**Figure 1-figure supplement 1.**

Spotted Gar -like ----------------------------------------MVISKKA------------------

Asian Arowana -like ---------------------------------------------MPPKK---------------

Coelacanth ASIC1 -------------------MAAPCHSSDSV----------LSPYDSKDRE---------------

Catfish ASIC1 -------------------MVTLTTTREPV----------NNGSKAPKAG---------------

E. Lamprey ASIC1 ----------------------------------------MDLKGAPSDE---------------

E. Shark ASIC1 ------------------------------------------MDLKPPAE---------------

J. Medaka ASIC1 ----------------------MDLKADSD----------EMDYKRPAPI---------------

Black Rock Cod ASIC1 ----------------------MDLKADSE----------DMDYKRPAPI---------------

Lancelet -like ------------------------------------------------MS---------------

Lancelet -like ----------------------------------------------MPRT---------------

E. Shark  -----------------------------------------------------------------

Frog  ---------------------------MES----------TEKEKKEGLI---------------

Coelacanth  ---------------------------MSE----------KKEEKSKGLI---------------

S. Lamprey  ---------------------PPTVLEFWR----------------GSVT---------------

J. Lamprey  -----------------------------------------------------------------

W. Lungfish  ----------------------MPNKEENA----------ENGKKKEGLF---------------

A. Lungfish  ----------------------MTDKEEEA----------EGGKKKEPMI---------------

Ropefish  -------------------------MSTTD----------DKQERKEGLL---------------

Frog  ---------------------------MTK----------EEKNEKEALI---------------

Salamander  -----------------------MTEE---------------KKEKEGLI---------------

Cow  ---------------------MKGDKPEEPGPGPEPSGPPPPTEEEEALL---------------

Human  -MEGNKLEEQDSSPPQSTPGLMKGNKREEQGLGPEPAAPQQPTAEEEALI---------------

Chicken  -MGTASRGGSVKAEKMPEGEKTRQCKQETE--------QQQKEDEREGLI---------------

Turtle  ----MHQVVAVKAENVPVGERLRRCKQEAEKQQKVEEVAEKLEKECQGLI---------------

Cow  --------MENGRLMAQVGRPGWGQAKWWAGAPLSLTSQMQAEGTGQTVGGGPGTWTCPQASPPT

Human  MAEHRSMDGRMEAATRGGSHLQAAAQTPPRPGPPSAPPPPPKEGHQEGLV---------------

Coelacanth  -----------------------CLQSLKM---------AQEEDKEEAVI---------------

Chicken  -----------------------MEQEAAR----------EEEERKEGLI---------------

Turtle  ------------------------MEQEWV----------NEEMGDEGLI---------------

S. Lamprey  ----------------------MKIRKYLT----------RSLHRLQ-KG---------------

J. Lamprey  -------------------MANMKIRKYLT----------RSLHRLQ-KG---------------

E. Shark  -------------------MLWVSARRCLS----------QALRRLQ-DG---------------

Coelacanth  ----------------------MSVRKYFT----------RALHRLQ-KG---------------

Ropefish  ----------------------MGVQKYLT----------YALHRIQ-KG---------------

W. Lungfish  ---------------------MSFLKRFCV----------RSWHRIK-KG---------------

A. Lungfish  ----------------------MFLKRWFI----------RALHRLQ-KG---------------

Frog  ----------------MIHGKMKRLKRYFT----------RALHRIQ-KG---------------

Cow  ----------------------MHVKKYLL----------KGLHRLQ-KG---------------

Human  ----------------------MHVKKYLL----------KGLHRLQ-KG---------------

Chicken  ----------------------MNLKRYFV----------RALHRLQ-KG---------------

Turtle  ----------------MFTGMTMNFKRYFI----------RVLHRLQ-KG---------------

S. Lamprey  ------------------MASEGDSKRVLH----------RVKDTLKIDG---------------

J. Lamprey  -----------------MASEGDSNKRVLH----------RVKDTLKIEG---------------

Ropefish  --------------------MESVAKKLPK----------KVKEKLPVTG---------------

E. Shark  --------------MESVGAMEPGKRKLSA----------KIMEKLPVTG---------------

W. Lungfish  ---------------------MKNTKKFKE----------SVKKQLPLTG---------------

A. Lungfish  ---------------------MGHGRRISE----------SIKKQLPVTG---------------

Coelacanth  ------------------ATMTSRKKSLPE----------KIKENLPVTG---------------

Frog  --------------------MSKSGKKLTQ----------KLKKNLPVTG---------------

Cow  ---------------------MAPGEKIKA----------KIKKNLPVTG---------------

Human  ---------------------MAPGEKIKA----------KIKKNLPVTG---------------

Chicken  ----------------------MAPGKITA----------RIKKTLPVRG---------------

Turtle  --------MEPPRPGDTRELNMAPGKTIKA----------KIKKTLPVTG---------------

Spotted Gar -like ---------------TLQSICRETLIHTSA**HG**VSSILRS-RSNHQKNCWIIFVVVVVGCML-**W**QC

Asian Arowana -like -----------PGAMTSLWMLRDDIQHTTA**HG**IPNIFRA-RHWFRRSLWAMFVIFAFCCAI-**W**QC

