# Supplementary material

**Figure S1.** Multiple sequence alignment of 145 *Idgfs* coding sequences across insect taxa, which we used for subsequent phylogenetic analysis and selection tests. Species list with abbreviations is in Table S1.

**Figure S2.** Phylogenetic analysis of *Idgf* coding sequences. **(A)** Minimum Evolution (ME) tree, brach support tested by bootstrap method with 10000 replicates (only values above 50 are shown next to well supported nodes). **(B)** Maximum-Likelihood tree, found by Neutral Network Intelligence (NNI) toolkit, aBayes values higher than 50 shown next to well supported nodes. **(C)** Maximum-Likelihood tree, found by Subtree-Pruning-Regrafting (SPR) search algorithm, 10 replicates, aBayes values higher than 50 shown next to well supported nodes.

**Figure S3.** Maximum likelihood phylogenetic trees with highlighted nodes under positive selection as detected by aBSREL (dots). Nodes dyed in red confirmed results from aBSREL analysis on large phylogeny (compare with Fig. 2), black nodes are unique and they were not confirmed by other analysis. **(A)** Phylogenetic tree of *Idgf1* from Schizophora, *Idgf* sequences from *M. destructor*, *A.gambiae* and *C. felis* were used as outgroups. **(B)** Phylogenetic tree of *Idgf2* from Schizophora, *Idgf* sequences from *M. destructor*, *A.gambiae* and *C. felis* were used as outgroups. **(C)** Phylogenetic tree of *Idgf3* from Schizophora, Idgf sequences from *M. destructor*, *A.gambiae* and *C. felis* were used as outgroups. **(D)** Phylogenetic tree of *Idgf4* from Schizophora, *Idgf* sequences from *M. destructor*, *A.gambiae* and *C. felis* were used as outgroups. **(E)** Phylogenetic tree of *Idgf5* from Schizophora, *Idgf* sequences from *M. destructor*, *A.gambiae* and *C. felis* were used as outgroups. **(F)** Phylogenetic tree of *Idgf6* from Schizophora, *Idgf* sequences from *M. destructor*, *A.gambiae* and *C. felis* were used as outgroups. **(G)** Phylogenetic tree of lepidopteran and trichopteran *Idgf* sequences with *C.felis*, *A. gambiae* and *D. melanogaster Idgf3* as outgroups. **(H)** Combined tree of *Idgf* sequences from Diptera (only *Idgf4* was taken as representative for Schizophora), Siphonaptera (*C. felis*), Trichoptera and Lepidoptera.

**Figure S4.** Protein alignment of IDGFs from *D. melanogaster*, *A. gambiae*, **O. striata**, *H. humuli*, *G. mellonella* and *B.mori* with highlighted α-helix, β-sheet structure. Modified catalytic binding site is shown (black arrow), positively selected positions localized within α7β7 domain insertion displayed in red rounds.

**Table S1**. List of sequences used in this study.

**Table S2**. aBSREL test results and statistics for positively selected nodes highlighted in Fig.2 phylogeny. B – optimized branch length, LRT – likelihood-ratio test, $\omega > 1$ (in red) – positive selection, $\omega < 1$ (in purple) – negative selection, $\omega = 1$ – neutral evolution.

**Table S3**. Positively selected sites and change in amino acid properties detected by TreeSAAP **analysis** in accordance with aBSREL result for Schizophora Idgf4 node **(A)**, Lepidoptera node **(B)** and Yponomeutoidea node **(C)**.

**Table S4**. Proportions of positions under purifying selection as detected by Selecton, FEL and FUBAR tests.

**Table S5**. List of negatively selected positions from Lepidoptera alignment mapped to *Hepialus humuli Idgf* sequence with statistics from Selecton, FEL and FUBAR tests.

Figure S1

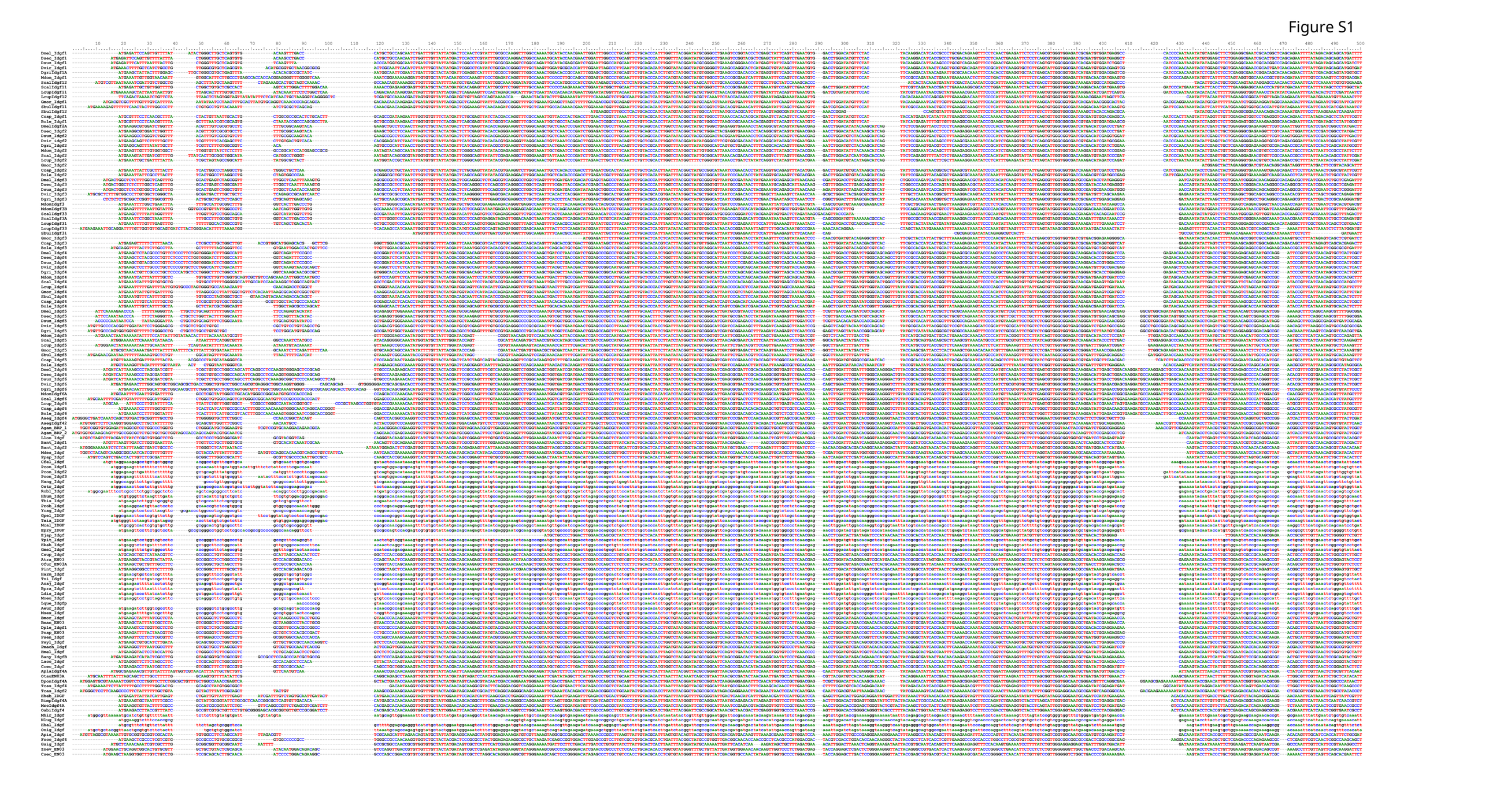


Figure S1

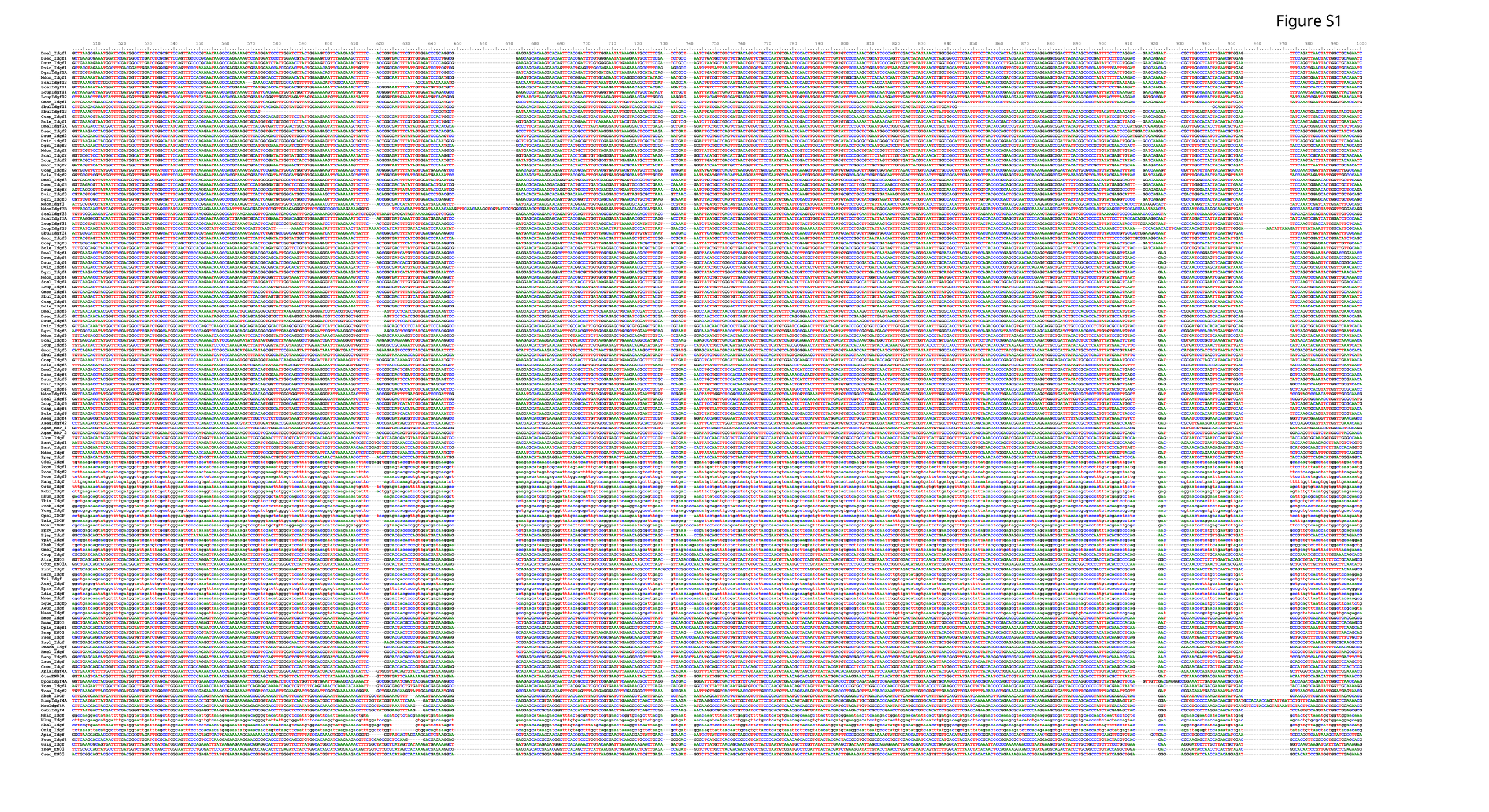
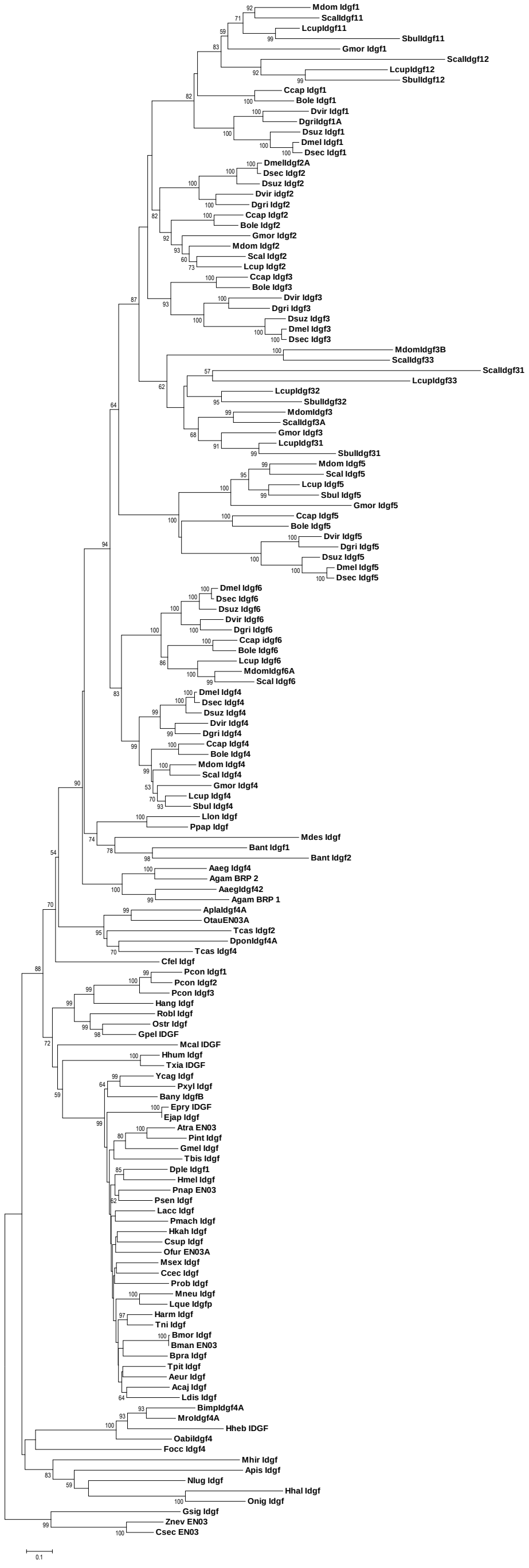


