**File S2** NCBI download sequence of phylogenetic analysis (Fig. 4).

>Rhodopsin 1 [*Megalurothrips usitatus* (Bagnall)]

MSLLHEPHFSAYTWQAAKGGFGNHTVVDQVPPEMMHMVDPHWYQFPPMNPLWHGLLGFVIGVLGVISIIGNGVVIYIFCSTKGLRTPSNMLVVNLAMSDFLMMFTMAPPMVINCYYETWVLGPFMCELYGMFGSLFGCGSIWTMTLIAMDRYNVIVRGLSAAPMTNKKAFLWILFIWFMATIWTIFPMVGWNRYVPEGNMTACGTDYLNKDFFSRSYILVYSCFVYFLPLIIIIWAYFYIVQAVCAHEKNMREQAKKMNVASLRSAENQQTSAEAKLAKVALMTISLWFMAWTPYLIINYTGIFEGYKISPLATIWSSLFAKAGACYNPIVYGISHPRYRAALQKKFPSLACAPATDDTASVASAVTSVSVTDSVTTEKA

>Rhodopsin 2 [*Megalurothrips usitatus* (Bagnall)]

MALAMAMPSEMWSRGPAYGNPQVAYQWGAPPGGGGGYRGGGGGGNSSVIDKVLPDMLHLIDSHWHQFPPMNPLWHAILGFVIACLGVVAISGNGMVIYIFTSTKALRTPSNLLVLNLAFSDFCLMFAMCPVMVINCYNETWVMGALICDLYGFAGSLFGCTSIWSMVLIAIDRYNVIVKGLAAKPLTNKRAAAWLLFAWTLSLVWTIFPFFGWNRYVPEGNMTACGTDYLTRDWFSRSYILGYSYFCYFLPLKVIVYCYWFIVSAVSAHEKNMREQAKKMNVASLRSAEAQQKSAEGKLAKIALMTISLWFMAWTPYLIVNYIGIFDGHSVITPLNSIWASLFAKANSCYNPIVYGISHPKYRVALYKKFPCLACSSEPEPSGGGGGGGDTSSVASGVTAVSSEEH

>Rhodopsin 3 [*Megalurothrips usitatus* (Bagnall)]

MREKRMTLFYGPSASIYEGALLGRFNNHSVVDIVLDDMLYLVDPHWYRFEPLHPVHLKLLAIMLATLGTMSVTGNGMVIYIFSTTKSLRTPSNLLVVNLAVSDFLMMFCMVPPMVFNSCFETWVFGPAFCEVYGMFGSLFGCTSIWTMTMISLDRYNVIVKGLSAKPMTTKKAIWWIIFVWGISLKWTIFPVFGWSRYVPEGSMTTCGGDYLNISWISRSYVILYAVMCYFVPLAIIVYSYYYIVKAVAAHERNMREQAKKMNIASLRSADQQSSENKLAMVALMTISLWFMAWTPYLVINFVGVFGFGQNITPLSTVFATLFAKANAVYNPIVYGISHPKYRAALAKRFPRFFKSMATGSTETSEVESVQSVVTSVPDNQA

>Ultraviolet-sensitive 1 [*Megalurothrips usitatus* (Bagnall)]

MEYPEGADCANGSAWGPLAEARVSGVSGPSETRLLGWNVPEVNKPHIPTHWFVYPEPDPLVNYGLGILYCFFFFFATVGNGIVIYIFLTAKNLRTPSNIFVVNLALCDFVMMIKTPIFIYNSFNGIGASASNAAIAYDRYMTIAKPFGSKMTRGKAIMIVVLIWMYVTPWVLFPALEIWGRFVPEGFLTSCTFDYLTDTDHIRVFVAVMFVVCYCIPMSLIIYFYSQIVSHVVAHEKALKAQAKKMNVESLRSNADKNQESTEIRIAKMAISLCFLFVLSWTPYAAIALIGAFGNKALLTPGVTMIPACTCKLVACIDPYVFALSHPRFRYVPRLADIRYLGEKKY

>Ultraviolet-sensitive 2 [*Megalurothrips usitatus* (Bagnall)]

MEVGPFTPADLDVVHNHWLSFPPHRPAVHYVLAAAYTLIMTLGVFGNLLVLYMFWRCRSLHSPANILIANLAISDFFLLAKMPVFIYNSMYFGPILGQLGNDIYGFLGGLTGAVSIANLAAIALDRYNVIVQPLDPGRRNSKLRARLCVLVTWLYGGALASCPLLGLSRYTPEGLLTSSSFDYLNTDPTNRTFIYCFFVAAWVLPFCIITLSYIGIYRIVERATRRGQAGGTGSDASRTRRHCREHDKRRTELRLAVVAGVVVSLWFVSWTPYAVVALLGVSGRPPGPLVSMLPALFCKTASCLDPYVYAVTHPRFRRELNKLCARAGLTFGLPSRAAKMRGSRSRSRSRFWRGTASLTSAATATMPKAGFQGSVSSEEGVEEEDVPVMLADLRRRGNEHGRVGQPDFRGSLCSTSSFRESQSQDSHSPPPVGPSCRIRDESRSSSSGEPPPQAARVVAGPGPPPLTCPLTPLAGVVMGDCPACPQLAHFPMSAAEQLRYQPPTTFNPPQPRRSQSFSLRNKLGESVTARTAVLPDPISV

>AAC47455.1 ultraviolet sensitive opsin [*Apis mellifera*]

MLLHNKTLAGKALAFIAEEGYVPSMREKFLGWNVPPEYSDLVRPHWRAFPAPGKHFHIGLAIIYSMLLIMSLVGNCCVIWIFSTSKSLRTPSNMFIVSLAIFDIIMAFEMPMLVISSFMERMIGWEIGCDVYSVFGSISGMGQAMTNAAIAFDRYRTISCPIDGRLNSKQAAVIIAFTWFWVTPFTVLPLLKVWGRYTTEGFLTTCSFDFLTDDEDTKVFVTCIFIWAYVIPLIFIILFYSRLLSSIRNHEKMLREQAKKMNVKSLVSNQDKERSAEVRIAKVAFTIFFLFLLAWTPYATVALIGVYGNRELLTPVSTMLPAVFAKTVSCIDPWIYAINHPRYRQELQKRCKWMGIHEPETTSDATSAQTEKIKTDE

>WCQ76402.1 ultraviolet sensitive opsin 2 [*Byrrhus pilula*]

MPQARVMDVAAPRLLAWNVPPSELIHIPEHWLKYTEPEASLHYLLGLVYIFFFLMSTIGNGLVMWVFSSAKSLRTPSNMFVVNLAFCDFIMFVSIPIFIYNSFNRGFAAGYLGCQIYAFVGSLSGIGAGMTNACIAYDRYTTIAKPFDGKLTRTKALLMIVCIWGYTLPWATLPMFEVWGRYVPEGFLTACSFDYLMDTFDNHMFVAVIFVCSYVIPMSMIIYFYSQIVSHVVNHEKALKEQAKKMNVASLRSNQSNATQSTEIRIAKVAITICFLFVASWTPYAVLSMIGAFGDQSLLTPAVTMIPACACKLVACLDPYVYALSHPRYRMELQKRLPWLAIKESAPSDTASATTESTAPAVTS

>WCQ76401.1 ultraviolet sensitive opsin 1 [*Byrrhus pilula*]

MATNSMPQARVMDASSPRLLAWNVPPSELVHIPDHWLKYPEPEASLHFLLGLVYIFFFILSTLGNGLVMWVFSSAKSLRTPSNMFVVNLAFCDFIMMIKTPIFIYNSFNRGFAAGYLGCQIFAFFGSLSGIGAGMTNACIAYDRYTTIAKPFDGKLTRTKALLMIVCIWAYTVPWASLPLFEIWGRYVPEGYLTSCTFDYLLNTFDNHVFVAAIFTCSYVIPMSLIIYFYSQIVSHVINHEKALKEQAKKMNVASLRSNQNTANQSTEIRIAKVAITICTLFVASWTPYAVLALIGAFGNQALLTPGITMIPACACKFVACLDPYVYALSHPRYRMELQKRLPWLAIKESAPSDTQSTTTDNTTTPVSAVTN

>WCQ76398.1 ultraviolet sensitive opsin 2 [*Heterocerus fenestratus*]

MNLLNWTHLNYNGPVRRPEEDAGPRLLAWNVPPSELVHIPEHWLTYPEPEASMHYLLGLVYIGFFIMSVVGNGLVLWVFSSAKSLRTPSNMFVVNLAFCDFIMMLKAPIFIYNAFSRGYAAGHIGCQIFAFMGSLSGIGAGMTNACIAYDRYTTIAKPFDGKLTRTKALVMIICIWTYTIPWAVLPAVEIWGRFVPEGYLTSCTFDYLLDTFDNHMFVSAIFVFSYVIPMSMIIYFYSQIVSHVINHEKLLREQAKKMNVESLRSNQNQSAQSAEIRIAKVAITICFLFVASWTPYAVLALIGAFGDHSLLTPGVTMIPACACKFVACLDPYVYALSHPRYRVELQKRLPWLAIKESLPSDTQSTATTETAAPTPAAAPAATT

>WCQ76397.1 ultraviolet sensitive opsin 1 [*Heterocerus fenestratus*]

MNLLNWTHLNYNGPVRRPEEDAGPRLLAWNVPPSELVHIPEHWLTYPEPEASMHYLLGLVYIGFFIMSVVGNGLVLWVFSSAKSLRTPSNMFVVNLAFCDFIMMLKAPIFIYNAFSRGYAAGHIGCQIFAFMGSLSGIGAGMTNACIAYDRYTTIAKPFDGKLTRTKALVMIICIWTYTIPWAILPAMEIWSRFVPEGYLTSCTFDYLLDTFDNHMFVSAIFVFSYLIPMSMIIYFYSQIVSHVINHEKLLREQAKKMNVESLRSNQNQSAQSAEIRIAKVAITICFLFVASWTPYAVLALIGAFGDHSLLTPGVTMIPACACKFVACLDPYVYALSHPRYRVELQKRLPWLAIKESLPSDTQSTATTETAAPTPAAAPAATT

>WCQ76396.1 ultraviolet sensitive opsin 1 [*Chrysochroa mniszechii*]

MKEIMFNRTFLDGPLPQARVLSEEQRLLGWNVDNSDLVHIPEHWLKYPEPEASIHFLLGLLYIIYFFMSTIGNGLVLWIFSSSKPLRTPSNLFVVNLAFCDLIMLLKAPLFVYNAFNRGFATGHIGCQIFATIGSLSGIGAGTTNACIAYDRYTTITNPLEGRLSRTKAVIMIIFVWIYTMPWVVLPLLEIWSRFVPEGFLTACSFDYLTDSFDNHLFVASIFTSSYVIPMLLIIYYYSQIVMHVIRHEKTLKEQAKKMNVDSLRSNQTQMNQSTEIRIAKVALTITFLYVAAWTPYAVVAMIGAFGDQSLLTPGITMIPSCFCKCVACLDPYVYALSHPRYRVELQKRLPWLAIVEPTQADTSSAVTEATNAATRT

>WCQ76395.1 ultraviolet sensitive opsin 2 [*Chrysochroa mniszechii*]

MHLTNYSVKFPEARVMDSGRQLLAWNVPAADLEHIPEHWLKYPAPEASLHLLLGLLYIGLFLMSTLGNGLVLWIFSSAKSLRTPSNMFIVNLAFSDFVMMLKTPIFIYNSFNRGFAGGFVSCQIFGVMGTLSGIGASMSNACIAYDRYHTITNPLEGKLTRTKALVMILFVWTYTTPWAILPLFEIWGRFAPEGFLTQCSFDYLTNTFDNHLFVGVLFTFSYVIPMSLIIYYYSQIVSHVIDHEKALREQAKKMNVDSLRSNQQQQNQSAEVRIAKVAITICFLFVASWTPYAVLAMIGAFGDQSLITPGFAMIPACTCKLVACLDPYVYALSHPRYRVELQKRLPWLAINEKDPSDTQSTATESSTNKP>WCQ76394.1 ultraviolet sensitive opsin 2 [*Chrysochroa rajah*]

