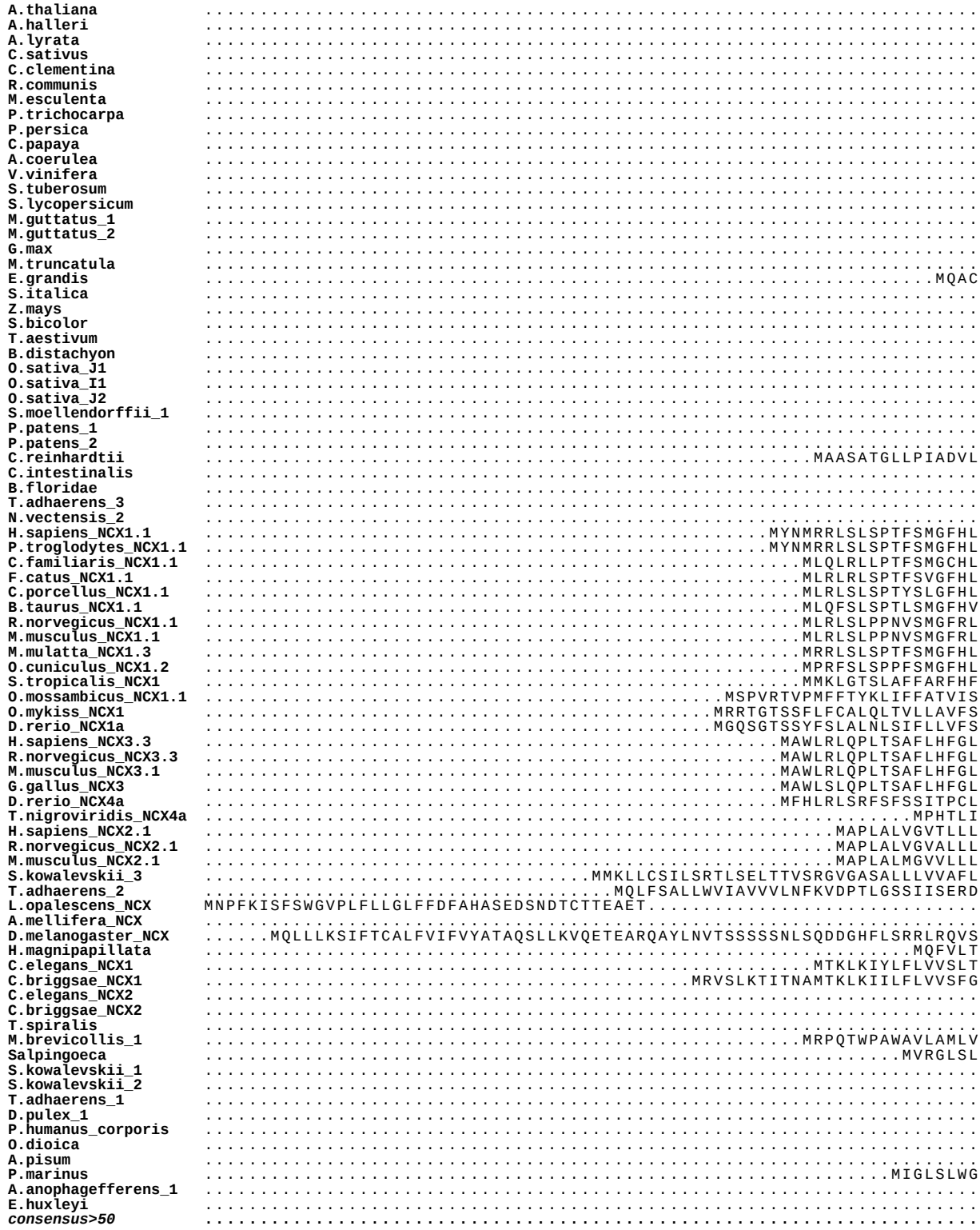
Additional file 9. Alignment of MHX and NCX proteins

The file presents the alignment of all currently identified MHX proteins and the NCX proteins that were utilized as markers or identified in this work (excluding CrNCX). See the legends of Additional file 5 for details of sequence alignment and color annotation.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S.tuberosum
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M.truncatula
E.grandis
S.italica
Z.mays
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B.distachyon
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O.sativa_J2
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P.patens_1
P.patens_2
C.reinhardtii
C.intestinalis
B.floridae
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N.vectensis_2
H.sapiens_NCX1.1
P.troglodytes_NCX1.1
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F.catus_NCX1.1
C.porcellus_NCX1.1
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C.briggsae_NCX2
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M.brevicollis_1
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S.kowalevskii_1
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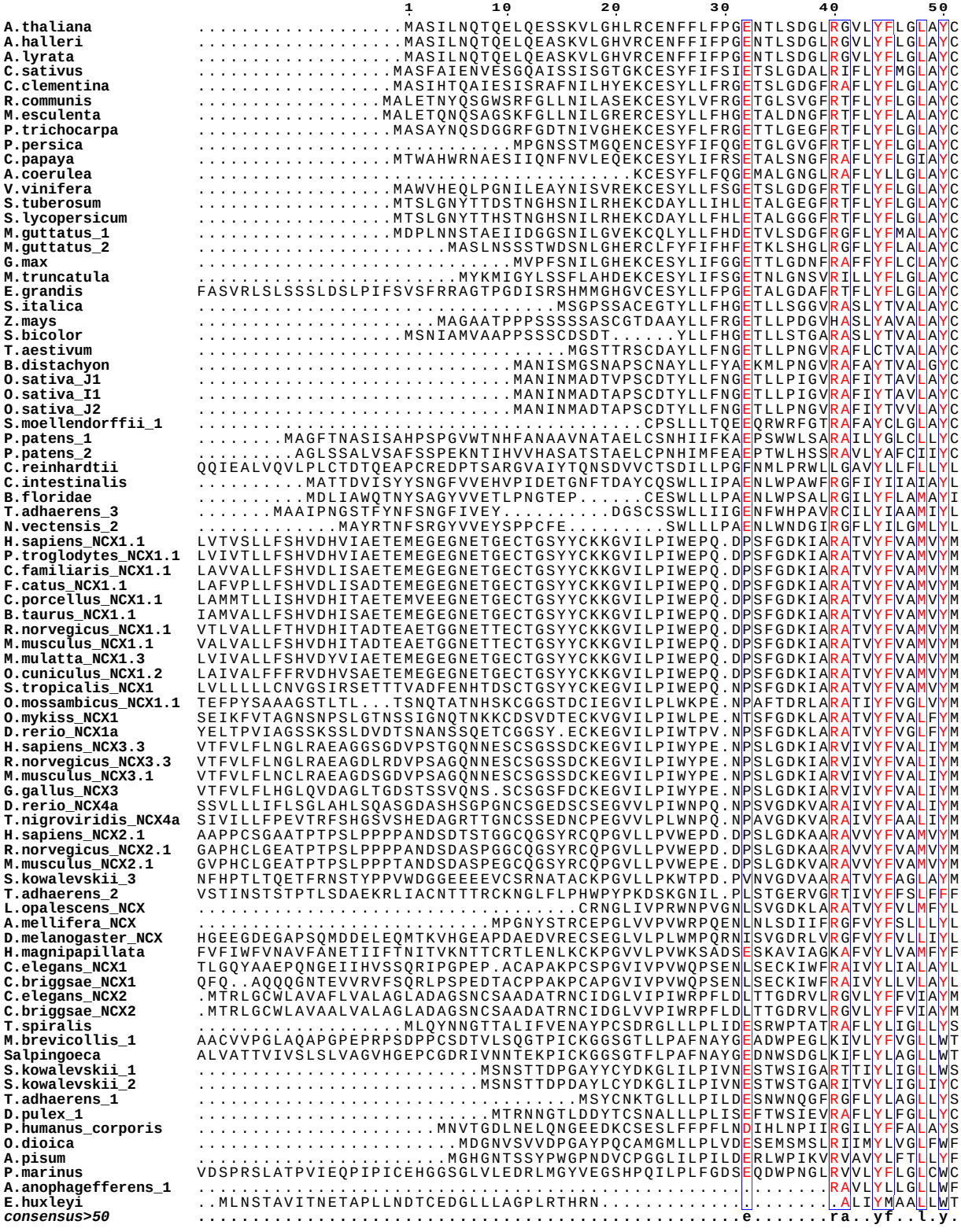
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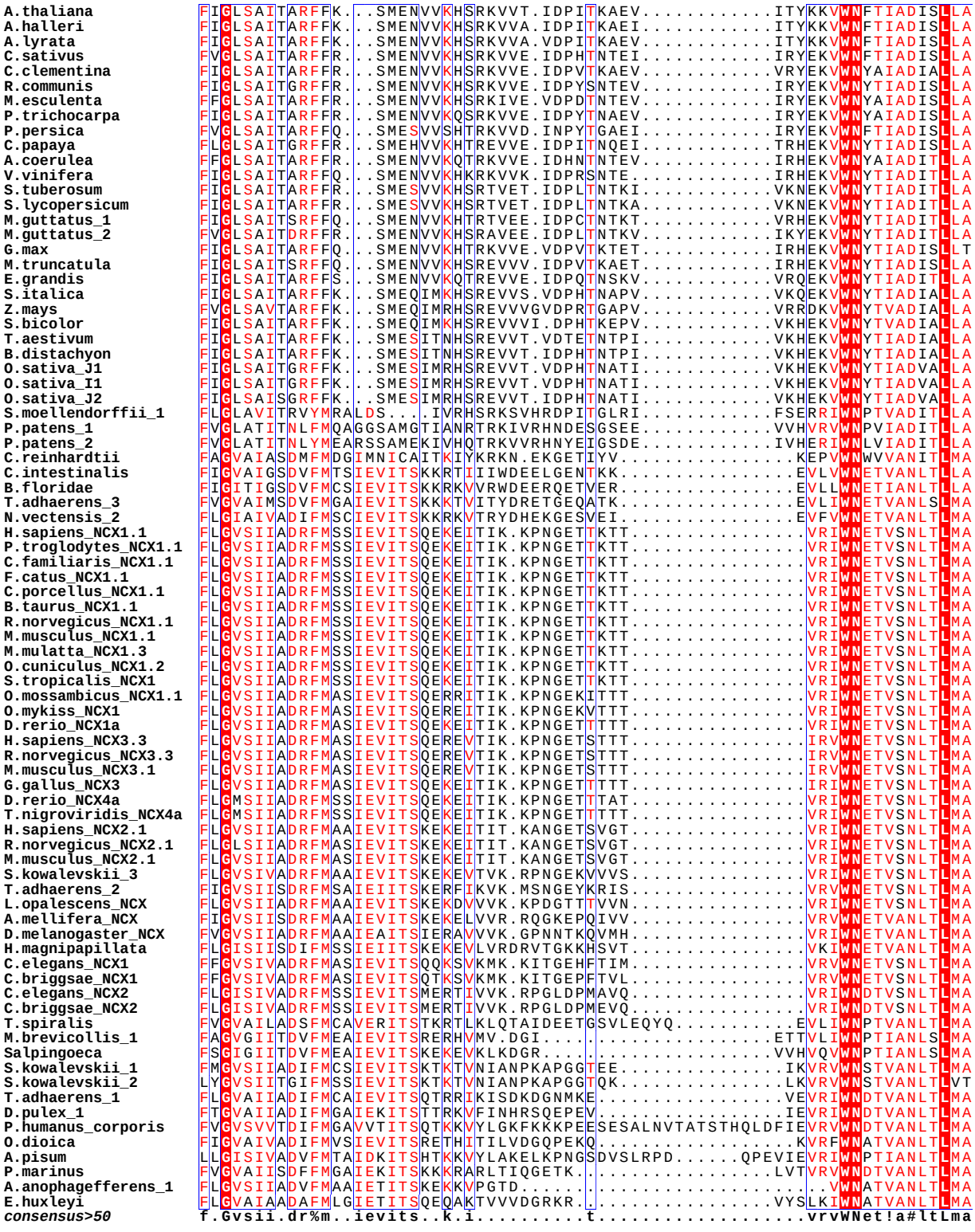
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C.intestinalis
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T.adhaerens_3
N.vectensis_2
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E.huxleyi
consensus>50


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consensus>50

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Z.mays                    DVSAVYYAKCD.....................................................