Figure S1

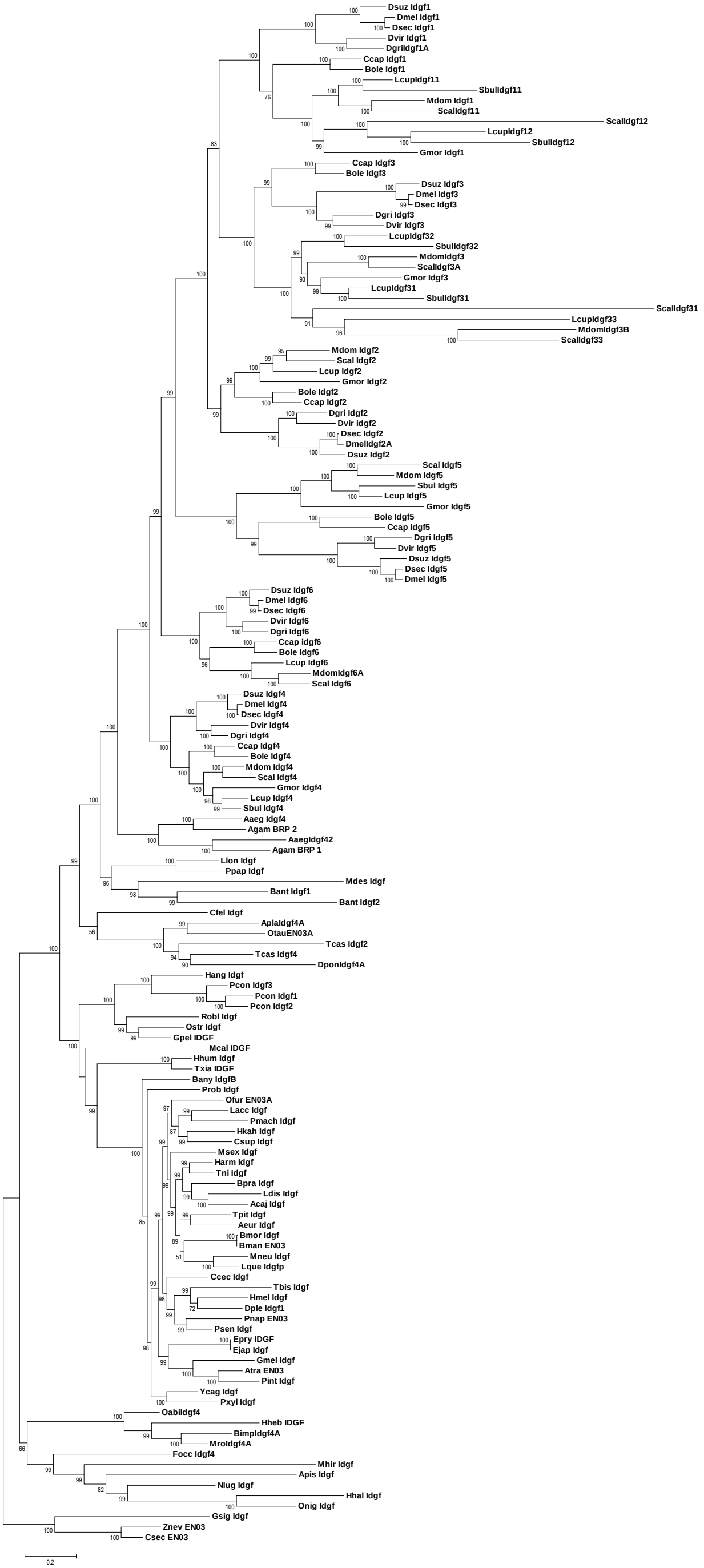

1010 1020 1030 1040 1050 1060 1070 1080 1090 1100 1110 1120 1130 1140 1150 1160 1170 1180 1190 1200 1210 1220 1230 1240 1250 1260 1270 1280 1290 1300 1310 1320 1330 1340 1350 1360 1370 1380 1390 1400 1410 1420 1430 1440 1450 1460 1470 1480 1490 1500
Dmel_Idgf1
Dsec_Idgf1
Dsus_Idgf1
Dvir_Idgf1
Dgri_Idgf1
Mdom_Idgf1
Scal_Idgf12
Scal_Idgf13
Lcup_Idgf11
Lcup_Idgf12
Gmor_Idgf1
Sbul_Idgf11
Sbul_Idgf12
Ccap_Idgf1
Bole_Idgf1
Aaeg_Idgf1
Agam_BRP_1
Agam_BRP_2
Lion_Idgf
Bant_Idgf1
Bant_Idgf2
Mdes_Idgf
Ppap_Idgf
Cfel_Idgf
Pcon_Idgf1
Pcon_Idgf2
Pcon_Idgf3
Hang_Idgf
Ostr_Idgf
Robl_Idgf
Hhum_Idgf
Tbis_Idgf
Prob_Idgf
Ycaj_Idgf
Qmel_Idgf
Txia_IDGF
Mcal_IDGF
Epry_IDGF
Ejap_Idgf
Tpal_Idgf
Hkah_Idgf
Gmel_Idgf
Caup_Idgf
Atra_ENO3
Ofus_ENO3A
Pint_Idgf
Hsim_Idgf
Tni_Idgf
Acal_Idgf
Bpra_Idgf
Ldis_Idgf
Mvem_Idgf
Lque_Idgfp
Aeur_Idgf
Mmek_Idgf
Bmor_Idgf
Hmen_Idgf
Dple_Idgf1
Pmon_ENO3
Pxen_Idgf
Pxyl_Idgf
Pmach_Idgf
Hmel_Idgf
Bany_IdgfB
Cpal_Idgf
Ccec_Idgf
AplaIdgf
CtauEN03A
DponIdgf4A
Tcas_Idgf
Tcas_Idgf2
Hhwb_IDGF
HimpIdgf4A
MroIdgf4A
Oabi1dgf4
Mhir_Idgf
Nlug_Idgf
Rhal_Idgf
Onig_Idgf
Apis_Idgf
Focc_Idgf4
Geig_Idgf
Enev_ENO3
Csec_ENO3

Figure S1

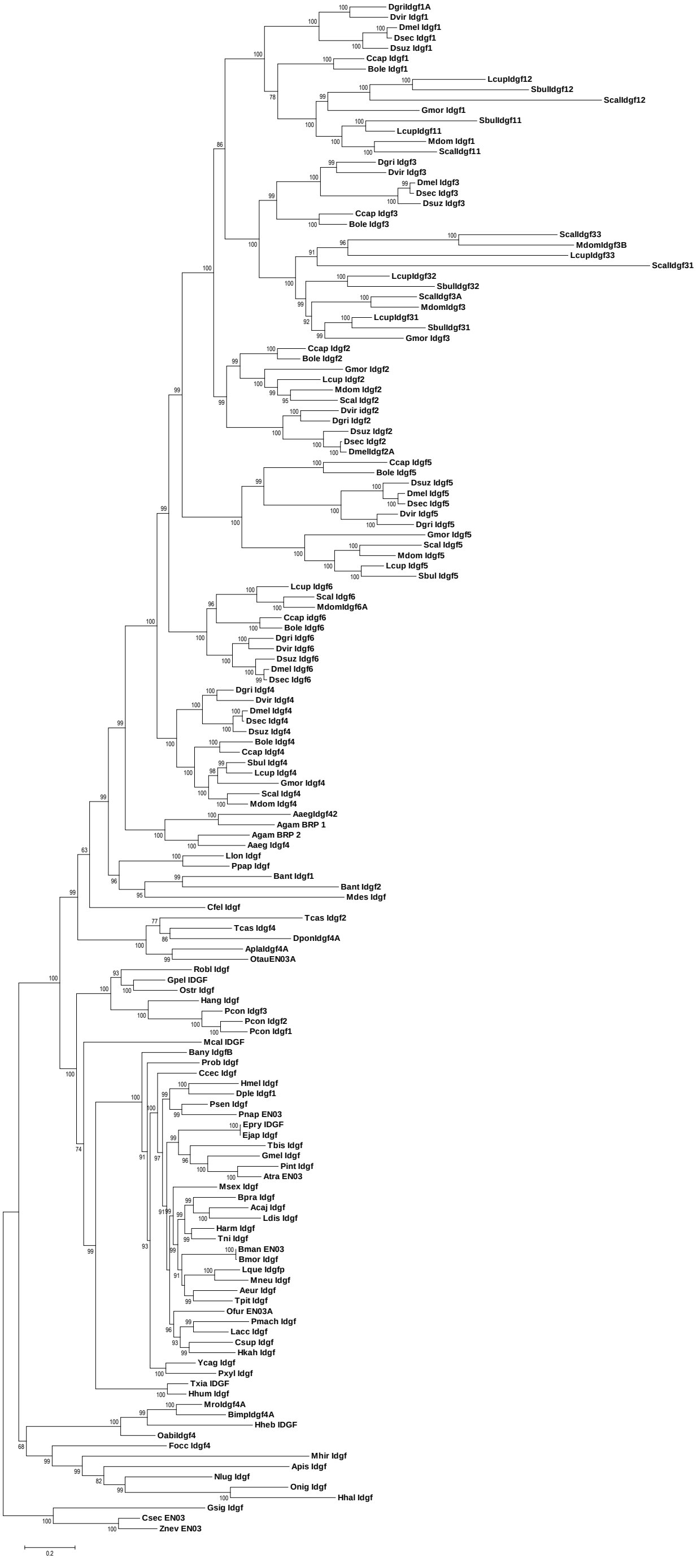



Mdom Idgf1
Scalldgf11
Lcupldgf11
Sbulldgf11
Gmor Idgf1
Scalldgf12
Lcupldgf12
Sbulldgf12
Ccap Idgf1
Bole Idgf1
Dvir Idgf1
Dgrildgf1A
Dsuz Idgf1
Dmel Idgf1
Dsec Idgf1
DmelIdgf2A
Dsec Idgf2
Dsuz Idgf2
Dvir Idgf2
Dgri Idgf2
Ccap Idgf2
Bole Idgf2
Gmor Idgf2
Mdom Idgf2
Scal Idgf2
Lcup Idgf2
Ccap Idgf3
Bole Idgf3
Dvir Idgf3
Dgri Idgf3
Dsuz Idgf3
Dmel Idgf3
Dsec Idgf3
MdomIdgf3B
ScalIdgf33
ScalIdgf31
LcupIdgf33
LcupIdgf32
SbulIdgf32
MdomIdgf3
ScalIdgf3A
Gmor Idgf3
LcupIdgf31
SbulIdgf31
Mdom Idgf5
Scal Idgf5
Lcup Idgf5
Sbul Idgf5
Gmor Idgf5
Ccap Idgf5
Bole Idgf5
Dvir Idgf5
Dgri Idgf5
Dsuz Idgf5
Dmel Idgf5
Dsec Idgf5
Dmel Idgf6
Dsec Idgf6
Dsuz Idgf6
Dvir Idgf6
Dgri Idgf6
Ccap idgf6
Bole Idgf6
Lcup Idgf6
MdomIdgf6A
Scal Idgf6
Dmel Idgf4
Dsec Idgf4
Dsuz Idgf4
Dvir Idgf4
Dgri Idgf4
Ccap Idgf4
Bole Idgf4
Mdom Idgf4
Scal Idgf4
Gmor Idgf4
Lcup Idgf4
Sbul Idgf4
Llon Idgf
Ppap Idgf
Mdes Idgf
Bant Idgf1
Bant Idgf2
Aaeg Idgf4
Agam BRP 2
Aaegldgf42
Agam BRP 1
AplaIdgf4A
OtauEN03A
Tcas Idgf2
DponIdgf4A
Tcas Idgf4
Cfel Idgf
Pcon Idgf1
Pcon Idgf2
Pcon Idgf3
Hang Idgf
Robl Idgf
Ostr Idgf
Gpel IDGF
Mcal IDGF
Hhum Idgf
Txia IDGF
Ycag Idgf
Pxyl Idgf
Bany IdgfB
Epry IDGF
Ejap Idgf
Atra EN03
Pint Idgf
Gmel Idgf
Tbis Idgf
Dple Idgf1
Hmel Idgf
Pnap EN03
Psen Idgf
Lacc Idgf
Pmach Idgf
Hkah Idgf
Csup Idgf
Ofur EN03A
Msex Idgf
Ccec Idgf
Prob Idgf
Mneu Idgf
Lque Idgfp
Harm Idgf
Tni Idgf
Bmor Idgf
Bman EN03
Bpra Idgf
Tpit Idgf
Aeur Idgf
Acaj Idgf
Ldis Idgf
BimpIdgf4A
MroIdgf4A
Hheb IDGF
OabiIdgf4
Focc Idgf4
Mhir Idgf
Apis Idgf
Nlug Idgf
Hhal Idgf
Onig Idgf
Gsig Idgf
Znev EN03
Csec EN03
0.1

