

### Supplemental File S3 – Color vision-related genes

Because most squirrel species, including *S. niger*, are diurnal mammals with cone-dominated retinas, similar to primate retinas (Van Hooser and Nelson 2006), we examined variation of five color vision-related genes (El Moussawi *et al.* 2021) among our focal species.

*ATF6* encodes activating transcription factor 6. Diseases associated with *ATF6* include achromatopsia 7 and achromatopsia. Among its related pathways are metabolism of proteins and the TNFR1 pathway. Gene ontology (GO) annotations related to this gene include DNA-binding transcription factor activity and protein heterodimerization activity. This gene encodes a transcription factor that activates target genes for the unfolded protein response (UPR) during endoplasmic reticulum (ER) stress. Although it is a transcription factor, this protein is unusual in that it is synthesized as a transmembrane protein that is embedded in the ER. It functions as an ER stress sensor/transducer, and following ER stress-induced proteolysis, it functions as a nuclear transcription factor via a cis-acting ER stress response element that is present in the promoters of genes encoding ER chaperones.

Compared with the sequences of congeners, the 536-amino acid sequence of ATF6 for *S. niger* shows 52 point-differences. Further, stretches of 35 and 36 amino acids of *S. vulgaris* ATF6 do not match those of *S. carolinensis* and *S. niger*, the first following the insertion of a leucine and the second after insertion of six amino acids. *A. rufa* and *S. vulgaris* have a deletion of 28 amino acids.

```
Atf6          LYGDSCNSPSSVEPLKEEKPVTPGPNKTEHGLTPKKKIQMSSKPSVQPKPLLLPAAPKTQ
Aplodontia_rufa -----ENGLIPKKKIQMSSKPSIQPKPLLLPAAPKTQ
Xerus_inauris@A -----ENGLTPKKKIQINSKPSIQPKPLLLPAAPKTQ
Marmota_monax@A -----ENGLTPKKKIQMGSKPSVQPKPLLLPAAPKTQ
Spermophilus_da -----ENGLTPKKKIQMGSKPSIQPKPLLLPAAPKTQ
Ictidomys_tride -----
Urocitellus_par -----ENGLTPKKKIQMGSKPSIQPKPLLLPAAPKTQ
Sciurus_vulgari -----ENGLTPKKKIQMSSKPSIQPKPLLLPAAPKTQ
Sciurus_carolin -----SENGLTPKKKIQMSSKPSIQPKPLLLPAAPKTQ
Sciurus_niger@A -----ENGLTPKKKIQMSSKPSIQPKPLLLPAAPKTQ
```

```
Atf6          TNASVPAKAI I I I QTLPALMPLAKQQSI I SIQPAPTKGQTVLLSQPTVVQLQSPAVLSSAQ
Aplodontia_rufa TNSSVPAKT I I I QTLPTLMPLTKQQPI I SIQPPTPKGQTVLLSQPTVVQLQAPGVLPSAQ
Xerus_inauris@A TNSTVPAKT I I I QTLPTLMPLTKQQPI I SIQPASSKGQTVLLSQPAVVQLQAPGVLPSAQ
Marmota_monax@A TNSSVPAKT I I I QTLPTLMPLAKQQPI I SIQPAPTKGQTVLLSQPTVVQLQAPGVLPAQ
Spermophilus_da TNSSVPAKT I I I QTLPTLMPLAKQQPI I SIQPAPTKGQTVLLSQPTVVQLQTPGVLPSAQ
Ictidomys_tride -----
Urocitellus_par TNSSVPAKT I I I QTLPTLMPLAKQQPI I SIQPAPTKGQTVLLSQPTVVQLQAPGVLPSAQ
Sciurus_vulgari TNSSVPAKT I I I QTLPALMPLAKQQSI I SIQPAPTKGQTVLLSQPTVVQLQSPAVLSSAQ
Sciurus_carolin TNSSVPAKT I I I QTLPTLMPLTKQQSI I SIQPAPTKGQTVLLSQPTVVQLQAPGVLPSAQ
Sciurus_niger@A TNSSVPAKT I I I QTLPTLMPLTKQQPI I SIQPAPTKGQTVLLSQPTVVQLQAPGVLPSAQ
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```
Atf6          PVLAVTGGAAQLPNHVVNVLPAPVVSSPVNGKLSVTKPVLQSATRSMGSDIAVLRQORM
Aplodontia_rufa PVLAVPGGASQLPNHVVNVLPAPVVNSPVNGKLSVTKPVLQSPMKSVGSDIAVLRQORM
Xerus_inauris@A PVLAVARGTTQLPNHVMNVVPAPVVNSPVNGKLSVTKPVLQSPMKSVGSDIAVLRQORM
Marmota_monax@A PVLAVGGGATQLPNQVVNVVPAPVVNSPVNGKLSVTKPVLQSATRSMGSDIAVLRQORM
Spermophilus_da PVLAVGGGATQLPNQVVNVVPAPVVNSPVNGKLSVTKTVLQSATRSMGSDIAVLRQORM
Ictidomys_tride -----ASSSLGA- IAVLRQORM
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Urocitellus\_par PVLAVGGGATQLPNQVVNVVPVNVSPVNGKLSVTKPVLQSATRSMGSDIAVLRQQRM  
 Sciurus\_vulgari PVLAVTGGAAQLPNHVNVLPAPVNVSSPVNGKLSVTKPVLQSATRSMGSDIAVLRQQRM  
 Sciurus\_carolin LVLAVTGGATQLPNHVNVVPVNVSSVNGKLSVTKPVLQSPMKSVGSDIAVLRQQRM  
 Sciurus\_niger@A PVLAVTGGATQLPNHVNVVPVNVSSVNGKLSVTKPVLQSPMKSVGSDIAVLRQQRM  
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Atf6 IKNRESACQSRKKKKEYMLGLEARLKAALSENEQLKKENGSLKRQLDEVVSE-----  
 Aplodontia\_rufa IKNRESACQSRKKKKEYMLGLEARLKAALSENEQLKKENGSLKRQLDEVVSE-----  
 Xerus\_inauris@A IKNRESACQSRKKKKEYMLGLEARLKAALSENEQLKKENGSLKRQLDEVVSEVRLDCPWE  
 Marmota\_monax@A IKNRESACQSRKKKKEYMLGLEARLKAALSENEQLKKENGSLKRQLDEVVSEVRLDCPWE  
 Spermophilus\_da IKNRESACQSRKKKKEYMLGLEARLKAALSENEQLKKENGSLKRQLDEVVSEVRLDCPWE  
 Ictidomys\_tride IKNRESACQSRKKKKEYMLGLEARLKAALSENEQLKKENGSLKRQLDEVVSEVRLDCPWE  
 Urocitellus\_par IKNRESACQSRKKKKEYMLGLEARLKAALSENEQLKKENGSLKRQLDEVVSEVRLDCPWE  
 Sciurus\_vulgari IKNRESACQSRKKKKEYMLGLEARLKAALSENEQLKKENGSLKRQLDEVVSE-----  
 Sciurus\_carolin IKNRESACQSRKKKKEYMLGLEARLKAALSENEQLKKENGSLKRQLDEVVSEVRLDCPWE  
 Sciurus\_niger@A IKNRESACQSRKKKKEYMLGLEARLKAALSENEQLKKENGSLKRQLDEVVSEVRLDCPWE  
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Atf6 -----NQRLKVPSPKRRAVCVMIVLAFIMLNYGPMMSMLEQESRRV  
 Aplodontia\_rufa -----NQRLKVPSGKRRAVCVMIVLAFIMLNYGPMMSMLEQESRRV  
 Xerus\_inauris@A MGWNIASVGPVPSFAFLSAPNSELKLGSGNRKVVCVMIVLAFIMLNFGPMMSMLEQDSRRM  
 Marmota\_monax@A MGCNTGSTRHPVSFTSPSAPNSELKLGSGNRKVVCIMVFLFFIAFNFGPMMSMLEQDSRRM  
 Spermophilus\_da MGCNTGSTQHPVSFASPSAPNSELKLGSGNRKVVCIMVFLFFIAFNFGPMMSMLEQDSRRM  
 Ictidomys\_tride MGCNTGSTKHPVSFASPSAPNSELKLGSGNRKAVCVMIVLAFIALNFGPMMSMLEQDSRRM  
 Urocitellus\_par MGCNTGSTRHPVSFASPSAPNSELKLGSGNRKVVCIMVFLFFIAFNFGPMMSMLEQDSRRM  
 Sciurus\_vulgari -----NQRLKVGSGNRRAVCIMIVLAFIMLNYGPMMSMLEQESRRV  
 Sciurus\_carolin MVGIQAVVWVSDSDFAS-SEPNSSELKLGSGNRKAVCIMIVLAFIMLNYGPMMSMLEQDSRRM  
 Sciurus\_niger@A MVGIQAVVWVSDSDFAS-SEPNSSELKLGSGNRRAVCIMIVLAFIMLNYGPMMSMLEQDSRRM  
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Atf6 KPSVSPANQRRHLLLEFSAKEVKDTSDGDNQKDSYSYD-HSVSNDKAL-----MVLSEEP  
 Aplodontia\_rufa KPSVSPANQRRHLLLEFSAKEVKDTSDGDNQKDSYSYD-SSVSNDKAL-----MVLSEEP  
 Xerus\_inauris@A NPSMSPANQRRHLLLEFSAKEVQDTSDGI IQKNSYRLD-HSVSNDKAL-----MVLSEEP  
 Marmota\_monax@A NPNVSPANQRRHLLLEFSAKEVQDTSDGI IQKNSYRLD-HSVSNDKAL-----MVLSEEP  
 Spermophilus\_da NPNVSPANQRRHLLLEFSAKEVQDTSDGI IQKNSYRLD-HSVSNDKAL-----MVLSEEP  
 Ictidomys\_tride NPNVSPANQRRHLLLEFSAKEVQDTSDGI IQKNSYRLD-HSVSNDKAL-----MVLSEEP  
 Urocitellus\_par NPNVSPANQRRHLLLEFSTKEVQDTSDGI IQKNSYRLD-HSVSNDKAL-----MVLSEEP  
 Sciurus\_vulgari KPSMSPANQRRHLLLEFSAKEVQDTSDGDNQKDSYSYDLPSFRNLTAFFGGAKELLLSDLD  
 Sciurus\_carolin NPSMSPANQRRHLLLEFSAKEVQDTSDGI IQKNSYRLD-HSVSNDKAL-----MVLSEEP  
 Sciurus\_niger@A NPNMSPANQRRHLLLEFSAKEVQDTSDGI IQKNSYRLD-HSVSNDKAL-----MVLSEEP  
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Atf6 LLYMPPPPCQPLINTTESLRLNHELGRGWVHRHEVERTKSRRTNSQQKARILQGALEQGS  
 Aplodontia\_rufa LLYMPPPPCQPLINTTESLRLNHELGRGWVHRHEVERTKSRRTNSQQKARILQGALEQGS  
 Xerus\_inauris@A LLYMPPPPCQPLINTTESLRLNHELGRGWVHRHEVERTKSRRTNSQQKARILQGALEQGS  
 Marmota\_monax@A LLYMPPPPCQPLINTTESLRLNHELGRGWVHRHEVERTKSRRTNQQKTRVLQVCFYLGS  
 Spermophilus\_da LLYMPPPPCQPLINTTESLRLNHELGRGWVHRHEVERTKSRRTNSQQKARILQGALEQGR  
 Ictidomys\_tride LLYMPPPPCQPLINTTESLRLNHELGRGWVHRHEVERTKSRRTNSQQKARILQGALEQGS  
 Urocitellus\_par LLYMPPPPCQPLINTTESLRLNHELGRGWVHRHEVERTKSRRTNSQQKARILQGALEQGR  
 Sciurus\_vulgari QLFL-SSDCRHF-NRTESLRLADELSGWVQRHERGRKVPQRTQ-ERKSQWLK-----K  
 Sciurus\_carolin LLYMPPPPCQPLINTTESLRLNHELGRGWVHRHEVERTKSRRTNSQQKARILQGALEQGS  
 Sciurus\_niger@A LLYMPPPPCQPLINTTESLRLNHELGRGWVHRHEVERTKSRRTNSQQKARILQGALEQGS  
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Atf6 NSQLMAVQYTETTSISRNSGSELQVYYASPGSYQGFDAIRRRGDTFYVVSFRRDHL LLP  
 Aplodontia\_rufa NSQLMAVQYTETTSFSGNSGSELQVYYASPRSYQDFEAIIRRRGDTFYVVSFRRDHL LLP

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Xerus_inauris@A NSQLMAVQYTETTSFSRNSGSELQVYYASPRSYQDFFEAIIRRGDTFYVVSFRRDHLLLP
Marmota_monax@A NSQLMAVQYTETTSISRNSGSELQVYYASPGSYQDFFEAIIRRGDTFYVVSFRRDHLLLP
Spermophilus_da IRHFLLVNTLPFSYFSRNSGSELQVYYASPRSYQDFFEAIIRRGDTFYVVSFRRDHLLLP
Ictidomys_tride NSQLMAVQYTETTSISRNSGSELQVYYASPGSYQGFFDAIRRGDTFYVVSFRRDHLLLP
Urocitellus_par IRHFLLVNTLPFSYFSRNSGSELQVYYASPRSYQDFFEAIIRRGDTFYVVSFRRDHLLLP
Sciurus_vulgari SPPVKAVPTQPPTSISRNSGSELQVYYASPRSYQGFFDAIRRGDTFYVVSFRRDHLLLP
Sciurus_carolin NSQLMAVQYTETTYFSRNSGSELQVYYASPRSYQDFFEAIIRRGDTFYVVSFRRDHLLLP
Sciurus_niger@A NSQLMAVQYTETTSISRNSGSELQVYYASPGSYQGFFDAIRRGDTFYVVSFRRDHLLLP
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Atf6 ATTHNKTTTRPKMSIVLPAININDNVINGQDYEVMMQIDCQVMDTRILHIKSSSVPPYLRD
Aplodontia_rufa ATTHNKTTTRPKMSIVLPAINFTENVINGQDYEVMMQIDCQVMDTRILHIKSSSVPPYLRD
Xerus_inauris@A ATTHNKTTTRPKMSIVLPAINITENVINGQDYEVMMQIDCQVMDTRILHIKSSSVPPYLRD
Marmota_monax@A ATTHNKTTTRPKMSIVLPAINITENVINGQDYEVMMQIDCQVMDTRILHIKSSSVPPYLRD
Spermophilus_da ATTHNKTTTRPKMSIVLPAINITENVINGQDYEVMMQIDCQVMDTRILHIKSSSVPPYLRD
Ictidomys_tride ATTHNKTTTRPKMSIVLPAININENVINGQDYEVMMQIDCQVMDTRILHIKSSSVPPYLRD
Urocitellus_par ATTHNKTTTRPKMSIVLPAINITENVINGQDYEVMMQIDCQVMDTRILHIKSSSVPPYLRD
Sciurus_vulgari AISHNKTSRPKMSLVMPAMAPNENVINGQDYEVMMQIDCQVMDTRILHIKSSSVPPYLRD
Sciurus_carolin ATTHNKTTTRPKMSIVLPAININENVINGQDYEVMMQIDCQVMDTRILHIKSSSVPPYLRD
Sciurus_niger@A ATTHNKTTTRPKMSIVLPAINITENVINGQDYEVMMQIDCQVMDTRILHIKSSSVPPYLRD
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Atf6 HQRNQTSTFFGSPPTTTTETHVSTIPESLQZ
Aplodontia_rufa QQRNQTNTFFGSPPAATKTTHVSTIPESLQ-
Xerus_inauris@A QQRNQTSTFFGSPPAATKATHVSTIPESLQ-
Marmota_monax@A QQRNQTNTYFGSPPAATKATHVSTIPESLQ-
Spermophilus_da QQRNQTNTYFGSPPAATKATHVSTIPESLQ-
Ictidomys_tride QQRNQTNTYFGSPPAATKATHVSTIPESLQ-
Urocitellus_par QQRNQTNTYFGSPPAATKATHVSTIPESLQ-
Sciurus_vulgari QQRNQTNTFFGSPPAATKATHVSTIPESLQ-
Sciurus_carolin QQRNQTNTFFGSPPAATKATHVSTIPESLQ-
Sciurus_niger@A QQRNQTNTFFGSPPAATKATHVSTIPESLQ-
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*CNGA3* encodes cyclic nucleotide gated channel subunit alpha 3, a member of the cation channel protein family which is required for normal vision and olfactory signal transduction. Mutations in this gene are associated with achromatopsia (rod monochromacy) and color blindness. Two alternatively spliced transcripts encoding different isoforms have been described. Gene ontology (GO) annotations related to this gene include protein C-terminus binding and voltage-gated potassium channel activity.

The 630-amino acid sequences of *S. niger* exhibits eight point-differences from other members of genus *Sciurus*. The three tree squirrels show an insertion of 9-10 amino acids relative to all other species at positions 134-143 or 144. *A. rufa* has a two-amino acid insertion at positions 170-171, after which is a sequence of 35 amino acids that differs from those of the other species. There is a deletion of three amino acids at positions 213-215 in *M. monax* and *S. dauricus*. Starting at position 218, there is a stretch of 445 amino acids showing just three point-differences among all species studied.

