

Summary of the insect species and the type of resistant genes

Insect species	Resistant genes
<i>Helicoverpa armigera</i>	Cytochrome P450 Acetylcholinesterase
<i>Aphis gossypii</i>	Cytochrome P450 KDR
<i>Acyrtosiphon pisum</i>	Cytochrome P450 Acetylcholinesterase
<i>Bemisia tabaci</i>	Cytochrome P450 Acetylcholinesterase
<i>Plutella xylostella</i>	Cytochrome P450 RDL
<i>Spodoptera exigua</i>	Cytochrome P450
<i>Spodoptera litura</i>	Cytochrome P450
<i>Nilaparavata lugena</i>	Cytochrome P450
<i>Myzus persicae</i>	Cytochrome P450
<i>Tribolium castaneum</i>	Cytochrome P450 RDL
<i>Leucinodes orbonalis</i>	Acetylcholinesterase

Independent test dataset

Cytochrome P450 (53)

>NP_610390.1 Cyp6a13 [Drosophila melanogaster]

MLTLLVLVFTVGLLLYVKLRWHYSYWSRRGVAGERPVYFRGNMSGLGRDLHWTDLINLRIYRKFRGVERYC
GYFTFMTKSLFIMDLELIRDIMIRDFSSFADRGLFHNVRDDPLTGNNLFLDGPWRWLRQNLTVFTSGK
MKFMFPNMVEVGEKLTQACRLQVGEIEAKDLCARFTTDDVIGSCAFGLECNLQDPESQFRMRGRSVTQEP
LHSVLVQAQAFMQPELARKLRFRLFRPEVSEFFLDTVRQTLDYRRRENIHRNDLIQLLMELGEEGVKDAL
SFEQIAAQALVFFLAGFDTSSTTMSFCLYELALNPDVQERLRVEVLAVLKRNNQKLTYSVQEMPYLDQV
VAETLRKYPILPHLLRRSTKEYQIPNSNLILEPGSKIIIPVHSIHHDPELYPDPEKFDPSRFEPEEIKAR
HPFAYLPPFEGGPRNCIGERFGKLQVKVGLVYLLRDFKFSRSEKTQIPLKFSSRNFLISTQEGVHLRMEGL
ERP

>NP_652075.1 Cyp6a22, isoform A [Drosophila melanogaster]

MLDVVALLLIALAVGFWFVRTRYSYWTRRGIGSEPARFPVGNMEGFRKNKHFIDIVTPIYEKFKGNGAPF
AGFFMMLRPVVLVTDLELAKQILIQDFANFEDRGMYNHNERDDPLTGHLFRIDGPKWRPLRQKMSPTFTSA
KMKYMFPTVCEVGEELTQVCGELADNAMCGILEIGDLMARYTSDVIGRCAFGVECNGLRNPEAEFAIMGR
RAFSERRHCKLVDGFIESFPEVARFLMRQIHQDITDFYVGIVRETVKQREEQGIVRSDFMNLLEMKQR
GELTIEEMAAQAFIFFAAGFDTSASTLGFALYELAKQPALQAKLREEIDQALRLHNGEFTYDSMQELRYM
ELVIAETLRKYPILPQLTRISRHLAAKGRHFYIEPGQMLLIPVYGIHHDPALYPEPHKFIPEFLADQ
LAQRPTAAWLPPGDGPRNCIGMRFGKMQTTIGLVSLLRNFHFSVCPRTDPKIEFLKSNILLCPANGIYLK
VQQLSQMSS

>NP_523628.1 cytochrome P450-6a2 [Drosophila melanogaster]

MFVLIYLLIAISSLLAYLHRNFNYWNRGVPHPDAPHPLYGNMVGFRKNRVMHDFDYDYNKYRKSGFPF
VGFYFLHKPAAAFIVDTQLAKNILIKDFSNFADRGQFHNGRDDPLTQHLFNLDGKKWKDMRQRLTPTFTSG
KMKFMFPTVIKVSEEFVKVITEQVPAQNGAVLEIKELMARFTTDDVIGTCAFGIECNTLRTPVSDFRMTG
QKVFTDMRHGKLLTMFVFSFPKLASRLRMRMPEDVHQFFMRLVNDTIALRERENFKRNDFMNLLIELKQ
KGRVTLDNAGEVIEGMDIGELAAQVVFVYVAGFETSSSTMSYCLYELAQNQDIQDRLRNEIQTVLEEQEGQ
LTYESIKAMTYLNQVISETLRLYTLVPHLERKALNDYVVPGHEKLVIEKGTQV IIPACAYHRDEDLYPNP
ETFDPERFSPEKVAARESVEWLPPGDGPRNCIGMRFGQMQRIGLAQIISRFRVSVCDTTEIPLKYS PMS
IVLGTVGGIYLRVERI

>NP_523748.2 cytochrome P450-6a9 [Drosophila melanogaster]

MGVYSVLLAIVVVLVGYLLLKWRRALHYQNLDIPCEEPHILMGSLTGVQTSRSFSAIWM DYNNKFRGTG

PFAGFYWFQRPGLVLDISLAKLILIKEFNKFTDRGFYHNTEDDPLSGQLFLLDGQKWKSMRSLSYTFT
SGKMKYMFPTVVKVGHEFIEVFGQAMEKSPIVEVRDILARFTTDDVIGTCAFGIECSSLKDPEAEFRVMGR
RAIFEQRHGPIGIAFINSFQNLARRLHMKITLLEEAHFFLRIVRETVAFREKNNIRRNDFMDQLIDLKNS
PLTKSESGESVNLTIEMAAQAFVFFGAGFETSSTTMGFALYELAQHQDIQDRVRKECQEVIKGYNGEIT
YESMKDMVYLDQVISETLRLYTVLPVLNRECLEDEYVPGHPKYVIKKGMPVLI PCGAMHRDEKLYANPNT
FNPDNFSPERVKERDSVEWLPFGDGPRNCIGMRFGQMARSGLALLINRFKFSVCEQTTIPIVYSKKTFL
ISSETGIFLKVERV

>NP_650224.3 Cyp313a4 [Drosophila melanogaster]

MLTWTLWCGLLFLLWIYFLWSRRRFYLLTLKIPGPLGYPI LGMAHWLMRREDILNAFGCFLDKHGPTIFS
WLGPIPFMIVSDPQVVQDIFTSPHCVNKGI IYKAVDDGAGVGLFSLKDRWSIHRKLLNPAFGHKVLLSF
LPIFNRETALLLDQLEPLQDDGKDLI PLLQSFTLGIATQTTMGSDVKDEESFRSNSLLGRYQCILETMT
DMCFSPWLNSRFRQLAGKESHYYQAKTEIRQFIRKIERKLAEDEMGALPSIQSNDKNLFLNLVTDLMR
RGVFTLKNVEDESNIIVFGAFETTANAVYYTLMLLAMFPEYQERAFEEIKTIFPNTGDFDVSADTQQMV
YLDLILNESMRVIPPVVSQRQTSQDLKLSNGIVVPGVQIAIDIYHMHRSKKIWGPDAETFNPDHFLPH
NIQDKHPYAYIPFTKGIRNCIGWRYALISAKVTLAKLLRNRYFKTSFPFENLYFVEDITMKLKSVP LLEL
QKRT

>NP_611000.2 Cyp6a23 [Drosophila melanogaster]

MSLLTLIALLVSLLLFMARRRHGYWQRGIPHDVPHPIYGNMKDWPKKRHIAMIFRDYYTKYKRSVYPF
AGFYFFFTRSAVITDLELVKRVLIKDFNHFENRGIFYNEIDDPLSATLFSIEGQKWRHLRHKLTPFTSG
KMKNMFPIIVKVGEEMEKIFSAKTTTGEGQVLEIVDLVARYTADVIGNCAFGLNCSLQNPNAEFVTIGK
RAIIERRYGGLDFLI FGFPKLSRRLRLKLNVDVEDFYTSIVRNTIDYRLRTNEKRHDFMDSLIEMYEK
EQAGNTEDGLSFNEILAQAFIFFVAGFETSSTTMGFALYELALDQDIQDQLRAEINNVLSKHNEFTYEG
IKEMKYLEQVVMETLRKYPVLAHLTRMTQTDSPEDPKYFIAKGTTVVIPALGIHYDPEIYPEPEKFKPE
RFTDEAIAARPCTWLPFGGPRNCIGLRFGLMQACVGLAYLIRGYKFSVSTETQIPMKFVVKSI LLSAE
NGIHLKVEKLSK

>NP_610743.2 Cyp6g1, isoform A [Drosophila melanogaster]

MVLTEVLFVVVAALVALYTWQFNHSYWQRKGIPYIPPTPIIGNTKVVFKMENSFGMHLSEIYNDPRLKD
EAVVGIYSMNKPLIIRDIELIKSILIKDFNRFHNRYARCDPHGDPLGYNNLFFVRDAHKGIRTKLTPV
FTSGKVKQMYTLMQEIGKDLELALQRRGEKNSGSFITEIKEICAQFSTDSIATIAFGIRANLENPNAEF
RNYGRKMF TTVARAKDFVFAFFLPKLVSLMRIQFFTADF SHFMRSTIGHVMEERERSGLLRNDLIDVLV
SLRKEAAAEPKPHYAKNQDFLVAQAGVFFTAGFETSSTMSFALYEMAKHPMQKRLRDEINEALVEGG
GSLSYEKIQSLEYLAMVVDEVLRMYPVLPFLDREYESVEGQPDLSLKPFDYDTLENGTPVFPIYALHHD

PKYWTNPSQFDPERFSPANRKNIVAMAYQFFGSGPHNCIGSRIGLLQSKLGLVSLLNHSVRNCEATMKD
MKFDPKGFVLQADGGIHLEIVNDRLYDQSAPSLQ

>NP_476907.2 cytochrome P450-4d1, isoform A [Drosophila melanogaster]
MFLVIGAILASALFVGLLLYHLKFKRLIDLISYMPGPPVLPVVGHHHFIGKPPHEMVKKIFEFMETYSK
DQVLKVVWLGPELNVLMGNPKDVEVVLGTLRFNDKAGEYKALEPWLKEGLLVSRGRKWHKRRKIITPAHFH
KILDQFVEVFEKGSRDLLRNMEQDRLKHGDSGFSLYDWINLCTMDTICETAMGVSINAQSNADSEYVQAV
KTISMVLHKRMFNILYRFDLTYMLTPLARAEEKALNVLHQFTEKIIVQRREELIREGSSQESSNDDADVG
AKRKMAFLDILLQSTVDERPLSNLDIREEVDTFMFEGHDTTSSALMFFFYNIATHPEAQKCFEEIRSVV
GNDKSTPVSYELLNQLHYVDLCVKETLRMYPSVPLLRKVLLEDCEINGKLIPAGTNIGISPLYLGRREEL
FSEPNIFFKPERFDVVTAEKLNPIYAI PFSAGPRNCIGQKFAMLEIKAIVANVLRHYEVDFVGDSSPEPPV
LIAELILRTKEPLMFKVRERVY

>NP_649151.1 Cyp305a1 [Drosophila melanogaster]
MSALIFLCAILIGFVIYSLISSARRPKNFPPGPRFVPWLGNLQFRKEASAVGGQHILFERWAKDFRSDL
VGLKLGREYVVVALGHEMVKEVQLQEVFEGRPDNFFLRRLRTMGRKGITCTDGQLWYEHHRHFAMQMRNV
GYGRSQMEHHIELEAEELLGQLERTEEQPIEPVTWLAQSVLNVLWCLIAGKRIARQEDGTLRRLDLDMNR
RSKLFDICGGLLAQFPWLRHVAPDRGTGYNLIQQLNTELYGFFMDTIEEHRRLAKDPSPAESDLIYAYLQ
EMKDRSAGGESSTFNETQLVMTILDFFIAGSQTTNTINLALMVLAMRPDVQEKLFQSQTASVAAASTDA
FPHLSRREAFDYMDAFIMEVQRFFHITPITGPRRALWATKLGGYDIPKNATILISLRSVHLDKEHWKDPL
EFRPERFIDSAGKCFKDEYFMPFGMGRRCCLGDALARACIFSFLVRIVQHFSVVL PAGESPSMVLLPGIT
LTPKPYKVQFVKRT