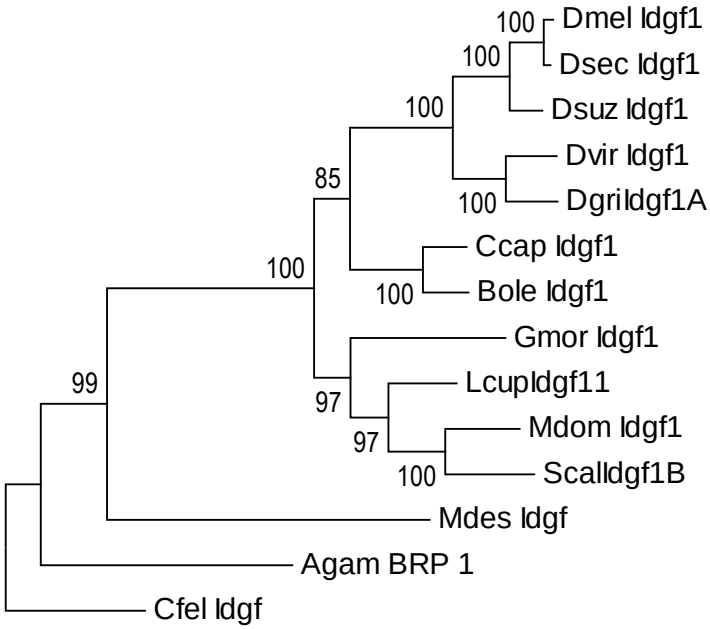
**A**


Dsuz ldgf1
Dmel ldgf1
Dsec ldgf1
Dvir ldgf1
Dgrildgf1A
Ccap ldgf1
Bole ldgf1
Lcupldgf11
Sbulldgf11
Mdom ldgf1
Scalldgf11
Scalldgf12
Lcupldgf12
Sbulldgf12
Gmor ldgf1
Ccap ldgf3
Bole ldgf3
Dsuz ldgf3
Dmel ldgf3
Dsec ldgf3
Dgri ldgf3
Dvir ldgf3
Lcupldgf32
Sbulldgf32
Mdomldgf3
Scalldgf3A
Gmor ldgf3
Lcupldgf31
Sbulldgf31
Scalldgf31
Lcupldgf33
Mdomldgf3B
Scalldgf33
Mdom ldgf2
Scal ldgf2
Lcup ldgf2
Gmor ldgf2
Bole ldgf2
Ccap ldgf2
Dgri ldgf2
Dvir idgf2
Dsec ldgf2
Dmelldgf2A
Dsuz ldgf2
Scal ldgf5
Mdom ldgf5
Sbul ldgf5
Lcup ldgf5
Gmor ldgf5
Bole ldgf5
Ccap ldgf5
Dgri ldgf5
Dvir ldgf5
Dsuz ldgf5
Dsec ldgf5
Dmel ldgf5
Dsuz ldgf6
Dmel ldgf6
Dsec ldgf6
Dvir ldgf6
Dgri ldgf6
Ccap idgf6
Bole ldgf6
Lcup ldgf6
MdomIdgf6A
Scal ldgf6
Dsuz ldgf4
Dmel ldgf4
Dsec ldgf4
Dvir ldgf4
Dgri ldgf4
Ccap ldgf4
Bole ldgf4
Mdom ldgf4
Scal ldgf4
Gmor ldgf4
Lcup ldgf4
Sbul ldgf4
Aaeg ldgf4
Agam BRP 2
Aaegldgf42
Agam BRP 1
Llon ldgf
Ppap ldgf
Mdes ldgf
Bant ldgf1
Bant ldgf2
Cfel ldgf
AplaIdgf4A
OtauEN03A
Tcas ldgf2
Tcas ldgf4
DponIdgf4A
Hang ldgf
Pcon ldgf3
Pcon ldgf1
Pcon ldgf2
Robl ldgf
Ostr ldgf
Gpel IDGF
Mcal IDGF
Hhum ldgf
Txia IDGF
Bany IdgfB
Prob ldgf
Ofur EN03A
Lacc ldgf
Pmach ldgf
Hkah ldgf
Csup ldgf
Msex ldgf
Harm ldgf
Tni ldgf
Bpra ldgf
Ldis ldgf
Acaj ldgf
Tpit ldgf
Aeur ldgf
Bmor ldgf
Bman EN03
Mneu ldgf
Lque ldgfp
Ccec ldgf
Tbis ldgf
Hmel ldgf
Dple ldgf1
Pnap EN03
Psen ldgf
Epry IDGF
Ejap ldgf
Gmel ldgf
Atra EN03
Pint ldgf
Ycag ldgf
Pxyl ldgf
Oabildgf4
Hheb IDGF
BimpIdgf4A
MroIdgf4A
Focc ldgf4
Mhir ldgf
Apis ldgf
Nlug ldgf
Hhal ldgf
Onig ldgf
Gsig ldgf
Znev EN03
Csec EN03
0.2

**B**


Dgrildgf1A
Dvir ldgf1
Dmel ldgf1
Dsec ldgf1
Dsuz ldgf1
Ccap ldgf1
Bole ldgf1
Lcupldgf12
Sbulldgf12
Scalldgf12
Gmor ldgf1
Sbulldgf11
Lcupldgf11
Mdom ldgf1
Scalldgf11
Dgri ldgf3
Dvir ldgf3
Dmel ldgf3
Dsec ldgf3
Dsuz ldgf3
Ccap ldgf3
Bole ldgf3
Scalldgf33
MdomIdgf3B
Lcupldgf33
Scalldgf31
Lcupldgf32
Sbulldgf32
Scalldgf3A
MdomIdgf3
Lcupldgf31
Sbulldgf31
Gmor ldgf3
Ccap ldgf2
Bole ldgf2
Gmor ldgf2
Lcup ldgf2
Mdom ldgf2
Scal ldgf2
Dvir idgf2
Dgri ldgf2
Dsuz ldgf2
Dsec ldgf2
DmelIdgf2A
Ccap ldgf5
Bole ldgf5
Dsuz ldgf5
Dmel ldgf5
Dsec ldgf5
Dvir ldgf5
Dgri ldgf5
Gmor ldgf5
Scal ldgf5
Mdom ldgf5
Lcup ldgf5
Sbul ldgf5
Lcup ldgf6
Scal ldgf6
MdomIdgf6A
Ccap idgf6
Bole ldgf6
Dgri ldgf6
Dvir ldgf6
Dsuz ldgf6
Dmel ldgf6
Dsec ldgf6
Dgri ldgf4
Dvir ldgf4
Dmel ldgf4
Dsec ldgf4
Dsuz ldgf4
Bole ldgf4
Ccap ldgf4
Sbul ldgf4
Lcup ldgf4
Gmor ldgf4
Scal ldgf4
Mdom ldgf4
AaegIdgf42
Agam BRP 1
Agam BRP 2
Aaeg ldgf4
Llon ldgf
Ppap ldgf
Bant ldgf1
Bant ldgf2
Mdes ldgf
Cfel ldgf
Tcas ldgf2
Tcas ldgf4
DponIdgf4A
AplaIdgf4A
OtauEN03A
Robl ldgf
Gpel IDGF
Ostr ldgf
Hang ldgf
Pcon ldgf3
Pcon ldgf2
Pcon ldgf1
Mcal IDGF
Bany IdgfB
Prob ldgf
Ccec ldgf
Hmel ldgf
Dple ldgf1
Psen ldgf
Pnap EN03
Epry IDGF
Ejap ldgf
Tbis ldgf
Gmel ldgf
Pint ldgf
Atra EN03
Msex ldgf
Bpra ldgf
Acaj ldgf
Ldis ldgf
Harm ldgf
Tni ldgf
Bman EN03
Bmor ldgf
Lque ldgfp
Mneu ldgf
Aeur ldgf
Tpit ldgf
Ofur EN03A
Pmach ldgf
Lacc ldgf
Csup ldgf
Hkah ldgf
Ycag ldgf
Pxyl ldgf
Txia IDGF
Hhum ldgf
MroIdgf4A
BimpIdgf4A
Hheb IDGF
Oabildgf4
Focc ldgf4
Mhir ldgf
Apis ldgf
Nlug ldgf
Onig ldgf
Hhal ldgf
Gsig ldgf
Csec EN03
Znev EN03
0.2

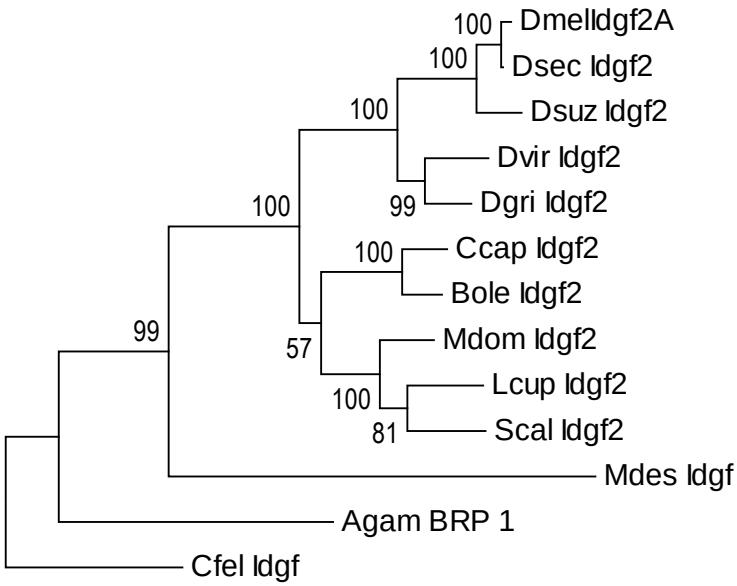
C




**A**



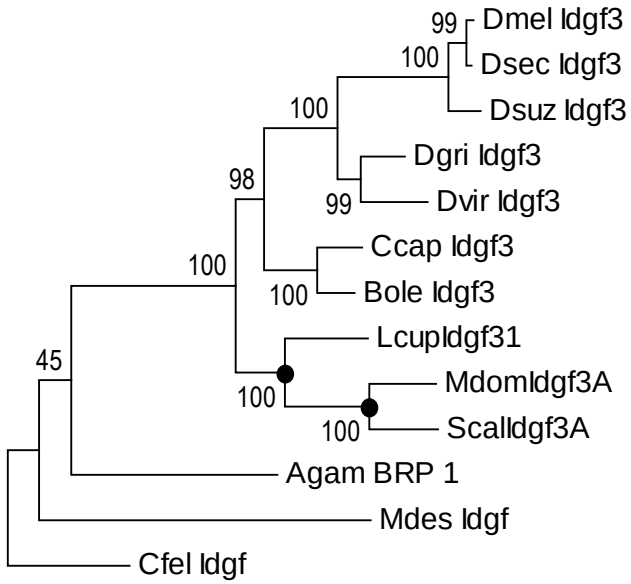

aBSREL did not detect any positively selected nodes




**B**



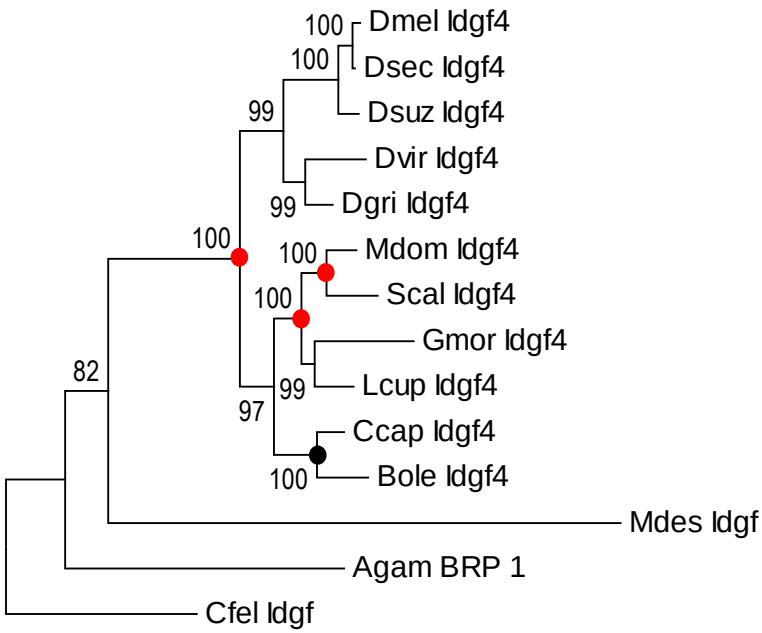

aBSREL did not detect any positively selected nodes




**C**

0.1

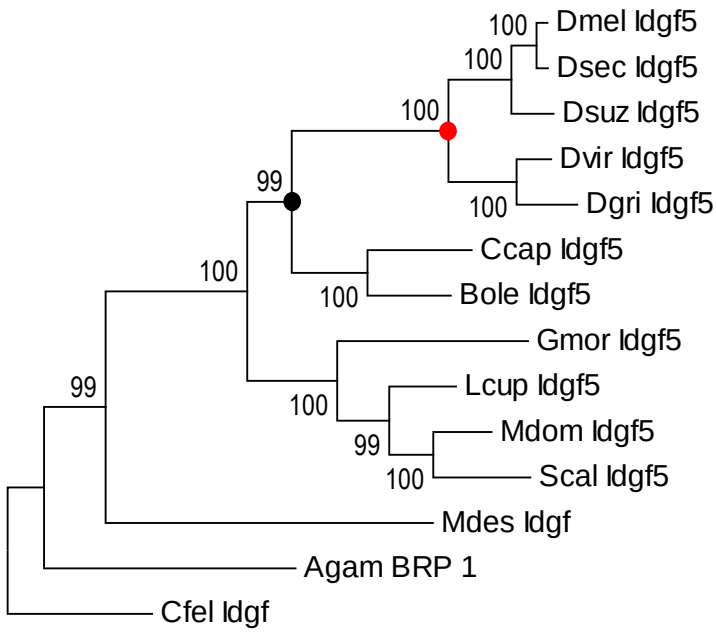
aBSREL detected 2 positively selected nodes




**D**

0.1

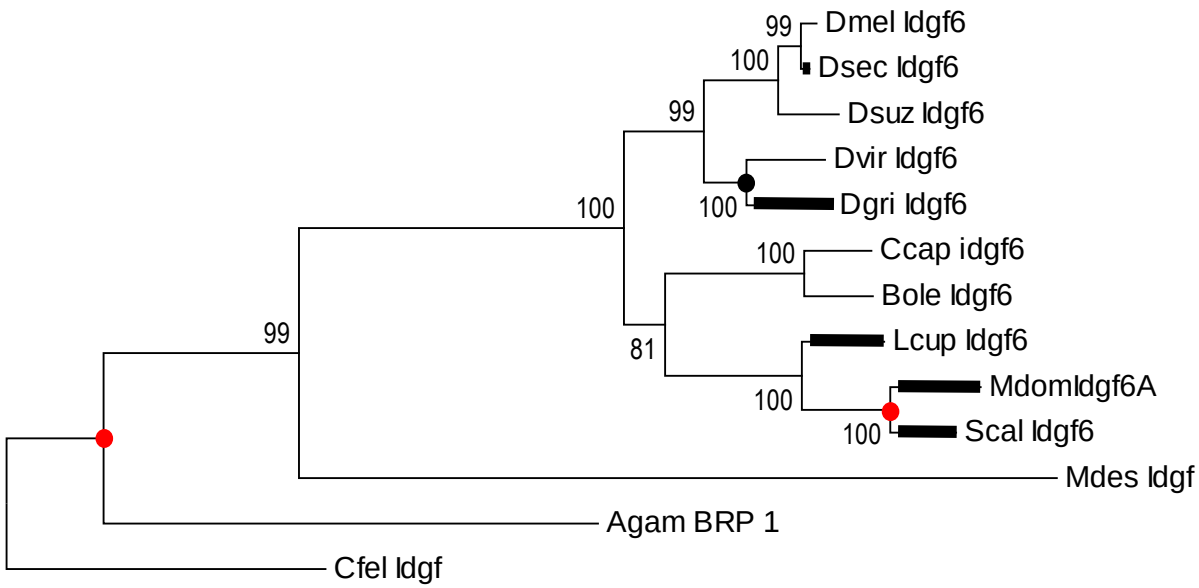
aBSREL detected 4 positively selected nodes