```
Cnga3 MAKVNTQCSQPSPTQLSIKNADRDLDHVENGLGRSHSPCEETSSTLQQGIAMETRGLAGS
Aplodontia_rufa -----
Xerus_inauris@C -----
Marmota_monax@C -----
Spermophilus_da -----
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Ictidomys_tride -----
Urocitellus_par -----
Sciurus_vulgari -----ASLLLQDLRRPGRGLCPS
Sciurus_carolin -----ASLLLQGLQRPGRGLCPS
Sciurus_niger@C -----QGLRRPGRGLCPS
```

```
Cnga3 ARSVVTSQG---PARVSRLIISIRAWASRHLHDEDQTPDSFLDRFRHGSELKEVSTRESNA
Aplodontia_rufa -----PSRLSRLIISLRWAASHSHREDQRPDSFLDRFRGAELKEVASQESNA
Xerus_inauris@C -----PSRLARLIIISLRTWAARHTHSCEDQRPDSLLDRFRGAELREVSSQESNA
Marmota_monax@C -----LPSDG---PSRLARLIIISLRTWAAGHSRCEQQRSDSLLDRFRGAELKEVSSQESNA
Spermophilus_da -----G---PSRFARLIIISLRTWTTRHSCEQQRSDSLLDRFRHGSELKEVSSQESNA
Ictidomys_tride -----SDG---PSRLARLIIISLRTWTARRSRCEQQRSDSPPDRFRGAELKEVSSQESNA
Urocitellus_par -----SDG---PSRLARLIIISLRMWTARRSRREDQQRSDSLLDRFRGAELKEVSSQESNA
Sciurus_vulgari S-----SDGCLSPSRLSRLIISLRTWATRHSRRKDP RPDSLLDPFRGAELKEVSSQESSA
Sciurus_carolin S-----SDGSLSPSRLSRLIISLRTWAARHSRRKDP RPDSLLDHFRGAELKEVSSQESST
Sciurus_niger@C S-----SDGCLSPSRLSRLIISLRTWAARHSRRKDP RPDSLLDRFRGAELKEVSSQESRD
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```
Cnga3 QPNPGEQKPPDGGE-----GRKEEPIVVDPSSNIYYRWLTAIALP--VFYNWCLLV
Aplodontia_rufa QLNTGSQEPPDRGE-----GRKEEPIVVDPSSNIYYRWLTAIALPCLLMYIWSMVI
Xerus_inauris@C LSHMGSQEPPDRGK-----REKEPLAVDPSSNIYYRWLTAIALP--VFYNWCLLV
Marmota_monax@C QSQAGSQEPPDRGE-----GRKEEPIVVDPSSNIYYRWLTAIALP--VFYNWCLLV
Spermophilus_da QSHAGSQEPPDRGE-----GRKEEPIVVDPSSNIYYRWLTAIALP--VFYNWVMLI
Ictidomys_tride QSHAGSQEPPDRGE-----GRKEEPIVVDPSSNIYYRWLTAIALP--SVYNWCLLV
Urocitellus_par WSHAGSQEPPDRGE-----GRKEEPIVVDPSSNIYYRWLTAIALP--VFYNWCLLV
Sciurus_vulgari QSHVGSQEPPDRGRRGKRPPPTPAGRKEEPIVVDPSSNLYYRWLTAIAMP--VFYNWCLLV
Sciurus_carolin QSHVGSQEPPDRGRRGKRPPAPAGRKEEPIVVDPSSNLYYRWLTAIAMP--VFYNWCLLV
Sciurus_niger@C QSHVGSQEPPDRGRRGKRPPAPAGRKEEPIVVDPSSNLYYRWLTAIAMP--VFYNWCLLV
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```
Cnga3 CRACFDELQSEHLTLWLVLVDYSADVLYVLDMLVRARTGFLEQGLMVRDTKRLWKHYTKTL
Aplodontia_rufa ARASFD-LESNDLEYWLI FNFSSDAGYLPGMFVRARTGFLEQGLMVRDTKRLWKHYTKTL
Xerus_inauris@C CRACFDELQSEHLMWLVLVDYSSDVIYGLDMLVRARTGFLEQGLMVRDTKRLWKHYTKTL
Marmota_monax@C CRACFDELQSEHLT IWLIFDFFSDVGCLPGMFV---TGFLQGLMVRDTKRLWKHYTKTL
Spermophilus_da ARARFD-LQSNLDLECWLI FDFSSDVGCLPGMFV---TGFLQGLMVRDTKRLWKHYTKTL
Ictidomys_tride CRACFDELQSEHLTLWLVLVDYSSDVIYGLDMLVRARTGFLEQGLMVRDTKRLWKHYTKTL
Urocitellus_par CRACFDELQSEHLTVFLVCLYELQHLQKSLLPRTRTGFLEQGLMVRDTKRLWKHYTKTL
Sciurus_vulgari CRACFDELQSEHLTLWLVLVDYSADVLYVLDMLVRARS GFLEQGLMVRDTKRLWKHYTKTL
Sciurus_carolin CRACFDELQSEHLTLWLVLVDYSADVLYVLDMLVRARTGFLEQGLMVRDTKRLWKHYTKTL
Sciurus_niger@C CRACFDELQSEHLTLWLVLVDYSADVLYVLDMLVRARTGFLEQGLMVRDTKRLWKHYTKTL
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```
Cnga3 HFKLDILSLIPTDLAYLKLGVNYPELRFNRLKFSRLEFFDRTE TRTNYPNVFRIGNLV
Aplodontia_rufa HFKLDILSLIPTDLAYLKLGVNYPELRFNRLKFSRLEFFDRTE TRTNYPNVFRIGNLV
Xerus_inauris@C HFKLDILSLIPTDLAYLKLGVNYPELRFNRLKFSRLEFFDRTE TRTNYPNVFRIGNLV
Marmota_monax@C HFKLDILSLIPTDLAYLKLGVNYPELRFNRLKFSRLEFFDRTE TRTNYPNVFRIGNLV
Spermophilus_da HFKLDILSLIPTDLAYLKLGVNYPELRFNRLKFSRLEFFDRTE TRTNYPNVFRIGNLV
Ictidomys_tride HFKLDILSLIPTDLAYLKLGVNYPELRFNRLKFSRLEFFDRTE TRTNYPNVFRIGNLV
Urocitellus_par HFKLDILSLIPTDLAYLKLGVNYPELRFNRLKFSRLEFFDRTE TRTNYPNVFRIGNLV
Sciurus_vulgari HFKLDILSLIPTDLAYLKLGVNYPELRFNRLKFSRLEFFDRTE TRTNYPNVFRIGNLV
Sciurus_carolin HFKLDILSLIPTDLAYLKLGVNYPELRFNRLKFSRLEFFDRTE TRTNYPNVFRIGNLV
Sciurus_niger@C HFKLDILSLIPTDLAYLKLGVNYPELRFNRLKFSRLEFFDRTE TRTNYPNVFRIGNLV
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```
Cnga3 LYTLIIHWNACIYFAISKFIGFGTDSWVYPNTSKPEYARLSRKYIYSLYWSTLTLTITIG
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Aplodontia\_rufa LYTLIIHWNACIYFAISKFIGFGTDSWVYPNTSKPEYARLSRKYIYSLYWSTLTLTTIG  
Xerus\_inauris@C LYTLIIHWNACIYFAISKFIGFGTDSWVYPNTSKPEYARLSRKYIYSLYWSTLTLTTIG  
Marmota\_monax@C LYTLIIHWNACIYFAISKFIGFGTDSWVYPNTSKPEYARLSRKYIYSLYWSTLTLTTIG  
Spermophilus\_da LYTLIIHWNACIYFAISKFIGFGTDSWVYPNTSKPEYARLSRKYIYSLYWSTLTLTTIG  
Ictidomys\_tride LYTLIIHWNACIYFAISKFIGFGTDSWVYPNTSKPEYARLSRKYIYSLYWSTLTLTTIG  
Urocitellus\_par LYTLIIHWNACIYFAISKFIGFGTDSWVYPNTSKPEYARLSRKYIYSLYWSTLTLTTIG  
Sciurus\_vulgari LYTLIIHWNACIYFAISKFIGFGTDSWVYPNTSKPEYARLSRKYIYSLYWSTLTLTTIG  
Sciurus\_carolin LYTLIIHWNACIYFAISKFIGFGTDSWVYPNTSKPEYARLSRKYIYSLYWSTLTLTTIG  
Sciurus\_niger@C LYTLIIHWNACIYFAISKFIGFGTDSWVYPNTSKPEYARLSRKYIYSLYWSTLTLTTIG  
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Cnga3 ETPPPVKDEEYLFVVIDFLVGVLI FATIVGNVGSMSI SNMNAPRVEFQAKIDSVKQYMQFR  
Aplodontia\_rufa ETPPPVKDEEYLFVVIDFLVGVLI FATIVGNVGSMSI SNMNAPRVEFQAKIDSVKQYMQFR  
Xerus\_inauris@C ETPPPVKDEEYLFVVIDFLVGVLI FATIVGNVGSMSI SNMNAPRVEFQAKIDSVKQYMQFR  
Marmota\_monax@C ETPPPVKDEEYLFVVIDFLVGVLI FATIVGNVGSMSI SNMNAPRVEFQAKIDSVKQYMQFR  
Spermophilus\_da ETPPPVKDEEYLFVVIDFLVGVLI FATIVGNVGSMSI SNMNAPRVEFQAKIDSVKQYMQFR  
Ictidomys\_tride ETPPPVKDEEYLFVVIDFLVGVLI FATIVGNVGSMSI SNMNAPRVEFQAKIDSVKQYMQFR  
Urocitellus\_par ETPPPVKDEEYLFVVIDFLVGVLI FATIVGNVGSMSI SNMNAPRVEFQAKIDSVKQYMQFR  
Sciurus\_vulgari ETPPPVKDEEYLFVVIDFLVGVLI FATIVGNVGSMSI SNMNAPRVEFQAKIDSVKQYMQFR  
Sciurus\_carolin ETPPPVKDEEYLFVVIDFLVGVLI FATIVGNVGSMSI SNMNAPRVEFQAKIDSVKQYMQFR  
Sciurus\_niger@C ETPPPVKDEEYLFVVIDFLVGVLI FATIVGNVGSMSI SNMNAPRVEFQAKIDSVKQYMQFR  
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Cnga3 KVTKDLETRVIRWFDYLDWANRKTVDKEEVLKKNLPDKLKAETIAINVHLDLTKKVRIFQDCE  
Aplodontia\_rufa KVTKDLETRVIRWFDYLDWANRKTVDKEEVLKKNLPDKLKAETIAINVHLDLTKKVRIFQDCE  
Xerus\_inauris@C KVTKDLETRVIRWFDYLDWANRKTVDKEEVLKKNLPDKLKAETIAINVHLDLTKKVRIFQDCE  
Marmota\_monax@C KVTKDLETRVIRWFDYLDWANRKTVDKEEVLKKNLPDKLKAETIAINVHLDLTKKVRIFQDCE  
Spermophilus\_da KVTKDLETRVIRWFDYLDWANRKTVDKEEVLKKNLPDKLKAETIAINVHLDLTKKVRIFQDCE  
Ictidomys\_tride KVTKDLETRVIRWFDYLDWANRKTVDKEEVLKKNLPDKLKAETIAINVHLDLTKKVRIFQDCE  
Urocitellus\_par KVTKDLETRVIRWFDYLDWANRKTVDKEEVLKKNLPDKLKAETIAINVHLDLTKKVRIFQDCE  
Sciurus\_vulgari KVTKDLETRVIRWFDYLDWANRKTVDKEEVLKKNLPDKLKAETIAINVHLDLTKKVRIFQDCE  
Sciurus\_carolin KVTKDLETRVIRWFDYLDWANRKTVDKEEVLKKNLPDKLKAETIAINVHLDLTKKVRIFQDCE  
Sciurus\_niger@C KVTKDLETRVIRWFDYLDWANRKTVDKEEVLKKNLPDKLKAETIAINVHLDLTKKVRIFQDCE  
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Cnga3 AGLLVELVLKLRPTVFS PGDYICKKGDIGREMYIIKEGKLAVVADDGVTQFVVLSDGSYF  
Aplodontia\_rufa AGLLVELVLKLRPTVFS PGDYICKKGDIGREMYIIKEGKLAVVADDGVTQFVVLSDGSYF  
Xerus\_inauris@C AGLLVELVLKLRPTVFS PGDYICKKGDIGREMYIIKEGKLAVVADDGVTQFVVLSDGSYF  
Marmota\_monax@C AGLLVELVLKLRPTVFS PGDYICKKGDIGREMYIIKEGKLAVVADDGVTQFVVLSDGSYF  
Spermophilus\_da AGLLVELVLKLRPTVFS PGDYICKKGDIGREMYIIKEGKLAVVADDGVTQFVVLSDGSYF  
Ictidomys\_tride AGLLVELVLKLRPTVFS PGDYICKKGDIGREMYIIKEGKLAVVADDGVTQFVVLSDGSYF  
Urocitellus\_par AGLLVELVLKLRPTVFS PGDYICKKGDIGREMYIIKEGKLAVVADDGVTQFVVLSDGSYF  
Sciurus\_vulgari AGLLVELVLKLRPTVFS PGDYICKKGDIGREMYIIKEGKLAVVADDGVTQFVVLSDGSYF  
Sciurus\_carolin AGLLVELVLKLRPTVFS PGDYICKKGDIGREMYIIKEGKLAVVADDGVTQFVVLSDGSYF  
Sciurus\_niger@C AGLLVELVLKLRPTVFS PGDYICKKGDIGREMYIIKEGKLAVVADDGVTQFVVLSDGSYF  
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Cnga3 GEISILNIKGSKSGNRRTANIRSIGYSDLFCLSKDDLMEALTEY PDAKRALEEKGRIILM  
Aplodontia\_rufa GEISILNIKGSKSGNRRTANIRSIGYSDLFCLSKDDLMEALTEY PDAKRALEEKGRIILM  
Xerus\_inauris@C GEISILNIKGSKSGNRRTANIRSIGYSDLFCLSKDDLMEALTEY PDAKRALEEKGRIILM  
Marmota\_monax@C GEISILNIKGSKSGNRRTANIRSIGYSDLFCLSKDDLMEALTEY PDAKRALEEKGRIILM  
Spermophilus\_da GEISILNIKGSKSGNRRTANIRSIGYSDLFCLSKDDLMEALTEY PDAKRALEEKGRIILM  
Ictidomys\_tride GEISILNIKGSKSGNRRTANIRSIGYSDLFCLSKDDLMEALTEY PDAKRALEEKGRIILM  
Urocitellus\_par GEISILNIKGSKSGNRRTANIRSIGYSDLFCLSKDDLMEALTEY PDAKRALEEKGRIILM  
Sciurus\_vulgari GEISILNIKGSKSGNRRTANIRSIGYSDLFCLSKDDLMEALTEY PDAKRALEEKGRIILM  
Sciurus\_carolin GEISILNIKGSKSGNRRTANIRSIGYSDLFCLSKDDLMEALTEY PDAKRALEEKGRIILM