Coelacanth ASIC1 -----------KRNHSLKQITIAFVKNSKF**HG**IRYIFAYHISKQRRAIWFLAFFIATGLLAI**W**SL

Catfish ASIC1 ----------FERMSSMAKITLAFVFRTKV**HG**LRYVFAADKSKPRRFFWLVAICVCLALLFI**W**SC

E. Lamprey ASIC1 -----------SLDQARPSSVATFADSCTL**HG**IRHIFSPGGLSVRRLLWLLAFLGSLSLLV-**L**QS

E. Shark ASIC1 -----------DGVSNHPASVEAFAKTSTL**HG**ISHIFTYERFSFKRIIWTLAFLGSLSFLV-**H**TC

J. Medaka ASIC1 ---------------------EVFATRSTL**HG**ISHMFTYERMCLKRTLWILFFMLSVGVLV-**M**VC

Black Rock Cod ASIC1 ---------------------EVFASRSTL**HG**ISHMFTYERMCIKRTLWILFFLSSVGVLV-**M**VC

Lancelet -like -----------EKRPSVRSTLRKYGENTSA**HG**IPRAVTT-KSLPRRLFWTCLFLASFSYFL-**Y**QA

Lancelet -like -----------TDNKVASALLE-FADTTTT**HG**VPRAVGS-SSLLRKICWTVAFVASLGYFL-**Y**QA

E. Shark  --------------MDLARALALSRREAIC**HP**APRKP-------------------------**W**R-

Frog  -----------EFYDSFEDMLTFFCDNTTI**HG**TVRLNCSRKNKMKTTFWLVLYFVSFAMMY-**W**QF

Coelacanth  -----------EFYSSYSDLFQFFCSTTTI**HG**AIRLVCTERNKMKTAFWSMLFVASFGLMY-**W**QF

S. Lamprey  -----------DFYDSYDEMFEFFCDNTTI**HG**TIRLVCSKRNKLKTAFWSLLFTVTVILFY-**Y**TS

J. Lamprey  -------------------MFEFFCDNTTI**HG**AIRLVCSKRNKLKTAFWSLLFIVTVILFY-**Y**TS

W. Lungfish  -----------EFYDSFQELFEFFCINTTI**HG**TIRMVCSKHNNMKTAFWTILFIATFGIMY-**W**QF

A. Lungfish  -----------GFYDSYQELFEFFCNNTTI**HG**TIRMVCSKHNNMKTVSWTILFITTFGVMY-**W**QF

Ropefish  -----------EFYTSYSDLFNFFCSNTTI**HG**AIRLVCSENNRMKTAFWAILFPGTVAILY-**W**QF

Frog  -----------EFFSSYRELFEFFCSNTTI**HG**AIRLVCSRRNRMKTAFWLVLFLVTFGLMY-**W**QF

Salamander  -----------EFYSSYRELFEFFCNNTTI**HG**AIRLVCSAHNRMKTAFWVVLFIASFGLLY-**W**QF

Cow  -----------EFHRSYRELFEFFCNNTTI**HG**AIRLVCSQHNRMKTVFWAVLWLCTFGMMY-**W**QF

Human  -----------EFHRSYRELFEFFCNNTTI**HG**AIRLVCSQHNRMKTAFWAVLWLCTFGMMY-**W**QF

Chicken  -----------EFYGSYQDVFQFFCSNTTI**HG**AIRLVCSKKNKMKTAFWSVLFILTFGLMY-**W**QF

Turtle  -----------EFHKSYHELFQFFCNNTTI**HG**AIRLVCSKRNKMKTAFWSVLFFLTFGLMY-**W**QF

Cow  LPEEEHGERLVELHASFRELVTFFCTNSTI**HG**TIRLVCSSQNRLKTASWGLLLAGALGVLY-**W**QF

Human  -----------ELPASFRELLTFFCTNATI**HG**AIRLVCSRGNRLKTTSWGLLSLGALVALC-**W**QL

Coelacanth  -----------EFYDSFKDLFQFFCAHTTV**HG**GIRLICSERNMMKTAFWIILFFASFGLMY-**W**QF

Chicken  -----------EFYDSFKDMFEFFCKNTTI**HG**TIRLVCSSSNKMKTAFWTLLLLASFGMLY-**W**QF

Turtle  -----------EFYSSFKDMFEFFCKNTTI**HG**TVRLVCSSSNRMKTAFWTLLFLASFGMLY-**W**QF

S. Lamprey β -----------PVA-SVSELLYWYCMNTNT**HG**CKRIVVY--GKKKRVLWFLITIIMLGVVL-**W**QW

J. Lamprey  -----------PVA-SVSELLYWYCMNTNT**HG**CKRVVVY--GKKKRVLWFLITIIMLGVVL-**W**QW

E. Shark  -----------PGE-SYRELLVWYCETTST**HG**PKRILTE--GPKKRALWLLLTLLLGGVVC-**W**QW

Coelacanth  -----------PGY-TYKELLVWYCDNTNT**HG**PKRIIKE--GPKKQVLWFILTLTFTALIF-**W**QW

Ropefish  -----------PGY-TYKELLVWYCNNTNT**HG**PKRIVTE--GPKKRFLWFLFTLVFAALVF-**W**QW

W. Lungfish  -----------PGY-GYAELFHWYCDNTNT**HG**PKRLIIE--GPKKKAMWGLLTITFACLVF-**W**NW

A. Lungfish  -----------PGY-GYSELFVWYCNNTNT**HG**PKRLIIE--GPKKKTLWSLFTVTFACLVF-**W**QW

Frog  -----------PGY-TYKELLVWFCDNTNT**HG**PKRIIKE--GPKKRVMWFILTLVFAGLVF-**W**QW

Cow  -----------PGY-TYKELLVWYCDNTNT**HG**PKRIICE--GPKKKAMWFVLTLLFTSLVC-**W**QW

Human  -----------PGY-TYKELLVWYCDNTNT**HG**PKRIICE--GPKKKAMWFLLTLLFAALVC-**W**QW

Chicken  -----------PGY-TYKELLVWYCDNTNT**HG**PKRIIKE--GPKKKVMWFFLTLLFASLVF-**W**QW

Turtle  -----------PGY-TYKELLVWYCDNTNT**HG**PKRIIRE--GPKKKVIWFFLTLLFASLVF-**W**QW

S. Lamprey  -----------PDP-SITDLLDFYLNNTNM**HG**MRRIAVS-KGPIKKTIWIVFSLIAVAMVF-**W**QG

J. Lamprey  -----------PDP-SITDLLDFYLNNTNM**HG**MRRIAVS-KGPIKKTIWIVFSLIAVAMVF-**W**QG

Ropefish  -----------PYAITVKELMVWYCNYTNT**HG**CRRIVVS-RGRLRRWIWTVLTLSAVALIS-**W**QC

E. Shark  -----------PQALSMSELARWYCYNTNT**HG**FRRIVVS-RGRLRRGAWVLLTGCAASLIV-**W**QC

W. Lungfish  -----------PESRTVKDLMDWYCNNTNT**HG**CRRIAVS-RGHLRRWIWICFTLTAVAIIF-**W**QY

A. Lungfish  -----------PEAPTVKNLMDWYLNNTNT**HG**CRRIAVS-RGYLRRWIWICFTVSSVGMIF-**W**QW

Coelacanth  -----------PQALSISELMRWYCYNTNT**HG**CLRIVAS-RGRLRRWIWILLTLSAVALIF-**W**QC

Frog  -----------PQAPTLYELMQWYCLNTNT**HG**CRRIVVS-KGRLRRWIWISLTLCAVAVIF-**W**QC

Cow  -----------PQAPNIKELMQWYCLNTNT**HG**CRRIVVS-RGRLRRLLWILFTLTAVALIF-**W**QC

Human  -----------PQAPTIKELMRWYCLNTNT**HG**CRRIVVS-RGRLRRLLWIGFTLTAVALIL-**W**QC

Chicken  -----------PQAPTLRELMRWYCLNTNT**HG**CRRIVVS-RGRLRRFIWILLTLSAVGLIL-**W**QC

Turtle  -----------PQAPTVSELMHWYCMNTNT**HG**CRRIVVS-RGRLRRFIWILLTLSAVGLIL-**W**QC

Spotted Gar -like SELINTFFHYPSQEKVTLVNSARLK-**FPAVT**F**CN**L**N**QVRKSLMLSKFSFLK-------GGLYFLN

Asian Arowana -like MEIIMTFYSYPSHEKIRLISDTKLM-**FPAVT**I**CN**L**N**SVRHSALKRNFALNNTFLDFCL-------

Coelacanth ASIC1 NRILYLFS-YPAVIKMQMIWARHLY-**YPTVT**I**CN**Y**N**LFRLSRMTK-------------ADLYYSG

Catfish ASIC1 NRLL-YLLSFPAVTKIYMVWANNMT-**FPAVT**L**CN**Q**N**LFRVSSLTK-------------ADLYHSG

E. Lamprey ASIC1 LDWVQYYLRYPCVTKQDEVSTPLTV-**FPAVT**L**CN**L**N**EFRFSRMTR-------------NDLYHAG

E. Shark ASIC1 TQRIQYYFQYPHVTKLDEISAANMT-**FPAIT**I**CN**L**N**EFRFSKITK-------------NDLYHAG

J. Medaka ASIC1 VDRVQFYFEYPHVTKLDEVAASMIV-**FPAIT**F**CN**L**N**SFRFSRVTR-------------NDLYHAG

Black Rock Cod ASIC1 VDRVQLYFQYPHVTKLDEVSAPMMV-**FPSVT**F**CN**L**N**SFRFSRVTR-------------NDLYHAG

Lancelet -like QTLVNKYLVYPVNTDVK-IEWSELE-**FPAVT**I**CN**A**N**PLRYRELIKR----------------GSA

Lancelet -like SMLFNKYFDYPVATDIS-IKFATIE-**FPAVT**I**CN**L**N**PVRLSKLNTAGGEFSSY---IISDVGTTA

E. Shark  ---------FPVKSHRCPPSFPLLLS**LPPSP**S**PS**P**S**PFTHSP-----------------------

Frog  GQLTDQYWAYPTSTIIG-LQSKGKI-**FPAVT**I**CN**L**N**PYRFDQVNMYINQLDQLANETLYSLYEYR

Coelacanth  GIIFGHYFSYPVSMSLT-LEHKKLL-**FPAVT**V**CT**L**N**PYRYKEVESELKELDSLTADTLFELYRYN

S. Lamprey  ALVFLQYYSYTVAVTMG-LMFQQST-**FPAIT**V**CS**L**N**PYRYEVVQSSLSQLDSMTGQALQQLYGYQ

J. Lamprey  ALVFLQYYSYTVAVTMG-LMFQQST-**FPAIT**V**CS**L**N**PYRYEAVQSSLRELDSMTGQALHRLYGYQ

W. Lungfish  GLLLDQYYSFPVSITMA-VNYDKLV-**FPAVT**V**CT**L**N**PYRYNAVSTELANLDCYTEQLLSTLYHYT

A. Lungfish  GLLLGQYYSYPVSITMS-VNFDKLI-**FPAVT**V**CT**L**N**PYRYNVVSTQLANLDCYTEELLSTLYHYN

Ropefish  GLLFGQYFSHPVSIGVS-VNFNELQ-**FPSVT**V**CT**L**N**PYRYSAVREELKELDAVTEETLYKLYGYT

Frog  GLLFGQYFSYPVSINLN-VNSDKLP-**FPAVT**V**CT**L**N**PYRYKAIQNDLQELDKETQRTLYELYKYN

Salamander  GLLFGQYFSYPVSINMN-VNSDKLL-**FPAVT**V**CT**L**N**PYRYTAVLEDLRELDRLTEQTLYDLYRYN

Cow  GQLFGEYFSYPVSLNIN-LNSDKLV-**FPAVS**I**CT**L**N**PYRYKEIQEELEELDRITEQTLFDLYKYN

Human  GLLFGEYFSYPVSLNIN-LNSDKLV-**FPAVT**I**CT**L**N**PYRYPEIKEELEELDRITEQTLFDLYKYS

Chicken  GILYREYFSYPVNLNLN-LNSDRLT-**FPAVT**L**CT**L**N**PYRYSAIRKKLDELDQITHQTLLDLYDYN

Turtle  GILYRQYFSFPVNLNLN-LNSDRLT-**FPAVT**L**CT**L**N**PYRYSAVQKELDELDRITHQTLMDLYNYN

Cow  ALLFEQYWRYPVIMTVS-VHSERKL-**FPSVT**L**CD**M**N**PHRPHLARHHLRVLDDFARESIYSLYRFN

Human  GLLFERHWHRPVLMAVS-VHSERKL-**LPLVT**L**CD**G**N**PRRPSPVLRHLELLDEFARENIDSLYNVN

Coelacanth  GLLFSQYWGYPVSVAIR-VHSGPKI-**FPAVT**V**CT**L**N**PYRYTQVHKYLKELDQMALEVLSTWYGFN

Chicken  ALMFSQYWDYPVVLTMS-MHSEPKM-**FPAIT**I**CN**L**D**PYRFDLVSEHLAQLDRMAEKSVTVLYGIN

Turtle  ALLFSQYWTYPVIMTMS-VHSEPKM-**FPAIT**L**CN**L**D**PYRFDLVSERLAQLDQMAEEAIANLYGYK

S. Lamprey β VLLFQAYLSYGVSVSVN-MGFQRMN-**FPAVT**V**CN**L**N**AYRYSSMKDKIKDLEAYTRVALQTLYNYT

J. Lamprey  VLLFQAYLSYGVSVSVN-MGFQRMN-**FPAVT**V**CN**L**N**AYRYSSIKDKIKDLEAYTRVALQTLYNYN

E. Shark  GVLVQRYLSGETISTLR-TGFKAMV-**FPAVT**L**CN**V**N**PFRYSRSRGLLQPLDRLAELALQRIYMYN

Coelacanth  GLLIQTYLSYGVSTSLS-MGFRAME-**FPAVT**V**CN**V**N**PMKYSEPPKLIQSMHFLIFLFLTKKISKR

Ropefish  GILIQTYMSWGVSTSLS-VGFKTAP-**FPAVT**I**CN**V**N**PFKYSKVKPLIEDLDEAARTALAKIHTYF

W. Lungfish  GVLIQTYLSWGVSVSLS-VGFSSLA-**FPAVT**I**CN**S**N**PFKYSRIKPLLTELDGFAASLLERIYIYS

A. Lungfish  GLLIQTYLSWGVSVSLS-VGFRGMD-**FPAVT**V**CN**V**N**PFKYSKVKPLLKELDELVDILLEQFYSYS

Frog  GVLILTYLSYGVSVSLS-IGFKTME-**FPAVT**L**CN**A**N**PFKYSRVKPLLKELDELVATALDRIQFSS

Cow  GLFIKTYLNWEVSVSLS-IGFKTMD-**FPAVT**I**CN**A**S**PFQYSKVQHLLKDLDELMEAVLGRILGPE

Human  GIFIRTYLSWEVSVSLS-VGFKTMD-**FPAVT**I**CN**A**S**PFKYSKIKHLLKDLDELMEAVLERILAPE

Chicken  GILINTYLSYNVTSSLS-IGFKTMK-**FPAVT**V**CN**A**N**PFKYSEVRPLLKELDKLIEAALERILQPT

Turtle  GILIDTYLSYSVSSSLS-IGFKTMK-**FPAVT**V**CN**A**S**PYKYSKVRHLLKELDELTEAALERILQSK

S. Lamprey  IQLIQSF--YSIAVSVT-INYQKLP-**FPAIT**V**CS**L**N**PYKYNQSQALLEKLDRNTAVALHNIGIAV

J. Lamprey  IQLIQSF--YSIAVSVT-INYQKMP-**FPAIT**I**CS**L**N**PYKYNQSQALLEKLDRNAAVALHNIGIAV

Ropefish  ALLIQTY--YSSSVSVT-VQFQTLT-**FPAVT**V**CN**L**N**PLRYSATKQLLTELDEQAERALQELYSPK

E. Shark  ALLASAY--YTVSVSIT-VHFQELP-**FPAIT**I**CN**I**N**PYRYSATRWLVGELEKATLTVLDELYKYT

W. Lungfish  TLLVMSY--YSVTVSVM-VKYQTLS-**FPAVT**V**CN**I**N**PYKPNTTISLLDELNRQARKILEKLYGFC

A. Lungfish  TLLLMSY--YTVSVSVT-VQFQTLP-**FPAVT**I**CN**I**N**PYRKNATSALLEELDKQTKLILKELYTSC

Coelacanth  ALLIISY--YSVTVAVS-VQFQELN-**FPAIT**I**CN**I**N**PYRYSATGELLQELERETKNALKVLYDFP

Frog  ALLLMSY--YSVSASIT-VTFQKLV-**YPAVT**I**CN**L**N**PYSYSKVKDRLAALEKETSQTLKNIYGFT

Cow  ALLISSF--YTVSVSIK-VHFQKLD-**FPAVT**I**CN**I**N**PYKYSAVRHLLADLEQETRAALKTLYGFS

Human  ALLVFSF--YTVSVSIK-VHFRKLD-**FPAVT**I**CN**I**N**PYKYSTVRHLLADLEQETREALKSLYGFP

Chicken  AELLLNY--YSASVSVT-VQFQKLP-**FPAVT**I**CN**I**N**PYKYSSMKDYLSELDKETKKALETFYGFS

Turtle  AELIMSY--YTASVSVT-VQFQKLP-**FPAVT**I**CN**I**N**PYKYSAMKEHLSELDKETKNALETLYGFS

Spotted Gar -like -----------------------------------------------------------------

Asian Arowana -like -----------------------------------------------------------------

Coelacanth ASIC1 -----------------------------YWLDLLHQDLSVNQDSLGVL----------------

Catfish ASIC1 -----------------------------YWIDIMHANHSVNRQSMAMLK---------------

E. Lamprey ASIC1 -----------------------------ELLALLDERMEIVEPRFADAQVIAQLRK--------

E. Shark ASIC1 -----------------------------ELLTLLNNRYEIPDPHLAERHILEALVE--------

J. Medaka ASIC1 -----------------------------ELLALLNGRYEIRDPHLVEENVLQVLRE--------

Black Rock Cod ASIC1 -----------------------------ELLALLNGRYEIRDPHMVEEHVLQILKE--------

Lancelet -like AFQNAGFIPKPQP----------------QGQNNPNSNGSTPATGSTTVATAPTTTQNSTS----

Lancelet -like PPSPGPRRKRGVDTSQDNRPEYDV-----DWEDPYPPREESAEEHELLRERRETGSSAGSADSQG

E. Shark  -----------------------------------------------------------------

Frog  APESGQQVVDLQD-LLNNLTGQVN-GGFYLDESIVLLKLQENGSGPALPG---------------

Coelacanth  TSQHGTSDDSMQSDIRRSNRIILS-----APDRVPLQVLDEPAAEHARTENQMAGT---------

S. Lamprey  PPATKAAGTAAAP----------------GIRLDTGVVLERTGPDT-------------------

J. Lamprey  PPATQSAGTAAAP----------------GIRLDTGVVLERTGPDT-------------------

W. Lungfish  PANSNQSACNNTS-NKQDS----------NNKYIPLEFLTYNDTQSGYPFKGTTNGSSSFN----

A. Lungfish  PLTSGNQSACNSS-STAGTRAFDE-------SYMKLEFLNDENTAYSGPVKGATNSTSPVN----

Ropefish  FSKKVQQNSTSHT-SATEKSRNSN-PL--FNKKFVLEVLNRETSVNFNTPEKKGNHGV-------

Frog  --------STGVQ-GWIPNNQRVKRDR--AGLPYLLELLPPGSETHRVSRSVIEEELQVK-----

Salamander  SSGMDALYHESRRER--------------RSATFPLFPLERLSPEQGAGGRVRRSSGAAVREEEL

Cow  -------SSKTLV-AHARSRRDLR-----EPLPHPLQRLPVPAPPHAARGVRRAGSSM-------

Human  -------SFTTLV-AGSRSRRDLR-----GTLPHPLQRLRVPPPPHGARRARSVASSL-------

Chicken  MSLARSDGSAQFS-HRRTSRSLLH-----HVQRHPLRRQKRDNLVSLPENSPSVD----------

Turtle  MSLVQSNWAAQSS-RKRSPRSLSH-----HVHRHPLRRHKRDEPASLKGNSPPVD----------

Cow  FSDSMDALGAEVP----GPEPAFH-----LDRRIRLQRLRPLDGQNR------------------

Human  LSKGRAALSATVP----RHEPPFH-----LDREIRLQRLSHSGSRVR------------------

Coelacanth  ASEDITPNDSIGDGAGHGIKNISDNMNITLDQSIPLVLIRDKDSLDSSSAHSFPLD---------

Chicken  TSASLFHVNEKSI-HVRDLPSTGNHNGSSFKLSQKFSLLRTTEFNNRT-----------------

Turtle  TSIFSSRYKKDIS-VKGGSANLSS-SSFQLNRHISLVMLKEPDTGSR------------------

S. Lamprey β DSSTPSAYDTSYAVG--------------PWQEIPLVLIDRRDPNRTVVTEVMCSRAAVGIETHT

J. Lamprey  DSSTPSPYNTSYA-KA-------------PWQDIPLVLIDRRDPNRTVVTEVVSKQSYLINGSID

E. Shark  QNRTLPPPMDDLEDKWSRGGAGLG-----PGPLVPLVIIEQTEKGEEVLVRILGDAESDVP----

Coelacanth  ERHSLTPVWKTNL-KKLLILPKTSQACVYLQKPQFLYLVSFFNKYHILKIVVLPL----------

Ropefish  ISGKVPELPLMA-----NTSLVSV-----FLQNIPLVIMDESDVNNPAIISLFENGTDGF-----

W. Lungfish  QSGTLPDPLLDTT-SRNATGQNL------LWYHLPLVIIDETDGDNPVIINILGPNNLTSTNGTT

A. Lungfish  TNGTLPVVFPDMR-SS-YLTGDPP-----PWYQIPLVMIDETDADNPTVTNVLGTDAL------S

Frog  QNQGNTFTHNNQT-RQ-NVTLDPA-----LWNHIPLVVIDETDPRNPIIHNIFDNNAVYSKN--S

Cow  LSQVNDTRALNLS----------------IWHHTPLVFINEQNPHHPVVLDLFEDNFNGSASNSP

Human  LSHANATRNLNFS----------------IWNHTPLVLIDERNPHHPMVLDLFGDNHNGLTSSSA

Chicken  HGDPISPLLLNNS-NA-TEGLDLD-----LWNQIPLVLIDEQDKDNPVIVEIFETNQSAAGNQ-T

Turtle  HGATISAPPLNSS-ETVSQQLDLK-----LWNQIPLVLIDESDPDHPVIIDLFETDQSGSGTRPN

S. Lamprey  TNLSAAKRDD-------------------EPLPIPLVWLDTTVTNQTVVTDVISGKFHVVPGKVE

J. Lamprey  TNLSAAKRDD-------------------EPLPMPLVWLDTTVTNQTVVTDVISGKFHVVPGEVE

Ropefish  EPTEKRKRRGLVTDKHAEDGQVVSN----LLKDIPLFWLDKKTFSAAFAPN---NRKRTYPEKFL

E. Shark  DAEDDGGEVRPQH-E-AEPGEGSR-PS--LFQNIPLLQIQARGPEYSIVSNLLSRRQHRVNGTVS

W. Lungfish  TDCGSGNFSSRSL-SLDDIPVKTRSLN--LLQDMSLIKVETAKDGQLVASDIVTDLQYRISGTAI

A. Lungfish  TGCSNRKLRSVLL-NEAPEEDSGV-AK--LLQDMPLMKFEVIKEDHVIVSELSSNRQYRINNTFI

Coelacanth  LDDNESHVLRSTE-TSLNSESDKE-VL--FSRSLPLLKIEEMEQNYTIVSDVFSDVKQRVNAPLM

Frog  EPLIRSKRDVGVNVENSTEDI--------FLKQIPLYRLESVKGSQLVVSDLKTKKRTRMSAKVI

Cow  EITSRKRREAQSW-SSVRKGTDPK-----FLNLAPLMAFEKGDTGKA--RDFFTGRKRKVNARII

Human  E--SRKRREAESW-NSVSEGKQPR-----FSHRIPLLIFDQDEKGKA--RDFFTGRKRKVGGSII

Chicken  EGKTKVRRAAGDWNGTESL----------FFRHVPLLRFE---NSFRAATDLRSGRKRKVEGSVF

Turtle  EGKSKVRRDADDWNATESK----------FFEIIPLLKFE--DLSKKTVTEIPSGNKRKIETSVF

Spotted Gar -like --------------------------------**-**---TDYANSS**Q**NQKAY----------------