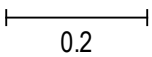

**E**




aBSREL detected 2 positively selected nodes

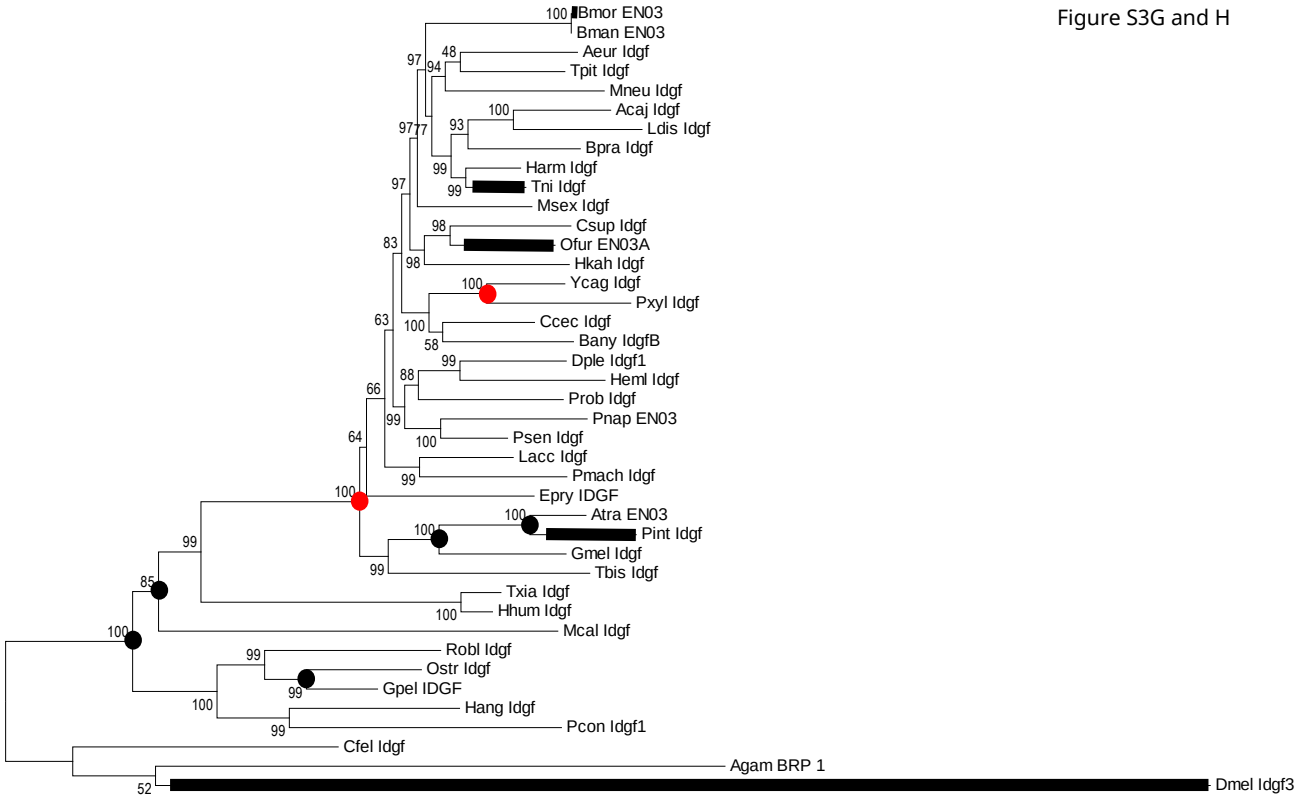



**F**

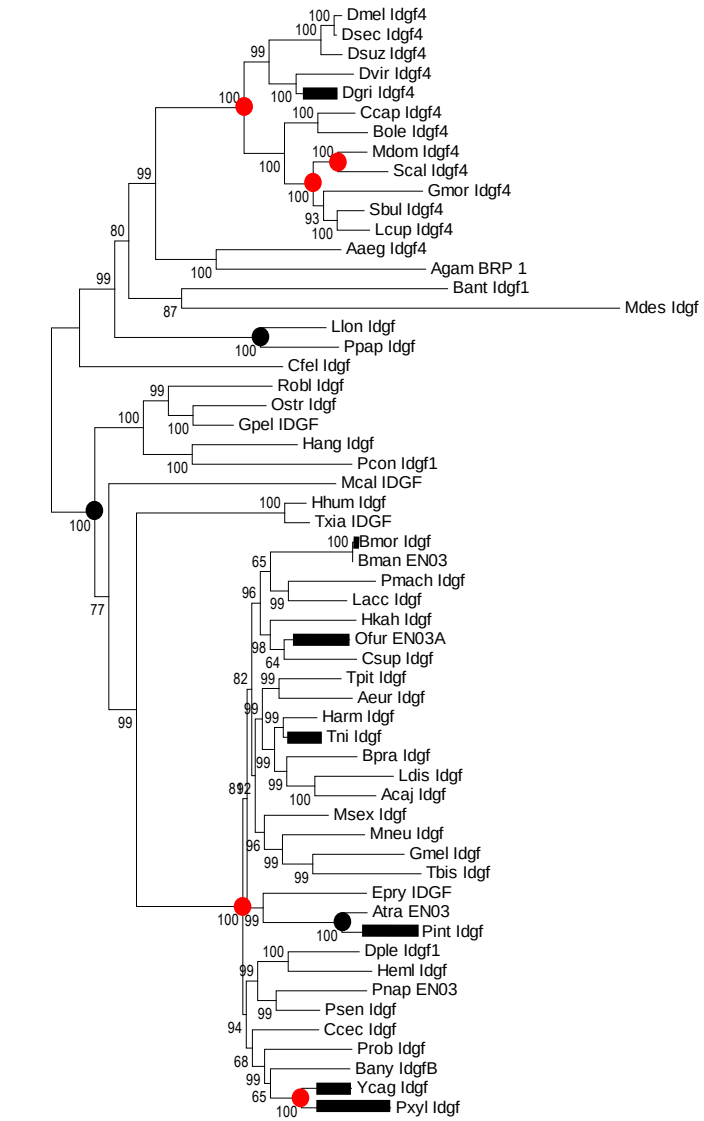



aBSREL detected 8 positively selected nodes

Figure S3G and H

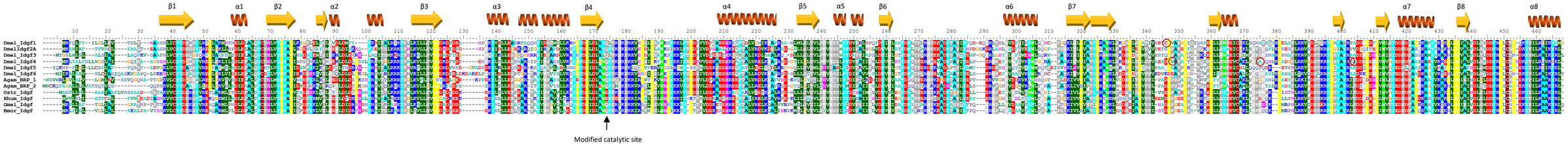



**G** aBSREL detected 12 positively selected nodes




**H** aBSREL detected 15 positively selected nodes

Figure S4


β1
α1
β2
α2
β3
α3
β4
α4
β5
α5
β6
α6
β7
α7
β8
α8
Dmel_Idgf1
Dmel_Idgf2A
Dmel_Idgf3
Dmel_Idgf4
Dmel_Idgf5
Dmel_Idgf6
Agam_BRP_1
Agam_BRP_2
Ostr_Idgf
Hhum_Idgf
Gmel_Idgf
Bmor_Idgf
Modified catalytic site

# Table S1

| Order | Family | Abbreviation | Species | Sequence ID | Database |
|---|---|---|---|---|---|
| Diptera | Drosophilidae | Dmel | Drosophila melanogaster | NM_057910, NM_057909, NM_165158, NM_001298139, NM_137477, NM_001299570 | Genbank |
| | | Dsec | Drosophila sechellia | XM_002038782, XM_002038781, XM_002038780, XM_002041783, XM_002034130, XM_002034398 | Genbank |
| | | Dsuz | Drosophila suzukii | XM_017090266, XM_017089326, XM_017089327, XM_017073697, XM_017081820, XM_017084939 | Genbank |
| | | Dvir | Drosophila virilis | XM_002052219, XM_002052220, XM_002052221, XM_002055522, XM_002048975, XM_002055522, XM_002050955 | Genbank |
| | | Dgri | Drosophila grimshawi | XM_001996410, XM_001996409, XM_001996408, XM_001997796, XM_001991865, XM_001995267, XM_001986951 | Genbank |
| | Muscidae | Mdom | Musca domestica | XM_005179350, XM_005179351, XM_005179325, XM_005189010, XM_005188622, XM_005186242, XM_005181848 | Genbank |
| | | Scal | Stomoxys calcitrans | XM_013243787, XM_013243805, XM_013243807, XM_013251754, XM_013243813, XM_013253991, XM_013252596, XM_013262691 | Genbank |
| | Sarcophagidae | Sbul | Sarcophaga bullata | TMW40086, TMW40679, TMW44785, TMW48511, TMW54608 | Genbank |
| | Caliphoridae | Lcup | Lucilia cuprina | XM_023445243, XM_023445045, XM_023447952, XM_023440331, XM_023440337, XM_023440336, XM_023444827, XM_023447952 | Genbank |
| | Glossinidae | Gmor | Glossina morsitans | DQ307194, DQ307195, DQ307196, DQ307197, DQ307193 | Genbank |
| | Tephritidae | Ccap | Ceratitis capitata | XM_004521576, XM_004520878, XM_004518515, XM_004517420, XM_004518514, XM_004518516 | Genbank |
| | | Bole | Bactrocera oleae | XM_014247671, XM_014229710, XM_014243820, XM_014244863, XM_014247632 | Genbank |
| | Cecidomyiidae | Mdes | Mayetiola destructor | Mdes001216 | EnsemblM |
| | Chironomidae | Bant | Belgica antarctica | JU25_03746, JU25_04757 | EnsemblM |
| | Culicidae | Aaeg | Aedes aegyptii | XM_001660695, XM_001660698 | Genbank |
| | | Agam | Anopheles gambiae | AY496420, AY496421 | Genbank |
| | Psychodidae | Llon | Lutzomyia longipalpis | KY274439 | Genbank |
| | | Ppap | Phlebotomus papatasi | PPAI009732 | Vector ba |
| Siphonaptera | Pulicidae | Cfel | Ctenocephalides felis | XM_026609733 | Genbank |
| Trichoptera | Polycentropidae | Pcon | Plectrocnemia conspersa | MN520319, MN520320, MN520321 | this study |
| | Hydropsychidae | Hang | Hydropsyche angustipennis | MN520322 | this study |
| | Limnephilidae | Gpel | Glyphotaelius pellucidus | MN520337 | this study |
| | Phryganeidae | Ostr | Oligotricha striata | MN520323 | this study |
| | Rhyacophilidae | Robl | Rhyacophila obliterata | MN520324 | this study |
| Lepidoptera | Micropterigidae | Mcal | Micropterix calthella | MN520338 | this study |
| | Hepialidae | Hhum | Hepialus humuli | MN520325 | this study |
| | | Txia | Thitarodes xiaojinensis | MN520339 | this study |
| | Tineidae | Tbis | Tineola bisseliella | MN520326 | this study |
| | Psychidae | Ejap | Eumeta japonica | GBP97637 | Genbank |
| | | Epry | Eumata pryerii | MN520329 | this study |
| | Yponomeutidae | Ycag | Yponomeuta cagnagella | MN520328 | this study |
| | Plutellidae | Pxyl | Plutella xylostella | pacbiov1_core_32_85_1__cds__g12542 | Lepbase |
| | Gracillariidae | Prob | Phyllonoricter roboris | MN520327 | this study |
| | Pyralidae | Gmel | Galleria mellonella | MG846880 | Genbank |
| | | Pint | Plodia interpunctella | v1_core_32_85_1__cds__maker-scaffold10-augustus-gene-6.74-mRNA-1 | Lepbase |
| | | Atra | Amyelois transitella | XM_013333909 | Genbank |
| | Crambidae | Ofur | Ostrinia furnacalis | XM_028300489 | Genbank |
| | | Csup | Chilo suppressalis | CSUOGS101503 | Lepbase |
| | Nymphalidae | Dple | Danaus plexippus | v3_core_32_85_1_Idgf1 | Lepbase |
| | | Bany | Bicyclus anynana | v1x2_core_32_85_1__cds__BANY.1.2.t14035 | Lepbase |
| | | Hmel | Heliconius melpomene | hmel2_core_32_85_1__cds__HMEL012202g1 | Lepbase |
| | Pieridae | Psen | Phoebis sennae | v1x1_core_32_85_1__cds__pse1789 | Lepbase |
| | | Pnap | Pieris napi | PIENAPT00000007661 | Lepbase |
| | Papilionidae | Pmach | Papilio machaon | papma1_core_32_85_1__cds__KPJ09136 | Lepbase |
| | Hesperiidae | Lacc | Lerema accius | v1x1_core_32_85_1__cds__lac161866 | Lepbase |
| | Lycaenidae | Ccec | Calycopis cecrops | v1x1_core_32_85_1__cds__cce19999 | Lepbase |
| | Lasiocampidae | Mneu | Malacosoma neustria | MN520334 | this study |
| | Cosmopterigidae | Hkah | Hyposmocoma kahamanoa | XM_026463826 | Genbank |
| | Bombycidae | Bmor | Bombyx mori | XM_021350318 | Genbank |
| | | Bman | Bombyx mandarina | XM_028176361 | Genbank |
| | Sphingidae | Msex | Manduca sexta | GQ843826 | Genbank |
| | Brahmaeidae | Aeur | Acanthobrahmaea europaea | MN520336 | this study |
| | Lasiocampidae | Lque | Lasiocampa quercus | MN520335 | this study |
| | Thaumetopoeidae | Tpit | Thaumatopoea pityocampa | MN520330 | this study |
| | Lymantriidae | Ldis | Lymantria dispar | MN520333 | this study |
| | Arctiidae | Acaj | Arctia caja | MN520331 | this study |
| | Nolidae | Bpra | Bena prasinana | MN520332 | this study |
| | Noctuidae | Tni | Trichoplusia ni | trichoplusia_ni_hi5v02_core_32_85_1__cds__evm | Lepbase |
| | | Harm | Helicoverpa armigera | XM_021340699 | Genbank |
| Coleoptera | Tenebrionidae | Tcas | Tribolium castaneum | NM_001044626 | Genbank |
| | Scarabaeidae | Otau | Onthophagus taurus | XM_023052363 | Genbank |
| | Buprestidae | Apla | Agrilus planipennis | XM_018473779 | Genbank |
| | Curculionidae | Dpon | Dendroctonus ponderosae | XM_019911548 | Genbank |
| Hymenoptera | Orussidae | Oabi | Orussus abietinus | XM_012432960 | Genbank |
| | Braconidae | Hheb | Habrobracon hebetor | MG733033 | Genbank |
| | Apidae | Bimp | Bombus impatiens | XM_003489324 | Genbank |
| | Megachilidae | Mrot | Megachile rotundata | XM_012283507 | Genbank |
| *Thysanoptera* | Tripidae | Focc | Frankliniella occidentalis | XM_026420798, XM_026436107 | Genbank |
| *Hemiptera* | Pseudococcidae | Mhir | Maconellicoccus hirsutus | EF070598 | Genbank |
| | Aphididae | Apis | Acyrthosiphon pisum | NM_001168671 | Genbank |
| | Delphacidae | Nlug | Nilaparvata lugens | KM217119 | Genbank |
| | Pentatomidae | Hhal | Halyomorpha halys | XM_024363492 | Genbank |
| | Cicadellidae | Onig | Oncometopia nigricans | AY725777 | Genbank |
| *Orthoptera* | Gryllidae | Gsig | Gryllodes sigillatus | KT355866 | Genbank |
| *Isoptera* | Termopsidae | Znev | Zootermopsis nevadensis | XM_022084000 | Genbank |
| | Kalotermitidae | Csec | Cryptotermes secundus | XM_023870763 | Genbank |

