

A

	TM3	ICL2	TM4	ECL2
Elephant Shark TMT1	GCVWYGFVNTLFGIVSLMSLTI LSYDRYITITGT-TEADITNYNKTIVGIALSWIYSLMWTLPPLFGWSSNYGPE			GGPTTCS
Spotted Gar TMT1A	GCVWYGFVNSLFGTVSLISLALLSYERYITMMRT-VEADATDYKKAVALGILVSWYSSLWTLPPLFGWSSYGP			GGPTTCS
Spotted Gar TMT1B	GCVWYGFVNSCLGMVSLISLAVLSYERYSTMMGS-TEADATNYRRIKIGVIMLSWGYSLLWTLPPLFGWSSYGP			GGPTTCS
Zebrafish TMT1B	GCVWYGFANSLFGIVSLISLAVLSYERYCTMMGS-TEADATNYKKVIGVIMLSWIYSLIWTLPPLFGWSSYGP			GGPTTCS
Zebrafish TMT1A	GCVWYGFINSFLGVVSLISLAVLSYERYCTMMGS-TQADSTNYRKYVIGIAFSWIYSVMVWTLPLFGWSSYGP			GGPTTCS
Western Clawed Frog TMT1	GCIWYGFVNTLFGTVSLVSLAVLSYERYCTMLRS-TEADLTNYKKAWLGILVSWIYSLVWTLPLFGWSSYGP			GGPTTCS
Green Anole TMT1	GCVWYGFANTFVGTVSLISLAVLSYERYCTMMGT-TEADATNYKKVWVWIFLSWIYSLFWSLPLFGWSSYGP			GGPTTCS
Flycatcher TMT1	ACAWHGFATALCGIISLISLAVLSYERYCTMTRT-AEPDITNYRKWAGIILSWYSSLWTLPPLFGWSSYGP			GGPTTCS
Elephant Shark TMT2	GCKWYGFANSLFGIVSLLSLFCVSYDRSYMITRI-RTTHNFKRPIILAIGVSWLYSLWTVPPLFGWSAYGPE			GQGISCS
Spotted Gar TMT2	GCMWYGFINSFCGIVSLISLAVLSYDRYSTLTV--YNKQVTDYRKPPLAVGGSWLYSLMWTVPPLLWSSYGL			GAGTSCS
Zebrafish TMT2A	GCMWYGFVNSCFGIVSLISLAI LSYDRYSTLTV--YNKRAPDYRKPLLAVGGSWLYSLFWTVPPLLWSSYGL			GAGTSCS
Zebrafish TMT2B	GCMWYGFINSFCGIVSLISLVLSYDRYSTLTV--YHKRAPDYRKPLLAVGGSWLYSLIWTVPPLLWSSYGL			GAGTSCS
Western Clawed Frog TMT2	GCVWYGFVNSCFGIVSLISLA I LSYERYSTLTL--YNKGGPNFKKALLAVASSWLYSLVWTVPPLLWSSYGR			GAGTSCS
Green Anole TMT2	GCRWYGFVNSCFGIVSLISLA I LSYERYSTLTQ--TNKRGSYQKALLGVGGSWLYSLIWTVPPLIGWSSYGL			GAGTSCS
Flycatcher TMT2	ACSWYGFVNSCFGIVSLISLAVLSYERYSTLTL--CHKRSDDFRKALLAVAASWIYSLWTVPPLLWSSYGE			GAGTSCS
Chicken TMT-L	GCRWYGFVNSCFGIVSLISLAVLSYERYSTLTL--CNKRSDYRKPPLLAVGGSWYSLWTVPPLLWSSYGI			GAGTSCS
Chicken TMT-S	GCRWYGFVNSCFGIVSLISLAVLSYERYSTLTL--CNKRSDYRKPPLLAVGGSWYSLWTVPPLLWSSYGI			GAGTSCS
Opossum TMT2	GCRWYGFANSFCGIVSLISLA I LSYERYRTLTL--CPGQGADYQKALLAVAGSWLYSLVWTVPPLIGWSSYGE			GAGTSCS
Elephant Shark TMT3	GCKWYGFANSLFGIVSLISL SLLSYERYATV LKS-TKADSTNYKKA WVI IAFSWFYSLVWTLPLFGWSSYGP			GYGTTCS
Spotted Gar TMT3	GCKWYGFANSLFGIVSLVSL SLLSYERYVTV LRS-TKADVRDYRKAWLCIAGSWLYSLVWTLPPFLGWSYGP			GGPTTCS