Asian Arowana -like ---------------------AQRWNSTGYPG**A**---TRDTN-R**C**A-NSF--------------S-

Coelacanth ASIC1 ---------------------REDTKQKILQL**S**----------**-**NFTQY--------------TP

Catfish ASIC1 ---------------------HSRHRERLMRL**L**----------**-**DFSDY--------------VP

E. Lamprey ASIC1 --------------------------------**-**---------H**A**DFRVH--------------KP

E. Shark ASIC1 --------------------------------**-**---------K**A**NFRNF--------------KP

J. Medaka ASIC1 --------------------------------**-**---------R**A**DFESY--------------KP

Black Rock Cod ASIC1 --------------------------------**-**---------R**A**NFDNY--------------KP

Lancelet -like --------------------------------**-**---DEDDD-D**Y**DYDGY--------------HG

Lancelet -like SSDSSDSSDSSD---------SSDSSDSSDSS**D**SSDSSDSSDS**S**DYASYMYGGTWSSHYGQDGSS

E. Shark  --------------------------------**-**----------**-**-------------------SP

Frog  ---------------------EKKFK-VGFKL**C**---NSSRD-D**C**YYKVF--------------WS

Coelacanth  ----DINNPALY---------KGEFRKIGFKL**C**---NASGL-S**C**FYQAY--------------SS

S. Lamprey  ---------------------------VGFKL**C**---NATGG-D**C**FYQSY--------------GS

J. Lamprey  ---------------------------VGFKL**C**---NATGG-D**C**FYQSY--------------GS

W. Lungfish  ---------------------NSEFYRVGFKV**C**---NDTDG-V**C**FYQIY--------------SS

A. Lungfish  ---------------------HTEFYRIGFKL**C**---NATGE-D**C**FYQTY--------------SS

Ropefish  ----AKNNPPLH---------NQNWQ-IGFKL**C**---NASGQ-D**C**YFQAY--------------SS

Frog  ---------------------RREWN-IGFKL**C**---NETGG-D**C**FYQTY--------------TS

Salamander  PID------------------SISWN-IGFKL**C**---NDSGK-D**C**FYQKY--------------SS

Cow  ----RDNNPQVN---------RKDWK-IGFQL**C**---NQNKS-D**C**FYQTY--------------SS

Human  ----RDNNPQVD---------WKDWK-IGFQL**C**---NQNKS-D**C**FYQTY--------------SS

Chicken  ---------------------KNDWK-IGFVL**C**---SENNE-D**C**FHQTY--------------SS

Turtle  ---------------------KSDWK-IGFIL**C**---NETNE-D**C**FHQTY--------------SS

Cow  ---------------------------VGFKL**C**---NSTGG-D**C**VERAY--------------SS

Human  ---------------------------VGFRL**C**---NSTGG-D**C**FYRGY--------------TS

Coelacanth  ---------------------KKGFR-VGFRL**C**---NVTGK-D**C**FYQSY--------------SS

Chicken  ---------------------GKRQSLVGFRL**C**---NATGG-N**C**FYKTY--------------SS

Turtle  ---------------------KKHFK-VGFKL**C**---NATGG-N**C**FYKAY--------------SS

S. Lamprey β VDNRVF---------------HIGFCKSALGV**C**---CDSAGDK**C**FYSEY--------------LS

J. Lamprey  TVSVPPERAAADATSSLIPHLGKDVR-IGFRL**C**---DTAGD-K**C**FYSEY--------------LS

E. Shark  ----RDAKLGRG---------PRSYK-VALHL**C**---SKDGR-D**C**LYRNF--------------TT

Coelacanth  ---------------------ANEKKQKVSVL**C**KDERMGKKKK**S**SVYFT--------------NA

Ropefish  ----VQNNPHPP---------TSDLK-VAIKL**C**---NANKT-E**C**LYWNF--------------TS

W. Lungfish  AGYPIP---------------PRRYK-VAFEL**C**---NASGS-D**C**FYKNF--------------SS

A. Lungfish  PTNNSTTNSSTE---------ARRYK-VAFHL**C**---NTNGT-D**C**FYKNF--------------SS

Frog  SIRNSSEDQTSY---------SQRYK-VAMKL**C**---TNNNT-Q**C**VYRNF--------------TS

Cow  APGRPC---------------SAHRCKVAMRL**C**---SHNGT-T**C**TFRNF--------------SS

Human  SEKIC----------------NAHGCKMAMRL**C**---SLNRT-Q**C**TFRNF--------------TS

Chicken  AAPPAPANVTSE---------EKKYK-LAVKL**C**---SHQGSNN**C**TYRNF--------------TS

Turtle  NSSPALSNVTSE---------VKKHK-VAVKL**C**---HHKDIPQ**C**MYWNF--------------TS

S. Lamprey  MRSYFSQNY------------QSSEPLIAIEV**C**---GEER--K**C**IYNAF--------------TS

J. Lamprey  MRSYFSQNY------------QSSEPLIAIEV**C**---GEEK--K**C**IYNAF--------------TS

Ropefish  SKSGSRLRF------------HEAQRQAGFQL**C**---NSTNVTD**C**VVYAF--------------DT

E. Shark  THSLGNADILNQ---------EHL---VGFKL**C**EGGDIDSS-D**C**TIYTF--------------TS

W. Lungfish  TRMYNNMDLTSL---------GGQGH-VGFKV**C**---NQGQD-N**C**VIYTF--------------NS

A. Lungfish  TRMYNNMDLATV---------GEQ---VGFKI**C**---DANKS-N**C**IIYTF--------------NS

Coelacanth  RKMFENVAIENQ---------GEL---VGFKL**C**---DTNGS-D**C**AIYTF--------------NS

Frog  HRDAESV--------------QDPGNMVGFKL**C**---DPKNSSD**C**TIFTF--------------SS

Cow  HKASDVMHI------------HNSKEVVGFQL**C**---SNDTS-D**C**AVYTF--------------SS

Human  HKASNVMHI-------------ESKQVVGFQL**C**---SNDTS-D**C**ATYTF--------------SS

Chicken  HKDSSIVNS------------GDSNDIIGFQL**C**---DANNSSE**C**ALYTF--------------SS

Turtle  HQGSSMVNT------------GDPQDVVGFQL**C**---DPNNSSD**C**AVYTF--------------SS

Spotted Gar -like ----IE**DSN**QL------GF--LLSKLN-----PDQQAEAGHQLEDMLIS**C**HFHGEKCD-K-----

Asian Arowana -like ------**---**--------KFASEFNRLS-----DEEKLDMGHQLEDMLLF**C**NYHGQPCN-T-----

Coelacanth ASIC1 PAQ---**--Y**QL------NTTDLINRL-------------GHQMEEMLLE**C**RFQGETCT-S-----

Catfish ASIC1 PPR---**--F**HL------NTTEMIGRLS-------------HQLEDMLLL**C**RFRGESCT-Y-----

E. Lamprey ASIC1 RPFSMR**EFY**E---------------------------RAGHELREMLLH**C**KFHGMNCT-P-----

E. Shark ASIC1 KPFNMR**EFY**A---------------------------RAGHDMKDMLLH**C**IFKGEFCT-A-----

J. Medaka ASIC1 RSFNMR**EFY**D---------------------------RTGHDIKDMLLS**C**SYRGTECS-A-----

Black Rock Cod ASIC1 RPFNMR**EFY**D---------------------------RTGHDIKEMLLS**C**SYRGVECS-A-----

Lancelet -like DFEMVN**---**--------SFMGLLVQLT-----ASMRQSLGHQGRDFIQE**C**QFDGRTCS-H-----

Lancelet -like SSDYMS**EDY**HHEFELVQNFSSSILGLN-----RTSRRTMGHQYQDLVLE**C**AYDGRSCS-R-----

E. Shark  G-----**---**--------------------------------RSSEFIRS**C**KFNRVSCD-N-----

Frog  GVNALH**EWY**KF------HYINIMSNIP------AVLNIANNFSKDFILT**C**HFNEVPCD-E-----

Coelacanth  GMDAVR**EWY**MF------HYVNIMVQVP-----MVTNPLQETHIRDFVFS**C**KFNHASCN-Q-----

S. Lamprey  GVQAVT**EWY**TF------QYVNIMSQVP-----SYIKQSDDANIEDFIFS**C**MFSGMPCS-D-----

J. Lamprey  GVQAVT**EWY**TF------QYVNIMSQVP-----SYIKQSDDANIGDFIFS**C**MFSGMPCS-D-----

W. Lungfish  GVDALR**EWY**KY------QYVNIMGNAP-----LSTYQEDNPQISNFVYA**C**EFNKISCG-S-----

A. Lungfish  GVDALR**EWY**KF------QYINIMAQIP-----SQSNQEDDSQISNFVYA**C**EFNKVSCG-V-----

Ropefish  GVDAIR**EWY**KY------HYINIMAQMSMNALADDDSNPDKADINNFVFA**C**SFNGAVCS-K-----

Frog  GVDAIR**EWY**RF------HYINILARVP------QEAAIDGEQLENFIFA**C**RFNEESCT-K-----

Salamander  GVDAIR**EWY**RF------HYINILARVP----ATSGVPLNEDSFQNFIFA**C**RFNEDSCS-E-----

Cow  GVDAVR**EWY**RF------HYINILSRRR----QDTSPSLEEDVLGKFIFT**C**RFNQDSCN-E-----

Human  GVDAVR**EWY**RF------HYINILSRLP-----ETLPSLEEDTLGNFIFA**C**RFNQVSCN-Q-----

Chicken  GVDAVR**EWY**SF------HYINILAQMP------DAKDLDESDFENFIYA**C**RFNEATCD-K-----

Turtle  GVDAVR**EWY**SF------HYINILARMP------NTKALDESNFENFIYA**C**RFNEVTCD-K-----

Cow  GVVAAR**EWY**RF------HYINILALLP--------AAHEDSHGSHFVFS**C**RYDDRDCH-A-----

Human  GVAAVQ**DWY**HF------HYVDILALLP-----AAWEDSHGSQDGHFVLS**C**SYDGLDCQ-A-----

Coelacanth  VMDAIQ**EWY**KF------HFINIMSQVS-----PMTNVSDSSPIGNVIYS**C**QYNGKSCS-G-----

Chicken  GMDAIL**EWY**RF------HYMNIMSQQP----VIINISDHEEKIEDMVYS**C**QYDGEPCR-P-----

Turtle  GVDTIQ**EWY**RF------HYMNIMSQLP----VIINISSHEEHIQNLVYS**C**QYDGEPCR-E-----

S. Lamprey β GMTAVK**QWF**HF------NLLSLLGNLS-----TEEKSNLSSSGDELIRS**C**LFSSDTCS-A-----

J. Lamprey  GMTAVK**QWF**HF------NLLSLLGELS-----NEEKSNLSSSGDELIRS**C**LFSNDACN-A-----

E. Shark  GLQAVN**EWY**SL------HYMSLMANVS-----LEDRTAMGEHGQDFILS**C**NFGGHPCD-L-----

Coelacanth  FLSRVT**HNY**VQ------NFFFT----------DSSLVYAPTEGRLSFLQ**V**HYG-EMCA-YFSWTL

Ropefish  GVDAVN**EWY**SL------HFMDIMSKFS-----INEKKQMAYSGKEFILT**C**LFGNQPCS-Y-----

W. Lungfish  SLEAVK**EWY**TL------HYLNIMLRIP-----LAEKAAMGYSGKDLILT**C**FFGGIACD-Y-----

A. Lungfish  SLEAVK**EWY**TL------QYIDIISKLP-----LSQKVEMGYSGKDFILT**C**LFGGEACN-Y-----

Frog  GVQALR**EWY**LL------QLSSIFSNVP-----LSGRIDMGFKAEDLILT**C**LFGGQPCS-Y-----

Cow  ATQAVT**EWY**TL------QATNIFAQVP-----NQELVAMGYPAERLILA**C**LFGAEPCN-Y-----

Human  ATQALT**EWY**IL------QATNIFAQVP-----QQELVEMSYPGEQMILA**C**LFGAEPCN-Y-----

Chicken  AAQAVT**EWY**IL------QSTSILSKVP-----LQERIRMGYQAEDMILA**C**LYGAEPCN-Y-----

Turtle  AAQAVT**EWY**IL------QSTSILSKVP-----LQERIRMGYQPEDMILA**C**LYGAEPCS-Y-----

S. Lamprey  AIDAVI**QWY**RL------HFINIMAIVP-----EKDKDKLGYSADEFIID**C**LFSGTVCDPS-----

J. Lamprey  AIDAVM**QWY**RL------HFINIMAIVP-----EKDKDKLGYSADEFIIG**C**LFSGTVCDPS-----

Ropefish  GISAVQ**EWY**WL------HFNNIIAQQS-----LETLVEMGYSAEEFIST**C**TFNEAMCS-L-----

E. Shark  GMAAVQ**EWY**QL------HYYNLLAQVP-----PEDKRAMGYSADDLFLT**C**LYDGLPCD-S-----

W. Lungfish  GITALQ**EWY**RL------NFIDIMAQVP-----NEKKAEMGYSADELIVS**C**MYDGQACD-S-----

A. Lungfish  GVTAIL**EWY**RL------NYLNIMAQIP-----NEKKLEMGYSADDLIVT**C**MYDGQSCD-S-----

Coelacanth  GITAIQ**EWY**RL------HYINIMAQVS-----WEKKQEMGYSADDLIVT**C**FYNGMPCN-S-----

Frog  GVNAIQ**EWY**RL------HYTNILAKIS-----MEDKIAMGYKADELIVT**C**FFDGLSCD-A-----

Cow  GVNAIQ**EWY**KL------HYMNIMAQVS-----QEKKINMSYSADELLVT**C**FFDGVSCD-A-----

Human  GINAIQ**EWY**KL------HYMNIMAQVP-----LEKKINMSYSAEELLVT**C**FFDGVSCD-A-----

Chicken  GVNAIQ**EWY**KL------HYMNIMAQIP-----LETKEELSYSADDLLLT**C**FFDGLSCD-K-----

Turtle  GVNAIQ**EWY**KL------HYMNIMAQIP-----LETKVNMSYSAEDLLLT**C**FFDGISCD-T-----

Spotted Gar -like ---SF**F**NAFF**N**HKF**G**N**CY**T**FN**SLTKMENRGRLMR-RDVLNATKA**G**FSY**GL**TME**L**SIEQDEYI**E**QF

Asian Arowana -like ---SF**F**SGFI**N**YKF**G**N**CY**T**FN**SHKQTDIRGRPIK-SESLNTTKA**G**FMY**GL**HLE**L**FIQQNEYV**R**DI