Sciurus\_niger@C GEISILNIKSGSKGNRRTANIRSIGYSDLFCLSKDDLMEALTEYPDRAKRALEEKGRQILM  
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Cnga3 KDNLIDEDLVAARVDTRDVEEKVEYLESSLDILQTRFARLLAEYSASQMMLKQRLTRLES  
 Aplodontia\_rufa KDNLIDEDLVAARVDTRDVEEKVEYLESSLDILQTRFARLLAEYSASQMMLKQRLTRLES  
 Xerus\_inauris@C KDNLIDEDLVAARVDTRDVEEKVEYLESSLDILQTRFARLLAEYSASQMMLKQRLTRLES  
 Marmota\_monax@C KDNLIDEDLVAARVDTRDVEEKVEYLESSLDILQTRFARLLAEYSASQMMLKQRLTRLES  
 Spermophilus\_da KDNLIDEDLVAARVDTRDVEEKVEYLESSLDILQTRFARLLAEYSASQMMLKQRLTRLES  
 Ictidomys\_tride KDNLIDEDLVAARVDTRDVEEKVEYLESSLDILQTRFARLLAEYSASQMMLKQRLTRLES  
 Uroditellus\_par KDNLIDEDLVAARVDTRDVEEKVEYLESSLDILQTRFARLLAEYSASQMMLKQRLTRLES  
 Sciurus\_vulgari KDNLIDEDLVAARVDTRDVEEKVEYLESSLDILQTRFARLLAEYSASQMMLKQRLTRLES  
 Sciurus\_carolin KDNLIDEDLVAARVDTRDVEEKVEYLESSLDILQTRFARLLAEYSASQMMLKQRLTRLES  
 Sciurus\_niger@C KDNLIDEDLVAARVDTRDVEEKVEYLESSLDILQTRFARLLAEYSASQMMLKQRLTRLES  
 \*\*\*\*\*

Cnga3 QMNRCCGFS PDRENSEDASKTDZ  
 Aplodontia\_rufa QMKRCCGFLSDGENSEDAAKTDQ  
 Xerus\_inauris@C QMKRCCGFS SDRENSEEEAAKTEQ  
 Marmota\_monax@C QMKRCCGFS SDRENSEEEAAKTEE  
 Spermophilus\_da QMKRCCGFS SDRENSEEEAAKTEE  
 Ictidomys\_tride QMKRCCGFS SDRENSEEEAAKTEE  
 Uroditellus\_par QMKRCCGFS SDRENSEEEAAKTEE  
 Sciurus\_vulgari QMKRCCDFSSDGENSEEEAAKTEQ  
 Sciurus\_carolin QMKRCCDFSSDGENSEEEAAKTEQ  
 Sciurus\_niger@C QMKRCCGFS SDGENSEEEAAKTEQ  
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*GNAT2* encodes G protein subunit alpha transducin 2. Diseases associated with *GNAT2* include achromatopsia 4 and achromatopsia. Among its related pathways are ERK signaling and signaling by GPCR. Gene ontology (GO) annotations related to this gene include GTP binding and obsolete signal transducer activity. An important paralog of this gene is *GNAT1*. Transducin is a 3-subunit guanine nucleotide-binding protein (G protein) which stimulates the coupling of rhodopsin and cGMP-phosphodiesterase during visual impulses. The transducin alpha subunits in rods and cones are encoded by separate genes. This gene encodes the alpha subunit in cones.

Among 354 amino acids for which sequence data are available, 351 are identical among all species. Among *Sciurus* sp., *S. carolinensis* has a phenylalanine instead of a tyrosine at position 146.

Gnat2 MGSGIS AEDKELARRSKELEKKLQEDADKEAKTVKLLLLGAGESGKSTIVKQMKIIHQDG  
 Aplodontia\_rufa MGSGIS AEDKELARRSKELEKKLQEDADKEARTVKLLLLGAGESGKSTIVKQMKIIHQDG  
 Xerus\_inauris@G MGSGIS AEDKELARRSKELEKKLQEDADKEAKTVKLLLLGAGESGKSTIVKQMKIIHQDG  
 Marmota\_monax@G MGSGIS AEDKELARRSKELEKKLQEDADKEAKTVKLLLLGAGESGKSTIVKQMKIIHQDG  
 Spermophilus\_da MGSGIS AEDKELARRSKELEKKLQEDADKEAKTVKLLLLGAGESGKSTIVKQMKIIHQDG  
 Ictidomys\_tride MGSGIS AEDKELARRSKELEKKLQEDADKEAKTVKLLLLGAGESGKSTIVKQMKIIHQDG  
 Uroditellus\_par MGSGIS AEDKELARRSKELEKKLQEDADKEAKTVKLLLLGAGESGKSTIVKQMKIIHQDG  
 Sciurus\_vulgari MGSGIS AEDKELARRSKELEKKLQEDADKEAKTVKLLLLGAGESGKSTIVKQMKIIHQDG  
 Sciurus\_carolin MGSGIS AEDKELARRSKELEKKLQEDADKEAKTVKLLLLGAGESGKSTIVKQMKIIHQDG  
 Sciurus\_niger@G MGSGIS AEDKELARRSKELEKKLQEDADKEAKTVKLLLLGAGESGKSTIVKQMKIIHQDG  
 \*\*\*\*\*:\*\*\*\*\*

Gnat2 YSPEECLEFKSVIYGNVLQSI LAI IRAMSTLGIDYAEPSCADAGRQLNNLADSTEEGTMP  
 Aplodontia\_rufa YSPEECLEFKSVIYGNVLQSI LAI IRAMSTLGIDYAEPSCADDGRQLNNLADSTEEGTMP  
 Xerus\_inauris@G YSPEECLEFKSVIYGNVLQSI LAI IRAMSTLGIDYAEPSCADAGRQLNNLADSTEEGTMP  
 Marmota\_monax@G YSPEECLEFKSVIYGNVLQSI LAI IRAMSTLGIDYAEPSCADAGRQLNNLADSTEEGTMP

Spermophilus\_da YSPEECLEFKSVIYGNVLQSIILAIIRAMSTLGLIDYAEPSCADAGRQLNNLADSTEEGTMP  
Ictidomys\_tride YSPEECLEFKSVIYGNVLQSIILAIIRAMSTLGLIDYAEPSCADAGRQLNNLADSTEEGTMP  
Urocitellus\_par YSPEECLEFKSVIYGNVLQSIILAIIRAMSTLGLIDYAEPSCADAGRQLNNLADSTEEGTMP  
Sciurus\_vulgari YSPEECLEFKSVIYGNVLQSIILAIIRAMSTLGLIDYAEPSCADAGRQLNNLADSTEEGTMP  
Sciurus\_carolin YSPEECLEFKSVIYGNVLQSIILAIIRAMSTLGLIDYAEPSCADAGRQLNNLADSTEEGTMP  
Sciurus\_niger@G YSPEECLEFKSVIYGNVLQSIILAIIRAMSTLGLIDYAEPSCADDGRQLNNLADSTEEGTMP  
\*\*\*\*\*

Gnat2 PELVDVIRKLWKDGGVQACFDRAAEYQLNDSASYLNLQDRITDPNYLPNEQDVLRSRVK  
Aplodontia\_rufa PELVDVIRKLWKDGGVQACFDRAAEYQLNDSASYLNLQDRITDPNYLPNEQDVLRSRVK  
Xerus\_inauris@G PELVDVIRKLWKDGGVQACFDRAAEYQLNDSASYLNLQDRITDPNYLPNEQDVLRSRVK  
Marmota\_monax@G PELVDVIRKLWKDGGVQACFDRAAEYQLNDSASYLNLQDRITDPNYLPNEQDVLRSRVK  
Spermophilus\_da PELVDVIRKLWKDGGVQACFDRAAEYQLNDSASYLNLQDRITDPNYLPNEQDVLRSRVK  
Ictidomys\_tride PELVDVIRKLWKDGGVQACFDRAAEYQLNDSASYLNLQDRITDPNYLPNEQDVLRSRVK  
Urocitellus\_par PELVDVIRKLWKDGGVQACFDRAAEYQLNDSASYLNLQDRITDPNYLPNEQDVLRSRVK  
Sciurus\_vulgari PELVDVIRKLWKDGGVQACFDRAAEYQLNDSASYLNLQDRITDPNYLPNEQDVLRSRVK  
Sciurus\_carolin PELVDVIRKLWKDGGVQACFDRAAEYQLNDSASYLNLQDRITDPNYLPNEQDVLRSRVK  
Sciurus\_niger@G PELVDVIRKLWKDGGVQACFDRAAEYQLNDSASYLNLQDRITDPNYLPNEQDVLRSRVK  
\*\*\*\*\*