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T.aestivum                DTSLHHDKNCD.....................................................
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P.troglodytes_NCX1.1      EHEGDRPS.SKTEIEMDGKVV...........................................
C.familiaris_NCX1.1       EHEGDRPS.SKTEIEMDGKVV...........................................
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G.gallus_NCX3             ESEGDHPKG....IEMDGKMM...........................................
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T.nigroviridis_NCX4a      ESEGDAMFT.KMDMEMDGQGV...........................................
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T.adhaerens_2             VEPDSI.......IMRSPKEE...........................................
L.opalescens_NCX          CEGQDAEAGEGKSEDG................................................
A.mellifera_NCX           AEAGDSDGGVELEIKPQQDSF...........................................
D.melanogaster_NCX        GEHDQVEMDAEKGPKQPMVTS...........................................
H.magnipapillata          IQTGDGDVVAVSLKSTIKHDS...........................................
C.elegans_NCX1            R............RSPSKKT...........................................
C.briggsae_NCX1           R............RSPSKKT...........................................
C.elegans_NCX2            T............EAEEMKM...........................................
C.briggsae_NCX2           T............EAEEMKM...........................................
T.spiralis                LRELNRRSWTGPALNGKEKLL...........................................
M.brevicollis_1           IRT.............................................................
Salpingoeca               NDV.............................................................
S.kowalevskii_1           DRY.............................................................
S.kowalevskii_2           ................................................................
T.adhaerens_1             DTE.............................................................
D.pulex_1                 SIQ.............................................................
P.humanus_corporis        MEE.............................................................
O.dioica                  NPD.............................................................
