

## ACC

>ARD71228.1 acetyl-CoA carboxylase [*Spodoptera exigua*]

MFTVIIVGLIFVYVFLKYFSGIEYSNTEMADQTDQARCSSSESDNFEKIDSDEAGENGGAN  
FVVGEVEVEQEPVDDGPAHEGRDSFPNAPRPNRPRPLTVAQQLALAEKRSTLRPSMSQGTVI  
HSQRFQEKDFTVATPEEFVRRFQGTKPINKVLIANNIGAVKCMRSVRRWSYEMFKNERA  
VRFVVMVTPEDLKANA EYIKMADHYVPVPGGSNNNNYANVELIVDIAIRTQVQAVWAG  
WGHASENPKLPELLHRAGVVFIPPEKAMWALGDKIASSIVAQTAEIPTLPWSGSELKAEY  
NSKKIKISSELFARGCVTTPEEGLQAAQKIGFPMIKASEGGGGKGIRKVENPDDFNSAFR  
QVQAEVPGSPIFVMKLAKSARHLEVQLLADQYGNAISLFGRDCSIQRRHQKIIIEEAPAAIA  
KPDVFIEMEKAAVRLAKMVGYSAGTVEYLYEPATGAYYFLELNPRLQVEHPCTEMVAD  
VNLPA AQLQIAMGLPLYHIKDIRLLYGESPWGLSQIEFDEPKQRPSPWGHVIAARITSENP  
EGFKPSSGTVQELNFRSSKNVWGYFSVAASGGLHEFADSQFGHCFSWGETREQARENLVI  
ALKELSIRGDFRTTVEYLLITLLETA AFQNNIDITAWLDALIAERMQSEKPNIMLGVICGSILI  
ADAYITANFQEFKSALEKGQIQGSSALSNCVEVELIHSGSKYKVSATKSGPTS YFLAMNGS  
FKEMEVHKLTDGGMLLSIDGASFTTYLRDEV DKYRIVIGNQTVVFDKEKDPSKLRAPSAG  
KLINTLVEDGGHVDKGQPYAEIEVMKMVMTLAAPESGKVTWILRSGAVLDMGALIGTLE  
LDDPSLVTTATPYKGFPIEDNNQLSEKLNHAHNKYKSVLENTLQGYCLPEPYNTPRLREV  
VEKFMQSLRDP SLPLELQEVLSSTSGRIPIAVEKKVRKLMALYERNITSVLAQFPSQQIAS  
VIDHHAASLAKRADRDVFFMSTQALVVLVQRYRNGIRGRMKA AVHDLLKQYYQVESNF  
QLGSYDKCVATLRERYKDDMQAVADIIFSHNQVAKKNMLVTLLIDHLWSNEPGLTDELAT  
TLNELTSLHRAEHSRVALRARQVLIAAHQPAYELRHNQMESIFLSAVDMYGHDFHPENLQ  
KLILSETSIFDILHDFFYHTNAAVCNAALEVYVRRAYTSYDITCLQHLALSGELGVVHFQFI  
LPTGHPNRIPIQSIEIELASAQDQEGIPAELCTAAMRKCHHRTGALAAFESFDQFVQYSDEL  
LDLVHDFASSATVRREDLAALQEGSES RDSTSINVGLDYKPNDPDNEAPLEPIHILMIGVRD  
SGENDDSAVSRRFGNFCRAHRHELHQKRIRRITFMLLIKRFKFFTFRARNDFTEDTIYRH  
LEPASAFQLELYRMRSYELEALPTS NQKMHLYL GKAKVKKGQEVTDFFRFFIRSIIRHQDLIT  
KEASFEYLQNEGERV LLEAMDELEVA FSHPLAKRTDCNHIFLNFGPTVIMDPAKIEESVLG  
MVMRYGPRLWKLRVLQAEIRFTLRIGPGAPTKNVRLCLSNGSGYSLDIYTYEEVSDPKIGV  
IMFQSFGRQGP MHGLPISTPYVT KDYLQQKRFLATSQGT TYVYDIPDMFRQMIERRWRE  
CIEEGSVDGPPPDNVMNAVELVIEPDGERRVVEVTRLPGQNNVGMVAWR LTYTPEC PDG  
RDIILIANDLTYYMGSFGPQEDWVYYKASAYARELKIPRVYVSVNSGARIGVAEEVKSEFN  
VAWIDSERPERGFKYLYLTPESSYKLGPLG SVKTTLIEDEGESRYKITDIIGKEDGLGVECLR  
DAGLIAGETAQAYEDIVTISIVTCRAIGIGSYV VRLGHRVIQVESSYIILTGYVALNKVLGRS  
VYASNNQLGGQQIMHHNGVSSAVAPTDLEAVRTALRWLSFVPKDKMSLVPIMRPADPVDR  
PVEWVPPRAAHD PRLMLAGDAARPGFFDAGSWDEV MQPWAQTVITGRARLG GIPVGVV  
AVETRTVEITLPADPANLDSEAKTLQ QAGQVWFPDSAYKTAQAINDFSREGLPIMIFANWR  
GFSGGQKDMYEQILKFGAEIVRALRGASAPVLVYIPPGAELRGGAWAVVDPSVNNLRME  
MYADPEARGGVLEAEAIVEVKFKQRDILKTMHRLDP ELQRVGARISELKEQIKEISKGLDR  
RGSVDESLRTDAGRAAETRVRELETELLAAEKTAKAREKELSPIYHQI AVQFAELHDTAER  
MLEKGCIFDIIPWRDSRRLFYWRLKRLLRQNEQERRVQEAVKPADRMEQGPAAATLRRWF  
TEDRGETQSHQWEHDNEAVCKWLEAQAGDDNSVLERNLKA IHQDALMQAVNNLV LKLT  
PSQRGEFIRKLSALEMEQ

>AID66639.1 acetyl-CoA carboxylase [*Agrotis segetum*]

MNSFAEFVNKYFKMMKRRTSKRFVLGETNEQQSFDDGDPTEVLPNLTQKFQMTLSMEDE

ERQHEAEQRQQDGRLLRTPNSGTLQPSMSQGTVIHSQRFQEKDFTVATPEEFVRRFQGTKP  
INKVLIANNGIGAVKCMRSVRRWSYEMFKNERAVRFVVMVTPEDLKANA EYIKMADHY  
VPVPGGSNNNNYANVELIVDIAIRTQVQAVWAGWGHASENPKLPELLHRAGVVFIGPPEK  
AMWALGDKIASSIVAQTAEIPTLPWSGSELKAEYNSKKIKISSEFAKGCVTSPSEQGLQAAQ  
KIGFPVMIKASEGGGGKGIRKVDNPDEFNSSFRQVQAEVPGSPIFVMKLAKSARHLEVQL  
LADQYGNAISLFGRDCSIQRHQKIIIEAPAAIAKPEVFIEMEKA AAVRLAKMVGYSAGTV  
EYLYEPATGAYYFLELNPRQLQVEHPCTEMVADVNLPA AQLQIAMGLPLYHIKDIRLLYGES  
PWGLSQIEFDEPKQRSPWGHVIAARITSENPDGFKPSSGTVQELNFRSSKNVWGYFSVA  
ASGGLHEFADSQFGHCFSWG ETRQARENLVIALKELSIRGDFRTTVEYLITLLETGAFQN  
NDIDTAWLDALIAERMQSEKPDIMLGVICGSILIADAITANFQEFKSALEKGGIQGSSALS  
CVELIHTGSKYKVYATKSGPTS YFLAMNGSFKEME VHKLTDGGMLLSIDGASFTTYLR  
DEV DKYRIVIGNQTVVFEKEKDPSKLRAPSAGKLINTLVDDGGHVDKGQPYAEIEVMKM  
VMTLAAPESGKVTWILRSGAVLDMGALIGTLELDDPSLVTTATPYKGQFPIEENPNLSEKL  
NHSHQKLRAVLENTLQGYCLPEPYNTPR LREVVEKFMQSLRDP SLPLELQEVLSSTSGRI  
PIAVEKKVRKLMALYERNITSVLAQFPSQQIASVIDHHAASLPKRADRDVFFMSTQALVVL  
VQRYRNGIRGRMKA AVHDLLKQYYQVESHFQLGSYDKCVVALRDYKDDMQMVSNIIF  
SHNQVAKKNLLVTLIDHLWSNEPGLTDELATTLNELTSLHRAEHSRVALRARQVLIAAHQ  
PAYELRHNQMESIFLSAVDMYGHDFHPENLQKLILSETSIFDILHDDFFYHTNAAVCNAALE  
VYVRRAYTSYDITCLQHLALSGELGVVHFQFILPTGHPNRIPISQAEIEMESGTAEGIPAEL  
CTAAMRKCHHRTGALAAFESFDQFVQYSDEL DLDLVHDFASSATVRREDLALQEGSES RD  
STSINVGMDFKPSD TDIEATLEPIHILMIGVRDSGESDDSAVSRRFGNFCRKHRELHQKRI  
RRITFMLLIK RQFPKFFTYRARNDFTEDTIYRHLEPASAFQLELYRMRSYELEALPTS NQK  
MHLYLGKAKVKKGQEVTDYRFFIRSIIRHQDLITKEASFEYLQNEGERVLLEAMDELEVA F  
SHPLAKRTDCNHIFLNFGPTVIMDPAKIEESVLGMVMRYGPRLWKLRVLQAEIRFTLRIGP  
GPGAPTKNVRLCLSN GSGYSLDVYTYEEISDPKIGVIMFQSF GPRQGPMHGLPISTPYVTK  
DYLQQKRFLATSQGT TYVYDIPDMFRQMIERRWRECIEEGSVEGPIPDNVMTSVELVVEP  
DGERRIVEVTRLPGQNNVGMVAWRLTLFTPEC PDGRDIILIANDLTYFMGSFGPNEDWVY  
YKASVYARELKIPRVYVSVNSGARIGVAEEVKSEFNVAWLD SERPSRGFKYLYLTPE SYSK  
LGPLGSVRTELIEDEGESRYKITDIIGKEDGLGVECLRDAGLIAGETAQAYEDIVTISIVTCR  
AIGIGSYVRLGHRVIQVESSYIILTGYAALNKVLGRAVYASNNQLGGQQVMHNGVSHA  
VAPTDLEAVRTALRWLAFVPKDKMS MVPIMRPWDPIDRPVEWVPRAAHDPR LMLSGDA  
ARAGFFDIGSWDEIMQPWAQTVITGRARLG GIPVGVVAVETRTVELTLPADPANLDSEAKT  
LQQAGQVWFPSAYKTAQAINDFSREGLPIMIFANWRGFSGGQKDMYEQILKFGAEIVRA  
LRGATAPVIVYIPPGGELRGGA WAVVDP SVNLRMEMYADPEARGGVLEAE AIVEVKFKQ  
RDILKTMHRLDPELQRVGARIAELKEIQIKEISKGLDRRGSVDESLIRTDAGKAAETRVREL  
ETELLAAEKT SKAREKELGPIYHQI AVQFAELHDTAERMLEKGCIFDIVPWRDSRRQFYWR  
LKRLLRQNEQERRVQEAVRPADKMEQGPAAATLRRWFTEDRGETQSHQWEHDNEAVCK  
WLEAQAGDDNSVLERNLRSIHQDALLQAVNNLVVELTPSQRAEFIRKLSALEMEQ

>ALJ30271.1 putative acetyl-CoA carboxylase ACC [*Spodoptera litura*]

MFTVIIIIGFVFVYVFLKFFSGIEHLNTKMADQPDQARCSSES DNFEKIESEEA RESGGAN  
FVVGEEVEQEPVDDGPAHEGRDSFPNAPRPNRPRPLTVAQQLALAEKRSTLRPSMSQGTVI  
HSQRFQEKDFTVATPEEFVRRFQGTKPINKVLIANNGIGAVKCMRSVRRWSYEMFKNERA  
VRFVVMVTPEDLKANA EYIKMADHYVPVPGGSNNNNYANVELIVDIAIRTQVQAVWAG  
WGHASENPKLPELLHRAGVVFIGPPEKAMWALGDKIASSIVAQTAEIPTLPWSGSELKAEY

NSKKIKISSELFARGCVTTPEEGLQAAQKIGFVPMIKASEGGGGKGIRKVENPDDFNSAFR  
QVQAEVPGSPIFVMKLAKSARHLEVQLLADQYGNAISLFGRDCSIQRRHQKIIIEEAPAAIA  
KPDVFIEMEKAAVRLAKMVGYSAGTVEYLYEPATGAYYFLELNPRLQVEHPCTEMVAD  
VNLPAQLQIAMGLPLYHIKDIRLLYGESPWGLSQIEFDEPKQRPSPWGHVIAARITSENP  
EGFKPSSGTVQELNFRSSKNVWGYFSVAASGGLHEFADSQFGHCFSWGETREQAREN  
ALKELSIRGDFRTTVEYLITLLETGAFQNNIDTAWLDALIAERMQSEKPDIMLGVICGSILI  
ADAYITANFQEFKSALEKGGQIQGSSALSNCVEVELIHSGSKYKVSATKSGPTS  
FLAMNGSFKEMEVLKLTLDGGMLLSIDGASFTTYLRDEVDKYRIVIGNQTVVFDKEK  
DPSKLRAPSAGKLINTLVEDGGHVDKGQPYAEIEVMKMVMTLAAPESGKVTWILRPG  
AVLDMGAMIGTLELDDPSLVTTATPYKGGQFPIEDNNQLSEKLNHAHNKYKAVLENT  
LQGYCLPEPYNTPRLREVVEKFMQSLRDPSPLELQEVLSSTSGRIPIAVEKKVRKLMALY  
ERNITSVLAQFPSQQIASVIDHHAASLAKRADRDVFFMSTQALVVLVQRYRNGIRGRMKA  
AVHDLKQYYQVESNFQLGSYDKCVAALRERHKDDMQAVSNIIFSHNQVAKKNMLVTLLID  
HLSWNEPGLTDELATTLNELTSLHRAEHSRVALRARQVLIAAHQPAYELRHNQMESIFLS  
AVDMYGHDFHPENLQKLILSETSIFDILHDFFYHTNAAVCNAALEVYVRRAYTSYDITCL  
QHLALSSELGVVHFQFILPTGHPNRIPIQSIEELASAQDQEGIPAELCTAAMRKCHHRTGA  
LAAFESFDQFVQYSDELDLVHDFASSATVRREDLAALQEGSESRDSTSINVGLDYKPN  
DPDNEAPLEPIHILMIGVRD SGENDDSAVSRRFGNFCRAHRHELHQKRIRRITFM  
LLIKRQFPKFFTFRARNDFTEDTIYRHLLEPASAFQLELYRMRSYELEALPTSNQKM  
HLYLGKAKVKKGQEVTDFRFFIRSIIRHQDLITKEASFEYLQNEGERVLLLEAMDELE  
VAFSHPLAKRTDCNHIFLNFGPTVIMDPAKIEESVLGMVMRYGPRLWKLRLVQAEIR  
FTLRIGPGAPTKNVRLCLSNGSGYSLDIYTYEEVSDPKIGVIMFQSFGRQGPMHGLPI  
STPYVTKDYLQQKRFLATSQGTTYVYDIPDMFRQMIERRWRECIEEGSDGPPPDNVM  
NSVELVIEPDGERRVVEVTRLPGQNNVGMVAWRLLTYTPEC PDGRDIILIANDLTYMGS  
FGPQEDWVYYKASAYARELKIPRVYVSVNSGARIGVAEEVKSEFNVAWIDSERPD  
RGFKYLYLTPESYSKLGPLGSVKTTLIEDEGESRYKITDIIGKEDGLGVECLR  
DAGLIAGETAQAYEDIVTISIVTCRAIGIGSYVRLGHRVIQVESSYIILTYVALNKV  
LGRPVYASNNQLGGQQVMHHNGVSHAVPTDLEAVRTALRWLSFVPKDKMSLV  
PIMRPADPIDRPVEWVPPRAAHDPRMLLAGDAARGGFFDAGSWDEVMQPWAQTVITGR  
ARLG GIPVGVVAVETRTVELTLPADPANLDSEAKTLQQAGQVWFPDSAYKTAQAIN  
DFSREGLPIIIFANWRGFSGGQKDMYEQILKFGAEIVRALRGATAPVLVYIPPGAELR  
GGAWAVVDPSVNNLRME MYADPEARGGVLEAEAIVEVKFKQRDILKTMHRLDP  
ELQRVGARISELKEQIKEISKGLDR RGSVDESLRTDAGRAAESRVRELETELLA  
AEKTAKAREKELSPIYHQIAVQFAELHDTAERMLEKGCIFDIIPWRESRRLLYWRL  
KRLLRQNEQERRVQHAVQPADCMQQGPAAATLRRWFTEDRGETQSHQWEHDNEAV  
CKWLEAQAGDDNSVLERNLRAIHQDALMQAVNNLVLKLT PSQRGEFIRKLSALEMEH

>ACX53705.1 acetyl-CoA carboxylase, partial [*Heliothis virescens*]

MNFLESVCGFVNIFLKMLKRRTSKRFVLGENAEPQSFDDDEEPTVLPNLAQKFQMTLSVD  
PEEREHDEGQRQPDGRLLRPPNSGTLQPSMSQGTVIHSQRFQEKDFTVATPEEFVRRFQ  
G TKPINKVLIANNIGAVKCMRSIRRW SYEMFKNERAVRFVVMVTPEDLKANA EYIKMAD  
HYVPVPGGSNNNNYANVELIVDIAIRTQVQAVWAGWGHASENPKLPELLHRAGVFIGPP  
EKAMWALGDKIASSIVAQTAEIPTLPWSGSELKAEYNSKKIKISSELFAGKCVTTPEQGLQ  
AAQKIGFVPMIKASEGGGGKGIRKVDNPDDFNSMFRQVQAEVPGSPIFVMKLAKSARH  
LEVQLLADQYGNAISLFGRDCSIQRRH

>AGR49308.1 acetyl-coA carboxylase [*Agrotis ipsilon*]

MVGYSAGTVEYLYEPATGAYYFLELNPRLQVEHPCTEMVADVNLPAACLQIAMGLPLY  
HIKDIRLLYGESPWGLSQIEFDEPKQRPSWGHVIAARITSENPDGFKPSSGTVQELNFRSS  
KNVWGYFSVAASGGLHEFADSQFGHCFSWGETREQARENLVIALKELSIRGDFRTTVEYLI  
TLLETGAFQNNIDITAWLDALIAERMQSEKPDIMLGVICGSILIADAIITANFQEFKSALEK  
GQIQGSSALSNCVEVELIHTGSKYKVYATKSGPTSIFLAMNGSFKEMEVBHKLTDGGMLLS  
IDGASFTTYLRDEVKRYRIVIGNQTVVFEKEKDPSKLRAPSAGKLINTLVDDGGHVDKGQ  
PYAEIEVMKMMVMTLAAPESGKVTWILRSGAVLDMGALIGTLELDDPSLVTTATPYKGFPI  
EENPNLSEKLNHSHQKLRAVLENTLQGYCLPEPYNTPRLREVVEKFMQSLRDPSPLELQ  
EVLSSSTSGRIPIAVEKKVRKLMALYERNITSVLAQFPSQQIASVIDHHAASLQKRADRDVFF  
MSTQALVVLVQRYRNGIRGRMKAHVHDLKQYYQVESHFQLGSYDKCVVTLRDYKDD  
MQMVSNIIFSHNQVAKNLLVTLIDHLWSNEPGLTDELATTLNELTSLHRAEHSRVALRA  
RQVLIAAHQPAYELRHNQMESIFLSAVDMYGHDFHPENLQKLILSETSIFDILHDFYHTNA  
AVCNAALEVYVRRAYTSYDITCLQHLALSGELGVVHFQFILPTGHPNRPISQAEIEMESGT  
DAEGIPAELECTAAMRKCHHRTGALAAFESFDQFVQYSDELDDLVDHDFASSASVRKEDLAA  
LQEGSES RDSTSINVGMDFKPSDTNEAPLEPIHILMIGVRDSGESDDSAVSRRFGNFCRKH  
RHELHQKRIRRTFMILLIKRQFPKFFTYRARNDFSEDITYRHLEPASAFQLELYRMRSYELE  
ALPTSQNMHLYLGKAKVKKGQEVTDYRFFIRSIIRHQDLITKEASFEYLQNEGERVLLEA  
MDELEVAFSHPLAKRTDCNHIFLNFGPTVIMDPAKIEESVLGMVMRYGPRLWKLRVLQAE  
IRFTLRIGPGPGAPTKNVRLCLSNGSGYSLDVYTYEEISDPKIGVIMFQSFGPRQGP MHGLP  
ISTPYVTKDYLQQKRFLATSQGT TYVYDIPDMFRQMIERKWRECIEEGSVEGPIPDNVMTS  
VELVVEPDGERRIVEVTRLPGQNNVGMVAWRLTLFTPECPDGRDIILIANDLTYFMGSFGP  
NEDWVYYKASVYARELKIPRVYISVNSGARIGVAEEVKSEFNVAWLD SERPSRGFKYLYLT  
PESYSKLGALGSVKTELIEDEGESRYKITDIIGKEDGLGVECLRDAGLIAGETAQAYEDIVTI  
SIVTCRAIGIGSYVVR LGHRVIQVESSYIILTGYAALNKVLGRAVYASNNQLGGQQVMHHN  
GVSHAVAPTDLDAVRTALRWLAFVPKDKMSMVPIMRPWDPIDRPVEWVPPRAAHDPRLM  
LSGDAARAGFFDVGSWDEIMQPWAQTVITGRARLG GIPVGVVAVETRTVELTLPADPANL  
DSEAKTLQQAGQVWFPDSAYKTAQAINDFSREGLPIMIFANWRGFSGGQKDMYEQILKFG  
AEIVRALRGATAPVIVYIPPGGELRGGA WAVDPSVNSLRMEMYADPEARGGVLEAEIV  
EVKFKQRDILKTMHRLDPELQRVGARIAEIKEIQIKEISKGLDRRGSVDESLRTDAGKAAE  
TRVRELETELLAAEKTAKAREKELSPIYHQIAVQFAELHDTAERMLEKGCIFDIVPWRDSR  
RQFYWRLKRLLRQNEQERRVQEA VRPADKMEQGPAATLRRWFTEDRGETQSHQWEHD  
NEAVCKWLEAQAGDDNSVLERNLRSIHQDALLQAVNNLVVELTPSQRAEFIRKLSALEME  
Q

>AGR49309.1 acetyl-coA carboxylase, partial [*Agrotis ipsilon*]

CDYFSDILFYVDGYIYYRICLVFIVIKLLEWAE GFKEVKMAEQDQARCSSESNDNFEKIDS  
EEAKENGAAANFVIGEEVEQEPVDEPAHEGRDSFPGAPIRPNRPRPMTVAQQLALAEKRS  
TLRPSMSQGTVIHSQRFQEKDFTVATPEEFVRRFQGTKPINKVLIANNIGIGAVKCMRSVRR  
WSYEMFKNERAVRFVVMVTPEI

>ALS92678.1 acetyl-CoA carboxylase [*Helicoverpa armigera*]

MNIFESVCGIANVFFKMLKRRTSKRFVLGENAEPQSFDDDEEPTVLPNLAQKFQMTLSVD  
PEEREGHEEGQRQQDGRLLRPPNSGTLQPSMSQGTVIHSQRFQEKDFTVATPEEFVRRFQG  
TKPINKVLIANNIGIGAVKCMRSIRRW SYEMFKNERAVRFVVMVTPEDLKANA EYIKMAD  
HYVPVPGGSNNNNYANVELIVDIAIRTQVQAVWAGWGHASENPKLPELLHRAGVVFIGPP  
EKAMWALGDKIASSIVAQTAEIPTLPWSGSELKAEYNSKKIKISSELFARGCVTTPEQGLQA

AQKIGFPVMIKASEGGGKGIRKVDNPDDFNSMFRQVQAEVPGSPIFVMKLAKSARHLE  
VQLLADQYGNAISLFGRDCSIQRRHQKIIEEAPAAIAKPDVFIEMEKA AAVRLAKMVG YVSA  
GTVEYLYEPATGAYYFLELNPRLQVEHPCTEMVADVNLPA AQLQIAMGLPLYHIKDIRLLY  
GESPWGLSQIEFDEPKQRPSWGHVIAARITSENPD EGFKPSSGTVQELNFRSSKNVWGYF  
SVAASGGLHEFADSQFGHCFWGETREQAREN LVIALKELSIRGDFRTTVEYLLITLLETGAF  
QNNIDITAWLDALIAERMQSEKPDIMLGVICGSILIADAYITANFQEFKSALEKGQIQGSSA  
LSNCVEVELIHSGSKYKVSATKSGPTSYFLAMNGSFKEME VHKLTDGGMLLSIDGASYTT  
YLRDEV DKYRIVIGNQTVVFEKEKDPSKLRAPSAGKLINTLVEDGGHVDKGQPYAEIEVM  
KMVMTLAAPESGKVTWILRSGAVLDMGAMIGTLELDDPSLVTTAVPYKGQFP IEDNQNL S  
EKL NHAHNKYRAVLENTLQGYCLPEPYNT PRLREVVEKFMQSLRDP SLPLLELQEVLSST  
SGRIPIAVEKKVRKLMALYERNITSVLAQFPSQ QIASVIDHHAASLAKRADRDVFFMSTQA  
LVVLVQRYRNGIRGRMKA AVHDLKQYYQVESNFQLGSYDKCVVALRDRHKDDMQAVS  
NIIFSHNQVAKKNLLVTLIDHLWSNEPGLTDELATTLNELTSLHRAEHSRVALRARQVLIA  
AHQPAYELRHNQMESIFLSAVDMYGHDFHPENLQKLILSETSIFDILH DFFYHTNAAVCNA  
ALEVYVRRAYTSYDITCLQHLALS GELGVVHFQFILPTGHPNRIPISQSEIELASASDQEGIP  
AELCTAAMRKCHHRTGALAAFESFDQFVQYSDEL DLVHDFASSATVRREDLAALQEGSE  
SRDSTSINVGSDFKPADADNEAPLEPIHILMIGVRDSGESDDSAVSRRFGNFCRAHRHELH  
QKRVR RITFMLLIKRQFPKFFTFRARNDFTEDTIYRHLEPASAFQLELYRMRSYEALPTS  
NQKMHLYLGKAKVKKGQEVTDYRFFIRSIIRHQDLITKEASFEYLQNEGERVLLEAMDEL  
EVAF SHPLAKRTDCNHIFLNFGPTVIMDPAKIEESVLGMVMRYGPRLWKLRLVQAEIRFTL  
RIGPGAPTKNVRLCLSN GSGYSLDIYTYEEVSDPKIGVIMFQSFGPRQGPMHGLPISTPYVT  
KDY LQQKRFLATSQGT TYVYDIPDMFRQMVERRWRECIEEGSV DGGPPDNVMTSVELVV  
EADGERRVVEVTRLPGQNNVGMVAWRLT LFTPECPDGRDIILIANDLTY YMGSGFPQEDW  
VYYKASVYARELKIPRVYISVNSGARIGVAEEVKSEFNVAWLDSERPDRGFKYLYLTPESY  
SKLGPLGSVKTTLIEDEGESRYKITDIIGKEDGLGVECLRDAGLIAGETAQAYEDIVTISIVT  
CRAIGIGSYVVR LGHRVIQVESSYIILTGYAALNKVLGRAVYASNNQLGGQQVMHHNGVS  
HAVAPTDL EAVRTALRWLSFVPKDKLSMVPIMRPSDPIDRPVEWAPPRAAHD PRLMLAGD  
AARAGFFDVGSWDEIMQPWAQT VITGRARLG GIPVG VAVETRTVELTLPADPANLDSEA  
KTLQQAGQVWFPDSAYKTAQAINDFSRENLP IIIFANWRGFSGGQKDMYEQILKFGAEIVR  
ALRGATAPVLVYIPPGAELRGGA WAVVDPSVNSLRMEMYADPDARGGVLEAE AIVEVKF  
KQRDILKTMHRLDP ELQRIGARISELKEQE QIKDKEISKSLDRRGSIDESLIRTD TGRAAETR  
VRELETELLAAEKTSKAREKELSPIYHQI AVQFAELHDTAERMLEKGCIFDIVPWRSSRKQL  
YWRLRRLLRQNEQERRVQAAARP GPAMQQGPAAATLRRWFTEDRGETQSHQWEHDNEA  
VCRWLEAQAGDDNSVLERNLRAIHQDALLQAVNDLVLELTPSQRSEFIRKLSALEMEQ

>AOD74995.1 acetyl-CoA carboxylase 2 [*Helicoverpa armigera*]

MSEQQDQARCSSSESDNFEKIDSEEARENGGAANFVVGEEEQEHPDDAPAHEGRDSFPNA  
PRPNRPRPLTVAQQLALAEKRSTLRPSMSQGTVIHSQRFQEKDFTVATPEEFVRRFQGTKPI  
NKVLIANNIGIGAVKCMRSIRRW SYEMFKNERAVRFVVMVTPEDLKANA EYIKMADHYVP  
VPGGSNNNNYANVELIVDIAIRTQVQAVWAGWGHASENPKLPELLHRAGVVF IGPPPEKAM  
WALGDKIASSIVAQTAEIPTLPWSGSELKAEYNSKKIKISSELFARGCVTTPEQGLQAAQKI  
GFPVMIKASEGGGKGIRKVDNPDDFNSMFRQVQAEVPGSPIFVMKLAKSARHLEVQLL  
ADQYGN AISLFGRDCSIQRRHQKIIEEAPAAIAKPDVFIEMEKA AAVRLAKMVG YVSA  
GTVEYLYEPATGAYYFLELNPRLQVEHPCTEMVADVNLPA AQLQIAMGLPLYHIKDIRLLYGES  
PWGLSQIEFDEPKQRPSWGHVIAARITSENPD EGFKPSSGTVQELNFRSSKNVWGYFSVAA

SGGLHEFADSQFGHCFWSWGETREQARENLVIALKELSIRGDFRTTVEYLITLLETGAFQNN  
DIDTAWLDALIAERMQSEKPDIMLGVICGSILIADAYITANFQEFKSALEKGQIQGSSALS  
CVEVELIHSGSKYKVSATKSGPTSIFLAMNGSFKEMEVBHKLTDGGMLLSIDGASYTTYLR  
DEV DKYRIVIGNQTVVFEKEKDPSKLRAPSAGKLINTLVEDGGHVDKGQPYAEIEVMKM  
VMTLAAPESGKVTWILRSGAVLDMGAMIGTLELDDPSLVTTAVPYKGGFPIEDNQNLSEK  
LNHAHNKYRAVLENTLQGYCLPEPYNTPLREVVEKFMQSLRDPSPLELQEVLSSTSG  
RIPIAVEKKVRKLMALYERNITSVLAQFPSQQIASVIDHHAASLAKRADRDVFFMSTQALV  
VLVQRYRNGIRGRMKA AVHDLLKQYYQVESNFQLGSYDKCVVALRDRHKDDMQAVSNII  
FSHNQVAKKNLLVTLIDHLWSNEPGLTDELATTLNELTSLHRAEHSRVALRARQVLIAAH  
QPAYELRHNQMESIFLSAVDMYGHDFHPENLQKLILSETSIFDILHDDFFYHTNAAVCNAAL  
EVYVRRAYTSYDITCLQHLALS GELGVVHFQFILPTGHPNRIPISQSEIELASASDQEGIPAE  
LCTAAMRKCHHRTGALAAFESFDQFVQYSDELDDLVDHDFASSATVRREDLAALQEGSES  
R DSTSINVGSDFKPADADNEAPLEPIHILMIGVRDSGESDDSAVSRRFGNFCRAHRHELHOK  
RVRRTIFMLLIKRFKFFTFRRANDFTEDTIYRHLEPASAFQLELYRMRSYEALPTSNO  
KMHLYLGKAKVKKGQEVTDYRFFIRSIIRHQDLITKEASFEYLQNEGERVLEAMDELEV  
AFSHPLAKRTDCNHIFLNFGPTVIMDPKIEESVLGMVMRYGPRLWKLRLVLAQEIFTLRI  
GPGAPTKNVRCLCSNGSGYSLDIYTYEEVSDPKIGVIMFQSFQPRQGPMPHGLPISTPYVT  
K DYLLQQRFLATSQGTTYVYDIPDMFRQMVERRWRECIEEGSVDPGPPDNVMTSVELVVE  
ADGERRVVEVTRLPGQNNVGMVAWRLTLFTPECPDGRDIILANDLTYMGSFGPQEDWV  
YYKASVYARELKIPRVYISVNSGARIGVAEEVKSEFNVAWLDSERPDRGFKYLYLTPESYS  
KLGPLGSVKTTLIEDEGESRYKITDIIGKEDGLGVECLRDAGLIAGETAQAYEDIVTISIVTC  
RAIGIGSYVVRLGHRVIQVESSYIILTGYAALNKVLGRAVYASNNQLGGQQVMHHNGVSH  
AVAPTDLEAVRTALRWLSFVPKDKLSMVPIMRPSDPIDRPVEWAPPRAAHDPRMLLAGDA  
ARAGFFDVGSWDEIMQPWAQTVITGRARLGIPVGVVAVETRTVELTLPADPANLDSEAK  
TLQQAGQVWFPDSAYKTAQAINDFSRENLP IIIIFANWRGFSGGQKDMYEQILKFGAEIVRA  
LRGATAPVLVYIPPGAELRGGAWAVVDPVSNLSRMEMYADPDARGGVLEAEIIVEVKFK  
QRDILKTMHRLDPELQRIGARISELKEQIKEISKSLDRRGSIDESLIRTDGTGRAAETRVRELE  
TELLAAEKTSKAREKELSPIYHQIAVQFAELHDTAERMLEKGCIFDIVPWRSSRKQLYWRL  
RRLLRQNEQERRVQAAARPGPAMQQGPAAATLRRWFTEDRGETQSHQWEHDNEAVCRW  
LEAQAGDDNSVLERNLRAIHQDALLQAVNDLVLELTPSQRSEFIRKLSALEMEQ

> acetyl-CoA carboxylase [*Helicoverpa zea*]

QSFDDEEPTVLPNLAQKFQMTLSVDPEEREGHEEGQRQQDGRLLRPPNSGTLQPSMSQG  
TVIHSQRFQEKDFTVATPEEFVRRFQGTKPINKVLIANNIGIAVKCMRSIRRWSEYEMFKNE  
RAVRFFVVMVTPEDLKANA EYIKMADHYVPVPGGSNNNNYANVELIVDIAIRTQVQAVWA  
GWGHASENPKLPELLHRAGVVFIGPPEKAMWALGDKIASSIVAQTAEIPTLPWSGSELKAE  
YNSKKIKISSELFARGCVTTPEQGLQAAQKIGFPVMIKASEGGGGKGIRKVDNPDDFNSMF  
RQVQAEVPGSPIFVMKLAKSARHLEVQLLADQYGN AISLFGRDCSIQRRHQKIIEEAPAAI  
AKPDVFIEMEKA AVRLAKMVGYSAGTVEYLYEPATGAYYFLELNPRLQVEHPCTEMVA  
DVNLPA AQLQIAMGLPLYHIKDIRLLYGESPWGLSQIEFDEPKQRPSPWGHVIAARITSEN  
P DEGFKPSSGTVQELNFRSSKNVWGYFSVAASGGLHEFADSQFGHCFWSWGETREQAREN  
LVIALKELSIRGDFRTTVEYLITLLETGAFQNN DIDTAWLDALIAERMQSEKPDIMLGVICGS  
IL IADAYITANFQEFKSALEKGQIQGSSALSNCVEVELIHSGSKYKVSATKSGPTSIFLAMNGS  
FKEMEVBHKLTDGGMLLSIDGASYTTYLRDEV DKYRIVIGNQTVVFEKEKDPSKLRAPSAG  
KLINTLVEDGGHVDKGQPYAEIEVMKMVMTLAAPESGKVTWILRSGAVLDMGAMIGTLE

LDDPSLVTTAVPYKGQFPIEDNQNLSEKLNHAHNKYRAVLENTLQGYCLPEPYNTPRLRE  
VVEKFMQSLRDPSPLELQEVLSSTSGRIPIAVEKKVRKLMALYERNITSVLAQFPSQQA  
SVIDHHAASLAKRADRDVFFMSTQALVVLVQRYRNGIRGRMKAAVHDLKQYYQVESNF  
QLGSYDKCVVALRDRHKDDMQAVSNIIFSHNQVAKKNLLVTLIDHLWSNEPGLTDELAT  
TLNELTSLHRAEHSRVALRARQVLIAAHQPAYELRHNQMESIFLSAVDMYGHDFHPENLQ  
KLILSETSIFDILHDFFYHTNAAVCNAALEVYVRRAYTSYDITCLQHLALSGELGVVHFQFI  
LPTGHPNRIPISQSEIELASASDQEGIPAEELCTAAMRKCHHRTGALAAFESFDQFVQYSDEL  
LDLVHDFASSATVRREDLAALQEGSESRDSTSINVGSDFKPADADNEAPLEPIHILMIGVRD  
SGESDDSAVSRRFGNFCRAHRHELHQKRVRRITFMLLIKRFKFFTFRRANDFTEDTIYR  
HLEPASAFQLELYRMRSYEALPTSQNMHLYLGKAKVKKGQEVTDYRFFIRSIHRHQDL  
ITKEASFEYLQNEGERVLEAMDELEVAFSHPLAKRTDCNHIFLNFGPTVIMDPAKIEESVL  
GMVMRYGPRWLKRLVLQAEIRFTLRIGPGAPTKNVRLCLSNNGSGYSLDIYTYEEVSDPKIG  
VIMFQSFQPRQGPMHGLPISTPYVTKDYLQKQKRLATSQGTYYVDIPDMFRQMVERRW  
RECIEEGSDGPPPDNVMTSVELVVEADGERRVVEVTRLPGQNNVGMVAWRLTLFTPECP  
DGRDIILANDLTYMGSFGPQEDWVYYKASVYARELKIPRIYISVNSGARIGVAEEVKSEF  
NVAWLDSERPDRGFKYLYLTPESYSKLGPLGSKTTLIEDEGESRYKITDIIGKEDGLGVEC  
LRDAGLIAGETAQAYEDIVTISIVTCRAIGISYVVRGLGHRVIQVESSYIILTGYAALNKVLG  
RAVYASNNQLGGQQVMHHNGVSHAVPTDLEAVRTALRWLSFVPKDKLSMVPIMRPSDPI  
DRPVEWAPPRAAHDPRMLAGDAARAGFFDVGSWDEIMQPWAQTVITGRARLGGIPVG  
VVAVETRTVELTLPADPANLDSEAKTLQAGQVWFPDSAYKTAQAINDFSRENLPPIIFANW  
RGFSGGQKDMYEQILKFGAEIVRALRGATAPVLVYIPPGAELRGGAWAVVDPSVNSLRME  
MYADPDARGGVLEAEAIVEVKFKQRDILKTMHRLDPELQRIGARISELKEQIKEISKSLDR  
RGSIDESLIRTDTGRAAETRVRELETELLAAEKTSKAREKELSPIYHQIAVQFAELHDTAER  
MLEKGCIFDIVPWRSSRKQLYWRLRRLLRQNEQERRVQAAARPGPAMQQGPAAATLRRW  
FTEDRGETQSHQWEHDNEAVCRWLEAQAGDDNSVLERNLRAIHQDALLQAVNDLVLELT  
PSQRSEFIRKLSALEMEQ

## FAS

>AGR49310.1 fatty acid synthase [*Agrotis ipsilon*]

MPSAVTNGARGSEDDIVLTGLSGRLPESDTIEEFAQQLFDGIDLVTADRRWTPGLHGLPE  
RNGKCLKDLAHFDATFFGVHAKQAHLMDPQLRLLELTHETIIDAGINPSELRGSRGTGVYV  
GVSNSETEEMWTVDPDKINGYALTGCCRAMFPNRISYTFDLKGPSFAVDACSSSMFALA  
QAATAIRSGHCDAIVAGCNLCLKPANSLNFHRLSMLSPEGRCAAFDASGRGYVRSEAAV  
AVLLQRRGAARRVYATLRGLRVNTDGAKDQGTFPSGDMQRRLAETFAEAKLRPADVAY  
VEAHGTGTVKGDPQEVNAIAELFCKGRKGPLLLGSVKSNGHSEPASGLCSVAKVVAM  
ERGIIPSNLHYKNANPDIPALSDGRIKVVDNRNTPWDGGLVAINSFSGFGGANAHVIFESEAG  
GGAARTPARYAAPRLVLASGRTEEAVQELTQLAAQHREDAGLHALLDVHRHNIPGHSYR  
GFAVLSDPVQECIEIESGDPRPVWFVFSGMGSQWPGMAKTLMQLPAFAASINRSAAALRP  
HKLDLNIITDAPAAAFDDVINSFVSIAAVQVALVDVLRALRIPDGIVGHSVGEIGCAYADE  
TLTAEQAVLAAYWRGRSIVDAKLAPGMAAVGLSWEQCEARCPPDVVPACHNANDSVTI  
SGPVDLSLEKFVAELSAEGTFARRVNSSGVAFHISKYIAAAAPLLRRSLEKVITAPKPRTSRWV  
SSSLPRDQWNSDLAKLSDANYHVNLLSPVRFADALREVPARSIVVEVAPHALLQAVLKR  
ALPAPAAAHVPLVRRDAACACAHLAAAGRLYAAGAQPAVGRLYPAVVWPVPRGTPGLA  
SRVRWDHRLEWQVAHFGNASRGENVIEYDVSRRNDDSFITGHNIDGRVLFPATGYLTLVW  
RTMAKLNNRKPEETPIVMENIQFRRATIVSRDTPVRFLINVLDGTGEFDVCEGGAVVVTGT

VRLADDPAGERLKDLDCPPRREDGLLPLVTDDIYKELRLRGYNYGGIFRGIRASDPRGTC  
GELAWDDNWISFMDTMLQFGIIGVDTRELYLPTRLQRALIDPAAQLAAVAALGEGGTLPV  
RMHRDIDVISAGGIEFRGVKTSAPRRANPNAPKLEKYVFLPYDNAAVATEDTSRSKRD  
ALTVSLQLVLENAGALKKLAEAAALDRPAEALLTPQALAVLESEPQVRVDATLAAGPTPAP  
YAAAVKDLGVKVLPKDGKSAPIESDCHLVMAADVLSRHGAATLEHLAAAMADSGMLLL  
EEPHKALDDRAAQEMLQRAGLSPVSRQVAASCEYVLLRRAPALPAQHVVVDVADDTSYA  
WVDALREALARAEGEDMRVYCVARTPNSGVGLCTCLRGEAGGRALRCYFLPGAREPFR  
PDAAPYAAQVRRDLAVNVLRAGVWGCYRHLPLGDAAEQQLQVEHAYVNTLTRGDLSSLR  
WIESPLRYARDVPQPARTDLCRVYCAPLNFRDIMLATGKLPPDALPGNLAGQECILGLEFS  
GRSSDGKRVMMGMVAACGLASTVLADKGLWEVPAKWSLEEASTVPVAYATAYYALAVRG  
RMQRGDSVLVHAGTGGVGQAABAIALHAGCTVFTTVGTPDKRAFLRERFPTLPENIGNS  
RDTSEQLIKRRTRGRGVLDVLNSLAADKLQASVRCLEAGGRFLEIGKLDLSNDTALGMS  
VFLKNTTFHGILLDALFDADSENSDKAAVVRVCTDGLAAGAVRPLPATVFSHQLEQAFRY  
MATGKHIGKVVLVRDEEAAGARPASKLVSAIPRTYMHPAKSYVLVGGMGGFGLAQLQW  
MVKRGCTRLVLNSRSGVRTGYQAWCVRRWREAGVRVLVSTADACSAAGARALLREAAA  
LGAVGGVFNLAAVLRDAFLDKQTPADFQAVAKPKIDATKILDAATRELAPELEYFVVFSSV  
SCGRGNPGQSNYGLANSAMERIMEQRQADGLPLAVQWGAIGEVGLIVETMGGDETUV  
GGTVPQRIASCMEALGALLALPHAVAASMLVADKRRSAAAPQQDLLHAVANILGIKDPTK  
VSDSANLAELGMDSLMGAEIKQTLERGYDVVLGVQEIRGLTFSKLGRMAGGEDAAAGD  
AAPAATESADQVQFAALGELMPKQVLVVKLPSAAPAGSELRPVFMVHPIEGVVELLRGVAA  
AVRAPVYGLQCTQAAPLEDMAALARHYVTHVRAMQPAAPYTILGYSFGAGVAFEMALQ  
LEQAGCETRLVLVDGSPAYVATHTTRGKKKRTRSAETDEADALAYFVQLFKDVDAAKVS  
SELERLPWEARLAHTTALVGPAAGPHGAELAAAANSFYRKLVIADTYKPAGRLRAPVT  
LFTARDNYVTLGEDYGLREVCAGELHTQQLAGTHRTILAGDAAAAIAQHLSQMLAH

>XP\_022831505.1 fatty acid synthase [*Spodoptera litura*]

MAPTTIAEDRLQSGHRLSHPPPGDEVLTIGISGYFPDSDSVIHLQENLFNKVDLISGDSRRW  
KLGHPEIPQRTGKINNPNKFDASFFGVHYKQAHTMDPMDRILLEKAYEAVIDAGVNPKE  
RDTKTGVFVGACFSESEKTFWYEKMQVNGFGITGCSRAMLNRIYWLGVTPSYTVDS  
ACSSSLYALEHAFAIRDGHCDAAIVGGSNLCLHPYVSLQFSRLGVLSPDGRCKCFDNSAN  
GYARSEAIADVFLQKAKDSRRVYAQLLHAKTNCDDGYKEQGITYPAGHIQKLLREFYEEC  
SIPPSILEFVEAHGTGTRVGDPEELLAIDEIFCTGRKAPLLIGSVKSNLGHSEPASGLCSIAKL  
CIAYSTGYIPPNNLNYNPREGVAALAEKRLSVVTEKTPWGRGMSGVNSFGFGGANAHVL  
LKNVARAKVNNGIPSDDLRLACVSGRTESAVARLLDDLESRTVDAELIRLLHSIHDDIA  
GHVVVRGFSLLGSTPTKSVSLAREIQYFSGVRRPVWFVYSGMGSQWAGMAKELMRIPVFS  
AAIEKCHKALEPKGINLTKIITENDPKIYDNILNSFIGIAAVQIGLTDVLKTIGIEPDYIIGHSV  
GELGCAYADGCFTAEMILSAYSRLASIETPFIKGSMAAVGLSYTQVKSMCPPEIEVACHN  
GPDSSITISGPADIMKNFVAKLSAQGIFAKEVPCSNIAYHSRYIAEAGPTLLKYLKQVIKNPK  
ARSEKWVSTVSPQALWKDPKAEISSAEYHTNNLLSPVLFEEAARLIHANAITIEIAPHGLL  
QAILRRSLKKDVINVALTQRDHPDNVQVLFTAIGKLYESGLNPHLANIYPHIPFPVSQGT  
LAHLVEWEHSEDWYVTSYKAQEKMKSGERTVRMSIVDEDSEYMAGHVVDGRNLYPATG  
YLVLVWETLGMMMGELYTEVSVVFENVRFRATNIPKEGSLEFIIMIQKSGNFIVEISGA  
SIVTGRIYAKKNVGQDFRVLPHLPEVTGPSIKHLLTKDFYKELRLRGYQYSGLFRGVLGCN  
VEGTRGRLSWVNNWVTFMDCMLQMKIIGQDTRGLFVPTRIEKLSIDANMHYNAISKMNP  
DSNKNSEIRVYPDVVDVIRAGGVEVRGLHATPITKRLPLGVPVLEKNEFVSNYGKSKMKM



EDILRANIQLILENIQTYKVKSIELYDDEYKKNDLKPILESVGDMLGDLPLVQAEALLISEEP  
VEMPSNITVENRKLAGESENTILFIGANLLGRPELLQNAVGTLRDKAFVISREKERPNPKDYS  
DKYDIVTIQDTGFEYIVLLRKRVGARPAKFVRILASDDTFAWIDKVKEEIKEGQKVVLTYQ  
DEHINGLLGLVNCLRKEPGGEIVYGLLISDPSAPFPNDLEFYEEQLDKDLALNVYQDGQ  
WGTYRHLLLGDLETVRANHAYVNTLTIGDLSSLRWVEGAIRENHVFKDKEKVLVHVYCA  
ALNFRDVMTAIGRVTVDAVARGRLAQECVQGFEIVGKTVNGSRVMGMIRNRGMANLAE  
GDRFLLWAIPDEWSFEEAATVPVAYGTVYYAMVMVVGQIQRGESILIHAGSGGVGQAAINV  
ALHYGCEVFTTVGTAEKRAFIKKLFPQLKDSHIGNSRDTSFEDMIRRETNGKGVDMLVNS  
LSDDKLQASVRCLAYRGRFLEIGKFDISNNTPIGMYFFLKETSFHGIMLDYIFDQNQLFRKR  
LQDLLLSGIENGAVRPLTYCTFEANDVEHAFRYMAAGKHIGKIVVKIREEERSRAVMPAP  
RPIDAVPRYICHEDHVYVVVGGLGGFLELADWLIMRGGRKILLTSRRGITNGYQSSRLRA  
WASYGADVQISTHDVTTESGCEEMLKMALSMGPVDAIFNLAVILKDSIFQNQTPETFKTSF  
APKALATMHLDKLSRKLCPLKDFVIFSSVSCGRNAGQTNYGLSNSVMERICEWKRL  
GLPALAVQWGAIGDVGLVADMQDDDVQLEIGGTLQQRISCLTALDKFMKQDAPIVSSIV  
VAEKKAGSGCGNIVDAVAQIMGIKDLKTVSQQVSLAELGMDSMMAVEIKQTLEREFEIF  
LTAQDIRTLTFARLVELTAQREAAASTSASRPANIEGAVGLRVLMRNFGEITASEPLVYMPS  
MVSDGVEGEEAIHVMERVMFMPLPGLEGCAAVLEPLCKRLKIKVCVLQLGVEHKNNMD  
QMVNRLHQTVISRLAPGAPFWLLGYSYGSLLILELASRLEKEGFKGTVFCLDGAPDFLYAL  
LTMTISFKNDFQLQNNLLCHTVDIVAPNNDVTKGLMEKLNEIESYDERVALTIKTSPVQSK  
YSDKFIANIASASFDRCLKTILDFDPKAFRKLQSPVILLRPKENPSFVAVEENYGLDKYTENN  
VTVHFLEGNHVSIIENKDCANIINRVLAENERQDGKTADNVVTSIVENAREVAV

>AID66640.1 fatty acid synthase, partial [*Agrotis segetum*]

MPSAVTNGARGSEDDIVLTGLSGRLPESDTIEEFAQQLFQDGVDLVTADRRWTPGLHGLPE  
RNGKCLKDLAHFDATFFGVHAKQAHLMDPQLRLLLELTHEAIIDAGINPGEIRGSRTGVYV  
GVSNSETEEMWTVDPDKINGYALTGCCRAMFPNRISYTFDLKGPSFAVDTACSSSMFALA  
QAATAIRSG

>AID66641.1 fatty acid synthase, partial [*Agrotis segetum*]

FPSGDMQRRLAETFAEAKLRPADVAYVEAHGTGTVGDPQEVNAIAELFCKGRKGPLL  
GSVKSNMGHSEPASGLCSVAKVVVAMERGIIPANLHYKNANPDIPALSDGRIKVVDNRNP  
NELMATRPPSHG

>AID66642.1 fatty acid synthase, partial [*Agrotis segetum*]

GGGAARTPARYAAPRLVLASGRTEEAVQELTQLAAQHRDDAGLHALLDVHRHNIPGHSY  
RGAFLTDPVPVQECIEIESGDPRPVWFVFSGMGSQWPGMAKTLMQLPAFAASINRSAAAL  
RPHKLDLNIITEAPAAAFDDVINSFVSIAAVQVALVDVLRALAIRPDGIVGHSVGEIGCAYA  
DETLTAEQAVLAAYWRGRSIVDAKLAPGAMAAGVLSWEQCEARCPPDLVPACHNANDSV  
TISGPVESLEKFVAELSAEGTFARRVNSSGVAFHISKYIAAAAPLLRRSLEKVITSPKPRSSRW  
VSSSLPRDQWDSDLAKLSDANYHVNLLSPVRFADALREVPARSIVVEVAPHALLQAVLK  
RALPAPAAA

>AID66643.1 fatty acid synthase, partial [*Agrotis segetum*]

WQVAHFGNASRSGENIEYDVSRNDDSFITGHNIDGRVLPATGYLTLVWRTMAKLNNRK  
PEETPIVMENIQFRRATIVSRDTPVRFLINVLDGTGEFDVCEGGAVVVTGTVRLAEDPAGE  
RLRDLDCPTPPREDGLLPLVTDDIYKELRLRGYNYGGIFRGIRASDPRGTCGELAWDDNW  
ISFMDTMLQFGIIGVDTRELYLPTRLQRALIDPAAQLAAVAALGEGGTLPVRMHRDIDVISA  
GGIEFRGVKTS LAPRRANPQNAPKLEKYVFLPYDNAAVATEDTSRSKRDAITVSLQLVLEN

AGALKKLAEAAALDRPAEALLTPQALAVLEAEPQVRVDATLAAGPAPAPYAAAVKDLGVK  
VLPKDGRSAPIESDCHLVMAADV

>AID66644.1 fatty acid synthase, partial [*Agrotis segetum*]

RAPALPAQHVVVDVADDTSAFWVEALRDALARAEGEDMRVYCVARTPDSGVLGLCTCLG  
EAGGRALRCYFLPGAREPFKPDAAPYAAQVRRDLAVNVLRAGVWGCRYHMPPLGDAAEQ  
LQVEHAYVNTLTRGDLSSLRWIESPLRYAGDVPQPARTDLCRVYCAPLNFRDIMLATGKLP  
PDALPGNLAGQECILGLE

>AID66645.1 fatty acid synthase, partial [*Agrotis segetum*]

SGRSSDGKRVMMGMVAACGLASTVLADKGFLWEVPAKWSLEEASTVPVAYATAYYALAVR  
GRMRRGESVLVHAGTGGVGQAAVAIALHAGCTVFTTVGTPDKRAFLRERFPTLPENIGN  
SRDTSFEQLIKRRTRGRGVDLVLNSLAADKLQASVRCLAEGGRFLEIGKLDLSNDTALGM  
SVFLKNTTFHGILLDALFDADSENSDKAAVVRCVTDGIAAGAVRPLPATVFSHQLEQAFR  
YMATGKHIGKVVLVRDEEAAGARPASKLVSAIPRTYMHPAKSYVLVGGMGGFGLELAQ  
WMVKRGCTRLVLNSRSGVRTGYQAWCVRRWREAGVRVVVSTADACSAGGARQLLREA  
AALGAVGGVFNLAAVLRDAFLDKQTPADFQAVAKPKIDATKILDAATRELAPELEYFVVF  
SVSCGRGNPGQSNYGLANSAMERIMEQRQADGLPGLAVQWGAIGEVLIVETMGGDET  
VVGGTVPQRIASCMEALGALLALPHAASMVLADKRRSAAAPQQDLLHAVANILGIKDP  
TKVSDSANLAELGMDSLMGAEIKQTLERGYDVVLGVQEIRALTFSKLRGMAGGEDAAA  
GDADAAAPGAESADQVQFAALGELMPKQVLVKLPSAAPAGSELRPVFMVHPIEGVVELL  
RGVAAAVRAPVYGLQCTQAAPLDDMAALARHYVTHVRAMQPAAPYTILGYSFGAGVAF  
EMALQLEQAGCETRLVLVDGSPAYVATHTRGKKKRTTSAETDEADALAYFVQLFKDV  
DAAKVSSELERLPSWEARLAHTTALVGPAAGPHGAEALAAAANSFYRKLVIADTYKPAG  
RLRAPVTLFTARDNYVTLGEDYGLRDVCAGELHTQQLAGTHRTILAGDAAAIAQHLSQ  
MLAH

>ACX53771.1 fatty acid synthase, partial [*Heliothis virescens*]

GPQAKLCSAEYHTNNLLSPVLFEETSRLIPNNAVLVEVAPHGLLQAILKRSLPCKNIALTR  
RKHADNAFLVLEAIGKLYMEGYNPKVHVLYPEVQLPVSTGTPFLSHLSEMGRMMRNGP

>ACX53772.1 fatty acid synthase, partial [*Heliothis virescens*]

DGCFTAEMILSAYSRGLASIETPFIKGSMAAVGLGYNQIKSMCPPEIEVACHNGPDSSTISG  
PADIMKVFVAKLSSQGIFAKEVPCSNIAYHSRYISQAGPTLLKYLKQVIKDPKPRSEKWWST  
SLPQAQWKDAKAALSSAEYHTNNLLSPVLFEETARLIHPNAITIEIAPHGLLQAILRRSLKK  
DVINIALTQRNHKDNVQVLFTAFGKLYESGLNPHLANIYPHVPFPVSQGTPMISHLVEWEH  
SEDWYVTSYKAQEKMKSGERT

>ACX53774.1 fatty acid synthase, partial [*Heliothis virescens*]

PKKRSEKWISTSVPQNQWNNDEAQYSSAEYHTNNLLNPVLFEESSRLIPENAIIVIEVAPHG  
LLQAILTRSLAACVHIPLTRRGHEHPVKFLLAEVKGKLYLAGLTPKVKSLYPKVEYPVSTETP  
LLSHLVEWEHSEEWLKTRYSTKTRVVTAGRDFILSTQDDDYKYFEYYKRDGVCVFPEAA  
LLTLVWETYAMYRQSDYRTMSVEFTNVYFYEEVEINDLLKLGV

>AKD01757.1 fatty acid synthase 1, partial [*Helicoverpa armigera*]

MPSAVTNGSRGSDDDIVLTGLSGRLPESDSIEEFAQQLFDGVDLVTADDRRWTPGLHGLPE  
RNGKLKDLAHFDATFFGVHAKQAHLMDPQLRLLLELTHETIIDAGINPGLRGSRGTGVYV  
GVSNSETEEMWTVDPDKINGYALTGCCRAMFPNRISYTFDLKGPSFAVDTACSSSMFALA  
QAATAIRAGHCDAIVAGTNLCLKPANSLNFHRLSMLSPEGRCAAFDASGRGYVRSEAAV  
AVLLQRRSAARRVYCTLRGLRVNTDGAKDQGIFPSGDMQRRLAEETFAEAKLRPSDVV

YVEAHGTGTKVGDQPQEVNAIAELFCKGRKGPLLLGSVKS NMGHSEPASGLCSVAKVVVA  
MERGVIPGNLHYKNANPDIPALSDGRIKVVD RNT EW D GGLVAINSF GFGGANAHVIFESEP  
GGGAARTPARYAVPRVVLASGRTEEAVRELTGLAAQHARDAGLHALLDAVHRHNIPGHSH  
RGFAVLTDPPIEECAEVESGEPRPVWFVFSGMSGQWPGMAKSLMQLPVFAASVNRSAAL  
RPHNIDL VKIITEAPAAAFDDVINSFVSIAAVQVALVDVLRAL EIRPDGIVGHSVGEIGCAYA  
DETLTAEQAVLAAYWRGRSIVDAKLPPGMAAVGLSWEQCEARCPPDVVPACHNANDSV  
TISGPVESLEKFVATLSAEGTFARRVNSSGVAFH SKYIAAAAPLLRRSLEKVIPEPKPRSARW  
VSSSLPRDKWNSDLAKLSDANYHVN NLLSPVRFADAVREVPERALLVEVAPHALLQAVLK  
RARPAPAAHVPLVRRDAPDALAHLLAAAGRLYAAGA QPHVARLYPAVPFPVPRGTPGLAS  
RVRWDHALEWSVAHFGSASRSGENVIEYDVS RADDGFITGHNIDGRVLF PATGYLTLVWR  
TMAKLHNRKPEETPIVMENIQFRRATIVSRDTPVRFLINVL DGTGEFDVCEGGAVVVTGTV  
RLADDPAAERLRDLDTAPPRQEDGLLPLVTDDIYKELRLRGYNYGGIFRGIRSSDPRGTCG  
ELAWDDN WISFMDT MLQFGIIGVD TRELYLPTRLQRALIDPAAQLAAVAASGGGTLPVRM  
HRDIDVISAGGIEFRGVKTS LAPRRANPQAAPKLEKYVFLPYDNTAVATEDTSRSKRDA LT  
VSLQLVLENAGALRLKLGEAALERPPEALLT PLAMQLLEAEPQVRVDATLAAGPAPAAYA  
AALKDLGVKVL PKDGKAAPVESDCHLVLAADVLSRHGAGVLAQLAAALGEGGM LLEE  
PHKALDAAGARDMLA

>AKD01758.1 fatty acid synthase 2, partial [*Helicoverpa armigera*]

MSIFLKNTTFHGILLDALFDADSADSDKA AVVRCVTDGIASGAVRPLPATVFS DHQLEQAF  
RYMATGKHIGKVVL RVREEEASGARPASKLVSAIPRTYMH PARSYVLVGGMG GFGLELAQ  
WMVRRGATRLVLNSRSGVRTGYQAWCIRRWREAGVQVCVSTADACSPAGARALL REAA  
ALGPVGGVFNLAAVLRDAFLDKQTPADFQAVAKPKIDATKILDAATRELAPELEYFVVFSS  
VSCGRGNPGQSNYGLANSAMERIVEQRQADGLPGLAVQWGAIGE VGLIVETMGGDET V  
VGGTVPQRIASCMEALGALLALPHA VAASMV LADKRRAAAAPQ QDLLHAVANILGIKDPS  
KVSDSANLAELGMDSLMGAEIKQTLRGYDVVLGVQEIRALTFAKL RGMAGGDDAAAG  
DAAPPAAGPDDQVQFAALGELMPKQALVKLP SAAAAPEQRAVFMVHP IEGVVELLRGVA  
AAVRAPVFGLQCTRAAPLDDMAALARHYVAHVRAQQSPPYTILGYSFGAGVAFEMALQ  
LEQAGCETRLVLVDGSPAYVATH TTRGKQKR TTRS AETDEADALAYFVQLFKD VDAAKVS  
AELERLPSWEARLARTTQLVGAAAGPHDADALAAAAGSFYRKLVIADTYKPAGRLRAPV  
TLFTARDNYVT LGEDYGLREVCAGPLQTQQLAGTHRTILAGDAAA AIAAHL SAML AQ

>AKD01759.1 fatty acid synthase 3, partial [*Helicoverpa armigera*]

MLAAAGLAPVSRQQAASCEYVLLRRAA APPAAHV VLEVPDDGSYAWVEALRDALARA E  
AEDMRVYCVSRAPASGVLGLCTCLRGEAGGRRLRCY YLPGARD AFRPDAAPYAAQVRR  
DLAVNVLRAGVWGSYRHVALGDAAEAQLQVEHAYVNTL TRGDLSSLRWIESPLRHARH  
VPQSPRTDLCRVYCAPLNFRDIMLATGKLPPDALPGNLAGQECILGLEFSGRSSDGKRVMG  
MVAACGLASTVLADKGFLWEVPAKWSLEE AATVPVAYATAYYALVVRGRMR RGEAVLVH  
AGTGGVGQA AVAIALHAGCTVYTTVGT PDKRAFLRERFPTLP PENIGNSRDTSF

>AKD01760.1 fatty acid synthase 1, partial [*Helicoverpa assulta*]