Gnat2 TTGIIETKFSVKDLNFRMFDVGGQRSEKRWIHC FEGVTCII FCAALSAYDMVLVEDDEV  
Aplodontia\_rufa TTGIIETKFSVKDLNFRMFDVGGQRSEKRWIHC FEGVTCII FCAALSAYDMVLVEDDEV  
Xerus\_inauris@G TTGIIETKFSVKDLNFRMFDVGGQRSEKRWIHC FEGVTCII FCAALSAYDMVLVEDDEV  
Marmota\_monax@G TTGIIETKFSVKDLNFRMFDVGGQRSEKRWIHC FEGVTCII FCAALSAYDMVLVEDDEV  
Spermophilus\_da TTGIIETKFSVKDLNFRMFDVGGQRSEKRWIHC FEGVTCII FCAALSAYDMVLVEDDEV  
Ictidomys\_tride TTGIIETKFSVKDLNFRMFDVGGQRSEKRWIHC FEGVTCII FCAALSAYDMVLVEDDEV  
Urocitellus\_par TTGIIETKFSVKDLNFRMFDVGGQRSEKRWIHC FEGVTCII FCAALSAYDMVLVEDDEV  
Sciurus\_vulgari TTGIIETKFSVKDLNFRMFDVGGQRSEKRWIHC FEGVTCII FCAALSAYDMVLVEDDEV  
Sciurus\_carolin TTGIIETKFSVKDLNFRMFDVGGQRSEKRWIHC FEGVTCII FCAALSAYDMVLVEDDEV  
Sciurus\_niger@G TTGIIETKFSVKDLNFRMFDVGGQRSEKRWIHC FEGVTCII FCAALSAYDMVLVEDDEV  
\*\*\*\*\*

Gnat2 NRMHESLHLFNSICNHKFFAATSIVLFLNKKDLFEKIKKVHLSICFPEYDGNN SYEDAG  
Aplodontia\_rufa NRMHESLHLFNSICNHKFFAATSIVLFLNKKDLFEKIKKVHLSICFPEYDGNN SYEDAG  
Xerus\_inauris@G NRMHESLHLFNSICNHKFFAATSIVLFLNKKDLFEKIKKVHLSICFPEYDGNN SYEDAG  
Marmota\_monax@G NRMHESLHLFNSICNHKFFAATSIVLFLNKKDLFEKIKKVHLSICFPEYDGNN SYEDAG  
Spermophilus\_da NRMHESLHLFNSICNHKFFAATSIVLFLNKKDLFEKIKKVHLSICFPEYDGNN SYEDAG  
Ictidomys\_tride NRMHESLHLFNSICNHKFFAATSIVLFLNKKDLFEKIKKVHLSICFPEYDGNN SYEDAG  
Urocitellus\_par NRMHESLHLFNSICNHKFFAATSIVLFLNKKDLFEKIKKVHLSICFPEYDGNN SYEDAG  
Sciurus\_vulgari NRMHESLHLFNSICNHKFFAATSIVLFLNKKDLFEKIKKVHLSICFPEYDGNN SYEDAG  
Sciurus\_carolin NRMHESLHLFNSICNHKFFAATSIVLFLNKKDLFEKIKKVHLSICFPEYDGNN SYEDAG  
Sciurus\_niger@G NRMHESLHLFNSICNHKFFAATSIVLFLNKKDLFEKIKKVHLSICFPEYDGNN SYEDAG  
\*\*\*\*\*

Gnat2 NYIKSQFLDLNMRKDVKEIYSHMTCATDTQNVKFVFDVAVTDII IKENLKDCGLFZ  
Aplodontia\_rufa NYIKSQFLDLNMRKDVKEIYSHMTCATDTQNVKFVFDVAVTDII IKENLKDCGLF-  
Xerus\_inauris@G NYIKSQFLDLNMRKDVKEIYSHMTCATDTQNVKFVFDVAVTDII IKENLKDCGLF-  
Marmota\_monax@G NYIKSQFLDLNMRKDVKEIYSHMTCATDTQNVKFVFDVAVTDII IKENLKDCGLF-  
Spermophilus\_da NYIKSQFLDLNMRKDVKEIYSHMTCATDTQNVKFVFDVAVTDII IKENLKDCGLF-  
Ictidomys\_tride NYIKSQFLDLNMRKDVKEIYSHMTCATDTQNVKFVFDVAVTDII IKENLKDCGLF-  
Urocitellus\_par NYIKSQFLDLNMRKDVKEIYSHMTCATDTQNVKFVFDVAVTDII IKENLKDCGLF-  
Sciurus\_vulgari NYIKSQFLDLNMRKDVKEIYSHMTCATDTQNVKFVFDVAVTDII IKENLKDCGLF-  
Sciurus\_carolin NYIKSQFLDLNMRKDVKEIYSHMTCATDTQNVKFVFDVAVTDII IKENLKDCGLF-  
Sciurus\_niger@G NYIKSQFLDLNMRKDVKEIYSHMTCATDTQNVKFVFDVAVTDII IKENLKDCGLF-  
\*\*\*\*\*

*OPN1MW* encodes opsin 1, medium wave sensitive. Diseases associated with *OPN1MW* include Deutan series partial colorblindness and blue cone monochromacy. Among its related pathways are signaling by GPCR and peptide ligand-binding receptors. Gene ontology (GO) annotations related to this gene include G protein-coupled receptor activity and photoreceptor activity. An important paralog of this gene is *OPN1MW2*. This gene encodes for a light-absorbing visual pigment of the opsin gene family. The encoded protein is called green cone photopigment or medium-wavelength sensitive opsin. Opsins are G-protein coupled receptors with seven transmembrane domains, an N-terminal extracellular domain, and a C-terminal cytoplasmic domain. The long-wavelength opsin gene and multiple copies of the medium-wavelength opsin gene are tandemly arrayed on the X chromosome, and frequent unequal recombination and gene conversion may occur between these sequences. X chromosomes may have fusions of the medium- and long-wavelength opsin genes or may have more than one copy of these genes.

The amino acid sequence of *OPN1MW* is highly conserved among all species. The four varying positions occur at the end of the sequence alignment, and differentiate *S. vulgaris* *OPN1MW* from all other species for which we have sequence information.