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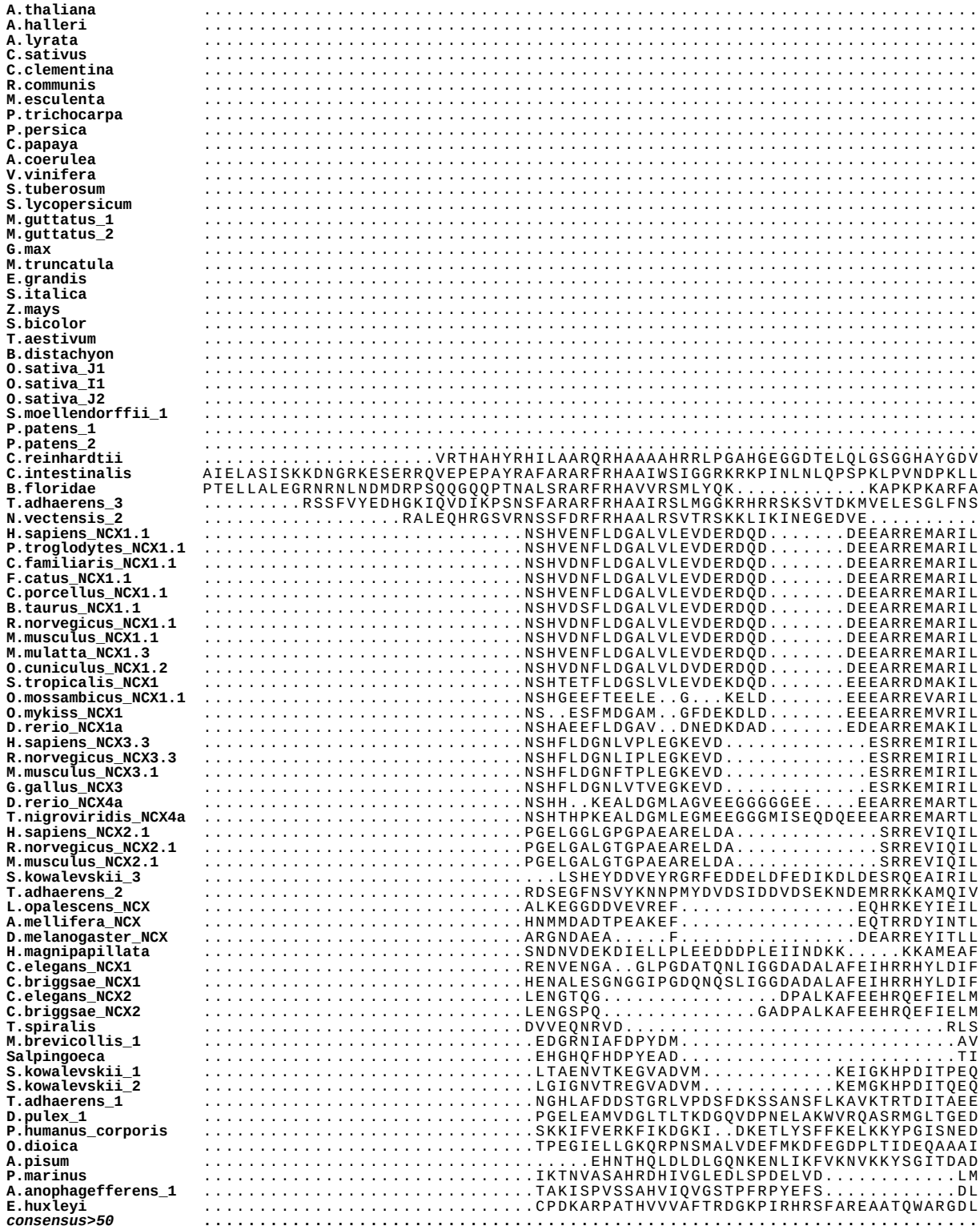
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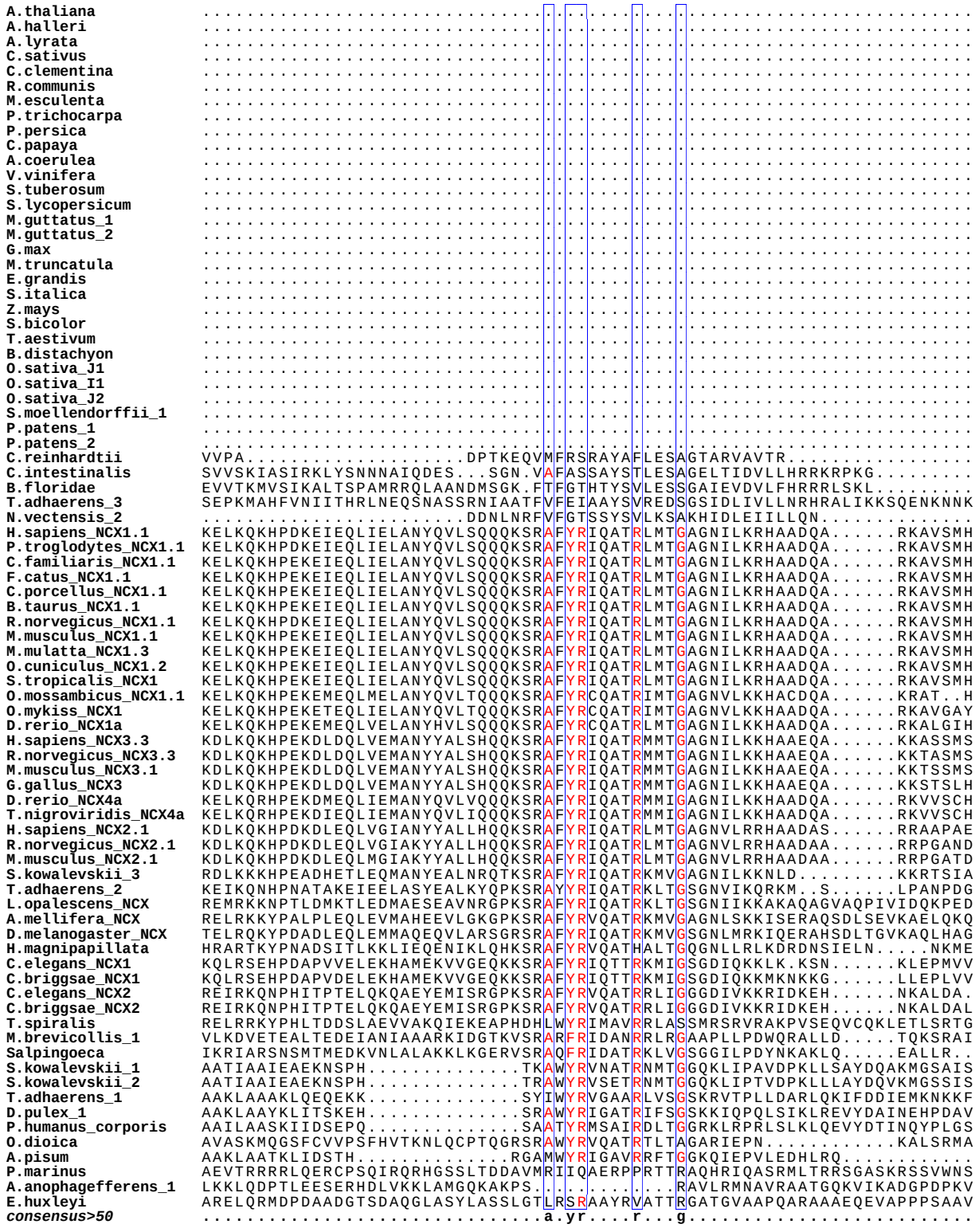
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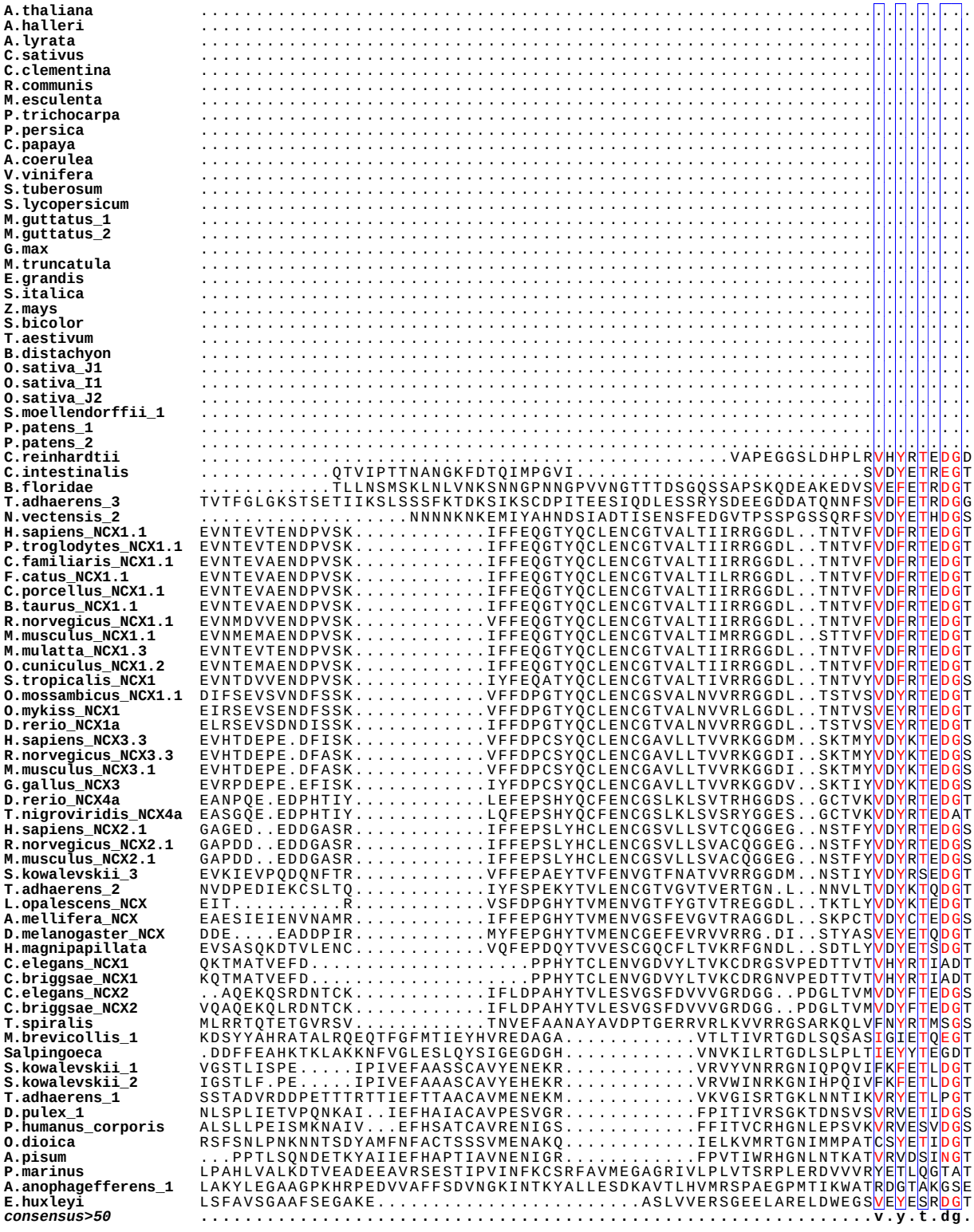
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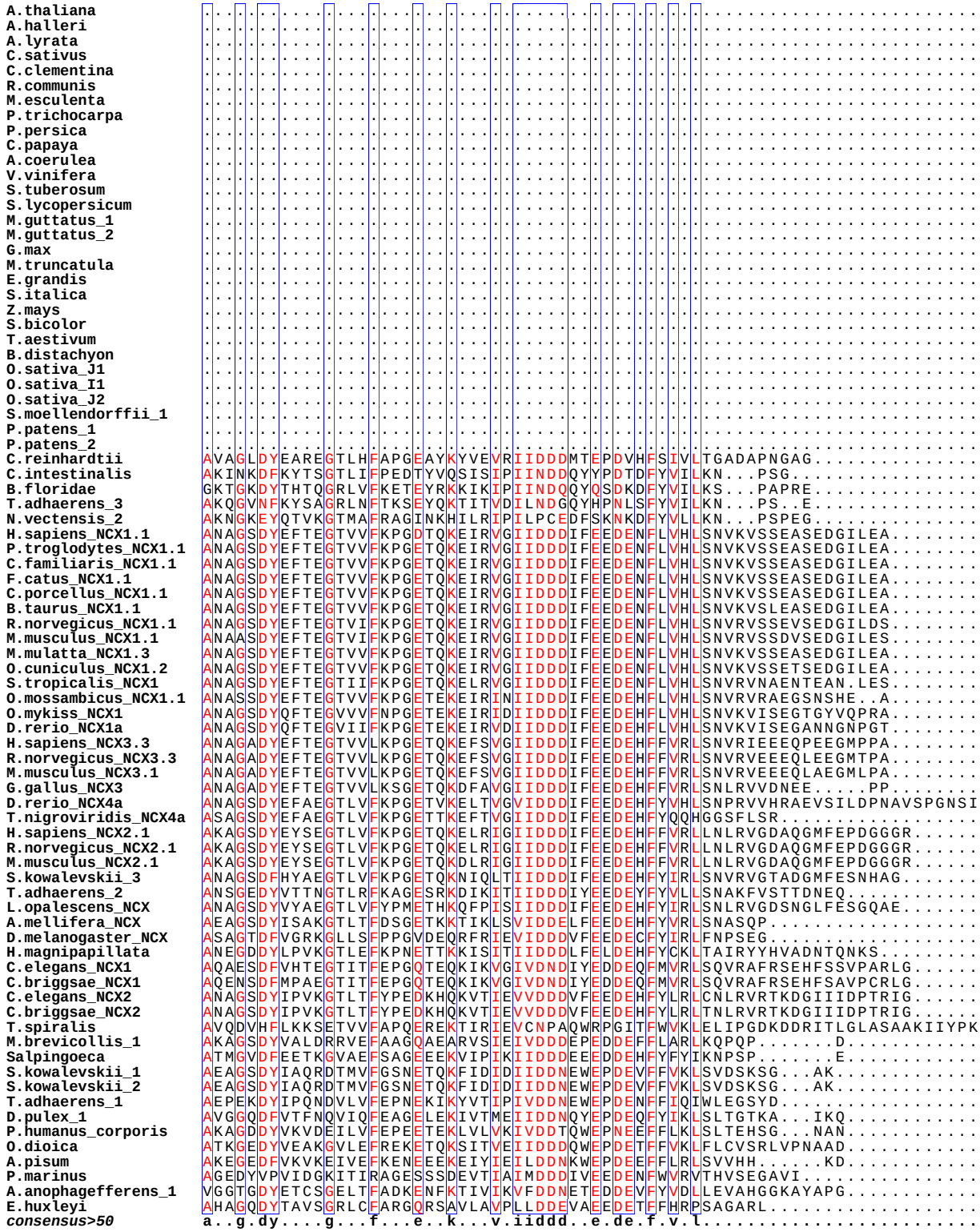
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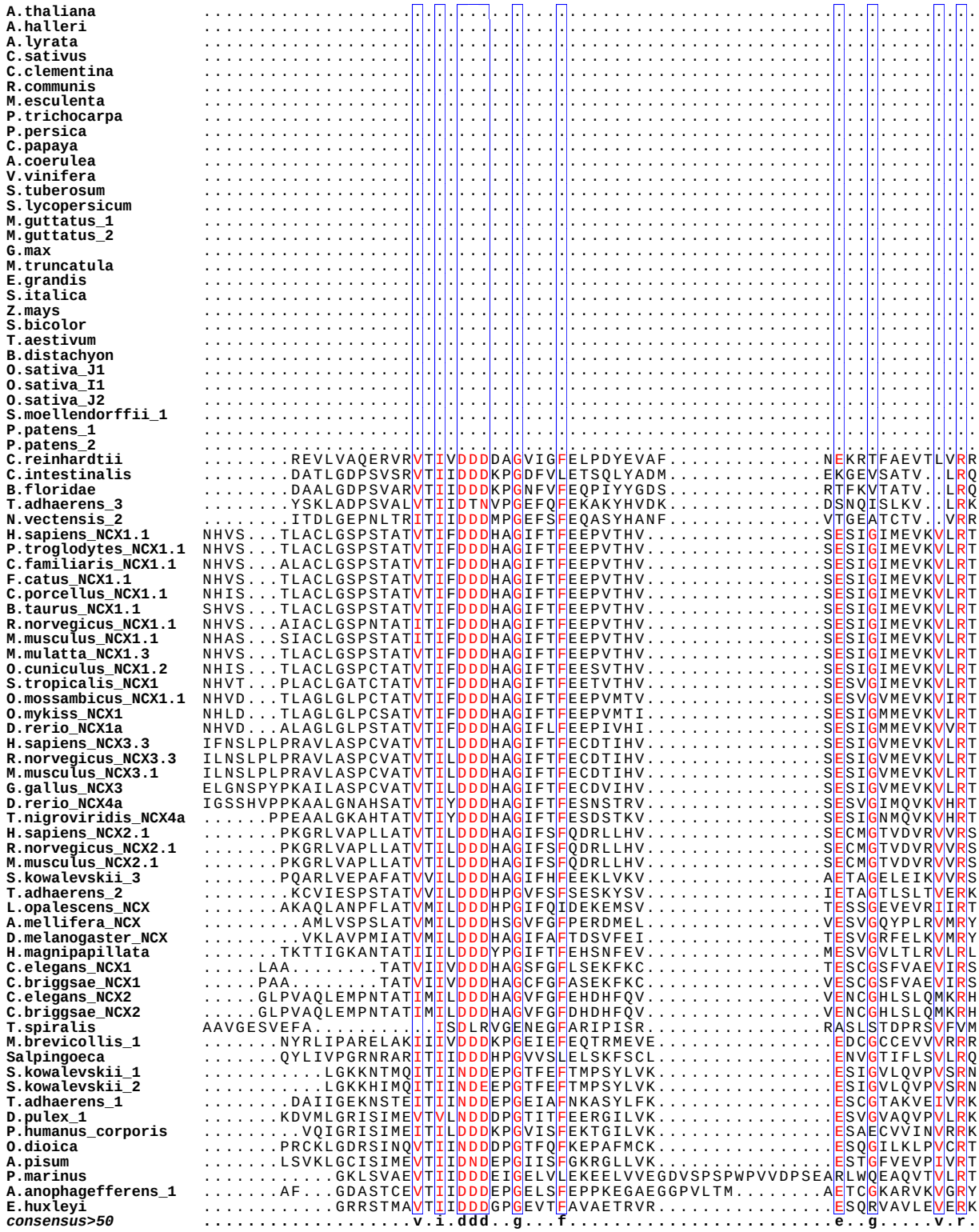
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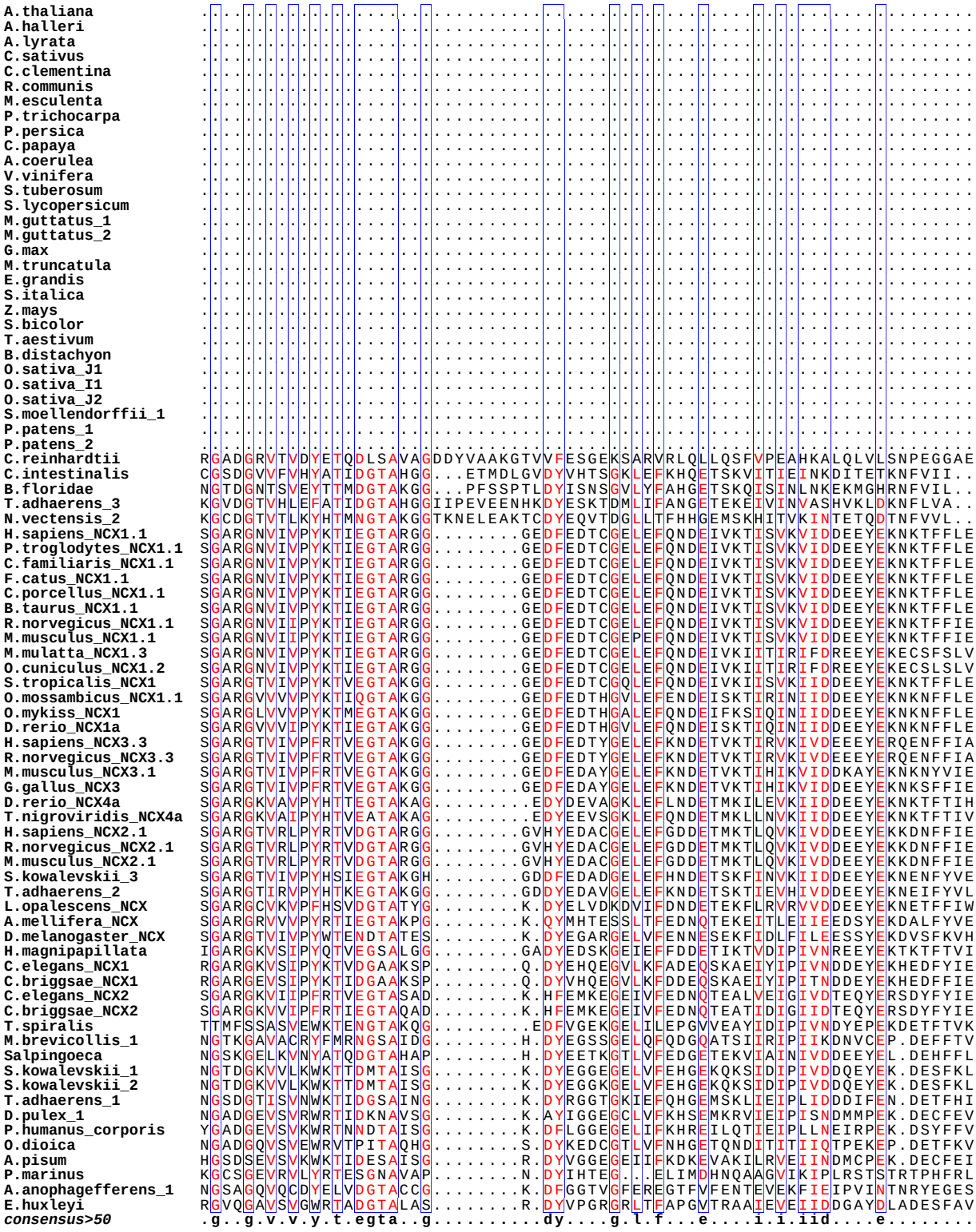
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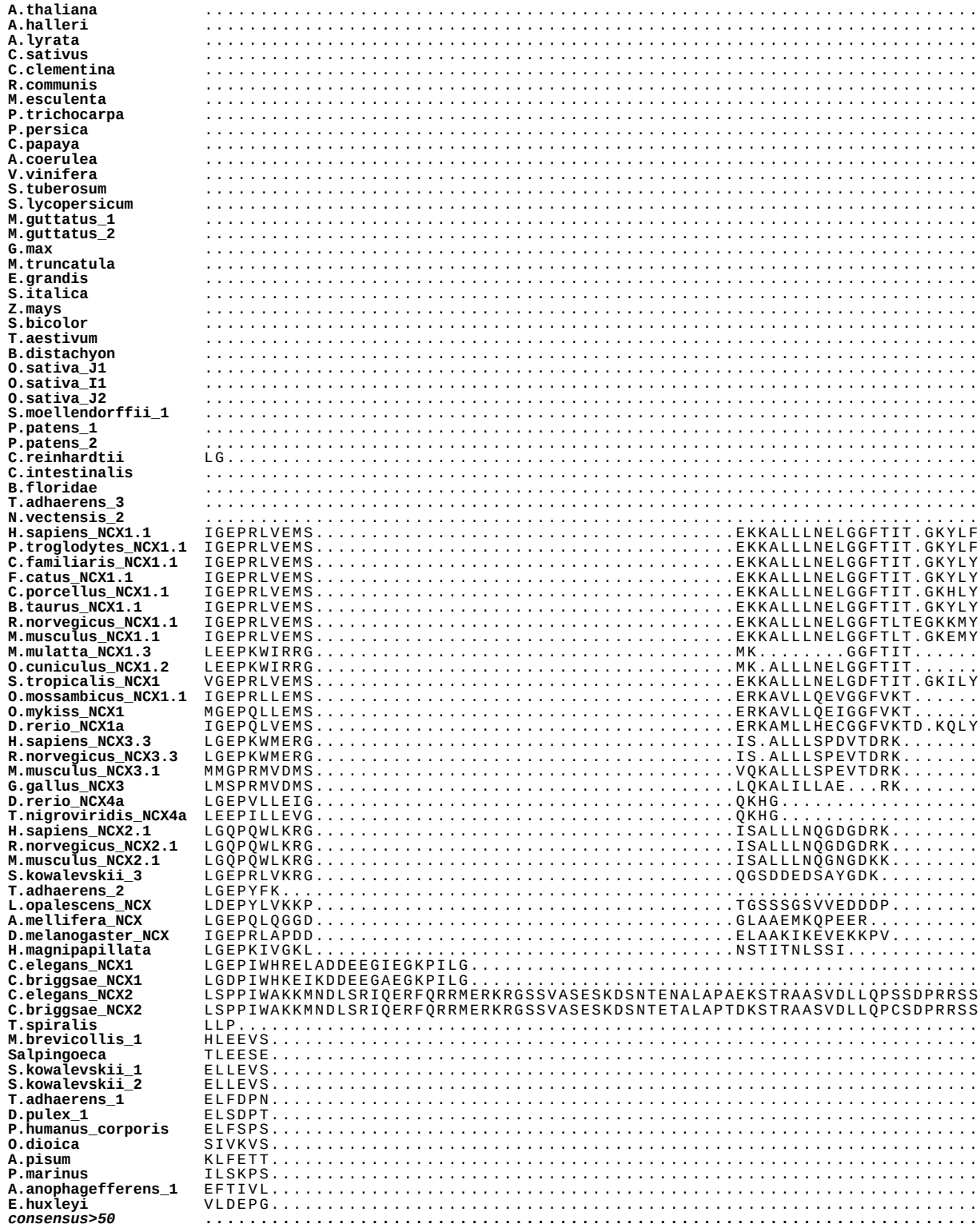
consensus>50 .g..g.v.v.y.t.egta..g.........dy....g.l.f...e....i.i.iid....e.....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M.truncatula
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P.patens_1
P.patens_2
C.reinhardtii
C.intestinalis
B.floridae
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N.vectensis_2
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P.troglodytes_NCX1.1
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S.tropicalis_NCX1
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D.rerio_NCX4a
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H.sapiens_NCX2.1
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M.musculus_NCX2.1
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T.adhaerens_2
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C.elegans_NCX1
C.briggsae_NCX1
C.elegans_NCX2
C.briggsae_NCX2
T.spiralis
M.brevicollis_1
Salpingoeca
S.kowalevskii_1
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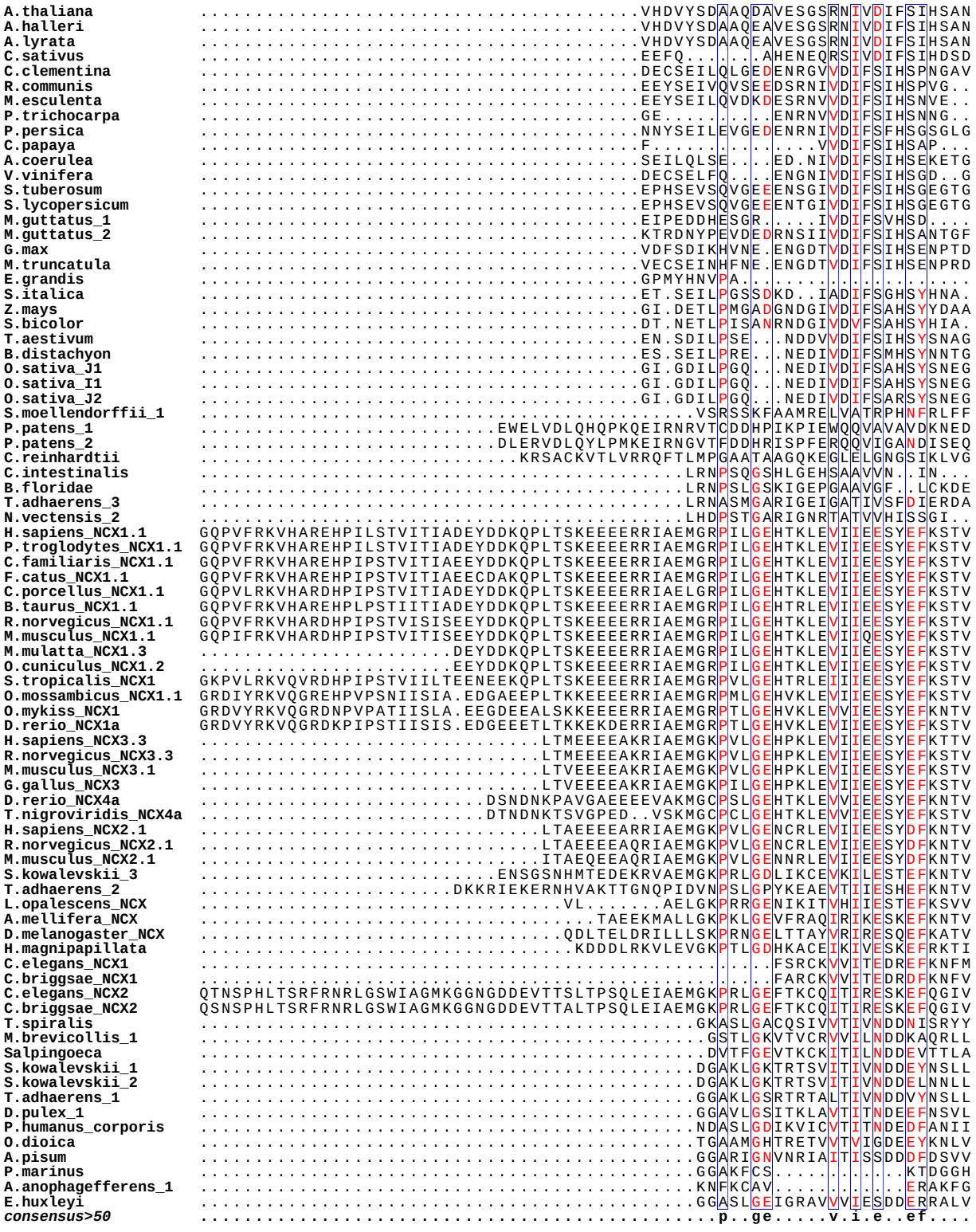
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T.aestivum
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O.sativa_J2
S.moellendorffii_1
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P.patens_2
C.reinhardtii
C.intestinalis
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N.vectensis_2
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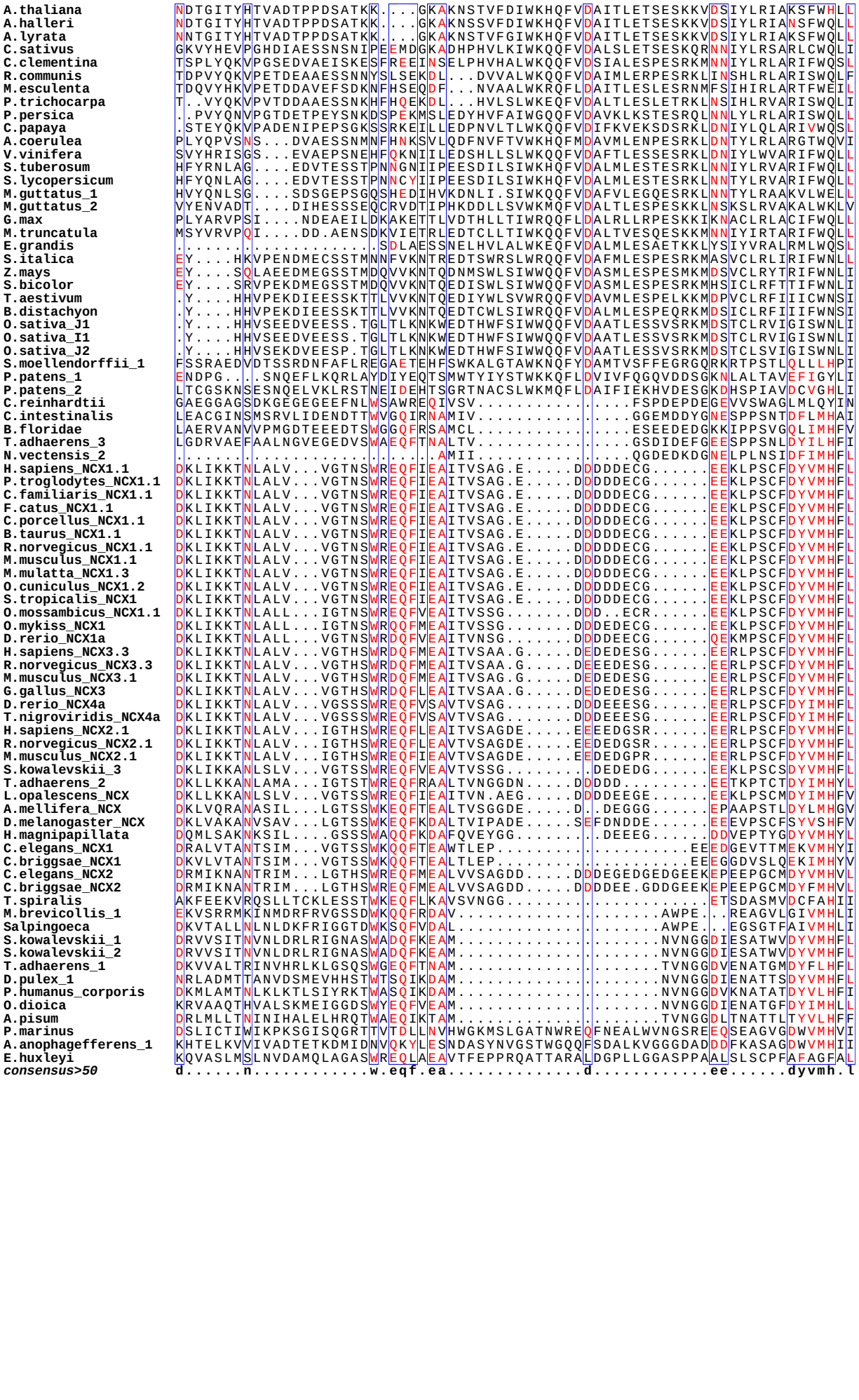
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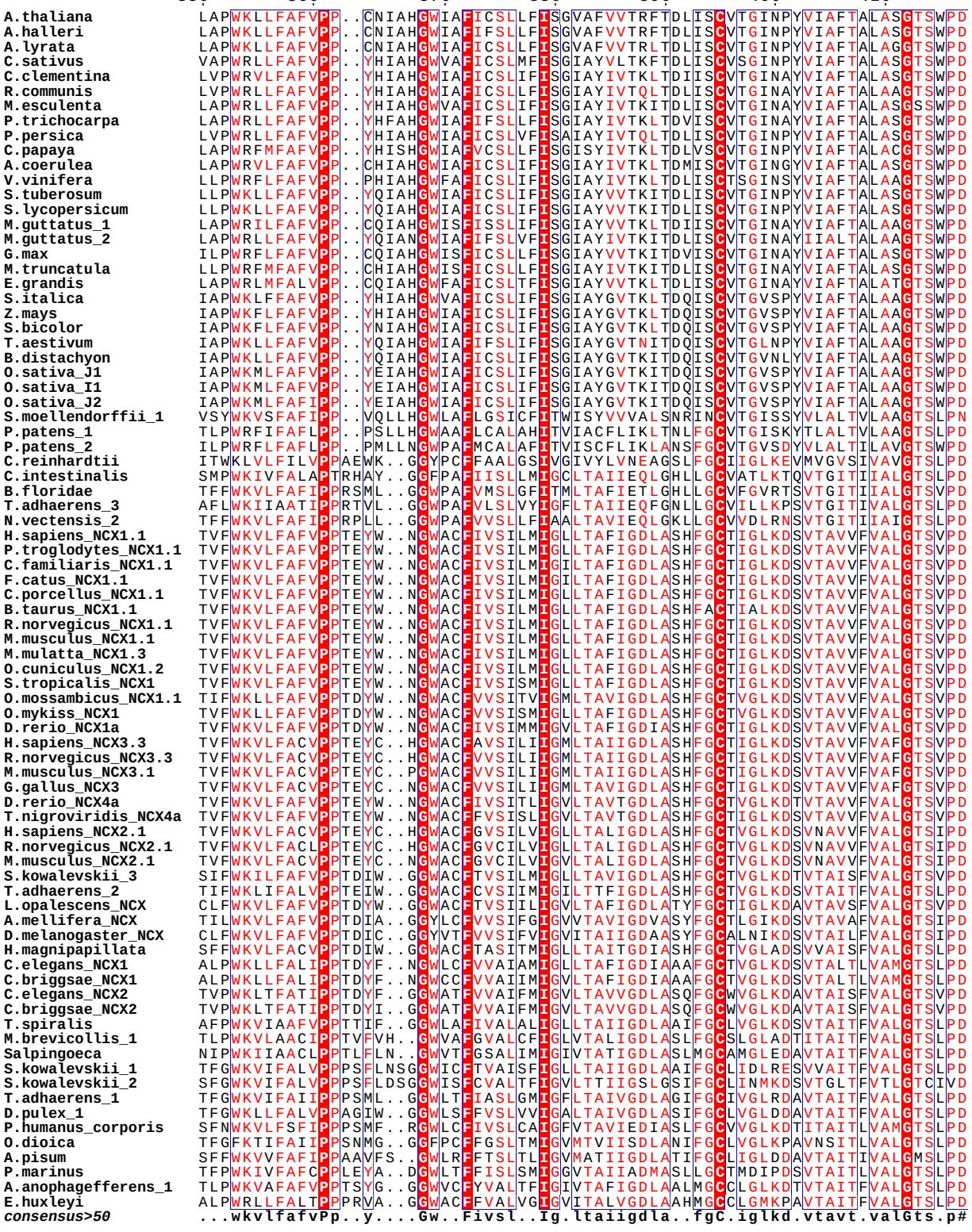
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C.sativus VAPWRLLFAFVPP..YHIAHGWVAFICSLMFISGIAYVLTKFTDLISCVSGINPYVIAFTALASGTSWPD
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O.sativa_J2 IAPWKMLFAFIPP..YEIAHGWIAFICSLIFISGIAYGVTKITDQISCVTGVSPYVIAFTALAAGTSWPD