Coelacanth ASIC1 ---RN**F**TPIF**-**TRY**G**K**CY**T**FN**S-------G--KDGNPLLTTLKG**G**MGN**GL**EIM**L**DIQQDDYL**P**VW

Catfish ASIC1 ---KN**F**TTIY**-**TRY**G**K**CY**T**FN**S-------G--LDGNPLLTTLKG**G**TGN**GL**EIM**L**DIQQDEYL**P**VW

E. Lamprey ASIC1 ---QD**F**QTVY**-**TRY**G**K**CY**T**FN**S-------G--KDGRPLLTSMKG**G**MGN**GL**EMM**L**DIQQDEYL**P**VW

E. Shark ASIC1 ---QD**F**KIVF**-**TRY**G**K**CY**T**FN**S-------GQIKD-QPILTTLEG**G**TGN**GL**ELM**L**DIQQDEYL**P**VW

J. Medaka ASIC1 ---EN**F**KVIF**-**TRY**G**K**CY**T**FN**S-------G--KDGQPLMVTMKG**G**TGN**GL**ELM**L**DIQQDEYL**P**VW

Black Rock Cod ASIC1 ---DN**F**KVIF**-**TRY**G**K**CY**T**FN**S-------G--QDGRPLMVTMKG**G**MGN**GL**ELM**L**DIQQDEYL**P**VW