| Name | B | LRT | Test p-value | Uncorrected p-value | ω distribution over sites |
|---|---|---|---|---|---|
| Node117 | 0.1379 | 29.9228 | 0 | 0 | ω1 = 0.770 (84%)<br>ω2 = 226 (16%) |
| Node140 | 0.0375 | 45.4859 | 0 | 0 | ω1 = 1.00 (91%)<br>ω2 = 208 (9.0%) |
| Node163 | 0.0696 | 76.0228 | 0 | 0 | ω1 = 0.00 (79%)<br>ω2 = 30.0 (21%) |
| Node175 | 0.0382 | 43.5013 | 0 | 0 | ω1 = 1.00 (94%)<br>ω2 = 95700000000 (6.4%) |
| Node183 | 0.074 | 73.8305 | 0 | 0 | ω1 = 1.00 (88%)<br>ω2 = 1830 (12%) |
| Node225 | 0.0779 | 43.9947 | 0 | 0 | ω1 = 0.0000000000577 (75%)<br>ω2 = 394 (25%) |
| Node25 | 0.0501 | 61.2561 | 0 | 0 | ω1 = 1.00 (83%)<br>ω2 = 159 (17%) |
| Node35 | 0.0222 | 30.9761 | 0 | 0 | ω1 = 0.809 (90%)<br>ω2 = 368 (9.5%) |
| Node40 | 0.0616 | 54.5886 | 0 | 0 | ω1 = 1.00 (90%)<br>ω2 = 820 (9.6%) |
| Node186 | 0.0597 | 28.4148 | 0.0001 | 0 | ω1 = 1.00 (7.3%)<br>ω2 = 1.00 (83%)<br>ω3 = 236 (9.5%) |
| Node38 | 0.0514 | 25.2506 | 0.0003 | 0 | ω1 = 1.00 (89%)<br>ω2 = 663 (11%) |
| Node89 | 0.0551 | 24.129 | 0.0005 | 0 | ω1 = 1.00 (92%)<br>ω2 = 613 (8.3%) |
| Node108 | 0.0786 | 23.1098 | 0.0009 | 0 | ω1 = 0.00 (83%)<br>ω2 = 611 (17%) |
| Node151 | 0.0133 | 21.8992 | 0.0016 | 0 | ω1 = 0.00 (97%)<br>ω2 = 2180 (3.2%) |
| Node32 | 0.0071 | 21.7488 | 0.0017 | 0 | ω1 = 0.335 (97%)<br>ω2 = 273 (2.7%) |
| Node31 | 0.0113 | 21.504 | 0.0019 | 0 | ω1 = 0.00 (91%)<br>ω2 = 400 (8.9%) |
| Node284 | 0.0324 | 20.3779 | 0.0034 | 0 | ω1 = 0.975 (97%)<br>ω2 = 1160 (2.8%) |
| Node152 | 0.0493 | 17.8957 | 0.0118 | 0 | ω1 = 0.210 (94%)<br>ω2 = 44.8 (6.1%) |
| Node37 | 0.0052 | 17.5 | 0.0143 | 0.0001 | ω1 = 1.00 (95%)<br>ω2 = 1180 (5.1%) |
| DMEL_IDGF1 | 0.0282 | 17.0203 | 0.0182 | 0.0001 | ω1 = 0.140 (98%)<br>ω2 = 5000 (1.5%) |
| Node64 | 0.0866 | 15.226 | 0.0447 | 0.0002 | ω1 = 0.431 (87%)<br>ω2 = 116 (13%) |

B – optimized branch length, LRT – likelihood-ratio test, $\omega > 1$ – positive selection, $\omega < 1$ – negative selection, $\omega = 1$ – neutral evolution

Table S3A

| Tree | Codon# | Position | Branch | Amount | Properties… (magnitude value, probability) | | | |
|---|---|---|---|---|---|---|---|---|
| Fig.S3D | 7 | Signal peptide | Idgf4 | 1 | (6, .05) Polarity | | | |
| Fig.S3D | 9 | Signal peptide | Idgf4 | 3 | (6, .001) Beta-structure tendencies | (7, .001) Polarity | (8, .01) Solvent accessible reduction ratio | |
| Fig.S3D | 14 | Signal peptide | Idgf4 | 1 | (6, .001) Beta-structure tendencies | | | |
| Fig.S3D | 18 | Signal peptide | Idgf4 | 1 | (6, .001) Beta-structure tendencies | | | |
| Fig.S3D | 22 | Signal peptide | Idgf4 | 1 | (6, .001) Solvent accessible reduction ratio | | | |
| Fig.S3D | 31 | Signal peptide | Idgf4 | 1 | (6, .001) Alpha-helical tendencies | | | |
| Fig.S3D | 41 | α helix 1 | Idgf4 | 1 | (6, .001) Alpha-helical tendencies | | | |
| Fig.S3D | 103 | α helix 2 | Idgf4 | 1 | (6, .001) Beta-structure tendencies | | | |
| Fig.S3D | 110 | α helix 2 | Idgf4 | 1 | (6, .001) Alpha-helical tendencies | | | |
| Fig.S3D | 131 | between β3-α3 | Idgf4 | 1 | (6, .01) Buriedness | | | |
| Fig.S3D | 134 | between β3-α3 | Idgf4 | 4 | (6, .001) Beta-structure tendencies | (8, .001) Bulkiness | (6, .001) Solvent accessible reduction ratio | (8, .001) Turn tendencies |
| Fig.S3D | 153 | α helix 3 | Idgf4 | 1 | (6, .01) Buriedness | | | |
| Fig.S3D | 205 | α helix 4 | Idgf4 | 1 | (7, .001) Polarity | | | |
| Fig.S3D | 254 | α helix 5 | Idgf4 | 1 | (6, .001) Beta-structure tendencies | | | |
| Fig.S3D | 278 | β sheet 6 | Idgf4 | 4 | (8, .05) Beta-structure tendencies | (7, .001) Buriedness | (8, .001) Polarity | (6, .001) Solvent accessible reduction ratio |
| Fig.S3D | 299 | α helix 6 | Idgf4 | 1 | (6, .001) Solvent accessible reduction ratio | | | |
| Fig.S3D | 315 | β sheet 7 | Idgf4 | 4 | (7, .001) Buriedness | (8, .001) Polarity | (8, .01) Solvent accessible reduction ratio | (8, .001) Turn tendencies |
| Fig.S3D | 345 | α7β7 DI* | Idgf4 | 2 | (8, .001) Alpha-helical tendencies | (7, .001) Turn tendencies | | |
| Fig.S3D | 371 | α7β7 DI* | Idgf4 | 2 | (8, .001) Alpha-helical tendencies | (7, .001) Turn tendencies | | |
| Fig.S3D | 399 | α7β7 DI* | Idgf4 | 2 | (6, .001) Bulkiness | (7, .001) Turn tendencies | | |
| Fig.S3D | 400 | α7β7 DI* | Idgf4 | 2 | (8, .001) Alpha-helical tendencies | (7, .001) Turn tendencies | | |
| Fig.S3D | 459 | α helix 8 | Idgf4 | 1 | (6, .001) Solvent accessible reduction ratio | | | |

*α7β7 domain insertion

Table S3B

| Tree | Codon# | Position | Branch | Amount | Properties… (magnitude value, probability) | | | |
|---|---|---|---|---|---|---|---|---|
| Fig.S3G | 106 | α helix 2 | Lepidoptera | 2 | (6, .001) Polarity | (6, .001) Turn tendencies | | |
| Fig.S3G | 156 | α helix 3 | Lepidoptera | 1 | (8, .01) Alpha-helical tendencies | | | |
| Fig.S3G | 196 | loop between β4-α4** | Lepidoptera | 1 | (6, .001) Buriedness | | | |
| Fig.S3G | 206 | loop between β4-α4** | Lepidoptera | 1 | (6, .001) Turn tendencies | | | |
| Fig.S3G | 228 | between α4-β5 | Lepidoptera | 1 | (7, .001) Polarity | | | |
| Fig.S3G | 237 | β sheet 5 | Lepidoptera | 2 | (7, .001) Buriedness | (7, .001) Polarity | | |
| Fig.S3G | 240 | β sheet 5 | Lepidoptera | 1 | (6, .001) Beta-structure tendencies | | | |
| Fig.S3G | 248 | α helix 5 | Lepidoptera | 1 | (6, .001) Alpha-helical tendencies | | | |
| Fig.S3G | 260 | between α5-β6 | Lepidoptera | 4 | (6, .001) Buriedness | (8, .001) Polarity | (6, .001) Solvent accessible reduction ratio | (8, .001) Turn tendencies |
| Fig.S3G | 289 | between β6-α6 | Lepidoptera | 1 | (6, .001) Alpha-helical tendencies | | | |
| Fig.S3G | 292 | between β6-α6 | Lepidoptera | 1 | (8, .01) Alpha-helical tendencies | | | |
| Fig.S3G | 296 | between β6-α6 | Lepidoptera | 2 | (7, .001) Buriedness | (7, .001) Polarity | | |
| Fig.S3G | 299 | between β6-α6 | Lepidoptera | 4 | (6, .001) Buriedness | (8, .001) Polarity | (6, .001) Solvent accessible reduction ratio | (8, .001) Turn tendencies |
| Fig.S3G | 303 | α helix 6 | Lepidoptera | 2 | (6, .001) Alpha-helical tendencies | (6, .001) Turn tendencies | | |
| Fig.S3G | 472 | between α7-β8 | Lepidoptera | 2 | (6, .001) Alpha-helical tendencies | (6, .001) Turn tendencies | | |
| Fig.S3G | 479 | β sheet 8 | Lepidoptera | 2 | (6, .001) Alpha-helical tendencies | (6, .001) Turn tendencies | | |

**characteristic fo ldgfs

Table S3C

| Tree | Codon# | Position | Branch | Amount | Properties… (magnitude value, probability) | |
|---|---|---|---|---|---|---|
| Fig.S3G | 13 | Signal peptide | Yponomutoidea | 1 | (6, .001) Solvent accessible reduction ratio | |
| Fig.S3G | 29 | before β1 | Yponomutoidea | 1 | (6, .001) Beta-structure tendencies | |
| Fig.S3G | 185 | loop between β4-α4** | Yponomutoidea | 1 | (6, .01) Bulkiness | |
| Fig.S3G | 295 | between β6-α6 | Yponomutoidea | 1 | (6, .001) Polarity | |
| Fig.S3G | 326 | β sheet 7 | Yponomutoidea | 1 | (8, .01) Alpha-helical tendencies | |
| Fig.S3G | 338 | β sheet 7 | Yponomutoidea | 2 | (6, .001) Alpha-helical tendencies | (6, .001) Turn tendencies |
| Fig.S3G | 490 | between β8-α8 | Yponomutoidea | 1 | (8, .01) Alpha-helical tendencies | |

**characteristic fo Idgfs

Purifying selection was confirmed by SELECTON, FEL and FUBAR analysis in the following proportion of positions:

| | Number of negatively selected positions/length of alignment | ratio |
|---|---|---|
| Schizophora Idgf1 | 353/470 | 0,75 |
| Schizophora Idgf2 | 355/469 | 0,75 |
| Schizophora Idgf3 | 347/469 | 0,74 |
| Schizophora Idgf4 | 365/466 | 0,78 |
| Schizophora Idgf5 | 321/478 | 0,67 |
| Schizophora Idgf6 | 314/497 | 0,63 |
| Lepidoptera | 413/508 | 0,81 |