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A.anophagefferens_1 TLPWKVAFAFVPPTSYG..GGWVCFYVALTFIGIVTAFIGDLAALMGCCLGLKDTVTAITFVALGTSLPD
E.huxleyi ALPWRLLFALTPPPRVA..GGWACFFVALVGIGVITALVGDLAAHMGCCLGMKPAVTAITFVALGTSLPD
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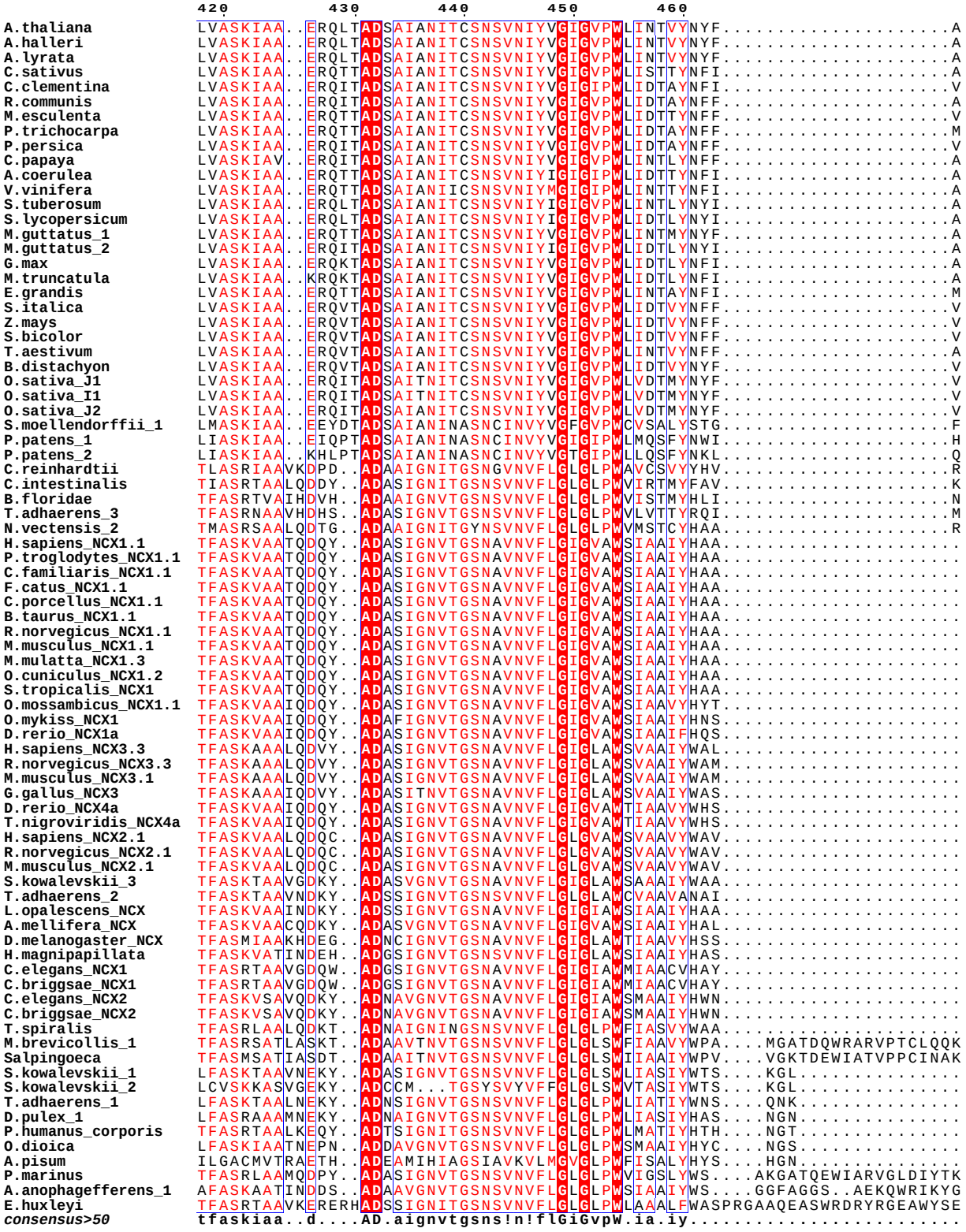
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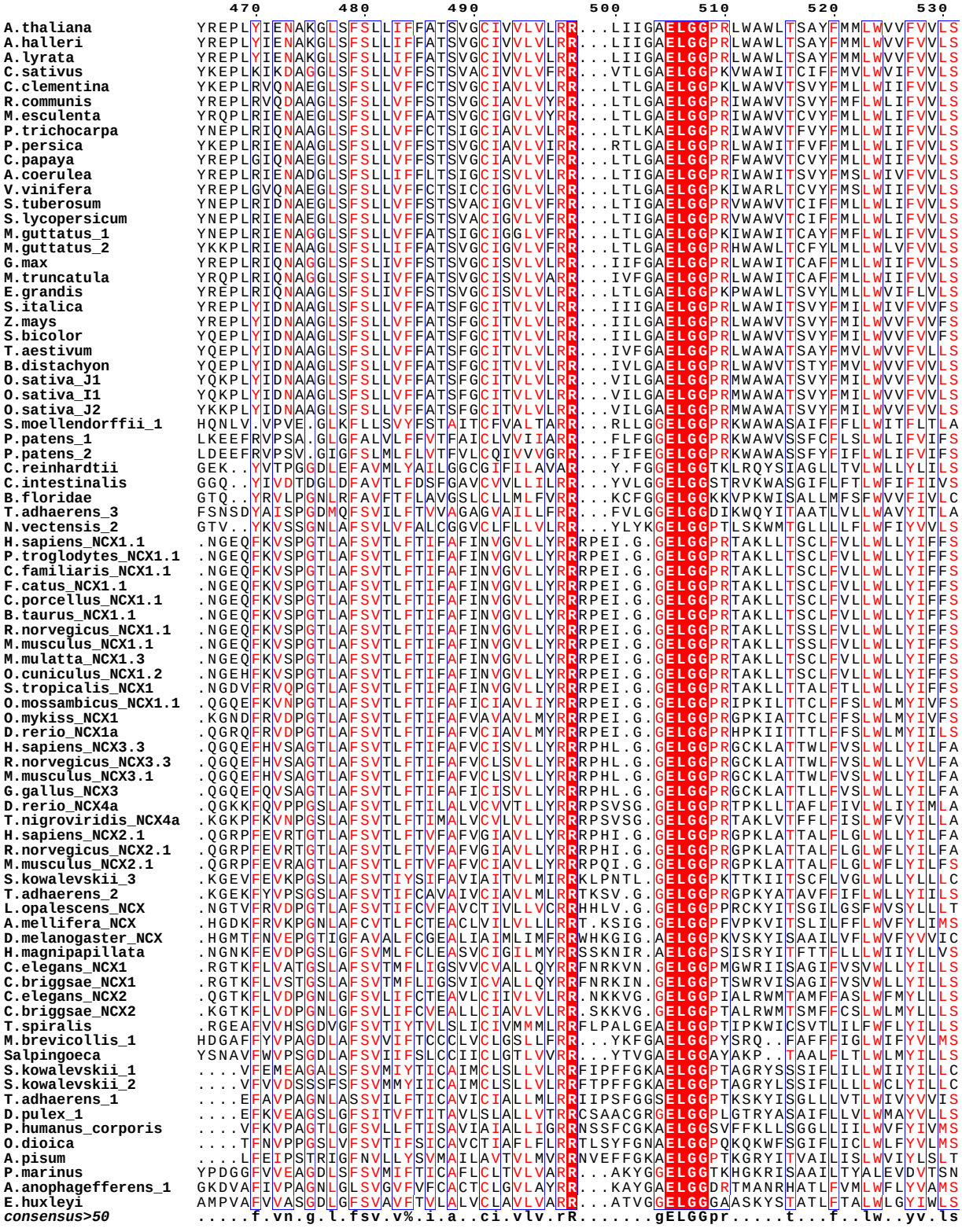
consensus>50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A.thaliana YREPLYIENAKGLSFSLLIFFATSVGCIVVLVLRR...LIIGAELGGPRLWAWLTSAYFMMLWVVFVVLS
A.halleri YREPLYIENAKGLSFSLLIFFATSVGCIVVLVLRR...LIIGAELGGPRLWAWLTSAYFMMLWVVFVVLS
A.lyrata YREPLYIENAKGLSFSLLIFFATSVGCIVVLVLRR...LIIGAELGGPRLWAWLTSAYFMMLWVVFVVLS
C.sativus YKEPLKIKDAGGLSFSLLVFFSTSVACIVVLVFRR...VTLGAELGGPKVWAWITCIFFMVLWVIFVVLS
C.clementina YKEPLRVQNAEGLSFSLLVFFCTSVGCIAVLVLRR...LTLGAELGGPKLWAWVTSVYFMLLWIIFVVLS
R.communis YREPLRVQDAAGLSFSLLVFFSTSVGCIAVLVYRR...LTLGAELGGPRIWAWVTSVYFMFLWLIFVVLS
M.esculenta YRQPLRIENAEGLSFSLLVFFATSVGCIGVLVYRR...LTLGAELGGPRIWAWVTCVYFMLLWLIFVVLS
P.trichocarpa YNEPLRIQNAAGLSFSLLVFFCTSIGCIAVLVLRR...LTLKAELGGPRIWAWVTFVYFMLLWIIFVVLS
P.persica YKEPLRIENAAGLSFSLLVFFSTSVGCIAVLVIRR...RTLGAELGGPRLWAWITFVFFMLLWLIFVVLS
C.papaya YREPLGIQNAEGLSFSLLVFFSTSVGCIAVLVFRR...LTLGAELGGPRFWAWVTCVYFMLLWIIFVVLS
A.coerulea YREPLRIENADGLSFSLLIFFLTSIGCISVLVLRR...LTIGAELGGPRIWAWITSVYFMSLWIVFVVLS
V.vinifera YREPLGVQNAEGLSFSLLVFFCTSICCIGVLVLRR...LTLGAELGGPKIWARLTCVYFMSLWIIFVVLS
S.tuberosum YNEPLRIDNAEGLSFSLLVFFSTSVACIGVLVFRR...LTIGAELGGPRVWAWVTCIFFMLLWLIFVVLS
S.lycopersicum YNEPLRIENAEGLSFSLLVFFSTSVACIGVLVFRR...LTIGAELGGPRVWAWVTCIFFMLLWLIFVVLS
M.guttatus_1 YNEPLRIENAGGLSFSLLVFFATSIGCIGGLVFRR...LTLGAELGGPKIWAWITCAYFMFLWLIFVVLS
M.guttatus_2 YKKPLRIENAAGLSFSLLIFFATSVGCIGVLVFRR...LTLGAELGGPRHWAWLTCFYLMLLWLVFVVLS
G.max YREPLRIQNAGGLSFSLIVFFSTSVGCISVLVLRR...IIFGAELGGPRLWAWITCAFFMLLWIIFVVLS
M.truncatula YRQPLRIQNAGGLSFSLIVFFATSVGCISVLVARR...IVFGAELGGPRLWAWITCAFFMLLWIIFVVLS
E.grandis YREPLRIQNAAGLSFSLIVFFSTSVGCISVLVLRR...LTLGAELGGPKPWAWLTSVYLMLLWVIFLVLS
S.italica YREPLYIDNAAGLSFSLLVFFATSFGCITVLVLRR...IIIGAELGGPRLWAWITSVYFMILWIVFVVFS
Z.mays YREPLYIDNAAGLSFSLLVFFATSFGCITVLVLRR...IILGAELGGPRLWAWVTSVYFMILWVVFVVFS
S.bicolor YQEPLYIDNAAGLSFSLLVFFATSFGCITVLVLRR...IILGAELGGPRLWAWVTSVYFMILWVVFVVFS