Lancelet -like ---RN**F**TTFE**D**STY**G**N**CF**T**FN**K-------D--KDGEVLHTATSA**G**PLH**GL**SLI**L**YIEQDEYI**P**AI

Lancelet -like ---TD**F**GRIL**D**EKY**G**N**CY**T**FN**S-------D--K--VLQRKVRDP**G**PAH**GL**QLT**L**YIEQDEYV**P**AV

E. Shark  ---NN**Y**TTFS**H**PRY**G**T**CY**T**LN**T-------G-----PVSWRVLGP**G**SAN**GL**TLT**L**QVGEG--L**R**FL

Frog  ---RE**Y**IHFH**H**PIY**G**N**CF**T**IN**N-------H--GK-ENSWYSPRP**G**KQY**GL**SMV**V**KADLHDNM**P**LL

Coelacanth  ---GN**Y**TYFN**H**PVY**G**N**CY**T**FN**G-------G--ST-GNLWSSTKP**G**REN**GL**SLL**L**RTEQNDYI**P**FL

S. Lamprey  ---SE**Y**SRFH**H**PTY**G**N**CY**T**FN**S-------A--NS-SKLWQASKP**G**RDY**GL**SLI**L**RTEQNDYI**P**FL

J. Lamprey  ---SE**Y**SRFH**H**PTY**G**N**CY**T**FN**S-------A--NS-SKLWQASKP**G**RDY**GL**SLI**L**RTEQNDYI**P**FL

W. Lungfish  ---GN**Y**TQFN**H**PQY**G**S**CY**T**FN**D-------G--DD-NNPWISFSP**G**VES**GL**SLV**L**RTEQNDFL**P**YL

A. Lungfish  ---EN**Y**TRFR**H**PVY**G**N**CY**T**YN**D-------G--QS-ATPWASFVP**G**VGN**GL**SLV**L**RTEQNDFL**P**FL

Ropefish  ---GN**Y**TTFH**H**PMY**G**N**CY**T**FN**S-------W--ED-GHEWSVSTP**G**VES**GL**SLL**L**RTEQNDFI**P**LL

Frog  ---AN**Y**SSFH**H**AIY**G**N**CY**T**FN**Q-------NQSDQ-SNLWSSSMP**G**IKN**GL**TLV**L**RTEQHDYI**P**LL

Salamander  ---AN**Y**THSH**H**PLY**G**N**CY**T**FN**E-------DHSRN-DSRWASSMP**G**INY**GL**SLV**L**RTEQNDYI**P**LL

Cow  ---AN**Y**SHFH**H**PMY**G**N**CY**T**FN**D-------K--NS-SNLWMSSMP**G**VNN**GL**SLT**L**RTEQNDFI**P**LL

Human  ---AN**Y**SHFH**H**PMY**G**N**CY**T**FN**D-------K--NN-SNLWMSSMP**G**INN**GL**SLM**L**RAEQNDFI**P**LL

Chicken  ---AN**Y**THFH**H**PLY**G**N**CY**T**FN**D----------NS-SSLWTSSLP**G**INN**GL**SLV**V**RTEQNDFI**P**LL

Turtle  ---AN**Y**THFH**H**PIY**G**N**CY**T**FN**D----------GN-SSLWTSSLP**G**INN**GL**SLL**V**RTEQNDYI**P**LL

Cow  ---QH**F**QTSH**H**PTY**G**S**CY**T**FN**G---------------VWAAQRP**G**VTH**RI**SLV**L**RAEQLDHL**P**LL

Human  ---RQ**F**RTFH**H**PTY**G**S**CY**T**VD**G---------------VWTAQRP**G**ITH**GV**GLV**L**RVEQQPHL**P**LL

Coelacanth  ---SE**Y**EHFH**H**PVY**G**I**CY**I**FK**S-------N--GS-DTFWETSKP**G**IAY**GL**SLI**I**GTKQEDFI**P**LL

Chicken  ---SD**Y**VHFH**H**PVF**G**S**CY**T**FN**S-------K--GT-DPFWTATKP**G**IPY**GL**SLI**L**RAEQKDHI**P**LL

Turtle  ---SD**Y**IHFH**H**QVY**G**S**CY**T**FN**S-------E--GT-DLFWKASKP**G**ISY**GL**SLI**L**KAEQNDRL**P**LL

S. Lamprey β ---TN**F**TTFF**H**PMY**G**N**CF**I**FN**W-------G--EN-ETVMQVSNP**G**VEY**GL**KLV**L**SIDQDEYI**P**FL

J. Lamprey  ---TN**F**TTLY**H**PMY**G**N**CF**I**FN**W-------G--EN-ETVMQVSNP**G**VEY**GL**KLV**L**SIDQDEYI**P**FL

E. Shark  ---RN**F**TRLF**H**PTY**G**N**CY**I**FN**W-------G--SS-GSVLTVSNP**G**AEF**GL**KVV**L**DISQEDYN**P**FL

Coelacanth  LTVIN**F**TQMF**H**PTY**G**N**CY**I**FN**W-------G--QD-GNALISSNP**G**ADF**GL**KLV**L**DINQEEYI**P**FL

Ropefish  ---KN**F**SQIF**H**HFY**G**N**CY**I**FN**W-------G--LH-DKAISSSNP**G**GEF**GL**NVV**L**DINQKEYI**P**FL

W. Lungfish  ---TN**F**TQIY**H**PSY**G**N**CY**I**FN**W-------G--LD-GNVAVSSNP**G**VGF**GL**QLV**V**DVNQEEYI**P**FL

A. Lungfish  ---DN**F**TQFY**H**SSY**G**N**CY**V**FN**W-------G--LD-GNVLIVSNP**G**VGF**GL**QLA**L**DVNQEEYI**P**FL

Frog  ---RN**F**THIY**D**ADY**G**N**CY**I**FN**W-------G--QEGENTMSSANP**G**ADF**GL**KLV**L**DIEQGEYL**P**FL

Cow  ---RN**F**TPIF**H**PDY**G**N**CY**I**FN**W-------G--MT-EKALPSANP**G**TEF**GL**KLI**L**DMGQEDYV**P**FL

Human  ---RN**F**TSIF**Y**PHY**G**N**CY**I**FN**W-------G--MT-EKALPSANP**G**TEF**GL**KLI**L**DIGQEDYV**P**FL

Chicken  ---KN**F**TQIY**H**PDH**G**N**CY**I**FN**W-------G--MD-KEALNSSNP**G**AEF**GL**KLI**L**DISQQDYI**P**YL

Turtle  ---RN**F**TQIY**H**PDH**G**N**CY**I**FN**W-------G--MD-EEALISSNP**G**AEF**GL**KLI**L**DISQQDYI**P**YL

S. Lamprey  ---TS**F**KKLQ**H**PIL**G**N**CF**T**FN**D-------G--SD-GKSLDIASA**G**IDY**GL**HMV**L**NTRQDNSL**P**YL

J. Lamprey  ---TS**F**KKLQ**H**PIL**G**N**CF**T**FN**D-------G--RD-GKSLDIASA**G**IDY**GL**HMI**L**NTRQDNAL**P**YL

Ropefish  ---RN**F**TQSY**H**PTL**G**N**CY**T**FN**S-------G--YD-GEIIQSSTA**G**IKN**GL**IVV**L**NLGLEDYN**P**FL

E. Shark  ---RN**F**SLHQ**H**PLH**G**N**CF**T**FN**G-------G--EN-GRVLITRTG**G**SQN**GL**KVT**L**HLDEDEYN**P**YL

W. Lungfish  ---RN**F**TLFQ**H**PLH**G**N**CY**T**FN**S-------G--ND-GNILQTLIG**G**NAR**GL**KLI**L**YTENDDYN**P**FL

A. Lungfish  ---RN**F**TLFQ**H**PLH**G**N**CY**T**FN**S-------G--DD-GNILQTLTG**G**SEY**GL**KLT**L**YLENDDYN**P**YL

Coelacanth  ---RN**F**TLFQ**H**PVY**G**N**CY**T**FN**S-------G--AD-GSILKTSTE**A**SEF**GL**NVI**L**YIDHKDYN**P**FL

Frog  ---RN**F**TLFH**H**PLY**G**N**CY**T**FN**S-------A--ER-GNLLVSSMG**G**AEY**GL**KVV**L**YIDEDEYN**P**YL

Cow  ---RN**F**TLFH**H**PMY**G**N**CY**T**FN**N-------R--QN-ETILSTSMG**G**SEF**GL**QVI**L**YINEEEYN**P**FL

Human  ---RN**F**TLFH**H**PMH**G**N**CY**T**FN**N-------R--EN-ETILSTSMG**G**SEY**GL**QVI**L**YINEEEYN**P**FL

Chicken  ---RH**F**TRFH**H**PLH**G**N**CY**T**FN**S-------G--EN-GTVLSTSTG**G**SEY**GL**QVV**L**YIDEADYN**P**FL

Turtle  ---RN**F**TPFH**H**PLH**G**N**CY**T**FN**S-------G--EN-GKVLTTSTG**G**SEY**GL**QVV**L**YIEEADYN**P**FL

Spotted Gar -like SQA------A**G**IRLII**H**DQKDM**PF**PEDD**G**VNIPPGQE**S**DIAIVKVHVHRLRAPYSS**T**CTTGDGIH

Asian Arowana -like THS------A**G**IRMLI**H**DHLAT**PF**PEDE**G**VNIPPGTE**T**DIGITKVGIRRLKHPYGS**N**CTDGEGIT

Coelacanth ASIC1 KETDETSLEA**G**IKVQI**H**SQEEP**PF**IDQL**G**FGVAPGFQ**T**FVSCQQQKLMYLPPPWGD**C**KATPINSE

Catfish ASIC1 GDTDETSYEA**G**IKVQI**H**SQDEP**PF**IDQL**G**FGVAPGFQ**T**FVSCQQQLLQYLPPPWGD**C**QSTAMNSE

E. Lamprey ASIC1 GETDETSFEA**G**IRVQI**H**SQDEP**PF**IDQL**G**FGVAPGFQ**T**FVSCQEQRLTYLPYPWGD**C**KDTPPESE

E. Shark ASIC1 GETDETSFEA**G**IKVQI**H**SQSEP**PF**IDQL**G**FGVPPGFQ**T**FVACQEQRLRYLPPPWGD**C**KSTPMDSD

J. Medaka ASIC1 GETDETSFEA**G**IKVQI**H**TQEEP**PF**IDQL**G**FGVAPGFQ**T**FVSCQEQRLTYLPPPWGD**C**KSTPMDSD

Black Rock Cod ASIC1 GETDETSFEA**G**IKVQI**H**TQDEP**PF**IDQL**G**FGVAPGFQ**T**FVSCQEQRLTYLPPPWGD**C**KASAMDSD

Lancelet -like AEK------A**G**ARVVI**H**NPYVF**PF**PESE**G**FDAAPGFL**T**SAGLRLTSITRLGGVYGN**C**T-NGQG--

Lancelet -like TPA------A**G**VRVVI**H**QPGEW**PF**PAEE**G**FDVGPGYS**T**SIGLQVTTIRRLGGKYGN**C**T-DGRDKD

E. Shark  TPG------F**G**VRLMV**H**DPKQT**PI**LEDD**G**IDLLPGLE**T**SVSLRLESVRRLGGGLSD**C**TKDGKGVE

Frog  SQA------A**G**ARIMI**H**NPNQP**PL**VEHE**G**FDIQPGTE**T**SISVKQEEVIRLGGKYSQ**C**TSDGSDLS

Coelacanth  STV------A**G**ARVMI**H**RQNQP**PF**MEDE**G**FNIRPGVE**T**SISMKKVSRQQLGGLYSD**C**TEDGSDIG

S. Lamprey  STV------A**G**ARIMV**H**DQESP**PF**MEEG**G**FDMRPGFE**T**SLGIRMLEATRMPDPYGN**C**TEDGSNVP

J. Lamprey  STV------A**G**ARIMV**H**DQESP**PF**MEEG**G**FDMRPGIE**T**SLGIRMLEATRMPDPYGN**C**TEDGSDVP

W. Lungfish  SNV------A**G**ARVMV**H**DQNQP**VF**MEDS**G**FDIRPGVE**T**SIGIKKEIISRLGGVYGN**C**TADGSDIN

A. Lungfish  STV------A**G**ARVLV**H**DQNQP**PF**MEDS**G**LDIRPGVE**T**SIGMKKEIISRLGGVYGN**C**T-DGSDID

Ropefish  STV------A**G**ARVMV**H**SQNHP**VF**MEDG**G**FDIKPGVE**T**SIGLRQEVFQRLGGEYGD**C**L-DGTDLD

Frog  SSV------A**G**ARVLV**H**GHKEP**AF**MDDN**G**FNIPPGME**T**SIGMKKETINRLGGKYSD**C**SEDGSDVD

Salamander  STT------A**G**ARVII**Q**APDEP**VL**LNEG**G**FNIQPGVE**T**SISMTKETMDRLGGAYSD**C**TEDGSDVE

Cow  STV------T**G**ARVMV**H**ERDEP**AF**MDDA**G**FNLRPGVE**T**SISMSKEAVDRLGGDYGD**C**TKNGSEVP

Human  STV------T**G**ARVMV**H**GQDEP**AF**MDDG**G**FNLRPGVE**T**SISMRKETLDRLGGDYGD**C**TKNGSDVP

Chicken  STV------T**G**ARVMV**H**DQNEP**AF**MDDG**G**FNVRPGIE**T**SISMRKEMTERLGGSYSD**C**TEDGSDVP

Turtle  STV------T**G**ARVMV**H**EQNEP**AF**MDDG**G**FNVRPGME**T**SISMRKETTMRLGGSYSD**C**TEDGSDVL

Cow  STK------A**G**IKVMI**H**PQDHT**PF**LEHQ**G**FSIRPGTE**T**TIDIREDEVHRLGSPYGQ**C**MDSTGSVD

Human  STL------A**G**IRVMV**H**GRNHT**PF**LGHH**S**FSVRPGTE**A**TISIREDEVHRLGSPYGH**C**TAGGEGVE

Coelacanth  STV------A**G**TRVMI**H**KQDQP**AF**MEDE**G**LNIKPGTE**T**SIGMKQDEVNRLAGNYGQ**C**TFDGTDVK

Chicken  STV------A**G**VKVMI**H**NHNQT**PF**LEHE**G**FDIRPGIA**T**TIGIQQDKVNRLGGNYGK**C**TTDGSDVK

Turtle  STV------A**G**VQVMI**H**NHNQT**PF**LEHE**W**FDIRPGIA**T**NIGIRQDEVHRLGGNYGK**C**TVDGADVD

S. Lamprey β TTI------A**G**AVIMV**H**DQNTY**PF**LSDL**G**VFVKTGVE**T**SVGIEVGQLQRQGAPYSD**C**TMDGTDLP

J. Lamprey  TTI------A**G**AVIML**H**DQNTY**PF**LSNQ**G**FFVKTGAE**T**SVGIEVGQLQRQGAPYSD**C**TMDGTDLP

E. Shark  SMA------A**G**AKFML**H**QQNTF**PF**LRDL**G**MYAKAGTE**S**SITIFADEIERLGGVYSR**C**RLNPSATE

Coelacanth  TTS------A**G**ARLML**H**DQNTF**PF**LKDL**G**MYAMAGSQ**T**SIGILVDEIQRIGAPYSQ**C**TPYGSDVP

Ropefish  STT------A**G**ARLLV**H**EQRSF**PF**LKDL**G**IFVLPGTE**T**SIGISVDKIERMEAPYSD**C**TQNGSDVP

W. Lungfish  TTS------A**G**VRFLL**H**DQKTF**PF**VETM**G**IYALVGTV**T**SVEILVDEVMRMEQPYGT**C**TADGSDVP

A. Lungfish  TTR------A**G**ARFLL**H**TQNTF**PF**VETM**G**TYALVGTV**T**SVGILVDEVQRMGQPYGT**C**TTDGLDVP

Frog  QTT------A**A**ARLIL**H**QQRSF**PF**VKDL**G**IYAMPGTE**T**SISVLVDQLEHMEAPYSS**C**TVNGSDIP

Cow  TST------A**G**ARLML**H**EQRSY**PF**IKEE**G**IYAMAGME**T**SIGVLVDKLQRKGEPYSQ**C**TKNGSDVP

Human  AST------A**G**VRLML**H**EQRSY**PF**IRDE**G**IYAMSGTE**T**SIGVLVDKLQRMGEPYSP**C**TVNGSEVP

Chicken  SSA------A**G**ARLML**H**QQKSF**PF**LKDQ**G**IYAMAGTE**T**SIGVLVDELERMGYPYSD**C**TANGSDVP

Turtle  TST------A**G**ARLML**H**EQKSF**PF**LKDQ**G**IYAMSGTE**T**SIGVLVDELERMGYPYSD**C**TMNGSDVP

S. Lamprey  AMG------A**G**AKIGI**H**LQNTT**PF**IEAV**G**IDIPPAME**S**SLGLRVNDVQKLGDPYSD**C**TMDGSDID

J. Lamprey  AMG------A**G**AKIGI**H**LQNTT**PF**IEAV**G**INIPPATE**S**SLGLRVNDVQKLGEPYSD**C**TMDGSDID

Ropefish  SSS------E**G**AIIMI**H**NQNEH**PF**IEDL**G**IMIQTAKE**T**SIGLQFMESHKLGEPYSS**C**TEDGTDVS

E. Shark  VTS------T**G**AKIVV**H**DQSEH**PF**VEDL**G**IAIPAGME**T**SIGLDLTESHKLGGPYSD**C**IE---DLP

W. Lungfish  FTS------M**G**AKVIV**T**DQNEY**PL**IDDV**G**LEVQTAME**T**LVGLQLTDSAKLSQPYSD**C**TVDGSDVM

A. Lungfish  FTS------M**G**AKIIV**H**DQTEY**PL**VDDV**G**LEIQTATE**T**LIGLQVTTSAKLSKPYSD**C**TMDGSDVL

Coelacanth  VTS------T**G**AKVVI**H**DQNEH**PF**IEDM**G**LEVETATE**T**SIGLQLTESHRLSSPYSN**C**TEDGSDVP

Frog  STA------A**G**AKILV**H**DQDEY**PF**IEYL**G**TELETATE**T**SIGMQLTESAKLSDPYSD**C**TMDGRDVS

Cow  VSS------T**G**AKVII**H**RQDEY**PF**VEDV**G**TEIETAMA**T**SIGMHLTESFKLSDPYSQ**C**TEDWSDVQ

Human  VSS------T**G**AKVII**H**RQDEY**PF**VEDV**G**TEIETAMV**T**SIGMHLTESFKLSEPYSQ**C**TEDGSDVP

Chicken  VTS------T**G**AKIIV**H**DQDEY**PF**IEDI**G**TEIETAAA**T**SIGMHFTRSRKLSKPYSD**C**TETGADIP

Turtle  VTS------T**G**AKIIV**H**DQNEY**PF**IEDI**G**TEIETATA**T**SIGMHFTRSHKLSKPYSD**C**TETGTDIP

Spotted Gar -like NYY**R**--DV**Y**K-VG**YS**R-------EA**C**KKT**C**GQMYIIKN**C**G**C**GMWEFPV**P**KDVK**V**PF**C**NITNKNI**-**

Asian Arowana -like NFY**H**--DL**H**G-FK**YT**R-------EA**C**KRT**C**AQQSIMKD**C**G**C**SHWEFAV**L**PDLQ**Y**PK**C**NFSSPAT**-**

Coelacanth ASIC1 ---**-**----**F**F-ST**YS**I-------TA**C**RID**C**ETRYLVEN**C**N**C**K--MVHM**P**GNAK**V**--**C**TPDQY--**-**

Catfish ASIC1 ---**-**----**F**F-ST**YS**I-------TG**C**RID**C**ETRYLLEN**C**N**C**R--MVHM**P**GTST**V**--**C**TPEQY--**-**

E. Lamprey ASIC1 ---**-**----**F**F-DT**YS**I-------AA**C**QID**C**ETRYLVEN**C**N**C**R--MVHM**P**GDAP**Y**--**C**TPEQY--**-**

E. Shark ASIC1 ---**-**----**F**F-DT**YS**I-------TA**C**RID**C**ETRYLVEN**C**N**C**R--MVHM**P**GDAP**Y**--**C**TPEQY--**-**

J. Medaka ASIC1 ---**-**----**F**F-NS**YS**I-------TA**C**RID**C**ETRYLVEN**C**N**C**R--MVHM**P**GDAP**Y**--**C**SPEQY--**-**

Black Rock Cod ASIC1 ---**-**----**F**F-NT**YS**I-------TA**C**RID**C**ETRYLVEN**C**N**C**R--MVHM**P**GDAP**Y**--**C**TPEQY--**-**

Lancelet -like RHL**L**----**Y**P-QM**YS**Q-------QN**C**LAT**C**HQEHMVEI**C**G**C**ADVTFLQ**P**N---**-**--**-**-------**-**

Lancelet -like --N**L**----**Y**R-SK**YS**T-------KT**C**LHT**C**FQRLLVEK**C**G**C**GSRFIPL**P**KKVP**A**--**C**PVPI---**-**

E. Shark  IEN**L**----**Y**D-SS**YS**Q-------QT**C**VRS**C**FQALMTLR**C**N**C**SYFFYNK**P**KNSH**Y**--**C**NSRSHPD**W**

Frog  IKI**L**----**Y**N-TS**YT**M-------QA**C**LNS**C**FQYKMIEM**C**G**C**GYYFYPL**P**PGME**Y**--**C**NYNKYPG**W**

Coelacanth  VEN**L**----**Y**N-SN**YT**Q-------QA**C**VRS**C**FQVTLVQR**C**G**C**GHYFYPL**P**EGAQ**Y**--**C**NYKKHKT**W**

S. Lamprey  VLN**L**----**Y**S-SA**YT**V-------QV**P**ECS**C**FQLALVEA**C**G**C**GYYFYPL**P**PNAS**Y**--**C**SYNN-TA**W**

J. Lamprey  VLN**L**----**Y**S-SA**YT**V-------QA**C**VRS**C**FQLALVEM**C**G**C**GHYFYPL**P**PNAA**Y**--**C**SYNN-TA**W**

W. Lungfish  VEN**L**----**Y**N-SD**YT**Q-------QA**C**IRS**C**FQATIVER**C**G**C**GYYFYPL**P**AGAT**Y**--**C**TNTKHRG**W**

A. Lungfish  VVN**L**----**Y**N-SD**YN**Q-------QA**C**VRS**C**FQATIVQQ**C**G**C**GYYFYPL**P**SGAE**Y**--**C**SYSRNKS**W**

Ropefish  IEN**L**----**Y**E-SS**YT**Q-------QA**C**IRS**C**FQLIMVKR**C**G**C**AYYFYPL**P**KGAS**Y**--**C**NYNRHIA**W**

Frog  VKN**L**----**F**Q-SE**YT**E-------QV**C**VRS**C**FQAAMVAR**C**G**C**GYAFYPL**S**PGDQ**Y**--**C**DYNKHKS**W**

Salamander  VKN**L**----**F**N-KK**YT**Q-------QA**C**VRS**C**FQANMVQR**C**G**C**AYYFDPL**P**PGEE**Y**--**C**DYHKQPN**W**

Cow  VEN**L**----**Y**N-TK**YT**Q-------QV**C**IHS**C**FQESMIKE**C**G**C**AYIFYPR**P**DGVE**F**--**C**DYRKHNS**W**

Human  VEN**L**----**Y**P-SK**YT**Q-------QV**C**IHS**C**FQESMIKE**C**G**C**AYIFYPR**P**QNVE**Y**--**C**DYRKHSS**W**

Chicken  VQN**L**----**Y**S-SR**YT**E-------QV**C**IRS**C**FQLNMVKR**C**S**C**AYYFYPL**P**DGAE**Y**--**C**DYTKHVA**W**

Turtle  VQN**L**----**Y**S-SR**YT**E-------QV**C**IRS**C**FQSSMVER**C**G**C**AYYFYPL**P**SGAE**Y**--**C**DYTKHIA**W**

Cow  VQL**L**----**Y**N-TS**YT**R-------QA**C**LVS**C**FQHLMVET**C**S**C**GYFFYPL**P**AGAE**Y**--**C**SYMRHPA**W**

Human  VEL**L**----**H**N-TS**YT**R-------QA**C**LVS**C**FQQLMVET**C**S**C**GYYLHPL**P**AGAE**Y**--**C**SSARHPA**W**

Coelacanth  IK-**L**----**Y**N-TP**YS**V-------QA**C**VRS**C**FQYLLIQE**C**G**C**GYYYYPL**P**PGAQ**Y**--**C**NYNKYPS**W**

Chicken  VKL**L**----**Y**N--S**YT**L-------QA**C**LHS**C**FQHIMVQK**C**G**C**GYYYYPL**P**PGAE**Y**--**C**NYNKQPA**W**

Turtle  VKL**L**----**Y**N-SS**YT**L-------QA**C**LHS**C**FQDKMVER**C**G**C**GYYYYPL**P**PGAE**Y**--**C**NYNKHPA**W**

S. Lamprey β ITN**L**----**Y**NGTA**YS**V-------QA**C**LRS**C**FQTKMIEM**C**G**C**GYYLYPL**P**PGEK**Y**--**C**QNQNFTG**W**

J. Lamprey  ITN**L**----**Y**NGTA**YS**V-------QA**C**LRS**C**FQTKMIEM**C**G**C**GYYLYPL**P**PGEK**Y**--**C**QNQNFTG**W**

E. Shark  VTT**L**----**Y**N-TS**YS**M-------QT**C**LRS**C**HQAHMVRL**C**G**C**AYHHYPL**S**EGAQ**Y**--**C**NNQDHPG**W**

Coelacanth  VPN**L**-YSI**Y**N-TS**YS**M-------QN**C**LYS**C**LQAKLVEK**C**G**C**GNYLHPL**P**DGAH**S**--**C**NNEDNPS**W**

Ropefish  ITD**L**FYKM**Y**E-TS**YS**V-------QS**C**LRS**C**FQMNLVKM**C**G**C**AYNLYPL**P**AEAP**Y**--**C**NFGDHPE**W**

W. Lungfish  VNN**L**-YSS**Y**N-LS**YS**M-------QS**C**LWS**C**FQAQMVKR**C**G**C**AYYLYPL**L**DGAN**Y**--**C**DTQNNSD**W**

A. Lungfish  IDN**L**-YSQ**Y**N-LS**YT**M-------QS**C**LWS**C**FQIQMVNS**C**G**C**AYYLYPL**P**EGAT**Y**--**C**NNQNNSD**W**