MHLTNYSVKFPEARVMDSGHQLIAWNVPAADLEHIPEHWLKYPAPEASLHLLLGLLYIGLFLMSILGNGLVLWIFSSAKCLRTPSNMFIVNLAFCDFVMMLKTPIFIYNSFNRGFAAGFVSCQVFGVMGTLSGIGAGMSNACIAYDRYHTITNPLEGKLTRTKALVMILFVWTYTTPWAILPLFEIWGKFVPEGFLTQCTFDYLTNTFDTHLFVGVLFTFSYVIPMSLIIYYYSQIVSHVIDHEKALREQAKKMNVDSLRSNQQQQNQSAEVRIAKVAITICFLFVASWTPYAVLAMIGAFGDQSLITPGFAMIPACACKLVACLDPYVYALSHPRYRVELQKRLPWLAINEKDPSDTQSTATESSTNKP

>WCQ76393.1 ultraviolet sensitive opsin 1 [*Chrysochroa rajah*]

MKEMMFNGTFLDGPLPQARVLSEERRLLGWNVDNSDLVHIPEHWLKYPEPEASIHFLLGLLYILYFLMSTIGNGLVLWIFSSSKSLRTPSNLFVVNLAFCDLIMLLKAPLFVYNAFNRGYATGHIGCQIFAMVGSLSGIGAGTTNACIAYDRYTTITNPLEGRLSKTKAVILIIFVWMYTMPWVVLPLLEIWSRFVPEGFLTACSFDYLTDSFDNHLFVASIFTTSYVIPMLLIIYYYSQIVMHVIRHERTLKEQAKKMNVDSLRSNQTQMNQSTEIRIAKVALTITFLYVAAWTPYAVVAMIGAFGDQSLLTPGITMIPSCFCKCVACLDPYVYALSHPRYRVELQKRLPWLAIVEPTQTDTASAVTEASNPATRT

>WCQ76392.1 ultraviolet sensitive opsin [*Callosobruchus maculatus*]

MRFENWTLPPNPLPRLMESPHLIGWNVPPEELKYIQEHWLVYPEPDKSLHLLLGLVYIFFFIMSVVGNGVVIWIFTSAKSLRTASNMFVVNLAFCDFMMMLKAPIFIYNSFHGGFALGMWGCRVFATMGSLSGIGQGMTNACIAYDRFTTITRPFDGKVSRTKALVMIIFVWVYTIPWALMPLFEIWGRFGPEGYLTACTFDFLTNRYDIKLFIGTIFTCSYVIPMSMIIYFYSQIVSKVFSHEKALREQAKKMNVESLRANQQGQTESAELRIAKAAITVCGLFVASWTPYAVMALIGGFGDQSLLTPGVSMIPALACKLVACIDPYVYAISHPKFRIELQKRMPWLAIKEADTVSTTTEASNAQNSTATT

>WCQ76391.1 ultraviolet sensitive opsin 2 [*Ptosima undecimmaculata*]

MLPINWTAHVLPQPRVMDPGPLLVEWNIRPEDLIYIPEHWLKYPPPEASLHFLLGLLYVGFFVMSTIGNGLVLWIFSTAKSLRTPSNMFVVNLAFCDFVMMLKTPIFIFNSFSRGFASGILWCEVFAIAGSFTGIGAGMTNACIAYDRYHTITNPLEGKLTTTKAFVMLIFVWLYTVPWSILPFLKIWGGFIPEGFLTQCGVDYLTRTFDNRLFVTTLFTFSYVIPMSLIIFYYSQIVTHVFHHEKALREQAKKMNVDSLRSNQQQQNQSAEIRIAKVAITICFLFVASWTPYAVLCLIGIYGDQSLLTPGFAMIPALTCKSVACLDPYVYALSHPRYRLELQKRLPWLAISEKAPSDTQSVGTESVNTNKT

>WCQ76390.1 ultraviolet sensitive opsin 1 [*Ptosima undecimmaculata*]

MLLNWTSYESPLPQVRVPDHEFRLLGWNIPPSELVHIPEHWLKYPEPEASLHFLLGLLYIVYFFMSTFGNGLVIWIFSTAKSLRTPSNMFVVNLAFCDMTMLLKAAPIFVFNSFHKGYATGHIGCQIYALVGSIAGIGAGMTNACIAYDRYTTITNPLEGRLSRVKAGLMIIFVWSYTLPWVLLPLFETWNRYVPEGFLTACSFDYLTDTFDTKLFVASIFICSYVIPMLLIIYYYSQIVIHVIRHEKTLKDQAKKMNVDSLRSNQMQATQSTEIRIAKVALTITFLFVAAWTPYAVVALIGAFGDQALLTPGVTMIPACFCKCVACFDPYVYALSHPRFRIELQKRLPWLAIKEPTPTDSASAATESTAPNSARA

>WCQ76389.1 ultraviolet sensitive opsin 2 [*Capnodis tenebrionis*]

MQLKNWTDNVNYPEARVMDPGHRLLAWDVPAAELVHIPEHWLKYPEPEASLHFLLGLLYIGFFLMSCFGNGLVLWIFSTAKSLRTPSNMFVVNLAFCDFIMMFKTPIFIYNSFHRGFAAGFLGCQIFSVMGTLSGIGASMSNACIAYDRYHTIANPLEGKLTRTKALVMIIFIWAYTIPWAIMPLLEVWGRFVPEGFLTQCTFDYLMDTFDNHMFVAVLFTFSYVIPMSLIIYYYSQIVSHVVNHEKTLREQAKKMNVDSLRSNQQQQNQSAEIRIAKVAITICFLFVASWTPYAVLAMIGAFGDQSLLTPGFAMVPACTCKIVACVDPYVYALSHPRYRLELQKRLPWLAINEKAPSDTQSTTTETSSTRT

>WCQ76388.1 ultraviolet sensitive opsin 1 [*Capnodis tenebrionis*]

MMLNWTSSNIPLPQARVLEDQRLLGWNIPPSELVHIPEHWLKYPEPEASLHFLLGLLYVVYFFMSTVGNGLVLWIFSTSKALRTPSNMFVVNLAFCDLIMLLKAPLFIYNAFNKGYATGHIGCQIFATVGSLSGIGAGATNACIAYDRYTTIANPLEGRLSRTKASIMIFFIWVYTLPWVVLPLFEIWNRFVPEGFLTACSFDYLTDTFDNRLFVASIFTCSYVFPMVLIIYYYSQIVSHVIRHEKALKDQAKKMNVDSLRSNQNQANQSTEIRIAKVALTITFLYVAAWTPYAVVAMIGAFGNQSLLTPGVTMIPACFCKCVACFDPYVYALSHPRYRIELQRRLPWLAISEPSASDTASTATESTTPGAART

>WCQ76387.1 ultraviolet sensitive opsin 2 [*Agrilus zanthoxylumi*]

MNYANWTVVSPPRARVMDPGNRLLGWNIPASELGHIPEHWLKFPEPEASIHFLLGLLYVALFFMSTFGNGLVLWIFSTAKSLRTPSNMFVVNLAFCDFLMMLKAPIFIYNSFHRGYTLGYTACQAFAVMGTLSGIGAGMTNACIAYDRYHTIANPLEGKLTRTKAFVMIIFVWIYVIPWAALPLMEFWGRFVPEGFLTQCSFDYLTRTFDTRMFVAVLFTFSYVLPMTSIIYYYSQIVSHVFDHEKALREQAKKMNVDSLRSNQQQQSQSAEVRIAKVAITICFLFVASWTPYAVLAMIGAFGDQNMITPGFAMIPACTCKLVACLDPYVYALSHPRYRLELQKRLPWLAINEKSVSDTQSTNTETNSTSKA

>WCQ76386.1 ultraviolet sensitive opsin 1 [*Agrilus zanthoxylumi*]

MIADALSQARVLGDGEQRLMGWNIPTSELSHIPEHWLKYPEPEPSLHFLLGLLYVAYFFLSTIGNGLVLWIFSTSKSLRTPSNMFVVNLAFCDLIMLLKAPLFIYNAFNKGYATGHLGCQIFATVGSISGIGAGITNACIAYDRYTTITNPLEGRLSATKASFIIFFIWVYTMPWVLLPLFEVWNRFVPEGYLTACSFDYLTDNFDTRLFVACIFVCSYVIPMTLIIYYYSQIVTHVIRHEKVLKEQAKKMNVDSLRSNQAQANQSAEIRIAKVALTITFLYVAAWTPYAVVAMIGAFGNQSLLTPGVTMIPACFCKCVACFDPYVYALSHPRYRLELQRRLPWLAINEAPISDNASVATESTNPNNATRT>KAG8227116.1 Short Wavelength Sensitive Opsin Ultraviolet [*Ladona fulva*]

MPPSVISDVLPPSILSSTSEGSPGCCSNLSAFRPEYRVSGKFLGWNVPPEELHHIPDHWLSYPEPEPYMHYLLGLLYICFMLVALSGNGIVIWIFTCAKSLRTPSNMFVVNLAILDFMMMSKTPIFIYNSFNLGFALGGFGCQIFAFVGSISGIGAGVTNAAIAFDRYRAIARPFDGKLSAGKVLIILILIWGYTLPWALLPLLGVWGRFVPEGFLTSCTFDYLTSTAENKIFVMMLFFFSYLIPMFMIIFYYAQIVSHVFDHEKALREQAKKMNVDSLRSNQNAGQVSAEVRIAKAAITVCFMFVASWTPYAVLSLIGAFGNKALLTPAVTMIPACTCKAVACIDPWVYAISHPRYRLELQKRVPWLRINEPDPPAETKSEGTVATTEG

>QWV42725.1 ultraviolet sensitive opsin [*Trixagus carinifrons*]

MWLNNLTISASPRIQSGVLESGGHLLAWNVPPAELVHIPEHWLSYQEPEASLHYLLGVLYIFFFFMSFIGNGLVLWIFSSAKSLRTASNMFIVNLAFCDWIMMLKAPIFIYNSFNRGFAAGHTACQVFAFVGSLSGIGAGMTNAAIAYDRYATISNPLEGKLTRTKAFVMIMVIWAYTLPWAVLPLLEVWGRFVPEGYLTSCSFDYLMDTFDNHMFVAVIFTFSYVIPMSMIIYFYSQIVKHVFHHEKALRDQAKKMNVESLRSNVNLQQQSTEIRIAKVAIMVCFLFVASWTPYAVLAMIGAFGDQSLLTPGVTMIPACACKFVACLDPYVYALSHPRYRLELQKRLPWLALDEHEPATDTKSVTTTATAPTAANETAAAPAAAE

>QWV42723.1 ultraviolet sensitive opsin [*Sinodendron cylindricum*]

MFLLNSTVFPGIRPQARVLEAEGGRRTLGWDLLPSELVHIPEHWLSYPEPEASIHYLLAIVYVGFFVMALIGNGLVMWIFSAAKSLRTPSNMFVVNLAFCDFIMMLKAPIFIYNSFNRGFAAGKIGCQIFGFVGTISGIGAGMTNACIAYDRYTTITNPLDGKLTTVKALLMITCIWIYTFPWAILPLLEIWGRFAPEGYLTACSMDYFMDTFDNHMFVATIFTFSYVIPMSLIIYFYSQIVGHVIEHEKLLKEQAKKMNVESLRSNQAHANQSVEIRIAKAAITVCFLFVASWTPYAVMAMIGSFGDATLLSPGVTMVPALACKLVACLDPYVYAISHPRYRIELQKRLPWLAIKESEAQSTTTEQTTAPPATS

>QWV42717.1 ultraviolet sensitive opsin [*Bitoma cylindrica*]

MFSHNLTKPSFQARVLDSIEVHYLGWNVPKEELIHIPEHWLIYPEPAASLHFLLGLIYTGFFITAVLGNGLVLWIFSTSKSLRTASNMFVVNLALCDFVMMLKTPIFIYNSFYRGYALGHFGCQIFAAMGSLSGIGAGMTNACIAYDRFTTITRPFDGKLTRTKALIMIIAVWIYTIPWAILPMLEVWGRFVPEGFLTSCTFDYLTNTFDNKVFVGSIFSCSYVIPMSMIIYFYSQIVKKVFSHEKALREQAKKMNVESLRSNQSQNNESAELRIAKAAITICSLFVASWTPYAVLALIGAFGNQALLTPGVTMVPACACKFVACIDPYVYAISHPKYRQELQRRLPWLAIKEAASGGETQSVATENTVQTTNT

