLLPSVAWIPRAFRVPEDEILSRHGLDALVLIRLFKFGIRFFLLCSLLGASLLLPVDYYNES-
--EYSMDAFTISNITRGSNKLWVHFSCLWFISFYALFLLHKEYKEILVIRLQQMKELR--
HRADQFTVLVRQVPLHNTRGCTVDHFFSKFSYHSHQMLYDGRDLEYLLGKQKKLKKEIEYKR--
----------HIGSQEHKHISTSEEKLQEITHMVYHLQSETMEK-
ELPVAFVTFKSRRNAALAAQTQQHSNP-
LELITEMAPEPRDVSWRNLAIPQKILPLNKIGVILAAALLTIFFAIPVTAVQGIAKYEKLKKWFPPAM
AIEFIPGLSSVVTGYLPSAILKGFMYIIPFAMLGLAYLGGSIFKSNEEIKACNMVFYFLMGNVFFLS
LISGSLLDEIGEYLTHPRDIPSHLAAAVSAQAEFFMTYILTDGLSGFSLEILQLGLILFDIIRSYTPYL
F---
SFPYFRVIPTVSLSIMIGMIYAVVAPLMLPFLVGYFCLGYIVYFNQMEDVYETTYDTCGRFWPFIH
HYIFVSIILMQITMVGLFGLKSKPSAAIATVPLILITIAYNEYCKIRFLPSFKHFPIQTAVDIMETHCV
DAASAYHQP
>Arabidopsis_lyrata_D7M169
---ATLQDIGVSAGINILTAFIFFIIFAFLRLQPFNDRVYFSKWYLKG--
LRSSPALKFLHWMPEALKMPERELIDHAGLDSVVYLRIYWLGLKIFAPIAMLAWAILVPVNWTNN
ELELSSDIDKLTISNIPESSHRFWAHIVMAYAFTIWTCYMLMKEYETVANMRLQFVASEA--
RRPDQFTVLVRNVPPE-
TVSELVEHFFLVDNYLTHQVVYNANKLADLVGKKKKLQNWLDYYQLKYTRNNSQTRPITKLCG
QKVDAIEHYIAEVDKTSKEIAEERENVVQKSIMPASFVSFKTRWAAAVCAQTTQTRNP-
TEWLTEWAAEPCDVYWPNLAIPYVSLTVRNLVMNVAFFFLTFFFIIPIAFVQSLATVEGIEKVAPF
LKVIIEDKFVKSLIQGLLAGIVLKLFLIFLPGILMTMSKFEGFTSVSSLERRSASRYYIFNLVNVFLG
NVIAGAAFEQLNSFLQSPNQIPKTIGMAIPMKATFFITYIMVDGWAGVAGEILMLKPLIIYHLKNAR
EEAMNPGSIGFNTGEPQIQLYFLLGLVYAPVTPMLLPFILIFFALAYVVYRHQIINVYNQEYESAA
AFWPDVHGRVITALIISQLLLMGLLGTKHAAFAAPFLIALPVITIGFHRFCKGRYEPAFIRYPLQEA
MMKNLNLKGYLQDAYIHP
>Arabidopsis_lyrata_D7M3B8
---ASVQDIGLSAAINLLSAFAFLFAFAMLRLQPVNDRVYFPKWYLKG--
IRGSPTVKFLNWMPAALKMPEPELIEHAGLDSAVYIRIYLLGLKMFVPITLLAFGVLVPVNWTGET
LENFSNVDKLSISNVPPGSPRFWAHITMTYVFTLWTCYILYMEYKTVANMRLRHLAAES--
RRPDQLTVLVRNVPPE-
SVNEHVEHFFCVDHYLCHQVVYNANDLAKLVAQRKAMQNWLTYYENKFERKPSS-
RPTTKTWGTTVDAIDFYTSKMDILARQEAVEREKIMPKSIMPAAFVSFRSRWGTAVCAQTQQC
HNP-
TIWLTEWAPEPRDVFWDNLAIPYVELSIRRLLTTVALFFLIFCFMIPIAFVQSLANLEGIQKVLPFL
KPVIEMKTVKSVIQGFLPGIALKIFLIILPTILMTMSQIEGYTSLSYLDRRSAEKYFWFIIVNVFLGSII
TGTAFQQLKSFLQPPTEIPKTVGVSIPMKATFFITYIMVDGWAGIAAEILRVVPLVIFHLKNTRQQ
AMDPGHLDFATSEPRIQFYFLLGLVYAAVAPILLPFIIVFFAFAYVVFRHQVINVYDQKYESGARY
WPDVHRRLIICLIISQLLMMGLLSTKKFAKVTALLLPQPILTFWFYRYCAGRFESAFSKFPLQEAM
VKNLNLKEYLKEAYVHP
>Arabidopsis_lyrata_D7MAI0
---ATINDIGVAAAINIVTALAFLLAFAIFRIQPVNDRVYFPKWYLKG--
LRSSSIIRFLNWMPEALKMPEPELVDHAGLDSVVYLRIYLLGLKIFFPIACVAFTAMVPVNWTNK
GLDRFSDIDKLSLSNIPNGSPRFWVHLCMAYAITFWTCFILKREYQNIALMRLQFLANDQ--
RRPNQFTVLVRNIPSE-
SICELVEHFFKVDHYLTFQAVHDATKLSELVLTRKQMQNLLDYNINKHMRNQSN-
RPVIKMCGEEADGIKYYTSVVEGLTREIAEEKQRLRTKSIVPAAFVSFKSRWGAAVCAQTQQTR
NP-
TEWLTEWAAEPRDIYYDNLALPYVDLKIRRLIVGVAYFFLTFFFMIPIAFVQSLANIEGIEKAFPFL
KPLIEVKLLKSIIQGFLPGIALKIFLLFLPRILMQMSKFEGFVSTSSLERRAATRFYMFQFINVFLGS
IVTGTAFQQLNSFLQSANDIPKTIGVSIPMKATFFITYIMVDGWAGVAGEILRLKPLIIYHLKNSRE

EATDPGTIGFNTGEPQIQLYFLLGLVYAAVSPILLPFILVFFGLAFVVYRHQVINVYNQKYESAGK
FWPDVHRRVVTALVVSQLLLMGLLSTKHASKSTPFLLVLPLLTIGFHMHCKNRYQPAFVTYPLQ
EAMIKNFNLKAFLRDAYAHP
>Arabidopsis_lyrata_D7MBR9
IPDAWYGNIQYLLNISVIGLLCCVSIFLFVKLRSDHRR----------
SALFSKLLAVWKATCREIARHCGADAAQFLLIEGGSFVLLFSIAVLAVSVMLPLNLYAGTA--
SDELSKTMITHIQKGSALLWLHFVFVVIVVVISHFGIAAIEARLKFTRFRD-----
NANSTAVFTIMVQGLPKNLGSDRVFEECFRLGKVYKIIVPMDLCALDDLATELVRVRDEITWLVA
KMDSRLL----------DEKLRKLQELRADLESQLAAYKEG--
RAQGAGVAFVMFKDVYTANKAVQDFRESVRLQQWKVDRAPLATDIYWNHLGLTKVALIVRRVI
VNTILLLILVFFSSPLALISALVSAGRIFSAQSWLAWVQTS-
WIGSLIFQFLPNVFIFVSYIVIPSALSYLSKFERHLTVSGEQRAALLKMVCFFLVNLIILKALVESSL
ESASCYLDGDR-
IEYMSPSFLSRSCVSALAFLITSTFLGISFDLLAPIPWIKKKIQKFSRTPIPKQKFDFAQYYAFNLTI
FALTMIYSSFAPLVVPVGAVYFGYRYIVDKYNFLYVYRVRGGNEGKLMDTVLCIMRFCVDLYLV
SMLLFFSVKGDSTKLQAIFTLGVLVMY--KLLTDRYHPALRSIQTDSI-----IDGPVDYEAYSHP
>Arabidopsis_lyrata_D7ME79
---ATLQDIGVSAGINILSAFVFFIIFAILRLQPFNDRVYFSKWYLKG--
LRSSPAMRFLNWMPEALKMPEPELIDHAGLDSVVYLRIYWLGLKIFAPIAVLAWAVLVPVNWTN
NTLEMSSDIDKLSVSNIPEYSMRFWTHIVMAYAFTIWTCYVLMKEYETIANMRLQFVASEA--
RRPDQFTVLVRNVPPE-
SVSELVEHFFLVDHYLTHQVVCNANKLADLVKKKKKLQNWLDYYQLKYARKNSQ-
RIMVKLWGQKVDAIEHYIAEIDKISKEISKEREEVVPKSIMPAAFVSFKTRWAAAVCAQTQQTRN
P-
TQWLTEWAPEPRDVFWSNLAIPYVSLTVRRLIMHVAFFFLTFFFIIPIAFVQSLATIEGIVKAAPFL
KVIVEDQFMKSVIQGFLPGIALKIFLAFLPSILMVMSKFEGFTSISSLERRAAFRYYIFNLVNVFLA
SVITGAAFEQLNSFLQSPNQIPKTIGVAIPMKATFFITYIMVDGWAGVAGEILMLKPLIMFHLKNA
REEAMDPGSIGFNTGEPRIQLYFLLGLVYAPVTPMLLPFILVFFALAYIVYRHQIINVYNQEYESA
AAFWPDVHGRVIAALVISQLLLMGLLGTKHAALAAPFLIALPVLTIGFHHFCKGRYEPAFIRYPLQ
EAMMKNLNLKGYLQNAYIHP
>Arabidopsis_thaliana_B5TYT3
---ATLGDIGVAAAINILTAIIFLLAFAILRIQPFNDRVYFPKWYLKG--
IRSSPLLRFLNWMPAALKMPEPELIDHAGLDSAVYLRIYLIGLKIFVPIALLAWSILVPVNWTSHGL
QLSSDIDKLSISNIENGSDRFWTHLVMAYAFTFWTCYVLMKEYEKVAAMRLAFLQNEQ--
RRPDQFTVLVRNVPAE-
SISDSVEHFFLVDHYLTHQVVYNANDLAALVEQKKSTQNWLDYYQLKYTRNQEH-
KPRIKTWGKKVDAIDHYIAEIEKLNEQIMEERKKVKDTSVMPAAFVSFKTRWGAAVSAQTQQSS
DP-
TEWLTEWAPEAREVFWSNLAIPYVSLTVRRLIMHIAFFFLTFFFMIPIAFVQSLASIEGIEKNAPFL
KSIIENDLFKSVIQGFLPGIVLKLFLIFLPSILMVMSKFEGFVSLSSLERRAAFRYYIFNLINVFLGSV
ITGSAFEQLDSFLQSAKEIPKTVGVAIPIKATFFITYIMVDGWAGIAGEILRLKPLIFFHIKNSREEA
MNPGQINYHATEPRIQLYFLLGLVYAPVTPVLLPFIIIFFALAYLVFRHQIINVYNQEYESAARFWP
DVHGRIISALIIAQILLMGLLSTKGAAQSTPFLLFLPIITFFFHRYCKGRYEPAFLRHPLKEAMVKNF
NLKPYLQKAYIHP
>Arabidopsis_thaliana_NP_683440.2
----EISALLTSAGINISICIVLLSLYSILRKQPANYCVYFGRRLVC-G-GAR---
VPSPSWLVKAWETSEDELLAAAGLDAVVFLRMVIFSIRIFFIVAVICIAFVLPVNYYGQPM--
LESSEVFTIENLKEGSKWLWVHCLALYIITSAACLLLYFEYSTIAKMRLGHITGCA--
SKPSQFTVLIRAIPWQ-SYSDTLSKFFTNSSYVSHQMVYHNGIIQRLLRDAERMCQTLKHVSP---
EI----NCKPSLCGTATSSFHILSNEADSVKG-MELGELTMTEQ-
ERSAAFVFFKTRYDALVVSEVLQSSNP-

MLWVTDLAPEPHDVYWKNLNIPYRQLWIRKIATLVGAVAFMFVFLIPVTFIQGLTQLVQLSHAFP
FLRGILSKNFINQVITGYLPSVILILFFYAVPPLMMYFSALEGCISRSIRKKSACIKVLYFTIWNVFF
VNILSGSVIRQLNVFS-
SVRDIPAQLARAVPTQAGFFMTYCFTSGWASLACEIMQPMALIWNLVAKVSYETL---
RFPYHTEIPRLLLFGLLGFTNSVIAPLILPFLLIYFFLAYLIYKNQILNVYITKYESGGQYWPIFHNTT
IFSLILTQIIALGFFGLKLSTVASGFTIPLILLTLLFSEYCRQRFAPIFNKNPAQVLIDMMEELHKKLH
NVYSQI
>Arabidopsis_thaliana_Q5XEZ5
---ATLQDIGVSAGINILSAFVFFIIFAVLRLQPFNDRVYFSKWYLKG--
LRSSPAMKFLNWMPEALKMPEPELIDHAGLDSVVYLRIYWLGLKIFTPIAVLAWAVLVPVNWTN
NTLEMSSDIDKLSVSNIPEYSMRFWTHIVMAYAFTIWTCYVLMKEYETIANMRLQFVASEA--
RRPDQFTVLVRNVPPE-
SVSELVEHFFLVDHYLTHQVVCNANKLADLVKKKKKLQNWLDYYQLKYARNNSQ-
RIMVKLWGQKVDAIEHYIAEIDKISKEISKEREEVVPKAIMPAAFVSFKTRWAAAVCAQTQQTRN
P-
TQWLTEWAPEPRDVFWSNLAIPYVSLTVRRLIMHVAFFFLTFFFIVPIAFVQSLATIEGIVKAAPFL
KFIVDDKFMKSVIQGFLPGIALKLFLAFLPSILMIMSKFEGFTSISSLERRAAFRYYIFNLVNVFLAS
VIAGAAFEQLNSFLQSANQIPKTIGVAIPMKATFFITYIMVDGWAGVAGEILMLKPLIMFHLKNAR
EEAMDPGSIGFNTGEPRIQLYFLLGLVYAPVTPMLLPFILVFFALAYIVYRHQIINVYNQEYESAA
AFWPDVHGRVIAALVISQLLLMGLLGTKHAALAAPFLIALPVLTIGFHHFCKGRYEPAFIRYPLQE
AMMKNLNLKGYLQNAYVHP
>Arabidopsis_thaliana_Q8GUH7
----LLSALLTSVGINLGLCFLFFTLYSILRKQPSNVTVYGPRLVKK-D-GKSQ--
LPTAGWVKRALEPTNDEILSNLGLDALVFIRVFVFSIRVFSFASVVGIFILLPVNYMGTEF--
KKSMDNFSISNVNDGSNKLWIHFCAIYIFTAVVCSLLYYEHKYILTKRIAHLYSSK--
PQPQEFTVLVSGVPLN-
SISETVENFFRESSYLSHIVVHRTDKLKVLMNDAEKLYKKLTRVKSGSISR----
QKSRWGFGNNVDVVDHYQKKLDKLEDDMRLKQSLLAGE-
EVPAAFVSFRTRHGAAIATNIQQGIDP-
TQWLTEAAPEPEDVHWPFFTASFVRRWISNVVVLVAFVALLILYIVPVVLVQGLANLHQLETWF
PFLKGILNMKIVSQVITGYLPSLIFQLFLLIVPPIMLLLSSMQGFISHSQIEKSACIKLLIFTVWNSFF
ANVLSGSALYRVNVFL-
EPKTIPRVLAAAVPAQASFFVSYVVTSGWTGLSSEILRLVPLLWSFITKLEFEVP---
STPFCQEIPRILFFGLLGITYFFLSPLILPFLLVYYCLGYIIYRNQLLNVYAAKYETGGKFWPIVHSY
TIFSLVLMHIIAVGLFGLKELPVASSLTIPLPVLTVLFSIYCQRRFLPNFKSYPTQCLVNKMSEFYS
ELVVAYRDP
>Arabidopsis_thaliana_Q8VZM5
---ATINDIGVAAAINIVTAFAFLLAFAIFRIQPVNDRVYFPKWYLKG--
LRSSSIIRFLNWMPEALKMPEPELVDHAGLDSVVYLRIYLLGLKIFFPIACVAFTTMVPVNWTNK
GLDRFSDIDKLSLSNIPNGSPRFWVHLCMAYAITFWTCFILKREYQNIALMRLQFLANDQ--
RRPNQFTVLVRNIPAE-
SICELVEHFFKVDHYLTFQAVHDATKLSELVLTRKQMQNLLDYNINKHMRNLSN-
RPVIKMCGEEADGIKYYTSVVEGLTREISEEKQRLRTKSIVPAAFVSFKSRWGAAVCAQTQQTR
NP-
TEWLTEWAAEPRDIYYDNLALPYVDLKIRRLIVGVAYFFLTFFFMIPIAFVQSLANIEGIEKAFPFL
KPLIEVKLLKSIIQGFLPGIALKIFLLFLPRILMQMSKFEGFVSTSSLERRAATRFYMFQFINVFLGS
IVTGTAFQQLNSFLQSANDIPKTIGVSIPMKATFFITYIMVDGWAGVAGEILRLKPLIIYHLKNSRE
EATDPGTIGFNTGEPQIQLYFLLGLVYAAVSPILLPFILVFFGLAFVVYRHQVINVYNQKYESAGK
FWPDVHRRVVTALVVSQLLLMGLLSTKHASKSTPLLLVLPLLTIGFHKHCKNRYQPAFVTYPLQ
EAMIKNLNLKAFLRDAYAHP
>Arabidopsis_thaliana_Q94A87

----DVSALLTSAGINIAICVVLVSLYSILRKQPANYCVYFGRLLSD-G-RVK---
APSPSWLVKAWETTEEEMLAAAGLDAVVFIRMVICSIRIFSIVAVVCLAFVLPVNYYGQKM--
LESLGVFTIENLNPRSRWLWVHCLSLYIISSAACALLYFEYKNIAKKRLAHISGSA--
SKPSHFTVLIRAIPQQ-SYSETVSKYFTNPSYVSHLMVYRDGFIHRLMNETERMCQAIKHVSP---
DL----SCNPSLCGAATNSFQIISNETDSVKG-LELGELTLTEE-
ERPVAFVFFKSRYDALVVSEVLQTPNP-
MLWVADLAPEPHDVHWRNLRIPYRQLWMRRIATLVGAIAFMFVFLFPVTFVQGLTQLPTLSKNF
PFLKDLLNRRFMEQVITGYLPSVILVLFFYTVPPLMMYFSTLEGCVSRSQRKKSACLKILYFTIWN
VFFVNILSGSVIRQFTVLN-
SVRDVPAQLAKLVPAQAGFFMTYCFTSGWAGLACEIMQPVGLIWNLIAKVSYETL---
RFPYHTEIPRLLLFGLLGFTNSVIAPLILPFLLIYFFFAYLIYKNQIINVYITKYESGGQYWPVFHNTT
IFSLILSQVIALGFFGLKLSTVASGFTIPLILLTLLFSEYCRQRFAPIFQKYPAEILIAMMEEIHNNLK
VAYSQI
>Arabidopsis_thaliana_Q9C792

MESSGLDGVVFMRMITFSLKVFLFAGIIGVFVLLPVNCFGDQLTVANSLDLFSVANLKVRSQWL
WVHFGAIYLVTVFVCCLLYFEFRYIALKRIEHFYSSK--PKPEQFTILVRNIPSS-
SVSDTVDRFFGESTYFSHVVIHRTSKLRSVVDKAKKLYKEVKHKKPVKKTP----------
FSRKDNTEGHYESVLQEMEQNIRLGQAEVSGK-EVRAAFVSFKSRYGAATALHMPQSINP-
TYWLTEPAPEPHDVHWPFFSASFMQKWLAKILVVFACLLLTILFLVPVVLVQGLTNLPALEFMFP
FLSLILSMKVVSQIITGYLPSLILQTSLKVVPPTMEFLSSIQGHICHSDIQKSACNKVIWFTIWNVFF
ATVFSGSAFYKLSVIL-
DPKQIPLKLAVAVPAQASFFIAYVVTTGWTDTLTELFRVVPFMVSYIKRSEFVVP---
PMRYHRDTPRVLFFGLLGITYFFLAPLILPFILLYFILAYIIYRNQFMNVYAPKFDTGGMFWPMIHY
TMIFSLVLMQAIAIGLFALKKMELATYLLVPLPVFTLLFNEFCRKRFMPIFTDYPAEVLTKRMPEF
YNNLVSAYKDP
>Arabidopsis_thaliana_Q9C8G5
----EFGSFLVSLGTSFVIFVILMLLFTWLSRKSGNAPIYYPNRILKG--------
RNPFAWMREALTSSEQDVVNLSGVDTAVHFVFLSTVLGIFACSSLLLLPTLLPLAATDNNIKNFS
QLDNLSMANITKKSSRLWAFLGAVYWISLVTYFFLWKAYKHVSSLRAQALMSAD--
VKPEQFAILVRDMPAGQTQKEFIDSYFREETFYRSLVATENSKVNKIWEKLEGYKKKLARAEAIL
AATNN--RPTNKTVGKQVDSIEYYTELINESVAKLETEQKAVLKQ--
QTAAVVFFTTRVAAASAAQSLHCQMV-
DKWTVTEAPEPRQLLWQNLNIKLFSRIIRQYFIYFFVAVTILFYMIPIAFVSAITTLKNLQRIIPFIKP
VVEITAIRTVLESFLPQIALIVFLAMLPKLLLFLSKAEGIPSQSHAIRAASGKYFYFSVFNVFIGVTL
AGTLFNTVKDIAKNPKMIINLLATSLPKSATFFLTYVALKFFIGYGLELSRIIPLIIFHLKKKVKEAWY
PGDLSYATRVPGDMLILTITFCYSVIAPLILIFGITYFGLGWLVLRNQALKVYVPSYESYGRMWPH
IHQRILAALFLFQVVMFGYLGAKTFFYT-ALVIPLIITSLIFGYVCRQKFYGGFEHTALEVA-CR------
EIFRAYIPH
>Arabidopsis_thaliana_Q9FVQ5
---ATLQDIGVSALINLFGAFLFLIAFAVLRIQPINDRVYFPKWYLTG--
ERNSPRFTFLNWMPQAMKMSESEIIRHAGLDSAIFLRIYTLGLKIFAPVMVLALVVLVPVNVSSG
TLFFVSNIDKLSISNVQPKSSKFFFHIAVEYIFTFWACFMLYREYNNVAIMRLQYLASQR--
RRPEQFTVVVRNVPDH-
SVPDTVDQFFKTEHYLCHQAVYNANTYAKLVKQRAKLQRWFDYYVLKHQRNPHK-
QPTCRTWGKRVDSIEYYKQQIKEFDHNMSLERQKVLSKLMLPVAFVSFDSRWGAAVCAQTQQ
SKNP-
TLWLTSSAPEPRDIYWQNLAIPFISLTIRKLVIGVSVFALVFFYMIPIAFVQSLANLEGLDRVAPFL
RPVTRLDFIKSFLQGFLPGLALKIFLWILPTVLLIMSKIEGYIALSTLERRAAAKYYYFMLVNVFLG
SIIAGTAFEQLHSFLQSPSQIPRTIGVSIPMKATFFITYIMVDGWAGIAGEILRLKPLVIFHLKNMRV
RAMDPGFVDFKETIPSLQLYFLLGIVYTAVTPILLPFILIFFAFAYLVYRHQIINVYNQQYESCGAF

WPHVHGRIIASLLISQLLLMGLLASKKAADSTPLLIILPILTLSFHKYCKHRFEPAFRQYPLEEAMA
KELNMKADLADAYLHP
>Arabidopsis_thaliana_Q9LVE4
---ATLTDIGVAATINILTAFAFFIAFAILRLQPVNDRVYFPKWYLKG--
LRSSPIIRFLNWMPQALRMPEPELIDHAGLDSVVYLRIYLLGLKIFFPIACIAFTVMVPVNWTNSTL
DQFSDIDKLSISNIPTGSSRFWVHLCMAYVITFWTCFVLQREYKHIASMRLQFLASEH--
RRPDQFTVLVRNIPPE-
SVSELVEHFFKVDYYLTYQAVYNANKLSELVQKRMKLQNWLDYYQNKHSRNPSK-
RPLIKIWGEEVDAIDHYIEKIEGLTRKISEEKETVMTKSLVPAAFVSFKKRWGAVVCSQTQQSRN
P-
TEWLTEWAPEPRDIYWDNLALPYVQLTIRRLVIAVAFFFLTFFFMIPIAFVQTLANIEGIEKAVPFL
KPLIEVKTVKSFIQGFLPGIALKIFLIVLPSILMLMSKFEGFISKSSLERRCASRYYMFQFINVFLCSI
IAGTALQQLDSFLQSATEIPKTIGVSIPMKATFFITYIMVDGWAGVAGEILRLKPLIIYHLKNFREEA
MDPGTIGFNTGEPQIQLYFILGLVYAAVSPILLPFILVFFALAYVVYRHQIINVYNQEYESAAAFWP
DVHRRVVIALIVSQLLLMGLLSTKKAARSTPLLFILPVLTIGFHKFCQGRYQPIFVTYPLQDAMVK
NLNLKTFLQNAYAHP
>Arabidopsis_thaliana_Q9M1H6
----TPESLLASASINIGLAVVALWLFSVLKKQPRNAVVYYARRLSD-R-
HHHRPLLPSVAWIPRAFRVPEDEILSRHGLDALVLIRLFKFGIRFFLMCSLLGASLLLPVDYYNES
---EYSMDAFTISNITRGSNKLWVHFSCLWCISFYALFLLHKEYKEILVIRLQQMKELR--
HRADQFTVLVRQVPLHNTRGCAVDHFFSKFSYHSHQMLYDGRDLEYLLGKQKKLKKELEDKR-
----------HTGSQEHKQISTSEEKLREITHMIYHLQSETMEK-
ELPVAFVTFKSRRNAALAAQTQQHSNP-
LELITEMAPEPRDVSWRNLAIPQKILPLNKIGVILAAALLTIFFAIPVTAVQGIAKYEKLKKWFPPAM
AIEFIPGLSSVVTGYLPSAILKGFMYIIPFAMLGLAYLGGSISNSKEEIKACNMVFYFLMGNVFFLS
LISGSLLDEIGEYLTHPRDIPSHLAAAVSAQAEFFMTYILTDGLSGFSLEILQLGLILFDIIRSYTPYL
F---SFPYFRVIPTVSLSIMIGMIYAVVAPLMLPFLVGYFCLGYIVYFNQ--
DVYETTYDTCGRFWPFIHHYIFVSIILMQITMVGLFGLKSKPSAAIATVPLILITIAYNEYCKIRFLPS
FKHFPIQTAVEIMETHYVDAATAYHQP
>Arabidopsis_thaliana_Q9MAV5
---ATLADIGLAAAINILSALIFLLLFAILRIQPFNDRVYFPKWYLKG--
VRSSPVVRFLNWMPDALKMPEPELIDHAGLDSAVYLRIYLIGLKIFGPIALLSWSILVPVNWTSD
GLQLSSNIDKLSISNVERGSDRFWAHLVMAYAFTFWTCYVLMKEYEKIAAMRLSFLQSEK--
RRADQFTVLVRNVPPE-
SISENVQHFFLVDHYLTHQVVYNANELAKLVEDKKKMQNWLDYYQLKYTRNKEQ-
RPRVKMWGKKVDAMDHYTAEIEKLSEQIMEERKRIKDKSVMQAAFVSFKTRWGAAVCAQTQQ
TKNP-
TEWLTEWAPEAREMYWPNLAMPYVSLTVRRFVMHIAFFFLTFFFIIPIAFVQSLASIEGIEKSAPF
LSPIVKNKLMKSLIQGFLPGIVLKLFLIFLPTILMIMSKFEGFISISSLERRAAFRYYIFNLVNVFLGS
VITGSAFEQLDSFLQSANDIPRTVGVAIPIKATFFITYIMVDGWAGVAGEIFRLKPLVIFHLKNFRE
EAMDPGQIDFYATEPRIQLYFLLGLVYAPVTPVLLPFIIFFFGFAYLVFRHQIINVYNQKYESAGAF
WPDVHGRIISALIISQILLLGLMSTKGKVQSTPFLLVLAILTFGFHRFCKGRYESAFVINPLQEAMI
KNLNLKGFLQNAYVHP
>Arabidopsis_thaliana_Q9SY14
---ASVQDIGLSAAINLLSAFAFLFAFAMLRLQPVNDRVYFPKWYLKG--
IRGSPTVKFLNWMPAALQMPEPELIEHAGLDSAVYIRIYLLGLKMFVPITLLAFGVLVPVNWTGE
TLENFSNVDKLSISNVPPGSPRFWAHITMTYVITFWTCYILYMEYKAVANMRLRHLAAES--
RRPDQLTVLVRNVPPE-
SVNEHVEHFFCVDHYLCHQVVYNANDLAKLVAQRKAMQNWLTYYENKFERKPSS-
RPTTKTWGTTVDAIDFYTSKMDILAEQEAVEREKIMPKAIMPAAFVSFRSRWGTAVCAQTQQC
HNP-

TIWLTEWAPEPRDVFWDNLAIPYVELSIRRLLTTVALFFLIFCFMIPIAFVQSLANLEGIQKVLPFL
KPVIEMKTVKSVIQGFLPGIALKIFLIILPTILMTMSQIEGYTSLSYLDRRSAEKYFWFIIVNVFLGSII
TGTAFQQLKSFLQPPTEIPKTVGVSIPMKATFFITYIMVDGWAGIAAEILRVVPLVIFHLKNTRQQ
AMDPGHLDFATSEPRIQFYFLLGLVYAAVAPILLPFIIVFFAFAYVVFRHQVINVYDQKYESGARY
WPDVHRRLIICLIISQLLMMGLLSTKKFAKVTALLLPQPILTFWFYRYCAGRFESAFSKFPLQEAM
VKNLNLKEYLKDAYVHP
>Arabidopsis_thaliana_Q9SZT4
IPDAWYGNIQYLLNISVIGLLCCVSIFLFVKLRSDHRR----------
SALFSKLLAVWKATCREIARHCGADAAQFLLIEGGSFVLLFSIAVLAVSVMLPLNLYAGTA--
SDELSKTMITHIQKGSALLWLHFVFVVIVVVISHFGIAAIEARLKFTRFRD-----
NANSTAVFTIMVQGLPKNLGSDRVFEDCFRLGKVYKFIVPMDLCALDDLATELVRVRDEITWLV
AKMDSRLL----------DEKLRKLQELRADLESQLAAYKEG--
RAQGAGVAFVMFKDVYTANKAVQDFRESVRLQQWKVDRAPLATDIYWNHLGLTKVALIVRRVI
VNTILLLILVFFSSPLALISALVSAGRIFSAQYWLTWVQTS-
WIGSLIFQFLPNVFIFVSYIVIPSALSYLSKFERHLTVSGEQRAALLKMVCFFLVNLIILKALVESSL
ESASCYLDGDR-
IEYMSPSFLSRSCVSALAFLITSTFLGISFDLLAPIPWIKKKIQKFSRTPIPKQKFDFAQYYAFNLTI
FALTMIYSSFAPLVVPVGAVYFGYRYIVDKYNFLYVYRVRGGNEGKLMDTVLCIMRFCVDLYLV
SMLLFFSVKGDSTKLQAIFTLGVLVMY--KLLTDRYHPALRSIQTDSI-----IDGPVDYEAYSHP
>Arabidopsis_thaliana_Q9XEA1
---ATLKDIGVSAGINILTAFIFFIIFAFLRLQPFNDRVYFSKWYLRG--
LRSSPALKFLHWMPEALKMPERELIDHAGLDSVVYLRIYWLGLKIFAPIAMLAWAVLVPVNWTN
NELELSSDIDKLTISNIPEGSNRFWAHIIMAYAFTIWTCYMLMKEYETVANMRLQFLASEG--
RRPDQFTVLVRNVPPE-
TVSELVEHFFLVDNYLTHQVVCNANKLADLVSKKTKLQNWLDYYQLKYTRNNSQIRPITKLCGQ
KVDAIEHYIAEVDKTSKEIAEERENVVQKSVMPASFVSFKTRWAAAVCAQTTQTRNP-
TEWLTEWAAEPRDIYWPNLAIPYVSLTVRRLVMNVAFFFLTFFFIIPIAFVQSLATIEGIEKVAPFL
KVIIEKDFIKSLIQGLLAGIALKLFLIFLPAILMTMSKFEGFTSVSFLERRSASRYYIFNLVNVFLGSV
IAGAAFEQLNSFLQSPNQIPKTIGMAIPMKATFFITYIMVDGWAGVAGEILMLKPLIIYHLKNAREE
AMNPGSIGFNTGEPQIQLYFLLGLVYAPVTPMLLPFILVFFALAYVVYRHQIINVYNQEYESAAAF
WPDVHGRVITALIISQLLLMGLLGTKHAASAAPFLIALPVITIGFHRFCKGRFEPAFVRYPLQEAM
MKNLNLKGYLQDAYIHP
>Aspergillus_niger_A2QDK9
SSAFQVNAIWASLATSAGFSILLALLFSLF--RPRHSVVYAPKVH---
DNKHTPPPRGFFAWLKPVLRTKEPALVECIGLDATMFVRFTKMCRNIFIFLSIIGCGLMIPLNLTQ
STG--YGAFSTMTVLYVTS-N-
AIWGQVICAWAFDAIIAFFLWRNYKGVLALRRKYFESSEYQRSLHARTLMITDIPPAARGDEGVL
RLTDEAAVPRASIGRNVKGLPRLIKEHDETVRELEAVLAKYLKHPDPKRPTMRPTNGRVDAIDY
LTDKIKRLEEEIKHVRSSI-DRRAMPFGFVSWDMIEHAHAVAYTARKKHP-
EGTTIVLAPRPDDLIWENLPLSKAARKWKRFLSAIWVSLLTLVYVVPNGLIAILSNLNNLASVWPA
FKTSMDNSYIWAAVQGILSPAVTSLVYIVLPIIFRRLAIRAGDVTKTSRERHVLNKLYTFFVFNNLI
VFSLFSAAWTFVSAVIDAERSLYIKIVNALCQVSPFWVTYLLQRNL-
GATIDLIQLVSVFWVWFSKTAIEWTAPPAFDYASYYNYFLFYATVALCFATLQPIVLPVTALYFGL
DAMMKKYMLLYVFVTKTESGGQFWRVLFNRMLFAVILSNIIIIIVATAKGTWTMVYCVIPPPLLML
AFKFYCMRKFDDDITFYNRANLT--KK-ASERLNSKFGHP
>Aspergillus_niger_A2R3B1
SASNSASGLVTTLVPSLISAAAMVIIFIIL--RRSETRMYMPRTYLGVP-
SERTPATGLWNWIMQMYRLPDEYVLQHHSMDAYLLLRFLKIVSMICFVGACMTWPILFPVNAT
GGG--G-SQLDMLSMSNV-
DKYARYFAHAFVAWLFVGFVFYTITRECLFYINLRHAYALAPAYASRLSSRTVLFTAVTEDYLSR
DKIRQMFGPEKVKNVWLTTNTSELDDKVAERDDAAMKLEAAETKLIKLANQDRPTHRLVGKKV

DTINWARSEIERLTPEIEELQAKHRNADLVSSVFVEFHAQADAQQAFQSVAHNYP-
LHMAPRIGLEPTQVIWSNLRIKWWERLIRYSATIAFVVALIVFWAIPTAVVGCISNINFLTDKVPFL
RFINDVPWILGVITSLLPTVLMSVLMALLPIVLRLMAKFGGAPSLAAVELTTQNFYFAFEVIQVFLV
VTISSSASSVVTKIINNPTSAASLLAENIPTASNFYISYIILQGLSFSAGALLQISGLILGKVLGRMYS
WSNLAGLGWGTVYPVFTLLAVIAIVYSCIAPLVLGFATIGLYLFYFAYRYNMLYVSNANIDTQGKA
YVQGLKHLTVGCYLLMVCLIGLFAIGTATGPLVLMIILLVFCVLYHVALNNALEPLIQYLPKNLESE
E-KYAPEVERDAYFNP
>Aspergillus_niger_A2R6X5
GDSTSLSAFLTTLIPALVIAAFWFGLFLIC--RRTQLRC----------
ERAPRSGFINWFGQFLKISDAQVLRHSSMDGYLFLRFLRVLSATCFTGCVITWPILLPINATGGA
--G-TQLDALSFSNV---PSSITRHGLMFCVE-
AFVFFVVTRESIFYANLRQAYFNSPAYAERISSRTVLFMSVPEEYKNEKTLRQVFG-
NNINRIWITSECKTLDKKVMERAKLAYKLEHAETKLIRAANIKRPTHRVFGKKVDTIRWLRAELTK
VIEEISILQKKHREMKNLSAVFIEFATQKDAQVALQTVSHHQP-
LHMTPRIGISPNEVVWSALNLSWWQRIARRFAVQGGLAALVIFWSIPSAMVGTISNITYLTSMIP
FLGFINKLPVILGLISGLLPSAALALLMSLVPIICRACARVSGVPSTSRVELFTQSAHFCFQVVQVF
LVTTLTSAASAATAQIIKDPLSAKDLLAENLPKATNFYISYFLLQGLTMSSMAVVQVAGAVVFKFI
TTLYQWAALSGVGWGNVFPVFTNMGVIAITYSCIAPLILGFAFVGLYLVYQAYRYNFLFVYELRI
DTRGLVYPRALQHLLTGIYLADICLIGLFAIKGAIGPLIIMALFLIVTILAHISLNDALEPLYSFLPANL
DVEE-RYTEEERNKAYYEP
>Bos_taurus_A7MB88
LQGVTFGGIPTVLFIDVTCFLFLIAAFSIIRRKFWDYG----RILEGNSS-
SSSGQMGLCSWLTAIFRLHDDQILEWCGEDAIHYLSFQRHIIFLLVVVSCLSLCVILPVNLSGDLL
--PYSFGRTTIANLQTDNNLLWLHTVFAILYLILTVVFMRHHTQSIKY----------
KEESLVRRTLFVTGLPRHAKK-
ETVESHFRDCEVVEVQLCYDVAKLIYLCKERKKTEKSLTYYTNLQVKTGQNPKPCG-Q--
EWEDAISYYTRMKDGLMERITEEECRV-
QDQPLGMAFVTFQEKSMATYVLKDFNASSELRRWSVTFAAYPEDICWKNLSIQGFRWWFQWL
GINFILFVVLFFLTTPSIILSTMDKFNVT----------
KLNNPVISQFFPTLLLWSFSALLPTIVYYSTLLESHWTKSGENWIMMTKVYIFLIFMVLILPSLGLT
SLDFFFRWLEA---
SIRLECVFLPDQGAFFVNYVIASAFIGNGMELLRLPGLILYTFRMVKNVQNQAFEYEFGAMYAW
MLCVFTVIMAYSITCPIIVPFGLIYILLKHMVDRHNLYFAYLPA-
KLEKRIHFAAVNQALAAPILCLFWLYFFSFLRLGLKAPLTLFTFLVLLLTILVCLAYTCFGCFKHLS
PNYK----------QQQTY---
>Bos_taurus_F1MY22
LQGLPFGGVPTVLALDFMCFLALLFLFSILRKVAWDYG----RLLDADTS-
VSSSVNGFCSWLTAIFRIKDDEIRDKCGGDAVHYLSFQRHIIGLLVAVGVLSVGIVLPVNFSGDLL
--AYSFGRTTIANLKSGNNLLWLHTSFAFLYLLLTVYSMRRHTSKMRY----------
KEDDLVKRTLFINGISKYAES-
EKIKKHFEECTVLEARPCYNVARLMFLDAERKKAERGKLYFTNLQSKDNVNPKPCG-H--
EQVEAIEYYTKLEQKLKEDYKREKEKV-
NEKPLGMAFVTFHNETITAIILKDFNVSSSLHNWTVSYAPDPQNIYWEHLSIRGFIWWLRCLVIN
VVLFILLFFLTTPAIIITTMDKFNVT----------
KLNNPIITQFFPTLLLWCFSALLPTIVYYSAFFEAHWTRSGENRTTMHKCYTFLLFMVLLLPSLGL
SSLDLFFRWLEA---
AIRFECVFLPDNGAFFVNYVIASAFIGNAMDLLRIPGLLMYMIRLCRNVRHQAYEFQFGAAYAW
MMCVFTVVMTYSITCPIIVPFGLMYMLLKHLVDRYNLYYAYLPA-
KLDKKIHSGAVNQVVAAPILCLFWLLFFSTMRTGFLAPTSMFTFVVLVITIVVCLCHVCFGHFKYL
SANYK---S----SGDEPPS---
>Botryotinia_fuckeliana_A6RS77

SSGSSLSGLVATLVPTFILAAVYFVIFLIL--RRSNVRWYAPRTYLGAE-
EERTKPSGWFNWIGPFRKIPDIYALQHQGLDAYLFLRFLRMTVVIMFVGCCITWPILFPINATGG
G--G-
QQLDILSMGNISSGRDRYYATCFVGWIFFGFVLFLVTRETIYYVNLRQAFLLNPTFANRISSRTVL
FISVPAAYLEEGKLRKVFG-
SAVRNIWIAADSEKVDELVEKRDEIANKLESAEVKLIKTANKERPTHKLYGKKVDTINWARSELE
TLIPETEAAQSTYLETKKVGSVFIEFAHQSDAQIAFQTLAHHQA-
LQMSPRIGVHPSEVIWGSLTISWWQRVVRRFAVVGFIAALIVFWAIPVAAVGLISNVTYL-
EQFSWLSWLKDIPWIMGVVSGLLPSVALSILMSLVPIIMRLCARLSGEPTTARVELFTQNAYFAF
QVIQVFLVVTIASSASSVLYQLINNPTGILSLLANKLPSASNFYISYFIVQGLTVAAGVISQVVGFFV
FKILYKMYQWTSLSAISWGSTLPVFTNIAVIGITYSCIAPLVMGFATIGMSFFYLAYRYNILFVTDT
QIDTKGLIYPRALQQLLTGVYLSELCLIGLFAIGKAWPQMILMIIFLVFTALYHISLNAAMDPLLSTL
PKTLEAEENLYDDVTARNAYYPP
>Botryotinia_fuckeliana_A6RVV4
RAQLSQNSIYASFGTSIGFTLLLAIGFSLL--RPYNSVVYAPKLI---
DDKHAPPPKGPLAWLGPVLKTKETELVNLIGLDATIFLRVLRMFRNMFLCITVVGCGILIPINMTK
G----TDFVSRVTPVNVWG-S-
SNWGMTICAWLFDLIIMVFLWLNYRAVLNLRRTYFESADYQASLHARTLMINDIPKTLRTDEGIG
RVIDVSSFSRTVVARNVKELPELIEQHDQTVRDLEGYLARYLKDPAPKRPECTPRGQKLDAIEY
LTARIKELEMEIKEVRLSV-DNRPLPYGFASYEAIDEAHGIAFAARKKHP-
KGTTIVLAPRPNDIIWQNMPLSRQTRKRKRIMNNIWVTLLTIVWMAPNALISILVSLPNLGSVWPA
FQTSLAQHVWWSIVQGVASPAVTSLVYLVLPIIFRRMLVKAGDRTKTARERHVTGKLYTFFVFN
YLLVFSIFSTVWTFVSTVVNKTNDLGLLVFISLCDISPFWVTWLLQRNL-
GAAVDLAQLWTLVWSFCARKMIELTAPPAFDYASYYNYFLFYTTVTLCFGCIQPLVIPAAAMYFS
LDVFLKKYLLLYIFITKTESG----------AILANLVVFLSTWVHG-
HMEAYAVIPLPFLVIGFKWYCARTFDDKIHYYSVRNML--GS-KGDRLASRFGHP
>Brassica_campestris_A8IXK5
----EFESFLVSLGTSAVIFVVLMLLFTWLSRRPGNVSVYYPNRILKG--------
RNPFAWIREAFTSTEQDVVKLSGVDTAVYFVFLSTVLGIFALSALLLLPTLLPLSATDNSLKTFSQ
LDNLSMANITRRSSRLWAFLGAVYWVSLVTYFMLWKAYKHVAALRAEALMSSE--
VLPEQYAILVRDIPSGETQKEFVDSYFREETFYRSLVVTENSKINKIWENLEGYKKKLARAEAVF
AATSN--RPMNKTVGERVDSIDYYTKLINESVAKLEAEQRTVLKQ--
QTAAVVFFTDRVTAALAAQSLHCQMV-
DKWTVTEAPEPRQLIWENLKIKFFSRIVRQYLIYFLVAITILFYMIPIAFVSAITTLGNLQKALPFIKPI
VEIAFIRTILQSYLPQIALIVFLAMLPKFLMFLSKSEGIPSQSHAIRAASGKYFYFSVLNVFIGVTLA
GSLFDNLKALRRNQTPIAYRLATSLPKNATFFLTYVALKFFVGYGLELSRIIPLIIFHLKKKVKEAW
YPGDLSYATRVPSDMLILTITFCYSVIAPLILVFGVIYFGLGWLILRNQALKVYVPSYESYGRMWP
HIHTRILAALFLFQLVMFGYLGAKLFVWA-TLLVPLIFISLIFGYVCRQKFYKGFEHTALEVA-CR----
--EVFRAYIPY
>Brassica_juncea_A9LIW2
----EFASFLVSLGTSAIIFVVLMFLFTWLSRRPGNVPVYYPNRILKG--------
RNPFAWIREAFTSTEQDVVKLSGVDTAVYFVFQSTVLGIFALSALLLLPTLLPIAATDNNLETFSQ
LDNLSMANITKSSSRLWAFLGAVYWVSVVTYFMLWKAYKHVAALRAQALMTSE--
VLPEQFAILVRDIPSG----------GDSERINKIWEDLEGYKKKLARAEAAFAATSN--
RPTNKTVGERVDSIDYYTKLINESVAKLEAEQRTVLRQ--
QTAAVVFFTDRVTAALAAQSLHCQMV-
DKWTVTEAPEPRQLIWENLKIKFFSRIVRQYVIYFLVAITILFYMIPIAFVSAITTLANLQKALPFLKP
IVDIAFIRTILESYLPQIALIVFLAMLPKFLMFLSKSEGIPSQSHAIRATSGKYFYFSVLNVFIGVTLA
GSLFENLKALEEKPNSFITLLATSLPKSATFFLTYVALKFFVGYGLELSRIIPLIIFHLKKKVKEAWY
PGDLSYATRVPSDMLILTITFCYSVIAPLILVFGVIYFGLGWLILRNQALKVYVPSYESYGRMWPH