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Opn1mw      MAQRLTGEQTLD-HYEDSTHASIFTYTNSTKGPFEFEGPNYHIAPRWVYHLTSTWMILVV
Aplodontia_rufa  -----GEQTLD-HYEDSTHASIFTYTNSTKGPFEFEGPNYHIAPRWVYHLTSTWMILVV
Xerus_inauris@O -----GEEGLETTWPDSTHASIFTYTNSTKGPFEFEGPNYHIAPRWVYHLTSTWMILVV
Marmota_monax@O -----GEEGLETTWPDSTHASIFTYTNSTKGPFEFEGPNYHIAPRWVYHLTSTWMILVV
Spermophilus_da -----NSTEASIFTYTNSTKGPFEFEGPNYHIAPRWVYHLTSTWMILVV
Ictidomys_tride -----GEEGLETTWPDSTHASIFTYTNSTKGPFEFEGPNYHIAPRWVYHLTSTWMILVV
Urocitellus_par --RRRNGEQTLD-HYEDSTHASIFTYTNSTKGPFEFEGPNYHIAPRWVYHLTSTWMILVV
Sciurus_vulgari -----NSTEASIFTYTNSTKGPFEFEGPNYHIAPRWVYHLTSTWMILVV
Sciurus_carolin -----NSTEASIFTYTNSTKGPFEFEGPNYHIAPRWVYHLTSTWMILVV
Sciurus_niger@O -----NSTEASIFTYTNSTKGPFEFEGPNYHIAPRWVYHLTSTWMILVV
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Opn1mw      VASVFTNGLVLAATMRFKKLRHPLNWILVNLAVADLAETIIASTISVFNQIYGYFVLGHP
Aplodontia_rufa  VASVFTNGLVLAATMRFKKLRHPLNWILVNLAVADLAETIIASTISVFNQIYGYFVLGHP
Xerus_inauris@O  VASVFTNGLVLAATMRFKKLRHPLNWILVNLAVADLAETIIASTISVFNQIYGYFVLGHP
Marmota_monax@O  VASVFTNGLVLAATMRFKKLRHPLNWILVNLAVADLAETIIASTISVFNQIYGYFVLGHP
Spermophilus_da  VASVFTNGLVLAATMRFKKLRHPLNWILVNLAVADLAETIIASTISVFNQIYGYFVLGHP
Ictidomys_tride  VASVFTNGLVLAATMRFKKLRHPLNWILVNLAVADLAETIIASTISVFNQIYGYFVLGHP
Urocitellus_par  VASVFTNGLVLAATMRFKKLRHPLNWILVNLAVADLAETIIASTISVFNQIYGYFVLGHP
Sciurus_vulgari  VASVFTNGLVLAATMRFKKLRHPLNWILVNLAVADLAETIIASTISVFNQIYGYFVLGHP
Sciurus_carolin  VASVFTNGLVLAATMRFKKLRHPLNWILVNLAVADLAETIIASTISVFNQIYGYFVLGHP
Sciurus_niger@O  VASVFTNGLVLAATMRFKKLRHPLNWILVNLAVADLAETIIASTISVFNQIYGYFVLGHP
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Opn1mw      LCVIEGYIVSLCGITGLWSLAIISWERWLTVCKPFGNVRFDKLATVGIVFSWVWAAIWT
Aplodontia_rufa  LCVIEGYIVSLCGITGLWSLAIISWERWLTVCKPFGNVRFDKLATVGIVFSWVWAAIWT
Xerus_inauris@O  LCVIEGYIVSLCGITGLWSLAIISWERWLTVCKPFGNVRFDKLATVGIVFSWVWAAIWT
Marmota_monax@O  LCVIEGYIVSLCGITGLWSLAIISWERWLTVCKPFGNVRFDKLATVGIVFSWVWAAIWT
Spermophilus_da  LCVIEGYIVSLCGITGLWSLAIISWERWLTVCKPFGNVRFDKLATVGIVFSWVWAAIWT
Ictidomys_tride  LCVIEGYIVSLCGITGLWSLAIISWERWLTVCKPFGNVRFDKLATVGIVFSWVWAAIWT
Urocitellus_par  LCVIEGYIVSLCGITGLWSLAIISWERWLTVCKPFGNVRFDKLATVGIVFSWVWAAIWT
Sciurus_vulgari  LCVIEGYIVSLCGITGLWSLAIISWERWLTVCKPFGNVRFDKLATVGIVFSWVWAAIWT
Sciurus_carolin  LCVIEGYIVSLCGITGLWSLAIISWERWLTVCKPFGNVRFDKLATVGIVFSWVWAAIWT
Sciurus_niger@O  LCVIEGYIVSLCGITGLWSLAIISWERWLTVCKPFGNVRFDKLATVGIVFSWVWAAIWT
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Opnlmw          APPIFGWSRYWPYGLKTS CGPDVFSGTSYPGVQSYMMVLMVTCCIFPLSIIVLCYLQVWL
Aplodontia_rufa APPIFGWSRYWPYGLKTS CGPDVFSGTSYPGVQSYMMVLMVTCCIFPLSIIVLCYLQVWL
Xerus_inauris@O APPIFGWSRYWPYGLKTS CGPDVFSGTSYPGVQSYMMVLMVTCCIFPLSIIVLCYLQVWL
Marmota_monax@O APPIFGWSRYWPYGLKTS CGPDVFSGTSYPGVQSYMMVLMVTCCIFPLSIIVLCYLQVWL
Spermophilus_da APPIFGWSRYWPYGLKTS CGPDVFSGTSYPGVQSYMMVLMVTCCIIPLSIIVLCYLQVWL
Ictidomys_tride APPIFGWSRYWPYGLKTS CGPDVFSGTSYPGVQSYMMVLMVTCCIFPLSIIVLCYLQVWL
Urocitellus_par APPIFGWSRYWPYGLKTS CGPDVFSGTSYPGVQSYMMVLMVTCCIFPLSIIVLCYLQVWL
Sciurus_vulgari APPIFGWSRYWPYGLKTS CGPDVFSGTSYPGVQSYMMVLMVTCCIIPLSIIVLCYLQVWL
Sciurus_carolin APPIFGWSRYWPYGLKTS CGPDVFSGTSYPGVQSYMMVLMVTCCIIPLSIIVLCYLQVWL
Sciurus_niger@O APPIFGWSRYWPYGLKTS CGPDVFSGTSYPGVQSYMMVLMVTCCIFPLSIIVLCYLQVWL
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Opnlmw          AIRAVAKQQKESESTQKAEKEVTRMVVVMVFAYCLCWGPYTFACFATAHPGYAFHPLVA
Aplodontia_rufa AIRAVAKQQKESESTQKAEKEVTRMVVVMVFAYCLCWGPYTFACFATAHPGYAFHPLVA
Xerus_inauris@O AIRAVAKQQKESESTQKAEKEVTRMVVVMVFAYCLCWGPYTFACFATAHPGYAFHPLVA
Marmota_monax@O AIRAVAKQQKESESTQKAEKEVTRMVVVMVFAYCLCWGPYTFACFATAHPGYAFHPLVA
Spermophilus_da AIRAVAKQQKESESTQKAEKEVTRMVVVMVFAYCLCWGPYTFACFATAHPGYAFHPLVA
Ictidomys_tride AIRAVAKQQKESESTQKAEKEVTRMVVVMVFAYCLCWGPYTFACFATAHPGYAFHPLVA
Urocitellus_par AIRAVAKQQKESESTQKAEKEVTRMVVVMVFAYCLCWGPYTFACFATAHPGYAFHPLVA
Sciurus_vulgari AIRAVAKQQKESESTQKAEKEVTRMVVVMVFAYCLCWGPYTFACFATAHPGYAFHPLVA
Sciurus_carolin AIRAVAKQQKESESTQKAEKEVTRMVVVMVFAYCLCWGPYTFACFATAHPGYAFHPLVA
Sciurus_niger@O AIRAVAKQQKESESTQKAEKEVTRMVVVMVFAYCLCWGPYTFACFATAHPGYAFHPLVA
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Opnlmw          SLPSYFAKSATIYNPIIYVFMNRQFRNCI-LHLFGKKVDDSSSELSSTSKTEVSSVSSVSP
Aplodontia_rufa SLPSYFAKSATIYNPIIYVFMNRQFRNAL-LHLLGK-----
Xerus_inauris@O SLPSYFAKSATIYNPIIYVFMNRQFRNCI-LHLFGK-----
Marmota_monax@O SLPSYFAKSATIYNPIIYVFMNRQFRNAI-----
Spermophilus_da SLPSYFAKSATIYNPIIYVFMNRQFRNAI-----
Ictidomys_tride SLPSYFAKSATIYNPIIYVFMNRQFRNAI-----
Urocitellus_par SLPSYFAKSATIYNPIIYVFMNRQFRNAI-----
Sciurus_vulgari SLPSYFAKSATIYNPIIYVFMNRQFRNAIKMVLLGK-----
Sciurus_carolin SLPSYFAKSATIYNPIIYVFMNRQFRNCI-LHLLGK-----
Sciurus_niger@O SLPSYFAKSATIYNPIIYVFMNRQFRNCI-LHLLGK-----
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*PDE6C* encodes phosphodiesterase 6C. Diseases associated with *PDE6C* include cone dystrophy 4 and achromatopsia. Among its related pathways are metabolism and metabolism of nucleotides. Gene ontology (GO) annotations related to this gene include 3',5'-cyclic-nucleotide phosphodiesterase activity and 3',5'-cyclic-GMP phosphodiesterase activity. An important paralog of this gene is *PDE6B*. This gene encodes the alpha-prime subunit of cone phosphodiesterase, which is composed of a homodimer of two alpha-prime subunits and 3 smaller proteins of 11, 13, and 15 kDa.

Along the 936-amino acid *PDE6C* sequence alignment, some upstream regions are well-conserved, while other, downstream regions are highly variable. There are 60 point-differences among sciurids, including tracts of 7, 7, 6, and 6 contiguous amino acids. *A. rufa* has a deletion of 27 amino acids at points 281-315, and an insertion of 29 amino acids at positions 363-391. *M. monax* and *S. vulgaris* have an insertion of 27 or 28 amino acids at positions 774-801. Six species have and three species lack an indel of 32 or 33 amino acids at positions 847-880.

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Pde6c          MGEISQEAVERYLEKNPCFAKEYFDKCLRVEALGVIFKNSHAGVQTGLSLPEMTQVEESA
Aplodontia_rufa MGEISQEAVERYLEKNPCFAKEYFDKCLRVEALGVIFKNSHAGVQTGLSLPELTQVEESA
    
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Xerus\_inauris@P MGEISQEAVERYLEKNPCFAKEYFDKCLRVEALGVI FKNSHAGVQTSLSLPELTQVEESA  
Marmota\_monax@P MGEISQEAVERYLEKNPCFAKEYFDKCLRVEALGVI FKNSHAGVQTSLSLPELTQVEESA  
Spermophilus\_da MGEISQEAVERYLEKNPCFAKEYFDKCLRVEALGVI FKNSHAGVQTSLSLPELTQVEESA  
Ictidomys\_tride MGEISQEAVERYLEKNPCFAKEYFDKCLRVEALGVI FKNSHAGVQTSLSLPELTQVEESA  
Urocitellus\_par MGEISQEAVERYLEKNPCFAKEYFDKCLRVEALGVI FKNSHAGVQTSLSLPELTQVEESA  
Sciurus\_vulgari MGEISQEAVERYLEKNPCFAKEYFDKCLRVEALGVI FKNSHAGVQTSLSLPELTQVEESA  
Sciurus\_carolin MGEISQEAVERYLEKNPCFAKEYFDKCLRVEALGVI FKNSHAGVQTSLSLPELTQVEESA  
Sciurus\_niger@P MGEISQEAVERYLEKNPCFAKEYFDKCLRVEALGVI FKNSHAGVQTSLSLPELTQVEESA  
\*\*\*\*\*.\*\*\*\*\*.\*\*\*\*\*