T.aestivum YQEPLYIDNAAGLSFSLLVFFATSFGCITVLVLRR...IVFGAELGGPRLWAWATSAYFMVLWVVFVLLS
B.distachyon YQEPLYIDNAAGLSFSLLVFFATSFGCITVLVLRR...IVLGAELGGPRLWAWVTSTYFMVLWVVFVVLS
O.sativa_J1 YQKPLYIDNAAGLSFSLLVFFATSFGCITVLVLRR...VILGAELGGPRMWAWATSVYFMILWVVFVVLS
O.sativa_I1 YQKPLYIDNAAGLSFSLLVFFATSFGCITVLVLRR...VILGAELGGPRMWAWATSVYFMILWVVFVVLS
O.sativa_J2 YKKPLYIDNAAGLSFSLLVFFATSFGCITVLVLRR...VILGAELGGPRMWAWATSVYFMILWVVFVVLS
S.moellendorffii_1 HQNLV.VPVE.GLKFLLSVYFSTAITCFVALTARR...RLLGGELGGPRKWAWASAIFFFLLWITFLTLA
P.patens_1 LKEEFRVPSA.GLGFALVLFFVTFAICLVVIIARR...FLFGGELGGPRKWAWVSSFCFLSLWLIFVIFS
P.patens_2 LDEEFRVPSV.GIGFSLMLFLVTFVLCQIVVVGRR...FIFEGELGGPRKWAWASSFYFIFLWLIFVIFS
C.reinhardtii GEK..YVTPGGDLEFAVMLYAILGGCGIFILAVAR...Y.FGGELGGTKLRQYSIAGLLTVLWLLLYLILS
C.intestinalis GGQ..YIVDTDGLDFAVTLFDSFGAVCVVLLILRR...YVLGGELGGSTRVKWASGIFLFTLWFIFIIVS
B.floridae GTQ..YRVLPGNLRFAVFTFLAVGSLCLLMLFVRR...KCFGGELGGKKVPKWISALLMFSFWVVFIVLC
T.adhaerens_3 FSNSDYAISPGDMQFSVILFTVVAGAGVAILLFRR...FVLGGELGGDIKWQYITAATLVLLWAVYITLA
N.vectensis_2 GTV..YKVSSGNLAFSVLVFALCGGVCLFLLVLRR...YLYKGELGGPTLSKWMTGLLLLFLWFIYVVLS
H.sapiens_NCX1.1 .NGEQFKVSPGTLAFSVTLFTIFAFINVGVLLYRRRPEI.G.GELGGPRTAKLLTSCLFVLLWLLYIFFS
P.troglodytes_NCX1.1 .NGEQFKVSPGTLAFSVTLFTIFAFINVGVLLYRRRPEI.G.GELGGPRTAKLLTSCLFVLLWLLYIFFS
C.familiaris_NCX1.1 .NGEQFKVSPGTLAFSVTLFTIFAFINVGVLLYRRRPEI.G.GELGGPRTAKLLTSCLFVLLWLLYIFFS
F.catus_NCX1.1 .NGEQFKVSPGTLAFSVTLFTIFAFINVGVLLYRRRPEI.G.GELGGPRTAKLLTSCLFVLLWLLYIFFS
C.porcellus_NCX1.1 .NGEQFKVSPGTLAFSVTLFTIFAFINVGVLLYRRRPEI.G.GELGGPRTAKLLTSCLFVLLWLLYIFFS
B.taurus_NCX1.1 .NGEQFKVSPGTLAFSVTLFTIFAFINVGVLLYRRRPEI.G.GELGGPRTAKLLTSCLFVLLWLLYIFFS
R.norvegicus_NCX1.1 .NGEQFKVSPGTLAFSVTLFTIFAFINVGVLLYRRRPEI.G.GELGGPRTAKLLTSSLFVLLWLLYIFFS
M.musculus_NCX1.1 .NGEQFKVSPGTLAFSVTLFTIFAFINVGVLLYRRRPEI.G.GELGGPRTAKLLTSSLFVLLWLLYIFFS
M.mulatta_NCX1.3 .NGEQFKVSPGTLAFSVTLFTIFAFINVGVLLYRRRPEI.G.GELGGPRTAKLLTSCLFVLLWLLYIFFS
O.cuniculus_NCX1.2 .NGEHFKVSPGTLAFSVTLFTIFAFINVGVLLYRRRPEI.G.GELGGPRTAKLLTSCLFVLLWLLYIFFS
S.tropicalis_NCX1 .NGDVFRVQPGTLAFSVTLFTIFAFINVGVLLYRRRPEI.G.GELGGPRTAKLLTTALFTLLWLLYIFFS
O.mossambicus_NCX1.1 .QGQEFKVNPGTLAFSVTLFTIFAFICIAVLIYRRRPEI.G.GELGGPRIPKILTTCLFFSLWLMYIVFS
O.mykiss_NCX1 .KGNDFRVDPGTLAFSVTLFTIFAFVAVAVLMYRRRPEI.G.GELGGPRGPKIATCLFFSLWLMYIVFS
D.rerio_NCX1a .QGRQFRVDPGTLAFSVTLFTIFAFVCIAVLMYRRRPEI.G.GELGGPRHPKIITTTLFFSLWLMYIILS
H.sapiens_NCX3.3 .QGQEFHVSAGTLAFSVTLFTIFAFVCISVLLYRRRPHL.G.GELGGPRGCKLATTWLFVSLWLLYILFA