IHTRILAALFLFQLVMFGYLGVKIFVWA-ILLVPLIFISLIFGYVCRQKFYGGFEHTALEVA-CR------
EVFRAYIPH
>Candida_albicans_C4YKA8
SSNSSVSQFLSTLIPTLVISVVFLLAFIVI--HSKQRRVYEPRAVVESD-
DLRTETKGPFSWLTYLLAKPRTFYIQYAGTDGYFFLRFLFEFFCVCVLGAVITWPILFPVNATNG
N--NVKGFDILTFANI---
KWRTFAHVFLSWILFGAVIFLIYRELVYYVTYRHALQTTPLYDSLLSSRTLLLTEISTEYLQDDKLR
GYF--
PTATNIWYSRDYKKLQKQVKERTKLANKYEGTLNKVLTKAVKKRPTHKLIGKKVDTLDYSPEKL
GELNKEITKEQTEYQTYDQLPAVFIEFPSQLEMQKAYQAIPYQPD-
FKGVKTINAAPEDIIWENLQLTSMKRRIKSIIANTILTLLIIFWCIPVAVVGSISNINVLTDKVPFLKFIL
KMPVIMGVITGLLPVVALAILMSLVPPFIKWMGKISGRLTIQQVESYCQSWYFAFQVVNVFLAIAL
GSSAAAVATQIVQNPGEALQKLSSSFPKSVNFYYSYLCLQGLTISSGVLLQIVALILSHILGRKWT
WNTLGQPAYSTLYPGFQLLTVIALSYSVIAPLILGFTAIAFILFYFAYIYTMIFVLRSTVDARGTNYI
KSLFQLFTGLFLAQLWITAIFVFSKNWACVALEGVIVVVTIAARLWMKWKFLPLVDAVPISAIKYAI
EYHSDFIRHAYDDP
>Candida_albicans_Q59MD1
HSVGPQRVFTTQLVLTLIAGMFSFLLFCMLRFKWPH--IYAVRTR-----------
NNLFGWIKVVYKITDEEIIACSGLDTFVYLRFFKMGIKIFLILSISAIFVLSPIRYYFTGNYD-ENIM----
-T-YDFPSFYWVYPIFTYVFSIVVFYYLFEFTTTILRTRQKYLASQ---
SSITDRTIKLDGIPKRLLQREKLKKFIEDGKVLDVKLIYNWTPLEDLLHKRQELMNNLESM---------
AVNP--Q-----NELANKYTQELIELDGEIKHMQGK--EFKQVPSAFITMDSVASAQMAAQTILDPRV-
YKLIASLAPAPKDIIWENLKLTYFERKIKSYFITLVIVLSYGFIIFLVIPLTSLLDLKTISKFWPALGEFI
GQSWLTTFVTGILPPLLFTLLNFSFPYFYQYLSQLQGYTSNSDVELSTLSKNFFFIFFNLFLIYVA
AGTFWDYMSYISDT-
TKIAVQLATSLRRMALFYVDLILLQGLTMFPVKLLQVSDFFLFYFKRLYRSYFTPQIFDFGINLPQ
HILIFMIILIYSVVSTKIVTCGLIYFILGLFVYKYQLVYNFVHPPHSTGKVWPMIFRRVILGLIIFQLFM
CGTLALESAILLSILCTPLIFITMIILWNFEKYYVPLNTFIALRAINPYTLDEEREEFTDYTYP
>Candida_albicans_Q59TM5
SSGIEFSVLMKTLFTSLCFCTIQLTLFCLL--RPVFNYLYQPRCF--CI-
NERMETREFFKWIVPTLKCSINTYL-SLGLDAYFFIRFISVLSLFFLFIGTLNMVILIPINYTGSS--
TAFGLDKLSLSNI-
TNVSRLNAHFLMGLITIGFFHWLIVYEFQSYVIIRQSYLLSQPHKDSVMAKTLLISNVPPYLQNHE
VLKTIFQVGGIKDIWDINEFEIIDHQVEIAQDALHYLEKSQVLGLKKYYIRIPQIERFQKPIPMYEWS
LQTLSECNQKIDEEKLKLAQLAKHSKIFIEFTSQEGSYIAHQCLLSQSQ-
GFLDKTIEINPNDIIWRNVRNDGIACKFEKYLVTIAFISIIILYVIPVSLIGLVSQIPLLTQLLPFLEWIY
QFPEARETIAGFLPSILLGVLTEIVMIIFRFLTYFKGRTTGCEVEIDLQKWYFAFLFVQQFLVVTISS
SVTVILKQIIDQPTSIPVLLATNLPKSATFFFQYISLRAFAFCGNNFLRISPLIQSLIVCKKFNITNLP
KIKWGTTFAVYSIYACIGISYSIISPLISIFIIFFLNLSILYYKYALKYVYHNESETTGRLYPTALLHLYT
GVYCLECCLIGVFFLSKGW----IMTGILILTIFANTIIYNRYIPHFSNLPILSDTFK-
DTCYSNHKLLYLHP
>Candida_albicans_Q5APG0
PSSVSTSTIISTLLANLALFGVFVGCFIVL--RLKFKRIYSPKSSFDLE-
EKKPEPKDPFRWIFILLTKPDSFFLQQAGLDGLVFLRYIKTFGTLFLCALL-MYIILLPVNATNGN--
H-KGFDQLSIANV---
PRRYYAHVLMGLVFNGIVIFVIYRELFFYNSLKNAVLSSPKYAKKLSCRTVLFQGVPDSLLDEKQ
AFKIF--
NGVKRVYVARTARELEYKVEKRAAMVTKLENAENKLMKMAVKKRPKMKVFSSKVDTIRHCQE
QIPILDKEVKKLQKKFRHSMPLNSIFVEFENQYYAQLAYQSTVHHNP-
MRMSPRIGLEPKDIIHSNLRMFWWERITRRFLAFAAIVALVVFWAIPVAAVGTISNITFLTNKLPW
LRWILKMPALLGLVTGLLPTILLSLLMFLLPIIIRVFARISGEISAVGVEKWTQNAYFAFLMVNGFLV

TALASSATATITEIIDKPTSAMSILANKLPLSSNFYISYLVLQGFSIAGGSLFQVVGLFLYYILGTKW
NFSGLGTVAWGTVFPIFTQLASITLAYSIISPLILVFAFASFFLVYVAYAHNITYCFVEGPDAFGSH
YPRALFQTFCGIYLGEIVLLGIVVVGKGWGPIVIQVIVLLATIFAHVHLNLAFDHLLDVVPLDAMRA
VIV----DNKHAYDAP
>Canis_familiaris_E2RBB2
LQGLPFGGVPTVLALDFMCFLALLFLFSILRKVAWDYG----RLLDADTS-
VSSSVNGFCSWLTAIFRIKDDEIRDKCGGDAVHYLSFQRHIIGLLVVVGVLSVGIVLPVNFSGDLL
--AYSFGRTTIANLKSGNNLLWLHTSFAFLYLLLTVYSMRRHTSKMRY----------
KEDDLVKRTLFINGISKYAES-
EKIKKHFEECTVLEARPCYNVARLMFLDAERKKAERGKLYFTNLQSKENVNPKPCG-H--
EQVEAIEYYTKLEQKLKEDYKREKEKV-
NEKPLGMAFVTFHNETITAIILKDFNVSSSLHNWTVSYAPDPQNIYWEHLSIRGFIWWLRCLVIN
VVLFILLFFLTTPAIIITTMDKFNVT----------
KLNNPIITQFFPTLLLWCFSALLPTIVYYSAFFEAHWTRSGENRTTMHKCYTFLIFMVLLLPSLGL
SSLDLFFRWLEA---
AIRFECVFLPDNGAFFVNYVIASAFIGNAMDLLRIPGLLMYMIRLCRNVRHQAYEFQFGAAYAW
MMCVFTVVMTYSITCPIIVPFGLMYMLLKHLVDRYNLYYAYLPA-
KLDKKIHSGAVNQVVAAPILCLFWLLFFSTMRTGALTGGLAFTFVVLVITIVICLCHVCFGHFKYL
SANYK---S----SGDEPPL---
>Chlamydomonas_reinhardtii_XP_001695096.1
----------MRLRPWAKRFFGPRRYAKD--------
TVLMGWIKPVMLYKEEDIIDEVGLDAAMYLRVVWFGMEVFFVLTLVCIPLTLPPNMTGSEIARFT
NFDRYSLSNVSPGDEVMWCHMVAVYISAIFVLWRLRTYNLQSVYLRLLFLGNAK--
RGGPSHTVLVTDVPYQ-----
MVAREFALYNIAAVNMIQDTSALEPLVEEYNQVMQSLEMAKLRLKLRKA--
LPVAEALDVKVDAVTYWLAKLKYLRERIRTEQAVA-RK-
LAPSAFVTFNTRMAQGVASNSLHAHDE-
TVWRISGAPAPNEVVWRNLPMTHPVRSGRLYILWILFWLMALFFMIPISAIQALIEVPKLAS-
VPVLGDIVTAPVISQLLQAIIPGLVLKIFMAIVPHILWAMALMSGATSMSEIDFGVVSRFFLFQVIVV
FFGCIIAGSFFNQLKQWVEDPASVISTLGKSIPMTATFFITYLFINGLGAKSIAFVRLPGFIIFWILS
KRERMWMNQSARYGILVPDHTMAMLLGLVFCCMNPIVCPAALAYFIVASVGERYNFIYVYRQP
YESAGRMWKTVYNQIMVGLYIMLLTMFGLLAIKKFKWVF-
FLLPIIAAAVISHMATLSLYSRPWSVTALHDAAEMNSAEKKEIADMYRNP
>Chlamydomonas_reinhardtii_XP_001698593.1

PMLAISDADIIRSNGFDALIMTRILLIGLQMMTLMTVLGVGVLIPVYYTRGK---
AGVLALMSISNLEKKSKIL-
VPFFFTYAFCIVCCFVLWINCKCYVQLRNAYFLCLATSAGAAAWRRLAQPLPLAAEADPNVAAQ
LTRGSFLGLVPVANHDEADKLIYEWDMAMQQLGERAAAASSRLA----------
KLRADVEKQQAQVVELEVRIEEARQRA-
AQPTGYSYFALFNSSQDAQLLAQCRRVVPPGASFDVMPAPAPDDVNWSALVTRGWERALRG
TVFWIPLVITF---LIPIGPLQGATGAGSSSTNGLWW---
CETMLLRAIVTGIMPSVIGFLWTFAMPQFLFFASNRRRPVSLNGVEREIQAWFWWYALLNTFIG
AVLGGGIFSQVGTFLEEPGNMLQRVGTGVVNTANFFIQLVIARALFTNCLKIVFPHGSMFTSMF
RSSAFIHQPPSLRSATLYNSMMSVMLFGFAYAVISPIILPCCWFYFLTGFISYRYNLVNFYERGY
DSGGRMWPALFGQLVGLLVVLEVLTGTVLLTNQSWELAAVMGTLTPALAYFWASCNRTYLEPL
KHPPLLVA---REPQGSVDPLVY---
>Chlamydomonas_reinhardtii_XP_001699063.1
RAAGGVGPAADGCAIFGATCPALVRLLGA----------
LSYLPPVTILRPAVLVPGP----------WCFA-------
LLWGNPVLPCAAGLLTLGTAVRCWEALAAVRQLVASKPG------KRSVLRPILPI----------

ADMARVP-----PELQSGPDAAAQFSALLASATLHAPGGAASAPPAPG-----
AADVPLLTLTVKQLAPAYDALRVR-------HLAFIAYSGAAPPAEAIHALR---
AALLWALVWEPRHKEPLW------------RLAVNGFTGFGMLAAWAAPCTQMTA--------GARVWD-------VVAEALRDVMPGLSQAVWIVCLAAVAALEYGQRLYACRDAADRTAE-----
VAVVRRIGVEVIADF-WSRLAAFVGSA--
VYGVRPVRVDLHLRTHLEVLYEQGLVLGPLAALRLWGLLQFAVRYGRARLLAAPPLTFAATVPS
HSIALLLGLVFSCVNPLVLPAAAAHFLLSGLLERHSHCYVWAREYESGGRMWSQ----------
>Chlamydomonas_reinhardtii_XP_001699584.1
QYQVSDNQVLDSLYINMVWGGLCMMGFMILRGWLK---VFQRRQ-
LQLPPLRRPPAKQIWNWFSPLLSVSDADIIRSAGYDALVLTRVLQIGLQMFTFMAIFGVGVMIPIY
YTGAGLA-LGDLSRISLANLIPGSLVL-VPFFFCYLFSAYGCFVLWINCKGYVQLRMSYFLCLA-----
-YYALFYNTVPYEQVDLDD-----
EDVDPDGVVPVIDHDSVEKLIAAWDRAMWALTAAGCRKVKRVP----------
EDEMNLLKVTVKALEGQIEEERARV-RVPLGTAYFAFFNCSQGPAMLL----------
SFTAEPAPAPDDVAWPNLSTRPWQQIPRQLGALLLLSIIF---LIPIGAVQGISNLDVALTNQLWF---
CNPGIAKSLVTGVLPSVLGMVWSVVMPHLLFMCSSSRRRKSLSAQDREMQAWFFWYSLFNTF
LGAVLGGGVFSQIGVYLKDPSSLLEHIGKALPSTANFFIQYVIARAVFNNTLRFIWPHGQMLAAII
RTAAFAHMVPSARAATFYNVILQIFMFSSAFAVAAPIILPCAWFFFLTGFFAYRYSLLYIYERSYD
NE----------AWTPGIVLCTLTPALVVFWRFCDRAYLKPLHHPPLLVA---
REPLGRVDPLVYMPP
>Chlamydomonas_reinhardtii_XP_001702312.1
----------QTVTRVLNSVIFMNGTLNGNSTIR-----
VSILANATLVINGTFLYPGSNNTETDLFTDFDKYSLSNVEAGSPKMWAHLVSMYVVVIYAMWLIT
RFNREAVLLRLMFLGNAK--RGGPSHTVLVTDVPGQ-----
MVRSEFELEDICVVNMVQNTRALQPLVDEYNKVQQSLEMLQLRLKLRKK--AEPQL-
WGKKVDAVTFWLDRLRYLKEQVLLQQVKA-NK-AAPSAFVTFKCVTG----------
GGAPAPFEIVWSNLSMNIHEKSSRVVGLWVVFWLMTLFFMIPVTLIQAMIEVPKLAT-
VDGLGPIVTAPVIKQLLEAIIPGLVLKIFLAIVPIILKAMAIMSGTTSLSEVDFGVVKRFFLFQVVVVF
FGNIIAGSFFNQLTQWVEDPASVIPTLGKSIPMTATFFITYLFTTGMFVKTLQFVRLPGFVIYWLL
NAKDRLWMFQYTDFGRTVAEHTTAMLIGIVFSCMNPIVCLAAWTYFLATYLGERYNNIYVYRRQ
YESAGRLWGTVFGQVMVGLYIMELTMLGLLAIKKFKWTP-
LAIPLVIITIGFHISNSRIYNKPWSVPAL-------AEEANEVTKLYKNP
>Chlamydomonas_reinhardtii_XP_001702326.1
--AAGSSSVLSSFLLNLYICLGCFGAFAWFRVTPWARRFFSPRRFATD--------
NGWVSWILPVIRYREEDIIDEAGLDCAIYLRILRFGIFLFLGASLWCIIAVLPVNMTSGEIDRFTDF
DKYSLSNVEGGSAKMWVHAISVYAVVLYTIWLLSRFNRESVLLRLMFLGNAK--
RGGPSHTVLLTDVPGQ-----
MIAREFALTTVSAVNVIQDTGGLEPLVEEYNKIREELEMLQLRLKLRKK--AEPKV-
WGKKVDAVTFWLDRLRYLKGQIIEQQAIA-KK-VAPSAFITLKTRQAQAVSSNSMHHHNV-
TTWRVQGAPAPFEVIWKNLALTLPIKSGRNWILWAAFWAMTLFFMIPVTLIQAMIEVPKLAA-
IPVLGDIVTAPVVKQLLEAIVPGLALKVFLAVVPIILRIMAIQSGATSLSEVDFGVTSRFFLFQVVVV
FFGNIIAGSFFNQVTQFVKNPTGVFNILGKAIPMTSTFFITYVITNGLSVKSLAFLRLPGFVIFWLL
SKRQRMWMYQYTDNGTTVVDHTIVVLIGLTFCCINPIVCPAAMAYFLVTSIGERYNNIYVFRRRY
ESAGKLWKTVYNQVMIGLYIMQITMLGLLAIKKFKATP-
VLFPLLFFTIGCHISTLSLYRRPWSLTALHDAADLTPAEQREIADMYKNP
>Chlamydomonas_reinhardtii_XP_001702328.1
----------LGLFTLFTIVRVRPWAKRFFAPRRYARD--------
SFYLGWVKPIMLYKEEDIIDEVGLDAAMYLRVLWFGMELFFMLTLICIPLVLPTNMTSGEIERFTN
FDKYSLSNIPAGSAKMWAHVVALWLVTLFTMWRLREYNLQSVYLRLLFLGNSK--
RGGPSHTVLVTDVPFQ-----

MVAQEFALYNIAAVNMIQDTTGLEPLVAEYLKIEQSLEMAKLRLKLRKA--
LPMKIRALAKVDAVTYWLARLKYLRECIKIQQAVA-RK-
IAPSAFVTFNTRMAQGVASNSLHAHDE-
TSWRIMPAPAPIEVVWGNLMMTHPVRTGRLWLIWVAFWAMTLFFMIPVTLIQALIEVPKLAS-
IPVLGDIVTAPVVKQLLEAIIPGTC----------
RVVVVFFGSIIAGSFFNQITQWVKDPASVISVLGKSIPMTATFFITYLFVNGLAVRSIQFVRLSDFV
VFWILSKRERMWMNQVQFYGKTVPDHTIAMLLGLVFCCMNPIVCPAALAYFLVACVGERYNVI
YVYRPQYESAGRLWKTVYNQIMVAIYIMLLAMFGLLAIKKFAATF-
LLVPLIIGVLLSHLSTLTLYSRPWTVTALHDAAEMNSAEKKEIADMAVPP
>Chlorella_variabilis_EFN53534.1
--ATSGKSLAITAGIYAIIALLVFIFFSWWRTTKLTRKFFSPKLYTPG--------
ARFGAWVPKVLYMSEAEVIRCGGVDAAMYIKILRMGVEIFLIVSFFVLVIILPINCTGSEVDNFTSL
DKTTISNIPPRSPRLWAHAVITWVVSFFVYMCLWKYNKEALRLRIFYLLNQP--
PGAESHTILCQDVPGDGSVGAMVEEEFRKEDLAAVHMVHNTSALDPLVAEYEKLRLACTNYISL
KRRGKE--MAPKK-WGVKVDAFEFYRDRLTELRRAIHEEQGKAQSN-
VFPSAFVTFKRRTSQVVGARTLMSEDL-
SAWRCQAAPRAEEIVWGNLGFRIWERSGRTLAMYGLYVAGMAFFMIPVAAVQGLLSMNSF-----
-
LDFVNSIPIAGAFLTGMLPGLALKIFLALVPMFIVMMNKFAGMVSQSQIDLGLVSRYFYFQVVTLF
LGSFIAGTFANQLNQFINDPSSIITIFGTSAPQTAIFFLTYVLLEALLTGSLTLMRLVPLIIFWVKSRK
ARLWQNQLMAYGVLVPNDTMAFLLCLTFCTICPIIAPVGLLYFMVNYMVWKYQQVYTYTPTYQ
SGGLVWVRVFDQCMLGMVMFHLLMVAILGLKKSIGAPIFVLILLTFDFVFWVAVHKRFWRPQEC
LSLISAADMGKELDQEVSDRYLSP
>Chlorella_variabilis_EFN53692.1
GETVTASEVVTSIYVSAVGGACFLICWAIFRKPLR---IFLKRTLAQ----
ARPPPNICFGYIPPVFFINDLEFVQTAGLDALILCRFLVLGFQIFLPMTIVCCAVLLPLCMTGTYVD
TLVGIMRYTLSNIQPGSSKLWAPFVLSYAVLAWTGYCLIQHYKSYAMLRLLH-----
VWVCVEQYSVLFTIAPPGKGAEFVLAQALQDDSFTQLVRVYNHKAVDKLLSQHEAAASHRDGK
AAKAAARLE----------RAEAELAKAEERVGELEGQVEVARQAA-
LEQPLGTAFILFSDQTSAALAAFVQAS----------FVPAIN----------FNRMLRALYVIPFLVLVI---
VFPIGVLTGLTNLSTAVTNNLWY---CEG-------
AGLLPSIISMTWTYVLPMAFFFSSQEARHLALSDLDHRVVILFFCFDIFNTFLGSVLGGAVFQQIG
SLTKEPGYWLQMLGAALPSASTYFLNYIIIHALCTNFFRFIWPHEGTVLFVIFRHTMIRTAPSFRG
GRHFGSFQLIMAMALSYAVIAPLVLPAALGFFLTAWVTWRYCCIYFYERSYESGGRIFETLFTLM
VWTLVLFSLFTSLVLASKKSYTASLILFTQPPLLLVYHRRVSLAIGHYARLLPLATL---
SAPRATPDPAAFLPP
>Chlorella_variabilis_EFN54682.1
STAISGENLITGMWVNLILGCLCYLGFVLFRSMRG---FYHARLLVS----
RKPPQQRLWGWLLPVFGVTDEELVHSSGLDALIAVRIISFGVTLFLPMTILGTAVLLPVNYTSDY
YTQTSVFMRMTISNIRQRSPLLWIHFTFVYLNVFWASWLIIEYYKAYIALRQTYLVRCALAVNASL
FTCLVMDMPLYAMYNKRATEMFSEADFDSIIPIYPTASVDKLAHKWDSKVAVLERHHAKRCAKL
K----------QRAGSNLLACKHEKEGLGDIAAERDAV-SDLPSTCFFATFKSQQAAAIASQTNLN--
PIMLFSVHPAPRPDDVNWPALQRSWWQRTMRPLYALPIILFFM---
LLPIGMFTGFAQLTVALPASRWY---CSD-
FMRNALTSLAPSIVLSIYMVFLPVMVYYAAQEGQHVSLSALDRRCADLFFYWDVFNVFLGALFG
GTVLAELKTFLQDPSYIWSALGSAIPAASNFFINYVMYRALVMSAFRLLYPHQAIMPAILKWKLM
EVPPRNCRYGRDIGIPVLMFVMVCSMCITSPLILPFGLLYFVGLWAVWRYQALYVYQRQYESG
GQFWPLVAHKVVGCQFIMVVFTACVLLFKGGYTQAALLITLPIYLLRFDNYLTKRYDDLVRQVPL
AVH---SAGRSTVPSDIYTPP
>Chlorella_variabilis_EFN57874.1

AETLTSRQLAAAAVASAVGGAFFLALWAFVRGPLR---IYQKRTILH----
ARPPPHRCLGFLAPVFLLTDAELLQTAGLDALMLCRFLALGLQVFVPISALCCAVLVPLTRTGTA
VEDTAELMRYTLSNVEEGSPKLWAPFALSYVVLGYTGYVLLMHYKSYALLRLLH-----
VWAQASQYAVLWTVIPPGPEADAILARSLKEQSFSRLVRVHDHLAVDRLLAKHEDAATCRDAS
AARAAARLA----------RAEAGLAKWQGRVEELEQQIVAARQHA-
LARPLGTAFILFRTQAAAMMAARLESS--
VLPNFSVQLAPGPDNINWPALWTPWLQRVWRGLAVIPLLAVVM---
LFPIGTLTGLSNLNTAVTNKLWY---
CQSALMKELLQGLLPAILSTCWTYVLPLAFYFLAQGQRHLALSDLDRRITALFYCFSVSNTFLMS
VLGGAVFQQIGSLVTNPTKWLQLLATALPSASIWFMDYLVVHALAINVWRFAWPHDGTVLFVLF
RRCMIRSTPSLRSGRHYGAFLLIQIMALSYAVIAPLLLPMAAFYFLTAWVTWRYCVLHFYERSYE
SGGRIFEILFTLVVWTGVLFTLFSSLVLASKKAWSPCLLMATQLPMLYVYHRKVQLSVGHYARV
VPMSTL---QAPKVEVDPATYLPP
>Clavispora_lusitaniae_C4XX35
NSSTSASQLLSSLIPNLIIFAVFILGFVLL--RKKQARVYEPRYTLETK-
DLKPAESGLFAWVSNLLKRPQQYLIQQTGPDGYFFLRFLFEFAFICLIGCFITWPILFSVNATNSN
--H-KQLDMLAIGNV---
KQRYYAHIFVSWVLFGMVIFIIYRELVYYTTFRHALQTTPLYDSLLSSRTLLLTELPESAMTEADL
RTFF--
PTATNIWYARDYSKLEKLHKERAKLAKKYENALTSVLTKAVKKRPTHRLIGKKVDTLDYGAERL
GELNSEIKKAQGEHKTNLQLPSVFIEFPSQLELQKAYQAIPYNPE-
LKKCGRSGIAPDDVVWENLSLTSTKRRTKKVLANTVLTVTIIFWSIPVAVVGAISNINFITEKLKFL
KFINNMPALMGVITSLLPTVALAILMSLVPPFIKKMGKVSGCLTIQDVERYCQNWYYAFQAVNSF
LVVTLASAAISSIQSIIDKPDTALKLLAQKLPKASNFYISYLCLYGLSVSSGLLFQMTALILAQFLGR
KWNYSSLGSPFFSILYPAYMLVSLIALAYAIIAPLILGFATITFFLIFTAFMYNFIYVLQNKTDARGR
NYPLALFQLFTALYLAEATLVAMFVFGKNWACVALEGFWILVTAVSHVYLKWKFLPLLDTVPISA
LKYAIEYNPEFVKTAYEDP
>Clavispora_lusitaniae_C4XXZ0
ASGTDFSVLMKHLLVSLCICLFEILCFSYL--RIYLKNLYQPLVF--SI-NAD-
DVQSVFGWLIPTWRKNTNDYM-RSDLDSYFFIRFIDLLLFYFSTCGILNFAILVPINFSGNS--
TATGLDKLSLSNI-
SKANRLNAHFVCTLVSIAFFHWALFREMQNIFEIRQVYLTSTSHKLKESSRILLVGDVPEAYRNID
KLQSLFKFGGLEEVWFTDDYTKYERQTEKAQDALDTFEEAQIRFLQKKIVKIPLLERFQKKIPILE
FCVQTLADTNDILLQRLQDIKDFDKKEKVILKFRSQESMHMAHQTLLSKEI-
WSFNHSTKVHPDDIMWDNVRKSTFFTSVEKYFICVISILAIALYIIPVSLITLLSQIPVIIKLFPFMIWL
ASTPQVREVLSSLLPAILLSILTECQLQVFQILVHWKGKWSGSEKELDLQQWYFAFLFIQHFLVV
SISSSLIVVVVQAVEKPASIPIMLAANVPKSATFFFKYLAVKAFAMCGGSFLQISRLTKHWLYYPK
KKLHDLPKISWGSIYPLISVYASIGITYCVISPMISLFMIFIFSLILLYYKYALDEVYHNPKDTFGMLY
PRALFHLYSGIYCLEFCMIGLFFASRGL----VMILVLLLTIFGNVYVHTHFGAHFEHVPVLNEEES--
---------YLHP
>Clavispora_lusitaniae_C4Y5W1
YGPSQSRVFRTQLALSLAIGLSSFLLFCFLRRRWPH--MYAVRTR----------
DDLFKWVGAVLLISDEEVLEYSGLDAYVVLAFFKMGIKIFLLLTALGMFVLSPIRYYFTGNYD-
DNVSWTTMAK-EEFPRYLWVYPLFTYLFSIIVYHQLFAYTKLVIKMRQKYLASQ---
NSITDRTIKLDGIPKRLIRKNDLKRFIEDGRVVDIKLIYDWSVLEDLFERRKQIISRLEHY---------
RVLPVIK-----RKKIDQGARELVEVDRKIRNIRNK--DIRILPSAFITMDSVASAQMAAQTVLDPRV-
YKLMVSLAPAAKDINWKNLKLSYYEKLYNSYMITSLIVLSYSVVFFLVTTLSTLIDVKTITKFWPAL
GNLISKSWLSTFVTGILPPLLFSLMNVSFPYLYRSLSQMQGYSSSSEVELSSLSKNFFFIFFILFL
VFTITGTLWDYISSIGDT-
TRFASQLASSLKKLSLFYVDLILLQGLAMFPVKLLQIGDFVLFFIKSLYRFYYTPPVFDFGLNLPQ

HILIFIIILIYSVVSTKIVTSGLVYFLLGFFVYKYQLIYSYVHPPHSTGKVWPMIFRRLIFGLIIFQLFM
CGTLALEGAILLSIICTPLFLVTMAVSWNFEKYYLPLHNFIALRAISPVTVDEEREQFTDYTHP
>Clavispora_lusitaniae_C4YBD3
AQGTSTSAVLSSLVANLILCGIFVGCFLVL--RLKFKRIYAPKSSFDLE-
EKKPEPKDPVRWIFILLTKPHSFIIQQCGLDGYFFLRYLFIFCLTFTGGIL-IWTVLLPINAVHGK--
G-NGLDQLSISNV---
RKRYYAHAFISWFFYGTVIYIIYRELFFFNSFRAAVLSSPRYAKKLSSRTVLFQSVPDAWLDEKQ
FFKLF--
NGVKRIYISRNIRLLNHKVRQREDMAIKLEAATSKLLKTAMKKRPRHKVFSKKVDSINYYRQQLP
LLDNDIYRLQKNYRKYRPKNSIFVEFENQYMAQLAYQSVVHHNP-
LRMSPVTGVEPGDVDWDNMRLFWWERITRKAIAVASITAVVIFWAFPVAFVGVISNINYLTNKIH
WLRWINDIPWILGVITGLLPTVMLSLLMSILPMFIRGMAKVAGAISAQEVEMFTQSAYFAFLLVNG
FLVTALASSATATVTRIIDNPSSALSILASSLPKACNFYISYLILQGLTVAGGALFQVVGLFLYYILG
KKWAFSGLGTVAYGTAFPQFTILAIITLAFSIIAPMILLFAAVAFALIYIAYCHNLTYVFVEGPDSRG
AHYPVALMQTFTGIYIGQICLLGLFVVGKGWGPIVVEAIGLGFTIFAHIQIKAAFNRLLTVVPIDAM
KSLIQ----DNKHAYEQP
>Coccidioides_posadasii_C5P9N8
QSAFQERAFWASLGTSLGVTFGLALLFSLF--RPRNSVVYAPKLH---
DRKHAPPPKGMFAWVTPIIKTKEGEMLDKVGLDATVFLRFTRMCRNIFLVLSLIGCAIMIPINVTG
SGG--LSTFTTMTPMYVTDQK-
VLWGHIACAWGIDAIAAYFLWHNYRAMCRLRRQYFMSTDFQQSLHARTVMVTHIPAAYRTDEG
LLRLTDQASIPRASIGRNVKELPDLINEHERVVKELEEILAKYFKNPDPKRPTCKPTPEKVDAIDY
YTVRIRTLEAEIRHVRESI-DKRAMSYGFASWESIENAHVVAFAARKKHP-
QGTNITLAPRPNDIIWENLALSKADLRRKRFMNIVWSTILTVVWIAPNAMIALLADLSHLGLVWPA
FRRSLDRNKVWSAIQGIASPAITSLVYLVLPIIFRRLATRAGKSTKSARERHVLHSLYAFFIFNNLI
VFSVFSAIWAFVATVIQEAKNFYVNVMTALCKVSPFWVTWLLQRNL-
GAAVDLMQLINMVWTFIARRAIEWTAPPPFDYASYFNYFLFYTTIAFCFASLQPIVLPVTALYFAV
DSWLKKYLLLYVFITKTESGGRFWRAIFNRMIFALILANFILGLVVKAKGSWNMVFALVPLPVLLL
GFKWYCRNTFDDELLYYHRAILS--KK-AAERLSSRFGHP
>Coccidioides_posadasii_C5PI64
NASNSASGLVSTLLPTLVISGAMLLLFVIL--RRSERRQYAPRTYIGAE-
QERTPAPGFFGWILSMLKLPDTYVLRHHSMDAYLLLRYLKIATSICLVGCFITWPVLFPVNATGG
G--G-VQLDILSFGNV--
NLSRYYAHTFIAWIFISFVFFMVTRENIYFINLRQAYFFSPLYSGRISSKTVLFTAVPDEYLDEARI
RKMYGEDKVKNVWLVPNIDQLLEKVEERDGAAFKLEGAETKLIKLATSERPTHRLIGKKVDTIN
WARGEIERLNPEIESLQEKLREAEHISSVFVEFYTQNDAQAAYQMLAHHQP-
LHMAPRIGLNPEDIIWSNLRIKWWELIIRNAATIAAVVALIIFWAIPVAVVGAISNINFLTNKVPFLAF
IKDCPVILGVITALLPSILLAVLMALLPIVLRLLARLGGVPTAAAVELRTQNFYFGFQVVQVFLVTTI
ASAASSAVTKIIQKPQEAASLLAENIPKASNFYIAYFILQGLTFSSGALLQIAGLVISKILGTMYKWS
TLAGMGWGTVFPVLTNLCVIAITYSAIAPLVMGFATIGLYLFYLAYRYNMLYVTNANIDTKGMVY
PRALQHTTVGCYLLIVCLIGLFAIGTALGPMILMIIFGVFTIIYHYSLIQAVTPLLNYLPKNLETED-
TYPPEIEKNAYYHP
>Coprinopsis_cinerea_A8N6F5
SQSNSTTAFVTALAVNAGLLAAEVGVFLIL--KTKLWRVYSPRAY--LP-
DKRADEGGLWRWFPALLRSPTKEIIQKNGLDAYMFLRFIKLLVWIFLAFTIVTFLVIIPADAVNIQS-
T-
TGVERISWSNVPRDQHRFAAHVIVVYVLTAFVVYMIHREMHHFVQLRHQFLLSPSHSKLAQSR
TVLITSIPEELGNEQDIKTFASFGGVDRVWLYRDTKTLNELFERRQELCELLEAAESALLKQATH
KRPMHRTVGTKVDTINWCKEEIAKINVSIAELRKD-------NS----------
EHKMDAHPKDIVWNNLDDGALEMKGRYITSWMATVGLIIAWTFPVSFIGTLSNLGELCTDVKWL
AWVCDLPVVRGLIEGVLPPGLLAVLFALLPFILQALAWYECIARYSLISVSVYKRFYFFLLIHGFLV

VTLTSGLTNVTQGLA------------------------------
GAGNALAQFVPLILHYVRKWAYATFMMPAADFGVVLPRLSLLATIAFAYSVLSPLINLLALLSFG
MFYIAWKFLFVQVFQDETETGGMYFPMAVGNLFVGLYIEHICLAALFFMRAAVVKAIFMLVLLGL
TAVAQLFMSNSFDHLIHYLPMSLATKK-----AADDHAFDHP
>Coprinopsis_cinerea_A8N733
SRTLAPEAVASQVALMSIVSIVTVLLFNLL--RPKNKIIYEPKVY---
EGNKPPPRSHLFGWLPPLAHTKEPELLDKIGLDAVAFLRFNRLLRQLFSGIVLLTGAILIPINVTYN
LKN-RDLLSMLTIRDVQG-D-
FLYAHVATTYLITILIMGVVWYHWTQMIKLRHQWFRSPEYLQSFYARTLQVIHVPKKYQSDNGL
KEIFDQYPTTSVHIGRKVGKLPELIEYHNQTVREFEQILVRYLKG-
GSKRPTIRIGGVTKDAIDFYTAKLKRTEAAIEEYRNQI-
DTRAENYGFASLAAVPYAHIVAQKLEGKHP-
KGTTISLAPNPKDIVWSNMNKTDGELARKKLIGVLWLVLVCFFNTLPLFVISALANMDA---------
QWFESSKTFAIVSGVLPATVSGIFGFFLPIVMRWLTKYMGALTYSRLDRAVIARYFAFLIISQLIIF
TLIGVLFNSVKEIIKAIGKLPGKIHTTYINQASYWLTFYPLRGF-
LVVFDLAQIINLVWLSFKTHIREWTQPPEFQYAVYYSNLLFMSAVGLVFAPLAPLVALAACCVFW
MGSWVYKYQLMFVYVSKVESGGRIWNVVINRLLFCVLLMQSLMVLTIGLQKRSLLWLSALPPVL
FIIAFKFYINAKFIPAFRYFTPTEEE--DH-KANKLEKRFGHP
>Cryptococcus_neoformans_XP_568337.1
LTQVSVRAVGSQFALMAAISMATLLAFSFF--RPREK-----KIY---
DYEPPPPPNGFFAWLSPMIHLKEEEIIANIGLDAATFLRFLRMLRNIFTITSIIVVALLV-
IDIVYNLKY-RNALSLLTIQNVSG-N-
WMWPALAASYVINIVAMYFIWFNWKAMVRLRKGWFRSPAYQTKIYSRTLMVTHVRKDFRSDA
GLLSLMDGPSIDCTCIGRRLEDFPKMVDDHNEAVQELEKHLVKYLKG-
GKKRPMIRKGGVKKDAIDYHAKEIKFLRDRIDAKRQAI-
DSLGENYGFVTFKTIAEAHRIARTHRGKLK-
EGAELQLAPMPHDIVWENISKEPAELGSKNTFGFIIIGIVCFFNTLPLLVVSLLANLSS--
TVYVTFADWKDAGWTFSMVSGILPSVVSALFGYLLPIIIRKISKYQGAPTRSRLDRAVTARYFFF
MIISNLVIFSLLGVVYTAIARIVVQVGGIPDQIQGTYVQQST---------CF-
LVIFELIQLIKLAMVSIRRFIREMTKPPYFEYAIVIVNLLFITAVGLIYAPLAPLVAMGACCVFWFSSV
VYKYQLLYVYISRAESGGRMWNVYVNRLLACCVLMQLLMVLTTGLIRRWIDCVAAAPPLLLIIAF
KIYISRTAERQFRYYEASPEE--PT-KQSEVENRFLHP
>Cryptococcus_neoformans_XP_568344.1
NYTAAYSGLLDNFYLTVAIAGACLVGYEITRKDPGSREIFQPK----------
RWPLAWIGTALKFREQDMPAKCGLDLTLHARFLRGCFFYTLLQTLIIMPILMPLHIFYS----
STSMLRASISSLSSGSRWLWVHALLIWWVSIWTCTVLWITWGGLAYRRREI-----
CEGIKRFRTVMVLNIPPDMRDENVLQDYFDHSSVEDIVLVRKLGVLINLRSRREEVLKKLEIAHT
ELAKRVLHSKPLS----QNPPLIDYLTTKLAYLTHLLTESLSK--
SYATASTAFVTFRDAKTARLVLKILDH--
PKRACKTVPAPDWTDLLWPRLKSVYRSEFVRGWAVYLGVWAFTLAWIFPVSLLCALASLTNIA
GFIKPLKAFLDNNKAASAITSLAPVILVALLLAICPILLVIANKAETIMTRLGVHNSVLERFWKFLMV
NGVVFFAIGQSAIEAYLAFQTN--
DFLPIVASAFPTAAPYFASYILLQVAIQPFFEVFRFGPAIVYVFGTRRRSRTQYPTFSHFSQLPQQ
LLAGAIMHLFMLLNPLVIAFALVFYGACYLVWKRQFIYVYGRLYEVNGR---------
RSCIRIQRYSMDALAYAKGHAIATGVLFALTLISKIM-----------------------------------
>Cryptococcus_neoformans_XP_568746.1
VQTSTTSSFVAALVVAGITVGAFSALWLVLHGRKDLQRVFQPRTI--LE-
SKRPQPSGIIAFWKTLIQTPDQDIITSNGPDAYFYVRFLKVFFQMLIPYEILTCAILIPVSVISPNQ-
G-
TGLNKLTFGNVETDQIRHVAHFLVAIVLMSWTVYLIWREYNHFVDVRQTWLTTPQHLSLARART
IAITNIPDSLNSSTGIKELAGVGGVRRVWLTRKCKNVEKVWKERDAECARLEGGVAKLQKRAAK

KRPSWKQIGQK-
QNLETSPDYIHEHNVKLDELREGIEDLPQGNTAFIRFSSQFEAHAFAKLASKTDK-
SNMHIRIEVVPEDIEWSNISMSPWERHARTIVSWCLTVGLIIVWAIPVAFVGMISNVDTLCANAS
WLAWICELPAALGIIKGVLPPALLAVLFMLLPVVLRLMVKMQGEIRKSDIELKLFSRFWLFQVIHG
FLIVTLASGLINALGNLGDTAGEVPTLLATKLPGASIFFLTFILTATLSGAAKTYARLVPWIMYLLR
DIVYLKYKMDSFTWSTAFPPTCLIICVTIVYSVIQPIITVLALVAFILLYCANKYVIHWCAQDAAETG
GLYYIKALRTVFVSLYIQGVCMAGLFFLSTGLGCGAVMCVMIVCIAVIQYLIFVHNTP---
SVPHSSSEPK-----GFHNRAFDHP
>Cryptococcus_neoformans_XP_569104.1
AQSASTSSFVTSLIVNSALAGGELAAFIGL--RRWLKAIYEPRTY--IK-
DAQAPAKHIFYPLWQIITSDPQEILHKNGVDPYVFVRFLIMMAKATIPIWLLSWIVLLPVDTANSH
VLG-
SGLDRFTFGNVPDKTSRYWSHLVLVYIFDFWIIWLLWGEMKHWLVIRQRHLINPSHSRLAQANT
VLVTGIPKHLLSEEKLAQLFSHGGVKRIWLNRNLKEMPNIHDRRNYALQKLESAQVSLIKYALSK
RPTLRIIGQKVDTIEWARKEIAYCTAELARSREQQDKYPPLNSAFIHFNQQIAAHMAVQCLAHNQ
P-
YAMNNRIEQSPANVIWRNLSLNQYERNVRQAISWAATFGLILLWATPVAFIGALSNVTTLTEKYH
WLAWINGTSVLQGVISGILPPVLLALLMELVPFILRQLAAFEGFPSRTEVEINLMTRYFLFLVIHTF
FIVTLASGLISSIQQFADNPGSAATTLATQMPTASTFFITLILT-
QFTGTMGSLLRVVNLLLYYVRIIVFTRYRLNRPQFGETFPKITVYVVIMIAYCVISPIINGFSAAFFV
FATLVYKYLYIWVIQPSQDTGGMFFPKAITHVFVGLYVQEVCMAAMFFLVRCVAQGALMVVLIVI
TIAIQYTVIVSYSPLKSSLPLSLARYSRKLDDGNDPNAFFHP
>Cryptococcus_neoformans_XP_569106.1

VYLLFLRLLKYLFSAMSVLAGLLAITNYYLNTQTTYIDNPQLLTAANVTSNGL-L-
VHISFEWIVTMMIIVFAFKE----------KLEIEELQDRIRQGQVD-----TITSAFVTVPSAKQAREILKNVKD--
DMKGYHIQRAPRSHNVLWKNLEKDVKSRHSHAIIGKFALVIICFVNTIPLMIVTVLANLGTLEDSS
EIW-------
AIFTVLAGVLPATISAMFSYILPYIMRRLSRWSGALTRGQLDKAVIRQLFIFQLVSNFIVFSLLGVV
YETYLTISEDGSTVPAKVTQAYISESLYWLSWYPIRSV-
VACLQLLQIPRLILKTPQLLLAEVAQPENFEVSSYTNLFLLLSTRCLMYAPLAPIIVICAAIYFWALY
IIHNNQLKFVF-
DSKETDGKCWKILINRVLIATVFMQLFMVLTCTLKTQSAAMAVGAGLPVIIFLFKMYLRRHYHPD
GEVFSQ------YIDKYEDDDTRHWAP
>Cryptococcus_neoformans_XP_570388.1
----------VYMGRTLFSP--------
NRFFGWILPTLKTSEFTVLQTVGLDAAVLLHFYRMCLSLFGVSALLALVVLIPLNLFRHGSTDRS
SLYDLLLD--PTTSS-T-IHLIFTYLFTFLSLSFFHKNFHSFVLSRQAFLQLI---
HSISARTILVTKLPTHLRGDRALAEYFEAFNVESVNICRDVEPLQRGLEKRTLALTKMEEAWAD
WVGNPARPRPTF--FGTKVDAIEHWEKKFNAADEEVKEMRRTG-
RFGATHAAFVTFEDARDAQVACQVTHYPHH-
SQAVTTPAPEPRDIVWQHVSMSIRESQIRDFIVMGIMGVLILTWIVPVSSLATLMSYEEIKKIMPW
LARFIGSSRLAAIVQNSLPSLALITFNGLLPFLLE--------FTRLTLDR---
SRYHLFLLISVLLIFLLTSTYWALVRDLVDTPMKIPEKLARALQNVRNFMVSYVMLQALGLMPLQ
LLNLGPLFSLALARAYAEANAPPMLNYGWVYPQALLVFTITLVYSVMSPLILIFGAIYFAMAYLVF
KYKLLFIYFKPYESNGEAWRITFARTLWALIIFQLFMTGLFSLRTYFWASAIMVPLIVYTLWKSWM
MWQDFGPLSEYLAISSICEV-----NTGRRRYAHP
>Culex_quinquefasciatus_B0WVM3
LLLNLYEGIPETLLLNVISWFFLIMLFTLLRQQAWDYG----RLLSHG--------
RGFFSWILATWRLTREQILTHSGPDAVHYLSFQRHLMLVMSIMTFISIVIILPINFSGELI--