LRGIQH VLLASTVPEQQTSLIQKIVALAGTPIKQSLDKNTTLEELGVFDDKIQEISQYLKLT Y  
NIVFDENKIPFLTVD TIQQIENSITKPAFKDEKGLSTFFTFVDADELVATTD FVCLPSLVNNS S  
MREDEFDATQTYLCIVPGMEGHHERFRLLCERLKLPAIVLQPGLDHLRETMQETAKRFVD  
VLLKKTQLQNNFYLLGYETGIAIALEMVALLED RGLTGTLYCIGFAPDELKVELDEQLSEF  
ASEEELQNAVARHMF TLMAGGDARGLGGLQAASTWAQKVELCVRTLLGRVPHSAQ

>AKD01761.1 fatty acid synthase 2, partial [*Helicoverpa assulta*]

MPSAVTNGSRGSDDDIVLTGLSGRLPESDSIEEFAQQLFDGVDLVTADDRRWTPGLHGLPE  
RNGKCLKDLAHFDATFFGVHAKQAHLMDPQLRLLLELTHETIIDAGINPGELRGSRTGVYV  
GVSNSETEEMWTVDPDKINGYALTGCCRAMFPNRISYTFDLKGPSFAVD TACSSSMFALA  
QAATAIRAGHCDAIVAGTNLCLKPANSLNHFRLSMLSPEGRCAAFDASGRGYVRSEAAV  
AVLLQRRSAARRVYCTLRGLRVNTDGAKDQGITFPSGDMQRR LAEETF AEAKLRPSDVV  
YVEAHGTGTKVGD PQEVNAIAELFCKGRKG PLLLSVKS NMGHSE PASGLCSVAKVVVA  
MERGVIPGNLHYKNANPDIPALSDGRIKVVDRNTEWDGGLVAINSF GFGGANAHVIFESEP  
GGGAARTPARYAVPRVVLASGRTEDAVRELTGLAAQHARDAGLHALLDAVHRHNIPGHS  
HRGFAVLTDPPIEECAEVESGEPRPVWFVFSGMGSQWPGMAKSLMQLPVFAASVNRSAA  
ALRPHNIDLIKITEAPAAAFDDVINSFVSIAAVQVALVDVLRAL EIRPDGIVGHSVGEIGCA  
YADETLTAEQAVLAAYWRGRSIVDAKLPPGMAA AVGLSWEQCEARCPDVPVACHNAND  
SVTISGPVESLEKFVATLSAEGTFARRVNSSGVAFHSKYIAAAAPLLRRSLEKVIPDPKPRSA  
RWVSSSLPRDKWNSDLAKLSDANYHVNLLSPVRFADAVREVPERALLVEVAPHALLQA  
VLKRARPAPAAHVPLVRRDAPDALVHLLAAAGRLYASGAQPHVARLYPAVAFVPRGTPG  
LASRVRDHAEWSVAHFGSASRSGENVIEYDVS RADDGFIAGHNIDGRVLF PATGYLTLV  
WRTMAKLHN RKPEETPIVMENIQFR RATIVSRDTPVRFLINVL DGTGEFDVCEGGAVVVT  
GTVRLADDPA AERLRDLDTAPPRQEDGLLPLVTDDIYKELRLRGYNYGGIFRGIRSSDPRG  
TCGELAWDDNWISFMDTMLQFGIIGVD TRELYLPTRLQRALIDPAAQLAAVAASGGGTVP  
VRMHRDIDVISAGGIEFRGVKTS LAPRRANPQAAPKLEKYVFLPYDNTAVATEDTSRSKR D  
ALTVSLQLVLENAGALRLKLGEAALERP AEALLTPLAMQLLEAEPQVRVDATLAAGPAPA  
AYAAALKDLGVKVL PKDGKAVPVESDCHLVLAADVLSRHGAGVLAQLAAALGEGGMLL  
LEEPHKALDAAGARDMLAQAGLAPVSRQQAASCEYVLLRRAA APPAQHV VVEVPDDGS  
YAWVEALRDALARA EAEDMRVYCVSRAPASGV LGLCTCLRGEAGGRRLRCY YLPGARD  
AFRPDAAPYAAQARRDLAVNVLRAGVWGSYRHVALGDAAEAQLQVEHAYVNTLTRGDL  
SSLRWIESPLRHARHVPQSPRTDL CRVYCAPLNFRDIMLATGKLPPDALPGNLAGQECILG  
LEFSGRSSDGKRV MGMVAACGLASTVLADK GFLWEVPAKWSLEE AATVPVAYATAYAL  
VVRGRMRERGEAVLVHAGTGGVGQA AVAIALHAGCTVYTTVGTADKRAFLRERFPTLPPE  
NIGNSRDTSF EQLIKRRTRGRGVDLVLNSLAADKLHASVRCLAEGGRFLEIGKLDLSNDTA  
LGMSIFLKNTTFHGILLDALFDADSADSDKAAVVRCVTDGIASGAVRPLPATVFS DHQLEQ  
AFRYMATGKHIGKVVL RVREEEAGGAR PASKLVSAIPRTYMH PARSYVLVGGMG GFGLEL  
AQWMVRRGATRLVLNSRSGVRTGYQAWCIRRWREAGVQVCVSTADACSPAGARALLRE  
AAALGPVGGVFNLAAVLRDAFLDKQTPAD FQAVAKPKIDATKILDAATRELAPELEYFVVF  
SSVSCGRGNPGQSNYGLANSAMERIVEQRQADGLPGLAVQWGAIGE VGLIVETMGGDET  
VVG GTVPQRIASCMEALGALLALPHA VAAASMV LADKRRAAAAPQQDLLHAVANILGIKD  
PSKVSDSANLAELGMDSLMGA EIKQTLERGYDVVLGVQEIRALTFAKL RGMAGGDDAA  
AGDAAPPAAGPDDQVQFAALGELMPKQALVKLPSAAA APEQRAVFMVHPIEGVVELLRG  
VAAAVRAPVFGLQCTRAAPLDDMAALARHYVAHVRAQQPSPPY TILGYSFGAGVAFEMA  
LQLEQAGCETRLVLVDGSPAYVATH TTRGKQKRSTRSAETDEADALAYFVQLFKDVDA  
KVS AELERLPSWEARLARTTQLVGAAAGPHDADALAAAAGSFYRKLV IADTYKPAGRVR  
APVTLFTARDNYVT LGEDYGLREVCAGPLQTQQLAGTHRTILAGDAAA AIAAHSAMLA  
Q

> fatty acid synthase1 [*Helicoverpa zea*]

GVDLVTADDRRWTPGLHGLPERNGKCLKDLAHFDATFFGVHAKQAHLMDPQLRLLLELTH  
ETIIDAGINPGELRGSRTGVYVGVSNSETEEMWTVDPDKINGYALTGCCRAMFPNRISYTF

DLKGPSFAVDTACSRSMFALAQAATAIRAGHCAAIVAGTSLCLKPANSNLFHRLSMLSPE  
GRCAAFDASGRGYVRSEAAEIGRAH

> fatty acid synthase 2 [*Helicoverpa zea*]

VRRSKNLTQYEQYKIGTWKKLGADVMSSENNINGNTLVKDASSIGTLGGIYVAITNVSND  
KVAELGQLIKSIDSSARSICPHLQYFAILSAIKSLGQDICVDRAKCGFAATHLDLSELYQAQS  
KASSHDVVDVAERALRSPSPVVAAPVPVNEPSLLQQIALSKIIPQNVDPPEATLKDLGLV  
DESIPLICSFLDVVYNVSLDEDSIPDLTLKGIQELVETATDIVPENVNGLATFFSKVSADELIA  
TTelfAVPTLNKDITLSEDEFDVNKRYLCIVPGMEGHYERFQVLCERLKLPAFVLQPGYDR  
PRETIRETAERYAKILLKKTGIQNNFYLLGYEIGVLVALELTAILEDHGLTGTVFCLGCAPEE  
FQATLEEQLSSFKTEEQLQDAIRHMSKLTIDEDVPALDDILSETATWSEKVAVCTRSLGR  
MQHSVQYAQAQIESALGNISRGRAYVAPVRALRSQVLVLLRAANCKPAARALQQH

> fatty acid synthase 3 [*Helicoverpa zea*]

NCASGEVRDSAMKCVAIEGYVFDLSEDDMKNNVDFGLSYLLDARHYKSLRPASLFKPEY  
ADEKKKLQYQIAEGITKGIVRPLHRVVYSPKDVSRAFRLQSLKLFSGNVLINMTDVQVSD  
EVLNVTPRFKYPAEGTYIVVCGDTKFGIEVADRLVKRGVVRKLLHVNPNSLTGYLHIKLT  
WKKLNVSVKISSENLTSDKECINLIKRGTKMAPVFGIFVQNYSTETKELTLEPENMLQKF  
NNDVQVVASLDVSSRKLCNNLKHFFVLNNSSTSASDAYAVEAMEKICEARN DARLPALAF  
RSHAVTEFDNNVNNETKTRPQKLSTVMNGLETSLKLNNTNVVTFDLKKQNNYDFLEKVA  
KIIGDRKSTRLNSSHSFISYAVFCLKK

#### **FATP**

>ARD71229.1 fatty acid transport protein [*Spodoptera exigua*]

MSNVEMSVDSNMNKTDIIQHKFEVKNGNADIEKGAVVKAGPKIPWTKAIIAMFALGVLA  
GACAVAWVFQDWQASLLVLAILAIVYCIAFYWRWIYVAIRTAPRDFSALYCYIKILRLTKNF  
TKKNWSMPDIFHQMVVHKPNKACFLFEDETWTFRQVEEYSLRVSAVLKGKGVKRGDTV  
AVMIGNCPEMPSIWLGATRVGAVCPLINTNQTGNTLLHSINIAKCDVVIYSDEFQTAQFQIS  
KELSPSLKLFKFTRRPLNTSPDAVKVVESDNDFTAMLENTAPFAWTPSDSDGFNGKLLIY  
TSGTTGLPKAAVISSSRMVFMASGVHYLGSLRASDVICYMPPLYHSAGGCITMGQAFIFGC  
TVALRTKFSASKYFPDCIKYNATAAHYIGEMCRYVLTTPPSPTDTQHKVVRTVYGNGMRPAI  
WTDVFKRFNIKKVVEFYGATEGNANIVNINNKTGAIGFVSRIIPAVYPIAILKVPDPSGEP  
DDRGLCQLAKPNEPGVFIGKINPNPSRAFLGYVDKAASDKKIVKDVFNYGDSAFISGDIL  
TADELGYLYFMDRTGDTFRWRGENVSTTEVESAI SRVADQRDAVVYGV EIPNTDGRAGM  
CGIVDPQGTLDLDKLAKDIAKDLPKYARPIFIRIMASVDMTGTFKMRKVDLQKEGYNPSL  
VKDKLYYADPKTGKYLPLGNEEYKIVSGQIRL

>ARD71230.1 fatty acid transport protein [*Spodoptera exigua*]

MVLVLAALGAACA AVFFSQGFLCMLVSIILGVVYLLAFHNRWCYVAIKTTPRDLRALLSY  
IKILWITRKFSKDLTLPDIFHDVVRHPDKPCFLFQDEVWTFKEVEDYSLRVTA VLKAQGI  
KKGSI VGLLVNCPQQPALWMGIARLGAITPLINTNQRGNALIHSVNVAKCDALIFSDEYQ  
SAIQDVAKDLSPSLKLFKFSQRPLKTSNSKFEGSGDIADFTNLVETTSPAPWTLADAEGFQ  
GKLLIYITSGTTGLPKAAVISNARFVFMATGLHYMGLEGNDVFYCPLPLYHTAGGVISVG  
QAVIFGCTVALKTKFSASQYFPDCVKYKATAAHYIGEMCRYVLATPPSPADTQHSVRVIYG  
NGLRPQIWKDFVKRFNIQSVTEFYGATEGNANIANVDGTPGAIGFVSRIIPKVPYPIAIIKVN  
QETGEPIRNSKGLCQLAEPNEPGVFIGKIQASNPARQYLG YVDKAASDKKVVKNVHFHGD  
SAFISGDILVADEFGYLFRRDRTGDTFRWRGENVSTTEVEAAISRVADHRDAVVYGVLPVN  
TEGRAGMCGIVDVGSLDLKLCRDLARDLPVYARPVIRVMDSLDMTGTFKMKKTDL

QKDGFDPKLAKKDRLYYLDLKQGRYLPLGVEEYDKIISGQIRL

>ARD71231.1 fatty acid transport protein [*Spodoptera exigua*]

MTEKTGVRFEAEKKGVILTSIAVSCAALGWLTRGCPTVMGAVALLGTYFLTGDYQWI  
YIWKQTHYRDFLGLRVLLYTIFRIWMWERQGKT VVTRWTEVARMSPNKKAFVMEDRAL  
TFREGDEFNSRISWYFKRAGYKPGEVVALLMETQPEYVFLWLGLAKIRVTTALINTNLKGS  
QLIHCLRIAGCKAVIFGDEMSESVKEIQTEISDIPLFQYNSPDRETAPFVQGTTPLSVELKEM  
STEPVIDSEQAKPRDTLLYIYTS GTTGFPKAAIITNIRYLLIPLGVQSSAQLTSSDVIYDPLPL  
HHTAGGVLGAGLAIVSGCTVVLRRKKFSASNYWSDAAKYGCTATQYIGEICRYLLAVPPGP  
NDRAHKVNVIFGNGLRPQIWEEFVKRFGIKRVMEFYGATEGNSNLVNLDSKVG AIGFLSRI  
FSTIYPLTLVKCDEITGEILRDSNGRCITCGPHEPGLLLGKIDPKKAILTFAGYADKTASEKK  
MVRNV RTEGDCYFNTGDVLVMDHYGYFYFKDRTGDTFRWRGENVSTAEVEGVISLIGL  
KDAVVYGVKVPNTEGKAGMAAIADPEKTLDLASLAKGLRSSLPVFARPLFVRILPESPLTA  
TFKLKKKELMEQGF DVEIVSDPIYFMDQKTGEYVPLTQKLFDDIMKGLVRL

>ARD71232.1 fatty acid transport protein [*Spodoptera exigua*]

MDAILAALVALMALAAAMA AVLSTLSKAAIFVILAVAPCVYRYRRHIYVFIKTLPRDCKFL  
WRYANGMIRSKRWGRQDATVAELFTRRALKNPDAPCFFVVGDRDWTFGQMAANSNKVA  
RVMQEHMGLKRGDVVCVFMPCNGEYVWTWLGM AKLGAVSALINSNL RHKPLLHC IQV  
AKAKAIVFSDQLADAISEVRDQLPEGLKLFQLYGECAPGVLDLAAEMEKHPPEYPIVTDK  
PRYKDTLLYIYTS GTTGMPKSAILPNSKYLLVVVATVHMLGLKKSDRMYNPLPLYHMAGG  
LVGTGAALVDGIPSVLR TKFSASNYWTDCKYDCTVAQYIGEMCRYLLAQPARASDAQHR  
VRIMVGNGMRS AIWQQIVDRFKVPQINEIYGATEGNANIINVDNTVGAVGFLPKLVPTS LH  
PIALVKADEHGTLLRGDDGYCIRCKPHEPGMFIGLIAQGNASREYYGYVDKDDSNKKLVR  
DVFCKGDAAFVSGDILVADELGYLYFRDRTGDTYKWKGENVATAEVENAMSPSLQQKAC  
VVYGV SIPQTEGRAGMACIADPARALPLSRLARDLDDSLPSYARPLFLRIINDIEITGTFKLK  
KLQYQKEGFDPEVIKDPLYFRLGADFVPITPQLYTDICTGKIKL

>ALJ30274.1 putative fatty acid transport protein FATP1 [*Spodoptera litura*]

MSNMENVDSDNMNKT DVSQQKFELKNGNADIEKGT VVKAGSKIPWTKAHAMFALGVL  
AGACAVAWVFQDWKASLLVLAILALVYCIAFYWRWIYVAIRTAPRDFSALYCYIKILRLTK  
NFTKKNWSMPDIFHQLVVKHPNKACFLFEDETWT FQQVEEYSLRVS AVLKGKGVKRGDT  
VAVMIGNCPEMP SIWLGATRLGAVCPLINTNQTGNTLLHSITIAKCDVVIYSDEFQTA FQDI  
SKELSPSLKLFKFVRRPLNTAPDAVKVVESDDDFTSMLENTAPFPWTPSDSDGFNGKLLYI  
YTS GTTGLPKAAVISSSRMVFMASGVHYLGSLRKS DVIYCPMPLYHSAGGCITMGQAFIFG  
CTVALRTKFSASRYFPDCIKYNATAAHYIGEMCRYVLTTPSPPTDTQHKVRTVYGNMMPA  
IWTDFVKRFNIKKVVEFYGATEGNANIVNINNK TGAIGFVSRIIPAVYPIAILKVDPDSGEPI  
RDDRGLCQLAKPNEPGVFIGKIKPNNPSRAFLGYVDKAASDKKIVRDVFDYGDSAFISGDI  
LTADELGYLYFMDRTGDTFRWRGENVSTTEVES AISRVADQRDAVVYGV EIPNTDGRAGM  
CGIVDPQETL DLKLA KDIAKDLPKYARPIFIRIMASVDMTGT FKM RKVDLQKEGYNP SL  
VKDKLYYADPKTGKYVPLGNEEY EKIMSGQIRL

>ALJ30275.1 putative fatty acid transport protein FATP2 [*Spodoptera litura*]

MVLVLAALGAACA AVLFTQGFLCMLVSIILGIVYLLAFHQRWCYVAIKTTPRDLRALLSYI  
KILWITRKFSKDLTLPDIFHDIVSRHPDKPCFLFQDEVWTFKEVEDYSLRVTA VLKAQGIK  
KGSIVGLLVNNCPQQPALWMGIARLGAITPLINTNQRGNALIH SVNVAKCDALIFSDEYQS  
AIQDVAKDLSPSLKLFKFSQRPLKTSNSKSESGDGIADFTNLVETTSPAPWTLADADGFQ  
GKLLYIYTS GTTGLPKAAVISNARFVFMATGLHYMGLEGNDV FYCPLPLYHTAGGVISVG

QAVIFGCTVALKTKFSASQYFPDCVKYKATAAHYIGEMCRYVLATPPSPADTQHSVRVIYG  
NGLRPQIWKDFVKRFNIQSVTEFYGATEGNANIANVDGTPGAIGFVSRIFPKVYPIAIKVN  
QETGEPIRNSKGLCQLAEPNEPGVFIGIKIQASNPARYLGYVDKAASDKKVQNVFHF  
SAFISGDILVADEFGYLFRRDRTGDTFRWRGENVSTTEVEAAISRVADHRDAVVYGVLPN  
TEGRAGMCGIVDVGTLDDLKLCRDLARDLPVYARPVFIRVMDSLDMTGTFKMKKTDL  
QKDGFDPKLAKKDKLYLDLKQGRYLPLGVEEYDKIISGQIRL

>ALJ30276.1 putative fatty acid transport protein FATP3 [*Spodoptera litura*]

MTEKTGVRFEAEKKGVLTSIAVSCAALGWLTRGCPTVMGAVALLGTYFLTGDYQWI  
YIWKQTHYRDFLGLRVLLYTIFRIWMWERQGKTVVTRWADVARMSPNKKA FVMDNRAL  
TFREGDEFNSRISWYFKRAGYKPGEVIALLMETQPEYVFLWLGLAKIRVTALINTNLKGS  
QLIHCLRIAGCKAVIFGDEMSESVKEIQSEIPDIPLFQYNSPDREKAPFVQGTAAHLSVELKE  
MSTEPVIETEQA KPRDTLLYIYTS GTTGFPKAAIITNIRYLLIPLGVQSSAQLTPSDVIYDPLP  
LHHTAGGVLGAGLAIVSGCTVVLRRKFSASNYWSDAAKYGCTATQYIGEICRYLLAVPPG  
PNDRAHKVNVI FGNGLRPQIWEEFVKRFGIKRVMEFYGATEGNSNLVNLDSKVGAIGFLS  
RIFSTIYPLTLVKCDEITGEILRDSNGRCITCGPHEPGLLLGKIDAKKAILTFAGYADKTASEK  
KMVRNVRNEGDCYFNTGDLVMDHYGYFYFKDRTGDTFRWRGENVSTAEVEGVISLV  
GLKDAVVYGVKVPNTEGKAGMAAIADPERTLDLATLAKGLRSSLPVFARPLFIRILPESPLT  
ATFKLKKKELMEQGFDVEIVSDPMYFMDQKTGEYVPLTQKLFDDIMQGLVRL

>ALJ30277.1 putative fatty acid transport protein FATP4 [*Spodoptera litura*]

MDAILAALVALMALAAAMA AVLSTLSKAAIFVILAVAPCVYRYRRHIYVFIKTLPRDCKFL  
WRYANGMIRSKRWGRQDATVAELFTRRALKNPDAPCFFVVGDRDWTFGEMAANSNKVA  
RVMQEHMGLKRGDVVCVFMPCGEYVWTWLGMALGAVSALINSNLRHKPLLHCIQV  
AKAKAIVFSDQLADAISEVRDQLPESLKLFLYGECSPGVLDLAAEMERHPPDYPIVTDKP  
RYKDTLLYIYTS GTTGMPKSAILPNSKYLLVVVATVHMLGLKKS DRMYNPLPLYHMAGGL  
VGTGAALVDGIPSVLRTKFSASNYWTDCKYDCTVAQYIGEMCRYLLA QPARPTDAQHRV  
RIMVGNGMRS AIWQQIVDRFKVPQINEIYGATEGNANIINVDNTVGAVGFLPKLVPTSLHPI  
ALVKADETGTLLRGDDGYCIRCKPHEPGMFIGLIAQGNASREYYGYVDKDDSNKKLVN  
VFCKGDAAFVSGDILVADELGYLYFRDRTGDTYKWKGENVATAEVENAMSPSLQQKACV  
VYGV SIPQTEGRAGMACIADPARALPLSRLARDLDDSLPSYARPLFLRIINDIEITGTFKLKK  
LQYQKEGFDPEVIKDPLYFRLGADFPITPQLYTDICTGKIKL

#### ACD

>AID66666.1 short-chain specific acyl-CoA dehydrogenase, partial [*Agrotis segetum*]

MASSPLLKSSKLG IYSRKCLKTSLSQHRTFTTQLTEQQVCIQEMARNFASEHLKPNAKHDT  
EARFPFEPIKKLASMGLMGACVDPKKGGLGLDYLSLALAVEELSR

>AID66667.1 short-chain specific acyl-CoA dehydrogenase [*Agrotis segetum*]

METEGVFRGKKERIMSVSETLRAATACPVTL EEVRIPRDYIVGEPGDGFRIAMEQLDQARI  
GIAAHAVGIAQSALDTAVSYAKKRIAFGKPLSRLASVKDRITEMVMLVETARLATYRAAV  
DVSTKNSAMAKYLAGRNATAVADHCVQILGGRGLSVNYDAERHYRDARGTQIYGGVTDI  
QKRLVGHYFLKENNAL

>AID66668.1 short-chain specific acyl-CoA dehydrogenase [*Agrotis segetum*]

MIKNFSKLVQTLAPTSVRQTRCIASLSALSEDYQMLYKTCRDFAE GELKPNAAKFDREHL  
YPGDAIKKMGE LGLMAIAVPEELGGAGLDYLAIALEEISRGCASAGVIMSVNNSLYLGP  
VLHWGTDKQKEQFVKPFTSGEIVGCFALSEPGNGSDAGAASTTAKDGGDKWVLNGTKC  
WITNGYESKASVVFATTDKSLKHKGISAFIVPKPIKGLELGKKEDKL GIRGSSTCSLMFEDC

SIPKENILGQPGLGFKIAMMTLDAGRIGIASQALGIAQASLDVAAEYASKRTAFGKPIMKLQ  
SIQNK LADMALQLESARLLTWRAAWLKDNKKPYTKEAAMAKLAASEAATFLSHQCIQIL  
GGMGYVSDMPAERHYRDARITEIYEGTSEIQRLVIAGQLIKEYGLN

>AID66669.1 short/branched chain specific acyl-CoA dehydrogenase [*Agrotis segetum*]

MFPLRRVGSKILEQWRSPVVATGMQRNYSSEVTPPRPLSVLTEDEQTMKETIRKLATEQIA  
PLVKKMEEEEHRIDDSVRQLLFDNGLMGIETPTDYSGSGCGFLTMMVVVEELSRVDPAAVA  
FVDIHNTLVNSLFMKLGTEEQKQKYLTKLCTEYAGSFCLTEPSSGSDAFALKTVAKKDGEH  
YVISGSKMWISNSDVAGVFLVMANADPSKGYKGITCFIVERDTPGLSVAKPENKLGRASG  
TCMVHFDNVRVHESAILGEYGKGYKYAAGFLNEGRIGIASQMIGLCQGCMDATIPYTLE  
KQFGKSIYSFQGISYQIAHLQTQLEAARLLTYNAARLKENGLEFVKEAAMAKYYASEIAQ  
KLTSKCIDFMGGVGFTKDFPQEKFFRDAKIGTIYEGTSNMQLQTIAKLIERQYTQ

>AID66670.1 putative medium-chain specific acyl-CoA dehydrogenase [*Agrotis segetum*]

MNPITQVIRATRPIYRKLSTTAPVAAAKPLPTTGMCFELSEEQKALQDLARKFTREEIVPA  
AQYDKTGEYPWPVIVKKAWEIGLMNGHIPEHCGGVGGNMGVLEECIAAEEMAFGCTGITT  
AVGGTTLGQMPVIIAGNKEQQKKYLGRLVEEPIVAAYCVTEPGAGSDVAGVKTRAEEKG  
DEWIINGQKMWITNGGVANWYFVLARTNPDPKCPASKAFTGFIVERDWPGVTPGRKEQN  
MGQRASDTRGITFEDVRVPKENVLIEEGAGFKIAMGAFDKTRPPVAAGATGLAQRALTEA  
TKYALERKTFGVPIARHQAVAFMLADMAIGVETARLAWMKAAWMADHGIRNTVLASVA  
KCHASEIANKAAADAVQIFGGNGFN TDYPVEKLMRDAKIYQIYEGTSQIQRLLISREIITQA  
MQSN

>AID66671.1 acyl-CoA dehydrogenase family member 9 [*Agrotis segetum*]

MNIARKLCTIHHSYVSRNLYRKFRFSAITYDNATATQPQVKEEKFD FEDLNVLER TERRKA  
KIEPFMKDIFTSIFNKDLLAYPEILNKEETESLERRINAITNVFIDPKKT TEDRKNILKSTRMY  
AAPVSLTRNGLASNITENLRYLEA IAGDFQLGQEMSEHWVALQALAQGLTQE QYSMIIDD  
LTVGDKPISLAIKERIAERISQADFRTSADIDGQGIWHLNGEKVCHYTNGYVLVLAIVEATR  
LKAFLVHPDASGVSSDGNFVTFMKT PATPLEMITEQKLAQILGLSRLYAAVLSRCQLTAAV  
RSVVEYTRPRAFSGKPLAELSTIQSTVGNAILDIYASESAEYFTAGLLDGYVEPD AELEVA  
MCRNFISNHGLHTMLNLLSIPALDKEEECKQLLDDMRHLATRGESLDSVNMFIALNGIHH  
AGKVMADDEVKQIRNPLMHPAFIFKKVL ANRHQERDDPKLTLHLSEHLHPSLKQPSEQLEY  
CVLRMRFACETLMARHG VKVSTAYTELNPLAEAAATEILMMTAVLARASRSYCI GLRNAET  
EMKLAACFVERTRD KVRLIKEIDDGEYLNLDHFTVQFGRKM LDSNSSLVEKPTARVFW

>AID66672.1 very long-chain specific acyl-CoA dehydrogenase, partial [*Agrotis segetum*]

MKGAKLLTCANRCIAGKSTQVQLPLHSCRR LATEAAEKRGAAARESGSFTLNLFRGRLETA  
QVFPFPEPLSDDQRQTLQELVPPVEKFFQEVNDPAKNDADSKIEPNTVSGLWELGAFGLQV  
PTDMGGLGLCNTQYARLVEVVG AHD LGV GITLGAHQSIGFKGVLLFGTPEQKAKYLP RV  
TGGEYAAFCLTEPSSGSDAGSIKSRAVLSPDGKHFILNGSKIWISNGGIAEIMTVFAQTPIEK  
DGKTIDKVTA FIVERSFGGVSSGP PENKMGIKCSNTTEVYYEDVKIPVENVLGGVGN GFK  
VAMNILNNGRFGMAAALAGTQRAALRQAAEHAATRVQFGKRIADYGTIQEKLARMALL  
QYTTESLAYMVSGNMDSGAQDYHLEAAISKVFASDSA WTVVDEAIQILGGMGFMKATGL  
ERVLRDLRIFRIFEGTNDILRLFALTGIQFAGSHLQELQRAFKNPTAHLGLIFSEAGRRAAG

>AID66673.1 isovaleryl-CoA dehydrogenase, partial [*Agrotis segetum*]

DRKVVMMAVRLGRVTSILRNCTSKTGTRC MSHYPIDEHVFGLSSEQQQLRQSVFDFAQKEL  
APKAQQIDKDNNFAELRQFWKKCGEMGLLGITANPEYGGTGGKYSDHCVIMEELSRASG  
GVALSYGAHSNLCVNQIN



>AID66674.1 isovaleryl-CoA dehydrogenase, partial [*Agrotis segetum*]

AHSNLCVNQINRNGTDEQKRKYLPKLCSGEHMGALAMSEPGSGSDVSMKTRAEEKGD  
YYVLNGNKFVITNGPDADVLVVYAKTDTTSKPQHGISAFLEKGFPGFSTAQKLDKLGMR  
GSNTCELVFEDCKVPAANLLGEENKGVYVLMISGLDLERLVAAGPIGIMQASVDTAFDYA  
HTRKQFGKSIGEFQLLQGKMADMYTTLSACRSYLYSVARACDEGHINSKDCAGVILYCAE  
KATQVALDAIQILGGNGYINDYPTGRLLRDAKLYEIGAGTSEVRRMLIGRALNNEYK

>ADB57042.1 acyl-CoA dehydrogenase [*Heliothis virescens*]

MNPITQVIRATRPIYRKLSTTAPVAAAKPLPTTGMSFELSEEQKALQDLARKFTRGEIVPVA  
AQYDKTGEYPWPVIVKKAWEVGLMNGHIPEHCGGMNMDVFDGCMVAEELAYGCTGIMT  
AMEASGLGQMPVIIAGNKEQQKKYLGRLVEEPIVAAYCVTEPGAGSDVAGVKTRAEEKG  
DEWIINGQKMWITNGGVANWYFVLARTNPDPKCPASKAFTGFIVERDWPVSPGRKEQN  
MGQRASDTRGITFEDVRVPKENVLIEEGAGFKIAMGAFDKTRPPVAAGATGLAQRALTEA  
TKYALERKTFGVPIARHQAVAFMLADMAIGVETARLAWMRAAWMADHGIRNTVLASVA  
KCHASEIANKAAADAVQIFGGNGFNTEYPVEKLMRDAKIYQIYEGTSQIQRLISREITNA  
MQSN

### **ECH**

>AID66689.1 enoyl-CoA hydratase [*Agrotis segetum*]

MASVGVVTRVLLGKNVVRVAAVNTGFVKFYSTGPSYENIKIDVVGAKKNVGLIQLNRP  
KALNALCGPLFVELGQAVRDFDANEKIAAIIITGNEKAFAAGADIKEMQNNTFSNTKKGF  
LKDWEDVSNCGKPLIAAVNGFALGGGCELAMLCDIYAGEKAKFGQPEINIGTIPGAGGTQ  
RLPRYVGKSKAMEIVLTGNFIDATEAERMGLVSRVFPVEKLLEETIKLAERIGTHSPLIVKM  
AKAAVNQAYETTLKSGLLFEKAYFYGTFTATEDRKEGMTAFVEKRPPNFKNE

>ADB57043.1 fatty acid beta-oxidation complex subunit alpha, partial [*Heliothis virescens*]

MSNSKIFNALKILRTRKDLKYLKAGSHIRTYAAAGSQVHTKCKNVNGIYVVTLDSPNTKVN  
SLNTAVMEEVNGVLNEIESNPSIQAAVLISGKPGCFIAGADISMLEACKTKDEFVTLKRGH  
EIFHRIERSRKPIIAAIQGSCLGGGLETAACHYRIAVKDPKTGFGLPEVMLGLPPGGGTQ  
RMPVPTSVPTTDLALTGKTVKADKAKKLGIVDLLVSPLGPGLSKPEESTMRYLEEVAIQI  
ARDIANGKIKVDRSKKGLVEKITASVMQWDMVKNMIFNKAKEQVMK

>ADB57046.1 enoyl-CoA hydratase, partial [*Heliothis virescens*]

MRVLLKRLISVTNIPIQRYAVRLCSSDSQAKAAVKEKPTEQDQKEAENIVVEKKNIVLEKF  
GAVMTLNIDRQTTRNSLDIATLKEMTEAINAFDNDPEAKVLVFNGEGGSFCSGFNMNDIG  
TVGYQNLKDAAMRLERRPLCDKITIAAVSGYAVVEGFELALSCDLRIIEDTAILGCLGRRFG  
VPQSLYGARKLTSILGLSPALDLLITGRLITGVDANRLGLACKLTSTGTALGESIKLAKSLVK  
FLWNAMVMDKMAAINS QLHLNSEESMRDEVIMNSLLGMLLKNMKEGVRSFQQGIG

>ADB57047.1 enoyl-CoA hydratase, partial [*Heliothis virescens*]

MLIPRLFKFNSITRNATARFLATQAQQSNENVSPVVYEKLLGTDRGIALYGLNSPKDRNAL  
GFDMEAMREVNQLIREDTKVS VILHSMVPGIFCAGANLKERFKMADDEVANFVKGLR  
GTFIEIEDLPMPTIAAIEGVAVGGGLELALACDVRVSETAKLRLVKTCRGLIP

>AID66685.1 methylglutaconyl-CoA hydratase [*Agrotis segetum*]

MLIPFPRLSRCSSLIKHGTVRLLATQTQQYNENVSPVVYEKLLGTDRGIALYGLNSPKDRN  
ALGFDMEAMREVNQLIREDTKVS VILHSMVPGIFCAGANLKERFKMADAЕVARFVKG  
LRATFIEIEDLPMPTIAAIEGVAVGGGLELALACDIRVVAETAKLGLVETGRGLIPGAGGTQR  
LPRAVNINIAKELIYTSRIVSGTEAKDLGIVNHVVPQSNSNNAALEKSLSIAREIILNAPIALR  
CAKQAINEGIQLSIKDGYEVEQKFYEMNIPTKDRQEGMISFMEKRKPIYEGH

>AID66686.1 putative enoyl-CoA hydratase [*Agrotis segetum*]

MRVILNRLFAATNLPIRRYAVRLRSNDKPAENEKKPEEAQKESENIEVNKKNIVVEKYGP  
VTTLNIDRQTTRNSLDIPTLREMAAAIDAFDNDQEAKILVINGEGGTFCSGFNMYEIAKEG  
YQNMKDAARRLERPLCDKITIAAVSGYAVAEGFEIALSCDLRVIEETAVLGCLGRRFGVP  
QSLFGARKMTGLIGLSAALDLLITGRLITGVDANRLGLACKLTATGTALGESVKLAKSLAK  
FPENAMIMDKMAAINS QLNPNSEDSMRDEAIMSSLLGNAIEDMKEGVKKFQAGIGKHGK  
FYKLTEVPLKEWELEETVDEVTVQMKDKPETEKKLT

>AID66687.1 trifunctional enzyme subunit alpha [*Agrotis segetum*]

MSNSKIFNALKILRTRKDLKYLTGSHSRTYAAAGSQVHTKCKNVNGVYVVTLDSPNTKV  
NSLNTAVMEEVSQVLNEIESNPSIQAAVVISGKPGCFIAGADITMLEACNTKEEFVDLSKRG  
HGIFHRIERSRKPIIAAIQGSCLGGGLETALACHYRIAVKDTKTGFGLPEVMLGLLPGGGGT  
QRMPVLTSIPTTLDLALTGKTVKADKAKKLGIVDLLVSPLGPGLSLPEESTMKYLENVAIQI  
ARDIANGKIKVDRAKKGLVQKITASIMQMDAVKNMIFNKAKEQVMKASRGLYPAPLKILE  
VVRTGVDKGPTAGYEAQAQGFGEAVTPQSRGLIGLFRGQTECKKNRFGKSKVDVKTIGV  
LGAGLMGAGIVQVSINKGYHVVMKDATNPGLFRGVGQIQNGLATAVKRKRMSGLQRDQ  
FLSNLLPTLDYEKMRNCDCVIEAVFEDLNVKHKVIKELEAVIPKHAILATNTSAIPITKIAAG  
SSRPDKVIGMHYFSPVDKMQLLEIIRHPGTSDDTAAAVGVGLRQGKVVITVGDPGFYT  
TRILSTMLSEAVRLQEGVDPKTLDSLTKNFGFPVGAVTLADEVGIDVGSHIAVDLAKAFG  
DRFSGGNLEVMPDFVKAGFLGRKSGKGFYVYEKGSKSKEVNQEAVNILKERYPLEPRGA  
NTAEDQQLRMVS RFVNEAVLSLEEKILHSPLEGDVGAVFGLGFPPFTGGPFRWVDQFGAD  
KLVKKMEEFHGLYGAPFKPAQTLVDMARDGKKFYKN

>AID66688.1 3-hydroxyisobutyryl-CoA hydrolase, partial [*Agrotis segetum*]

TSMVSKLLPQLQEWESKKTIVIVKGAGDKAFCAGGDVKA AIDKVEGPRFFHTEYNVNYL  
IGKYKIPYIAFMNGITMGGGLGLSVHGRYRIATEKTVIAMPETKIGLFPDVGGSYFLPRLQV  
NLGLYLGLTGDRKLGWDVVKSGIATHFVPSKRLYELEVLLSRCADGEISNLLSKFNPSD  
KFSLSDNIKHINYCFAASTIEEIERLEKVQNEWSVKTLKTLQSQMCPGSLKITLRALQRGSQ  
LELNQCLKMEYRVACRATENHDFPEGVRALLIDKDNNPQWKPRTLAEVDDDDYVESYFKK  
LPQERELQYFDSKL

>AID66690.1 enoyl-CoA hydratase domain-containing protein 3 [*Agrotis segetum*]

MLVSLQKKCFRPLYVHCRALHSQYVKINENNGAREITLNHEKTKNSLSLDMMKHLIEAIN  
KNKDDTSLRAIVLSAKGNVFSAGHNLKELQSNTGVDQHKLIFSKATELMKAIQSPVPVIA  
KVNSFAAAAGCQLVATCDMIVCSDTSKFSTPGANFGIFCSTPGIAGRCVPKSRATYMLFT  
GEPLTAQEAYESGLVTKVVPASELDNEVNKIIIEKIKHKRSRVIALGKEFYKQIDLSLMDAY  
KLGEDIMVKNINTNDGQEGIKSFVEKRKAVWSHE

## HCD

>XP\_022823313.1 hydroxyacyl-coenzyme A dehydrogenase, mitochondrial-like [*Spodoptera litura*]

MAGDASAEDIDIAMKLGAGYPMGPLELADFTGLDTKKFVLGVMHEKTGLPAFEPIPLL  
KLVSEGKFGKRTGEGFYKYDK

>XP\_022822785.1 hydroxyacyl-coenzyme A dehydrogenase, mitochondrial-like [*Spodoptera litura*]

MTKLQVQFQVIARNFSSSSAMQSAIKNVTVIGGGLMGSGIAQVSAQAGQNVILVDVSSDVL  
AKSQKSIGANLGRVAKKMYKDKPQEGEFVTDAMARIKTSTDPEASKSADLVVEAIVEN  
MSVKHKLFSQLDGVAPNHTIFASNTSSLSINEICSVVKRKDRFGGLHFFNPVPMRLLLEV

RGAE TSDATYKTMMEWGKAVGKTCITCKDTPGFVVNRLLPYICEAIRLYERGDASARDI  
DTAMKLGAGYPMGPLELADYVGLDTNKFILDGWHKKYPDQPLFNPIPLLDKLVAEGKLG  
VKAGEGFYKYDKK

>XP\_021195856.1 hydroxyacyl-coenzyme A dehydrogenase, mitochondrial-like [*Helicoverpa armigera*]

MTKL VQFGVIARNFSSSSAMQSAIKNVTVIGGGLMSGIAQVSAQAGQNVILVDLSSDVL  
AKSQKSIGANLGRVAKKVYKDKPQEGEKFVAESMARIKTSTDPAEAAKSADLVVEAIVEN  
MNVKHKLFSQLDAVAPNHTIFASNTSSL SINEICSVVKRKDRFGGLHFFNPVPMRLLEV  
V  
RGAE TSDATYKTMMEWGKAVGKTCITCKDTPGFVVNRLLPYICEAIRLYERGDASARDI  
DTAMKLGAGYPMGPLELADYVGLDTNKFILDGWHKKYPDQPLFNPIPLLDKLVAEGKLG  
VKAGEGFYKYDKK

>AID66691.1 3-hydroxyacyl-CoA dehydrogenase, partial [*Agrotis segetum*]

MLKGMVSLVTGGASGLGKATVERFVKNGGKVILDIQGTAKKVAQELGENVAVATGCV  
TSEEDVKKALEIVRDKFGRDLTLVNCAGQSETHQIYNFLKDKSCELDGFMRCINVNTIGTF  
NTIRLSAGLIGKNKPDDNGQRGVIVNTASTIAYEGDIGQAAYAASSAAIIGMTLPIARDLAS  
QGIRVVTVAPGLFETPLITYLPDKMLDFIKRMTFPSPRLGKPEEFAHLVTSIVENPMLNGEVI  
RLDGAQRWFP

>AID66692.1 3-hydroxyacyl-CoA dehydrogenase [*Agrotis segetum*]

MFKGLVGLVTGGASGLGRATVEQLLKQGGRVVICDLPTSTGQETAKQLKENVAFVPIDVT  
SEKDVKNALQTTIDKFGRLDVVNCAGVATASRVYNFKKDQPFDLKSFQRTIEVNLTGTFN  
VIRLAAGLIGKNAPDADGQRGVIVNTASVAAFQDGQIGQAAYSASKAGVVGMTLPIARDLA  
KQGIRVVTIAPGLFRTPMMEQLPEPAIKSLEATVPFPRLGHPQEFALLVQSIIQNPMNLGET  
IRLDGSLRMQP

>AID66693.1 peroxisomal multifunctional enzyme [*Agrotis segetum*]

MDQLRFDGRVAVVTGAGGGLGKAYALLGSRGAKVVVNDLGGARDGVGKSNFADAVV  
KEIKDKGGIAVADYNNVVEGEKIIKTALDNFGRIDILINNAGILRDKSFTKMSDQDWDLIHL  
VHLKGAFKTTTHAAWETFRKQKYGRVIMTSSNAGIFGNFGQANYSAAKMGLVGLTNTLAI  
EGSKYNIKVNTIVPTAASRLTEDILPPEMFEAMKPELIAPVVAYMVHESFPDTGAVIDSTLG  
YATKMHYVRAPGAILKKKPSDPVTIESVREFWPQVTNMNGAIHLDKMAEVTVDLVEKIQ  
DFEERSKLDDGRESYWSSYKYDSKDLMLYALGIGASVQNESDLKFLYESHEGFAALPTYFI  
LPGMALESPLVANSMPGKHADFTNILHGEQFIEFVGDFPGTEGDFKIRSYVVDLLDKGSS  
AVSIVNSEIYQNKQLIARTQQHIFVLGQGGFNGPRNSKLAVDVQPAPKRAPDAVIEQRTAED  
QAALYRLSGDMNPLHIDPNVATASGHQKPILHGMATLGFSARHVLAKYGGNEPNFKAL  
KARFVKPVQPGNTLVTEMWLEGKRVHFQTKVKESGNIVIAGAYVDLKNVVAGQVGSSSA  
APAAAPSGGSFKSDALFAKIKEEVGKNKDLAKSIGGVFQYNISENGKTAKSWTLDLKTPE  
VYEGTPKSGKADTTLTVSDDDMVAIAAGSLSPQVAYMKGKLLKIAGNIMLAQKLGPLLKSP  
AKI

>AID66694.1 hydroxyacyl-CoA dehydrogenase [*Agrotis segetum*]

MTKL VQFGVIARNFSSSSAMQAAIKNVTVIGGGLMSGIAQVSAQAGQNVILVDLSPEVL  
AKSQKSIGANLGRVAKKMYKDKPQDGEKFVSESMARIKTSTDPAEAAKSADLVVEAIVEN  
MSVKHKLFSQLDGVAPNHTIFASNTSSL SINEICSVVKRKDRFGGLHFFNPVPMRLLEV  
V  
RGAE TSDATYKSMMEWGKAVGKTCITCKDTPGFVVNRLLPYICEAIRLYERGDASARDI  
DTAMKLGAGYPMGPLELADYVGLDTNKFILDGWHKKYPNQPLFNPIPLLDKLVAEGKLG  
VKAGEGFYKYDKK

>AID66695.1 putative 3-hydroxyacyl-CoA dehydrogenase [*Agrotis segetum*]

MNKLIGITRNFSSSTSLNAIKTVTVVGGGLMGSGIAQVAAQAGQNVTIIDINAELLDKAQK  
SIQTNLTRVGKKLYKGDAAKIDSFVKESAERIRVSTKLEDGADVLDLIVEAIVEKLDKQEL  
FNKLDVLSPGRTIFATNTSCISVNAIGSGIKRKDRYGGLHFFNPVPVPMRLLEVIKDDTSEE  
TYQAMMEWGKAVGKTCITCKDTPGFVVNRLGYPYSAEAI RMLERGDASKEDIDIGMKLG  
AGLPMGPFELADYTGLDTNRLAQQALYSMTKNEVFAPIELLEKMVQEGKYGIKSGEGFY  
KYNKK

>ADB57043.1 fatty acid beta-oxidation complex subunit alpha, partial [*Heliothis virescens*]

MSNSKIFNALKILRTRKDLKYLKAGSHIRTYAAAGSQVHTKCKNVNGIYVVTLDSPNTKVN  
SLNTAVMEEVNGVLNEIESNPISQA AVLISGKPGCFIAGADISMLEACKTKDEFVTL SKRGH  
EIFHRIERSRKPIIAAIQGSCLGGGLE TALACHYRIAVKDPKTGFGLPEV MLGLLPGGGGTQ  
RMPVPTSVPTTDLALTGKTVKADKAKKLGIVDLLVSPLGPGLSKPEESTMRYLEEVAIQI  
ARDIANGKIKVDRSKKGLVEKITASVMQWDMVKNMIFNKAKEQVMK

>ADB57049.1 3-hydroxyacyl-CoA dehydrogenase, partial [*Heliothis virescens*]

VAAQAGQNVTIIDINS DLLGKAQTSIQANLTRVGRKLYKGDEAKINSFVKESFERIRVSTKL  
EDGADVLDLIVEAIVEKLDKQELFNKLDQLSPARTIFATNTSCISVNAIGSGIQRKDRYGGL  
HFFNPVPVPMRLLEVIKCDTSEQTYQAMMEWGKSVGKTCITCKDTPGFVVNRLGYPYFA  
EAIKM

**KCT**

>AID66700.1 3-ketoacyl-CoA thiolase, partial [*Agrotis segetum*]

ILFLLERRCFNGGNLICGNQGLMVEDQRNRVKLSKIVGATSMFVSGSSDGILTPRHSALKA  
GVPYDKPALGVNKL CGSGIQAMVNSAQDILLGSAQISLAGGTENMSAIPFLVRNLRFGTQ  
LGQVRPFEDFLKAGALDSYCNYTMAQTAENLAKMYDLKREQLDEFALKSQMKWKAGF  
KNGAFEAE MAHVTVTVGGKPVVVNKDEHPRTNTTLESLSKLPALFREGGVGT VGNSTGV  
NDGAGALILASEEAIKQHNLTPLARLSCWSHAGVEPRVMGLGPVPAVRQLLAATGYTLDD  
MDMFEINEQFAAQALASVLEIGLDQDKLNMNGGALAMGHPAAASGARIAAHLTHELRRR  
GLKRGIGATCIGGGQG

>AID66699.1 3-ketoacyl-CoA thiolase, partial [*Agrotis segetum*]

ATIKKKGVVVDKQPAQLSIKTEELKQFPTLIENGEILTAGNISAPADGAAALLIADEEAVK  
SHNLRP

>AID66698.1 trifunctional enzyme subunit beta [*Agrotis segetum*]

MASQISKSLIKVSHVGSTAKFDTARRALSVGAALHAKRNSLPDRTGKNVVLVDGVRTPFL  
VSFTDYAKMMPHELARHSLGLLQKTGISKDVIDYIVYGTVIQEVKTSNIGREAALAAGFS  
DKTPAHTVTMACISSNQAITTGVGMI AAGAYDVIVAGGVFEFMSDVPIRHSRKMRSLLLRL  
NRAKTPAQRLSLIATIRPDFFAPELPVAEFSSGETMGHSADRLAAAFGASRQE QDEYSLRS  
HKLAAEAQKGYFTDLIPVKVDGKDGVDKDN GIRSTPEQLAKLKPAFVKPHGTVTAA  
NASFLTDGASACLV MSEAKAKELGLKPKAYLRDFTYVAQDPVDQLLLGPTYGIPKILDKA  
GLKISDIDTWEIHEAFAGQILANLKAMDS DWFAQTYLGRQSKVGTPDLEKWNKWGGSL  
IGHPFAATGVRLAMHTAHLVREDGQFGVISACAAGGQGVAMILERHPDATCN

>AID66697.1 3-ketoacyl-CoA thiolase, partial [*Agrotis segetum*]

MAVAVKKGVYIVAGKRTPF GKYGGLLRDVL AEDLFATAAKAALKAGDVP GDLDVTVNIG  
QISPISQSGLSPRHAALKTGIPADRPVLSMNRLSGSSFNAMLC SAQEILLGAAKISLAGGME  
TLS

>AID66696.1 3-ketoacyl-CoA thiolase, partial [*Agrotis segetum*]

ETLSSIPFLIYGVRFGTQFGKPIELEDFLRHGNIDTYCNKFLPQTADVVAACYGITRREADE  
YALRSQQRWKHADASGLFSEELVSVPVKIKSREVLMTREHPQPDVTLEKLSRLQPVSTG  
GITTAGNITGLNDGAAAMILANGQALRDHNLKPLARIVGWSVVGVDPMVMGYAAVPAVE  
TLLKTTGLTIDMDLVEIHETFAATTVCARHLGVDEDKMNVNGGAIAMGHPSGASGARI  
VSHLTHELRRRGLKRGIASAGIAGGQGIAIIIETV

#### DES

>ALJ30226.1 putative desaturase des2 [*Spodoptera litura*]

MAPAQKHVQMCGDEIQSGLKISPLTYDADKLNAPQYENNNNTVLRNSANDKVNSEADFD  
INKYEAIIDFKAKIRWPDLTQILLHLVSIYGLYLMISNQVKLLTLLFALGTIYTSFGGITAGV  
HRLWSHRAYRARLPLRIILALLFTVTGQRDIYTWALDHRVHHKYAETVADPHDIRRGFWF  
AHVGWLVLTPHVAEDRRIALKPTCADLLADPVVRLQKQFFIPLFALLNIAIPIWVPWYCW  
NETLINSFVISFVMRFTITLNIACVNSFAHLWGNKPYDRFVKSVENSLVSLAALGEGWHN  
YHHVFPWDYRTSELGKLNISTGFIDFFAKIGWAYDLKAATDMISNRAKRCGDGTFGESEE  
PYPTSEKCHAE

>ALJ30227.1 putative desaturase des3 [*Spodoptera litura*]

MAPNTEKRQVSFPQLEYPIYREAQPKSAQHWLKGKRMQDGAEDLWRIHDSLYDLTDFISS  
HPGGSQWIAVNKGTDITEAFETHHLKGIAESLLPNYYVRKATKPRNQPFTEKEDGFYKTLK  
LKVMDQIQSIPKDVRKKSDFITDGLLLALIVLAPLSCWGWTSQFIIGASLTLMTSYVLSSVV  
TCAHNYFHRGDNWRMYIFNLAGMSFSDWRVSHSMHHLHTNTAQDIELSMIEPFLQFIPY  
KDKPIWAQMGAFFYYPLVYATSLLSIMGHELILSATNHEGKTLTWKNLIPFLIPTWMYIMGG  
LPLHWTILLWLATMPASFFVFYGLTAGHHNRNFFEGDVPRDENIDWGIHQDLAICERI  
DYAGNHFKSITRFGDHALHHLFPTLDHAELKYLYPVLLHCEKFEFQKTNFTFYETIINAS  
KQLIRKRPNNFRDVKATK

>ALJ30228.1 putative desaturase des4 [*Spodoptera litura*]

MAHITKTISSKILNKSTHRCLSTAVSQIRIYEVGPRDGLQNEAKFVPTDIKIELINKLAAAGI  
KDIESASFVSPKWVKQMSDGVDMKNIPRVPGVNYPVLPNLKGYDIAKQCNIIEVAIFP  
AGSEAFSQKNLNCVVEGLKRFLVADQAVKDGIRVRGYVSCVVGCPYEGPIHPKGIKIT  
EQLFEMGCYEVSLGDTIGVGTAGSVKRLMREVLTVAKPEQLALHFHDTYGGALS NLVAG  
LEFGIKTVDSSISGLGGCPYARGASGNLATEDLVYLLYGLGVNTNVDLVKLI EAGRYISNFL  
GKPTESKVNRAISDRFKNHSDIVKIASCDI

>AGH12217.1 delta 11 desaturase [*Spodoptera litura*] des5

MAQTIQTTTILEQKEEKTVTLLVPQAGKRKFEIVYFNLVSFAYWHIAGLYGLYLCFTSAKW  
ATILFSFFLVVAEVGVTAGAHRLWSHKTYKAKLPLQILLMVMNSLAFQNTAIDWVRDHR  
LHHKYSDDADPHNASRGFFYSHIGWLFVRKHPDVKKRGKEIDISDIYNNPVLRFQKKYA  
IPFIGAVCFALPTLIPVYGWGETWTNAWHVAMLRIMNLTFLVNSAAHIYGKRPYDKKI  
LPSQNI AVSIATFGEGFHNYHHVFPWDYRAAELGNCLNFTTKFIDFFAWIGWAYDLKTVS  
KEMIKQRSKRTGDGTNLWGLEDVDTPEDLKNTKGE

>ALJ30229.1 putative desaturase des6, partial [*Spodoptera litura*]

ATFGEGFNNNVFKWDYREDEIGNKCLNLNKKLIDLF EWIGWEYDIKNV

>ALJ30230.1 putative desaturase des7, partial [*Spodoptera litura*]

LLCFVIPAWIPCYFWGENPWYSWYVASITRYTVALHFTWLVNSAAHIWGNRPYDKNIGAT  
DNKAVAICAFGEGWHNYHHVFPWDYKAAELGNYSTNLSTALIDFAAKHGLAYDLKTVS

>ALJ30231.1 putative desaturase des8 [*Spodoptera litura*]

MGARVSRTDFEWVYTEEPHASRRKIILEKYPQIKKLFYDPNFKWVVTAMVLVQIISLPFV

TQLSWPLMLVVAYCFGGVINHSLMLAIHEIAHNLAFGHNRPLANKLFGFFANLPIGLPVSIS  
FKKYHLEHHRYQGDEVIDTDLPTLIEAKLFCTTGGKLLWLFLQPFFYSFRPLVVRPKAPT  
MELINLVIQLFFDAVIIKLWGWKALGYLLLGAVMAMGVHPVAGHFVAEHYMFKKGYETY  
SYYGPLNWITFNVGYHNEHDFPAVPGSKLPEVRRIAPEFYDTLPHHDSWSKVLYDFVMD  
PDIGPYARIKRKHHGLDS

>AGH12218.1 delta 9 desaturase [*Spodoptera litura*]

MPPQGQTGGSWVLYETDAVNVDSEAPVIVPPSAEKREWKIVWRNVILMGLLHIGGVYGA  
YLFLTAMWRTSLFAVFLYICSLGITAGAHRLWAHKSYPKARLPLRLLLTFLNTLAFQDAVI  
DWARDHRMHHKYSETDADPHNATRGGFFSHVVWLLVRKHPQIKAKGHTIDLSDLKNDPI  
LRFQKKHYLILMPLVCFILPCYIPTLWGESLWNAYFVCSIFRYVYVLNVTWLVNSAAHLW  
GAKPYDKNINPVETKPVSLVVLGEGFHNYHHTFPWDYKTAELGDYSLNLTCLFIDFMAAI  
GWAYDLKTVSSDVIQKRVKRTGDGSHAVWGWDDHEVHQEDKELAAIINPDKTE

>ALJ30232.1 putative desaturase des10 [*Spodoptera litura*]

MPHNTNWEEAAQQRADVKNTHVSFPQLKYPRLRDEGLRDPVQWLAGKAMDDGAEGWL  
RIHDKLYDLTRFIKRHPGGEEWLELTQGTDITEAFESHHLNPSTEKILTQYYIRDAKT  
PRNSPFTFKEDGFYKTLKRAAFEELKKIPKASRTANNITDFLFVSLLISSSLTCWVTN  
NIAVKFWYTYASFNLAVLTVACHNYIHRKTNWRMYLFNMSMWSYRDFRVSHVLSHHLYT  
NTLMDLELSSLEPILFYTPRKDKPLHAKLGCITEIFFFPVFVFLSFTKRFLSIFLQQGF  
FKSHYRWHDAIGLLPLWMAITSGAPFLDVISMWLWINCSGLIFFSIAVNAAHHHPDAIKD  
GDQPASETDPDWGMHQVEALLDRKDVGNGNVFAVMTLFGDHCLHMFPTLDHSVLKYM  
HPLFIDLCEKYQAN YRVSTQFKLVLGQIKETMRTEFKMKND

>ALJ30233.1 putative desaturase des11 [*Spodoptera litura*]

MAPNISEDVNGVLFESDAATPDLALARPPVQKADNKPKQLVWRNIILFAYLHLAALY  
GGYLFLFSAKWQTDIFAYILYVISGLGITAGAHRLWAHKSYPKAKWPLKVILIFNTVAF  
QDAAMDWARDHRMHHKYSETDADPHNATRGGFFSHIGWLLVRKHPDLKEKGKGLDMS  
DLLADPVLRFQKKYYLLLMPLACFVMPTVIPVYLWGETWTNAFFVAAMFRYAFILNVT  
WLVNSAAHKWGDKPYDKSIKPSENMSVAMFALGEGFHNYHHTFPWDYKTAEFGNKNL  
NFTTAFINF FAKIGWAYDMKTVSEDIVKNRVKRTGDGSHHLWGWGDENQPKEEIEA  
AIRINPKDD

>ALJ30234.1 putative desaturase des12, partial [*Spodoptera litura*]

MLSLYGTYLLLFEVKMMTLLFFMLLTSVALLGMTTGAHRLWAHQTYQASTGLKIMLMLF  
QTLAGVGSIIYDWVKYHRFHHAHFATDVPDYDYNQGFHSHLITRLRKLSPHQEKL  
MQSIDMSDLEKDTVVMFQKKLYWLLYAIIFVLLPLNAPLEYWDDTILCSAFVIGFLR  
YLVVLHGSWLIESAISVWGLKPGEKSPPDNTAVFILTCTFWPHYHYLVYPYDYKSGEY  
GTYDGGCSTAFIRVWAALGLATKLRTVETASIQKALADAARTKKDLKTCIDAAVNNQQL  
PEEHYLRKA

>ARD71178.1 desaturase [*Spodoptera exigua*] des2

MAPAQKHVQMCGDEIQSGLKISPVTYDADKLNELGPQYENNNNTVLRNSANDKVN  
SDADF DISKYEAIDFKAKFRWPDLTQVILLHLSIYGLYLTFNQVKILTLLFALGTIY  
TSGFGITAGVHRLWSHRAYRARLPLRIILALLFTVTGQRDIYTWALDHRVHHKYAET  
VADPHDIRRGFWFAHVGWLVLTPHAPVEDRRIALRPTCADLIADPVVRLQKQFFIPM  
FALLNIAIPIWVPWYCWNETLVNSFVISFVMRFTITLNIACVNSFAHLWGNKPYDRFV  
KSVENSLVSLAALGEGWHNYHHVFPWDYRTSELGKLNISTGFIDFFAKIGWAYDLKA  
ATDMISKRAKRCGDGTFGESEEPYPSSEKCHAE

>ARD71179.1 desaturase [*Spodoptera exigua*] des3

MAPNTEKRQVSFPKLEYPFREAAQPKSAQHWLKGKRLQDGAEDLWRIHDSLYDLTDFISS

HPGGTHWISVTKGTDITEAFETHHLKGIAESLLPNYYVRKAIKPRNQPTFKEDGFYKTLK  
LKVMDQMALIPKDVRKKSDFITDSLALLIILAPLSCWGWTSQSFVIGASLTFSTGFVLSSLV  
TCAHNYFHRGDNWRMYIFNLAGMSFNDWRVSHSMHHLHTNTAQDIELSMIEPFLQFIPY  
KDKPIWAQMGAFYYPVYATSLLSIMGHELILSATNHEGKTLNWRNFIPFTIPAWMYLMGG  
LPLHSTILLWLVTLVPASFFVFYGLTAGHHNHRNFFEGDVPRDENIDWGIHQDAICERID  
YAGNHFKSITRFGDHALHHLFPTLDHAELKYLYPVLLHCEKFDQFKTNTFYETIINASK  
QLIRKRPNNFRDVKATK

>ARD71180.1 desaturase [*Spodoptera exigua*] des4

MAHITKTISSKILNKSTHRSSTAVSQIRIYEVGPRDGLQNEAKFVPTDIKIELINKLAAAGI  
KDIESASFVSPKWVKQMSDGVDMKNIPRVPGVNYPVLPNLKGYDIAKQCNIIEVAIFP  
AGSEAFSQKNLNCVVEGLKRFLVADQAVKDGIKRVGRYVSCVVGCPYEGPIHPKGIKIT  
EQLFEMGCYEVSLGDTIGVGTAGSVKRLMREVLTVAKPEQLALHFHDTYGGQALSNNLAG  
LEFGIKTVDSSISGLGGCPYARGASGNLATEDLVYLLYGLGVNTNVDLVKLEAGRYISNFL  
GKPTESKVNRAISDRFKKHNDIVKIASCDI

>ARD71181.1 desaturase [*Spodoptera exigua*] des5

MAQTIQTITLEQKEEKTVTLLVPQAGKRKFEFVYQNLITFAYWHIAGLYGLYLCFTSAKW  
ATILFSFILFVIAEIGITAGAHRLWSHKSYSYKVKLPLEILLMVMNSIAFQNTVIDWVRDHRH  
HKYSDTDADPHNASRGFFYSHIGWLFVRKHPEVKKRGKELDMSDIYNNPVLRFRQKYAV  
PFIGAVCFGLPTLIPVYCWGESWTNAWHITMLRYIMNLNATFLVNSAAHIYGKRPYDKKIL  
PAQNIGVSIATFGEGFHNYHHVFPWDYRAAELGNNGNLNLTTFIDFFAWIGWAYDLKTVS  
KEMIKQRSKRTGDGTNLWGLEDKDTPENLNKNIKGE