>QWV42712.1 ultraviolet sensitive opsin [*Epuraea ocularis*]

MSLLNWTAPSYQARVGAPNGQHNLGWNLKPEDLIHIPEHWLMFPEPEYSIHLILALVYIALFFASVIGNGLVLWVFSSAKSLRTASNMFVVNLAFCDFMMMLKTPINIYNSVNRGFATGFLGCQIFGVMGSLSGIGAGMTNACIAYDRYTTITRPFDGKITRTKALIFIILIWCYTIPWAIFPLLEIWGKFAPEGYLTTCSFDYLTNSFDTRLFVGAIFFCSYFVPMSAIIYFYSKIVSKVFSHEKALREQAKKMNVDSLRSNQSQHNESAELRIAKAAITICFLFVASWTPYAVLALIGAFGNQALLTPGVSMIPALNCKLVACIDPYIYAISHPRYRIELQKRLPWLAIKESDSDTRSTGTEVTTAAAATPASA

>QWV42709.1 ultraviolet sensitive opsin [*Brachypeplus habecki*]

MNLLNWTATPSYEARVMELRGQRNLGWNVKPEELVHIPEHWLLYPEPEYSLHMLLALVYIFLFFASTIGNGLVLWIFSTAKSLRTASNMFVVNLAFCDFIMMLKTPINIYNSIYRGYALGHMGCQIFALMGSLSGIGAGMTNACIAYDRYTTITRPFDGKVTKVKALVMIMLVWAYTIPWALLPLFEVWGRFVPEGYLTTCSFDYLTNTFDNHLFVGCIFFCSYVVPMSMIIYFYSQIVSKVFSHEKALREQARKMNVESLRSNQNQNSESAELRIAKAAITVCFLFVASWTPYGVLALIGAFGDQSLLTPGVSMIPALACKLVACIDPYIYAISHPRYRVELQKRLPWLAIKESDGSDTRSTGTEVTTAAPAAPAPT

>QWV42708.1 ultraviolet sensitive opsin 2 [*Lygistopterus sanguineus*]

MTFFNSTFYPSAASLSQILQSEQRMLAWNVPPSELIHIPSHWLVYPEPEASIHLLLGLLYIAFFLMSMLGNGLVIWIFTTSKSLKTASNMFVVNLAICDFFMMVKTPIFIYNSFFRGFAAGQVGCQIFAFIGSLTGIGASMSNACIAYDRYATISNPLEGKMTRIKALVMIIIIWIYTLPWGILPLLEIWGRFVPEGFLTSCTFDYLTDTFDNRMFVGVIFTFSYVIPMSLIIYFYSQIVKHVIAHEKALREQAKKMNVESLRSNQNMQAQSAEIRIAKVAVTICFLFVASWTPYAVVALIGAFGDQSLLTPGVTMIPACTCKAVACLDPYVYALSHPRFRVELQKKMPWLAIKEAATNDTQSVATSATTGQQDT

>QWV42700.1 ultraviolet sensitive opsin 2 [*Lycostomus kraatzi*]

MARPNLTLYPSSSRQNQFFLSEQRFLAWNVPPSELIHIPIHWLSYPEPEASVHILLGLLYIAFFLMSTLGNGLVIWIFTTSKSLKTASNMFVVNLAFCDFFMMFKTPIFIYNSFYRGFATGHIGCQIFAFAGSLTGIGASMTNACIAYDRYATISNPLEGKMTRTKALVMILFVWFYTLPWAILPLLELWGRFVPEGYLTSCTFDYLTDSFDNRMFVGVIFTFSYVIPMSLIIYCYSQMVKHVINHEKALREQAKKMNVDSLRSNQNTQAQSTEIRIAKVAVTICFLFVASWTPYAVVALIGAFGDQSLLTPGLTMIPACTCKAVACLDPYVYALSHPRFRVELQNKLPWLAIKESVTETQSTVSNTTTAAQA>QWV42695.1 ultraviolet sensitive opsin [*Protaetia brevitarsis*]

MILLNSTISDIHPLPRIMDNSGGTRLLGWNIPPEELVHIPEHWLVYPEPEASIHYLLAILYTAFFIMSLVGNGLVLWIFSAAKSLRTPSNMFVVNLAFCDFIMMAKAPIFIYNAFNRGFAAGHIGCQVFAFIGSLSGIGAGMTNACIAYDRYTTISNPLEGKLTMIKALVMISCLWTYTIPWAVLPLLEVWGRFVPEGYLTSCSFDYFMDTFDNRMFVAVIFTFSYVIPMTMIIYFYSQIVSHVISHEKALKEQAKKMNVESLRSNANQGQSAEIRIAKAAITICFLYVASWTPYAVMAIIGSFGDASLLTPGVTMIPAVTCKLVACLDPWVYAISHPRYRIELQKRLPWLAIKEENETASTNTGHTNVTQTNSPADGAHG

>QWV42691.1 ultraviolet sensitive opsin [*Epicauta chinensis*]

MASRNLTINPIYAARVIDIIDNRHKLGWNVPPEELVHIPTHWLAYPEPEASMHFLLGLIYIGFFLMSTLGNGLVIWIFTTSKSLRTASNMFVVNLAIFDFIMMLKTPVFIYNSFYRGFALGHMGCQVFGLMGAISGIGAGMTNACIAYDRYTTITRPFDGKVTRTKALLMIIVVWLYALPWSILPLVEFWGRFVPEGFLTSCTFDYLTDTFDNRVFVGAIFTCSYCIPMTMIIYFYSQIVNKVFTHEKLLREQAKKMNVESLRSNQNQNSESAEVRIAKAAITICFLFVASWTPYACLALIGAFGDQRLLTPAVTMIPACACKMVACIDPYVYAISHPKYRLELQKRLPWLAIKEKEIGDVQSTATENSNTTQT

>QWV42673.1 ultraviolet sensitive opsin [*Nedyus quadrimaculatus*]

MATMSNWTRGPYHGARVADAGMPHNLGWNVPPEELVHIPEHWLMYQEPDKSLHLLLGMVYVFFFMASTIGNGIVLWVFTTAKSLRTASNMFVVNLALCDFMMMLKSPVFLYNSFHYGFAMGHLGCQIFAGMGSMSGIGAGMTNAAIAYDRYTTITRPFDGKLTRTKAMVMILFIWFYTTPWTVMPLLEVWGRFAPEGYLTACSFDYLTRSFDNRLFVGTIFTFSYVFPMLMIIYFYSQIVSKVFSHEKTLREQAKKMNVESLRANQSQNNESAELRIAKAAITITFLFVVSWTPYAVLALIGAFGDQSLLTPGVSMIPALNCKLVACIDPYIYAISHPKFRIELQKRLPWLAIKEKEVSDAQSTTSEQTSVPQPNQA

>QWV42658.1 ultraviolet sensitive opsin [*Eulasia bombylius*]

MILLNSTNLDIARSFRRVMEPNGGRKMLGWNVPPEELIHIPEHWLVYPAPEDSLHYLLAMVYVAFFVMAILGNGLVIWIFSAAKSLRTPSNMFVVNLAFCDFMMMAKAPIFIYNSFYTGFAAGQLGCQIFAIIGTLSGIGAAMTNVCIAFDRYRTISNPLEGKLSRTKAAALLVGVWVYVVPWAVMPALQIWGRFAPEGFLTACTFDYFMDTFDNRLFVATIFTFSYIVPMSLIIYFYSQIVGHVVNHEKALKEQAKKMNVESLRSNQGNQSAEVRIAKAAITICFLFVASWTPYAVMAMIGSFGDASLLTPGVTMIPALTCKLVACFDPYVYAISHPRYRLELQKRLPWLAIKEESETQSNATENAAPATT

>QWV42647.1 ultraviolet sensitive opsin 1 [*Anthocomus equestris*]

MLNLLNTTVASSNSTLPIPQARVLPSNNGIDQRFLGWNVPPEELVHIPEHWLAYPEPPDSMQLLLGLLYIGFFFMAIIGNGLVLWIFSSCKSLRTASNMFVVNLAFCDFIMMLKTPIFIYNSFQKGFALGQLGCQVFAFMGSISGIGAGMTNSFIAYDRYMTITKPFDGKLTRTKALIMIIFIWIYTIPWAVFPLTEIWGRFAPEGYLTACTFDYLTDTFDNRLFVGSIFTCSYVIPMLFIIFFYSQIVSKVFSHEKALREQAKKMNVESLRSNQQQGNQSAEVRIAKAAITICSLFVASWTPYAVVALIGAFGDQALLTPGVTMIPACTCKLVACIDPYVYAISHPKYRLELQNKLPWLAIKETAPSDAQSVSSTTTEANQAAS

>QWV42628.1 ultraviolet sensitive opsin 1 [*Mordella albosuturalis*]

MIVPAHNWTIGVAEARVVDYMGVHDGGLHKLAWNVPKEELIHIPEHWLKYPEPEASMHFLLGLVYIAFFFMSILGNGVVLWIFSTAKSLRTASNMFVVNLAICDFVMMLKSPIFLYNTFYRGFATGFTGCQIFALMGSFSGIGAGMTNACIAYDRYTTITRPFDGKVTRTKALIMILFVWLYTIPWCIMPLLEVWGKFAPEGFLTTCTFDYLTNTFDNHLFVGAIFFCSYCIPMSMIIFFYSQIVSKVFSHEKALREQAKKMNVESLRSNQNQQSQSAELRIAKAAITICFLFVASWTPYAAVALIGAFGNQAVLTPGVTMIPACCCKLVACIDPYVYAISHPRFRIELQKRMPWLAIQEKEQTETASTSTEQSAAPPAAAVPT

>QWV42635.1 ultraviolet sensitive opsin [*Trichodes sinae*]

MLLNSSTISPKPLFPQARIMNPGGSERNLLAWNVPPEEIVHIPEHWLSYEEPETSMHLLLGMLYIGFFFMATIGNGLVLWIFTTAKSLQTASNVFVVNLAFCDFMMMLKTPVFVYNCFHKGYALGHLGCQIFASMGSLSGIGGGMTNACIAYDRYTTITKPFDGKITRPKAIVMVLLVWIYTVPWTVLPLTEVWGRFVPEGFLTTCSFDYLTNTFDTKLFVGSIFTCSYVIPMIMIIYFYSQIVSKVFSHEKALREQAKKMNVESLRSNQNQGNQSAEVRIAKAAITICSLFVAAWTPYAVVAMIGAFGDQALLTPGVTMIPACCCKFVACLDPYVYAISHPRYRMELQKRMPWLAIKESDSDAQSTTTESSAPPPAPAST

>QWV42636.1 ultraviolet sensitive opsin [*Lytta caraganae*]

MLNYAFQSIEMESTHNSTIGSPLFQARVIDAIDDRHKLGWNVPPEELVHIPTHWLSYPEPADSMHFLLGLLYIGFFVMATLGNGLVIWIFTTAKSLRTASNMFVLNLAICDFIMMLKTPIFIYNSFYRGYALGHIGCQIFGVMGSVSGIGAGMTNACIAYDRYTTITRPFDGKVTKIKALILIIAVWVYTIPWAVLPSMEIWGRYVPEGFLTSCTFDYLTDNFDTRVFVTAIFTCSYCVPMSMIIYFYSQIVSKVFAHEKLLREQAKKMNVESLRSNQNQNSQSAEIRIAKAAITVCFLFVASWTPYACLALIGAYGDQRLLTPAVTMIPACTCKLVACIDPYVYAISHPKYRLELQKRLPWLAIRENEISDAQSTTTENSNAAQTPTTTTTT

>QWV42623.1 ultraviolet sensitive opsin 1 [*Trirhabda eriodictyonis*]