Frog  VQN**L**-YAE**F**N-SS**YS**I-------QS**C**LRS**C**YQEEMVKT**C**K**C**AHYQYPL**P**NGSE**Y**--**C**TNMKHPD**W**

Cow  IQN**L**-YSN**Y**N-TT**YS**I-------QA**C**IRS**C**FQEHMIRE**C**G**C**GHYLYPL**P**HKRK**Y**--**C**NNQEFPD**W**

Human  VQN**F**-YSD**Y**N-TT**YS**I-------QA**C**LRS**C**FQDHMIRN**C**N**C**GHYLYPL**P**RGEK**Y**--**C**NNRDFPD**W**

Chicken  VKN**L**-YSE**Y**N-TS**YS**IQLPLSFFQA**C**LRS**C**FQNHMTEI**C**G**C**GHYMFPL**P**EGVT**Y**--**C**NNEDNPG**W**

Turtle  VKN**L**-YNE**Y**N-TS**YS**I-------QA**C**LRS**C**FQAQMFEN**C**G**C**GHYLFPL**P**EGVN**Y**--**C**NNEDDPD**W**

S. Lamprey  VKS**L**----**Y**D-SP**YS**V-------QT**C**QNS**C**FQWEMIKS**C**G**C**ANYEQPL**P**EGSR**F**--**C**NYDNNPG**W**

J. Lamprey  VKS**L**----**Y**D-SP**YS**V-------QT**C**QNS**C**FQLEMIKS**C**G**C**ANYEQPL**P**EGSL**F**--**C**NYDNNPG**W**

Ropefish  VNN**L**----**Y**N-KT**YS**L-------QV**C**LHS**C**FQKEMTLQ**C**G**C**AHFHYPL**P**AEAQ**Y**--**C**NYNAFPD**W**

E. Shark  EDN**L**----**Y**N-KS**YS**L-------QM**C**LHS**C**FQKEMVQT**C**G**C**GHYEKPL**P**PGAQ**Y**--**C**DYNRFPG**W**

W. Lungfish  EEN**L**----**Y**N-KS**YS**L-------QI**C**LHS**C**FQKEMVNS**C**G**C**AYYEQPL**P**PGAE**Y**--**C**SYEKFPG**W**

A. Lungfish  EQN**L**----**Y**N-TS**YS**L-------QI**C**LHS**C**FQTEMISN**C**G**C**AYYEQPL**P**SGAE**Y**--**C**YYEKYPG**W**

Coelacanth  MQN**L**----**Y**N-TT**YS**F-------QM**C**LYS**C**FQKEMVQS**C**G**C**AHYEYPL**P**VDTE**Y**--**C**DYKKYPG**W**

Frog  VEN**L**----**Y**N-KK**YT**L-------QI**C**LNS**C**FQREMVRS**C**G**C**AHYDQPL**P**NGAK**Y**--**C**NYEEYPS**W**

Cow  ITN**I**----**Y**N-AT**YS**L-------QI**C**LHS**C**FQAKMVEN**C**G**C**AQYSQPL**P**RGAD**Y**--**C**NYQQHPN**W**

Human  IRN**I**----**Y**N-AA**YS**L-------QI**C**LHS**C**FQTKMVEK**C**G**C**AQYSQPL**P**PAAN**Y**--**C**NYQQHPN**W**

Chicken  VEN**L**----**Y**N-KS**YS**L-------QI**C**LHS**C**FQKAMVES**C**G**C**AQYAQPL**P**NGAE**Y**--**C**NYKKNPN**W**

Turtle  VAN**L**----**Y**N-KS**YS**L-------QI**C**LHS**C**FQRAMVDT**C**G**C**AQYAQPL**P**PGAE**Y**--**C**NYKKYPN**W**

Spotted Gar -like --NK**C**VQLYEDKFAHDELE**C**--N**C**PLQ**C**EEEIFELTLSSSQ**WPS**AV**Y**MNEFARK**L**RQSG------

Asian Arowana -like --RR**C**LELYEYKFAQDILP**C**--H**C**PLQ**C**KEELYSLTVSGSQ**WPA**TA**F**LDKFSSN**L**RGKG------

Coelacanth ASIC1 --KN**C**ADPALDFLVEKD-N**D**YCV**C**QTP**C**NMTRYGKELSMVK**IPS**KA**S**AKYLAKK**F**NKTE------

Catfish ASIC1 --KD**C**ADPALDFLVEKD-N**N**YCV**C**PTP**C**NMTRYGKELSMVK**IPS**KA**S**AKYLAKK**F**NKSE------

E. Lamprey ASIC1 --KE**C**ANPALMFLVEKD-D**D**YCA**C**EMP**C**NIKRYAKELSMVK**VPS**QA**S**AKYLAKK**F**NKTE------

E. Shark ASIC1 --KE**C**ADPALDFLVEKD-S**V**FCT**C**ETP**C**NMTRYGKELSMVK**IPS**KA**S**AKYLAKK**Y**NKSE------

J. Medaka ASIC1 --KE**C**ADPALDFLVERD-N**D**YCV**C**ETP**C**NLTRYGKELSFVK**IPS**KA**S**AKYLAKK**F**NKTE------

Black Rock Cod ASIC1 --KD**C**ADPALDFLVERD-N**D**YCV**C**ETP**C**NMTRFGKEMSFVK**IPS**KA**S**AKYLAKK**F**NKTE------

Lancelet -like --VD**C**EEKVKQRLGNGNLT**C**--Q**C**PIS**C**MDRIYRKAIGLSE**WPA**DS**Y**VSTVLNK**L**KTKR------

Lancelet -like --NS**C**EQRWISEMRNGRIW**C**--D**C**PPS**C**VDNTLSMTFGFSE**WPA**DS**Y**EKSLRQK**L**SKLD------

E. Shark  --GH**C**YYKLYEEFIAEKLN**C**FEK**C**PKL**C**DQSLYHITVGHSK**WPS**KQ**V**ESWMRPF**L**SNKK------

Frog  --GH**C**FYQLYEKMLDHTLI**C**FTQ**C**PKQ**C**KQTQYHLAAGTAK**WPS**PV**S**KA--IQL**L**SLQE------

Coelacanth  --GH**C**YYRLYKEFKANDLG**C**FTK**C**RKR**C**LESEYHQMTGYSK**WPA**KD**S**GKWIHHI**L**AKQN------

S. Lamprey  -AGH**C**YYKLYRQFISDELG**C**VDK**C**AQP**C**TTKRFAVTPGYAA**WPD**SS**S**EKWIFNL**L**SLQN------

J. Lamprey  -AGH**C**YYKLYRRFISDELG**C**VDK**C**AQP**C**TTKRFAVTPGYAT**WPD**SS**S**EKWIFNL**L**SLQN------

W. Lungfish  --GY**C**YYKLYKAFAADELG**C**FKR**C**PKP**C**IVAEYVKTAGYSK**WPS**SS**S**ETWIAKV**L**SQES------

A. Lungfish  --GY**C**YYKLYKAFAADELG**C**FRR**C**RKP**C**QYTDYKMTAGYAQ**WPS**SV**S**ESWITSI**L**SQEN------

Ropefish  --GH**C**YYKLYNEFSLDNLG**C**STK**C**RRP**C**QDTEYTMTAGYAT**WPT**KA**S**KNWIFNV**L**NKQN------

Frog  --GH**C**YYKLIIEFTSNKLG**C**FTK**C**RKP**C**LVSEYQLTAGYSK**WPN**RV**S**QDWVLHT**L**SR--------

Salamander  --GH**C**YYKLENEFVSDDLQ**C**FTK**C**RKP**C**QLSEYHLSAGYSR**WPS**DV**S**KSWVFHM**L**SQQN------

Cow  --GY**C**YYKLQDAFSSDRLG**C**FTK**C**RKP**C**SVTIYKLSASYSQ**WPS**AT**S**QDWVFQM**L**SRQN------

Human  --GY**C**YYKLQVDFSSDHLG**C**FTK**C**RKP**C**SVTSYQLSAGYSR**WPS**VT**S**QEWVFQM**L**SRQN------

Chicken  --GY**C**YYKLLAEFKADVLG**C**FHK**C**RKP**C**KMTEYQLSAGYSR**WPS**AV**S**EDWVFYM**L**SQQN------

Turtle  --GH**C**YYKLQVEFKSNVLG**C**FSK**C**RKP**C**EVTEYQLSAGHSH**WPS**TV**S**EDWVSHM**L**SRQN------

Cow  --GH**C**FHHLYQKLKTHQLP**C**TTR**C**PRP**C**RESSYKLSAGTSR**WPS**ST**S**ADWVLAV**L**GEPSRRNPWP

Human  --GH**C**FYRLYQDLETHRLP**C**TSR**C**PRP**C**RESAFKLSTGTSR**WPS**AK**S**AGWTLAT**L**GEQG------

Coelacanth  ETGH**C**YYKLYKKFVAGDSG**C**FQK**C**PKP**C**QEFKYKLTTGISK**WPS**QN**A**ENWIFHL**L**SHHN------

Chicken  --GH**C**FYQLYSRLRNHHLN**C**FDQ**C**PKP**C**RESLYKVSAGTAK**WPS**RK**S**QDWIRQA**L**RHQN------

Turtle  --GH**C**FYQLYNRLADHHLS**C**FAK**C**PKP**C**WESWYKLSAGTAK**WPS**TK**S**QDWVRQI**L**SRQK------

S. Lamprey β --RY**C**YYKLYEQFVEEDMD**C**YTI**C**KQP**C**IESEYKMSISMSD**WPS**QS**S**EDWIFHI**L**SKER------

J. Lamprey  --RY**C**YYKLYDQFVEEDMD**C**YTI**C**KQP**C**IESEYKMSISMSD**WPS**QS**S**EDWIFHI**L**SKER------

E. Shark  --AY**G**YYHLKEQIESENSE**C**LTS**C**IPP**C**NDTLYRLTISMAE**WPS**QA**S**EEWIYQI**L**SYER------

Coelacanth  --AY**C**YYSLGDSSEYKD-S**C**LQI**C**EQP**C**NETQYRLTISMAD**WPS**ES**S**EDWIFHV**L**SYER------

Ropefish  --VY**C**YHKWKKS-AESELL**C**LQT**C**KQS**C**NESQHLLTVSMAD**WPS**ES**S**EDWIFHV**L**SYER------

W. Lungfish  --VY**C**YYHLQDSTDANE-E**C**IQI**C**ELP**C**IENQFRISTSMAD**WPS**ES**S**EDWIFHV**L**SHER------

A. Lungfish  --AY**C**YYLLQDSKDHKN-E**C**LQT**C**IQT**C**NELQFRISTSMAD**WPS**ES**S**EDWIFHV**L**SYER------

Frog  --VP**C**YYSLRDSVAIRE-N**C**ISL**C**QQP**C**NDTHYKMVISMAD**WPS**AG**A**EDWIFHV**L**SYEK------

Cow  --AH**C**YSALRISLAQRE-T**C**IYA**C**KES**C**NDTQYKMTISMAV**WPS**EA**S**EDWIFHV**L**SQER------

Human  --AH**C**YSDLQMSVAQRE-T**C**IGM**C**KES**C**NDTQYKMTISMAD**WPS**EA**S**EDWIFHV**L**SQER------

Chicken  --AY**C**YSSLRSSIRHRQ-I**C**IDS**C**KET**C**NDTQYKMTISMAD**WPS**EA**S**EDWIFHI**L**SYER------

Turtle  --AY**C**YSSLRSSIRHRQ-F**C**IDS**C**KET**C**NDTQYKMTISMAD**WPS**EA**S**EDWIFHI**L**SYER------

S. Lamprey  --EY**C**YYRLYDMYIKEELK**C**IQV**C**RQI**C**SETEHEVTLSLAD**WPS**KA**S**KGWLLRA**L**SKEQ------

J. Lamprey  --EY**C**YYRLYDMYIKEELK**C**IQV**C**RQI**C**SETEHEVTLSLAD**WPS**KA**S**KGWLLRA**L**SEER------

Ropefish  --MV**C**YSKLHAKFLQEELN**C**QKT**C**KGT**C**HTKEWILTESVAQ**WPS**VN**S**EKWVLQT**L**RFGN------

E. Shark  --IY**C**YYRLRDRFHREQLV**C**QEL**C**RQA**C**HCKEWTLMTSVAQ**WPA**QS**A**EDWVLRL**L**SWER------

W. Lungfish  --IY**C**YYQLQDKFVNERLP**C**QDV**C**KEP**C**NSKDFEITKSLAQ**WPS**GA**S**EAWVIRL**L**DWER------

A. Lungfish  --IY**C**YYQLQDKFVNERLA**C**QDI**C**KET**C**NSKDWDLTKSLAR**WPS**VA**S**KDWVLNL**L**NWER------

Coelacanth  --IY**C**YYKLRGKFAQEQLE**C**QQV**C**KEA**C**NSKEWALTKSLAH**WPS**LA**S**EDWILRA**L**NLQG------

Frog  --IY**C**YFKVYKQFVQEELG**C**QSA**C**RES**C**SFKEWTLTRSLAK**WPS**LN**S**EEWMLRV**L**SWEL------

Cow  --MY**C**YYQLHQAFVREELG**C**QSV**C**KEA**C**SFKEWTLTTSLAQ**WPS**EV**S**EKWLLSI**L**TWDQ------

Human  --MY**C**YYQLHRAFVQEELG**C**QSV**C**KEA**C**SFKEWTLTTSLAQ**WPS**VV**S**EKWLLPV**L**TWDQ------

Chicken  --MY**C**YYRLHEKFVKEQLG**C**QQI**C**KDA**C**SFKEWALTTSIAQ**WPS**TV**S**EDWMLRV**L**SWDK------

Turtle  --MY**C**YYKLHETFVKEQLG**C**QQI**C**KEA**C**SFKEWTLTTSLAQ**WPS**SV**S**EDWMLRV**L**SWDK------

Spotted Gar -like ----------GKLAKVADK---VRD--------------------NLVKVIINYQQLNYELIEEI

Asian Arowana -like ----------GQLKAIADNPQDIRD--------------------NMVKVVVYYQKLNYEHISEE

Coelacanth ASIC1 ------------DYIA--------E--------------------NILVLDIFFEALNYETIEQK

Catfish ASIC1 ------------QYIG--------E--------------------NILVLDIFFEALNYEKIEQK

E. Lamprey ASIC1 ------------AYIA--------E--------------------NVLVLDIFFEALNYETIEQK

E. Shark ASIC1 ------------DYIG--------E--------------------NILVLDIFFEALNYETIEQK

J. Medaka ASIC1 ------------QYIA--------D--------------------NILVLDIFFEALNYETIEQK

Black Rock Cod ASIC1 ------------QYIS--------D--------------------NLLVLDIYFEALNYETIEQK