Pde6c VCLELLQCMQDEAGSAEQMAHRALQRLAQLLQADCCSMFSCRARNGIPEVASRLLNVTPT  
Aplodontia\_rufa VCLELLQCMQDEAGSAEQMAHRALQRLAQLLQADRC SMFSCRARNGIPEVASRLLNVTPT  
Xerus\_inauris@P VCLELLQCMQDEAGSAEQMAHRALQRLAQLLQADRC SMFSCRARNGIPEVASRLLNVTPT  
Marmota\_monax@P VCLELLQCMQDEAGSAEQMAHRALQRLAQLLQADRC SMFSCRARNGIPEVASRLLNVTPT  
Spermophilus\_da VCLELLQCMQDEAGSAEQMAHRALQRLAQLLQADRC SMFSCRARNGIPEVASRLLNVTPT  
Ictidomys\_tride VCLELLQCMQDEAGSAEQMAHRALQRLAQLLQADRC SMFSCRARNGIPEVASRLLNVTPT  
Urocitellus\_par VCLELLQCMQDEAGSAEQMAHRALQRLAQLLQADRC SMFSCRARNGIPEVASRLLNVTPT  
Sciurus\_vulgari VCLELLQCMQDEAGSAEQMAHRALQRLAQLLQADCCSMFSCRARNGIPEVASRLLNVTPT  
Sciurus\_carolin VCLELLQCMQDEAGSAEQMAHRALQRLAQLLQADRC SMFSCRARNGIPEVASRLLNVTPT  
Sciurus\_niger@P VCLELLQCMQDEAGSAEQMAHRALQRLAQLLQADRC SMFSCRARNGIPEVASRLLNVTPT  
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Pde6c SKFEDNLVAPDREVVFPDLIGIVGWVAHVKKALNVSDVKKNSHFSDFMDKQTYVTRNLL  
Aplodontia\_rufa SKFEDNLVAPDREVVFPDLIGIVGWVAHVKKALNVSDVKKNSHFSDFMDKQTYVTKSLL  
Xerus\_inauris@P SKFEDNLVAPDREVVFPDLIGIVGWVAHVKKALNVPDVKKNSHFSDFMDKQTYVTKSLM  
Marmota\_monax@P SKFEDNLVAPDREVVFPDLIGIVGWVAHVKKALNVPDVKKNSHFSDFMDKQTYVTRNLL  
Spermophilus\_da SKFEDNLVAPDREVVFPDLIGIVGWVAHVKKALNVPDVKKNSHFSDFMDKQTYVTRNLL  
Ictidomys\_tride SKFEDNLVAPDREVVFPDLIGIVGWVAHVKKALNVSDVKKNSHFSDFMDKQTYVTRNLL  
Urocitellus\_par SKFEDNLVAPDREVVFPDLIGIVGWVAHVKKALNVSDVKKNSHFSDFMDKQTYVTRNLL  
Sciurus\_vulgari SKFEDNLVAPDREVVFPDLIGIVGWVAHVKKALNVPDVKKNSHFSDFMDKQTYVTKSLL  
Sciurus\_carolin SKFEDNLVAPDREVVFPDLIGIVGWVAHVKKALNVPDVKKNSHFSDFMDKQTYVTRNLL  
Sciurus\_niger@P SKFEDNLVAPDREVVFPDLIGIVGWVAHVKKALNVPDVKKNSHFSDFMDKQTYVTRNLL  
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Pde6c AVPIVAGKEVLAVVMVAVNKISAPEFSKQDEEVFSKYLSFVAVALRLQHTSYLYSVESSRS  
Aplodontia\_rufa AAPVVMGKEVLAVVMALNKLNAEFKQDEEVFSKYLI FVSVILKLHHTNYLYNVEFRRS  
Xerus\_inauris@P AAPVVMGKEVLAVLMAVNKVNASEFSKQDEEVFTKYLNFVSVILRLHHTNYLYNVESSRS  
Marmota\_monax@P AVPVVMGKEVLAVLVAVNKVNASEFSKQDEEVFTKYLNFVSVILKLHHTNYLYSVESSRS  
Spermophilus\_da AAPVVMGKEVLAVLAAVNKVNASEFSKQDEEVMSKYLSFVAVALRLQHTSYLYSVESSRS  
Ictidomys\_tride AAPVVMGKEVLAVLAAVNKVNASEFSKQDEEVFTKYLNFVSVILKLHHTNYLYNIESRSRS  
Urocitellus\_par AVPVVMGKEVLAVLAAVNKVNASEFSKQDEEVMLT----LHIHLEVQEI DLLYNVESSRS  
Sciurus\_vulgari AAPVVMGKEVLAVLMAVNKVNASEFSKQDEEVFTKYLNFVSVILKLHHTNYLYSVESSRS  
Sciurus\_carolin AVPIVAGKEVLAVLMAVNKVNASEFSKQDEEVFTKYLNFVSVILKLHHTSYLYSVESSRS  
Sciurus\_niger@P AVPIVAGKEVLAVLMAVNKVNASEFSKQDEEVFTKYLNFVSVALRLQHTSYLYSVESSRS  
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Pde6c QILMWSANKVFEELTDVERQFHKALYTI RTYLNCDRYSIGLLDMTKEK-----  
Aplodontia\_rufa QILMWSANKVFEELTDVERQFHKALYTV RTYLNCDRYSIGLLDMTKEK-----  
Xerus\_inauris@P QILMWSANKVFEELTDVERQFHKALYTI RTYLNCDRYSIGLLDMTKEKVRPGALRGPPAR  
Marmota\_monax@P QILMWSANKVFEELTDVERQFHKALYTI RTYLNCDRYSIGLLDMTKEKVRSGALGSPPAQ  
Spermophilus\_da QILMWSANKVFEELTDVERQFHKALYTI RTYLNCDRYSIGLLDMTKEKVRSGALGSPPGQ  
Ictidomys\_tride QILMWSANKVFEELTDVERQFHKALYTI RTYLNCDRYSIGLLDMTKEKVRSGALGSPPAQ  
Urocitellus\_par QILMWSANKVFEELTDVERQFHKALYTI RTYLNCDRYSIGLLDMTKEKVRSGALGSPPAQ  
Sciurus\_vulgari QILMWSANKVFEELTDVERQFHKALYTI RTYLNCDRYSIGLLDMTKEKVRPGAFRGPAAQ  
Sciurus\_carolin QILMWSANKVFEELTDVERQFHKALYTI RTYLNCDRYSIGLLDMTKEKVRPGVFRGPPGQ  
Sciurus\_niger@P QILMWSANKVFEELTDVERQFHKALYTI RTYLNCDRYSIGLLDMTKEKVRPGVFRGPPGQ

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Pde6c -----EFYDEWPIKLGVEPEYKGPKTPDGREIIFYKIIDYILHGKEEINV  
Aplodontia_rufa -----EFFDVWPVLMGEAQPYSGPRTPDGREIIFYKVIDYILHGKEEIKV  
Xerus_inauris@P PDPAPGLPPLFSSAQEFFDVWPVLMGEAQPYSGPRTPDGREIIFYKIIDYILHGKEEINV  
Marmota_monax@P PDPAAGLSPLFSSAQEFFDVWPVLMGEAQPYSGPCTPDGREVIFYKVIDYILHGKEEIKV  
Spermophilus_da PDPAPGLSPLFSSAQEFFDVWPVLMGEAQPYSGPRTPDGREVIFYKVIDYILHGKEEIKV  
Ictidomys_tride PDPAPGLSPLFSSAQEFFDVWPVLMGEAQPYSGPRTPDGREVIFYKVIDYILHGKEEIKV  
Urocitellus_par PDPAPGLSPLFSSAQEFFDVWPVLMGEAQPYSGPRTPDGREVIFYKVIDYILHGKEEIKV  
Sciurus_vulgari PDPAPGLSILLSSAQEFFDVWPVLMGEAQPYTGPRTPDGREVIFYKVIDYILHGKEEIKV  
Sciurus_carolin PDPAPGLSALLSSAQEFFDVWPVLMGEAPPYSGPRTPDGREIIFYKIIDYILHGKEEINV  
Sciurus_niger@P PDPAPGLSALLSSAQEFFDVWPVLMGEAQPYSGPRTPDGREIIFYKIIDYILHGKEEINV  
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Pde6c IP-----SPPADHWTLVSGLPTYVAENGFICNMLNA  
Aplodontia_rufa IPVLSSSSGVAIFLCTVHFSQQQFSFFSPSRTPPADHWTFFVSGLPTYVAENGFVCNMLNA  
Xerus_inauris@P IP-----SPPADHWTLVSGLPTYVAENGFICNMLNA  
Marmota_monax@P IP-----TPPADHWTFFVSGLPTYVAENGFVSYWTNS  
Spermophilus_da IP-----TPPADHWTFFVSGLPTYVAENGFVSYWTNS  
Ictidomys_tride IP-----TPPADHWTFFVSGLPTYVAENGFVSYWTNS  