R.norvegicus_NCX3.3 .QGQEFHVSAGTLAFSVTLFTIFAFVCLSVLLYRRRPHL.G.GELGGPRGCKLATTWLFVSLWLLYVLFA
M.musculus_NCX3.1 .QGQEFHVSAGTLAFSVTLFTIFAFVCLSVLLYRRRPHL.G.GELGGPRGCKLATTWLFVSLWLLYILFA
G.gallus_NCX3 .QGQEFQVSAGTLAFSVTLFTIFAFICISVLLYRRRPHL.G.GELGGPRGCKLATTLLFVSLWLLYILFA
D.rerio_NCX4a .QGKKFQVPPGSLAFSVTLFTILALVCVVTLLYRRRPSVSG.GELGGPRTPKLLTAFLFIVLWLIYIMLA
T.nigroviridis_NCX4a .KGKPFKVNPGSLAFSVTLFTIMALVCVLVLLYRRRPSVSG.GELGGPRTAKLVTFFLFISLWFVYILLA
H.sapiens_NCX2.1 .QGRPFEVRTGTLAFSVTLFTVFAFVGIAVLLYRRRPHI.G.GELGGPRGPKLATTALFLGLWLLYILFA
R.norvegicus_NCX2.1 .QGRPFEVRTGTLAFSVTLFTVFAFVGIAVLLYRRRPHI.G.GELGGPRGPKLATTALFLGLWFLYILFA
M.musculus_NCX2.1 .QGRPFEVRAGTLAFSVTLFTVFAFVCIAVLLYRRRPQI.G.GELGGPRGPKLATTALFLGLWFLYILFS
S.kowalevskii_3 .KGEVFEVKPGSLAFSVTIYSIFAVIAITVLMIRRKLPNTL.GELGGPKTTKIITSCFLVGLWLLYLLLC
T.adhaerens_2 .KGEKFYVPSGSLAFSVTIFCAVAIVCIAVLMLRRTKSV.G.GELGGPRGPKYATAVFFIFLWLLYIILS
L.opalescens_NCX .NGTVFRVDPGTLAFSVTIFCVFAVCTIVLLVCRRHHLV.G.GELGGPPRCKYITSGILGSFWVSYLLLT
A.mellifera_NCX .HGDKFRVKPGNLAFCVTLFCTEACLVILVLLLRRT.KSIG.GELGGPFVPKVITSLILFFLWVFYLIMS
D.melanogaster_NCX .HGMTFNVEPGTIGFAVALFCGEALIAIMLIMFRRWHKGIG.AELGGPKVSKYISAAILVFLWVFYVVIC
H.magnipapillata .NGNKFEVDPGSLGFSVMLFCLEASVCIGILMYRRSSKNIR.AELGGPSISRYITFTTFLLLWIIYLLVS
C.elegans_NCX1 .RGTKFLVATGSLAFSVTMFLIGSVVCVALLQYRRFNRKVN.GELGGPMGWRIISAGIFVSVWLLYILLS
C.briggsae_NCX1 .RGTKFLVSTGSLAFSVTMFLIGSVICVALLQYRRFNRKIN.GELGGPTSWRVISAGIFVSVWLLYILLS
C.elegans_NCX2 .QGTKFLVDPGNLGFSVLIFCTEAVLCIIVLVLRR.NKKVG.GELGGPIALRWMTAMFFASLWFMYLLLS
C.briggsae_NCX2 .KGTKFLVDPGNLGFSVLIFCVEALLCIAVLVLRR.SKKVG.GELGGPTALRWMTSMFFCSLWLMYLLLS
T.spiralis .RGEAFVVHSGDVGFSVTIYTVLSLICIVMMMLRRFLPALGEAELGGPTIPKWICSVTLILFWFLYILLS
M.brevicollis_1 HDGAFFYVPAGDLAFSVVIFTCCCLVCLGSLLFRR...YKFGAELGGPYSRQ..FAFFFIGLWIFYVLMS
Salpingoeca YSNAVFWVPSGDLAFSVIIFSLCCIICLGTLVVRR...YTVGAELGGAYAKP..TAALFLTLWLMYILLS
S.kowalevskii_1 ....VFEMEAGALSFSVMIYTICAIMCLSLLVLRRFIPFFGKAELGGPTAGRYSSSIFLILLWIIYILLC
S.kowalevskii_2 ....VFVVDSSSFSFSVMMYIICAIMCLSLLVLRRFTPFFGKAELGGPTAGRYLSSIFLLLLWCLYILLC
T.adhaerens_1 ....EFAVPAGNLASSVILFTICAVICIALLMLRRIIPSFGGSELGGPTKSKYISGLLLVTLWIVYVVIS
D.pulex_1 ....EFKVEAGSLGFSITVFTITAVLSLALLVTRRCSAACGRGELGGPLGTRYASAIFLLVLWMAYVLLS
P.humanus_corporis ....VFKVPAGTLGFSVLLFTISAVIAIALLIGRRNSSFCGKAELGGSVFFKLLSGGLLIILWVFYIVMS
O.dioica ....TFNVPPGSLVFSVTIFSICAVCTIAFLFLRRTLSYFGNAELGGPQKQKWFSGIFLICLWLFYVLMS