RNSFGHTTISNLEPDGGVMWVHVFFAIAYVPMVVLIMRRASGRNAF----------
KTAPTRTVMATNVAQPDCDKNAIRTYVQQVGIDDIQLAYNINSLIKAAEEYERIVDARIYCEVHRN
RDREQAKLSC----ESVDALEYYKDEEARLAGQVSRLRASA-
LNEPLGIAFITLNSAHEAQHVILHFK---
PGTDWDLSFAPAPSDIFWEHLSVDTAQWYCKWITVNLVLFLFLFFLTTPVIIVNMLDTFSLT-------
------
KKISPLVSEFLPTLLLWSLSALMPVIVAYSDTWLSHWTRSRQNYVIMTKTFGYLLFMILILPSLGL
TSAEAFLEWTNE---
TYRWQCIFLPDKGAFFVNYIITAAFIGTALELIRFPDLICYIWKLAPHIKSILITFPFGIHYAWMVMVF
TMSTVYSLACPLIMPFAMTYILLKHFVDKHNLFFAFAPSNGSGGKIHSTAVTMTKFSVILLLSIMA
ALAGVREGRLNVRAVVLITALVVTLVMFT---------FMSPKKC---------PSHLSY---
>Danio_rerio_A4QP59
LKGVNFGGIPVVLLLDFTVFILLLSIFTLIRRKLWDYG----RLLETDT--
SSMSVKGCCSWLTFIVNMDETLVQERCGVDAVHYLPFQKHLVTLLLIICVLSVSIILPVNLSGDLL
--PYNFGRTTIGNLQHDDKLLWLHTVFAVLYLMITVFLLRRYTSKMKG----------
TKREIVRNTLFVRPIPRTSTDDS-
IKTHFMECHVTSVNLCYDVAKLIDVNKNRKRAEKNLRHYNRILQQLGRNPRPCS-H--
EEVDAIEFYSSQEAALHEEEVRLKQG--
ELHPLGMAFVTLQNEYMATYILKDFNASTELGKWKVNYASHPHNIYWENLSVRGWRWLLRCV
LLNTALFVLLFFLTTPSIIISTMDKFNVT----------
MLNSPIISQFFPTLMLWTFSALLPTIVYYSTLGEAHWTRSSENMSMMYKLYTFLIFMVLILPSLGL
TSLAVFFRWLEG---
QLRFECVFLADQGAFFVNYVIAAALVGSGMELLRLPGLLLYIVRLAKYVQNQAYEFQYGAMYG
WTLCVFTVIMAYSIVCPLIVPFGLLYLLLKHLVDKHNLYFAYLPA-
RLDRQVHLGAVNQALAAPIICLIWLYFFSVLRTGFMTGTSLFTLVVLCITVFICISYTCFGHFKYLS
PNYN--------CSPSHSY---
>Danio_rerio_B0R175
LQGLPFGGVPTVLAINVVLWLILLLIFSCLRKAAWDYG----RLLKNDS--
DSSPSMGFCSWLTSLYHMKDEEIRSKCGIDAVTYLSFQRHIILLMMVVCLLSLTIILPVNLSGNLL-
--ENFGRTTVVNVPAQNIFLWLHSIFALLYFVITVLCMAHHSSRLEY----------
REDEKVARTLMITSIPREISDPGLITKHLHECTVTDIHFCFNVQKLMKLDSERRKAMKGRLYFTT
KAQKNGRKTHPCA-Q--EKVDAEQYYSELEEKLTDEFNAEKNWI-
SMKRLGIAFVTFRDERMTAVIVKDYSRSSVVRQWDVSYAPAPNDIIWENLSVCGPRWWLRCIL
LNILLFLLLFFLTTPAIIVNTMDKFNVT----------
RLRNPVITQFFPTLLLWAFSILLPFIVYYSSFFEYHWTRSGENQVTMHKCFLLLVFMVIILPSLGLS
SLNLFFRWLET---
DVKFQCVFLPDNGAFFVNYVITSSLIGTAMELLRIPALLVYSLRLCIHVISQAYEFQFGLEYAWTM
CIFSVSMTYSITCPVIVPFGLLYLVLKHMVDRYNIYYAYTPT-
KLNQRIHAAAISQVVVAPILCMFWLLFFSVLRLGPVQPITLFTFITLLCSIAFSCFGFCLKKLRADR
SSYQ--------SPAHQSY---
>Danio_rerio_XP_002664275.2
LQGLPFGGVPTVLALDFMCFLVLLCVFSFLRKVAWDYG----RLLDADTS-
VSSSVNGLCSWLTAIFRIKDDEIREKCGEDAVHYLSFQRHIIGLLVVVGVLSVGIVLPVNFSGDQL
VEAYSFGRTTVVNLKSGNHLLWLHTIFAFFYLLLTVYSMRRHTSKMHY----------
KEDDLVKRTLFISGIAKYAEE-
SEIKQHFEKCVVLDARICYNVAKLMSLESERKKAERSKKFYTDLMSREHINPKPCG-H--
EQEEAVNYYTKLEAKLKEEYRKEREKV-
NTKPLGMAFVTFQNEAMAALILKDFNASPQLHNWTVSYAPDPQNVYWEHLSISGLNWWVRCF
VINCFLFLLLFFLTTPAIIISTMDKFNVT----------
KLNNPIVTQFFPTLLLWCFSALLPTIVYYSAFFEAHWTRSGENRTTMHKCYTFLIFMVLLLPSLGL
SSLDLFFRWLEA---

TIRFRCVFLPDNGAFFVNYVIASAFIGNAMDLLRIPYFLMYMIRLCRNVKHQAYEFQFGAAYAW
MMNVFTVVMTYSITCPIIVPFGLMYMLLKHLVDRYNMYYAYLPS-
KLDKKIHSGAVNQVVAAPILCIFWLLFFSTVRQGFGAPTSMFTFVVLIITIIICLSHIVFGHFKYLSA
NYK---------GSDQGQ---
>Debaryomyces_hansenii_B5RSZ8
EEDNSVSQFISTLIPTFVVAAIFYLTFVNI--RKKQQRVYEPRNVVETQ-
DLKPGEAGFFGWVSFLLHKPETYIIQQAGVDGYFFIRFLFEFAAICLMGCCILWPILFPVNATGG
N--N-EGLNTISYANV---
KNRFFAQIFLSWIFFGAVLFLIYRELVYYTTFRHALQTTPLYDSLLSSRTMLLTEIPENLLKETELR
GFF--
PTATNVWYARDYAELTKKIKERSKLTNKYEGTLNKTISKAIKKRPSHKLIGKKVDTLNYCPERLG
ELNTEIKKDQAQHNANTQIPSVFIEFPTQLELQKAYQAIPYNKE-
LGSPKRTGLTPDDVIWENLSLTPTKRRTKKIIASTVLTLTIIFWSIPVAVVGAISNITFLIKVAPWLEF
INNMPKLKGIITGLLPVVALAILMSLVPPFIKKVGKVSGCMTVQQVESYCQAWFYAFEVVHVFLV
VALCSSSISSVPDIVEDPSSLMPLLARQLPKSANFYIAYLCLQGLTISAGLLVQIVALILAQFLGKK
WNWNTLGQPFWSVIYPPYELLCVIAFAYSILAPLVLGFTFVTFVFIYCAYMYLLVHVLQNKTDAR
GRNYPSALLQLFVGLYLAEICLTAMFVFGKNWAAVALEGIMIGVTALCHIYYKWKFLPLWDIVPV
SAIRHAIEYNPGFLRNAYDDP
>Debaryomyces_hansenii_Q6BLR7
ATPTSTSAVITTLVANLTLFGVFIGCFLIL--RIKFKRTYSPKVSYDLE-
EKKPDPRDPLRWIYILLMKPDSFIIQQAGLDGYFFLRYLFVFGIIFLFGIA-MFAILLPVNATNGGS-
A-TGFDQLAISNI---
KNRYFAHVFMGWIFYGAVIYMIHRELFFYNSVRCAALSSPKYAKKLSSRTLLIQCVPDTMLDEK
QFLKIF--
NGVKRIYVTRNARKLEYKDRLRQNMVTKLEKAENKLLKSAVEKRPRHRSFSKKIDTINYCREEIP
KLDKEVKSLQKKYRTYQPKNSIFVEFEDQYTAQLALQSVTHHNP-
LRMGPVTGIEPSDVYWNNLRLFWWEKFFRRLFACADVVLLIIFWAVPVALVGVISNITYITKVLP
WLDWINNMPQLLGIITGLLPTAMLSLLNTFLPIFIRYMAKVAGCPTLQSIEFYTQDAYFAYLMVNA
FLVVALASSAVSVVEKIIDNPTSAMKILATNLPKSSNFFISYIALQGLTVSSGALLQIVGLFLYYILG
AKWNFSGLGTMLWGTTFPVYTNLACIVLAYSIIAPMILIFACIAFFLLYIAYCYNLTYVFVESPDSR
GMHYPRALMQTFVGLYLGQVCLLGIFVVGKGWGPIVLQAISLGFTIMTHIYLRDAFHHLLRVIPID
CMKPLEV----DDKHAYDSP
>Debaryomyces_hansenii_Q6BWA0
AADTSVSTFISTLIPTLVIAIIFYLAFIGI--RKKQQRVYEPRNVVETP-
DLKPGEAGFFGWVSFLLHKPETYIIQQAGVDGYFFIRFLFEFATICLMGCCILWPILFPINATGGN-
-G-EGFNILSYSNV---
KNRFFAQIFLSWVFFGAVLFLIYRELVYYTTFRHALQTTPLYDSLLSSRTLLLTEVPENLLKETEL
RGFF--
PTATNVWYARDYTELTKKVKERNKLTSKYEGTLNKTITKAVKKRPSHKLIGKKVDTLTYCPERL
GELNTEVKKDQAQHNANTQIPSVFIEFPTQLELQKAYQAIPYNKE-
LGSSKRTGLTPDDVIWENLHLTSSKRRVKKIIASTVLTLMIIFWCIPVAVVGAISNINTLIEYAPWLE
FINNLPKLLGLITGLLPVVALAVLMSLIPPFIKKMGKVSGCMTVQQVESYCQAWFYAFNVVQVFL
VMALCSSSMSAVPAIVGDPSSLMPLLAEKLPASSNFYIAYFCLQGLTITSGLLLQIVALILSKILGR
KWNWNTLGQPFWSIIYPNYQLLCVIAFSYAIIAPLILGFAFVTFVFLYCVYMYTLVHVLQNKTDAR
GRNYPSALLQLFVGLYLAEICLTAMFVFGKNWAAVALEGIMIGVTALCHIYYKWKFLPLWDVVP
VSAIRYTIEYNPDFIRNAYEDP
>Dictyostelium_discoideum_Q54RR3
YLSTGWPTFTTSFITNIVIGSVIMIIFFFLRIIYRN--FYNARLK----------
TSPFQWIIYTISYQMESIFESRGIDAYMHLQFLYLCIQILSIIMVFGIGILLPINYTSITEE-
LNTLDTVTVGTIQPNSKRLWAHTLSIPIFTMVAFYFFQKTNTIYLEKRIRWMSKH----
NERNYTVLVREMSRSISNADDMREFFSRKAILSCHIIYKEAKLRSLWRKHKHVQRSLERVLSES

DIKGV--PPTR----
KTVDSVEYFTKKLEQVDKELRIAQEEAKSQDTSTAGFITFSRMAFASQAAQCLFSKNI-
EKFKVTPAPEIKNIKWKNMIVPNRSRFLRRIVSSIIFFVIFCFYTIPVTAISAVSNIQTL-
SKVPWLLEVVNLDTLRGFVEGYLPSLALVLFLALLPLFIKIIIHFNKEDTRTQFYHKVFTVYWAFLV
TNVFLVVSIAGTVLGILFKMLENLTDIATLLGQSLPKQSSFFINYILVQALTSVPMDIVRPIELIAGII
RSSMKASHDDPTSLNSIKYARELLIFVITLSYSTLSPLILPFGLLYFLMDFFVSKYNHIYSFCPKYQ
SGGMIWPLVFNRLCIGLVIYQLTGIGLFVLKTFIPGIVISFLMPFFTLFYWWRNVDKYKKPSSVLS
LDIC---EDYFGNEFVKSYEDP
>Drosophila_ananassae_B3MGE2
FFTSAYNGIPETLILNTIFWVLLIMLFTTLRHQAGDFG----
RLLSNGQVSPRPSTDSLFGWIKIVLKLRKETILLHTGPDAVHYLSFQQHLMAVMALVTLVSLAIIL
PVNFLNGPT--VNSFGRTTMANLANDSPWLWVHTIITILYVPLVVLIMRRASGRNAF----------
KKAATRTIMISNISSSDRNKTVVRNYMQEVTIENVTIAYNISRLHVRNGEFERVHEARLYCEHHR
DKDTLMAKPEM----KKENAYEYYQREERKLSGDVARLRAST-
MNEPLDIAFLTVSTVQEAQNIVTHFT---
PGTQWHMMFAPSPDDIFWENLNVNKSHWYLKFFCVNVVLFLFLFFLTTPAMVVNLLNQRPWL-
----
KNISPLISEFLPTLMLWTLSALMPVIVAVSDKWMGHYTRSKQNYSIMTKCFGYLLLMILILPSLGL
TSAQALLEWGNE---
TGRWQCIFLPERGSFYVNYIITAAFIGTALELLRFPELIVYIWQLLPYIKSILIEFPFGTHYAWTTLV
FTISVVYSVFCPMIMPFAMIYICLKHFVDRYNLYFAYGPSNRKGGKIHSTAVTMTKFSVVILVIVM
TMFAYFRGESGMARFMLLIITLAITLTLFT---------FMSPKRC---------AGFGGY---
>Drosophila_erecta_B3N988
FFTTAYNGIPETLILNTIFWVLLILLFTTLRHQAGDFG----
RLLSNGQVTPRPSAEGLFGWIRVTLKLRKETILLHTGPDAVHYLSFQQHLMAVMALVTIVSLVIIL
PVNFLNGPK--VNAFGRTTMANLSPESPWLWVHTIITILYIPLVVLIMRRASGRNAF----------
KKAATRTIMISNISSSDRNKTVVRNYMQEVTIENVSIAYNISRLYVRNAEFERVHEARLYCEQHR
NRDTLMAKPDM----KKENAYEYYQREERKLSGDVARLRASA-
MNEPLDVAFITVSTVQEAQNIVTHFT---
PGTQWHLVFAPSPDDLFWENLNVNKSHWYLKFFCVNTVLFLVLFFLSTPAMVVSLLNSRPWV--
----
KKISPLVADFLPTLMLWTLSALMPVIVAISDKWMRHYTRSKQNYSIMTKCFGYLLMMILILPSLGL
TSAQALLEWGNQ---
ADRWQCVFLPERGSFYVNYIITAAFIGTALELLRFPELIVYIWSLLPYIKAILIEFPFGTHYAWTTLV
FTIAIVYSVACPLIMPFAMIYISLKHFVDRHNLYFAYGPSNRKGGKIHSTAVTMTKFSVVILVLVMA
MICYFRGENGMARFLLLIISLAITLTLFT---------FMSPKRC---------AGFGGY---
>Drosophila_grimshawi_B4J841
LLISAYNGIPETLILNTILWVLLILLFTMLRHQASDY-----RLLTNG--
HPRSSVPSIFNWIRVTFKLRKETILLHSGPDAVHYLSFQQHLMAVMALVTIISVAIILPINFLHGSN-
-GQSFGRTTMANLSGNSAWLWVHTIITILYIPLVVLIMRRSSGRNAF----------
KKAATRTIMISNISNSDRNKTVIRNYMQEVTIETVSIAYNISRLYVRNGEFERAHEARVYCEHHRD
RDTLMAKPEV----KKENAYEYYQREERKLSGDVARLRAST-
MNEPLDIAFLTVSTVQEAQNIVTHFT---
PGTQWQIMFAPSPDDIFWENLNVNKSHWYLKFVCVNVVLFIVLFFLTTPAMVVNLLNSRPWL----
----
KKISPLISEFLPTLMLWTLSALMPVIVSISDKWMGHYTRSKQNYSIMTKCFGYLLLMILILPSLGLT
SAQALLEWGNE---
TYRWQCIFLPDRGSFYVNYIITAAFIGTSLELLRFPELIVYIWALLPYIRSILIEFPFGIHYAWTTLVF
TISIVYSVFCPLIMPFAMIYICLKHMVDRYNLYFAYGPSNRKGGKIHSTAVTMTKFSVLILVLVMA
MICYFRGDEGMAKFLILIITLAITVTLFI---------FMSPKRC---------TGFGGY---
>Drosophila_melanogaster_Q6NP91

FFTTAYNGIPETLILNTIFWVLLILLFTVLRHQAGDFG----
RLLSNGQVSPRPSTEGLFGWIRVTLKLRKETILLHTGPDAVHYLSFQQHLMAVMALVTIVSLVIIL
PVNFLNGPK--VNAFGRTTMANLSPDSPWLWVHTIITILYIPLVVLIMRRASGRNAF----------
KKAATRTIMISNISSSDRNKTVVRNYMQEVTIENVSIAYNISRLYVRNAEFERVHEARLYCEHHR
NRDTLMVKPEM----KKENAYEYYQREERKLSGDVARLRAST-
MNEPLDIAFITVSTVQEAQNIVTHFT---
PGTQWHLVFAPSPDDLFWENLNVNKSHWYLKFFCVNAVLFLVLFFLSTPAMVVSLLNSRPWV--
----
KKISPLVADFLPTLMLWTLSALMPVIVAISDKWMRHYTRSKQNYSIMTKCFGYLLMMIMILPSLG
LTSAQALLEWGNQ---
TDRWQCIFLPDRGSFYVNYIITAAFIGTALELLRFPELIVYIWSLLPYIKAILIEFPFGTHYAWTTLVF
TIAIVYSVACPLIMPFAMIYICLKHFVDRHNLYFAYGPSNRKGGKIHSTAVTMTKFSVVILVLVMA
MICFFRGDNGMARFLLLIISLAITLTLFT---------FMSPKRC---------AAFGGY---
>Drosophila_mojavensis_B4KNX3
LFISAYNGIPETLILNTIFWVLLILLFTMLRHQASDY-----
RLLANGNPMPRPSTPGLFNWIRVTLKLRKETILLHSGPDAVHYLSFQQHMMAVMAVVTVISLAII
LPINFLNGPR--VNAFGRTTMANLQPESPWLWVHTIITILYIPLVVLIMRRSSGRNAF----------
KKAATRTIMISNISNSDRNKTVIRNYMQEVTIESVSIAYNISRLFVRNAEFERVHEARVYCEHHRD
RDTLMAKPEM----KKENAYEYYQREERKLSGDVARLRAST-
LNEPLDIAFLTVSTVQEAQNIVNHFT---
PGTQWHIVFAPSPDDIFWENLNVNKSHWYLKFVCVNVVLFIVLFFLTTPAMVVNLLNSRPWV----
----
LKISPLVSEFLPTLMLWTLSALMPVIVSISDKWMGHYTRSKQNYSIMCKCFGYLLLMILILPSLGL
TSAQALLEWGND---
TGRWQCIFLPDRGSFYVNYIITAAFIGTSLELLRFPELIVYIWALLPYIKSILIEFPFGTHYAWTTLV
FTISIVYSVFCPLIMPFAMIYICLKHMVDRYNLYFAYGPSNRKGGKIHSTAVTMTKFSVLILVLVMA
MICYFRGDDGMARFLILIITLAITVTLFI---------FMSPKRC---------VGFPGY---
>Drosophila_persimilis_B4GGP0
FFTSAYNGIPETLILNTIFWILLILLFTTLRHQATDFG----
RLLSNGQATPRPSVQGLFGWIWITFKLRKETILLHTGPDAVHYLSFQQHLMAVMAIVTLISLAIILP
VNFLNGPK--VNAFGRTTMANLSPESPWLWVHTIITILYIPLVVLIMRRASGRNAF----------
KKAATRTIMISNISSSDRNKTVVRNYMQEVTIESVSIAYNISRLYVRNAEYERIHDARVYCEHHRN
RDTLMAKPDM----KKENAYEYYQREERKLAGDVARLRAST-
MNEPLDIAFLTVSTVQEAQNIVTHFT---
PGTQWEMMFAPSPDDLFWENLNVNKSHWYLKFFFVNFVLFLFLFFLTTPVMVVNLLNSRPWL-
----
KKISPLVSEFLPTLMLWTLSALMPVIVAISDKWMGHYTRSKQNYSIMTKCFSYLLLMILILPSLGLT
SAQALLEWGNG---
TGRWQCIFLPDRGSFYVNYIITAAFIGTALELLRFPELIVYIWSLLPHIKSILIEFPFGTHYAWTTLV
FTIAIVYSVFCPLVMPFAMVYICLKHFVDRHNLYFAYGPSNRKGGKIHSTAVTMTKFSVVILVFV
MAMICAFRGDDGMARFLLLIISLAITLTLFM---------FMSPKRC---------AGFGGY---
>Drosophila_pseudoobscura_Q28ZW6
FFTSAYNGIPETLILNTIFWILLILLFTTLRHQATDFG----
RLLSNGQATPRPSVQGLFGWIWITFKLRKETILLHTGPDAVHYLSFQQHLMAVMAIVTLISLAIILP
VNFLNGPK--VNAFGRTTMANLTPESPWLWVHTIITILYIPLVVLIMRRASGRNAF----------
KKAATRTIMISNISSSDRNKTVVRNYMQEVTIESVSIAYNISRLYVRNAEYERIHDARVYCEHHRN
RDTLMAKPDM----KKENAYEYYQREERKLAGDVARLRAST-
MNEPLDIAFLTVSTVQEAQNIVTHFT---
PGTQWEMMFAPSPDDLFWENLNVNKSHWYLKFFFVNFVLFLFLFFLTTPVMVVNLLNSRPWL-
----
KKISPLVSEFLPTLMLWTLSALMPVIVAISDKWMGHYTRSKQNYSIMTKCFSYLLLMILILPSLGLT

SAQALLEWGNG---
TGRWQCIFLPDRGSFYVNYIITAAFIGTALELLRFPELIVYIWSLLPHIKSILIEFPFGTHYAWTTLV
FTIAIVYSVFCPLVMPFAMVYICLKHFVDRHNLYFAYGPSNRKGGKIHSTAVTMTKFSVVILVFV
MAMICAFRGDDGMARFLLLIISLAITLTLFM---------FMSPKRC---------AGFGGY---
>Drosophila_sechellia_B4HRJ2
FFTNAYNGIPETLILNTILWVLLILLFTVLRHQAGDFG----
RLLSNGQVSPRPSTEGIFGWIRVTLKLRKETILLHTGPDAVHYLSFQQHLMAVMALVTIVSLVIIL
PVNFLNGPK--VNAFGRTTMANLSPDSPWLWVHTIITILYIPLVVLIMRRASGRNAF----------
KKAATRTIMISNISSSDRNKTVVRNYMQEVTIENVSIAYNISRLYVRNAEFERVHEARLYCEQHR
NRDTLMAKPDM----KKENAYEYYQREERKLSGDVARLRAST-
MNEPLDIAFITVSTVQEAQNIVTHFT---
PGTQWHLVFAPSPDDLFWENLNVNKSHWYLKFFCVNAVLFLVLFFLSTPAMVVSLLNSRPWV--
----
KKISPLVADFLPTLMLWTLSALMPVIVAISDKWMRHYTRSKQNYSIMTKCFGYLLMMIMILPSLG
LTSAQALLEWGNQ---
TDRWQCIFLPERGSFYVNYIITAAFIGTALELLRFPELIVYIWSLLPYIKAILIEFPFGTHYAWTTLVF
TIAIVYSVACPLIMPFAMIYICLKHFVDRHNLYFAYGPSNRKGGKIHSTAVTMTKFSVVILVLVMA
MICFFRGDNGMARFLLLIITLAITMTLFT---------FMSPKRC---------AGFGGY---
>Drosophila_simulans_B4QFA5
FFTNAYNGIPETLILNTILWVLLILLFTVLRHQAGDFG----
RLLSNGQVSPRPSTEGMFGWIRVTLKLRKETILLHTGPDAVHYLSFQQHLMAVMALVTIVSLVIIL
PVNFLNGPK--VNAFGRTTMANLSPDSPWLWVHTIITILYIPLVVLIMRRASGRNAF----------
KKAATRTIMISNISSSDRNKTVVRNYMQEVTIENVSIAYNISRLYVRNAEFERVHEARLYCEQHR
NRDTLMAKPDM----KKENAYEYYQREERKLSGDVARLRAST-
MNEPLDIAFITVSTVQEAQNIVTHFT---
PGTQWHLVFAPSPDDIFWENLNVNKSHWYLKFFCVNAVLFLVLFFLSTPAMVVNLLNSRPWV--
----
KKISPLVADFLPTLMLWTLSALMPVIVAISDKWMRHYTRSKQNYSIMTKCFGYLLMMIMILPSLG
LTSAQALLEWGNQ---
TDRWQCIFLPERGSFYVNYIITAAFIGTALELLRFPELIVYIWSLLPYIKAILIEFPFGTHYAWTTLVF
TIAIVYSVACPLIMPFAMIYICLKHFVDRHNLYFAYGPSNRKGGKIHSTAVTMTKFSVVILVLVMA
MICFFRGDNGMARFLLLIITLAITMTLFT---------FMSPKRC---------AGFGGY---
>Drosophila_virilis_B4LJM0
IFTSAYNGIPETLILNTIFWVLLILLFTTLRHQASDY-----
RLLANGTPTPRPSVPGIFSWIKVIFKLRKQTILLHSGPDAVHYLSFQQHLMIVMAVVTIISLGIILPI
NFLNGPT--VNAFGRTTMANLSPNSSWLWVHTIITILYIPLVVLVMRRSSGRNAF----------
KKAATRTIMISNISISDRNKTVIRNYMQEVTIESVSIAYNISRLFVRNAEYERAHDARVYCEHHRD
RDTLMAKPEM----KKENAFEYYQREERKLSGDVARLRAST-
MNEPLDIAFLTVSTVQEAQNIVTHFT---
PGTQWHVMFAPSPDDIFWENLNVNKSHWYLKFVCVNVVLFIVLFFLTTPAMVVNLLNSRPWL---
----
KKISPLVSEFLPTLMLWTLSALMPVIVSISDKWMGHYTRSKKNYSIMTKCFGYLLLMILILPSLGLT
SAQALLEWGNE---
IGRWECIFLPDRGSFYVNYIITAAFIGTSLELLRFPELIVYIWALLPYIKSILIEFPFGTHYAWTTLVF
TISIVYSVFCPLIMPFAMIYISLKHMVDRYNLYFAYGPSNRKGGKIHSTAVTMTKFSVLILVLVMA
MICYFRGDDGMARFLILIITLAITVTLFI---------FMSPKRC---------TGYAGY---
>Drosophila_willistoni_B4NMJ5
FFTSAYNGIPETLILNTIFWILLILLFTMLRHQAGDFG----
RLLNNGHPTPRPSAQGIFGWIKITFKLRKETILLHTGPDAVHYLSFQQHLMGVMALVTLVSLTIIL
PVNFLNGPK--VNAFGRTTMANLSPESPWLWVHTIVTILYIPLVVLIMRRASGRNAF----------
KKAATRTIMISNIASSDRNKTVVRNYMQEITIESVSIAYNISRLYVKNAEYERVHEARLYCEHHRD

RDTLVAKTEM----KKENAFEYYQREERKLSGDVARLRAST-
MNEPLDIAFLTVSTVQEAQNIVTHFS---
PGTQWHMMFAPSPDDIFWENLNVNKSHWYLKFICVNVVLFIVLFFLTTPAMVVNLLNSRPWL---
----
KKISPLVSEFLPTLMLWTLSALMPVIVAISDKWMGHYTRSKQNYSIMTKCFSYLLLMILVLPSLGL
TSAQALLEWSNE---
TGRWQCIFLPERGSFYVNYIITAAFIGTSLELLRFPELIVYIWSLLPFIKSILIEFPFGIHYAWTTLVF
TIAIVYSIFCPLIMPFAMVYICLKHFVDRHNLYFAYGPSNRKGGKIHSTAVTMTKFSVVILVLVMA
MICYFRGEGGMARFILLIITLAITLTLFT---------FMSPKRC---------AGFNGY---
>Encephalitozoon_cuniculi_NP_585973.1
PLSRADNAVLTNAVFQGFITFCILIAYVIL--RKRAKWLYSPN-----
VRGRPSHPTGFLSWIIPVVTVNDTILLSIIGLDAFMMLQTLKMLYRILFILSLFVIPSLGYLFWTNQ
RENVDQWLVRLSLGSLDPDSGSYRLVIPVVYLISGFIMYSIFIYYKRYIVLRQAYLRNP-
EYVNLPNRTLLVSRLPSYVNNDVDLYEFINAGEIDDSVLVYDTNTLQSLYGERDSYIYNIEKEINE
KFVRINQKRQLIK-
EGEDVSRVSLYLEKLNDVNARISREKEIIEFSFKTKRGFVTFKDQRSANIVKQSQIGSRI-
FSVTTEDAPAPNDVIWENITNSEVENYMYSIFGTVFFILFIVLFSSMVSIVTLLVNFEGFKESKLFL-
--SRY-
TIADSLRGALSPLIYNSMLLLVPTVITALMNMEGIYSYSTLQQKLMDKLCNFLFFNGFASVFFVTS
FYRLFSDVLSRKEDIVEAFSKESLESSVFFANIIIQKSLVGTALTLLKPAPLLINYIIFPKLDAEFSPP
FDFGTIFPSCLTVFSMSIAYAVMCPPILLLGAFFYFCNYLAFKSEFLYSSRNEYESGGGYWDSA
CQNIVFSLIFFQVVTFAKMSSDKRFYLSMSLFPIILITFIFRNSLRKMFYKSCHFYPLNIKEEERVN
LLESWSEIGKGP
>Gallus_gallus_E1C7I8
LQGLPFGGVPTVLALDFMCFLALLFVFSILRKVAWDYG----RLLDADTS-
VSSSVNGFCSWLTAIFRIKDDEIRDKCGGDAVHYLSFQRHIIGLLVAVGVLSVGIVLPVNFSGDLL
--AYSFGRTTIANLNSGNNLLWLHTSFAFLYLLLTVYSMRRHTSKMRY----------
KEDDLVKRTLFINGISKYAEP-
EKIKKHFEECTVLEARPCYDVARLMFLDAERRKAERGRIYFTNLQSKENTNPKPCG-H--
EEVEAIEYYTKLEEKLKDDYKREKEKV-
NEKPLGMAFVTFHNETITAIILKDFNASSSLHNWTVSYAPDPQNIYWEHLSIRGFIWWIRCLVINV
VLFILLFFLTTPAIIITTMDKFNVT----------
KLNNPIITQFFPTLLLWCFSALLPTIVYYSAFFEAHWTRSGENRTTMHKCYTFLIFMVLLLPSLGL
SSLDVFFRWLEA---
AVRFECVFLPDNGAFFVNYVIASAFIGNAMDLLRIPGLLMYMIRLCRNVRHQAYEFQFGAAYAW
MMCVFTVVMTYSITCPIIVPFGLMYMLLKHLVDRYNLYYAYLPA-
KLDKKIHSGAVNQVVAAPILCLFWLLFFSTMRTGFLAPTSMFTFVVLVITIVICLCHVCFGHFKYL
SANYK---------ATESEE---
>Homo_sapiens_B2RN22
LQGQPFGGVPTVLCLNIALWVLVLVVYSFLRKAAWDYG----
RLLHNDTSPSETSLKGFCSWFFNSITMKDEDLINKCGDDARIYIVFQYHLIIFVLIICIPSLGIILPINY
TGSVL--SSHFARTTIVNVSTESKLLWLHSLLSFFYFITNFMFMAHHCLGFAP----------
RNSQKVTRTLMITYVPKDIEDPELIIKHFHESVVTRVHFCYDVRNLIDLDDQRRHAMRGRLFYTA
KAKKTGKRIHPCA-R--KEVDAEQYYSELEEQLTDEFNAELNRV-
PLKRLDLIFVTFQDSRMAKRVRKDYKYSSIVKYWRVTMAPHPKDIIWKHLSVRRFFWWARFIAI
NTFLFFLFFFLTTPAIIMNTIDMYNVT----------
RLQNPIVTQFFPSVMLWGFTVILPLIVYFSAFLEAHWTRSSQNLVMVHKCYIFLVFMVVILPSMG
LTSLDVFLRWLQA---
SIRFQCVFLPDNGAFFVNYVITAALLGTGMELLRLGSLFCYSTRLFVNIKNQAIDFQFGREYAWM
MNVFSVVMAYSITCPIIVPFGLLYLCMKHLTDRYNMYYSFAPT-

KLNEQIHMAAVSQAIFAPLLGLFWMLFFSILRLGSLHAITIFSLSTLLIAMVIAFVGIFLGKLRMVAD
EPE--------SPARHTY---
>Homo_sapiens_O94886
LQGVTFGGIPTVLLIDVSCFLFLILVFSIIRRRFWDYG----
RILEADSSTSSSGQLGCCPWLTAIFRLHDDQILEWCGEDAIHYLSFQRHIIFLLVVVSFLSLCVILP
VNLSGDLL--PYSFGRTTIANLQTDNDLLWLHTIFAVIYLFLTVGFMRHHTQSIKY----------
KEENLVRRTLFITGLPRDARK-
ETVESHFRDCEVVDVQLCYNVAKLIYLCKEKKKTEKSLTYYTNLQVKTGQNPKPCG-Q--
EWEDAISYYTRMKDRLLERITEEERHV-
QDQPLGMAFVTFQEKSMATYILKDFNASSELYKWTVTFAADPEDICWKNLSIQGLRWWLQWL
GINFTLFLGLFFLTTPSIILSTMDKFNVT----------
KLNNPIISQFFPTLLLWSFSALLPSIVYYSTLLESHWTKSGENQIMMTKVYIFLIFMVLILPSLGLTS
LDFFFRWLEA---
SIRLECVFLPDQGAFFVNYVIASAFIGNGMELLRLPGLILYTFRMIRNVQNQAFQYEFGAMYAW
MLCVFTVIVAYSITCPIIAPFGLIYILLKHMVDRHNLYFVYLPA-
KLEKGIHFAAVNQALAAPILCLFWLYFFSFLRLGMKAPATLFTFLVLLLTILVCLAHTCFGCFKHLS
PNYK--------QQQQQTY---
>Homo_sapiens_Q5T3F8
LQGLPFGGVPTVLALDFMCFLALLFLFSILRKVAWDYG----RLLDADTS-
VSSSVNGFCSWLTAIFRIKDDEIRDKCGGDAVHYLSFQRHIIGLLVVVGVLSVGIVLPVNFSGDLL
--AYSFGRTTIANLKSGNNLLWLHTSFAFLYLLLTVYSMRRHTSKMRY----------
KEDDLVKRTLFINGISKYAES-
EKIKKHFEECTVLEARPCYNVARLMFLDAERKKAERGKLYFTNLQSKENVNPKPCG-H--
EQVEAIEYYTKLEQKLKEDYKREKEKV-
NEKPLGMAFVTFHNETITAIILKDFNVSSSLHNWTVSYAPDPQNIYWEHLSIRGFIWWLRCLVIN
VVLFILLFFLTTPAIIITTMDKFNVT----------
KLNNPIITQFFPTLLLWCFSALLPTIVYYSAFFEAHWTRSGENRTTMHKCYTFLIFMVLLLPSLGL
SSLDLFFRWLEA---
AIRFECVFLPDNGAFFVNYVIASAFIGNAMDLLRIPGLLMYMIRLCRNVRHQAYEFQFGAAYAW
MMCVFTVVMTYSITCPIIVPFGLMYMLLKHLVDRYNLYYAYLPA-
KLDKKIHSGAVNQVVAAPILCLFWLLFFSTMRTGFLAPTSMFTFVVLVITIVICLCHVCFGHFKYL
SANYK---S----SGDEPPS---
>Laccaria_bicolor_B0D8L9
SRTLAPAAVGSQVALMSIISVIAILLFNFL--RPTNKIIYEPKVY---
EGNKPPPKDSIFGWLPPLIHTKEPELLDKIGLDAVAFLRFLRLLRTLFTGITLLTCGILIPINVVYNL
KN-RDILSMLTIRDVKG-S-
FLYAHVVVTYLITLLIVFCVNMHWKAMVGLRHTWFRSPEYMQSFYARTLQVIHVPKKHQSDEGL
KGIFAGYPTTSVHIGRKVGKLPELIEYHNQTVREFEEVLVKYLKG-
GANRPTIRLGGTRKDAIEFYTAKLKRTEAAIEDYRSQI-
DTRAENYGFASLAAVPYAHIVAKKLDGKHP-
KGTTVDLAPNPKDIIWENMNKSDAELARKRLVGFWWLVLVCFFNTVPLFIISILSNLDSIR-
VYVPFQTWFEDSFSFAFVSGVLPPAISGLFGFFLPIIMRWLTKYMGALTHSKLDRAVVARYYSFL
IISQLVIFTLIGVIFNSVKEIIQQIGSLPKQINRTYINQASYWLTFFPLRGF-
LVVFDLAQIINLVWLSIKTHIREWTQPPLFQYAIYYSNILFMAAVGMVFAPLAPLVVLAATIVFWM
SSWVYKYQLMFVFVSKVESGGRLWNVVVNRLLFCVLLMQALMILSRPLW---
IQWLSSVPPILIIIAFKIYINRTYLPAFYFFNPSDEE--DT-QGNRLEKRFGHP
>Laccaria_bicolor_B0DWN0
MQKFEGPWFTTQLTISLSVGLTSFFLFSYCRTRWP---IFAPRTLFSP--------
QAFFGWIMPTIRTSEFTVLQIVGLDAAVLLNFFKMSFYLFSVCSLFATTMLMPLNWKHNKDLDH
TGHDWLDLI--SDANSYLSLHLMFTYLFTLLALYFIYKNYRRFLRSRQLFLELV---
HSIPARTVIVTDLPNHLQGERPLADYFENLAVESVTVCREVGSLKTLLDRRTRALLELETAWVSY

VGNPSRKRPTL--FKPKVDALEYLENQFKEADELVKKRRRTG-
KFKATRAAFVTFEKMSSAQIAVQVAHAPGP-
GQITTYPAPEPRDIVWSNMAPSQATIRTRDFFVLAIMGFLLFFWIFPITALASLLSYKEIKKSMPW
LGNLIDSNQVRAIVQNSLPSVAMISLNALLPFILEALTYVQGYRARSWVEYSLLKKYFLFLLVNVV
FIFLLASTYWQLVRDLANSPAKVPEKLAQALQRARHFFLSYVILQGLGIMPLQLLNLGVIVPRFFY
RMFAELNAPPMINYGVVYPQAILMFVITMLYSVVQPLIVIFGAIYFGVAYVVYKYKLLFVFYKPYE
SQGQAWPITFIRLIWGVVIFLLFMIGIFTLRKSYILSSLLVPLLIGTVVWSWYVDKELKPLSKFVSL
SSVFEV-----NTGKRRYGHP
>Lotus_japonicus_B0BLA8
---ASLGDIGLAAAINILTAFAFLIAFAVLRIQPINDRVYFPKWYLKG--
LRSSPLIRFLNWMPAALQMPEPELIDHAGLDSAVYLRIYLLGLKIFVPISLLAFSVMVPVNWTNNT
LE-YSNIDKLSISNIPTGSNRFWTHLAMAYLFTFWTCYILKREYQIVATMRLSFLASER--
RRPDQFTVLVRNVPPE-
SVSELVEHFFLVEHYLTHQVVYDAKKLSSLVAKKKKKQNWLDYYELKHSRNQSI-
RPTKKTCGSSVDAIDFYTAEIEKLSEEIELERDKVKPKSIMPAAFVSFRTRWGAAVCAQTQQTR
NP-
TIWLTEGAPEPRDVYWDNMAIPYVSLSIRRLIIGVAFFFLTFFFMIPIAFVQSLANIEGIEKAAPFLK
SFIEIKFIKSFIQGFLPGIALKIFLIFLPTILMIMSKFEGFISLSGLERRSATRYYIFQFINVFLGSIITGT
AFQQLDKFIQSANEIPKTIGVSIPMKATFFITYIMVDGWAGCAGEILRLKPLIFYHLKNFREEAMD
PGTIGFNTGEPQIQLYFLLGLVYAVITPFLLPYIIVFFGLAYVVYRHQIINVYNQEYESAAAFWPDI
HGRIIFALVISQLLLMGLLSTKEAANSTPLLIILPVLTIWFHLFCKGRYEPAFVQHPLQEAMMKQLN
YKEFLQNAYIHP
>Medicago_truncatula_A2Q3S2
----IFSALLTSIAINFGFCSLFFTLYSILRKQPGNILVYAPRLVSE-G-KLQ---
LPTSGWVRRAWEPSDDEFISTAGLDAFVFIRIFVFSLKVFAFAGIVGTIFLLPVNYMGTQI--
KTSLDSFSISNVNNGSHRLWIHFSAVYIFTGVVCILLYYEYEYIASKRIACFYSSK--
PEPRQFSILVRGIPVC-
TCSEAVEQFFMESAYHSHSVVRRSSKLQILVTDTDRLYKRLTQLKDKENSP----
QRHRRDFGQKVDLLDHYEKKLGDIADNVRIEQSALAGK-
EVPAAFVSFKSRFGAAIALNSQPGVNP-
THWITEPAPEPHDVYWPFFSVTFIRRWISRLAVFVACIALTILFLIPVAVVQGLTHLDQLETMFPP
LRSILRLTLVSQVITGYLPIQILQLFLSFVPAIMIFLSSLQGYISWSQIQKSACTKVLWFTIWNIFFAN
VLSGSALYRLNYFL-
EPKEFPRVLAEAVPAQASFFMAYIVAFGWTNIASELFQLIPLSYNYVNRYDFEAP---
SIPYYSEIPRILFFGLLGVTYFILAPLILPFILVYFCLGYIIYRNQLLYVYVQKFETGGEFWPIVHNCT
IFSMVLMHIIVIGIFGLKELPIASGFTLPLPIVTLLFNEYCQKRFIPIFNAYPAECLIKKMSEFYDKLT
NAYNDP
>Micromonas_pusilla_XP_003057675.1
LTD--AGLSFKELGWLTILFVVLFALFNALRKIRYLRFSFDPC-------
YARPDFKGTFGWLRRAWWVKDTELYNFITTDELMLLRWFRLAYTWFWGLVLFAMWPLMIAYK
FEGDYQVELGIKRLSLTMAYRGN-ILLIVVVEIWLASLWLVYLLGKETRAYARLVWKS-----
KTTGIKAHAVLVSDIPVEVEAEE--AKKFSEDAVVSITIARDTRKLDKAAEAYNNLNIRH-
NLKLHLSEL--DQKLMK----
ESQKAHNDLVIKIEKSDVQREKTRNKRYDESPSPSAIVVFSRQMDSVIASSMALDDWY-
GRWKTSAAPGPNDLVWHNVSLTSKQRFWKNMRAHAIAAVVILFFMIPINYITYLISLGYD-DIVA--
----
AIGTSGHSILIALVLTIFLVVGHIVSLVLSKQYGYTSKAKMDSRGADIYFWLLFCNLFLTNVSGSSV
YEDLRVWLNRPATMVNALMVQIVSQQTFFLLFCMLRIAQSCPLELLHPPFHLGFIVKSFMIQWT
QPENTPMHRVPAQTMFVFFLGTMYCMVQPLVIPVCAVFFSLFYLFFKHNLRYHYMQSYNFGQT
TWPWLVQYTFNSLMLAQIIIAIGISLIDGERLRYLLLPLPVVTWAYHRRTKVIMRASR-
KVPVTRSG--EKVMKLIRKGIWYLP

>Micromonas_pusilla_XP_003059254.1
----------SAVVGLVCMFVFALVRERHK---AYRTRVHVT----
RNPPPTFLWGWIVHVVRVKEQALYDTAGLDVLYFDRSNRLCFLISLFVAVVNLCVVLPVNYKLG
TVITMMTIDKISMTNIPVGSPLLWVHTLVVVVTVYFVSFLLYLNFVDYRADRQAWLGHSEFAVKA
QQYAVLVTNVPSFTATQAAVSRTFARDDFVATVPVRYHAKIDVLLTMLDQTQLSMLPT-
SKLAAKL----------ASRREKISTQVEEIFAHIQLEQKA--NPRSALSHIVIFKSQVSAAVAAQTLLE--
PGGPWNVSSAPAPDDVNSNTLWLYPGQKWFRSTVAAILIAGLV---
VFPIGIFTSMVSLSQSLGSSWWY---
CKDGFFVRLLTAWVPSLLLALWAVVIPYGFAFIALQGAEVSLSGIDRKVFTWFYLYNALNVLAGG
MLAGTLFSQLENIIKTPGSFFNLIGHALPQSAGFFISYVSTYAFMLEPLRLLLPHLGVLTSLFTSID
AAFEPKTLRLGAQYGGQQLILLLCLVFSTASPLITAAALVYFTLSLLVKRYHIMYIFVRSYESGATL
FPSLFSRILVSLLLYQIFMSAYLLIKEAYTQAFVLLLIPPFLWQFHSYCLTRFITKSTYLPLIAD---
KMPVASIPLDTYDAP
>Micromonas_SP_XP_002501858.1
GTNFTATEFFITCGWLAVLWVVLMAVFIFIRSFKHMMHTCDPC-------
YKRPPKKGHFAWLVRAWHVTDTELIANTTPDELMLLRWYRMVYHWFFGATIFVLPVCATLYHL
DSKDQ-AFGMKRITIAAANSEG-VFWVVVLQMWVISTWLVYLLSRETAAYTRLVWRL-----
SRIGIKSHAVLVSDIPMKAEAQEEMAKAWSEGCVVSVLLARDTRKLDKSANAWKASEQAY-
ELKDDIEEALGENKGSK----DV-----
ELKAKLAKADEEREKLRLDRYDETPSPSSIVVFSRQMDAVIASQVQLDNQF-
GRWHTEPAPGPNDLVWHNVALTGKQRWRKNIRARLVATIMVIFFSVPVNFLVAALNAGKD-
DIVS---------
VLGEGIFKVLIGLILTIFLVVAHIMSLVISRQYGSIAKSTMDVRGASIYFWLLVLNLFLGNLNSTPV
WEDLLDWIQDPKLVLSTLIYRCVEASSFFLQFCLLRIATSTVLELIHPPTHLGYLVKTLMVQWSQ
PENTPLHRVPAQTMLIFFLGCQYCVTAPAFLPVCGVFFSLFYLFWKHNLSYHYMQPYLSGLTL
WPWLVKQTFNSLLFSQVVLILGLPLSKTEYLRLALLPLPVWSWMQIRRCMAVLRRAS-
KVPVQR----DKVREMVAKGTWYQP
>Micromonas_SP_XP_002502566.1
NTKRSWKDTRNAMIMSASIGIACLILFGLVRHHCK---VYRTRLHVAP---
HRPPPWNLFGWVLDVVNINQRTLYDTAGLDALYFDRSNLLMLKVIGFVAVVNCGVVMPVNYLL
GDVITMSPSDKLSMTNIPIGSALMWIHAAVVVLTTFFVCALLYVDANDFRADRHAWLGHSQWA
VKAQQYAVIVTNV-----
TKSTVSTSFRSPDVIAAVPVLHHAIVDKNLEKLDQAQLSLLNPESERMKKM----------
LSRREFLKDKITSTFSAVKKAQED--DPRSGYSYIILFRSQASAAIAAQTLLD--
PGGGWNVAAAPAPDDVNFQSLWLGPGQRWYRSIVALLTVAFIV---
SFPIGIFTSMVALSAALSDILWY---
CDNKFFFRLLTAWIPSLLLATWAVVVPFGFAFVALEGSEITLSGIDRKVFRWFYLYSCLNVLAGG
MLAGSFFSQLENIIRTPSSIFTLLGYAVPQSSGFFLAYISTNAFMLEPLRLLLPHGGVLLWFATGI
SAYFSPRSQRYGSNYGTQQLIFLICLVFSTASPVITPLGFAYFLLAWLVWRYQLCYVFIRAYESG
ALLFPALFSRIMISLLLYQMFMSFYLLIKAAFVPAFVLIIVPPFLWSFHSHCTRCFMMKSVYLPLAI
A---EMPVASIPVDTYCAP
>Monosiga_brevicollis_A9UQI6
RAYSTTASFVVAFAFNGLVGLLCIIIFVFVRPR--FPQLYEPRTD----------
HGWVGWLRSILSIGDDEIFRKCGLDSTMYLVMFRYATFLFFCMAFYVLIVLMPINSRGKFLSGE
HGIDRVSLANVPEGSDYLWAHLVAAYLVALLAMYLLDHAYRKFVRFRREYLQNR----
RADSYVVMVRDIPSSCRDDRGLAHYYREPDVLAATRARNIDALHPVSEQRLKTAIKLERYTFRD
QRDGG--------SGDQRPAVEYLGRTLEQQNADFASARRSAV---
YHATGFVAFASQRSATVAAQVLHCAEP-
YTWSTQRAPEPQDLVWENIGVTSQERAHRTAIASLITGALVVLWVIPVTFVASITTLETLDLWAD
GLDDVADASLVQGMVQGVIPTLLLVIFMAVLPGIMKFISRKEGIASKSEIGRSAMAKLFWFQILNV
FLVSFIAGSILDIADNFSRDPRGVLKLLGGAIPRTGTFFTTYVMLRSVTGYPTMLLRVWEVLWSLI