Zebrafish TMT3B	GCKWYGFANSLFGIVSLMSLS ILSYERYAALLRA-TKADVSDFRRAWLVCAGSWLYSLWTLPPLFGWSSYGP			GGPTTCS
Zebrafish TMT3A	GCRWYGFANALFGIVSLVSLAVLSYERYSTILCS-SKADASDYRKAWLFITGCWLYSLWTVPPLLWSSYGP			GGPTTCS
Western Clawed Frog TMT3	GCKWYGFVNSLFGVMSI L SMLSYERYLTVLKG-TKADMTDYKKS WLCI I VSWLYSLCWTLPLIGWSSYGL			ESSGTTCS
Green Anole TMT3	GCRWYGVANVLFGLVSLVSL ILSYERYMVLRLKPKSMTSSYSRSLCIGGTWLYSLSWTLPLFIWSSFGPKP			GESCS
Elephant Shark Opn3	ACVWDGFSHSLFGTVSIVTLTVLAYERIRV---VNAKATNFPWAWRAIYTWYSLAWSGAPLVGWNRYSLHRLGCA			
Spotted Gar Opn3	TCVWDGFSNSLFGIVSIMTLTVLAYERIRV---VHAKVIDFTWSWKA IAYIWL YSLAWTGAPLIGWNRYTLERHRLGCS			
Zebrafish Opn3	TCVWDGFSNSLFGIVSIMTL SGLAYERIRV---VHAKVDFPWAWRAITHIWL YSLAWTGAPLLGWNRYTLEVHQLGCS			
Coelacanth Opn3	GCIWDGFSNSLFGIVSIMTLTVLAYERIRV---VHAKVIDFSWTRAI IYIWL YSLAWTGAPLIGWNRYSLIHHLGCS			
Green Anole Opn3	GCVWDGFSNSLFGIVSIMTLTVLAYERIRV---VHAKVIDFSWSRAI IYIWL YSLAWTGAPLLGWNHYTLEIHLGCS			
Chicken Opn3	GCVWDGFSNSLFGIVSIMTLTVLAYERIRV---VHAKVIDFSWSRAI IYIWL YSLAWTGAPLLGWNRYTLEIHLGCS			
Flycatcher Opn3	GCVWDGFSNSLFGIVSIMTLALAYERIRV---VHAKVIDFSWSRAI IYIWL YSLAWTGAPLLGWNRYTLEIHLGCS			
Opossum Opn3	GCAWDGFSNTLFGIVSIMTLTVLAYERIRV---VHAKVINFSWAWRAI IYIWL YSLVWTGAPLLGWNRYTLEIHLGCS			
Mouse Opn3	GCAWDGFSGSLFGVSIITTLTVLAYERIRV---VHARVINFSWAWRAI IYIWL YSLAWAGAPLLGWNRYILDHHLGCT			
Human Opn3	GCVWDGFSGSLFGIVSIATLTVLAYERIRV---VHARVINFSWAWRAI IYIWL YSLAWAGAPLLGWNRYILDVHHLGCT			
Bovine Rhodopsin	GCNLEGGFATLGGELWLSVLVAIERYV VVCKP-MSNFRFGENHA I MGVAFTWVMALACAAPPLVGSRYIPEGMQCSCG			

E113 (D/E)R(Y/W) motif E181

B

	TM6	ECL3	TM7	C terminus
Elephant Shark TMT1	FLLCWLPGYIVALLATFGSPGLIPTASII P SVLAKTSTVYNP I IY I FMNKQF-SR-CFRALLSQNSPVAFSTRNSSKTLRDGH			-----NTQKTH-----KNFTCIEASV-A-QQTT-----AQQNRSSSDQEDTGLDV-S-----
Spotted Gar TMT1A	FLLCWLPGYIVALIATFGKPGLIPTVSIIPSVLAKSSTVYNP I IY VFMNNQF-YR-CFCSFVRCQKPTINSNSRSTSKTLKACR			-----AAKMIH-----DNKFSFLVSE-G-QLST-----ANHNPNANGHNEVHGTL-SVDETKPA-SRVPHYHS-----
Spotted Gar TMT1B	FLLCWLPGYIVALLATFGKSGLVTPASI I P SLLAKSSTVFNP I IY I FLNKQF-YR-CFRAFLMCQRPAANGSSVSRSSKTKPCR			-----AARRAI-----NDNRNFVVTSA-G-RHST-----LIQNRTDSVGERGSS-----WDASKPPV-LLVAHYNG-----