Lancelet -like ---------RGPGTGILDDRDEFKK--------------------NLLKLNIYYEALNYETITES

Lancelet -like ----------EESQEKLQTSHDARR--------------------NLLKLSVYFEQLNQQTISES

E. Shark  ------------DFNV-------RK--------------------DFAKLNVYFEALSYREIEEI

Frog  ------------RYNSTSE----RS--------------------DVSKINVYYEELSYRSVEET

Coelacanth  ------------QYNFTTN---SRE--------------------DVSKLTVYFQELHHKTVGES

S. Lamprey  ------------NYSVTTV----RN--------------------DVAKLNVYFRELNMKTISES

J. Lamprey  ------------NYSVTTV----RN--------------------DVAKLNVYFRELNMKTISES

W. Lungfish  ------------PYS-TSA----RK--------------------VIAKLNIYFYELSYKTTGES

A. Lungfish  ------------QYNMTSG----RK--------------------NIAKLNVYFYELNYQTMGES

Ropefish  ------------GYNITSD----RN--------------------DIAKVNIYFEDLNYRTFGES

Frog  ------------QYNLT-D----RN--------------------GIAKLNIYFEELNYKTILES

Salamander  ------------QYNFTSD----RS--------------------GVAKLNIYFSEMTYKSTVES

Cow  ------------NYTIKNK----RD--------------------GVAKLNIFFKELNYKSNSES

Human  ------------NYTVNNK----RN--------------------GVAKVNIFFKELNYKTNSES

Chicken  ------------KYNITSK----RN--------------------GVAKVNIFFEEWNYKTNGES

Turtle  ------------KYNITSK----RN--------------------GVAKVNIFFEEWKYKTNGES

Cow  SSASIKSWPLPLPSSPSRA----RTEGPTSRSGAQPLSPEPCPSISLAKVNIFYQELNYRTVDET

Human  -----------LPHQSHRQ----RS--------------------SLAKINIVYQELNYRSVEEA

Coelacanth  ------------GKNLTNN----RR--------------------DVSKLNIFFQKLSYESFDET

Chicken  ------------GYNSTSN----RK--------------------DIAKVTIYYKQLNYQSVNES

Turtle  ------------GYNSTHN----RR--------------------DIAKVNIFYQQLNYQSVDES

S. Lamprey β ------------KHNVSRI-FNRKQ--------------------DIIKLNLFFQEFNSMTISES

J. Lamprey  ------------KHNVSRQ--------------------------DIIKVNLFFQEFNSMTTSES

E. Shark  ----------DSSPKVTVN----RN--------------------SILKLNMYFKENNFRTISES

Coelacanth  ----------DLAINRTMN----RN--------------------GALKLNLYFQEFNYRTISES

Ropefish  ----------DFSSNVTIN----RD--------------------GVMKMNLYFKEINYRSITES

W. Lungfish  ----------DNSSDITMN----SD--------------------GVLRLNFYFNEFNYRVISES

A. Lungfish  ----------DDSTNITMK----RD--------------------GVLKLNLYFKEFNYRVITES

Frog  ----------DSSHNITVN----RN--------------------GIVRLNIYFQEFNYRSISES

Cow  ----------DQSSNITLS----RK--------------------GIVKLNIYFQEFNYRTIEES

Human  ----------DQSTNITLS----RK--------------------GIVKLNIYFQEFNYRTIEES

Chicken  ----------DMSTNVTLD----RN--------------------GIIKLNIYFQEYNYRTISES

Turtle  ----------DLSTNVTLD----RN--------------------GIIKLNIYFQEYNYRTISES

S. Lamprey  ----------GLPANDTLK----PS--------------------DIAIVNIYFKDLTQKTISES

J. Lamprey  ----------GLPANDTLK----PS--------------------DIAIVNIYFKDLNQKTISES

Ropefish  ----------VLKKKQNIS----KE--------------------NFAKFSIFYKDLNLKTITES

E. Shark  ----------GRDGNKTLS----TS--------------------ELASLDIYYADLSVRNITEK

W. Lungfish  ------------GLNGTLS----KN--------------------DLVNLAIFYQDLNWRSLSES

A. Lungfish  ------------GLNNTLN----KN--------------------DLASIAIFYQDLNLRSLSES

Coelacanth  ----------SLKGNKGLS----KN--------------------DLVNLGIFYKDLNLRSISES

Frog  ----------GEKLNKNLT----KN--------------------DLANLNIFYQDLNSRSISES

Cow  ----------SQQIKKKLN----KT--------------------DLAKLLIFYKDLNQRSIMEN

Human  ----------GRQVNKKLN----KT--------------------DLAKLLIFYKDLNQRSIMES

Chicken  ----------GQKINKKLN----KT--------------------DLANLMVFYKDLNERFISEN

Turtle  ----------GQKINKMLN----KT--------------------DLANLVVFYKDLNERFISEN

Spotted Gar -like PSFQVID**LVS**SI**G**G**L**VGL**W**I**G**V**S**I**C**TVA**E**FV**E**-LFL**K**VIIFIIKRVIR-----------------

Asian Arowana -like PFITDID**LFS**SV**G**G**L**VGL**W**V**G**V**S**L**C**TLA**E**FL**E**-FAV**N**VVLIVARGCLS-----------------

Coelacanth ASIC1 KAYEVAG**LLG**DI**G**G**Q**MGL**F**I**G**A**S**I**L**TIL**E**IL**D**-YLY**E**VFKDQVLGYFK----RKKRPKRSH----

Catfish ASIC1 KAYEVAG**LLG**DI**G**G**Q**MGL**F**I**G**A**S**V**L**TIL**E**IF**D**-YLY**E**VFKDKVLGYFLR-KGRPRRSASDN----

E. Lamprey ASIC1 RAYEVAG**LLG**DI**G**G**Q**MGL**F**I**G**A**S**I**L**TIL**E**IF**D**-YLY**E**IIKYRILYYFR----RNKKQRNIS----

E. Shark ASIC1 KAYEVAG**LLG**DI**G**G**Q**MGL**F**I**G**A**S**L**L**TIL**E**LF**D**-YVY**E**VLKHKMCGVLR--MGKQQKRNNND----

J. Medaka ASIC1 KAYELAG**LLG**DI**G**G**Q**MGL**F**I**G**A**S**I**L**TVL**E**LF**D**-YLY**E**ILKYKLCRCMK---KKHKSRNNND----

Black Rock Cod ASIC1 KAYELAG**LLG**DI**G**G**Q**MGL**F**I**G**A**S**L**L**TIL**E**LF**D**-YLY**E**VIKYKLCRCVK---KKHKGRNNND----

Lancelet -like PAYEVEN**LLG**DL**G**G**Q**LGL**W**V**G**M**S**C**L**SAM**E**LL**E**-FLV**D**IAIIL------------WKKMSNR----

Lancelet -like PAYRVEN**LLG**DL**G**G**Q**LGL**W**V**G**V**S**V**M**TIL**E**VL**E**-LIV**D**VTQILLS------KARGKKKTRV-----

E. Shark  SAISVME**LLS**SL**G**G**E**VSV**W**F**G**G**S**V**L**SGF**E**LL**E**-LLL**D**FLVLSIALL----KASVWRGH-------

Frog  PTMSVNV**LLS**SM**G**G**L**WSW**W**F**G**S**S**V**L**SVA**E**IA**E**-LVL**D**TAAMVTIVIYQ--WKKQRANRNDG----

Coelacanth  PSINAAT**LLS**NL**G**S**Q**WSF**W**F**G**S**S**V**L**SVI**E**MV**E**-LLI**D**FFVLSTILLFR--HYCIQREENQD----

S. Lamprey  AATNVIW**LLS**NI**G**S**Q**WSL**W**F**G**S**S**V**L**SWL**E**VG**E**-LGI**D**CCIMVFVLAYR--RRRSRAERRRA----

J. Lamprey  AATNVIW**LLS**NI**G**S**Q**WSL**W**F**G**S**S**V**L**SWL**E**VG**E**-LGI**D**CCIMVFVLAYR--RRRSCAERRRARGTE

W. Lungfish  PSFNVVT**LLS**NM**G**S**Q**WSL**W**F**G**S**S**V**L**SVV**E**MG**E**-LVI**D**LIAVGIIVLRR----RQREKTKAT----

A. Lungfish  PSFTVVT**LLS**NM**G**S**Q**WSL**W**F**G**S**S**V**L**SVV**E**MG**E**-LVF**D**LIAVGVIVLRR----RRREKCQAS----

Ropefish  PAFTAVM**LLS**NL**G**S**Q**WSL**W**F**G**S**S**V**M**SVV**E**LA**E**-LVF**D**LVAITLIFSAQ--KYFQWKNTESKVNTD

Frog  PTINMAM**LLS**LL**G**S**Q**WSL**W**F**G**S**S**V**L**SVV**E**ML**E**-LVI**D**FVIIGVMILLHRYYYKKANEGEET----

Salamander  PAINMVV**LLS**LL**G**S**Q**WSL**W**F**G**S**S**V**L**SVV**E**MA**E**-LLF**D**VAAITVILYLQ--RRRKRQMDSVE----

Cow  PSVTMVT**LLS**NL**G**S**Q**WSL**W**F**G**S**S**V**L**SVV**E**MA**E**-LII**D**LLVITFLMLLRRFRSRYWSPGRGG----

Human  PSVTMVT**LLS**NL**G**S**Q**WSL**W**F**G**S**S**V**L**SVV**E**MA**E**-LVF**D**LLVIMFLMLLRRFRSRYWSPGRGG----

Chicken  PAFTVVT**LLS**QL**G**N**Q**WSL**W**F**G**S**S**V**L**SVM**E**LA**E**-LIL**D**FTVITFILAFR--WFRSKQ---------

Turtle  PAFTVVT**LLS**QL**G**N**Q**WSL**W**F**G**S**S**V**L**SVV**E**LA**E**-LIL**D**FIAITFILSFR--WLRSRQ---------

Cow  PVYSVPQ**LLS**AM**G**S**L**WSL**W**F**G**S**S**V**L**SVV**E**VL**E**-LLL**D**AIALTLLLCCR--WLCGSRGQPRA----

Human  PVYSVPQ**LLS**AM**G**S**L**CSL**W**F**G**A**S**V**L**SLL**E**LL**E**-LLL**D**ASALTLVLGGR--RLRRAWFSWPR----

Coelacanth  PSISAVT**ILS**QM**G**N**L**WSF**W**F**G**S**S**V**L**SVI**E**LI**E**-LIL**D**VIAMSFILTFK--WHKLKK---------

Chicken  PLLSDNL**LLS**SM**G**S**Q**WSL**W**F**G**S**S**V**L**SVV**E**ML**E**-LLI**D**TLVLSLLFCYQ--RFRSKTLNVAR----

Turtle  PVYTVNL**LLS**NM**G**S**Q**WSL**W**F**G**S**S**V**L**SVV**E**MF**E**-LLL**D**IMVLSLIFCYR--RFKAKKTLKMA----

S. Lamprey β PAQTIVT**LLS**NL**G**G**Q**FGF**W**M**G**G**S**V**L**CII**E**FI**E**-III**D**CVWIGMIKASN--DVRERRKTSRK----

J. Lamprey  PAQTIVT**LLS**NL**G**G**Q**FGF**W**M**G**G**S**V**L**CII**E**FI**E**-III**D**CVWIGIIKASH--DVRERRKTSRK----

E. Shark  KAQTLVW**LLS**NL**G**G**Q**FGF**W**M**G**G**S**V**L**CIV**E**LL**E**-VML**D**CVWIMAIRGAR--LYMGHRRRRSL----

Coelacanth  AATDISW**LVS**NL**E**G**Q**FGF**W**M**G**G**S**I**L**CII**E**FL**E**-III**D**CVWITIIKLVI--WYRDRKHKKAQ----

Ropefish  ASTTVVW**LLS**NL**G**G**Q**FGL**W**M**G**G**S**V**I**CIV**E**FG**E**-III**D**CLWITIIKLIM--WNRNWKLKKAQ----

W. Lungfish  AATNVVW**LLS**NL**G**G**Q**FGF**W**M**G**G**S**V**L**CII**E**FG**E**-III**D**CIWIAIIRFVI--WQKNRKKMQLP----

A. Lungfish  VATNVVW**LLS**NL**G**G**Q**FGF**W**M**G**G**S**V**L**CII**E**FG**E**-VFI**D**CIWIAVIRFVK--WYKNRKERQVQ----

Frog  EATNVVW**LLS**NL**G**G**Q**FGF**W**M**G**G**S**V**L**CII**E**FG**E**-III**D**CMWITILKFLA--WSRNRRQRRKR----

Cow  AANNIVW**LLS**NL**G**G**Q**FGF**W**M**G**G**S**V**L**CLI**E**FG**E**-III**D**FVWITIIKLVA--LAKSVRQKRAQ----

Human  AANNIVW**LLS**NL**G**G**Q**FGF**W**M**G**G**S**V**L**CLI**E**FG**E**-III**D**FVWITIIKLVA--LAKSLRQRRAQ----

Chicken  AATTIVW**LLS**SL**G**G**Q**FGF**W**M**G**G**S**V**L**CLI**E**FG**E**-III**D**SLWITVINIIS--WCKGLKQKRVR----

Turtle  AATTIVW**LLS**SL**G**G**Q**FGF**W**M**G**G**S**V**L**CLI**E**FG**E**-III**D**FLWITIINIIS--WCKGLKQKRAR----

S. Lamprey  PASSIVT**LLS**NL**G**G**L**LGL**W**L**S**C**S**M**L**CVV**E**VL**E**IFCV**D**FPWILLKKLLT--TCSSAFASLIR----

J. Lamprey  PASSIVT**LLS**NL**G**G**L**LGL**W**L**S**C**S**M**L**CVV**E**VL**E**IFCV**D**FPWILLKKLLA--TCRRTFASLVR----

Ropefish  PLNNIVT**LLS**NV**G**G**Q**LGL**W**L**S**C**S**I**V**CVI**E**II**E**VFFL**D**APWILVRQIIR--SCQIRCRERQQ----

E. Shark  PANTMVT**LLS**NF**G**G**Q**LGL**W**M**S**C**S**V**I**CVI**E**IV**E**VLLV**D**ALWVLVRSAGQ--RVRRWW---------

W. Lungfish  PANSIVT**LLS**NF**G**G**Q**NGL**W**M**S**C**S**V**V**CFI**E**IW**E**VFLV**D**ILTILVRNWFR--KAKLWWNKKKE----

A. Lungfish  PANSIAT**LLS**NM**G**G**Q**LGL**W**M**S**C**S**I**V**CFL**E**MW**E**VFLV**D**ILTIIARYWLH--RGRQWWRKRKE----

Coelacanth  PANNIVT**LLS**NF**G**G**Q**LGL**W**L**S**C**S**V**V**CVL**E**II**E**VFFI**D**AFWIVLRQTTQ--KARDWWTKRK-----

Frog  PTYNIVT**LLS**NF**G**G**Q**LGL**W**M**S**C**S**M**I**CVL**E**II**E**VFFI**D**SFWVVLRQRWR-----NWWENRKE----

Cow  PANSIEQ**LLS**NI**G**G**Q**LGL**W**M**S**C**S**V**V**CVI**E**II**E**VFFI**D**SLSIIARHQWH--KAKGWW----A----

Human  PANSIEM**LLS**NF**G**G**Q**LGL**W**M**S**C**S**V**V**CVI**E**II**E**VFFI**D**FFSIIARRQWQ--KAKEWW----A----

Chicken  PANTLVI**LLS**NF**G**G**Q**LGL**W**M**S**C**S**V**V**CVI**E**II**E**VFFI**D**SFSIVMRRQWQ--KAKKWWNHRKR----

Turtle  PANNIVI**LLS**NF**G**G**Q**LGL**W**M**S**C**S**V**V**CVI**E**II**E**VFFI**D**SFFIVTRRRWQ--KAKKWWRDRKA----

Spotted Gar -like -KNKEAPLNPYM-----------------------------IAHQTFKSSV--------------