VGLLEKARREETWNVAPAAAGDILVFLVGVVYVVVTPIIAPFLVLYFGLGYLTIRHLLYYVYRPTP
DSGGLLWPMLFNRLMVALLIAELVVAGVFSVKNNPPVAAMMLPLAAFTLWFWFRTHKGLEAVG
DYLPMEVAAEE-APLDEADLQDYVQP
>Mus_musculus_Q3TWI9
LQGLPFGGVPTVLALDFMCFLALLFLFSILRKVAWDYG----RLLDADTS-
VSSSVNGFCSWLTAIFRIKDDEIRDKCGGDAVHYLSFQRHIIGLLVVVGVLSVGIVLPVNFSGDLL
--AYSFGRTTIANLKSGNNLLWLHTSFAFLYLLLTVYSMRRHTSKMRY----------
KEDDLVKRTLFINGISKYAES-
EKIKKHFEECTVLEARPCYNVARLMFLDAERKKAERGKLYFTNLQSKENVNPKPCG-H--
EQVEAIEYYTKLEQRLKEDYRREKEKV-
NEKPLGMAFVTFHNETITAIILKDFNVSSALHNWTVTYAPDPQNIYWEHLSIRGFIWWLRCLVINV
VLFILLFFLTTPAIIITTMDKFNVT----------
KLNNPIITQFFPTLLLWCFSALLPTIVYYSAFFEAHWTRSGENRTTMHKCYTFLIFMVLLLPSLGL
SSLDLFFRWLEA---
AIRFECVFLPDNGAFFVNYVIASAFIGNAMDLLRIPGLLMYMIRLCRNVRHQAYEFQFGAAYAW
MMCVFTVVMTYSITCPIIVPFGLMYMLLKHLVDRYNLYYAYLPA-
KLDKKIHSGAVNQVVAAPILCLFWLLFFSTMRTGFLAPTSMFTFVVLVITIVICLCHVCFGHFKYL
SANYK---S----SGDEPPS---
>Mus_musculus_Q8CBX0
LQGQPFGGIPTVLVLNIILWVFVVLLYSFLRKAAWDYG----
RLLHNDSSPSEVSLRGFSSWFFNSLTMRDRDLINKCGDDARIYITFQYHLIIFVLILCIPSLGIILPV
NYIGTVL--NSHFGRTTIVNVSTESKFLWLHSLFAFLYFLINLAFMGHHCLGFVP----------
KKSLHFTRTLMITYVPTEIQDPEIISKHFHECVVTRVHFCYDVRNLIDLDDQRRHAMRGRLYYTA
KAKKTGKKTHPCS-R--KEVDAEQYYSELEEQLTDEFNAELNRV-
QLKRLDLIFVTFQDARTVRRIYDDYKYSSIVKHWRVAHAPHPKDIIWKHLSIRRFSWWTRFIAINT
FLFFLFFFLTTPAIIINTIDIYNVT----------
RLQSPIVTQFFPSVLLWAFTVTMPLLVYLSAFLEAHWTRSSQNLIIVHKCYIFLVFMVVILPSMGL
TSLHVFLRWLHA---
TIRFQCVFLPDNGAFFINYVITAALLGTGMELMRLGSLCTYCTRLFVHIKNQATDFQFGREYAW
MLNVFSVVMAYSITCPIIVPFGLLYLCMKHITDRYNMYYSYAPT-
KLNAQIHMAAVYQAIFAPLLGLFWMLFFSILRVGSLHSITLFSMSSLIISVVIAFSGVFLGKLRIAQR
EQP--------SPARHTY---
>Mus_musculus_Q91YT8
LQGVTFGGIPTVLLLDVSCFLFLILVFSIIRRRFWDYG----RILEAGSS-
SSSGQLGCCPWLTAIFRLHDDQILEWCGEDAIHYLSFQRHIIFLLVVISFLSLCVILPVNLSGDLL--
PYSFGRTTIANLQTDNDLLWLHTVFSVIYLFLTVGFMWHHTRSIRY----------
KEESLVRQTLFITGLPREARK-
ETVESHFRDCEVVDVQLCYSVAKLIYLCKERKKTEKSLTYYTNLQAKTGRNPKPCG-Q--
EREDAISYYTRMNDSLLERITAEESRV-
QDQPLGMAFVTFREKSMATYILKDFNASSELCKWTVTFASYPEDICWKNLSIQGVRWWLQWL
GINFSLFVVLFFLTTPSIIMSTMDKFNVT----------
KLNNPVISQFFPTLLLWSFSALLPSIVYYSTLLESHWTRSGENRIMVSKVYIFLIFMVLILPSLGLT
SLDFFFRWLET---
SIRLECVFLPDQGAFFVNYVIASAFIGSGMELLRLPGLILYTFRMIRNVQNQAFEYEFGAMYAWM
LCVFTVIMAYSITCPIIVPFGLIYILLKHMVDRHNLYFAYLPA-
KLEKRIHFAAVNQALAAPILCLFWLFFFSFLRLGLTAPATLFTFLVVLLTILACLLYTCFGCFKHLS
PNYK---------QQQQTY---
>Nematostella_vectensis_A7RGG4
----------VLFCVIRRLVWDYG----
RLVKEDPSVTFPEVKGLLSWVPVLLRVTDEHIHVKCGMDALQYIQFQKHLIVYSVIIFCLSIGIVLP
INYSGTNE--RNSFGATTVSNLEAQSSMFWLHAVFALLYIIIIVVILRHFTSLFNM----------

ESLHESATTVMITNIPKNVTKEL-
IQQHFVESMIEEVQLAYNCDKLQSIERKLEAARLGREHCQELLQLNGEKVSPCM----
KHVDGIEYFTEVEGKARVEFEQTKQS---LKSLGVAFVTFVNEETSQKCLKDFN-
SSKIFHWNVASAPLTGDILWEHLSVDPESWWARALIINIILFIFVLFITTPTVLITSFNEIKASI----------
---
VAPNPFFTQFLPTIMLWTFSAILPVVVSYSSYFEAHWTRSRLEHSVMIKTYVFLLLMVIVLPSLAL
TSADALFQVTKS-----
RLACVFLPNNGAFFVNYLVTSALIGTALELCRFPELAAYAVRMCRLVRESVREFAFGHQYAWMI
VIFSVMVVYSIACPLVTPFGLLYLTFKHVVDRYNLYFNYRPAYYVDPSVHSTAVVFTIISSFFLLLS
ILFFGVVRLGINDPQTIFTIVLVALTLAAFVGRVAFGFFKRLGPKQR--------LTRRKTYTSP
>Neurospora_crassa_XP_956097.1
KDPASLSALGSTFVPVLVYAAICLLIFFTF--RRISTRTYAPRTIAQLP-
EHPAQTNGWIDWVKPFWKIDDDYILNNCSLDGYLFLRFLKILSVICFAGLAISWPILLPINATGGN-
-L-RQLDKLTMGNI---
PSKYYAHVVVAWLFFGFVLFMVCRECIYYINLRQAYLLSPNMSNRLSARTVLFTCIPKPYLDEAK
LRKLFG-
DSVKNIWIPKNTNYLRGLVEDRDDVAERLEKAEIELIKKANNDRPHHRPFGRRVDTIRWTRARL
KVLNRDIWKLRRKFRDGQPLSSAFVEFDSQASAEAAYQILSHHQP-
MHMSPRIGVRPEQVIWSSLRIRWWEQIMRQFLMLALVVVAIIFWSIPSAAVGIISNIDFLSEKVPF
LFWIPLLPVILGVIKGLLPAVALSMLMAIVPAGLRVCARVAGCPSHALVELYCQSAYFAFQVIQVF
LVTTITSAASAAIIDVIKQPMSAPNLLAQNLPKASNFYLSYILVQCLGAGAGKLANVSDLLRHYVA
TSAYHWRKLTPIHWGAVYPRFTNMGVIALAYSCISPLILVFAGFGMLFVGLVYRYNLIYIHDSELD
TKGLLYPRALLHLMVGLYIAEICLIGLFALKKAFGPMLLMILFFGFCAITHYSLSSALSPLLASLPQT
LALEKELPKGYENKRGYYPP
>Neurospora_crassa_XP_962104.2
AAQLSSNSIYAALGSSVSITVAVALGFSLV--RPLNTVVYAPKLH---
DDKHAPPQKGFFSWIKPLWTTTEQDLVRLVGMDATIFMRFTRMCRNIFLCLAVLCCCIQIPINW
YKN----SPWLQKVTPMNVWN-Q-
WQWATVVMSWVTTLIVCFFLWWNYRKVCELRIQYLRSEEYQQSLHARTLMLYDIPKNLTSDEG
IARIIDSSSFSRTAVARDVKILPTLIEEHEKTVRKLEQVLAKYLKDPKVTRPVCRPKDKKLDAIDYL
TQRIKLLELEIKEVRQRI-DKRSMPYGFASYSDISEAHAIAYLCRSKKP-
QGARVTLAPKPNDIVWENMPLSSASRATRRLWNNLWITVLTVVWVAPNAMIAILVNLSNLARV
WPDFQKSLETNNFWAIVQGIASPALTSLVYMVLPIIFRRLSMKAGDMTKTGRERHVVAKLYSFF
VFNNLFVFSLFSALWSFGATVIKNTATFGTTVFVSLCGISPFWVVWLIQRQL-
GAAIDLSQLWKLIYGSIMRKLIELTAPPPFDYASYYNYFLFYATAALCYAPIMPLVLPAAGMYFAI
DVALKKYLLMYVFVTKTESGGMFWRILFNRILFGLMLSHLIVFLVVWVRG-
KTQAYAVVPLPILIIIFKFVCSWIYDNKITYFSTRIIK--GP-RNDRLASRFGHP
>Neurospora_crassa_XP_962529.1
FGGISLVAFLTALATSLVVFGVQMGLFLLL--RHKLARIFKPKTY--LE-
RERTEPASPWNLLSTVLRYNDREIIKKCGLDAYFFLRYLQTLLVLFIPIAIVVIPILIPINYVGGL--
GPTGLDTLAWGNV-
EHYRRRWAHLILALLVIIWVCGVFFAELRVYVKIRQDYLTSAEHRLRASANTVLVSSIPDKWLTE
DALRGLFDVGGIRNVWLTRDFTKLLEKIHRRDAIHVQLEEAETELIREAKKDRPHHRLLNKKVDT
IYWCRAELAKLNLEIEEDQQHPERYPIMNSAFIQFNHQVAAHMACQSVTYHIP-
KQMAPRVEISPNDVIWDNMAIKWWHEWARSALVFAVVTGMLVLWAFPVAWTASLAQLDALVE
KYSWLHWLKTIHVIKG-
VAGVLPAAVLAILLILVPIALDWLATFQGAKTGSQTTETVQTYYFAFLFVQVFLVVSITSSTFQTIA
NITQDITSTPEVLAENLPKAANYFFSYMILQALSTSSGTLLQIGTLFMWYIMARKWTNTQLPSVT
WGSFFPVYTNFACIALIYSVVAPLISIFAIITFALLWCAHRYNMLYVTRFRTDTGGVLYPRAINQTF
TGLYVMELCLIGLFFLAVCVPQAIIMIIALIFTILYQYLLNRSFGPLLRYLPITFEDEAPEERDVLVRK
AFQHY

>Neurospora_crassa_XP_962626.1
KEPVSLSGMIVTLVPILITSAIYLAIFLVL--RKSNRRYYAPRTYLGSE-
NERSPSNGLFSWVKDFWKIPDVYALQHQSLDAYLYIRYLRMAVTICFVGCCITWPVLFPVNATG
GN--G-
KQLDILTYGNIETRYNRYYAHVFISWIFFGFVMYLIMRECIFYINLRQAFLISPLYSQRISSRTVLFT
SVPEPYLDEQRLRKVFG-
ASVKNVWITSETKEVDELVEERDKVAMRLEKAEVKLIKLANNKRPTHRLIGKKVDTIDWCREELT
RLIPEAEAAQDKYRAFKKVPGVFIEFRTQADAEGAAQILAHHRG-
LHMTPKIGIRPNEIVWKSLAIPWWQRVIRRYAVYAFITAMIIFWAIPVGVVGIISNVNYL-
KTISFLTWLDDIPFILGAVTGLLPSIALSILMSLVPIVIRICAKLSGEPSLSRVELFTQHAYFAFQVIQ
VFLVATVASSATAVAKQIADNPGSVTKLLSENLPKSSNFYISYFIVQGLSIATSVLTQVVGFFVFN
LVYKLYTWANLSAISWGSTMPVYTNIVVIAIAYATIAPLMLGWATVAMGLFYLAWRYNVLFVTDT
QIDTRGLIYPRAIKQLYTGIYLAEICMIGLFGASVAPGPLVLMVIFLIFTILFHISMNAALNPLLYNLP
LTLLAEE-PYTEEVERDAYCPP
>Neurospora_crassa_XP_964945.1
YVRPGNKDTWYQFIISVSLGISAFLAFCALRPRWKS--LYASRKA----------
DTFFGWMGTLYRVTERQVLASAGLDAYVFLNFFKMAMKLFVIIFFFALAVLEPINRAFPDDLNTY
PYGHTTLYD-KKSKRYLWSYLVFTYFFTGLTLFLMNRETFKVLRVRQDYLGTQ---
STITDRTFRLSGIPKDLRTEKDIKNLVEKGKVENVTLCRKWKELDDLMDKRQAILAKLEAYLLGN
TTSDLRPRPQTR---RKTDAIDYYTEKLRVLDDQIRAARKK--
HYEPTDLAFVTMDSIAACQMAIQALIDPHP-
GQLLTKPAPAPSDIEWRNTYASRLTRRVRSVAVTLFVAFLTVVWLVPVAFLASFLSICTIEAYFK
GFAMWLKQYLARALVQTGLPTAVVSLLNVAVPYFYDYLSYQQGMLSRGDAALSTISKNFFFTFF
NIFLIFTVFGAVTSIIESLKDT-
TYIAYVLASKIENLGVFYTNFIMLQGIGLFPFRLLQFGSVSLYPINRLFAQIVSPPMFYYGFYLPTA
LLVFILCLVYSALPQKVVGLGVAYFTLGYFTYKYQLLYAMEQPAHATGGAWNMICYRIMLGLLVF
QLTMSGYLALRKAFTAALLVSPLLIITVWYGYSFRRHFEPLTKFIALRSIRGETLDEDKEKGAKFV
NP
>Oryza_sativa_indica_A2Y4C8
---GSLTDIGVAAGINILSALGFLLAFAVLRIQPINDRVYFPKWYLKG--
TRSSPRIRFLNWMPAALQMPEPELIEHAGLDSAVYVRIYLLGLKIFVPIAVLAFIVLVPINWASGTL
EKYDQIDKLSISNLGKGSKRFWAHIVMAYVFTFWTFFVLYREYKVVTTMRLRFLAIQN--
RRADQFTVLVRNVPPE-
TVSEHVEHFFAVDHYLSHQTVYNANTLAGLVEQKKGLQNWLVYYENQHAKNPAK-
KPTMKTWGKRVDAIEHYTTAIEELCKQEDEERHKVIPNAIMPAAFVSFKSRWGAAVCAQTQQT
SNP-
TLWLTEWAPEPRDVFWPNLAIPFVELSVRRLIMAVALFFLTFFFMIPIAIVQSMANLDDIERMLPF
LKPIIERNSLKSIVQGFLPGIALKIFLILLPTFLVMMSKIEGHTSLSGLDRRTASKYYLFLFVNVFLG
SVITGTAFQQLNNFIQSANKIPEIVGESIPMKATFFITYVMVDGWAGVAAEVLRLKPLVMFHIKNT
REQAMDPGSLDFGTTEPRIQLYFLLGLVYAVVTPILLPFIIVFFSLAYLVFRHQIINVYNQQYESGA
QFWPDVQRRLVIALIVSQILLLGLLSTQEAEKSTVALLPLPVLSIWFHYVCKGRFEPAFIKFPLQD
AMVKTLNLREYLKDAYVHP
>Oryza_sativa_indica_A2Y857
---ATVSDIGLSAAINVSMAVAFLLVFAFLRLQPINDRVYFPKWYLRG--
MRDSPVLKFLSWMPAALKMPEDELINHAGLDSAVYLRIYLTGIKIFVPISILASLVLFPVNWTNDT
LD-HSKIDKLSISNIPYGSNRFVTHLVMAYAVTFWTCYVLFREYEIITTMRLRFLASEK--
RRPDQFTVLVRNIPPE-
SISELVEHFFLVDHYLRHQVVYNANKLADLVEKKKKLQNWLDYYQLKYERNPSK-
RPTTKTFGSEVDAIEYYKAEIEKIGKEEADERQKIMPQSAVPAAFVSFRSRWGAAVCAQTQQTS
NP-
TVWITEWAPEPRDVYWNNLSIPFVSLTVRRLIVAVAFFFLNFFYVIPIAFVQSLASLEGIEKALPFL

KPLIKIDVIKSFIQGFLPGIALKVFLILLPTILMFMSKFEGLISQSSLERRSASKYYIFLFFNVFLGSIV
TGSALDQLKAYIQSANEIPRTIGVAIPMRATFFITYVMVDGWTGVAGEILRLRALIIFHLKNFREEA
MDPGSICFDWCEPRIQLYFLLGLVYAVVTPLLLPFILVFFGLAYVVYRHQIINVYNQQYESGAQF
WPSVHGRIIIALIVSQLLLIGLLSTKGFEETTPVLVVLPVLTFWFYKYCKNRFEPAFVRNPLQEAM
RKTFDLKAYLANAYLHP
>Oryza_sativa_indica_A2YI72
----DTASFVTSLLTSFVIFVVLVLVFTWLSSRPGNAPVYYPSVLLRG--------
RSPVGWLRQAISASEGDVVAAGGVDAAVYLVFLSSVLSILVFSGIVLLPVLLPVAATDDNLNLFT
ELEKLALGNVQEHSRRLWAFLLSVYWVSFVTYFVLWKSYKHVSNMRAAARSTPD--
VKPEEFAVLVRDVPKDQTIKDSVDSYFRADTFYRSMVVTDHTKADKIYQEIEGHKQKIARAEVV
YAESKTGTKPTHRIIGKKVDTIEYCNDQIKELLPKLEAEQKTTLKQ--
QQAAIVFFNRRSAAASASQTLHAQMF-
DKWTVEQAPEPRQIIWSNLSKKIYERQIRQVVVYTIVFLTVVFYMIPITAISALTTLEKLREKLPFLK
VVVDQPKIKTVLQAYLPQLALIVFLALLPSLLMFLSKLEGIPSQGHTVRAAAGKYFYFIVFNVFLG
VTISSTLFSALTTIINNPPGIVNMLASSLPGSATFFLTFVALKFFVGYGLELSRLVPLIIFHLKRKVR
AAWAPGDLGYNTRVPNDMLIVTIVLCYSVIAPLIIPFGVAYFALGWIIAKNQVLRVYVPSYESNGR
MWPHMHTRIIAALLIYQITMVGVILLKKFLYS-PVLVPLIPISFIFAYICHMRFYPAFAKTPLEVV-QH-
-----AVYTSYIPA
>Oryza_sativa_indica_A2ZAL4
---ATLPDLGVSAFINILGAFVFLLIFAALRLQPINDRVYFPKLYLTG--
RRHHPHLRFLAWVPGALRMSQPDLIHHAGLDSAVYLRIYTLGLKIFLPIMTVALLVLIPVNVSGGT
LLNFSDIDKLSISNVNPGSNRFFIHLLMAYVFTFWTCFMLYKEYSNVAFMRLHFLASQK--
RCADQFTVIVRNIPHH-
STSETVDEFFRRDHYLGQQAVYNANRYAKLVKKKERLQNWLDYYQLKFERHPGK-
RPIGRTCGREVDQIDYYRARISELDKKLASERQRVLPKAVMPVAFVTFDSRWGAAVCAQTQQS
KNP-
TQWLTDWAPEPRDVYWQNLAIPFFSLSIRKFLISIAVFALVFFYMIPIAFVQSLANLEGIEKVAPFL
RPVIDAPVVKSFLQGFLPGLALKIFLYILPTVLMIMSKVEGYVSLSSLERRAASKYYYFMLVNVFL
GSIIAGTAFEQLNAFFQPPSQIPRTIGVAIPMKATFFMTYIMVDGWAGIANEILRVKPLVIYHLKNM
RERAMDPGSIGLAENLPSLQLYFLLGLVYAVVTPILLPFIIIFFAFAFLVYRHQIINVYNQEYESAAA
FWPQVHSRIIASLLISHVTLFGLMSTMKAAYSTPLLIFLPLLTIWFHKYCKSRFEPAFRKYPLEEA
MEKNLNLKSYLQNAYLHP
>Oryza_sativa_indica_B8A969
----DAEGLLASAAINLGLALVALSLFSLLKKQPGNAPVYLARRMAA---------
TPSFRWIRAALRLSEDDVLRRHGLDALVVVRLFKFGIKCFAVCSIVGLFILAPTNYSCEGLQDSN
SMELFTVSNVARGSNRLWVHFACLCFISFYVVYLLHKEYKEMSSRRIAHLKYHR--
KRPDQFTILVRGIPLHGTYGCYADHFFSKQTYQSYHIVHDIGNIEALQKLASSLEDKIKRK----------
-RETRRCLTLEAIDTRKLEEKLKNVHHSIRLLQCENMRK-
ELPVAFVSFKSQLDAAQAAEMQQHVNP-
LSLVTTYAPEPPDALWTNLAIPFCRIAIYKLGVFIAAFLLIVFFTIPVTAVQGIVQFEKIKIWFPPARA
VELIPGLNSVVTGYLPSMILNGFIYLIPFAMLGMASFEGCIAKSQKEIKACNM----------
IGESFTHPKDIPSRLARAVSAQSDFFITYILTDGMSGFSLEVLQFGLLTWHFFKAHQPYLY---
GFPYYRVVPIVSLAVLIGLVYAVVAPLLLPILVIYFLLGYAVYINQMEDVYEITYDTCGQYWPNIHR
YIFLSVTLMQITM-----LKSKPGASFATVPLLVSTILFNEYCKVRFLPTFLRRPVQVAKEN-
RGDLDHAISAYKPP
>Oryza_sativa_indica_B8A9P0
---ATIQDIGVSAAINILSAITFLLAFAFLRLQPINDRVYFPKWYLKG--
ARESPSLKVLSWMPAALKMPEDELISHAGLDSAVYLRIYLIGLKIFAPITVLAFIILVPVNWTNITLQ
-HSDIDKLSISNIPVGSKRFAAHLTMAYVFTFWTCYVLLREYEIVATMRLRFLASEK--
RRPDQFTVLVRNIPPE-
SIGELVEHFFLVDHYLTHQVVYNANKLDKMVKEKKKMQNWLDYYQLKYERNTSQ-

RPTTKTFGSKVDAIEYYTSEIERIEKEETDERGKIMPKSVVPAAFVSFRSRWGAAVCAQTQQTS
NP-
TVWLTEWAPEPRDVYWDNLSIPFVYLTIRRLIIAVAFFFLNFFYVLPIAFVQSLANIEGIEKAAPFL
KPLIEMRTIKSFIQGFLPGIALKIFLILLPSILMFMSKVEGLTSVSSLERRSAFKYYIFLFFNVFLGSII
AGSALEQLKTFLQSANEIPRTIGEAIPMKATFFITYVMVDGWAGVAGEILRLKPLIIFHLKNFREEA
MDPGSIGFDSNEPQIQLYFLLGLVYAVVTPFLLPFILIFFGLAYVVYRHQIINVYNQEYESAAAFW
PSVHGRIIVALIVSQLLLLGLLSTKGAGQSTPVLLVLPVVTFYFYKYCKNRYEPAFVEYPLQDAM
RKGFDLKGYLMNAYIHP
>Oryza_sativa_indica_B8ACM4
----KISGLLTSAGINIALSVLFISLYSVLRKQPANVRVYFGRRIAE-E-HNR---
VPSTGWIVKALQCTEEEILAAAGLDAVVFNRILVFSLRIFSLAAILCVFGILPLNYFGQDI--
SESLDIFTIGNVKVRSRWLWVHCVALYIISGVACILLYLEYKHIARLRLRHLTCAM--
PNPSHFTVLVRGIPKE-
SCSNAIDDFFTKSSYLFHQVVYKVGKVQKIMTGAKKAYRKFKHFTDSTIDQ----
RCRAISCGASSNSFQLLATGLEQNQGKSDLQDSSLKDQ-
ECAAAFVYFRTRYAALVASEILQTSNP-
MKWVTDLAPEPDDVYWSNLWLPYKQLWIRRIATLLGSIVFMLFFLIPVTFIQGLSQLEQLQQRLP
FLKGILEKKYMSQLVTGYLPSVILQIFLYAVAPIMILFSTLEGPISHSERKRSACCKVLYFTVWNIF
FGNVLSGTVISQLNVLS-
SPKDIPVQLARAIPVQATFFITYVLTSGWASLSSELMQLFGLIWNFVRKYTEFVP---
SFPYHTEVPKVLLFGLLGFTCSVLAPLILPFLLVYFFLGYIVYRNQLLNVYRTRYDTGGLYWPIAH
NAVIFSLVLTQIICLGVFGLKESPVAAGFTIPLIILTLLFNQYCRNRLLPLFRTTPAQDLIDMMDEIH
HRLHSAYCQF
>Oryza_sativa_indica_B8AMU4
EPEAWYGSIQYLVNISAVGAASCVLLFLLVKLRFDHRR----------
SALAAKLLAVYHATAPQIALHCGADAAQFLLFERASFLVLAAVAAAAVAAALPLNLLAGDA--
ADQFAATTISHIPKSSPLLWLHLLLTAAVVAIAHLGISRMEDALRITRFRD-----
NSSSVAVFTIMIQGIPKTLAADKTLKDYFEHGKVYRVIVPFDLCTLEYLAEEWGKVRNRISWLEA
RMDARNL----------EEMLRRLQTKKLVLGSRLSDYKDG--
RAPGAGIAFVVFKDVYTANKAVRDFREPVQLERWTVERAPPASDIYWNHLGLSKTSLGLRRIAV
NTCLILMLLFFSSPLAIISGMQSAARIINAKSWLVWLQSS-
WFWTIIFQFLPNVLIFVSYIIIPSVLSYFSKFECHLTVSGEQRAALLKMVCFFLVNLILLRALVESSL
ESWGCYLDSDQ-
IQYLSPSFLSRSSLSSLAFLITCTFLGISFDLLAPIPWIKHVMKKFNRSHMPKQTFDFAQYYAFDIT
IFALTMIYSLFAPLTVPVGAVYFGYRYLVDKYNFLFIYRVRGGNDGKLMDMVICIMQFCVIFFLVA
MLLFFAVQGDPMKLQAICTLGLLVFY--KLLSDRFQPSLEGMQTNSF-----VDGPTDYEVFSQP
>Oryza_sativa_indica_B8AP47
----KVGALLTSAGINISLCILFLSLYSVLRKQPQNVKVYFGRRIAE-E-NSR---
VPSASWILRSLRCTEDELLATAGLDAVVFNRILVFSIRIFSLAAFLCVLGVLPLNYFGQDM--
SASLETFTIGNMQERSRWLWVHCVALYIISGVACLLLYLEYKHIARLRLLHVSRAS--
TNPSHFTVLVRGVPKE-
SISCTVESFFTKSSYLSHQIIYKVGKLQKIVTGAKKAYKKFKHFKGTTVDQ----
RCGPITCGASSKSFELLPVEPEQEMKKHDVKDSELSDK-
DCGAAFVFFKTRYAALVVSEIVQTSNP-
MEWVTSLAPDRDDVYWSNLWLPYKQLWIRRIVTLSGSIVFMFLFLIPVTFIQGLTQLEQLQQRLP
FLNGILKKKYITQLVTGYLPSVILQIFLYTVPPTMMFFSTLEGPVSHSERKRSACCKVLYFTIWNV
FFVNVLSGSAISQVNALS-
SPKDIPMVLARAVPVQATFFTTYVLTSGWASLSSELMQLFGLTWNFIMKYSYFVP---
SFPYHTEVPKVLLFGLLGFTCSVLAPLILPFLLVYFFLGYVVYRNQFLNVYCTKYDTGGLYWPIA
HYTTIFSIVLTQIICLGVFGLKESPVAAGFTVPLIILTLLFNQYCSNRLRPLFKTLPAQDLIDMMDDI
HHRLHSAYCQF

>Oryza_sativa_indica_B8AR42
----EFSALLTSAGINIGLCALLLSLYSVLRKQPHNYGVYFGRRLAE-E-KFR---
LPTAGWIVKAYWCTEEEIRRVAGLDSVVFLRLFIFSIRIFSITSLVCIFGVLPVNYHGKET--
AESLNVFTIANLKEGSRMLWVHCVALYVITISACILLYYEYKYISRKRLAHITGSP--
PDPGHFSVLVRSIPKE-
LLDDTIRNFFVNSSYLSHQMIYRKGSMQKFVDNAERVYRKFVRVKMSSFGQ----
SRRSDLCGVRASSFQQYRNKFINSKK-PDLSDPEVIQK-
DCPGAIVFFKTRYAAIVASRILQSSNP-
MLWVTDFAPEPRDVYWSNLWIPYRQIWLRKIATLAASVAFMFVFIVPVAFVQSMMQLDQIEQLF
PSLKNMLKKPFFVKLVTGYLPSVVLLLSLYTVPPMMMFFSSIEGSISRSGRKKSACCKILFFTIW
NVFFVNVLSGSVLNQLNVFT-
RPRDMPSMLAELVPKQATFFITYVLTSGWASLCSEILQVYNLVYNFFRKCPEYGY---
SFPYHTEVPKVLLFNLLGFTFSIMAPLILPFLLVYFCLGYLVYRNQILNVYYPKYEMGGKLWPIMH
STLVFALVLTQTIALGVFTIKHATISSGFTILLIIGTVLFHQYCRHRFSSIFNSFSAQDLIEMMEEIHK
HLLDAYSQG
>Oryza_sativa_japonica_Q10S28
EPEAWYGSIQYLVNISAVGAASCVLLFLLVKLRFDHRR----------
SALAAKLLAVYHATAPQIALHCGADAAQFLLFERASFLVLAAVAAAAVAAALPLNLLAGDA--
ADQFAATTISHIPKSSPLLWLHLLLTAAVVAIAHLGISRMEDALRITRFRD-----
NSSSVAVFTIMIQGIPKTLAADKTLKDYFEHGKVYRVIVPFDLCTLEYLAEEWGKVRNRISWLEA
RMDARNL----------EEMLRRLQTKKLVLGSRLSDYKDG--
RAPGAGIAFVVFKDVYTANKAVRDFREPVQLERWTVERAPPASDIYWNHLGLSKTSLGLRRIAV
NTCLILMLLFFSSPLAIISGMQSAARIINAKSWLVWLQSS-
WFWTIIFQFLPNVLIFVSYIIIPSVLSYFSKFECHLTVSGEQRAALLKMVCFFLVNLILLRALVESSL
ESWGCYLDSDQ-
IQYLSPSFLSRSSLSSLAFLITCTFLGISFDLLAPIPWIKHVMKKFNRSHMPKQTFDFAQYYAFDIT
IFALTMIYSLFAPLTVPVGAVYFGYRYLVDKYNFLFIYRVRGGNDGKLMDMVICIMQFCVIFFLVA
MLLFFAVQGDPMKLQAICTLSLLVFY--KLLSDRFQPSLEGMQTNSF-----VDGPTDYEVFSQP
>Oryza_sativa_japonica_Q2QLP9
----KISGLLTSAGINIALSVLFISLYSVLRKQPANVRVYFGRRIAE-E-HNR---
VPSTGWIVKALQCTEEEILAAAGLDAVVFNRILVFSLRIFSLAAILCVFGILPLNYFGQDI--
SESLDIFTIGNVKVRSRWLWVHCVALYIISGVACILLYLEYKHIARLRLRHLTCAM--
PNPSHFTVLVRGIPKE-
SCSNAIDDFFTKSSYLFHQVVYKVGKVQKIMTGAKKAYRKFKHFTDSTIDQ----
RCRAISCGASSNSFQLLATGLEQNQGKSDLQDSSLKDQ-
ECAAAFVYFRTRYAALVASEILQTSNP-
MKWVTDLAPEPDDVYWSNLWLPYKQLWIRRIATLLGSIVFMLFFLIPVTFIQGLSQLEQLQQRLP
FLKGILEKKYMSQLVTGYLPSVILQIFLYAVAPIMILFSTLEGPISHSERKRSACCKVLYFTVWNIF
FGNVLSGTVISQLNVLS-
SPKDIPVQLARAIPVQATFFITYVLTSGWASLSSELMQLFGLIWNFVRKYTEFVP---
SFPYHTEVPKVLLFGLLGFTCSVLAPLILPFLLVYFFLGYIVYRNQLLNVYRTRYDTGGLYWPIAH
NAVIFSLVLTQIICLGVFGLKESPVAAGFTIPLIILTLLFNQYCRNRLLPLFRTTPAQDLIDMMDEIH
HRLHSAYCQF
>Oryza_sativa_japonica_Q5JKX1
----DAEGLLASAAINLGLALVALSLFSLLKKQPGNAPVYLARRMAA---------
TPSFRWIRAALRLSEDDVLRRHGLDALVVVRLFKFGIKCFAVCSIVGLFILAPTNYSCEGLQDSN
SMELFTVSNVARGSNRLWVHFACLCFISFYVVYLLHKEHKEMSSRRIAHLKYHR--
KRPDQYTILVRGIPLHGTYGCYADHFFSKRTYQSYHIVHDIGNIKALQKLASSLEDKIKRK----------
-RETRRCLTLEAIDTRKLEEKLKNVHHSIRLLQCENMRK-
ELPVAFVSFKSQLDAAQAAEMQQHVNP-
LSLVTTYAPEPPDALWTNLAIPFCRIAIYKLGVFIAAFLLIVFFTIPVTAVQGIVQFEKIKIWFPPARA

VELIPGLNSVVTGYLPSMILNGFIYLIPFAMLGMASFEGCIAKSQKEIKACNMVFYFLLGNVFFLSI
LSGSLLHQIGESFTHPKDIPSRLARAVSAQSDFFITYILTDGMSGFSLEVLQFGLLTWHFFKAHQ
PYLY---
GFPYYRVVPIVSLAVLIGLVYAVVAPLLLPILVIYFLLGYAVYINQMEDVYEITYDTCGQYWPNIHR
YIFLSVTLMQITM-----LKSKPGASFATVPLLVSTILFNEYCKVRFLPTFLHRPVQVAKEN-
RGDLDHAISAYKPP
>Oryza_sativa_japonica_Q5JLH8
---ATIQDIGVSAAINILSAITFLLAFAFLRLQPINDRVYFPKWYLKG--
ARESPSLKVLSWMPAALKMPEDELISHAGLDSAVYLRIYLIGLKIFAPITVLAFIILVPVNWTNITLQ
-HSDIDKLSISNIPVGSKRFAAHLTMAYVFTFWTCYVLLREYEIVATMRLRFLASEK--
RRPDQFTVLVRNIPPE-
SIGELVEHFFLVDHYLTHQVVYNANKLDKMVKEKKKMQNWLDYYQLKYERNTSQ-
RPTTKTFGSKVDAIEYYTSEIERIEKEETDERGKIMPKSVVPAAFVSFRSRWGAAVCAQTQQTS
NP-
TVWLTEWAPEPRDVYWDNLSIPFVYLTIRRLIIAVAFFFLNFFYVLPIAFVQSLANIEGIEKAAPFL
KPLIEMRTIKSFIQGFLPGIALKIFLILLPSILMFMSKVEGLTSVSSLERRSAFKYYIFLFFNVFLGSII
AGSALEQLKTFLQSANEIPRTIGEAIPMKATFFITYVMVDGWAGVAGEILRLKPLIIFHLKNFREEA
MDPGSIGFDSNEPQIQLYFLLGLVYAVVTPFLLPFILIFFGLAYVVYRHQIINVYNQEYESAAAFW
PSVHGRIIVALIVSQLLLLGLLSTKGAGQSTPVLLVLPVVTFYFYKYCKNRYEPAFVEYPLQDAM
RKGFDLKGYLMNAYIHP
>Oryza_sativa_japonica_Q5TKG1
---ATVSDIGLSAAINVSMAVAFLLVFAFLRLQPINDRVYFPKWYLRG--
MRDSPVLKFLSWMPAALKMPEDELINHAGLDSAVYLRIYLTGIKIFVPISILASLVLFPVNWTNDT
LD-HSKIDKLSISNIPYGSNRFVTHLVMAYAVTFWTCYVLFREYEIITTMRLRFLASEK--
RRPDQFTVLVRNIPPE-
SISELVEHFFLVDHYLRHQVVYNANKLADLVEKKKKLQNWLDYYQLKYERNPSK-
RPTTKTFGSEVDAIEYYKAEIEKIGKEEADERQKIMPQSAVPAAFVSFRSRWGAAVCAQTQQTS
NP-
TVWITEWAPEPRDVYWNNLSIPFVSLTVRRLIVAVAFFFLNFFYVIPIAFVQSLASLEGIEKALPFL
KPLIKIDVIKSFIQGFLPGIALKVFLILLPTILMFMSKFEGLISQSSLERRSASKYYIFLFFNVFLGSIV
TGSALDQLKAYIQSANEIPRTIGVAIPMRATFFITYVMVDGWTGVAGEILRLRALIIFHLKNFREEA
MDPGSICFDWCEPRIQLYFLLGLVYAVVTPLLLPFILVFFGLAYVVYRHQIINVYNQQYESGAQF
WPSVHGRIIIALIVSQLLLIGLLSTKGFEETTPVLVVLPVLTFWFYKYCKNRFEPAFVRNPLQEAM
RKTFDLKAYLANAYLHP
>Oryza_sativa_japonica_Q6AU79
---GSLTDIGVAAGINILSALGFLLAFAVLRIQPINDRVYFPKWYLKG--
TRSSPRIRFLNWMPAALQMPEPELIEHAGLDSAVYVRIYLLGLKIFVPIAVLAFIVLVPINWASGTL
EKYDQIDKLSISNLGKGSKRFWAHIVMAYVFTFWTFFVLYREYKVVTTMRLRFLAIQN--
RRADQFTVLVRNVPPE-
TVSEHVEHFFAVDHYLSHQTVYNANTLAGLVEQKKGLQNWLVYYENQHAKNPAK-
KPTMKTWGKRVDAIEHYTTAIEELCKQEDEERHKVIPNAIMPAAFVSFKSRWGAAVCAQTQQT
SNP-
TLWLTEWAPEPRDVFWPNLAIPFVELSVRRLIMAVALFFLTFFFMIPIAIVQSMANLDDIERMLPF
LKPIIERNSLKSIVQGFLPGIALKIFLILLPTFLVMMSKIEGHTSLSGLDRRTASKYYLFLFVNVFLG
SVITGTAFQQLNNFIQSANKIPEIVGESIPMKATFFITYVMVDGWAGVAAEVLRLKPLVMFHIKNT
REQAMDPGSLDFGTTEPRIQLYFLLGLVYAVVTPILLPFIIVFFSLAYLVFRHQIINVYNQQYESGA
QFWPDVQRRLVIALIVSQILLLGLLSTQEAEKSTVALLPLPVLSIWFHYVCKGRFEPAFIKFPLQD
AMVKTLNLREYLKDAYVHP
>Oryza_sativa_japonica_Q6ZLQ0
----DTASFVTSLLTSFVIFVVLVLVFTWLSSRPGNAPVYYPSVLLRG--------
RSPVGWLRQAISASEGDVVAAGGVDAAVYLVFLSSVLSILVFSGIVLLPVLLPVAATDDNLNLFT

ELEKLALGNVQEHSRRLWAFLLSVYWVSFVTYFVLWKSYKHVSNMRAAARSTPD--
VKPEEFAVLVRDVPKDQTIKDSVDSYFRADTFYRSMVVTDHTKADKIYQEIEGHKQKIARAEVV
YAESKTGTKPTHRIIGKKVDTIEYCNDQIKELLPKLEAEQKTTLKQ--
QQAAIVFFNRRSAAASASQTLHAQMF-
DKWTVEQAPEPRQIIWSNLSKKIYERQIRQVVVYTIVFLTVVFYMIPITAISALTTLEKLREKLPFLK
VVVDQPKIKTVLQAYLPQLALIVFLALLPSLLMFLSKLEGIPSQGHTVRAAAGKYFYFIVFNVFLG
VTISSTLFSALTTIINNPPGIVNMLASSLPGSATFFLTFVALKFFVGYGLELSRLVPLIIFHLKRKVR
AAWAPGDLGYNTRVPNDMLIVTIVLCYSVIAPLIIPFGVAYFALGWIIVKNQVLRVYVPSYESNGR
MWPHMHTRIIAALLIYQITMVGVILLKKFLYS-PVLVPLIPISFIFAYICHMRFYPAFAKTPLEVV-QH-
-----AVYTSYIPA
>Oryza_sativa_japonica_Q75GI5
----EFSALLTSAGINIGLCALFLSLYSVLRKQPHNYGVYFGRRLAE-E-KFR---
LPTAGWIVKAYWCTEEEIRRVAGLDSVVFLRLFIFSIRIFSITSLVCIFGVLPVNYHGKET--
AESLNVFTIANLKEGSRMLWVHCVALYVITISACILLYYEYKYISRKRLAHITGSP--
PGPGHFSVIVRSIPKE-
LLDDTIRNFFVNSSYLSHQMIYRKGSMQKFVDNAERVYRKFVRVKMSSFGQ----
SRRSDLCGVRASSFQQYRNKFINSKK-PDLSDPEVIQK-
DCPGAIVFFKTRYAAIVASRILQSSNP-
MLWVTDFAPEPRDVYWSNLWIPYRQIWLRKIATLAASVAFMFVFIVPVAFVQSMMQLDQIEQLF
PSLKNMLKKPFFVKLVTGYLPSVVLLLSLYTVPPLMMFFSSIEGSISRSGRKKSACCKILFFTIWN
VFFVNVLSGSVLNQLNVFT-
RPRDMPSMLAELVPKQATFFITYVLTSGWASLCSEILQVYNLVYNFFRKCPEYGY---
SFPYHTEVPKVLLFNLLGFTFSIMAPLILPFLLVYFCLGYLVYRNQILNVYYPKYEMGGKLWPIMH
STLVFALVLTQTIALGVFTIKHATISSGFTVLLIIGTVLFHQYCRHRFSSIFNSFSAQDLIEMMEEIH
KHLLDAYSQG
>Oryza_sativa_japonica_Q75LY2
----KVGALLTSAGINISLCILFLSLYSVLRKQPQNVKVYFGRRIAE-E-NSR---
VPSASWILRSLRCTEDELLATAGLDAVVFNRILVFSIRIFSLAAFLCVLGVLPLNYFGQDM--
SASLETFTIGNMQERSRWLWVHCVALYIISGVACLLLYLEYKHIARLRLLHVSRAS--
TNPSHFTVLVRGVPKE-
SISCTVESFFTKSSYLSHQIIYKVGKLQKIVTGAKKAYKKFKHFKGTTVDQ----
RCGPITCGASSKSFELLPVEPEQEMKKHDVKDSELSDK-
DCGAAFVFFKTRYAALVVSEIVQTSNP-
MEWVTSLAPDRDDVYWSNLWLPYKQLWIRRIVTLSGSIVFMFLFLIPVTFIQGLTQLEQLQQRLP
FLNGILKKKYITQLVTGYLPSVILQIFLYTVPPTMMFFSTLEGPVSHSERKRSACCKVLYFTIWNV
FFVNVLSGSAISQVNALS-
SPKDIPMVLARAVPVQATFFTTYVLTSGWASLSSELMQLFGLTWNFIMKYSYFVP---
SFPYHTEVPKVLLFGLLGFTCSVLAPLILPFLLVYFFLGYVVYRNQFLNVYCTKYDTGGLYWPIA
HYTTIFSIVLTQIICLGVFGLKESPVAAGFTVPLIILTLLFNQYCSNRLRPLFKTLPAQDLIDMMDDI
HHRLHSAYCQF
>Oryza_sativa_japonica_Q7XBT3
---ATLPDLGVSAFINILGAFVFLLIFAALRLQPINDRVYFPKLYLTG--
RRHHPHLRFLAWVPGALRMSQPDLIHHAGLDSAVYLRIYTLGLKIFLPIMTVALLVLIPVNVSGGT
LLNFSDIDKLSISNVNPGSNRFFIHLLMAYVFTFWTCFMLYKEYSNVAFMRLHFLASQK--
RCADQFTVIVRNIPHH-
STSETVDEFFRRDHYLGQQAVYNANRYAKLVKKKERLQNWLDYYQLKFERHPGK-
RPIGRTCGREVDQIDYYRARISELDKKLASERQRVLPKAVMPVAFVTFDSRWGAAVCAQTQQS
KNP-
TQWLTDWAPEPRDVYWQNLAIPFFSLSIRKFLISIAVFALVFFYMIPIAFVQSLANLEGIEKVAPFL
RPVIDTPVVKSFLQGFLPGLALKIFLYILPTVLMIMSKVEGYVSLSSLERRAASKYYYFMLVNVFL
GSIIAGTAFEQLNAFFQPPSQIPRTIGVAIPMKATFFMTYIMVDGWAGIANEILRVKPLVIYHLKNM