>NP_525044.1 cytochrome P450-4ae1 [Drosophila melanogaster]
MLVVLLVALLVTRLVASLFRALKELRHPLQGVVPSVSRVPLLGAAWQMRSFQPDNLHDKFAEYVVKRFGR
SFMGTVLGHVVMVTAEPRHIDALLQGQHQLKKGTMFYALRGWLDGLLLSRGKEWHTMRKIITPTFHFSI
LEQFVEVFDROSSILVERLRTLSTYGNVNIYPLVGLAALDIITETAMGVNVDAQGADSEVVHAVKDLTN
ILATRFRPHLLFPHLFRLCWPSGFRKQAGVICLHEFTNGIIEQRRLLAREANQDKPTKPHALLDTLL
RATVDGQPLTDKQIRDEVNTFIFEGHDTTSAVSFCLYLLSRHEAVQQKLFEELRMHYQDLFRGVILSD
FATLPYLSCVVKESLRLYPPIPAVARCLEKDLVIDEGYIPVGTNVVLLWQLLRDEAIFTDPLVFQPERH
LGEEAPRLSPYSYIPFSAGPRNCIGQKFALLEMKTMTVKVIRHYQLLPMGADVPSIKIVLRKSGVNVG
LRPRLY

>NP_611002.3 Cyp6a20 [Drosophila melanogaster]
MAVMIVLLIGVITFVAWYVHQHFNWKRRIIPHDEPKIPYGNLSELMKTVHFADIFKRITYNKLNRKTDGP

FVGFYMYFKRMVVVTDIDFAKTVLIREFDKFDHGRGVFHNERDDPLSANLVNIDGQKWKTLRQKLTPTFTS
GKMKTMFPTILTVGDELIRVGETASADSDSMEITNVVARFTADVIGSCAFGLDCHSLSDPKAKFVQMGT
TAITERRHGKSMDDLLFGAPELAALKRMKATVQEVEDFYMNIIRDVTDYRVKNNVKRHDFVDMLIEMKLLK
FDNGDKENGLTFNEIAAQAFIFFLAGFETSSTTMGFALYELACHQDIQDKLRTEINTVLKQHNGKLDYDS
MREMTYLEKVIDETMRKRPVVGHLIRVATQHYQHTNPKYNIKGTGVIVPTLAIHHDPEFYPEPEKFIPE
RFDEDVQVQRPACTFLPFGDGPRNCIGLRFGRMQVIVGMALLIHNFKFEFHPTKTVVPLEYRTDDFLLSS
KGGIHLKVTRV

>NP_611003.2 Cyp6a21 [Drosophila melanogaster]

MSVGTVLLTALLALVGYLLMKWRSTMRHWQDLGIPCEEPHILMGSMKGVRTARFNEIWTSYNKFRRSG
PFAGFYWFRRAVAVVLETSKQILIKEFNKFTDRGFFHNPEDDPLSGQLFLLDGQKWRMTRNKLSTFT
SGKMKYMFPTVVKVANEFTDVFQGNVAKSPVVEVRELLARFTTDVIGTCAFGIECSSLKDPDAEFREMGR
RSLTEQRLGVPVIGFVNSFPNLARLHMKMTAEPIERFFMRIVRETVAFREQNNIRRNDFMDQLIDLKKN
PLMVSQSGESVNLTIIEIAAQAFVFFAAGFETSSTTMGFALYELAQNQDIQNRVRKECQEVIKCNKNGELN
YESMKDLVYLDQVVSSETLRLYTVLPVLNRECLEDEYVPGHPKYVIKKGMPVLI PCGAMHRDEKLYANPT
FNPDNFSPERVKERDSVEWLPFGDGPRNCIGMRFGMQARIGLALLIKDFKFSVCEKTTIPMTYNKEMFL
IASNSGIYLKAERV

>NP_610744.1 Cyp6g2 [Drosophila melanogaster]

MELVLLILVASLIGIAFLALQQHYSYWRMGVREIRPKWIVGNLMGLLNMRMSPAEFISQLYNHPDAENE
PFVGIHVHFKPALLLRDPEMVRNILVKDFAGFSNRYSSSDPKGDPLGSQNIFFLKNPAWKEVRLKLSPPF
TGNRLKQMFPLIEEVGASLDAHLRQQPLHNERMRCFDLEAKELCALYTTDVIATVAYGVSANSFTDPKCE
FRRHGRSVFEFNLLRAAEFTLVFFLPHLVFVRFKVVPAEATRFLRKTINYVMSEREKSGQKRNDLIDIL
IEFRRSTQLAKASGIKQFVFECDILVAQAVLFFTAGFESSSTMAFAMYELAKDTDVQQLRREEIKDAL
VESGGQVTLKMIESLEFQMILLEVLRYMPPPLFDRECTSGRDYSLAPFHKKFVVPKGMVYI PCYALH
MDPQYFPQPRKFLPERFSPENRKLHTPYTYMPFGLPHGCIGERFGYLQAKVGLVNLNRNHMITTERTP
HRMQLDPKAIITQAKGGIHLRLVRDALGV

>NP_731751.1 Cyp304a1 [Drosophila melanogaster]

MITETLLTICAAVFLCLSRYAVGRPSGFPPGPPKIPLFGSYLFMLIINFKYLHKAALTLRWYKSDIIG
LHVGPFPVAVVHSADGVREILNNQVFDGRPQLFVAAMRDPGQDVRGIFFDGPLWKEQRRFILRYLRDFG
FGRRFDQLELVIQEQLNDMLDLIRNGPKYPHEHEMVKSGGYRVLLPLLFPFSANAHFYIVYNECLSREE
MGKLVKLCQMGIQFQRNADDYGMKLSIIPWIRHIWPEWSGYNKLNESNLFVRQFFADFVDKYLDSEEGV
ERNFMDVYIAEMRRPGYGFNRDQLIMGLVDFSPPAFTAIGVQLSLLVQYLMLYPAVLRVQNEIDEVVG
CGRLPNLEDRKNLPTTEATIREGLRIETLVPSDVPHKALEDTELLGYRIPKDTIVVPSLYAFHSDARIWS

DPEQFRPERFLDADGKLCCLKLDVSLPFGAGKRLCAGETFARNMLFLVTATMCQHDFVGLGPNDRLPDLSQ
NLNGLIISPPDFWLQLQDRH

>NP_650003.4 Cyp12e1 [Drosophila melanogaster]

MLSTQWNANKQISRQIYQLCRGLAQKATAVNLEEAKPYADIPGPSKLQLIRAFPLPGGLYKNLPVHEMFLD
MNRQYGSIFRMPVAVGTDLVLTMNPQDYEVIFRNEGQYPYRRSFEVMDYFKRVHRREVFDGYDGLTSGNG
PAWGKMRNAVNPILLQPRNAKLYMTNLVQVSDEFLEIRIRIIRDVPVTQEMPDDFAVDIRHLVIESICSVAL
NTHLGLLGEQRNNKDIQKLVLALQDVVELGFQLDIMPFAWKYLPMPNFKKLMRSLDTITDFCYFHIGNAL
KRIEEDAKAGTLNEIGLETSLLEKLARFDRQTAVIIAMDLLFAGADPTLVTLGGILFSLSKSPDKQARLL
EEIRGILPNKDSLSLTIENTMRNLPYLRACIKEGIRMYPGPGTLRRMPHDVVLGSGYRVVAGTDVGIANYQ
MANMEQFVPKVREFIPERWLRDESNSHLVGETATPFMYLPPFGFGPRSCAGKRIVDMMLEIAISRLVRNFK
IGFDYPIENAFKAQFFVQPNIPFKFKFIERNE

>NP_611067.2 Cyp4aa1 [Drosophila melanogaster]

MFVEKVLERTTNLELCSILILLVISLSIYTFYATLNTYLRSVLLSLRLTGPPSLPFLGNCMLVTDKDLMR
RCAGKAFDLYGSLVRIWVLLFPFFAVLEPEDLQVILSSKKHTNKVFFYRLMHNFLGDGLITSSGSKWSNH
RRLIQPAFHNNLLEKFIDTFVDASQSLYENLDAEAVGTEINI AKYVNNCVLDILNEAVLGVPIKKGQDV
AMMEDSPFRQ GKIMPARFTQPWLLLDGIYHWTKMANDELNQQKRLNDFTRKMIQRRRQIQNNNNGNSER
KCLLDHMI EISESNRDFTEEDIVNEACTFMLAGQDSVGAAVAFTLFLLTQNPECQDRCVLELATIFEDSN
RAPMTDLHEMRYMEMCIKEALRLYPSVPLIARKLGEEVRLAKHTLPAGSNV FICPYATHRLAHIYPDPE
KFQPERFSPENSENRHPYAFLPFSAGPRYCIGNRFAIMEIKTIVSRLRSYQLLPVTGKTTIAATFRITL
RASGGLWVRLKERDHPLIAH

>NP_610252.3 Cyp6u1, isoform A [Drosophila melanogaster]

MDLMHRTLLTALGALSVVYALVKFSLGYWKRRGILHEKPKFLWGNIKGVVSGKRHAQDALQDIYTAYKGR
APFVGFYACLKPFILALDLKLVHQIIFTDAGHFTSRGLYSNPSGEPLSHNLLQLDGHKWRSLHAKSAEVF
TPANMQKLLVRLSQISSRIQRDLGEKSLQ TINISELVGAYNTDVMASMAFGLVGQDNVEFAKWTRNYWAD
FRMWQAYLALFPLIARLLQYKSYAEPATAYFQKVALSQLQLHRRRDRQPLQTFQLYSNAEKPLTDIEI
AGQAFGFVLAGLPLNATLAFCLYELARQFEVQDRTRLEINKALEEHGGQVTPDECLRELRYTKQVLNETL
RLHTPHPFLLRRATKEFEVPGSVFVIKGNVLIPTAAIHMDPGIYENPQRFYPERFEEQARRSRPAAAF
LPFGDGLRGCIAARFAEQQLLVGLVALLRQHRYAPSAETSIPVEYDNRRLLLMPKSDIKLSVERVDKL

>NP_523961.1 cytochrome P450-4d8 [Drosophila melanogaster]

MQLMLRLNPKTFIKVGREYVLKFGHLQRVWIFNRLLIMSGDAELNEQLSSQEHLVKHPVYKVLGQWLG
GLLSDGKVVHQRKIIITPTFHFSILEQFVEVFDQQSNICVQRLAQKANGNTFDVYRSICAAALDIIAET

AMGTKIYAQANESTPYAEAVNECTALLSWRFMSVYLQVELLFTLTHPHLKWRQTQLIRTMQEFTIKVIEK
RRQALEDDQQSKLMDTADEDVGSKRMMALLDVLMLSTVDGRPLTNDEIREEVDTFMFEGHDTTTSALSFCL
HELRSRHEVQAKMLEEIVQVLGTDRSRPFVSIRD LGELKYMCEVIKESLRMYPPVPIVGRKLQTD FKYTHS
VHGDGVI PAGSEIIIGIFGVHRQPETFPNPDEFI PERHENGSRVAPFKMIPFSAGPRNCIGQKFAQLEMK
MMLAKIVREYELLPMGQRVECIVNIVLRSETGFGQLGMRKRKH

>NP_652018.1 cytochrome P450-6a17, isoform A [Drosophila melanogaster]
MLLLALIVVILSLLVFAARRRHGYWQRRGIPHDEVHPLFGNIKDWPNKRHIAEIFRDYFVKYKNSDYPPFA
GFFFFFFRTRAVVTDMEELLKRVLIKDFNHFENRGVFYNEIDDP LSATLFSIEGQKWRHLRHKLTPFTTSGK
MKNMFPIVVKVGEEMDKVFRSKTAADRQVLEVVLDLVARYTADVIGNCAFG LNCNSLYDPKAEFV SIGRK
AITEHRYGNMLDIFLFGFPKLSRRLRLKLN IQEAEDFYTKIVRETIDYRLRTKEKRND FMSLIEMYKNE
QSGNSEDGLTFNELLAQAFIFFVAGFETSSTTMGFALYELARNQDVQDKLREEIGNVFGKH NKEFTYEGI
KEMKYLEQVVMETLRKYPVLAHLTRMTD TDFSPEDPKYFI AKGTIVVIPALGIHYDPDIY PEPEIFKPER
FTDEEIAARPSCTWLPFGE GPRNCIGLRF GMMQTCVGLAYLIRGYKFSVSPETQIPMKIVVKNILISAEN
GIHLKVEKLAK