Urocitellus_par IP-----TPPADHWTFFVSGLPTYVAENGFVSYWTNS  
Sciurus_vulgari IP-----TPPADHWTFFVSGLPTYVAENGFVCNMLNA  
Sciurus_carolin IP-----SPPADHWTLVSGLPTYVAENGFICNMLNA  
Sciurus_niger@P IP-----SPPADHWTLVSGLPTYVAENGFICNMLNA  
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Pde6c PADEYFTFQKGPVDETGWVIKVNLSLPIVNKKEDIVGVATFYNRKDGKPFDEHDEHITET  
Aplodontia_rufa PADEYFTLQKGPVDETGWVIKVNLSLPIVNKKEDIVGVATFYNRKDGKPFDEHDEHITET  
Xerus_inauris@P PPSALHAPQKGPVDETGWVIKVNLSLPIVNKKEDIVGVATFYNRKDGKPFDEHDEHITET  
Marmota_monax@P PADEFMPLQKGPVDETGWVIKVNLSLPIVNKKEDIVGVATFYNRKDGKPFDEHDEHITET  
Spermophilus_da PADEFMHLQKGPVDETGWVIKVNLSLPIVNKKEDIVGVATFYNRKDGKPFDEHDEHITET  
Ictidomys_tride PADEFMPLQKGPVDETGWVIKVNLSLPIVNKKEDIVGVATFYNRKDGKPFDEHDEHITET  
Urocitellus_par PADEFMPLQKGPVDETGWVIKVNLSLPIVNKKEDIVGVATFYNRKDGKPFDEHDEHITET  
Sciurus_vulgari PP--YFTFQKGPVDETGWVIKVNLSLPIVNKKEDIVGVATFYNRKDGKPFDEHDEHITET  
Sciurus_carolin PADEFLPPQKGPVDETGWVIKVNLSLPIVNKKEDIVGVATFYNRKDGKPFDEHDEHITET  
Sciurus_niger@P PADEFFTFQKGPVDETGWVIKVNLSLPIVNKKEDIVGVATFYNRKDGKPFDEHDEHITET  
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Pde6c LTQFLGWSLLNTDITYERVNKLESRKDIAQEMVMNLTKATPDEISSILKFKEKLNVEVIEE  
Aplodontia_rufa LTQFLGWSLLNTDITYEKMNKLENRKDIAQEMVMNLTKATPDEISSILKFKEKLNVEVIDE  
Xerus_inauris@P LTQFLGWSLLNTDITYEKMNKLENRKDIAQEMLMNHTKATPDEIKSILKFKEKLNVEVIEE  
Marmota_monax@P LTQFLGWSLLNTDITYEKMNKLENRKDIAQEMLMNHTKATPDEIKSILKFKEKLNVEVIEE  
Spermophilus_da LTQFLGWSLLNTDITYEKMNKLENRKDIAQEMLMNHTKATPDEIKSILKFKEKLNVEVIEE  
Ictidomys_tride LTQFLGWSLLNTDITYEKMNKLENRKDIAQEMLMNHTKATPDEIKSILKFKEKLNVEVIEE  
Urocitellus_par LTQFLGWSLLNTDITYEKMNKLENRKDIAQEMLMNHTKATPDEIKSILKFKEKLNVEVIEE  
Sciurus_vulgari LTQFLGWSLLNTDITYEKMNKLENRKDIAQEMVMNHTKATPDEISSILVPHLHSTVPLCGE  
Sciurus_carolin LTQFLGWSLLNTDITYEKMNKLENRKDIAQEMLMNHTKATPDEIKSILKFKEKLNVEVLQQ  
Sciurus_niger@P LTQFLGWSLLNTDITYEKMNKLENRKDIAQEMLMNHTKATPDEIKSILKFKEKLNVEVIEE  
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Pde6c CEERQLLAILKEDLPDPRTADLYEFCFSDFPITEHELKCGLRFLFLEINVVEKFKVPVEV  
Aplodontia_rufa CNQKNLSFQKEDLPDPKAVDLYEFRFSDFPITEHELKCGLRMFFEINVVEKFKVPVEV  
Xerus_inauris@P CEERQLLAILKEDLPDPQAVELYEFRFSDFPITEHELKCGLRFLFLEINVVEKFKVPVEV  
Marmota_monax@P CEERQLLAILKEDLPDPQAVELYEFRFSDFPITEHELKCGLRMFFEINVVEKFKVPVEV  
Spermophilus_da CEERQLLAILKEDLPDPQAVELYEFRFSDFPITEHELKCGLRMFFEINVVEKFKVPVEV  
Ictidomys_tride CEERQLLAILKEDLPDPQAVELYEFRFSDFPITEHELKCGLRMFFEINVVEKFKVPVEV
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Urocitellus\_par CEERQLLAILKEDLPDPQAVELYEFRSDFPITEHELKICGLRMFFEINVVEKFKVPVEV  
 Sciurus\_vulgari AGSP-----KEDLPDPRTVDLYEFRSDFPITEHELKICGLRFLFLEINVVEKFKVPVEV  
 Sciurus\_carolin ASHNIITPISKEDLPDPRAADLYEFCFSDFPITEHELVKCGLRFLFLEINVVEKFKVPVEV  
 Sciurus\_niger@P CEERQLLAILKEDLPDPRAADLYEFCFSDFPITEHELKICGLRFLFLEINVVEKFKVPVEV  
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Pde6c LTRWMYTVRKGYRPVTYHNWRHGFVNGQTMFTLLMTGRLKKYYTDLEAFAMLAFAFCHDI  
 Aplodontia\_rufa LTRWMYTVRKGYRSVTYHNWRHGFVNGQTMFALLMTGRLKKYYTDLEAFAMLAFAFCHDI  
 Xerus\_inauris@P LTRWMYTVRKGYRAVTYHNWRHGFVNGQTMFTLLMTGRLKKYYTDLEAFAMLAFAFCHDI  
 Marmota\_monax@P LTRWMYTVRKGYRAVTYHNWRHGFVNGQTMFTLLMTGRLKKYYTDLEAFAMLAFAFCHDI  
 Spermophilus\_da LTRWMYTVRKGYRPVTYHNWRHGFVNGQTMFTLLMTGRLKKYYTDLEAFAMLAFAFCHDI  
 Ictidomys\_tride LTRWMYTVRKGYRAVTYHNWRHGFVNGQTMFTLLMTGRLKKYYTDLEAFAMLAFAFCHDI  
 Urocitellus\_par LTRWMYTVRKGYRAVTYHNWRHGFVNGQTMFTLLMTGRLKKYYTDLEAFAMLAFAFCHDI  
 Sciurus\_vulgari LTRWMYTVRKGYRAVTYHNWRHGFVNGQTMFTLLMTGRLKKYYTDLEAFAMLAFAFCHDI  
 Sciurus\_carolin LTRWMYTVRKGYRPVTYHNWRHGFVNGQTMFTLLMTGRLKKYYTDLEAFAMLAFAFCHDI  
 Sciurus\_niger@P LTRWMYTVRKGYRPVTYHNWRHGFVNGQTMFTLLMTGRLKKYYTDLEAFAMLAFAFCHDI  
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Pde6c DHRGTNNLYQMKSTSPLARLHG-TSILERRHLEYSKTL-LQDESLNIFQNLNKRQFETVI  
 Aplodontia\_rufa DHRGTNNLYQMKSTSPLARLHG-TSILERRHLEYSKTL-LQDESLNIFQNLNKRQFETVI  
 Xerus\_inauris@P DHRGTNNLYQMKSTNPLARLHG-SSILERRHLEFGKFL-LAEESLNIFQNLNKRQFETVI  
 Marmota\_monax@P DHRGTNNLYQMKSTSPLAKLHG-SSILERRHLEFGKFL-LQDESLNIYQNLNRRQHEHVI  
 Spermophilus\_da DHRGTNNLYQMKSTSPLAKLHG-SSILERRHLEFGKFL-LQDESLNIYQNLNRRQHEHVI  
 Ictidomys\_tride DHRGTNNLYQMKSTSPLAKLHG-SSILERRHLEFGKFL-LQDESLNIYQNLNRRQHEHVI  
 Urocitellus\_par DHRGTNNLYQMKSTSPLAKLHG-SSILERRHLEFGKFL-LAEESLNIFQNLNKRQFETVI  
 Sciurus\_vulgari DHRGTNNLYQMK-VSPYAVLHG-TSILERRHLEYSKTL-LQDQSLNIYQNLNRRQHEHVI  
 Sciurus\_carolin DHRGTNNLYQMKSTSPLARLYNDTAVLESHHAELAFQLTVRDESLNIFQNLNKRQFETVI  
 Sciurus\_niger@P DHRGTNNLYQMKSTSPLARLYNDTAVLESHHAELAFQLTVRDESLNIFQNLNKRQFETVI  
 \*\*\*\*\* ..\* \* \*:. :::\*\* \* . \* : :\*\*\*\*\*:\*\*\*\*\*:\*\*\* \*\*