MGFSNCTILSNARVLDTLDGRILQHLGWNVPNEEIIHIPEHWLTFPDVDKSLHFMLGIVYFFFFAAAMIGNGMVLWIFCSAKSLRTASNMFVVNLAFCDFIMMLKAPIFLYNTFHSGFAMGYLGCQIFASMGALSGIGAGMTNACIAYDRYSTITRPFDGKISKIKAFVMIVIVWVYTVPWTIFPLTEIWGKFVPEGFLTTCSFDYLTRTFNNRVFVGTIFTFSYVFPMMLIIYFYSQIVSKVFSHEKALREQAKKMNVESLRANQQNSESAELRIAKAAITVCFLFVASWTPYAVLALIGAFGDQSLLTPGVSMIPACTCKLVACIDPYIYAISHPKYRQELQKRLPWLGVNESSDTQSTATEATAQQSATA

>QWV42620.1 ultraviolet sensitive opsin 2 [*Tychius meliloti*]

MGTPNWTWVPFYDRRIMEVEIQHNLGWNLGPEELSHIPDHWLVYPEPEKSLHILLAMFYVVFFVSSMTGNGLVLWIFTTSKALRTASNMFVVNLALFDLIMMTCAPMFIYNAYNQGYTSHLSCQIFAIIGSISGIGAGMTNAAIAYDRYATITSPFDGKVTRTKAMLICVFIWLYILPWTVMPALEVWGRFVPEGFLTTCSFDYLTRTFDNQLFVAVIFVCSYVFPMLAIIYFYSQIVNKVFSHEAALRKQAKKMNVESLRANQNQNSESVELRIAKAAIAICSVFVMAWTPYAVLALIGAFGDQSLLTPNVSMIPAVACKTVGSIDPYIYALSHPRFRLELQKRVPWLAIKEKDVSDTHSVATEQSAAPTATA

>QWV42618.1 ultraviolet sensitive opsin 1 [*Tychius meliloti*]

MGMLNWTVGQPVHERRIMDVGIPHNLGWNLGPEDLSHIPEHWLIYPEPDKSIHLLLGMVYTFFFVASMIGNGLVLWIFITSKPLRTASNMFVVNLAIFDFLMMLKAPIFLYNAFHQGFATGHLGCQIFAGMGSVSGIGQGMTNAAIAYDRYTTITSPFDGKLTRTKALLIVILIWIYTVPWTVMPFLEVWGRFVPEGFLTTCSFDYLTRTFDNRLFVGTIFTFSYVFPMLMIIYFYSQIVSKVFSHEAALRKQAKKMNVESLRANQTQNSESAEMRIAKAAITICSLFVLSWTPYAVGALIGAFGDQSLLTPGVSMIPAVCCKLVACIDPYIYALSHPRFRLELQKRLPWLAIKEKEVSDNQSVATEQSAPPQSTA

>QWV42616.1 ultraviolet sensitive opsin [*Sibinia setosa*]

MGTLNWTNQPSFQARLLDSGIIHNLGWNLPPEELAHVPEHWLMYPEPDKSLHLLLGMVYVFFFMASMIGNGIVLWVFTTAKSLRTASNMFVVNLALCDFVMMLKSPIFLYNAFHYGFEMGHFGCQIFAGMGSMTGIGAGMTNAAIAYDRYTTITRPFDGKLTRTKAMFIILFIWFYTVPWTVMPMMEIWGRFAPEGFLTTCSFDYLTRTFDNRLFVGAIFTFSYVIPMSMIIYFYSQIVSKVFSHEKALREQAKKMNVESLRANQQQNAESAEMRIAKAAITICFLYVASWTPYAVESLIGAYGNQALLTPGVSMIPACACKLVACIDPYIYAISHPKFRIELQKRLPWLAIKEKDVSDTQSVATEQSAAQPQQAQT

>QWV42614.1 ultraviolet sensitive opsin [*Nitops pallipennis*]

MNLLNWTAAPSYQARVLEELRGQHNLGWNVKPEDLVHIPEHWLLYPEPEGSLHMLLALVYIFLFFASTIGNGLVLWIFSSAKSLRTASNMFVVNLAFCDFIMMLKTPINIYNSIYRGYELGHIGCQIFAFMGSLSGIGAGMTNACIAYDRYTTITRPFDGKVTKVKALVMIILVWAYTLPWALLPFFEVWGRFVPEGYLTTCTFDYLSNTFDNHLFVGCIFFCSYCIPMSMIIYFYSQIVSKVFSHEKALRDQAKKMNVESLRSNQNQNSESAELRIAKAAITVCFLFVASWTPYAVVALIGAFGDQSILTPGVSMIPALTCKLVACIDPYIYAISHPRYRVELQKRLPWLAIKESDGSDTRSTATEVTTGAAPAST

>QPF71149.1 ultraviolet sensitive opsin [*Lasioderma serricorne*]

MNLYLNWTNSVPKPEARLTEAAEAGPHLLAWNVPQSELVHIPEHWLTYPEPEASMHYLLGLLYIFFFLMSIIGNGLVIWVFSSAKSLRTPSNMFVVNLAFCDFMMMLKTPIFLYNSFQRGYALGHLGCQVFAFMGSLSGIGQGMTNACIAYDRYSTIAKPFEAKMTHTKALVIILFIWCYTFPWAVLPLIEVWGRFVPEGFLTSCTFDYLTRTFDNKMFVAVIFTFSYVFPMSLIIYYYSQIVKQVFSHEKALREQAKKMNVESLRSNQNQAAQSVEVRIAKAAITVCFLFVASWTPYAVLALIGAFGDQSLLTPGVTMIPACACKLVACIDPWVYAISHPRYRLELQKKLPWLAIKESDPDAQSTTTDTTTATPAAAAAAQPAAAATPAAAS

>QFP92729.1 ultraviolet sensitive opsin protein [*Spodoptera frugiperda*]

MYNQTENSYYDAHFAPFKSGGPSEVEMLGAGLTGEDLAAVPEHWLAFPAPPASAHTALALLYTFFTAASLLGNGLVIFIFSTTKSLRTSSNLLILQLAILDFIMMAKAPIFIYNSAMRGFATGTVGCQIFALMGAYSGIGAGMTNACIAYDRHSTITRPLDGRLSRGKVLLMMAFVWIYSTPWALLPLFKIWGRYVPEGYLTSCTFDYLTNTFDTKLFVACIFTCSYVFPMSMIIYFYSGIVKQVFAHEAALREQAKKMNVESLRANQSSGAESAEIRIAKAALTVCFLFVASWTPYGVMALIGAFGDQQLLTPGVTMIPAVACKAVACIDPWVYAISHPKYRQELQRRMPWLQIQEPDDTVSTATSNTVSNAPPAAPA

>KAE8750137.1 Short Wavelength Sensitive Opsin Ultraviolet [*Frankliniella occidentalis*]

MEYPESADCSNGTAWLPVAEARIGSGVSGPSEQRLLGWNVPPDELPHIPTHWLVYPEPDPLINYGLGVLYCFFFFFAVMGNGIVIYIFLTSKNLKTPSNIFVVNLAICDFVMMAKTPIFIYNSFNLGPASGPTACLVFATMGSFSGIGAGATNAVIAYDRYMTIAKPFGSKMTRGKAIMIIFFLWMWVTPWVVFPATEIWGRFVPEGFLTSCTFDYMSDTDHIRVFVGVMFFVCYCIPMTMIIYFYSQIVSHVVAHEKALKAQAKKMNVESLRSNVDKNQDSTEIRIAKMAISLSFLFVLSWTPYATVALIGAFGNKALLTPGVTMIPACCCKLVACFDPYVFALSHPRFRLELQKKMPFLDIKEDKPTASETASTTTEATSANPD

>KAF4525364.1 Short Wavelength Sensitive Opsin Ultraviolet [*Ephemera danica*]

MLGSNVAAHEIHHIPEHWFSYPEPDASLHYLLGLIYIFLTFFALTGNGLVIWVFSSAKQLRSSSNFFVVNLAIADFMMMLKTPIFIYNSFHTGFELGHFYCQVFATVGSMSGILQATTNTCIAYDRYRTISSPMDGRMSKGKAISMVLFTWAYAVPWTLMPLTEYWGRFVPEGFLTSCTFDYLTNTMENKLFVFFIFICAYFIPMLLIMFYYSQIVGHVINHEKALKEQAKKMNVESLRSGEKASASAEIRIAKAAIGICALFVASWTPYAVLALIGAFGNQAMLTPGVTMIPALCCKLVACIDPYVYAISHPRYRSVT

>APY20676.1 ultraviolet sensitive opsin 1 [*Xanthostigma xanthostigma*]

MEYNNNWTVISHGWPEARMGEADMRLLGWNVPEKERIHIPEHWFAYPEPPASIHYLLGLLYIAFMFFATIGNGLVIWVFSSAKALRTPSNMFVVNLAICDFFMMVKTPLFIYNSFHRGYALGHLGCQTFALIGALTGISAALTNACIAYDRYTTIAKPFDGKLSRTKALCMVLFVWLYALPWGLLPLLEIWGRFVPEGYLTACSFDYLTNTFDTKMFVGVIFTFSYLIPMSMVIYYYSQIVSHVVNHEKTLREQAKKMNVESLRSNQNQASQSAEIRIAKAAITICFLFVASWTPYAVLALIGAFGDQSLLTPGVTMIPACTCKFVACLDPYVYAISHPRYRIELQKRLPWLAIKESAPSDSASNVSNATTTDAAPAVSS

>APY20675.1 ultraviolet sensitive opsin [*Tribolium castaneum*]

MLHNLTATPFHQARTMETMANHLGWNVPKDELIHIPQHWLVYPEPEASMHFLLALIYIGFFIMATIGNGLVIWIFSTSKSLRTASNMFVVNLAICDFAMMIKTPIFIYNSFYRGFALGHLGCQIFAFIGSLSGIGAGMTNACIAYDRYTTITRPFDGKITRTKALVMIIFVWGYTIPWAVMPLLEIWGRFAPEGFLTACSFDYLTDTFDNHMFVTSIFICSYVIPMSMIIYFYSQIVSKVFSHEKALREQAKKMNVESLRSNQSQQASQSAELRIAKAAIAICSLFVASWTPYAVLALIGAFGDQSLLTPGVTMVPACACKFVACLDPYVYAISHPKYRLELQKRLPWLAIKETAASETQSTTTENTTTQSATTTT

>APY20670.1 ultraviolet sensitive opsin [*Stylops melittae*]

MHFNWTIIDVVSPLARTSESEHKLIGWNLSPEELEHIPEHWLSFPEPEASIHYLLGLIYIGFFLAAIFGNGLVLWIFSTSKSLQTPSNIFVVNLAFCDFMMMLKTPIFIYNSFYRGYALGFTGCQVFSIMGALSGIGAGTTNACIAYDRYMTIARPFDGKVSKGKALFMVLCIWMYVIPWTLMPYFEVWGRFVPEAYLTSCTFDYMSEDFDNHLFVASIFSCSYVFPLFFMIIYYSRIVSHVVAHENALKEQAKKMNVESLRSNQSGANTSVEIRIAKSAITMCALFVASWTPYGTIAMIGAFGDKSVLTPGVTMIPALTCKFVACIDPYIFAISHPRYRAELEKRVSWLGIKETLPDDKKSTASETVTVQATSE

>APY20668.1 ultraviolet sensitive opsin 1 [*Steraspis amplipennis*]

MFNTTLFDSSLPQARILSEERRLLGWNVDSSDLVHIPEHWLKYPEPEASIHFLMGLLYILFFLMSTIGNGLVMWIFLTSKSLRTPSNMFIVNLAFCDFVMMMESPFFVYNAFNKGYATGHIGCQIFAALGTISGIGAGATNACIAYDRCTTITNPLEGRLSRTKAIIMIIFVWMYTTPWVVLPGLEIWGRFTPEGFLTACSFDYLTDSFDIRLFVASIFTCSYVIPMLLIIYFYSQIVVHVIHHERNLKEQAKKMNVDSLRSNQTQMNQSTEIRIAKVALTITFMFVVAWTPYAVVSLIGAFGDQSLLTPGVTMVPATFCKCVACFDPYVYALSHPRYRVELQNRLPWLAIVEPNQPDTASVATESTNQVART