>NP_611004.1 Cyp317a1, isoform A [Drosophila melanogaster]
MWIIFLIIGLLVLGLLVLLIIAARYQRDYWRYLDIPHERPKKLWPIIRQIMTQTLSTEAMKAEHYS AIYK
KFKGSGPFCGFYALLQPRALILDRELIRQIMIKDFWNFNDRGLYCNQKSDPLSGDLYALRGESWKEMRQK
LDPSLEGDRMSLLYDCLYEEAEQ LLLTVNSTLMSQPHSTVHIQKIMRRYVLS SLAKCVFGLNAEQRKTY P
LEDFEQMTTELALNSHKHGYLMNLM MIRFPNFCRMLRMR RTPKQAE EYFIKLLTSIVEQRETS GKPQKDY L
QLLIDVKALEFITHQY EADKELGAHLQNELAAHAVVFLKAGYEQTANTLSYVLYELALHP ELQVRVREEV
KKAIERHDGHITHEGIKSL SFGQVINETLRMHPI TPYILRRTLNDYAVPDHPKYILVKELFLIIP THAI
HHDPIYDPDEEFKPD RWSGPRDSLQE QGTWFGFGVGARSCIGIQFAQLQLRLALALLLSEYEFSLNTRK
PLINLEDGIALTLMPLGVIEPGNEERAV

>NP_608912.1 Cyp28d1 [Drosophila melanogaster]
MCPISTALFVIAAILALIVF LTNFNSYWKKRGIPTAKSWPFVGSFSPSVFTQKRNVVYDIDEIYEQYKNT
DSIVGVFQTRIPQLMVTTP EYAHKIYVSDFRSFDNEMAKFTDSKTDPI LANNPFVLTGEAWKERRAEVT
PGLSANRVKAAYPVSLRVCKKFVEYIRRQSLMAPAQGLNAKDLCLCYTTEVISDCVLGISAQSFTDNPTP
MVGMTKRVF EQSFGFIFYTVVANLWPPITK FYSVSLFAKDVA AFFYDLMQKCIQVRRES PAAQQRDDFLN
YMLQLQEKKGLNAAELT SHTMTFLTDGFETTAQVLTHLTLFLARNPK EQMKLREEIGTAE LTFEQISELP
FTEACIHETLRIFSPVLAARKVVTEPC ELTNKNGVSVKLRPGDVVIIPVNALHHD PQYYE EPQSFKPERF
LNINGGAKKYRDQGLFFGFGDPRICPGMRFSLTQIKAALVEIVRNFDIKVNPKTRKDNEIDDTYFMPAL
KGGVWLD FVERN

>NP_608403.1 Cyp6v1, isoform A [Drosophila melanogaster]

MVYSTNILLAIVTILTGVFIWSRRTYVYWQRRRVKVFVQPTHLLGNLSRVLRLEESFALQLRRFYFDERFR
NEPVVGIYLFHQPALLIRDLQLVRTVLVEDFVSFSNRFAKCDGRSDKMGALSFLAKQPEWREIRTRLAP
AFAGAKLKQMFSLMEEIGCDLEWYLKRLTRDLRRGDAERGAIVSIKDVCDLYNTDMIASIAFGLRSYSLR
NTQSEIGSHCQDLFRPNVRIIDLFIYFVLPKLVPLLRPKLFTEPHAEFLRRVIQLVIEERERGGDLRND
LIEMLTLTKKEADLQDKSHFTHHRDFLAAQAASFEVAGIETCSASMSFALYELAKQPLMQSRLREIRE
AFASNPNGRLTYEAVARMEFLDMVVEETLRKYPIVPLLERECTPINKKRFYSLRPHAECYTRRGMPVFIS
NLAIHHPKYWPDPRDFPERFSAANKALQAPMSYMPFGAGPRNCIGMQIGLLQIKLGLVYFLHQHVEI
CDRTVERIQFDAKFALLASEQRIYLVKVDCL

>NP_525043.1 cytochrome P450-4d2, isoform A [Drosophila melanogaster]

MLGVVGVLLLVAFATLLLDLWDFLWRRRNGILPGPRPLPFLGNLLMYRGLDPEQIMDFVKKNQKRYGRLYR
VWILHQAVFSTDPRIEFVLSSQQHITKNNLYKLLNCWLGDGLLMSTGRKWHGRRKIITPTFFHKILEQ
FVEIFDQQSAVMVEQLQSRADGMTPIINIFPVICLTALDIAETAMGTKINAQKNPNLPYVQAVNDVTNIL
IKRFIHAWQRVDWIFRLTQPTEAKRQDKAIKVMHDFTENIIRERRETLVNNSKETTPEEEVNFLGQKRRM
ALLDVLQSTIDGAPLSDDEDIREEVDTFMFEGHDTTTSAISFCLEYEISRHPVQQRLQOEIRDVLGEDRK
SPVTLRDLGELKFMENVIKESLRLHPPVPMIGRWFAEDVEIRGKHIPAGTNFTMGIFVLLRDPEYFESPD
EFRPERFDADVPQIHPYAYIPFSAGPRNCIGQKFAMLEMKSTVSKLLRHFELLPLGPEPRHSMNIVLRSA
NGVHLGLKPRA

>NP_525031.1 cytochrome P450-4g1 [Drosophila melanogaster]

MAVEVVQETLQQAASSSTTVLGFSPMLTTLVGTLMALYEYWRNSREYRMVANIPSPPELPILGQAH
VAAGLSNAEILAVGLGYLNKYGETMKAWLGNVLLVFLTNPSDIELILSGHQHLTKAEYRYFKPWFGDGL
LISNGHHWRHHRKMIAPTFFHQSILKSFVPTFVDHSAVARMGLEAGKSFVDVHDYMSQTTVDILLSTAMG
VKKLPEGNKSFEYAQAVVDMCDIIHKRQVKLLYRLDSIYKFTKLREKGRMMNIIILGMTSKVVKDRKENF
QESRAIVEEISTPVASTPASKKEGLRDDDDIDENDVGAKRRLALLDAMVEMAKNPDIEWNEKDIMDEV
NTIMFEGHDTTSAGSSFALCMMGIHKDIQAKVFAEQKAIFGDNMLRDCTFADTMEMKYLERVILETLRLY
PPVPLIARRLDYDLKLAGPYTPVKGTTVIVLQYCVHRRPDIYPNPTKFDPDNFLPERMANRHYYSFIPF
SAGPRSCVGRKYAMLKLVLLSTIVRNYIVHSTDTEADFKLQADIILKLENGFNVSLEKRQYATVA

>NP_524828.1 cytochrome P450-4p1 [Drosophila melanogaster]

MIIWLILALSALLYWLHRANKDYHILSFFTKRIRLKDGTPEIIAPIAKGKTIFGNTLDLYGRDHAGVF
NYSRERAKEMGTSYIEYVFGKAIYNIIDADSAENVLNHPNLITKGLVYNFLHPFLRTGLLTSTGKKWHAR
RKMLTPTFFHFNILNQFQEIFKTESQKFLQFEGQDEVTTILHDVIPRFTLNSICETAMGVKLDMAEKGD

RYRENFSQIEECFIRRLSNPLLWGDKLFEMFAAKDFASALDVVHRFSSEIIAKRRDLLKDELDKSSSTAD
DDGFVSKKRFAMLDTLIYAEKDGLIDHIGICEEVDTLMFEGYDTTSSIGLIFGLMNMSLNPDKQELCYQEI
QEHIDDDLNLDVQGQNLKLYEYFMKETTRLFPSPVIMGREAVQETELANGLILPKGAQITIHVFDIHR
NAKYWDSPEEFRPERFLPENVDQRHTYAYVPPSAGQRNCIGKKYAMQEMKTLMVVLLKQFKVLKAIDPQK
IVFHTGITLRTQDKIRVKLVRRRT

>NP_524598.1 cytochrome P450-4c3 [Drosophila melanogaster]

MSSKVITSLMAESILLSKVGQVISGYSPIVFLGSGILIFLVVYNKRRSRLVKYIEKIPGPAAMPFLGNA
IEMNVDHDELFNRVIGMQKLWGTRIGINRVWQGTAPRVLLFEPETVEPIILNSQKQFVNKSHDYDYLHPWL
EGLLTSTDRKWHRRKILTPAFHFKILDDFIDVFNEQSAVLARKLAVEVGSEAFNLFPPYVTLCTLDIVCE
TAMGRRIYAQSNSESEYKAVYIGISIVQSRQAKIWLQSDIFISLTAEYKLHQSINTLHGFSNMVIRER
KAELAILQENNNNNNNNAPDAYDDVGKKKRLAFLDLLIDASKEGTVLSNEDIREEVDTFMFEGHDTTSA
ISWTLFLLGCHPEYQERVVEELDSIFGDDKETPATMKNLMDMRYLECCIKDSLRLFPSPMMARMVGEDV
NIGGKIVPAGTQAIIMTYALHRNPRVFPKPEQFNPDNFPENCAGRHPFAYIPFSAGPRNCIGQKFAILE
EKAVISTVLRKYKIEAVDRREDLTLGELILRPKDGLRVKITPRD

>NP_523646.1 cytochrome P450-9b2 [Drosophila melanogaster]

MALIEICLALVVIGYLIYKWSTATFKTFEERKLYFEKPYPFVGNMAAAALQKSSFQRQLTEFYERTRQHK
LVGFFNMRTPMITLNDPELIKVKVCVDFDHFPHQPFITSNDRFLNDMLSVMRDQRWKHMRNTLTPVFTA
AKMRNMFITLMNESFAECLQHLDSSTKLPGRKGFVDMKVMCNKLSNDIIATTAFLKVNYSYDNPKNEFY
EIGQSLVFSRGLQFFKMLSTLVPKLFSLKLTIFDSAKVDYFARLVVEAMQYREKHNI TRPDMIQLLME
AKNESEDKWTDEIVAQCFFFAAFENNSNLICTTTTYELLYNPDVQERLYEEIVETKKALNGAPLTYDA
VQKMTYMDMVISLRSKWTLAAATDRLCSKDYTLTDDGTKLDFDKVGDRIINIPISGLHLDDRYFPEPRK
FDPDRFSEERKGMVPTYLPFGVGPNCIGNRYALMQVKGMLFNLLLHYKIEASPRTIKDLWGSASGFN
FTPRSGFWMHLVPRK

>NP_611370.2 Cyp12b2 [Drosophila melanogaster]

MWKYSNKIIYRNVSGNLWFNRSVGGTLSQQTQLELADSRIDEKWQQARSFGEIPGPSLLRMLSFMP
GGALRNTNLIQMNRLMREMYGDIYICIPGMMGKPNVFTYNPDDFEMTYRNEGVPPIRIGLESNYYRKIH
RPDVFKGVGGLASDQGEWADIRNKVNPVLMKVQNVQRNLPQLDQISKEFIDKLETQRNPETHLTTFDFH
NQLKMWAFESISFVALNTRMGLLSDNPDNADRLAKHMRDFFNYSFQFDVQPSIWTIFYKTAGFKKFLKTY
DNITDITSNYIETAMRGFGKNDGKTKCVLEQLLEHNKVAVTMVMMDLMAGIDTSSACLTILYHLARN
PSKQEKLRRELLRILPTTKDSLTDQNTKNMPYLRAKIEGLRITSITPGNFRITPKDLVLSGYQVPRGTG
VLMGVLELSNDDKYFAQSSEFIPERWLKSDLAPDIQACPAARTRNPFVYLPFGFGPRTCIGKRIAELEIE
TLLVRLRLRSYKVSWLPETPIEYESTIILSPCGDIRFKLEPVGDLM

>NP_608689.2 Cyp309a2 [Drosophila melanogaster]

MMPERFSFDFRPIDQYWTRAKGACSNTRKGNMYILASLALILLHLLVLPYLYLTWHHKYWRKRGLVTAR
PLTLLGTYPGLLTRKSNLVFDVQKIYDKYKKGKRAVGVFVTRQPQILVLDPELAHEVLVSNFRCYKDSLQ
SSYL RHAKWDKYARLNPFWASGQSWRRLRTDAQAGISGSRLRQAYNIWEQGGQMLTEYMTQQVAEKNNIL
ETRDLCFRYTAHVMAFDIWGIDAGTLTRPMEQPNKVQEMASKWTSYAFYMLTLMATIVAPCSRLLLRFR
FYPKETDEFFSNLTKESIELRLKAGDSTRDYLSHLLQLRDQKQATHDDLVGHALTVMLDGYDTSGTALL
HALYYLAENPAVQQKLRVEILSCMASEKSLDFEKLSSLYLEQVIYESLRSSLI PQYTKVCTLPTVIRL
SESKSLDVEVGMTIMI PNYQFHDKQYFPEPEAFKPERFDNGAYQELMRKGI FL PFS DGP RICMGVPLAM
LTLKSALVHILSNFQVVRGRDRLIPKGD SGFGVVLQGDVNLE YRRFFR

>NP_572780.3 Cyp311a1 [Drosophila melanogaster]