A.pisum ....LFEIPSTRIGFNVLLYSVMAILAVTVLMVRRNVEFFGKAELGGPTKGRYITVAILISLWVIYLSLT
P.marinus YPDGGFVVEAGDLSFSVMIFTICAFLCLTVLVARR...AKYGGELGGTKHGKRISAAILTYALEVDVTSN
A.anophagefferens_1 GKDVAFIVPAGNLGLSVGVFVFCACTCLGVLAYRR...KAYGAELGGDRTMANRHATLFVMLWFLYVAMS
E.huxleyi AMPVAFVVASGDLGFSVAVFTVLALVCLAVLVARR...ATVGGELGGGAASKYSTATLFTALWLGYIWLS
consensus>50 .....f.vn.g.l.fsv.v%.i.a..ci.vlv.rR.......gELGGpr.....t...f..lw..yv.ls

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A.thaliana              SLKVSGVI..................
A.halleri               SLKVSGVI..................
A.lyrata                SLKVSGII..................
C.sativus               SLKVSDII..................
C.clementina            SLKVSGII..................
R.communis              SLRVSGII..................
M.esculenta             SLRVSGFI..................
P.trichocarpa           SLRVSGII..................
P.persica               SLKVSGII..................
C.papaya                SLRVSGII..................
A.coerulea              SLKVSDII..................
V.vinifera              SLKIYGII..................
S.tuberosum             SLRVSGII..................
S.lycopersicum          SLRVSGII..................
M.guttatus_1            SLRVSGFI..................
M.guttatus_2            SLQVSNII..................
G.max                   SLKVSGFI..................
M.truncatula            SLKVSGFI..................
E.grandis               SLKVSGII..................
S.italica               SLKVYGII..................
Z.mays                  SLRVSGVI..................
S.bicolor               SLRVSGVI..................
T.aestivum              SLRVSGVI..................
B.distachyon            SLRVSGVI..................
O.sativa_J1             SLKISGVI..................
O.sativa_I1             SLKISGVI..................
O.sativa_J2             SLRISGVI..................
S.moellendorffii_1      CLAGRFT...................
P.patens_1              CLRNYHHL..................
P.patens_2              CLRNYNLL..................
C.reinhardtii           GLRAYGNI..................
C.intestinalis          SLKAYNYF..................
B.floridae              SLKAYDLLPF................
T.adhaerens_3           SLRAYDVIRFQ...............
N.vectensis_2           SLMAYGHISGSL..............
H.sapiens_NCX1.1        SLEAYCHIKGF...............
P.troglodytes_NCX1.1    SLEAYCHIKGF...............