>AFO38465.1 delta-9 desaturase 14-26 [*Spodoptera exigua*] des7

MAAMSGAPLLLANATLTSKLQDDDHRYAEPMKKNRDYEWQVWVRNVFAFVYLHAAAL  
YGFYLMFTGKVRIWTILFGLLFAIMAGMGVTAGAHRLWAHRSYKARWPLRLFLALMQT  
MAFQNHIEYWVRDHRVHHKFTETDADPHNARRGFFFSHIGWLMVRKHKDVFEKGATVD  
MSDLEKDPIVMFQKKTVMVLMPLLCFVIPAWIPCYFWGENPWYSWYVASITRYTVALHFT  
WLVNSAAHIWGNRPYDKNIGATDNKAVAICAFGEGWHNYHHVFPWDYKAAELGNYSTN  
LSTALIDFAAKHGLAYDLKTVSAEMIRQVRNRTGDGSHPWTKDSQEEHHYPENPVWGW  
EDTDMTEEEKQFAEIVHRKTE

>ARD71184.1 desaturase [*Spodoptera exigua*] des10

MPPNADWEEVAQQRAIDKNTHVSFPQLKYPRLRDDGLRDPVQWLAGKAMDDGAEGW  
RIHDKLYDLTRFIKRHPGGEEWLELTQGTDITEAFESHHLNPSTEKILTQYYIRDAKTPRNSP  
FTFKEDGFYKTLKRAAFEELKKIPKDASRTANNITDGLFVSLISSAMASWVTNYYAVKF  
WYTYASINLAILTVCCCHNYIHRKTNWRMYLFNMSMWSYRDFRVSHVLSHHLYTNTLMD  
LELSSLEPFLFYTPRKDKPLHAKLGFITEIFFFPFVFFLSFVKRFLSIFLHQGFFKSHYRWHD  
AIGLLLPLWMIASGAPILDVISMWLWINCTGSLIFFSIAVNAAHHHPDAIKDGDQPASETPD  
WGMHQVEALLDRKDVNGNVFAVMTLFGDHCLHHMFPTLDHSVLKYMHPFLFIDLCEKYQ  
ANYRVSTQFKLVLGQIKETMRTEFKTKND

>ARD71182.1 desaturase [*Spodoptera exigua*] des8

MGARVSRTDFEWVYTEEPHASRRKIILEKYPQIKKLFYDPNFKWVVTGMVLVQIISLPFV  
TQLSWPMMMLVAYCFGGVINHSLMLAIHEIAHNLAFGHNRPLANKLFGFFANLPIGLPVS  
SFKKYHLEHHRYQGNEVIDTDLPTLLEAKLFCTTGKLLWLFLQPFFYSFRPLVVPRKPPT  
PMELINLVIQLFFDAVVIKLWGWKAIGYLLIGALMAMGVHPVAGHFVAEHYMFKKGYET  
YSYYGPLNWITFNVGYHNEHDFPAVPGSKLPEVRRIAPEFYDTLPHHDSWSKVLDFVM

DPDIGPYARIKRKHHGLDS

>ARD71183.1 desaturase [*Spodoptera exigua*] des9

MPPQGGQTGGSWVLYETDAVNVDSEAPVIVPPSAEKREWKIVWRNVILMGLLHIGGVYGA  
YLFLTAMWRTSLFAVFLYICSLGITAGAHRLWAHKSYPKARLPLRLLTLFNTLAFQDAVI  
DWARDHRMHHKYSETDADPHNATRGGFFSHVGVLLVRKHPQIKAKGHTIDLSDLKNDPI  
LRFQKKYYLILMPLICFILPCYIPTLWGESLWNAFVCSIFRYVYVLNVTLVNSAAHLWG  
AKPYDKNINPVETKPVSLVVLGEGFHNYHHTFPWDYKTAELGDYSLNLTCLKFIDFMAAIG  
WAYDLKTVPDVIQKRVKRTGDGSHAVGWWDHEVQQEDKKLAAINPDKTE

>AFO38464.1 delta-9 desaturase 16-18 [*Spodoptera exigua*] des11

MAPNISEDVNGVLFESDAATPDLALARPPVQKADNPKQLVWRNIIIFAYLHLAALYGGY  
LFLFSKWQTDIFAYILYVISGLGITAGAHRLWAHKSYPKAKWPLKVILIIFNTVAFQDAAM  
DWARDHRMHHKYSETDADPHNATRGGFFSHIGWLLVRKHPDLKEKGKGLDMSDLLADP  
LLRFQKKYYLVLMPLACFVMPTMIPVYLWGETWTNAFFVAAMFRYAFILNVTWLVNSAA  
HKWGDKPYDKSIKPSNMSVAMFALGEGFHNYHHTFPWDYKTAELGNNKLNLFATAFINF  
FAKIGWAYDMKTVSDDIVKNRVKRTGDGSHHLWGWGDKNQPKKEIEAAIRINPKDD

>ARD71185.1 desaturase [*Spodoptera exigua*] des12

MVEVKEAAPVAEEQKLSKSREANWPAVLFFIIHLLSLYGTYYLLFEVKMMTLLFFILLTS  
VALLGMTTGAHRLWAHQAYQASTGLKITLMLFQTLGIGSIYDWVKYHRFHHAHFATDV  
DPYDYNQGFIIHSHLLTRLRKLSPHQEKLMSIDMSDLEKDSVVMFQKRLYWVLYAIIIFALL  
PLNAPLEYWDDTILSSAFVIGFLRYLVVLHGSWLIESAICVWGLKPGEKSPPDNTNAVFILTK  
TFWPHYHYLVYPYDYKSGEYGTYDSGCSTAFIRVWAALGLATKLRTVETVTIQKALAESAR  
TKKDLKACIDAAVNNQKLPDEHYLKRA

>ATJ44457.1 desaturase IPAE [*Helicoverpa armigera*]

MDNNTNKKIRGITLSEIVQNFEKNLGFKNKWKSSFIFITLYHVLAVYWCYHYAFPVKWQS  
LIFALIMYVASGFGITGGAHRLWTHKSYKARLPLKLFLLLCFSSAGQNSLLHWVRDHRVH  
HKYSDDADPHNANRGLFFSHIGWLMMKKNNEVILRGKQMDMSDIENDPVIQFYERNFT  
LLKLTFCYILPTMIGVVWLNEDWKC AWAQCFIRFLGMFHSELTVNSLAHAYGYRPNKN  
IIPAENRFVATCTLGEGWHNYHHAFFPDYKAAEHFDVLNFATTFIRFFEKIGWAYDLREAS  
ADVINSMAKRLGDGTPVHFPVATDTLNERAAG

>ATJ44456.1 desaturase PDSN [*Helicoverpa armigera*]

MVEVKEAVPENEEPIRSREANWPAVLFFIIHLLSLYGLWLLIFEVKLLTLLFFFTLTSVAIL  
GMTTGAHRLWAHGAYKASTGLRVTLMLFQTLGAGVGSYDWVQYHRLHHAHFATEDDPY  
DYNKGFVYAHFLTRLRKLSPQKEKLKSAIDMSDLENDIVMFQKKAYWFLYAILFALLPLN  
APLEYWDDTVLSSVFVVGFLRYLIVLHASWLIDSAISVWGLRPGKSPDSNTVFILTKTF  
WPHYHYLVYPYDYKSGEYGTYDCGCSSAFIRVWAALGLATNLQTVETHTIQKALADAART  
QKDLKTCIDEAVVNQKLPEEHYLRG

>ATJ44455.1 desaturase QPGE [*Helicoverpa armigera*]

MGAVQEDPPTMGSEVKTEEVHKPNVPSDHKWEIVWGRAVFAVLVHLAGFYGAFLFFTAA  
KWQTCFLTIFLHVAMASVTAGAHRLWAHRAKAKLPLRILLTFFTMAFQNTLIVWARD  
HRAHHKYVDTADPHNSNRGFFSHIGWLLVRRHPEVRAHKVDLSDFADPLLKFQNNY  
YVWMLPFLVLTPIYIPTLWGEKKMVALFVCLFLRYLLTIHVFFVNSVAHMFGRPYDK  
NIQPGESKLVSFFASGEGFHNYHHAFFWDYRTAELGGYLFNTSRLFIDLMKIGWAYDLKS  
VPTDMIERRVKRTGDGSHPVWGWDDPMSAEDRKLATIINENKES

>ATJ44454.1 desaturase LPAQ [*Helicoverpa armigera*]



MAQSYQSTTVLSEEKEPTLAHLVPQASPRKYQIVYPNLITFGYWHIAGLYGLYLCFTSAK  
WSTILFSYILFVLAIEGITAGAHRLWAHKTYKAKLPLEILLMVFNISIAFQNSAIDWVRDHRL  
HHKYSDTDADPHNASRGFFYSHVGWLLVRKHPEVKKRGKELNMSDIYNNPVLRQKKY  
AIPFIGAVCFALPTMIPVYFWGETWSNAWHITMLRYIMNLNVTFLVNSAAHIWGNKPYDA  
KILPAQNVAVSVATGGEGFHNYHHVFPWDYRAAELGNNSLNLTTKFIDLFAAIGWAYDLK  
TVSEDMIKQRIKRTGDGTDLWGHEQKCDEVWDVKDKSS

>ATJ44453.1 desaturase MPVE [*Helicoverpa armigera*]

MAPNISEDVNGVLFESDAATPDLALSTPPVQKADNRPKQLVWRNILLFAYLHLAALYGGY  
LFLFSKWQTDIFAYILYVISGLGITAGAHRLWAHKSYKAKWPLRVILVIFNTVAFQDAAM  
DWARDHRMHHKYSETDADPHNATRGFFFSHIGWLLVRKHHPDLKEKGKGLDMSDLLADPI  
LRFQKKYYLILMPLACFVMPTVIPVYFWGETWTNAFFVAAMFRYAFILNVTWLVNSAAH  
KWGDKPYDKSIKPSENLSVAMFALGEGFHNYHHTFPWDYKTAELGNNKLNFTTTFINFFA  
KIGWAYDLKTVSDDIVKNRVKRTGDGSHHLWGWDENQSKEEIDAAIRINPKDD

>ATJ44452.1 desaturase NPVE [*Helicoverpa armigera*]

MPPQGQTGGSWVLYETDAVNEDTDAPVIVPPSAEKREWKIVWRNVILMGMLHIGGVYG  
AYLFLTAMWRTCIFAVVLYICSGLGITAGAHRLWAHKSYKARLPLRLMLTLFNTLAFQDA  
VIDWARDHRMHHKYSETDADPHNATRGFFFAHVGVLLVRKHHPQIKAKGHTIDLSDLKSD  
PILRFQKKYYLFLMPLVCFILPCYIPTLWGESLWNAFYVCSIFRYVYVLNVTWLVNSAAHL  
WGAKPYDKNINPVETRPVSLVVLGEGFHNYHHTFPWDYKTAELGDYSLNLTKLFIDTMA  
AIGWAYDLKTVSTDVIQKRVKRTGDGSHPVWGWDDEHVHQEDKKLAAIINPEKTE

>ATJ44451.1 desaturase KSVE [*Helicoverpa armigera*]

MAPAQQNLEMCDENMHSELKIRHPTYKNDKVGGFENNNTVLRDSASEVKSDSDFDLKK  
YEAMEFKAQIRWPDLTQVLLHLVSIYGLYLMISNQVKLLTILFALGTIYTSFGGITAGVHR  
LWSHRAYRARLPLRILLAILFTITGQDIYI WALDHRVHHKYSETVADPHDVRRGFWFAHV  
GWLVLTPHPAVENRRIALRPTCADLLADPVVRLQKKFFIPLFALLNIALPIWVPWYCWSET  
LVNSFVISFVTRFTITLNIASFVNSFAHMWGNKPYDRFIKSVENSLVSLAALGEGWHNYHH  
VFPWDYRTSELGKLNISTGFIDFFARIGWAYDLKAATYDMISKRAQRCGDGTFGEDEEPPY  
TSEHCHSE

>ATJ44450.1 desaturase GATD [*Helicoverpa armigera*]

MAAMSSTPLLLANTMLSSKLQDHDRLRYAEPRKPNRDYEWQVVWRNVLAFFVYLHVS AV  
YGFYLMFTGKVKLYTILFGLLFAIMSGMGVTAGAHRLWAHRSYKARWPLRVFLALMQTM  
AFQNHIYEWVRDHRVHHKFTETDADPHNAKRGFFFSHIGWLMVRKHKDVFEKGATVDM  
SDLEQDPVIMFQKKTYLVMPILCFIIPAWIPVHFWDENPWTSWYTAAITRYTVALHFTWL  
VNSAAHIWGNRPYDKNIGATDNKMVAICAFGEGWHNYHHVFPWDYKAAELGDYSTNLS  
TALIDFAAKHGYAYDLKTVSAEMIRKRVNRTGDGSHPWTKGKVEGDHYHPENPVWGWE  
DTDMTEEEKQFAEIVHRKTE

>ATJ44449.1 desaturase MPVE [*Helicoverpa armigera*]

MAPITYTETELIEQPLHTNDYIQYKLHHPAKDTGETRTNGTLYQISPYDQMLNPKEPKFLA  
PLRRLEKRMGFVTPIRWVNTIAITAFHIIIGVLWFLRFVYFIDKPFKWQTLIFGYLVGQVAGF  
GVTGGAHRYWCHRSYKATLPLQWILIICYSTAGQNTIYEWVRDHRVHHKFSETTADPHDA  
NRGFLFSHVGLWMMKKHPNVLRQGAKLDLSDITNDPLIQFHTKYFLLFKIVFCFLIPSVIP  
ALCWGECWEISVMSQSVLRYLLSLNFTWSVNSFAHLWGNKPYDKNIMPVENWGV SIVA  
MGEGWHNYHHTFPWDYKAAELGIPMNLTTLLNHFA SIGWAYDLKEASPSLRSVAKAR  
GEPRDD

>AKU76404.1 acyl-CoA desaturase 5 [*Helicoverpa armigera*]

MAQSYQSTTVLSEEKEPTLTHLVPQASPRKYQIVYPNLITFGYWHIAGLYGLYLCFTSAKW  
ATILFSYILFVLAIEGITAGAHRLWAHKTAKLPLEILLMVFNISAFQNSAIDWVRDHLH  
HKYSDTDADPHNASRGFFYSHVGWLLVRKHPEVKRKGKELNMSDIYNNPVLRQKKYAI  
PFIGAVCFALPTMIPVYFWGETWSNAWHITMLRYIMNLNVTFLVNSAAHIWGNKPYDAKI  
LPAQNVAVSVATGGEGFHNYHHVFPWDYRAAELGNNSLNLTTFIDLFAAIGWAYDLKTV  
SEDMIKQRIKRTGDGTDLWGHEQKCDKSGSVNDKLS

>AKU76401.1 acyl-CoA desaturase 2 [*Helicoverpa armigera*]

MPPQGQTGGSWVLYETDAVNEDTDAPVIVPPSAEKREWKIVWRNVILMGMLHIGGVYG  
AYLFLTAMWRTCIFAVVLYICSGLGITAGAHRLWAHKSYPKARLPLRLMLTLFNTLAFQDA  
VIDWARDHRMHKKYSETDADPHNATRGFFFAHVWGWLLVRKHHPQIKAKGHTIDLSDLKSD  
PILRFQKKYYLFLMPLVCFILPCYIPTLWGESLWNAFYVCSIFRYVYVLNVTWLVNSAAHL  
WGAKPYDKNINPVETRPVSLVVLGEGFHNYHHTFPWDYKTAELGDYSLNLTCLKFIDTMA  
AIGWAYDLKTVSTDVIQKRVKRTGDGSHPVWGWDDHEVHQADKKLAAINPEKTE

>AKU76400.1 acyl-CoA desaturase 1 [*Helicoverpa armigera*]

MAPNISEDVNGVLFESDAATPDALSTPPVQKADNRPKQLVWRNILLFAYLHLAAQYGGY  
LFLFSAKWQTDIFAYILYVISGLGITAGAHRLWAHKSYPKAKWPLRVILVIFNTVAFQDAAM  
DWARDHRMHKKYSETDADPHNATRGFFFSHIGWLLVRKHHPDLKEKGKGLDMSDLLADPI  
LRFQKKYYLILMPLACFVMPTVIPVYFWGETWTNAFFVAAMFRYAFILNVTWLVNSAAH  
KWGDKPYDKSIKPSENLSVAMFALGEGFHNYHHTFPWDYKTAELGNNKLNFTTTTFINFFA  
KIGWAYDLKTVSDDIVKNRVKRTGDGSHHLWGWGDENQSKEEIDAAIRINPKDD

>AKU76406.1 acyl-CoA desaturase 7, partial [*Helicoverpa armigera*]

HLMCAIGIGAGSHRIWTHRCFKARTPLRIVLMLWQTMGFQDCIFEWARDHRTHHKYADT  
DADPHNAERGLFFSHMGWLCKKKSPEVIEGGKRIDLSLDYADPVVMFQKKHYMKMMPL  
LCFVLPTVVPVYFWGETWMNAFFIPTILRYTCGINVVWSVNSFAHTFGYRPYDKSLNPRE  
NIGVWMICVEGFHNYHHTFPWDYRATELPLYNMLTPTIVFIELMAKIGQAYDLKYVSPEII  
KQRAHRTGDGTHHLWGWDDPEFTEKLKEKYGAVSHS

>AKU76405.1 acyl-CoA desaturase 6 [*Helicoverpa armigera*]

MAPAQQNLEMCDENMHSELKIRHPTYKNDKVQGQFENNNTVLRDSASEVKSDSDFDLKK  
YEAMEFKAQIRWPDLTQVLLHLVSIYGLYLMISNQVKLLTILFALGTIYTSFGGITAGVHR  
LWSHRAYRARLPLRILLAILFTITGQRDIYIWDHRVHHKYSETVADPHDVRRGFWFAHV  
GWLVLTPHPAVENRRIALRPTCADLLADPVVRLQKKFFIPLFALLNIALPIWVPWYCWSET  
LVNSFVISFVTRFTITLNIASFVNSFAHMWGNKPYDRFIKSVENSLVSLAALGEGWHNYHH  
VFPWDYRTSELGKLNISTGFIDFFARIGWAYDLKAATYDMISKRAQRCGDGTFGEDEEPPY  
TSEHCHSE

>AKU76403.1 acyl-CoA desaturase 4 [*Helicoverpa armigera*]

MAAMSSTPLLLANTMLSSKLQDHDDLRYAEPRKPNRDYEWQVVWRNVLAFFVYLHVSAY  
YGFYLMFTGKVLYTILFGLLFAIMSGMGVTAGAHRLWAHRSYPKARWPLRVFLALMQTM  
AFQNHIEWVRDHRVHHKFTETDADPHNAKRGFFFSHIGWLMVRKHKDVFEKGATVDM  
SDLEQDPVIMFQKKTYLVMPILCFIIPAWIPVHFDENPWTSWYTAITRYTVALHFTWL  
VNSAAHIWGNRPYDKNIGATDNKMVAICAFGEGWHNYHHVFPWDYKAAELGDYSTNLS  
TALIDFAAKHGYAYDLKTVSAEMIRKRVNRTGDGSHPWTKGKVEGDHYHPENPVWGWE  
DTDMTTEEEKQFAEIVHRKTE

>AKU76402.1 acyl-CoA desaturase 3 [*Helicoverpa armigera*]

MAPITFTETELIEQPLHTNDYIQYKLHHPAKDTGETRANGKLYQISPYDQMLNPKEPKFLA  
PLRRLEKRMGFVTPIRWVNTIAITAFHIIGVLWFLRFVYFIDKPFKWQTLIFGYLVGQVAGF  
GVTGGAHRYWCHRSYKATLPLQWILIICYSTAGQNTIYEWVRDHRVHHKFSETTADPHDA  
NRGFLFSHVGLWMMKKHPNVLRRQGAKLDSLITNDPLIQFHTKYFLLFKIVFCFVIPSVIP  
ALCWDECWEISVMSQSVLRYLLSLNFTWSVNSFAHLWGNKPYDKNIMPVENWGVSIWA  
MGEGWHNYHHTFPWDYKAAELGIPMNLTTLLNYFASIGWAYDLKEASPSLVRVAKAR  
GEPRDD

>AKU76414.1 acyl-CoA desaturase 8 [*Helicoverpa assulta*]

MGARVSRTDFEWVYTEEPHASRRKIILEKYPQIKKLFQYDPNFKWVVVTAMVLIQIISLPFV  
VQLSWPVMLVVAYCFGGVINHSLMLAIHEIAHNLAFGHNRPLANRLFGFFANLPIGLPVSI  
SFKKYHLEHHRYQGDEVIDTDLPTLLEAKLFCTTGKKLAWLFLQPFYFYSRPLIVRPKPPTP  
MELINLVIQLFFDAIIKLFGWKALGYLIFGAVMAMGVHPVAGHFVAEHYMFKKGYETYS  
YYGPLNWITFNVGYHNEHHDFAVPGSKLPEVRRIAPEFYDNLPHHDSWSKVLYDFVMDP  
DIGPYARMKRKHKGLDS

>AKU76412.1 acyl-CoA desaturase 6 [*Helicoverpa assulta*]

MAPAQQNLEMCDENMHSELKIRHPTYKNDKVGQFENNNTVLRDSASEVKSDSDFDLKK  
YEAMEFQAQIRWPDLTQVLLHLSIYGLYLMISNQVKLLTILFALGTIYTSFGGITAGVHR  
LWSHRAYRARLPLRILLAVLFTITGQTDIYIWDHRVHHKYSETVADPHDVRRGFWFAH  
VGWLVLTPHPAVENRRIALRPTCADLLADPVVRLQKKFFIPLFALLNIALPIWVPWYCWSE  
TLVNSFVISFVTRFTITLNIASFVNSFAHMGWGNKPYDRFIKSVENSLVSLAALGEGWHNYH  
HVFPPWDYRTSELGKLNISTGFIDFFARIGWAYDLKAATYDMISKRAQRCDGTGGEDEEPPY  
PTSEHCHSE

>AKU76413.1 acyl-CoA desaturase 7, partial [*Helicoverpa assulta*]

LEFIIHLLSLYGLWLLIFEVKLLTLLFFILTSVAILGMITGAHRLWAHGAYKASTGLRVTL  
MLFQTLAGVGSIDWVQYHRLHHAHFATEDDPYDYNKGFVYAHFLTRLRLKLSPPQEKKL  
SAIDMSDLENDISVMFQKRAYWFLYAILFALLPLNAPLEYWDDTVLSSVFVVGFLRYLIVL  
HASWLIDSAISVWGLRPGKSPDSNTVFILTKTFWPHYHYLVYDYKSGEYGTYDCGCS  
SAFIRVWAALGLATNLQTVETHTIQKALADAARTQKDLKTCIDEAVVNQKLPEE

>AKU76411.1 acyl-CoA desaturase 5 [*Helicoverpa assulta*]

MAQSYQSTTVLSEEKEPTLTHLVPQASPRKYQIVYPNLITFGYWHIAGLYGLYLCFTSAKW  
ATILFSYILFVLAIEGITAGAHRLWAHKTAKLPLEILLMVFNSIAFQNSAIDWVRDHLH  
HKYSDTDADPHNASRGFFYSHVGWLLVRKHPEVKKRGKELNMSDIYNNPVLRQKKYAI  
PFIGAVCFALPTMIPVYFWGETWSNAWHITMLRYIMNLNVTFLVNSAAHIWGNKPYDAKI  
LPAQNVAVSVATGGEGFHNYHHVFPWDYRAAELGNNSLNLTTKFIDFFAAIGWAYDLKTV  
SEDMIKQRIKRTGDGTDLWGHEQKCDKSGSVNDKL

>AKU76410.1 acyl-CoA desaturase 4 [*Helicoverpa assulta*]

MAAMSSTPLLLANTMLSSKLQDHDDLRYAEPRKPNRDYEWQVVWRNVLAFFVYLHVSVA  
YGLYLMFTGKVKLYTILFGALFAIMSGMGVTAGAHRLWAHRSYKARWPLRVFLALMQT  
MAFQNHIEWVRDHRVHHKFTETDADPHNAKRGFFFSHIGWLMVRKHKDVFEKGATVD  
MSDLEQDPIVMFQKKTYLVMPILCFVIPAWIPVHFWDENPWTWYTAATRYTIALHFT  
WLVNSAAHIWGNRPYDKNIGATDNKMVAICAFGEGWHNYHHVFPWDYKAAELGDYST  
NLSTALIDFAAKHGYAYDLKTVSADMIRKRVNRTGDGSHPWTKGKVEGDHYHPENPVW  
GWEDTDMTEEEKQFAEIVHRKTE

>AKU76409.1 acyl-CoA desaturase 3 [*Helicoverpa assulta*]

MAPITFTETELIEQPLHTNDYIQYKLHHPAKDTGETRANGKLYQISPYDQMLNPKEPKFLA  
PLRRLEKRMGFVTPIRWVNTIAITAFHIIGVLWFLRFVYFIDKPFKWQTLIFGYLVGQVAGF  
GVTGGAHRYWCHRSYKAKLPLQWILILCYSAAAGQNTIYEWVRDHRVHHKFSETTADPHD  
ANRGFLFSHVGWLMKKHHPVLRQGAKLDLSDITNDPLIQFHTKYFLLFKIVFCFVIPSVI  
PALCWDECWEISIMSQSVFRYLLSLNFTWSVNSFAHLWGNKPYDKNIMPVENWGVSIVA  
MGEGWHNYHHTFPWDYKAAELGIPMNLTTLLNYFASIGWAYDLKEASPSLVRSAKAR  
GEPRED

>AKU76408.1 acyl-CoA desaturase 2 [*Helicoverpa assulta*]

MPPQGQTGGSWVLYETDAVNEDTDAPVIVPPSAEKREWKIVWRNVILMGMLHIGGVYG  
AYLFLTAMWRTCIFAVVLYICSGLGITAGAHRLWAHKSYPKARLPLRIMLTLFNTLAFQDA  
VIDWARDHRMHHKYSETDADPHNATRGGFFAHVGVLLVRKHPQIKAKGHTIDLSDLKSD  
PILRFQKKHYLFLMPLVCFILPCYIPTLWGESLWNAFVCSIFRYVYVLNVTWLVNSAAHL  
WGAKPYDKNINPVETRPVSLVVLGEGFHNYHHTFPWDYKTAELGDYSLNLTCLFIDTMA  
AIGWAYDLKTVSTDVIQKRVKRTGDGSHPVWGWDDHEVHQEDKKLAAIINPEKTE

>AKU76407.1 acyl-CoA desaturase 1 [*Helicoverpa assulta*]

MAPNISEDVNGVLFESDAATPDLALSTPPVQKADNRPKQLVWRNILLFAYLHLAALYGGY  
LFLFSKWQTDIFAYILYVISGLGITAGAHRLWAHKSYPKAKWPLRVILVIFNTVAFQDAAM  
DWARDHRMHHKYSETDADPHNATRGGFFSHIGWLLVRKHPDLKEKGKGLDMSDLLADPI  
LRFQKKYYLILMPLACFVMPTVIPVYFWGETWTNAFFVAAMFRYAFILNVTWLVNSAAH  
KWGDKPYDKSIKPSNLSVAMFALGEGFHNYHHTFPWDYKTAELGNNKLNFTTTTFINFFA  
KIGWAYDLKTVSDDIVKNRVKRTGDGSHHLWGWGDENQSKEEIDAAIRINPKDD

>ATJ44515.1 desaturase QPGE, partial [*Helicoverpa assulta*]

MFGTRPYDKNIQPGESKLVSLFASGEGFHNYHHAFFWDYRTAELGGYLFNTSKLFIDLMA  
KIGWAYDLKSVPSPDMIERRVKRTGDGSHPVWGWDD

>ATJ44514.1 desaturase PDSN [*Helicoverpa assulta*]

MVEVTEAVPENEEPIRSREANWPAVLFFIHIHLLSLYGLWLLIFEVKLLTLLFFILTSVAILG  
MTTGAHRLWAHGAYKASTGLRVTLMLFQTLAGVGSIDWVQYHRLHHAHFATEDDDPYD  
YNKGFVYAHFLTRLRLKLSPPQEKLSAIDMSDLENDISVMFQKRAYWFLYAILFALLPLNA  
PLEYWDDTVLSSVFVVGFLRYLIVLHASWLIDSAISVWGLRPGEKSPDSNTVFILTKTFW  
PHYHYLVYPYDYKSGEYGTYDCGCSSAFIRVWAALGLATNLQTVETHTIQKALADAARTQ  
KDLKTCIDEAVVNQKLPEEHYLRG

>ATJ44513.1 desaturase LPAQ [*Helicoverpa assulta*]

MAQSYQSTTVLSEEKEPTLTHLVPQASPRKYQIVYPNLITFGYWHIAGLYGLYLCFTSAKW  
ATILFSYILFVLAIEGITAGAHRLWAHKTYPKAKLPLEILLMVFNSIAFQNSAIDWVRDHLH  
HKYSDTDADPHNASRGFFYSHVGWLLVRKHPEVKRKGKELNMSDIYNNPVLRQKKYAI  
PFIGAVCFALPTMIPVYFWGETWSNAWHITMLRYIMNLNVTFLVNSAAHIWGNKPYDAKI  
LPAQNVAVSVATGGEGFHNYHHVFPWDYRAAELGNNSLNLTTFIDFFAAIGWAYDLKTV  
SEDMIQRIKRTGDGTDLWGHEQKCDKSGSVNDKLS

>ATJ44512.1 desaturase NPVE [*Helicoverpa assulta*]

MPPQGQTGGSWVLYETDAVNEDTDAPVIVPPSAEKREWKIVWRNVILMGMLHIGGVYG  
AYLFLTAMWRTCIFAVVLYICSGLGITAGAHRLWAHKSYPKARLPLRIMLTLFNTLAFQDA  
VIDWARDHRMHHKYSETDADPHNATRGGFFAHVGVLLVRKHPQIKAKGHTIDLSDLKSD  
PILRFQKKHYLFLMPLVCFILPCYIPTLWGESLWNAFVCSIFRYVYVLNVTWLVNSAAHL  
WGAKPYDKNINPVETRPVSLVVLGEGFHNYHHTFPWDYKTAELGDYSLNLTCLFIDTMA

AIGWAYDLKTVSTDVIQKRVKRTGDGSHPVWGWDDHEVHQEDKKLAAIINPEKTE

>ATJ44511.1 desaturase MPVE [*Helicoverpa assulta*]

MAPITFTETELIEQPLHTNDYIQYKLHHPAKDTGETRANGKLYQISPYDQMLNPKEPKFLA  
PLRRLEKRMGFVTPIRWVNTIAITAFHIIIGVLWFLRFVYFIDKPFKWQTLIFGYLVGQVAGF  
GVTGGAHRYWCHRSYKAKLPQWILILCYSAAGQNTIYEWVRDHRVHHKFSETTADPHD  
ANRGFLFSHVGLMMKKHPPHVLRQGAKLDLSDITNDPLIQFHTKYFLLFKIVFCFVIPSVI  
PALCWDECWEISVMSQSVFRYLLSLNFTWSVNSFAHLWGNKPYDKNIMPVENWGVSVIA  
MGEGWHNYHHTFPWDYKAAELGIPMNLTITILNYFASIGWAYDLKEASPSLVRVAKAR  
GEPRED

>ATJ44510.1 desaturase GATD [*Helicoverpa assulta*]

MAAMSSTPLLLANTMLSSKLQDHDLLRYAEPRKPNRDYEWQVWVRNVLAFFVYLHVSVA  
YGLYLMFTGKVKLYTILFGALFAIMSGMGVTAGAHLWAHRSYKARWPLRVFLALMQT  
MAFQNHIEWVRDHRVHHKFTETDADPHNAKRGFFFSHIGWLMVRKHKDVFEEKGATVD  
MSDLEQDPIVMFQKKTYLVMPILCFVIPAWIPVHFWDENPWTSWYTAATRYTIALHFT  
WLVNSAAHIWGNRPYDKNIGATDNKMVAICAFGEGWHNYHHVFPWDYKAAELGDYST  
NLSTALIDFAAKHGYAYDLKTVSADMIRKRVNRTGDGSHPWTKGKVEGDHYHPENPVW  
GWEDTDMTEEEKQFAEIVHRKTE

>ATJ44509.1 desaturase KSVE [*Helicoverpa assulta*]

MAPAQQNLEMCDENMHSELKIRHPTYKNDKVGQFENNNTVLRDSASEVKSDSDFDLKQ  
YEAMEFQAQIRWPDLTQVLLHLVSIYGLYLMISNQVKLLTILFALGTIYTSFGGITAGVHR  
LWSHRAYRARLPLRILLAVLFTITGQRDIYI WALDHRVHHKYSETVADPHDVRRGFWFAH  
VGWLVLTPHPAVENRRIALRPTCADLLADPVVRLQKKFFIPLFALLNIALPIWVPWYCWSE  
TLVNSFVISFVTRFTITLNIASFVNSFAHMGWGNKPYDRFIKSVENSLVSLAALGEGWHNYH  
HVPWDYRTSELGKLNISTGFIDFFARIGWAYDLKAATYDMISKRAQRCGDGTGGEDEEPPY  
PTSEHCHSE

>ATJ44508.1 desaturase KPSE [*Helicoverpa assulta*]

MAPNISEDVNGVLFESDAATPDLALSTPPVQKADNRPKQLVWRNILLFAYLHLAALYGGY  
LFLFSAKWQTDIFAYILYVISGLGITAGAHLWAHKSYPKAKWPLRVILVIFNTVAFQDAAM  
DWARDHRMHHKYSETDADPHNATRGGFFSHIGWLLVRKHPDLKEKGKGLDMSDLLADPI  
LRFQKKYYLILMPLACFVMPTVIPVYFWGETWTNAFFVAAMFRYAFILNVTWLVNSAAH  
KWGDKPYDKSIKPSNLSVAMFALGEGFHNYHHTFPWDYKTAELGNNKLNFTTTTFINFFA  
KIGWAYDLKTVSDDIVKNRVKRTGDGSHHLWGWGDENQSKEEIDAAIRINPKDD

>AID66656.1 desaturase [*Agrotis segetum*]

MAPAQKNMEMCGEEMHSELKISPVTYKNGKGAHFENNNTVLRDSASVVTSDSDFDIKKY  
EAMEFKAQWRWPDLAQVFLHLVSIYGLYLIISNQLKLYTILFVFGTIYTSFGGITAGVHRL  
WSHRAYRARLPLRVLLAILFTITGQRDIYTWALDHRVHHKYAETVADPHDIRRGFWFAHV  
GWLVLTPHPAVEDRRIALRPTCADLLADPVVRLQKQFFIPMFALLNIGIPIFVPWYFWSETL  
VNSFIVSFVLRFTITLNIACVNSFAHLWGNKPYDKFVKSVENSLVSLAALGEGWHNYHH  
VFPWDYRTSELGKMNVSTGFIDLFAKIGWAYDLKAATYDMIKRAKRSGDGTGGESEEPY  
PTTEHCHAE

>AID66657.1 desaturase [*Agrotis segetum*]

MPPQGGQTGGSWVLYETDAVNEDTDAPPVIVPPSAEKRVWKIVWRNVILMGLLHIGGVYG  
AYLFLTKAMWTTTCFFAVFLYICSLGITAGAHLWAHKSYPKARMPLRLLLLTFNTLAFQDA  
VIDWARDHRMHHKYSETDADPHNATRGGFFAHVGWLLVRKHPQIKAKGHTIDLSDLKSD

PILRFQKKHYLILMPLVCFVLPSYIPTLWGESLWNAYFVCSIFRYVYVLNVTWLVNSAAHL  
WGAKPYDKNINPVETKPVSLVVLGEGFHNYHHTFPWDYKTAELGDYSLNITKLFIDTMA  
AIGWAYDLKTVSTDVIQKRVKRTGDGSHAVWGWDDKEVHQEDKKLADIINPEKTE

>AID66658.1 desaturase [*Agrotis segetum*]

MGAKVSRTDFEWVYTEEPHASRRKIILEKYPQIKKLFGYDPNFKWVVTAMVLVQIISLPFV  
TQLSWPMMLLVAYCFGGVINHSLMLAIHEIAHNLAFGHNRPLANRLFGFFANLPIGLPVSIS  
FKKYHLEHHRYQGNEVIDTDLPTLLEAKLFDTTGGKFLWLILQPPFYFRPLIVRPKPPTPM  
ELINLVIQLFFDAIVIKLWGKALGYLIFGAVMAMGVHPVAGHFVAEHYMFKKGYETYSY  
YGPLNWITFNVGYHNEHHDFPAVPGSKLPEVRRIAPEFYDNLPHHDSWTKVLYDFVMDPE  
IGPYARIKRKELGLKS

>AID66659.1 desaturase [*Agrotis segetum*]

MAQGVQTTTILREEEPSLTFVVPQEPRKYQIVYPNLITFGYWHIAGLYGLYLCFTSAKWQT  
ILFSFMLVLVLAELGITAGAHRLWAHKTYKAKLPLQIILMILNSIAFQNSAIDWVRDHRLLH  
KYSDDADPHNATRGGFFYSHVGWLLVRKHPEVKRRGKELDMSDIYNNPVLRFQKKYAIP  
FIGAMCFGLPTFIPVYFWGETWSNAWHITMLRYILNLNITFLVNSAAHIWGYKPYDIKILPA  
QNAIVSIVTGGEGFHNYHHVFPWDYRAAELGNNYLNLTTFIDFFAWIGWAYDLKTVSSD  
VIKSKAERTGDGTNLWGLEDKGEEDFLKIWKDN

>AID66660.1 desaturase [*Agrotis segetum*]

MVEVHDAVSGPEETKLKGRDANWPAVLFFIHHLLSLYGTWLLIFEAKLMTIIFVALTSV  
AILGMTTGAHRLWAHGAYKASTGLRIALMLCQTLAGVGSYDWWQYHRLHHAHFATDD  
DPYNYNKGFFYSHFLTRLRLKLSPHQEKLKDAIDMSDLEKDSVVMFQKRLYWGLHAVLFL  
LLPLNAPLEYWDDTILNSVFVIGFLRYLIVLHASWLIESAICVWGLRPGEKSPPDSNTVFIIS  
KTFWPHYHYLVYPDYKSGEYGTYSGCSAFIRVFAALGLATNLQTVETAAAQKALADA  
AKTKKDLKTCIDAAS

>AID66661.1 desaturase [*Agrotis segetum*]

MTHVTKTINSKLIKSLIYRSLSTAVPQIRIYEVGPRDGLQNESKFVPTEIKIELINKLAAAGIK  
DIESASFVSPKWVKQMSDGDVDMKNVPRAPGVNYPVLVNLKGYDTAKQCNVEEVAIFP  
AGSEGFSSQKNLNCVVEGLKRFLVADQAVKDGLRVRGYVSCVVGCPYDGPVHPKGIKI  
TEQLFEMGCYEVS LGDTIGVGTAGSVKRLMQEVLTVAKPEQLALHFHDTYGGALSLLA  
GLEFGIKTVDDSSISGLGGCPYARGASGNLATELVYFLYGLGLNTHIDLVLKIEAGRYISNY  
LGKPTESKVNRAIGDRFKNHNDIAKLASCDV

>AID66662.1 desaturase [*Agrotis segetum*]

MAPNTERHQISFPRLEYPILREVMPKSAHNWLKGKRMQDGAEDLWRIHDNLYDLTDFVT  
AHPGGTYWISVTKGTDITEAFETHHLKGVAETLLPNYYIRKATKPRSHPTFKEDGFYKTL  
KLKVMAQLPNIPKDLRKKSDFVSDSLLLALIILSPMSCWGWWTQSFLLGASLTILNGLVLSSII  
TCAHNYFHRSDSWRMYLFNLGGMSYSWDRISHAMSHHLHTNTAQDVELSMIEPFLQFLP  
YKDKPIWAQMGAFYYPFVYGASFLVLVFTLVLCATNHEGKSLSWKNLIPFTIPTWMYLM  
GGLPLHWTIAIWLLTMIPASLFFVIYGLTAGHHSHRNFFEGDVPRDENIDWGLHQLDTIVE  
RIDYAGNHFKSITRFGDHALHHLFPTLDHAELNALYPTLFEHCEKFESQLKTNTFYEALISA  
SKQLIRKRPNNFRDKKF

>AID66663.1 desaturase, partial [*Agrotis segetum*]

MPPNSEWEEGAQQRALDKNTHVTFPQLKYPSLRDESLRDPVQWLAGKAMDDGAEGLW  
RIHDKLYDLTRFIKRHPGGEEWLELTQGTDITEAFESHHLNPSTEKMLTQYYIRDATKPRNS  
PFTFKEDGFYKTLKREAFEQLKKIPKDASKTADNITDGLFLSLLISSALSCWVTNEYAAKF

WYAYASVNLAFITVACHNFIHRKTNWRMYLFNMSMWSYRDFRVSHVLSSHLYTNTLMD  
LEISSLEPILFYNPRKDKPLHAKLGFITEIFFFPFIFLISFVKRFLSIFLRQGFFKSHYRWHD  
AILLLPVW

>AID66664.1 desaturase [*Agrotis segetum*]

MEEENQYDKEDQPTIAVPFKKVYLWPNILFLIYAHAGVYGLYLLFTSAKWTTIVFFMISFII  
NTGITAGAHRLYSHKSYKAKKPLQVFLMLCHCHAYQRTLATWIRDHRLHHKYSDDAD  
PHNINRGFFFAHYGWLLVKSHPEVEKRRATVDMRDVYSNEVVMFQKRHKEWMLPLFAFI  
IPTVIPWLLGDTFSNSWHLNIFRFLTSNLTFLNSLAHWSGYKPYDKTMRASQNLAVVAFN  
FGEGYHNFHHAFPWDYRSAELGNNKWNLVAKVIDFFEMGLAYDLKMASPGMIQTRRK  
RTGDGDTDLWGRIKEEY

>AID66665.1 desaturase, partial [*Agrotis segetum*]

GKVKLWTVLFGVSFAIMSGMGVTAGAHRLWAHRSYKARWPLRLFLAFMQTMAFQNHIIY  
EWVRDHRVHHKFTETDADPHNAKRGFFFSHIGWLMVRKHKDVFEKGASVDMSDLEKDP  
IVMFQKKTYLVVMPILCFIIPAWIPVYFWGENAWISWYVASITRYTVALHFTWLVNSAAHI  
WGNRPYDKNIGATDNKAVAICAFGEGWHNYHHVFPWDYKAAELGNYSTNLSTALIDFAA  
KHGLAYDLKTVSAEMIRQRVNRTGDGSHAWSKKSLEEEHHYHPENPVWGWEDADMTEE  
EKQFAEIVHRKTE

>AGR49311.1 acyl-CoA delta 9 desaturase [*Agrotis ipsilon*]

MAPNISDDVNGVLFESDAATPDLALASPPVQKADNRPKQYVWRNILLFAYLHAAALYGG  
YLFLTSAKWQTDVFAYILYVMSG LGITAGAHRLWAHKS YKAKWPLKVILIIFNITIAFQDAA  
MDWARDHRMHKYSSETDADPHNATRGFFFSHIGWLLVRKHDPDLKEKGKGLDMSDLQA  
DPILRFQKKYYLLMPLACFVMPTVIPVYFWGETWNNAFFVAAMFRYAFILNVTWLVNS  
AAHKWGD KPYDKSIKPSENMSVAMFALGEGFHNYHHTFPWDYKTAELGNNKLNFTTTFI  
NFFAKLGWAYDMKTVSDDIVKNRVKRTGDGSHHLWGWDKNQSKKEIASAIRINPKDD

>AGR49312.1 acyl-CoA delta 11 desaturase [*Agrotis ipsilon*]

MAQGVQTTTIFREEEPALTFVVPQEPRKYQIVYPNLITFGYWHIAGLYGLYLYFTSAKWQT  
MLFSFMLVLVLAELGITAGAHRLWAHKT YKAKLPLQIILMVLNSIAFQNSAIDWVRDHR LH  
HKYSDDADPHNANRGFFYSHVGWLLVRKHPEVKRRGKELDMSDIYNNPV LRFQKKYAI  
PFIGAMCFGLPTFIPVYCWGETWTNAWHITMLRYIVNLNITFLVNSAAHIWGNKPYDSKIL  
PAQNIASIVTGGE GFHNYHHVFPWDYRAAELGNNYLNLTTKFIDFFAWIGWAYDLKTVS  
SDVIKSRAQRTGDGTNLWGLEDKGEEELKIWKDN

>AGR49312.1 acyl-CoA delta 11 desaturase [*Agrotis ipsilon*]

MAQGVQTTTIFREEEPALTFVVPQEPRKYQIVYPNLITFGYWHIAGLYGLYLYFTSAKWQT  
MLFSFMLVLVLAELGITAGAHRLWAHKT YKAKLPLQIILMVLNSIAFQNSAIDWVRDHR LH  
HKYSDDADPHNANRGFFYSHVGWLLVRKHPEVKRRGKELDMSDIYNNPV LRFQKKYAI  
PFIGAMCFGLPTFIPVYCWGETWTNAWHITMLRYIVNLNITFLVNSAAHIWGNKPYDSKIL  
PAQNIASIVTGGE GFHNYHHVFPWDYRAAELGNNYLNLTTKFIDFFAWIGWAYDLKTVS  
SDVIKSRAQRTGDGTNLWGLEDKGEEELKIWKDN

>AGR49314.1 desaturase, partial [*Agrotis ipsilon*]

MAPAQKNMEMCGEEIHSELKISPV TYKNGKGAHYENNNTVLRDSASEVTS DSDFDIKKY  
EAMEFNAQWRWPD LAA

>AGR49315.1 acyl-CoA desaturase GATD, partial [*Agrotis ipsilon*]

LWAHRSYKARWPLRLFLAFMQTMAFQNHIIYEWVRDHRVHHKFTETDADPHNAKRGFF  
SHIGWLMVRKHKDVFEKGASVDMSDLEKDPIVMFQKKTYLVVMPILCFIIPAWIPVYFWG

ENAWISWYVASITRYTVALHFTWLVNSAAHIWGNRPRFERPSSA

>ACX53794.1 desaturase [*Heliothis virescens*]

MAQSYQSTTVLSEEKEPTLTLVVPQAAPRKYQIVYPNLITFGYWHIAGLYGLYLCFTSAK  
WATILFSYFLFVVAEIGITAGAHRLWAHKTYKAKLPLEILLMVLNSIAFQNSAIDWVRDHR  
LHHKYSDTDADPHNASRGFFYSHVGWLLVRKHPEVKKRGKELNMSDIYNNPVLRFAQK  
YAIPFIGAVCFVLPTLIPVYCWGETWSNAWHITMLRYIMNLNVTFLVNSAAHIWGYKPYD  
AKILPAQNVAVSVATGGEGFHNYHHVFPWDYRAAELGNNSLNLTTKFIDFFAWIGWAYDL  
KTVSEDMIKLRTKRTGDGTDLWGHEQKYDEVLDVKDK

>AGO45844.1 acyl-CoA desaturase HvirIPAE [*Heliothis virescens*]

MDNNTNKKIRGITLSEIVQNFEKHLGFKNEIKWSSFIFITLYHVLAVYWCYHYAFPVKWQS  
LVFALIMYVASGFGITGGAHRLWTHKSYKAKLPLKLFLLLCFSSAGQNSLLHWVRDHRVH  
HKYSDTDADPHNANRGLFFSHIGWLMMKKNSEVILRGKQMDMSDIENDPVIQFYERNFT  
WLKLTCYILPTMIGVVLWNEDWKCATAWQCIFRFLGMFHSELTVNSLAHAYGYKPYNK  
NIIPAENRFVATCTLGEGWHNYHHAFFPDYKAAEHFDVLNFATTFIRFFEKIGWAYDLREA  
SADVINSMAKRLGDGTPVHFPVPTDTFNERAAG

>AGO45843.1 acyl-CoA desaturase HvirKPVE [*Heliothis virescens*]

MGLVQEEHSSTMDSDATAEEDHKSNNVPSKWQWEIVWERVAFIIMHIGGFYGAYLFFTEA  
KWQTCLFTIFLHVAMATSVTAGAHRLWSHRAYKAKLPLKIILLTFFT MAYQNTVMVWAR  
DHRAHHKYCDTDADPHNSNRGFFFSHIGWLLVRRHPEVRANKIDLSDLFEDPLLRFQNKY  
YLWVVPFLT VLTPIYIPTLWGETKMVALFVCLFLRYIMTVHAFFIVNSVAHKWGTPYDKS  
IKPVETKLVSLATGEGFHNYHHAFFPDYKAAELGGYLFNTSRLFIDLMAKIGWAYDLKS  
VPSDMIERRVKRTGDGSHPVWGWDDPDLSAEDRKSAIN

>AGO45842.1 acyl-CoA desaturase HvirKSVE [*Heliothis virescens*]

MAPAQQNIEMCDENMHSEIKIRHPAYKNDKVGQFENNNTVLRDSASEVKSDSEFDLKKY  
EAMEFKAQIRWPDLT VQVLLHLVSIYGLYLMICNQVKLLTILFALGTIYTSFGGITAGVHRL  
WSHRAYRARLPLRILLAILFTITGQRDIYI WALDHRVHHKYSETVADPHDVRRGFWFAHV  
GWLVLTPHPAVENRRIALRPTCADLLADPVVRLQKKFFIPLFALLNIALPIWVPWYCWN  
ETLVNSFVISFVTRFTITLNIASFVNSFAHMWGNKPYDRFIKSVENSLVSLAALGEGWHNYHH  
VFPWDYRTSELGKLNISTGFIDFFARIGWAYDLKAATYDMISKRAQRCGDGTFGEDEEPPY  
TSDHCHSE

>AGO45841.1 acyl-CoA desaturase HvirNPVE [*Heliothis virescens*]

MPPQGGQTGGSWVLYETDAVNEDTDAPVIVPPSAEKREWKIVWRNVILMGMLHIGGVYG  
AYLFLTAMWRTCIFAVVLYICSGLGITAGAHRLWAHKSYPKARLPLRLLTLFNTLAFQDA  
VIDWARDHRMHHKYSETDADPHNATRGFFFAHVGVLLVRKHPPQIKAKGHTIDLSDLKSD  
PILRFQKKHYLILMPLVCFVLPCYIPTLWGESLWNAFVCSIFRYVYVLNVTWLVNSAAHL  
WGAKPYDKNINPVETRPVSLVVLGEGFHNYHHTFPWDYKTAELGDYSLNLTKLFIDTMA  
AIGWAYDLKTVSTDVIQKRVKRTGDGSHPVWGWDDHEVHQEDKKLAAIINPDKTE

>AGO45840.1 acyl-CoA desaturase HvirGATD [*Heliothis virescens*]

MAMSSTPLL MANTMLSSKLQDHEDIRYAEPRKPNRDYEWQVVWRNVLA FVYLHVAAYV  
GLYLMFTFKVKLYTILFGALFAMMSGMGV TAGAHRLWAHRSYKARWPLRLFLALMQTM  
AFQNHIEWVRDHRVHHKFTETDADPHNAKRGFFFSHIGWLMVRKHKDVFEKGATVDM  
SDLEQDPVIMFQKKTYLVVMPILCFVIPAWIPVHFWGENPWTSWYTAATRYTIALHFTWL  
VNSAAHIWGNRPYDKNIGATDNKMVAICAFGEGWHNYHHVFPWDYKAAELGDYSTNLS  
TALIDFAAKHGYAYDLKTVSAEMIRKRVNRTGDGSHQWTKAKVDEDGHFHPENPVWGW



EQTDMTEEEKQFAEIAHRKTE

>AGO45839.1 acyl-CoA desaturase HvirLPAQ [*Heliothis virescens*]

MAQSYQSTTVLSEEKEPTLTLVVPQAAPRKYQIVYPNLITFGYWHIAGLYGLYLCFTSAK  
WATILFCYFLFVVAEIGITAGAHRLWAHKTYKAKLPLEILLMVLNSIAFQNSAIDWVRDHR  
LHHKYSDTDADPHNASRGFFYSHVGWLLVRKHPEVKKRGKELNMSDIYNNPVLRFQKK  
YAIPFIGAVCFVLPTLIPVYCWGETWSNAWHITMLRYIMNLNVTFLVNSAAHIWGYKPYD  
AKILPAQNVAVSVATGGEGFHNYHHVFPWDYRAAELGNNSLNLTTKFIDFFAWIGWAYDL  
KTVSEDMIKLRTKRTGDGTDLWGHEQKYDEVLDVKDK

>AGO45838.1 acyl-CoA desaturase HvirKPSE [*Heliothis virescens*]

MAPNISEDVNGVLFESDAATPDALATPPVQKADNRPKQLVWRNILLFAYLHLAALYGGY  
LFLFSKWQTDIFAYILYVISGLGITAGAHRLWAHKSYKAKWPLRVILVIFNTVAFQDAAM  
DWARDHRMHHKYSETDADPHNATRGFFFSHIGWLLVRKHHPDLKEKGKGLDMSDLLADPI  
LRFQKKYYLILMPLACFVMPTVIPVYFWGETWTNAFFVAAMFRYAFILNVTWLVNSAAH  
KWGDKPYDKSIKPSNLSVAMFALGEGFHNYHHTFPWDYKTAELGNNKLNFTTTFINFFA  
KIGWAYDLKTVSDDIVKNRVKRTGDGSHHLWGWGDENQSKEEIDAAIRINPKDD

>LPAQ [*Helicoverpa zea*]

MAQSYQSTTVLSEEKELTLQHLVPQASPRKYQIVYPNLITFGYWHIAGLYGLYLCFTSAK  
WATILFSYILFVLAIEGITAGAHRLWAHKTYKAKLPLEILLMVFNIAFQNSAIDWVRDHRL  
HHKYSDTDADPHNASRGFFYSHVGWLLVRKHPEVKKRGKELNMSDIYNNPVLRFQKKY  
AIPFIGAVCFALPTMIPVYFWGETWSNAWHITMLRYIMNLNVTFLVNSAAHIWGNKPYDA  
KILPAQNVAVSVATGGEGFHNYHHVFPWDYRAAELGNNSLNLTTKFIDLFAAIGWAYDLK  
TVSEDMIKQRIKRTGDGTDLWGHEQNCDEVWDVKDKSS\*

>PDSN [*Helicoverpa zea*]

SEFYSPITFFCSFDLHTVTRSLFQHYPFFEDADGCKKLTNRSPDKMVEVKEAVPENEEPIR  
SREANWPAVLFFIHHLLSLYGLWLLIFEVKLLTLLFFFILTSVAILGMTTGAHRLWAHGAYK  
ASTGLRVTLMLFQTLAGVGSIDWVQYHRLHHAHFATEDDPYDYNKGFVYAHFLTRLRK  
LSPQQEKLKSAIDMSDLENDISVMFQKKAYWFLYAILFALLPLNAPLEYWDDTVLSSVFV  
VGFLRYLIVLHASWLIDSAISVWGLRPGEKSPDSNTVFILTCTFWPHYHYLPYDYKSGE  
YGTYDCGCSSAFIRVWAALGLATNLQTVEAHTIQKALADAARTQKDLKTCIDEAVVNQK  
LPEEHYLKR\*

>NPAE [*Helicoverpa zea*]

MVCFSGFGITAGAHRYWAHKAFKATTPRLRIIMLLGFASAGQNTIYQWVRNHRHHKYSDT  
ESDPHNRRERGLFFSHIGWLLMKKKPEVTSKAKEIDMSDIENDALLTWHRKHLDIVNPLMT  
FVIPTLIGMVLWGETWKAATAVWQCCIRFLFVYHSELTVNSLGHTIGYKPYDTSINPAENAI  
SALTGGEGWHNFHHSFPFDYKAAEWSHTFDFTTDLIHFFEKFGWVYDKREVTKDFIKKY  
AEQHAKFSS\*

>GATD [*Helicoverpa zea*]

IFFFFFFFNDTATTEIYTFVVLQSDDLIAIYGLYLMFTGKVKLYTILFGALFAIMSGMGV  
TAGAHRLWAHRSYKARWPLRVFLALMQTMAFQNHIEWVRDHRVHHKFTETDADPHNAKR  
GFFFSHIGWLMVRKHKDVFEKGATVDMSDLEKDPIVMFQKKTYLVVMPILCFVIPAWIPV  
HFWDENPWTSWYTAATRYTVALHFTWLVNSAAHIWGNRPYDKNIGATDNKMVAICAFG  
EGWHNYHHVFPWDYKAAELGDYSTNLSTALIDFAAKHGYAYDLKTVSADMIRKRVNRT  
GDGSHPWTKGKVEGDHYHPENPVWGWEDTDMTEEEKQFAEIVHRKTE\*

>QPVE [*Helicoverpa zea*]

MFIWCRDHLHHRYSDTDGDPHNSKRGFFCHMGWLMHKKHPYVIELGRRIDMSDMQS  
DWMVMFQKKYYYPLYLLAIFIPMYVPLYFFGEHWWHSLVCYFLRYVFSLHGTWVNS  
IAHLYGTRPYDKNLQPVESWVFSVVTLGEGWHNYHHAFPWDYKAAELSYFINHSATFIEF  
LDMIGLAYDLKTASPAMVLNRIARTGDGSHYLLGDEETRKAVTAWGPLHPLNPTYNSTLQ  
PPSAVLKPEGLPLFHEKDVLLKLISRRSASTA\*

>NPVE [*Helicoverpa zea*]

MPPQGQTGGSWVLYETDAVNEDTDAPVIVPPSAEKREWKIVWRNVILMGMLHIGGVYG  
AYLFLTTAMWRTCIFAVVLYICSGLGITAGAHRLWAHKSYPKARLPLRLMLTLFNTLAFQDA  
VIDWARDHRMHHKYSETDADPHNATRGGFFAHVGVLLVRKHPQIKAKGHTIDLSDLKSD  
PILRFQKKYYLFLMPLVCFILPCYIPTLWGESLWNAYFVCSIFRYVYVLNVTWLVNSAAHL  
WGAKPYDKNINPVETRPVSLVVLGEGFHNYHHTFPWDYKTAELGDYSLNLTCLFIDTMA  
AIGWAYDLKTVSTDVIQKRVKRTGDGSHPVWGWDDHEVHQADKKLAAIINPEKTE\*

>KPSE [*Helicoverpa zea*]

MAPNISEDVNGVLFESDAATPDALSTPPVQKADNRPKQLVWRNILLFAYLHLAALYGGY  
LFLFSKWQTDIFAYILYVISGLGITAGAHRLWAHKSYPKAKWPLRVILVIFNTVAFQDAAM  
DWARDHRMHHKYSETDADPHNATRGGFFSHIGWLLVRKHPDLKEKGKGLDMSDLLADPI  
LRFQKKYYLILMPLACFVMPTVIPVYFWGETWTNAFFVAAMFRYAFILNVTWLVNSAAH  
KWGDKPYDKSIKPSNLSVAMFALGEGFHNYHHTFPWDYKTAELGNNKLNFTTTFINFFA  
KIGWAYDLKTVSDDIVKNRVKRTGDGSHHLWGWGDENQSKEEIDAAIRINPKDD\*

>KSVE [*Helicoverpa zea*]

MAPAQNLNEMCDENMHSELKIRHPTYKNDKVDQFENNNTVLRDSASEVKSDSDFDLKK  
YEAMEFKAQIRWPDLTQVLLHLVSIYGLYLMISNQVKLLTILFALGTIYTSFGGITAGVHR  
LWSHRAYRARLPLRILLAILFTITGQRDIYIWDHRVHHKYSETVADPHDVRRGFWFAHV  
GWLVLTPHPAVENRRIALRPTCADLLADPVVRLQKKFFIPLFALLNIALPIWVPWYSWSET  
LVNSFVISFVTRFTITLNIASFVNSFAHMGWGNKPYDRFIKSVENSLVSLAALGEGWHNYHH  
VFPWDYRTSELGKLNISTGFIDFFARIGWAYDCKFTMRDLL\*

>DES9 [*Helicoverpa zea*]

MGARVSRTDFEWVYTEEPHASRRKIILEKYPQIKKLFYDPNFKWVVVTAMVLIQIISLPFV  
VQLSWPVMLVVAFCFGGVINHSLMLAIHEIAHNLAFGHNRPLANRLFGFFANLPIGLPVSI  
SFKKYHLEHHRYQGDEVIDTDLPTLLEAKLFCTTGKKLAWLFLQPFYFSRPLIVRPKPPTP  
MELINLVIQLFFDAIIKLFGWKALGYLIFGAVMAMGVHPVAGHFVAEHYMFKKGYETYS  
YYGPLNWITFNVGYHNEHDFPAVPGSKLPEVRRIAPEFYDNLPHHDSWSKVLYDFVMDP  
DIGPYARMKRKHKGLDS\*

## FAR

>AID66646.1 fatty acyl reductase, partial [*Agrotis segetum*]

DTDDTVLMMFFNAVISSQRTPFPGWIENLNGPSGVIVGAGKGVHLVLSGGGQRADLLP  
VDLAIDTLLAAAWETAVDLRETRVYNCSTCSNPITWGQFRSYMLSGVRAHPLDNALWY  
PYGLIIEGTMMQKLLTVLQTTPLYLIHYVSKMCGMKARPSLSTVSNRLQAMNEALKFFA  
LREWHFNTDNVQRLKQRLSPADAAVFNLDSTIDWTEVCTDFVKGTRKYLLQEKDEDVE  
QAQRRMHMLHMMHNATKLFLSIMLCRLAMRTTPAILRAIASLIRLRKNTMLHTM

>AID66647.1 fatty acyl reductase [*Agrotis segetum*]

MVPRPMPPSPAEPPLPRFYAGRSILITGATGFMGKVLIERILSTCPDVGGHLHLLMRDKKGHS  
PQKRLAQLKQSQVFDNVRARNHRQLDKLFVISGDVSKPRLGMDSEAIQLKEVSIVFHSA  
ATLKFDEPLRVAIDQNVRSVQRLLDICDELNIEAFIHVSTAYSNAELTYVEERVYPPVPLE

QAFTIADSVPEELLVKINAEYISPKPNTYTFTKALAENVVQEHGNKGYPVAIFRPTIVISSLR  
HPYPGWIEENLNGPSGVVVGAGKGLLHVFRCKDTAKADMLPVDMAIDTLLAVAWETAVD  
RPEQVRVYNCSTYENPTTWGEFEGALRQYLRGHPLDNAYWYPSGLAVENKIAHKSLETL  
LQTAPLHIAEYLTAKILGIKTRMSLITVSQRLVAMGDVLKFFSIREWHFATDNVKKLHARLSP  
QDAAIYNLDPHTINWSDHYENFIKGTRKYLLQEKDQDIDVAKKHLRKMYYVHQALLFFV  
VALLCRFALLNPYIRTFVYRTFRMFMTILTAAYIRIQQS

>AID66648.1 fatty acyl reductase [*Agrotis segetum*]

MPVLTSREDEKLSVPEFYAGKSIFVTGGTGFLGKVFIEKLLYCCPDIDKIYMLIREKKNLSD  
ERMSKFLDDPLFSRLKEERPGDLEKIVLIPGDITAPNLGLSAENERILLEKVSVIINSAATVK  
FNEPLPIAWKINVEGTRMLLALSRRMKRIEVIHISTAYSNASSDRIVVDEILYPAPADMDDQ  
VYQLVKDGVTEEETERLLNGLPNTYTFTKALTEHLVAEHQTYVPTIIIRPSVASIKDEPIRG  
WLCNWFATGATGISVFTAKGLNRVLLGKASNIVDVIPVDYVANLVIVAGAKSGGQKSDELKI  
YNCCSSDCNPVTLKKIIEFTEDTIKNKSHIMPLPGWFVFTKYKWLLTLLTIIFQMLPMYLA  
DVYRVLTGKIPRYMKLHHLVIQTRLGIDFFTSHSWVMKTDRVRELFGSLSLAEKHMFPD  
PSSIDWTDYLSYCYGVRRFLEKKK

>AID66649.1 fatty acyl reductase [*Agrotis segetum*]