>APY20666.1 ultraviolet sensitive opsin 2 [*Steraspis amplipennis*]

MHLTNYSVNVKLPEARVMDPGQRLLAWNVPASDLVHIPEHWLQYPEPEASLHFLLGLLYTGFFLMSTFGNGLVLWIFSSAKSLRTPSNMFIVNLAFCDFMMMLKAPIFIYNSFQRGFATGFLGCQIFSVMGTLSGIGAGMTNACIAYDRYHTIANPLEGKLTRTKALVMVLFVWMYTIPWAVMPLFEIWGRFAPEGFLTQCSFDYLMNTFDNRMFVAVLFTFSYVIPMSLIIYYYSQIVSHVFDHEKALREQAKKMNVDSLRSNQQNQSAEVRIAKVAITICFLFVASWTPYAVLAMIGAFGDRSMITPGFAMVPACTCKMVACLDPYVYALSHPRYRLELQKRLPWLAINEKAPSDTQSTTTESSTNKP

>APY20660.1 ultraviolet sensitive opsin [*Pyractomena dispersa*]

MLVHNASVIAAAQVKDGVTDTGVHLLGWNVPPSELIHIPEHWLSYPEPEASIHYLLGLLYIFMLTMGIVGNGLVIWIFSTSKSLKTASNMFVVNLAFCDIIMMMKMPIFVYNSFNRGFALGHVGCQIFGFVGSLSGIGAGMSNAFIAYDRYATISNPLEGKLTRTKALMMIFIIWCYTFPWAVLPMFEFWGRFVPEGFLTSCSFDYLTDTFDNDMFVAVLFVCSYVIPMGLIIYFYSQIVKQVMHHEKALRDQAKKMNVESLRSNQNLQSQSVEIKIAKVAIMVCFLFVASWTPYAVLALIGAFGDQSLLTPGITMIPALSCKFVACLDPYVYALSHPRYRMELQKRLPWLAIKEEGVSDAQSMVTTTTAGVTAPATTEPAATA

>APY20658.1 ultraviolet sensitive opsin [*Apertochrysa prasina*]

MDRKWAALNLTKPSALRGEEELHLLGWNVPPEELIHIPEHWLTYQEPPASVNYLLGLLYIFFFFASIIGNGLVIWIFSSAKTLRTPSNMFVVNLAICDFMMMLKAPIFIYNSFNRGFATGHFGCQIFAFMGSLSGIGAGATNACIAYDRYTTIAKPFDGKMTSTKALVMIIAVWMYTLPWGVLPLLEFWGRFVPEGYLTSCTFDYLTKTFDNQMYVGVIFTFSYVLPMSLIIYYYGQIVSHVISHEKTLREQAKKMNVDSLRSNQNQQSQSVEIRIAKAAITVCFMFVASWTPYAVLALIGAFGDTSLLTPGVTMIPACACKFVACIDPYVYAISHPRYRMELQKKLPWLAIKESCGDDSTSTTTESTAATTPATPAAPAAT

>APY20656.1 ultraviolet sensitive opsin [*Priacma serrata*]

MRPNQSVFTNIFPEPSTEHLLAWNVPPSELVHIPEHWLTYPEPEASIHYLLGLLYIVFFFVACIGNGLVIWVFSSAKSLQTPSNILVINLAICDFIMMLKTPIFIYNSYSRGYALGHVGCQIFAFMGAVSGIGAGMTNACIAYDRYTTIAKPFDGKMTKTKAAFMVVCVWGYALPWAVLPLLEIWGRFVPEGFLTSCTFDYLMNSFDNHMFVAVIFVCSFVVPMSMIIYFYSQIVSHVVQHEKTLKEQAKKMNVESLRSNQSQANQSVEIRIAKAAITVCFLFVASWTPYAVLALIGAFGDQSLLTPGVTMIPACTCKFVACLDPYVYAISHPRYRMELQKRLPWLAIKEPLGEAQSTTTETTTGPPPTDAT

>APY20648.1 ultraviolet sensitive opsin [*Photinus marginellus*]

MLVHNASVIAAAQINANVIETGVRLLGWNVPPSELIHIPVHWLSYPEPEASIHYLLGLVYIFMLTMGIVGNGLVIWIFSTSKSLKTASNMFVVNLAFCDIIMMMKMPIFVYNSFNRGFALGHVGCQIFGFVGSLSGIGAGMSNAFIAYDRYATISNPLEGKLTRTKALMMIFIIWCYTFPWAVLPMFEFWGRFVPEGFLTSCSFDYLTDTFDNDMFVVVLFICSYVIPMGMIIYFYSQIVKEVMHHEKALRDQAKKMNVESLRSNQAAQSQSVEIKIAKVAIMVCFLFVASWTPYAVLSLIGAFGDQSLLTPGVTMIPALACKFVACLDPYVYALSHPRYRMELQKRLPWLAIKEEGVSDAQSMVTTTTAAVTAPATTEPAATA

>APY20646.1 ultraviolet sensitive opsin [*Phausis reticulata*]

MLLHNASINAAAQTQDGTLDSPVHLLGWNVPLSELHHIPEHWLVYPEPEASIHYLLGLVYVFLLVSGIIGNGLVLWIFSTSKSLKTASNMFVVNLAFCDIIMMMKMPIFVYNSFNRGFALGHIGCQIFGFVGSLSGIGAGMTNAFIAYDRYATISNPLEGKLTRTKALIMILIIWCYTVPWAVLPMFEVWGRFVPEGFLTSCSFDYLTDTFDNDMFVTVLFVCSYVIPMSMIIYFYSQIVKEVMHHEKALRDQAKKMNVESLRSNQNVQSQSIEIKIAKVAIMVCFLFVASWTPYAVLALIGAFGNQALLTPGLTMIPALACKFVGCLDPFVYALSHPRYRMELQKRLPWLAIKEEGVSDAQSMATTTTAAVTAPATTEPAANA

>APY20634.1 ultraviolet sensitive opsin [*Nicrophorus vespilloides*]

MDAFGGMQSLLNSTSYVYTKAEARILDKGRNLGGHRMLGWNVPPEELIYIPEHWLSYPEPEASLHLLLGILYVGFFFIALIGNGLVIWIFSAAKSLRTPSNMFVINLAICDFMMMLKAPIFIYNSFYRGFALGHLGCQIFAFIGSMSGIGAGMTNACIAYDRYSTIANPLERKVTKVKALVMIIIIWMYTTPWAVLPLLEIWGRFVPEGFLTACSFDYLTETFDNKMFVAVIFTFSYLIPMSMIIYFYSKIVGFVVNHEKALREQAKKMNVESLRSNSSQQSQSAEVRIAKAAITICFLFVAAWTPYAVLSLIGAFGDQSKLTPAVTMIPACACKFVACIDPYIYAISHPRYRIELNNRLPWLAINETSTETQSTTTTTTSEPAPQA

>APY20630.1 ultraviolet sensitive opsin [*Micronaspis floridana*]

MLVHNASVIAAAQIKDDVSDTGVHLLGWNVPPSELIHIPEHWLSYPEPEASIHYLLGLVYIFMLTMGIVGNGLVIWIFSTSKSLKTASNMFVVNLAFCDIIMMMKMPIFVYNSFNRGFALGHVGCQIFGFVGSLSGIGAGMSNAFIAYDRYATISNPLEGKLTRTKALMMIFIIWCYTFPWAVLPMFEFWGRFVPEGFLTSCSFDYLTDTFDNDMFVAVLFVCSYVIPMGLIIYFYSQIVKQVMHHEKALRDQAKKMNVESLRSNQTLQSQSVEIKIAKVAIMVCFLFVASWTPYAVLALIGAFGDQSLLTPGVTMIPALTCKFVACLDPYVYALSHPRYRMELQKRLPWLAIKEEGVSDAQSMVTTTTAGVTAPATTEPAATA

>NP\_524368.5 rhodopsin 6 [*Drosophila melanogaster*]

MASLHPPSFAYMRDGRNLSLAESVPAEIMHMVDPYWYQWPPLEPMWFGIIGFVIAILGTMSLAGNFIVMYIFTSSKGLRTPSNMFVVNLAFSDFMMMFTMFPPVVLNGFYGTWIMGPFLCELYGMFGSLFGCVSIWSMTLIAYDRYCVIVKGMARKPLTATAAVLRLMVVWTICGAWALMPLFGWNRYVPEGNMTACGTDYFAKDWWNRSYIIVYSLWVYLTPLLTIIFSYWHIMKAVAAHEKAMREQAKKMNVASLRNSEADKSKAIEIKLAKVALTTISLWFFAWTPYTIINYAGIFESMHLSPLSTICGSVFAKANAVCNPIVYGLSHPKYKQVLREKMPCLACGKDDLTSDSRTQATAEISESQA

>NP\_524411.1 rhodopsin 3 [Drosophila melanogaster]

MESGNVSSSLFGNVSTALRPEARLSAETRLLGWNVPPEELRHIPEHWLTYPEPPESMNYLLGTLYIFFTLMSMLGNGLVIWVFSAAKSLRTPSNILVINLAFCDFMMMVKTPIFIYNSFHQGYALGHLGCQIFGIIGSYTGIAAGATNAFIAYDRFNVITRPMEGKMTHGKAIAMIIFIYMYATPWVVACYTETWGRFVPEGYLTSCTFDYLTDNFDTRLFVACIFFFSFVCPTTMITYYYSQIVGHVFSHEKALRDQAKKMNVESLRSNVDKNKETAEIRIAKAAITICFLFFCSWTPYGVMSLIGAFGDKTLLTPGATMIPACACKMVACIDPFVYAISHPRYRMELQKRCPWLALNEKAPESSAVASTSTTQEPQQTTAA

>NP\_524398.1 rhodopsin 2 [*Drosophila melanogaster*]

MERSHLPETPFDLAHSGPRFQAQSSGNGSVLDNVLPDMAHLVNPYWSRFAPMDPMMSKILGLFTLAIMIISCCGNGVVVYIFGGTKSLRTPANLLVLNLAFSDFCMMASQSPVMIINFYYETWVLGPLWCDIYAGCGSLFGCVSIWSMCMIAFDRYNVIVKGINGTPMTIKTSIMKILFIWMMAVFWTVMPLIGWSAYVPEGNLTACSIDYMTRMWNPRSYLITYSLFVYYTPLFLICYSYWFIIAAVAAHEKAMREQAKKMNVKSLRSSEDCDKSAEGKLAKVALTTISLWFMAWTPYLVICYFGLFKIDGLTPLTTIWGATFAKTSAVYNPIVYGISHPKYRIVLKEKCPMCVFGNTDEPKPDAPASDTETTSEADSKA

>NP\_476701.1 rhodopsin 4 [*Drosophila melanogaster*]

MEPLCNASEPPLRPEARSSGNGDLQFLGWNVPPDQIQYIPEHWLTQLEPPASMHYMLGVFYIFLFCASTVGNGMVIWIFSTSKSLRTPSNMFVLNLAVFDLIMCLKAPIFIYNSFHRGFALGNTWCQIFASIGSYSGIGAGMTNAAIGYDRYNVITKPMNRNMTFTKAVIMNIIIWLYCTPWVVLPLTQFWDRFVPEGYLTSCSFDYLSDNFDTRLFVGTIFFFSFVCPTLMILYYYSQIVGHVFSHEKALREQAKKMNVESLRSNVDKSKETAEIRIAKAAITICFLFFVSWTPYGVMSLIGAFGDKSLLTPGATMIPACTCKLVACIDPFVYAISHPRYRLELQKRCPWLGVNEKSGEISSAQSTTTQEQQQTTAA

>XP\_057329296.1 rhodopsin [*Microplitis mediator*]

