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DOR Human      -MFQRLSSLFFSTP-----SPPE-DPDCPRAFVS--E-----
DOR Opossum    -MFQRLTSLFFSTS-----PPSE-EPPSPKAFICPED-----
DOR Lizard     -MFQRLTSLFFSDS-----SAPE-DLEEPKPFIS--K-----
DOR Chicken    -MFQRLTSLFFSDS-----SAPE-GLEPKPFVS--E-----
DOR Frog       -MFQRLTRLFFSDV-----PSS--NTNEPKPIIS-----
DOR Medaca     -MFQRLSNLLFGEV-----EEVAELKGPNPCLT-----
DOR Elephant fish -MFHRFTSLFYGGS-----ENT--CIEGPDPSLT-----
TP53INP1 Human -MFQRLNKMVF-----GEVSSSS--NQEPEF--N-----
TP53INP1 Opossum -MFQRLNSMFV-----GEIKNSS--SKEPEF--S-----
TP53INP1 Lizard -MFQRLNNMFM-----EEINNL--SQEPAF--S-----
TP53INP1 Chicken -MFQRLNNMFM-----GEIDGLS--SQEPEF--S-----
TP53INP1 Frog   -MFQMLNNMFA-----RECSNAL--SQETKL--S-----
TP53INP1 Medaca -MFQVFSALFRDG-----VEELSQC SRPGDDKRE--E-----
TP53INP1 Elephant fish -MYQRFSSMLF-----GEIDGAERESQLEI--S-----
DOR Sea squirt -MLNTIAYWAGFGS-----NDTPVVDNLSFIT-----
DOR Lancelet   -MFSAVTNLLFGASEEVG-----ACDLRTS-----
DOR Sea urchin -MLSGLSDYLFSSNNQAGD-----AMVTDQTQQRDTPVKDPVK-----
DOR Fly        -MLSSSLASYLFGSATSDSISQEANPAQNRNANSSSSPGPTSDPAAGDVIEVTSSTPSVAGSSRGAVRASNGKRGKNNRGGKQQRTO
DOR Sea slug   -MFNSVAKYLWGDANEVEQG-----YMEVSGQADTAGEQLDL--AI-----
DOR Capitella -MLSGISSYLFG-----ASSAEDNLPQPTVDPPE-----
DOR Sea anemone -MFSLSYIWGQT-----DDQVVPDCPLDVED-----
DOR Trychoplax MLWQSLSSYLWDQ-----SSTEDASNHRVNS-----

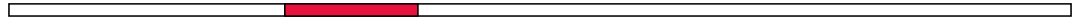
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DOR Human      -----EDEVGWLIIDLPD-----
DOR Opossum    -----EEEVDGWLIIDLPD-----
DOR Lizard     -----EEEEDDWLIIDITGEKDS-----VCAS-----
DOR Chicken    -----EEEEDDWLIIELGA-----
DOR Frog       -----EEEDDGWLIIDIPESYDL-----NSSGDE-----
DOR Medaca     -----EADEEGWMLVNLPD-----
DOR Elephant fish -EKEDDGWLVDFPEVKAS-----TCVPSP-----
TP53INP1 Human -EKEDDEWILVDFIDTCTG-----FSAEEEEEEE-----
TP53INP1 Opossum -EKEDDEWILVDFIDTN-----FSTVEEEE-----
TP53INP1 Lizard -EKEEEEWIVDFIDTCNN-----FSMVEEDEEEEEEEEDNC-----
TP53INP1 Chicken -EKEDDEWILVDFIADT--C-----TNCTTEQD-----
TP53INP1 Frog   -EKEDDEWILVDFIAQVDP-----GSRVSEAAA-----
TP53INP1 Medaca -EEDDEDWILVNYLTDACSGDCGGLSRMSLSPEDDEDEED-----
TP53INP1 Elephant Fish -EKEDDEWILVDYIDGM-----
DOR Sea squirt -KETGDWTLVDLENQND-----
DOR Lancelet   -TLDDDWLVVLPAGMNIQMEKE-----TEALT-----
DOR Sea urchin -EIEMDGDWLVVDVTND-----SGSPS-----
DOR Fly        QQRKQPAITKLLTPSGEIVDEDFDEDEWYIVEKEDEDD-----SLPRSDSEELSVVEVSQPRGGSNNASSPMVTVATG
DOR Sea slug   -HQDDDDWLVVQPGASDIELDEAASLRCSYNPLTGCSDSVQALQDCTMNLNN-----
DOR Capitella -VQDDLRLMTR-----EGEEWLVVDKAAR-----SPPRS-----PR-----
DOR Sea Anemone -SRTEEGWIMVDLGSVVNPKD-----
DOR Trychoplax -----LTEEDDWILVVKENKD-----