Asian Arowana -like -SRSQGPASSAL-----------------------------------------------------

Coelacanth ASIC1 -SDNLSTCDTLR---------------------------------SHSDSLGFTPNMLPR-----

Catfish ASIC1 -LDYSENPTSPG-----------------------------------VTPNHTPRAHATH-----

E. Lamprey ASIC1 -DNSVPMTSSYA---APQGHTQAAIH---------------------------------------

E. Shark ASIC1 -KGVTLSLDDIK--RHNPC----------------------ESLRGHPTGMSYTANMLPH-----

J. Medaka ASIC1 -RGAVLSLDDVK--RHAPCE-------------------------NLRTPSTYPGNMLPH-----

Black Rock Cod ASIC1 -RGAVLSLDDVK--HHDPCD-------------------------NLRTPSTYPGNMLPH-----

Lancelet -like -EKTTSRNNVVN--VAETG----------------------KIGTSNGHTIPIHMTEVM------

Lancelet -like --------------IDISGHM--------------------------------------------

E. Shark  -----------------------------------------------------------------

Frog  -MNGSNAASNVC-----------------------------SVPYIDSKTFSTPQTGLSE-----

Coelacanth  -PEITISTVSYP--HYANE----------------------NSEFNSEESMGNHFDVVAD-----

S. Lamprey  -RGTGDSEAAPP-----------------------------------------------------

J. Lamprey  DSEAAPPPPPSF--REALGCANAAYDGANDGADDG------HDGDGGGVAIGGPTERPPPWRRGS

W. Lungfish  -DDTEDNSPSET--YVHPRQENS------------------DNEHRERAPNRIEVVAEIS-----

A. Lungfish  -SDGEGTSDSTA--GTHRGQ---------------------ENASRSGRDVACNRFVVVA-----

Ropefish  GHQEPNTHNAVSNENHQEFDSLGVNFAFEAEDATHSIQSIPSDSPNVEMTTSFQFDVVAD-----

Frog  -TVVPTPAPAFA--DLEQ-----------------------QVPHIPRGDLSQRQISVVA-----

Salamander  -EDSQAPTPTLP---RFEGHGNPEFQ------------------SEEEPSHQFRVVADIT-----

Cow  -KGTQEVASTPA--ASLPSS---------------------FCPHPAFFSSSPPDPAISP-----

Human  -RGAQEVASTLA--SSPPSH---------------------FCPHPMSLSLSQPGPAPSP-----

Chicken  -WHSSPAPPPNS-------HDNTAFQ---------------DEASGLDAPHRFTVEAVVT-----

Turtle  -LLASAVPPPGA-------HDNTAFQ---------------PEPSGPSAPHRFTVEAVVT-----

Cow  -ATRVHPPSQRP------------------------------------ASGPVAADTTSN-----

Human  -ASPASGASSIK--PEAS-----------------------QMPPPAGGTSDDPEPSGPH-----

Coelacanth  -----------------------------------------------------------------

Chicken  -TPSIPSVSLTL--ESYRVVQEAGN----------------GTAPAHGHTSGVPMAVANS-----

Turtle  -QPLAISSVTLTLENYRAVHEDLAADWNSIWTNQN------VGTVAKTKNGDLPFHSICN-----

S. Lamprey β -PRYSDEPPTLS--SIVQGQGNSGFEMEERGPPG-------EAPEANGSAAQPPAAAAEQ-----

J. Lamprey  -PRYSDEPPTLS--SIVQGQGNSGFEMEEREPPR-------EAPDANGSAAQPPTAAAEQ-----

E. Shark  -ARHPPPVPTVA---------------------------------QCVEEQEHRAQSERP-----

Coelacanth  -AQYSGPPPSVS--QLARAHTDTGFQ------HD-------STDINYGTEAYCNEAYIPP-----

Ropefish  -SQYMGPPPSIS--QLAEGHMNTGFE------PD-------NVTSDSGQSLQTMSSCEHP-----

W. Lungfish  -QLYNDPPPTVS--ELVEGISNQGFQ---------------PDIINSCTSQPQPPDLHIP-----

A. Lungfish  -AQYADPPPTVS--ELVEGYTNQGFQ---------------PDIINSCSPQAQPPDLYLP-----

Frog  -PQYSDPPPTVS--ELVEAHTNSGFQ--------------------HDDGDHVPVD---------

Cow  -ARYEGPPPTVA--ELVEAHTNFGFQ------PD-------LATPGPDVE-AYPHEQNPP-----

Human  -ASYAGPPPTVA--ELVEAHTNFGFQ------PD-------TAPRSPNTG-PYPSEQALP-----

Chicken  -ARYPDTPPTVS--ELVEAHTNLGFQ-------------------HEEAGTETQGEALPP-----

Turtle  -AQYPDTPPTVS--ELVEAHTNLGFQ------HE-------DTNITPCDE-VPPPGALPP-----

S. Lamprey  -GPDPAPSVHFP--VQLPVGGSPA-----------------EDPPTFHTAMQCPREPIPM-----

J. Lamprey  -GPDPAPSVHFP--VQLPVGGSPA-----------------EDPPTFHTAMQCPREPIPT-----

Ropefish  ----RPTLPTVS--GGIPVD---------------------EDPPTFNSALRLPQPNLLE-----

E. Shark  ---QRPEQEEVP--AHGTAHGITVYL------ED-------EDPPTFNAALRLP--RQCP-----

W. Lungfish  -GQ-EQVYN--Q--NRHTGHDNPVCV------ED-------EDPPTFHTAMQLPCVQTGE-----

A. Lungfish  -RQMQQPSP--P--DHDTGHHNPVCI------DD-------EDPPTFHTAMQLPCVQTGP-----

Coelacanth  -VRQAQPSLAAP--TDYAGQHNPVYVSD-------------EDPPTFSTAVHLPHSESCP-----

Frog  -NQAEDTPEIPV--PTMTGHDNPLCVDNPICLGE-------EDPPTFNSALQLPQSQDSH-----

Cow  -RRRAPACPEAP--RAPQGRDNPSLD------ID-------DDLPTFTSALSLPPAPGSQ-----

Human  -WKQAPPCPEAP--RSPQGQDNPALD------ID-------DDLPTFNSALHLPPALGTQ-----

Chicken  -DETGKPPEVGD--AEQQGHDNPAC-------SD-------EDLPTFNTALRLPLPQEGH-----

Turtle  -APAQVNAPAKE------GHDNPVCID--------------EDLPTFNTALHLPLPQENH-----

Spotted Gar -like -----------------------------------------------------------------

Asian Arowana -like ----------------------------------MAGREGPPS----------------------

Coelacanth ASIC1 -------------------------------------HPPLGNFEEFAC----------------

Catfish ASIC1 ------------------------------------SGVTRTASDSRRTCYLVTRL---------

E. Lamprey ASIC1 ------------------------------------PHGAHAKYEDFTC----------------

E. Shark ASIC1 -------------------------------------HPPRNTFEDFTC----------------

J. Medaka ASIC1 -------------------------------------HPGQGNFEDFTC----------------

Black Rock Cod ASIC1 -------------------------------------HPGQANFEDFTC----------------

Lancelet -like -----------------------------------------------------------------

Lancelet -like -----------------------------------------------------------------

E. Shark  -----------------------------------------------------------------

Frog  -----------------------------------------KELESKTNDPKFNGEINTFS----

Coelacanth  -------------------------------------VSAPPAYETLDLDLPPSAAQCITGCKCV

S. Lamprey  ---------------------------------------PPPSF---------------------

J. Lamprey  LTRNACSFCVVADISCPPAAAAKPVVGASREDAAAAPEALPPDYGSLRRVPEGYVAVSSDPGGPP

W. Lungfish  ---------------------------------------PPPAYDSLELDTPVACSADCSCTRRM

A. Lungfish  ------------------------------------EISPPPAYDTLQLDVPVACAPDCECTQHV

Ropefish  -------------------------------------ISPPPAYDSLNLECSSLSQTIKGCNAEC

Frog  ------------------------------------DITPPPAYESLDLRSVGTLSSRSSSMRSN

Salamander  ---------------------------------------PPPAYDSLELHAREECDDSCSCSHRS

Cow  -----------------------------------ALSAPPPAYATLGPHPAPSGLAEASTSAHA

Human  -----------------------------------ALTAPPPAYATLGPRPSPGGSAGASSSTCP

Chicken  ---------------------------------------TLPSYNSLEPCGPSKDGETGLE----

Turtle  ---------------------------------------TLPSYNSLELCGQNRDAEIGVE----

Cow  --------------------------------------APGPGCLHLPRCCRDFSRSLG------

Human  -----------------------------------LPRVMLPGVLAGVSAEESWAGPQPLETLDT

Coelacanth  -----------------------------------------------------------------

Chicken  -------------------------------------SDPHPAQLSSKAIPEHCPDVVLNGFRYM

Turtle  -------------------------------------KTPTPELNPDVVLNGFRHIKDHSIEIDL

S. Lamprey  --------------------------------QPDVPGTPPPHYDTLRISKTELHDEINSDDDGE

J. Lamprey  ---------------------------------QDVPGTPPPHYDTLRISKTELHDEINSDDDSE

E. Shark  -----------------------------------VPSTPPPRYDSLHICSLTEPGPPEAGGKIV

Coelacanth  --------------------------------REPTPGTPPPNYDSLRVQPVENTEQISDSEEN-

Ropefish  --------------------------------VHPIPGTPPPHYDSLRLKSVRVNNE--------

W. Lungfish  -------------------------------TTLEVPGTPPPHYDSLRIQPIDMEQQSDNEDF--

A. Lungfish  -------------------------------TTLEIPGTPPPKYDSLRVHPIDTEHHSDSEDL--

Frog  -----------------------------------IPGTPPPNYDSLRVNTAEPVSSDEEN----

Cow  -----------------------------------IPGTPPPNYDSLRLQPLDVIESDSEGDAI-

Human  -----------------------------------IPGTPPPNYDSLRLQPLDVIESDSEGDAI-

Chicken  -----------------------------------EPGTPPPNYDSLRVQPSHNPGTDSDIECEE

Turtle  -----------------------------------EPGTPPPNYDSLRVDPRAGIDSDSDAEAS-

S. Lamprey  ------------------------------------PNTPPPQYNTLRLRQIAGYVPDGGSDGE-

J. Lamprey  ------------------------------------PNTPPPQYDTLRLRQIAGYVPDEGSDGED

Ropefish  -----------------------------------VPKTPPPNYNTLRIHNVFSHMNDEDEHDTI

E. Shark  ------------------------------------PTAPPPNYEMLQQCHGFNGGPEEERF---

W. Lungfish  -----------------------------------VPSTPPPQYDALRIQNVFDEQFSDTEVN--

A. Lungfish  -----------------------------------VPSTPPPQYNALRIQSVFDEQVSDTEVN--

Coelacanth  -----------------------------------VPKTPPPTYDALRIQTAFAEQISDTEDNEY

Frog  -----------------------------------VPRTPPPKYNTLRIQSAFQLETIDSDEDVE

Cow  -----------------------------------VPGTPPPRYNTLRLERAFSSQLTDTQTTFP

Human  -----------------------------------VPGTPPPKYNTLRLERAFSNQLTDTQMLDE

Chicken  -----------------------------------PPRTPPPNYSTLRLETAFTEQLPDTLEAGQ

Turtle  -----------------------------------VPRTPPPNYSTLKLDAAFTDPLPDTLEGSC

Spotted Gar -like -----------------------------------------

Asian Arowana -like -----------------------------------------

Coelacanth ASIC1 -----------------------------------------

Catfish ASIC1 -----------------------------------------

E. Lamprey ASIC1 -----------------------------------------

E. Shark ASIC1 -----------------------------------------

J. Medaka ASIC1 -----------------------------------------

Black Rock Cod ASIC1 -----------------------------------------

Lancelet -like -----------------------------------------

Lancelet -like -----------------------------------------

E. Shark  -----------------------------------------

Frog  -----------------------------------------

Coelacanth  HCASFISHEVEDLMSDLAGDP--------------------

S. Lamprey  -----------------------------------------

J. Lamprey  RRGAGAPLLSPRVSALAASGKEVLRRRSASLNVVSFAIEEA

W. Lungfish  SQTSIKSHTSNSSNTEESTSEGPTAL---------------

A. Lungfish  SHASVHSQAPCSSQPEQEASEGPTVL---------------

Ropefish  QCSRRLCEINEKD----------------------------

Frog  RSYYEENGGRRN-----------------------------

Salamander  SIRSNMSVHSRASSAATNA----------------------

Cow  PGEP-------------------------------------

Human  LGGP-------------------------------------

Chicken  -----------------------------------------

Turtle  -----------------------------------------

Cow  -----------------------------------------

Human  -----------------------------------------

Coelacanth  -----------------------------------------

Chicken  KDSSLGGEINH------------------------------

Turtle  NS---------------------------------------

S. Lamprey β FV---------------------------------------

J. Lamprey  FVS--------------------------------------

E. Shark  VEVGGEEAGEEWGEEGCRL----------------------

Coelacanth  -----------------------------------------

Ropefish  -----------------------------------------

W. Lungfish  -----------------------------------------

A. Lungfish  -----------------------------------------

Frog  -----------------------------------------

Cow  -----------------------------------------

Human  -----------------------------------------

Chicken  QRPAANHHGDASVWAE-------------------------

Turtle  -----------------------------------------

S. Lamprey  -----------------------------------------

J. Lamprey  -----------------------------------------

Ropefish  TPIDDSIVHDNTMTINQRRRKENPFLII-------------

E. Shark  -----------------------------------------

W. Lungfish  -----------------------------------------

A. Lungfish  -----------------------------------------

Coelacanth  -----------------------------------------

Frog  RL---------------------------------------

Cow  H----------------------------------------

Human  L----------------------------------------

Chicken  H----------------------------------------

Turtle  H----------------------------------------