MTVLTGPSFAAYGSGGGWSRGSGNQTVVDKVLPEMMHLVDAHWYQFPPMNPLWHAILGLVIGCLGIVSVIGNGMVVFIFTSTKSLRTPSNLLVVNLAFADFLMMFCMAPPMIVNCIYETWVFGPLMCQLYACAGSLFGCTSIWSMTAIAFDRYNVIVKGLSGKPLTVGGALLRILGIWLFCLAWTVFPLFGWNRYVPEGNMTACGTDYITKDWFSRSYILAYSVFVYFLPLFLIIYSYYFIIAAVSAHEKNMREQAKKMNVASLRSQENQNQSAECKLAKVALTTISLWFMAWTPYLVINYAGVFESATISPLFTIWGSVFAKANAVYNPIVYGISHPKYRAALFARFPSLACSDNSSGGDAVSTATTVTEGEKANA

>XP\_056646379.1 rhodopsin [*Diorhabda sublineata*]

MSVMGEPSFAGWAAQRAAGFGGNMTVVDKVLPDMLHMVDAYWYQFPPMNPLWHGILGFMIGVLGFIAIVGNGMVVYIFLGTKQLRTPSNLLVVNLAFSDFLMMVTMSPPMVINCYYETWVLGPFFCELYGMFGSLFGCASIWTMVFIALDRYNVIVKGLSAKPLTKKTALLRILLIWTMSVGWTIAPLFGWNRYVPEGNMTACGTDYLNQDPLSKSYLYVYGFFVYFIPLFTIIYSYFFIVQAVAAHEKSMREQAKKMNVASLRSSEASQTSAECKLAKIALMTISLWFMAWTPYLVTNAAGILGNSKISPLATIWCSLFAKANAVYNPIVYGISHPKYRQALEKKFPSLICGSAQDDTVSTVTGVTGSDEKPGA

>XP\_052120366.1 rhodopsin [*Frankliniella occidentalis*]

MSLLHEPHFSAYQWQPATGGFGNHTVVDSVPAEMLHMVDPHWYQFPPMNPLWHGLLGFVIGCLGVISLIGNGVVVFIFCSTRGLRTPSNMLVVNLAMSDFLMMFTMAPPMVINCYYETWVLGPFMCELYGLFGSLFGCGSIWTMTLIAMDRYNVIVRGLSAAPMTNKKAFLWILFIWIMAVVWTVFPMVGWNRYVPEGNMTACGTDYLNKDFFSRSYILVYSCFVYFLPLIIIIWAYFYIVQAVCAHEKNMREQAKKMNVASLRSAENQATNAEAKLAKVALMTISLWFMAWTPYLIINYAGIFEGYKISPLATIWSSLFAKAGACYNPIVYGISHPRYRVALQKKFPSLSCAPAIDDTASVSSGVTNVSVSESVVTEKA

>XP\_050501427.1 rhodopsin [*Diabrotica virgifera virgifera*]

MSVMGEPSYAGWAAQRAAGFGGNITVVDKVLPDMLHMVDAYWYQFPPMNPLWHGILGFMIGVLGFISITGNGMVIYIFMGTKALRTPSNLLVVNLAFSDFLMMTTMAPPMVINCYNETWVLGPFFCELYGMFGSLFGCASIWTMVFIALDRYNVIVKGLSAQPLTKKTAMLRILLIWAMSVGWTIAPLFGWNRYVPEGNMTACGTDYLNQDPLSKSYLYVYGIFVYFFPLFIIIYSYFFIVQAVAAHEKSMREQAKKMNVASLRSSEASQTSAECKLAKIALMTISLWFMAWTPYLVTNFAGIMGNSKISPLATIWCSLFAKANAVYNPIVYGISHPKYRQALEKKFPSLVCAGAQDDTVSTATGVSGGDEKPAA

>XP\_050462513.1 rhodopsin [*Cataglyphis hispanica*]

MMSIASGPSHAAYTWTAQGGGFGNQTVVDKVPPEMLHLVDAHWYQFPPMNPLWHAILGFVIGILGIISVIGNGMVIYIFTTTKSLRTPSNLLVINLAISDFLMMLSMSPAMVINCYYETWVLGPLVCELYGLTGSLFGCGSIWTMTMIAFDRYNVIVKGLSAKPMTINGALLRILGIWFFSLGWTIAPMFGWNRYVPEGNMTACGTDYLTKDLLSRSYILVYSFFCYFLPLFLIIYSYFFIIQAVAAHEKNMREQAKKMNVASLRSAENQSTSAECKLAKVALMTISLWFMAWTPYLVINYAGIFETVKINPLFTIWGSLFAKANAVYNPIVYGISHPKYRAALFQRFPSLACSSGPAGADTLSTTTTVTEGTEKPAA

>XP\_050309959.1 rhodopsin [*Anthonomus grandis grandis*]

MSVIGEPNFASWAAQRAAGFGGNLTVVDKVPPEMLHMVDAYWYQYAPLNPLWHGILGFMIGVLGFISIIGNGMVIYIFTGTKALRTPSNLLVVNLAFSDFLMMVTMSPPMVINCYYETWVLGPFFCELYGMFGSLFGCGSIWSMVFIAMDRYNVIVKGLSATPLTKKTAMLRILLIWVMAIGWTIAPLFGWNRYVPEGNMTACGTDYLSKDILSVSYIIVYASFVYLLPLLLIIYSYWFIVQAVAAHEKSMREQAKKMNVASLRSSEAAQTSAECKLAKIALMTISLWFMAWTPYLVTNFSGIFGNSKITPLATIWCSLFAKANAVYNPIVYGISHPKYRQALQKKFPSLVCAGSSPDDTTSQASGVTNVTEDKSAA

>XP\_012172199.1 rhodopsin [*Bombus terrestris*]

MMYTFNVTTPCFIGAMPPNISILTTTIEPHFARQIMRFNNQTVVSKVPEEMLHLIDTYWYRFPPLDPLWHKVLGLVMIVLGIMGWCGNGVVVYIFIMTPSLRTPSNLLVVNLAFSDFIMMGFMCPPMVICCFYETWVLGPLMCDIYAMVGSLCGCASIWTMTAIALDRYNVIVKGMSGTPLTIKRSIIQILGIWSFGLIWTILPLVGWNRYVPEGNMTACGTDYLTQDWVSKSYILVYSFFVYYTPLFTIIYSYYFIVSAVAAHEKAMKEQAKKMNVASLRSGENQGASAEAKLAKVALTTISLWFMAWTPYLVINYIGIFNRSLITPLFTIWGSLFAKANAIYNPIVYGISHPKYRAALKEKLPFLVCGSTEEQTAGGEKTSEAGGNS

>XP\_015510994.1 rhodopsin [*Neodiprion lecontei*]

MTVMSGPSFAAYSWSAQVGGFGNQTVVDKVPAEMLHLVDSHWYQFPPMNPLWHGILGFVIACLGFVSVIGNGMVVYIFCSTKTLRTPSNLLVVNLAFSDFLMMFTMSPPMVINCYYETWVFGPLMCEIYALFGSLFGCGSIWTMTMIAFDRYNVIVKGLSAKPMTIKGSLLRILGVWAFAVIWTIAPMLGWNRYVPEGNMTACGTDYLSKDWLSRSYILVYSFFVYYLPLFMIIYSYYFIISAVSAHEKSMREQAKKMNVASLRSSENQNTSAEAKLAKVALMTISLWFMAWTPYLVINYAGVFESAKISPLFTIWGSLFAKANAVYNPIVYGISHPKYRAALFKKFPSLACGGDAGHGGDATSTVSGVTTLTENEKPAA

>XP\_012237085.1 rhodopsin [*Bombus impatiens*]

MMYTFNATTPCFIGAMPPNISILTTTTEPHFARQIMRFNNQTVVSKVPEEMLHLIDTYWYRFPPLNPLWHKVLGLVMIVLGIMGWCGNGVVVYVFIMTPSLRTPSNLLVVNLAFSDFIMMGFMCPPMVICCFYETWVLGPLMCDIYAMVGSLCGCASIWTMTAIALDRYNVIVKGMSGTPLTIKRSIIQILGIWSFGLIWTILPLVGWNRYVPEGNMTACGTDYLTQDWVSKSYILVYSFFVYYTPLFTIIYSYYFIVSAVAAHEKAMKEQAKKMNVASLRSGENQGASAEAKLAKVALTTISLWFMAWTPYLVINYIGIFNRSLITPLFTIWGSLFAKANAIYNPIVYGISHPKYRAALKEKLPFLVCGSTEEQTAGGEKTSEAGGNS

>XP\_015110387.1 rhodopsin [*Diachasma alloeum*]

MATLAGPSFAAYTYGGAGGNQTVVDKVPADMLHMIDPHWYQFPPMNPLWHGILGFVIGCLGFVSIIGNGMVIYIFSSTKSLRTPSNLLVVNLAFSDFAMMTCMAPPMVINCYYETWVFGPLMCELYACAGSLFGCGSIWSMTMIAFDRYNVIVKGLAGKPMTINGALLRILGIWVFSLAWTVAPFFGWNRYVPEGNMTACGTDYLNKDWLSRSYILVYSIFVYYSPLLLIIYSYYFIIQAVSAHEKNMREQAKKMNVASLRSAENQAQSAECKLAKVALMTISLWFMAWTPYLVINYAGVFESAKISPLFTIWGSVFAKANAVYNPIVYGISHPKYRAALFQRFPSLACGGSQSSGSDATSTTTTVTEGEKASA

>EGI62545.1 Rhodopsin [*Acromyrmex echinatior*]

MAFADVLTRTIGPRAMQQIMSFNNKTVMDKIPPDMIHLIDPHWYQFPSMDPMWHKILGLVMIVLGFMGWCGNGVVVYIFLMTPSLRTPSNLLVVNLAFSDFIMMIIMTPHMVINCYYETWMLGPLMCDMHAMVGSLCGCASIWTMTAIALDRYNVIVKGMAGKPLTIKKALLEILIIWFFASIWAILPMVGWNRYVPEGNMTACGTDYLTKDWSSKSYILVYSIFVYYTPLLTIIYSYYFIVSTVAAHERAMREQAKKMNVQSLRSGDNQNISAEAKLAKVALMTISLWFMAWTPYLVINYVGIFGIAKISPLFTIWGSLFAKANAIYNPIVYGISHPKYRAALKEKLPFFVCGSTEDPSAAAKTAETSSITTTT

>XP\_057668031.1 rhodopsin [*Diorhabda carinulata*]

MSVMGEPSFAGWAAQRAAGFGGNMTVVDKVLPDMLHMVDAYWYQFPPMNPLWHGILGFMIGVLGFIAIVGNGMVVYIFLGTKQLRTPSNLLVVNLAFSDFLMMVTMSPPMVINCYYETWVLGPFFCELYGMFGSLFGCASIWTMVFIALDRYNVIVKGLSAKPLTKKTALLRILLIWTMSVGWTIAPLFGWNRYVPEGNMTACGTDYLNQDPLSKSYLYVYGFFVYFLPLFTIIYSYFFIVQAVAAHEKSMREQAKKMNVASLRSSEASQTSAECKLAKIALMTISLWFMAWTPYLVTNAAGILGNSKISPLATIWCSLFAKANAVYNPIVYGISHPKYRQALEKKFPSLICGSAQDDTVSTVTGVTGSDEKPGA

>KZC13492.1 Rhodopsin [*Dufourea novaeangliae*]

MLNRSSVTPDDIVEEQVINPAVYICAAIALGFIGFFGFTMNLLVAVVIIKDAQNLWTPVNVILVNLVVGDFLVAAFGNPVAMVSAIRGGWYWGYKVCLWYAWFMSTLGFASIGNLTVMAVERWLLVARPMRALSIRTAAILALIVWIYALCLSVPPLFGWGSYGPEAGNVSCSVSWEVHDPTTKSDSYIGFLFTVGLIVPVIVISTSYVAILLTLRGVRRRAGARGRREAKITKMVALMITAFLVAWSPYAALALGAQYFDARPSASLALLPALLAKSSICYNPIIYAGLNSQFPRSLKKIFDIRSSRTMVPESQNTALTVLNRQEQRN

>KYQ47300.1 Rhodopsin [*Trachymyrmex zeteki*]