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DOR Human      -----SYAAP-----PSPGAAPAP--AG-----RPPPAP
DOR Opossum    -----SFAAP-----PSP--K-----PASP
DOR Lizard     -----CCHGSLP-----PTSSLPLSPSDCISRSM-----PSQDP
DOR Chicken    -----HTGS-----S--T-----PTLPSP
DOR Frog       -----VAQEEDD-----ATPSPLPHSLADRIGWS-----IPPHPP
DOR Medaca     -----PGSEC-----GGN-----GGRS-----REGSER
DOR Elephant fish -HLPDDHLP-----LASSLESLELCHCGISSR-----PPRSKA
TP53INP1 Human -DISEESPTEHP-----SVFSCLPASLECLADTS-----DSCFLQFES
TP53INP1 Opossum -DVSEESPTNHP-----PVFSCLPASLECLADTS-----ESCFVQFEA
TP53INP1 Lizard -NIHETSSVDHP-----PVFSHLPNSLECLSDAS-----ESCFIQFDS
TP53INP1 Chicken -DIAETSPAGSS-----PVFTCLPSPLEHLPEAG-----ESCFIQFES
TP53INP1 Frog   -TFEVISHSDET-----SVLPHVSNTFERLGTTS-----DSCFIHFNL
TP53INP1 Medaca -LVMIPSPIASP-----AIRYPSCTSLNSVADTPDGGVDEDEYVDDEGGFLRLDA
TP53INP1 Elephant fish -DRATSPNS-----AMFSSSTSLELLGNSS-----DPCFLQLDS
DOR Sea squirt -----AQS-----NYTPPPSP-----
DOR Lancelet   -----QSRPGDR-----PSTS--SSVPVIPEN-----
DOR Sea urchin -PLRSPTRS-----PSKDGFQSQQAVPEKP-----
DOR Fly        TAFNCRRQGVNSCSLYSGPRQQRNYLQRSRVSRPLSISTLSPRSVPALGAGDHDTLTQSLYVASPSGD-----QGQDHGQGAN
DOR Sea slug   FLDLSNYSSDGES-----GGDSGVRPSPSEVFSVCSGR-----SHATYRPS
DOR Capitella -----CRFR-----G-----SADVTPNGSSGHSTPVHILHPS-----
DOR Sea anemone -----PLRSPTRS-----VKKEKEAEN-----AVP
DOR Trychoplax -----LEEVSNEDQLVKNRK-----

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DOR Human SLMDESFWFVTPACFTA**E**GPGLGPAPLQSSPLEDLLIEHPSMSVYVTVGS-----TIVLEPGS-PSPLPDA----