Pde6c HLFEEVAIIATDLALYFKKRTMFQKIVDTCEQMQSEEEETIKYVTS DPTKKEVIM-----  
 Aplodontia\_rufa HLFEEVAIIATDLALYFKKRTMFQKIVDTCEQMQSEEEETVKYVTS DPTKKEIIM-----  
 Xerus\_inauris@P HLFEEVAIIATDVKLF SRKRTMFQKIVDACEQMQTEEEA IKYVTIDPTKKEIIM-----  
 Marmota\_monax@P HLFEEVAIIATDLALYFKKRTMFQKIVDTCEQMQSEEEETIKYVTS DPTKKEIIMVVRMVFS  
 Spermophilus\_da HLFEEVAIIATDLALYFKKRTMFQKIVDTCEQMQSEEEETIKYVTS DPTKKEIIM-----  
 Ictidomys\_tride HLFEEVAIIATDLALYFKKRTMFQKIVDTCEQMQSEEEETIKYVTS DPTKKEIIM-----  
 Urocitellus\_par HLRHLLCLLYMVKLF SRKRTMFQKIVDACEQMQTEEEA IKYVTIDPTKKEIIM-----  
 Sciurus\_vulgari HLFEEVAIIATDLALYFKKRTMFQKIVDTCEQMQSEEEETIKYVTS DPTKKEIIMVVGMLVP  
 Sciurus\_carolin HLFEEVAIIATDLALYFKKRTMFQKIVDTCEQMQSEEEETIKYVTS DPTKKEVIM-----  
 Sciurus\_niger@P HLFEEVAIIATDLALYFKKRTMFQKIVDTCEQMQSEEEETIKYVTS DPTKKEVIM-----  
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Pde6c -----AMMNTACDLSAITKPWEVQSQVALLVANEFWEQDGLERT  
 Aplodontia\_rufa -----ALALQVW-LSAITKPWEVPLQVALLVANEFWEQDGLERI  
 Xerus\_inauris@P -----AMMNTACDLSAITKPWEVQSQVALLVANEFWEQDGLERT  
 Marmota\_monax@P FGGKKVVCVFFYLTIFLFFLRAMMNTACDLSAITKPWEVQSQVALLVANEFWEQDGLERT  
 Spermophilus\_da -----AMMNTACDLSAITKPWEVQSQVALLVANEFWEQDGLERT  
 Ictidomys\_tride -----AMMNTACDLSAITKPWEVQSQVALLVANEFWEQDGLERT  
 Urocitellus\_par -----AMMNTACDLSAITKPWEVQSQVALLVANEFWEQDGLERT  
 Sciurus\_vulgari FGQRKAVCNSI-LTIFLFFLRAMMNTACDLSAITKPWEVQSQVALLVASEFWEQDGLERT  
 Sciurus\_carolin -----AMMNTACDLSAITKPWEVQSQVALLVASEFWEQDGLERT  
 Sciurus\_niger@P -----AMMNTACDLSAITKPWEVQSQVALLVANEFWEQDGLERT  
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Pde6c VLQQQPI-----PMMDRSKKDEL PKLQVGFID  
 Aplodontia\_rufa VLQQQPIVKTLENALSRNSYNQSILFIKCKEIIILKGCFFFPMMDRNRKDEL PKLQVGFID

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Xerus_inauris@P VLQQQPIVKALENALLSKNY-ESVYFVRIGHYLNKRICFSFPMMDRNKKDELPKLQVGFID
Marmota_monax@P VLQQQPIVKTLENALLSKNY-ESVYFVHIGNYLNKRIYFSFPMMDRNKKDELPKLQVGFID
Spermophilus_da VLQQQPIVKTLENALLSKNY-KSVYFVHIGNYLNKRIYLSFPMMDRNKKDELPKLQVGFID
Ictidomys_tride VLQQQPIVKTLENALLSKNY-KSVYFVHIGNYLNKRIYFSFPMMDRNKKDELPKLQVGFID
Uroditellus_par VLQQQPI-----PMMDRNKKDELPKLQVGFID
Sciurus_vulgari VLQQQPIVKTLENALLSKNY-ESVYFGHIGNYLNKRICFFFPMMDRNNKDELPKLQVGFID
Sciurus_carolin VLQQQPI-----PMMDRNKKDELPKLQVGFID
Sciurus_niger@P VLQQQPIV-----MPMMDRNKKDELPKLQVGFID
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Pde6c          FVCTFVYKEFSRFHGEITPMLNGLQNNRVEWKS LAEEYEAKVKVTEEEAGKQEEEEASDGK
Aplodontia_rufa FVCTFVYK-----
Xerus_inauris@P FVCTFVYK-----
Marmota_monax@P FVCTFVYK-----
Spermophilus_da FVCTFVYK-----
Ictidomys_tride FVCTFVYK-----
Uroditellus_par FVCTFVYK-----
Sciurus_vulgari FVCTFVYK-----
Sciurus_carolin FVCTFVYKEFSRFHKEITPMLNGLQNNRVEWKS LADEYDAKMKV-----
Sciurus_niger@P FVCTFVYKAWDTFVD--LPDLMHLDN NFKCWKGLDE-----
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