MALWPLLLITLTIWILVRKWTLLRLGSSLPGPWAFPLLGNAQMVGKLRPEYIFLVFTELRDRFGATYRLR
LGPQLWVFLHSAEETRQALHDPTLRKADTFMQLEPLIGNGLLISHGAHWTRQRLLTPAFQPQLLRSFAP
AIGGHVERLVGRLGATRGAFLEVTEPLFACLLDAIVDTSMGAQLDTQSV DHP I IQAFHLSKLLFKRMI
NPLLSSDWIFQRTQLWRDLDEQLQVIHSQMESVIEKRAKELLDMGEPAGRAHNLLDTLLLAKFEGQSLSR
REIRDEINTFV FAGVDTTAAMSFVLYALAKFPETQTRLRKELQDVALDETTDL DALNGLPYLEALIKEV
LRLYTIVPTTGRQTTQSTEIGGRTYCAGVTLWINMYGLAHDKEYYPDPYAFKPERWLPEDGAVAPPAFSY
IPFSGGPHVCIGRRYSLLMKLLTARLVREFQMELSPEQAPLRLEAQMV LKAQQGINVSFLKQ

>NP_647975.2 spook, isoform A [Drosophila melanogaster]

MLAALIYITILAILLSVLATSYICIIYGVKRRVLQPVKTKNSTEINHAYQKYTQAPGPRPWP IIGNLHLL
DRYRDS PFAGFTALAAQQY GDIYSLTFGHTRCLVNNLELIREVLNQNKGVM SGRPDFIRYHKLFGGERSN
SLALCDWSQLQQKRRNLARRHCS PREFSCFYMKMSQIGCEEMEHWNRELGNQLVPGE PINIKPLILKACA
NMFSQYMC SLRFDYDDVDFQQIVQYFDEIFWEINQGHPLDFLPWLYPFYQRHLNKI INWSSTIRGFIMER
IIRHRELSVDLDEPDRDFTDALLKSLEDDKDVSRNTIIFMLEDFIGGHS AVGNLVMLVLA IAKNVDIGR
RIQEEIDAIIEEENRSINLLDMNAMPYTMATIFEVLRYS SSPIVPHVATEDTVISGYGVTGKTIVFINNY
VLNTSEKFWVNPKEFNPLRFLEPSKEQSPKNSKGS DSGIESDNEKLQLKRNI PHFLPFSIGKRTCIGQNL
VRGFGFLVVVNMQRYNIS SHNPSTIKISPESLALPADCFPLVLT PREKIGPL

>NP_523749.2 cytochrome P450-6a8 [Drosophila melanogaster]

MALTYILFQVAVALAILTYIHRKLT YFKRRGIPFVAPHLIRGNMEELQKT KNIHEIFQDHYNKFRESK
APFVGFFFFQSPA AFVIDLELAKQILIKDFS NFSNKGIFYNEKDDPISAHFNLDGAQWRLLRNKLSSTF
TSGKMKLMPYPTVVS VANEFMTVMHEKVPKNSVLEIRDLVARFTVDVIGTCAFGIQCNSLRDEKAEFLYFG
KRSLVDRKHGTLN GFMRSYPKLARKLGMVRTAPHIQEFYSRIVTETVAVREKEHIKRNFMDMLIELKN

QKEMTLENGDVVRGLTMEEVLAQAFVFFIAGFETSSSTMGFALYELAKNPDIQDKVRAEVVEVIEQHDQN
FTYECKDLKYLNVLDLRLTYTIVPNLDRMAAKRYVVPGHPNFVIEAGQSVIIPSSAIHHDPSIYPEP
FEFRPERFSPEESAGRPSVAWLPGDGPNCIGLRFQMQARIGLALLIRNFKFSTCSKTPNPLVYDPKS
FVLGVKDGIIYLVKQVETV

>NP_724937.1 Cyp49a1, isoform C [Drosophila melanogaster]

MELRPSMPSLRHYKGLRRDFFGDVAGLIGVHGPKWEAFRQEVQHILLQPQTAKKYIIPPLNDIASEFMGR
IELMRDEKDEL PANFLHELYKWALESVGRVSLDTRLGCLSPGSEEAQQIIEAINTFFWAVPELELRMPL
WRIYPTKAYRSFVKALDQFTAICMKNIGKTMKADADEARGLSKSEADISIVERIVRKTGNRKLAILAL
DLFLVGVDTTSVAASSTIYQLAKNPKQKFLDELQKVFPHREADINQNVLEQMPYLRACVKETLRMRPV
VIANGRSLQSDAVINGYHVPGKTHVIFPHLVVSNPDYFPEPKRFLPERWLKQSTDAAGCPHANQKIHPF
VSLPFGFGRRMCVGRRAEIELHTLLAKIFRKYKVSYNSGEFVYRVNSTYIPQSPLNFKLTLRDE

>NP_573003.2 Cyp4s3 [Drosophila melanogaster]

MSTLALVAVFLWAAFLRYLPKILNFLRLQRFAKTLPGPTIGELIANVKKGEILNWLKELREKHGPFVRIW
FGKDLMMVFTDPEDIKQLLGNQLLTKSRNYELLEPWLGKLLTNGGESWHRRRKLLTPGFHFRILSEFK
EPMEENCRILVRRRLRTKANGESFDIYPYITLFDALDAICETAMGIKKHAQLQSDSEYVQAVQSI CRVMHKQ
SFSFWQRLNVFFKHTKPGKEREAAKVLHDETNRVIRLRREQLIQERNEWKPEAEQDDVGAKRRLAFLDM
LLLTQMEGGAELSDTDIREEVDTFMFEGHDTSSAIAFALSLLSKNPDVQQRAFEEASELEGREKESMPY
LEAVIKETLRIYPSVPPFSRKVLEDELVGKLTVPKGASISCLIIYMLHRDPKNFPDPERFDPDRFLVNEKQ
MHPFAFAAFSAGPRNCIGQKFAMLELKTSLAMLLRSYRFLPKDKHQPKPLAELVTKSGNGIRLRILPRDE
NGTTA

>NP_727590.1 Cyp318a1 [Drosophila melanogaster]

MHLNIALWACGALLAVLLAWQRKRCWRLIWQLNGWRGVIQQPVLWLLLCINLHPNSILEKVSQYRVHFQR
PLAVLVGTRVLLYIDDPAGMECVLNAPECLDKTFLQDGGFVRRGLLHARGQKWKLRKQLNPAFVSHNIVA
SFFDVFNSVGNQMVQFQQTQTNLHGQAVKFTAEDLLSRAVLEVSCLTIMGTPTNFTQLDDAHIAHSYKR
LLEISAVRVVVKPWLQIRLLHRLLAPELYEESKCKAKLLEDFVGGIVRTKHRNWRLRDAVGGEKSGEDASN
GWQRRIFIEQIFQLAANGEMTLEEIMDEAQMVLVVSFETVSNSIMLALLCLATNKGDCQRLLAEIRALV
PDVGQVGLQQLRLYLDAFVSESLRLLATVPMNLRHVSDFRDLRQAGHETIVPQNSIVVLDTFNMQRDE
RWWGANARQFDPQRFLDQEEEQLSKGHNDSSGSEKRRQRDRRHSYSFLPFSNGLRSCIGRRYGLFIMKVF
LVKLI TNDFQSDFELEKLFQFVENISLKFKNADDILLTIQPKKEST

>NP_477117.2 cytochrome P450-4e2, isoform A [Drosophila melanogaster]

MWFVLYIFLALPLLLVAYLELSTFRRRRVLNKFNPRGLPLMGNAHQMGKNPSEILDTVFSWWHQYKGDN

FVFWIGTYSNVLVTSKYLEFILSSQTLITKSDIYQLTHPWLGLGLLTSTGSKWHKHKRKMITPAFHFNIL
QDFHEVMNENSTKFIKHLKTVAAGDNIFDFQEQAHYLTLDVICDTAMGV SINAMENRSSSIVQAFKDMCY
NINMRAFHPKRNELLYRLAPDY PAYSRTLKTLQDFTNEIIAKRIEAHKS GAVSTNAGDEFTRKKMAFLD
TLLSSTIDGRPLNSKELYEEVSTFMFEGHDTTTTSGVSAFVYLLSRHQDEQRKLFKEQREVMGNSSELGRDA
TFQEISQMKYLDLFIKEAQRVYPSVPIGRFTEKDVIDGDVLPKGTTLNLGLVMLGYNEKVFKDPHKFR
PERFELEKPGPFYVPPSAGPRNCIGQKFALLEIKTVVSKIIRNFEVLPALDELVSKDGYISTTIGLPDA
ERKKRDPYRHKYDPILSAVLTLSKSENGLYIRLKERH

>NP_650368.1 Cyp313a1 [Drosophila melanogaster]

MLTINLLLAVGALFWIYFLWSRRRLYFLMLKIPGPIGLPILGSSLENIITYKRKLSFRTKYLNKYGSTIL
TWMGPVPPFIVTRDPKVVEDIFSSPDCHNKSQHIVNAITSCMGNGLLGKQDPHWLDRRKHFNPSFKQDLLL
SFFHIFDAETKVLNLLDITYVDKGEIDVVPPEMLRWSFKIAAQTTMGSEVKHDEHFKNGLVESFESLISH
STLNILMPLVQNRMISKICGYDKLRADNFSRIQKMLDNVNVNKKVNPLPKTSDSDPESNIVINRAMELYRKG
DITYMDVKSECCIMIAAGYDTSALTVYHALFLLANHPEHQEAVFEELNGVFPDAGHFGITYPDMQKLDYL
ERVIKETLRLIPAIPITARETKNDVRLSNGVLI PKGVVIGIDMFHTHRNP EVWGPADNFPDNFLAENM
EQKHPYAYIPFARGKRNCIGSKYAMSSKFALCRILRNYKISTSTLYKDLVYVDNMTMKLAEYPRLLKLR
RG

>NP_650327.1 Cyp6d5 [Drosophila melanogaster]

MIGIYLLIAAVTLLYVYLKWTFSYWDRKGF PSTGVSIPFGALESVTKGKRSFGMAIYDMYKSTKEPVI GL
YLTLRPALLVRDAQLAHDV LVKDFASFHDRGVYVDEKNDPMSASLFQMEGASWRALRNKLTPTSFTSGK LK
AMFETSDSVGDKLVDSIRKQLPANGAKELELKKLMATY AIDI IATTIFGLDVSFADPNNEFQIISKV N
RNNIEDIIRGTSSFLYPGLEKFFVKIGWKQEATERMRELSNR TVDLREQNNIVRKDLLQLLLQLRNQGI
NTDDNIWSAESTKNGVKMSKDLIAGQLFLFYVAGYETTASTTSFTLYELTQNPEVMEKAKEDVRS AIEK
HGGKLT YDAISDMKYLEACILETARKYPALPLLNRICTKDY PVPDSKLVIQKGTPIIISLIGMHRDEEYF
PDPLAYKPERYLENGKDYTQAAYLPFGE GPRMCIGARMGKVNKIAIAKVL SNFDLEIRKEKCEIEFGVY
GIPLMPKSGVPVRLSLKK

>NP_651563.1 Cyp6a18, isoform A [Drosophila melanogaster]

MQLTYFLFQVAVALLAIVTYILHRKLT YFKRRGIPYDKPHPLRGNMEGYKTRTVHEIHQEY YNKYRNSK
APFVGFYLFQKPAAFVIDLELAKQILIKNFSNFTDKGIYNEKDDPMSAHLFNLDG PQWRLLRSKLSSTF
TSGMKMFMYPTVVSVAEEFMAVMHEKVSSENSILDVRDLVARFTVDVIGTCAFGIKNSLRDEKAEFLHFG
RRALLDSRHGNLV SGLMRSYPNLARRLGLCRNTAQIQEFYQRIVKETVTLREKENIKRND FMDMLIGLKN
QKNMTLENGEVVKGLTMEIVAQAFVFFIAGFDTSSSTMGFALYELAKNPSIQDKVRAELGQVLEQHDQK
FTYECIKDLKYLDQVINETLRHYTIVPNVDRVA AKRFVVPGNPKFVIEAGQSVIIPSSAIHHDPSIYPEP

NEFRPERFSPEESAKRPSVAWLPGEGPRNCIGLRFQMQARIGLAMLIKNTFSPCSATPDPLTFDPHS
AILLGIKGGIQLKVEAI

>NP_650189.1 Cyp9f2 [Drosophila melanogaster]