MAVEALTSQFLFESKQGGDITFMDMVDEQEPLGESQIQKLFAGSAVLLTGGTGFLGKLVV  
EKLLRSCPDLKKIFLLARPKKNKDITKRLQEQQFDDVLYDRLRKERPDFISKISIVEGDMGQP  
ELGMCAEDRAKIMNEVDVIFHGAATVRFDEPLKTAVEINVRGTREMFKLARGCTKLKAF  
VHISTAYSNCPQTSIDEKFYDSPLPGEKLIDLVTMDEQTINNITPGLLGNFNTYAYTKAVA  
ENIVLEYSKGLPVALFRPAIVIGTAKEPVAGWIDNVYGPTGVVVGAAVGLLHVLNCNPKV  
KADLVPGDMVVSAAIAAAWRTARDYPTTCNHEDAPPADLPPPVSNNYVSSEQKPLTWERF  
MKYNEVYGFQVPTVQAIYYVFMILTASPLYAFYCFMMHWIPAYIVDAIAVLIGKKPMLR  
KTYAKITKFSEVMAYFATREWKFDNSNTQRLFAEMCPADKKMFDFDMSALDWNDFYS  
YIRGVRVYLLKDPVNTVPAGLTKHNRLRFLHYTFCTILGLLFLRILWAVFSMIVGF

>AID66650.1 fatty acyl reductase [*Agrotis segetum*]

MNNILEESPLKQTPLTGEKMEKWVEAQLKGEHLDDIYGKPSEQTIKELENVRNLSKELQ  
DNLHELENSVRIAEEVENQAMNPTAPILDFSEDHEFVPDNQNTYYAGEDKVDAAKEEEKQKL  
TKGKGPKTAIQQFYKDQCFLTGGTGFLGKVLIEKLIRSCGDVDTVFLARSKKGKDAQT  
RLNDLLDEFLFQRAHEENPKGVHKVVPVIGDMELPGLGISDEDRKMLASKVSIINVAATV  
KFDEKLSVSTAINVKGTKEVLKLAKECRNLRAVTHVSTAFSNTHVKHIEEKFYEPPIVSEA  
LEAISVDENLIESILPTLLGDRPNTYCFTKAIAEEAVRVFGEGLPLCILRPSIVVSTYEEPVR  
GWTDSVYGPTGLVVGIGTGVLRTMYMDQKQVADMVPVDLCVNAILTSAWYATKNYKEN  
QTSDIPIYNFVSGAQNPITWGEFIERNRKHGIDKPTTKAVWYYGLNPTNNYYMFLFYNNFL  
HYMPALFVDLYCTLTGKRRAMLKLYSKVMKLANILFYFSTQDWKFSDNNVRNMWNSLS  
PDDRVVFPFSIGEMSWERMCEFLVGLRVYLVKDDLSTLPEARKKWTKLYYLHQLLKALT  
IVVVLNLVYFVVKAVFALHW

>AID66651.1 fatty acyl reductase [*Agrotis segetum*]

MTSEVNEWYKGRSVLVTGALGLMGKVLIEKLLYSVPDLGCVYALVRSKRKGKSPETRIEEM  
WKLPLFKRIREEKPHVMKKLIPVTGDIMFEELGINGSHLKEIYDEVSIVFHFAASLRLEAPL  
KEGLEMNTRGTLRVLDMAKKMKKLVAFIHLSTAFYCYPDYERMAEKVFDPPADPHEVLRA  
AGWLTEEQLNLLAPSIYQKHPNSYTYSKRLAEALVRESYPQLPAVVVRPSIVTPSYKEPTPG  
WVDNLNGPIGLMVGAGKGVIRSMHCYGHYHAEVIPVDIAINSIIIIAYKTGKDTQRQPEIPV  
YNITTGDDRHTTWKEVLDIGKATVRKFPFEGPLWYPDGNIRHNKFIHDL CVFFYHIIPAYFI

DFLLLLFRQRRFMVRIQNRTIGLEVLQYFTTREWTFDNNFKSLVGLLNPVDKQTFPMD  
LTIIEDEPYIESCMIGGKLYCLKEKMENLPKARLQNHILYILDRVSLFFYLVLVYWIVSYFE  
PVRELLSYGGPAIRYLPLVGKAVFRDV

>AID66652.1 fatty acyl reductase [*Agrotis segetum*]

MKVLITGGTGFMGKVLVEKLLRKCPDIGQILLFVRSKKGKNPKQRLEEIFNGVLFKVRRA  
MRGGVEPLIEKVTLVTGDVSEPDLMSEEDRQMVMDVDIIHAAATIRFDEELKKAVLL  
NVRGTKLMVELAKTCKKLKLFHISTSYCHLHEKLLLEEKAYPPPADPHQIIQAVEWMDEET  
ITALTPKLLNKLPSYAFTKALGEALVVESMEHIPAMVLRPSIVIPWQEPVPGWTDNINGP  
TGLLIGAGKGVIRSMYCKSNSYADYLPVDVFINGIMIAAWNYMKNGETKANIINFSSAEI  
KVTWSEMIDAGREIIMNRVPLNGVVWYPGSGMKHSRLYHNICVFFFHWIPAFIIDTLLFCL  
GYKPVLCRVQRRTKGFVFEYYTNNQWDFKSDIAQKVRTKLNPRERREYKVDVGLDIS  
KYFEDCIRAARVFILKEYDDTLPAARRHMRVMYWVDVIVRCLFWGLMLYWISGWSSSN  
SIVADQHTLPTVIAMDA

>AID66653.1 fatty acyl reductase [*Agrotis segetum*]

MPDVGKIYLLMRPKKGKEISERLQEFPKNLIFEKLLSTNDIFQKLIPIAGDVGEDNLGLS  
PQDRQTLVDNVNVVIHSAATLDFQESLRPTVNINLLGTRRIMELCKDAKNLKVMIHVSSA  
YVNSFLTEAHEKVYEAPEDAEEKVISLVGTLNDQALLEIEPKLLKSHPNITYTFTKHLAEHEV  
VKCADLFPCTIVRPTMIVATWKEPVPGWTC SKVGPQGFLMGAAKGVVRRLPLAKENIAD  
YIPVDVVVNQLLVAGWEASKSNSGLSVYHCSSTCKPFTWSMLDSTVNSMLHKYPLKSA  
VWYPCQLQFVPSLLMFRISAIFVHFFPALLLDMMLRLTGGRPILIRLHKNVWNSLSRLERFIF  
SEWKFYNPNTLELCKKLNQTDKELFYIDLTMLHWVEYFKSLHLGVRRLNREKESTLPAA  
RKKDMVLLMFHVIWQLFIIGLLWYIFACLTGLTLAHSAFIAPVIYILFSFL

>AID66654.1 fatty acyl reductase [*Agrotis segetum*]

MAPSMSIAEYYAGKTLFITGATGFMGKVMVEKLLRCCPDVKKMYLLMRPKKGHSSKERL  
DDLFSFRVFDRLKAESPFIKDLHVIPGDILSEDLGMSNEDRMLIQNEAQMIFHCAACVRF  
DMFLRDAVKMNTMGTKMVLELAEGVKNEAFVHVSTSYCRCELELFEEKLYPSKHRPEH  
VMHCVGWMDDELLGHMQPKIIEPQPNITYAYTKSLTEDLVSYQYEGKFPVIVARPSIVAAAYK  
EPMPGWVDNLNGPTGLLVGAGKGVIRTMHCNENYAADVVPVDVAVNACIILGYLTGMEK  
PKQISICNITQSEINPITWGQALDMGRIHVQEFPTVCLWYPGGSPKSSRLAHQLALFFTHL  
LPAYFVDLLMFLMGKKTFMIKIQKRINYGLEVLQYYTTKEWHFKNDNFVALQNRRISEKDN  
ETFYTDKMDMNWSMYIRNYIKGAREYCKEDPSTLPAARRLQRQLYYLDKAVQIMVGLL  
ISYITYYYLNMMLYSLISA

>AID66655.1 fatty acyl reductase [*Agrotis segetum*]

MNNMFRLRILINKDSVLSKRMKINHVLGYSSMPENLTKATEYTTTYQPIADFYAGKSVF  
VTGGTGFLGKVYLEKLLYSCKKVDKVYLLVREKKGHNITKRIEDLFANPLFSRLKKTNP  
YFKKVVPVSGDITLNLGLTPKDEQTLIDKVSVVYHAAATVRFNEPLPVAMNINFEGTQK  
VLELSRRMKNIEAFLYISTAYTQTQRKVLMTVYPPPAKEEDIYKFIEEFGNDAKETEKYLC  
DHEKPNSYTFTKALAESYIAKNHGDVPAVIRPSAVVSIKDEPLKSWLDNWFGLTFYFYTA  
AKGWNRFNLGNSNNSVDLIPVDYVSNFTIAGARAKSKYNEVQVFNTTSSSVNPVTFGEA  
HKYFSEDIISRGKNDMPALIFVNSKAILNIGAFFCQTIPVHIADMWLKMTGKKPKFVKL  
AADFTELARMADYFTSKNWQFRADRMRELFDLSLPEDKRIFPCDPTQIDWSEYLRDYGK  
GVRKYLKPK

>AGR49316.1 fatty-acyl CoA reductase 6, partial [*Agrotis ipsilon*]

GCIRGRTQWCPRPVPQSPPPLIPEFFAGREVFITGGTGFMGKVLVERLLWTCRDVARVHLL

LRRKQDCAPQKRLAQLKQSKVFDVIRAHCPQQLDKLNAVPGDVTQPRLGLDQHHLNQL  
QQVSVVFHSAATLKFTEPLEAALAQNVRPVITLMDICDELPMQVLVHVSTAYSNAELSV  
VEERVYPSPTSPAQVLALVEHLPPELLADTTHKLISPKNPTYTFTKALAERAVAEHAAAAS  
YATAIFRPTIVISSQRTPFPGWIENLNGPSGVMVGAGKGVLHVLSCDGGQRADMLPVDLAI  
DTLLAVAWETAVDDLRETRVYNCSTCSNPITWEQFRSYMLSGVRAHPFDNAMWYPYGLIT  
ESTMMQKLLLETVLQTAPLYLIHYVSKMCGIKPRPSLSTVSKRMQAMNEALKFFALREWHF  
NTDNVQRLKQRLSPADA AVFNLD PSTIDWTEVCTDFVKGTRKYLLREKDEDIEHAQRRM  
HLLHMMHNATMLFLT VLLCRLAMRTTPAILRAIATLIRLRKSSILHNI

>AGR49317.1 putative fatty acyl-CoA reductase, partial [*Agrotis ipsilon*]

ILKTMAVEALTNSQLFESKQGGDITFMDMVDEQEPLGDSQIQKLFAGSAVLLTGGTGFLGK  
LVVEKLLRSCPDLLKKIFLLARPKKNKDITKRLQE QFEDVLYDRLRKERP DFISKISIVEGDM  
GQPELGMCAEDRAKIMNEVDVIFHGAATVRFDEPLKTAVEINVRGTREMFKLARGCTKL  
KAFVHISTAYSNC PQTSIDEKFYDSPLPGEKLIDL VETMDEQTINNITPGLLGDFPNTYAYTK  
AVAENIVLEYSKGLPVALFRPAIVIGTAKEPVAGWIDNVYGPTGVVVGA AVGLLHVLNCNP  
KVIADLVPG

>AGR49318.1 putative fatty acyl-CoA reductase [*Agrotis ipsilon*]

MPDDSQVRAFYAGKNFFITGGTG FVGLCLIEKILRCMPDVGKIYLLMRPKKGKEISERLQE  
FPKNLVFEKLL ETNSTDIFQKLIPIAGDVGEDNLGLSPQDRQTLVDNVNVVIHSAATLDFQE  
SLRPTVNINLLGTRRIMELCKDAKNLKVMIHVSSAYVNSFLTEAHEKVYEAPEDA EKVISL  
VGTLNDEALLEIEPKLLKSHPN TYTFTKHLAEHEVVKCADLFPCTIVRPTMIVATWKEPVP  
GWTCSKVGPQGFLMGA AKGVVRRRLPLAKENIADYIPVDVVVNQLLVAGWEASKSNSGL  
SVYHCSSSTCKPFTWSMLDSTVNSMLHKYPLKSAVWYPCLQFVPSLLMFRISAIFVHFFPA  
LLL DLMLRLTGGRPILIRLHKNVWNSLSRLERFIFSEWKFYNPNTLELCKKLNQTDKELFY  
IDISMLHWVEYFKTLHLGVRRYLNREKESTLPAARKKDMVLLMFHVIWQLFIIGLLWYIFA  
SLTGLTLAHSAPIAPVIYILLSFL

>AGR49319.1 putative fatty acyl-CoA reductase [*Agrotis ipsilon*]

MTSEVNEWYKGRSVLVTGALGLMGKV LIEKLLYSVPDLGCVYALVRSKRGKSPETRIEEM  
WKLPLFQRIREEKPHVMKKLIPVTGDIMYEELGINGSHLKEIYDEVSIVFHFAASLRLEAPL  
KEGLEMNTRGTLRVLDMAKKMKKLVAFIHLSTAF CYPDYERMAEKVFDPPADPHEVLRA  
AGWLTEDQLNLLAPSIYQKHPNSYTYSKRLAEALVRESYPQLPAVVVRPSIVTPSYKEPTP  
GWVDNLNGPIGLMVGAGKG VIRSMHCYGHYHAEVIPVDIAINSIIIIAYKTGKDTQRQPEIP  
VYNITTGDDRHTTWKEVLDIGKATVRKF PFEGPLWYPDGNIRHNKFIHDL CVFFYHIIPAYF  
IDFLLFLFRQRRFMVRIQN RITIGLEVLYFTTREW WFDTN NFKSLVGLLNPVDKQTFPMD  
LTIIEDEPYIESCMIGGKLYCLKEK MENLPKARLQNHILYILDR LVSLFFYLVLVYWIVSYVE  
PVRELLSYGGPAVRYLPLVGKAVFRDA

>AGR49320.1 fatty-acyl CoA reductase 3 [*Agrotis ipsilon*]

MATETLSSADIDALPDRIADTFSGMKVLITGGTG FMGKVLLEKLLRKCPDIGQILLFVRSK  
KGKNPKQRLEEIFSGVLFDKVRTMRGGVEPLVEK VTLVTGDVSEPD LGMSEEDRQMVIK  
DVDIIIIHAAATIRFDEELKKAVLLNVRGTKLMVELAKTCKKLLKFIHISTS YCHLHEKLL EE  
KAYPPPADPHQIIQAVEWMDEETITALTPKLLDKLPNSYAF TKALGEALVVESMQHIPAMV  
LRPSIVIPIWQEPVPGWTDN INGPTGLLIGAGKG VIRSMYCKSNSYADYLPVDVFISGIMIV  
AWNLYLKTEIQRPTL

>AGR49321.1 fatty-acyl CoA reductase 6, partial [*Agrotis ipsilon*]

TNYRDISLRHPYPGW IENLNGPSGVVVGAGKGLLHVFCCKDTAKADMLPVDMAIDTLLA

VAWETAVDREPEQVKVYNCSTYENPTTWGEFESALRLYLRGHPLDNAYWYPSGLAVENKI  
AHKSLETLLQTAPLHIAEYLTKLLGIKTRMSLITVSQRLVAMSDVLKFFSMREWHFKTDNV  
KKLHARLSPQDAAIYNLDPQTINWSNHYENFIKGTKEYLLQEKDQDIDVAKKHLRKMYY  
VHQGLLLFVLAILCRFALENQYIRAFVYRTFRMLLSILTAAYMRIQQS

>AGR49322.1 fatty-acyl CoA reductase 4, partial [*Agrotis ipsilon*]

VGWMDDELLGHMQPKIIEPQNPTYAYTKSLTEDLVSQYEGKFPVIVARPSIVAAAYKEPMP  
GWVDNLNGPTGLLVGAGKGVIRTMHCNENYAADVVPVDVTVNACIILGYLTGIEKPKQIS  
VCNITQSEINPITWGQALDMGRIHVQEFPFTVCLWYPGGSPKSSRLAHQLALFFTHLLPAY  
FVDLLMFLMGKKTTFMIKIKRIN

>AGR49323.1 fatty-acyl reductase, partial [*Agrotis ipsilon*]

RMAVVISREEEKLSPPEFYAGKSIFITGGTGFLGKVFIKLLYSCPDIDKIYMLIREKKNLSID  
ERMTMFLDDPLFSRLKEKRPDVEKIVLIPGDISSPNLGLSAENERILIENVSVIIIHSAATIKF  
NEPLPIAWKINVEGTRMLMDLSRRMKRIKVFIIHISTAYSANASERAAVEEILYPAPADMDO  
VYQLVKDGVTEETEILLNGLPNTYTFTKALAEHLAAEHQVHVPTVIIRPSIVGSIKDEPIR  
GWLNCNWFGATGISVFTAKGLNRVLLGKASNIVDVIPVDYVANLVIVAGAKNGGEKSEELK  
IYNCCSSDCNPVTVKKILKEFIDDTIKNKSHIMPLPGWVFVTKYKWLMTLLTIIFQMIPMYL  
ADVVRVLMGKNPRYMKLHHLVIQTRLVINFFTFHWSVMKTDRELFGLSPVEKHMFP  
WDPSGIDWTEYLQSYCYGVRHFLEKRR

>AGR49324.1 fatty-acyl CoA reductase 5, partial [*Agrotis ipsilon*]

EYRGSSPPLEPPIFYNYVSSVENRITWGDFLQQNMQWIHCFPFSDAVWFISVRLTKSAFMNKI  
YMFHLHLIPAILVDGLAICLGRKPKMLKVYRKIHKFSAVLSYFCTREIKFCNSRTRELWENF

>AGR49325.1 fatty-acyl-CoA reductase, partial [*Agrotis ipsilon*]

HVAASVRFDLTKFAAKMNLRGTVEMELAKEVRELSAVVHVSTSYSNTNRDPIEEVLYP  
PHADWRDTLEVCEKIDPHALKVLTTPKYLGEIPNTYTFSKQLAENVVAEYKGILPVIIRPS

>AGR49326.1 fatty-acyl CoA reductase 6 [*Agrotis ipsilon*]

MVPRPVSPSPAEPLPRFYAGRSILITGATGFMGKVLIERILSTCPDVGRLHLLMRDKKGHS  
PQKRLAQLKQSQVFDNVRARNHRQLDKLFVICGDVSKPHLGMDSEIAELREVSIVFHSA  
ATLKFDEPLRVAIDQNVRSVQRLLEICDKLPNIAAFIHVSTAYSNAELTHVEERVYPPVPLE  
QAFIADSLPEELLVKINAHEYISPKPNTYTFTKALAENVVQEHGIKGYPVAIFRPTIVISPSAI  
HTLVG

>AGR49327.1 fatty-acyl-CoA reductase, partial [*Agrotis ipsilon*]

SKYSRVLQRKNCFYTGSGFMGKVLVEKLLYSCPDLDRIYLLLRNKKGVKSEDRLNELFA  
SPCFDRLRKERPEFRSKVFVIAG

>AGR49328.1 putative fatty acyl-CoA reductase, partial [*Agrotis ipsilon*]

EKCHAPPVDPDHVMKLVQWLDNNQLALLTPSLLGHPNICYTFSKRLAENLVEQAHPHMP  
VVIARPSIVCPAVKEPMPGWVDNLNGPVGVMGAGKGVIRTMCLCNGNLIAQVVPVDIAIN  
AIIAIGMLEGSRTEKPESLPVYNVNGHQKPTTWGDVLNVAKAYGRQYPLSWPLWYPNG  
DITTNKFLHEYRRICYHLVPAYLIDLLLFLLGQKRIMVRIQERSQGLEVLQYFTMRPWN

>ACX53790.1 fatty-acyl reductase [*Heliothis virescens*]

MVVLTSKETKPSVAEFYAGKSVFITGGTGFLGKVFIKLLYSCPDIVNIYMLIREKKGLSVS  
ERIKQFLDDPLFTRLKDKRPADLEKIVLIPGDITAPDLGITAANEKMLIEKVSVIIIHSAATVK  
FNEPLPTAWKINVEGTRMMLALSRRMKRIEVFIHISTAYTNTNREVVDIILYPAPADIDQVY  
QYVKEGISEEDTEKILNGRPNTYTFTKALTEHLVAENQAYVPTIIVRPSVAAIKDEPLKGW  
LGNWFGATGLTVFTAKGLNRVIYGHSNYIVDLIPVDYVANLVIAAGAKSNTSSELKVYNC

CSSSCNPVKIGTLMMSMFADDAIKQKSYAMPLPGWYIFTKYKWLVLTLTFLFQVIPAYITDLS  
RHLVGKSPRYIKLQSLVNQTRSSIDFFTNSWVMKADRVRELYASLSPADKYLFPCDPVNI  
NWTQYLQDYCWGVRNFLEKKT

>ACX53770.1 fatty-acyl-CoA reductase, partial [*Heliothis virescens*]

VNTEVLEQFYPCPVHPDAIIGMAESMEDDRLNAITEHLITGWPNITYTFTKAIAEELVRASG  
ADLPVCVVRPPIVTPSYYEPTPGWMDLTALSGPTGILAGIIMGILHVFYVDKDKLPLTPVD  
YVNNATIAAGWDAECRRKNGEKDIQVYTVSNKDNFITWDFIGVLMRTEGKRSPSPKALW  
YCWLIETNSKVIYWILAFFLHYIPAYVMDAMGALLGNMPKEINSYVAVFRKIDKFALIYHF  
FLSNEWGFKDDNVQ

>ACX53773.1 fatty-acyl-CoA reductase, partial [*Heliothis virescens*]

FSLNWNLQNLNFDKNHGFPRRTGLSDVPTIPEFYKGKTIFITGGSGFIGKVLIEKL  
LYSCTDLDRYLLLRNKKGVKSEDRLSQLYAKPCFQRLKAERPGEVSKVFFVSGNVMEI  
GLGLTQEDRALLVNRVNVIFHVAASVRFDDTLKYSTQLNLRGTVEVMELAKEMRDLCSL  
VHVSTSYANTNRDPIEEVLYPPLADWRETLDICENADEHTL

>ACX53775.1 fatty-acyl-CoA reductase, partial [*Heliothis virescens*]

MAEESQVRAFYAGKNFFITGGTGFGVGLCLIEKILRCMPDVGKIYLLMRPKKGKEIAERLEE  
FPKNPVFEKLLESNSTDIFKKLVVAGDVGEVNLGLSPADRQMLIDNINNVIIHSAATLDFQE  
SLRPTVNINLLGTRRIMELCKDAKDLKVMIHVSSAYVNSYLTEAHEKV

>ALJ30235.1 putative fatty acyl reductase FAR1 [*Spodoptera litura*]

MAAETLTENQLFEAKQGGDITYMDMIEETQPLGDSQIQKLFAGSAVLLTGGTGFLGKLVV  
EKLLRSCPDLKKIFLLARPKNKTITKRLQEQQFDDVLYDRLRKECPDFINKISIVEGDVGQL  
DLGMCPEDEKIMNEVEVIFHGAATVRFDEPLKTAVEINVRGTREMLKLARGCSKLKAFV  
HISTAYSNCQNMIGEKFYESPLPGDKLIDLTVETMEEKVINNITPGLLGDFPNTYAYTKAVA  
ENIVKEYSKGLPVALFRPSIVIGTSKEPVSGWIDNVYGPTGVVVGAAGVLLHVLNCNPKV  
KADLVPGDMVNVNACIATAWKTAKEYPSNHEDAPPPDLTPPVYNYVSSEQRPLTWKFMN  
YNEVYGFQVPTVQAIYYLFLHTSSKFLYNLYCFLHWPAYIIDGIAVIIGKKPILRKAYKKI  
TKFSEVMAYFATREWKFDNSNTQQLFKELCDADKYLDFDMSALQWNEYFYNYIRGVRV  
YLLKDPVDTVPEGLKKHHRLKFLHYTFCGILGLLFFRLLWAMISGILSF

>ALJ30236.1 putative fatty acyl reductase FAR2, partial [*Spodoptera litura*]

MLWVDFSLSLNDLFKIFATMVPRPVSPSPAEPLIPRFYAGRSILITGATGFMGKVLVERILST  
CPEVGRLHLLMRDKKGHSPQKRLAQLKQSQVFDNVRARNHRQLDKLCVVSQVSKPQL  
GMDADAIAQLREVSIVFHSAAATLKFDEPLPVAIDQNVRSVERLLDICDKLPNMEAFIHVST  
AYSNAELTVVEERVYPAPVPLAQAQCTLAETLPVDLLGQINTQYISPKPNTYTF

>ALJ30237.1 putative fatty acyl reductase FAR3 [*Spodoptera litura*]

MVVLTSSKEKSNMSVADFYAGKSVFITGGTGFLGKVFIEKLLYSCPDIDKIYMLIREKKGQSI  
RERLTKIVDDPLFNRLKDKRPGDLGKIILIPGDITVPGLGISEENETILIEKVSVVIHSAATVK  
FNEPLATAWNVNVEGTRMIMALSRRMKRIEVIHISTAYTNTNRAVIDEVLYPPPADINDVH  
QHVKNQVTEETEKLNGRPNTYTFTKALTEHLVAENQSYMPTIIVRPSIVGAIKDDPIRGW  
LANWYGATGLSVFTAKGLNRVIYGHSNHVVDLIPVDYVANLVIVAGAKTYHSNEVTIYNS  
CSSSCNPITMKRLVGLFIDYTVKHKSVMPLPGWYVYSNYRWLVFLVTLIFQVIPAYLGDI  
GRLLGKNPRYYKLQNLVAQTQEAVHFTSHTWEIKSKRTSELFSSLSLTDQRMFPCDANR  
IDWTDYITDYCSGVRQFLEKIK

>ALJ30238.1 putative fatty acyl reductase FAR4, partial [*Spodoptera litura*]

MAPSVNIAEYYAGKTLFITGATGFMGKVMVEKLLRDCSDVKKMYLLMRPKKGHSSKER

LDELLNFKIFDRLKAENPKLFEKLQVVAGDILLEDGLLSAEDRLLIQEEAQIIFHCAACVRF  
DMFLRDAVKMNTMGTKKVLELAEGVKNLEAFVHVSTSYCRCELPLFECKLYPSKHRPEH  
VMHCNVNWMDELLGHLQPKIIEPQPNTYAYTKSLTEDLVSQYEGKFPVVIARPSIVAAAYK  
EPLPGWVDNLN

>ALJ30239.1 putative fatty acyl reductase FAR5, partial [*Spodoptera litura*]

MDPALAVELEALSQRKAMFEATERGDSTVQQFYKDSTVFLTGASGFLGKQLVEKLFACN  
IRKIFILLRPKKNM TIQERLEEMLQDPVFNLVKKKKPDFAENIVPVKGDVAETKLGLSDTD  
WTMITSEVDVIFHVAATTRFDEALRVSTMINIRGTRET VLLGKDCQKLSFVYVSTTYSTA  
TQANVDKEVMERFYPCPLPELMIDMAENIDDERMEAIEANLIKGYPN TYTFTKSIAEEVV  
RSLAGEMPTCIIRPAVVISSYREPVPGWADASCAFGASGLILGPATGLIHAIYASNDVKFSLV  
PVDYVNNAILVAGWHTATEKPN DVQIYSVSSARNLFHWEPISSKIRDIGKVLPTPLAVWYT  
FIINTSNKPLFFILT WLLHYIPGYILDAGCILLGKPTMFIKLYNRVNRSSLALS YFTTHTWVF  
NDSNTDKLFNSLSKTDR LIFNFDTS DINISEFVTLWCVGLRK YLMKDG IKNTEYARKKQFL  
LKYLHYVVSFMYVYVLFKITCLVCYLILCLFG

>ALJ30240.1 putative fatty acyl reductase FAR6 [*Spodoptera litura*]

MVPRPAPQSSTPPLIPEYFAGREVFITGATGFMGKVLVERLLWTCPDISRLHLLMRHKKDC  
APDKRLALLKQSQVFDVVREQCPQQLDKLCVVPGDVTKRRFGFDQPTLNQLNQVS VVFH  
SAATLK FDEPLSVAVEQNVRPVLTLM DICDQLPNMQVFIHVSTAYSNAELSTVEERVYPAP  
VSPSHLLALVDALPATMLQEITPRLIAPKPN TYTFTKAVAESA VSERATSAHYACAIFRPSIV  
VSSLRHPFPGWIENLNGPSGVIAGAGKGLLRVLRCGAQRRADMMPVDICIDTLIAVAVET  
GVDNLREGRVYT CASSCHAATWGQFRARMLRLVREHPFDNLWYPYGIICENTVIQKVL  
ETVLQTAPLCLAHCVWRACGLKQKPSLWTACKRLQAMNHALQFFATRHWSFSTTHVQK  
LADRLHGEDKLRYNLRPETIDWEQHCVD FVKGARRYLLRERDDDIHTARRRMKLLTVIH  
NATLLFAIFFVCRLTIRTAPAILRGVAVLTRLRNKAIQES

>ALJ30241.1 putative fatty acyl reductase FAR7 [*Spodoptera litura*]

MSNPSIRDFYKGRN ILVTGGTGFMGKVLIEKMLYSIPDLGNIYILMRPKRGKSVAQRIEDM  
QRLRLFERIRTEKPD AFKKMKPLQGDVLF DNLGLSDSDIELLCNEVS VVFHFAATLRLEAP  
LKDNVNMNTCGTQRALDI AKKFKKLDIFVHLSTAF CYPDYEVLGEKCFGPPVKPENVMK  
LIQWLDDKQLALLTPSLLGHPNCYTFSKRLAETIVEQA HDELPVVIARPSIVCPSLKEPVP  
GWVDNLNGPVGVMLGAGKG VIRTMLCDGSLTAQVCPVDIAINGIIAIGMIEGNKKEKHTS  
LPVYNVNNGHQKPTTWGDVLTIAKDYGRKYPLSWPLWYPNGDITTN AVLHEYRRIFYHL  
VPAYLIDFLLFLLGQKRIMIRIQERISQGLEVLQYFTMRPWNFPCPNYDAIREKLSPEEQEIY  
NTD TTDVDRHEYMKMCVEGGRVYCFKEDPNKIPYNRIYHRFLYVLDW FVKIMFWLFLVLS  
FIASWCGPIKTVFSFGEP IVKHL PFLGKVVSKEEL

>ALJ30242.1 putative fatty acyl reductase FAR8 [*Spodoptera litura*]

MASETISAELECLPDRIADTFSGMKVLITGGTGFMGKVLVEKLLRKCPDIDQILLFVRSKK  
GKNPKQRLEEICSGVLFEKLREMRGGVEP LLEKVT LINGDVSEPD LAMSPEDRQMIIDQV  
DIIHAAATIRFDEELKKAVLLNVRG TKLMVELGKACKNLKVFIHISTAYCHLHEKLL EKA  
YSPPADPHQIIQAVEWMDEETIATMTPKLLNKL PNSYAFTKALAEALVVEAMEKANLPAM  
VLRPSIVIPIWQEPVPGWTDNINGPTG LLIGAGKG VIRSMYCKSNSYADYLPVDVFINGIMI  
VAWNYLKNNGDKKCN IINFTSSAEIKVTWSE MIDAGREIIMNRVPLNGVVWYPGGS MKHSR  
LYHNICVFFFHWIPAFIIDTLLFCLGYKPVLCRVQRRITKGFEVF EYYTNNQWDFKSDIAQT  
LRQKLN AKERRDYKVDAVGLDISKYFEDCIRAARV FILKEYDDTLPAARRHMRIMYWVD  
VIVNCLFWGFLLYWLSGWM TTSKAIVPDTASPTVIAMDA



>ALJ30243.1 putative fatty acyl reductase FAR9 [*Spodoptera litura*]

MHCNENYEADVVPVDVTVNACILGYLTGMEKPKKINFCNITQSQINPITWGQALDMGRV  
HVQEFPTVCLWYPGGSASWIAHQFALFFTHMLPAYFVDLLMFLMGKKTFMIKIQKRI  
NYGLEVLQYYTTKEWHFTNDFFVSLQNRISKRDNEIFYTNMKEMDWSQYIRNYIRGARE  
YCKKEDPSTLPAARRLQKQLYYLDKAVQIMVGLLVSYFIYYFNMPLYSMISS

>ALJ30244.1 putative fatty acyl reductase FAR10 [*Spodoptera litura*]

MNYAIEKSPLSQTPVTREKMEKWVDAQVKGEKADIDVYGKPTDKMLKELENVRNLSKE  
LQDNLHELENSVRIAEVENQAMNPTAQILDSEDFEVPDNKDTYYAEEDKVDAKEEEK  
KKLTGKGGPKTEIQEFYKDQCVFLTGGTGFLGKVLIEKIIRSCGDINTIYVLARNKKGKDP  
VRLHEMMDEFLFHRAHEENPKGIHKVVPILGDMELPGLGINEEDRKMLASKVTIINAAT  
VKFDEKLSVSTAINVKGTKEVLKLAKECRNKKAITHVSTAFSNTQVKHIEEKFYEPMSVE  
ALEAISEVDEKLVESILPTLLGTRPNTYCFTKAVAEAAVRTYGEGLPICIVRPSIVVSTYEEPV  
RGWTDVSYGPTGLVVGIGTGVLRTMYMDQEKVADMVPVDLCVNAILASAWHTAKNYK  
ENQTSIPIYNYVSGAQNPLTWGEFIERNRRYGIDKPTTKAVWYYGLNPTNNYYLFLFYNF  
FLHYLPALMIDTYCAITGKRRAMLKLYSKVMKLANILFYFSTQDWKFSDMNVRNMWNS  
LSDADRVVFPFSGMGEMSWEYMCETFLVGLRVYLIKDDLSTLPEARKKWNKLYLHQILKI  
ITLSLVLYLTYFVLQPIIALVFN

>ALJ30245.1 putative fatty acyl reductase FAR11 [*Spodoptera litura*]

MSTEPGDGPLLPGFYAGRAVLITGGTGFLGKVLIERLLWTCPEVGEVHLLLRDKRGQPPRV  
RLNQLKQSQAFDNVRAHCPGQLDKLRVVCGDVAQPRGLDDAALLQREVSLVFHSAAT  
VKFWESLETALHQNVTSVVALMELCDQLPRLEALVHVSTAYSNAERRHIEERVYEAPQL  
AGLRAMLDALPPSLDDLTARYIAPKPNITYVFSKAVAEATIAQRPRKHYATAIVRPSIVVSS  
HRHPYPGWIEENLAGPSGVVVGCGKGLVHAFNLDLAARADLIPVDITIDTMLAVAWEIATD  
KSEEVRYNSCSQQNPITWGTFRDRVVRNARAHFPDQLMYYPFTFGIKNRYVYKALELVL  
QTIPLYVADYIARLCGIKLQSLVTVSERLQAMNRVLAFFATREWFSTRNVQALRRRLTR  
ADQDIYNLDVTSVDWDEHVSNFVKGTRKFLLKEKDDNIPRAKKFVERLRRVHQFVLLML  
SVLVYRFLMLLLPRFLRSSPVLAGLAAPH

>ALJ30246.1 putative fatty acyl reductase FAR12 [*Spodoptera litura*]

MADPSQVRSFYAGKNFFITGGTGFLCLIEKILRCIPDAGKIYLLMRSKKGKEIADRLQEF  
PKNPVFEKLLESNSADIFKKLIPIAGDVGEENLGLSPQDRQTIIDNVNVVIHSAATLDFQESL  
RPTVNINLLGTRRMQLCKDAKNLKVMIHVSSAYVNSYLTEAHEKVYEAPEDPEKVISLV  
GTLNDEALLEVEPKLLKSHPNITYTFTKHLAEHEVVKCADLFPCTIVRPTMIVAAWKEPIPG  
WTCSKVGPQGFLMGAAKGVVRRPLAKENVADYIPVDVVVNQLLVAGWEAANSRSGLT  
VYHCSSSTCHPFTWTMLDDTVNSMLHKYPLKSAVWYPHLKFVPSLLMFRISAIFVHFFPA  
LLLDLMLRMTGGRPILIRLHKNVWNSLNRLERFIFSEWKFNPNNTLELATKLNQTDKELFF  
IDISKLYWVEYFKTLHLGVERRYLNKEKESSLPAARKKDMVLLLHVIVWQLFIMGLVWYIF  
ACFTGLTLAHSAWIPIIYILFTFL

>ALJ30247.1 putative fatty acyl reductase FAR13 [*Spodoptera litura*]

MAARADMLPVDMAIDTLLAVAWETAVIDRPEAVRVYNCSTCENPTTWDRDFETALRHRLRV  
NPLDNFWYPSGFTVENKLTQKTLETILQTAPLHIAEYISKILGIKTRLSLITVSQRLIAMNE  
VLRFFSVREWHFVTDNVRKLHARLTPQDAAIYNLDPQTINWNEHYCNFIIGARKYLLQEK  
DQDINEAKKHLRRMYYLHHGVMFFVVTLLCRLALRNQYLRAFIYRTFRMLLTVAGSAYM  
RIRQS

>ARD71186.1 fatty acyl reductase [*Spodoptera exigua*]

MAVETLTEHQLFEAKQGGDITYKDMVEESQPLGDSQIQKLFAGSSVLLTGGTGFLGKLIVE  
KLLRSCPDLLKKIFLLARPKKNKTITKRLQEQFDDVLYDRLRKECPDFINKISLVEGDVGQL  
DLGMCPEDEKIMNEVEIIFHGAATVRFDEPLKTAVEINVRGTREMFKLARGCSKLKAFVH  
ISTAYSNCPQNMIGEEFYESPLPGDKLIDLVTMEEKVINNITPGLLGDFPNTYAYTKAVAE  
NIVKEYSKGLPVALFRPSIVIGTSKEPVSGWIDNVYGPTGVVVGAAGVLLHVLNCPKVIA  
DLVPGDMVNVNACIATAWKTAKEYPSNHEDAPPPDLTPPVYNYVSSEQRPLTWEKFMNYN  
EVYGFQVPTVQAIYYLFLHLLTSSKFLYNLYCFLHWPAYIIDGIAVIGKKPMLRKAYKKIT  
KFSEVMAYFATREWKFDNTNTQQLFKELCDADKYMFDMDSSLEWNEYFYNYIRGVRV  
YLLKDPVETVPQGLKKHNRLKYLHYTFCAILGLLFLRLWAIWFGIFSF

>ARD71187.1 fatty acyl reductase [*Spodoptera exigua*]

MTYRQINEFDAEKFTAAVPTSYSVSPDFYAGKSIFITGGTGFLGKVFLEKLLYSCKDDET  
VYILIREKKGKTPQQRVEDLFNKPIFSRLKQKDSQCMKKVTAIIGDLSEPGLGISKDDEELL  
LQKVSVVFHVAANVQFYKEFKEIINTNVGGTKYVLQLCQRIKDIKAFVHISTAYCHTDQK  
VLEERIYPPPAELSEVLKFLQPPHDKKQIKELFKKQPNSTYFAKALAETYIAENCGRVPTII  
IRPSIISASLKEPLPGWVDSWNGATGLITASYNGANRVLLGEGGNFLDLIPVDFVANLAIVA  
AAKCTSSLKVYNCCSSGCNPLTLKQLVSHMNNVGFDDKNVSIIFTNNKASLSTLTFFLQTP  
SFTADMFLRVGTGKSPRYMKIQSKLTIARNALNFFTCHSWVMKADNSRRLYASLSLHHRHT  
FPCDPTDIDWKYITIYIEGINQFLMKRS

>ARD71188.1 fatty acyl reductase [*Spodoptera exigua*]

MVVLTSKEKSNMSVADFYAGKSVFITGGTGFLGKVFIEKLLYSCPDIDKIYMLIREKKGQSI  
RERLTKIVDDPLFNRLKEKRPGLDLKIVLIPGDVTVPLGISDENEAILDKVSVVIHSAATV  
KFNEPLATAWNVNVEGTRMIMALSRRMKRIEIFIHISTAYTNTNRAVVDEVLYPPPADINEV  
HQYVKNGITEEETEKILNGRPNTYTFTKALTEHLVAENQAYMPTVIVRPSIVGAIKDDPIRG  
WLANWYGATGLSVFTAKGLNRVIYQSSHVVDLIPVDYVANLVIVAGAKTYRSNEVTIYN  
SCSSSCNPITMERLVGLFIDDTVKHNSYVMPLPGWYVYSNYRWLVVLTIIQFMIPAYLADI  
GRLLGKNPRYYKLQSLVAQTQEAVHFFTSHTWEIKSKRTSELFASLSHTDQRMFPCDAK  
KIDWTDYITDYCSGVRQFLEKRS

>ARD71189.1 fatty acyl reductase, partial [*Spodoptera exigua*]

MCHTYCFYYIKKLIMAPSMNIAEYYAGKTLFITGATGFMGKVMVEKLLRDCSDVKKMYL  
LMRPKKGHSSKERLDDILSFRIFDRLKAENPKLFEKLQVVAGDILSEDGLSPEDRLLIQEE  
AQIIFHCAACVRFDMLRDAVKMNTMGTKKVLELAEGVKNLQAFVHVSTSYCRCELPFE  
EKLYPSKHRPEHVMHCVNWMDELLGHLQPKIIEPQPNTYAYTKSLTEDLVSQYEGKFPIV  
IARPSIVAAAYKEPLPGWVDNL

>ARD71190.1 fatty acyl reductase, partial [*Spodoptera exigua*]

MPTPLAVWYTFIINTSNKPLFFLLTWLLHYIPGYILDAGCILLGKPTMFIKLYNRVNRSSLAL  
SYFTSRTWVFNDNNSDKLFQSLSKSKLIFNFDTTDINIPEFVTIWCVGLRKYLMKDGKN  
TEYARKKQ

>ARD71191.1 fatty acyl reductase [*Spodoptera exigua*]

MVPRPAPQFPTPLIPEYFAGREVLITGATGFMGKVLVERLLWTCPDIGRLHLLMRHKRDV  
APDKRLALLKQSQVFDVVRERCPQQLDKLCMVPGDVTKRRFGFDQSALNQLNQVSVVF  
HSAATLKFDEPLSVAEQNVRPVLTLMDICDQLPNMQVLVHVSTAYSNAELAEVEERVYP  
APVTPEHLLALVDALPASMLQEITPRLIAPKPNTYTFTKAVAESAVSERAVTARYACAIFRPT  
IVVSSLRHPFPGWIENLNGPSGVVAGAGKGLLRVLRCAQRRADMMPVDICIDTLIAVAW  
ETGIDNLREARVYQCASSSHAATWGQFRERMLRLVREHPFDNVLWYPYGVICENTVVQK

VLEAVLQTAPLCVAHCVARACGLKQKPSLWTACKRLQAMNQALQFFATRHWFSFRTTRVQ  
QLAHLRLHPDDQKLYNLRPETIDWEQHCVDVFKGARRYLLRERDDDIHAARRRMRIYLIH  
KATLLFAIFTMCRLTIRTAPAILWGVAAALTRQRNKSALLS

>ARD71192.1 fatty acyl reductase [*Spodoptera exigua*]

MANPTIRDFYRGRNLTGTGGTGFMGKVLIEKVLYSIPDVGNIIYILMRPKRGKSVAQRIEDM  
QRLRLFERIRSEKPDALKKMKPLQGDVLFENLGLSDSDIEKLSNEVSVVFHFAATLKLEAP  
LKDNVNMNTCGTQRALEIAKKFKKLDIFVHLSTAFICYPDYEVLGERCYGPVVRPENVMK  
LIQWLDDKQLALLTPSLGPHPNICYTFSKRLAETIVEQAHDDELVVVIARPSIVCPSVAEPM  
GWVDNLNGPVGVMGAGKGVIRTMCDGSLIAQVCPVDIAINAIIGMIEGNRKEKHTT  
LPVYNVNNGHQKPTTWGDVLTIAKDYGRKYPLSWPLWYPNGDITTNVAVLHEYRRIFYHL  
VPAYLIDFLLFLLGQKRIMIRIQERISQGLEVLQYFTMRPWNFPCPNYDAIKEKLSPEEQVIF  
NTDITDADRDEYMKMCVEGGRVYCFKEDPTKIPYNRIYHRFLYVLDWVFKIMFWLFLVLS  
YLASWFEPKTLFSLGEPVVKHLPFLGKVVCKTEEL

>ARD71193.1 fatty acyl reductase [*Spodoptera exigua*]

MASETISAELECLPDRIADTFSGMKVLITGGTGFMGKVLVEKLLRKCPDIEQIYLFVRAK  
KGKNPKQRLEEIFSGPLFEKLRDMRGGVEPLLAKMTIVNGDVSEPDLGMSPEDRQMIINQ  
VDIIHAAATIRFDEELKKAVLLNVRGKLMVELGKACKNLKVFIHISTAYCHLHEKLLEEK  
PYPPPADPHQIIQAVEWMDEETIANMTPKLLNKLPSYAFTKALAEALVVEAMEKANLPA  
MVLRPSIVIPWQEPVPGWTDNINGPTGLLIGAGKGVIRSMYCKSNSYADYLPVDVFINGI  
MIVAWNYLKNKGDKKCNINFTSSAEIKVTWSEMEDAGREIIMNRVPLNGVVWYPGGSMDKH  
SRMYHNICVFFFHWIPAFIIDTLLFCLGYKPVLCRVQRRITKGFEVFEYYTNNQWDFKSDIA  
QTLRQKLNAKERRDYKVDVGLDISKYFEDCIRAARIFILKEYDDTLPAARRHMRIMYWV  
DVIVNCLFWGFLLYWLSGWMTTSKAIVPDTATPTVIAMDA

>ARD71194.1 fatty acyl reductase [*Spodoptera exigua*]

MNTNFESTKKLLELSQRMKNIEVFLYISTAFTHQKKVLVETVYPPPAKVEDIYKFIEENG  
DEQATLKFINGQPNTYTFTKSLSEAYLSKHHGNVPAVIIRPSIVSATNQEPIPGWLDN  
WYGS TPFLMNASEGWLRIVRGNYSNGIDFIPVDFVTNLSIVAAAKAKRTNEVQVFHSTTSADNPT  
DWSDFKNYFLDEVVRRGKNDLPYPNIVFVESKIALAIGSFLMQTVPAHMLDLWLKITGKE  
PRYVKILAQVIRLRDSYEHFSSNDWIMRSDRTRQLHASLSPEDQEKFCQDPTQINWPEY  
LYK DYCRGVLYLYKPRKMY

>ARD71195.1 fatty acyl reductase [*Spodoptera exigua*]

MNYTAEKSPLSQTPVTREKMDKWVDAQVKGEKLDIDVYGKPTDKMLKELENVRNLSKE  
LQDNLHELENSVRIAEVENQAMNPTAQILDFSEDHEFVPDNKDTYYAEEDKLDKEEEKK  
KLTKGKGPKTEIQEFYKDQCFLTGGTGFLGKVLIEKLIRSCGDINTIYVLARNKKGKDPR  
VRLHEMMDEFLFHRAHEENPKGIHKVVPILGDMELPGLGINEEDRKMLASKVTIINAAAT  
VKFDEKLSVSTAINVKGTKEVLKLAKECRNLKAITHVSTAFSNTQVKHIEEFYEPMSVE  
ALEAISEVDEKLVESILPTLLGSRPNTYCFKAVAEAEAVRTYGEGLPICIVRPSIVSTYEE  
PV RGWTDVSYGPTGLVVGIGTGVLRTMYMDQEKVADMVPVDLCVNAILASAWHTAKNYK  
ENQTSHIPIYNFVSGAQNPLTWGEFIERNRKYGIDKPTTKAVWYYGLNPTNNYYLFLFY  
NF FLHYLPALMIDTYCAITGKRRAMLKLYSKVMKLANILFYFSTQDWKFSMDNVRNMWNS  
LSDADRIVFPFSIGEMSWEYMCETFLVGLRVYLIKDDLSTLPEARKKWNKLFYLHQTLKAI  
TSLSVVYLYTFVLQPIIALVFN

>ARD71196.1 fatty acyl reductase [*Spodoptera exigua*]

MASEVNEWYKGRSVLVTGALGLMGKVLIEKLLYSVPDVGCVYALVRSKRGKSPETRIEE

MWKLPLFKRIREEKPHVMKKLIPVTGDIMYDELGISAENLKNIYNEVSIVFHFAASLRLEA  
PLKEGLEMNTRGTLRVLEMAKKMKSLVAFIHLSTAFICYPDYERMAEKVFDPPPTDPHEVLR  
AASWLTEEQLNLLAPSIYQKHPNSYTYSKRLAEALVRESYPNLPAVVVRPSIVTPSYKEPTP  
GWVDNLNGPIGLMVGAGKGVIRSMHCYGHYHAEVIPVDIAINSIIVIAKYTGKDTERRQPEI  
PVYNLTGDDRNTTWKEVLDIGKATVRKFPFEGPLWYPDGNIRHNKFIHDL CVFFYHIIPA  
YFIDFLMFLFRQKRFMVRIQNRISIGLEVLQYFTTREWWFDTNNYKSLVHLLNPVDKETFP  
MDTTIIEDEPYIESCMIGGKLYCLKEKLENLPKARLQNHILYILDRLVSLFFYLVLLYWIVSY  
FEPARELLSYGGPAVRYLPLVGKAVFKDV

>ARD71197.1 fatty acyl reductase [*Spodoptera exigua*]

MADPSQVRSFYAGKNFFITGGTGFVGLCLIEKILRCIPDSGKIYLLMRPKKGKEIADRLQEF  
PKNPVFEKLLSNSTDVFNKLIPIAGDVGEENLGMSPQDRQTIINN NVNVVIHSAATLDFQE  
NLRPTVNINLLGTRRVMQLCKDAKNLKVMIHVSSAYVNSYLTEAHEKIYEAPEDPEKVISL  
VGTLNDEALLEIEPKLLKSHPN TYTFTKHLAEHEVVKCADLFPCTIVRPTMIVASWKEPIPG  
WTCSKVGPQGFLMGAAKG VVRRLPLAKENVADYIPVDV VVNQLLVAGWEAANSSSGLT  
VYHCSSTCHPFTWTMLDDTVNGMLHKYPLKSAVWYPHLKFVPSLLMFRISAI FVHFFPA  
LLL DLMLRMTGGRPILIRLHKNVWNSLNRLERFIFSEWKFNPN TLELATKLNQTDKELFF  
IDISKLYWVEYFKTLHLG VRRYLNKEKESTLPAARKKDMVLLL FHV MWQLFIMGLVWYI  
FACATGLTLAHS AWVAPIIYILFTFL

>ARD71198.1 fatty acyl reductase [*Spodoptera exigua*]

MAPNVKEYYYRGKNIFITGGTGFVGKALLEKLLRNCSEVNAIYLLMRQKKGVSAEERLKD  
LCSKPVFDMVREKNPSSFKKLMIINGDITEAGLGISED DVKLLQKECNIIFHSAACVRFDQ  
KLKDAVNMNTTGTLRMLTLAESMQNLEVFVHLSTAYCRCDL DVLEEKVYTAVHKPRKIM  
DIVEWMDDETLAYLEPKIISSEPNTYSYTKAITEDLVNEYS GKFPIAIARPSIVTAVWKEPIP  
GWVDNLNGPTGIVIGSGKGVIRTMHCEPSYKADAISVDV VANACILIAVVTGLDKPKETQ  
VYNLTLSGVINLTWQEIIDLGEK WVNEFPYTMALWYPGGSIKSYRITHQIDKFFSHLVPAYL  
VDALLFLLGKKT FMINLQKRISHGLNVLQYYTTKEWHFRNN NYKGLRNRVTPEDNEVFY  
TDASTLDPDEYLKNYVLGTRKFCCNEDPANLPRARKLHRIRY MADRFFKLLFIFLILWTLY  
SNSHVFTSSVELLDNSLKS LPLMNQANAEEISNIAL

>AKD01773.1 fatty acyl-CoA reductase 12, partial [*Helicoverpa armigera*]

MVVLTSKETKPSVAEFYAGKSVFITGGTGF LGKV FIEKLLYSCPDIGNIYMLIREKKGLSVS  
ERIKHFLDDPLFTRLKEKRPADLEKIVLIPGDITAPDLGITSENEKILIEKVS VIIHSAATVKFN  
EPLPTAWKINVEGTRMMLALSRRMKRIEVFIHISTAYTNTNREV VDEILYPAPADIDQVHQF  
VKDGISEEETEKILNGRPNTYTFTKALTEHLVAENQAYVPTIIVRPSVVA AIKDEPIKGWLG  
NWyGATGLTVFTAKGLNRVIYGHSSYIVDLIPVDYVANLVIAAGAKSSKSTELKVYNCCSS  
ACNPITIGKLMSMFAEDA IKQKSYAMPLPGWYIFTKYKWLVL LLLTLLFQVIPAYITDLYRHL  
IGKNPRYIKLQSLVNQTRSSIDFFTSHSWVMKADRVRELFASLSPADKYLFP CDPTDINWT  
HYIQDYCWGVRHFLEKKT TNK

>AKD01763.1 fatty acyl-CoA reductase 2, partial [*Helicoverpa armigera*]

MVPRPAPQSSTPPLIPEFFAGREVFITGATGFMGKVLVERLLWTCRDISRLHLLLREKKDVA  
PEKRLSQLKQSQVFDVIRQHCPKQLDKLSMLAGDVT KHRFGLDHHAISQLNQVS VVFHS  
AATLKFDEPLPVALQQNVHSVVTLM DICDQLPNMQVLVHVSTAYSNAELTSVEERVYPAP  
AQLQQLSALVEALPAGLLAEITPQLISPKPNTYTFTKAMAESVVAERANTANYAVAIFRPTI  
VISSLRHPFPGWIENLNGPSGVVVGAGKGLLHVLSCGAVRRADMM PV DIAIDTLIAVAWE  
AANDQPGYARVYNCCSSCMDGT SWGQFRARMRCVREHPFDSVLWYPFGVLSENTLMQ

RFLETTLQTVPLYFVHYISKLCGIKSRPSMTTVSKRLHAMNEALKFFALREWHFNTDNVQ  
QLMHRLAPADAAVYNLDPGTIDWESHCEDFVKGTRKYLLREKDQDIEAARRRMHVLHM  
IHSCLKILLTLLMARLAYRSTPAILRAVAVLTRLRRRGATVALSA

>AKD01774.1 fatty acyl-CoA reductase 13, partial [*Helicoverpa armigera*]

MAPSVSVAEYYAGKTLFITGATGFMGKVMVEKMLRSCPDVKKMYLLMRPKKGHSSKER  
LDDLLSFKIFDRLKAENPKIFDKLHVIPGDILSEDLGISDEDRRLIQSEAQVIFHCAACVRFD  
MFLRDAVKMNTVGTKKVLQLAEGVKNLEAFIHVSTSYCRCELPELEEKLYPSKHRPEHV  
MHCVSWMDDDLLTHLQPKIIEPQPNTYAYTKSLTEDLVSYQYEGKFPIAARPSIVAAAYKEP  
LPGWVDNLNGPTGLLVGAGKGVIRTMHCNDSYTADVVPVDVTVNACHIILGYLTGLEQPK  
QINVVNVTQSEINPITWGQALDMGRVHVQEFPTVCLWYPGGSPKSSRVAHQALFFTHL  
LPAYLVDMLMFLMGKKTFMIKIQKRINYLEVLQYYTTKEWFFRNDNFVALQHRISKSDN  
ETFYTDMDMDWSGYIRNYIRGAREYCCKEDPATLPAARRLQTQLYYLDKAVQIMVGLL  
VSYFIYYYYFNMLYSVISS

>AKD01770.1 fatty acyl-CoA reductase 9, partial [*Helicoverpa armigera*]

MSSPSIRDFYKGRNLTGTTGFMGKVLIEKLLYSVPEVGNIYILMRPKRGKSVSQRTEDL  
QRLKLFERLRTENPNALKKLKPLQGDVLFNDLGLSDADIELLTKEVSVVHFHAATLRLEAP  
LKDNVNMNTCGTQRAIDLAKRMKKLQIFVHLSTAFCTPDYEVLEGEKCHAPPVKPDNVM  
KLIEWLDDKQVDLLTPSLLGPHPNCTYFSKRLAENIVEQAYQDLPIVIARPSIVCPSVKEPM  
PGWVDNLNGPVGVMGAGKGVIRTMCDGSLVAQVIPVDIAINAIHAIAGMIEGSRTEKPES  
LPVYNVNNGHQKPTTWGDVLSVAKAYGRKYPLSWPLWYPNGDITNPILHEYKRIFYHL  
VPAYLIDFLLFLLGQKRLMIRIQUERISRGLEVLQYFTMRPWNFPCPNYDAVREKLNPEEQAI  
FNTDIKDVRDEYMKICIEGGRVFCFKEDPTKVPMNRAYHNFLYVLDWFWKIMFWLFWFS  
VLASWFSVPKSLFSLGEPVVKHLPFLGKVIEKQD

>AKD01769.1 fatty acyl-CoA reductase 8, partial [*Helicoverpa armigera*]

MEADGMAQLKEVSIVFHSAAATLKFDEPLRVAMEQNVRVERLLEICDKLPNIQAFIHVSTA  
YSNAELTRVEERVYAPPVPLAQALTVADSVPEHLLATINAQYIAPKPNTYTFTKALAETVV  
EEHGNRGYPVAIFRPSIVISSLRHPFGWIENLNGPSGVVVGAGKGLLHVFCCRSRAGADM  
LPVDIAIDTLLAVAWETAVIDRPEHVRVYNCSTCENPTTWGDFEDALRKNLRGHPLDNTFW  
YPSGYSVENKVTQKAMETLLQTLPLHIAEYVTKLLRIKTRMSLITVSQRLKAMNEVLRFF  
SVREWHFETNNVKRLQARLTPQDAIYNLDPQTINWDDHYENFVKGTRKYLLKEKDQDI  
QEARKHLRKMYYVHYGFLFFVVTLICRLMLQNHYIRTLVFRFTKLLLTVIGSVFLRIQS

>AKD01778.1 fatty acyl-CoA reductase 18, partial [*Helicoverpa armigera*]

MLSVISTAKEPLKGWLDNMYGPTGVAVGSAATGILRTLQCDDEMVSADIVPDSVVNCLMV  
AACSVHHSYKQSSPPLEPPIFNYVSSVENRITWGEFMLQNMAWIIHYYPFSEAVWFISLRLT  
KSALMNKIYVFLHLIPAALVDGLAVCLGRKPKMLKVYRKIHKFSSVLSYFCTREIKFCNT  
RTRELWE

>AKD01777.1 fatty acyl-CoA reductase 17, partial [*Helicoverpa armigera*]

TAKNFKENQTSIPIYNFVSGAQKPITWGDFIERNRKYGIDKPTTKAVWYYGLNPTNNY  
LFLFYNNFLHYLPALMIDTYCAITGKRRAMIKLYNKVMKLANILFYFSTQDWQFSDYNVR  
NMWKSLSDEDRVFPFSGIGEMSWEYMCETFLVGLRVYLIKDDLSSLPEARCKWNKLYYL  
HQILKAVTLGLVINLAYFVLKPVLALVFGH

>AKD01776.1 fatty acyl-CoA reductase 15, partial [*Helicoverpa armigera*]

MGKVLIEKLLYSVPDLGCVYALVRSKRKSPETRIEEMWKLPLFQRIREEKPHVMKKLIPV  
TGDIMYDELGISADRLNDIYNEVSIVFHFAASLRLEAPLKEGLEMNTKGTLRVLTMAKKM

KKLVAFLHLSTAFCDYERMAEKVFDPPADPHEVLRAASWLTEEQLNLLAPSIYQKHPN  
SYTYSKRLAEALVRESYPELPAVVVRPSIVTPSYKEPTPGWVDNLNGPIGLMVGAGKGVIR  
SMHCYGHYHAEVIPVDIAINSIVVIAYKTGKDTQRQPEIPVYNLTGDDRNTTWKQVLDIG  
KATVRKFPPF

>AKD01772.1 fatty acyl-CoA reductase 11, partial [*Helicoverpa armigera*]

MASETMSAADLESPLDRIADTFSGMRVLVTGGTGFMGKVLLEKLLRKCPLDIGQIMLFVRN  
KKGKNPKQRLEEIFNGVLFEKVRNMRGGVEPLLQKVTLVAGDVSEPDGLSDQDRAMIV  
DQVDIIIHAAATIRFDEELKKAVLLNVRGTKLMVELAKTCKNLKLFIHISTSYCHLHEKLL  
EQAYPPPADPHHVIQAVEWMDDEAIAMLTPLKLLDKLPNSYAFTKALGEALVVEAMEHIPA  
MVLRPSIVIPWQEPVPGWTDNINGPTGLLIGAGKGVIRSMYCKSNSYADYLPVDVFINGI  
MIVAWNYLQNGDTKCNINFTSSAEIKVTWSEMIDAGREIIMNRVPLNGVVWYPGGSMKH  
SRLYHNICLVLFHWVPAVLVDILLFCLGYKPILCRVQRRINKGFEVFEYYTNNQWDFKSDI  
AQTLRQKLNPRRRDYKVDAVGLDISKYFEDCIRAARVFILKEYD

>AKD01768.1 fatty acyl-CoA reductase 7, partial [*Helicoverpa armigera*]

MAAPQLISVSDVISDNLKEKEINYCSKCIDNVNENMNTNENLQVQFYNGKNILITGA  
TGFLGKILVEKLLRCCPGVENLYLLVRQKRGKDIYTRMEEIFDDPVFSRLKDEVPKFRHKV  
VVVPADCEAAGLGLTLTDRQMLTEKVNIIHSAATVKFDEHLRAALLTNVKAPLHLLRLA  
RDMKKLDVLMHISTAYSNSHLPEIEERYYPCEADCEQLHQMIDKMSDNEINKILPKILGPW  
PNTYTFTKALAEKELRENAGGMPIGIFRPA

>AKD01766.1 fatty acyl-CoA reductase 5, partial [*Helicoverpa armigera*]

MLVDMITQNQLFEAKQGGDITFMDMVDEREALGESQIQKMFAGSSVLLTGGTGFLGKLV  
LEKLLRSCPDLLKKIYLLARPKKNKDITKRLQEQQFDDVLYDKLRKECPNFIQKIRIVEGDMG  
QLELGMCPEDRIKIMNEVDVIFHGAATVRFEPLKTAVEINVRGTREMFKLARGCTKLKA  
FVHISTAYSNCPTNIDEKFYESPLPGDKLIDMVETIDARTLDSITPGLLGDFPNTYAYTKAV  
AENIVLEYSQGLPVALFRPSIVIGTAKEPVSGWIDNVYGPTGVVVGAAGVLLHVLNCDAK  
VVADLVPGDMVVCACIAAAWRTARDSRSNHEDAPPPDLPPPVYNYVSSEKPLTWEKFM  
HYNEVYGFQVPTVQAIYYLFTITSSRFLYTLYCFLHWPAYIIDGIAVHIGKKPMLRKAY  
TKITKFSEVMAYFATREWKFDNSNTQKLYSEMCEADKHLFDMDSTMDWNDYFYNYIRG  
VRVYLLKDPVDTVPAGLKKLNRLRLHYTFCAILGLLFLRLIWAIFSGILGFSF

>AKD01765.1 fatty acyl-CoA reductase 4, partial [*Helicoverpa armigera*]