| Alignment Position | Refseq Hhum | Selecton Ka/Ks | Refseq Position | Ka/Ks | FEL ω>1 ω<1 | p-value | FUBAR neg/purif P[α>β] | pos/div P[α<β] |
|---|---|---|---|---|---|---|---|---|
| 1 | M | 0.0055 | 1 | 0.0055 | NaN | 1 | *0.97* | 0.018 |
| 2 | W | 0.11 | 2 | 0.11 | 0.225 | 0.242 | *0.938* | 0.049 |
| 3 | V | 0.04 | 3 | 0.04 | 0.115 | *0.004* | *1* | 0 |
| 5 | S | 0.4 | 5 | 0.4 | 0.175 | *0.005* | *0.983* | 0 |
| 6 | L | 0.14 | 6 | 0.14 | 0.007 | *0* | *1* | 0 |
| 7 | I | 0.25 | 7 | 0.25 | 0.183 | *0.001* | *1* | 0 |
| 9 | - | 0.2 | | | 0.05 | 0.145 | *0.929* | 0.057 |
| 10 | - | 0.03 | | | 0 | 0.147 | *0.93* | 0.056 |
| 11 | - | 0.022 | | | 0 | *0.009* | *0.995* | 0.004 |
| 12 | A | 0.32 | 8 | 0.32 | 0.234 | *0.012* | *0.982* | 0 |
| 13 | T | 0.27 | 9 | 0.27 | 0.146 | *0.001* | *0.999* | 0 |
| 14 | F | 0.2 | 10 | 0.2 | 0.687 | 0.404 | *0.96* | 0.012 |
| 15 | C | 0.13 | 11 | 0.13 | 0.199 | *0* | *1* | 0 |
| 16 | L | 0.38 | 12 | 0.38 | 0.571 | 0.2 | *0.981* | 0.005 |
| 17 | L | 0.25 | 13 | 0.25 | 0.301 | *0.006* | *0.999* | 0 |
| 18 | F | 0.07 | 14 | 0.07 | 0.164 | *0* | *1* | 0 |
| 19 | V | 0.39 | 15 | 0.39 | 0.561 | 0.26 | *0.991* | 0.001 |
| 20 | W | 0.15 | 16 | 0.15 | 0.111 | *0* | *1* | 0 |
| 21 | T | 0.2 | 17 | 0.2 | 0.222 | *0.002* | *0.996* | 0 |
| 22 | E | 0.088 | 18 | 0.088 | 0.374 | *0.036* | *0.964* | 0.016 |
| 24 | - | 0.38 | | | 0.246 | *0.006* | *0.998* | 0 |
| 29 | D | 0.35 | 20 | 0.35 | 0.114 | *0* | *1* | 0 |
| 30 | T | 0.4 | 21 | 0.4 | 0.357 | *0.083* | *0.947* | 0 |
| 32 | H | 0.36 | 23 | 0.36 | 0.492 | 0.313 | *0.926* | 0.014 |
| 33 | N | 0.23 | 24 | 0.23 | 0.409 | *0.075* | *0.931* | 0.007 |
| 34 | K | 0.043 | 25 | 0.043 | 0.061 | *0* | *1* | 0 |
| 35 | V | 0.017 | 26 | 0.017 | 0.011 | *0* | *1* | 0 |
| 37 | C | 0.0036 | 28 | 0.0036 | 0 | *0* | *1* | 0 |
| 38 | Y | 0.027 | 29 | 0.027 | 0.068 | *0* | *0.997* | 0.001 |
| 39 | Y | 0.0033 | 30 | 0.0033 | 0 | *0* | *1* | 0 |
| 40 | D | 0.019 | 31 | 0.019 | 0.035 | *0* | *1* | 0 |
| 42 | R | 0.075 | 33 | 0.075 | 0.226 | *0.024* | *0.986* | 0.009 |
| 43 | S | 0.0098 | 34 | 0.0098 | 0.017 | *0* | *1* | 0 |
| 44 | F | 0.078 | 35 | 0.078 | 0.136 | *0.001* | *0.983* | 0.009 |
| 46 | R | 0.0021 | 37 | 0.0021 | 0 | *0* | *1* | 0 |
| 47 | E | 0.01 | 38 | 0.01 | 0.029 | *0* | *1* | 0 |
| 48 | - | 0.035 | | | 0 | *0.003* | *0.997* | 0.002 |
| 49 | - | 0.023 | | | 0 | *0.001* | *0.999* | 0.001 |
| 51 | - | 0.032 | | | 0 | *0.044* | *0.98* | 0.015 |
| 56 | Q | 0.029 | 40 | 0.029 | 0.174 | *0.016* | *0.992* | 0.005 |
| 57 | G | 0.022 | 41 | 0.022 | 0.046 | *0* | *1* | 0 |
| 58 | K | 0.023 | 42 | 0.023 | 0.029 | *0* | *1* | 0 |
| 59 | M | 0.026 | 43 | 0.026 | 0 | *0.009* | *0.998* | 0.001 |
| 60 | I | 0.064 | 44 | 0.064 | 0.237 | *0.014* | *0.974* | 0.014 |
| 61 | L | 0.052 | 45 | 0.052 | 0.031 | *0* | *1* | 0 |
| 62 | A | 0.23 | 46 | 0.23 | 0.604 | 0.292 | *0.968* | 0.011 |
| 63 | D | 0.0023 | 47 | 0.0023 | 0 | *0* | *1* | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 64 | L | 0.039 | 48 | 0.039 | 0.061 | *0* | *1* | 0 |
| 65 | E | 0.08 | 49 | 0.08 | 0.022 | *0* | *1* | 0 |
| 66 | P | 0.034 | 50 | 0.034 | 0.034 | *0* | *1* | 0 |
| 67 | A | 0.0018 | 51 | 0.0018 | 0 | *0* | *1* | 0 |
| 68 | L | 0.016 | 52 | 0.016 | 0.01 | *0* | *1* | 0 |
| 69 | T | 0.081 | 53 | 0.081 | 0.08 | *0* | *1* | 0 |
| 70 | F | 0.063 | 54 | 0.063 | 0.229 | *0.077* | *0.909* | 0.048 |
| 71 | C | 0.0035 | 55 | 0.0035 | 0 | *0.001* | *0.998* | 0 |
| 72 | T | 0.03 | 56 | 0.03 | 0.072 | *0* | *1* | 0 |
| 73 | H | 0.017 | 57 | 0.017 | 0.001 | *0* | *1* | 0 |
| 74 | L | 0.028 | 58 | 0.028 | 0.034 | *0* | *1* | 0 |
| 75 | V | 0.075 | 59 | 0.075 | 0.085 | *0* | *1* | 0 |
| 76 | Y | 0.0033 | 60 | 0.0033 | 0 | *0* | *1* | 0 |
| 77 | G | 0.0036 | 61 | 0.0036 | 0 | *0* | *1* | 0 |
| 78 | Y | 0.016 | 62 | 0.016 | 0.029 | *0* | *0.999* | 0 |
| 79 | A | 0.0017 | 63 | 0.0017 | 0 | *0* | *1* | 0 |
| 80 | G | 0.027 | 64 | 0.027 | 0.017 | *0* | *1* | 0 |
| 81 | I | 0.08 | 65 | 0.08 | 0.161 | *0* | *0.999* | 0.001 |
| 82 | Q | 0.093 | 66 | 0.093 | 0.009 | *0* | *1* | 0 |
| 83 | P | 0.038 | 67 | 0.038 | 0.079 | *0* | *1* | 0 |
| 84 | D | 0.047 | 68 | 0.047 | 0.11 | *0.003* | *0.968* | 0.02 |
| 85 | T | 0.018 | 69 | 0.018 | 0.035 | *0* | *1* | 0 |
| 86 | Y | 0.09 | 70 | 0.09 | 0.144 | *0.002* | *0.972* | 0.016 |
| 87 | R | 0.032 | 71 | 0.032 | 0.014 | *0* | *1* | 0 |
| 89 | V | 0.086 | 73 | 0.086 | 0.195 | *0* | *1* | 0 |
| 90 | P | 0.11 | 74 | 0.11 | 0.101 | *0* | *1* | 0 |
| 91 | L | 0.027 | 75 | 0.027 | 0.02 | *0* | *1* | 0 |
| 92 | N | 0.0016 | 76 | 0.0016 | 0 | *0* | *1* | 0 |
| 93 | E | 0.074 | 77 | 0.074 | 0.07 | *0* | *1* | 0 |
| 94 | N | 0.024 | 78 | 0.024 | 0.05 | *0* | *1* | 0 |
| 95 | L | 0.0036 | 79 | 0.0036 | 0 | *0* | *1* | 0 |
| 96 | D | 0.011 | 80 | 0.011 | 0.007 | *0* | *1* | 0 |
| 97 | T | 0.16 | 81 | 0.16 | 0.2 | *0* | *1* | 0 |
| 98 | D | 0.03 | 82 | 0.03 | 0.046 | *0* | *1* | 0 |
| 99 | K | 0.16 | 83 | 0.16 | 0.041 | *0* | *1* | 0 |
| 100 | G | 0.18 | 84 | 0.18 | 0.244 | *0.002* | *0.999* | 0 |
| 101 | H | 0.019 | 85 | 0.019 | 0.009 | *0* | *1* | 0 |
| 102 | A | 0.09 | 86 | 0.09 | 0.361 | *0.034* | *0.983* | 0.007 |
| 103 | L | 0.024 | 87 | 0.024 | 0.042 | *0* | *1* | 0 |
| 104 | Y | 0.051 | 88 | 0.051 | 0.07 | *0* | *0.999* | 0 |
| 105 | R | 0.023 | 89 | 0.023 | 0.013 | *0* | *1* | 0 |
| 106 | N | 0.18 | 90 | 0.18 | 0.268 | *0.005* | *0.998* | 0 |
| 107 | V | 0.038 | 91 | 0.038 | 0.092 | *0* | *1* | 0 |
| 108 | A | 0.012 | 92 | 0.012 | 0.047 | *0* | *1* | 0 |
| 109 | A | 0.068 | 93 | 0.068 | 0.121 | *0.001* | *0.987* | 0.007 |
| 111 | N | 0.029 | 95 | 0.029 | 0.053 | *0* | *1* | 0 |
| 112 | K | 0.18 | 96 | 0.18 | 0.459 | *0.077* | *0.988* | 0.002 |
| 113 | K | 0.012 | 97 | 0.012 | 0.002 | *0* | *1* | 0 |
| 114 | Y | 0.067 | 98 | 0.067 | 0.037 | *0* | *1* | 0 |
| 115 | P | 0.014 | 99 | 0.014 | 0.012 | *0* | *1* | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 116 | G | 0.16 | 100 | 0.16 | 0.179 | 0 | 1 | 0 |
| 117 | L | 0.041 | 101 | 0.041 | 0.036 | 0 | 1 | 0 |
| 118 | K | 0.022 | 102 | 0.022 | 0.001 | 0 | 1 | 0 |
| 119 | V | 0.032 | 103 | 0.032 | 0.014 | 0 | 1 | 0 |
| 120 | L | 0.071 | 104 | 0.071 | 0.047 | 0 | 1 | 0 |
| 121 | L | 0.0036 | 105 | 0.0036 | 0 | 0 | 1 | 0 |
| 122 | S | 0.026 | 106 | 0.026 | 0.03 | 0 | 1 | 0 |
| 123 | V | 0.023 | 107 | 0.023 | 0.041 | 0 | 1 | 0 |
| 124 | G | 0.0036 | 108 | 0.0036 | 0 | 0 | 1 | 0 |
| 125 | G | 0.033 | 109 | 0.033 | 0.046 | 0 | 1 | 0 |
| 126 | G | 0.043 | 110 | 0.043 | 0.043 | 0 | 1 | 0 |
| 127 | A | 0.084 | 111 | 0.084 | 0.165 | 0 | 1 | 0 |
| 128 | D | 0.0025 | 112 | 0.0025 | 0 | 0 | 1 | 0 |
| 130 | K | 0.22 | 113 | 0.22 | 0.392 | 0.039 | 0.952 | 0.011 |
| 131 | E | 0.082 | 114 | 0.082 | 0.005 | 0 | 1 | 0 |
| 132 | E | 0.23 | 115 | 0.23 | 0.045 | 0 | 1 | 0 |
| 133 | K | 0.49 | 116 | 0.49 | 0.336 | 0.02 | 0.991 | 0 |
| 134 | E | 0.18 | 117 | 0.18 | 0.17 | 0.001 | 1 | 0 |
| 137 | K | 0.012 | 118 | 0.012 | 0.005 | 0 | 1 | 0 |
| 138 | Y | 0.0033 | 119 | 0.0033 | 0 | 0 | 1 | 0 |
| 139 | N | 0.032 | 120 | 0.032 | 0.024 | 0 | 1 | 0 |
| 140 | L | 0.089 | 121 | 0.089 | 0.123 | 0 | 1 | 0 |
| 141 | L | 0.038 | 122 | 0.038 | 0.046 | 0 | 1 | 0 |
| 142 | L | 0.015 | 123 | 0.015 | 0.011 | 0 | 1 | 0 |
| 143 | E | 0.0023 | 124 | 0.0023 | 0 | 0 | 1 | 0 |
| 144 | S | 0.023 | 125 | 0.023 | 0.03 | 0 | 1 | 0 |
| 145 | P | 0.13 | 126 | 0.13 | 0.112 | 0 | 1 | 0 |
| 147 | E | 0.054 | 127 | 0.054 | 0.2 | 0.014 | 0.991 | 0.006 |
| 148 | A | 0.061 | 128 | 0.061 | 0.091 | 0 | 1 | 0 |
| 149 | R | 0.033 | 129 | 0.033 | 0.064 | 0 | 1 | 0 |
| 150 | T | 0.037 | 130 | 0.037 | 0.06 | 0 | 1 | 0 |
| 151 | K | 0.062 | 131 | 0.062 | 0.009 | 0 | 1 | 0 |
| 152 | F | 0.027 | 132 | 0.027 | 0.007 | 0 | 1 | 0 |
| 153 | I | 0.029 | 133 | 0.029 | 0.032 | 0 | 1 | 0 |
| 154 | N | 0.031 | 134 | 0.031 | 0.108 | 0.002 | 0.97 | 0.017 |
| 155 | S | 0.013 | 135 | 0.013 | 0.052 | 0 | 1 | 0 |
| 156 | A | 0.075 | 136 | 0.075 | 0.126 | 0 | 1 | 0 |
| 157 | V | 0.083 | 137 | 0.083 | 0.062 | 0 | 1 | 0 |
| 158 | Q | 0.088 | 138 | 0.088 | 0.01 | 0 | 1 | 0 |
| 159 | L | 0.026 | 139 | 0.026 | 0.017 | 0 | 1 | 0 |
| 160 | T | 0.057 | 140 | 0.057 | 0.091 | 0 | 1 | 0 |
| 161 | K | 0.083 | 141 | 0.083 | 0.042 | 0 | 1 | 0 |
| 162 | Q | 0.038 | 142 | 0.038 | 0.011 | 0 | 1 | 0 |
| 163 | Y | 0.077 | 143 | 0.077 | 0.007 | 0 | 1 | 0 |
| 164 | G | 0.088 | 144 | 0.088 | 0.094 | 0 | 1 | 0 |
| 165 | F | 0.0034 | 145 | 0.0034 | 0 | 0 | 1 | 0 |
| 166 | D | 0.011 | 146 | 0.011 | 0.003 | 0 | 1 | 0 |
| 167 | G | 0.0032 | 147 | 0.0032 | 0 | 0 | 1 | 0 |
| 168 | L | 0.063 | 148 | 0.063 | 0.039 | 0 | 1 | 0 |
| 169 | D | 0.011 | 149 | 0.011 | 0.006 | 0 | 1 | 0 |