RERAMDPGSIGLAENLPSLQLYFLLGLVYAVVTPILLPFIIIFFAFAFLVYRHQIINVYNQEYESAAA
FWPQVHSRIIASLLISHVTLFGLMSTMKAAYSTPLLIFLPLLTIWFHKYCKSRFEPAFRKYPLEEA
MEKNLNLKSYLQNAYLHP
>Ostreococcus_lucimarinus_XP_001416012.1
RFATSDRDIYVGLGIYATIAFLGLLLFGRMRHVMP---IYFGRLLLT----
KPPPPRYYFGWIPHILRVDDKTLIQTAGLDAFAFLRVCQFGLQLFVPLSIFSMMILLPIHVNGDDM
VRPGGLILTTVANIPGKQGVLWLHTVGMWLMVLYTTWLLKQHSATFVVLRTLYLTTRDVSVWA
SSYTVLITDIPFEEVRVRGVEATLEYDEFRGLIPIFDHRPADALLDSRDECKNMITMIRPPKNLRK
L----------ALSEQVAVLEAQLEAIDEAIICVRKTT-EGSPGPCAFAVFENQVSASTAAQCVIS--
RASVYRALPAPGPDDVNWPTLLHNSTDNRARALAIWPFIIALM---
IFPTGMFATVTSVCQVRNSGAWY---CSD-
VYAAIISGVLPPIILTLWVFVISFYMMYLVQQNVHVSLAATDRRFLRFYWAWGALNVLLGGIFGG
A-
LSLFTTTLSSSSEVQLQFGRVLPLSSNFFLLFIVFRAIYLPVQRLLLPHPGSFCLAADIKTRLYSPR
AVRMGRETGVFMLIMVIGLTFVCIAPLIPLAAALFYITNFVIWRYHVLYVYERGYESNGSVWFTFT
QLVILSLVVAQTFLSCVLFSKQAYIQGAVLATVPYYLFKVYRKFRAEFGSASWAVPLEAT---
AAPPTDFGGEIYTHP
>Ostreococcus_lucimarinus_XP_001417492.1
DTQIAMSEVGTLVGSYAGLFSFLLILFVMLRKIVWLRMAIDSA-----
REIQIPKPDNAWSWLYDAYHRDNNWMKEFTTPDEYMLVRWFKLSSRFFFTAGAVCCPILMSLY
AADTVPSAKSGIAKYTLLNARTESS-FAAAMAFTWITSLFLISLIRVESRKYVHMMWTV-----
DKTGIKANAILVKDMPLKIFDDEELGRFKGTDCIAFKMLASDTRKLDSAAKAWANAREHVT-------
----
QNMQAIADLSTQLAKALKDMDSLKRARYNHRPACSAVVVFARQMDAVIASQIQIDDVP-
GQWVTEPAPGNSDVVWHNLSLTSVERAKKTTQAFFIAVAISLFFMYPVNIAVAVADVKD--
SLVS---------
VFGESIYNIILSIVLTVFLVVGHILSLVVSRQTGYVSVSAMDSFGASMYFWLLILNLVFSNLNTTPL
WKDVLVWMQKPHLFTYQFILRLMNTSTFFLQFVMLRTATSPVLELIHPPVLLGFVTKCLKRLWA
QPTPTPSHRVPAQTMLVFFIGIIYTVVAPVLLPVCGVFFGFFYIFWKHNMVYHYIQQYSAGTSM
WAWLVGKMYFSLVFSQIMVAFGLPLGFTMKYRVFIIPLVLFTLLEWSRVNTILNDAF-
RVPVHAAGAAAEIEYKVKKGIWYAP
>Ostreococcus_lucimarinus_XP_001421858.1
NTDVADAEVLSAFAAYVCAALAVLTAFGIARKYVP---IYTGRELLK-
TSGCAPPRSTTYGWIAHVLTVADSDIVHTAGLDALVFLRIAQFGTQLFAPLALVGVLALAPTHLS
RSYYETSHVLMRMTIANVEPTSSLMWMHVVMFWAFTAYALWLLTAHYRSYEFLRQVYGTTTE
VSVLVQNYCVLMTDV--AADPWEGVETFFGGDDFLMVIPLQDYRPVDDLLIERDKLKNEIEGH--
RRMRRGS----------GFRDEITGLRDRVAILDHLVVQERTRI-
QTEPGSSCIVAFKSQYAAACAAQCRIT--
SRQLFAIEPAPGPDNLNWQSVLLRRRQREIRSMVIFPLILTII---
LIPTGMFTGMSSLCVANNHNDWY---CSS-
YLRILVQGILPPILLTLWTFVVSFGMMYLVQQSKYSSLSKTDESFAEYYFLWAFLNVFFGTVSGY
AIQRYLNALNTKPDAMLQLLGTSLPLTSNFFLLWIVFRGVYLPTQRLIFPHPGVLCMIVNRRTIKY
SPRSVRLGREVGVFAMVMMIGLVFSTVAPLITLLCTVFFVFNFVIWRYHVLYVYERSYEAGGAM
WTTFCNLTIYALVIAQSFLSFVLLSKQAYAGALILITVLPVLSKASHRFRSIASELRWSVPLQAS---
IAPRAEFNAETYMHP
>Ostreococcus_tauri_Q01B23
DTKTTINDLMATTGVYASIFLLLVCLFTGLRKIKWLRMAIDSA-----
REIPLPKPDSAWSWLWDAWYRDNEWMKEFTTPDEYMLVRWFKLSSRFFFASGVLCCPLLIPL
YVSDTVPSTRSGIAEYTLLNARGGHS-FAAAVASCWIISLFLMTMIRVESRKYIAMMWSV-----
NKTGIKANAIVVKDMPL--IDDEDLGKTKGT----------QTF----TEGNRXXXXXC----------
MQAIDDLSKQLSKALQEVDELKRARYNQAPASSAIVVFARQMDAVIASQIQVDSVP-

GQWATEPAPGNSDVVWHNLSLTTVERARKTTQAWLIALSISVFFMYPVNAAVSITQEKT--
ALVD---------
FMGEQLYNVILSIVLTIFLVIGHILSLVVSRQTGFVAISSMDSFGASMYFWLLILNLVLGNLSDTPL
WESIGQWISKPHLFTYQFILRLMNTSTFFLQFLLLRCATSPVLELIHPPVLLGFVTKCLKRLWAQP
TPTPSHRVPAQCMLVFFIGMIYAVVSPLLLPVCGLFFFFFYVFWKHNIVYHYIQQYSAGTSMWA
WLVGKMYFSLMFSQIMIAFGLPLGYTMKYRAAILPIIALTAIEWARINIILKSAL-KVPVTSA---
EEIEYKVKAGLWYAP
>Ostreococcus_tauri_XP_003083863.1
NTDVADAEVLSAFAVYVALSSLVLVLFGALRDKVP---IYTGRTLLR-
SSGSAPEMRRTFGWITSVLAISDEEVVNTAGLDALVFLRITQFGTQLFAPMAVIGAFALVPAHLS
RSFYTSKHVLMRMTIANLEKRSELAWLHVCVFWVFTAYTLWLLDRHYQSYEFLRQVYGTTTEV
SVLIQNYCVLMTDV--SADSWQDIEKFFKGDEFLMVIPLQDYRVVDDLLMEHDRLVNQIEQH--
RRRRRGL----------SVIDEINSLRKRLATIEHLVVRERSNI-
SAKPGPSCIVAFKSQYATAIAAQCRIT--
SRQLFSIQPAPGPDNINWQSVLLRRHERKFRAVVIFPLILAVI---
LIPTGMFAGLSSLCVANKQSSWY---CTN-
YLRVVVQGILPPILLTVWTFVVSFGMMYLVQQSKYSSLSRTDESFAKYYFLWAFLNVFFGTVSG
FAIQRYVHALNTEVDAMFELVGTSLPLTSNFFLLWLVFRGVYLPTQRLIFPHAGVLCMIINRRAIK
YSPRSIRLGREVGVFAMVMMIGLVFSTVAPIITVVATFFYVFNFIIWRYHVMFVYERSYESGGMM
WNTFCTLTIYSLMIAQFFLSFVLLSKEAYAAALALITILPVLSRSMYKFRNLATELRWSVPLLAA---
SAPKAAFNAEAYIHP
>Penicillium_marneffei_B6Q4A7
KEAIQLNAFWVSLATSLGISLLLALLFSIF--RPYHNAIYAPKVH---
DQKHAPPPKGVFAWVPPVLSVKEENIADRIGLDAVVFLRCANMMRNIFLVLSVIGCGILIAVNITQ
SNG--TSTFTLMTPLYIIS-E-
AVWAQVVCAYAFDIVIMFFLWQNYRHILALRRRYFDSPDYQMSLHARTLMITSVPPNLRSEEGL
MRLTDGSSLPRTTIGRNVKDLPSLIKKHEEAVRELESVLAKYLKNPNINRPTMSVGSGKVDAIDY
LTDRIQELEAKIKDVRQSV-DKRPMPYGFASWEAIEHAHAVAYTARRKKP-
QGTIIKLAPRPSDIIWENLHLSPQTRRWRRVVNVFWVTLLTLLWVAPNAMIAILSDLNNLGLVWP
AFQTSLEAHNTWAAVQGIAAPALTSLIYLILPIFFRRLMRRAGDITKTAREQHVIHHLYFFFIFNNLI
VFSLFSAAWTYVAAVINAKNNFWYKALSALCQVSPFWVTWLLQRNL-
GATLDLVQLFTIVWQWFMKTSIEWTAPPPFDYASYYNYYLFYATVAFCFATLQPIILPVAALYFAL
DCYFKRYLLLYVFVTKNESGGLFWRIVVNRMLFGAFLSNVVIALVAKSKGTWIMVYCLAPLPFIIL
GFKWFCSRTYDDNMVYYNKGVMN--KR-AGDRLNSRFGHP
>Penicillium_marneffei_B6Q5Z5
PAPTSLSGFISTLVPALVIAGAMVLAFIIL--RRKYRRDYMPRTFLPTD-
YERTPSTGLWNWIIAMYKLPDTYVLQHHSLDAYLMLRYMKLLVVMTFVGCCITWPILFPINATG
GV--G-KQFDMLSMSNV---
KARYFAHAFVGWIFFGFVFFLVTRESIFYINLRQAYAFSPAYANRLSSRTVMFSSVPQDYLDEKK
LRRMFGAERVKNVWIATDTSKLEEKVKDRDAAAMKLEGAETALIKQANKDRPTHRLIGKKVDTI
DWARAEIERLNPEIEEEQAKHRDAKKVSAVFVEFYNQNDAQAAYQSVAHNQP-
LHMAPRIGVDPTQVIWSNLRIMWWERVLRNFATIAFICVLIIFWAIPVAFVGSISNIDSLIARLPWL
GFINHVPFIRGVITGLLPSVLLAVLMALLPIIIRLCAKLGGAPTAAAVELWTQNAYFGFQVVQVFLV
TTLSSAASAVVEEIIQQPTQAASLLAAHLPQAANFYVSYIVLQGLTFTSGALLGIVGLILGKVLGK
MYNWIGLAGLSWGTVLPPMSLLGVIAITYSIIAPLVMGFATVGLYLFYFAFRYNLLYVANADIDTQ
GRIYTRALQHLLVGVYIAVVCLIGLFAIAAGTGPLVLMIIFLVFAILYHVSLNAALDPLLNYLPKNLE
AEE-EYSAEVERDAYFHP
>Penicillium_marneffei_B6QPV3
VGSTSDSALLSTLLPALVIAGFWFGLFLIC--RRNQQRWYSPRSHLPNH-
HERSPERGFLNWFGAFFQISDSHVLHHSSLDGYLFLRFLRNLCIICFAGIIILWPVLLPVHATGGA
--G-SQMDQFSFSNV---

PTRYYAHVVMGIIYFTYVFFVVTRESLFYANLRQTYLNSPAYVNRISSRTVLFMSVPESYKSEKK
LRQVFG-
DSICRIWITSDCKELNKKVDQRDKLAYSLEKAEIKLIRRANIKRPMHRVFGKKVDSVQYYRSRLA
VAIKEVEELQQKHRDAKYLTAVFVEFKTQSDAQVALQTLSHHQP-
MHMTPRAGIAPREVIWSALNLSWWQRIVRMFMVQGGIAALIIFWSIPAAIVGTISNVTYLANLIPF
LGWLAHLPFIEGIITGLLPSAALILLMSLVPPICRLCARKAGLPSLSRVELFTQSAHFCFQVVQVFL
VTTITSAASAAVSQIIKNPLSAKDLLAQNLPKASNFYISYFLLQGLSMSSAAVVQIMSALMFKILSM
LFKWTQLAGVSWGSILPVFTNMGVIALTYSCIAPLILGFAFIGLFLVYQAYRYNLLFVYDLDIDTK
GLIYPRALQHLLTGVYLAEICMIGLFSIKAAIGPLIIMAFYTILTILAHISLNDMLRPLMNFLPRSLDT
EE-EYLEKELADAYYEP
>Perkinsus_marinus_C5KLG9
PETVGGEAVLLSFALYIGIFAVLVILYSILRPR--LPRLYQPRRILRC--------
TLFGSWIVGAIQITDEELFADAGLDAVAFIRMLRLGTKVALVGCCNAI-YLLPVYKYQG----
TDALDQHSLGHLPNGSAAMVATLLASYVIFVWTLFLVYKEFSWYLKKRHEFLARH----
NVANYTVFVRCIPEDLRSNEKLREYFDDHQVTDVRVALDVDELEKEVQERDALIPNLEHAYNLL
DQKGI--RQKT----
NEFDTITMLEAQLLSLNRYISKTVDNAFTFRVRSAGFITFRSLQSTMMALQMLLNDKP-
FKLCTEPTPLPDDVYWSNVGMPHLHQQLGLLLSLTATFALCIFWTIPVAFVASISNVSFLKQEFS
FLEDAVDA-
PAMDIILQQVSPIALSILNALLPVFLMLFSKWEGHISLATLNASLFGKLALFYIIQTFFVSAIASSLM
ASLKELTEKPT-
FQTILATNLPQQANYFISFVFVQIGLDLGLELIRVVPAVTAFLRRWLKPLSFPMELEQPRLVSTVM
LFFMILFVYSVMSPITSFVMAFAFTAFAVVYKIQYASVYDPSHDTGGQLWARAIRFIIACVVIAEFT
VMTVMAIKEGAVVSPLMLPLFIGTILFWMYLEQRHFSAASFLSVKTC---WEGAYNPIAMRHAEP
>Perkinsus_marinus_C5KY51
IQ-LGQSAVLLSGAIFLGTFVAAVTIYSPLRGR--FLSLYQPRQILRC--------
GAFMGWIPGIIKITDDELLENAGLDAIAFIRLLRLGTRVAVVGCLNAI-YLIPVYKYQG----
QDELARWSVGHLATRSPSMVSTLIASYITFSITLFLIYTEFSWYTAKRHASMCRE----
SVANYSVFVRHIPPSLRSNHRLGEFFEEGGVADVAVALDLGVLSKKVKKRNKLVLKLEHNYNM
WHHRGV--RPQK----
EKIDVIEVLEVQLAALNDFIEKDISDAFSFRVLSDGFVTFKSLQFTAMALQMQLYDEP-
HALCIEAAPLPDGVYWSNVGMPHFHQQLGIVMSLAATTALCIFWTIPVTFVVSISKVSFLKEELH
FLQSALEA-
PPLGIVLQLLSPIALALLNELLPFILGFFSKWEGHVSVTALEVSLFGKLALLYIIQAFFVSAIAGSLL
SGLRDLVENPT-
LQNALSVYLPQQSYYFMSFVFVQIGLGLGIELTRLVPALLALFRRCLNPLSSPVELNHPRVLSTI
MLFFMILFVYSVMSPISSFVMAIAFSFFSLVYKNQFAVVYAPSCDSKGELWTRAIRFILACLISAE
FTVMGVLAIKEAAVVAPLMLPLFIGTILFWCYLEERHFKVASSLPAKVF---
YTGCYEPVAMRQLQP
>Phaeodactylum_tricornutum_B7G8J8
EVVISWSGIWVTGLVSF---VQGLVFYSFFRYRRGKDALYEPRQT---RQHRSPPP--
AGSWYKAAWNVSQEETLRCVGLDSYMFLRFLRLGARICTMGCVLAL-VLIPTYATGE----
TQQFNQLTLARVSADSKRLWASLIAWWIFVGFVLYELWNEWVLYAHNRYEFLARGVDMPKGY
RYAVRVEQIPPAYRTDQALLDYFERGSVEQATVFWKTDKLQALIDERQVTIEKLESAVAFTHGK
PNKPRPKV----KVTDAIEHYKIEIDRLNEAIDMERSM--
GKADTSTAFVTFSNLRTKQAAVQCELTGNP-
DSMIIFPAPDPKGVLWKNISVPLPQQKILQVQAAALWLAGILFWAAPVSFVTSIANLNSILESIG----
-VDSAFWYGLVSGLLPVIALAILMAVLYMAIVAAAKFVRYKSMAEVDAYALYWHQLFQFANLWLI-
LIGGSVFNQIDALISDFSAIVDIIASALPGASVFFVNMMLVSSFGSFGMELSMLPTYGIKLIMQMLD
QGKEPPSLEWGQKVPPVVFMFLVVVLYMPIVPLMEVFGLIYFAGSYLVMKHQCLHVYAQEFEG

GGDTWQKLFGFLIACLYMGEVIFIAYMGIKEAPAQGVLGFPLV-
GTIIMQAVLKRNIIQPLANLSLEVA---LDTTTGETGKLYGMP
>Phaeosphaeria_nodorum_Q0UJ62
----------LGAKVPLGISAAIFLVFLLL--RPFNTIVYAPRLH---
DEKHRPPPKSLFAWYRPVFKTNEDAYVHMIGLDATIFLRFARMCRNMFVVLSIVGCGIIIPVNVIK
GVEFNVEAIMLMTPKSLFG-P-
ILWAFVVVAYLFNIIVCGFLWWTYRAVHRLRRNYLEGSEYQNALHSRTLMITDIKRNFRSDQGL
VEITDSPEVPRATVGRNVKDIPDLIEEHEKAVIQLESVLAKYLKNPNATRPLCAPKKQKVDAIDYL
TARIQRLEGQIKEARETV-DKRAMPYGFASYETIESAHTVAYAARNKHP-
KGTTVRLAPKPKDVIWKNLLLDAKTRRWRRFINHGWISLLTILYFIPNALIAILSKLPNLALVWEAF
SVELNRHGFWAVVQGILAPALTSLFYYFLPIIFRRLSMRAGDFTKTSRERHVTAQLYNFFVFNNL
FVFSLFSAAFGMITLVVKYARDIFDTIMQTLCNVSPFWVTWLVQRNL-
GAAIDLSQVANLAWGSFSRKLITRTAPPPFDYASYYNYFLFYSTVALCFAPLQPVTLVVVAFYFS
IDSWMKKYLLMYVFCTKNESGGLYWRILFNRMLVGVMLSNCIIALLCVARGKWTMLGAMVPLP
LGLVAFKFYCKNTFDNSIKYYTIGDIK--SR-RRDRVAVRFGHP
>Phaeosphaeria_nodorum_Q0UR74
ESSNSLSSVISTLVPAALLALAFVTAFIVA--RKYFRRVYAPRTYLNHE-
QRQTPAGGLFGWIKDFKNLPDTFILDHQSIDGYLFVRYFKVLVAISLLGCIITWPVLFPVNATGGA
--G-
EQLDILSMSNVAMNVNRYYAHAGVSFIFLSLVMVIIARESFYVVNLRQAYRRSPWGASRLSARTI
LFTNVPK-TLSQSTLFEMF--
PGVKHAWVASNTKDLEKLVEDRDETALKLENGRGTATDGCKKKRPTHKLIGKKVDTIEYGRSH
LAELLPKIQAEQDKHWQGELVGGVFLEFDTQRHAQDAWQMMQNKKN-
SKLEAQLGVIPQEVVWQNLRIKPAEHLVRWTAATAFISVMIIFFAVPVAFVGLVSNINYLQQQFS
WLRWIGSIPVILGVITGLLPTVMLAVLMALVPIFCRFLAKTAGYVTWSQVELKTQSWYFAFQVVQ
VFLITTVASAATTVVRSVINDPGSALTVLSENLPKASNFYISYFILLGLSSAAGTLLNIGGFVVVVLL
GRIFELTKLSGPSWGSEFPKWTNLAVIAITYSGIAPLMLGFAVIGFSLIYVAFRYNFLYVYESNIET
KGAAYQKAMKHILVGCYLSELCLIGLFAISTAVGPLIIMCILLLITIIFSVTLSKALAHEEARLAY---
TDPEPLPVEIQKRAFFNP
>Phaeosphaeria_nodorum_Q0V4S6
KGPSSLGAVAAAFVPTALTAVLFIIAFVLI--RQRFPNIYYPRTFLGTK-
KDRTPCRSYWDWIHTMRVVPDKWMLYHQSLDSYLFLRFLRTLIFICVVGACITWPILMPVNATG
GG--K-TELNRISIGNV---
RKHLYAHATVAWVFFSFVMFTVARERLWLIGLRQAWNLSKTNAKRLSSRTVLFLSAPTPALDQ
ANMQRFFG-
NDAVRVWPATKADKLKSLVSSRNSLVEELESAELTLIKNANSLRPTHRLVGKQVDSIDYYREKIK
EKESEIERARESNADSHGAAAVFVEFRTQAAAQHACQQVASADI-
LSLTPRTGVKPNEVIWENLTLAPARRLSQEGIALALVIATIIFWSIPVSLVGAVSNIGYLAENFKWL
AFLNKLPTAISLLSGLLPPLLLSMLASYVPKIFRYIFKTFGEATNTSAELRVVKWYFVFQVLQVFL
VTTLASGAAAVVSQIANNPTSIPQLLADKLPSASNTYLTYFIIQGLSNAPSNVLNYSDVLSWAFFD
KKYNYVYMRGMQWGKLFPKYVNFVIIAIAYACIAPLVLGFAALGLGLFYYSYRYQLLYTNQPKVD
TKGHCYTLALQQILTGIYIAELCLFGLFSLRNATGPSIMIALLFVATVIFNYTTNRYFAPLEQYLPA
DLALESPEYSEEDLNKAYLNP
>Physcomitrella_patens_A9RIT4
---TATSAFITSLLTSFGIFCGLVFAFSILSKWKVNHNIYYSSRIISG--------
RNPFTWLYEAIFTSDAELVRVAGLDAAIYLNFFVCILEIFGYSSLFCIPVLIPIAAKSKSNADYDGF
DNLAMGNVEEGTKKLWAFLVGTYWVSIMTYCVLVKHYKKMIHLRGKEQAHEK--
PAPQQFSCLVRDIPPGMSRREQVNAFFRKDTYENCLIVCNLKKLTKMWTKYQAAKRNLEHAEA
VHEESKVGIRPMHRLFGPKVDSINFYEEQVREIGRAVEAEQQRTLEQ--
LPAAFVFFNNRRAAAEAAQAVHAPYA-
MQWQVYPAPEPREVVWKNLHKSVYERLIRQGLVYFAVFMTVLFYMIPIALISSFTTLDNLVKFLP

FLKVIVEYPPINTVLQAFLPQIALIIFLSLLPSLLMALSRMEGIPSQSHVVRGASGKYFYFIVFNVFL
GVTLFGTVFSSLAGFQFSVSSVVSLFGSKLPPVAAYFITFVALQFFVGYGLELSRVVPLAVYHLK
KTLEEAWEPGPFEYHNLVPNDILILMISMAYAVIAPMILLFALLYFAIGYVVLRNQALKVYVPAFES
GGRMWPHIHSRIVAALFIGQVTMMGYMGIKKFPYA-
VLVIILPLFTIFFASMCKMNYYPSFNVISLAIASE-------KIIEAYTPE
>Physcomitrella_patens_A9RU79
--
AKSELDLLTSFWINVVLTVSFLISYVLLKNLPLNFRVYYPRRYLKGLVERVDDLSNLFDWILSTW
RTTEMEFIEQYGLDSAVLLRTYLFGLKLFVPLMIWGSVVLIPVNTTDTELQNYSRVDTLSIANVH
DLSERLWAHLLASYLFTIWTIILLYIEYSRISKRRLQYIVSRK--QRPEHFTVLVRHVPKM-
SVGEKIREFFQEEHYHTHQVVFNARKLHKLIKKVEKYEGELEAYEARKDADPEASRPTLKKCMP
KSDAIDFYKDKIAQLKKEVRSERKNVLSDYVVKAGFVTFNSCWGAAVCAQSLQSGEC-
TKWMTEWACEPRDVYWRSLPLNYMQLNAYRLIVNLLVVALIIFFFIPVAFVQSLANLDTLIKYFPF
LKPIIRWSIVRSFFQGYLPGLLLRIIVLILPPLLRVLTKFEGHVSYSKIDKYAALKYYIFMVVNVFFG
NVFIGSLFEQLRQYIAAPTTIPKTFGFSVPMKATFFMSYIMVDGWSANAAEILRLWPLFWYHVSD
FRVKILPASPPDYTVILTRLSLYFLLGLVYAVISPLILPFLVMFFAFGYLVYRNQIINVYEPRYECAA
SFWPFIHRNIIIALIIKHLTIIGLFSLKQAVASTPFLLPLPVLTIVFHLHCRQKFLPAFKNFPLQEAIRK
NADTVNMLEKSYLHP
>Physcomitrella_patens_A9RYA3
--AGNTLDVVTSAWINVVTSIVILLAFAVLKNQPMNARVYFPKWFLEL--
HKRSAGAHVMDWIWTTLRMPEMELIEHAGLDSAVLLRVFLLGLKMFAPMLVWGCFVLIPINKTD
NELMSYSTVDMMSIANVHDKSKRLWAHLLAAYMYTAWTCLMLFKEYEQVESLRFKFLAAQK--
RRPDQFTILVRQVPRI-
KVSQQIENFFKEEHYITHQVVYDANYLSLLVEDKEKCLDTIEYLQKQQGGSQSSQCPTTRKVGE
KVNSIDFYTSKYNRLIEEIKTVQCHILEKFVMKAGFVSFNSRWGAAVCAQTQQSKDS-
TCWLTDWAPEARDVCWDNLSIPYMALNSRRLLVGFLIFFIAFFFMIPITFVQSLANLDALDKNFH
FLKPLIDQSFIRSVLQGFLPGLSLNLSLHFLPQLMMFLSKFEGRVSYSKIMRSAATKYFIVMVVNV
FFGNVIVGSVFVQLKQYINSPIRVPKAFGSSIPMKSTFFITYIMVDGWSTVAAEALRLGAFMWYH
LQNMRNNAMAFSTLQYNAVLPKLGLYFLLGLVYSVISPLILPFIIVFYAFGYIIYRNQVINVYVPKF
ESSAAFWPLAHRFIIVALLITHITLIGLFSIKRSAASTPLLLPLPVLTLFFHWYCTDRYGPAFDQYPL
QEARAKNLDVRSFLERAYLHP
>Physcomitrella_patens_A9S3X9
---TATAAFVTSLVISFVIFVVLFLLFLILSRRPGNFHVYHPLRALRG--------
YGPFQWAIDAFRVTDEQLVAAAGLDAVVYVNLFTTALEITVLSAVFCIIVLIPICATENNNFEYSGF
DNLSMSNIPSGSPKIWAFLIGVYWVSIVTYYSLWRAYKKVFSLRNMMHSSEV--
SRPQQYTVLVRDIPVHEKRTEQVESFFRRHSYERCMIMHDFSEAESLYNEREVASRKLEHAEA
VFELSKGGVRPMHKTLGPKVDSIEFWTKKIHELTPQLEEARKKCKAN--
EDAALVFFNERLAAAQAAQSVHAAYA-
LEWQVEPAAEPRECIWRNMHLSAWQRSIRKPVVYVVTFFVVIFYMIPIAAISAITTLENLETVLPFI
KSITRIKALNAILQAYLPQLALIVFLALLPKLLLTLSKAEGIPSKSHISRAASGKYFYFMIFNVFLGVT
IFGAVFSSFKGFKLSVSKVVELFGTKLPPVSTYFITYVALKFFVGYGLEISRIIPLIIYHIKRKLEDA
WAPGSFSYHTSVPSDLLVVTLTLSYSVIAPMILVFAFLYFAIGWLVMRNSALNVYVPEWESNGR
MWPHIHNRILVALLVSQITALGFFAVKKFPYT-
VFLIFLPLATFAFYLYCKRNFYKSFAVVSLYVASQ-------TIVQAYTPT
>Physcomitrella_patens_A9S768
---ATQTSFLTSLVTSFVVFCVLMLVYFILSRRPGNAPVYYPLRILRG---------
GPFSWITESYRATDAEIVAAAGLDAAVYIHLFTAAVEIIGLSALYCIPVLVPLSSTSSYNQQYQNF
DNLGMANVEPNSRKIWAFLIGMFYVSMVVYFVLWRSYRWVVDLRDREIASSN--
ARPQQFTALVRDIPKKETRAQQVESFFARGAYNRVQPVYNIKPVEKLFSEREDALRKLEHSEAV
WELSKQGERPMHRIWGRKVDSIDYWRQKSEEMKPKLDAEQSRTRLE--
QDAAFVIFNDRRTAAEASQVVHAPHA-

LFWKVSQAPEPEEVVWNNLHIHAWNRAMRRIIVSVITFFLVIFYMIPIAFVAGLTTLENLEKLLPFT
SNITKIPVVGAIVQGYLPQLALLLFLFLLPKIMMVLSHAEGFPSQSQVVRSASSKYFYFIIFNVFLG
VTIFGAVFSNLSSVKLSANKVVTLLGSKLPPVASYYITYVALRFFIGYGLELSRLIPLCIFHFKRKLK
EAWAPGAFTYHKSIPNDLLILTISLCYSVIAPMVIPFAFTYYVLGWFVQRNQALNVHVPDFESHG
SMWPHIHNRILAALFVAQITALGYFGVKEFLFT-
PILIILPVATVIFYMFCKKNYYPSIVVVSLWTAAE-------AIAYEYTPS
>Physcomitrella_patens_A9SDM0
----EISDLATSAGINIGLATLFLLLYSVFRKNPRNAGVYSTRQMLRE--KRKE--
LPSPGWLVRAWNPSEDEILETAGLDAVVFLRIFKFCIRFFTICTLVGCGILAPLNFNDTYIADNGT
LEKLTILNISQGSPRLWFHLAVLYFISFTAYILLYSEYREISMMRQAYLMEAS--
PQPDQFSVLVRGIPKEKSYSERVEKFFIELHYLSHQMIFHSNELESLLKKFDYEKNKLANLKSKP
LDE----RKPCRTFGPTKDRIEYHTQKLEELFGQIREQQINIYKE-
ELPAAFVSFRTRWEAVVAAQTQQSVNP-
MYWVTEWAPEPRDVDWNSLKIGHGQLFIRRIFSVAVATLIIL-
FTSPVGVIQLLDSIDRLTKYLPIAKILFEIPGVKQVVQGYLPSLLTVAVLYGLPLVMMCLAKIAGYV
SISRQERKTAGMVFNLLWINVFVVSILGTSIFQILDTYSSDPRSIPRRLAEVIPGKAYFFMTYIMTT
GWAGFPLEILQSSVLILNYVKRILSDVW---
SLPYYRCVPNVLLFVFLGLTYSIITPLLLPFLLVYFVLGYIVFRNQILHVYEPAYETGGQFWPHVH
VRIIIFLVFLQICFIGVFTVKGLGNGSFFVVPLPIFTLMFNEYCRQRFFPAFRHFNMESTVKKREDL
LEHIRVAYLHP
>Physcomitrella_patens_A9SH39
----EIIYLATSAGINLGLAILFFTLYSVFRKQHANAGVYFTRHLLRE--
RQRMKLVPSATWVKRALDPSEEDILKSSGVDAVVFLRVFIFCMRFFMICTIVAFGALAPLNYTDT
YLADYGTLEKLTILNISYGSMRLWVHFAVLYIISFSAYALLYIEFKHISKLRLEYLDTVL--
PQPDQFTVLVQSIPQELSYSDNVDDFFRRIEYLSHHMVYKSGHVTSLLNELEKLKLKIFELKQKP
PTE----RKPRRAYGPLVDPVELHMQKLEDVHHQIRQCQME-FKK-
KIPNAFVTVRSRWGATVTAQTQQSTNP-
MHWVTQWAPEPRDIDWPNMEIPYDQLFYRRIVSTVLALALTAIYYPIVAAIQLLDNLDNVKKYLPI
VANVLEIPAISSLVQGYLPALLLALLLYMVPSIFFFLSRIEGHPSVSHQERKASSKMFSLLAGNIFL
ASVLSGSLLTISETFTEDPKGIPRRLAEAIPTRASFFITYIMTTGWAGMPLEILQSGVLVLNFVKRN
LDQVL---
SLPYYRTLPLVLFFVLLGLVYSIVSPLILPFLLIYFTLGYIVYRNQVLNVYEPAYETGGQYWPEIHS
RTIGCIVFMQIVFIGMFSLKGLKSASIACIPLPFLTWLFHEHCRQRFLPIFKNFNLESTMKKKDEIL
NSIRDAYMHP
>Physcomitrella_patens_A9SJW4
---TATGAFITSLLTSFAVFCGLLAAFAVLSKLKVNYNIYYPSRMISG--------
QNPLEWMKEAIMTSEEELVRIAGLDATIYLNFFVAVLEIFAYSSLFCIPVLIPIAAKSHHNEEYAGF
DNLAMGNVEEGTTKLWAFLVGTYWVSFVTYYVLAKHYKKMIHLRGKEQAYEK--
AAPQQFTCLVRDIPPGMTRLEQVNSFFKKDTYETCMVVTNIKRLLKIWLKYEAAKKNLEHAEAV
CEEPKSVTRPKHKLIGPEVDSINFYREKVRELGRLVEVEQQRTLEQ--
LGAAFIFFNNRRAAAEASQAVHAPYA-
MQWQVFPAPEPREVVWQNLAIPVYQRMVRQGVVYCMVFMTVLFYMIPIALISSFTSLENLIRVL
PFLKVVVNYPPINTVLQAYLPQLALLVFMNLLPSLLMLLSRLEGIPSQSHLVRAASGKYFYFIVFN
VFLGVTLFGTVFSSIAGFKFSVSSVVTLFGSRLPPVAAYFITYVALQNFIGYGLELSRVVPLAIYHL
KRRLDAAWAPPAFTYHTLVPTDILILMISMAYAVIAPLILVFALLYFAIGYVVLRNQALKVYVPAFE
SGGRMWPHIHTRIVVALFVGQITMIGYFGIKKFPYA-
VLVILLPLITIIFATMCRINYYPSFRVTSLAIAVE-------KIIEVYTPS
>Physcomitrella_patens_A9SK54
---TATSAFVTSLLTSFGIFCGLVFAFSILSKWKVNHNIYYSARITAG--------
RNPFAWLREAIFTSDEELIRIAGLDSAIYLNFFVCILEIFGYSALFCIPVLVPIAARSRNNEAYEGFD
NLAMGNVEEGTAKLWAFLVGTYWVSFVTYFVLVKHYKKMIRLRGKEQAREK--

AAPQQFSCLIRDIPPGMTRREQVNAFFRKDTYMNCLIVCKLNKLLRIWKKHQAAKRNLEHAEAV
YEESKTGTRPMHRLCGPKVDSINFYEEQVREMASMVAVEQQRTLEQ--
LPAAFVFFSSRRAAAEASQAVHAPYA-
MQWRVFPAPEPREVVWNNLHKPVYERMIRSGLVYFAVFMTVVFYMIPIALISSFTTLDNLVKILP
FLEVVVNFGPINTVLQAFLPQIALIIFLSLLPSLLMAFSRMEGIPSQSHVVRAASGKYFYFVIFNVF
LGVTLFGTVFSSLAGFQFSVSSVVTLFGSKLPPVAAYFITFVALQFFVGYGLELSRVVPLSVYHL
KRKLEEAWEPGPFEYQTLVPNDILILMISMAYAVIAPMILLFAIVYFAIGYVVLRNQALKVYVPEFE
SGGRMWPHIHTRIVVALFIGQITMMGYMGIKKFPYA-
VLVIILPLFTIFFASMCKMNYYPSFNVMSLAIASE-------EIIAAYTPE
>Physcomitrella_patens_A9SW37
---ATQSSFITSLVTSLIVFLVLWLVYAILSRRPGNAVIYYPLRVLRG--------
GGAFAWVREAFKAKEDDIVATAGLDAAVYMHLFTAAFQIILISAIFCLPILLSLAGTSNYNQQYTNI
DNLGMGNIEPQSSKIWAFMLGMFWVSLATYYVLWKSYRRVVYMRDRANANAA--
ARPQQYTVLVRDIPKKESRTDQIVNFFARGVFSRVQPVHDIKPAGKIFSDREDALRKLEHAEGV
WEISKQGQRPMHKTLGPKVDSIDYWRAKSQEMNPQLEAEQRHTLMQ--
QAAAFVIFSDRRSAAEASQVVHAPHA-
LRWRVSQAPEPEEVVWKNLHIPAWQRAIRRGVVAVLTFLLIVFYMIPISFVASLTTLENLEELLPF
IRSITRISVLGNIIQAYLPQLALILFLALLPHILILLSRLEGFPAQSQIVRSASAKYFYFVIFNVFLGVTI
FGAVFSNLSSFQLSVSRVVQLLGSKLPPVASYFITYVALRFFVGYGLELSRIIPFIIFHLKRKVREA
WAPGAFKYHKSVASDMLILTITLCYAVIAPLILIFAAAYFGLGWLVMRNQALNVHVPDFESHGSF
WPHIHNRVLAALFVAQITAIGYFGIKEFPFS-PFLIVLPILTVVFYMFCKKNYYPSIKVVSLYVAAD--
-----SIAHTYTPV
>Physcomitrella_patens_A9TEC4
---TATSAFVTSLLTSLIIFVVLLLLFLVLSRRPGNFHVYYPLRALRG--------
RGLFAWAKEAFQATDEDIVAAAGLDAVVYIHLFTTALEIIVLSAAFCIPILIPIAATSDNNKFYSDFD
NLGMGNIQASSPRLWAFLLGVYWVSFVTYYSLWKAYKRVFNLRNNLHSSAV--
ARPQQYAVLVRDIPAHQTRSEQVESFFRRHTYERCMVLHDFSQAEKLYDEREAASRKLQHAQ
AVFELSKTGVRPMHKTVGPKVDSIDYWTTKINELTPKLEEERSRVDAK--
KDAALVIFNDRLAAAEAAQSVHAPYA-
LEWQVEPAPEPRECIWNNMYVPAWQRSIRKPTVYVITFLTIVFYMIPIIAISAITTLENLEKILPFIKS
ITRISALNTVLQAFLPQLALIIFMALLPKLLLALSKTEGIPTKSHIERAAAGKYYYFMVFNVFLGITIF
GAVFSSSAGFKISVSKVVELLGSKLPPVATYYITFVALKFFVGYGLEISRIVPLIIFHIKRKLEEAWA
PGPFSYHTSVPADLLILIVTLCYSVIAPMILVFSFLYFFIGWLVTRNSALKVQVPEWESNGRMWP
HIHNRFLGSLLVSQITALGYFAVQQFPYT-VFLIFLPILTFGFYVYCKRNFYPSFAVVSLYVASQ----
---TIVEAYTPT
>Physcomitrella_patens_A9RK07
---TTLREIGVAALVNIGLTILFLLSFVFLSLQPVNDRVYYPKLYIKG--
LRKGRPTRLFDWVKSALRKTENDIIQHAGLDSAVYLRIFLVGLKIFIPLMILSMAILVPVNVGAGSL
AEFSSIDKLSMSNVPNRSPRLWAHLVMSYVFTAWVCFILFMEYKSIAALRLKFLSDET--
RRPDQYTVMVLQIPDL-
PLGKQVETFFRTDYYLTHEMAYNANKLTKIARERDKAQNWLDYFQLKYKRKPAM-
RPMTKTFGEQVDAIDHYSALVERLTTEAEIEREFVIPKAIMPAAFVSFRTRWGAAVCAQTQQVQ
DP-
TLWLTCWAPEPRDVYWPNLAIPYVQLGFRRLAITVIVFLTVFFYMIPIAAVQSLANLEGLRRSIPA
LDGFLQMEFISSFVQGFLPGLILKLCFLLLPMFIMFLSKFEGHLSISKLERRAAAKYYYFVVVNIFF
GSILTGSAFQQLKTFVSS-
SGFLNTIALSIPQKASFFITYIMVDGWSGPAGEILRLTPLVKYHVKNTRLEAASPGTLTLDETLPQ
LQLYFLMGLVYSVITPVIIPFIVVFMGFGFVVYRHQIINVYDSAYESAGSFWPHVHGRIIAALIIEHV
TLISLFLVKDSCSSTPFMIALPVLTLVFNNYCKKRFEPAFKNYPVETAVEKDLNLAVFFRNAYNH
P
>Physcomitrella_patens_A9SW54

-
SESGSLDLLSSFWINSVLSVAFLICYALFKNQPLNSRVYFPRWYVFGEDERIDEFLNGFNWIWF
SLRKTEEELIELVGLDSTVFVRIFLFGLKVFVPMLLWGCAVLIPVNKTDGYLKVYGAPESLSIANV
EDSAKRLWAHLVASYLFTGWTCLMLYIEYATVERMRYDFLASKK--QRPDQFTVLVRQVPRQ-
SVGMRIQEFFQQEHYVTHQVVYKAKELTKLIKEKEKYEGKLERWYDQLSREPSTPRPTIKPTTK
REDAIDYYEREIERLEDEIKKERKKVLQKYVMRAGFVSFDCRWAAAVCAQTQQSRDR-
TKWITEWAPEPRDVYWNNLAIRYMLLNSRRLVVTALVVVLVIFFLIPVGAVQVLANLEQLIKYMP
FLEPLSRWKYVESFISGFLPGAILKIFLLIIPYVLRELTKFEGHVSKSKIEKYTGVKYFVFLVVNVFF
GNVLIGSLFDQLRQYIAAPTSIPRAFGVSIPKKATFFMTFIMIDGWTSIAAEVLRLWPLIWYHITSV
RVKVIPATPPAYFIVLPRLSLYILLGLVYAVISPLILPFLCVFFAFGFLIYRNQVINVYEPEYESAASF
WPSFHRNVIVALILKHVTLIGLFSVKRAFASTPFLLPLPIVTYLFHLFCSEKFYHAFVNYPLQEARL
KGVDVKSFLETAYLHP
>Physcomitrella_patens_A9TU69
---TTLQDIGVSALVNIGLTILFLLSFVFLSIQPVNDIVYYPKLYIRG--
IRKERPMRLLDWAKSALRKTEDDIIQHSGLDSAVYLRIFLVGLKIFVPLMILGMAILIPVNVGAGSL
PEFSSIDKLSMSNVPNGSSRLWAHLVMSYVFTAWVCYILFMEYKAIAALRLRFLCDEQ--
RRPDQFTVMVLQIPNQ-
PLDQQVEQYFRRDNYLTHQMAYNANQLSKIVKERDKAQNWLVYFQIKYQRNPAM-
RPVTKTFGDQVDAIDYYTSEIERLTKEAQAEREVVIPNATMPAAFVSFKNRWGAVVCAQTQQN
QDP-
TLWLTESAPEPRDVYWSNLSIPYVQLGFRKLAVGGIVFLLVFFYMIPIAAVQSLANLEGLRRSIPA
LDGFLQKSFVSSFVQGFLPGLALKLFFKFLPKFIKIITKLEGHLAVSKIERRAAAKYYIFVVVNIFFG
SIFTGTAFQQLKTFVSS-
SDFLNTLASSIPQKASFFITYIMVDGWSGPAGEILRLKPLVKYHIRNMRLEAADPGTLSLDESLP
QLQLYFLMGLVYSVITPIIIPFIVVFMGFGFLVYRNQVINVYDPEYESAGAFWTHVHGRIIAALIIEH
LTLIGLFLVNESFSSTPFMVALPILTLVFHNYCKKRFEAAFTHYPLENAMEKNLDLTIFLRNAYNH
P
>Physcomitrella_patens_XP_001768825.1
-A--SLYDIGVSAVINCTIMSLLFIFFLVFNIQPLNDRVYHPKLYMKDQ-
RKGSPSLQSFAWIVEAFRMSEHQIIDHAGLDAAIFLRNIQVGLKIFIPLMTVGLSTIVTINVGGGYL
KSFTDIDKLSIANVPSGSSR----------

FLKTLAYTIPMKATFFITFIMVDGWAGAASEILRPWGLLSYHIQNAKVRAMDPGPIIYYVNLAQLQ
LYFLMGLVYSVITPIILPFVVVTFAINYVVYRHQ----------
----------HASKKNFNMSEFIQNSYKHP
>Picea_sitchensis_B8LKM0
----IVSALLTSVGINTGLCVLLLSFYSVLRKQPDNVYVYAPRRVAE-E-QAK---
VPSPGWIVRAWRLSEDEFLSAAGFDAFVFLRIFIFSIRIFSIAGIIGVFVLLPLNYTGNQLRTNQSL
DLFTIANVQDGSKRLWVHFCAVYLISGAACCLLYLEYKGIAEKRFSYFNSSP--
PQPNHFTILVRGIPKH-
SMSETVEEFFTLSTYFSHQMVYHSNRVQSLMHEAEKLYKRILHLKTKPRLQ----
RKSHREFGAKVDPVDLYTKKLEDVEENVKLEQSTFYEK-
ELPAAFVSFRSRYGAAMASQLVQSSNP-
LLWVTEPAPEPSDIYWPFLSAPYIQLWISKFVVVVAVFFLTILFLVPVTFVQGLTQLTELESFLPFL
KKVLKLTIVSDIITGYLPSLILQMFQYFVPPIMLLFSAMRGHISNSGKMKSACIMVLSFTIWNVFFA
TVLSGSVISQINTFLSDPKDIPRQLAVVVPGQATFFITYVLTSGWTGLSLEIARIFPLIGNFFIRHAD
CAP---
SFPYHRDIPKVLLFGLLGFTYSLLAPLIMPFLLVYFFVGYIFYRNQMLKVYSPRFESAGQFWPIVH
NCTIFSLVFMQIIAIGIFGVKKVPFASGWVIPMTVITLLFNDYCRKRFLPIFNRYPAEILIKRMASFL
DSLVNAYRDP