MNHTIEESPLMQTPMTQEKMDKWVDAQIKGEKIEIDVYGKPTQMLKELENVRNLSKEL  
QDNLHELETSVRIAEVENQAMNPTAEILDFSEDHEFVPDNQDTYYAEEDKMDAKEEEKQ  
KLTKGKGAKTEIQSFYKDQCFLTGGTGFLGKVLIEKLIRACGDINTIYVLARSKKGDAT  
VRLHEMMDEFLFHRAHEVNPKGHIKVVPIVGDMEPLGLGISEDRKMLTSKVTIINAAT  
VKFDEKLSVSTAINVKGTKEVLKLAKECRNLKAITHVSTAFSNTHVNHIEEKFYEPMSVE  
ALEALTEVDNKLINILPTLLGKRPNITYCFTKAIAEEAVRKYGEGLPISIVRPSIVVSTYEEP  
VRGWTDVYGPGLVVGIGTGVLRTMYMDQSKVADMVPVDLCVNAILASAWFTAKNFK  
E

>AKD01764.1 fatty acyl-CoA reductase 3, partial [*Helicoverpa armigera*]

MSVIAAARAKKSSDVQVYNCTSSAENPIIWSNVHKEYFNREMVARGKNEIPYPHVIYLSK  
PLMNIGTFILQTTPAQIADMWLKITGREPKYTETLSKVLKVRDGYEFFTANSWVMKAERA  
RELYSSLSPEDRAEFPCDVTQIVWSEYMRDYCRGILKYITPRTNGK

>ATJ44516.1 fatty acyl reductase 1 [*Helicoverpa assulta*]

MVVLTSKETKPSVAEFYAGKSVFITGGTGFLGKIFIEKLLYSCPDIGNIYMLIREKKGLSVSE

RIKQFLDDPLFTRLKDKRPADLEKIVLIPGDITAPDLGITSENEKMLIEKVSVIIHSAATVKFN  
EPLPTAWKINVEGTRMMLALSRRMKRIEVFIHISTAYTNTNREVVDAILYAPADINQVHQY  
VKDGISEEETEKILNGRPNTYTFTKALTEHLVAENQAYVPTIIVRPSVVAIKDEPIKGWLG  
NWyGATGLTVFTAKGLNRVIYGHSSYIVDLIPVDYVANLVIAAGAKSSKSTELKVYNCCSS  
ACNPITIGKLMSMFAEDAIKQKSYAMPLPGWYVFTKYKWLVLTLFQVIPAYVTDLYRH  
LIGKNPRYIKLQSLVNQTRSSIDFFTSHSWVMKADRVRELFASLSPADKYLFPDPTDINWT  
HYIQDYCWGVRHFLEKKTNNK

>ATJ44527.1 fatty acyl reductase 16 [*Helicoverpa assulta*]

MDTKIMTTDKMDDYQKHIEMLNNDLNTLNLNYEGDHINLEQPKSSEAIADFYEDSVI  
MVTGGTGFVVGKALLEKLLRSCPGIKTIYVLMRPKRGLTVDQRYKELLKNQVDFRIRARWP  
ERLGLYPITGDVSAPNLGVSPEQRELLAKVTTLFHSAATVRFTEPLHAATTLNVQGTASL  
LKLAE DMHKLKALVHVSTAYSNA PRPSIEERVYPPPYDPDSIVRCTRMLPAETVEVIAETL  
QGEHPNPYTLTKALAESIVYSHTNLPVCIVRPSIVTAALQEPYPGWIDNVYGV TGLIMEISR  
GTYRSGYSREQYVVDLVPVDLVVNSCIVA AWRQGVKRP GHCPVYNVTSGSINPIQWGQF  
TKLCVKWAIENPTKYVMWYPNFSFTESRFMNTFW EVSCHFLPAFLYDMLLRAQGRKAIM  
MKLARFRKMAAATGEYFANHEWEFGISELKALHDDVTATRDGAVFPHWSDFEWDSYIGA  
YMF GIRRYILKDTAESLPVARTKLRRLYWVHKLFQAATGYLFRFLAGRLR

>ATJ44526.1 fatty acyl reductase 12 [*Helicoverpa assulta*]

MGFLEDRLSSVPSIAEFYKGKTIFISGGSGFMGKVLVEKLLYSCPDLDRIYLLLRNKKGV  
KSEDLRAQLFSSLCFDRLLRRERPSFASKVFVIAGDVLEVGLGLSEEDRTLLVNRVNIVFHVA  
ASVRFDDPLEYAVRMNLRG TKEMVELAADM RNLC SFIHVSTSYSNTNRDPIEEILYPPHAD  
WRDTLEVCEKTDPHILKVLTPKYL GELPNTYTFSKQLAENVVAEYAGRLPVVIIRPSIVISS  
VEEPIPGWIENFNGPAGLLVACGKGIMRSLYTDPDLIADYMPVDISIKSFIVASWLRGTKELS  
PSDDVP IYNCCAGKLNNITMGEMVTIGKQIYPSVPLNDMLWHVGGDLTTSKTVHYIKVIL  
LHLLPAILVD TILWVMGRKPLL VKIQRR IYIANLALMY YITKQWTFDNKNLVLLRSKIKEV  
DRKS FYEIEIENVDKY EYFVNSVKGGK YLLKEKDEDLPKAKIHYQRMLILD TIVQILFHG  
YVFWWFLNLSFVQNFISYLF SNV

>ATJ44525.1 fatty acyl reductase 10 [*Helicoverpa assulta*]

MAPSVSVAEYYAGKTLFITGATGFMGKVMVEKMLRSCPDVKKMYLLMRPKKGHSSKER  
LDDL SFKIYDRLKAENPKIFDKLHVIPGDILSEELGISDEDRRLIQSEAQVIFHCAACVRFD  
MFLRDAVKMNTVGT KKVQLAEGVKNLEAFIHVSTSYCRCELPEEEKLYPSKHRPEHV  
MHCVSWMDDDLLTHLQPKIIEPQPNTYAYTKSLTEDLV SQYEGKFPIAIARPSIVAAAYKEP  
LPGWVDNLNGPTGLLVGAGKGVIRTMHCNDSYTADVVPVDVTVNACIILGYLTGLEQPK  
QINVVNVTQSEINPITWGQALDMGRVHVQEFPFTVCLWYPGGSPKSSRVAHQALFFTHL  
LPAYLVDMLLFLMGKKTFMIKIQRINYGLEVLQYYTTKEWFFRNDNFVALQHRISKSDN  
ETFYTDMKMDWSGYIRNYIRGAREYCKEDPATLPAARRLQTQLYYLDKAVQIMVGLL  
VSYFYVYYYFNMLYSVISS

>ATJ44524.1 fatty acyl reductase 11 [*Helicoverpa assulta*]

MVPRPAPQSSTPPLIPEFFAGREV FITGATGFMGKVLVERLLWTCRDISRLHLLLREKKDVA  
PEKRLSQLKQSQVFDVIREHCPEQLDKLSMLAGDVT KRRFGLDHHAISQLNKVSVVFHSA  
ATLKFDEPLPVALQQNVHSVVTLM DICDQLPNMQVLVHVSTAYSNAELTSVEERVYPAPA  
QLQHLSALVEALPAGLLAEITPQLISPKN TYTFTKAMAESVVAERANTANYAVAI FRPTIVI  
SSLRHPFPGWIENLNGPSGVVVGAGKG LHLVLSGSGSVRRADMMPV DIAIDTLIAVAWEAA  
NDQPGYARVYNCCSSCMDGTSWGQFRARM MRCVREYPFDSVLWYPFGVLSENTLMQRFL

ETTLQTVPLYFVHYISKLCGIKSRPSMTTVCKRLHAMNEALKFFALREWHFNTDNVQQLM  
HRLAPADAAVYNLDPGTIDWESHCEDFVKGTRKYLLREKDQDIEAARRRMHVLHMIHSL  
TKILLTLLMVRLAYRSTPAILRAVAVLTRLRRRGATVALSG

>ATJ44523.1 fatty acyl reductase 9 [*Helicoverpa assulta*]

MEADGMAQLKEVSIVFHSAAATLKFEPLRVAMEQNVRsverlleicDKLPNIQAFIHVSTA  
YSNAELTRVEERVYAPPVPLAQALTVADSVPEHLLATINAQYIAPKPNTYTFTKALAETVV  
EEHGNRGYPVAIFRPSIVISSLRHPFGWIENLNGPSGVVVGAGKGLLHVFCCRSRAGADM  
LPVDIAIDTLLAVAWETAVIDRPEHVRVYNCSTCENPTTWGDFEDALRKNLRGHPLDNTFW  
YPSGYSVENKVTQKAMETLLQTLPLHIAEYVTKLLRIKTRMSLITVSQRLKAMNEVLRFF  
SVREWHFETNNVKRLQARLTPQDAAIYNLDPQTINWDDHYENFVKGTRKYLLKEKDQDI  
QEARKHLRKMYYVHYSFLFLVTLICRLVLQNQYIRTLVFRTFKLLLTVIGSVFMRIQS

>ATJ44522.1 fatty acyl reductase 6 [*Helicoverpa assulta*]

MLVDMITQNQLFEAKQGGDITFMDMVDEREALGESQIQKMFAGSSVLLTGGTGFLGKLV  
LEKLLRSCPDLKKIYLLARPKKNKDITKRLQEQQFDDVLYDKLRKECPNFIQKIRIVEGDMG  
QLDLGMCPEDEKIMNEVDVIFHGAATVRFDEPLKTAVEINVRGTREMFKLARGCTKLKA  
FVHISTAYSNCPTNIDEKFYESPLPGDKLIDMVETIDARTLDSITPGLLGDFPNTYAYTKAV  
AENIVLEYSQGLPVALFRPSIVIGTAKEPVSGWIDNVYGPTGVVVGAAVGLLHVLNCDAK  
VVADLVPGDMVVCACIAAAWRTARDSRSNHEDAPPPDLPPPYNVVSSEQKPLTWEKFM  
HYNEVYGFQVPTVQAIYYLFTITSSRFLYTLYCFLHWPAYIIDGIAVIIGKKPMLRKAY  
TKITKFSEVMAYFATREWKFDNSNTQKLYSEMCEADKHLFDMDSTMDWNDYFYNYIRG  
VRVYLLKDPVDTVPAGLKKLNRLRLHYTFCAILGLLFLRLWAIFSGILGFSF

>ATJ44521.1 fatty acyl reductase 5 [*Helicoverpa assulta*]

MAAPQLISVSDVITDNLKNEKEINYCSQCIDNVDENMNNTNENLTEVQKFYNGKNILITG  
ATGFLGKILVEKLLRCCPGVENLYLLVRQKRKDIYTRMEEIFDDPVFSRLKDEVPKFRHK  
VVVVPADCEAAGLGLTLTDRQMLTEKVNIFHSAATVKFDEHLRAALLTNVKAPLHLLRL  
ARDMKKLDVLMHISTAYSNSHLSEIEERYYPCEADCEQLHQMIDKMSDNEINKILPKILGP  
WPNTYTFTKALAEKELRLNAGGMPIGIFRPAIVISTAKEPLKGWLDNMYGPTGVAVGSAT  
GILRTLQCDEMVSADIVPDSVNVCLMVAACSVHHSYKQSSPPLEPPIFNYVSSVENRITW  
GEFMLQNMAWIHYYPFSEAVWFISLRLTKSALMNKIYVFLHLIPAALVDGLAVCLGRKP  
KMLKVYRKIHKFSSVLSYFCTREIKFCNSRTRELWEKTSEADKQIYPFSMSEMNWEEYFQ  
HYLG GIRFLFKENDDTLPQARIKWKRLYYLHQIARFIFILAVYCLWWILSLIW

>ATJ44520.1 fatty acyl reductase 2 [*Helicoverpa assulta*]

MASETMTADLETLPDRIADTFSGMRVLVTGGTGFMGKVLLEKLLRKCPDIGQIMLFVRN  
KKGKNPKQRLEEIFNGVLFKVRNMRGGVEPLLQKVTLVAGDVSEPDLGLSDQDRAMIID  
QVDIIHAAATIRFDEELKKAVALLNVRGTKLMVELAKSCKNLKLFIHISTSYCHLHEKLLLE  
QAYPPPADPHHVIQAVEWMDDEAIAMLT PKLLDKLPNSYAFTKALGEALVVEAMEHIPAM  
VLRPSIVIPWQEPVPGWTDNINGPTGLLIGAGKG VIRSMYCKSNSYADYLPVDVFINGIMI  
VAWNYLQNGDTKCNINFTSSAEIKVTWSEMIDAGREIIMNRVPLNGVVWYPGGSMKHSR  
LYHNICLVLFHWVPAVLVDILLFCLGYKPILCRVQRRINKGFEVFEYYTNNQWDFKSDIAQ  
TLRQKLNPRERRDYKVDAVGLDISKYFEDCIRAARVFILKEYDDTLPAARRHMRVMYWV  
DVIVRCLFWGLILYWLSGFVTSPSTITEHNATVIAMDA

>ATJ44519.1 fatty acyl reductase 7 [*Helicoverpa assulta*]

MTSEVNEWYKGRSVLVTGALGLMGKVLIEKLLYSVPDLGCVYALVRSKRKSPETRIEEM  
WKLPLFQRIREEKPHVMKKLIPVTGDIMYDELGISADRLNDIYNEVSIVFHFAASLRLEAPL



KEGLEMNTKGTLRVLTMAKKMKKLVAFLHLSTAF CYPDYERMAEKVFDPPADPHEVLRA  
ASWLTEEQLNILAPSIYQKHPNSYTYSKRLAEALVRESYPELPAVVVRPSIVTPSYKEPTPG  
WVDNLNGPIGLMVGAGKGVIRSMHCYGHYHAEVIPVDIAINSIVVIAYKTGKDTQRQPEI  
PVYNLTGDDRNTTWKQVLDIGKATVRKFPFEGPLWYPDGNIRHNKFIHDL CVFFYHIVP  
AYFIDFLLFIFRQRRFMVRIQNRITIGLEVLQYFTTREWWFDTNNFKSLVGLLNPVDKETYP  
MDLTHIEDEPYIESCMIGGKLYCLKEKLENLPKARLQNHILYILDRLVSLVFYLVLLYWIVSY  
FEPARELLSYGGPAVRYLPLVGKAVFRDA

>ATJ44518.1 fatty acyl reductase 4 [*Helicoverpa assulta*]

MADESQVRAFYAGKNFFITGGTG FVGLCLIEKILRCMPDVGKIYLLMRPKKGKEISERLEE  
FPKNPVFEKLLESHSTDIFKKLIPVSGDVGEANLGLSPADRQMLIDNINVVIHSAATLDFQE  
SLRPTVNINLLGTRRIMELCKDAKDLKVMIHVSSAYVNSFLKEAHEKVYEAPEDAQKVIS  
LVETLNDESLLQIEHKLLKSHPN TYTFTKHLAEHEVIKCIDMF PCTIVRPTMIVASWKEPVP  
GWTCSKVGPQGFLMGAAGVVRRLPLAKEKVADYIPVDV VINQLLVAGWEAAKSKSGL  
TVYHCSSTCNPFTWTMLDNTVNNMLHKYPLKSAVWYPHLKFVPTLLMFRISAIFVHFFP  
AFLDLMLRVTGGRPILIRLHKNVWNSLNRLET FIFSEWKFYNPNTLELATKLSKKDKELF  
YIDITSLQWVEYFSTLHLGVRRYLNREKESSLPAARNKDMVLLVFHVIWQLFIMGLLWYIF  
AWQTGLTLATSAWIAPHIYVLYNLL

>ATJ44517.1 fatty acyl reductase 3 [*Helicoverpa assulta*]

MNHTIEESPLMQTPMTQEKM DKWVDAQIKGEKIEIDVYGKPTEQMLKELENVRNLSKEL  
QDNLHELETSVRIAEVENQAMNP TAEILDFSEDHEFVPDNQDTYYAEEDKMDAKEEEKQ  
KLTKGKGAKTEIQSFYKDQC VFLTGGTGFLGKVLIEKLIRACGDINTIYVLARSKKGKDAT  
VRLHEMMDEFLFHRAHEVNPKGIHKVVP IVGDMELPGLGISEEDRKMLTSKVTIINAAT  
VKFDEKLSVSTAINVKGTKEVLKLAK ECRNLKAITHVSTAFSNTHVNHIEEKFYDPPMSVE  
ALEALTEVDNKL IENILPTLLGKRPNTYCF TKAIAEEAVRKYGEGLPISIVRPSIVVSTYEEP  
VRGWTD SVYGPTGLVVGIGTGVLRTMYMDQSKVADMVPVDLCVNAILASAWFTAKNFK  
ENQTSHIPIYNFVSGAQKPITWGDFIERNRKYGIDKPTTKAVWYYGLNPTNNYYLFLFYNF  
FLHYLPALMIDTYCAITGKRRAMIKLYNKVMKLANILFYFSTQDWQFSDYNVRNMWKS L  
SDEDRVVPF SIGEMSWEYMCETFLVGLRVYLIKDDLSSLPEAR KKWKNKLYYLHQILKAV  
TLGLVINLAYFVLKPVLALVFGH

>ATJ44471.1 fatty acyl reductase 1 [*Helicoverpa armigera*]

MVVLTSKETKPSVAEFYAGKSVFITGGTGFLGKV FIEKLLYSCPDIGNIYMLIREKKGLSVS  
ERIKQFLDDPLFTRLKEKRPADLEKIVLIPGDITAPDLGITSENEKILIEKVS VIIHSAATVKFN  
EPLPTAWKINVEGTRMMLALSRRMKRIE VFIIHISTAYTNTNREV VDEILYPAPADIDQVHQY  
VKDGISEEETEKILNGRPNTY TFTKALTEHLVAENQAYVPTIIVRPSVVA AIKDEPIKGWLG  
NWyGATGLTVFTAKGLNRVIYGHSSNIVDLIPVDYVANLVIAAGAKSSKSTDLKVYNCCSS  
ACNPITIGKLMSMFAEDAIKQKSYAMPLPGWYIFTKYKWLVL LLTILFQVIPAYITDLYRH LI  
GKNPRYIKLQSLVNQTRSSIDFFTSHSWVMKADRVREL FASLSPADKYLFPCDPTDINWTH  
YIQDYCWGVRHFLEKKTNK

>ATJ44472.1 fatty acyl reductase 8 [*Helicoverpa armigera*]

MSSPSIRDFYKGRN ILVTGGTGFMGKV LIEKLLYSVPEVGNIYILMRPKRGKSVSQRTEDL  
QRLKLFERLR TENPNALKKLKPLQGDV LFDNLGLSDADIELLTKEVS VVFHFAATLRLEAP  
LKDNVNMNTCGTQRAIDLAKRMKKLQIFVHLSTAF CYPDYEVLGEKCHAPPVKPDNVM  
KLIEWLDDKQVDLLTPSLLGHPN CYTFSKRLAENIVEQAYQDLPIVIARPSIVCPSVKEPM  
PGWVDNLNGPVGVM LGAGKGVIRTMLCDGSLVAQVIPVDIAINAI IAGMIEGSRTEKPES

LPVYNVNNGHQKPTTWGDVLSVAKAYGRKYPLSWPLWYPNGDITTNPILHEYKRICYHL  
VPAYLIDFLLFLLGQKRLMIRIQUERISRGLEVLQYFTMRPWNFPCPNYDAVREKLNPEEQAI  
FNTDIKDVDREYMKICIEGGRVFCFKEDPTKVPMNRAYHNFLYVLDWFWVKIMFWLFFVS  
VLASWFSPVKSLSLGEPPVKHLPFLGKVIEKQD

>ATJ44470.1 fatty acyl reductase 15 [*Helicoverpa armigera*]

MGFLEERDLSGVPTIPDFYKGKTIFVTGGSGFIGKVLIEKLLYSCTDLDRIYLLLRNKKGVK  
SEDRLAELYAAPCFQRLKAERPGVFESKVFVVSNGVMEAGLGLSQEDRALLVNRVNVIFH  
VAASVRFDDTLKYSTQLNLRGTVEVMELAKEMRELCSLVHVSTSYANTNRDTIEEVLYPP  
LADWRETLAICEKADEHTLKILTPKFLGELPNTYTFTKQLAEHVVNEYKQQLPIIIVRPSIVI  
SSIDEPIPGWIESFNGPVGIFVACGKGIMRTIHTKADIKSDFMPVDVCVKNIAGAWIRGTKI  
MDPTDDIEIYNCCSGNLHPILMGDLIAMSQVAKDVPLDNMVWYMGGTITASEKYHYVK  
VLLQHLLPAMLIDTLLWLFGKKPMLVKIQRRIYIANLALRYTTQQWTFNTNFTKLRSVI  
KLEDIEQFYFELESTNVVEYFKQCCLGGRRFLLKEKDEDIPKARLHCQRMVVDRIQIA  
FYTVLIWWVCSKIVKVFNLSNIF

>ATJ44469.1 fatty acyl reductase 12 [*Helicoverpa armigera*]

MGFLEDRLSSVPSIAEFYKGKTIFISGGSGFMGKVLVEKLLYSCPDLRIYLLLRNKKGV  
KSEDRLAQLLSSLCFDRLLRRERPSFASKVFVIAGDVLEVGLGLSEEDRTLLVNRVNVIFHVA  
ASVRFDDPLEYAVRMNLRGTEKEMVELAADMRNLCSFIHVSTSYSNTNRDPIEEILYPPHAD  
WRDTLEVCEKTDPHILKVLTTPKYLGEPLNTYTFSKQLAENVVAEYAGKLPVVIIRPSIVISS  
VEEPVPGWIENFNGPAGLLVACGKGIMRSYTDPLDIADYMPVDISIKSFIVASWLRGTKE  
SPSDDVPINCCAGKLNITMGEMVTIGKQIYPSIPLNDMLWHVGGDLTTSKTVHYIKVIL  
LHLLPAILVDTLWAMGRKPLLVKIQRRIYIANLALMYITKQWTFDNKNLVLLRSKIKEV  
DRKSFYIEIENVDKYEYFVNSVKGKKYLLKEKDEDLPRAKIHYQRMLILDMTMVQILFH  
GYVFWWFLHLSFVQNFISYLSNV

>ATJ44468.1 fatty acyl reductase 13 [*Helicoverpa armigera*]

METEAMDPAQEFVAKVHARQKPVLEAIARWDSVPVQQFYENTTVFITGGSGFLGKQLIEKL  
FRATKISKILLLRSKKGKPIEQRLDMLQDPVFDVAVKELHPNFAEKIIPVAGDVAEMKLGL  
SEKDOWNLVADETDIFMHVAATTRFDEPLKIATLINVRGAREALLGKACKKLKSYVHVST  
AYSHACENMINTEVLEDFYKSPIDPETLIQLAETLDEEKLNEISSGLIKNWPNTYSFGKAVA  
EETVRSMAEGLPLCIVRPAIVIVAHKEPTPGWLDMSNVYGASGVVLGPGIGLMHTIMADN  
DVNIGLVPVDYVNNAIIVSAYETYKKVQKGETKPKIYTVTTSTRNPTRWGWLVDFTGYI  
AKQYPSPSAIAFAWGTNNPTVFWLYSWLLHFIPAYVIDAVCFVLGKERRFVKIYTKMFK  
MSMALSFTVNDWRFIDDNTAALYDGLSTIDKTIFNFDVTQLQWTEYMWLVWCLGLRKFI  
VKDGLKGSVYAVKKQFFFFKILFCVLPAYLFLLYKVVFVAVSSLYLVLRFF

>ATJ44467.1 fatty acyl reductase 14 [*Helicoverpa armigera*]

MASCLSGGHYVPGSQEYVPVAEFYADKSVFVTGGTGFMGKVLVEKLLRSCPKIKKIYLLM  
RPRKGQDVASRLTELTQSPLFETLRRERPQELNKIVPIVGDITEPELGISAADQTMCLCQKVS  
VVFHSAATVKFDEKLLSVTINMLGTQQLVQLCHRMLSLEALVHVSTAYCNCERERVEET  
VYAPPAHPEHVTLVQTLDELVDRIPTDLVGDRPNTYTFTKALAEDMLIKESGNLPVSIV  
RPSIVLSSLREPVKGWVDNWNNGPNGIIAAVGKGIFRTMLGTGTVADLVPVDTVINLMIVC  
AWRTHLRRGEGVVVYNCCTGQQNPITWQRFVKTSFKYMRKHFPNEVLWYPGGDITSNR  
LKHGTLSSLQHRAPAALMDLVSTATGKKPMMVRVQNKLEKAAACLEFYFTTRQWAFADD  
NVQALCASLSPDDRRTDFDNVRNIDWDAYIESYVLGIRRFLEKESPDTPKSRVLRRLHIV  
HILTQVATVFFLWRFLFSRSNALRNWRRVLELLTRAARLLAIA

>ATJ44466.1 fatty acyl reductase 11, partial [*Helicoverpa armigera*]

MVPRPAPQSSTPPLIPEFFAGREVFITGATGFMGKVLVERLLWTCRDISRLHLLLREKKDVA  
PEKRLSQLKQSQVFDVIRQHCPKQLDKLSMLAGDVTKRRFGLDHHAISQLNQSVVFHS  
AATLKFDEPLPVALQQNVHVVTLMDICDQLPNMQVLVHVSTAYSNAELTSVEERVYPAP  
AQLQQLSALVEALPAGLLAEITPQLISPKPNTYTFTKAMAESVVAERANTANYAVAIFRPTI  
VISSLRHPFPGWIENLNGPSGVVVGAGKGKLLHVLSCGAVRRADMMMPVDIAIDTLIAVAWE  
AANDQPGYARVYNCSSCMDGTSWGQFRARMRCVREYPPFDGVLWYPPFGVLSENTLMQ  
RFLETTLQTVPLYFVHYVSKLCGIKSRPSMTTVSKRLHAMNEALKFFALREWHFNTDNVQ  
QLMHR LAPADA AVYNLDPGTIDWESHCEDFVKGTRKYLLREKDQDI

>ATJ44465.1 fatty acyl reductase 10 [*Helicoverpa armigera*]

MAPSVSVAEYYAGKTLFITGATGFMGKMVEKMLRSCPDVKKMYLLMRPKKGHSSKER  
LDDLFSKIFDRLKAENPKIFDKLHVIPGDILSEDLGISDEDRRLIQNEAQVIFHCAACVRFD  
MFLRDAVKMNTVGTKKVLQLAEGVKNLEAFIHVSTSYCRCELPEEEKLYPSKHRPEHV  
MHCVSWMDDDLLTHLQPKIIEQPNTYAYTKSLTEDLVSYQYEGKFPIAIARPSIVAAAYKEP  
LPGWVDNLNGPTGLLVGAGKGVIRTMHCNDSYTADVVPVDVTVNACIILGYLTGLEQPK  
QINVVNVTQSEINPITWGQALDMGRVHVQEFPFTVCLWYPPGGSPKSSRLAHQLALFFTHL  
LPAYLVDMLMFLMGKKTFFMINLQKRISHGLNVLYYYTTKEWHFRNDNYKSLRTRITSQE  
NDTFYTDPSQLDPDEYLKNYVLGTRQFCCKEDPANLPRARKLHKIRYIADRFIKALFIILIL  
WTLYSHSQFTSSVELLDSTLKSIPPISTAAQEAYDIQP

>ATJ44464.1 fatty acyl reductase 7 [*Helicoverpa armigera*]

MTSEVNEWYKGRSVLVTGALGLMGKVLIEKLLYSVPDLGCVYALVRSKRGKSPETRIEEM  
WKLPLFQRIREEKPHVMKKLIPVTGDIMYDELGISADRLNDIYNEVSIVFHFAASLRLEAPL  
KEGLEMNTKGTLRVLTMAKKMKKLVAFLHLSTAFICYPDYERMAEKVFDPPADPHEVLRA  
ASWLTEEQLNLLAPSIYQKHPNSYTYSKRLAEALVRESYPELPAVVVRPSIVTPSYKEPTPG  
WVDNLNGPIGLMVGAGKGVIRSMHCYGHYHAEVIPVDIAINSIVVIAYKTGKDTQRQPEI  
PVYNLTGDDRNTTWKQVLDIGKATVRKFPFEGPLWYPDGNIRHNKFIHDLCVFFYHIVP  
AYFIDFLLFIFRQRRFMVRIQNRITIGLEVLYQYFTTREWTFDNNFKSLVGLLNPVDKETYP  
MDLTHIEDEPYIESCMIGGKLYCLKEKLENLPKARLQNHILYILDRLVSLVLYLVLLYWIVSY  
FEPARELLSYGGPAVRYLPLVGKAVFRDA

>ATJ44463.1 fatty acyl reductase 5 [*Helicoverpa armigera*]

MAAPQLISVSDVISDNLKNEKEINYCSKCIDNVNENMNTNENLTVQKFYNGKNILITGA  
TGFLGKILVEKLLRCCPGVENLYLLVRQKRGKDIYTRMEEIFDDPVFSRLKDEVPKFRHKV  
VVVPADCEAAGLGLTLTDRQMLTEKVNIIFHSAATVKFDEHLRAALLTNVKAPLHLLRLA  
RDMKKLDVLMHISTAYSNSHLPEIEERYYPCEADCEQLHQMIDKMSDNEINKILPKILGPW  
PNTYTFTKALAEKELRENAGGMPIGIFRPAIVISTAKEPLKGWLDNMYGPTGVAVGSATGI  
LRTLQCEDEMVSA DIVPVDSVVNCLMVAACSVHHSYKQSSPPLEPPIFNYVSSVENRITWGE  
FMLQNM AWIHYYPFSEAVWFISRLTKSALMNKIYVFLHLIPAALVDGLAVCLGRKPKM  
LKVYRKIHKFSSVLSYFCTREIKFCNSRTRELWEKTSEADKQIYPFSMSEMNWEEYFQHYL  
GGIRRFLFKESDDTLPQARIKWKRLYYLHQIARFIFFILAVYCLWWILSLIW

>ATJ44461.1 fatty acyl reductase 3 [*Helicoverpa armigera*]

MMDEFLFHRAHEVNPKGIHKVVPIVGDMEPLGLGISEEDRKMLTSKVTHIINAAATVKFDE  
KLSVSTAINVKGTEVLKLAKECRNLKAITHVSTAFSNTHVNHIEERFYEPMSVEALEAL  
TEVDNKLIESILPTLLGKRPNTYCFTKAIAEEAVRKYGEGLPISIVRPSIVVSTYEEPVRGWT  
DSVYGPTGLVVGIGTGVLRTMYMDQSKVADMVPVDLCVNAILASAWFTAKNFKENQTS

HIPIYNFVSGAQKPITWGDIFIERNRKYGIDKPTTKAVWYYGLNPTNNYYLFLFYNNFFLHYL  
PALMIDTYCAITGKRRAMIKLYNKVMKLANILFYFSTQDWQFSDYNVRNMWKSLSDEDR  
VVPFSGIGEMSWEYMCETFLVGLRVYLIKDDLSSLPEARKKWNKLYYLHQILKAVTLGLVI  
NLAYFVLKPVLAALVFGH

>ATJ44460.1 fatty acyl reductase 6 [*Helicoverpa armigera*]

MLVDMITQNQLFEAKQGGDITFMDMVDEREALGESQIQKMFAGSSVLLTGGTGFLGKLV  
LEKLLRSCPDLLKKIYLLARPKKNKDITKRLQEQQFDDVLYDKLRKECPNFIQKIRIVEGDMG  
QLELGMCPEDRIKIMNEVDVIFHGAATVRFDEPLKTAVEINVRGTREMFKLARGCTKLKA  
FVHISTAYSNCPTNIDEKFYESPLPGDKLIDMVETIDARTLDSITPGLLGDFPNTYAYTKAV  
AENIVLEYSQGLPVALFRPSIVIGTAKEPVSGWIDNVYGPTGVVVGAAGVLLHVLNCDKAK  
VVADLVPGDMVVCACIAAAWRTARDSRSNHEDAPPPDLPPPYNVVSSEQKPLTWEKFM  
HYNEVYGFQVPTVQAIYYLFTITSSRFLYTLYCFLHWPAYIIDGIAVIIGKKPMLRKAY  
TKITKFSEVMAYFATREWKFDNSNTQKLYSEMCEADKHLFDMDSTMDWNDYFYNYIRG  
VRVYLLKDPVDTVPAGLKKLNRLRLHYTFCAILGLLFLRLIWAIFSGILGFSF

>ATJ44459.1 fatty acyl reductase 4 [*Helicoverpa armigera*]

MADESQVRAFYAGKNFFITGGTGFGVGLCLIEKILRCMPDVGKIYLLMRPKKGKEISERLEE  
FPKNPVFEKLLSHSTDIFKKLIPVSGDVGEANLGLSPADRQMLIDNINVVIHSAATLDFQE  
SLRPTVNINLLGTRRIMELCKDAKDLKVMIHVSSAYVNSFLTEAHEKVYEAPEDAQKVISL  
VETLNDESLQIEHKLLKSHPNYTYFTKHLAEHEVIKCIDMFPCITVRPTMIVASWKEPIPG  
WTCSKVGPPQGLMGAAGGVVRRPLAKEKVADYIPVDVVINQLLVAGWEAAKSKSGLT  
VYHCSSTCNPFTWTMLDNTVNNMLHKYPLKSAVWYPHLKFVPTLLMFRISAIHVHFFPA  
FLDLMLRVTGGRPILIRLHKNVWNSLNRLERFIFSEWKFYNPNTLELATKLSKKDKELFY  
IDVTSLQWVEYFSTLHLGVERRYLNKEKESSLPAARNKDMVLLVFHVWQLFIMGLLWYIF  
AWQTGLTLATSAWIPIHYVLYNLL

>ATJ44458.1 fatty acyl reductase 2 [*Helicoverpa armigera*]

MASETMTADLESPLDRIADTFSGMRVLVTGGTGFMGKVLLEKLLRKCPCDIGQIMLFVRN  
KKGKNPKQRLEEIFNGVLFKVRTMRGGVEPLLQKVTLVAGDVSEPDLGLSDQDRAMIID  
QVDIIHAAATIRFDEELKKAVLLNVRGTKLMVELAKTCKNLKLFIHISTSYCHLHEKLLLE  
QAYPPPADPHHVIQAVEWMDDEAIAMLTPLKLLDKLPNSYAFTKALGEALVVEAMEHIPAM  
VLRPSIVIPWQEPVPGWTDNINGPTGLLIGAGKGVIRSMYCKSNSYADYLPVDVFINGIMI  
VAWNYLQNGDTKCNINFTSSAEIKVTWSEMIDAGREIIMNRVPLNGVVWYPGGSMKHSR  
LYHNICLVLFHWVPAVLVDILLFCLGYKPILCRVQRRINKGFEVFEYYTNNQWDFKSDIAQ  
TLRQKLNPRERRDYKVDAVGLDISKYFEDCIRAARVFILKEYDDTLPAARRHMRVMYVW  
DVIVRCLFWGLILYWLSGFVTSPSTVTEHNATVIAMDA

>ATJ44462.1 fatty acyl reductase 9, partial [*Helicoverpa armigera*]

MRKNLRGHPLDNTFWYPSGYSVENKVTQKAMETLLQTLPLHIAEYVTKLLRIKTRMSLIT  
VSQRLKAMNEVLRFFSVREWHFETNNVKRLQARLTPQDAAIYNLDPQTINWDDHYENFV  
KGTRKYLLKEKDQDIQEARKHLRKMYYVHYG

> fatty acyl reductase 1 [*Helicoverpa zea*]

MVVLTSKETKPSVAEFYAGKSVFITGGTGFLGKVFIKLLYSCPDIGNIYMLIREKKGLSVS  
ERIKQFLDDPLFTRLKEKRPADLEKIVLIPGDITAPDLGITSENEKMLIEKVSVIIIHSAATVKF  
NEPLPTAWKINVEGTRMMLALSRRMKRIEVFIHISTAYTNTNREVVDAILYAPADINQVHQ  
YVKDGISEEDTEKILNGRPNTYFTFKALTEHLVAENQAYVPTIIVRPSVVAIAIKDEPIKGWL  
GNWYGATGLTVFTAKGLNRVIYGHSSYIVDLIPVDYVANLVIAAGAKSSKSTELKVYNCCS

SACNPITIGKLMSMFAEDAIKQKSYAMPLPGWYIFTKYKWLVLTLMLFQVIPAYITDLYR  
HLIGKNPRYIKLQSLVNQTRSSIDFFTSHSWVMKADRVRELFASLSPADKYLFPCDPTDIN  
WTHYIQDYCWGVRHFLEKKSTNK

> fatty acyl reductase 2 [*Helicoverpa zea*]

MTSEVNEWYKGRSVLVTGALGLMGKVLIEKLLYSVPDLGCVYALVRSKRGKSPETRIEEM  
WKLPLFQRIREEKPHVMKKLIPVTGDIMYDELGISADRLNDIYNEVSIVFHFAASLRLEAPL  
KEGLEMNTKGTLRVLTMAKKMKKLVAFLHLSTAFCCYDPDYERMAEKVFDPPADPHEVLRA  
ASWLTEEQLNLLAPSIYQKHPNSYTYSKRLAEALVRESYPELPAVVVRPSIVTPSYKEPTPG  
WVDNLNGPIGLMVGAGKGVIRSMHCYGHYHAEVIPVDIAINSIVVIAYKTGKDTQRQPEI  
PVYNLTGDDRNTTWKQVLDIGKATVRKFPFEGPLWYPDGNIRHNKFIHDLCVFFYHIVP  
AYFIDFLFIFRQRRFMVRIQNRITIGLEVLYQYFTTREWWFDNNSFKSLVGLLNPVDKETYP  
MDLTHIEDEPYIESCMIGGKLYCLKEKLENLPKARLQNHILYILDRVSLVLYLVLLYWIVSY  
FEPARELLSYGGPAVRYLPLVGKAVFRDA

> fatty acyl reductase 3 [*Helicoverpa zea*]

NTYSYTKAITEDLVDEYSGKFPVAIARPSIVTAVWKEPIPGWVDNLNGPTGLVIGSGKGVIR  
TMHCEPSYKADAISVDVVANACILIGYVTALDKPKETQVYNLTLSGVINLTWAEIQLGEK  
WVNEFPYSVALWYPGGSIKSYRLAHQLDVFLSHVVPAYLVDALLFLLGKKTFMINLQKRI  
SHGLNLVQYYTTKEWHFRNDNYKSLRTRITSQENDTFYTDPSQLDPDEYLKNYVLGTRQ  
FCKKEDPANLPRARKLHKIRYIADRFIKALFIVLVLTLYSHSQTLTSSVELLDSTLKSIPPIS  
TAAQEAYDIQP

> fatty acyl reductase 4 [*Helicoverpa zea*]

MSSPSIRDFYKGRNLTGTTGTFMGKVLIEKLLYSVPEVGNIYILMRPKRGKSVSQRTEDL  
QRLKLFERLRTENPNALKKLKPLQGDVLFNLGLSDADIELLTKEVSVVFHFAATLRLEAP  
LKDNVNMNTCGTQRAIDLAKRMKKLQIFVHLSTAFCCYDPDYEVLEKCHAPPVKPDNVM  
KLIEWLDDKQVDLLTPSLLGPHPNCTYFSKRLAENIVEQAYQDLPVIARPSIVCPSVKEPM  
PGWVDNLNGPVGVMGAGKGVIRTMLCDGSLVAQVIPVDIAINAIHAIAGMIEGSRTEKPES  
LPVYNVNNGHQKPTTWGDVLSVAKAYGRKYPLSWPLWYPNGDITNPILHEYKRIFYHL  
VPAYLIDFLLFLLGQKRLMIRIQUERISRGLEVLYQYFTMRPWNFPCPNYDAVREKLNPEEQAI  
FNTDIKDVRDEYMKICIEGGRVFCFKEDPNKVPNMNRAYHNFLYVLDWFWKIMFWLWV  
SVLACWFSVPKSLFSLGEPVVKHPLPFLGKLVIEKQD

> fatty acyl reductase 5 [*Helicoverpa zea*]

MASETMSAADLESPLDRIADTFSGMRVLVTGGTGMGKVLLEKLLRKCPDIGQIMLFVRN  
KKGKNPKQRLEEIFNGVLFKVRNMRGGVEPLLQKVTLVAGDVSEPDLGLSDQDRAMIID  
QVDIIHAAATIRFDEELKKAVLLNVRGTKLMVELAKTCKNLKLFIHISTSYCHLHEKLLLE  
QAYPPPADPDHVIQAVEWMDDEAIAMLTPLKLLDKLPNSYAFTKALGEALVVEAMEHIPAM  
VLRPSIVIPWQEPVPGWTDNINGPTGLLIGAGKGVIRSMYCKSNSYADYLPVDVFINGIMI  
VAWNYLQNGDTKCNINFTSSAEIKVTWSEMIAGREIIMNRVPLNGVVWYPGGSMKHSR  
LYHNICLVLFHWVPAVLVDILLFCLGYKPILCRVQRRINKGFEVFEYYTNNQWDFKSDIAQ  
TLRQKLNPRERRDYKVDAVGLDISKYFEDCIRAARVFILKEYDDTLPAARRHMRVMYWW  
DVIVRCLFWGLILYWLSGFVTSPSTITEHNATVIAMDA

> fatty acyl reductase 6 [*Helicoverpa zea*]

KDNETTTSITHHSSVPEFYAGKSVFITGGTGLGKVFLEKLLYSCKDIVTIYVLIRDKKGKS  
AQQRIEELVNKPLFTRLRSEPHDLKKLVVVGDTSLPNLGISTEEDIEILQKVTAVFHVA  
NVKFHEELEIPVNTNIRGTSLVLDLCRRMENLEVHVHISTVFCHTSQKILEEKLYPPPAELSE

VFKYLEQSNQDRRQLKTLNQGPNQTYTFTKALAETYVAENHGNIPTVIVRPAIVTGSLEKPE  
LPGWVDHWLGATGLFAATAKGANRVLLGNPNYNLDLIPVDYVANLAIVAATRCRTDEVSI  
YNCCTSSCNPIPEGKIYEYLQIVCKNNGFDIPRLIFTENKLILSIQTFLQTTPAYFMDLVRRV  
RGKKPMYMKIQSQVSVRNVLNYFTSRSWEMKADRTRELHASLSSDRLQFPCDPCHID  
WEDYTNVYLKGIEQFLMVRK

> fatty acyl reductase 7 [*Helicoverpa zea*]

LHSADHYIPVDVVINQLLVAGWEAAKSKSGLTVYHCSSTCNPFWTMLDNTVNNMLHK  
YPLKSAVWYPHLKFVPTLLMFRISAIFVHFFPAFLDLMLRVTGGRPILRLHKNVWNSLN  
RLERFIFSEWKFYNPNTLELSTKLSKKDKELFYIDVTSLQWVEYFSTLHLGVRRYLNKEKE  
SSLPAARNKDMVLLVFHVIWQLFIMGLLWYIFAWQTGLTLATSAWIPIIYVLYNLL

> fatty acyl reductase 8 [*Helicoverpa zea*]

MGFLEDLDLSSVPSIAEFYKGTIFISGGSGFMGKVLVEKLLYSCPDLDRIYLLLRNKKGV  
KSEDLRAQLLSSLCFDRRLRRERPSFASKVFVIAGDVLEVGLGLSEEDRTLLVNRVNIVFHV  
ASVRFDDPLEYAVRMNLRGTKEMVELAADMNRNLCSEFHVSTSYNTNRDPIEEILYPPHAD  
WRDTLDVCEKTDPHILKVLTPKYLGEPLNTYTFSKQLAENVVAEYAGKLPVVIIRPSIVISS  
VEEPVPGWIENFNGPAGLLVACGKGIMRSYTDPLDIADYMPVDISIKSFIVASWLRGTKE  
SPSDDVPIYNCCAGKLNITMGEMVTIGRQIYPSVPLNDMLWHVGGDLTTSKTV

> fatty acyl reductase 9 [*Helicoverpa zea*]

CYAADIELAFYRVNYICRNVNYERLEEMLKDPVYNMVRKKKSNFAEKIIPVAGNVADIRL  
GMSDQDWAIVTKEVNVIFHMAATTRFDEALKIATMINVRGTREAVLLGKACQKLKSFVY  
VSTTYANATDNFVEKEVLETFYPPVPPELMISMAETIDEDRLQGIEHDLIKGYPNQTYTFAK  
AIAEEVVRSRAGNMPISIVRPAVVISSYREPMGWADTSCAYGASGLILGPATGLIHATYAG  
DNTRYSLVPVDYVNNAILAAGWKTSSMPGDVKIYSVSSARNLFHWQPVSTKIREIGRVLP  
TPLAVWYMFINTANKPLFVLLTWLLHYIPGYILDGGCVLLGKPPMFIKLYNRVYRASLAL  
SYFTTHSWLFRDDNTDKLFQDLSTEDKLIFNFDTTNINIMEYVTLWCVGLRKLYMKDGIK  
NTEYAIKKQFWLQKLHYIVAALYVYVLYKICSYVLFVVLFFGWV

> fatty acyl reductase 10 [*Helicoverpa zea*]

MAAPQLISVSDVISDNLKNEKEINYCSKCIDNVNENMNTNENLTVQKFYNGKNILITGA  
TGFLGKILVEKLLRCCPGVENLYLLVRQKRKDIYTRMEEIFDDPVFSRLKDEVPKFRHKV  
VVVPADCEAAGLGLTLTDRQMLTEKVNIFHSAATVKFDEHLRAALLTNVKAPRLRLRLA  
RDMKKLDVLMHISTAYSNSHLPEIEERYYPCEADCEQLHQMIDKMSDNEINKILPKILGPW  
PNTYTFTKALAEKELRENAGGMPIGIFRPAIVISTAKEPLKGWLDNMYGPTGVAVGSATGI  
LRTLQCDDEMVSADIVPVDSVVNCLMVAACSVHHSYKQSSPPLEPIFNYSVENRITWGE  
FMLQNMAWIHYYPFSEAVWFISRLRLTKSALMNKIYVFLHLIPAALVDGLAVCLGRKPKM  
LKVYRKIHKFSSVLSYFCTREIKFCNSRTRELWEKTSEADKQIYPFSMSEMNVVEEYFQHYL  
GGIRRFLFKESDDTLQARIKWKRLLYHLQIARFIFILAVYCLWWILSLIW

> fatty acyl reductase 11 [*Helicoverpa zea*]

CRKFVKMADESQVRAFYAGKNFFITGGTGFVGLCLIEKILRCMPDVGKIYLLMRPKKGKE  
ISERLEEFKPNPVFEKLLSHSTDIFKKLIPVSGDVGEANLGLSPADRQMLIDNINVVIHSAA  
TLDFQESLRPTVNINLLGTRRIMELCKDAKDLKVMIHVSSAYVNSFLTEAHEKVYEAPED  
AQKVISLVETLNDESLLQIEHKLLKSHPNQTYTFTKHLAEHEVIKCIDMFCTIVRPTMIVAS  
WKEPIPGWTCSEKVGPGQFLMGAAKGVVRRPLAKEKVADYIPDRKSTRLNSSH

> fatty acyl reductase 12 [*Helicoverpa zea*]

LMIRPPRSTRSEFYSPTIKPQLGMEADGMAQLKEVSIVFHSAATLKFDEPLRVAMEQNVR  
SVERLLEICDKLPNIQAFIHVSTAYSNAELTRVEERVYAPPVPLAQALTVADSVPEHLLATIN  
AQYIAPKPNTYTFTKALAE TVVEEHGNGRGPVAIFRPSIVISSLRHPFPGWIENLNGPSGVV  
VGAGKGLLHVFCRSRAGADM L PVDIAIDTLLAVAWETA VDRPEHVRVYNCSTCENPTT  
WGDFEDALRKNLRGHPLDN TFWYPSGYSVENKVTQKAMETLLQTLPLHIAEYVTKLLRI  
KTRMSLITVSQRLKAMNEVLRFFSVREWHFETNNVKRLQARLTPQDAAIYNLDPQTINW  
DDHYENFVKGTRKYLLKEKDQDIQEARKHLRKMYYVHYGFLFFVVTLICRLMLQNHYIR  
TLVFRTFKLLLTVIGSVFMRIQS

> fatty acyl reductase 13 [*Helicoverpa zea*]

MAPSVSVAEYYAGKTLFITGATGFMGKVMVEKMLRSCPDVKKMYLLMRPKKGHSSKER  
LDDLLSFKIFDRLKAENPKIFDKLHVIPGDILSEDLGISDEDRCLIQSEAQVIFHCAACVRFD  
MFLRDAVKMNTVGTKKVLQLAEGVKNLEAFIHVSTSYCRCELPEEEKLYPSKHRPEHV  
MHCVSWMDDDLLTHLQPKIIEPQNTYAYTKSLTEDLVSQYEGKFPIAIARPSIVAAAYKEP  
LPGWVDNLNGPTGLLVGAGKGVIRTMHCNDSYADVPVDVTVNACIILGYLTGLEQPK  
QINVVNVTQSEINPITWGGQALDMGRVHVQEFPTVCLWYPGGSPKSSRLAHQLALFFTHL  
LPAYLVDMLMFLMGKKTFMIKIQKRINYLEVLQYYTTKEWFFRNDNFVALQHRISKSDN  
ETFYTDMDKDMDWSGYIRNYIRGAREYCKEDPATLPAARRLQTQLYYLDKAVQIMVGLL  
VSYFIYYYYFNMLYSVISS

> fatty acyl reductase 14 [*Helicoverpa zea*]

MNHTVEESPLMQTPMTQEKM DKWVDAQIKGEKIEIDVYGKPTEQMLKELENVRNLSKE  
LQDNLHELETSVRIAEVENQAMNP TAEILDFSEDHEFVPDNQDTYYAEEDKMDAKEEEKQ  
KLTKGKGAKTEIQSFYKDQCVFLTGGTGFLGKVLIEKLIRACGDINTIYVLARSKKGKDAT  
VRLHEMMDEFLFHRAHEVNPKGIHKVVPVIGDMELPGLGISEDRKMLTSKVTIINAAAT  
VKFDEKLSVSTAINVKGTKEVLKLAKECRN LKAITHVSTAFSNTHVNHIEEFYEP PMSVE  
ALEALTEVDNKL IENILPTLLGKRPNTYCFTKAIAEEAVRKYGEGLPISIVRPSIVVSTYEPP  
VRGWTD SVYGPTGLVVGIGTGVLRTMYMDQSKVADMVPVDLCVNAILASAWFTAKNFK  
ENQTSHIPIYNFVSGAQKPITWGD FIERNRKYGIDKPTTKAVWYYGLNPTNNYYLFLFYNF  
FLHYLPALMIDTYCAITGKRRAMIKLYNKVMKLANILFYFSTQDWQFSDYNVRNMWKS L  
SDEDRVVPF SIGEMSWEYMCETFLVGLRVYLIKDDLSSLPEARKKWNKLYYLHQILKAV  
TLGLVINLAYFVLKPVLALIFGH

> fatty acyl reductase 15 [*Helicoverpa zea*]

MGQLDLGMC PEDRIKIMNEVDVIFHGAATVRFDEPLKTAVEINVRGTREMFKLARGCTKL  
KAFVHISTAYSNC PQTNIDEKFYESPLPGDKLIDMVETIDARTLDSITPGLLGDFPNTYAYTK  
AVAENIVLEYSQGLPVALFRPSIVIGTAKEPVSGWIDNVYGPTGVVVGAAVGLLHVLNCDA  
KVVADLVP GDMVVCACIAAAWRTARDSRSNHEDAPPPDLPPP VYNYVSSEQKPLTWEKF  
MHYNEVYGFQVPTVQAIYYLFTITSSRFLYTLYCFL LHWVPAYIIDGIAVIIGKKPMLRKA  
YTKITKFSEVMAYFATREWKFDNSNTQKLYSEMCEADKHLFD FDMSTMDWNDYFYNYIR  
GVRVYLLKDPVDTPAGLK KLNRLRLHYTFCAILGLLFLRL LWAIFSGILGFSF

> fatty acyl reductase 16 [*Helicoverpa zea*]

TRNFIYVSTAFSHATYDRVNTEVL DQFYPCPVQPETIIGMAESMEEDRLNSIAEDLIVGWP N  
TYTFTKAIAEELVRTYDPDL PVCVVRPPIVTPTYEPTPGWMDLSALSGPTGVLAGIIMGF  
LHIFYVDKDCKLPLTPVDYVNNATIAAAWDADLKRKSGNKDIQVYTVSNNDHFITWDFIG  
VILRSEGKKSPSPKAVWYCWLMETNSKFVFWVISFFVHYIPAYIMDLVGGILGNMPKEINS

FVAVFRKIDKFALIYHYFLSNEWFFKDHNVQEMVSRMSPADKAIFNCDLRTIDFTEYVMIW  
GIGIRKYLKDELKDESELAYRKQQKLKIANIFFISLNVIVVLSLLYQLFKVVIWLF

> fatty acyl reductase 17 [*Helicoverpa zea*]

QSADPVAWETATQRQETRSVRVYNVCSQENRVSWRILYYPTLIAVRNWYLYKFLELVLQT  
VPLHIVDCVTRACRTPMKVRLSSVPARLRDMSAALSYPATREWRFDShNVTHLQERLTQA  
DREIYNLDVNTVDWEEHLTDFVKGVRAyllRESDAELPRARRHMHRLRVVHRAVLLVAH  
AALCALLVYVALALYHVITS

> fatty acyl reductase 18 [*Helicoverpa zea*]

MVPRPAPQSSTPPLIPEFFAGREVFITGATGFMGKVLVERLLWTCRDISRLHLLLREKKDVA  
PEKRLSQLKQSQVFDVIRQHCPKQLDKLSMLAGDVTKRFGLDNHAI SQLNQVS VV FHS  
AATLKFDEPLPVALQQNVHsvvtlMDICDQLPNMQVLVHVSTAYSNAELTSVEERVYPPP  
AQLQQLSALVEALPADLLAEITPQLISPKPNTYTFTKAMAESVVAERANSTNYAVAI FRPTI  
VISSLRHPFGWIENLNGPSGVVVGAGKGLLHVLSGAVRRADMMMPVDIAIDTLIAVAWE  
AANDQPGFARVYNCSsCMdGTswGQFRERMMRCVREYPFDSVLWYPFGVLSentLMQR  
FLETPLQTVPLYIVHYISKLCGIKSRPSMTTVSKRLHAMNEALKFFALREWHFNTDNVQQL  
MHRLAPADAAVYNLDPGTIDWESHCEDFVKGTRKYLLREKQDIEAARRRMHVLHMIHS  
LTKILLTVLMVRLAYRSTPAILRAVAVLTRLRRRGATVALSG

>fatty acyl reductase 19 [*Helicoverpa zea*]

MASCLSGGHYVPGSQEYVPVAEFYADKSVFVTGGTGFMGKVLVEKLLRSCPKIKKIYLLM  
RPKRQGDVASRLTELTQSPLFETLRRERPQELNKIVPIVGDITEPELGISAADQTMLCQKVS  
VVFHSAATVKFDEKLKLSVTINMLGTQQLVQLCHRMLSLEALVHVSTAYCNCERERVEET  
VYAPPAHPEHVVTLVQTLDELVDRI TPDLVGD RPNTYTFTKALAEDMLIKESGNLPVSIV  
RPSIVLSSLREPVKGWVDNWNGPNgIIAAVGKGIFRTMLGTGTKVADLVPVDTVINLMIVC  
AWRTHLRRGEGVVVYNcCTGQQNPITWQRFVKTSFKYMRKHFPNEVLWYPGGDITSNR  
LKHGTLSSLQHRAPAALMDLVSTATGKKPMMVRVQNKLEKAAACLEYFTTRQWAFADD  
NVQALCASLSPDDRRTDFNVRNIDWDAYIESYVLGIRRF LFKE SPDTLPKSR AVLRLRHIV  
HILTQVATVFFLWRFLFSRSNALRNvWRRVLELLTRAARLLAIA

> fatty acyl reductase 20 [*Helicoverpa zea*]

FVLKVFKRLKVSNPESIKKVPMIGDVTLPNLGLNQKDEETLVDKVSVVYHAAATIKFNE  
PLQVAMNINFEGTQKILELSKRMKNIEAFIYISTAFTNTSRRVLLETVYPPPAKVDDVYKFIE  
EYGHDAQETKKFLNEQPSTYTFTKSLSEAYVAKNHGDVPTVIIRPSVVSsAKDEPLKGWL  
DNWYGGTALVQNAGRGWNRfALGNNDAPLDLIPVDYVSNMSVIAAAKAKKSSDVQVY  
NCTSSAENPIIWSDVHKYFNREmVALGKNEIPCPhVIYLKSKLLMNIGTFVFQTTPAQIADF  
WLKITGREPKYTETLSKVLKVRDGYEFFTANSWVMKAERARELYSSLSPEDKEEFPCDVT  
QIVWSEFMRDYCRGILKYISSKTNGK

## ACT

>ALJ30248.1 putative acetyltransferase ACT1 [*Spodoptera litura*]

MSVAAKGIFIVGAKRTAFGTGGVFRNTTATELQTTATIAALKEAGVAPEKVDSIVVGQVM  
TASQTDGIFIPRHVMLKAGIPQDKPALGVNRLCGSGFQSVVNSAQDILTGSAKISIAGGVEN  
MSQAPFAVRNVRFGTALGSSYAFEDTLWAGLTDSYCGLPMGMTAEKLG AQFGITRDEVD  
NFALRSQQRWKA AQDAGVFKA EITPVTLT VKRKEVKVEVDEHPRPQTtieGLKKLPVVK  
KEGLVTAGTASGISDGAGAIVLAGEEAAKGLKPLARLVGWSYVGVDPSIMGVGPVPAIEN  
LLKVTKMSLNDIDLIEINEAFCAQTLACAKALKLDMEKLNvNGGATALGHPLGASGSRT  
AHLVHELRRRGLKRGIGSACIGGGQGIALMVETV



>ALJ30249.1 putative acetyltransferase ACT2 [*Spodoptera litura*]

MISLSILKQSTIVHLCFAISYFTSGLILTFIQAILYFGLRPFNKSLYRKINYLYAYSFYSQLVFM  
SEWWSNSKLIYIKKDEYEKYYGKEHGYLIMNHSYEIDWLMGWHFNCNTIGVLGNCKAYA  
KKSQYQLPPIGWWMKFSEFVFLERSFEKDKETIKHQISELCDYPDPVWLLMTPEGTRYTKK  
KHEASLNFAKEKNLPLLKHHLTPRTRGFTTSLQFFRGKIPVIYNIQLAFEKDSKTPPTLTSL  
YGKPVNAHLYIERIPVEKVPEDEGEAAKWLHELFFVKDKMQDSFFNTGDFFLGSGVERRE  
SFTVPPPIWVSLVNALGWAVVTLTPMLYLLGLLFSGKLLYFSIACAIFGAFFILLQKSIGMSK  
ISQGSSYGTEKK

>ALJ30250.1 putative acetyltransferase ACT3 [*Spodoptera litura*]

MSSRKPLTKSQKLQYEKKYEKRSYIPIKYFLIAIVILLAASYKLYFVKTDYEMPEIDLEQW  
WGSYPMNEIDTSIRPFTIEFSDVKVNDLKERLLHRAQFAPPLDSAGFSYGFNSLFLPKVLDF  
WQKEYNFEERERFLNKYNHFITGMQGLDVHYMHVCPDLGVGDDITVVPLLLIHGWPGSI  
REFYELIPKLVTTPRNHKFVFEVIAPSIPGFGYSQAPVQQGMGAKEVAVVFYNLMKRIGYT  
KYYVQGGNYGAKIGSVMATLFPDSVLGFHTNTPSVSWSPMSIFYTLLGTIWPNFIVEPSLA  
DRMYPLSQYLSSTIVQETGHFHMQATKPDTVGIALSDSPAGLAAYILEKFSAWTNENKQAI  
DGALLQKFSLTHLLDNVMIYWTTNSITSSMRHYTEHKQLWTLDRVPTDVPTWGIKFKYN  
LCFQPDLSILRLKYRNYLHSSIVEDGGHFAAMELPDILADDIFDAVDTFIKFNEERNKSGPLP  
EPVESNAQQTKSKTASTEPTKPTESAKKPTEPAKQPNESAKQPSEPANKPTKPVQQPTEPS  
KQPTQVDYMKAKSVHEFTVKDINGNEVKLDTRYKGQVLIIVNVASNCGYTNVHYKQLNEL  
YEKYSNKGLRILAFPCNQFAYQEPGSPEEILQFTKAKQVKFDLFEKVAVNGEDAHPLWNFL  
KRMQGGTLGDFVKWNFSKFIVDKNGVPVERFGPNTDPLELVPYLEKLFQDQ

>ALJ30251.1 putative acetyltransferase ACT4 [*Spodoptera litura*]

MSANVILGCVMALVILFTISSMARYYIKFTLFIVMSLIFAAAPMPLMLIKPFDPRNALIPAF  
LRCFARILGLRWKVRGLENVDNSRGAVVLLNHQSSLDLYALAIHWPLMSRCTTVVSKRSLQ  
YLVPGTATWLWGTVFIDRGAKSARDALNKQVDAIKNEKRKLLLFPEGTRHSGDRLLPFR  
KGAHFVAMDAGAPIQPVVISKYHYLDGKRHKFGSGEFIVSFLPMIETEGLTCKDDIVSLVDK  
TQLNMQEEFTKISMETLERRNRIKAD

>ALJ30252.1 putative acetyltransferase ACT5 [*Spodoptera litura*]

MAPSNLSLNEVVIVSAVRTPIGSFKGSLANVTATELGAIVVRAAVERAGIPSSEVKEVFMGN  
VCSAGLGQNPARQAAIFGGLEKSTICTTVNKCASGLKAVTLAVQGLQTGANDVILAGG  
MESMSNIPFYIRRGEIPYGGTQLLDGILYDGLTDVYDQIHMGDCAENTAKNLNLSRKQQD  
DYAIIYSYKRSAAHAHAKAFDAEVIPVPVPQKKGGAPVIFAEDDEEYKRVDFDKLVKLPTVFK  
KENGTVTASNALNDGAAAVMMTAEAAKRLNVKPLARVIGYADGEREPIDFPIAPSVA  
IPKLEKTGVKKENVAMFEINEAFSVVTLGNQKLLDIDLEKINVHGGAVSLGHPIGMSGTR  
IVGHLCHALKKGEIGVATACNGGGGASAIMIEKL

>ALJ30253.1 putative acetyltransferase ACT6 [*Spodoptera litura*]

MDSKTTKMPKVAKVKNKAPAEIQITAEQLLREAKERDLEILPPPKQKISDPEELRDYQHR  
KRKAFEDNIRKNRLVIGNWLKYAQWEESQKQVQRARSYERALDVDHRNVTLWLKYTE  
MEMRNRQVNHARNLWDRAVTILPRVSQFWYKYTYMEEMLENVAGARQVFERWMEWQ  
PDEQAWQTYINFELRYKELDRARQIYERFVMVHPDVKNWIKYARFEENHGFINGARKVL  
ERAVEFFGDEDLDERLFIAFAKFEENQKEHDRAVVIKYALDHIPKDRNKELYKAYTIEK  
KYGDRSGIEDVIVNKRKYMYEQEVIENTNYDAWFDYIRLVENEGNVDDIRDTYERAIA  
VPPSKDKQFWRRYIYLWINYALYEELEAEDAERTRQVYRTCLELIPHKIFTFSKIWLMYAQ  
FEVRCKDLKQARKTLGMALGICPRDKLYRGYIDLEIQLREFDRCRILYQKFLEYGPENCIT

WIKFAELETLLGDTDRARAIYEIAVGQPRLDMPPELLWKSIDFEVQQGETEKARQLYERLL  
ERTVHVKVWLSYAKFELNAENADNINVDLARRVYERANDSLRSAGEKEARVLLLEAWK  
DFETEIGEEEEKLEKVL SKMPRRVKKRQKIISESGVEEGWEEVFDYIFPEDEMVRPNLKLLA  
AAKQWRKQKEVSQPPESERNDHEERREND D D D D D D D D S E E E E Q T P P Q P Q N R N E K E D E S