MLWEFFALFAIAAALFYRWASANNDFFKDRGIAYEKPVLYFGNMAGMFLRKRAMFDIVCDLYTKGGSKKF
FGIFEQRQPLLMVRDPDLIKQITIKDFDHFINHRNVFATSSDDDPHMSNLFGSSLFMRDARWKDMRST
LSPAFTGSKMRQMFQLMNQVAKEAVDCLKQDDSRVQENELDMKDYCTRFTNDVIASTAFGLQVNSFKDRE
NTFYQMGGKLTFTFLQSMKFMFLFALKGLNKILKVELFDRKSTQYFVRLVLDAMKYRQEHNIVRPDMIN
MLMEARGIIQTEKTKASAVREWSDRDIVAQCFVFFFAGFETSAVLMCFTAHELMENQDVQQRLYEVEVQV
DQDLEGKELTYEAIMGMKYLDQVVNEVLRKWPAAIAVDRECNKDITFDVDGQKVEVKGDVWLPTCGFH
RDPKYFENPMKFDPERFSDENKESIQPFTYFPFGLGQRNCIGSRFALLEAKAVIYYLLKDYRFAPAKKSC
IPLELITSGFQLSPKGGFWIKLVQRN

>NP_651082.1 Cyp6d4 [Drosophila melanogaster]

MFLSILLAVTLLTLAWFYLRHYEYWERRGFPFEKHSGIPFGCLDSVWRQEKSMGLAIYDVYVSKSERVL
GIYLLFRPAVLIRDADLARRVLAQDFASFHDRGVYVDEERDPLSANIFSLRQSWRSMRHMLSPCFTSGK
LKSMTSSEDIGDKMVAHLQKELPEEGFKEVDIKKVMQNYAIDIIASTIFGLDVNSFENPDNKFRKLVSL
ARANNRFNAMFGMMIFLVPSIAQFLFRIGFKNPVGLAMLQIVKETVEYREKHGIVRKDLLQLLIQLRNTG
KIDENDEKSFSIQKTPDGHIKTISLEAITAQAFIFYIAGQETTGSTAAFTIYELAQYPELLKRLQDEVDE
TLAKNDGKITYDSLKMEFLDLQVQETIRKYPGLPILNRECTQDYTPDTHVPIPKGTPVVISLYGIHHD
AEYFPDPETYDPERFSEESRNYNPTAFMPFEGGPRICIAQRMGRINSKLAIKILQNFNVEVMSRSEIEF
ENSGIALIPKHGVRVRLSKRVPKLS

>NP_652020.1 Cyp4d14, isoform A [Drosophila melanogaster]

MYLELFAILLATALAWDYMRKRRHNKMYAEAGIRGPKSYPLVGNAPLLINESPKTIFDMQFRLIAEFGKN
IKTQMLGESGFMTADSKMIEAIMSSQQTIQKNNLYSLVNWLGDGLLISQGKKWFRRKIITPAFHFKIL
EDFVEVFDQQSATMVQKLYDRADGKTVINMFPVACLAMDIAETAMGVKINAQLQPQFTYVQSVTTASA
MLAERFMNPLQRLDFTMKLFYPKLLDKLNDVAVKMHDFDNSVITERRELLQKAIADGGDADAALLNDVGQ
KRRMALLDVLLKSTIDGAPLSNDDIREEVDTFMFEGHDTTSSIAFTCYLLARHPEVQARVFQEVDRVIG
DDKSAPVTMKLGLGELYECVIKESLRLFPSPVPIIGRYISQDTVLDGKLIPADSNVILIYHAQRDPDYF
PDPEKFI PDRFSMERKGEISPFAYTPFSAGPRNCIGQKFAMLEMKSTISKMVRHFELPLGEEVQPVNLV
ILRSTTGINCGLKPRVY

>NP_610473.1 Cyp4p3 [Drosophila melanogaster]

MLLILWLVGAFIVLIQWIYRLNRDYCILGFFAKRIRTKNGQNPEIAPLVKGSTIFANSFDLYGKDHSGVF

EHSRDCAKKLGKSYAEYAMGTAIYNVIDADSAERVLNDPNLINKGTIYDFLHPFLRTGLLTSTGKKWHAR
RKMLSPTFFHFNILNQFQEIFITESLKFLEQFKGNDEAIISLNEVIPRFTLNSICETAMGVKLDMAEKGD
RYRENFRQIEECFIRMSNPLLWSDTLFKMFAEKDYASALDVVHGFSSEIIAKRRDQLNDEIDSRGNTQT
AEDELFTSKRRFAMLDTLILA EKDGLIDHIGICEEVDTLMFEGYDTSIGLMFGLMNMSLYPEEQEKCYQ
EIQANIDDELNILNIGQLNKLKNLEYFIKETMRLFPSVPAMGRETTRETELSNGLILPKGSQIFVHVFDI
HRNPEYWDSPEEFRPERFLPENSQNRHTYAYIPFSAGQRNCIGQKFAMQEMKTLMVALLKQFQILPEIDP
KTIVFQTGLTLRTKNQIHVKLVRRK

>NP_609891.1 Cyp310a1 [Drosophila melanogaster]

MWLLLPILLYSAVFLSVRHIYSHWRRRGFPSEKAGITWSFLQKAYRREFRHVEAICEAYQSGKDRLLGIY
CFFRPVLLVRNVELAQTILQQSNGHFSELKWDYISGYRRENLEKLAPMFGTKRLSEMFGVQKVGDLHI
HLLDRQGQGCPEVDIQQKLRVYSVNI IANLIYGLDINNFEHEDHILTSYLSHSQASIQSFTLGRLPQK
SSYTYRLRDLIKQSVELREDHGLIRKDILQLLVRFRNGNEVSGDKWQLEPINDADKLLSIKRLAKVAEDL
LKVSLDAVASTVTFLLLEILQEPLIVEKLRRAEIKELSNENGQLKFEELNGLRYMDMCLKETLRKYPPLPI
IERVCRKSYSLPNSKFTIDEGKTLMVPLLAMHRDEKYFSEPMKYKPLRFLQTANDVGQCEDKTKSNVFIG
FGIGGSQCVCQNFQAKLVIKVALIKLLQNFHLELDANQVKT LKVSHRPAPFIHTKDGLKVKLKRREINTKFI
YS

>NP_609694.1 Cyp28a5 [Drosophila melanogaster]

MVLITLTLVSLVVGLLYAVLVWNYDYWRKRGVPGPKKLLCGNYPNMFMTMKRHAIYDLDDIYRQYKNKYD
AVGIFGSRSPQLLVINPALARRVFSNFKNFHDNEIAKNIDEKTDFFIFANNPFSLTGEKWKTRRADVTPG
LTMGRIKTVYPVTNKVCQKLEWVEKQLRLGSKDGDIDAKHMSLCFTTEMVTDCVLGLGAESFSDKPTPIM
SKINDLFNQPWTFVLFFILTSFPSSLHLIKLRFVPDVERFFVDLMGSAVETTRAQLAAGKQFERSDFL
DYILQLGEKRNLDNRQLLAYSMTFLLDGFETTATVLAHILLNLGRNKEAQNLLREEIRSHLQDGTIAFEK
LSDLPLYLDACVQETIRLFPFPGFMSNKLCTESIEIPNKEGPNFVVEKGTTVVPHYCFMLDEEFFPNPQSF
QPERFLEPDAAKTFRERGVFMFGDGRVCIGMRFATVQIKAAIVELISKFNVKINDKTRKDNDYEPGQI
ITGLRGGIWLDEKL

>NP_608916.1 Cyp4ac1 [Drosophila melanogaster]

MWIALLGIPILLAVLTLKHKINKTYFILSLTKRVTEDEGSPLESKVAIMP GKTRFGNNLDILNFTPASV
FNFVRESTAKAKGQNYLWYFLYAPMYNVVRPEEAEEVFQSTKLITKNVYELIRPFLGDGLLISTDHKWH
SRRKALTPAFHFVNLQSLFGIFKEECKKFLNVLEKNLDAELELNQVIPPFTLNNICETALGVKLDMMSE
NEYRKAIHAIEEVLIQRVCNPLMYYNWYFFVYGDYRKHLQNLRIVHDFSSRIIERKRQQFQQKQLGEVDE
FGRKQRYAMLDTLLAAEADGQIDHQICDEVNTFMFEGYDTSSTCLIFTLLMLALHEDVQKKCYEEVENL
PEDSDDISMFOFNKLVYLECVIKESLRMFPSVFFIGRQCVEETVNVGMVMPKDTQISIHIDIMRDPHF

PKPDLFQPDRLPENTVNRHPFAYVPPFSAGQRNCIGQKFAILEMKVLLAAVIRNFKLLPATQLEDLTFEN
GIVLRTQENIKVKLSKRVK

>NP_608911.1 Cyp28d2 [Drosophila melanogaster]

MCPVTTFLVLVLTLLVLVYVFLTWNFNYWRKRGIKTAPTWPFFVGSFPSIFTRKRNIAYDIDDIYEKYKDT
DNMVGVFTRVLPQLLMCEPEYIHKIYATDFRSFHNNEWRFVFNKKTDMILGNNPFVLTGDEWKERRSEIM
PALSNNRVKAVYPVSVQVCKKFEYIRRQQMATSEGLDAMDLSLCYTTEVVSDCGLGVSASQFTDTPTP
LLKMIKRVFNTSFEFIFYSVVTNLWQVKRFYSVPPFNKETEVFFLDIIRRCITLRLEKPEQQRDDFLNY
MLQLQEKKGLHTDNILINTMTFILDGFETTALVLAHIMLMGRNPEEQDKVRKEIGSADLTFDQMSSELP
LDACIYETLRLFSQPVAARKLVTEPFEFANKNGRTVHLKPGDVVTIPVKALHHDPPQYEDPLTFKPERFL
ESNGGGMKSYRDRGVYLAFGDGPRHCPGMRFALTQLKAALVEILRNFEIKVNPKTRSDNQIDDTFFMATL
KGGIYLDKDL

>NP_608457.1 Cyp6t1 [Drosophila melanogaster]

MIAVFSLIAAALAVGSLVLLPVVLRGGCLLVVTIVWLWQILHFHWRRRLGVPFVPAAPFVGNVWNLRLGA
CCFGDQFRELYESKEAAGRAVFGIDVLHNNHALLRDPALIKRIMVEDFAQFSSRFETTDPTCDTMSQNL
FFSKYETWRETHKIFAPFFAAGKVRNMYGLENIGQKLEEHMEQKLSGRDSMELEVQKLCALFTTDIIAS
LAFGIEAHSIQNPEAEFRMCIEVNDPRPKRLLHLFTMFFFRLSHRVGTHLYSEEYERFMRKSMDYVLS
QRAESGENRHLDLIDIFLQKRTEPAESIHRPDDFAAQAFLLLAGFDTSSTITFALYELAKNTTIQDR
LRTELRAALQSSQDRQLSCDVTGLVYLRQVVDEVLRLYPPTAFLDRCCNSRTGYDLSPWNGGSPFKLRA
GTPVYISVLGIHRDAQYWPNEVDFPERFSAEQRQHHMPMTYLPFGAGPRGCIGTLLGQLEIKVGLLHIL
NHRVEVCERTLPEMRFDPKAFVLTAHNGTYLRFVKNLS

>NP_572721.1 Cyp4g15, isoform A [Drosophila melanogaster]

MEVLKKAALGSPSSVFYFLLLPTLVWYIYWRLSRAHLYRLAGRLPGPRGLPIVGHFLFDVIGPASSVFR
TVIRKSAPFEHIAKMWIGPKLVVFIYDPRDVELLSHVYIDKASEYKFFKPWLGDLLISTGQKWRSHR
KLIAPTFFHLNVLKSFIELFNENSRNVVRKLAEDGRTFDCHDYMSEATVEILLETAMGVSKKTQDKSGFE
YAMAVMRMCDILHARHSIFLRNEFVFTLTRYYYKEQGRLNIIHGLTTKVIKSKAAFEQGTGSLAQCE
LKAAALEREEREQNGGVDQTPSTAGSDEKREKDEKASPVAGLSYQSAGLKDDLDVEDNDIGEKKRLAF
LDLMLESAQNGALITDTEIKEQVDTIMFEGHDTAAGSSFFLSLMGIHQDIQDRVLAELDSIFGDSQRPA
TFQDTLEMKYLERCLMETLRMYPPVPLIARELQEDLKLNSGNVIIPRGATVTVATVLLHRNPKVYANPNV
FDPDNFLPERQANRHYAFVPPFSAGPRSCVGRKYAMLKILKILLSTILRNRYVSDLTESDFKLQADIILK
REEGFRVRLQPRTS

>NP_524771.1 cytochrome P450-4e1 [Drosophila melanogaster]