>Pichia_stipitis_A3LQ78
STATSTSAVLSTLVANLILFGIFILGFLIL--RLKYKRIYSPKSSFELE-
DQRPEPRDPFRWIFILLTKPNSFIIQQAGIDGYFFLRYVFSFACVFLVGML-TWTVLLPINATNGK-
-G-TGLDQLAISNV---
RNRYYAHVFIGWVFYGGVIFVIYRELFLYNSLRSAVLASPKYSKKLSSRTVLFQTVPDSLLDEKQ
LYKMF--
NGVKRIFVARTARDLESKVAKRDALVKQLENAQNKLLATAVNKRPRHKSFSKKIDTINYCKEEIP
KIDKEVRAMQKKFRTNRPKNSIFVEFEDQYHAQLAYQATVHHNP-
LRMKPVTGVEPGDVQWSNLRMFWWERITRRFLAFAAVVALIILWAVPVAFVGVISNITYLTNKL
PWLRWILNMPFLLGIITGLLPAIMLALLMMILPMFIRGMAKIAGAPTYQAIELYTQNVYFAFLMING
FLVTALASSATSTVTQIIEEPTSAMSILANNLPKSSNFYISYIILQGLSVASGSLFQIVGLILFYLLGR
KWNFSGLGSTAWGTTFPVFTNITCIALIYSIISPMIMLFACVALFLIYIAFCHNLTYVLKEGPDTRG
LHYPRALFQTFTGIYIGQVCLLGIFAVGKGWGPIVLQIIGIFATVFIHINLNESFDHLLQVVPIDCMR
ALTE----DDKHAYDMP
>Pichia_stipitis_A3LQH6
AIRGPQRVFQAQLLFCSSLGLISFCLFCVLRYRWPH--IYAVRTR----------
RNYFGWISVIYKLTDEDILNFSGLDAYVYLEFFRMGIKVFFLLAIVALCILSPVRYYFTGNYD-
DNITWG-KPS-DDFPKYLWVYPVFTYLFSIIVYVYLFEFTQKVLKTRQKYLASQ---
NSITDRTIRLDGIPKKILKKNDLKRFIEDGKVIDVKLMYDWTPMEHLFKQRRKIINRLESK---------
SVMPDLK-----DSEINDLSRSLININSKIRNIQDR--EFKQLPSAFITMESVASAQMAAQTILDPRV-
YKMIVNLAPAPKDIRWENLKMSYTKRMIKSYLITTIIILSYAVIIFLVALLTSLLDLKSIIKFWPSLGKF
IGKSFLTTFVTGILPPLLFSALSVSVPYFYKFLCMHQGYSSNSEIELSTLSKNFFFNFFILFLAFMT
TGTIWDYLSYISDT-
TKIAKTLASALRKYSLFYVDLILLQGLAMFPVKLLQISDFLLFLLRNMYRSYYTPQVFDFGIHLPQ
HIFIFMIILIYSVVSTKIVTSGLVYFVLGWFVYRYQLVYNFVHPPHSTGKVWPMIFRRVMLGLIIFQ
LFMCGTLVLEKAILLSLLCSPLPVVTVVIFWNFEKYYVPLNTFIALRAINPYTIDEEREQYTDYTYP
>Pichia_stipitis_A3LTU0
SSDSSVSQFLAALIPTAVIAAVFILLFIAI--RKKQKRVYEPRSIIETK-
DLQTESTGLFSWAPHVLKKSESYLIQQAGIDGYFFIRFLLEFGLICILGCFITWPILFPVNATNSN--
G-KGFNAISYSNV---
KWRFLAHIFVSWIFFGSVLFLIYREIVYYTTFRHAVQTTPLYDSLLSSRTLLLTEIPESLYEEETLR
SYF--
PPAKTIWYARDYKKLEKDVKERTKLAGKYEGAANKVIIKAVKKRPTHRLIGKKVDTLNYGVERLG
ELNTSIKEQQENFKENKQVPSVFIEFPTQLDLQLAYQAVPFNKD-
LKGVRRSGLAPSDIIWENLPLTKKSRWAKKVVANTVLTLMIIFWAIPVAVVGAISNINFLTDKVHF
LRFIDNMPKLMGIITGLLPVVALAILMSLVPPFIKKMGKVAGCITIQEVNGFCQAWFFAFQVVHSF
LVVTVTSAAASSVTSIISKPGTALQLLSSNLPKASNFYLAFFCLQGLTIPSGLLLQIVPLILSQVFSR
KWNWYKIGSPDWSTTYPAYQLLAVIGLCYAIIAPLVLGFAGIAFLVIYLAYIYTLVYVLQNPVDAR
GRNYPRGLLQLFVGLYLAEVCLTAMFVFGKNWVSVALEALTIPVTVAVHLYLKWKYLPLWETVP
ISAIRYAIEYNDEFVKTAYADP
>Pongo_abelii_Q5R826
LQGVTFGGIPTVLLIDVSCFLFLILVFSIIRRRFWDYG----
RILEADSSTSSSGQLGCCPWLTAIFRLHDDQILEWCGEDAIHYLSFQRHIIFLLVVVSFLSLCVILP
VNLSGDLL--PYSFGRTTIANLQTDNDLLWLHTIFAVIYLFLTVGFMRHHTQSIKY----------
KEENLVRRTLFITGLPRDARK-
ETVESHFRDCEVVDVQLCYNVAKLIYLCKERKKTEKSLTYYTNLQVKTGQNPKPCG-Q--
EWEDAISYYTRMKDRLLERITEEERHV-
QDQPLGMAFVTFQEKSMATYILKDFNASSELYKWTVTFAADPEDICWKNLSIQGLRWWLQWL
GINFTLFLGLFFLTTPSIILSTMDKFNVT----------
KLNNPIISQFFPTLLLWSFSALLPSIVYYSTLLESHWTKSGENQIMMTKVYIFLIFMVLILPSLGLTS
LDFFFRWLEA---

SIRLECVFLPDQGAFFVNYVIASAFIGNGMELLRLPGLILYTFRMIRNVQNQAFQYEFGAMYAW
MLCVFTVIMAYSITCPIIAPFGLIYILLKHMVDRHNLYFIYLPA-
KLEKGIHFAAVNQALAAPILCLFWLYFFSFLRLGMKAPATLFTFLVVLLTILVCLAHTCFGYFKHL
SPNYK--------QQQQQTY---
>Populus_trichocarpa_B9GJG0
----DFSSFLTSLGTSFLIFVVLMLLFTWLSRKPGNSFVYYPNRILKG--------
RNPFAWIREAFSSSEQDVINMSGVDTAVYFVFLSTALAILVLSGLVLLPVLLPVAATDDNVKTFS
DIDKLLMGNVKGGSPRLWAFLIATYWVSLVTYFLLWKAYVHVSGLRANALMSPE--
LTPEQFAVLVRDIPPGRTRKEQVDSYFKSETFYRSMVVTNNKEVNKIYIELEGYKKKLAHAEAVY
DESKKGLRPTIRTVGRKVDSIEHYNEKIKELIPKLEAEQKVTLNQ--
QACAFAFFTNRVTAASAAQSLHAQMV-
DTWTVMEAPEPRQIIWSNLKIKYFQRIIRQYVVCFIVALTILFYMIPIGLISALTTLDNLKKILPFLKPI
VNIVAVKTVLEAYLPQIALIVFLALLPKLLLALSKAEGIPSVGHAVRATSGKYFYFTILNVFIGVTLG
GTLFTTFKSIEEKPNSIVSLLASSLPGNATFFLTFVALKFFVGYGLELSRIVPLIIFHLKKKLKEAWF
PGDLGYATRIPGDMLVLTIVLCYSVIAPLIIPFGVVYFGLGWLVLRNQALKVYAPSFETYGRMWP
HIHTRVIAALILFQVTMFGYFVVKKFSFSTFLLIPLPILSLLFAYVCHKKFYRSFSDTALEVA-CR----
--RIYRSFIPP
>Populus_trichocarpa_B9GNK6
----DIGALLTSAAINTGLSVLLFSLYSILRKQPSNTIVYFGRRLAS-L-NNR---
VPSPSWIVKAWETTENEILAIGGLDAVVFQRILVFSIRVFSIAAVTCLFLVLPVNYYGQEM--
AESLNVFTIANVKEGSRWLWAHCLALYIISCSACVLLYFEYKSITKMRLAHITTSP--
PNPSHFTILVRSIPYE-SYSNSVKKFFTNSSYLSHQIVYRCGLVQKLMVDAEKICMRIKAAPKG----
------QSSLCGGS-TSFKVLTDEPESVKDSFSYSNLNLADN-
ERSAAFVIFKTRYAAVVATQMLQSPNP-
MSWVTELAPEPHDVLWSNLCIPFRQLWLRKIATLLASIVFMVLFLAPVTFVQGLTQLEKLSQTFP
FLRGFLKQDLINHVLTGYLPSVILILFLYTVPPTMMLFSSVEGPVSHSGRKRSACLKILYFTIWNV
FFVNHVSGGFLFAFNMLS-
SVGDIPVELAKAIPNQASFFVTYVLTSGWASLSCEVMQPFSLLCNFLKKHSDGLV---
SFPYHTEVPRVLLFGLIGFTYSVMAPLILPFLLIYFLLAYLVYRNQIVNVYITKYEGGGQLWPIVHN
TTIFSLVLTQMISLGVFGIKKSPVASGFTIPLIICTLLFNEYCRQRFFPIFKKNVAQVLLEMMEEIHQ
QLHSAYCQL
>Populus_trichocarpa_B9GTV5
---ATLSDIGVAAAINILTAFAFFFAFAILRIQPVNDRVYFPKWYIKG--
LRSSPFVRFLNWMPAALHMPEPELIDHAGLDSAVYLRIYLIGLKIFVPIAFLAFTILVPVNWTNSTL
E-YSDLDKLSISNIPTGSNRFWTHLVMAYASTFWTCYVLKKEYEIVAKMRLHFLASEK--
RRPDQFTVLVRNVPPE-
SVSELVEHFFLVNDYLTYQVVYNANQLSHLVNEKKKMKNWLDYYQIKYSRNKSR-
MPSLKTFGTRVDAIDHYTSEIERLSR----
KRDEIVAKAIMPAAFVSFKTRWGAAVCAQTQQSRNP-
AMWLTEWAPEPRDVYWDNLAIPFVSLALRRLVIAVTFFFLTFFFMVPIAFVQSLANIEGIEKALPF
LKPIIEMKVIKSFIQGFLPGIALKIFLIFLPSILMLMSKFEGFISISGLERRSAARYYIFQFINVFLGSIIT
GTAFQQLDNFIQSATEIPKTIGVSIPMKATFFITYIMVDGWAGVAGEILRLKPLIIYHLKMFMEEAM
DPGTLGFNTGEPQIQLYFLLGLVYAVVSPILLPFIIVFFALAFVVYRHQIINVYNQEYESAAAFWPD
VHGRIIVAVIVSQLLLMGLLSTKEAAQSTPLLITLPVLTIWFHLFCKGRYEPAFVRYPLQEAMMKN
LNLKSFLQNAYIHP
>Populus_trichocarpa_B9GWL7
----NPESLTASAAINFGLAFIVLSLFSIFKKQPSNASIYYARRLSK-R-HH---
DLPSVAWIPRAFRVTEDEVLDIGGLDALIIIRLFKFGIYFFGICSLIGLVVLLPINFGDQ----
YHSMDPFTISNISAGSNRLWVHFTCLWLISFYGLYLLYKEYDGISVKRIQLLRNLR--
HQPDRFNVLVRQVPFHNAYGCSVDHFFSKNSYCSYQMIYDGKDIEDLLHQAKYVARKIEDMRG
KLTVK----KRDKESSQEDDVKIALFEEKQQENVRKIRQLQNESMGK-

ELPVAFVTFKSRRGAALVSQTQQHSHP-
LIWITEMAPEPRDVSWRSLEIPFKILPLCKIGVVVAASLLTIFFAVPVTAVQGIAKLEKLKKWFPPA
MAMELIPGLSSIITGYLPSAILKGFIYVVPFAMLGMAKLGGSISKSKEEIKACNMVFYFLVGNVFFL
SLISGSLLDELGEYFTHPRSIPSHLASAVSSQADFFVTYILTDGLSGFSLEILQPGLLVWDAVKSH
NPYLY---
SLPYFRIIPSVSLSILIGMVYAVVAPLLLPFLVGYFYLGYVVYVNQIEDVYETAYDTCGQYWPYVH
HYIFVGIILMQITMIGLFGLKSKPSASIATIPLLLLTIMFNEYCKIRFLPTFRHYSVKDADEHMEINCE
NARSAYCQP
>Populus_trichocarpa_B9H0G3
----ILSALLTSVGINLGLCLLFFTLYSILRKQPGNFYVYAPRLVDK-E-KSQPQ-
LPSAGWVRNAWQLSEDEILSISGLDGLVLTRIFTFSLKVFTVAGVIGISILLPINYFGNQLS-
NKSLDSFSISNVNDGSNRLWVHFSAAYIFTGVVCYLLYYEHNYMSAKRIAYFYSSK--
PQPHQFTILVRSIPSK-
NFSETVESFFTESTYLSHSMVHRTSKIQDLINDADKLYRKLDCMKSNNHSQ----
QNFRRDTGRKVNLLDLYEKKLEDLEDNLRKEQNLLAGE-
EVPAAFVSFKSRFGAAVALHIQQGVNP-
TEWVTERAPEPQDVHWAFFSASFIKRWIFKLVVLVASFALIVLFLIPVVIVQGLANLDQLEKWFPF
LKDILSLTVVSQVITGYLPSLILQLFLSFVPPIMLTFSAIQGYISRSQIERSSCSKMLWFIIWNIFFAN
VLSGSALYLVNVFL-
EPKNIPRVLAEAVPGQASFFISYVVTSGWTNLSSELFRLIPLVCSFWKRLEFEVP---
SIPYYNDIPTILFFGLLGITYFFLSPLILPFLLVYFCLGYIIFRNQLLNVYAPKYETAGMFWPIVHNST
IFSLILMHIIAIGIFGLKKLPLASSLIIPLPVLTLIFNAYCQKRFLPLFKAYPTECLIKKMTEFYDKLVTA
YQDP
>Populus_trichocarpa_B9HH28
IPDPWYGNIQYLLNISTIGLFFCIFIFLFAKLRSDHRR----------
SALTTKLLAVWHATGREIASHCGADAAQFLIIEGGSFAVVFSIGVLSTGVLLPLNVYGGSQ--
NDEFSKTTINHIEKGSSFLWIHFVFVVFVVLLVHFGMSLIEKRLKVTRFRD-----
NANSTAAFTIMVQGLPKSIGDDRRLQEYFQYGKIYKVTVPVDLCAFDDLATELIKVRDEITWLVV
KIDSRLL----------EEKLRILLELRVELETKLAEYKEG--
RAPGAGVAFVIFKDVYTAKQAVQDFCESVRLQQWKVERAPLAPDIYWNHLGSSKLSMRLRRLF
VNTCLLLMLVFFSSPLAVISALNSAGRIINAQSWLDWVQSS-
WLASLIFQFLPNVIIFVSYIIIPSALSYLSKFERHLTVSEEQRAALLKMVCFFLVNLILLRGLVESSLE
SAGCYLDGDR-
IQYMSASFLSRSCFSSLAFLITSTFLGISYDLLAPIPWIKKKIQKFSGTPIPKQTFDFAQYYAFNLTI
FALTLIYSSFAPLVVPVGAVYFGYRYVVDKYNFLFVYRVRGGNDGRLMDTVLCIMRFCVDLFLL
SMLLFFSVQGDSMKLQAIFTLGLLVLY--KLLNDSFQPALERIQNDSI-----VEGPIDYEVFSQP
>Populus_trichocarpa_B9HZA2
---ATLGDIAVSGALNLLGAFIFLLAFAILRIQPFNDRVYFPKWYLKG--
LRSSASTRFLNWMPEALKMPEPELIDHAGLDSAVYLRIYLMGLKIFVPIAFLAWAILVPVNYTNDT
LEKASDIDKLSISNVPLKSQRFWAHIVMAYAFTFWTCYVLLKEYEKIASMRLQFLSSEG--
RRPDQFTVLVRNVPPE-
SVSELVEHFFLVHHYLIHQVVCNANKLASLVKKKKSKQNWLDYYQLKYDRNQSQ-
RPLKKTWGEKVDAIDHHISEIKKLSEEIEEEREKVLPKSIMPAAFVSFKTRWGAAVCAQTQQSR
NP-
TLWLTEWAPEPRDVYWENLAIPYMSLSVRRLIIGVAFFFLTFFFMIPIASVQALASIEGIEKKAPFL
KPIIEIKFIKSVIQGFLPGIALKLFLIFLPTILMIMSKFEGFLSISSLERRSATRYYIFLIINVFLGSILAG
AAFEQLNSFIQSANEIPKTIGVAVPLKATFFITYIMVDGWAGIAGEVLMLKPLILYHLKNFREEAM
DPGSLGFNTGEPRIQLYFLLGLVYATVTPVLLPFIIIFFAFAYVVFRHQIINVYNQEYESGAAFWP
DVHGRVITALVISQLALLGLMSTKEAAQSAPFLIALPVLTIWFHGFCNGRHKSAFVKYPLQEAMM
KNFNLKAYLQDAYIHP
>Populus_trichocarpa_B9IAI0

---ATISDIGVAAAINILTAFAFFIVFAILRIQPVNDRVYFPKWYIKG--
LRSSPLVRFLNWMPAALQMPEPELIDHAGLDSAVYLRIYLTGLKIFVPIAFLAFTISVPVNWTNNT
LE-YSDLDKLSISNIPTGSCRFWTHMVMAYAFTFWTCYVLKTEYETVAKMRLHFLASEK--
RRPDQFTVLVRNVPPE-
SVSELVEHFFLVSDYLTHQVVYNANELSNLVNKKKKMKNWLDYYQIKYSRNQSR-
KPSLKTWGNRVDAIDHYTSEIERLSREISLERDKIVPKSIMPAAFVSFKTRWGAAVCAQTQQSR
NP-
TIWLTGWAPEPRDVYWDNLAIPFVSLTLRRLVIAVAFFFLTFFFMIPIAFVQSLANIEGIEKALPFL
KPIIEMKVIKSFIQGFLPGIALKIFLIFLPSILMLMSKFEGFISLSGLERRSAARYYIFQFVNVFLGSII
TGTAFQQLDNFIQSATQIPKTVGVSIPMKATFFITYIMVDGWAGVAGEILRLKPLIIYHLKNFKKEA
MDPGTLGFNTGEPQIQLYFLLGLVYAVVSPILLPFIIVFFALAFVVYRHQIINVYNQEYESAAAFW
PDVHGRIIVAVIVSQLLLMGLLSTKEAAQSTPLLITLPILTIWFHLFCKGRYEPAFVRYPLQEAMM
KNLNLKSFLQNAYSHP
>Populus_trichocarpa_B9MUA6
---ATLQDIGVSALINILGAFAFLLAFALLRIQPINDRVYFPKWYISG--
GRSNPRFTFLNWMPQALKMTEAEIINHAGLDSAVFLRIYTLGLKIFVPITILALLILIPVNVSSGTLF
FMSDIDKLSISNVRPQSIRFFIHIALEYAFTIWICFMLYKEYDHVALMRLRFLASKR--
RHAEQFTVVVRNVPHR-
SVLDTVEQFFQTNTYLCQQAVYNANKFAKLVRKRDRLQNWLDYNQLKFERHPDK-
RPTRKNWGERVDSIEHYKQQMKHLEKNMASERQTILSKSILPVSFVSFNSRWGAAVCAQTQQ
SKNP-
TLWLTNWAPEPRDIYWRNLAIPFMSLTVRKLIISVTVFALVFFYMIPIAFVQSLANLEGLEKVAPFL
RPVIELKFIKSFLQGFLPGLALKIFLYILPTVLMIMSKIEGYIAHSTLERRAAAKYYYFMLVNVFLGS
IIAGTAFEQLDAFLQSPTQIPRTIGVSIPMKATFFITYIMVDGWAGIAGEILRLKPLIIFHLKNMIERA
MDPGSVDFPETLPSLQLYFLLGIVYAVVTPILLPFVLVFFAFAYLVYRHQIVNVYNQQYESAAAF
WPHVHSRIIASLLISQLLLLGLLSTKKAANSTPLLVILPVLTLSFHKYCKIRFEPAFRKYPLEEAMA
KDMNLKAYLADAYLHP
>Populus_trichocarpa_B9MXB5
IPDPWYGNIQYLLNISTIGLFFCIFIFLFAKLRSDHRR----------
SALATKLLAVWHATGREIALHCGADAAQFLIIEGGSFVVVLSIGVLSICVLLPLNMYGGSQ--
NDEFSKTTINHIEKGSSFLWIHFVFVVIVVLLAHFGMSLIEKRLKVTRFRD-----
NANSIAIFTIMVQGLPKSIGDDRRLQEYFQHGKIYKVIMPMDLCALDVLATELVRVRDEITWLVAK
IDSRRL----------EEELRRLQELRVELETELAEYKEG--
RAPSAGVAFVIFKDVYTANKAVQDFRESVRLQQWRVERAPLAADIYWNHLGSSKLSLRLRRLF
VNTCLLLMLLFFSSPLAVISALNSAGRIINAQSWLDWVQSS-
WFASLIFQFLPNLIIFVSYIIVPLVLSYMSKFERHLTVSGEQRAALLKMVCFFLVNLILLRALVESSL
EGTGCYLDGDR-
IQYMSASFLSRSCLSSLAFLITSTFLGISYDLLAPIPWIKKKIQKYSRTPIPKQTFDFAQYYAFNLTI
FTLTLIYSSFAPLVVPVGAVYFGYRYVVDKYNFLFVYRVRGGNDGRLMDTVLCIMRFSVDLFLL
SMLLFFSVHGDSTKLQAIFTLGILIMY--KLLNDSFQPALEGIQADSI-----VDGPIDYEVFSQP
>Populus_trichocarpa_B9N8E6
---ATLEDIGVSAAINLLSALIFLFLFAILRLQPFNDRVYFPKWYLKG--
LRNSPSIQFLNWMPQALKMPEPELIDHAGLDSAVYLRIYLMGLKIFVPITILAWVVLVPVNYTNNA
LEAASDIDKLSISNVPLKSQRFWAHIVMAYAFTFWTCYVLLKEYEKVASMRLQFLSSER--
RRPDQFTVLVRNVPPE-
SVSELVEHFFLVDHYLTQQVVCNANNLASLVKKNEGMQNWLDYYRFKYSRNRSQ-
RPQTKTWGAKVDAIDYYISEIEKLSKEITEEREKVLPNCIMPAAFVSFKTRWGAAVCAQTQQSR
NP-
TLWLTEWAPEPRDVYWPNLAIPYVSLSVRRLIIGVSFFFLAFFFMIPIAFVQSLASIEGIEKSLPFL
KPVIEVEFIKSVVQGFLPGIALKLFLILLPTLLMMMSKFEGLTSLSSLERRSAMRYYIFIIINVFLGSI
LTGAAFEQLDSFIQSASEIPKTIGVAIPMKATFFITYIMVDGWAGIAGEVLMLKPLIIYHLKNFRKEA

MDAGSLGFNTGEPRIQLYFLLGLVYAPVTPILLPFIVMFFGFAYVVYRHQIINVYNQEYESGAAF
WPAVHGRVITALVIAQLLMMGLLSTKQASSTTPFLIALPVLTIWFHVFCNGRYKSAFVKYPLQEA
MMKNFNFRSYLEKAYVHP
>Populus_trichocarpa_B9N8E7
---ATLADIAVSGAINLLSAFIFLLAFAILRLQPFNDRVYFPKWYLKG--
LRSSPSIRFLNWMPEALKMPEPELIDHAGLDYAVYLRIYLMGLKIFVPITFLAWAILVPVNYTNDA
LEAASDIDKLSISNIPLKSQRFWTHIVMAYAFTFWTCYVLLREYEKVAAMRLQFLSSER--
RRPDQFTVLVRNVPPE-
TVSELVEHFFLVDHYLTHRVVCNANKLASLVKKKKKKQNWLDYYQLKYSRNQSQ-
RPQMKTFGGKVDAIDHHISEIEELSKEIEEERTRVLPKSIMPAAFVSFKTRWGAAVCAQTQQSR
NP-
TLWLTEWAPEPRDVYWQNLAIPYMSLKVKRLIIGVAFFFLTFFFMIPIASVQALASIEGIEKRAPFL
KSVIEIKFIKSVIQGFLPGIALKLFLIFLPTILMIMSKFEGFVSLSSLERRSATRYYIFLIINVFLGSILT
GAAFDQLNAFIQSANEIPKTIGVAVPMKATFFITYIMVDGWAGIAGEVLMLKPLIFYHLKNFREEA
MDPGSLGFHTGEPRIQLYFLLGLVYATVTPVLLPFIVIFFAFAYLVFRHQIINVYNHEYESGAAFW
PDVHGRVITALVISQLALMGLMSTKEAAQSTPFLIALPVLTIWFHRFCNGRHKSAFVKYPLQEAM
MKNFNLKAYLQSAYVHP
>Populus_trichocarpa_B9NGP9
---ATLADITVSGAINVLSAFIFLLAFAILRLQPLNDRVYFPKWYLKG--
VRGSPSIRFLNWMPEALKMPEPELIDHAGLDYAVYLRIYLMGLKIFVPITILALAILVPVNYTNNAL
EAASDIDKLSISNIPLKSQRFWTHIVMAYAFTFWTCYVLLREYEKVASMRLQFLSLER--
RRLDQFTVLVRNVPPE-
TVSELLEHFFLVDHYLTHQVVCNANKLASLVKKKKKKQNWLDYYQLKYSRNQSQ-
RPQMKTFGGKVDAIDHHISEIEELSKEIEEERTRVLPKSIMPAAFVSFKTRWGAAVCAQTQQSR
NP-
TLWLTEWAPEPRDVYWQNLAIPYMSLKVRRLIIGVAFLLLTFFFIIPIASVQALASIEGIEKRAPFLK
SVIEIKFIKSVIQGFLPGIVLKLFLIFLPTILMIMSKFEGFISLSSLERRSATRNYIFLIINVFLGSILTGA
AFEQLNSFIQSANEIPKTIGVAVPMKATFFITYIMVDGWAGIAGEVLMLKPLIFYHLKNFREEAMD
PGSLGFHTGEPRIQLYFLLGLVYATVTPVLLPFIVIFFAFAYLVFRHQIINVYNHEYESGAAFWPD
VHGRIITGLVISQLALMGLLSTKEAAQSTPFLIALPVLTIWFHRFCNGRHKSAFVKYPLQEAMMK
NFNLKACLHSAYVHP
>Rattus_norvegicus_D3ZNF5
LQGQPFGGIPTVLLLNIILWVCVVLVYSFLRKAAWDYG----
RLLHNDSSPSEVYLKGFSTWFFNSLTMRDRDLINKCGEDARIYIMFQYHLIIFVLILCIPSLGIILPV
NYIGSAL--SSHFGRTTIVNVSTESQFLWLHSIFAFMYFLTNFAFMGHHCLGFVP----------
KKNLHFTRTLMITYVPTEIQDPETISKHFHECVVTRVHFCYDVRNLIDLDDQRRHAMRGRLYYTA
KAKKTGKKVHPCS-H--KEVDAEQYYSELEEQLTDEFNAELNRV-
QLKRLDLIFVTFQDARTVKRIHNDYKYSSIVKHWRVARAPHPKDIIWKHLSIRRFSWWARFIAINT
SLFFLFFFLTTPAIIINTIDMYNVT----------
RLQSPVVTQFFPSVLLWAFTVIMPLLVYFSAFLEAHWTRSNQNLIIMYKCYIFLVFMVVILPSMGL
TSLDVFLRWLHA---
TIRFQCVFLPDNGAFFINYVITSALFGTGMELMRLGSLCTYCTRLFVHIKNLAMDFQFGREYAW
MLNVFSVVMAYSITCPIIVPFGLLYLCMKHITDRYNMYYSYAPT-
KLNAQIHMAAVYQAIFAPLLGLFWMLFFSILRVGSLHSITLFSLSSIIISVIIAFSGVFLGKFRIAQQE
QP--------SPARHTY---
>Rattus_norvegicus_D4A105
LQGLPFGGVPTVLALDFMCFLALLFLFSI-RKVAWDYG----RLLDADTS-
VSSSVNGFCSWLTAIFRIKDDEIRDKCGGDAVHYLSFQRHIIGLLVVVGVLSVGIVLPVNFSGDLL
--AYSFGRTTIANLKSGNNLLWLHTSFAFLYLLLTVYSMRRHTSKMRY----------
KEDDLVKRTLFINGISKYAES-
EKIKKHFEECTVLEARPCYNVARLMFLDAERKKAERGKLYFTNLQSKENVNPKPCG-H--

EQVEAIEYYTKLEQRLKEDYRREKEKV-
NEKPLGMAFVTFHNETITAIILKDFNVSSALHNWTVTYAPDPQNIYWEHLSIRGFIWWLRCLVINV
VLFILLFFLTTPAIIITTMDKFNVT----------
KLNNPIITQFFPTLLLWCFSALLPTIVYYSAFFEAHWTRSGENRTTMHKCYTFLIFMVLLLPSLGL
SSLDLFFRWLEA---
AIRFECVFLPDNGAFFVNYVIASAFIGNAMDLLRIPGLLMYMIRLCRNVRHQAYEFQFGAAYAW
MMCVFTVVMTYSITCPIIVPFGLMYMLLKHLVDRYNIYYAYLPA-
KLDKKIHSGAVNQVVAAPILCLFWLLFFSTMRTGFLAPTSMFTFVVLVITIVICLCHVCFGHFKYL
SANYK---S----SGDEPPS---
>Rattus_norvegicus_D4A2I3
LQGVTFGGIPTVLLLDVGCFLVLILVFSIIRRKFWDYG----RILEAGSS-
SSSGQLGCCSWLSAIFRLHDDQILEWCGEDAIHYLSFQRHIIFLLVVVSFLSLCVILPVNLSGDLL-
-PYSFGRTTIANLQTDNDLLWLHTVFSVIYLFLTVGFMWHHTRSIRY----------
KEESLVRQTLFITGLPREARK-
ETVESHFRDCEVVDVQLCYSVAKLINLCKERKKTEKSLTYYTNLQVKTGRNPKPCG-Q--
EREDAISYYTRMNDSLTERITAEECRV-
QDQPLGMAFVTFREKSMATFILKDFNASSELCKWSVTFASYPEDICWKNLSIQGVRWWLQCLG
INFSLFVVLFFLTTPSIIMSTMDKFNVT----------
KLNNPVISQFFPTLLLWSFSALLPTIVYYSTLLESHWTRSGENRIMVSKVYIFLIFMVLILPSLGLT
SLDFFFRWLDT---
SIRLECVFLPDQGAFFVNYVIASAFIGSGMELLRLPGLILYTFRMIRNVQNQAFEYEFGAMYAWM
LCVFTVIMAYSITCPIIVPFGLIYILLKHMVDRHNLYFAYLPA-
KLEKRIHFAAVNQALAAPILCLFWLFFFSFLRLGLTAPATLFTFLVALLAILACLLYTCFGCFKHLS
PNYK---------QQQQTY---
>Ricinus_communis_B9R6U4
----DIAALLTSAGINIGLCIVLLSLYSILRKQPSNRVVYFGRRLAS-V-RIR---
VPSPSWIVKAWETTEEEILAIGGLDALAFQRMLIFSIRVFSIAAVICLLLVLPMNYYGKEM--
SESLDVFTIGNVKEGSRWLWAHCLALYIISCAACVLLYFEYKSITEMRLAHITKSS--
LNASHFTILVRSVPWE-SYSETVKKFFANSSYLSHQMVYKRGLIQKLMVDAEKMCSMIIPVPID---
-------RPSLCGKSTTSFKILASEAESVKDSISIADLNVAEN-
ECAAAFVFFKTRYSAVVATQMLQSPNP-
MLWVTELAPEPHDVLWSNLSIPYKQLWLRKIATLLAAIVFMFLFLIPVTFVQGLTQLDKLSRTFPF
LRGLLKKDFMNHVVTGYLPSVILMLFLYTVPPVMMLFSSVEGPVSRSGRKKSAGLKILYFTIWN
VFFVNVLSGSVISQLNVFS-
SVRDIPMELAKAIPTQASFFMTYVLTSGWAGLACEVMQLFPLSCNMFKKFSDDLM---
TFPYHTEVPRVLLFGLIGFTCSIMAPLILPFLLVYFSLAYLVYRNQILNVYIPKYEGGGHFWPIVHN
TTIFSLVLTQIIALGVFGIKESPVASGFTFPLVIGTLLFNEYCRLRFSPIFDKDPIKILIEMMDQIYQQ
LHSAYCQF
>Ricinus_communis_B9RGD1
----KPESLAASAGINFGLALIVLSLFSIFRKQPSNALIYYSRRLSK-G-HR---
VLPSVSWIPRAFRVTEDEILQTSGLDALLIIRLFKFGIKFFGVSSIIGLVVLLPVNYGGQ----
YHTMDSFTISNVCRGSNRLWVHFTCLWVVSFYGLYLLYKEYNEVLIKRIQQIRDFR--
HRPEQFTVLVRQIPLHNALGCSVGHFFSKASYHSHQMLYDAKEIENLLKQAKYLTEKIEGLRGR
STVK----KHGKECSGVDALKITLLEEKVQEIYHDIRQSQGEIMGK-
ELPVAFATFKSRSGAALVAQSQQHSNP-
LLWITEMAPEPRDVSWRRLAIPYKYLPIYKIGVIVSASLLTIFFAVPVTAVQGIAKFEKLKKWFPPA
MAIELIPGLSSIVTGYLPSAVLKGFIYVVPFAMFGMARVGGSISKSKAEIKACNMVFYFLVGNVFF
LSLISGSLLDEIGEYLSHPKNFPSHLASSVSAQADFFMTYILTDGLSGFSLEILQPGMLLWDSIML
HNPYLF---
SLPYFRIIPSVALSMLIGMVYAVVSPLLLPLLVGYLCLGYIVYVNQIENVYETVYETSGLYWPYIHH

YIFVGIILMQITMIGLFGLKSKPAASIATILLLLMTIAFNEYCKIRFLPTFGHYSIQDAVEHLEIKCEYA
SNAYRPP
>Ricinus_communis_B9RXG3
---ATLGDIGVSAAINLLTAFIFLLAFAILRLQPFNDRVYFPKWYLKG--
IRSSPTLRFLNWMPEALRMPEPELIDHAGLDSAVYLRIYLLGLKIFVPIAFLAWAILVPVNWTNST
LELSSDIDKLSISNIPLHSQRFWAHIVMAYAFTFWTCYVLMKEYEKVATMRLQFLASEK--
RRADQFTVLVRNVPPE-
SVSELVEHFFLVDHYLTHQVVYNANKLSKLVKKKKSMQNWLDYYQLKYSRDKSL-
RPLLKSWGKKVDAIDHYTSEIEKLSKEIVEERERVEPKAIMPAAFVSFKTRWGAAVCAQTQQSR
NP-
TLWLTDWAPEPRDVYWHNLAIPYVSLAIRRLIMGVAFFFLTFFFMIPIAFVQSLASIEGIEKRAPFL
KPIIEIKFIKSVIQGFLPGIALKLFLIFLPTILMIMSKFEGFASLSSLERRSATRYYFFNIVNVFLGSIIT
GTAFEQLNSFIQSANDIPKTIGVAIPMKATFFITYIMVDGWAGIAGEVLMLKPLIIFHLKNFREEAM
HPGSLGFNTGEPRIQFYFLLGLVYATVTPTLLPFIIVFFAFAYVVFRHQIINVYDQEYESGAAFWP
DVHGRVITALIISQVLMIGLLSTKRAAQSTPFLIVLPVLTIWFHRFCKGRYEPAFVKYPLQEAMMK
NLNLKPFLQNAYRHP
>Ricinus_communis_B9S1E8
---ATLGDIGVSAFINIVSAFAFLLAFALLRIQPVNYRVYFPKRYISG--
ERSSPRLTFLNWMPQAMRMSESQIINHAGLDSAIFLRIYTLGLKIFIPITVLALLILIPVNVSSGTLF
FLSDIDKLSISNVRPKSIRFFVHIALQYLFTIWTCFLLYKEYDIVASMRLRFLASQG--
RHAEQFTVMVRNVPHQ-
SKSDTVEQFFKTNTYLCHQAVYNANKFAKLVRKRDRLRNWLDYNQLKFERHPDK-
RPTRKGWGERVDSIDYYKQQIQELEKRMAMERQKILPKSMLSVAFVSFNSRWGAAICAQTQQ
SNNP-
TLWLTNWAPEPRDIYWRNLAIPFVSLSIRKLIISLSVFALVFFYMIPIAFVQSLANLEGLEKVAPFL
RPVIELEFIKSFLQGFLPGLALKIFLYILPTILMIMSKIEGYIAVSTLERRAAAKYYYFMLVNVFLGSII
TGTAFQQLHSFLQSPTQIPRTIGVSIPMKATFFITYIMVDGWAGIAGEILRLKPLVIFHLKNMREKA
MDPGSVDFPETLPSLQLYFLLGIVYAVVTPILLPFILVFFALAYLVYRHQVINVYNQQYESAGAFW
PHVHSRIIASLLISQLLLMGLLSTKEAANSTPLLVILPILTLAFHKYCKNRFEPAFRKYPLEEAMAK
DLNLKSCLADAYLHP
>Ricinus_communis_B9S919
----LVSALLTSLGINSGLCVLFFVFYSILRKQPSNYEVYAPRLLAE-G-NSK---
IPSPGWISKAWKLSEEDILLSSGLDAVVFMRLITFSLKVFSFAGIIGIFVLLPVNCLGTQLQKSNSL
DVFTISNVNYGSKWLWMHFCAVYMISIFICYLLYNEYKYISSKRIAYFYSSK--
PQPHQFTILVRGIPVS-SISETVERFFTETTYLSHMVVRRSSNLRSLVTEAKKLYTRLLHLQSEP-
SH----QKYRR-FGENVDLVDHYEKKLEDVEQNVKLEQSDLSGE-
ETRAAFVSFKSRYGAAVAFHLQQSVNP-
TQWVTEQAPEPDDVYWPFFSSSFMRRWISKLVVVVACILLTILFLIPVVVVQGLTNLSQLEIWFP
FLKSILTITFVSQVITGYLPSLILQLFLKIVPPIMEFLSSIQGYISHSDIEKSACNKVLWFTIWNIFFAT
VFSGSVLYQVNIFL-
DPKNIPAKLAVSVPAQASFFVAYVVTSGWTSTSSELFRIIPLICSLATRCELEVP---
SIAYHKDIPRILFFGLLGITYFFLAPLILPFLLVYLCLAYIIFRNQFMNVYAPKYETAGKFWPIVHNS
MIFSLVLMHAIAIGIFTLKKLSTASTLIFPLPVLTLLFNEYCRKRFLPIFIAYSAEVLIKKMHEFFDKL
VTAYQDP
>Ricinus_communis_B9STM2
---ATLSDIAVAAAINILGAFAFFLAFAILRIQPVNDRVYFPKWYIKG--
LRSSPILRFLNWMPAALQMPEPELIDHAGLDSAVYLRIYLTGLKIFVPIAFVAFTVLVPVNWTNST
LK-YSDLDKLSISNIPMGSSRFWTHLVMAYAFSFWTCYVLKKEYEIVASMRLHFLASEH--
RRPDQFTVLVRNVPPE-
SVNELVEHFFLVDHFLTHQVVYNANKLSELVNKKKKMRNWLDYYQLKYSRNQSR-
KPSVKTCGDSVDAIDYYTSEIERLSKEISLERDNTVPKYIMPAAFVSFQTRWGAAVCAQTQQSR

NP-
TVWLTEWAPEPRDIYWDNLAIPYVSLAVRRLLVAVAFFFLTFFFMIPIAFVQSLANIEGIEKALPFL
KSLIE---
MXSFIQGFLPGIALKIFLIFLPSILMLMSKFEGFISLSGLERRSATRYYIFQFINVFLGSIITGTAFQQ
LNNFIQSANDIPKTIGVSIPMKATFFITYIMVDGWAGVAGEILRLKPLIIYHLKNFREEAMDPGTLG
FNTGEPQIQLYFLLGLVYSVVSPILLPFIIVFFGLAYVVYRHQIINVYNQEYESAAAFWPDVHGRIV
TALIVSQLLLMGLLSTKQAAQSTPLLITLPVLTIWF--ICSAK----------DNAYIHP
>Ricinus_communis_B9SVJ7
----ILSALLTSVGINLGLCFLFFTLYSILKKQPSNRYVYAPRLVRS-Q-
KSNQQLLPSAGWVTRAWQLTDDHLISISGLDALVFARIFYFGLRVFAFGGIVGIFVLLPVNYLGN
QLNRNKSLDSFSISNVDDGSNWLWMHFSAAYVFTGVVCYLLYYEYNYIFSKRIACFYSSK--
PQPHQFTILVRGIPSR-
SFSEVVESFFTQSTYLSHSMIHQTSKIRGLIDDAEKLYRRLAHVKTENHLR----
QHFKRDFGKKVNIVDHYEKKLENLEDNVRMKQRSLAGE-
KVPAAFVSFKSRFGAAVALHIQQGVNP-
TEWVTEQAPEPQDVHWSFFSASFLRRWIYKLVAVFAFLILTILFLIPVLLVQGLANLYQLETWFPF
LKGILSLTVVSQLITGYLPSLILQLFLFFVPPLMILFSSMQGYISLSQIEKSACTKVLCFTLWNIFLA
NVLSGSAFYMVNVFL-
EPKKIPEVLAEAVPAQASFFISYVVTSGWTSLSSELFRLIPLICSFIKRLKFEVP---
SIPYHSEIPTALFFVLLGITYFFLAPLILPFLLIYFCLGYIIFRNQLLNVYAPKYETSGKFWPIVHYST
VFSLILMHVIAIGTFGLKKLPLASSLTIPLPVLTLLFNEYCRKRFLPIFKAYPTECLVTKMAEFYDKL
VSAYHDP
>Ricinus_communis_B9T4A8
---ANLQDIGYSAAVNLLSAIAFLIAFAILRLQPINDRVYFPKWYLKG--
IRASPTIRFLNWMPAALRMPELELIDHAGLDSVVYIRIYLLGLKIFVPITVLAFGVLVPVNWTGETL
EHYSDIDKMSISNIPPGSKRFWAHVVMSYVFTFWTFYVIYKEYKRVAIMRLQFLASES--
RRPDQFTVLVRNVPPE-
SITEHVEHFFCVDHYLSHQVVYNANKLASLVAKKKSLQNWLIYYQNKYDRNPSV-
KPTKKTWGTRVDAIDYYTSEIGKLSEEEEKERERVLPNAVVPAAFVSFKSRWGAAVCAQTQQS
SNS-
TIWLAERAPEPRDVYWDNLAIPYVELTVRRLLMAVGLFFLIFFFMIPIALVQSLASIEGIEKFLPFLK
PLIEMKSVKSLIQGILPGLALKIFLIVLPIILMIMSKIEGFTSLSSLDRRSAAKYHLFLLVNVFIGSIVT
GTAMDQLKAFLESATEIPKTIGVSIPLRATFFITFIMVDGWAAIAAEILRLVPLALFHLKNTRDQAM
DPGCVDFATSEPRIQFYFLLGLVYAAVTPLLLPFIIVFFAFSYMVFRHQIINVYNQKYESGAAFWP
DVHRRLIIGLIIAQLLLLGLLSTKDAEELTPLLVALPILTIWFHIFCKGRFESAFVKFPLQDAMVRTL
NLRIYLHDAYVHP
>Ricinus_communis_B9T723
IPNSWYGNIQYLLNISTIGLLFCIFIFIFVKLRSDHRR----------
SALISKLLAVWHATGREIARHCGADAAQFLIIEGGSFAVLLGIAVLSICFVLPLNLYAGTA--
DDQFSKTTINHIEKGSAFLWVHFVFVVIVVVLVHFGMSVIEERLKITRFRD-----
NADSTAIFTIIVQGLPKSLGDDRSLREYFQHGKVFKVIVPMDLCTLDDLATELVRIRDEITWLVAR
MDSRLL----------EEKLRKLQEVRAELETDLAAYKEG--
LAPSAGVAFVIFKDVYTANKAVQDFRESIRLQQWKVERAPLATDIYWNHLGSTKLSLRLRRLFV
NTCLLLMLLFFSSPLAVISALTSAGRIINAQSWLAWVQSS-
WFASLIFQFLPNVIIFVSYIVVPSALSYLSKFERHLTMSGEHRAALLKMVCFFLVNLILLRALVESS
LESAGCYLDGDK-
IQYMSASFLSRSCLSSLAFLITSTFLGISFDLLAPMPWIKKKIQKFSRTPIPKQKFDFAQYYAFNLT
IFALTLIYSSFAPLVVPVGAVYFGYRYVVDKYNFLFVYRVRGGNDGRLMDTVLCIMRFCVDLFLL
SMLLFFSVQGDSTKLQAIFTLGLLVMY--KLLNDGFLPALEGVQTDSI-----VDGPTDYEIFSQP
>Saccharomyces_cerevisiae_NP_013096.1