DOR Opossum CLLDESFWFVTPACFTA**E**GPGLGPAHLESSPLEDLLIEHPSMSVYVTVGS-----TIVLEPGPGPTLTTPR-----

DOR Lizard CLMDESFWFVTPPPCFTA**E**CS--DPVSMESNPMDLLIEHPSMSVYVTVSS-----TIVVETQT--PEEH-----

DOR Chicken CLMDESFWFVTPPPCFTA**E**EP--GPDGVGSSPMEDLLIEHPSMSVYVTVS-----TLELDAEG--POD-----

DOR Frog QSMDESFWFVTPPPCFTA**E**AP--GQDELGTSPLEDLLIEHPSMSVYITNG-----SIVVEEDT--REAP-----

DOR Medaca GCMDESFWFVTPPPCFTA**E**GA-----TAEASPMEDLLIEHPSMSVYVSPNN-----TSMVSTSDLSVVGEEC-----

DOR Elephant fish CTLEESWFVTPPPCFTA**E**GQ--EPGEVEISPLENLLIEHPSMSVYAGSN-----TNISTM-----

TP53INP1 Human CPMEESWFITPPPCFTAGGL--TTIKVETSPMENLLIEHPSMSVYAVH-----NSCPGLSEATRGTD-----

TP53INP1 Opossum CPMEESWFITPPPCFTAGGL--TTIKVETSPLENLLIEHPSMSVY-----NSSRNLINEAGCETD-----

TP53INP1 Lizard CPMEESWFITPPPCFTAGGL--ATLKVETSPLENLLIEHPSMSVYAVH-----NTHSHLNKTS CGDEEEEEED

TP53INP1 Chicken CPMEESWFITPPPCFTAGGL--TAIKVETSPMENLLIEHPSMSVYAVH-----NACHSLSDTGCDE-----

TP53INP1 Frog CPMEESWFVTPPPCFTAGEL--TSMAVKTSMPENLLIEHPSMSVYAVH-----NMCHKP-ETSCESG-----

TP53INP1 Medaca CSLEESWFVTPPPCFTGRGS--QPVLLETSPLENLLIEHPSMSVYAHHSPPRLMLNPLQHSLEGKLDLSSGSPDRKPSRGKPK-----

TP53INP1 Elephant fish CALEESWFITPPPCFTAGGQ--APVQVEMSPMENLLIEHPSMSVYTVH-----NACHSLSDTGCDE-----

DOR Sea squirt -RIEHSWLTITPPPCFTA**E**AS--MHV GALNARENLLIEHPSMFVKPAE-----P-----

DOR Lancelet HPVEESWFVTPPPCFTAGGQ--SPVAMETNPMENLLIEHPSMSVYVQ-----QRSS--RNSSETTE-----

DOR Sea urchin HRMEESWFITPPPCFTAGGH--SPHQATSPLEDLLIEHPSMSVYHHP-----SQRGAPMAHRRQHLPRQK-----

DOR Fly VLMEE**S**YVVTTPPCFTSIGP--INMETS PFENLLIEHPSMSVYHSIRST-----Q--EGTDSFVNLDLGVSTEVPPQRE-----

DOR Sea slug GSSHDPWIVAPPPCFTGSLG--ELPTISSSPLENLLIEHPSMSVYLSVPPS-----SLPPSHPFHLAHLAGESAPASSEPRDSDGDS

DOR Capitella -LCES-WLVTPPCFTA**A**AG-----SARSDPLENLLIEHPSMSVYS-----LG-QRGGRRGSAGEESE-----

DOR Sea anemone DSVEESWFVTPPCFES**R**DN--FSGVLESNPMEDLLIEHPSMSVYGP-----RRSADASAGPSSRS-----

DOR Trychoplax -EKESGWLLTTPPCFDGHVM--EELSVSPFEDLLIEHPSMSIYRR-----IDSASIRNN-----

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DOR Human ----ALPDGDL**S**E**G**ELTPARREPREARHAAPLPA-----AALLEKAGQVR--RLQARQRAERHALSAKAVQRQNRARESPRRSKN-