>ALJ30254.1 putative acetyltransferase ACT7 [*Spodoptera litura*]

MESMSNPYYLKRGETPYGGIQLIDGIVFDGLTDVYNKFHMGNCAENTAKKLNISRQQQ  
DDYAISSYKRSAAAYEAKAFADELVSVPVPQKRGAPPVLFAEDEEYKKINFEKFTKLSTVF  
QRENGTVTAGNASTLNDGAAAMVLMTAEAAQRLNIKPIARVVGADGECDPIDFPIAPAV  
AIPKLEKTGVKKDDVAMWEINEAFSVVAVANQKLELDPKVN IHGGAVSLGHPIGMSG  
ARIVVHLCHALKKGEKGVASICNGGGGASSIMIEKL

>ALJ30255.1 putative acetyltransferase ACT8 [*Spodoptera litura*]

MNIRCARPSDLMNMQH CNLLCLPENYQMKYYFYHGLSWPQLSYVAEDEKGHIVGYVLA  
KMEEDGEDNRHGHITSLAVKRSHRRLGLAQKLMNQASLAMVECFKAKYVSLHVRKSNR  
AALNLYTNSLGFKILEIEPKYYADGEDAYSMMRDLSAF AAENKTEPQPTENLEIKSESAIIS  
QC

>ALJ30256.1 putative acetyltransferase ACT9 [*Spodoptera litura*]

MLRRCSKHLQTLYRRQGQALRFKSTEAPKVFGALSQAAARTAQPRSLTAAHNQVATIHFT  
NPLLAEQDIMTPSPDVSSEGDAKIEKKVGDAVAMDEVVMEIETDKTALPVMAPGNGIIKE  
FYVNNGDTV KAGQKLFRLELTEGGPPPKAAAAPAEPPKAEAPPPPPAAAAAPPPPPPPAA  
AAPPPPPPPPPAPAAAAPKPAAPISSIPVA AIRHAQSIETASVKVPPTDYSKEIAGTRTEQVRK  
MNRMRQRIAQRLKEAQNTNAMLTTFNEIDMSHIMAFRKKHLDAFTKKHGVKLGLMSPF  
VKASATALMDQPVVNAVIEDNEIYRDYVDISVAVATPKGLVVPVVRNVQNM TYADIELTI  
ANLAEKAKAGKLTIEEMDGGTFTISNGGVFGSLMGTP IINPPQSAILGMHGIFERPIAVNGQ  
VVIRPM MYIALTYDHRLIDGREAVMFLRKIKQGVEDPATIAGL

>ALJ30257.1 putative acetyltransferase ACT10 [*Spodoptera litura*]

MALIMSFVSV AISILYTPLLLLILCIIFLASIGKSLGVRRLYVNILLKLF EYGRQHIEVAKIKIQ  
RTDSSDEEDLPPVPDDKPPSAIIKENG VNGTKMTVIERQEILGPSPELNYKRSTSQERVQNG  
PKTTQNGESNMEFDLSNCLDLVKAGMESIIEDQVTSVF EAEELRSWNLLTRTNRQYEF LT  
WRLTHIWAMGFVVRYMFLPLRIMIFVIGVWWLI ACTACIGTLPDGKTKQRINYAVSVMCF  
NFLSRCISAVITYHDAHYPKNGICVANHTSPIDALVLMCDNCYSLIGQRHNGFLGILQRAL  
ARASPHIWFERSEVKDRHAVAKRLKEHISVPDNPPI LFPEGTCINNTSVMQFKKGSFEVGG  
TIYPVAIKYDPRFGDAFWNSSRYGMLHYLLNMMTSWAIVCDVWYLPAMTRA ADES AVDF  
ANRVKAVIARRGGLVDLMWDGQLKRMKPKKEWRELQQEEISKRLKGE

>ALJ30258.1 putative acetyltransferase ACT11 [*Spodoptera litura*]

MAFAGLKKQINKANQYVTEKMGGAEGTKLDLDFVEMERKTDVTCELVEELQTKTKEFL  
QPNPTARAKMAAVKGISKL SGQAKSNTYPQPEGVLGDCMLLYGKKLGEDTVFSNCLIEM  
GEALKQMADV KYSLDDNIKQNFLEPLHL LQTKDLKEVMHHRKKLQGRRLDFDCKRRRQ  
AKGAHIADDEIRQAEEKFAESLQLAQIGMFNLLDNDVEQVAQLTFFAESLLEYHQQCTEIL  
KGLVSTLMEKKEEAVNRPKMEFVPKTLADLHIEGI HDLNNGRRYGSTQSLSRPRQHIPPSS  
SVGDLSTTDPFKAW EAPSPVRTQVRPAPGFKPHPAPRNQFN GRDPWTGDFSICRV IYVWF  
WLWIAGDGGGTWWKAVHGRNLTCT

>ALJ30259.1 putative acetyltransferase ACT12 [*Spodoptera litura*]

MSFLMRKCIVNLKNVNR CRTVCVFLQTERQLSRCSANILKRSILLSEVHLRHRQFHTSQIF  
NKVVAFKLSDIGEGIREVVIKEWFVKVGDKVQQFDNICEVQSDKAAVTITSRYDGVVTKL

YHDVDQTALVGQPLVDIEVQGAADEASSESVEKPAAVNQQLKEEKQQRVKVLTTSPVRR  
IAAQFKVDLSTVKATGRNGRVLKEDMLAHLNIDSDGSNRVSDPTSDAVQIPMTPAQAKV  
EVLLEDREVVPVSGFTKAMVKSMTEAMKIPHFSGYSDYDVSKLVESREALKNIALSRGVKL  
TYMPIIIKATSLGLENIPVLNSSLDTTCEHLTYKANHNIGVAMDTPNGLVVPVIKINVQNKTI  
LDIARELNTLQEKGSKGQLGLSELSSGGTFTLSNIGIVGGTYTKPVILPPQVAIGALGKIQVLP  
RFDAEGNIRKAHILTVSFSADHRVIDGVTMARFSNHLKNYLENPYTLLLDL

>ALJ30260.1 putative acetyltransferase ACT13 [*Spodoptera litura*]

MRQSGIILLTVLVVQAYSAPQFITFSEGKLGVNFGGYHAGVGLGGLAGGKGNTAGGLYAE  
AGTPFGPAAGLGGAVDGSSTAGGLYAGATAGGNVNAAAGLGGAVAGGKAVGGGYS  
TAQSGGHSATSVLGGESGASGSAGFSVSAHKSVEVPVTVVKETEVSVIPVEEVKTVHKNV  
YGETKYEASNEITPAKAGVEATANVNVNAQQGFAKEVHVPEPTEVVYVRKHKPHRHHV  
HKAVYVGGFVGAGGEVAAPETKSVYKTVQPIEKRVDEAHAEAHGEAGAGYNGGYYQS  
PKVATVHKEVVVNAKPSTFFQDIFNIPISTLKAVSGFLTNTAENTGVSQKSATFKAGGYS  
FSGNAGYSGHSGYSSYY

>ALJ30261.1 putative acetyltransferase ACT14 [*Spodoptera litura*]

MIGANKLISKNNVCQKIIQQRNFTKKNIKDANYQYLQRSKLPTMHFQKSLPRLPIPELSKT  
GERYLNALRPLLTASQFEEAQQRNFTKEGKILQEKLTAKDKRNKHTSYISDYWFDLYL  
RDRVPLPINYNPMIVFQNDVRPEYNDQLIRSTNILISAVRFMLSLREQILEPEVYHMPKKS  
DTPLFRNFTRMLPEAISWYGAYLFKVFPLDMSQFVGLFGATRLPRQNKDEIFRDPKSKHV  
VVQRKGNFYVFDVLDADGNLLSPQEILGNLSKVINDNSPSEYPLGVLTQTNRDQWAQQR  
VHLESTGNSEVLRKIDSAIFNLVLEDDVINDDKRVLLRKYLHSDGTNRWFDKSFSLIVTGD  
GVSGVNFESWGDGVAVLRFFQDIYAETTKKPFHPESKPADSNISVQKLEFKLDDKSKQFI  
DNAKKEYKAWCDLSIDYILYEGLNKAACKKFKVSPDCIMQLSFQAAHLLKGSFVGT  
ESCSTSAFKHGRTEETMRPCTLKTKAFCELTLSNNRSDDDLRSKLTECSKLHLELVKESAM  
GQGFDRHMFALMKMAEDNNMPRPEIFDSYKYLNKSILSTSTLSSPSVMAGGFGPVVK  
EGFGIAYSAPDKLGAASVYKSHNNSTHYVEALHKSFLDITKILSA

>ALJ30262.1 putative acetyltransferase ACT15 [*Spodoptera litura*]

MIEKLAHTSDGPPVLTFYTKDPCGLCDIVMEELEPYKNRLIIQKVDITEKENIRWLRRLYRHD  
IPVFLNQGQYLCMHKLNKHLLEKRLQMIEEEKS

>ALJ30263.1 putative acetyltransferase ACT16 [*Spodoptera litura*]

MWYQIILFTTVCVFTYVLKKLHDTGPNKFKFYFNFFIFYFLTSVLSAVIWPYFLLSPKNVRN  
SKIAVRLLKHITKLYDLEWHLRDGKILAEDRGAVIISNHQSSLDILGMFNIWDVVDKLA  
AKKELFYIWPFGLSAYLAGVVFIDRSNAKGAYRQLKVTSEVMVKNKTKIWLFPETR  
DYTKLQPFKKGAFNIAVAAQVPIIPVVFSPYYFINKEKYIFNKGHVIIQCLEPVPTTGLTMD  
VPDLINRVHEKMTIAYKELSKEVVSALPADYPFTLLG

>ALJ30264.1 putative acetyltransferase ACT17 [*Spodoptera litura*]

MMENLSSIVEALSKIFSQVSTLLGIQWAPMDIPMSRRLQTFAAFLWIYLILFGEAFAYL  
LVYSKYWWAAILYGVWMLNDVEICNRGGRSSEWVRNWIWWRYLADYFPIKLVKTVDLD  
PSKNYMFACPHGVISLGAFGSFCTNALDFKKLPGMTCHLITLGGHFLVPFFRELALALGI  
CSSEQSLLYLLDKKKYEGNCACMIIGGAAEALDAHPKEYKVILSRKGFIRVAMKSGAA  
LVPVFSFGETDLFRPPNNPENSLLRRFQEKVRQITGISPMFPMGRGLFQYSYGVLP  
TVVGAPMEVKNRLEPTNEEIDAVHAEFTQRLQTLFETEKVKYLKYHEEARLVIT

>ALJ30265.1 putative acetyltransferase ACT18 [*Spodoptera litura*]

MGARSLKVLQVISGWQAVELILTCVFGIWQIIEISVKRLWKGYRRKVDSEQPVELTVDSS

IGTHCYIKVMGVKYHYVETGPRSGQKVLILKDAPDTGNLWGPNNWANVVRRLAETDHHV  
VTDLRGTGGSEGSRSELSPPRAVEELSALLKALGVSENQAVVIGFGIGGMLTWYLVHT  
RGPLISKFAVINAPHNLYWQYPPATFCHRALQFIQWPHFPERWLAEGELNDREGRWTSSR  
ACDWTGALNYVRGAAWWQVKQGLKTSAPALLVGNKDSAAQLVASAQHCTASTLRLVTK  
PEPSSKEVTDVLLDFLIEKEKLIIEVPRGLMGRVFGAVADRGRELTARLVLPTQA

>ALJ30266.1 putative acetyltransferase ACT19 [*Spodoptera litura*]

MVFDNNWTGGWFSWTRQSDAMLRNVEKKILSCLKTAYKRFYVDIGSVVGQSDKIWTISL  
NEESPKTPLVLLHGMGAGLALWCPNLDSFAATRPVYAIIDLLGFRSSRPKFACDAQKAEA  
QWVESVEEWRREVNLGQFILLGHSLLGGYIATAYAIKYPERVRLVLADPWGFAERPQNAY  
EKAQLPLWVRAIATAVQPLNPLWAVRAAGPAGKWLVSKTRPDISRKYLNYPDAERVIPE  
YIYQCNSQTPSGESAFHTLMTGFGWAKNPMVRRVDELDPALPITVLYGSRSWVDNSSGQV  
LVEHRGPSNTFVQVINGAGHHVYLDKPELFNKFVLDACTRADEHDPALPAKAVPAEPGTE  
TPALPPGGEAPSTTVATTNKATASSDAAPTS

>ALJ30267.1 putative acetyltransferase ACT20 [*Spodoptera litura*]

MARRLLCRMILNSNTTSIKSSLPVLGKKLHSQVPTKEIQIPVKFGHIAGKLWGNSSERPILA  
LHWQDNAGTWDPLIPMIKDRPILALDFPGHGFSSWIPDMQYYQWELPRIILYLKEYFK  
MEKVSILSHSMGAIASMRFAVFPDDVDFYIAVDSLIIYDDYDLDAVVGKIPTTLKKALIAQ  
TRLNDEPPAYSLEEMTKIWHLGTRKSVALESVQHLLKRGIKPSKADPNKYFYSRDSRLKY  
TLFNPEDKKFVEALVRRLLKCPTLYIKAIDSPYSSDAYSIEMREILEQNNENYEFHFVPGTHH  
VHLNNPELVAPLIKNFIQNHNL

>ALJ30268.1 putative acetyltransferase ACT21 [*Spodoptera litura*]

MAVVINKGIFIVAARPTFGRFGGAFKEVYPSDLLAVAAKDALKAGSVAPEVIDTVNIGQV  
YGLSGSSDGGLSRHAALKAGIPQEKPALGISRLCGSGFQAVVNSAQDIITGAAQTSLAGG  
TENMSTVPFVVRNTRFGVGLGVKMPFEDLLTSSLDTSNFTMPQTAENLAKEYGLQRM  
EVDQFALQSQRWKAHEQGVFKAEMAPVTVRVKKQDKVVEVDEHPRPETTTEMLSRL  
PVLFRKGGVVTAGNSSGVNDGAGAIVLASEESVKQNGFTPLVRLLAWSAVGVDPSIMGIG  
PVPAIQNILSATGLKLDDIDLIEINEAFAAQTACAKELGLDQSKLVNNGGAIAMGHPVGA  
SGARITAHLAHELRRRGLKRGIGSACIGGGQGIALLFETV

>ALJ30269.1 putative acetyltransferase ACT22 [*Spodoptera litura*]

MFGLLLTLLGWVGLSPVPFLAGVIGATEPALKLLISILIAIYPLAIVYHKYVRQHVEYRNLYF  
IATGLDMAYYNFGISMYHNAIPALVIYLTTKLFGPGKVN SVITFAFNMAYLLAGYVVTESE  
EYDITWTMPHCVLTLKLIALSFDLWDGKKMLKGQELSANNKLTAEISSPTFLELIGFVYFP  
ACFLVGPIFSFRYKDYITDKFPLDKEKAVYEAQAIKRLVQGLIYLVAYQVGTVFNIKYM  
LSDEFRETSIFYRHFYCGLWAHFALYKYISCWLLTEASCIRFGLSFNGMETKGYPQVSKWD  
GCNNIKLLRFEGATRFQHYIDSFNCNTNYFAAEYVYKRLRFLGNRNLSQLITLAFLALWH  
GTQSGYYMTFFNEFIIMVMEKDIEVMLTKTQFYHKMWGNTIFKYLLYILKTYTIVFMGW  
SLAPFDAKSFSKWWSIYASLYFSGFILFLPWTFVYKPLIKSGLKSLEQNESKTQ

>ALJ30270.1 putative acetyltransferase ACT23 [*Spodoptera litura*]

MTYYDYYDGSRIFSISTRVGLPLDLVNFLIAQVAALCLARLFRKPLRYASPEFRHSVCLVI  
GLTMGYFCFGRQAIHLSVLPMLTYTMLKSVSHNIMGNVILAVSMVYLSCLHLHRQIYHTA  
DYSLDITGPLMVITQRVTSLAYSLQDSLTVKERPTSANSSEANGRLVKIEKIPSPLEYFAYTL  
AFQTLMCGPVVVFYSDYIKFIEGARVDEFKSKHATEPSPRRAVFYKVCGSVAAALLYTLA  
KKYPLAVLEELTDPSSSEVSRWSALYLLWYAYLSTLVVRCKYYHAWLLSEAICNNCGMGF  
NGYNNDGTPKWDKMSNIDIFGFEFAQNFRVAIASWNKNTNAWLRDVAYERGGAAWRTA

RVYALSAVWHGFHPGYLTFAGGLFTIAARKIRYVARPMFLDSVPKKLFYNFVTFFTTRV  
AMTYATVPFVLLHLTPSLAFYGKFYYSLHFIALGAMLIPEKSTRSKATQIQENISCKLSAEA  
LPTLESVESLNGKCLKIT

>AIN34682.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MLFLKGSRIITIKMRPTNKLFKAMAAAYSSKVTLNEVVIAAVRTPIGSFRGSLASLSASELG  
AVAVKAAVERAGIPKEEIKEVYIGNVCSAGMGQAPARQAVIFSGLPKSTICTTVNKCSSG  
MKAIVLAAQGLQTGTHDVLAGGMESMSNVPFYMKRGDIPYGGTQLIDGIVFDGLTDVY  
NKFHMGNAENTAKKFNISRQQQDEYAISSYKRSAAAYESKAFADELVPVPVPQKRGAAAP  
IMFSEDEEYKKVNFEEKFSKLGTVFQKENGTVTAGNASTLNDGASAMVLMTAEAAQRLNV  
KPIARVVGADGECDPIDFPIAPAVAIPKLLAKTGVKKEDVAMWEINEAFSVVALANIKML  
ELDPSKLNHGGGVSLGHPIGMSGNRIVVHLCHALKKGEKGVAICNGGGGASSIMIEKLE  
HTTDGLPVMTFYTKDPCGLCDIVMEELEPYKNRIVIQVDITQKENVRWLKLYRHDIPVL  
FLNGQFLCMHKLDKHLLENRLQKIEDGKLH

>AIN34683.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MAVAINKGIFIVAARTPFGRFGGAFKDVYPSDLLAAAKDALKAGSIAPEVIDTVNIGQV  
YGLSGSSDGGLSPRHAALKSGIPEDKPALGISRLCGSGFQAVVNSAQDIITGVAQTSLAGGT  
ENMSTVPFVVRNTRFGVNLGVKMPFEDLLTASSLDTSCNNTMPETAENLAEKYGLHRME  
VDQYALQSQQRWKAAQDQGAFAEMTPVTVKVKRQDKVIEVDEHPRPETTTEMLSKLP  
VLFRKGGVVTAGNSSGVNDGAGALVLASEESVKQNGFKPLVRLLGWSVVGVDPSIMGIG  
PVPAIQNLLKVTGLKLDDIDMVEINEAFSAQTLACAKELGLDQSKLNINGGAIAMGHPVG  
ASGARITAHLAHELRRRGLKRGIGSACIGGGQGIALLLETV

>AIN34684.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MTGSVSMEMIKLRIEEQHPTIVYNVNRFSWSSLETMWHQVLEIGMDIANISAKHPDGI  
NLIGYSQGGLIARGIVETFPNVSVSTFISLSSPQAGQYGAGFLHLVFPGLVKDTAYELFYSR  
VGQHTSVGNYNWDPYHQSLYESYSVFLPYINNHILSAKSADFKNNLLRLKRLVLIGGPDD  
NVITPWQSSQFGYYDANETIEMKGGQDIYMEDKIGLRTLDESGRLHIVTVPGVNHFSWHM  
NISIVDDCLLPFLD

>AIN34685.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MDGKTTKMPKVAKVKNKAPAEIQITAEQLLEAKERDLEILPPPPKQKISDPEELRDYQHR  
KRKAFEDNIRKNRLVIGNWLKYAQWEESQKQVQRARSIERALDVDHRNVTWLWKYTE  
MEMRNRQVNHARNLWDRAVTILPRVSQFWKYTYMEEMLENVAGARQVFERWMEWQ  
PDEQAWQTYINFELRYKELDRARQIYERFVMVHPDVKNWIKYAKFEENHGFINGARKVF  
ERAVEFFGDEELDERLFIAFAKFEENQKEHDRARVIYKYALDHIPKDRNKELYKAYTIHEK  
KYGDRSGIEDVIVNKRKMYEQEVIENTNYDAWFDYIRLVENEGNVDDIRDITYERAIAN  
VPPSKDKQFWRRIYILWINYALYEELEAEDAERTRQVYRTCLELIPHKIFTFSKIWLMYAQ  
FEVRCKDLKQARKTLGMALGICPRDKLYRGYIDLEIQLREFDRCRILYQKFLEYGPENCIT  
WIKFAELETLLGDIDRARAIYEIAVGQPRLDMPPELLWKSIDFEVQQGETEKARQLYERLL  
ERTVHVKVWLSYAKFELNAENADNINVDLARRVYERANDSLRSAGEKEARVLLLEAWK  
DFETEIGEEEEKLEKVMAMPRRVKKRQKIISESGVEEGWEEVFDYIFPEDEMVRPNLKL  
AAAKNWRKQKEVTQPTETENKQDEEEEGQTPPQRMNEVEDD

>AIN34686.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MPRKVFVVGGMTNFIKPSTGPDYPELGKEAVLAALADARIKYTDIQQAVCGYVFGDSTC  
GQRVLYQVGMTGIPIFNVNNNCSTGSNALYLAKKLEGGISDVMLAVGFEEKMAPGALASS  
VFNDRTNPLDRHTIKMADMAELTGAPMTAQYFGNAATEHMKKYGTTEVHLAKIAAKNH

RHGVKNPRAQGKREYTVEEVLASRRYIGPLTKLECCPTSDGAGAAVLMSEEA VIRYGLQA  
KAVEIIGMEMATDTPAVFEENSLMKVAGFDM TALAAQRLYQNTGISPKQVDVVELHDCFA  
ANELITYEGLQLCGEGEAGKFVDAGDNTYGGRRVVNPSGGLIAGHPLGATGLAQCAEL  
VWQLRGEAGDRQVPRARIGLQHNGLGGA VVVVTMYKKGFSDVAPRAVAAAGNPEDFKV  
FKYMKILEDAMENDTDNLIEKVRGIYGFVKVKNGPNGAEGYWVINAKEGKGKVTYNGSE  
KPDVTFTVSDDEDVVDLISGKLN PQKAFFQGGIKIQGNMGLAMKLTDLQRQAAGRIDAIRS  
KL

>AIN34687.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MASQISKSLIKVSHVGSTAKFDTARRALSVGAALHAKRNSLPDRTGKNVVLVDGVRTPFL  
VSFTDYAKMMPHELARHSLGLLQKTGISKDVIDYIVYGTVIQEVKTSNIGREAALAAGFS  
DKTPAHTVTMACISSNQAITTGVMIAAGAYDVIVAGGVFMSDVPIRHSRKMRSLLLRL  
NRAKTPAQRLSLIATIRPDFFAPELPVAEFSSGETMGHSADRLAAAFGASRQE QDEYSLRS  
HKLAAEAQQKGYFTDLIPVKVDGKDGVDKDN G IRVSTPEQLAKLKPAFVKPHGTVTAA  
NASFLTDGASACLV MSEAKAKELGLKPKAYLRDFTYVAQDPVDQLLL GPTYGIPKILDKA  
GLKISDIDTWEIHEAFAGQILANLKAMDSDWFAQTYLGRQSKVGTPDLEKWNKWGGSL  
IGHPFAATGVRLAMHTAHLVREDGQFGVISACAAGGQGVAMILERHPDATCN

>AIN34688.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MNIRCARPSDLMNMQH CNLLCLPENYQMKYYFYHGLSWPQLSYVAEDEKGHIVGYVLA  
KMEEDGEDNRHGHITSLAVKRSHRRLGLAQKLMNQASLAMVECFQAKYVSLHVRKSNR  
AALNLYTNSLGFKILEIEPKYYADGEDAYSMMRDLSAFVAESKTELPPIENLEIKSESAAISQ  
C

>AIN34689.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MSAAAKGIFIVGAKRTAFGTFGGAFRNTSATELQTVAAVAALKEAGVAPDKVDSVVVGQV  
MTASQTDGIYLP RHVMLKAGIPQDRPALGVNRLCGSGFQSVVNSAQDILTGSAKISLAGG  
VENMSQAPFAVRNVRFGTALGQNYAFEDTLWAGLTDSYCGLPMGMTAEKLGAKFGITRD  
EVDNFALRSQQRWKAAQDAGAFKAEIAPVTLTVKRKEVKVEVDEHPRPQT TIEGLKKLP  
VFKKEGIVTAGTASGISDGAGAIVLASEEAAKGLKPLARLVGWSYVGVDPSIMGVGPVPAI  
ENLLKVTKLTLNDIDLIEINAFCAQTLSCAKALKLDVEKLVNNGGATALGHPLGASGSRI  
TAHLVHELKRRGLKRGIGSACIGGGQGIALMIETV

>AIN34690.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MLLERCFNGGNLICGNQGLMVEDQRNRVKLSKIVGATSMFVSGSSDGILT PRHSALKAG  
VPYDKPALGVNKL CGSGIQAMVNSAQDILLGSAQISLAGGTENMSAIPFLVRNLRFGTQL  
GQVRPFEDFLKAGALDSYCN YTMAQTAENLAKMYDLKREQLDEFALKSQMKWKAGFK  
NGAFEAEMAHVTVTVG GKPVVNKDEHPRTNTTLESLSKL PALFREGGVGT VGNSTGVN  
DGAGALILASEEAIKQHNLTP LARLSCWSHAGVEPRVMGLGPVPAVRQLLAATGYTLDDM  
DMFEINEQFAAQALASVLEIGLDQDKLNMNGGALAMGHPAAASGARIAAHLTHELRRRG  
LKRIGIGATCIGGGQG

>AIN34691.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MKTLFIFLFVIKLISAKPTSIVLWHGMGDTCCVSFSLGGFKLFLEKAIPGVYVDSLQIGNSTI  
EDLENGYFLNPNTQVEKVCKYLAEHPKLDGFNAIGFSQGSQFMRAVVQRCGHTLPTIKN  
LISMGGQH QGVYGLPHCGALMHPTCDYIRQLLN YAA YDTWVQHALVQATY WHDPLDEE  
TYIHK TIFLPDINNEVFVNKTYIQNLNNLEHFVLVKFDNDTIVQPRETEWFGFYEPGQSKK  
MLPMQETR VYKEDRLGLKKMEKEGKLVLISTEGDHLRFSDKWF IENIIKPYLLN

>AIN34692.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MELQDTYYNKSEYVETASGNKVSQRQTVLCGSQNIVLHGKVIVQSDAIRGDLANVKTGRF  
CIISKGSVIRPPFKKFSKGVAFFPLQMGDHVFGENTVVNAAVVGSYVYIGKNVVIGRRCV  
LKDCCMIEDNSVLP AETVVP SFARYSGSPARLITLPEAMPDLMTEFTKSYYQHFLPTTVQ

>AIN34693.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MLEHLSYAMEIVTKIFSQISALLGIQWAPMDIPMSRRLQTLAAFVWIYLILFGEALSIYLFIQ  
LVYSRFFWMGILYGVWFLNDIEICSRGGRASEWVRNWTWWRYLCDYFPIKLVKTVELDP  
SKNYMFACFPHGVISLGAFGSFCTNATGFHKLFPGMTCHLITLGGHFLVPFFRDLALALGI  
CSSSEQSLLHLLDNKKYEGNCACMIIGGAAEALDAHPKEYKVILSRRKGFIRVAMKSGAA  
LVPVFSFGETDLFRPPNNPENSLLRRFQEKVRQYTGISPMFPMGRGLFQCSYGVLPMPRAPV  
TTVVGAPMEVKNLEPTNEEINAVHAEFTERLKTLEFETEVKYLQYHEEAKLVIT

>AIN34694.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MMFGLLLNVLGLIGLSPFLSEVIGATEPALKLLISILLGYPLAVIYHKYVKHHKEYRNLYF  
VLTGFDMAFYNFGISMYHNAIPAIVIYLSKFLGPGKNNAIVTFAFNMTYLLAGYVVTSE  
DYDITWTMPHCVLTLLIALSFDLWDGKKMLKGEELSANNKLTALLESQPSFLELLGFVYF  
PACFLVGPIFSFRRYKDFISDKFPLEREVKVYEAQAVKRLVQGVYLAAYQIGVTVFSMKY  
MLSDEFWDNSVFYRNFYCGLWAHFALYKYISCWLLTEAACIRFGLSYNGSRTENGVSVSQ  
WDGCNNIKLLRFEGATRFQHYIDSFNCNTNHFAAEYVYKRLRFLGNRNLSQLITLAFLAL  
WHGTQSGYYMTFLNEFLIMVMEKDLESMLLKTEFYHKMWNNSSIKEYLLYFILKMYTIVF  
MGWSLAPFDVKSFSSKWWTVYTSLYFSGFILFVPWSFVYKPLVKKALKASGAHPKAQ

>AIN34695.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MGKNPVLFLPTHRSYADFCLMTYLCYHFDIDFPAVAAGMDFY SMAVIGRRMRETCAFYIR  
RTLAGDPLYAATLKQYVRTVVGKHAAPIEFFLEGTRSRSNKSMPPKYGMLSMTLVPLFAH  
EVS DITIVPVNISYDRVMEHSLFAYEHLGVPKPKESTGGFLKALHSLNDHFGNIIYNLGSPL  
SVREYLKNDTSHSKETLKPLDIQQLTPEQFKKVQSIADYVISLQQKNTVATISNLLSLVLMQ  
SLMKDSPLEFEEVVQEVGWMVQELRNLGATVFENDVRSSVERILVVQKKMMRLDKERK  
LRLISGVLTDLSDVDVKKMKGHILQPQTMVAAPIVQLQLYVNPILHYLVPPAIICLIVHRS  
AVTRDNLEVDYHVRKLLSHEFFHLEREEVNTFNKALDYCMQNGVITYSSELYTLGEDTK  
LQYLLKWSVLPALTLLKCAEVMTEQTNCAHKQALKLVQQRVESERVHPYCLSLEATAN  
CLSGLVAAHALVKHKGESDVIYDLVPTTMLECSNLVNSILPSFNVD FERN SVVIDHKELSR  
L

>AIN34696.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MTRDEHPQPDVTLEKLSRLQPVSTGGITTAGNITGLNDGAAAMILANGQALRDHNLKPLA  
RIVGWSVVGVDPMMGYAAVPAVETLLKTTGLTIDDMDLVEIHETFAATTVVCARHLGV  
DEDKMNVNGGAIAMGHPSGASGARIVSHLTHELRRRGLKRGIASAGIAGGQGIAIIETV

>AIN34697.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MTANVILGCV MALLVILFTISSIARYYIKFTLFVVM SLIFATAPVPLMLIKPFDPRNALIPAFF  
LRCFAKLLGLRWKVRGLENVDNSRGAVVLLNHQSCLDLYALAIIWPLMSRCTVVSRSRLQ  
YLVPGTATWLWGTVFIDRGAQSARDALNKQVDAIKNQKRKLLLFPEGTRHSGDKLLPLR  
KGAFHVAMDAAPIQPVVISKYHHLDGERQRFGSGEFIVSILPMIETEGMTKEDITGLIEKV  
QTSMQEEFTKISMETLARRNLRTKAD

>AIN34698.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MINLHILKQSTVVHLCFAISYFTSGLILTFIQAILYFGLKPFNKSLYRKINYYSYSFYSQLVF  
MSEWWSNSKLSIYIKKDEYEKFGYKEHGYLIMNHSYEIDWLMGWHFCNTIGVLGNCKA  
YAKKSIQYLPPIGWMWK FSEFVFLERSFEKDKETIKYQISELCDYPDPVWLLMTPEGTRYT

KKKHEASLSFAKEKNLPLLKHHLTPRTRGFTTSLQFFRGKIPVIYNIQLAFEKDSKTPPTLTS  
LLYGKPVHAHLYIERIPVERVPEDEAEAAKWLHDLFVVKDKMQDSFFNTGDFFLESGVER  
REPFSVPPPIWSLVNALGWAVVTLTPMLYLLGLLFSGKLLYFSIGCGIFGAFFILLQKSIGM  
SKISQGSSYGTEKK

>AIN34699.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MAFAGLKKQINKANQYVTEKMGGAEGTKLDLDFVEMERKTDVTCELVEELQAKTKEFL  
QPNPTARAKMAAVKGISKLSGQAKSNTYPQPEGVLGDCMLLYGKKLGEDTVFSNCLIEM  
GEALKQMADVKEYSLDDNIKQNFLEPLHHLQTKDLKEVMHHRKKLQGRRLDFDCKRRRQ  
AKGAHIADDEIRQAEKFAESLQLAQIGMFNLLDNDVEQVAQLTYFAESLLEYHQQCTEIL  
KGLVATLMEKKEEAVNRPKMEFVPKTLADLHIEGIHDLNNGRRYGSTQSLSRPRQHIPPSS  
SVGDLSNTDPFTAWEAPPAYRAQARPAQTRPAPGFKPHPAPRNQINGRDPWKASPLPSPVK  
SPARTPVAPNKTPCCTALYDFAENQGELGFKENDVITLINKVDDNWFEGSVHGKTGYFPI  
SYVQVTVPPLNM

>AIN34700.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MSSKRFNLTNLVLLVSLSVVAVAYVIRTPWLPIKRETKASLGYPKDSL MNFTELTGKYGYISE  
EHHVITDDGYILTMFRIVKATNCHKQKRSPPVLLMHGLLQSSDSWIDSGPNAGLAYLISDA  
CYDLWLGNVRGNYYSRGHVHLNPDKDAAYWKFYIEEIGIYDVPAMIDYVLDYTGFEKLN  
YIGFSQGTGTFVLMCSERPGYCDKAQLVIALAPAARNLNTKSMIFRTLQTFAKIEGALSM  
YGVQEVFSKGAFSQEFVAFFCQLSDFTERLCETIIDTFDHADFSHMGSITNETTRVLFGHFP  
AGTSVHNMARYGQSTRSTTFKKFDYGKEQNLVVYGSEQPPLYNLSATTVPVLCIYGND  
GLVDTKDVEWLMSKLPNVLESVKVKDPLWNHLDVTYSQYTVGSIFPKINEYLLKYTSA

>AIN34701.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MTENGVRNRQKNGKQSGKQNGVATHQEEKIQDEEFSVRESPLTSLLASSLHLRAIYHIFVV  
ILLVLICDTVIFDLVESGKINIGLSIVAAGFGDVSRGIKLWLYDFCVVMSFYPLL VVYSWTG  
AISRKYPVLRPTVVLLGVIGIVAVEVAVAAVPVYELGKKHLELGSSVAVTCEMFRFMMKLV  
SVASACGPRCVNGNIPLPTFKHYVYFMFAPTLLYRDQYPRTKKIRWGLVVFHFMEVGAIVF  
YNCFLWERFIMPYWSDYGKEKTVEAGAVVRGMFACVLPGVISFLCGFYCVLHAWLNAW  
SEMLRFGDRLFYEDWWTTSRFSLYYRRWNRVHWSWLRDHIYLPAPYFGRPLATFAVFFV  
SSIAHEVILALSFGFFYPVLLVEFGILGVIMVPLTATAGRFPNVFNVIMWLGFFIGNGILWS  
LYPMEYFARRNCPPSENDSFFVPKSWSCPEVILKPNWSFQNPLSILFTK

>AIN34702.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MWQSSIIIFAVLLVQVYSAPQFITFKEGKLGVNFGGYHAGVGLGGVAGGSNTAGGLFAEA  
GTPFGQGAKAGLGGAVNGNSGTAGGLYAAATAGGNVNAAAGLGGAVAGGKSVGGGFST  
AQAGGKSATSVLGGESDVSGSSGSFIEAHKSIGVPTTVVKETKVSIVPVEEVKNVQGEAKF  
EATNEIAPSANAGAEGNINAYVNVNAKPEIVKEVSTWKGPYYHTSKIPPFDQDFMSSLFR  
SPQGSYSPPMWAPPQYNYIQQIHAEPTPVVQTIYLRKHKPHRHHVHKAVYVGGYAGVG  
GEVAPPVQQTVVYKTVQPIEKRV DVNV DN AHGAGAAVS GEHYGPSSGV TYTKQVAV  
NSRPSTFFQDIFNIPSTLKA VSGFLSNTAQNTGISVQKSASFNAGGYS GFSGKAGYSGHSG  
YYSY

>AIN34703.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MAMAHNPYINKVSFSAVFGMPWAVIGRSAILYTDSFLYLSGFLNAHNLLTDLEKKGTINLK  
DRLIARWFRLFPLFMSLMLFCTYILPDLNNGPQWNLVVEEHSRVCEKNMWKSFLFIHNYF  
GFEDMCLTHTHQIGMDMQLYVATLPLMVLIWKYKTLGWSLLALIAVASTALRYLAIWY  
DISMFVYYGISVQKLLDAARYSYILPTHRATIYLGIVAMAYLMKNKKLKFTLSTTQTRLW



VFCFALMTATIATPYKWGLEGYKYENFGAALFASLTPILWGVFMCVSHWAIANDYAGIGT  
KFIESRLFKFFNKIAYSVYLTQFPIFFYNVGVQRNPDYYSPLLLLYIPELLIVTVISILTTVAIE  
MPFNQVYRIYFGQSQKKLKEK

>AIN34704.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MVFDNNWTGGWFSWTRQSDAMLRNVEKKILSCLKTAYKRFYVDIGSVVGQSDKIWTISL  
NDESPKTPLVMLHGMGAGLALWCPNLDSFAATRPVYAIDLLGFGRSSRPKFASDAQKAEA  
QWVESVEEWRREVNISQFILLGHSLGGYIATAYAIKYPERVERHLVLADPWGFSERPPNAYE  
KAQLPLWVRAIATAVQPLNPLWAVRAAGPAGKWLVSKTRPDISRKYLNFLPDAERVIPEYI  
YQCNSQTPSGEAAFHSLMTGFGWAKNPMVRRVDEIDPALPITVLYGSRSWVDNTTGQVL  
AEHRGPTNTYVQVINGAGHHVYLDKPELFNKFVLEACARADAHDPRPSLAGASPSAIEAP  
PSKLAIEAAPATSATSTESTGKVNISTEAQSS

>AIN34705.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MGARNLKVLQVISGWQAVELILTCVFVGIWQIIIESVKRLWKGHRRKIEDTSPVELTIDSSI  
GTHCYIKVMGVKYHYVETGPRTGQKVLILKDAPDSGNLWGPNWASVVRRLAETDHHVV  
TLDLRGTGGSEGGSRSDLAPRAVEELSALLKALGVSENQAVVIGFGVGGMLAWYLVHS  
RGPLISKFAVINAPHNLYWQYPPAPFCHRALQFIQWPHFPERWLAEGEMYDREGSWASSR  
ACDWTGALNYVRGAAWWKIKPGLRTSAPALLVGHKDSAGQLVASAQYCTASTLRLVTKP  
DPSSKELTGVLLDFLIAKEKLLEEQVPRGLMGRVFGAVADRGRELTARLVLPMMQA

>AIN34706.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MLRRCSKHLQTLYRRQGQTLRFKSSEAPKVFGALSQAAARTTQPRVLTAAHNQVATIHFT  
NPLFAEQDVMTPSPDSVSEGDAKLGDKKVGDAAVDEVVMEIETDKTALPVMAPGNGII  
KEFYVKDGDTVKAGQKLFRLLETEGGPPPKAAAPAPEPPKADAPPPPPAAAAPPPPPPPA  
AAIPTPPPPPPQAPPAKPAAPISSIPVAAIRHAQSIETATVKVPPTDYSKEIAGTRTEQVRKM  
NRMQRISQRLKEAQNTNAMLTTFNEIDMSHIMAFRKKHLDFTKKHGVKLGLMSPFVK  
AAANALVDQPVVNAVIEDTEIYRDYVDISVAVATPKGLVVPVVRNVQNMTFADIELTIAGL  
AEKAKKGKLTIEEMDGGTFTISNGGVFGSLMGTPINPPQSAILGMHGIFERPIALNGQVVI  
RPMMYIALTYDHRLLIDGREAVMFLRKIKEGVEDPATIIAGL

>AIN34707.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MRATIAKRLSAAKQTIPHYQLTATVNVEKTMAMRKTVNEKLEAEKAGVKVSMNDFIVKA  
VAAACKRVPTVNSHWMDSFIRQFANVDVSVAVATPSGLITPILFNCDSRGIIDLSTNMKELA  
AKAREGKLQNEFMGGTVTVSNLGMYGITMFNAIINPPQSLILACGGLQELVIPDKEDPRG  
FRSAKFVTFTASADHRVIDGAVGAQWMKAFKENMEDPANMIL

>AIN34708.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MIGANKLIGKNNIVYQKFIQQRKFTNKNIKDVNYQYLQRSKLPTMHFQKSLPRLPIPELSK  
TGDRLKALRPLLNDNQFEEAEKRTSNFINNEGKVLQEKLISKDKRNKHTSYISDYWFDL  
YLRDRAALPINYNMIVFQNDVRPEYNDQLIRSTNILITAVRFMLSREQILEPEVYHLNPK  
KSDTQLYRTFTRMLPEAISWYGAYLMKVFLDMSQFVGLFGATRLPRLNKDEIFRDPKSK  
HVLVQKQGNFYVFDVLDTDGNLLSPELLGNLKNIMNDKTPASEHPLGILTQNRDEWAK  
QRDHLEATGNSEVLRKIDSAIFNLILDDDDINDDKRVLLKKYLHSDGTNRWFDKSVSLIVT  
RDGVGGVNFEHSWGDGVAVLRFFQDIYAETTKKPFIHPSKPVDSNISVQKLEFKLDDKS  
KHFIDNAKKEYKAWTDSLIDYILYEGLNKAACKKFKVSPDCIMQLSFQAAHHLLKGNFV  
GTYESCSTSAFKHGRTEETMRPCTVKTKAFCE TLHSNKSSIEELRGKLTECSKLHLELVKDA  
AMGQGFDHRMFALMKMAEDNNMPREIFDSYEYKFLNKSILSTSTLSSPSVMAGGFGPV  
VKEGYGIAYSAPDKLGA AVASYKAHNNSTQYVEALHKSFLDITKILSG

>AIN34709.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MSSRTPLTKAEKVAYALRHEKSYSWHKWFSVLAVLTIIVSLTTYLFGMWTEPPPLPKLDL  
EQHWGPYPIDMKPDNSIRPFTIEFSDVIVNDLRERLLHRRSFTPLENAGFTYGFNTHFLTQ  
VLDFWQNKYNFKEREQFLNKYEHFVTNIQGLDIHYMHVKPKVPGNVTVPPLLLIHGWPG  
SIREFYEIIPKLTTPRPNQEFVFEVIAPSIPGFGFSQAPVRAGMGPIQVSVIFRNLQMQRIGHDE  
YYVQGGDYGSAIGSVMATLFPENILGYHTNMPMVAVNTWVSIYTVLGSGLWPNFIVEPSVQ  
DRMYPLSKHIGKVIEETGYFHIQATKPDTVGIALSDSPAGLAAYILEKFSTWTNMENKKAS  
DGALLQKFSLTHLLDNVMIYWASNTITSSMRHYVEGYKQLMFTDRIPTEVPTWGIFKHE  
ISFQPDSILKLKYKNYLHSSVVEDGGHFAAMELDPVLADDIFDAVHMFRTFHRKKRNKA  
SDKPITKESTKPDAETVNVKVEKESKVNFTVNVKVEKEPKVNFETAKTVEFTVKDIQGQE  
VKLERYKGVLIIVNVASHCGYTNSHYTELNELYEKYSKKGLRILAFPCNQFGGQEPGTLK  
EILQFTKEKKVKFDLFEKIEVNGENAHPLWKFLKRIQGGTLGDFIKWNFSKFIIDRNGVPV  
ERFGPNTSPLELEPYLEKLLG

>AIN34710.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MSFLMRKCIVNLKNVNRCSVVCVLMQTGKHSQYSTSNILKRSIVPSDVHLRQRKFHTSQ  
IVNKIVAFKLSDIGEGIREVVIKEWVVKVGDKVQQFDNICEVQSDKAAVTITSRYDGVVTK  
LYHEVDQTALVGQPLVDIEVQGGADEGTSSAPESIPAAAAKQESVADKSQKVKILTTPSVR  
RIAAQFKVDLSSVKATGRNGRVLKEDMLAHLNISSDKSNEIHEPSSISAMAIPLVPAQAKM  
EVMLEDRVVPVSGFTKAMVKSMTEAMKIPHFGYSDEYDVTKLVESRESLKKLAEAKGVK  
LTYMPIIIKATSLGLEQIPVLNSSLDSTCEHLTYKASHNIGVAMDTPNGLIVPVIKNVQAKTI  
LEVARELNTLQEKSGKQLGLSELTTGGTFTLSNIGIVGGTYTKPVILPPQVAIGALGKIQAL  
PRFDVEGNLRKAHILTVSFSADHRVIDGVTMARFSNLLKNYLENPYSLLLDL

>AIN34711.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MDLTEHEWYIQAPWGRIAIHAWGDCYDPPVLLVHGSMDSAVSFRPLVSKLPKNFYIYIGMD  
LPGNGKSDRFLPGLMISVYDMVYSVHAVVKHFRWKTYTLIGHSFGAYLGQFYNLCPGR  
LDKLVNLDPINFFAVPPEEFGRWYHVFFTDYYKNYDKFNTQPENAPKIKWTEALQSIKSSR  
PSLTEEQAAAVLERLSMPAGDGYVKYTYDLRMKRVNGPAYSPHEIKQLFTTTTKTPILTAC  
QKSLKRKLFRNTDFLLDEAEFPGRNLRFRTVDGTHDVHVSHPERVAAYVGQFLVYGLDGL  
DNKAKL

>AIN34712.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MALVMPFVSVAISILYTPLLLLILCIIFLASIGKSLGVRRLYVNILLKLFYGRQHIEVAKIKIQ  
RTDSSDDEEVPPAPDDDKPPSATIKENGVNGLTNTVIERQEILGPSPELNYKRSTSQERVQN  
GHKPSQNGENNIEFHLNCLDLVKAGMESIIEDQVTSVFEAEELRSWNLLTRTNRYEF  
LTWRLTHIWAMGFVVRYMFLPLRIMIFVIGVWWLVACTACVGTLPDGKTKQRVNYAVSL  
MCFNFLSRCISAVITYHDTHYKPRNGICVANHTSPIDALVLMCDNCYSLIGQRHNGFLGILQ  
RALARASPHIWFERSEVKDRHAVARRLKEHISVPDNPPILIFPEGTCINNTSVMQFKKGSFE  
VGGTIYPVAIKYDPRFGDAFWNSSRYGMLHYLLNMMTSAIVCDVWYLPAMTRAHDES  
AVDFANRVKAVIARRGGLVDLMWDGQLKRMKPKKEWRELQQEEISKRLKGE

>AIN34713.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MAKRLSSSLILNSSGTNLKSSLPVLSKKLHTQQVPTKEIQIPVKFGHLAGKLWGSQDQPIL  
ALHGWQDNAGTWDPLIPMIKDRPILALDFPGHGFSSWIPPGMLYYQWELPRIILYLKEYF  
KMEKVALLAHSMGAIAGMRFATVFPDDVEFYIAIDSLIYDDYDLDAVVDRISKTIKGLLA  
QSRLDKEPPPLYTLEDMIKIWHAGTRKSVALESVPHLLKRGANQSKTDPSKYYFSRDSRLK  
YSLFNPEDKKFVEALVRRLKCPTLYVKAIDSPYSADAYSIEMREILEQVNEKYEYFHVVRGT

HHVHLNNPVLVAPLIKNFQKHNLTI

>AIN34714.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MFNIWEVVKMAAIAKKELFYIWPFGLSAYLAGVVFIDRSNPKNAYKQLQQTSDVMVKS  
KTKIWLFPETRNDYTRIKPFKKGAFNIAVAAQVPIIPVVFSPYYFINKEYIFNGHIIQC  
LEPVPTKGLTMDDVPELINKVHQQMSATYKELSKEVVNALPADYPFTLLG

>AIN34715.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MGNVILAVSMIYLSCHHLHRQIYHTADYSLDITGPLMVITQRTSLAYTLQDSLAVKEIGSN  
GVTETARDPELAKIEKIPSPLEYFAFTLAFQTLTMCGPVVFYSDYIQFIEGARVDACEKGPSV  
AKEEPSRNAVIFKVAGSVAAVLYLSLAKKYPMTALEELTDPASEVSRTWSALYLLWYAY  
LATLVVRCKYYHAWLLSEAICNCCGMGFNGYNNDGTAKWDKLSNIDIFGFEEAQNFRTAI  
SSWNKNTNAWLHRHAYQRGGAAWRTARVYALSAVWHGFYPGYYMTFFAGGIFTVAARK  
IRFLARPVFLDSAPKKLFYDSLFSITTRVAMTYTTVPFVLLHLTPSLAFYGKFYYSLHFIALG  
AMLLPEKSKQPTENYQQSSKETTETSNGKLKIT

>ATJ44623.1 acetyltransferase 30 [*Helicoverpa armigera*]

MENLSSLPLLVDRMRFGNPLGKYFKVDDFLHMGFFDSYCNLFLVQTADIVAAGFGVTREE  
ADEFALRS

>ATJ44622.1 acetyltransferase 29 [*Helicoverpa armigera*]

MATSTKAIFIIGAKRTPFCSYGGPLRELPAYQVFATAAKEAIRSANLEPSLIDNTVVGNVNFL  
SQCDGGKTPRYCGIYSGVPISSPALGVSKACGTGLQAIINSAVDITGNSKVTLAGGTDLM  
SSMPMLVRNVRFGTALGTPYRFEDHIQRQIPDGYTGLTMQKMVEDLANKYGVTRKDVDE  
FALQSHLKWKAEESEKAFELVSLVTLKKKQVLVDKDQTPQSLKSEDLSTLPVLIENG  
NILTPGNTSAPADGAAALLAHEEAVKGHSLQPLARVAGWTCVGVNPEDAGLGGVLAIRN  
LLDSQKLTVGVDLFEINENFASQAVMATRELKIDQSKVNVSGGALAIGDPMSTATGARMA  
THLVHELRRRNLRGIAASSCGGGQGVAILLEKM

>ATJ44621.1 acetyltransferase 28 [*Helicoverpa armigera*]

MASSYSPELFLAGFIFTLPLYEKSNNVFRYYLKFFLYYAYVLITCTVLLPVVLIYPRDVTNL  
IVASRFCRYASYIVGIEWELRGMEHWNSEQCYIVISNHQSSLDILGMFEMWPMKRCCTVV  
AKRPLMFTGAFGFGAWLSGLVFIDRLRTERARQLMKDATARVIKEKTKLWIFPEGARFNK  
GSIQNFKKGAFYLAIDAQIPIMPVVFSSQYYFLDSDTKTFEPGKVIITLPPIPTSGMTRNDVE  
TLSEMARQQMIEVFHESSKDLVMQKKIAI

>ATJ44620.1 acetyltransferase 27 [*Helicoverpa armigera*]

MGARNLKVLQVISGWQAVELILKCVFVGWQIIEISVKGLWKGARRKVKDTPPVELTIDSS  
VGTHCYIKVMGVKYHYVETGPRTGQKVLILKDAPDSGNLWGPNNWANAVRRLAETDHHV  
MTLDLRGTGGSEGSRSELSPPRAVEELSALLKALGV TENRPAVVIGFGVGGMLAWYLVH  
SRGPLISKFAVINAPHPNLYWQFPAAFCRVLHFIQWPHFPERWFAEGELNDCDGRWASS  
RACDWTGALNYVRGAAWQVRPGLRTSAPALLVGDKDSAGQLVASAQHCTTSTLRLVT  
KPEPNSKELAVVLLDFLISKEKLIEEVPRGLMGRMFGAVADRGRELTARLVLPTQA

>ATJ44619.1 acetyltransferase 26 [*Helicoverpa armigera*]

MWDKIIYMIVIVVTYILKQLFSETPNFVKFSKFLVFIWTSVTAVILLPFFVFNPKNVKNS  
LFGSQIVKHVTKVIEVKWLLRNGKVLAE DRGAVVVS NHQSSIDILGMFNIWHVADKVA AI  
ARKEIFYVWPFGLAAYLAGVVFIDRNNSKDAYKQLKITSEVMIKNKTKIWLFP

>ATJ44618.1 acetyltransferase 25 [*Helicoverpa armigera*]

MSEQVEFVDILEPRRTQSGIFSFMTRNWHQPRTLKLDKYFTPQELKDIAANSVYLDAFIEA  
ECSRSGQSKDKLHQEVHNYLEEMGLDKKMHVIRWMGVIFLKISFMMKIKMFVNEAAAF

NLKSVMGNNPVLFLPTHRSYADFCLMTYLCYHFDIDFPAVAAGMDFYSMAVIGRRMRET  
CAFYIRRTLAGEPLYAATLKQYVRTVVGKHAAPIEFFLEGTRSRSNKSMPPKYGMLSMTL  
VPYFAHEVTDITVVPVNISYDRLMEHSLFAYEHLGVPKPKESTGGFLKALHTLNDHFGNIY  
INLGAPLSIREFLKNDTSHSQETLKPLDMQQLTDPQFKQVQSIADYVITLQQKNTVATISNL  
LSLVLMQSLMKNVPLEFEEVLQEVGWMVQELRNLGATVFENDVRSVERILVVHRKMM  
RLDKERRRLRLISGVLVDLSSDVKKKMKGHILQAQTMVAAPVIQLQLYVNPILHYLVPPAI  
CLIVHRSATARDRLEADYHRVRKLLSHEFFHLEKEEPNTFAKALEYCIQNSVISYNGELYAL  
GEDTKLQYLLKWSVWPALTSLLKCAQVMTEQSICAHKQALKLVQQRVESERVHPYCLSL  
EATANCLNGLVAANALVRNKGECDIYELVPHTMQECHNLVSSILPTFSVDFTNNAVVVDH  
KALSRL

>ATJ44617.1 acetyltransferase 24 [*Helicoverpa armigera*]

MKILFILLCVIKLISGTPTPIVLWHGMGDTCCLSFSLGGIKVFLEKNIPGVYVNSLKVGNSSI  
EDLENGYFMNPNQQVEYVCGLLAADPQLKDGFAIGFSQGSQFLRAVVQRCGHILPKIKN  
LISLGGQHQQGVYGLPHCGALMHPTCDYIRQLLNAYAYENWVQNALVQATYWHDPDDE  
TYIHKSIFLSDINNEIMANKTYIQNLNLDHLVLVKFDNDTIVQPRETEWFGYYEPGQSKK  
LLPLRETKIYTEDRLGLKKMDKEGKLILLSTVGDHLRFSDTWFDNILKPYLLN

>ATJ44616.1 acetyltransferase 23 [*Helicoverpa armigera*]

MTYYDYDDGSRIFLFSNKVGLPLDLVNFLIAQVAALCLARLFRKPLRYASPEFRHSVCLVI  
GLTMGYFCFGRQAIHLSVLPMLTYTLLKSVKHQIMGNVILAVSMIYLSCLHLHRQIYHTAD  
YTLDITGPLMVITQRVTSLAYSLQDSLTVKDLKSKATALQTTGGEDLVKIEKIPSPLEYFAFT  
LAFQTLMCPPVVFYTDYIKFIEGARVDELEKSADTKEPSRPTAVFYKVAGSLAAALLYTLT  
AKKYPLTVLEELTDPTSEVSRWSALYLLWYAYLSTLVVRCKYYHAWLLSEAICNNCGMG  
FNGYNNDGSPKWDKMSNIDIFGFQAQNFRIAIASWNKNTNAWL RDVAYSRGGAAWRTA  
RVYALS AVWHGFHPGYLTFFAGGIFTVAARKIRFVARPMFLDSVPKKLFYDSVSFITRVA  
MTYATVPFVLLHLAPSLAFYAKFYYSLHFIALGAMLIPEKAKRPKPAVVQEQQSKSPTLSK  
EAMEESLEELNGKCLKIS

>ATJ44615.1 acetyltransferase 22 [*Helicoverpa armigera*]

MELQDTYYNKSEYVETASGNKVSQRQTVLCGSQNIVLHGKVIVQSDAIRGDLANVKTGRF  
CIISKGSVIRPPFKKFSKGVAFFPLQMGDHFVFGENTVVNAAVVGSYVYIGKNVVIGRRCV  
LKDCCMIEDNSVLP AETVVP SFARYSGSPARLITLPEAMPDLMTEFTKSYYQHFLPTTVQ

>ATJ44614.1 acetyltransferase 21 [*Helicoverpa armigera*]

MSFLMRKCVVNLKNVNRYSACVLMQSERHRSRFSNNVLKRNRLSDVHLQHKKIHTS  
QIVNKTVAFKLSDIGEGIREVVIKEWFVKVGDKVQQFDNICEVQSDKAAVTITSRYDGVVT  
KLYHDVDTTALVGQPLVDIEVQGEADEGSSSSSPEEQPKVTKQESVEEKSQRIKVLTPAVR  
RIAAQFNVDLSTVKATGRNGRVLKEDMLAHLNIDSDGSNEVPAPSSVQAMSIPLTQAKAK  
VEVLLEDKVVPVTGFTKAMVKSMTEAMKIPHFGYSDEYDVTKLVESREALKKIAEARGA  
KLTYMPIIIKATSLSLEQLPVLNSSL DSTCEHLTYKASHNIGVAMDPNGLIVPVIK NVQNK  
TILEIARELNTLQERGSKGQLGLNELSGGTFTLSNIGIVGGTYTKPVILPPQVAIGALGKIQV  
LPRFDAEGNVRKAHILTVSFSADHRVVDGVTMARFSNFLKNYLENPTYTLLLDL

>ATJ44613.1 acetyltransferase 20 [*Helicoverpa armigera*]

MMEHISNIFEVLTKTFSQISDLLGIQWAPMNPMSRRLQTLAAFVWIYLILFGEALAIYLFIQ  
LVYSRFFWAAIYGVWMLNDIDICHRGGRVSQWVRNWTWWRYLCDYFPINLVKTVDL  
PSKNYMFAIFPHGVISLGAFGSFCTNATNFHKLFPGM SCHLITLGGHFLVPFFRDLALAIGM  
CASSEQSLLHLLDQKKYEGNAVCMIIGGAAEALDAHPKEYKVILSRRKG FIRVAMKSGAS

LVPVFSFGETDLFHPNPNPENSLLRRFQEKVRQWTGISPMFPMGRGLFQYSYGVLPPIRSPV  
TTVVGAPMEVKRNLEPTNEEIDAVHAEFTKRLQTLFETEKVKYLKYHEEAKLVIT

>ATJ44612.1 acetyltransferase 19 [*Helicoverpa armigera*]

MAVVINKGIFIVAARKRTPFGRFGGAFKEVYPSDLLAAAKDALKSGSVAPEIIDTVNIGQV  
YGISGSSDGGLSPRHAALKSGIPQEKPALGISRLCGSGFQAVVNSAQDIITGAANISLAGGT  
ENMSTVPFVVRNTRFGVGLGAKMPFEDVLTSSLDTSNFTMPETAENLAEKYGLQRME  
VDQFALQSQQRWKAAHDQGVFKAEMTPVTVKVKRQEKVVEVDEHPRPDTTTEMLSRLP  
VLFRKGGVVTAGNSSGVNDGAGALILATEESVKQHGLKPLVRLLAWSVVGVDPSVMGIG  
PVPAIQNLLSATGLKLDDIDLVEINEAFAAQTLACAKELGLDQSKLNVNGGAIAMGHPVG  
ASGARITAHLAHELRRRGLKRGIGSACIGGGQGIALLLETV

>ATJ44611.1 acetyltransferase 18 [*Helicoverpa armigera*]

MFGVALCLLDVIGLNPIPIAGIIGATVPAVNLLISILLGYPLAIYHKYVRKTVELRNLYFIVT  
GMDLAYFNFGTSMYHNAIPAIVIYLSACLGPCKMNVIFTFAFNMIYLLAGYVMTESEDY  
DITWTMPHCVLTLKLIALSFIDIWDGDKFLKGEELSKNNLQTALPTQPTFLELIGFVYFPACF  
LVGPIFSFRRYKDYITDVFPDLTAPEVYEELALKRLFQGVCYLAAYQIGVSVFSMKSMMLSD  
EFRDTSIFYRHFYCGLWAHFALYKYISCWLLTEAACIRFGLSFNGFVGPVKTLTKWDGCNN  
IKLMRFESATRFQHYIDSFNCNTNHFASEYVYKRLRFLGNRNLSQLITLAFLALWHGTQSG  
YYMTFLNEFLIMVMEKDIEAILTKTAFYDKMWSTPYVKYPLYVILKTYTIVFMGWSLAPF  
DVKSFGKWWSIYSSLYFSGFILPWSFVYKPMIILLKRNAASHKAS

>ATJ44610.1 acetyltransferase 17 [*Helicoverpa armigera*]

MASQISKSLKVSHTSSTAKFDTARRALSVGAALQQKKKSLPDRTGKNVVLVDGVRTPFL  
VSFTDYAKMMPHELARHSLGLLQKTGISKDLIDYIVYGTVIQEVKTSNIGREAALAAGFS  
DKTPAHTVTMACISSNQAITTGVMIAAGAYDIIVAGGVEFMSDVPPIRHSRKMRSLRLRN  
RAKTPAQRLSLIASIRPDFFAPELPAVAEFSSGETMGHSADRLAAAFGASRQEQQDDYALRSH  
KLAHEAQKQGYFTDLMPVKVDGKDGVDKDNIRVSTPEQLAKLKPAFIKPHGTVTAAN  
ASFLTDGASACLVMSSEAKAKELGLKPKAYLRDFTYVAQDPVDQQLLGPAYGIPKILDKAG  
LKMSDVDVTWEIHEAFAGQILANLKAMDSDWFAQTYLGRQTKVGAPDLDKWNKWGGSL  
SIGHFPAATGVRLAMHTAHLVREDGQFGVISACAAGGQGVAMILERHPDATCN

>ATJ44609.1 acetyltransferase 16 [*Helicoverpa armigera*]

MWYKIFIFTIVCVLTYILKKLHDTGPNRVKIFYNFFLFYFLSSMLAAVIWPYFLLSPRNVN  
AKIAVRLKHKITKLYDLKWHLRDGGKILAEDRGAVIISNHQSSLDILGMFNIWEVVDKLA  
AKKELFYVWPFGLSAYLAGVVYIDRRNAKGAYKQLKVTSEVMVKNKTKIWLFPETR  
KDYTKLQPFKKGAFNIAVAAQVPIIPVVFSPYFINKYIFNKGHVIIQCLEPVPTVGLTME  
DVPDLIDRVHHKMSVAYQEISKEVFSSLPDYPVTLKG

>ATJ44608.1 acetyltransferase 15 [*Helicoverpa armigera*]

MAKRLLSRLILNSGTTLSPLPILSKKLHTQIPVKEIQIPVKFGHMSGKLGSGDKQPILA  
LHGWQDNAGTWDPLIPMIKDRPILALDFPGHGLSSWIPPGMLYYQWELPRVILYLKEYFK  
MEKVSLSMESHMGAIASMRFATVFPDDVEFFIAIDSLIYDDYDLNSVNVNRISKTLRKGLIAQ  
TRLDQEPPAYTMEEMIKIWHLGTRKSVSMESVPHLLKRGAKQTKSDPSKYYFSRDSRLKY  
TLFNPEDRKVFVEALVKRLKCPTLYVKAIDSPYSADPYSIEMREILEQINDKYEHFVPGTHH  
VHLNNPELVAPLIKNFVQKHNLSI