Zebrafish TMT1B	YLLCWLPGYIMALLATFGAPLVTAESI VPSILAKSSTVINPVIY I FMNKQF-YR-CFRALLNCDKQQRGSSKSSK-TKPF			-----PGRRTD-----NFTFMVASV-GPNQTN-----PVEDGPPSAD-----NTKPAVLSLVAHYNG-----
Zebrafish TMT1A	YLLCWLPGYIMALLATFGHPGLVTPAASI VPSLLAKSSTVINP I IY I FMNKQF-CR-CFHALIMCTTPERGSSFKNSKVKTLR			-----TVRRAN-----GQNVTFAVASA-VHRT-----PYSDRQKSSSEGEKLPATGGGTSKPVV-SLVAYYNG-----
Western Clawed Frog TMT1	FLLCWLPGYGMALVATFGKPGI I P SPSASI I P SVLAKSSTVYNP I IY I FLNKQF-YR-CFTAL IHCNKHQPQVSNKSSKTKIML			-----TARKLP-----DANFTVNAASN-P-PSSS-----VVKYEADSKTHNG-----DTKPFK-TLVANYVI-----
Green Anole TMT1	FLLCWLPGYIVALIATFGKPGLIPTASII P SVLAKSSTVYNPVIY I FLNKQF-YR-CFCALLKCGKKS I ASSNKCSSRSTRVCR			-----SIRKQD-----NFTFVAASA-GPPSSEHQDA ILSIQNPPEPTDQNSP-----KAKQRV-LLVAHYSV-----
Flycatcher TMT1	FLLCWLPHYAVALIATFGQDGLIPTASII PAILAKSSTVYNP I IY VFLNKQF-YR-CFVALLRCNKSPSSLPRLKKQQ			-----QKPG-----SEELLPKPSQAQPPQNRD-----AERGAVGLQGETTCM-----
Elephant Shark TMT2	FLLCWPMPYIGIMALLATFGSDLIPTSVIIPVVLAKTSTVYNP I IY VLMNKQF-FQ-CYKALYQM			-----
Spotted Gar TMT2	YLLCWIPIYGVVAMLATFGRPGTVSPIASVVP S I LAKSSTVFNP I IY I LLMNKQF-YG-CFLKLFHCQKRSSANGPFSLQSRITVIQ			-----LNRRVY-----NNTIDGTQV-INTADEDREGTPPMKVSNPPEMNP-----
Zebrafish TMT2A	YLLCWPMPYGVVAMMATFGRPGI I S P IASVVP S LAKSSTVINP I IY I LLMNKQF-YR-CFLI I LHCNKHSSLENGQSSMPSRITVIQ			-----LNRRPY-----SNPVADNAP-PSIDLQ-DCSTPVSQ-----
Zebrafish TMT2B	YLLCWPMPYGVVAMMATFGRPGI I S P VASVVP S LAKSSTVINP I IY I LLMNKQF-YR-CFRILFCQSRLLQNGHSSMPSKTTVIQ			-----LNRRVN-----SNAVACTAQ-ISTGTHNHCSTHVERTSNPPEVIP-----
Western Clawed Frog TMT2	YLLCWLPGYVALLATFGRPGLVSPVASVP S I LAKSSTVFNP I IY I LLMNKQF-YK-CFLILFHCHPTSSADGKSI CQSNYTVIQ			-----LNQKLN-----NIVAI PGQTQIPESVDKMPCI-HRQNNESPDDQMP-----QSTTEH-LISGT-----
Green Anole TMT2	YLLCWPMPYGVIALLATFGKPGI I P SPSASI I P SVLAKSSTVFNP I IY I LLMNKQF-YK-CFLMLLHCQPSVADGETI CQSKVMA I H			-----QNQKAG-----GGVILKSQV-VPQDEKAI C LLSPESSLDPVL-----ESTPQL-SKENSF-----L