C.familiaris_NCX1.1     SLEAYCHIKGF...............
F.catus_NCX1.1          SLEAYCHIKGF...............
C.porcellus_NCX1.1      SLEAYCHIKGF...............
B.taurus_NCX1.1         SLEAYCHIKGF...............
R.norvegicus_NCX1.1     SLEAYCHIKGF...............
M.musculus_NCX1.1       SLEAYCHIKGF...............
M.mulatta_NCX1.3        SLEAYCHIKGF...............
O.cuniculus_NCX1.2      SLEAYCHIKGF...............
S.tropicalis_NCX1       SLEAYCHIKGF...............
O.mossambicus_NCX1.1    SLEAYCHVKGF...............
O.mykiss_NCX1           SLEAYCHVKGF...............
D.rerio_NCX1a           SMEAYCIIKGF...............
H.sapiens_NCX3.3        TLEAYCYIKGF...............
R.norvegicus_NCX3.3     TLEAYCYIKGF...............
M.musculus_NCX3.1       TLEAYCYIKGF...............
G.gallus_NCX3           TLEAYCYIKGF...............
D.rerio_NCX4a           SLEAYCHVPGF...............
T.nigroviridis_NCX4a    SLEAYCHVHSF...............
H.sapiens_NCX2.1        SLEAYCHIRGF...............
R.norvegicus_NCX2.1     SLEAYCHIRGF...............
M.musculus_NCX2.1       SLEAYCHIRGF...............
S.kowalevskii_3         SFESYCYIEGF...............
T.adhaerens_2           SLESYCHIPGF...............
L.opalescens_NCX        GLMSYCHIPGF...............
A.mellifera_NCX         ILEAYGYIEGF...............
D.melanogaster_NCX      ILEAYDVIRV................
H.magnipapillata        GLESYCYFTLKF..............
C.elegans_NCX1          TLEAYCIIKGF...............
C.briggsae_NCX1         TLEAYCVIKGF...............
C.elegans_NCX2          ALEAYCIIPGF...............
C.briggsae_NCX2         ALEAYCIIPGF...............
T.spiralis              ALQAYGHISSF...............
M.brevicollis_1         SLQVEGYIASI...............
Salpingoeca             SLSTYEHISL................
S.kowalevskii_1         SLQAYGYIHF................
S.kowalevskii_2         SFQSYDYIDF................
T.adhaerens_1           SLQVYRIIPPIVKT............
D.pulex_1               SLETYGHITGF...............
P.humanus_corporis      CLKEYRVIDVNF..............
O.dioica                TLQAYEFIPGF...............
A.pisum                 CFQPF.....................
P.marinus               GVALNSNLHLNYRDASDVDRGEY....
A.anophagefferens_1     ILASEGIV..................
E.huxleyi               IAKTEGDPRLARLLQQLPPQARALLGA
consensus>50            sle.y..i..................
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