>ATJ44607.1 acetyltransferase 14 [*Helicoverpa armigera*]

MFASEVLRSDNMASKRSNTFKVLLASLAVAALGYVLRSPSLYLRRETKSSLGYPKDSLL  
NFTELTAEGYLSEEHKVLTDGTYLTMFRIVKARNCHRAKRSPPVLLMHGLLQSSDSWID

SGPDAGLAYLISDACYDLWLGNVRGNYYREHVRLLDPDKDPAYWKFYIEEIGIYDVPAMI  
DYVLNYTGFEKLNIGFSQGTGTFLVMCSEKPGYCDKVKLVISLAPASRQMHTQSKIFRT  
MTQTfYRMEGLLSMTGLQEVSFG

>ATJ44606.1 acetyltransferase 13 [*Helicoverpa armigera*]

MAFAGLKKQINKANQYVTEKMGGAEGTKLDLDFVEMERKTDVTCELVEELQTKTKEFL  
QPNPTARAKMAAVKGISKLSGQAKSNTYPQPEGVLGDCMLLYGKKLGEDTVFSNCLIEM  
GEALKQMADVYSLDDNIKQNFLEPLHHLQTKDLKEVMHHRKKLQGRRLDFDCKRRRQ  
AKGAHIADDEIRQAEEKFAESLQLAQIGMFNLLDNDVEQVAQLTYFAESLLEYHQQCTEIL  
KGLVSTLMEKKEEAVNRPKMEFVPKTLADLHIEGIHDLNNGRRYGSTQSLSRPRQHIPPSS  
SVGDLSTTDPFKAWEPSPVRAQVRPAPGFKPHPAPRNQFNGRDPWKASPLSPVKSPART  
PVVANKTPCCTALYDFEPENQGELGFKENDVITLINKVDDNWFEGSVNGKTGYFPISYVQ  
VTVPLPNM

>ATJ44605.1 acetyltransferase 12 [*Helicoverpa armigera*]

MALKIVFLGLVLFITPILCYKPVVLIHGVMTGSASMEMIKFRIEEQHPGTIVYNNRFESWS  
SLETMWHQVLEIGMDIANISASHPEGINLIGYSQGGLIARGIVETFPNVSVSTFISLSSPQAG  
QYGAGFLHLVFPGLVKDTVYELFYSRVGQHTSVGNYNWDPYHQSLYETYSVYLPYINNHI  
KSAKSEDFKKNLLRLKRLVLIGGPDDNVITPWQSSQFGYYDANETHIEMKSQDIYMEDKIG  
LRTLDESGRLHVTVPGVNHFSWHMNISIVDDYLLPYLD

>ATJ44604.1 acetyltransferase 11 [*Helicoverpa armigera*]

MIRANTIIFKNNSVCQKFQNRNFKNVVDVEYQYLQRSKLPTMHFQKSLPRLPIPDLSK  
TGERYLKALRPLLNDNQYEEAQRTGNFIAKEGKILQEKLIAKDKRNKHTSYISEYWFDL  
YLRDRVPLPINYNPMIVFQNDVRPEYNDQLIRSANILISSVRFMLSLREQILEPEVYHMPK  
KSDTPLFRNFTRMLPEAISWYGAYLMKVPLDMSQFVGLFGATRLPRQTKDEIFRDPKSK  
HVVVQKQGNFYVFDVLDANGNLLSPQEILGNLAQIMNDNTTAAEHPLGILTQNRDVWA  
KQRSHLESTGNSEVLNKIDSAIFNLILDDDTINDDKRVLLKKYLHSDGLNRWFDKSFSLIVT  
RDGVAGVNFESWGDGVAVLRFFQDIYAETTKKPFHPDSKPADSNISVQKLEFKLDDKSK  
QFIDNAKKEYKAWCDSLSIDYILYEGLNKAACKKFKVSPDCIMQLSFQAAHLLKGNFVG  
TYESCSTSAFKHGRTEMRPCTDKTKAFCETLHSNNTSIDELEAKLTECSKLHLELVKDAA  
MGQGFDRHMFALMKMAEDNNMPRPEIFDSYIEYKFLNKSILSTSTLSSPSVMAGGFPGPVV  
KEGFGIAYSAPDKLGAASVYKPHNDSSQYIEALHKSFLDITKILSG

>ATJ44603.1 acetyltransferase 10 [*Helicoverpa armigera*]

MDLVEHEWYIQAPWGRIAIWGDCCNPPVLLCHGSMDSAVSFRPLVSKLPRNYYYIGLD  
LPGNGKSDRFLPGLMISVYDMLYAIHALVKHFRWKTFTLIGHSFGAYLGQFYNLCPDKL  
ELLINLDPINFFAVPPEEFSRWYHIFFTNFYKNYDKYNTPKESPTIKWTEALQSLMRNRP  
LNEEQAAAVLERLSEPVGDGCVRYTYDLRMKRINGPAYSPHEVKKLFTAVRTPILTACQK  
SLKNKLFNRNTAFLLDEAEYPGGNFRFKSVEGSHDVHISHPERVAGFIGQFLEYGVEGLDKK  
SKL

>ATJ44602.1 acetyltransferase 9 [*Helicoverpa armigera*]

MALIMPFVSVAISILYTPLLLLILCIIFLASIGKSLGVRRLYVNILLKLFYGRQHIEVAKIKIQ  
RSDSSDEEELPPIPDDTPPSAIVKENGANGTKMTVIERHEILGPSPELNYKRSTSQERVQNG  
HKTPQGNGENNMEFHLSNCLDLVKAGMESIIEDQVTSVFEEELRSWNLLTRTNRQYEF  
TWRLTIWAMGFVVRYMFLPLRIMIFVIGVWWLVACTACIGTLPDGRTKQRVNYAISVMC  
FNFLSRCISAVITYHDTDYKPKNGICVANHTSPIDALVLMCDNCYSLIGQRHNGFLGILQRA  
LARASPHIWFERSEVKDRHAVARRLKEHISVADNPPILIFPEGTCINNTSVMQFKKGSFEVG

GTIYPVAIKYDPRFGDAFWNSSRYGMLHYLLNMMTSWAIVCDVWYLPAMTRAADESAV  
DFANRVKAVIARRGGLVDLMWDGQLKRMKPKKEWRELQQEEISKRLKGE

>ATJ44601.1 acetyltransferase 8 [*Helicoverpa armigera*]

MNIRCARPSDLMNMQHNCNLLCLPENYQMKYYFYHGLSWPQLSYVAEDEKGHIVGYVLA  
KMEEDGEDNRHGHITSLAVKRSHRRLGLAQKLMNQASLAMVECFQAKYVSLHVRKSNR  
AALNLYTNSLGFKILEIEPKYYADGEDAYSMMRDLSAFAAESKDTQPTENLEIKSESAIISQ  
C

>ATJ44600.1 acetyltransferase 7 [*Helicoverpa armigera*]

MLRRCSKHLQTLYRRQGQTLRFKSTEAPKVFGLSQAARTTQPRVLSAAQNQIATIHFT  
NQLFAEQDVMTPSFDPDSVSEGDAKIEKKVGDAMDEVVMEIETDKTALPVMAPGNNGIHK  
EFYVKNNGDTVKAGQKLFRLTEGAPPKAAAPPAPEPPKAEAPPPPPAAAAPPPPPPPAA  
AAPPPPPPPAPKAEAPRAAPISSIPVAAIRHAQSIETATVKVPPTDYSKEMAGTRTEQRVKM  
NRMQRQAQRLKEAQNTNAMLTFNEIDMSHIMAFRKKHLDAFTKKHGVKLGMLSPFVK  
AAANALMDQPVVNAVIEDQEIIYRDYVDISVAVATPKGLVVPVVRNVQNMITYADIETIAG  
LAEKAKGGKLTIEEMDGGTFTISNGGVFGSLMGTPINPPQSAILGMHGIFERPIALNGQVV  
IRPMMYIALTYDHRLLIDGREAVMFLRKIKEGVEDPATIIAGL

>ATJ44599.1 acetyltransferase 6 [*Helicoverpa armigera*]

MNHSYEIDWLMGWHFNCNTIGVLGNCKAYAKKSIQYLPPIGWMMWKFFSEFVFLERSYEKDK  
ETIKHQISELCDYPDPVWLLMTPEGTRYTKKKHEASLSFAKEKNLPLLKHHLTPTTRGFTT  
SLQFFRGKIPVIYNIQLAFEKDSKTPTLTSLLYGKPVHAHLYIERIPVENIPVDEAEAAKWL  
HDLFVVKDKMQDSFFNTGDDFTESGVERTEPFTVPPPIWSLVNALGWAVVTLTPMLYLL  
GLLFSGKLLYFSIACAIFGAFFILLQKSIGMSKISQGSSYGTEKK

>ATJ44598.1 acetyltransferase 5 [*Helicoverpa armigera*]

MAAYSSKLSLNDVVIASAVRTPIGSFKGSLSLSATELGGVAVKAAVERAGIPKEEVKEVY  
MGNVCSAALGQAPARQASIFGGLPKSTICTTVNKCSSGMKAIVLATQGLQTGTQDVILA  
GGMESMSNVPPYYLKRGDTPYGGVQLNDGILYDGLTDVYNKIHMGNCAENTAKKLNISR  
KEQDDYAISYKRSAAAYENKTFADELVPVPVPQKRGAAAPVIFAEDDEYKKINFDFKFTSLA  
TVFQKENGTVTAGNASTLNDGAAAMVLMTADAAQRLNVKPLARVIGYADGECDPIDFPI  
APAVAIPKLLAKTGKKEDVAMWEINEAFSVVALSNMKMLELDSNKINIHGGAVSIGHPIG  
MSGARIVVHLCHALKKGEKGVAAVCNGGGGATSIMIEKL

>ATJ44597.1 acetyltransferase 4 [*Helicoverpa armigera*]

MDGKTTKMPKVAKVKNKAPAEIQITAEQLLREAKERDLEILPPPPKQKISDPEELRDYQHR  
KRKAFEDNIRKNRLVIGNWLKYAQWEESQKQVQRARSIYERALDVDHRNVTWLKYTE  
MEMRNRQVNHARNLWDRAVTILPRVSQFWYKYTYMEEMLENVAGARQVFERWMEWQ  
PDEQAWQTYINFELRYKELDRARQIYERFVMVHPDVKNWIKYAKFEENHGFINGSRKVFE  
RAVEFFGDEDLDERLFIAFAKFEENQKEHDRAVVIKYALDHIPKDRNKELYKAYTIHEKK  
YGDRSGIEDVIVNKRKYMYEQEVIENTPTNYDAWFDYIRLVENEGNVDDIRDTYERAIANV  
PPSKDKQFWRRIYLWINYALYEELEAEDAERTRQVYRTCLELLPHKIFTFSKIWLMYAQF  
EVRCKDLKQARKTLGMALGICPRDKLYRGYIDLEIQLREFDRCRILYQKFLEYGPENCITW  
IKFAELETLLGDIDRARAIYEIAVGQPRLDMPPELLWKSIDFEVQQGETEKARQLYERLLER  
TVHVKVWLSYAKFELNAENADNFNVELARRVYERANDSLRSAGEKEARVLLLEAWKDF  
ETEIGDEEKLEKVMAMKPRRVKKRQKIISESGVEEGWEEVFDYIFPEDEMVRPNLKLAA  
AKQWRKQKEVAQPAEPETQNEDQDDEGHTPPQRNDDEIENENN

>ATJ44596.1 acetyltransferase 3 [*Helicoverpa armigera*]

MSVAAKGIFIVGAKRTAFGTGGVFRNTSATELQTIAATAAIKEAGIAPEKVDTVVVGQVM  
TASQTDGIFIPRHVALKSGIPQDRPALGVNRLCGSGFQSVVNSAQDILTGAAKISLAGGVEN  
MSQAPFAVRNVRFGTALGSTYAFEDTLWAGLTDSYCGLPMGMTAEKLG AQFKITRDEAD  
NFALRSQQRWKA AQDAGVFKNEITPVTLT VKRKEVKVEVDEHPRPQT TIEGLKKLPVFK  
KEGLVTAGTASGISDGAGAIVLASEEAAKGLKPLARLVGWSYVGVDPSIMGVGPVPAIEN  
LLKVTKMTLNDIDLIEINEAFCAQTLSCAKALKLDMEKLVNNGGATALGHPLGASGSRIT  
AHLVHELKRRGLKRGIGSACIGGGQGIALMVEAV

>ATJ44595.1 acetyltransferase 2 [*Helicoverpa armigera*]

MTALAAKRLYQNTGISPKQVDVVELHDCFAANELITYEGLQLCGEGEAGKFVDAGDNTY  
GGRVVVNPSGGLIAGHPLGATGLAQCAELVWQLRGEAGERQVPRAKIALQHNLGLGGA  
VVVTMYRKGFADITPRPVAASGNPEDFKVKYMKILEEAMENDTENLIEKVRGIYGFKVR  
NGPNGAEGYWVINAKEGKGKVTYNGGEKPDVTF TISDEDVVDLISGKLN PQKAFFQGKI  
KIQGNMGLAMKLTDLQRQAAGRIESIRSKL

>ATJ44594.1 acetyltransferase 1 [*Helicoverpa armigera*]

MSANVVFGCVMALLIILFTISSMARYYIKFTLFTVMSLIFATAPVPLMLIKPFDPRNALIPAF  
FLRCFAKILGLRWTVRGLENVDNSRGAVVLLNHQSALDLYALAIIWPLMSRCTV VAKRSL  
QYLVPFGTATWLWGTVFIDRGAQTARDALNKQVDAIKNHKRKLLLFPEGTRHSGDKLLPL  
RKGAHVAMDAGAPIQPVVVSKYHYLDGKRQRFGSGEFIVSILPMIETEGMSKDDIGALIE  
KTQTSMQEEFTKISMETLARRNLRNKAD

>ATJ44564.1 acetyltransferase 1 [*Helicoverpa assulta*]

MSANVVFGCVMALLIILFTISSMARYYIKFTLFTVMSLIFATAPVPLMLIKPFDPRNALIPAF  
FLRCFAKILGLRWTVRGLENVDNSRGAVVLLNHQSALDLYALAIIWPLMSRCTV VAKRSL  
QYLVPFGTATWLWGTVFIDRGAQTARDALNKQVDAIKNHKRKLLLFPEGTRHSGDKLLPL  
RKGAHVAMDAGAPIQPVVVSKYHYLDGKRQRFGSGEFIVSILPMIETEGMSKDDIGALIE  
KTQTSMQEEFTKISMETLARRNLRNKAD

>ATJ44566.1 acetyltransferase 2 [*Helicoverpa assulta*]

MPRKVFVVGVMNTFIKPSTGPDYPELGKEAVLAALADARIKYSDIQQAVCGYVFGDSTC  
GQRVLYQVGMTGIPIFNVNNNCSTGSNALYLAKK LIEGGVSDVMLAVGF EKMAPGALSA  
GVFNDRTPMDRHTLKMAELAELTGAPMTAQYFGNAAAEHMKKYGTTELHLAKIAAKN  
HRHGVKNPRAQ GKREYTVEEVLNSRRIYGPLTKLECCPTSDGAGAAVLMSEEAVIKYGLQ  
AKAVEIIGMEMATDTPAVFEENSLMKVAGFDMTALA AKRLYQNTGISPKQVDVVELHDCF  
AANELITYEGLQLCGEGEAGKFVDAGDNTY GGRVVVNPSGGLIAGHPLGATGLAQCAE  
LVWQLRGEAGDRQVPRAKIALQHNLGLGGA VVVVTMYRKGFADITPRPVAASGNPEDFKV  
FKYMKILEEAMENDTENLIEKVRGIYGFKVRN GPNGAEGYWVINAKEGKGKVTYNGGE  
KPDVTF TISDEDVVDLISGKLN PQKAFFQGKIKIQGNMGLAMKLTDLQRQAAGRIESIRSK  
L

>ATJ44567.1 acetyltransferase 3 [*Helicoverpa assulta*]

MSVAAKGIFIVGAKRTAFGTGGVFRNTSATELQTIAATAAIKEAGIAPEKVDTVVVGQVM  
TASQTDGIFIPRHVALKSGIPQDRPALGVNRLCGSGFQSVVNSAQDILTGAAKISLAGGVEN  
MSQAPFAVRNVRFGTALGSTYAFEDTLWAGLTDSYCGLPMGMTAEKLG AQFKITRDEAD  
NFALRSQQRWKA AQDAGVFKNEITPVTLT VKRKEVKVEVDEHPRPQT TIEGLKKLPVFK  
KEGLVTAGTASGISDGAGAIVLASEEAAKGLKPLARLVGWSYVGVDPSIMGVGPVPAIEN  
LLKVTKMTLNDIDLIEINEAFCAQTLSCAKALKLDMEKLVNNGGATALGHPLGASGSRIT  
AHLVHELKRRGLKRGIGSACIGGGQGIALMVEAV



>ATJ44568.1 acetyltransferase 4 [*Helicoverpa assulta*]

MDGKTTKMPKVAKVKNKAPAEIQITAEQLLREAKERDLEILPPPPKQKISDPEELRDYQHR  
KRKAFEDNIRKNRLVIGNWLKYAQWEESQKQVQRARSIYERALDVDHRNVTWLKYTE  
MEMRNRQVNHARNLWDRAVTILPRVSQFWYKYTYMEEMLENVAGARQVFERWMEWQ  
PDEQAWQTYINFELRYKELDRARQIYERFVMVHPDVKNWIKYAKFEENHGFINGSRKVFE  
RAVEFFGDEDLDERLFIAFAKFEENQKEHDRARVIYKYALDHIPKDRNKELYKAYTIHEKK  
YGDRSGIEDVIVNKRKYMYEQEVIENTNYDAWFDYIRLVENEGNVDDIRDTYERAIANV  
PPSKDKQFWRRIYLWINYALYEELEAEDAERTRQVYRTCLELLPHKIFTFSKIWLMYAQF  
EVRCKDLKQARKTLGMALGICPRDKLYRGYIDLEIQLREFDRCRILYQKFLEYGPENCITW  
IKFAELETLLGDIDRARAIYEIAVGQPRLDMPPELLWKSIDFEVQQGETEKARQLYERLLER  
TVHVKVWLSYAKFELNAENADNFNVELARRVYERANDSLRSAGEKEARVLLLEAWKDF  
ETEIGDEEKLEKVMAMKPRRVKKRQKIISESGVEEGWEEVFDYIFPEDEMVRPNLKLLAA  
AKQWRKQKEVALPAEPETKNEDQDDEGHTPPQRNDDEIEN

>ATJ44565.1 acetyltransferase 5 [*Helicoverpa assulta*]

MAAYSSKLSLNDVVIASAVRTPIGSFKGSLSLSATELGGVAVKAAVERAGIPKEEVKEVY  
MGNVCSAALGQAPARQATIFGGLPKSTICTTVNKCSSGMKAIVLATQGLQTGTQDVILA  
GGMESMSNVPYYLKRGDTPYGGVQLNDGILYDGLTDVYNKIHMGNCAENTAKKLNISR  
KEQDDYAISYKRSATAYENKTFADELVPVPVPQKRGAAPVIFAEDDEYKKNFDFKFTSLAT  
VFQKENGTVTAGNASTLNDGAAAMVLMTADAAQRLNVKPLARVIGYADGECDPIDFPIA  
PAVAIPKLLAKTGVKKEDVAMWEINEAFSVVALSNMKMLELDSNKINIHHGAVSLGHPIG  
MSGARIVVHLCHALKKGEKGVAACNGGGGATSIMIEKL

>ATJ44574.1 acetyltransferase 6 [*Helicoverpa assulta*]

MINLNILKQSTIVHLCFAISYFTSGLILTFIQAVLYFGLKPFNKSLYRKINYLSYSFYSQLVF  
MSEWWSNTKLSIYIKKDEYDKYYGKEHGYLMNHSYEIDWLMGWHFcntigVLGNCKA  
YAKKSIQYLPPIGWMWKFSEFVFLERSYEKDKETIKHQISELCDYPDPVWLLMTPEGTRYT  
KKKHESLSFAKEKNLPLLKHHLTPTRGFTTSLQFFRGKIPVIYNIQLAFEKDSKTPTLTS  
LLYGKPVHAHLYIERIPVENIPVDEAEAAKWLHDLFVVKDKMQDSFFNTGDFFTESGVER  
TEPFTVPPPIWSLVNALGWAVVTLTPMLYLLGLLFSGKLLYFSIACAIFGAFFILLQKSIGM  
SKISQGSSYGTEKK

>ATJ44571.1 acetyltransferase 7 [*Helicoverpa assulta*]

MLRRCSKHLQTLYRRQGQTLRFKSTEAPKVFGALSQAAARTTQPRVLSAAQNQIATIHFT  
NQLFAEQDVMTPSFPDSVSEGDAKIEKKVGDAMDEVVMEIETDKTALPVMAPGNNGIHK  
EFYVKNGDVTAKAGQKLFRLELTEGAPPPKAAAPPAPEPPKAEAPPPPPAAAAPPPPPPPAA  
AAPPPPPPPAPKAEAPRAAPISSIPVAAIRHAQSIETATVKVPPTDYSKEMAGTRTEQRVKM  
NRMQRQAQRLKEAQNTNAMLTTFNEIDMSHIMAFRKKHLDaftKKHGVKLGLMSPFVK  
AAANALMDQPVVNAVIEDQEIIYRDYVDISVAVATPKGLVVPVVRNVQNMTYADIELTIAG  
LAEKAKGGKLTIEEMDGGTFTISNGGVFGSLMGTPINPPQSAILGMHGIFERPIALNGQVV  
IRPMMYIALTYDHRLIDGREAVMFLRKIKEGVEDPATIAGL

>ATJ44577.1 acetyltransferase 8 [*Helicoverpa assulta*]

MNIRCARPSDLMNMQHcnllCLPENYQMKYYFYHGLSWPQLSYVAEDEKGHIVGYVLA  
KMEEDGEDNRHGHITSLAVKRSHRRLGLAQKLMNQASLAMVECFQAKYVSLHVRKSNR  
AALNLYTNSLGFKILEIEPKYYADGEDAYSMMRDLSAFAAESKDTQPTENLEIKSESaiISQ  
C

>ATJ44569.1 acetyltransferase 9 [*Helicoverpa assulta*]

MALIMPFVSV AISILYTPLLLLILCIIFLASIGKSLGVRRLYVNILLKLFEYGRQHIEVAKIKIQ  
RSDSSDEEELPPIPDDTPPSAIVKENGANGTKMTVIERHEILGPSPELNYKRSTSQERVQNG  
HKTPQGNGENNM EFHLSNCLDLVKAGMESIIEDQVTSVFEAEELRSWNLLTRTNRQYEFL  
TWRLTIIWAMGFVVRYMFLPLRIMFVIGVWWLVACTACIGTLPDGR TKQRVNYAISVMC  
FNFLSRCISAVITYHDTDYKPKNGICVANHTSPIDALVLMCDNCYSLIGQRHNGFLGILQRA  
LARASPHIWFERSEVKDRHAVARRLKEHISVADNPPILIFPEGTCINNTSVMQFKKGSFEVG  
GTIYPVAIKYDPRFGDAFWNSSRYGMLHYLLNMMTSWAIVCDVWYLPAMTRA ADES AV  
DFANRVKAVIARRGGLVDLMWDGQLKRMKPKKEWRELQQEEISKRLKGE

>ATJ44573.1 acetyltransferase 10 [*Helicoverpa assulta*]

MDLVEHEWYIQAPWGRIAI IAWGDCCNPPVLLCHGSMD SAVSFRPLVSKLPRNYYYIGLD  
LPGNGKSDRFLPGLMISVYDMLYAIHALVKHFRWKTFTLIGHSFGAYLGQFYNL CYPDKL  
DRLINLDPINFFAVPPEEFSRWYHIFFTNFYKNYDKYNTPKESPTIKWTEALQSLMRNRPS  
LNEEQAAAVLERLSEPVGDGCVRYTYDLRMKRINGPAY SPEHVKKLFTAVRTPILT IACQK  
SLKNKLFRNTAFLLD EAEYPEGNFRFKSVEGGHDVHISHPERVAGFIGQFLEYGLEGLDKK  
SKL

>ATJ44576.1 acetyltransferase 11 [*Helicoverpa assulta*]

MIRANTIIFKNNSVCPKFNQQRNFNKNVKDVEYQYLQRSKLPTMHFQKSLPRLPIPDLSKT  
GERYLKALRPLLNDNQYEEAQQRTGNFIAKEGKILQEKLIAKDKRNKHTSYISEYWFDLY  
LRDRVPLPINYNPMIVFQNDVRPEYNDQLIRSANILISSVRFMLSLREQILEPEVYH MNPKK  
SDTPLFRNFTRMLPEAISWYGAYLMKVFP LDM SQFVGLFGATRLPRQTKDEIFRDPKSKH  
VVVQKQGNFYVFDVLDANGNLLSPQEILGNLAQIMNDNTTAAEHPLGILT TQNRDVWAK  
QORTHLESTGNSEVLNKIDSAIFNLILDDDTINDDKRVLLKKYLHSDGLNRWFDKSFSLIVTR  
DGVAGVNF EHSWGDGVAVLRFFQDIYAETTKKPF IHPDSKPADSNISVQKLEFKLDDKSKQ  
FIDNAKKEYKAWYNSLSIDYILYEGLNKAACKKFKVSPDCIMQLSFQAAHLLKGNFVGT  
YESCSTSAFKHGR TETMRPCTDKTKAF CETLHSNNTSIDELRAKLTECSKLHLELVKDAA  
MGQGFD RHMFALMKMAEDNNMPRPEIFDSY EYKFLNKSILSTSTLSSPSVMAGGF GPVV  
KEGFGIAYSAFPDKLGAAVASYPHNDSSQYIEALHKSFLDITKILSG

>ATJ44575.1 acetyltransferase 12 [*Helicoverpa assulta*]

MALKIVFLGLVLFISPILCYKPVVLIHGVMTGSASMEMIKFRIEEQH PGTIVYNVNR FESWS  
SLETMWHQVLEIGMDIANISASHPEGINLIGYSQGGLIARGIVETFPNVSVSTFISLSSPQAG  
QYGAGFLHLVFPGLVKDTVYELFYSRVGQHTSVGN YWNDPYHQSLYETYSVYLPYIN NHI  
KSAKSEDFKKNLLRLKRLVLIGGPDDNVITPWQSSQFGYYDANETIEMKSQDIYMEDKIG  
LRTLDESGRLHVTVPGVNHFSWHMNISIVDDYLLPYLD

>ATJ44588.1 acetyltransferase 13 [*Helicoverpa assulta*]

MAFAGLKKQINKANQYVTEKMGGAEGTKLDLDFVEMERKTDVTCELVEELQTKTKEFL  
QPNPTARAKMAAVKGISKLSGQAKSNTYPQPEGVLGDCMLLYGKKLGEDTVFSNCLIEM  
GEALKQMADV KYSLDDNIKQNFLEPLHHLQTKDLKEVMHHRKKLQGRRLDFDCKRRRQ  
AKGAHIADDEIRQAEEKFAESLQLAQIGMFNLLDNDVEQVAQLTYFAESLLEYHQQCTEIL  
KGLVSTLMEKKEEAVNRPKMEFVPKTLADLHIEGIHDLNNGRRYGSTQSLSRPRQHIPPSS  
SVGDLSTTDPFKAW EAPSPVRAQVRPAPGFKPHPAPRNQFN GRDPWKASPLSPVKSPART  
PVVANKTPCCTALYDFEPENQGELGFKENDVITLINKVDDNWFEGSVNGKTGYFPISYVQ  
VTVPLPNM

>ATJ44570.1 acetyltransferase 14 [*Helicoverpa assulta*]

MASKRSNTFKVLLASLAVAALGYVLRSPSLYLRRET KSSLGYPKDSL NTFELTA EYGYLS

EEHKVLTDDGYILTMFRIVKARNCHRAKRSPVLLMHGLLQSSDSWIDSGPDAGLAYLISD  
ACYDLWLGNVRGNYYSRGHVRLDPDKDPAYWKFYIEEIGIYDVPAMIDYVLDYTGFEKL  
NYIGFSQGTGTFLVMCSEKPGYCDKVKLVISLAPASRQMHTQSKIFRTVTQTIFYKMEGLLS  
MTGLQEVSFKGGFSQEFVAFFCQLSGVTERLCEKVIDAFDHVDSTHLGSITNHTTRVLFGH  
FPAGTSVHNMARYGQSMNSGRFEKFDYGREQNLVLYGSEEPQYNLSATTVPVMCIYGK  
NDGLVDTKDVEWLMAQLPNVLEMVKVEDPQWNHMDVTYSQYTGDTIFPKINEYLLKYT  
ST

>ATJ44580.1 acetyltransferase 15 [*Helicoverpa assulta*]

MAKRLVSRILNSNGTTLKSPLPILSKKVHTQIPVKEIQIPVKFGHMSGKLGWSGDKQPILA  
LHWQDNAGTWDPLIPMIKDRPILALDFPGHGLSSWIPPGMLYYQWELPRVILYLKEYFK  
MEKVSLSMESHMGAIASMRFATVFPDDVEFFIAIDSLIYDDYDLNSVVRNRIKTLRKGLIAQ  
TRLDQEPPAYTMEEMIKIWHLGTRKSVSMESVPHLLKRGAKQTKSDPTKYYFSRDSRLKY  
TLFNPEDRKFEALVKRLKCPTLYVKAIDSPFSADPYSIEMREILEQINDKYEYFHVPGTHH  
VHLNNPELVAPLIKNFVQKHNLSI

>ATJ44590.1 acetyltransferase 16 [*Helicoverpa assulta*]

MWYKIFIFTIVCVLTYILKKLHDTGPNRVKIFYNFFLFYFLSSMLAAVIWPYFLLSPRNVN  
AKIAVRLKKHITKLYDLKWHLRDGKILAEDRGAVIISNHQSSLDILGMFNIWEVVDKLA  
AKKELFYVWPFGLSAYLAGVVYIDRRNAKGAYKQLKVTSEVMVKNKTKIWLFPETR  
KDYTKLQPFKKGAFNIAVAAQVPIIPVVFSPYYFINKEKYIFNKGHVIIQCLEPVPTVGLTME  
DVPDLIDRVHHKMSVAYQEISKEVFSSLPSPDYPTLKG

>ATJ44579.1 acetyltransferase 17 [*Helicoverpa assulta*]

MASQISKSLKVS HVSSSTAKFDTARRALSVGAALQQKKKSLPDRTGKNVVLVDGVRTPFL  
VSFTDYAKMMPHELARHSLGLLQKTGISKDLIDYIVYGTVIQEVKTSNIGREAAALAGFS  
DKTPAHTVTMACISSNQAITTGVMIAAGAYDIIVAGGVFMSDVPIRHSRKMRSLLRLN  
RAKTPAQRLSLIASIRPDFFAPELPAVAEFSSGETMGHSADRLAAAFGASRQEQDDYALRSH  
KLAHEAQKQGYFTDLMPVKVDGKDGVDKNGIRVSTPEQLAKLKPAFIKPHGTVTAAN  
ASFLTGDGASACLVMSSEAKAKELGLPKAYLRDFTYVAQDPVDQLLLGPAYGIPKILDKAG  
LKMSDVDTWEIHEAFAGQILANLKAMDSWFAQTYLGRQTKVGAPDLDKWNKWGGSL  
SIGHPPAATGVRLAMHTAHLVREDGQFGVISACAAGGQGVAMILERHPDATCN

>ATJ44585.1 acetyltransferase 18 [*Helicoverpa assulta*]

MFGVALCLLDIIGLNPIPSIAVTIGATVPAVKLLISILGYPLAIYHKYVRKTVELRNLYFIVT  
GMDLAYFNFGTSMYHNAIPAIVIYLSKYLGP GKMN AIFTFAFNMVYLLAGYVMTESEDY  
DITWTMPHCVLTKLIALSFDIWDGEKFLKGEELSEN NLKTALPTQPTFLELIGFVYFPACF  
LVGPIFSFRRYRDYISDTFPLDASADVYEQLALKRLIQGVCYLAAYQIGVSVFSMKSMLS  
EFWDTSIFYRHFYCGLWAHFALYKYISCWLLTEAACIRFGLSFNGFVDSTQTMTKWDGCN  
NIKLMRFESATRFQHYIDSFNCNTNHFAAEYVYKRLRFLGNRNLSQLITLVFLALWHGTQS  
GYMTFLNEFLIMVMEKDVEALLTKTEFYHKMWNIPYVKYPLYVILKTYTIVFMGWSLA  
PFDVKSFGKWWSIYTSLYFSGFILPWSFVYKPIIVKLLKRNAASHSKTS

>ATJ44587.1 acetyltransferase 19 [*Helicoverpa assulta*]

MAVVINKGIFIVA AKRTPFGRFGGAFKEVYPSDLLAAAKDALKAGSVAPEIIDTVNIGQV  
YGISGSSDGLSPRHAALKSGIPQEKPALGISRLCGSGFQAVVNSAQDIITGAANISLAGGT  
ENMSTVPFVVRNTRFGVGLGAKMPFEDVLTSSSLDTSCNFTMPETAENLAEKYGLQRME  
VDQFALQSQQRWKAAHDQGVFKAEMTPVTVKVKRQEKVVEVDEHPRPDTTTEMLSRLP  
VLFRKGGVVTAGNSSGVNDGAGALILATEESVKQHGLKPLVRLLAWSVVGVDPSVMGIG

PVPAIQNLLSATGLKLDDIDLVEINEAFAAQTLACAKELGLDQSKLNVNGGAIAMGHPVG  
ASGARITAHLAHELRRRGLKRGIGSACIGGGQGIALLLETV

>ATJ44578.1 acetyltransferase 20 [*Helicoverpa assulta*]

MMEHISNIFEVLTKTFSQISDLLGIQWAPMNPMSRRLQTLAAFVWIYLILFGEALAIYLFIQ  
LVYSRFWWAAILYGVWMLNDIDICHRGGRVSQWVRNWTWWRYLCDYFPINLVKTVDDL  
PSKNYMFAIFPHGVISLGAFGSFCTNATNFHKLFPGMSCHLITLGGHFLVPFFRDLALAIGM  
CASSEQSLHLLDQKKYEGNAVCMIIGGAAEALDAHPKEYKVILSRRKGFIRVAMKSGAS  
LVPVFSFGETDLFHPPNNPENSLLRRFQEKVRQWTGISPMFPMGRGMFQYSYGVLPIRSPV  
TTVVGAPMEVKRNLEPTNEEIDAVHAEFTKRLQTLFETEKVKYLKYHEEAKLVIT

>ATJ44584.1 acetyltransferase 21 [*Helicoverpa assulta*]

MSFLMRKCVVNLKNVNRYSAVCVLMQSERHRSRFSSSNVLKRNRLSDVHLQHKKIHTS  
QIVNKTVAFKLSDIGEGIREVVIKEWFKVGDKVQQFDNICEVQSDKAAVTITSRYDGVVT  
KLYHDVDTTALVGQPLVDIEVQGEADEGSSSSSPEEQPKVTKQESVEEKSQRIKVLTPAVR  
RIAAQFNVDLSTVKATGRNGRVLKEDMLAHLNIDSDGSNEVPAPSSVQAMSIPLTQAKAK  
VEVLLEDKVVPVTGFTKAMVKSMTEAMKIPHFGYSDEYDVTKLVESREALKKIAEARGA  
KLTYMPIIIKAASLSLEQLPVLNSSLDSTCEHLTYKASHNIGVAMDTPNGLIVPVIKNVQNK  
TILEIARELNTLQERGSKGQLGLNELSGGTFTLSNIGIVGGTYTKPVILPPQVAIGALGKIQL  
LPRFDAEGNVRKAHILTVSFSADHRVVDGVTMARFSNFLKNYLENPYTLLLDL

>ATJ44583.1 acetyltransferase 22 [*Helicoverpa assulta*]

MELQDTYYNKSEYVETASGNKVSQRQTVLCGSQNIVLHGKVIVQSDAIRGDLANVKTGRF  
CIISKGSVIRPPFKKFSKGVAFPLQMGDHVFGENTVVNAAVVGSYVYIGKNVIGRRCV  
LKDCCMIEDNSVLPAETVVPFARYSGSPARLITMLPEAMPDLMTEFTKSYYQHFLPTTVQ

>ATJ44582.1 acetyltransferase 23 [*Helicoverpa assulta*]

MTYYDYYDGSRIFLFIANKVGLPLDLVNFLIAQVAALCLARLFRKPLRYASPEFRHSVCLVI  
GLTMGYFCFGRQAIHLSVLPMLTYTLLKSIKHQIMGNVILAVSMIYLSCLHLHRQIYHTAD  
YTLDITGPLMVITQRVTSLAYSLQDSLTVKDLKSKATGLQTTGGDDLKIEKIPSLEYFAF  
TLAFQTLTMCGPVVIFYTDYIKFIEGARVDELEKSADTKEPSRTAVFYKVAGSLAAALLYLT  
LAKKYPLTVLEELTDPTSEVSRWSALYLLWYAYLSTLVVRCKYYHAWLLSEAICNNCGM  
GFNGYNNDGSPKWDKMSNIDIFGFEFAQNFRIAIASWNKNTNAWL RDVAYSRGGAAWRT  
ARVYALS AVWHGFHPGYLTFAGGIFTVAARKIRFVARPMFLDSVPKCLFYDSVSFITTRV  
AMTYATVPFVLLHLAPSLAFYAKFYYSLHFIALGAMLIPEKAKRPKPAVVQEQQSKSPKMS  
KEAIEESLEELNGKCLKIS

>ATJ44572.1 acetyltransferase 24 [*Helicoverpa assulta*]

MKKLFILLCVIKLISGTPPIVLWHGMGDTCCLSFSLGGIKVFLEKNIPGVYVNSLKVGNSS  
IEDLENGYFMNPNKQVEYVCGLLAADPQLKDGFN AIGFSQGSQFLRAVVQRCGHILPKM  
KNLISLGGQH QGVYGLPHCGALMHPTCDYIRQLLN YAAAYENWVQNALVQATYWHDPLD  
DETYVHKSIFLSDINNEIMANKTYIQNLNNDHLVLVKFDNDTIVQPRETEWFGYYEPGQS  
KKLLPLRETKLYTEDRLGLKKMDKEGKLILLSTVGDHLRFSDTWFDNILKPYPYLLN

>ATJ44581.1 acetyltransferase 25 [*Helicoverpa assulta*]

MSEQIEFVDILEPRRTQSGIFSFMTRNWHWPQRTLKLDKYFTPQELKDIAASSVYLDAFIEAE  
CSRSGQSKEKLHQEVHNYLEEMGLDKMHVIRWMGVIFLKISFMMKIKMFVNEAAAFN  
LKSVMGNNPVLFLPTHR SYADFCLMTYLCYHFDIDFPAVAAGMDFYSMAVIGRRMRETC  
AFYIRRTL AGDPLYAATLKQYVRTV VAKHSAPIEFFLEGTRSRSNKSMPPKYGMLSMTLVP  
YFAHEVTDITVVPVNISYDRLMEHSLFAYEHLGVPKPKESTGGFLKALHTLNDHFGNIYIN

LGAPLSIREFLKNDTSHSQETLKPLDMQQLTPDQFKQVQSIADYVITLQQKNTVATISNLLS  
LVLMQSLMKNVPLEFEEVLQEVGWMVQELRNLGATVFENDVRSSVERILVVHRKMMRL  
DKERRRLRLISGILVDLSSEVKKKMKGHILQAQTMVAVVPVIQLQLYVNPILHYLVPPAIICLI  
VHRSAAGRDCLEADYHRVRKLLSDEFFHLEKEEPNTFAKAVEYCIQNSVISYNGELYAMG  
EDTKLQYLLKWSVWPALTSLLKCAQVMTEQSSCAHKQALKLVQQRVESERVHPYCLSLE  
ATANCLNGLVAANALVRNKGECDIVYELVPHTMQECNKLVSILPTFSVDFTNNAVVVDH  
KALSRL

>ATJ44592.1 acetyltransferase 26 [*Helicoverpa assulta*]

MWDKIIYMIVIIVVITYILKQLFSETPNFVKFKSKFLVFYIWTSTAVILLPFFVFNPKNVKNS  
LFGSQIVKHVTKVIEVKWLLRNGKVLAEDRGAVVVSNHQSSIDILGMFNIWHVADKVAAI  
ARKEIFYVWPFGLAAYLAGVVFIDRNNNSKDAYKQLKITSEVMIKNKTKIWLFPETRND  
FTKLLPFKKGAFNIAVAQVPIIPVVFSPYYFINRKKYIFNKGHAVIQCLEPVPTVGLTMED  
VPALINKVRNTMDAAYKELSKEVLSALPPNYPLATD

>ATJ44586.1 acetyltransferase 27 [*Helicoverpa assulta*]

MGARNLKVLQVISGWQAVELILKCVFVGIWQIIEISVKGLWKGARRKVKDTTPVELTIDSS  
VGTHCYIKVMGVKYHYVETGPRTGQKVLILKDAPDSGNLWGPNNWANAVRRLAETDHHV  
MTLDLRGTGGSEGSRSELSPPRAVEELSALLKALGVTENRPAVVIGFGVGGMLAWYLVH  
SRGPLISKFAVINAPHPNLYWQFPAAFCHRVLHFIQWPHFPERWFAEGELNDCDGRWASS  
RACDWTGALNYVRGAAWWQVRPGLRTSAPALLVGDKDSAGQLVASAQHCTTSTLRLVT  
KPEPNSKELAVVLLDFLISKEKLIEEVPRGLMGRMFGAVADRGRELTARLVLPPTQA

>ATJ44593.1 acetyltransferase 28 [*Helicoverpa assulta*]

MEHWNSEQCYIVISNHQSSLDILGMFEMWPQMKRCTVVAKRPLMFTGAFGFGAWLSGLV  
FIDRLRTERARQLMKDATARVIKEKTKLWIFPEGARFNKGSIQNFKKGAFYLAIDAQIPIMP  
VVFSQYYFLDSETKTFEPGKVIITLPPIPTSGMTRNDVETLSEMARQQMIEVFHESKDLV  
MQKKIAI

>ATJ44591.1 acetyltransferase 29 [*Helicoverpa assulta*]

MSSMPMLVRNVRFGTALGTPYRFEDHIQRQIPDGYTGLTMQKMVENLANKYGVTTREDA  
DEFALQSHLKWKEAEESKAFQQEVVSLEVTLKKKQILVDKDQIAQPLKSEDL SRLPTLIDN  
GTILTTGNTSAPVDGAAALLADEEAVRGHSLQPLARVAGWTCVGVNPEDAGLGGVLAI  
KKLLDSQKLTVDVDIFEINENFASQAVIATRELKIDQSKVNVSSGALALGDPMSATGARM  
ATHLVHELRRRNLKRGIAASSCGGGQGVAILLEKM

>ATJ44589.1 acetyltransferase 30 [*Helicoverpa assulta*]

MAVAVKKGVYIVAGKRTPFGKFGGLLDVLAEDLFAIAATAAFQAGNVDAELVDTVNIGQ  
VSPVSQNGLAPRHAALKAGIPSDRPVLGVNKLSGSGFNAICGAQEILTGSAQITLAGGME  
NLSSLPLLIRDMRFGNPLGKYFKVDDLLHMGFFDSYCNLFLVQTADIVA AKFGVTREEAD  
EFALRSQQRWKTADAAGLFGHEELVPVPVKNLNNREILITKDEYPQPDTTLEKLSKLQPMFEG  
GIATPGNSSGINDGAAAILLANDEALKTHNLKPLARLVGWSCTGVDPSMLGIAAAPAAQNL  
LNCTGLSIDDVDLVEIHETYAATSLFCARQLAVDDNRLNVKGGAISIGHAFGASGVRIISHL  
THELRRRRLKRALATTAIAGGQGVAVMIETV

>AGQ45622.1 acetyltransferase 1 [*Agrotis ipsilon*]

MAVAINKGIFIVAAKRTPFGRFGGAFKDVYPSDLLAAAKDALKAGSVAPEVIDTVNIGQV  
YGLSGSSDGGLSPRHAALKSGIPEDKPALGISRLCGSGFQAVVNSAQDILTGVAQTSLAGG  
TENMSTVPFIVRNTRFGVNLGVKMPFEDLLTASSLDTSNNTMPQTAENLAEKYGLHRME  
VDEYALQSQQRWKAAQDQGAFAEMTPVTVKVKRQDKVIEVDEHPRPETTTEMLSKLP

VLFRKGASLLLATLLVSTTVLER

>AGQ45623.1 acetyltransferase [*Agrotis ipsilon*]

MTANVILGCVMLLVILFTISSIARYYIKFTLFVVM SLIFATAPVPLMLIKPFDPRNALIPAFF  
LRCFARILGLRWKVRGLENVDNSRGAVVLLNHQSCLDLYALAIHWPLMSRSTVVSKRSLQ  
YLVPGTATWLWGTVFIDRGAQSARDALNKQVDAIKNQKRKLLLFPEGTRHSGDKLLPLR  
KGAHFVAMDAAPIQPVVISKYHHLDGERHKFGSGEFIVSILPMIETEGMTKEDITELIEKV  
QTSMQEEFTKISLETLERRNLRTKAD

>AGQ45624.1 acetyltransferase [*Agrotis ipsilon*]

MSAAKGIFIVGAKRTAFGTFGGAFRNTSATELQTVAAVAALKEAGVAPEKVDSVVVGQV  
MTASQTDGIYLP RHV MLKAGIPQDKPALGVNRLCGSGFQSVVN SAQDILTGS AKISLAGG  
VENMSQAPFAVRNVRFGTALGQNYAFEDTLWAGLTDSYCGLPMGMTAEKLGAKFGITRD  
EVDNFALRSQQRWKA AQDAGAFKAEIAPVTLTVKRKEVKVEVDEHPRPQT TIEGLKKLPP  
VFKKEGIVTAGTASGISDGAGAIVLASEEAAKGLKPLARLVGWSYVGVDPSIMGVGPVPAI  
ENLLKVTKMTLNDIDLIEINEAFCAQTLVLCQGPQAGR

>AGQ45625.1 acetyltransferase [*Agrotis ipsilon*]

MNIRCARPSDLMNMQH CNLLCLPENYQMKYYFYHGLSWPQLSYVAEDEKGHIVGYVLA  
KMEEDGEDNRHGHITSLAVKRSHRRLGLAQKLMNQASLAMVECFQAKYVSLHVRKSNR  
AALNLYTNSLGFKILEIEPKYYADGEDAYSMMRDLSAFVAESKTELPPIENLEIKSESAIISQ  
C

>AGQ45626.1 acetyltransferase, partial [*Agrotis ipsilon*]

PFELFITAMAPTKLSLNEVVIA SAVRTPIGSFKGT LASVPATELGAICVRAAVERAGIPPEEV  
KEVFMGNVCSAAMRQAPARQAAIFGGLSKSTICTTVNKCSSGMKTILLAVQGLQTGTH  
DVILAGGMESMSNIPFYLKRDNIPYGGTQLLDGILYDGLTDVYNQIHMGDCGEHVAKTFN  
FSREQQDDYAIAGYKKVAAAYEANAFADELVPVPVPQKKGAAPIISEDEEYKKVDFEKL R  
KLPPVFQENG TITAANAAALNDGGAAMILMTAEAAQRLNVKPLARVIGYADAECDPIDFPI  
APTLAIPKLEKTGVRKEDIALWEINEPFSIV

>ACX53699.1 acetyl-CoA acetyltransferase, partial [*Heliothis virescens*]

MAVAVKKGVYIVA AKRTPFGKFGLLRDVLAEDLFAIAATAALRAGNVAAELVDTV NIGQ  
ASPVSQSGLSPRHAALKAGIPSDRPVLGMNRLSGSGFHAIICGAQEILIGSAQ

>ACX53799.1 acetyltransferase, partial [*Heliothis virescens*]

MSVAAKGIFIVGAKRTASGTFGGVFRNTSATELQTIAATAAIKEAGIAPEKVD TIVVGQVM  
TTSQTDGIFIPRHVALKSGIPQDRPALGVNRLCGSGFQSVVN SAQDILTGA AKISLAGGVEN  
MSQAPFAVRNVRFGTALGSTYAFEDTLWAGLTDSYCG

>ACX53783.1 acetyltransferase, partial [*Heliothis virescens*]

EIIDTVNIGQVYGISGSSDGGLSPRHAALKSGIPQEKPALGISRLCGSGFQAVVN SAQDIITG  
AANVSLAGGTENMSTVPFVVRNTRFGVGLGAKMPFEDVLTSSSLDTSCNFTMPETAENL  
AEKYGLQRMEVDQFALQSQQRWKA AHDQGVFKAEMTPVTVKVKRQDKVVEVDEHPRP  
DTTDMLSRLPVLFR

>AIN34698.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MINLHILKQSTVVHLCFAISYFTSGLILTFIQAILYFGLKPFNKSLYRKINYYLSYSFYSQLVF  
MSEWWSNSKLSIYIKKDEYEKFGYKEHGYLIMNHSYEIDWLMGW HFCNTIGVLGNCKA  
YAKKSIQYLPPIGWMWK FSEFVFLERSFEKDKETIKYQISELCDYDPVWLLMTPEGTRYT  
KKKHEASLSFAKEKNLPLLKHHLT PRTRGFTTSLQFFRGKIPVIYNIQLAFEKDSKTPTLTS  
LLYGKPVHAHLYIERIPVERVPEDEAEAAKWLHDLFVVKDKMQDSFFNTGDF FLES GVER

REPFSVPPPIWSLVNALGWAVVTLTPMLYYLLGLLFSGKLLYFSIGCGIFGAFFILLQKSIGM  
SKISQGSSYGTEKK

>AIN34709.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MSSRTPLTKAEKVAYALRHEKSYSWHKWFSVLAVLTIIVSLLTYLFGMWTEPPPLPKLDL  
EQHWGPYPIDMKPDNSIRPFTIEFSDVIVNDLRERLLHRRSFTPPLNAGFTYGFNTHFLTQ  
VLDFWQNKYNFKEREQFLNKYEHFVTNIQGLDIHYMHVKPKVPGNVTVVPLLLIHGWPG  
SIREFYEIIPKLTTPRPNQEFVFEVIAPSIPGFGFSQAPVRAGMGPIQVSVIFRNLMQRIGHDE  
YYVQGGDYGSAIGSVMATLFPENILGYHTNMPMVAVNTWVSIYTVLGSLWPNFIVEPSVQ  
DRMYPLSKHIGKVIEETGYFHIQATKPDTVGIALSDSPAGLAAYILEKFSTWTNMENKKAS  
DGALLQKFSLTHLLDNVMIYWASNTITSSMRHYVEGYKQLMFTDRIPTVPTWGIFKHE  
ISFQPDSILKLKYKNYLHSSVVEDGGHFAAMELPDVLADDIFDAVHMFRTFHRKKRNKA  
SDKPITKESTKPDAETVNKVEKESKVNFEFVNKVEKEPKVNFETAKTVYEFTVKDIQGQE  
VKLERYKGVLIIVNVASHCGYTNSHYTELNELYEKYSKKGLRILAFPCNQFGGQEPGTLK  
EILQFTKEKKVKFDLFEKIEVNGENAHPLWKFLKRIQGGTLDGFIKWNFSKFIIDRNGVPV  
ERFGPNTSPLELEPYLEKLLG

>AGG54993.1 acyltransferase AGPAT2 [*Heliothis virescens*]

MSANVVFGCVMALLIILFTISSMARYYIKFTLFIVMSLIFATAPVPLMLIKPFDPRNALIPAFF  
LRCFAKILGLRWTVRGLENVDNSRGAVLLNHQSALDLYALAIWPLMSRCTTVAKRSLQ  
YLVPGTATWLWGTVFIDRGAQTARDALNKQVDAIKNQKRKLLLFPEGTRHSGDKLLPLR  
KGAHFVAMDAGAPIQPVVISKYHYLDGKRQRFGSGEFIVSILPMIETEGMTKDDIGALIEK  
TQNMNQEEFTKISMETLARRNLRNKAD

>AIN34682.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MLFLKGSRIITIKMRPTNKLFKAMAAYSKSVTLNEVVIA SAVRTPIGSFRGSLASLSASELG  
AVAVKAAVERAGIPKEEIKEVYIGNVCSAGMGQAPARQAVIFSGLPKSTICTTVNKCSSG  
MKAIVLAAQGLQTGTHDVILAGGMESMSNVPFYMKRGDIPYGGTQLIDGIVFDGLTDVY  
NKFHMGNCAENTAKKFNISRQQQDEYAISSYKRSAAAYESKAFADELVPPVPQKRGAAAP  
IMFSEDEEYKKVNFEEKFSKLGTVFQKENGTVTAGNASTLNDGASAMVLMTAEAAQRLNV  
KPIARVVGADGEDPIDFPIAPAVAIPKLLAKTG VKKEDVAMWEINEAFSVVALANIKML  
ELDPSKLNHGGGVSLGHPIGMSGNRIVVHLCHALKKGEKGVA AICNGGGGASSIMIEKLE  
HTTDGLPVMFTYTKDPCGLCDIVMEELEPYKNRIVIQVDITQKENVRWLKLYRHDIPVL  
FLNGQFLCMHKLDKHLLNRLQKIEDGKLH

>AIN34685.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MDGKTTKMPKVAKVKNKAPAEIQITAEQLLREAKERDLEILPPPPKQKISDPEELRDYQHR  
KRKAFEDNIRKNRLVIGNWLKYAQWEESQKQVQRARSIYERALDVDHRNVTWLKYTE  
MEMRNRQVNHARNLWDRAVTILPRVSQFWYKYTYMEEMLENVAGARQVFERWMEWQ  
PDEQAWQTYINFELRYKELDRARQIYERFVMVHPDVKNWIKYAKFEENHGFINGARKVF  
ERAVEFFGDEELDERLFIAFAKFEENQKEHDRARVIYKYALDHIPKDRNKELYKAYTIHEK  
KYGDRSGIEDVIVNKRKYMYEQEVIENTNYDAWFDYIRLVENEGNVDDIRDTYERAIA  
VPPSKDKQFWRRYIYLWINYALYEELEAEDAERTRQVYRTCLELIPHKIFTFSKIWLMYAQ  
FEVRCKDLKQARKTLGMALGICPRDKLYRGYIDLEIQLREFDRCRILYQKFLEYGPENCIT  
WIKFAELETLLGDIDRARAIYEIAVGQPRLDMPPELLWKS YIDFEVQQGETEKARQLYERLL  
ERTVHVKVWLSYAKFELNAENADNINVDLARRVYERANDSLRSAGEKEARVLLLEAWK  
DFETEIGEEEEKLEKVMAMP RRVKKRQKIISESGVEEGWEEVFDYIFPEDEMVRPNLKL  
AAAKNWRKQKEVTQPTETENKQDEEEEGQTPPQRMNEVEDD

>AGQ45625.1 acetyltransferase [*Agrotis ipsilon*]

MNIRCARPSDLMNMQHCHNLLCLPENYQMKYYFYHGLSWPQLSYVAEDEKGHIVGYVLA  
KMEEDGEDNRHGHITSLAVKRSHRRLGLAQKLMNQASLAMVECFQAKYVSLHVRKSNR  
AALNLYTNSLGFKILEIEPKYYADGEDAYSMMRDLSAFVAESKTELPPIENLEIKSESAIISQ  
C

>AIN34706.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MLRRCSKHLQTLYRRQGQTLRFKSSEAPKVFGLSQAAAARTTQPRVLTAAHNQVATIHFT  
NPLFAEQDVMTPSPDSVSEGDALGDKKVGDAVAVDEVVMEIETDKTALPVMAPGNGII  
KEFYVKDGDTVKAGQKLFRLLETEGGPPPKAAAPAPEPPKADAPPPPPAAAAPPPPPPA  
AAIPTPPPPPPQAPPAKPAAPISSIPVAAIRHAQSIETATVKVPPTDYSKEIAGRTEQVRKM  
NRMQRISQRLKEAQNTNAMLTTFNEIDMSHIMAFRKKHLDAFTKKHGVKLGLMSPFVK  
AAANALVDQPVVNAVIEDTEIYRDYVDISVAVATPKGLVVPVVRNVQNMTFADIELTIAGL  
AEKAKKGKLTIEEMDGGTFTISNGGVFGSLMGTPINPPQSAILGMHGIFERPIALNGQVVI  
RPMMYIALTYDHRIDGREAVMFLRKIKEGVEDPATIIAGL

>AIN34712.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MALVMPFVSVAISILYTPLLLLILCIIFLASIGKSLGVRRLYVNILLKLFYGRQHIEVAKIKIQ  
RTDSSDDEEVPPAPDDDDKPPSATIKENGVTNLNTVIERQEILGPSPELNYKRSTSQERVQN  
GHKSQSGNGENNIEFHLNCLDLVKAGMESIIEDQVTSVFEAEELRSWNLLTRTNRQYEF  
LTWRLTHIWAMGFVVRYMFLPLRIMIFVIGVWWLVACTACVGTLPDGKTKQRVNYAVSL  
MCFNFLSRCISAVITYHDTHYKPRNGICVANHTSPIDALVLMCDNCYSLIGQRHNGFLGILQ  
RALARASPHIWFERSEVKDRHAVARRLKEHISVPDNPPILIFPEGTCINNTSVMQFKKGSFE  
VGGTIYPVAIKYDPRFGDAFWNSSRYGMLHYLLNMMTSWAIVCDVWYLPAMTRAHDES  
AVDFANRVKAVIARRGGLVDLMWDGQLKRMKPKKEWRELQQUEISKRLKGE

>AIN34699.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MAFAGLKKQINKANQYVTEKMGGAEGTKLDLDFVEMERKTDVTCELVEELQAKTKEFL  
QPNPTARAKMAAVKGISKLSGQAKSNTYPQPEGVLGDCMLLYGKKLGEDTVFSNCLIEM  
GEALKQMADVYSLDDNIKQNFLEPLHLQTKDLKEVMHHRKKLQGRRLDFDCKRRRQ  
AKGAHIADDEIRQAEKFAESLQLAQIGMFNLLDNDVEQVAQLTYFAESLLEYHQQCTEIL  
KGLVATLMEKKEEAVNRPKMEFVPKTLADLHIEGIHDLNNGRRYGSTQSLSRPRQHIPPSS  
SVGDLSNTDPFTAWEAPPAYRAQARPAQTRPAPGFKPHAPRNQINGRDPWKASPLPSPVK  
SPARTPVAPNKTPCCTALYDFEAENQGELGFKENDVITLINKVDDNWFEGSVHGKTGYFPI  
SYVQVTVPPLNM

>AIN34710.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MSFLMRKCIVNLKNVNRCSSVCVLMQTGKHRSQYSTSNILKRSIVPSDVHLRQRKFHTSQ  
IVNKIVAFKLSDIGEGIREVVIKEWFVKVGDKVQQFDNICEVQSDKAAVTITSRYDGVVTK  
LYHEVDQTALVGQPLVDIEVQGGADEGTSSAPESIPAAAQKQESVADKSQKVKILTTPSVR  
RIAAQFKVDLSSVKATGRNGRVLKEDMLAHLNISSDKSNEIHEPSSISAMAIPLVPAQAKM  
EVMLEDRVVPVSGFTKAMVKSMTEAMKIPHFGYSDEYDVTKLVESRESLKKLAEAKGVK  
LTYMPIIIKATSLGLEQIPVLNSSLDSTCEHLTYKASHNIGVAMDTPNGLIVPVIKNVQAKTI  
LEVARELNTLQEKSGKQLGLSELTTGGTFTLSNIGIVGGTYTKPVILPPQVAIGALGKIQAL  
PRFDVEGNLRKAHILTVSFSADHRVIDGVTMARFSNLLKNYLENPYSLLLDL

>AIN34702.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MWQSSIIIFAVLLVQVYSAPQFITFKEGKLGVNFGGYHAGVGLGGVAGGSNTAGGLFAEA  
GTPFGQGAKAGLGGAVNGNSGTAGGLYAAATAGGNVNAAAGLGGAVAGGKSVGGGFST



AQAGGKSATSVLGGESDVSGSSGFSIEAHKSIGVPTTVVKETKVSIVPVEEVKNVQGEAKF  
EATNEIAPSANAGAEGNINAYVNVNAKPEIVKEVSTWKGPYYHTSKIPPFDQDFMSSLFR  
SPQGSYSPPMWAPPPQYNYIQQIHAEPTPVVQTIYLRKHKPHRHHVHKAVYVGGYAGVG  
GEVAPPVQQTVVYKTVQPIEKRVVDVNVNAHGGAGAAVSGEHYGPSSGVITYTKQVAV  
NSRPSTFFQDIFNIPISTLKA VSGFLSNTAQNTGISVQKSASFNAGGYSGFSGKAGYSGHSG  
YYSY

>AIN34708.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MIGANKLIGKNNIVYQKFIIQQRKFTNKNIKDVNYQYLQRSKLPTMHFQKSLPRLPIPELSK  
TGDRYLKALRPLLNDNQFEEAEKRTSNFINNEGKVLQEKLISKDKRNKHTSYISDYWFDL  
YLRDRAALPINYNPMIVFQNDVRPEYNDQLIRSTNILITAVRFMLSLREQILEPEVYHLNPK  
KSDTQLYRTFTRMLPEAISWYGAYLMKVFLDMSQFVGLFGATRLPRLNKDEIFRDPKSK  
HVLVQKQGNFYVFDVLDTDGNLLSPELLGNLKNIMNDKTPASEHPLGILTTQNRDEWAK  
QRDHLEATGNSEVLRKIDSAIFNLILDDDDINDDKRVLLKKYLHSDGTNRWFDKSVSLIVT  
RDGVGGVNFESHWSGDGVAVLRFFQDIYAETTKKPFIIHPDSKPVDSNISVQKLEFKLDDKS  
KHFIDNAKKEYKAWTDSLIDYILYEGLNKAACKKFKVSPDCIMQLSFQAAHHLLKGNFV  
GTYESCSTSAFKHGRTEMRPCTVKTAKFCETLHSNKSIEELRGKLTECSKLHLELVKDA  
AMGQGFDHRHMFALMKMAEDNNMPRPEIFDSYIEYKFLNKSILSTSTLSSPSVMAGGFGPV  
VKEGYGIAYSAPFDKLGA AVASYKAHNNSTQYVEALHKSFLDITKILSG

>AGG55013.1 acyltransferase AGPAT5 [*Heliothis subflexa*]

MWYKIFIFTIVCVFTYILKKLHDTGPNRVKFYFNFFLFYFLSSMLAAVIWPYFLLSPKNVRN  
AKIAVRLKHKITKLYDLKWHLRDGGKILAE DRGAVIISNHQSSLDILGMFNIWEVVDKLA AI  
AKKELFYVWPFGLSAYLAGVVYIDRRNAKGAYKQLKITSEVMVKNKTKIWLFPETRKNK  
DYTKLQPFKKGAFNIAVAAQVPIIPVVFSPYYFINKEKYIFNKGHVIIQCLEPVPTVGLTMED  
VPDLIDRVHQKMSVAYQEISKEVFSSLPADYPVTLVG