MWIVLCAFLALPLFLVITYFELGLLRRKRMLNKFQGPSMLPLVGNAHQMGNTPTTEILNRFFGWWEYKDN
FRYWIGYYSNIMVTNPKYMEFILSSQTLISKSDVYDLTHPWLGLGLLTSTGSKWHKHKRMITPAFHFNII
QDFHEVMNENSTKFIDQLKKVADGGNIFDFQEEAHYLTLDVICDTAMGVSINAMENRSSSVVQAFKDITY
TIKMRAFSPWKRNYLFHFAPEYPEYSKTLKTLQDFTNEIIAKRIEVRKSGLEVGKADFEFSRKKMAFLD
TLLSSKVDGRPLTSQELYEEVSTFMFEGHDTTTTSGVGFVYLLSRHPDEQEKLFEQCDVMGASGLGRDA
TFQEISTMKHLDLFIKEAQRLYPSVPPFIGRFTEKDYVIDGDIVPKGTTLNLGLLMLGYNDRVFKDPHKFQ
PERFDREKPGPFYVPPSAGPRNCIGQKFALEIKTVVSKIIRNFEVLPALDELVSKDGYISTTLGLQPA
EKKSRAHNNHYDPILSASMTLKSENGLHLRMKQRLVCDST

>NP_523850.1 cytochrome P450-9c1 [Drosophila melanogaster]

MVFVELSIFVAFIGLLLYKWSVYTFGYFSKRQVAHEKPIPLGNIPWSVLMGKESYIKHSIDLHLRLKQH
KVYGVFNLRDPLYLSDPELIRQVGIKNFDTFTNHRKGITTEGFNDTSVISKSLSLRDRRWKQMRSTLTP
TFTSLKIRQMFELIHFCNVEAVDFVQRQLDAGTSELELKDFTRYTNDVIATAAFGIQVNSFKDPNNEFF
SIGQRISEFTFWGGLKVMYIILMPKLMKALRVPVMDMNNVDYFKKLVFGAMKYRKEQSIVRPDMIHLLME
AQRQFKAEQEGSAESAAQQDKAEFNDDLLAQCLLFFSAGFETVATCLSFTSYELMMNPEVQEKLLEIL
AVKEQLGEKPLDYDTLMGMKYLNCVSESIRKWPFAFIVDRMCGSDFQKDEEGEVVNLREDDLHVHINV
GALHHDPDNFPPEQFRPERFDEEHKHEIRQFTYLPFGVGQRSCIGNRLALMEVKSLIFQLVLRYLKPT
DRTPADMSSISGFRLPRELFWCKLESRGPA

>NP_523645.1 cytochrome P450-9b1 [Drosophila melanogaster]

MSFVEICLVLATIGLLLFKSTGTGFAFEGRNLYFEKPYPFLGNMAASALQKASFQKQISEFYNRTRHHK
LVGLFNLRTPMIQINDPQLIKKICVKDFDHFPHQTLNIPNERLVNDMLNVMRDQHWRNMRSVLTPVFTS
AKMRNMF'TLMNESFAQCLEHLKSSQPIAAGENAFELDMKVLCKNLSNDVIATTAFLKVNFSFDDPENEFH
TIGKTLAFSRGLPFLKFMCLLAPKVFNFKLTIFDSTNVEYFVRLVVDAMQYREKHNI TRPDMIQLLME
AKKESKDNWTDDEIVAQCFFFAAFENNSNLICTTAYELLRNLDIQRERYEVEKQEQEALKGAPLTYDA
AQEMTYMDMVISSESLRKWTL SAAADRCAKDYTLTDEGTKLFEFKAGDNINIPICGLHWDERFFPQPQR
FDPERFSERRKDLIPYTYLPFGVGPRSCIGNRYAVMQAKGMLYNLMLNYKIEASPRTRDMWESARGFN
IIPTTGFWMQLVSRK

>NP_523527.1 cytochrome P450-4e3 [Drosophila melanogaster]

MWLAVLALLVPLITLVYFERKASQRRQLLKEFNGPTVPVILGNANRIGKNPAEILSTFFDWWDYDYGKN
FLFWIGYSSHIVMTNPKQLEYIILNSQQLIQKSTIYDLLHPWLGHLLTSFGSKWHKHKRMITPSFHFNII
QDFHEVMNENSAKFM'TQLKKASAGDTIIDFQEHANYLTLDVICDTAMGVPI NAMEQRDSSIVQAFRDMCY
NINMRAFHPFKRSNRVFSLTPEFSAYQKTLKTLQDFTYDIEKRVYALQNGGSKEDHDPSLPRKKMAFLD
TLLSSTIDGRPLTRQEIYEEVSTFMFEGHDTTTTSGVSFSVYLLSRHPDVQRKLYREQCEVMGHDMNRSVS

FQEIAKMKYLDLFIKEAQRVYPSVPIFIGRYCDKDYDINGSIVPKGTTLNALILLGYNDRIFKDPHHRP
ERFEEKPAFFEYLPFSAGPRNCIGQKFALELKTIVISKVRSFEVLPVDELVSTDGRLNTYLGLAPDE
KLRKREAGRHKYDPILSAVLTLSKSDNGLHLRLRERS

AChE (17)

>P07140.1 RecName: Full=Acetylcholinesterase; Short=AChE; Contains: RecName:
Full=Acetylcholinesterase 16 kDa subunit; Contains: RecName:
Full=Acetylcholinesterase 55 kDa subunit; Flags: Precursor

MAISCRQSRVLPMSLPLPLTIPLPLVLVLSLHLSGVCVIDRLVVQTSSGPVGRSVTVQGREVHVYGTI
PYAKPPVEDLRFKRPVPAEPWHGVLDATGLSATCVQERYEYFPGFSGEEIWNPNNTNVEDCLYINWAPA
KARLRHGRGANGGEHPNGKQADTDHLIHNGNPQNTTNGLPILIIWIYGGGFMGTGSATLDIYNADIMAAVGN
VIVASFQYRVGAFGLHLAPEMPSEFAEEAPGNVGLWDQALAIRWLKDNAHAFGGNPEWMTLFGESAGSS
SVNAQLMSPVTRGLVKRGMMSQGTMNAPWSHMTSEKAVEIGKALINDCNCNASMLKTNPAHVMSCMRSVD
AKTISVQQWNSYSGILSFPSAPTIDGAFLPADPMTLMKTADLKDYDILMGNVRDEGTYFLLYDFIDYFDK
DDATALPRDKYLEIMNNIFGKATQAEREAIIFQYTSWEGNPGYQNNQQIGRAVGDHFFTCPTNEYAQALA
ERGASVHYYYFTHRTSTSLWGEWVGVLHGDEIEYFFGQPLNNSLQYRPVERELGKRMLSAVIEFAKTGNP
AQDGEWPNFSKEDPVYIFSTDDKIEKLARGPLAARCSFWNDYLPKVRSWAGTCDGDSGSASISPRLQL
LGIAALIYICAAALRTRKRVF

>AAM94376.1 acetylcholinesterase [Aphis gossypii]

MDQWLLWFGYLVASTYGLSLRHRHQSVGTPTAEEIILEPQILIEDTDHVFRQRASDMFAQEPEYTEKRNL
NHRRRSEFSGNQDTNFESSGATYSAYTSDDPLIIHTNKGKIRGITQEATGKLVDAWLGIPIYAKKPIGDL
RFRHRPRIDRWDTTSPETILNCTTPPNTCVQIFDTLFGDFPGATMWNPNPVSSEDCLYINVVPRPRPQN
AAMVWVIFGGGFYSGSATLDIYDPKILVSEENVILVSMQYRVASLGFLYFDTEDEVPGNAGLFDQLMALQW
VHENIKLFGGNPNNTLFGESAGAVSVSLHLLSPLSRNLFNQAIMESGSSTVPWAILSREESFSRGLKLA
KAMGCPDRNEIHKTVELRKNVSSAMVEKEWDHVAMCFFFPVVDGAFDDHPQKSLSTNNFKKTNIL
MGSNSEEGYYFIFYLTELKKEENVVSRENFIKAIGQLNPNADA AVKSAIEFEYTDWFPNDPEKRN
ALDKMVG DYQFTCNVNEFAHKYALTGNNVYMYFKHRS LN NPWKWTGVMHGDEISYVFGDPLNPNKRYE
IEEIELSKMMRYWTNFAKTGNPSKTEGWSVTPKWPVRTAYGKEFLTLDTNNTSIGVGRLEQCAFWKN
YVPDLTVISKSMKSDKNCTTISGGTKTNMIKLSVWTIVMTTAVLML

>AAM94375.1 acetylcholinesterase [Aphis gossypii]

MSVDCVYTSAVTLLLCCSAVLGRPSSNGGADAGGGGGGGGAGGAGGGGAGGGGGGS AVDDTDEIPVVV
TSTGLVQGYTKIIANREVRVYTGIPFAKPPVQQLRFRRPVDPWTGVLNATRLPNTCYQERYEYFPGFV
GEEMWSPNTKLS EDCLYLNIWIPKKQRTRHSSNNAHHAKIPVLVWIYGGGYMSGTSTLDIYDGDLLAATF

DVMIASMQYRLGAFGSLYLTPELPEDSDDAPGNMGLWDQALAIKWIKENAAAFGADPETITLFGESAGGG
SVSVHLISPETGGMVKRGIIQSGTVNAPWSYMTGERAVEIAKKLLDDCNCNSTSLDSNPIGTMSCMRPVD
ASTISKQWNSYSGILGFPSAPTVDGILLPEHPLDMLAKANFSDIDILIGSNLNEGTYFLLYDFVDFDR
TSATALPREKFVQIVNVIKDRQTQLERDAIIYQYSGWEKKEVDDIYSNQQLSDVVADYFFVCPTNLFAN
IVSSRGARVYYYYFFTHRTDSHLWGDWVGVLHGDEMQYVFGHLLNMSMPYNARERDLSIRIMEAFTRFSLT
GTPVSDDDIDWPLYNESKPIYHVWNAEMHVGYGPRAAECQFWNGFFPKIAQALKETSKTTCEDYDPSMPT
INENCTFTSSFATVNPQISFTIIFIFVLPAYGLF

>AAL99585.1 acetylcholinesterase precursor [*Myzus persicae*]

MSVDCVYTSAVTLLCCSAVLGRPSSNGGADGGGGGGGGGAGAGSGGGGGGGGGSGVDDTDESPVVV
TSSGMVQGYTKIIANREVRVYTGIPFAKPPVGPLRFRRPVAVDPWTGVLNATRLPNTCYQERYEYFPGFV
GEEMWNPNTKLSIEDCLYLNWIWPKKQTRHHSNNAHAKIPVLVWIYGGYMSGTSTLDIYDGDLLAATF
DVMIASMQYRLGAFGSLYLTPELPEDSDDAPGNMGLWDQALAIKWIKENAAAFGADPETITLFGESAGGG
SVSVHLISPETGRMVRRGIIQSGTVNAPWSYMTGERAVDIAKKLLDDCNCNSTLDSNPIATMSCMRAVD
ASTISKQWNNYSYSGILGFPSAPTVDGVLLPEHPLDMLAKANFSDIDILIGSNLNEGTYFLLYDFVDFDR
TSATALPKEKFVQIVNVIKDKTQLERDAIIYQYSGWEKKDVDDKYSNQQLSDVVADYFFVCPTNLFAN
IVSSRGARVYYYYFFTHRTDSHLWGEWVGVLHGDEMQYVFGHPLNMSMPYNARERDLSIRIMEAFTRFSLT
GTPVSDDDIDWPLYNESNPIYHVWNAEELHVGYGPRAAECQFWNGFFPKIAQALKETSKITCEDYDPSMPT
TNENCTFTSSFASINPQISFAIIFIFVLPAGHLL

>AAN71600.1 acetylcholinesterase 2, partial [*Myzus persicae*]

MDQWLLWFSYLVASTYGLSLRHRHQSVGTPTAEIILEPQILIEDTDHVFRQRALDMFAQEPEYTEKRNL
NHRRRSEFSGNQDNDFESSGETYSAYKSDDPLVIHTNKGKIRGITQAASTGKLVDAWLGIPIYAKKPIGDL
RFRHPRPIDRWNTNPETILNCTTPPNTCVQIFDTLFGDFPGATMWNPNSPVSEDCLYINVVVPKPRPQN
AAVMVWIFGGGFYSGSATLDIYDPKVLVSEENVILVSMQYRVASLGFLYFDTEDEVPGNAGLFDQLMALQW
VHENIKLFGGNPNVTLFGESAGAVSVSLHLLSPLSRNLFNQAIMESGSSTAPWAILSREESYSRGLRLA
RAMGCPDDRNEIHKTVECLRKANSSTMVEKEWDHVAICFFFPVVDGAFLLDDYPQKSLSTNNFKKTNIL
MGSNSEEYYSIFYLTELFKKEENVVVSRENFVKAIGQLNPNADA AVKSAIEFEYTDWFSFNDPEKNRN
ALDKMVG DYQFTCNVNEFAHKYALTGNNVYMYFKHRS LNNPWPKWTGVMHGDEISYVFGDPLNPNKRYE
IEEIELSKMMRYWTNFAKTGNPSKTLKSWVTRQWPVHTAYGKEFLTLDTNNTSIACKTRQCA