Flycatcher TMT2	YLLCWIPIYGVIALLATFGKPGI I P S I LAKSSTVCPNP I IY I LLMNKQF-YK-CFRQLFHCQPPSSTNGEPTYHSKVTVIQ			-----LDQRV-----GGNMCNNEP-HPETDSKMPSSLHP-----EPIS-----KAVSPP-S-----
Chicken TMT-L	YLVCGIPIYGVIALLATFGKPGVTPVASI I P S I LAKSSTVCPNP I IY I LLMNKQF-YK-CFRQLFHCQPPSSTDGEPTCHSKVTVIQ			-----LNQKTD-----GGKLCNNK-REPETDNKVTSL LHPEPGLPAA-----KTVPPM-----
Chicken TMT-S	YLVCGIPIYGVIALLATFGKPGVTPVASI I P S I LAKSSTVCPNP I IY I LLMNKQF-RS-ATLKL Y FHQGLSGV			-----LDQCV-----
Opossum TMT2	YLLCWPMPYGMIALLATFGPPGVSPVANVVP S I LAKSSTVCPNP I IY VLMNKQF-YK-CFLI L FHCQPAQSGPDVSLCPSNVTVIQ			-----LGQRKN-----KDAP-----GSI-----
Elephant Shark TMT3	YLLCWLPGYGTVALIGTFGNADLIPTCSVIP S I LAKSSTVINPVIY I FMNKQF-YR-CFVTLRLCNTAPT LHQ			-----
Spotted Gar TMT3	YLLCWPMPYIGIMIALIATFGRADLVPTASII P S I LAKSSTVFNP I IY I LLMNQRVRYRTPCPAVLALSEH			-----IERLCC-----PVF-----
Zebrafish TMT3B	YLLCWPMPYGVVALLATFGRTGLIPTVSIIPSVLAKSSTVYNPVIY VLFNNQF-YR-CFVAFKQCQEPVHGNQNPQHSSKEDPH			-----VFRPCD-----GAS I HRSAE-GPQKKEQHS-----SLVVHYTP-----
Zebrafish TMT3A	YLLCWPMPYGMALLGTF-SAGITSPASVSSLLAKSSTVINP I IY VLFNNQF-YR-CFIALVRSAGAEPPVHLT LHTEEGAAQQH			-----CIPMGLYAATS-PPESPMDT-PQMTQNSSLQRGNKTL-----VLVHCTP-----
Western Clawed Frog TMT3	YLLCWPMPYGLVSLMTAFGKPGMIPTVSI I P S I LAKSSTFINP I IY I FMNKQF-YR-CFIALIKESGPHNENI STSRQSMR			-----LETACK-----VQSSIFYTHKA-RRTKDTTSSPEMRKL-----TLTVHYRDDR-----
Green Anole TMT3	YFLCWPYGVIVLITVFGKPGTVPLSIVSIPS I LAKASTVNP I IY VLLNKQF-YR-CFTVLMNCDPLPKHLEMLHSHKWSRTPNAESQEGPVHLLGIQRRLGSTKVRPNPLGRNSKDLPFRTPKT-PSMSSK			-----YERPPHDSADQIHKN-----
Elephant Shark Opn3	FLICWMPYAVVVFVAVGYDTVITPAVAI I P S F I A K S S T A Y N P I I Y I F M S R K Y - R R - C L S Q L F C S H L M S L Q W S I K D P S S K A R N D M			-----PVKPIVLSQK-G-----DRPKKRVTFSSSI-VFIITSDDTQELGSIAG-SNATQISIV-----QVQPL-----
Spotted Gar Opn3	FLICWTPYAVVSMLEAFGKKSIVTPTVAI I P S F F A K S S T A Y N P V I Y I F M S R K F - R R - C L L R L C A R L V S I R R S I K D R P I - A R V E K			-----PIRPIVVSQKV-----ERPKKVTFNSSSI-VFIITSDNTNLDIPSK-NSLSEVNI-----KVRPL-----