DOR Opossum ----SPPPARAG**H**REVMQPRRDGP RHHTASMPSR-----TALLEKASQAR--WVQARQRADRQRLSPKVVQRQNRVREHPRRSKH-

DOR Lizard ----I----NRD**G**EEPERRLQRHAPHHSTSLATK-----AAILEKVSQVH--RIQRAKQLAEKHNFSQKVMQRQNRTRERPRRAKH-

DOR Chicken ----DA**V**GEVPEPRLERHVPHRASLSVK-----AAVLEKVSQAR--RVQRAKQLAEKPNLSQKALQRQDRARQRP RRARQR

DOR Frog ----RDR**S**PSKTRVERRTPHATSMSAK-----AALGKVGQAS--RIQRAKAHVDRRKISRLSKLQRQNLAREIQGRSMTR-

DOR Medaca ----ILSLASS**V**SRVSEPGVIPAARSTMPTRVTRGGAHPGALAKVTQVA--RVQRCKARIDRRHLSRNHIQRQNRTREQVPCHAAHA

DOR Elephant fish ----TESPARVSHHIRCYAALAHA-----TSFLEQANQIR--HSQRAKEHLEKHLNRRNNI RRQNLIRESSSRQTKH-

TP53INP1 Human ----ELHSPSS**P**RVEAQN-EMGOHICHYVAALAHA-----TTFLEQPKSFR--PSQWIKHEHSE RQPLNRRNSLRRQNLTRDCHPRQVKH-

TP53INP1 Opossum ----EFHNPSS**P**RLEVQN-EMGOHVHCYVAALAHA-----STFLEQTKSFR--PTQWIKHEHSE RSHLNRNSLRRQNLTRDCHSRQIKH-

TP53INP1 Lizard EEEKENRNAT**N**PQSEAQS-QMGQHIRCYIATLATH-----STFLEQTKNLR--PSQWTKHEHHERQYLTRNCLRRQNLTRDCYSRQLKN-

TP53INP1 Chicken ----EFCGPG**S**PLREARN-ETGQRVHCFVAALPTR-----SSVLEKKNK SFR--PTHWIKHEHGERHYPSRNLRRQNLTRDCHSRHIKH-

TP53INP1 Frog ----FSPD**R**TELATENKKKGKHIHCSIAALAAR-----MKGLENTKIYL--GDKLTKLHLEKHP--SRKGFRRQNLIRGCRSQQTKH-

TP53INP1 Medaca VRCSIEGSR**R**QDVAAAQRPNLHSPCYAATLSPN-----AGFLQQQRRP--GS--AAQRSQPLSRKGLRRRNLRLR-----PPKT-

TP53INP1 Elephant fish --NIHSSLRE**N**S**R**VIPVQVPRRVSAFRIRDSVL-----EHTNHIHFMQC-----AKLYVERRKLSCHLRRQNRARKRYFAKEKH-

DOR Sea squirt ----SEEPKNKTESRSVQRHK**G**APTSLR-----RSHRRASR--QASCVISQMHRSNQIKRDVARSNKAMQK-----

DOR Lancelet ----SSDSSGQHQQRRD**V**HRPPQRAAIAAR-----VGIVEQA-KMKR--HAQRVQERHEKANKSKTNLQRANLTSRPIRASR-H

DOR Sea urchin ----SSRTVPK**R**THNLRLVNAKPPRRAAAIAAR-----VGIEQSANQVGL--QEQRDTKRRHQQRYS PGKIERHNKAYHHQSASSRRH-

DOR Fly ----EPEPEAE**P**DQDQALQEQRAPNARFD**S**H-----AAVQLKQQT**L**AR--QSQSKNKKEHQQLCRSAIKRANKVRDFQAKANKRPR

DOR Sea slug GEPGDALREDR**T**HQLPVGEQLPAAHRAHREGLGRHWGFAAPQVSPAQAVARLHAAQ**R**VQSGKSNKAVSRQKCRRENKVYEQKCPKGT

DOR Capitella ----ESDVEE**E**AVRS-QRLQASRPHPLAINTAI--ASRKVT**R**Q--SMQKAVKKHEQQR**L**ARNVMQRNNRVQKHNNNSCRPR

DOR Sea anemone ----ASQA**E**ENQ**E**LEKKPPRR**T**VQ**F**Q**E**K-----LELIAQKR**K**VE--APQ**H**G**T**IRPNKKNIKKQNLVQ**F**Q**H**SR**T**TR**T**KKRDRM

DOR Trychoplax ----LDHDFAA**S**LANSGDN**N**TH**E**D**T**H**E**Q**S**R-----SR**S**IELYMDR--ELNKKSD**R**FNYIRKARDLNVK**S**L**T**FSKAN--SR**S**Y

DOR Human QSSFIYQPCQRQFNY-----

DOR Opossum QGSFLHQPCQRQFNY-----

DOR Lizard QGSFVYQPSQRQYNY-----

DOR Chicken AGSFLHQPCQRHCNY-----

DOR Frog HRSFLCQPRQRQCNY-----

DOR Medaca RNTFLHQPSKRNFCH-----

DOR Elephant fish SGHVLHQPCQRQYN-----

TP53INP1 Human NGWVVHQPCPRQYNY-----

TP53INP1 Opossum NGWVVHQPCQRQYNY-----

TP53INP1 Lizard NGILVHQPCQRQYNY-----

TP53INP1 Chicken NGLFVHQPCQRQFNY-----

TP53INP1 Frog SRLLVHQPSPRQYNY-----

TP53INP1 Medaca GTMHLQQPIQRHLNF-----

TP53INP1 Elephant fish FGHFKQPCQRNHKY-----

DOR Sea squirt MRQIVHQ**P**RKRC-----

DOR Lancelet NRRNGLMCKQ**P**QGRV**N**KGRC--

DOR Sea urchin YKQNSSISGRHSGA**I**YK**P**R--

DOR Fly RSEM**Q**HCKLVSGANNR**S**K**C**CY

DOR Sea slug KR**S**KRSR**P**SSCKSGR**M**CQ**R**V--

DOR Capitella RS--ERM**Q**PSGR**S**NNR**S**ML**H**-

DOR Sea anemone VGKHIGVHG**K**R**G**S-----

DOR Trychoplax SNSWSRR**H**CF**T**N**F**S**Y**RR-----

Supplementary Figure 1