>Q9TX11 Acetylcholinesterase, ACE (Acetylcholinesterase)

MKMSAVVRLCCNMISLLLCITVISPVYGFIDRLVVQTSSGPIRGRSTMVLGREVHVFNQVPPFAKPPVDGL
RFRKPVPAEPWHGVLDATRLPSPCIQERYEYFPGFAGEEMWNPNTNVEDCLYLNIVVPTKTRLRHGRGL
NFGNNDYFQDDDDFQRQHQS KGLLMLVWIYGGGFMSGTSTLDVYNAEMLAAVGNVIVASMQYRVGSFGE

FYLAPYLNDDDAPGNVGLWDQALAIRWLKENAKAFGGDPDLITLFGESAGGSSVSLHLLSPVTRGLSRRG
ILQSGTLNAPWSHMSAEKALSVAEALIDDCNCNVTLTKDNPNYVMNCMRNVDAKTISVQQWNSYSGILGF
PSAPTIDGVFMTADPMTMLREANLEGVEILVGSNRDEGTYFLLYDFIDYFEKDAATSLPRDKFLEIMNTI
FSKASEPEREAIIFQYTGWESGNDGYQNOQQVGRSVGDHFFICPTNEFALGLAERGASVYYYYFTHRTST
SLWGEWMGVLHGDEVEYIFGQPMNVSMQYRQRERDLSRRMVLSVSEFARSGNPALEGEHWPVYTKENPIY
FIFNAEGEDDLRGEKYGRGPMATACAFWNDFLPRLRASVPPKSSCNILEQTSAAITLYVDIKIVTVLMV
FILVRLY

>sp|Q869C3|ACES_ANOGA Acetylcholinesterase OS=Anopheles gambiae GN=Ace PE=3 SV=3

MEIRGLLMGRLRLGRRMVPLGLLGVTALLLILPPFALVQGRHHELNNGAAIGSHQLSAAA
GVGLASQSAQSGSLASGMSSVPAAGASSSSSSSSLLSSAEDDVARITLSKDADAFFTPY
IGHGESVRIIDAELGTLEHVHSGATPRRRGLTRRESNSDANDNDPLVVNTDKGRIRGITV
DAPSGKKVDVWLGIPYAQPPVGPLRFRHPRPAEKWTGVLNTTTPPNSCVQIVDTVFGDFP
GATMWNPNTPLESDCLYINVVAPRPRPKNAAVMLWIFGGGFYSGTATLDVYDHRALASEE
NVIVVSLQYRVASLGFLLGTPEAPGNAGLFDQNLALRWVRDNIHRFGGDPSRVTLFGES
AGAVSVSLHLLSALSRLDFQRAILQSGSPTAPWALVSREEATLRALRLAEAVGCPHEPSK
LSDAVECLRKGDPHVLVNEWGTLGICEFFFPVVDGAFLEDETPQRSLSAGRFFKTEILT
GSNTEEGYFYIIYYLTELRLKEEGVTVTREEFQAVRELNYPVNGAARQAIVFEYTDWTE
PDNPNNSRDALDKMVGDIYHFTCNVNEFAQRYAEEGNVYMYLYTHRSKGNPWRWTGVMH
GDEINYVFGEPLNPTLGYTEDEKDFSRKIMRYWSNFAKTGNPNPNTASSEFFPEWPKHTAH
GRHYLELGLNTSFVGRGPRLRQCAFWKKYLPLVAATSNLPGPAPPSEPCESSAFFYRPD
LIVLLVSLLTATVRFIQ

>AAL33820.1 acetylcholinesterase [Plutella xylostella]

MIYNSKIVFTKLLLCICVCGARGRSWANHHDTTSTTTPAPTTPPPAPKNFHNDPLIVETKSGLVKGYAKT
VMGREVHIFTGIPFAKPLGPLRFRKPVPIEPWHGVLEATAMPNSCYQERYEYFPGFEGEEMWNPNTNIS
EDCLYLNIWVPQHLRVRHHQDKPLTERPKVPILVWIYGGGYMSGTATLDLYKADIMASSSDVIVASMQR
VGAFFGLYLNKYFSPGSEEAAGNMGLWDQQLAIRWIKDNARAFGGDPELITLFGESAGGGSVSLHMLSPE
MKGLFKRGILQSGTLNAPWSWMTGERAQDIGKVLVDDCNCNSSLLAVDPSLVMDCMRGVDAKTISVQQWN
SYTGILGFPSAPTVDGVFLPKDPDTMMKEGSFHNTTEVLLGSNQDEGTYFLLYDFLDYFEKDGPSFLQREK
FLEIVDTIFKEFSKIKREAIYVQYTDWEEITDGYLNQMIADIVGDYFFVCPTNYFAEVLADSGVDVYYY
YFTHRTSTSLWGEWMGMVHGDEMEYVFGHPLNMSLQYHTREERDLAAHIMQSFTRFALTGKPHKPEEKWPV
YSRASPHYTYTSAADAASGPAPPRGPRASACAFWNHFLNKLNELEHVPCDGAVTGPYSSMAGKSLPIVLLT
ALATTAAL

>AAN37403.1 acetylcholinesterase [*Helicoverpa armigera*]

MISNTKIVFTKLLCCFVSGAVARSWANHHDTTSTTQTPTTSPVPKNFHDPLIVETKSGLVKGYAKT
VMGREVHIFTGIPFAKPLGPLRFRKPVPIIDPWHGVLEATAMPNSCYQERYEYFPGFEGEEMWNPNTNIS
EDCLYLNIVWPQHRLVRHHQDKPLAERPVPILVWIYGGGYMSGTATLDLYKADIMASSSDVIVASMQYR
VGAFGFLYLNKYFSPGSEEAPGNMGLWDQQLAIRWIKDNARAFGGPELITLFGESAGGGSVSLHMLSPE
MKGLFKRGILQSGTLNAPWSWMTGERAQDIGKVLVDDCNCNSSLLAADPSLVMDCMRGVDAKTISVQQWN
SYTGILGFPSAPTVDGVFLPKPDPDMMKEGNFHNTTEVLLGSNQDEGTYFLLYDFLDYFEKDGPSFLQREK
FLEIVDTIFKDFSKIKREAIIVFYQYTDWEEITDGYLNQKMIADVVDYFFVCPTNYFAEVLADSGVDVYYY
YFTHRTSTSLWGEWMGMVHGDEMEYVFGHPLNMSLQYHTRERDLAAHIMQSFTRFALTGKPHKPDEKWPL
YSRTSPHYTYTADGTSGPAGPRGPRASACAFWNDFLNKLNLELHMPDCGAVTGPYSSVAGTTLPIVLLT
TLATTVAL

>AAM69920.1 acetylcholinesterase [*Bactrocera oleae*]

MAHPTSLLAGASLAAASSLSSRQYSVASSSRLSGDIGRGLFAIVVLLLRMSSVYGVDRLLVVQTSSGPVR
GRSVTVQGREVHVYTGIPYAKPPLDDLRFKRPVPAEPWHGVLDATRLPATCVQERYEYFPGFSGEEIWNP
NTNVSEDCLYINWAPAKARLRHGRGANGGEHSNKADTDHLIHNGNPQNI TNGLPVLIWIYGGGFMTGTA
TLDIYNADIMSAVGNVIVASFQYRVGAFGFLHLS PAMPGYEEEEAPGNVGLWDQALAIRWLKTNAAHAFGGN
PEWMTLFGESAGSSSVNAQLVSPVTAGLVKRGMMQSGTMNAPWSHMTSEKAVEIGKALINDCNCNASLLS
ENPQAVMACMRAVDAKTISVQQWNSYSGILSFPSAPTIDGAFLPDHPMKMMETADLRGYDILMGNVRDEG
TYFLLYDFIDYFDKDEATSLPRDKYLEIMNNI FGKVKPAERDAIIFRHTSWVGNPGLNQQQIGRAVGDH
FFTCTNEYAQALAERGASVHYYYYFTHRTSTSLWGEWMGVLHGDEIEYFFGQPSNTSLQYRQVERELGKR
MLNAVIEFAKTGNPATDGEWEPYFSKDPVYVVFSTDDKEEKLQRGPLEGRCAFWNEYLREVRKWSQCE
VKPSSASSLQQQQHLLLQQRSIVAFMLLALSLVLKIPSVNAFF

>AAM69372.1 acetylcholinesterase precursor [*Musca domestica*]

MARSVRTPTSPSSSSSSWSSWSSPSSSYFYSLLSSFKASLTRPSSSSSVAHHLAARNNDICRGLFATLVI
LLRMSALTSAMTDHLTVQTTSGPVRGRSVTVQGRDVHVFTGIPYAKPPVDDLRFKRPVPAEPWHGVLDAT
RLPATCVQERYEYFPGFSGEEMWNPNTNVSEDCLFMNIWAPAKARLRHGRGTNGGEHSSKTDQDHLIHS
TPQNTTNGLPILIWIYGGGFMTGSATLDIYNAEIMSAVGNVIVASFQYRLGAFGFLHLS PVMFGEFEEAP
GNVGLWDQALALRWLKENARAFGGNPEWMTLFGESAGSSSVNAQLMSPVTRGLVKRGMMQSATMNAPWSH
MTSEKAVEIGKALVNDNCNASLLPENPQAVMACMRQVDAKTISVQQWNSYSGILSYPSAPTIDGAFLPA
DPMTLTKTADLSGYDILIGNVKDEGTYFLLYDFIDYFDKDDATSLPRDKYLEIMNNI FQKASQAEREAI I
FQYTSWEGNPGYQNNQQQIGRAVGDHFFTCTNEYAQALAERGASVHYYYYFTHRTSTSLWGEWMGVLHGDE
IEYFFGQPLNNSLQYRPVERELGKRMLNSVIEFAKSGNPAVDGEEWPNFSKEDPVYVVFSTDEKIEKLQR
GPLAKRCSFWNDYLPKVRSWIGSECENKSSTSASAAIYEMKMQQLTLLAVAIILTMVNSIFQ

>AAK09373.1 acetylcholinesterase precursor [Schizaphis graminum]
MDQWLLWFGYLVASTYGLSLRHRHQSVGTPTAEEIILEPQILIEDTDHVFRQRASDMFAQEPEYTEKRNL
NHRRRSEFGNQDTEFASSETYSAYTSDDPLIIHTNKGKIRGITQTATGKLVDAWLGIPIYAKKPIGDL
RFRHRPRPIDRWDTTTPETILNCTTPPNTCVQIFDTLFGDFPGATMWNPNPSPVSEDCLYINVVVVKPRPQN
AAVMVWIFGGGFYSGSATLDIYDPKILVSEENVILVSMQYRVASLGFLYFDTEDEVPGNAGLFDQLMALQW
VHENIKLFGGNPNNTLFGESAGAVSVSLHLLSPLSRNLFNQAIMESGSSTAPWAILSREESFNRLKLA
KAMGCPDDRNTIHKTVELRKNASSVMVEKEWDHVAICFFFPVVDGAFDLDHPQKSLSTNNFKKTNIL
MGSNSEEGYYSIFYLTELFKKEENVMSRENFIKAIGQLNPNADA AVKSAIEFEYTDWFSPNDPEKNRN
ALDKMVG DYQFTCNVNEFAHKYALTGNNVYMYFKHRS LN NPWKWTGVMHGDEISYVFGDPLNPNKRYE
IEEIELSKMMRYWTFNAKTGNPSKTEGSSWVTPKWPVHTAYGKEFLTLDTNNTSIGVGPRLQCAFWKN
YVPDLTAISKSMKSDKNCTTISGGTKTNVIELSVWTIVMTTAVLML