MLLTLKPDHKKHMLFLVEQSSPVLQDFCKLALDYLQKGPNVKVYNAAAQKLNVELDVIKNSVEGLVNLLLESCKYKLSTEDFRDSIVALGFTEDKEAILSKLYNVKKDEVSDALEEIGFKLPRYHDMEWRFEVQTASRSLLKQVAPLISLDLSLKNPDNPERIEHIVLQTDPTNLLHITQELEEALQESRSQHIRRISRAKMESLVTVSTENLTIFSENSTMAFADVLTTMIGPRAMQQIMSFYNKTVVDKVPPDMIHLIDLHWYQFPPIDPIWHKILGLVMIVLGFMGWCGNGVVVYVFLMTPSLRTPSNLLVVNLAFSDFIMMIIMTPHMVINCYYETWILGSLMCDIHAMVGSLCGCASIWTMTAIALDRYNVIVKGMAGKPLTIKKALLEILIIWFFGSIWAILPMVGWNRYVPEGNMTACGTDYLAKDWSSKSYILTVAAHERSMREQAKKMNVQSLRSGDNQNISAEAKLAKVALMTISLWFMAWTPYLVINYIGIFDVAKISPLFTIWGSLFAKANAIYNPIVYGISHPKYRAALKEKLPFFVCGSTEDPTVAAKNAETSSTTTAT

>KYN32703.1 Rhodopsin [*Trachymyrmex septentrionalis*]

MSFVSGPSHAAYTWAAQGGGFGNQTVVDKVPPEMLHMVDVHWYQFPPMNPLWHGLLGFAIGVLGTISIIGNGMVIYIFTTTKSLRTPSNLLVVNLAISDFLMMLCMSPAMVINCYYETWVLGPLFCELYGMAGSLFGCGSIWTMTMIAFDRYNVIVKGLSAKPMTIKGALIRIFAIWLFTILWTIAPLFGWNRYVPEGNMTACGTDYLTKDIVSRSYILFYSIFVYFMPLFLIIYSYFFIIQAVAAHEKNMREQAKKMNVASLRSAENQSTSAECKLAKASLLACKLSALMTISLWFMAWTPYLVINFSGIFETTKISPLFTIWGSLFAKANAVYNPIVYGISHPKYRAALFQRFPSLACASEPAPGADTMSTTTTVTEGEKPVA

>KYN13670.1 Rhodopsin [*Trachymyrmex cornetzi*]

MLLTLKPDHKKHMLFLVEQSSPVLQDFCKLALDYLQKGPNVKVYNAAAQKLNVELDVIKNSVEGLVNLLLESCKCKLSAEDFRDSMVALGFTEDKEAILSKLYSIKKDEVSDALEEIGFKLPRYHDMEWRFEVQTASRSLLKQVAPLVSLDLSLKNPDNPEEIEHKMESLVTVSTENLIIFSENSTMAFTDVLTRTIGPRAMQQTMSFNNKTVVDKIPPDMMFLIDPHWYQFPPLDPMWHKILGLVMIVLGFMGWCGNGVVVYVFLMTPSLRTPSNLLVVNLAFSDFIMMIIMSPQMIINCYYETWVLGPLMCDIHAMVGSLCGCASIWTMTAIALDRYNVIVKGMAGKPLTIKKALLEILIIWLFASIWTILPMVGWNRYVPEGNMTACGTDYLTKDWSSKSYILAVAAHERSMREQAKKMNVQSLRSGDNQSISAEAKLAKVALTTISLWFMAWTPYLVINYVGIFDAAKISPLFTIWGSLFAKANAIYNPIVYGISHPKYRAALKEKLPFFVCGSTEDPSVAAKTAETSSTTTIKCISYIVKKIVVILCDRFGREQLDTWDGWNHIEKRLVPLEACETIHLLYRILSVKIHSNDDILQRMELLRPT

>KYM96118.1 Rhodopsin [*Cyphomyrmex costatus*]

MSFISGPSHAAYTWAAQGGGFGNQTVVDRVPPEMLHMVDVHWYQFPPINPLWHALLGFVIGVLGTVSIIGNGMVIYIFTTTKSLRTPSNLLVVNLAISDFLMMACMSPAMVINCYYETWVLGPLFCEMYGMAGSLFGCGSIWTMTMIAFDRYNVIVKGLSAKPMTINGALLRIFAVWLFTILWTIAPMFGWNRYVPEGNMTACGTDYLTKDIISRSYILVYSIFVYFMPLFLIIYSYFFIIQAVAAHEKNMREQAKKMNVASLRSAENQSTSAECKLAKVSFLAPLMTISLWFMAWTPYLVINFAGIFETTKISPLFTIWGSLFAKANAVYNPIVYGISHPKYRAALFQRFPSLACATESAPGSDTVSTTTTVTEGEKPAA

>KOX69883.1 Rhodopsin [*Melipona quadrifasciata*]

MSSNISTLATTTGPHFARQLMRFNNQTVVSKVPEDILHLIDPYWYQFPPLHPLWHKILGLVMIILGIIGWCGNGVVVYVFIMTPALRTPSNLLVVNLAFSDFIMMGFMCPPMVICCFYETWVLGTLMCDIYAMVGSLCGCASIWTMTAIALDRYNVIVKGMSGTPLTIKRAIVQILGIWSFGAIWTILPLVGWNRYVPEGNMTACGTDYLTQDWGSKSYILVYSIFVYYTPLFTIIYSYYFIVSTVAAHEKAMREQAKKMNVASLRSGENQGGPSAEAKLAKVALTTISLWFMAWTPYLVINYIGIFNRSLITPLFTIWGSLFAKANAIYNPIVYGVSHPKYRAALKEKLPFLVCGSTEEQAAGGEKPSEGGGNS

>EFN67092.1 Rhodopsin [*Camponotus floridanus*]

MSIASGPSHAAYTWASQGGGFGNQTVVDKVPPEMLHMVDAHWYQFPPMNPLWHALLGFVIGVLGVISVIGNGMVIYIFTTTKSLRTPSNLLVVNLAISDFLMMLCMSPAMVINCYYETWVLGPLFCELYGLAGSLFGCASIWTMTMIAFDRYNVIVKGLSAKPMTINGALIRILTIWFFTLAWTIAPMFGWNRYVPEGNMTACGTDYLTKDLFSRSYILIYSIFVYFTPLFLIIYSYFFIIQAVAAHEKNMREQAKKMNVASLRSAENQSTSAECKLAKASVALMTISLWFMAWTPYLVINYSGIFETTKISPLFTIWGSLFAKANAVYNPIVYGISHPKYRAALFQKFPSLACTTEPTGADTMSTTTTVTEGNEKPAA

>EDS36741.1 rhodopsin [*Culex quinquefasciatus*]

MASYAAWNAAQSGLGAMVNLTVVDRVPADMLHMVDAHWYQFPPMNPLWHSILGFAIFVLCFISLVGNGCVVYIFTNTKTLRTPSNLLVVNLAFSDFLMMFTMGPPMVINCYHETWVFGPFACELYGMLGSLFGCVSIWSMTLIAFDRYNVIVKGLSAKPMTNNGALLRIFLVWASCLAWTIPPFFGWNRYVPEGNMSACGTDYLTDTFLSRSYILVYSVFVYFAPLLMIIYSYIFIIKAVSAHEKNMREQAKKMNVASLRSSEAQNTSTEMKLAKVALVTISLWFMAWTPYLIINYTGIFKAAPITPLATIWGSLFAKANAVYNPIVYGISHPKYRAALYQKFPSLSCTDAVDDSQSVTSGTTTVVNEEKPSA

>ETN59673.1 rhodopsin [*Anopheles darlingi*]

MAAFAEPHFSAWTQTVVSNVTVVDKVPPEMLHMVDAHWYQFPPMNPLWHSILGFAIFILGVVSIIGNGCVIYIFTNTKSLRTPSNLLVVNLAFSDFLMMFTMAPPMVINCWHETWSFGPFACELYGMLGSLFGCASIWTMTMIAFDRYNVIVKGLSGRPMTNNGALLRILGIWAFALLWTLAPLFGWNRYVPEGNMTACGTDYLNQDFTSRSYILIYSGFVYYLPLFSIIYSYIYIIQAVSAHEKNMREQAKKMNVASLRSQEAQNTSTEMKLAKVALVTISLWFMAWTPYLVINYTGIFKAAPISPLATIWGSLFAKANAVYNPIVYGISHPKYRAALYQKFPSLSCQDSPTDDGQSVASATTGVSEEKSSA

>AAC47083.1 rhodopsin [*Camponotus atriceps*]

MMSIASGPSHAAYTWASQGGGFGNQTVVDKVPPEMLHMVDAHWYQFPPMNPLWHALLGFVIGVLGVISVIGNGMVIYIFTTTKSLRTPSNLLVVNLAISDFLMMLCMSPAMVINCYYETWVLGPLFCELYGLAGSLFGCASIWTMTMIAFDRYNVIVKGLSAKPMTINGALIRILTIWFFTLAWTIAPMFGWNRYVPEGNMTACGTDYLTKDLFSRSYILIYSIFVYFTPLFLIIYSYFFIIQAVAAHEKNMREQAKKMNVASLRSAENQSTSAECKLAKVALMTISLWFMAWTPYLVINYSGIFETTKISPLFTIWGSLFAKANAVYNPIVYGISHPKYRAALFQKFPSLACTTEPTGADTMSTTTTVTEGNEKPAA

>AAD34223.1 rhodopsin [*Papilio glaucus*]

MAANYSDDIGPMAYPMKLVSSEIVEHMMGWNIPEEHQAMVHAHWRSFPAVSKYYHFILALIYTMLMVTSLIGNGIVIWIFSTSKSLRSASNMFVINLAVFDLMMMIEMPLLIANSFYQHPIGFQLGCDIYAVLGSISGIGGAITNAVIAFDRYKTISCPLDGRINKVQASLLIVFTWFWSLPFTILPALKVWGRFVPEGFLTTCSFDYFTDDQDTKVFVACIFVWSYAIPMALICYFYSQLFGAVRLHEKMLQEQAKKMNVKSLASNKEDASKSVEIRIAKVAFTIFFMFVCGWTPYAIVTMTGAYGDRSLLSPVATMIPAVCCKIVSCIDPWVYAINHPRYRAELQKRLPWLGVREQDPDSVSTSNSVTTTQSHTPNAET

>XP\_046606737.1 rhodopsin [*Neodiprion virginianus*]

MTVMSGPSFAAYSWSAQVGGFGNQTVVDKVPAEMLHLVDSHWYQFPPMNPLWHGILGFVIACLGFVSVIGNGMVVYIFCSTKTLRTPSNLLVVNLAFSDFLMMFTMSPPMVINCYYETWVFGPLMCEIYALFGSLFGCGSIWTMTMIAFDRYNVIVKGLSAKPMTIKGSLLRILGVWAFAVIWTIAPMLGWNRYVPEGNMTACGTDYLSKDWLSRSYILVYSFFVYYLPLFMIIYSYYFIISAVSAHEKSMREQAKKMNVASLRSSENQNTSAEAKLAKVALMTISLWFMAWTPYLVINYAGVFESAKISPLFTIWGSLFAKANAVYNPIVYGISHPKYRAALFKKFPSLACGGDAGHGGDATSTVSGVTTLTENEKPAA

>XP\_046735151.1 rhodopsin [*Diprion similis*]

MTVMSGPSFAAYSWSAQAGGFGNQTVVDKVPAEMLHLVDSHWYQFPPMNPLWHGILGFVIACLGFVSVVGNGMVVYIFCSTKTLRTPSNLLVVNLAFSDFLMMFTMSPPMVINCYYETWVFGPLMCEIYALFGSLFGCGSIWTMTMIAFDRYNVIVKGLSAKPMTIKGSLLRILGVWAFSVIWTIAPMLGWNRYVPEGNMTACGTDYLSKDWLSRSYILVYSFFVYYFPLFMIIYSYYFIISAVSAHEKSMREQAKKMNVASLRSSDNQNASAEAKLAKVALMTISLWFMAWTPYLVINYAGVFESAKITPLFTIWGSLFAKANAVYNPIVYGISHPKYRAALFKKFPSLACGGDAGHGGDATSTVSGVTTLTDNEKPAA