Type your text

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 170 | I | 0.054 | 150 | 0.054 | 0.022 | 0 | 1 | 0 |
| 171 | A | 0.014 | 151 | 0.014 | 0.034 | 0 | 1 | 0 |
| 172 | W | 0.035 | 152 | 0.035 | 0 | 0.001 | 1 | 0 |
| 173 | E | 0.034 | 153 | 0.034 | 0.031 | 0 | 1 | 0 |
| 174 | F | 0.038 | 154 | 0.038 | 0.141 | 0.013 | 0.978 | 0.009 |
| 175 | P | 0.12 | 155 | 0.12 | 0.096 | 0 | 1 | 0 |
| 176 | E | 0.18 | 156 | 0.18 | 0.153 | 0 | 1 | 0 |
| 177 | N | 0.17 | 157 | 0.17 | 0.34 | 0.016 | 0.98 | 0.006 |
| 178 | K | 0.0025 | 158 | 0.0025 | 0 | 0 | 1 | 0 |
| 179 | P | 0.0031 | 159 | 0.0031 | 0 | 0 | 1 | 0 |
| 180 | K | 0.011 | 160 | 0.011 | 0.022 | 0 | 1 | 0 |
| 181 | K | 0.021 | 161 | 0.021 | 0.03 | 0 | 1 | 0 |
| 182 | I | 0.046 | 162 | 0.046 | 0.168 | 0.002 | 0.987 | 0.007 |
| 183 | R | 0.012 | 163 | 0.012 | 0.023 | 0 | 1 | 0 |
| 184 | G | 0.038 | 164 | 0.038 | 0.082 | 0 | 1 | 0 |
| 185 | A | 0.17 | 165 | 0.17 | 0.383 | 0.03 | 0.974 | 0.009 |
| 186 | I | 0.38 | 166 | 0.38 | 0.016 | 0 | 1 | 0 |
| 187 | G | 0.032 | 167 | 0.032 | 0.076 | 0 | 1 | 0 |
| 188 | S | 0.07 | 168 | 0.07 | 0.017 | 0 | 1 | 0 |
| 189 | L | 0.2 | 169 | 0.2 | 0.37 | 0.066 | 0.925 | 0.04 |
| 190 | W | 0.0073 | 170 | 0.0073 | NaN | 1 | 0.984 | 0.003 |
| 191 | H | 0.01 | 171 | 0.01 | 0.008 | 0 | 1 | 0 |
| 192 | G | 0.075 | 172 | 0.075 | 0.058 | 0 | 1 | 0 |
| 193 | F | 0.084 | 173 | 0.084 | 0.258 | 0.026 | 0.913 | 0.056 |
| 194 | K | 0.0025 | 174 | 0.0025 | 0 | 0 | 1 | 0 |
| 195 | K | 0.013 | 175 | 0.013 | 0.016 | 0 | 1 | 0 |
| 196 | I | 0.078 | 176 | 0.078 | 0.101 | 0 | 1 | 0 |
| 197 | F | 0.0033 | 177 | 0.0033 | 0 | 0 | 1 | 0 |
| 200 | K | 0.076 | 178 | 0.076 | 0.192 | 0.001 | 0.995 | 0.002 |
| 201 | T | 0.073 | 179 | 0.073 | 0.07 | 0 | 1 | 0 |
| 202 | T | 0.033 | 180 | 0.033 | 0.033 | 0 | 1 | 0 |
| 203 | P | 0.076 | 181 | 0.076 | 0.122 | 0 | 1 | 0 |
| 204 | V | 0.026 | 182 | 0.026 | 0.019 | 0 | 1 | 0 |
| 205 | D | 0.0024 | 183 | 0.0024 | 0 | 0 | 1 | 0 |
| 206 | E | 0.17 | 184 | 0.17 | 0.25 | 0.042 | 0.904 | 0.063 |
| 207 | N | 0.032 | 185 | 0.032 | 0.032 | 0 | 1 | 0 |
| 208 | A | 0.024 | 186 | 0.024 | 0.018 | 0 | 1 | 0 |
| 209 | E | 0.17 | 187 | 0.17 | 0.338 | 0.017 | 0.983 | 0.006 |
| 210 | Q | 0.03 | 188 | 0.03 | 0.027 | 0 | 1 | 0 |
| 211 | H | 0.002 | 189 | 0.002 | 0 | 0 | 1 | 0 |
| 212 | R | 0.042 | 190 | 0.042 | 0.035 | 0 | 1 | 0 |
| 213 | E | 0.075 | 191 | 0.075 | 0.153 | 0.003 | 0.998 | 0.001 |
| 214 | G | 0.054 | 192 | 0.054 | 0.052 | 0 | 1 | 0 |
| 215 | Y | 0.059 | 193 | 0.059 | 0.03 | 0 | 1 | 0 |
| 216 | T | 0.019 | 194 | 0.019 | 0.033 | 0 | 1 | 0 |
| 217 | A | 0.031 | 195 | 0.031 | 0.025 | 0 | 1 | 0 |
| 218 | F | 0.027 | 196 | 0.027 | 0.018 | 0 | 1 | 0 |
| 219 | I | 0.021 | 197 | 0.021 | 0.03 | 0 | 1 | 0 |
| 220 | R | 0.033 | 198 | 0.033 | 0.044 | 0 | 1 | 0 |
| 221 | E | 0.02 | 199 | 0.02 | 0.024 | 0 | 1 | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 222 | L | 0.15 | 200 | 0.15 | 0.306 | *0.049* | *0.966* | 0.019 |
| 223 | K | 0.034 | 201 | 0.034 | 0.023 | *0* | *1* | 0 |
| 224 | Q | 0.074 | 202 | 0.074 | 0.014 | *0* | *1* | 0 |
| 225 | A | 0.0072 | 203 | 0.0072 | 0.011 | *0* | *1* | 0 |
| 226 | V | 0.091 | 204 | 0.091 | 0.034 | *0* | *1* | 0 |
| 227 | R | 0.11 | 205 | 0.11 | 0.083 | *0* | *1* | 0 |
| 228 | P | 0.086 | 206 | 0.086 | 0.093 | *0* | *1* | 0 |
| 233 | E | 0.038 | 207 | 0.038 | 0.03 | *0* | *1* | 0 |
| 234 | - | 0.024 | | | 0.015 | *0* | *1* | 0 |
| 235 | K | 0.067 | 208 | 0.067 | 0.09 | *0* | *0.998* | 0.001 |
| 236 | L | 0.14 | 209 | 0.14 | 0 | *0.001* | *0.999* | 0.001 |
| 237 | I | 0.09 | 210 | 0.09 | 0.069 | *0* | *1* | 0 |
| 238 | L | 0.028 | 211 | 0.028 | 0.004 | *0* | *1* | 0 |
| 239 | T | 0.11 | 212 | 0.11 | 0.207 | *0* | *1* | 0 |
| 241 | T | 0.046 | 214 | 0.046 | 0.091 | *0* | *1* | 0 |
| 242 | V | 0.053 | 215 | 0.053 | 0.056 | *0* | *1* | 0 |
| 243 | L | 0.033 | 216 | 0.033 | 0.019 | *0* | *1* | 0 |
| 244 | P | 0.0028 | 217 | 0.0028 | 0 | *0* | *1* | 0 |
| 245 | N | 0.021 | 218 | 0.021 | 0.018 | *0* | *1* | 0 |
| 246 | V | 0.0086 | 219 | 0.0086 | 0.024 | *0* | *1* | 0 |
| 247 | N | 0.0017 | 220 | 0.0017 | 0 | *0* | *1* | 0 |
| 249 | T | 0.13 | 222 | 0.13 | 0.262 | *0.007* | *1* | 0 |
| 250 | I | 0.15 | 223 | 0.15 | 0.127 | *0* | *1* | 0 |
| 251 | Y | 0.037 | 224 | 0.037 | 0.184 | *0.057* | *0.916* | 0.045 |
| 253 | D | 0.0024 | 226 | 0.0024 | 0 | *0* | *1* | 0 |
| 254 | V | 0.034 | 227 | 0.034 | 0.078 | *0* | *1* | 0 |
| 255 | S | 0.033 | 228 | 0.033 | 0.02 | *0* | *1* | 0 |
| 256 | A | 0.083 | 229 | 0.083 | 0.255 | *0.004* | *0.996* | 0.001 |
| 257 | I | 0.02 | 230 | 0.02 | 0.042 | *0* | *1* | 0 |
| 258 | I | 0.037 | 231 | 0.037 | 0.057 | *0* | *1* | 0 |
| 259 | N | 0.025 | 232 | 0.025 | 0.028 | *0* | *1* | 0 |
| 260 | H | 0.14 | 233 | 0.14 | 0.1 | *0* | *1* | 0 |
| 261 | L | 0.045 | 234 | 0.045 | 0.05 | *0* | *1* | 0 |
| 262 | D | 0.0023 | 235 | 0.0023 | 0 | *0* | *1* | 0 |
| 263 | F | 0.2 | 236 | 0.2 | 0.132 | *0* | *0.999* | 0 |
| 264 | V | 0.033 | 237 | 0.033 | 0.052 | *0* | *1* | 0 |
| 265 | N | 0.036 | 238 | 0.036 | 0.081 | *0* | *0.997* | 0.001 |
| 266 | L | 0.16 | 239 | 0.16 | 0.014 | *0* | *1* | 0 |
| 267 | E | 0.39 | 240 | 0.39 | 0.317 | *0.08* | *0.938* | 0.009 |
| 268 | G | 0.059 | 241 | 0.059 | 0.057 | *0* | *1* | 0 |
| 269 | F | 0.14 | 242 | 0.14 | 0.01 | *0* | *1* | 0 |
| 270 | D | 0.01 | 243 | 0.01 | 0.011 | *0* | *1* | 0 |
| 271 | F | 0.15 | 244 | 0.15 | 0.098 | *0* | *0.993* | 0.004 |
| 273 | T | 0.0072 | 246 | 0.0072 | 0.007 | *0* | *1* | 0 |
| 274 | P | 0.05 | 247 | 0.05 | 0.037 | *0* | *1* | 0 |
| 275 | E | 0.11 | 248 | 0.11 | 0.008 | *0* | *1* | 0 |
| 276 | R | 0.0025 | 249 | 0.0025 | 0 | *0* | *1* | 0 |
| 277 | N | 0.0016 | 250 | 0.0016 | 0 | *0* | *1* | 0 |
| 278 | P | 0.039 | 251 | 0.039 | 0.055 | *0* | *1* | 0 |
| 279 | S | 0.036 | 252 | 0.036 | 0.015 | *0* | *1* | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 280 | E | 0.01 | 253 | 0.01 | 0.003 | 0 | 1 | 0 |
| 281 | A | 0.014 | 254 | 0.014 | 0.032 | 0 | 1 | 0 |
| 282 | D | 0.0023 | 255 | 0.0023 | 0 | 0 | 1 | 0 |
| 283 | Y | 0.026 | 256 | 0.026 | 0.023 | 0 | 1 | 0 |
| 284 | T | 0.085 | 257 | 0.085 | 0.208 | 0 | 1 | 0 |
| 285 | A | 0.13 | 258 | 0.13 | 0.197 | 0.001 | 1 | 0 |
| 286 | P | 0.003 | 259 | 0.003 | 0 | 0 | 1 | 0 |
| 287 | L | 0.14 | 260 | 0.14 | 0.048 | 0 | 1 | 0 |
| 288 | Y | 0.026 | 261 | 0.026 | 0.041 | 0 | 1 | 0 |
| 289 | E | 0.093 | 262 | 0.093 | 0.045 | 0 | 1 | 0 |
| 290 | A | 0.063 | 263 | 0.063 | 0.02 | 0 | 1 | 0 |
| 291 | Y | 0.083 | 264 | 0.083 | 0.09 | 0 | 1 | 0 |
| 292 | E | 0.062 | 265 | 0.062 | 0.235 | 0.019 | 0.896 | 0.068 |
| 293 | R | 0.011 | 266 | 0.011 | 0.01 | 0 | 1 | 0 |
| 294 | N | 0.03 | 267 | 0.03 | 0.037 | 0 | 1 | 0 |
| 295 | P | 0.17 | 268 | 0.17 | 0.266 | 0.005 | 0.998 | 0.001 |
| 296 | G | 0.16 | 269 | 0.16 | 0.171 | 0 | 1 | 0 |
| 299 | N | 0.28 | 270 | 0.28 | 0.042 | 0 | 1 | 0 |
| 300 | N | 0.0017 | 271 | 0.0017 | 0 | 0 | 1 | 0 |
| 301 | I | 0.11 | 272 | 0.11 | 0.17 | 0 | 1 | 0 |
| 302 | N | 0.067 | 273 | 0.067 | 0.025 | 0 | 1 | 0 |
| 303 | H | 0.12 | 274 | 0.12 | 0.263 | 0.002 | 0.997 | 0.001 |
| 304 | L | 0.1 | 275 | 0.1 | 0.208 | 0.001 | 1 | 0 |
| 305 | T | 0.056 | 276 | 0.056 | 0.143 | 0 | 1 | 0 |
| 306 | Q | 0.38 | 277 | 0.38 | 0.287 | 0.007 | 0.936 | 0 |
| 307 | Y | 0.072 | 278 | 0.072 | 0.204 | 0.027 | 0.912 | 0.059 |
| 308 | W | 0.057 | 279 | 0.057 | 0.005 | 0.015 | 0.991 | 0.007 |
| 309 | L | 0.18 | 280 | 0.18 | 0.058 | 0 | 1 | 0 |
| 310 | T | 0.19 | 281 | 0.19 | 0.063 | 0 | 1 | 0 |
| 311 | N | 0.19 | 282 | 0.19 | 0.184 | 0.001 | 0.982 | 0 |
| 312 | G | 0.11 | 283 | 0.11 | 0.158 | 0 | 0.999 | 0 |
| 313 | A | 0.054 | 284 | 0.054 | 0.011 | 0 | 1 | 0 |
| 314 | P | 0.015 | 285 | 0.015 | 0.002 | 0 | 1 | 0 |
| 315 | G | 0.31 | 286 | 0.31 | 0.161 | 0.001 | 0.983 | 0 |
| 316 | S | 0.31 | 287 | 0.31 | 0.233 | 0.015 | 0.964 | 0 |
| 317 | K | 0.0025 | 288 | 0.0025 | 0 | 0 | 1 | 0 |
| 318 | I | 0.092 | 289 | 0.092 | 0.004 | 0 | 1 | 0 |
| 319 | V | 0.074 | 290 | 0.074 | 0.114 | 0 | 1 | 0 |
| 320 | V | 0.19 | 291 | 0.19 | 0.12 | 0 | 1 | 0 |