>Q27677.1 RecName: Full=Acetylcholinesterase; Short=AChE; Flags: Precursor
MGQSLILCLFVTVCASVCGYSWPSDETTTKPSQFKDFHTDPLVVETTSGLVRGYSKTVLGREVHVFTGIP
FAKPPIEQLRFKKVPVIDPWHGILDATKQPNSCFQERYEYFPGFEGEEMWNPNTNISEDCLYLNIVPQR
LRIRHHADKPTIDRPKVPVLIWIYGGGYMSGTATLDVYDADI IAATSDVIVASMQRGLSGFLYLNRIF
PRGSEDETPGNMGLWDQILAIRWIKDNAAAFGGDPDLITLFGESAGGSSISIHLSIPVTKGLVRRGIMQSG
TMNAPWSYMSGERAEQIGKILIQDCGCNVSLLENSPRKVMDCMRAVDAKTISLQQWNSYSGILGFPSTPT
IEGVLLPKHPMDMLAEGDYEDMEILLGSNHDEGTYFLLYDFIDFFEKDGPSFLQREKYHDIIDTIFKNMS
RLERDAIVFYQYTNWEHVHDGYLNQKMI GDVVGDYFFVCPTNNFAEVAADRGMKVFFYYFTHRTSTSLWGE
WMGVIHGDEVEYVFGHPLNMSLQFNSRERELSLKIMQAFARFATTGKPVTDVNWPLYTKDQPYFIFNA
DKNGIGKGRPRATACAFWNDFLPKLRDNGSSEAPCVNTYLSKIRSSSNELLPPSTSLVLIWIMTLLNAL

>P56161.1 RecName: Full=Acetylcholinesterase; Short=AChE; Flags: Precursor
MFVNQRTRRPYMSVFVLVGAAVICPAYGIIDRLVVQTS SGP I RGRSTMVQGREVHVFNQVFPFAKPPVDS
LRFKKVPAEPWHGVLDATRLPPSCIQERYEYFPGFAGEEMWNPNTNISEDCLYLNIVPPTKRLRHGRG
LNFGSNDYFQDDDDFQRHQSKGGLAMLVWIYGGGFMSGTSTLDIYNAEILAAVGNVIVASMQRVGFAGF
FLYLAPYINGYEEDAPGNMGMWDQALAIRWLKENAKAFGGDPDLITLFGESAGSSVSLHLLSPVTRGLS
KRGILQSGTLNAPWSHMTAEKALQIAEGLIDDCNCLTMLKESPSTVMQCMRNVDAKTISVQQWNSYSGI
LGFPSAPTIDGVFMTADPMTMLREANLEGIDILVGSNRDEGTYFLLYDFIDYFEKDAATSLPRDKFLEIM
NTIFNKASEPEREAIIFQYTGWESGNDGYQNQHQVGRAVDHFFICPTNEFALGLTERGASVHYFFTHR
TSTSLWGEWMLHGDEVEYIFGQPMNASLQYRQRERDL SRRMVL SVSEFARTGNPALEGEHWPLYTREN
PIFFIFNAEGEDDLRGEKYGRGPMATSCAFWNDFLPRLRAWVSPKSPCNLLEQMSIASVSSTMPIVVMV
VLVLIPLCAWWAIAKKNKTPPHQVILETRAFMH

>AAG43568.1 acetylcholinesterase, partial [*Apis mellifera*]

MTTRILLFFLLSSCTRPSRGNVAVSSQQRGNVHNDPLVVEVETTSGLVRFPRVLDKEVHVYFYGIPFAKP
PIGPLRFRKPLPIEPWHGVLNATVLPNSCYQERYEYFPGFGEEMWNPNTNISEDCLYLNIWVPQKYRLR
HKGDGSPGGNGGPRNGLPLLVWIYGGGFMSGTATLDVYNADIMAATSNVIIASMQYRVGAFGLYLNKH
FTNSEEAPGNMGLWDQALALRWLRDNEAFGGDPELITIFGESAGGSSVSLHLISPVTRGLVRRGILQSG
TLNAPWSYMSGEKANEVATILVDDCGCNSTMLNENPARVMACMRSVDAKTISVQQWNSYWGILGFPSAPT
IDGIFLPKHPLDLLREADFKDTEILIGNNENEGTYFILYDFNDIFEKQASFLERERFLGIINNIFKNMS
QIEREAITFQYTDWEEVYNGYIYQKMVADVVDYFFICPSIHFAQLFADRGMKVYYYYFTQRTSTNAMGR
VD

>AAC02779.1 acetylcholinesterase [*Lucilia cuprina*]

MARFITSSSPTLTTSTAATAPSSSWSSNATSTATSISHSRSTSRKSRYTSSNLLNAFASLTSRSSLSL
STSSNDLYRGFLTTLVILLRMSSVAYGITDRLIVQTTSGPVRGRAVTVQGREVHVFTGIPYAKPPVDDL
FRKPVPAEPWHGVLDATRLPATCVQERYEYFPGFSGEEIWNPNNTNVEDCLYMNIWAPAKARLRHGRGAN
GGEHSSKTPDHLIHSATPQNTTNGLPILIIWIYGGGFMGTSATLDIYNADIMSAVGNVIVASFQYRVGAF
GFLHLSVMPGFEFEEAPGNVGLWDQALALRWLKENARAFGGNPEWMTLFGESAGSSSVNAQLVSPVTRGL
VKRGMMSGTMNAPWSHMTSEKAVEIGKALINDCNCNASLLPANPQSVMACMRAVDAKTISVQQWNSYS
ILSFPSAPTIDGAFLPADPMTLMKTADMSGYDIMIGNVKDEGTYFLYDFIDYFDKDEATSLPRDKYLEI
MNNIFNKATQAEREAIFQYTSWEGNPGYQNOQQIGRAVGDHFFTCPTNEYAQAALERGAQVHYFFTHR
TSTSLWGEWGMVHLGDEIEYFFGQPLNTSLQYRAVERELGKRMLNSVIEFAKTGNPAVDGEEWPNFSKED
PVYYVFSTDEKTEKLQRGFLAKRCSFWDYLPKVRSWVGSECENNSAESAAVSIIYEKQQNLLKWVIMLT
IMVTCIFQ

>AAF65202.1 acetylcholinesterase precursor [*Nephotettix cincticeps*]

MARLRFSTLSLSLLVAVATQPQPSTPRTLHSDHNHGFLNEHKHSHAHAYKSHDRAHNTHAQFAEATGPA
STPSGGTPKHGDPLIVETTSGLVRLSKTVLGREVHVFTGIPFAKPPVGPPLRFRPVPVDPWHGVYDATT
LSNSCYQERYEYFPGFEGEEMWNPNTNISEDCLYLNIWVPQRLRIRHKSSEENTYRQKVPVLIWIYGGG
YMSGTATLDIYDADMVAATSDVIVASMQYRVGAFGLYLSPELPPGSEEAPGNLGLWDQALAIQWIKANI
ANFGGDPELCTLFGESAGGSSVSLHLVSPVTRGLVRRGIMQSGTLNAPWSYMTGERAVEIAKTLIDDCGC
NASMLIESPSRVMSCMRAVDAKTISVQQWNSYFGILGFPSAPTIDGVFLPKHPLDLLKEGDFQDTEILIG
SNQDEGTYFILYDFIDYFEKDGPSFLQRDKFLDIINTIFKNFTRLERDAIFQYTDWEHANDGYLNQMI
GDVVGDYFFICPTNLFAQAFSDHGLKVYFFFTQRTSTSLWGEWGMVHGDEIEYVFGHPLNMSLQYNAR
ERDLRLIMQAYSRFALTGKPVSDINWPIYSREQPQYIFNAEKSGIGKGRATACAFWNEFLPRLRGO
PDPECLADVAEVEVETSSPLVDNVSDNSTSTTFKPCTVITVLGLLLLTI

Kdr (2)

>ALB75309.1 voltage gated sodium channel subunit 2 transcript variant 1 [Rhopalosiphum padi]

MSVYSSEELLDAGIIYRNKKEQLDVTIGDGMELLIRGEKNKKKKPPTSSSYNSFGMHQSSTDENYYLKDK
YEYDTRSTKSYGSHEHDPYDSESHRGSKRSLHNAEEKDPSKEDVEINQNSGNDGIAAEEINGDEYKEQG
PVEMVEDVFEEEEYPEDCFPPNCYKFFLAGDDETPFWLGGWQLRLKTFQLIENKYFETAVITMILLSS
LALALEDVHLQHRPVLQDILYYMDRIFTVIFFLLEMLIKWLALGFRNYFTNAWCWLDIFIIVMVSLINFVAA
LLGASGIQAFKTMRTLRLRALRPLRAMARMQGMRVVVALVQAIPSI FNVLLVCLIFWLI FAIMGVQLFAGK
YYKCVDPKDGKTLNHEIIPDKNVCIAEMYKWENSKMNFDMGNAYLCLFQVATFNGWMEIMRDAVDSRDT
HGKQPIREINNYMYFYVFFIIFGSFFTLNLFIVIIDNFNEQKKKTGASLEMFMTEDQKKYYNAMKKMS
SKKPLKAI PRPRWRPQSIVFQTVTDKFKDMLIMLFIGFNMLTMTLDHYQQTKLFTDVLERLNQIFIAIFS
TECLLKI FALRYYYFKEPWNLFDFVVI LSLAGLVLSDLISKYFVSPTLLRVVRVAKVGRVLRVLVKGAKG
IRTL LFALAMSLPALFNICLLLFLVMFIFAIFGMSFFMNVDSHGGLDEDYNFRTFGQSMILLFMLSTSSG
WDAVL DGITNEENCQKPNLEMGITGSCGSSAVGTAFLLSYLVINFLIVINMYIAVILENYSQATEDVQEG
LTDDYDMYYEIQHFDPNGTRYIRYDQLSDFLDILEPPLKIHKPNKYKIVSMDIPICKGDLIYCV DILD
ALTKDF FARKGNPIIETVAEIGEMQTRPEEAGYEPISSSLWRMREVYCAII IQNSWRKYTAAAKQQTADD
ERSDGAASP DRETAVLVESDGFVTKNGHKVVIHSRSSSKSSRLADV

>AJS11555.1 voltage gated sodium channel variant 2 [Rhopalosiphum padi]

MSIADTDSSFSSEEKSLFRPFTRESLRAIEQRIAEDHAKQKELEEKRAEAGEVRYEDEDEDEGPQPDATLE
QGAPL PVRLVGTFPPELASVPLEDIDPYHYNQKTFVVISKGDIFRFSATDGLWALDPFNPIRRVAIYIL
VHPIFSVTIITITILTNCVFMIMPPTPTIEASEVIFTGIYTFESAVKVMARGFILEHFTYLRDAWNWLDIFI
VIALAYVTMGIELGNLAVLRTFRVLRALKTVAIVPGLKTIVGAVIESVKNLRDVIILTFSLSVFALLGL
QIYMGVLTQKCIKYFPTDGSAGNL TNENWF AFMSNSSNWQPGE EEPDEYPLCGNGTGAGQCKE GYMCIQG
FGINPNYGYTSFDTFAWALLSAFRLMTQDNWEALYQQLRAAGPWHMFFFI VIIFLGSFYLVNLILAI VA
MSYDELQKKAEEEEAAEEEAIREAEQA AKDREVRRAHEERVAERAERARHV TQHPKSPSDFSCQSYDNM
FADGQDRGIGNDHHREKMSLRSVSITSHDKNSDTGSVDRQSGKTRKASLSLPGSPFNIRRASRGSHQLSH
RNGRPRFTGADTKPLVNLTLDAEEHLPYADDSNAVTPMSEENGAIIVPVSYANFGSRHSSYTSHTSRIT
YTSHADLFKPPMTKERQLRSRSARNYFNPSDQRYHRDDDYDSSMSKSKQKVDECGYNDSQKHTVVD MRD
VMVLNDIIEQAAGRQSRGSEKAESTVYVFP TDEDAVDGEDEEEDEEPTFREKQVWLLKFIDTFCVWDC
GWPWLK FQQLAFIVFDPFVELYITLCIVVNTLFMALDHHEMDPKLDFILNKANVFFSATFGVEAALKLM
AMSPKYFQMGWNIFDFIIVILSVVELLSAGYQGLSVLRSFRLLRVFKLAKSWPTLNLLISIMGRTIGAL
GNLTFVLCIIIFIFAVMGMQLFGKNYTEKMYLFRDHELPRWNFTDFLHSFMIVFRVLCGEWIESMWDCLH
VGEPTCIPFFLATVVIGNLVVNLFLALLSNFGSSNLSVPTADSDTNKI TEAFERIGRFNKMMKTHIMN
FLKALRAKITNQISVQASGRDRDIDL PVD ETIVDVIAPFKDTKEPVEMTIGDGMEFTIPGDVKQKIKKNQ
VGNSIGNHQGNKVGNDYKKE SFDLDSLKC