Zebrafish Opn3	FLVCGWTPYAVVSMLEAFGKKSIVTPTVAI I P S L F A K S S T A Y N P I I Y I F M S R K F - R R - C M L Q M L C S R L T S L Q H T I K D R P L - S R I E H			-----PIRPIVMSQSRT-----DRPKKRVTFSSSI-VFI IASHDTHPLDITSKCNDEPDINVI-----QVRPL-----
Coelacanth Opn3	FLICWMPYVVSLLVSYGYGSSITPTVAI I L S F F A K S S T A Y N P I I Y I F M S R K F - R R - C L L K L C I R L V R F Q R S I K D R P V - A E N D R			-----PIRPIVSHKIG-----DRPKKVTFNSSSI-VFIITSDDTQPMETMKS-NS-ARVNI-----QVRPL-----
Green Anole Opn3	FLICWMPYAVVSL IAYGYGH I TPTVAI I P S F F A K S S T A Y N P V I Y I F M S R K F - R R - C L V Q L F C V Q F L R F K R L K E Q P A - I E S N K			-----PIRPIVMSQKV-----DRPKKVTFNSSSI-IFIITSDDEQIDVSTK-CSDTKINVI-----QVKPL-----
Chicken Opn3	FLICWMPYAVVSLLVTYGYSNLVTPVAI I P S F F A K S S T A Y N P V I Y I F M S R K F - R Q - C L L Q L L C F R L M R F Q R I M K E P S G - A G N V K			-----PIRPIVMSQKV-----DRPKKVTFNSSSI-IFI IASDDTQIIDNSK-HNGTKVNI-----QVKPL-----
Flycatcher Opn3	FLICWMPYAVVSLI TYGYSNLVTPVAI I P S F F A K S S T A Y N P V I Y I F M S R K F - R H - C L L Q L L C F R L M R F Q R T M K E T P A - T G S D K			-----PIRPIVMSQKAG-----DRPKKVTFNSSSI-IFIITSDDEQIIDSSK-HNETKVNVI-----QVKPLQ-----G
Opossum Opn3	FLFCWMPYAVICLLVANGYGLVTPVAI I A S L F A K S S T A Y N P I I Y I F M S R K F - R R - C L L Q L L C F R L L F Q Q P K D R P V - I R T E K			-----QIRPIVMSQKV-----DRPKKVTFNSSSI-IFIITSDQTI DENDK-NSGTKVNVI-----QVRPL-----
Mouse Opn3	FLFCWMPYIVTRFLVNGYGH I VTPVSI V S Y L F A K S S T V Y N P V I Y I F M S R K F - R R - S L L Q L L C F R L L R C Q R P A K N L P A - A E S E M			-----HIRPIVMSQKDG-----DRPKKVTFNSSSI-IFIITSELSVEDSDR-SSASKVDVI-----QVRPL-----
Human Opn3	FLVCGWPIVIFLVVNGHGH I VTPVSI V S Y L F A K S S T V Y N P V I Y V F M I R K F - R R - S L L Q L L C L R L L R C Q R P A K D L P A - A G S E M			-----QIRPIVMSQKDG-----DRPKKVTFNSSSI-IFIITSELSVDDSDK-TNGSKVDVI-----QVRPL-----
Bovine Rhodopsin	FLICWLPGYAVYIFTHQGSDFGIFMTI P A F F A K T S A V Y N P V I Y I M M N K Q F - R N - C M V T T L C G G K N P L G D D E A S T T V S K T E T S			-----QVAPA-----

CWxP motif K296 NPxxY motif