| 321 | G | 0.07 | 292 | 0.07 | 0.117 | 0 | 0.999 | 0 |
| 322 | I | 0.068 | 293 | 0.068 | 0.152 | 0.002 | 0.987 | 0.007 |
| 323 | A | 0.079 | 294 | 0.079 | 0.119 | 0 | 1 | 0 |
| 324 | T | 0.035 | 295 | 0.035 | 0.061 | 0 | 1 | 0 |
| 325 | F | 0.2 | 296 | 0.2 | 0.055 | 0 | 1 | 0 |
| 326 | G | 0.14 | 297 | 0.14 | 0.171 | 0 | 1 | 0 |
| 327 | R | 0.0027 | 298 | 0.0027 | 0 | 0 | 1 | 0 |
| 328 | T | 0.042 | 299 | 0.042 | 0.065 | 0 | 1 | 0 |
| 329 | W | 0.0073 | 300 | 0.0073 | NaN | 1 | 0.984 | 0.003 |
| 330 | K | 0.032 | 301 | 0.032 | 0.002 | 0 | 1 | 0 |
| 331 | M | 0.076 | 302 | 0.076 | 0.088 | 0 | 1 | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 332 | T | 0.061 | 303 | 0.061 | 0.067 | 0 | 1 | 0 |
| 333 | S | 0.17 | 304 | 0.17 | 0.322 | 0.008 | 0.999 | 0 |
| 334 | S | 0.082 | 305 | 0.082 | 0.126 | 0.003 | 0.959 | 0.026 |
| 335 | S | 0.038 | 306 | 0.038 | 0.018 | 0 | 1 | 0 |
| 336 | N | 0.068 | 307 | 0.068 | 0.041 | 0 | 1 | 0 |
| 337 | I | 0.027 | 308 | 0.027 | 0.069 | 0 | 1 | 0 |
| 338 | A | 0.076 | 309 | 0.076 | 0.25 | 0.002 | 0.99 | 0.004 |
| 339 | G | 0.004 | 310 | 0.004 | 0 | 0 | 1 | 0 |
| 340 | V | 0.0091 | 311 | 0.0091 | 0.009 | 0 | 1 | 0 |
| 341 | P | 0.0032 | 312 | 0.0032 | 0 | 0 | 1 | 0 |
| 342 | P | 0.034 | 313 | 0.034 | 0.035 | 0 | 1 | 0 |
| 343 | L | 0.23 | 314 | 0.23 | 0.507 | 0.113 | 0.96 | 0.013 |
| 344 | E | 0.083 | 315 | 0.083 | 0.075 | 0 | 1 | 0 |
| 346 | M | 0.21 | 317 | 0.21 | 0 | 0.399 | 0.916 | 0.071 |
| 347 | D | 0.068 | 318 | 0.068 | 0.038 | 0 | 1 | 0 |
| 348 | G | 0.017 | 319 | 0.017 | 0.011 | 0 | 1 | 0 |
| 349 | P | 0.13 | 320 | 0.13 | 0.212 | 0 | 0.999 | 0 |
| 350 | G | 0.031 | 321 | 0.031 | 0.027 | 0 | 1 | 0 |
| 351 | E | 0.037 | 322 | 0.037 | 0.148 | 0.003 | 0.999 | 0.001 |
| 352 | E | 0.029 | 323 | 0.029 | 0.092 | 0 | 0.999 | 0 |
| 353 | G | 0.0036 | 324 | 0.0036 | 0 | 0 | 1 | 0 |
| 354 | P | 0.0033 | 325 | 0.0033 | 0 | 0 | 1 | 0 |
| 355 | Y | 0.035 | 326 | 0.035 | 0.191 | 0.055 | 0.9 | 0.059 |
| 356 | S | 0.025 | 327 | 0.025 | 0.044 | 0 | 1 | 0 |
| 357 | K | 0.021 | 328 | 0.021 | 0.003 | 0 | 1 | 0 |
| 358 | T | 0.19 | 329 | 0.19 | 0.298 | 0.004 | 0.999 | 0 |
| 359 | P | 0.086 | 330 | 0.086 | 0.08 | 0 | 1 | 0 |
| 360 | G | 0.015 | 331 | 0.015 | 0.019 | 0 | 1 | 0 |
| 361 | L | 0.19 | 332 | 0.19 | 0.065 | 0 | 1 | 0 |
| 362 | L | 0.017 | 333 | 0.017 | 0.02 | 0 | 1 | 0 |
| 363 | S | 0.0055 | 334 | 0.0055 | 0.007 | 0 | 1 | 0 |
| 364 | Y | 0.041 | 335 | 0.041 | 0.044 | 0 | 1 | 0 |
| 365 | P | 0.042 | 336 | 0.042 | 0.032 | 0 | 1 | 0 |
| 366 | E | 0.0024 | 337 | 0.0024 | 0 | 0 | 1 | 0 |
| 367 | V | 0.043 | 338 | 0.043 | 0.03 | 0 | 1 | 0 |
| 368 | C | 0.0036 | 339 | 0.0036 | 0 | 0 | 1 | 0 |
| 369 | A | 0.078 | 340 | 0.078 | 0.188 | 0 | 1 | 0 |
| 370 | K | 0.013 | 341 | 0.013 | 0.012 | 0 | 1 | 0 |
| 371 | L | 0.015 | 342 | 0.015 | 0.013 | 0 | 1 | 0 |
| 373 | N | 0.02 | 344 | 0.02 | 0.02 | 0 | 1 | 0 |
| 374 | P | 0.0029 | 345 | 0.0029 | 0 | 0 | 1 | 0 |
| 375 | D | 0.083 | 346 | 0.083 | 0.088 | 0 | 0.998 | 0.001 |
| 376 | N | 0.029 | 347 | 0.029 | 0.029 | 0 | 1 | 0 |
| 377 | Q | 0.084 | 348 | 0.084 | 0.1 | 0 | 1 | 0 |
| 378 | K | 0.046 | 349 | 0.046 | 0.032 | 0 | 1 | 0 |
| 381 | G | 0.0038 | 350 | 0.0038 | 0 | 0 | 1 | 0 |
| 382 | L | 0.076 | 351 | 0.076 | 0.04 | 0 | 1 | 0 |
| 383 | L | 0.17 | 352 | 0.17 | 0.071 | 0 | 1 | 0 |
| 384 | P | 0.087 | 353 | 0.087 | 0.125 | 0 | 1 | 0 |
| 385 | H | 0.082 | 354 | 0.082 | 0.054 | 0 | 1 | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 386 | L | 0.052 | 355 | 0.052 | 0.024 | 0 | 1 | 0 |
| 387 | R | 0.0088 | 356 | 0.0088 | 0.013 | 0 | 1 | 0 |
| 388 | K | 0.02 | 357 | 0.02 | 0.015 | 0 | 1 | 0 |
| 389 | V | 0.021 | 358 | 0.021 | 0.045 | 0 | 1 | 0 |
| 390 | P | 0.07 | 359 | 0.07 | 0.155 | 0 | 1 | 0 |
| 391 | D | 0.0024 | 360 | 0.0024 | 0 | 0 | 1 | 0 |
| 392 | P | 0.0029 | 361 | 0.0029 | 0 | 0 | 1 | 0 |
| 393 | S | 0.014 | 362 | 0.014 | 0.173 | 0.049 | 0.928 | 0.034 |
| 394 | K | 0.029 | 363 | 0.029 | 0.01 | 0 | 1 | 0 |
| 395 | R | 0.0031 | 364 | 0.0031 | 0 | 0 | 1 | 0 |
| 396 | F | 0.044 | 365 | 0.044 | 0.014 | 0 | 1 | 0 |
| 433 | - | 0.067 | | | 0 | 0.115 | 0.959 | 0.033 |
| 434 | - | 0.052 | | | 0 | 0.084 | 0.972 | 0.023 |
| 438 | G | 0.0041 | 366 | 0.0041 | 0 | 0 | 1 | 0 |
| 439 | T | 0.015 | 367 | 0.015 | 0.03 | 0 | 1 | 0 |
| 440 | Y | 0.0033 | 368 | 0.0033 | 0 | 0 | 1 | 0 |
| 441 | A | 0.0017 | 369 | 0.0017 | 0 | 0 | 1 | 0 |
| 442 | F | 0.026 | 370 | 0.026 | 0.15 | 0.082 | 0.921 | 0.026 |
| 443 | R | 0.013 | 371 | 0.013 | 0.034 | 0 | 1 | 0 |
| 444 | V | 0.18 | 372 | 0.18 | 0.108 | 0 | 1 | 0 |
| 445 | P | 0.048 | 373 | 0.048 | 0.096 | 0 | 1 | 0 |
| 446 | D | 0.011 | 374 | 0.011 | 0.008 | 0 | 1 | 0 |
| 447 | D | 0.064 | 375 | 0.064 | 0.121 | 0.002 | 0.961 | 0.024 |
| 448 | N | 0.092 | 376 | 0.092 | 0.101 | 0 | 0.998 | 0.001 |
| 449 | D | 0.096 | 377 | 0.096 | 0.091 | 0 | 1 | 0 |
| 450 | E | 0.075 | 378 | 0.075 | 0.029 | 0 | 1 | 0 |
| 451 | G | 0.082 | 379 | 0.082 | 0.252 | 0.003 | 0.972 | 0.011 |
| 452 | G | 0.0034 | 380 | 0.0034 | 0 | 0 | 1 | 0 |
| 453 | L | 0.19 | 381 | 0.19 | 0.085 | 0 | 1 | 0 |
| 454 | W | 0.0073 | 382 | 0.0073 | NaN | 1 | 0.984 | 0.003 |
| 455 | V | 0.041 | 383 | 0.041 | 0.08 | 0 | 1 | 0 |
| 456 | G | 0.19 | 384 | 0.19 | 0.411 | 0.091 | 0.956 | 0.013 |
| 457 | Y | 0.0032 | 385 | 0.0032 | 0 | 0 | 1 | 0 |
| 458 | E | 0.01 | 386 | 0.01 | 0.001 | 0 | 1 | 0 |
| 459 | D | 0.0024 | 387 | 0.0024 | 0 | 0 | 1 | 0 |
| 460 | P | 0.048 | 388 | 0.048 | 0.027 | 0 | 1 | 0 |
| 461 | D | 0.036 | 389 | 0.036 | 0.051 | 0 | 1 | 0 |
| 462 | S | 0.028 | 390 | 0.028 | 0.044 | 0 | 1 | 0 |
| 463 | A | 0.0079 | 391 | 0.0079 | 0.031 | 0 | 1 | 0 |
| 464 | G | 0.086 | 392 | 0.086 | 0.188 | 0.001 | 0.999 | 0 |
| 465 | D | 0.04 | 393 | 0.04 | 0.062 | 0 | 1 | 0 |
| 466 | K | 0.02 | 394 | 0.02 | 0.007 | 0 | 1 | 0 |
| 467 | A | 0.014 | 395 | 0.014 | 0.027 | 0 | 1 | 0 |
| 469 | Y | 0.038 | 397 | 0.038 | 0.011 | 0 | 1 | 0 |
| 470 | V | 0.083 | 398 | 0.083 | 0.151 | 0 | 1 | 0 |
| 471 | R | 0.043 | 399 | 0.043 | 0.045 | 0 | 1 | 0 |
| 472 | A | 0.064 | 400 | 0.064 | 0.162 | 0 | 1 | 0 |
| 473 | K | 0.036 | 401 | 0.036 | 0.087 | 0.001 | 1 | 0 |
| 474 | G | 0.15 | 402 | 0.15 | 0.154 | 0 | 1 | 0 |
| 475 | L | 0.0032 | 403 | 0.0032 | 0 | 0 | 1 | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 476 | G | 0.014 | 404 | 0.014 | 0.011 | 0 | 1 | 0 |
| 477 | G | 0.0036 | 405 | 0.0036 | 0 | 0 | 1 | 0 |
| 478 | V | 0.072 | 406 | 0.072 | 0.018 | 0 | 1 | 0 |
| 479 | A | 0.019 | 407 | 0.019 | 0.041 | 0 | 1 | 0 |
| 480 | I | 0.028 | 408 | 0.028 | 0.036 | 0 | 1 | 0 |
| 481 | V | 0.2 | 409 | 0.2 | 0.018 | 0.001 | 1 | 0 |
| 482 | D | 0.0024 | 410 | 0.0024 | 0 | 0 | 1 | 0 |
| 483 | L | 0.0035 | 411 | 0.0035 | 0 | 0 | 1 | 0 |
| 484 | S | 0.025 | 412 | 0.025 | 0.006 | 0 | 1 | 0 |
| 485 | L | 0.078 | 413 | 0.078 | 0.064 | 0 | 1 | 0 |
| 486 | D | 0.0024 | 414 | 0.0024 | 0 | 0 | 1 | 0 |
| 487 | D | 0.0023 | 415 | 0.0023 | 0 | 0 | 1 | 0 |
| 489 | R | 0.0029 | 417 | 0.0029 | 0 | 0 | 1 | 0 |
| 490 | G | 0.015 | 418 | 0.015 | 0.015 | 0 | 1 | 0 |
| 491 | S | 0.11 | 419 | 0.11 | 0.063 | 0 | 1 | 0 |
| 492 | C | 0.0035 | 420 | 0.0035 | 0 | 0 | 1 | 0 |
| 493 | T | 0.068 | 421 | 0.068 | 0.095 | 0 | 1 | 0 |
| 494 | G | 0.046 | 422 | 0.046 | 0.038 | 0 | 1 | 0 |
| 495 | D | 0.028 | 423 | 0.028 | 0.039 | 0 | 1 | 0 |
| 496 | K | 0.011 | 424 | 0.011 | 0.007 | 0 | 1 | 0 |
| 497 | Y | 0.028 | 425 | 0.028 | 0.002 | 0 | 1 | 0 |
| 498 | P | 0.0029 | 426 | 0.0029 | 0 | 0 | 1 | 0 |
| 499 | I | 0.033 | 427 | 0.033 | 0.063 | 0 | 1 | 0 |
| 500 | L | 0.0035 | 428 | 0.0035 | 0 | 0 | 1 | 0 |
| 501 | R | 0.013 | 429 | 0.013 | 0.009 | 0 | 1 | 0 |
| 502 | A | 0.0017 | 430 | 0.0017 | 0 | 0 | 1 | 0 |
| 503 | A | 0.034 | 431 | 0.034 | 0.069 | 0 | 1 | 0 |
| 504 | K | 0.021 | 432 | 0.021 | 0.038 | 0 | 1 | 0 |
| 505 | Y | 0.014 | 433 | 0.014 | 0.027 | 0 | 0.999 | 0 |
| 506 | R | 0.035 | 434 | 0.035 | 0.019 | 0 | 1 | 0 |
| 507 | L | 0.041 | 435 | 0.041 | 0.033 | 0 | 1 | 0 |

value for positions under purifying selection highlighted by purple
significant p value of FEL test in red