>XP\_044727952.1 rhodopsin [*Chrysoperla carnea*]

MAFVSGPSYSAWQGSGNMTVVDKVPPDMLHMVDAHWFQFPPMNPLWHSILGFAIFCLGVTSVIGNGMVIFIFSTTKSLRTPSNLLVVNLAFSDFFMMFTMFPPMVYNCYHETWVLGPLICEVYAMLGSLFGSVSIWTMTMIALDRYNVIVKGLSAKPMTNGSAMMRIMLVWILSVVWVSFPFFGWNRYVPEGNMTACGTDYLSKDWTSRSYILVYSVFVYFAPLLTIIYSYFFIVQAVAAHEKSMREQAKKMNVASLRSSEAANTSAECKLAKVALMTITLWFFAWTPYLIINYAGVFESMTISPLATIWGSLFAKANAVYNPIVYGISHPKYRAALGARFPSLVCAGEPHDDGTSVVSGATNVSEEKPAA

>XP\_044268154.1 rhodopsin [*Tribolium madens*]

MSVMGEPTFIAWAAQRSGFGGNLTVVDKVLPDMLHLVDAHWYQFPPMNPLWHGILGFVIGVLGFVSVVGNGMVIYIFSSTKALRTPSNLLVVNLAFSDFLMMLSMSPAMVINCYNETWVLGPLLCELYGMAGSLFGCISIWTMTFIALDRYNVIVKGLSAQPLTKKGALLRIFLIWALSLLWTIAPLFGWNRYVPEGNMTACGTDYLTKNWVSRSYILVYAIWVYFVPLFTIIYSYWFIVQAVAAHEKSMREQAKKMNVASLRSSEAAQTSAECKLAKIALMTITLWFFAWTPYLVTNFTGIFEGGKITPLATIWCSLFAKANAVYNPIVYGISHPKYRQALQKKFPSLVCAAQPDDTTSTASGITNVTTDEKATA

>XP\_023027119.1 rhodopsin [*Leptinotarsa decemlineata*]

MSVMGEPSFASWAAQRAAGFGGNMTVVDKVMPDMLHMVDAYWYQFPPMNPLWHGILGFMIGVLGFISIVGNGMVVYIFSSTKALRTPSNLLVVNLAFSDFLMMVTMSPPMVINCYYETWVLGPFFCELYGMFGSLFGCGSIWTMVFIALDRYNVIVKGLSAQPLTKKTALLRILLIWAMSIGWTIAPLFGWNRYVPEGNMTACGTDYLTRDALSRSYIVVYGFFVYFLPLLLIIYSYFFIVQAVAAHEKSMRDQAKKMNVASLRSAEASQTSAECKLAKIALMTITLWFMAWTPYLVTNFTGIFGNSKISPLATIWCSLFAKANAVYNPIVYGISHPKYRQALEKKFPSLVCASHTDDTVSTVTGASNVGEEKVPA

>XP\_039295943.1 rhodopsin [*Nilaparvata lugens*]

MSLISEPSYNAYSAWYGAPGGGGHGMGMGGNQTVVDKVLPEMLHMVDAHWYQFPPMNPLWHDLLGFAIGFLGFLSVSGNAMVVYIFCSTKSLRTPSNLFVVNLAFSDFLMMFCMSPTMVINCYYETWVLGPFMCELYGMLGSLFGCASIWSMTMIALDRYNVIVKGLSAKPLTNKRAILKLLFVWLFSLGWTLAPFFGWNRYVPEGNMTACGTDYLTKDWFSRSYIIVYGFFVYFMPLFIIIYSYWFIVQAVFAHEKQMREQAKKMNVASLRSAESQTTSQEMKLAKVALMTIALWFFAWTPYLVINFSGIFETATISPLFTIWGSVFAKANAVYNPIVYGISHPKYRAALGKKFPSLVCAAAPSDDATSVASGATTVTEEKGPSA

>QOY43977.1 rhodopsin [*Trichobius frequens*]

MERIGSHAFGPQFSALVGNGSVTDKVTPDMMHLIHPYWNQFPAMEPLWSKILLLYMIVIGIISWCGNGVVIYIFTTTKSLRTPANLLVINLALSDFGMMVVNTPMMGINLYFETWILGPGMCDAYGALASALGCGSIWSMCMIALDRYNVIVLGMAGRPMTIKLALMKIAFIWSMAAFWTLAPMFGWNRYVPEGNLTSCGIDYLQRDWNSRTYLIFYTIFVYYTPLFLICYSYWYIISAVSAHEKAMREQAKKMNVKSLRSSEDAEKSAEGKLAKVALVTISLWFMAWTPYTIINMMGLFKFPGITPLNSIWGACFAKSAACYNPIVYGISHPKYRIALKEKCPCCVIGQTDDGRSAETTSQVTTTTNEAETRA

>NP\_001011606.1 opsin, blue-sensitive [*Apis mellifera*]

MLLHNKTLAGKALAFIAEEGYVPSMREKFLGWNVPPEYSDLVHPHWRAFPAPGKHFHIGLAIIYSMLLIMSLVGNCCVIWIFSTSKSLRTPSNMFIVSLAIFDIIMAFEMPMLVISSFMERMIGWEIGCDVYSVFGSISGMGQAMTNAAIAFDRYRTISCPIDGRLNSKQAAVIIAFTWFWVTPFTVLPLLKVWGRYTTEGFLTTCSFDFLTDDEDTKVFVTCIFIWAYVIPLIFIILFYSRLLSSIRNHEKMLREQAKKMNVKSLVSNQDKERSAEVRIAKVAFTIFFLFLLAWTPYATVALIGVYGNRELLTPVSTMLPAVFAKTVSCIDPWIYAINHPRYRQELQKRCKWMGIHEPETTSDATSAQTEKIKTDE

>NP\_001011639.2 rhodopsin, long-wavelength [*Apis mellifera*]

MIAVSGPSYEAFSYGGQARFNNQTVVDKVPPDMLHLIDANWYQYPPLNPMWHGILGFVIGMLGFVSVMGNGMVVYIFLSTKSLRTPSNLFVINLAISDFLMMFCMSPPMVINCYYETWVLGPLFCQIYAMLGSLFGCGSIWTMTMIAFDRYNVIVKGLSGKPLSINGALIRIIAIWLFSLGWTIAPMFGWNRYVPEGNMTACGTDYFNRGLLSASYLVCYGIWVYFVPLFLIIYSYWFIIQAVAAHEKNMREQAKKMNVASLRSSENQNTSAECKLAKVALMTISLWFMAWTPYLVINFSGIFNLVKISPLFTIWGSLFAKANAVYNPIVYGISHPKYRAALFAKFPSLACAAEPSSDAVSTTSGTTTVTDNEKSNA

>NP\_001071293.1 long wavelength sensitive opsin 2 [*Apis mellifera*]

MDTLNITTSFFIEVMPSNISTLTTTGPQFARQLMRFNNQTVVSKVPEEMLHLIDLYWYQFPPLDPLWHKILGLVMIILGIMGWCGNGVVVYVFIMTPSLRTPSNLLVVNLAFSDFIMMGFMCPPMVICCFYETWVLGSLMCDIYAMVGSLCGCASIWTMTAIALDRYNVIVKGMSGTPLTIKRAMLQILGIWLFGLIWTILPLVGWNRYVPEGNMTACGTDYLSQDWTFKSYILVYSFFVYYTPLFTIIYSYYFIVSAVAAHEKAMKEQAKKMNVTSLRSGDNQNTSAEAKLAKVALTTISLWFMAWTPYLVINYIGIFNRSLITPLFTIWGSLFAKANAIYNPIVYGISHPKYRAALKEKLPFLVCGSTEDQTAATAGDKASEN

>AAC13418.1 ultraviolet-sensitive opsin [*Apis mellifera*]

MSNDSIHWEARYLPAGPPRLLGWNVPAEELIHIPEHWLVYPEPNPSLHYLLALLYILFTFLALLGNGLVIWIFCAAKSLRTPSNMFVVNLAICDFFMMIKTPIFIYNSFNTGFALGNLGCQIFAVIGSLTGIGAAITNAAIAYDRYSTIARPLDGKLSRGQVILFIVLIWTYTIPWALMPVMGVWGRFVPEGFLTSCSFDYLTDTNEIRIFVATIFTFSYCIPMILIIYYYSQIVSHVVNHEKALREQAKKMNVDSLRSNANTSSQSAEIRIAKAAITICFLYVLSWTPYGVMSMIGAFGNKALLTPGVTMIPACTCKAVACLDPYVYAISHPKYRLELQKRLPWLELQEKPISDSTSTTTETVNTPPASS

>XP\_034249734.1 opsin, ultraviolet-sensitive isoform X1 [*Thrips palmi*]

MESPESAHCSNASAWQPVAEARVSGVSGPSEVRMLGWNIPPEILPHVPTHWLGYPEPDPLVNYGLGLLYCFFFFFSVLGNGIVIYIFLTSKNLRTPSNIFVVNLALCDFVMMLKTPIFIYNSFNLGYASGPMGCLVFGLMGSFSGIGAGATNAAIAYDRYMTIAKPFGSKMTRGKAIMIVVLIWMWVSPWALFPALEVWGRFVPEGFLTSCTFDYLTDTTHIRVFVAVMFSVCYCVPMSFIIYFYSQIVSHVVAHEKALKAQAKKMNVESLRSNADKNQESTEIRIAKMAISLCFLFVLSWTPYAAVALTGAFGNKALLTPGITMIPACTCKLVACIDPYVFALSHPRFRLELQKRMPFLDIRESQPASETASTTTEATSANPE

>XP\_034231936.1 opsin, ultraviolet-sensitive-like [*Thrips palmi*]

MALHPVRTWVEVGPFTPADLDVVHDHWLGFPPQKPYIHYTLAAAYTVIMTLGVFGNLLVLYMFCRCRSLRSPANILIANLAISDFFLLAKMPVFIYNSLYFGPILGQIGNDVYGFLGGLTGAVSIANLAAIALDRYHVIVQPLDPGRRISRLRARLSVLVTWLYGGALATGPLVGLSRYTPEGLLTSSSFDYLNTDPRNRTFIWCFFFAAWVVPFCIITLSYLGIYRIVERATQRGKAGPSSDTSRTRRHCREHDKRRTEVRLAVVAGVVVALWFASWTPYAVVALMAVSGRPPGPLVSMLPALFCKTASCLDPYVYAVTHPRFRRELAKLCARLGACRILGVGLAPRRPAKLRGRSRAWRGDNSLTSAAAVTGCALRLQGSISSDDVAVEEEVVPVMMVDFRKGRRGRDHRGSSVCSSSSLRESVQDSPPPVGPSRSGTSRAEEPSRSSSSGDPPPQAARVVANPVPPPEPPPHAGQLAAFMMGDCPACPQLANFPMSASEQLRYRAPSIFTSPRPRRSKSFSLRANANKLALGEPVLPPVAAVLQDPISV

>NP\_524035.2 rhodopsin 7 [*Drosophila melanogaster*]

MEAIIMTTLPNLTTDAGDSSFWLTGALSLSEMLANSSHSHSTGSTTSTAGSSATESSAVNVGKDHDKHVNDSVSTGLSNYSNYPSYIHYRDKYDLSYIAKVNPFWLQFEPPKSSTFLIMAALYCLISVVGCVGNAFVIFMFANRKSLRTPANILVMNLAICDFLMLIKCPIAIYNNIKEGPALGDIACRLYGFVGGLSGTCAIGTLTAIALDRYNVVVHPLQPLRRCSRLRSYLIILLIWCYSFLFAVMPALDIGLSVYVPEGFLTTCSFDYLNKEMPARIFMALFFVAAYCIPLTSIVYSYFYILKVVFTASRIQSNKDKAKTEQKLAFIVAAIIGLWFLAWSPYAIVAMMGVFGLERHITPLGSMIPALFCKTAACVDPYLYAATHPRFRVEVRMLFYGRGVLRRVSTTRSSYMTRSRSSFTHRLRTSTTGEGGMGDHRMENYLMNNNLMMVPEETEENEEIVVVAEINNSISSVMEQSKF