HAGISLKGFISGILFSFLYFLFQLSLFIIL--RSRFKTIYQANVVLKIG-
SKVCFAKNYWSLFAFLKQLPGRMLNERYGLDNYLFLRFLKLLIFFFAVLSIINIPILIPIHYFSRDILK
TSKLDKWTMSNL-NSSNTLICHLFLSIFVVLWFHFILSSELRFVNRLGYSVLTKSKYQNILYLEGF-
----SSKLVTQSILETFFQPFGVTH-
FIPKNLKKVHKLEIKLNKLQKSKEQIIFEIILEKYSIFPLYKYIIRKEKLIKFQVNSLKATSETKQALPD
DLSTDIYMDKMFITFKSTLLSNVIGELLSYRLP-
TQNLKVIGPNVNDIIWRNIDSSPLWKSAKYFSANILRIFVIIGWILPVAFLGLISQIPNISSLIPFTKIIH
FQSFIREVAKNLIPIVTLIIIIEIVPYFFRWLSYLRGLKTGAQIEADVQNWYFVFVFIHLFVVVTISSG
FSIIIERLLNNPVSIPALLANDLPKCANFFCSFVLIRGMAYAGGNLLRIKELLFELFYYKQFKLKTSL
FFQLGSIYPIFSVLGCIGIIYSVVAPIILLLCCISFSMVFFSFSYLFKYQYKNYSETFGKLYIQALMQL
YAGIYFMEFCLLGLFTLFDQYTLSTIMLVVFALTVITHSKISKQIKSKPQRIPTLEYSNLEERKDQF
CQESYTFH
>Saccharomyces_cerevisiae_NP_013342.1
FRKPTAKVVTTQLTIATSLGIFALLSFSILLKKWPR--LYASRRK----------
SSLFGWLTVLYKIRDEQILEYAGLDAYVFLSFFKMCIKLLSIFCFFSVCVISPVRYHFTGKID--------
----ERTNVYLWMYVLFTYFFTFIAIKMAVAETKHVVSTRQAYLGKQ---
NTITDRTIRLSGIPIELRDSEALKTRIEQGTVSSITICREWGPLNKLFHCRKKILKNLEECILYSQISL
-GERPKMKIFGKEVDAIEYLEQQLKFIDAEIIEARKQ--
HYSATPTAFVTMDSVANAQMAAQAVLDPRV-
HYFITRLAPAPHDIKWDHVCLSRKDRLTKVYSTTVFIGLSSLFLVIPVSYLATLLNLKTLSKFWPS
VGQLLKDHWAANIVTGLLPTYLFTLLNFGIPYFYEYLTSYQGLVSYSEEEISLVSKNFFYIFVNLFL
VFTLAGTASNYWAYLSDT-
TKIAYQLATSVKEFSLFYVDLIILQGIGMFPFKLLLVGSLIGFPLVKIRNELYNPPIFNFGLQLPQPIL
ILIITLIYSVMSTKILTSGLAYFIIGFYVYKYQLIFATDHLPHSTGKVWPLIFRRIIVGLLLFQLTMTGT
LAFEGGWVLSSCLFPLPVVTLCFLYDFEKNYLPLSKYIALSSIREYSTVNSANEEESYAYP
>Saccharomyces_cerevisiae_NP_013993.1
STNTSTQQVVTSLVSNGTIFGVFVIAFLIL--RIKLKRIYEPKSSFNLE-
EKKPEPQGVWQWLKPLLKKSDNFVIQQAGLDGYFFLRYLFIIAIYCAVSMSYIFPILLSINASNGN-
-H-SGLNQLAYQNV---
RGRYFAHVFCGWIFFWGFLYIIYRELYFYTSMKQAVLASPRYAKKLSSRTVLFQTVPKQYLSEE
EFSKLF--
DGVKRVWIARGSGSIEAMVKARDNMAIQLEGAETKYLKAALKKRPHHKIFGKKVDTISYIKEELP
KLNQKVKALQEDHENSSPFNSVFVEFESQYQAQVAAQITTYHAP-
LFMTPVIGIEPSDVVWFNLRMFWWERLGREVSAVSAIVALVILWAFPVAFVGMISNITSLTNEVK
WLKFIYKLPQLLGLLTSLAPTVALAVLMSFLPKFIRGMAITQGAPSKQNVEYFTQQAYFAFQVIQ
VFLVTTLSSAATSTVTEIVKEPTKAMDLLASNLPKASNFFMSYVILQGLSISSGALLQIVPLILFYVL
GAKWNFCGLSSMQWGTAFPVYTNLAVITFSYSIISPLILLFAAVAFFLLYIAYLYNLTYVYQESPD
ARGIYYPRALFQTIVGIYIGQICLLGLFAVGKGWGPIVLQVIGICVTVLIHLHLSAAFDHLSKVIPVD
TMKPLERVNDFDISHAYDYP
>Saccharomyces_cerevisiae_NP_014557.1
ADSSSTSAFISTLIIYGLTAVVFVWLFLLL--RPKNRRVYEPRSLIQTE-
EERTEPEGYFGWVEYLLSKPHSFLIQHTSVDGYFLLRYIGIVGSLSFVGCLLLLPILLPVNATNGN
--N-QGFELLSFSNV---
KNRFYAHVFLSWIFFGLFTYVIYKELYYYVVFRHAMQTTPLYDGLLSSRTVIVTELHKSIAQEGE
MQMRF--
PKASNVAFAYDLSDLQELCKERAKNAAKYEAALNKVLNKCVKKRPKHRLGGKKVNTLSYSSKRI
GELNEEIHEKQADWASNDRQPACFIQFETQLEAQRCYQSVEAILG-
KKNGKRIGYSPEDVNWGSMRLSSKERHSRRAVANTIMVLLIIFWAFPVAVVGIISNVNFLTDKVP
FLRFINNMPFLMGVITGLLPTIALVVLMSLVPPFIVMLGKLSGCVTRQETDLYSQAWYYAFAVIQI
FLVVTATSSASSTVDSIIDRPRSAMTLLANNLPKASNFYIMYFILKGLTGPTWTILQAVNLLLSKVL
GRKWNYNTLATPRMGIVYPGIEILVCIYICYSIIAPILLFFSTVMLTLLYVAYLYNLNYVFGFSFDLK

GRNYPRALFQIFVGIYLSEVCLLGLFIMAKTWGPLVLEVFWIVVTALAHIYMKRKFIPLFDAVPLS
AIRHAIEYDEEYLSSAYTDP
>Schizosaccharomyces_pombe_non_NP_593089.1
LKTDPSSDLRTQFWLAFLLGASACVFFCFFRKRWK---LYAPRTI----------
SSYYKWLMDLVNIPDDVVQNCAGLDGYVFLLFFKMGIKFLSFASLLGVLIIMPVNKHFRG----
DAFGNITLSNVQPGDGFLYLYVLFTYFISIFLLYVLFSSTKSIADIRQSYLARQ---
NRLTDRTVFISGLPNELCSTENLKAYFDKGSIDSLSICRNYSYMDILLSKKSKYVKKLEKYWSIYL
SNCKQCHPLI--FGQKIDAIDFYSAKLYKISQQIENARSF--
DYPTTGQAFITFESMATAQIVAQTHIDSK--
SGLHIELAPAANDIQWHNTYIGRWHKFFQGWFITLVTFMIILLWTVPVGAIAVFINLDTIRRLWPE
LGRMIEDLFLNSLLRTFLPTLVYSLFISISPFLFRWLSSMQGLSSRAEEEIYAVGKNYAYLFVNFF
LVYVIAGS-TSIW-
ELAKDTTSFAHFLANRLPHQAQFFIDLIVLQGIGMFPLKLIQLGKLSSYFVRRSSKKFETPDSFSV
GIFLPQPMFIMLICLCYSIISPLILVFGLIYFIIGFLVYKYELIYQMEHPQHSTGELWSTIFLRMIFGC
VIMQLTMMGLMSLRKAYWLSTVIFPLLCFTVISAYNFSTMIRSSMQFVSLYYITHQSESRNSESS
GSYVHP
>Schizosaccharomyces_pombe_NP_592939.1
SSSSSTSAFVSSLVFNFAIFCAFIGLFLCL--RPREKHVYQPRCIIDTK-
EEKPEPSSPFGLFAYVVKRSETYLIQYAGVDGYFFIRYLFTFGALCILGCLVLFPILLPVNATNGV-
-G-KGFDILSFSNV---
HNRFYAHVFLSWLFFGFTIFIIYRELRYYVIFRHAMQSSGLYNNLPSSSTMLLTELPNSVLNDEEL
HELF--
PNASEFTCVRDLKKLEKKVKKRSDLGNKYESTLNSLINKSVKKRPTHRLIGKKVDTIDYCRDTIA
ELDEVVDKLQTSLEERKKVGSVFIRFRSQTDLQTAYQAFLYSKK-
FYRGRAVGIAPEDIVWSNLDLSMYTRRGKKTISNTILTLMIIFWAFPVAVVGCISNVNYLIEKVHFL
KFIDHMPKLLGIITGILPSVALSILMSLVPPFIKFLGKFGGALTVQEIENYCQNWYYAFQVVQVFLV
TTMTSAATSAVVQVIKEPASSMTLLASNLPKASNFYISYFLLQGLSIPGGALLQIVTLLLSKVLGR
KWNWNQLSAPSWGTVYPVYSLLVTIMICYSIIAPIIIGFAAVAFVLIYFAYSYNLIYVLGHNADAKG
RNYPRALFQVFVGLYLAEVCLIGLFVLAKNWGATVLEAVFLGFTVACHLYFKYKFLPLMDAVPIS
AIESV---PVRVRNVQYVSP
>Schizosaccharomyces_pombe_NP_595232.1
QAKFDKYSILVSLGFSSLLSVILLCIFTLL--RTKF-NTY----------
DRCIPPKSLWGWIEPLWSIKVEDCLYNMGADAVISLLFSRFCRDVFLILAAICCTILIPINIVATNKT
LQNAYAKLSIQNVTG-N-
WTWAHVVICYVFNVLVLFLLARYYQIVMRIRQRYYRSPTYQQSMSSRSLLIMDIPTTMRSNNGL
SILASREAPMHVHICHAIKNLPKILKKHDNAVRSLEAVLAKFFKNPKDDRPVRR-
TSEKVDAIDYYSAKIENYGLRVDAARESL-YENFEHYGFITYKSSYIAHDTA--RHNSRV-
AGASVSMAPEPSDFLWDNLSLAWSTRLFNRMIGNILFIILIIAWIIETALVAIISNLYHLGSVWPWL
QQQLTSRGFWSIVQGILSPAVAGFTFMILEIIMRRISYWQGSFTKSSRERGVLNKLHIIFTLDNFII
YTLMAVFWRLGVIIAYKTKETVGLSVSSFVQFSTFWIMFIAHSTC-
SFFVEIAQPITLTIRLIKTKLLEWTAPTKYVYSQVLNKLIYFFTIAICYACINPLVLLFASVLFCVNYLT
QKYILMYVSNSSTESGGGYWRPVVNRILLGLELANIILFLCLWVQGGRVRAYCIIPNFSFAIAFKI
WCMFALDPKSHYMIEDPYM--E------SEMCFGHP
>Selaginella_moellendorffii_D8QPN8
----QLGGLVASAGINIGLAVIFYSLYSIFRKQRTNVNVYFPRYVLR---------
VPSAGWIQRALQPSEEEIIASCGLDAAVLLRIFIFSMRFFAICTLIGVGILAPLNYTDNQVSHFDSL
DLFTISNISNGSNRLWIHLAALYVISFSAYWLLHMEYKHVTQKRLEVLSTAR--
PQPDQYTVLVRSIPREESYSASIDRFFSQHTYLSHQMVIRDWRVVRKKQTLESLVKEIERLKQIA
PHE----
RPTCRDFGSKVDQLEFKSRKFEELFDDFREGQRELQGEAELPSAFVSFKSRWGAAMAAQTQ
QAENP-

MAWVTDWAPEPRDVYWPNLSIPLLLSKLYAIGVWVAVFAIILTFVIPVGLVQTIAQLENLRKWFP
AIKIVLKIPGIKSVITGYLPSVLLSLLLYIVPSLMLFLSKVEGHVSRSTQEREAARKVFFFLVGNVFF
ISSLSGSLIDQLYAGFSEPKNIPNQLAIYVPRQSTFFITYILTTGWTGFSTEILQLGIFLLNFIKVRET
DTI---
SLPYYRALPSVLLFILLGLMYAVLAPLLLPFLLIYLVFGYIVYRNQVLFVYEPSYETSGQFWPHVH
SSVIFALVLMQITFIGVFGVKQKPNASILTIFLPFITLFFDNYCKSRFVPIFANLSMETTMKKKDELL
QCIQGSYKHP
>Selaginella_moellendorffii_D8RE49
---ATLQDLMLSAAINGGSTIVFLLVFAFLRLQPFSDRVYYPKWFIKG--
VRKSEDLHFLDWMWESIRMPELELIDHAGLDSAILLRIYLLGLKVFVPLLVLCFLILVPVNATDTNL
RKSADIDKLSVANVQDRSDRLWAHMLLTYVFTLWTCYVLHNEYKTVAFMRLRFLKSQM--
SRPEQFTVLVRQIPDE-
TVGLHVDHFFRVEHYLMYQIVYNANKLAKIVKKIEDIENKLNYCRIMESRNPSS-
RPQIKKRGEKLDAMKFYTSEIERLVGEAATEKERIFEKAKLPVAFVTFDSRWGAAVCAQTQQTK
DP-
TKWLAEWAPEPRDVYWRNLAIPYMELYFRKIAITAAVVVLILFFMIPVTFVQSLANIEDIERTVKFL
RPVIERKFIKSILQGFLPGLALKIFLLILPSVLMILSKVEGHLSLSKLDRMAAAKHFYFMVFNVFFA
SVFTGSALQQLKLFLKSPSDIPQLLGDAIPLKATFFISYIMVDGWASVAGEILRLKPLLFFHFRNM
REKAMAPGGLSLNTALPHVGLYFLLGLVYAVIAPIILPFIVTFFGFSYLVYRNQVINVYHPEYESA
GGFWPHIHNRVVASMIIMQLTLLGLLSTKRAASSTPFLAGLPVLTFIFHTYTKRCFESAFVKFPLE
EARAKHTDFRSLFRNSYTHP
>Selaginella_moellendorffii_D8RRD4
---ATLQDLGVAAAINIISAFIFLLVFAFLKLQPANARVYYPKWYLKG--
VRQGSSLHFLDWMRDALRMPEGELIAHAGLDSVVYLRIYLLGLKVFVPLMLLGFLVLVPVNVTD
SNIQ-GTDIDKISLTNIREKSPRLWAHVVMTYVFTAWTCFMLFTEYKTVARMRFQFLAAEA--
RRPDQFTVLVRQVPLE-
PISTHIDHFFRVDYYLCNQVIYNANKLAKLVKKREGLQNWLDYYQLQFQRKNTE-
RPMTKTWGQKVDAIQYYTDGINQISKEAAAERERVLDSSKLPVAFVSFRSRWGAAVCAQTQQT
RDP-
TVWLTEWAPEPRDVYWRNLSVPYLQLTMRKLFITGAVFLLIFFYIIPVTFVQSLANLEGIEKKLTF
LRPIIEAKFIKSFLQGFLPGLALKLFLHFLPKLLMFMSKIEGHLALSQLEVSTSAKYYYFMVVNVFF
ASVIAGAAFEQLKTFFQSPSQIPVILAGSIPQKATFFITYIMVDGWASIAADIMRIKPLIVYHLKNMR
ENAMSPGSAGFDTVFPQLELYFLLGTVYSIITPFILPFIIVYLAFAYVVYRHQVINVYDPEYESAAA
FWPHIHNRIIVSLLVEQITLFGVFAGKRAAASTPLLIGLPIMTIVFHYYCKNRFEPAFRKYPLEEAM
SKNWNIKTYLQNSYMHP
>Selaginella_moellendorffii_D8S958
QQDAWYGNIQYLSNISIIGAVCCVILFLVVKVRSDHKL----------
ASLVTKLLAVWHTTSQQIARLCGANSAQYLWVEGYTFVTLAIVSVVALLVILPVNLYGGTV--
EDQFAKATVAHVKEGSPWLWAHTVFMVALTAAVHLCTSSLEKHLQATQFHD-----
SADSVAIFTLMVRGVPRVLAMDKRLEDYFEHGKVYSIVVPHDLDAFYRLKSELLKTRERIVAAEA
QARARQQ----------EDRLRRLAARREELESSLGAYRDG--
MAAGAGIAFVVFKDVFTASRALQDARNSMQLSCWKVGRAPPPRDIYWHHLGRSSLQRRLRTV
AVNLLLLLVLFFCSSPLAAITAIHNASRFIHLQVWLAWARSS-
WFSTFILQFLPNVLIFVTYVLVPAVLAHLSKFESHLTVSGEQQAVLVKTVCFFLVNLILLKALVETT
LEAAGCYIDKDS-
IQLMSATFLATSCLSALAFMITSSFLGVSFDLLAPIPWIKRKFMMRVKDRWGIQRFDHAQYYAFN
LTIFALVIVYSTFAPVMIPFGALYFGYRYMVDKYNFLFVYRVRGANDGKLMGTVLRVMRLSLCLY
LVAMLLFFYVRGDGERLQVLTTLALLMVVCAKLVKDGFDLSVQGLRTDEAEGA-----
EVEYEVLARP
>Selaginella_moellendorffii_D8SKT7

----QLGGLVASAGINIGLAVIFYSLYSIFRKQRTNVNVYFPRYVLR---------
VPSAGWIQRALQPSEDEIIASCGLDAAVLLRIFIFSMRFFAICTLIGVGILAPLNYTDNQVSHFDSL
DLFTISNISNGSNRLWIHLAALYVISFSAYWLLHMEYKHVTQKRLEVLSTAR--
PQPDQYTVLVRSIPREESYSASIDRFFSQHTYLSHQMVIRDWRVVRKKQTLESLVKEIERLKQIA
PHE----
RPTCRDFGSKVDQLEFKSRKFEELFDEFREGQRELQGEAELPSAFVSFKSRWGAAMAAQTQQ
AENP-
MAWVTDWAPEPRDVYWPNLSIPLLLSKLYAVGVWVAVFAIILTFVIPVGLVQTIAQLENLRKWFP
AIKIVLKIPGIKSVITGYLPSVLLSLLLYIVPSLMLFLSKVEGHVSRSTQEREAARKVFFFLVGNVFF
ISSLSGSLIDQLYAGFSEPKNIPNQLAIYVPRQSTFFITYILTTGWTGFSTEILQLGIFLLNFIKVRET
DAI---
SLPYYRALPSVQLFILLGLMYAVLAPLLLPFLLIYLVFGYIVYRNQVLFVYEPSYETSGQFWPHVH
SSVIFALVLMQITFIGVFGVKQKPNASILTIFLPFITLFFDNYCKSRFVPIFANLSMETTMKKKDELL
QCIQGSYKHP
>Selaginella_moellendorffii_XP_002990725
------------------------------RRPKNYPVYYPAVLIRE--------
RTPFQWLSEAWRVTESEIVSFAGLDAAIYIHLLDAALKILSIAALFCLPVLVTVAALSDDYARFSGL
DKLAMGNIPERNSKIWLFAIGAYWLSAAVYIVLWTKYRRISKLRKSVLSSG---
ARPEQFAALVRDIPRSHRDTAQIDAFFRRDSYERCIPVGDLGGASKTWKAMESTKAKLDRAQA
GVTS---SNRPHHKTLGPSVDSVDFYKEKLREASERHKSSKTAAAPP--
GRAAILVFNNPAAAAACGQCVYASSA-
GRWVTSPAPEPRQMIWGNVKIPWYQRYIRQAIVYTLVALTILFFMIPIGFVSAFSTLDKLEKLVPF
VKNIEKIKVLSTVLQAYLPQLALIVFLALLPTLLLFLSRMEGIVSQSHVERAAAGKYFYFNVFNVFL
GITITSSLFDTVKKIQKEPNSTVSLLGAAIPPAASFFITFIALRFFVGYGLQLSRLVPLIIFRIKKKIRA
AWAPKDFSYATRVPGDMLILTIALCYAVIAPMVLPFALVYFAFAWIIARHEALKVVVPAYESYGR
MWPHIHTRIIAALLVSQLAMLGYFSIKKFVFS-PILVPLPIATLLFALITNKIYYPTFKNPPLEVT-------
----
>Sorghum_bicolor_C5WQN2
---ATLQDLGVSAFINILSAFVFLLLFAVLRIQPVNDRVYFPKLYLAQ--
KRQHDHITFLSWVPGALRMSETELVAHAGLDSAVYLRIYKLGLKIFLPIATLALLVLIPVNVSGGT
LLDFSDIDKLSISNVNPGSNRFFIHLLMAYVFTFWACFMLYKEYSNVAFMRLHFLASQK--
RCADHFTVIVRNIPRH-
STSETVDEFFRRDHYLGQQPVYNANRYAKLVKQRERLQNWLDYYELKFERHPER-
RPTGRTCGREVDQIDYYRARISELEKRMASERQKVLPKAVMPVSFVTFDSRWGAAVCAQTQQ
SKNP-
TQWLTDWAPEPRDVYWQNLAIPFFSLSIRRFLISVAVFALVFFYMIPIAFVQSLANLEGLEKVAPF
LKPVIEVKVVKSFLQGFLPGLALKIFLYVLPTVLLIMSKVEGYVSLSSLERRTASKYYYFMLVNVF
LGSIIAGTAFEQLHSFLEPPTQIPRTIGVAIPMKATFFMTYIMVDGWAGIANEILRVKALVIYHLKN
MRERAMDPGSIRLGENLPSLQLYFLLGLVYAVVTPLLLPFIIVFFAFAFLVYRHQIINVYNQEYES
AAAFWPQVHTRIIASLLISHVTLFGLMSTKKAAYSTPLLIFLPLLTIWFHKYCKSRFEPAFRKYPLE
EAMAKNLNLKSFLANAYLHP
>Sorghum_bicolor_C5X9J3
----DLASFITSVLTSFVIFVALVLVFTWLSRRPGNAPVYYPNLLLRG--------
RSPVGWIRDAISASEPDVVAAGGVDAAVYLVFLSSVLSILVYSGIVLLPVLLPVAATGGALVGFS
AIERLGVGNVPEGSMRLWAFLLSVYWVSFVTYFVLWKSYKHVSNLRATARSTPD--
VKPEEFAVLVRDIPRDETIKDFVDSYFRANTFYRSMVVTDHTKADKIYQEIEGHKQKIARAEAIYA
NSKTGTKPTHRTIGKKVDTIEYCSEQIKELLPKLEAEQKTTLKQ--
QRAAIVIFNSRSAAASASQTLHAQVY-
DKWTVMEAPEPCQILWPNLPRNLYERQIRQSVVYAIVFLVVVFYMVPIAAISAVTTLENLEKKLP
FLKVVVEKPAIKTVLEAYLPQIVLIVFLALLPTLLMFLSKQEGIPSQSHAVRAASGKYFYFIVFNVF
LGYTLGSTLFKSLTTIIDHPAGIVTMLANSLPGSATFFLTFVALKFFVGYGLELSRLVPLIIFHLKRK

VKAAWAPGDLGYNTRVPNDMLIATVVLCYSVIAPLIIPFGVAYFALGWLIAKNQILRVYVPSYESY
GRMWPHMHTRIITALMVYQTTMIGFIPLKKFYYV-
PVLVPLLPISIIFAYVCHMRFYPAFAKTPLEVVAQH------TIYTSYIPP
>Sorghum_bicolor_C5XHW4
----DAEGLLASAAINLGLALVALSLFSLLKKQPGNAPVYRPRRMAT---------
TPSFRWICAAFRLSEEDVLRRHGLDALVVVRLFKFGIKCFSVCSIVGLLILAPTNYTSEGRADSN
SMELFTVTNVTRGSNRLWVHFSCLCFISFYVIYLLHKEYREITMRRIEHLKHHY--
KRHDQYTILVRGIPTHGTYGCYVDHFFSKQTYQSYQIVHDIGNIEALQKLASSIQKRIQRK---------
--RETRKCFTSEATNIHNHEKKLKNLQETIRLLQCENLQK-
EVPVAFVSFKSRLDAAQAAEMQQLVNP-
LSLVTTYAPEPADIIWKNLSIPFWRMGMYKIGVFVAAFLLTVFFTIPVTAVQGIVQFEKIKRWFPP
ARAVQLIPGLNSVVTGYLPSMILNGFIYLVPFAMLGMASFEGCIANSQKEIKACNMIFYFLLGNVF
FLSILSGSLLDQIGESFEHPKNIPNRLASAVSAQSDFFMTYILTNGMSGFSLEVLQLGLLIWQFLK
AHEPYLY---
GFPYFRVVPIVSLAILIGVVYAVVAPLLLPILLIYFLLGYAVYINQMEDVYEITYDTCGQYWPNIHHY
IFLSVTLMQITMIGLFGLKSKPGASFATIPLLVLNILFNEYCKVRFLPNFSHRPVQVAKQSTEGDV
NDAICAYWPP
>Sorghum_bicolor_C5XMV4
---ATIQDIGLSAAINILGAVVFLLAFAFLRLQPINDRVYFPKWYLKG--
ARESPSLKFLSWMPAALKMPEDELISHSGLDSAVYLRIYLVGLKIFAPISVLAFIVLVPVNWTNDT
LQ-HSNIDKLSISNIPVGSKRFIAHLAMAYVFTFWTCYVLLREYGIVAKMRLRFLSSEK--
RRPDQFTVLVRNIPPE-
SISELVEHFFLVDHYLTHQVVYNANKLAKLVKEKANMQNWLDYYQLKFERNASK-
RPTTKTFGTKVDAIQYYTSEIERIENEEAEEREKIVPKSVVPAAFVSFRSRWGAAVCAQTQQTS
NP-
TVWLTEWAPEPRDVYWDNLSIPFVSLTVRRLIVAVAFFFLNFFYVIPIAFVQSLANIEGIEKAAPFL
KPLIEEPTIKSFIQGFLPGIALKIFLILLPSILMFMSKVEGLTSISSLERRSASKYYIFIFFNVFLASIIA
GSALEQLKSYIQSANEIPRTIGEAIPMKATFFITYTMVDGWAGVAGEILRLKPLVIFHLKNFREEA
MDPGSIGFDSSEPQIQLYFLLGLVYAAVTPFLLPFVLIFFGFAYVVYRHQIINVYNQEYESAAAFW
PSVHGRIITALIVSQFLLLGLLSTKGAGQSTPVLLVLPVVTFYFHKYCKNRYEPTFVKCPLQEAM
KKGFDLKGYLMNAYIHP
>Sorghum_bicolor_C5YSZ5
----KISALLTSAGINIGLCVLFLSLYSVLRKQPANVRVYFGRRIAE-E-HDR---
VPSTGWIVKALQCTEEEILAAAGLDAVVFNRILVFSMRIFSLAAVLCVFGILPLNYFGQDI--
SESLDIFTIGNVEVKSRWLWVHCVTLYIISGVACILLYIEYKHIARLRLLHLTSAT--
PKPSHFTVLVRGIPKE-
SCSDVVDGFFTKSSYLFHQVVYKVGKVQKIMTGAKKAYKKFKHFTDETVDQ----
GCRTITCGASSNSFKLLNTECEQNRGKAD-NKSILDDE-
ECTAAFVFFKTRYAALVASEILQTSNP-
MKWVANLAPEPEDVYWSNLWLPYKQLWARRIATLLGSICFMFIFLIPVTFIQGLSQLEQLQQRL
PFLRGILKKKYMTQLVTGYLPSVILQIFLYTVAPIMMLFSTLEGPTSHSERKRSACCKVLIFTVWNI
FFANVLSGTVISQLNVLS-
SPKDIPVELAKAVPGQATFFITYVLTSGWASLSSEVMQLFGLIWNFIRKYTEFVP---
SFPYHTEVPKVLLFGLLGFTLSVLAPLILPFLLVYFCLGYVVYRNQLLNVYRTRYDTGGLYWPIA
CNTVIFSLVLTQIICLGVFGLKESPVAAGFTIPLIILTLLFNQYCRNRLLPLFKTFPAQDLIDMIDEIH
HGLHSAYCQF
>Sorghum_bicolor_C5YX25
---ASLSDIGVAAGFNVLTAVAFLLAFAFLRLQPINDRVYFPKWYLRG--
MRDNPILKFLNWMPAALKMPQDELINHAGLDSVVYLRIYITGLKIFVPITVLAFLVLVPVNWTSDT
LG-YSPIDKLSISNVPNGSKRFIAHLSMAYVITFWTCYVLFKEYEIISNMRLRFLASEK--
RRPDQFTVLVRNIPPE-

SISELVEHFFLVDHYLRHQVVYNANKLADLVEKKKKMQNWLDYYRLKYERNPSE-
RPTTKTFGSKVDAIDYYKSEIEKIGKEEAEERKKVMPKSVVPAAFVSFRSRWGAAVCAQTQQT
SNP-
TVWLTEWAPEPRDVYWNNLSIPFVSLTVRRLIIAVAFFFLNFFYIIPITLVQSLANLEGIEKALPFLK
PLIELPFIKSFIQGFLPGIALKIFLIVLPTILMFMSKFEGLISQSSLERRSASKYYIFLFFNVFLTSVIA
GSALEQLKTYLTSANDIPRIIGDSIPMKATFFITYVMVDGWTGIAGEILRLKPLIFFHLKNLREEAM
DPGSICFDSTEPRIQLYFLLGLVYAAVTPFLLPFILVFFGFAYVVFRHQIINVYNQQYESAAQFWP
SVHGRIITALIVSQLLLLGLMSTNDFEQSTPVLLVLPVLTFWFYKYCKNRFEPAFVRNPLQEAMK
KNFDLKAYLANSYLHP
>Sorghum_bicolor_C5YY97
---GSLTDIGVSAGLNILSAVGFLLAFAVLRIQPINDRVYFPKWYLKG--
TRSSPRIRFLNWMPAALKMPEPELIEHAGLDSAVYVRIYLLGLKIFVPIALLAFSVLVPVNWTSGT
LENYDEIDKLSISNLGKGSKRFWAHIAMSYVFTFWTFFVLYHEYKVVTTMRLRFLANQN--
RRPDQYTVLVRNVPPE-
SVSEHVEHFFAVDHYLSHQIVYNANHLSGLVETKKGLQNWLIYYENKHAKNPAK-
RPKIKTWGQRVDAIEYYQKEIENLCKQEDEERQKVIPNYIMPAAFVSFKTQWGAAVCAQTQQT
SNP-
TVWLTDWAPEPRDVFWANLAIPFVELSVRRLTVAVAFFFLTFFFMIPIAIVQSLANVDDLEKVLPF
LKPIIERNSLQAVIQGFLPGIVLKIFLILLPTILMAMSKIEGHTSLSGLDRRTAMKYYIFLFVNVFLGS
VITGTAFQQLDNFIQSANKIPEVIGESIPMKATFFMTYIMVDGWSGIAAEVLRLKPLVIFHIKNARE
QAMDPGSLDFYNSEPRLQLYFLLGLVYAVVTPMLLPFIIVFFSLAYLVFRHQIINVYSQRYESGA
QFWPDVHMRLIIALIVSQILLLGLLSTQEAEKSTVALLPLPVLSIWFHHVCKGRFEPAFVKFPLQD
AMVKTLNLREYLKGAYVHP
>Sorghum_bicolor_Q1KSB7
DPEAWYGSIQYLINISAVGAASCVLLFLLVKLRFDHRR----------
SALAAKLLAVYHATAAQIALHCGADAAQFLLFERASFLILAAVAAAAVAAALPLNLLAGDA--
VDQFAATTISHIPKSSPLLWLHLLLTAAVVAIAHLGISRMEDALRITRFRD-----
NSSSVAVFTIMIQGIPKTLAADKTLKDYFDHGKVYRAIVPFDLCTLEYLVDQLGKVRNKISWLEA
RLGARDL----------EERLRKLQTKKLVLASRLSDYKEG--
RAPGAGVAFVVFKDVYTANKAVRDFKEPVQLERWKVERAPPASDIYWNHLGLSKISSRLRRIA
VNTCLILMLLFFSSPLAIISGMQNAARIIHAKSWLARLEGS-
WFWTIIFQFLPNVLIFVSYIIIPSVLSYFSKFECHLTVSGEQRAALLKMVCFFLVNLILLRALVESSL
ESWGCYLDGDQ-
IRYLSPSFLSRSSLSSLAFLITCTFLGISFDLLAPIPWIKHIMKKFNRSHMPKQKFDFAQYYAFDITI
FALTMIYSLFAPLVVPVGATYFGYRYLVDKYNFLFVYRVRGGNDGKLMDRVLCIMQFCVIFFLAA
MLLFFAVQGDSMKLQAICTLGMLVFY--KLLSDRFQPSLEGMQTNSF-----VDGPTDYEVFSQP
>Sus_scrofa_F1RQV6
LQGLPFGGVPTVLALDFMCFLALLFLFSILRKVAWDYG----RLLDADTS-
VSSSVNGFCSWLTAIFRIKDDEIRDKCGGDAVHYLSFQRHIIGLLVVVGVLSVGIVLPVNFSGDLL
--AYSFGRTTIANLKSGNNLLWLHTSFAFLYLLLTVYSMRRHTSKMRY----------
KEDDLVKRTLFINGISKYAES-
EKIKKHFEECTVLEARPCYNVARLMFLDAERKKAERGKLYFTNLQSKDNVNPKPCG-H--
EQVEAIEYYTKLEQKLKEDYKREKEKV-
NEKPLGMAFVTFHNETITAIILKDFNVSSSLHNWTVSYAPDPQNIYWEHLSIRGFIWWLRCLVIN
VVLFILLFFLTTPAIIITTMDKFNVT----------
KLNNPIITQFFPTLLLWCFSALLPTIVYYSAFFEAHWTRSGENRTTMHKCYTFLIFMVLLLPSLGL
SSLDLFFRWLEA---
AIRFECVFLPDNGAFFVNYVIASAFIGNAMDLLRIPGLLMYMIRLCRNVRHQAYEFQFGAAYAW
MMCVFTVVMTYSITCPIIVPFGLMYMLLKHLVDRYNLYYAYLPA-
KLDKKIHSGAVNQVVAAPILCLFWLLFFSTMRTGFLAPTSMFTFVVLVITIVICLCHVCFGHFKYL
SANYK---S----SGDEPPS---

>Sus_scrofa_F1S8R3
LQGVTFGGIPTVLFIDVTCFLFLILVFSIIRRRFWDYG----RILEADSS-
SSSGQLGCCPWLTAIFRLQDDQILEWCGEDAIHYLSFQRHIIFLLVVVSALSLCVILPVNLSGNLL-
-PFSFGRTTIANLQTDNNLLWLHTVFAIIYLILTVGFMRHHTQSIKY----------
KEESLVRRTLFITGLPRNAKK-
ETVESHFRDCEVVEVQLCYNVAKLIYLCKERKKTEKSLTYYTNLQVKTGQNPKPCG-Q--
EWEDAIAYYTRLKARLMERITEEECRV-
QDQPLGLAFVTFQEKSMATYILKDFNASSDLCKWTVTFASYPEDICWKNLSIQGFRWWFQWL
GINFTLSVGLFFLTTPSIILSTMDKFNVT----------
KLNDPVISQFFPTLLLWSFSALLPTVVYYSTLLESHWTKSGENRIMMTKVYIFLIFMVLILPSLGLT
SLDFFFRWLEA---
SIRLECVFLPDQGAFFVNYVIASAFIGNGMELLRLPGLILYTFRMGRNIQNQAFEFEFGAMYAW
MLCVFTVIMAYSITCPIIAPFGLIYILLKHMVDRHNLYFVYLPA-
KLEKRIHFAAVNQALAAPILCLFWLYFFSFLRLGLKAPLTLFTFLVVLLTILVCLAYTCFGCFKHLS
PNYK---------QQQQTY---
>Tetraodon_nigroviridis_Q4RQ32
LQGLPFGGVPTVLALDFMCFLVLLLVFSFLRKVAWDYG----RLLDADTS-
VSSSVTGFCSWLTAIFRIKEDEIREKCGEDAVHYLSFQRHIIGLLVVVGVLSVGIILPVNFSGNLL--
AYSFGRTTIANLDTDNALLWLHTTFAFLYLLLTVYSMRRHTSKMHY----------
KEDDLVKRTLFVNEISKYAEE-
SELKQHFENCVVLEARICYNVAKLMCLNSERKKAERSKKFFIDLLTKEQVNPKPCG-H--
EEEEAVSYYTKLEAKLKDEYRKEKEKV-
NKKPLGMAFVTFQNEAMTAMILKDFNASQKLQNWSVSYAPDPQNVYWEHLSVGGFSWWVRC
LIINIILFLLLFFLTTPAIIISTMDKFNVT----------
KLNNPIITQFFPTLLLWSFSALLPTIVYYSAFFEAHWTRSIQNRTTMHKCYTFLIFMVLLLPSLGLS
SLDLFFRWLDV---
KVRFECVFLPDNGAFFVNYVIASAFIGNANDLLRIPGLLMYMIRLCKNVRHQAYEFQFGAAYAW
MMCVFTVVMTYSITCPIIVPFGLMYMLLKHLADRYNMYYAYLPT-
KLDKKIHSGAVNQVVAAPILCLFWLLFFSTLRSGFSAATSMFTFIVLIITIIICLSHVCFGHFKYLSA
NYK--------SGEDDGQ---
>Tribolium_castaneum_D6W8C0
VISNVYEGIPETILLNVITWILLILLFAILRNRAWDYG----RLLTE---------
DAGCLWFPSIFKISRERIFTRCGPDASHYLSFQEQLLFLSTTITVFALCVILPINFQGTLQ--
KTTFGHTTLSNLEPSSYWLWVHVVASFCFVPLTVLIMRKSSGRIPS----------
ASALTSRTVMITHISHAHRNIDDIKNYFTVTEIKDIQIAYRIKKLTILEKQRALTHEAKMYCILNNKP
DLK-VQPYG----KTQNALEYYTEEEARLTDLVVAERRKV-LESPLGIAFITLNSEERAHHVIKSFT---
PGSHWLITKAPSPSDINWENLEISYRNWYSKAILINAILFLVLFFLTTPVIVVNVFNNLTSA----------
--
QKLTPLLSDFLPTLLLLSVSALMPVLVAYSDEWMSHWTKSKQNHATMHKAFFFLLFMVLILPSL
GLTSAQAFVEWSNL---
TVRWECVFLADKGAFFINYVITSALIGTALELLRFPELAMYAFRLLTSIKEIMSEFPFGIHYAWTLLI
FTISTVYSLTCPLITPFGLLYLCLKHFVDKYNIYYVYRPITGEGQQIHADAVRMVRVAILLLQLIMA
AFSFIRGGFNIMCA-VSFIAFIVTVTFFF---------FLSPPSC--------VSSPSSY---
>Ustilago_maydis_XP_758658.1
NSGASTSTVISAIVLNAVIFAILFTVFLLA--RPRFKRVYAPRTY--LP-
EEQIEPQSLFGWLPVWLKTPTSTILEKNGLDAYMFVEYLEMMLWIFIPIFLLSWIVLMPVYGAGT
NG-I-
DGFNRFILSRVPQQQKRYIAPLLIQWIFTFWLMWNIRSRVAKFIKLRQDFLVSPQHAASVQARTV
LITGIPNELLSEKKLRALYSQGGVAKVWLNRNLKDLPDLFDEREKWCNKLEAAETSLIKTAYKKR
PTHKLMGEKVDTIHWCREEIARLNKEIQTKRSEYKNYPAQSSAFILFNTQIAAHMAVKTQAHHQ
P-

YRMTNRVEAHPDDVVWANMNMNPYERKIRTVVGWAITIGLIIFWAIPVAFVGIISNVKGLADNVP
FLGWLNDIPVVVGIIQGILPTVLLAVLNMLLPIFLRLLSRLSGTPTRSAIELDLQGRFAAFQIVQNFL
FLTLVSGNAGQIQRVASQPTQFPGLLAEAIPKGSLFFLSFIALQGLSGAAGLFAQIAPLIVYYVKK
FVWHDHDTSGPAWGTLFPSMTLITVIGTGYVVIAPILNGFVAFTFFLFFLGYKYLFLYVYTPSSET
SGLFFGKAIRHIFAGLYVEMVMLTAIFFLAQAIPEGAFMVVLIVIVVAFHYFLNDSFKALETALPLT
LVAGNE--------SAFYHP
>Ustilago_maydis_XP_758942.1
QINSNFQGLVSTCVIFAVVGSISAITYESLRQLRRTCEFYLSRVH-----
ASTPSPRWPFAWVKLAISFTDEWYADHTGMDTVVYVRFLRACLFWVLLHCFTTAPILLSIHITFS
RGTS-
TDMQRASLSYLEKGSSLLWVHLVLLWYISITWVLALWWIGKGSLTLRKAQIAKTNNSDGWRQR
SLMVMNLPATMRDEASIRRYFEESPIQTVVLVRKMNELASMLSRRQEVLTQLEAAHVKLAQEVL
DHRPSSRTRGQTVPTIDYLLTKLNLLTALVTEMRSR--SYEPTSTAFVTFRDPRQARMVWRELK-
----DVVKVRLAPEVKDLDWDRLKTSFTVDVVRGFGVSIVTWGFTIFWVIIIAIVLGIFSVDKL-
KQIPGLNFFDNN-
KLTGFVTITLPPLLVSLASMSVPELIFQVSKAQGFVTFSALYDMCLARYWKFVICNVVIFFSVGST
VIVTVLTKVGNTGSILSTVASAFPSAAPFFVSYLILQLALQSGFEHMGFMIALLQHLGARRAIKTL
PRNFNRYYWLPLHINIMAIVFIFALLNPLVIPFALVYLALALVIFKKNFAYHYYRRFEMEGVYFTRL
LRYSLDAIVVMQAVLLIFFSLKKYIGMSAVLIPLTVITKLIA---TRLWKSQC-----
RALDEETSSTQPEGATS-TDP
>Ustilago_maydis_XP_759473.1
QRAFEGPWFSQQLSLSIFIGLASFFIFVFVRRR--NAALFAPRTLFSP--------
VGYFGWIMPTLKTEEMRILQTVGMDAAILLSFLKMGFWLFFSLSCWSILVLMPVNYWQNGVLD
EEPLPQLPLPA-KPAQAQLYTHLLSTYLFTILAMRAIWINYQRFVRSRQLYLEIV---
ESIPARTVEIRDLPAHLRDEKALAEYFENMPVESTAVVRNTEGLSRLLKLRSNALQQLEKIWVR
WLGNPTHPRPTMR-FSEKVDAIDELTRQFHAVDRAVRRRRKTG-
RFPGGNVGFVTFQSAASAQIASQTVHYPMP-
AYCATSMAQEPRDIIWSNIDLSNNDRRVRQVLVSIFMVAVLVFYIPPLVFLASFVSPGAIKKYAP
WLDRLLDTDRLRALVQNNLPSLVVIGFNALLPLVLEYSSYLQGLKARSLVEYSLLKKYYLFLMVS
VVFIFLIATTAWGVLQELAENPMRVIDKLAASLPKARFFSLSYVILQGIALQPLQLLQLPTLILRAFY
RVFAELNAPPTLAMGNVYPQALLIFTLCILYSIVSPLIVIFGTVYFGIAYVVNKYKLLYVFYKPYES
QGQAWPISASRCIWALVLFHIFQFSLFSVRKELWMSTGLLPLIVFTFWFNGHLETTFGPLTEHV
NLSSVVEV-----NTGRRRYGHP
>Ustilago_maydis_XP_760031.1
GSTDL-KKVAITIVAFVALSLFTLIAFQIL--RPNNKIVYAPKYY---
EEGKAPPKEGFFGWIPPILKYKEHDLLPLIGLDGVTFLRFVRMMRWMLTTLALLMSVVLMPVDIA
YNVRN-TNRLNYLNMSNVHG-T-
YMWAHVGMSYVGTIVALSFIWYHYREMVRLRWSYFRSEEYQTSFHARTLMITDVTKRYQADN
ALGAVLSEYPTTEVHIGRRVGLLPDLIEKHSDLVRELEHVLAKYLKNPNSKRPTKTIGGEKLDAID
YLTEQINRVEAAVMHQRETI-QQKPEMYGFASLAAVPYAHAAAKVLQNKKP-
RGMRITLAPPPTGIIWQNLVKSRASRAKSSFFGFLMLLVLFFMNIFPLIIVSLLSNMA--
RISWLRWKDWQTASFTFAAVSGLGAPIIMGIASFFFPIAMRKIAKYRGVQTRYRLDRLLVGQYF
GFLVISQFLFFSLIGVVLSLVSQLVVEINHAAYATKQQYLNQSNYWLTWLPLRGY-
LAVFDLAQVIKLLLVWIQKVVREYTKPPVFDYWIYYSNFLFMSAVAMIYAPLAPLVVVFSAIVFWA
SSFIYKYQLMYVFVTKHETGGMLWRPTINRLLICIGFMQVILILAVVLDTNYYQAIAALPPILMLIAF
KIYCRRTFDSRFDWYIPNEAE--DA-RHNRLQRRFGHP
>Vitis_vinifera_D7SYN5
---ATLEDIGVSASINILSAFAFLLAFALLRIQPINDRVYFPKWYICG--
GRASPRLTFLNWMPQALRMSEAEIIQHAGLDSAVFLRIYTLGLKIFLPVTVLALLILVPVNVSSGT
LFFVSDIDKLSISNVRPESTRFFFHIGMEYLFTMWICYMLYKEYHNVALMRLHFLASQH--
RRVEQFTVVVRNVPHH-

SISDTVDHFFQTNHYIDHQAVYNANKYSKLVRKRERVRNWLDYNKLKFERHPDR-
RPTTKICGKRVDSIEYYEQQIKEIDKRIALERQRILPKSIMPVAFVSFNSRWGAAVCAQTQQSRN
P-
TLWLTNWAPEPRDVYWQNLAIPFVSLSIRKLIVSLTVFALVFFYMIPIAFVQSLANLEGLERVAPF
LRAVIELKFIKSFLQGFLPGLALKIFLYILPTVMMILSKIEGYIALSTLERRSSAKYYYFMLVNVFLG
SIVTGTAFEQLHSFLQSPTQIPRTIGVSIPMKATFFITYIMVDGWAGIASEILRLKPLVIFHLKNMRE
HAMNPGSVDFPETIPSLQLYFLLGIVYAVVTPILLPFILVFFAFAYFIYRHQVINVYNQQYESGAAF
WPHVHSRIIASLLISQLLLMGLLSTKKAANSTPLLIALPILTLTFHKYCKNRFEPAFRKYPLEEAMA
KNLNIKAYLADAYLHP
>Vitis_vinifera_D7TEB7
---ATLYDIAVAAAINILTAFAFFIAFAILRIQPCNDRVYFPKWYLKG--
LRNSPLLRFLNWMLAALQMPEPELIDHAGLDSAVYLRIYWTGLKIFVPIALLAFSIMVPVNWSNG
TLE-YSNIDKLSISNVPTGSPRFWTHLVMAYVFSFWTCYVLKKEYEIVATMRLHFLASER--
RRPDQFTVIVRNVPSE-
SVLELVEHFFLVNHFLGFQAVYDANKLFKLVDEKKKMHNWLDYYQLKYVRDPSK-
RPTLKTLGNRVDAIDFYTSNIERLAKEISVEREVIATKYVMPAAFVSFKTRWAAAVCAQTQQTRN
P-
TIWLTEWAPEPRDVYWENLAIPYVALAVRKLISGVAFFFLTFFFMIPIALVQSLANIEGIEKAVPFL
KPLIETHFIKSIIQGFLPGIALKIFLIFLPSILMLMSKFEGFISRSALERRSAARFYIFQFINVFLGSIIT
GTAFQQLNSFIQSANDIPKIIGTSIPMKATFFITYIMVDGWAGVSGEILRLKPMIIYHLKNFREEAM
DPGSLSFNTGEPQIQLYFLLGLVYAVVTPILLPFIIVFFGLAYVVFRHQIINVYNQEYESAAAFWPD
VHMRIIVALVVSQLLLMGLLSTKQAAQSTPLLIALPVLTIWFHFFCKGRYEPAFVRYPLQEAMMK
NLNLKGYLREAYFHP
>Vitis_vinifera_D7TPC6
---ATLQDISVAATINILSALAFLVAFAILRLQPFNDRVYFPKWYLKG--
IRGSPRLRFLNWMPVALKMPEPELIDHAGLDSAVFIRIYLLGLKIFVPLAVLAFAVLVPVNWTGKS
LQNFSDIDKLSISNVPTGSNRFWAHIVMQYVFSFWTCYVLYKEYKIIATMRLHFIASEN--
RRPDQFTVIVRNVPPE-
SVSEHIEHFFCVDYYLTHRVVYNANKLAKLVEEKKSLQNWLTYYQNKYERNPEK-
KPTTKTWGTNVDAVDHYAAKMEKLCEAVTEERERVIPKAIMPAAFVSFKTRWGAAVCAQTQQ
SRNP-
TIWLTEWAPEPRDIYWDNLAIPYVELTIRRLLMAVAVFFLTFFFMIPIAFVQSIANIDGIEKVLPFLK
SLMEMNVIKSFIQGFLPGIALKIFLILLPTILTIMSKIEGLISLSSLEQRTAGKYYLFILVNVFLGSIITG
TAFQQLHKFIQSPTEIPKTVGVSIPMKATFFITYIMVDGWAGVAAEILRLVPLIMFHLKNAREQAM
DPGCLNFSISEPRIQLYFLLGLVYAAVTPILLPFIIIFFSFAYMVFRHQIINVYDQKYESGAAFWPSV
HQRVIIGLMISQLLLMGLLNTKDFSKSTPFLIVLPVLTFWFHRFCNGRFESAFVRFPLQEAMVKN
LNLKNYLQDAYIHP
>Vitis_vinifera_E0CNX2
----KLYALLTSAGINIAFCAILLSLYSILRKQPSNVSVYFGRRLAQ-F-SPK---
VPSPGWMVKAWETSEEEILSVGGMDAVVFLRIVVFSIRIFAIAAIICIFLVLPVNYYGQAV--
SESLDVFTIGNIKEGSKWLWVHCFALYVISCSACVLLYFEYKSITNMRLAHITGSP--
PNPSHFAVLVRSIPWQ-SYSDLVKQFFINSSYLSHQMVSDSWTVHKLVTDAYKMLQTSS------
MKQ----SSTPSLCGVSPNSFKILSND--PVKDKVDLDSTT-VSH-
EGASAFVFFKTRYAAVVASQVLQSSNP-
MLWVTDLAPEPHDVYWSNLCIPYKQLWIRRITTLLAAIVFMFLFLLPVTFVQGLTQLEQLQQTFP
FLRGILKKTIVSQVVTGYLPSVILILFLYTVPPTMMLFSAVEGSISRSGRKKSACCKILYFTIWNVF
FVNVFSGSLISQWSVFS-
SVKDLPTELARAVPTQASFFMTYVLTSGWASMSFEVVQVFALLCNYFTRFSNETL---
SFPYHTEIPKALLFGLLGFTCSILAPLILPILLVYFFLAYLVYRNQIINVYISKYESGGKFWPIVHNTT
IFSLVLAQIIAIGVFGLKRSPVPSGFTIPLVIGTLLFNEYCRQRFRPIFENHAATVLIEMMEQIHHQL
HSAYHQP

>Vitis_vinifera_E0CVN9
---ATLQDIALAAAINILSACIFFLAFAVLRIQPFNDRVYFPKWYLKG--
LRSSPTLRFLNWMPDALKMPEPELIEHAGLDSAVYLRIYLIGLKLFVPITFLAWAILVPVNWTNAS
NTLYSDIDKLSISNTPLGSERFWSHIVMAYAFTFWTCYLLQKEYEIIASMRLQFLASEK--
RRPDQFTVLVRNVPPE-
SVSELVEHFFLVDNYLTHQVVYDANKLAKLVKKKEKMQNWLDYYQIKYSRNESS-
RPFLKTWGNRVDAMDFYTSEIEKLCKEISVERERVAPKSIMPAAFVSFKTRWGAAVCAQTQQS
RNP-
TLWLTEWAPEPRDVYWHNLAIPFVSLTVRRLIIAVAFFFLTFFYMIPIAFVQSLASIEGIEKAVPFL
RPIIEKKFIKSLIQGFLPGIVLKIFLIVLPTILMLMSKFEGFISISSLERRSASRYYLFNFVNVFLGSIIT
GSALEQLNTFMQSPNQIPRTIGVAIPMKATFFISYIMVDGWAGIAAEILMLKPLIIFHLKNFREEAM
DPGSIGFNTGEPRIQLYFLLGLVYAVVTPVLLPFIIVFFCLAYVVFRHQIINVYNQEYESGAAFWP
DVHGRIIGALIISQLLLMGLLSTKQAAQSTPFLIALPILTISFHYYCKGRFEPAFIRYPLQEAKMKHL
NLKGYLQTAYIHP
>Volvox_carteri_XP_002948882.1
PYVVSDTQLKASAILNFILGAVSLLAFISMRGTLR---VYQRRRLLF----
LQPPQRQAWSWATSVMCMSDTDIVRTAGFDALLLNRTILMGLQIFSVLTVLALGILLPTYYSFDD
VVTVAELSRTTISNLPPGHAILWLPAAATYLVIAYCCWVLLVHCQSYAELRMAYMLCLAHLVNC
HHYAVLIRDV--
PWDDSEEVAAYYTQDSFQRLVPVCSHRAVDELLFQWTAAMGNLARSTAADSSSSL---PSG----
TATAAIRRAAAAVRRLQDRILLERARA-RSPTRRAYIALFSSQRDAAVAAQCSP-
LARAQHFRACAAPPPDSVYWPALWTLPTGRAARLLASLPLLAVLVF----
PIGVLTGLANLPVAVLNALWF---
CNRRLARSLLTGLLPALISLGWAWVLPMVLYLLSAQSRCVSLPAMDRQMSRWFFWWSLLNMF
LGAVVGGGMFQQLGAYLQDPGKLLLRIGTALPTASNFFMHYTLTKGLYSNWLRVAWPHGSMA
GAIMRGVFLIHTPPGYRFGAQYRGSRHTLMVGLAYVVTAPLIAPIALLFFITAYITWRYAIVYIFER
QYESGGQMFPVVFSHMTGYLLVGELFTGAVLLTNGGWMQAALLCSLTPAIVAFHRLCVKRYLR
PLEHPPLLAM---AAPPASVDSSVYLPP
>Volvox_carteri_XP_002949162.1
KNQVSDTTIITGLWISGVVGTAVIILFCVLQRVSL---LYKYRLAVR----
VKPPKISFIDWAIKSISVSDVDFILSAGLDALIMVKICALGVQLFLPLCILGTAVLIPLHWTGGASK-
QSGFMRLTMSNIPHGSKVFWVHLGFVYIYLGWAMVLLHWHYHQYLTIRQHYLRKGDVAVLAQ
HYAVLVTDVSRELPWRYRVSATFLREEFDRAIQVVNFKEVDLLLMEVDKHMAQYE--
AIKYEEKTG--KPLY--VGERCRVRDHHRDKINDLLVQVRKARVAA-
NKAHTPSWFVFFRTQRAAAMASQCIIH--
AEDQFRVHPAPGPDEVNWSALWSNFRDRDLRRNLMRPLVVLMV---
AFPIGIFTGVTQLDYLLSQQLWY---
CGQALLKRLVVAWLPSLLLILWGMVLPLFFTFVVQSRQARSLSEADRYIAKNMFYFGVFNVFLG
GVAGSTIIQGINSAIEKPSEIFNLVGTYVPTSSNFFINYTMFRVFVSVPVRMLWPHIGIRMYLIRRR
AFLMAPVSPRYGFEVGMVMIIFLIAFAFSVVSPLLMPMAMLFFAISWLFWRWALLYVYVRKYEG
GGTMWPFVFNRVLVCLAIFPAFTACVFVTKHAYAQAIVLVTVPVILVRFHKYCYYRFETGLQAM
PLATV---AAPPARVEPWVYTPP
>Volvox_carteri_XP_002951035.1

FLLLSVWCLGVVLPVNMSGKEVSRLSDLDLLSLANISPGSRLMWVHLASVYVVTAVTLWMLWR
QSREAVALRVLYVTHSA--PGDSSHTVLLRDIPGA-----
FIVKEMAECRLVALHVVRDERSLAGLVQQYSTTKRSLEFYAARLAAGRR--VRRRQ-
WGIRVDELLHLRTRLEVLYEQLRAGLAKV----------DELPRRWDAAVVSTALHDRDE-
ALWRPTPAPHPGELLWGNLRLRLWQISWRTAVARTAFMALLLSYTVPVSALQGLMQLRRLER-
LPVVKVIVRLSVVRSLLSGLLPGAVLRLFLMLLPALLSRLVRWAGAISLSEVDFRTTTLAFDFQVV
AVFLASLLAGALLNQITEFVAQPGQVLTVLGTGVPQTASFFIAYILFNGLVVGPLGFLRPFALLTL

ALRNRRARLWEAPEARFAHSVPHHSLMILLGLSYSLVNPLIAPACVVYFAMVGLMERYQHCYC
WSRPYESGGKMWSQVFRHVMVGLYTFHVVMLALLVIKKFPFAP-
LVLPAPLGAAAFHRQLHSLYRRPWSNLSLRDAADL----------
>Volvox_carteri_XP_002955034.1
----------C----------RYAKD--------
NGLLSWIYPVITYPEGDIIDEAGLDCAMYLRILRFGVYLFFPLTIFCIIVVLPPNMKSNGIEAFSDFD
HYSLSNVEAASPKMWAHLFAVYCVVLYTLWLLWRFNRESVLLRLLFLGNAK--
RGGPSHTVLVTDIPGQ-----
LVAREFALSNVAAVNMIQDTSALEPLAEEYNQVCQDLDMAKLRLKLRKA--LPQKQ-
MDVKVDAVEFWLERMKYLRERIKIEQAKC-RK-MAPSAFVTFNTRMAQAVSANSLHSHDE-
NAWRVQNAPAPFEVVWKNLSLTMPIKNGRLYLLWAAFWGMTIFFMVPVSFIQGMIEVPKLAS-
IPVLGDIVTTPPIKQLLQAVIPGLVLKIFLALVPTILRIMAQLSGATSVSEIDFGVVKRFFLFQTVVVF
FGSIILGSFFNQLKQWVKEPSSVIATLGKSIPMTSTFFITYLLVNGLGVKSFAFIRLPNFVIYWILSK
RQRMWMFQWTNNGTTVVDHTIAMMLGLTFSCINPIVCPAALAYFLVNFLGETYNNVYVYRRQY
ESGGMLWKTVYNQVMVALYIMQITMLGLLSLKKFKFSP-
FMFPLIIFSITSHISTLQLFNRPWSVTALHDAAYMNSQEKREVEEMYMNP
>Xenopus_tropicalis_A0JP96
LQGLPFGGIPTVLAINFLAWLVLLLIFSCLRKAAWDYG----RLLDNDC--
EISPSVGLCSWLSSIYQMKDEEIQSKCGSDAITYLSYQRHLLVVLLAVCCISVAIILPVNFSGDML-
-PAQFGRTTIVNVPTKDRFLWLHSVFALVYFLFSVLCMRHHTSSLHY----------
KEDDKVARTLMITKIPSEISDASLFTKHFHECTVTDVQFCYDVRHLMKLDKERRRAMKGRMYFA
GRAQKEGKKIHPCA-R--QQVEAEQYYGELEERLTDEFTAERNRI-
TLKRLGAVFVTFQDERMTAVIIKDYNRSSLLKKWKVHYAPAPSDIIWENLAVSGALWWFRFLAL
NLLLFVLLFFLTTPAVIVSTMDRFNVT----------
YLRNPVITQFLPTFLLWMFSVCLPFLVYYSAFFECHWTRSSENQHTMHKCYFFLVFMVIVLPSL
GLTSLNLFFRWLEA---
NIKFQCVFLPNNGAFFVNYVITASLIGTAMELLRFPGLTVYAARLCLHVRNQAYEFQFGLEYAWT
TCVFSVVMAYSITCPVIVPFGLIYMLLKHMTDRYNIYYAYIPT-
KLSPGLHKAAAYQMLAAPVLCIFWLLFFSVLRLGSTHPVTLFTFAVLLFCLLFSTFGLCLKKLQP
NRPSYQ--------SPAHASY---
>Xenopus_tropicalis_NP_001072343.1
LQGVTFGGIPTVLVLDVACFMFLLLAFAIIRRHFWDYG----RVLDADS--
SSSGGNGFCYWMTSTFQMNDEDIYDRCGEDATHYLSFQRHIICLLIIASILSVGVILPVNLSGNLL
--PLSFGRTTIANLQHHDRLLWLHTVVAVVYLILTVVFMRHHLSAIKY----------
KEENTVKQTLFITGLPRNVDK-
ETVRLHFSECQVEEVNLCYDVADLIRLSKERKKAEKNLAYFTNLLNKTGRNTKPCG-Q--
EREDAIEYYTRVRDGVMEEYARKQEVV-
CDIPLGIVFVTFADKSMSTLILKDFNASAQLGRWGVTYATYPENICWGNLSLQGVKWWARCLGI
NFCLFIVLFFLTTPSIIISTMDKFNVT----------
KLNNPVISQFFPTLMLWSFSALLPTIVYYSTLLEAHWTKSAENRIMMHKVYIFLIFMVLILPSLGLT
SLDFFFRWLQG---
PVRLECVFLPDQGAFFVNYVIASAFVGNGMELMRLPGLILYTIRMIRNIQNQAFEYEFGAMYAW
MLCVFTVVMAYSITCPIIVPFGLIYLLLKHMVDRHNLYYAYLPT-
KLDKKIHFSAVRQALTAPILCLMWLFFYSLLRMGFTAPSTLFTLIILLITILICLLYTCFGFFRHLNPY
YK--------VQEQQTY---
>Yarrowia_lipolytica_XP_502505.1
LAGMSIQTFLSSLVVAIVIFGIQLAIFILI--RPRIKKLYEPRTL---
PPELRVVSSGLIDWLTATVRYDIEDVVDRGGLDSYFFLRFMRMLLWIFGVACCIIIPILVPINATGN
TADMPTGMDNLSWSNIPYKSSRYSAHLVMAIATVIVLLALFTYELNVYIEKRHRYLTKPSHQIRA
TATTILIKYVPAHLRSEKAIKNLFRNGDVKNVWFTRDYSKLTSLLSLQKKRYRQLECLVTKRIIKS
EESIRSP--LGTKHDSIEWHCEEIERLTKEIAALKSET-

QFETMPTCMIQFNTQLDAHVACQSLSYHNP-
NFMDTRIETDHRDVIWANMRGSFYEEKVRFAIATALNLALIIGWAIPVSVVGLISQISYLTQLLPFL
SFLNDLPAIKGAISGILPPLLLALLMMLVPPILTLLAYLKGISTGIRVQLDVQKYYYAFQYIQLFLVIT
VSSGLTTTVQQIVDTPTSTPTILANNLPKAANFFMSYLILQGMITSMNNMLRVDELIFHLLARIKFS
LSSISEVIWGNTFPTYTNLATIGIIYSIISPIILIFCLISFSLTYMAFKYRIIYCNVNRVNSYGLFFPTAIF
QLFTGIYTLQLCLIGLFFLVKCTKHAIIMIIVLAFTILYQLHLSSKLKAVIEYLPVDKAATDADNREKL
LNRAFLHE
>Yarrowia_lipolytica_XP_505246.1
TQDTSVSNMVTTLISNGVTLGVFFIAFLIL--RPKFKRIYQPRSFLPTE-
RERTEPVSPVSWLMQLWHKKDSRILEEAGLDGYFFLRYIRLSFIIVVVGIVLLYPILLPVNATGKG-
-D-GGLNLLGFTNI---
SNRFYAHVLLGWIFFGFCLFMIYREFVYFISIRQAVLTSPAYSTRLSSRVVLITSLPEDYQDETEL
RKLF--
RGVHTVYVSRNFKKIEKKVAEREKLAGKLEGAENKMIKMAIKKRPTHRLIGEKVDTINYARTEVG
KLNREIEDMQAHLDQNDKLNSAFVLFNTQEDAQVAYQLLAHHKA-
LHAAPRTGISPDEVIWSNLRVKWWERVTKAMVVKAFLTALIVLWAIPVAVVGSFSNIKSLTGLVP
FLDFLNNLPQLQGLVSGLLPTILMAVLMMLLPIIIRQCAKQAGCPTTTRVEYYTQNAYFAFQFVN
VFLITTFASSAAATVKAIKDNPGSVMTMLSGNLPKSSNFFVSYIMLQALSFPGGALLQIVALILFKL
LGTMWTYNILGSTSWGTVFPMYTFLIVVSIAYACVSPIILVFSAVGFALIYLVFLNNLVYCEVPA-
DGRGIYYSRALRQTMLGIYFGQIFMLALFIMAKSWGPLALQVIFLVFTCFFHKTMLKAFNPLLDA
VPINLMRECAPLTIEQEKAAFLHP
>Yarrowia_lipolytica_XP_505733.1
DLWKHSSLLKTQLLIAGSLGMTAFLSFCVLRKNWPQ--IYAARTR----------
NTYFGWIPALYKITEEEVLEHCGLDCYVFLQFFKMAIIIFALCTFFAVTVIGPIRRNYDNGDELTSF
GVTTYRASEDYQPYLWTYVFFTYVFTGIVSFFLMRYTQKVIRVRQRYLGAQ---
NSITDRTIRLSGIPTELRDENRLTEHIEKGDVRSITICREWGELDQLFVVRKEIIKKLEVYQLGSRT
HS-YDRPTVRIYGTKVDAIDYYTGQLDTLDQKIIKARHK--
EYTPTNTAFVTMDSVASAQMVAQAVLDPSP-
YHLIAKLAPAPHDIIWKNIYMSTMKREVRTYAVTIAIGFLTVALVPPVLGVAKLMDTKTISKSWPAL
GQLLKDTWLEKLVTGILPPYLFTILNFALPYFYVYLASLQGFISHGDEELSVISKNFFYIFVNLFLIF
TVAGAAIDIFQYLKDT-
TSIAYKLASSLKKWALFYVDLIVLQGIGMFPFRLLEFGNLLRFGFEKPFRSLYTPPVFNFGLNLPQ
PILILIITLLYSVMSSKILAAGTAYFVLGYFTYKYLLMYAMVHPSHSTGQAWPMIVRRVCVGLVLF
HATMSGILALQQAYYLATLLAPLPVCAMLLLYNFENNYQPLTQFIALQAIRDTTLDEARERFLTYN
NP
>Zea_mays_B0FSL2
----DLTSFITSVLTSFVIFVALVLLFTWLSRRPGNAPVYYPNLLLRG--------
RSPVGWLRDAISASEPDVVAAGGVDAAVYLVFLSSVLSILVYSGIVLLPVLLPVAATGGALSTFS
SIERLGMGNVPEKSMRLWAFLLSVYWVSFVTYFVLWKSYKHVSNLRATARSAPD--
VKPEEFAVLVRDIPRDETIKDSVDSYFRANTFYRSMVVTDHTKADKIYQEIEGHKQKIARAEVVY
ANSKTGTRPTHRTIGTKVDTIEYCSEQIKELLPKLEAEQKTTLKQ--
QRAAIVVFNSRSAAAFASQTLHAQVY-
DKWTVMEAPEPRQIIWSNLPRKLYDRQIRQCVVYCIVFLIVVFYIVPLTAIAAVTTLENLEAKLPFL
KPVVEQPAIKTVLEAYLPQIALIVFLALLPTLLMFLSKQEGIPSQGHAVRAASGKYFYFIVFNVFLC
YTLGSTLFKSLTTIINHPAEIVNMLAKSLPGSATFFLTFVALKFLVGYGLELSRLVPLIIFHLKRKVR
AAWAPVDLGYNTRVPNDMLIATVVLCYSVIAPLIIPFGVAYFALGWLIARNQILRVYVPSYESYGR
MWPHMHTRIIAALMVYQTTMIGFISLKKFAYA-
SVLVPLLPASIIFAYVCHMRFYPAFAKTPLEVVVRH------AIYTAYIPP
>Zea_mays_B6SS81
---ASLGDIGLAAGLNVLTAVAFLLAFAFLRLQPINDRVYFPKWYLRG--
MRDNPILKFLNWMPAALKMPQDELINHAGLDSVVYLRIYVTGLKIFVPITVLAFLVLVPVNWTND

TLG-YSPIDKLSISNVPNGSKRFIAHLGMAYAITFWTCYVLLKEYEIISNMRLRFLASEK--
RRPDQFTVLVRNIPPE-
SISELVEHFFLVDHYLQHQVVYNANKLADLVEKKKKMRNWLDYYLLKYERNSSL-
RPTTKTFGSKVDAIDYYKSEIEKIGKQEAEERKNVMPKSVVPAAFVSFRSRWGAAVCAQTQQT
SNP-
TLWLTEWAPEPRDVYWNNLSIPFVSLTIRRLIVAVAFFFLKLFYVIPITFVQSLANLEGIEKALPFL
KPLIDLPFIKSFIQGFLPGIALKIFLIVLPTILMFMSKFEGLISQSSLERRSASKYYIFLFFNVFLGSVI
AGSALEQLKTYLTSANDIPRIIGDSIPMKATFFITYVMVDGWTGIAGEILRLKPLIFFHLKNFREEA
MDPGSICFDSTEPRIQLYFLLGLVYAAVTPFLLPFILVFFGFAYVVFRHQIINVYNQQYESAAQFW
PSVHGRIITALIVSQLLLLGLMSTNDFEQTTPVLLVLPVLTFGFYKYCKNRFEPAFVRNPLQEAM
KKNLDLKAYLANSYLHP
>Zea_mays_C0PEC9
DPEAWYGSIQYLINISAVGAASCVLLFLLVKLRFDHRR----------
SALAAKLLAVYHATAAQIALHCGADAAQFLLFERASFLILAAVAAAAVAAALPLNLLAGDA--
VDQFASTTISHIPKSSPLLWLHLLLTAAVVAIAHLGISRMEDALRITRFRD-----
NSSSVAVFTIMIQGIPKTLAADKTLKDYFDHGKVYRVIVPFDLCTLEHLVEQLGKVRNKISWLEA
RLGARDL----------EERLRKLQTKKLVLASRLSDYKEG--
CAPGAGVAFVVFKDVYTANKAVKDFKEPVQLERWKVERAPPASDIYWNHLGLSKISSRLRRIAV
NTCLILMLLFFSSPSAIISGMQNAARIIHAKSWLAWLEGS-
WFWTIIFQFLPNVLIFVSYIIIPSVLSYFSKFECHLTVSGEQRAALLKMVCFFLVNLILLRALVESSL
ESWGCYLDGDQ-
IRYLSPSFLSRSSLSSLAFLITCTFLGISFDLLAPIPWIKHIMKKFNRSHMPKQKFDFAQYYAFDITI
FALTLIYSLFAPLVVPVGATYFGYRYLVDKYNFLFVYRVRGGNDGKLMDRVLCIMQFCVIFFLAA
MLLFFAVQGDSMKLQAICTLGMLVFY--KLLSDRFQPSLEGMQTNSF-----VDGPTDYEVFSQP

Phylogenetic Tree (Newick format)

(((Tribolium_castaneum_D6W8C0:0.4340299999999999,(((Drosophila_mojavensis_B4KNX3:0.
02943999999999969,(Drosophila_grimshawi_B4J841:0.047735000000000305,Drosophila_virili
s_B4LJM0:0.038078000000000056):0.00710899999999981):0.025144000000000055,((Drosop
hila_persimilis_B4GGP0:0.0,Drosophila_pseudoobscura_Q28ZW6:0.0016650000000000276):0
.0409790000000001,(Drosophila_willistoni_B4NMJ5:0.048836000000000546,(Drosophila_anan
assae_B3MGE2:0.05597200000000013,(Drosophila_erecta_B3N988:0.013180999999999887,(
Drosophila_melanogaster_Q6NP91:0.007699000000000122,(Drosophila_sechellia_B4HRJ2:0.
0,Drosophila_simulans_B4QFA5:0.004974999999999952):0.008990000000000276):0.0101489
99999999742):0.04105300000000023):0.012366000000000001):0.011871999999999883):0.0307
30999999999842):0.32638500000000015,(Anopheles_gambiae_Q7Q7M1:0.049886999999999
57,(Aedes_aegypti_Q16T32:0.06290500000000021,Culex_quinquefasciatus_B0WVM3:0.0723
5300000000011):0.04759399999999969):0.17078499999999996):0.23221000000000025):0.29
58400000000001,(Nematostella_vectensis_A7RGG4:0.6337440000000001,((((((Homo_sapiens
_Q5T3F8:0.0,(Mus_musculus_Q3TWI9:0.0,Rattus_norvegicus_D4A105:0.00166099999999946
85):0.006657000000000135):0.0,((Sus_scrofa_F1RQV6:0.0,Bos_taurus_F1MY22:0.004987999
9999999924):0.0016599999999997728,(Canis_familiaris_E2RBB2:0.010140999999999956,Ail
uropoda_melanoleuca_D2GZA8:0.0):0.0016609999999999125):0.0):0.007986999999999966,('
Anolis_carolinensis_XP_003215953.1':0.015498000000000012,Gallus_gallus_E1C7I8:0.00862
3999999999743):0.0216289999999999):0.056620000000000115,('Danio_rerio_XP_002664275
.2':0.0731269999999995,Tetraodon_nigroviridis_Q4RQ32:0.07451399999999975):0.04999100
000000034):0.14798899999999993,(Danio_rerio_A4QP59:0.3695619999999997,('Anolis_caroli
nensis_XP_003216139.1':0.19848200000000027,('Xenopus_tropicalis_NP_001072343.1':0.214
63500000000035,(Bos_taurus_A7MB88:0.026029999999999998,(Sus_scrofa_F1S8R3:0.0285
89000000000198,(Ailuropoda_melanoleuca_D2HVN1:0.08292300000000008,((Homo_sapiens

_O94886:0.005323999999999884,Pongo_abelii_Q5R826:0.0030599999999996186):0.025873999999999953,(Mus_musculus_Q91YT8:0.005304999999999893,Rattus_norvegicus_D4A2I3:0.0236780000000031):0.052952999999999584):0.014763000000000304):0.011197000000000124):0.020054999999999712):0.11130500000000021):0.043684999999999974):0.1252169999999997):0.1257100000000002):0.112927,((Danio_rerio_B0R175:0.1611480000000003,(Xenopus_tropicalis_A0JP96:0.20939200000000024,'Anolis_carolinensis_XP_003214481.1':0.13942600000000027):0.03862299999999985):0.09533999999999976,(Homo_sapiens_B2RN22:0.07281399999999971,(Ailuropoda_melanoleuca_D2HUR2:0.07762600000000042,(Mus_musculus_Q8CBX0:0.026864999999999917,Rattus_norvegicus_D3ZNF5:0.04492900000000022):0.08062000000000014):0.02769499999999958):0.40037199999999995):0.19653900000000046):0.34020399999999995):0.188936):0.25408399999999975,((('Cryptococcus_neoformans_XP_568344.1':0.8189649999999999,'Ustilago_maydis_XP_758942.1':0.7183229999999998):0.8129520000000001,(('Schizosaccharomyces_pombe_NP_595232.1':0.9471400000000001,(Phaeosphaeria_nodorum_Q0UJ62:0.38786900000000024,(((Ajellomyces_capsulata_A6QRK6:0.18912800000000018,Coccidioides_posadasii_C5P9N8:0.2495980000000002):0.06021199999999993,(Penicillium_marneffei_B6Q4A7:0.28584699999999996,Aspergillus_niger_A2QDK9:0.22752099999999986):0.0536439999999998):0.17828100000000013,(Botryotinia_fuckeliana_A6RVV4:0.274737,'Neurospora_crassa_XP_962104.2':0.3108439999999999):0.11922699999999997):0.05796599999999996):0.3121299999999998):0.21255800000000002,('Cryptococcus_neoformans_XP_569106.1':1.398155,('Ustilago_maydis_XP_760031.1':0.559898,('Cryptococcus_neoformans_XP_568337.1':0.5553490000000001,(Coprinopsis_cinerea_A8N733:0.15096100000000012,Laccaria_bicolor_B0D8L9:0.11603200000000014):0.24992899999999985):0.15782199999999999):0.11233899999999997):0.2656670000000001):0.568457,((('Ustilago_maydis_XP_759473.1':0.4488699999999999,('Cryptococcus_neoformans_XP_570388.1':0.44698300000000035,Laccaria_bicolor_B0DWN0:0.2803690000000003):0.14593999999999951):0.4684440000000003,('Schizosaccharomyces_pombe_non_NP_593089.1':0.7933460000000001,('Neurospora_crassa_XP_964945.1':0.6233969999999998,('Yarrowia_lipolytica_XP_505733.1':0.361526,('Saccharomyces_cerevisiae_NP_013342.1':0.4432619999999998,(Clavispora_lusitaniae_C4Y5W1:0.21518499999999996,(Candida_albicans_Q59MD1:0.21103000000000005,Pichia_stipitis_A3LQH6:0.21623100000000006):0.08102900000000002):0.4751270000000001):0.08732300000000004):0.18193899999999985):0.22824700000000053):0.3118909999999997):0.2985850000000001,((((('Ustilago_maydis_XP_758658.1':0.49997800000000003,('Cryptococcus_neoformans_XP_569104.1':0.6159780000000001,('Cryptococcus_neoformans_XP_568746.1':0.7840940000000001,Coprinopsis_cinerea_A8N6F5:0.596543):0.16825899999999994):0.09287499999999982):0.20208800000000027,(((((Penicillium_marneffei_B6Q5Z5:0.19197299999999995,(Aspergillus_niger_A2R3B1:0.19986300000000012,(Ajellomyces_capsulata_A6QU75:0.097935999999998,Coccidioides_posadasii_C5PI64:0.12167299999999992):0.12157499999999999):0.06886800000000015):0.12123499999999998,((Botryotinia_fuckeliana_A6RS77:0.20279999999999987,'Neurospora_crassa_XP_962626.1':0.30572599999999994):0.11268900000000004,('Neurospora_crassa_XP_956097.1':0.56541,(Ajellomyces_capsulata_C0NQE5:0.23352299999999993,(Aspergillus_niger_A2R6X5:0.17305500000000018,Penicillium_marneffei_B6QPV3:0.21185000000000001):0.11542500000000011):0.14650300000000005):0.09219599999999994):0.09187900000000004):0.04290100000000008,(Phaeosphaeria_nodorum_Q0V4S6:0.797269,Phaeosphaeria_nodorum_Q0UR74:0.5372310000000002):0.11669900000000011):0.16254500000000016,('Yarrowia_lipolytica_XP_505246.1':0.4894620000000006,(('Saccharomyces_cerevisiae_NP_013993.1':0.34391399999999983,(Debaryomyces_hansenii_Q6BLR7:0.213244,(Clavispora_lusitaniae_C4YBD3:0.250359,(Pichia_stipitis_A3LQ78:0.1675390000000001,Candida_albicans_Q5APG0:0.27428300000000005):0.03916699999999995):0.043174000000000046):0.15093500000000004):0.22643699999999978,('Schizosaccharomyces_pombe_NP_592939.1':0.3557399999999995,('Saccharomyces_cerevisiae_NP_014557.1':0.4693100000000001,(Clavispora_lusitaniae_C4XX35:0.2467220000000001,((Debaryomyces_hansenii_B5RSZ8:0.079817999999999

94,Debaryomyces_hansenii_Q6BWA0:0.06049000000000155):0.18086000000000002,(Pichia_stipitis_A3LTU0:0.21576299999999993,Candida_albicans_C4YKA8:0.31011500000000014):0.04128199999999982):0.04368000000000016):0.1778900000000001):0.0554260000000002):0.29650599999999994):0.06593900000000019):0.11060200000000009):0.2740230000000001,('Neurospora_crassa_XP_962529.1':0.6026389999999999,('Yarrowia_lipolytica_XP_502505.1':0.5800800000000002,('Saccharomyces_cerevisiae_NP_013096.1':1.2458959999999997,(Candida_albicans_Q59TM5:0.40353700000000003,Clavispora_lusitaniae_C4XXZ0:0.6174430000000002):0.39376999999999995):0.3220019999999999):0.18794600000000017):0.16497200000000012):0.12365700000000013):0.4878169999999997,'Encephalitozoon_cuniculi_NP_585973.1':1.835811):0.048653999999999975,(Dictyostelium_discoideum_Q54RR3:1.3566539999999998,((Phaeodactylum_tricornutum_B7G8J8:1.159182,(Perkinsus_marinus_C5KLG9:0.2592479999999999,Perkinsus_marinus_C5KY51:0.31494199999999983):0.8972820000000001):0.271045,(Monosiga_brevicollis_A9UQI6:1.1368609999999997,((((('Ostreococcus_lucimarinus_XP_001417492.1':0.12796699999999994,Ostreococcus_tauri_Q01B23:0.212005):0.606668,('Micromonas_SP_XP_002501858.1':0.33692699999999975,'Micromonas_pusilla_XP_003057675.1':0.5125310000000001):0.1950949999999998):1.2621209999999996,((('Chlorella_variabilis_EFN54682.1':0.8090540000000002,('Volvox_carteri_XP_002949162.1':0.7452100000000002,('Micromonas_pusilla_XP_003059254.1':0.28057799999999977,'Micromonas_SP_XP_002502566.1':0.3280500000000002):0.8465039999999999):0.10722299999999985):0.08594599999999986,('Chlorella_variabilis_EFN53692.1':0.25260300000000013,'Chlorella_variabilis_EFN57874.1':0.31965999999999983):0.5514989999999997,('Volvox_carteri_XP_002948882.1':0.579895,('Chlamydomonas_reinhardtii_XP_001698593.1':0.4919419999999999,'Chlamydomonas_reinhardtii_XP_001699584.1':0.398037):0.2672620000000001):0.30084100000000014):0.27912999999999999):0.1040899999999998,('Ostreococcus_lucimarinus_XP_001416012.1':0.699004,('Ostreococcus_lucimarinus_XP_001421858.1':0.136212,'Ostreococcus_tauri_XP_003083863.1':0.1851029999999998):0.46663500000000013):0.5011779999999999):0.493468):0.17617800000000017,(('Chlorella_variabilis_EFN53534.1':0.6761149999999998,((('Chlamydomonas_reinhardtii_XP_001695096.1':0.13268099999999983,'Chlamydomonas_reinhardtii_XP_001702328.1':0.15770399999999984):0.1190739999999999,('Volvox_carteri_XP_002955034.1':0.17252199999999984,('Chlamydomonas_reinhardtii_XP_001702312.1':0.3561359999999998,'Chlamydomonas_reinhardtii_XP_001702326.1':0.16592899999999977):0.0922019999999999):0.055611999999999995):0.42115500000000017,('Volvox_carteri_XP_002951035.1':0.5375839999999998,'Chlamydomonas_reinhardtii_XP_001699063.1':2.294195):0.29141400000000006):0.17235300000000002):0.4795419999999999,((((Physcomitrella_patens_A9RYA3:0.3372419999999998,(Physcomitrella_patens_A9SW54:0.28393099999999993,Physcomitrella_patens_A9RU79:0.31966699999999999):0.1931820000000002):0.1909209999999999,(('Physcomitrella_patens_XP_001768825.1':0.5169799999999998,(Physcomitrella_patens_A9RK07:0.124193,Physcomitrella_patens_A9TU69:0.09490599999999993):0.19187300000000018):0.12894300000000003,((Selaginella_moellendorffii_D8RE49:0.3634409999999999,Selaginella_moellendorffii_D8RRD4:0.2276370000000001):0.06277199999999983,(((Sorghum_bicolor_C5WQN2:0.05902999999999916,(Oryza_sativa_indica_A2ZAL4:0.0,Oryza_sativa_japonica_Q7XBT3:0.0015239999999998588):0.04299600000000034):0.12514400000000014,((Arabidopsis_lyrata_D7KHF7:0.007648000000000099,Arabidopsis_thaliana_Q9FVQ5:0.004427999999998765):0.1431840000000002,(Vitis_vinifera_D7SYN5:0.0877349999999999,(Populus_trichocarpa_B9MUA6:0.06400700000000015,Ricinus_communis_B9S1E8:0.07067699999999988):0.03086499999999992):0.023697999999999997):0.07409499999999998):0.13217899999999982,(((Sorghum_bicolor_C5YY97:0.07205400000000006,(Oryza_sativa_indica_A2Y4C8:0.0,Oryza_sativa_japonica_Q6AU79:0.0):0.06210799999999983):0.17069,(Ricinus_communis_B9T4A8:0.14670300000000003,(Vitis_vinifera_D7TPC6:0.13262600000000013,(Arabidopsis_lyrata_D7M3B8:0.006501999999999786,Arabidopsis_thaliana_Q9SY14:0.004140000000000325):0.1675209999999998):0.020888999999999935):0.028303999999999885):0.06498299999999979,(((Sorghum_bicolor_C5XMV4:0.050453999

99999978,(Oryza_sativa_indica_B8A9P0:0.0,Oryza_sativa_japonica_Q5JLH8:0.0):0.04342699999999988):0.04664899999999994,((Oryza_sativa_indica_A2Y857:0.0,Oryza_sativa_japonica_Q5TKG1:0.0):0.08363299999999985,(Sorghum_bicolor_C5YX25:0.011878999999999973,Zea_mays_B6SS81:0.03278900000000018):0.06606500000000004):0.05584699999999998):0.1149659999999999,((((Arabidopsis_lyrata_D7MAI0:0.00975400000000004,Arabidopsis_thaliana_Q8VZM5:0.0023689999999998435):0.15057799999999988,(Arabidopsis_lyrata_D7L0U9:0.004071000000000158,Arabidopsis_thaliana_Q9LVE4:0.014116000000000017):0.06349399999999994):0.11513000000000018,(Lotus_japonicus_B0BLA8:0.11110499999999979,(Vitis_vinifera_D7TEB7:0.123421,(Ricinus_communis_B9STM2:0.06475300000000006,(Populus_trichocarpa_B9GTV5:0.0392809999999999,Populus_trichocarpa_B9IAI0:0.026847000000000065):0.03693599999999986):0.02147599999999983):0.014097000000000026):0.01563099999999995):0.03693100000000005,(Vitis_vinifera_E0CVN9:0.10813499999999987,((Ricinus_communis_B9RXG3:0.05496400000000001,(Populus_trichocarpa_B9N8E6:0.10251799999999989,(Populus_trichocarpa_B9HZA2:0.046791999999999945,(Populus_trichocarpa_B9N8E7:0.008884000000000114,Populus_trichocarpa_B9NGP9:0.03247100000000014):0.03184800000000001):0.026225999999999986):0.05122699999999991):0.028620999999999786,(((Arabidopsis_lyrata_D7ME79:0.0073910000000001475,Arabidopsis_thaliana_Q5XEZ5:0.013746999999999954):0.045647000000000215,(Arabidopsis_lyrata_D7M169:0.018117999999999856,Arabidopsis_thaliana_Q9XEA1:0.02540200000000147):0.06345199999999984):0.08918800000000005,((Arabidopsis_lyrata_D7KN76:0.009120999999999935,Arabidopsis_thaliana_B5TYT3:0.02499900000000215):0.06790399999999996,(Arabidopsis_lyrata_D7KUS0:0.010053999999999785,Arabidopsis_thaliana_Q9MAV5:0.016210000000000058):0.08086899999999986):0.10727099999999999):0.020127000000000006):0.021240999999999843):0.040484000000000187):0.03488800000000003):0.028929000000000205):0.10151399999999988):0.10530099999999987):0.06857099999999994):0.10995700000000008):0.23944199999999993,((Physcomitrella_patens_A9SDM0:0.369421,Physcomitrella_patens_A9SH39:0.3109329999999999):0.1676000000000002,((Selaginella_moellendorffii_D8QPN8:0.0017000000000000348,Selaginella_moellendorffii_D8SKT7:0.005954000000000015):0.36737200000000003,(((Sorghum_bicolor_C5XHW4:0.093325000000001,(Oryza_sativa_indica_B8A969:0.00270599999999875,Oryza_sativa_japonica_Q5JKX1:0.005494999999999806):0.08758700000000008):0.2789989999999998,((Arabidopsis_lyrata_D7LUU6:0.012157999999999891,Arabidopsis_thaliana_Q9M1H6:0.011695000000000011):0.20585999999999993,(Populus_trichocarpa_B9GWL7:0.12127899999999991,Ricinus_communis_B9RGD1:0.15402899999999997):0.08440000000000003):0.1424500000000002):0.5077919999999998,((((Oryza_sativa_indica_B8AP47:0.0,Oryza_sativa_japonica_Q75LY2:0.0):0.14147199999999982,(Sorghum_bicolor_C5YSZ5:0.06470799999999999,(Oryza_sativa_indica_B8ACM4:0.0,Oryza_sativa_japonica_Q2QLP9:0.0):0.056545999999999985):0.04890699999999981):0.174557000000000007,((Oryza_sativa_indica_B8AR42:1.000000000139778E-6,Oryza_sativa_japonica_Q75GI5:0.007770999999999972):0.37568400000000013,(((Arabidopsis_lyrata_D7KKL9:0.02298499999999981,Arabidopsis_thaliana_Q94A87:0.038428999999999824):0.13535699999999995,(Arabidopsis_lyrata_D7KXW9:0.006388999999999978,'Arabidopsis_thaliana_NP_683440.2':0.01099300000000003):0.06579099999999993):0.2068270000000001,(Vitis_vinifera_E0CNX2:0.18550099999999992,(Populus_trichocarpa_B9GNK6:0.152393,Ricinus_communis_B9R6U4:0.10605799999999999):0.09415899999999988):0.026575999999999933):0.083669):0.04608699999999999):0.28186599999999995,(Picea_sitchensis_B8LKM0:0.20858,((Ricinus_communis_B9S919:0.10118099999999997,(Arabidopsis_lyrata_D7KX16:0.007998999999999867,Arabidopsis_thaliana_Q9C792:0.03009400000000065):0.34985700000000001):0.10639200000000004,(Medicago_truncatula_A2Q3S2:0.2553580000000002,(Arabidopsis_thaliana_Q8GUH7:0.26927400000000024,(Populus_trichocarpa_B9H0G3:0.12236100000000016,Ricinus_communis_B9SVJ7:0.14162799999999987):0.050807999999999964):0.037285999999999993):0.07015299999999991):0.22007399999999988):0.09383000000000008):0.270054):0.07801200000000019):0.08604399999999979):0.4233760000000002):0.200529999999999

65,(((Physcomitrella_patens_A9SJW4:0.1099619999999999,(Physcomitrella_patens_A9RIT4:0.061164999999999914,Physcomitrella_patens_A9SK54:0.07561200000000001):0.089112999999999978):0.281498,((Physcomitrella_patens_A9S3X9:0.15418300000000018,Physcomitrella_patens_A9TEC4:0.10440100000000019):0.15128399999999997,(Physcomitrella_patens_A9S768:0.20454000000000017,Physcomitrella_patens_A9SW37:0.15632599999999996):0.2012999999999998):0.10505999999999993):0.11688300000000007,(Selaginella_moellendorffii_XP_002990725:0.5079890000000002,(((Oryza_sativa_indica_A2YI72:0.0,Oryza_sativa_japonica_Q6ZLQ0:0.001510999999999818):0.08136700000000019,(Sorghum_bicolor_C5X9J3:0.03925100000000015,Zea_mays_B0FSL2:0.046075999999999784):0.07011000000000012):0.19869899999999996,(Populus_trichocarpa_B9GJG0:0.14502199999999998,((Arabidopsis_lyrata_D7KET4:0.021558999999999884,Arabidopsis_thaliana_Q9C8G5:0.012030999999999903):0.08117200000000002,(Brassica_campestris_A8IXK5:0.03941300000000014,Brassica_juncea_A9LIW2:0.04264599999999996):0.07550699999999999):0.18181499999999984):0.11091899999999999):0.18359300000000012):0.07394500000000015):0.5023429999999998):0.15404000000000018):0.10614699999999999):0.09618400000000005):0.12595599999999996):0.04678099999999974):0.0760740000000002):0.1283829999999999):0.12188299999999996):0.2034370000000001):0.48728700000000025,(Selaginella_moellendorffii_D8S958:0.34041299999999985,(((Arabidopsis_lyrata_D7MBR9:0.0,Arabidopsis_thaliana_Q9SZT4:0.006444000000000116):0.12919099999999996,(Ricinus_communis_B9T723:0.050075000000000536,(Populus_trichocarpa_B9HH28:0.05930100000000049,Populus_trichocarpa_B9MXB5:0.04027500000000028):0.055352000000000007):0.046630999999999645):0.11162300000000025,((Sorghum_bicolor_Q1KSB7:0.004753000000000007,Zea_mays_C0PEC9:0.009985999999999606):0.036423000000000094,(Oryza_sativa_indica_B8AMU4:0.0,Oryza_sativa_japonica_Q10S28:0.001627000000000045):0.03146099999999974):0.21405300000000027):0.21927299999999983):1.2366780000000004):0.25408399999999975);

References

1. Liu, K. & Luan, S. Internal aluminum block of plant inward K(+) channels. *The Plant Cell* **13,** 1453–1465 (2001).
2. Liedtke, W. *et al.* Vanilloid receptor-related osmotically activated channel (VR-OAC), a candidate vertebrate osmoreceptor. *Cell* **103,** 525–535 (2000).
3. Katoh, K. *et al.* MAFFT: a novel method for rapid multiple sequence alignment based on fast Fourier transform. *Nucleic Acids Research* **30,** 3059–3066 (2002).
4. Guindon, S. *et al.* New Algorithms and Methods to Estimate Maximum-Likelihood Phylogenies: Assessing the Performance of PhyML 3.0. *Systematic Biology* **59,** 307–321 (2010).
5. Anisimova, M. & Gascuel, O. Approximate Likelihood-Ratio Test for Branches: A Fast, Accurate, and Powerful Alternative. *Systematic Biology* **55,** 539–552 (2006).
6. Klammer, M., Messina, D. N., Schmitt, T. & Sonnhammer, E. L. L. MetaTM - a consensus method for transmembrane protein topology prediction. *BMC Bioinformatics* **10,** 314 (2009).