>AIN34693.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MLEHLSYAMEIVTKIFSQISALLGIQWAPMDIPMSRRLQTLAAFVWIYLILFGEALSIYLFIQ  
LVYSRFWWMGILYGVWFLNDIEICSRGGRASEWVRNWTWWRYLCDYFIPIKLVKTVELDP  
SKNYMFACFPHGVISLGAFGSFCTNATGFHKLFPGMTCHLITLGGHFLVPFFRDALALGI  
CSSSEQSLLHLLDNKKYEGNCACMIIGGAAEALDAHPKEYKVILSRRKGFIRVAMKSGAA  
LVPVFSFGETDLFRPPNNPENSLRRFQEKVRQYTGISPMFPMGRGLFQCSYGVLPMPRAPV  
TTVVGAPMEVKRNLEPTNEEINAVHAEFTERLKTLETEKVKYLQYHEEAKLVIT

>AIN34705.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MGARNLKVLQVISGWQAVELILTCVFVGIWQIIIEISVKRLWKGHRRKIEDTSPVELTIDSSI  
GTHCYIKVMGVKYHYVETGPRTGQKVLLKDAPDSGNLWGPNWASVVRRLAETDHHVV  
TDLRGTGGSEGGSRSDLAPRAVEELSALLKALGVSENQAVVIGFVGGM LAWYLVHS  
RGPLISKFAVINAPHPNLYWQYPPAPFCHRALQFIQWPHFPERWLAEGEMYDREGSWASSR  
ACDWTGALNYVRGA AWWKIKPGLRTSAPALLVGHKDSAGQLVASAQYCTASTLRLVTKP  
DPSSKELTGVLLDFLIAKEKLLEEQVPRGLMGRVFGAVADRGRELTARLVLPMPQA

>AIN34704.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MVFDNNWTGGWFSWTRQSDAMLRNVEKKILSCLKTAYKRFYVDIGSVVGQSDKIWTISL  
NDESPKTPLVMLHGMGAGLALWCPNLDSFAATRPVYAIDLLGFRSSRPKFASDAQKAEA  
QWVESVEEWRRVNIQS FILLGHSLGGYIATAYA IKYPERVRHLVLADPWGFSERPPNAYE  
KAQLPLWVRAIATAVQPLNPLWAVRAAGPAGKWLVS KTRPDISRKYLNFLPDAERVIPEYI  
YQCNSQTPSGEAAFHSLMTGFGWAKNPMVRRVDEIDPALPITVLYGSRSWVDNTTGQVL

AEHRGPTNTYVQVINGAGHHVYLDKPELFNKFVLEACARADAHDPRPSLAGASPSAIEAP  
PSKLAIEAAPATSATSTESTGKVNISTEAQSS

>AIN34713.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MAKRLLSSLILNSSGTNLKSSLPVLSKKLHTQQVPTKEIQIPVKFGHLAGKLWGSQDQPPIL  
ALHGWQDNAGTWDPLIPMIKDRPILALDFPGHGFSSWIPPGMLYYQWELPRIILYLKEYF  
KMEKVALLAHSMGAIAGMRFATVFPDDVEFYIAIDSLIYDDYDLDAVVDRISKTIKGLLA  
QSRLDKEPPPLYTLEDMIKIWHAGTRKSVALESVPHLLKRGANQSKTDPISKYYFSRDSRLK  
YSLFNPEDKKFVEALVRRLKCPTLYVKAIDSPYSADAYSIEEMREILEQVNEKYEYFHFVRGT  
HHVHLNNPVLVAPLIKNFQKHNLT

>AIN34683.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MAVAINKGIFIVAAKRTPFGRFGGAFKDVYPSDLLAAAKDALKAGSIAPEVIDTVNIGQV  
YGLSGSSDGGLSRPHAALKSGIPEDKPALGISRLCGSGFQAVVNSAQDIITGVAQTSLAGGT  
ENMSTVPFVVRNTRFGVNLGVKMPFEDLLTASSLDTSCNNTMPETAENLAEKYGLHRME  
VDQYALQSQQRWKAAQDQGAFAEMTPVTVKVKRQDKVIEVDEHPRPETTTEMLSKLP  
VLFRKGGVVTAGNSSGVNDGAGALVLASEESVKQNGFKPLVRLLGWSVVGVDPSIMGIG  
PVPAIQNLLKVTGLKLDDIDMVEINEAFSAQTLACAKELGLDQSKLNINGGAIAMGHPVG  
ASGARITAHLAHELRRRGLKRGIGSACIGGGQGIALLLTV

>AIN34694.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MMFGLLLNVLGLIGLSPIFLSEVIGATEPALKLLISILLGYPLAVIYHKYVKHHKEYRNLYF  
VLTGFDMAFYNFGISMYHNAIPAIVIYLSTKFLGPGKNNIAIVTFAFNMTYLLAGYVVTSE  
DYDITWTMPHCVLTLKLIALSFDLWDGKMLKGEELSANNKLTALESQPSFLELLGFVYF  
PACFLVGPIFSFRRYKDFISDKFPLEREVKVYEAQAVKRLVQGVYLAAYQIGVTVFSMKY  
MLSDEFWDNSVFYRNFYCGLWAHFALYKYISCWLLTEAACIRFGLSYNGSRTENGVSVSQ  
WDGCNNIKLLRFEGATRFQHYIDSFNCNTNHFAAEYVYKRLRFLGNRNLSQLITLAFLAL  
WHGTQSGYYMTFLNEFLIMVMEKDLESMLLKTEFYHKMWNNNSIYKLYFILKMYTIVF  
MGWSLAPFDVKSFSKWWTVYTSLYFSGFILFVPWSFVYKPLVKKALKASGAHPKAQ

>EFN73032.1 Membrane-bound O-acyltransferase domain-containing protein 2 [*Camponotus floridanus*]

MATTMDHYDGFRTFSWFADFVGLPIDQVNFVLTQFTALILAGLFRSSLPIAATPAARHVY  
GLIIGLALGYFCFGRQAIHLASLPALCYVAMRTQNPRNMQRVVLAIALIYLSCHIFQRQIYD  
YGSYTLDTGPLMVITQKVTSLAYSIDGLTRREEELTPMQRHQAVQKIPTTLEYFSYIFHF  
QALMAGPIIFYRDYMDFIYGHHLPGSKSLTIFYDKNSQEKEIVLEPSPTLVVVKVVASLAC  
AIVFITFISDFPIQRVKEDEFLKNTSMYKMWYMLTMTLSRFKYYHAWLFADAICNNSGL  
GFSGYDERGKPKWDLTSNVDVYKFETSLNLRDSIESWNKGTNLWLRSIMYERAGRNKVL  
FTYALSAFWHGFYPGYYLTFASGAFFTVAAARSVRRHIRPLFLESQRKKTFYDILTFITRIV  
MAYMTFSFILLEFMPSIKVYLYLYMFPHLLGLIAIILPPRLGLSKKAHKQSAEIDLSETISNG  
NAHKTM

>ARD71199.1 acetyltransferase [*Spodoptera exigua*]

MLRSIFVRNQVLNDALKKSIRSNSRCMSTELSKRKLSHRVLSAQNKRVSAAPQWTIQIRY  
YADLPHTSKVNLPAISPTMESGSIINWQKKEGEKLESGDLLCEIETDKATMGFETPEEGYL  
AKILIPAGTKGVPVGQLLCIIVGNEADVAFAFKDFKDDSPPGAVKPPVKKTAQAAAAAPAASA  
PAPAAPAAPAAPAAAAAPPPAAPAAPDSGRVYASPMARRLAIEIRNIRLGGQGSGLYGS  
LKSGDLSDAPAAAEALAPPPMPAPGATFVDIPLSSMRATIAKRLSAKQTIPIHYQLTATVNV  
EKTIEMRKKVNEKLAAEKAIEVKVSMNDFIVKAVAAACKRVPTVNSHWMDSFIRQFNNVD

VSVAVATPAGLITPILFNCDSRGHIELSKNMKELAAARAREGKLQPQEFQGGTVTVSNLGM  
GITMFNAIINPPQSLILACGGLQELVIPDKNEPQGFRLAKFVTFTASADHRVIDGAVGAQW  
MKAFKENMEDPANMIL

>ARD71200.1 acetyltransferase [*Spodoptera exigua*]

MSANVILGCVMALVILFTISSMARYYIKFTLFIVMALIFATAPVPLMLIKPFDPRNALIPAFF  
LRCFARLLGLRWKVRGLENVDNSRGAVVLLNHQSSLDLYALAIIWPLMSRCTVVSKRSLQ  
YLVPGTATWLWGTVFIDRGAKSARDALNKQVDAIKDQKRKLLLFPEGTRHCGDRLLPFR  
KGAHFVAMDAGAPIQPVVISKYHYLDGKRHKFGSGEFIVSFLPTIETEGLTKDDIPTLVEKT  
QLSMQEEFTKISMETLERRNRLKAN

>ARD71201.1 acetyltransferase [*Spodoptera exigua*]

MSISSVMPRFHIPCCSIWTHYLMPIFYHVIIGFLSWTGGWFSWTRQSDAMLRNIEKQILSCL  
KTAYKRFYVDIGSVVGQSDKIWTISLNEESPKTPLVLLHGMGAGLALWCPNLDSFAATRPV  
YAIDLLGFGRSSRPKFASDAQKAEAQWVESVEEWRREVNLGQFILLGHSLLGGYIATAYAM  
KYPERVRHLVLADPWGFAERPPNAYEKAQLPLWVRVIGSALQPLNPLWAVRAAGPAGKW  
LVSKTRPDISRKYLNYPDAERVIPEYIYQCNSQTPSGESAFHTLMTGFGWAKNPMVRRV  
NELDPALPITVLYGSRSWVDNSSGQVLVEQRGPTNTYVQVINGAGHHVYLDKPELFNKFV  
LEACTRADEHDPRPALKAAPAEPGTETPALPPGGEAPSNTVAITNKASASSDTTAHTS

>ARD71203.1 acetyltransferase [*Spodoptera exigua*]

MAMRIVVLSILFFIVPILCYKPVVLIHGVMTGSASMELIKLRIEEEQHPGTIVYNVNRFSWS  
SLETMWHQVLEIGMDIANISSKHPEGINLIGYSQGGLIARGIVETFPNVSVSTFISLSSPQAG  
QYGAGFLHLVFPGLVKDITYELFYSRVGQHTSVGNYNWDPYHQSLYESYSVYLPYINNH  
LPSAKSADFKKNLLRLKRLVLIGGPDDNVITPWQSSQFGYYNANETIEMKAQDIYVEDRI  
GLRTLDETGRHLHVVTVPGINHFNWHMMSIVDNYPYLD

>ARD71204.1 acetyltransferase [*Spodoptera exigua*]

MDLLEKEWYIQAPWGRIIAWGNCFDPPVLLCHGSVDSAVSFKPLISKLPKNFYIYIGVDL  
PGNGKSDRMLPGLMISVTDMAVAINAVAKHFRWKKFTFIGHSFGAFLGQMFNLYPGRNLN  
KLVNLDPINFFATPPQDFGKWYHSRFTNFYKNYEKFNTPVENGPRVKWTEALQSLRSNRP  
SLSEENAIIVLERLSEPAAGDYIRYTYDLRIKCMHFPAFSPEHVKKLFTNHDTPILTVACKN  
SLDKKLFNRNTAFLLDAAEYPSGNLRFERSVAGGHDVHISNPDRVAVYVSQFLLYGLEMDN  
KAKL

>ARD71205.1 acetyltransferase [*Spodoptera exigua*]

MTYYNYDGSRIFLFLSTRIGLPLDLVNFLIAQVAALCLARLFRKPLRYASPEFRHSVCLVI  
GLTMGYFCFGRQAIHLSVLPMLTYTMLKSVSHKIMGNVILAVSIIYLSCHLHRQIYHTADY  
TLDITGPLMVITQRTSLAYSLQDSLTVKEKPTSGNTSEANGDLVKIEKIPSPLEYFAFTLAF  
QTLMCGPVVFYSDYIKFIEGARIDEFEKSKDATEPSRRAVFYKVCGLAAALLYLTAKK  
YPLAVLEELTDPSSEVSRWSALYLLWYAYLSTLVVRCKYYHAWLLSEAICNNCGMGFNG  
YNKDGSPPKWDKMSNIDIFGFEFAQNFRVAIASWNKNTNAWLRDVAYERGGAAWRTARVY  
ALSAVWHGFHPGYLLTFFAGGLFTIAARKIRYAARPMFLDSAPKKLFYDCVFTLTTRVAMT  
YATVPFVLLHLAPSLAFYGKFYYSLHFIALGALLIPEKPKRSKSAQIQEKGSYKSSEETLPIL  
ETLDSSHGKLIKIT

>ARD71206.1 acetyltransferase [*Spodoptera exigua*]

MALIMSFVSVAISILYTPLLLLILCIIFLASIGKSLGVRRLYVNILLKLFYGRQHIEVAKIKIQ  
RTDSSDEEDLPPVPDDKPPSAIHKENGVNNGTKMTVIERQEILGPSPELNYKRSTSQERVQNG  
PKTTQNGGESNMEFDLSNCLDLVKAGMESIHEDQVTSVFEEELRSWNLLTRTNRQYEFLLT

WRLTIIWAMGFVVRYMFLPLRIMIFVIGVWWLIACTACIGTLPDGKTKQRINYAVSVMCF  
NFLSRCISAVITYHDAHYKPKNGICVANHTSPIDALVLMCDNCYSLIGQRHNGFLGILQRAL  
ARASPHIWFERSEVKDRHAVAKRLKEHISIPDNPPILIFPEGTCINNTSVMQFKKGSFEVGG  
TIYPVAIKYDPRFGDAFWNSSRYGMLHYLLNMMTSWAIVCDVWYLPAMTRAADSAVDF  
ANRVKAVIARRGGLVDLMWDGQLKRMKPKKEWRELQQEEISKRLKGE

>ARD71207.1 acetyltransferase [*Spodoptera exigua*]

MSFLMRKCIVNLKNFNRCRTVCVLLQTERQLSRYSSNILNRSILLSEVHLRHRKFHTSQILN  
KVVAFKLSDIGEGIREVVIKEWFVKVGDKVQQFDNICEVQSDKAAVTITSRYDGVVTKLY  
HDVDQTALVGQPLVDIEVQGASDEASSDSNEKPAAASQQEQKADKPQRVKVLTTPSVRRI  
AAQFKVDLSTVKATGRNGRVLKEDMLAHLNIDSDGSNKVSDPTSVDVAVQIPMTSAQAKV  
EVLLEDRVVPVSGFTKAMVKSMTEAMKIPHFGYSDEYDVSKLVESRESLKNIALSRGVKL  
TYMPIIIKAASLGLENIPILNSSLSTCEHLTYKASHNIGVAMDTPNGLVVPVIKNVQNKTIL  
EIARELNTLQEKGSKGQLGLSELSSGGTFTLSNIGIVGGTYTKPVILPPQVAIGALGKIQVLPR  
FDEEGNVRKAHILTVSFSADHRVIDGVTMARFSNHLKNYLENPYTLLLDL

>ARD71208.1 acetyltransferase, partial [*Spodoptera exigua*]

MFIHNYFGFEDMCLTHTHQIGMDMQLYVATLPLMLVIWKYSTLGWSLLALIAMASTVLR  
YLAIYWYDISMFVYYGISVQKLLDAARYSYILPTHRATYILIGVVMAYLMKTKKLNFTLTS  
NQTRLLWTFCLVLMTATIATPYKWGLEGYQYEHFPAAMFSALSPILWGVFMSVSHWAIVN  
DYAGIGTAFLESRVFKFFNKIAYSVYLTQFPIFFYNVGVQRHAEFYSPLLLLHIPEVFTVTAIS  
ILTTVAIEMPFNQVYRIY

>ARD71209.1 acetyltransferase [*Spodoptera exigua*]

MKQSGIILLTVLVVQAYSAPQFITFSEGKLGVNFGGYHAGVGLGGLAGGKGNTAGGLYAE  
AGTPFGPAAGLGGAVDGSSTAGGLYAGATAGGNVNAAAGLGGAVAGGKAIGGGYST  
AQSGGHTATSVLGGESGASGSAGFSVSAHKSVEVPVTVVKETEISVIPVEEVKTVHKKVY  
GEAKYEASNEITPVAKAGVEATANVNVNAQPEFVKEVSNWNRPIYSAPIIPPVFFQSIFSSL  
FGSPQRSYPPPMWLPLSYNFKQVCRVIIIKWYVHPEA

>ARD71210.1 acetyltransferase [*Spodoptera exigua*]

MSSKRPLTKAQKQQYEKKYEKRSLYIPKKYFVIAIIFLLAASSKLYFFKTDCVIPNVDFEQW  
WGSYPKTEIDTSIRPFMIEFSDIKVNDLKERLLHRAQFAPPLDSAGFSYGFNSLFLPKVLDF  
WQKEYNFEERERFLNKYNHFVTGIQGLDVHYMHVKPDLGVGDDITVLPILLHGWPGSIR  
EFYELIPKLVTTPRNQKFVFEVIAPSIPGFGYSQAPVQQGMGPQEVAVVFYNLMKRLGFTK  
YYVQGGNYGAKIGSVMATLFPDPTVLGFHTNTPTIMWSPMAIFYTLFGTIWPSFIVEPTLAD  
RMYPLSQYLRTIIQETGHFHLQATKPDTVGIALSDSPAGLAAYILEKFSAWTDVDNKQAID  
GALLHKFSLTHLLDNVMIYWTTNSITSSMRHYTEYKQLWVLDRIPTDVPTWGIFKYNLC  
FQPDSILRLKYKNYLHSSIVEDGGHFAAMEMPDVLADDIFDAVDTFIRFHEEKKKNEPQPE  
PAESKTAETVSAKKSTEPVKKTEPAKKPTEVDYMKAKSVHEFTVKDIHGNEVKLDTRYKG  
QVLIIVNVASNCGYTNVHYKQLNELYEKYSKGKGLRILAFPCNQFAYQEPGSPEEILKFTKA  
KQVKFDLFEKVAVNGEDAHLWNFLKRMQGGTLGDFVKWNFSKFIVDKNGVPVERFGP  
NTDPLELVPPYLEKLFDQ

>ARD71211.1 acetyltransferase [*Spodoptera exigua*]

MAKRLLCRTILNSNTTIKSSLPVLSKKLHSQVPTKEIQIPVKFGHIAGKLWGNISNERPILA  
LHGWQDNAGTWDPLIPMIKDRPILALDFPGHGFSSWIPDMQYYQWELPRIILYLKEYFK  
MEKVSILSHSMGAIASMRFASVFPDDVDFYIAVDSLIIYDDYDLDAVVSISKSTMKKALIAQ  
TRLNDEPPGYTLEDITKIWHLGTRKSVALESVQHLLKRGIKPTKADPNKYYFSRDSRLKYT

LFNPEDKKFVEALVRRCLKCPTLYIKAIDSPYSADAYSIEMREILEQNNENYEFHFVPGTHHV  
HLNNPELVAPLIKNFIRNHNL

>ARD71212.1 acetyltransferase [*Spodoptera exigua*]

MSVAAKGIFIVGAKRTAFGTGGVFRNTTATELQTAATVAALKEAGVAPEKVDSVVVGQV  
MTASQTDGIFIPRHVMLKAGIPQDKPALGVNRLCGSGFQSVVNSAQDILTGAAKISVAGGV  
ENMSQAPFAVRNVRFGTALGSTYAFEDTLWAGLTDSYCGLPMGMTAEKLGAFGTRDEV  
DNFALRSQQRWKAQAQDAGVFKAETPVTTLTVKRKEVKVEVDEHPRPQTTIEGLKKLPPVF  
KKEGLVTAGTASGISDGAGAIVLAGEEAAKGLKPLARLVGWSYVGVDPSIMGVGPVPAIE  
NLLKATKMSLNDIDLIEINEAFCAQTLSCAKALKLDMEKLVNNGGATALGHPLGASGSRIT  
AHLVHELRRRGLKRGIGSACIGGGQGIALMVETV

>ARD71213.1 acetyltransferase [*Spodoptera exigua*]

MAPSNLSLNEVVIVSAVRTPIGSFRGSLANVTATELGAIVVRAAVERAGIPSSEVKEVFMGN  
VCSAGLGQNPARQAAIFGGLEKSTICTTVNKVCASGLKAVTLAVQGLQTGANDVILAGG  
MESMSNIPFYIRRGEIPYGGTQLLDGILYDGLTDVYDQIHMGDCAENTAKNLNLSRKQQD  
DYAII SYKRSAAAHAAKAFDAEVVPVPVPQKKGGAPVIFAEDDEEYKRVDFDKLVKLPTVF  
KKENGTVTAGNASALNDGAAAVMMTAEAAKRLNVKPLARVIGYADGEREPIDFPIAPS  
VAIPKLEKTGVKKEDVAMYEINEAFSVVTLGNQKLLGIDLEKINVHGGAVSLGHPIGMSG  
TRIVGHLCHALKKGEIGVATACNGGGGASAIMIEKL

>ARD71214.1 acetyltransferase [*Spodoptera exigua*]

MELQDTYYNKSEYVETASGNKVSQRQTVLCGSQNIVLHGKVIVQSDAIRGDLANVKTGRF  
CIISKGSVIRPPFKKFSKGVAFPLQMGDHVFGENTVVNAAVVGSYVYIGKNVIGRRCV  
LKDCCMIEDNSVLPAETVVPFARYSGSPARLITLPEAMPDLMTEFTKSYQHFLLPTTVQ

>ARD71215.1 acetyltransferase [*Spodoptera exigua*]

MFGLLLTLLGWVGLSPVPFLAGVLGATEPALKLLISILLAYPLAIVYHKHVRQHVEYRNLY  
FIATGLDMAYYNFGFSMYHNAIPAIVIYLTTKFLGPGKNNTIITFAFNMTYLVAGYVTESE  
DYDITWTMPHCVLTLKLIALSFDLWDGKMLKGQELSANNKLTALESSPTFLELIGFVYFP  
ACFLVGPMFSFRRYKDYITDKFPLDKEKDVEYEAQAIRLIQGLVYLIAYQVGVTVFSMKY  
MMSDEFRETSVFYRHFYCGLWAHFALYKYISCWLLTEASCIRFGLSYNGVETKRYPVSK  
WDGCNNIKLLRFEGATRFQHYIDSFNCNTNYFAAEYVYKRLRFLGNRNLSQLITLAFLAL  
WHGTQSGYYMTFFNEFIIMVMEKDVEMLTKTQFYHKMWDNTILKYLLYIILKTYTIVF  
MGWSLAPFDAKFSKWWSIYHSLYSGFVFLFPWAFVYKPLLKSGLSLEKGTNHQQ

>ARD71216.1 acetyltransferase [*Spodoptera exigua*]

MFLKKGSSIITIKMRPTNKLFKAMAAYSSKVSLNDVVIASAVRTPMGsFRGSLASLSASEL  
GAVAVKAAVERAGVPKEEIKVYMGNVCSASMGQAPARQAVIFAGLPKSTICTTVNKVCA  
SGMKSIMLATQGLQIGSQDVILAGGMESMSNVPFYMKRGDTPYGGIQLIDGIVFDGLTDV  
YNKFHMGNCAENTAKKLNISRQQDDYAISSYKRSAAAYEAKAFAEELVPVPVPQKRG  
PPVMFAEDEEYKKINFEKFTKLSTVFQKENGTVTAGNASTLNDGAAAMVLMTAEAAQRL  
NIKPIARVVGADGECDPIDFPIAPAVAIKLEKTGVKKDDVAMWEINEAFSVVAVANQKL  
LELDPKVNIIHGGAVSLGHPIGMSGARIVVHLCHALKKGEKGVASICNGGGGASSIMIEKL

>ARD71217.1 acetyltransferase [*Spodoptera exigua*]

MINLGILKQSTIVHLCFAISYFTSGLILTFIQAILYFGLRPFNKSLYRKINYYLAYSFYSQLVF  
MSEWWSNSKLTIIYIKKDEYEEKYYGKEHGYLMNHSYEIDWLMGWHFCNTIGVLGNCKA  
YAKKSIQYLPPIGWMWKFSEFVFLERSFEKDKETIKHQISELCDYPDPVWLLMTPEGTRYT  
KKKHEASLNFAKEKNLPLLKHHLTPRTRGFTTSLQFFRGKIPVIYNIQLAFEKDSKTPPTLTS

LLYGKPVNAHLYIERIPVENVPEDEGEAAKWLHELFFVVKDKMQDSFFNTGDDFFLESQVER  
RESFTVPPPIWSLVNALGWAVVTLTPMLYLLGLLFSGKLLYFSIACAIFGAFFILLQKSIGM  
SKISQGSSYGTEKK

>ARD71218.1 acetyltransferase [*Spodoptera exigua*]

MNIRCARPSDLMNMQHCHNLLCLPENYQMKYYFYHGLSWPQLSYVAEDEKGHIVGYVLA  
KMEEDGEDNRHGHITSLAVKRSHRRLGLAQKLMNQASLAMVECFKAKYVSLHVRKSNR  
AALNLYTNSLGFKILEIEPKYYADGEDAYSMMRDLSAFAAENKTEPQPTENLEIKSESAIIS  
QC

>ARD71219.1 acetyltransferase [*Spodoptera exigua*]

MIGANKLICKSNVCQKIIQQRNFTRKNIKDVNYQYLQRSKLPTMHFQKSLPRLPIPELSKTS  
ERYLNALRPLLTQKFEAAQRTNNFIAKEGKVLQEKLIAKDKRNKHTSYISDYWFDLYL  
RDRVPLPINYNPMIVFQNDVRPEYNDQLIRSTNMLISAVRFMLSREQILEPEVYHMNPKK  
SDTPLFRNITRMLPEAISWYGAYLFKVFPLDMSQFVGLFGATRLPRQNKDEIFRDPKSKHV  
VVQRRGNFYVFDVLDADGNLLSPQEILGNLSKVMNDNSPISEYPLGVLTQTNRDQWAQQ  
RVHLESTGNSEILRKIDSAIFNLVLDLDDVINDDKRVLLRKYLHSDGTNRWFDKSFSLIVTGD  
GVAGVNFESWGDGVAVLRFFQDIYAETTKKPFHPESKPADSNISVQKLEFKLDDKSKQFI  
DNAKIEYNWCDLSIDYILYEGLNKAACKKFKVSPDCIMQLSFQAAHLLKGSFVGTYE  
SCSTSAFKHGRTEETMRPCTVKTAKFCETLHNNRSDDDLRSKLTECSKLHLELVKEAAMG  
QGFDRHMFALMKMAEDNNMPRPEIFDSYKYLNKSILSTSTLSSPSVMAGGFGPVVKE  
GFGIAYSAPDKLGAASVSYKSHNNSSHYVEALHKSFLDITKILSA

>ARD71220.1 acetyltransferase [*Spodoptera exigua*]

MAVVINKGIFIVAARPTFGRFGGAFKDIYPSDLLAVAAKDALKAGSVAPEIIDTVNIGQVY  
GLSGSSDGGLSRHAALKAGIPQEKPALGISRLCGSGFQAVVNSAQDIITGAAQTSLAGGT  
ENMSTVPFVVRNTRFGVNLGVKVPFEDVLTSSLDTSNFTMPQTAENLAEKYGLQRM  
VDQFALQSQQRWKAAHDQGVFKAEMAPVTVKVKKQDKVVEVDEHPRPETTTEMLSRP  
VLFRKGGVVTAGNSSGVNDGAGAIVLASEESVKQNGFTPLVRLLAWSAVGVDP  
SIMGIGPVPAIQNILSATGLKLDDIDLIEINEAFAAQTLACAKELGLDQSKLVNNGGAIAMGHPVGAS  
GARITAHLAHELRRRGLKRGIGSACIGGGQGIALLLETV

>ARD71221.1 acetyltransferase, partial [*Spodoptera exigua*]

MESKTTKMPKVAKVKNKAPAEIQITAEQLLREAKERDLEILPPPKQKISDPEELRDYQHR  
KRKAFEDNIRKNRLVIGNWLKYAQWEESQKQVQRARSYERALDVDHRNVTWLKYTE  
MEMRNRQVNHARNLWDRAVTILPRVSQFWYKYTYMEEMLENVAGARQVFERWMEWQ  
PDEQAWQTYINFELRYKELDRARQIYERFVMVHPDVKNWIKYARFEENHGFINGARKVFE  
RAVEFFGDEDLDERLFIAFAKFEENQKEHDRARVIYKYALDHIPKDRNKELYKAYTIHEKK  
YGDRSGIEDVIVNKRKMYEQEVIENTNYDAWFDYIRLVENEGNVDDIRDTYERAIANV  
PPSKDKQFWRRIYILWINYALYEELEAEDTERTRQVYRTCLELIPHKIFTFSKIWLMYAQFE  
VRCKDLKQARKTLGMALGICPRDKLYRGYIDMEIQLREFDRCRILYQKFLEYGPENCITWI  
KFAELETLLGDTDRARAIYEIAVGQPRLDMPPELLWKSIDFEVQQGETEKARQLYERLLER  
TVHVKVWLSYAKFELNAENPDDINVDLARRVYERANDSLRSAGEKEARVLLLEAWKDFE  
TEIGEEEEKLEKVLSKMPRRVKRQKIIESGVEEGWEEVFDYIFPEDEMVRPNLKLAAAK  
QWRKQKEVLQPAESETKTNQEETKEDDNNDDDDNNSEEEQTPPQPQEQNEKED

>ARD71222.1 acetyltransferase [*Spodoptera exigua*]

MGARSLKVLQVISGWQAVELILTCVFGIWQIIELSVKRLWKGYRRKVDDNQPVELTVDS  
SIGTHCYIKVMGVKYHYVETGPRSGQKVLILKDAPDTGNLWGPNNWANVVRRLAETNHH

VVTLDLRGTGGSEGGSRSDLSPRAVEELSALLKALGVSENQAVVIGFGIGGMLTWYLV  
HTRGSLISKFAVINAPHPNLYWQYPPATFCHRALQFIQWPHFPERWLAEGELNDREGRWTS  
SRACDWSGALNYVRGAAWWQVKPGLRTSAPALLVGNKDSAAQLVASAQHCTASTLRLV  
SKPEPSSKEVTDVLLDFLIEKEKLIIEVPRGLMGRVFGAVADRGRELTARLVLPTQA

>ARD71223.1 acetyltransferase [*Spodoptera exigua*]

MASKRINTFKVVFVSLAVVAVGFIIRTPWLPIRRELKASLGYPDRSLLNFTELTAEYGYVSE  
EHEVVTEDGYILTMFRIVQARNCHQKKRSPVLLVHGLLQSSDSFIDSGPNAGLAYLISDA  
CYDLWLGNVRGNYYSRGHTRLDPNKDPKYWKFYIDEIGYYDIPAMIDHVLDTGNDKL  
NYIGFSQSGTFLVMCSERPSYCEKVQLLIGLAPAAARQFNTKSKLFRTLQTTFEVLEGPLEN  
YGLVEVFSKGAVSQEFVAFQCQLSHFTGKLCEQVLDVFDYVDSSHLGSITNETTRVLFGHF  
PAGTSLHNMARYGQSMKSKRFEKFNYGKEKNLVMYGSEEPPTYNLSAVTAPVVCYIGSN  
DGLVDTKDVEWLVGKIPNVIESIKVEDPLWNHMDVTYSQYTSDTIFPKINEYLLKYTSA

>ARD71224.1 acetyltransferase [*Spodoptera exigua*]

MIENLSSIVEALSKSFSQISTLLGIQWAPMDIPMSRRLQTFAAFLWIYLILFGEAFIYLFIRL  
VYSKYWWAALLYGAWMLNDIEICNRGGRSSEWVRSWIWWRYLADYFPIKLVKTVDLDP  
SKNYMFACFPHGVISLGAFGSFCTNATDFKKLFPGMTCHLITLGGHFLVPLFRDLALALGI  
CSSSEQSLLYLLDKKKYEGNCACMIIGGAAEALDAHPKEYKVILNRRKGFIKVMKSGAA  
LVPVFSFGETDIFRPPNNPENSLRRRFQEKVRQLTGISPMFPMGRGVFQYSYGVLPPIRAPVT  
TVVGAPMEVKRNLEPTNEEIDAVHAEFTERLQTLFETEKKKYLKYEEEARLVIT

>ARD71225.1 acetyltransferase [*Spodoptera exigua*]

MLGIAPVLAVKSLLKRTGLTMNMDLVELHETFAAATVACIRELDVDDDKLVNNGGAIAI  
GHPPAATGARIVTNLTHELRRRGLKRALTAGSIAGGQSIAMIIEAV

>ARD71226.1 acetyltransferase [*Spodoptera exigua*]

MKTLFILLFVIKFISSKPTSIVLWHGMGDTCCVSFSLGGIKVFLENNIPGVYVTSRIGNSTV  
EDFENGYYFMNPNYQVEYVCKQLAADPNLKDGFNAIGFSQGSQFLRAVVQRCGHILPPIKN  
LISLGGQHQQGVYGLPHCGALMHPTCDYIRQVLNYAAYDSWVQDALVQATYWHDPLEDE  
TYINKSIFLAEINNELRVNKTYYIENLNNLQHFVLVKFDNDTIVQPRETEWFGFYDPGQSKK  
VVPFYETRLYVEDRLGLRKMHKDGRVLVLISTEGDHLRFSDKWLVEITHKPYLLN

>ARD71227.1 acetyltransferase [*Spodoptera exigua*]

MAFAGLKKQINKANQYVTEKMGGAEGTKLDLDFVEMERKTDVTCELVEELQTKTKEFL  
QPNPTARAKMAAVKGISKLSGQAKSNTYPQPEGVLGDCMLLYGKKLGEDTVFSNCLIEM  
GEALKQMADV KYSLDDNIKQNFLEPLHHLQTKDLKEVMHHRKKLQGRRLDFDCKRRRQ  
AKGAHIADDEIRQAEEKFAESLQLAQIGMFNLLDNDVEQVAQLTFFAESLLEYHQQCTEIL  
KGLVSTLMEKKEEAVNRPKMEFVPKTLADLHIEGIHDLNNGRRYGSTQSLSRPRQHIPPSS  
SVGDLSTTDPFKAWAEPSPVRTQVRPAPGFKPHPAPRNQFNGRDPWTASPLPSPVKSPART  
PVVANKTPCCTALYDFEPENQGELGFKENDVITLINKVDDNWFEGSVHGMTGYFPISYVQ  
VTVPLPNM

>AIN34707.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MRATIAKRLSAAKQTIPHYQLTATVNVEKTMAMRKTVNEKLEAEKAGVKVSMNDFIVKA  
VAAACKRVPTVNSHWMDSFIRQFANVDVSVAVATPSGLITPILFNCDSRGIIDLSTNMKELA  
AKAREGKLQNEFMGGTVTVSNLGMYGITMFNAIINPPQSLILACGGLQELVIPDKEDPRG  
FRSAKFVTFTASADHRVIDGAVGAQWMKAFKENMEDPANMIL

>AIN34695.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MGKNPVLFLPTHRSYADFCLMTYLCYHFDIDFPAAVAGMDFYSMVIGRRMRETCAFYIR

RTLADGPLYAATLKQYVRTVVGKHAAPIEFFLEGTRSRSNKSMPPKYGMLSMTLVPLFAH  
EVSDITIVPVNISYDRVMEHSLFAYEHLGVPKPKESTGGFLKALHSLNDHFGNIYINLGSPL  
SVREYLKNDTSHSKETLKPLDIQQLTPEQFKKVQSIADYVISLQQKNTVATISNLLSLVLMQ  
SLMKDSPLEFEEVVQEVGWMVQELRNLGATVFENDVRSSVERILVVQKKMMRLDKERK  
LRLISGVLTDLSDVKKKMKGHILQPQTMVAAPVIVQLQLYVNPILHYLVPPAIICLIVHRS  
AVTRDNLEVDYHRVRKLLSHEFFHLEREEVNTFNKALDYCMQNGVITYSSELYTLGEDTK  
LQYLLKWSVLPALTTLKCAEVMTEQTNCAHKQALKLVQQRVESERVHPYCLSLEATAN  
CLSGLVAAHALVKHKGESDVIYDLVPTTMLECSNLVNSILPSFNVDERNVVIDHKELSR  
L

>AIN34684.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MTGSVSMEMIKLRIEEQHPGTIVYNVNRFSWSSLETMWHQVLEIGMDIANISAKHPDGI  
NLIGYSQGGLIARGIVETFPNVSVSTFISLSSPQAGQYGAGFLHLVFPGLVKDTAYELFYSR  
VGQHTSVGNYNWDPYHQSLYESYSVFLPYINNHLSSAKSADFKNNLLRLKRLVLIGGPDD  
NVITPWQSSQFGYYDANETIEMKGGDIYMEDKIGLRTLDESGLRHIVTVPGVNHFSWHM  
NISIVDDCLLPFLD

>AIN34711.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MDLTEHEWYIQAPWGRIAHAWGDCYDPPVLLVHGSMDSAVSFRPLVSKLPKNFYIIGMD  
LPGNGKSDRFLPGLMISVYDMVYSVHAVVKHFRWKTYTLIGHSFGAYLGQFYNLCPGR  
LDKLVNLDPINFFAVPPEEFGRWYHVFFTDYYKNYDKFNTQPENAPKIKWTEALQSIKSSR  
PSLTEEQAAAVLERLSMPAGDGYVKYTYDLRMKRVNGPAYSPHIKQLFTTTKTPILTAC  
QKSLKRKLFRNTDFLLDEAEFPGRNLRFRTVDGDTHDVHVSHPERVAAYVGQFLVYGLDGL  
DNKAKL

>AIN34703.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MAMAHNPYINKVSFSAVFGMPWAVIGRSAILYTDSFLYLSGFLNAHNLLTDLEKKGTINLK  
DRLIARWFRLFPLFMSLMLFCTYILPDLNNGPQWNLVVEEHSRVCEKNMWKSFLFIHNYF  
GFEDMCLTHTHQIGMDMQLYVATLPLMVLIWKYKTLGWSLLALIAVASTALRYLAIWY  
DISMFVYYGISVQKLLDAARYSYILPTHRATIYLIGVAMAYLMKNKKLKFTLSTTQTRLLW  
VFCFALMTATIATPYKWGLEGYKYENFGAALFASLTPILWGVFMCVSHWAIANDYAGIGT  
KFIESRLFKFFNKIAYSVYLTQFPIFFYNVGVQRNPDYYSPLLLLYIPELLIVTVISILTTVAIE  
MPFNQVYRIYFGQSQKKLKEK

>AIN34692.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MELQDTYYNKSEYVETASGNKVSQRQTVLCGSQNVLHGVVIVQSDAIRGDLANVKTGRF  
CIISKGSVIRPPFKKFSKGVAFPLQMGDHFVFGENTVVNAAVVGSYVYIGKNVVIGRRCV  
LKDCCMIEDNSVLPATVVPFARYSGSPARLITLPEAMPDLMTFTKSYQHFLLPTTVQ

>AIN34694.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MMFGLLLNVGLIGLSPIFLSEVIGATEPALKLLISILGYPLAVIYHKYVKHHKEYRNLYF  
VLTGFDMAFYNFGISMYHNAIPAIVIYLSKFLGPGKNNIVTFAFNMTYLLAGYVVTSE  
DYDITWTMPHCVLTLKLIALSFDLWDGKKMLKGEELSANNKLTALQSFSLELLGFVYF  
PACFLVGPIFSFRRYKDFISDKFPLEREVKVYEAQAVKRLVQGVYLAAYQIGVTVFSMKY  
MLSDEFWDNSVFYRNFYCGLWAHFALYKYISCWLLTEAACIRFGLSYNGSRTENGVSVSQ  
WDGCNNIKLLRFEGATRFQHYIDSFNCNTNHFAAEYVYKRLRFLGNRNLSQLITLAFAL  
WHGTQSGYYMTFLNEFLIMVMEKDLESMLLKTEFYHKMWNNNSIIKYLLYFILKMYTIVF  
MGWSLAPFDVKSFSKWWTVYTSLYFSGFILFVPWSFVYKPLVKKALKASGAHPKAQ

>EHJ65205.1 acetyltransferase 1 [*Danaus plexippus*]



MAVALNKGIFIVAARKRTPFGKMGGMLKDMRPADLLAGVAKDAFKAGNVSPAIDTVNIGI  
VNVLSGSPDGGLSPRHAALKAGVPQEKPALGVNRLCGSGFQAVINSAQDIITGSANVSLA  
GGTENMSSVPFLVRNVRHGVPLGSNIEFEDTLFRQSLDTYCNHTMPQTAENLADQYNLTR  
TEVDEFSFQSQRKWKAQDSGVFKSELSPTVTRVKKQEVTEVDEHPRPDTSLALHKL  
PVLFRKGGGLVTAGNSSGVNDGAGALILASEEGLKNNNLKPLVRVLGWSCVGVDPSPVMI  
GPVPAIQNLLKVANLTLKDIDLVEINEAFAAQTLSCAKALKLDMKLVNNGGAIAIGHPLA  
ASGARITAHLAHELRRRGLKRGIGSACIGGGQGIALLLEV

>AIN34700.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MSSKRFTNLVLLVSLSVAVAYVIRTPWLPIKRETKASLGYPKDSLMTLTGKYGYISE  
EHHVITDDGYILTMFRIVKATNCHKQKRSPVLLMHGLLQSSDSWIDSGPNAGLAYLISDA  
CYDLWLGNVRGNYYSRGHVHLNPDKDAAYWKFYIEEIGIYDVPAMIDYVLDYTGFEKLN  
YIGFSQGTGTFLVMCSEPGYCDKAQLVIALAPAARNLNTKSMIFRTLTQTFAKIEGALSM  
YGVQEVFSKGAFSQEFVAFCCQLSDFTERLCETIITFDHADFSHMGSITNETTRVLFGHFP  
AGTSVHNMARYGQSTRSTTFKKFDYDKEQNLVVGSEQPPLYNLSATTVPVLCIYGND  
GLVDTKDVEWLMSKLPNVLESVKVKDPLWNHLDVTYSQYTVGSIFPKINEYLLKYTSA

>AIN34696.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MTRDEHPQPDVTLEKLSRLQPVSTGGITTAGNITGLNDGAAAMILANGQALRDHNLKPLA  
RIVGWSVVGVDPMMGYAAVPAVETLLKTTGLTIDDMDLVEIHETFAATTVCARHLGV  
DEDKMNVNNGGAIAMGHPSGASGARIVSHLTHELRRRGLKRGIASAGIAGGQGIATV

>AIN34691.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MKTLFIFLFIKLISAKPTSIVLWHGMGDTCCVSFSLGGFKLFLEKAIPGVYVDSLQIGNSTI  
EDLENGYFLNPNTQVEKVCKYLAEHPKLKDGFNAGFSQGSQFMRAVVQRCGHTLPTIKN  
LISMGGQHQQGVYGLPHCGALMHPTCDYIRQLLNAAAYDTWVQHALVQATYWHDPDLEE  
TYIHKTIPLDINNEVFVNKTYIQNLNLEHFLVKFDNDTIVQPRETEWFGFYEPGQSKK  
MLPMQETRVYKEDRLGLKKMEKEGKLVLISTEGDHLRFSDKWFENIIPYLLN

>AIN34699.1 fatty alcohol acetyltransferase [*Agrotis segetum*]

MAFAGLKKQINKANQYVTEKMGGAEGLDLDVEMERKTDVTCELVEELQAKTKEFL  
QPNPTARAKMAAVKGISKLSGQAKSNTYPQPEGVLGDCMLLYGKKLGEDTVFSNCLIEM  
GEALKQMADVYSLDDNIKQNFLEPLHHLQTKDLKEVMHHRKKLQGRRLDFDCKRRRQ  
AKGAHIADDEIRQAEKFAESLQLAQIGMFNLLDNDVEQVAQLTYFAESLLEYHQQCTEIL  
KGLVATLMEKKEEAVNRPKMEFVPKTLADLHIEGIHDLNNGRRYGSTQSLSRPRQHIPPSS  
SVGDLSNTDPFTAWEAPPAYRAQARPAQTRPAPGFKPHAPRNQINGRDPWKASPLPSPVK  
SPARTPVAPNKTPCCTALYDFEAENQGELGFKENDVITLINKVDDNWFEGSVHGKTGYFPI  
SYVQVTVPLPNM

>XP\_022830278.1 N-alpha-acetyltransferase 60 [*Spodoptera litura*]

MAGFSWYLSEGFQVIEKSKDAKCSLKDIQLRFLCPDDLEEVRSLCRDWFPIEYPQSWYED  
ITSSERFFALAAVHKSEIIGLIVAEIKPYLKLNAEDRGILSRWFASKDTLVAYILSLGVARFR  
RSGVATMLLDVLINHLAGPVPQPPHEHRVKAIFLHVLTNTNTEAILFYEHRRFRLHSFLPYYY  
SIKGRCKDGFYVYYVNGGHAPWGLYDYVKYVARAAWRGGGLYPWLWTKLRTALTIAW  
HRNSHKT

>XP\_021195034.2 N-alpha-acetyltransferase 60 [*Helicoverpa armigera*]

MAGFSWYLSEGFQVIEKSKDAKCSLKDIQLRFLCPDDLEEVRSLCRDWFPIEYPQSWYED  
ITSSERFFALAAVHKSEIIGLIVAEIKPYLKLNAEDRGILSRWFASKDTLVAYILSLGVARFR  
RSGVATMLLDVLINHLAGPVPQPPHEHRVKAIFLHVLTNTNTEAILFYEHRRFRLHSFLPYYY

SIKGRCKDGFTYVYYYVNGGHAPWGLYDYVKYVARAAWRGGGLYPWLWGKLRTALTIA  
WHRRFSSTTRVGAVRSDGEAI

>XP\_047026493.1 N-alpha-acetyltransferase 60 [*Helicoverpa zea*]

MAGFSWYLSEGFQVIEKSKDAKCSLKDIQLRFLCPDDLEEVRSLCRDWFPIEYPQSWYED  
ITSSERFFALAAVHKSEIIGLIVAEIKPYLKLNAEDRGILSRWFASKDTLVAYILSLGVARSR  
RSGVATMLLDVLINHLAGPVPQPPHEHRVKAIFLHVLTNTTEAILFYEHRRFRLHSFLPYYY  
SIKGRCKDGFTYVYYYVNGGHAPWGLYDYVKYVARAAWRGGGLYPWLWGKLRTALTIA  
WHRRFSSTTRVGAVRSDGEAI

>XP\_022817604.1 N-acetyltransferase 6 [*Spodoptera litura*]

MDAEDLQVLRHLHENPQYLKPCCELINDEWPRSKTARMMSLQASCNNLPTSLILVNDKKH  
LLGHCKLTPIPIESCFIETVVISKSMRGKKLGSYLMRQVEEYCKNVNLKMLHLSTKGQ  
ENFYAKLGYEVCPPVSIYGTRILNSEPVDISIKIQNPVPSNSVKSGLPPPPPPPPMPKPESLVQ  
SSTVKSCKTFMFKYL

>XP\_022821905.1 N-alpha-acetyltransferase 35, NatC auxiliary subunit isoform X1 [*Spodoptera litura*]

MGDNDDYYDGDGRMDSLGAPEVIYNWVDITSDFFKHIQDLQLGELLHDGHLFGLFEAM  
SAIEMMDPKMDAGMLCNRGNPKPLNFQQAAGKLIKDDLEPPELIGIIDATMACIVSWL  
EGHSLAQTVFTNLYLHQPHSIVNKTAKYCIAVYKLLDCIRDCINKAQVFEEEDFQPMGYG  
YRLGSNPQSGNTYDARLEVSEQKCVLMLREQEEELNKKARSCDDEDNLWAALQARIRFT  
RMFYRALLMITKRDSQSGADCVALNGCSEMMKVIKTSKGKTQPVENS DSPNPMGFEP  
MINQRLLPPTFPTRYTRIKPRAEALHYFDELVARLRHAWKITSCTNFHTALDFFMEFSRQRA  
CILSRSAQLLYLSPSPANTASMAQSAMNGPVGQPRPQHPFVEILRESVKNFVNPPALTPKS  
PMVSTPQAREFVENFLARCVRPFAVLLQVCGHNRRARQRDKLALLLDEFAALQEEAESVD  
AVVSGAAGTGPRACFGTWLLYHVLVMIAYLLSGLELELYSVHEYHYIFWYLYEFLYGWL  
VSALGRAENLSGDSGRRDSRDSRRRKTKKRVRPYAREGLLCNVMQNLGGYYKALVAFK  
LQGKIRQPQSEFDNEAVRYKHRFAPLSVLTTPQVHYHEFCENTQPLQYENPVILYLGCKH  
FQQARSLLTITTPDQEVQDLLKVAKTNFVVLKLLAGGHKRDSTVPPEFDFSVHRHFPIKL  
V

>XP\_022826697.1 N-alpha-acetyltransferase 30-like [*Spodoptera litura*]

MNQLTEENIQSIKCSQKGTNMKNKSKKAKDPENPDEISISNQENLSDSLANTLHINNINRN  
LTNGTSDHPNGSPESQKHESNQDDVPIEANEDVNDVNSIQSDATCKRESIDAPAQIADR  
CIFDDALGNLENVSKEEQHPEDIEIISYESELQMPEIMRLIQKDLSEPYSIYTYRYFIHNWP  
KLCFLATHEGKCIGAI VCKLDMHRNVVVRGYIAMLAVDEKYRKRKIGSRLVRKAIQAMIK  
DNADEVVLETEITNKPALKLYENLGFVRDKRLFRYYLNGVDALRLKLWLR

>XP\_021190649.2 N-alpha-acetyltransferase 30 [*Helicoverpa armigera*]

MNQLTEENVQNMKCSQKGTNIKNSKKAKDPSENPDISISNQENLSDTLANTLHINNINS  
NLTNGMSDHPNGSPEGPKDKSETREDATSGDVQDVNSVQCSDGMCKRECKDAPAQHTG  
RCIYDDALESLDNAISHEEHEPQDEIEIISYESELQMPEIMRLIQKDLSEPYSIYTYRYFIHN  
WPKLCFLATHEGKCIGAI VCKLDMHRNVVVRGYIAMLAVDEKYRKRKIGSRLVRKAIQA  
MINDNADEVVLETEITNKPALKLYENLGFVRDKRLFRYYLNGVDALRLKLWLR

>XP\_022826734.1 N-alpha-acetyltransferase 20 [*Spodoptera litura*]

MTTIRPFTCEDMLKFNNVNLDPLETYGLSFYTQYLAHWPEYFQVVESPSGEIMGYIMGK  
AEGHGENWHGHV TALTVGPEYRRLGLAATLMNILEDVSEKKKAYFVDLFVRVSNKVAIN  
MYKNLGYIVYRTVLEYYS GPDDEDAYDMRKACSRDVNKKSVIPLTHPVRPEDVD

>XP\_021195271.1 N-alpha-acetyltransferase 20 [*Helicoverpa armigera*]

MTTIRPFTCEDMLKFNNVNLDPLETETYGLSFYQTQYLAHWPEYFQVVESPSGEIMGYIMGK  
AEGHGDNWHGHVLTALTVGPEYRRLGLAATLMNILEDVSEKKKAYFVDLFRVSNKVAIN  
MYKNLGYIVYRTVLEYYSGBPDEDAYDMRKACSRDVNKKSVIPLTHPVRPEDVD

>XP\_022830428.1 N-alpha-acetyltransferase 10 [*Spodoptera litura*]

MNIRCARPSDLMNMQHNCNLLCLPENYQMKYYFYHGLSWPQLSYVAEDEKGHIVGYVLA  
KMEEDGEDNRHGHITSLAVKRSHRRLGLAQKLMNQASLAMVECFKAKYVSLHVRKSNR  
AALNLYTNSLGFKILEIEPKYYADGEDAYSMMRDLSAFAAENKTEPQPTENLEIKSESAIIS  
QC

>XP\_021192849.1 N-alpha-acetyltransferase 10 [*Helicoverpa armigera*]

MNIRCARPSDLMNMQHNCNLLCLPENYQMKYYFYHGLSWPQLSYVAEDEKGHIVGYVLA  
KMEEDGEDNRHGHITSLAVKRSHRRLGLAQKLMNQASLAMVECFQAKYVSLHVRKSNR  
AALNLYTNSLGFKILEIEPKYYADGEDAYSMMRDLSAFAAESKDTQPTENLEIKSESAIISQ  
C

>XP\_022817999.1 N-alpha-acetyltransferase 40 [*Spodoptera litura*]

MGKKTQANVNKKEKRNARKQEQRRIADGMSSVNSANKLKD L ATLC KELLVYRNNELE  
VEMYIQRVTELDKNVLEW AIDLTERNMKHLYETCAWGWNRDRKVEEMTDEGAWYLIAR  
EKKGTLLAFSHFRFDMDFGDPVLYCYEVQVEAEGRRRGLGQRVLSVLEKLADATRMRCV  
RLTALTHNPSASAFFRACGYSLDETSPGQDEAAHYEILSKLTENQQDGDATQEK CPLSDGM  
KAVQVGNPQ

>XP\_047034057.1 N-alpha-acetyltransferase 40 [*Helicoverpa zea*]

MGKKTQASATKNKEKRQARKLEQRKIADGMSSVTSANKLKDMATLC KELLVYRNNELE  
VEMYIQRVTELDKNVLQW AIDLTERNMKRLYETCAWGWNRDRKVEEMTDEGAWYLIAR  
EKNGTLLAFSHFRFDMDFGDPVLYCYEVQVEAEGRRRGLGQRV LIVLEKLANATRMRCV  
RLTALTHNPSASAFFRACGYSLDETSPPKDEAAHYEILSKSTDNPDGESSEDKCSLTDGMR  
AVQVANTQ

>XP\_021193614.2 N-alpha-acetyltransferase 40 [*Helicoverpa armigera*]

MGKKTQASATKNKEKRQARKLEQRKIADGMSSVTSANKLKDMATLC KELLVYRNNELE  
VEMYIQRVTELDKNVLQW AIDLTERNMKRLYETCAWGWNRDRKVEEMTDEGAWYLIAR  
EKNGTLLAFSHFRFDMDFGDPVLYCYEVQVEAEGRRRGLGQRV LIVLEKLANATRMRCV  
RLTALTHNPSASAFFRACGYSLDETSPSKDEAAHYEILSKSTDGPDGESSEDKCSLTDGMR  
AVQVANTQ

>XP\_022823263.1 N-acetyltransferase 9 [*Spodoptera litura*]

MKLNSNTKIIGRNVVLVPYREYHVPRYHKWMKSEELQKLTASEPLTLEQEYEMQKSWRE  
DDDKCTFIILNKTIFEKNEETGAMVGDTNIFITDKELRVGEIEIMIAEESARGKKLGWEAV  
ILMFLYGIQHINLKTFEAKISLSNSISIKMFQKLGFQEKSLSEVFQEITLEKVVNTEWIKWLN  
EQAQYEIQTSH

>XP\_021200289.1 alpha/beta-tubulin-N-acetyltransferase 9 [*Helicoverpa armigera*]

MKLNSNTKIVGKNLVLVPYREYHVPRYHEWMQSVELQKLTASEPLTLEEEYEMQRSWRE  
DEDKCTFIILDKDIYEKSNDET DAMIGDTNIFITDNELAAAGEIEIMIAEESARGKKFGWEAVI  
LMFLYGIKHINIKLFEAKISLTNTISIKMFNKLGFQEKSVSEVFQEV TLEKKVND EWIRWLN  
EQAQYEIQTC

>XP\_047028385.1 alpha/beta-tubulin-N-acetyltransferase 9 [*Helicoverpa zea*]

MKLNSNTKIVGKNLVLVPYREYHVPRYHEWMQSVELQKLTASEPLTLEEEYEMQRSWRE

DEDKCTFIILDKDIYEKSNDDTDAMIGDTNIFITDNELAAGEIEIMIAEESARGKKFGWEAVI  
LMFLYGIKHINIKLFEAKISLTNTISIKMFNKLGFQEKS SVSEVFQEV TLEKKV NDEWIRWLN  
EQAQYEIQTC

>XP\_022823402.1 N-alpha-acetyltransferase 15, NatA auxiliary subunit [*Spodoptera litura*]

MPPSNPLPPKENALFKRILRCYEHKQYKNGLKFAKQILSNPKFAEHGETLAMKGLTLNCL  
GRKEEAYEYVRRGLRNDLKSPVCWHVYGLLQRSDDKKYDEAIKCYRNALKWEKENIQILR  
DLSLLQIQMRDLEGYKDTRYQLFMLRPTQRASWIGFAMSYHLLGDYEMAISILDAFRTNQ  
MKGTDDEYHSELLLYQNMVLAESGQYERALQHLQKFSSQILDKLSIKETSGEYYLKLKRF  
KEAESVYEDLLKRNPENVMYYEKLIEAKQLVDPDEKVAFFEVYKKEFPRAIAPRRLQLTE  
ALAQPVFEEKLVDEYLRHGLHKGIPPLFVDLRSLYAIQDKAETIEKLILQYLENLSKNGTFGP  
DPSEVKQPASALLWAYYYYAAQHFDYKKDTRALQYIDAAIDHTPTLIELFIVKGRIYKHAG  
DPVSAYQWLEEAQAMDTADRYVNSKCARYMLRAGHVKRAEDMCAKFTREGVPATENL  
NEMQCMWFQTEAAAAYKRLQQWGEALKKAHEVDRHFSEIMEDQDFDHSYCMRKMTLR  
SYVGLLRLEDVLRAPFYFRAAKVAVDVYLRDLQDQHPLQDAPQTAEPDTENLAPSELKKLR  
NKQRKAKRKAESALQAQVQVKREQHHKARQQQEQGDPEAPQLDELIPDKLARAEDP  
LEQALKFLQPLRTLAAADRIDTHLMAFEIYFRKDKPLLMLQSIKRAHRLDAAHHHLHDCLL  
RFQGWLDDNLASLNPAVA AVITKEI EPMVRGRSTEEMAEQFVSQPGAARCQAGALSAAR  
ALRRLRPPRALHALQLATSLDYPDL SIQGCVDVLD SLRDGDFGPCEKEIEQYIEACRKKFP  
YAIAFKPASELSELADDHVADDAPLQPKEIAVNN

>XP\_021190458.1 N-alpha-acetyltransferase 15, NatA auxiliary subunit isoform X1 [*Helicoverpa armigera*]

MPPSNPLPPKENALFKRILRCYEHKQYKNGLKFAKQILSNPKFAEHGETLAMKGLTLNCL  
GRKDEAYEYVRRGLRNDLKSPVCWHVYGLLQRSDDKKYDEAIKCYRNALKWEKENIQIL  
RDLSLLQIQMRDLEGYKDTRYQLFMLRPTQRASWIGFAMSYHLLGDYEMANSILDAFRT  
NQMKGPYDYEHSSELLLYQNMVLAESGQYERALQHLHKFSTQILDKLSIKETSGEYYLKL  
KRFKEAEAVYEDLLKRNPENVMYYEKLIEAKQLVTPEEKVAFFDVYKKEYPRAIAPRRLQ  
LTEAVAQPVFEEQLVDEYLRHGLHKGIPPLFVDLRSLYSDQSKADTIEKLILQYLEHLAKSGT  
FGPEESEQKQPASALLWAYYYYAAQHFDKDKDTRALHYIDAAIEHTPTLIELFIVKGRIYKH  
AGDPVSAYQWLEEAQAMDTADRYVNSKCARYMLRAGHVKRAEEMCAKFTREGVPATE  
NLNEMQCMWFQTEAAAAYKRLHQWGEALKKAHEVDRHFSEIMEDQDFDHSYCMRKMT  
LRSYVGLLRLEDVLRAPFYFRCARVAIAVYLRLYTQPLQDAPQTQEPDTENLAPSELKKL  
RNKQRKAKRKAESALQAQVQVKREQHHKARQQQEQGDPEAPQLDELVPDKLARA  
E DPLEQAIFLQPLRTLAAADRIDTHLMAFEIYRDKDKPLLMLQSIKRAFQLDSSHHHLHDCL  
LRFQRWLDDNLAGLNPAVA AVINKEI EPMVRGRSAVQMAEEFIRSAADKTQANALWGAR  
ALRRLPERAHQALKLATALHYPDLSIQGCVDVLD SLREGDFGPCEKEIEQYIEACRSKFP  
YAIAFKPASALADLPDNHVADDAPLQPKEIAANN

>XP\_047027460.1 N-alpha-acetyltransferase 15, NatA auxiliary subunit [*Helicoverpa zea*]

MPPSNPLPPKENALFKRILRCYEHKQYKNGLKFAKQILSNPKFAEHGETLAMKGLTLNCL  
GRKDEAYEYVRRGLRNDLKSPVCWHVYGLLQRSDDKKYDEAIKCYRNALKWEKENIQIL  
RDLSLLQIQMRDLEGYKDTRYQLFMLRPTQRASWIGFAMSYHLLGDYEMANSILDAFRT  
NQMKGPYDYEHSSELLLYQNMVLAESGQYERALQHLHKFSTQILDKLSIKETSGEYYLKL  
KRFKEAEAVYEDLLKRNPENVMYYEKLIEAKQLITPEEKVAFFDVYKKEYPRAIAPRRLQ  
LTEAVAQPVFEEQLVDEYLRHGLHKGIPPLFVDLRSLYSDQSKADTIEKLILQYLEHLAKSGT  
FGPEESEQKQPASALLWAYYYYAAQHFDKDKDTRALHYIDAAIEHTPTLIELFIVKGRIYKH

AGDPVSAYQWLEEAQAMDTADRYVNSKCARYMLRAGHVKRAEEMCAKFTREGVPATE  
NLNEMQCMWFQTEAAAAYKRLHQWGEALKKAHEVDRHFSEIMEDQFDFHSYCMRKMT  
LRSYVGLLRLEDVLRHPFYFRCARVAIAVYLRLYTQPLQDAPQTQEPDTENLAPSELKKL  
RNKQRKAKRKAQESALQAQVQVKREQHHKARQQEQGDPEAPQLDELVPDKLARA  
DPLEQAIKFLQPLRTLAAADRIDTHLMAFEIYRDKPLLMLQSIKRAFQLDSSHHHLHDCL  
LRFQRWLDNLAGLNPAAVINKEIEMVRGRSAVQMAEEFIRSAADKTQANALWGAR  
ALRRLPERAHQALKLATALHYPDLSIQGCVDVLDLREGDFGPCEKEIEQYIEACRSKFP  
YAIAFKPASALADLPDNHVADDAPLQPKEIAANN

>XP\_022830430.1 N-alpha-acetyltransferase 10 [*Spodoptera litura*]

MNIRCARPSDLMNMQHNCNLLCLPENYQMKYYFYHGLSWPQLSYVAEDEKGHIVGYVLA  
KMEEDGEDNRHGHITSLAVKRSHRRLGLAQKLMNQASLAMVECFKAKYVSLHVRKSNR  
AALNLYTNSLGFKILEIEPKYYADGEDAYSMMRDLSAFAAENKTEPQPTENLEIKSESAIIS  
QC

>XP\_022826734.1 N-alpha-acetyltransferase 20 [*Spodoptera litura*]

MTTIRPFTCEDMLKFNNVNLDPLETYGLSFYTQYLAHWPEYFQVVESPSGEIMGYIMGK  
AEGHGENWHGHVLTALTVGPYRRLGLAATLMNILEDVSEKKKAYFVDLFVRVSNKVAIN  
MYKNLGYIVYRTVLEYYSGBPDEDAYDMRKACSRDVNKKSVIPLTHPVRPEDVD

>XP\_022826697.1 N-alpha-acetyltransferase 30-like [*Spodoptera litura*]

MNQLTEENIQSIKCSQKGTNMKNKSKKAKDPENPDEISISNQENLSDSLANTLHINNINRN  
LTNGTSDHPNGSPESQKHESENQDDVPIEANEDVNDVNSIQCSDATCKRESIDAPAQIADR  
CIFDDALGNLENVSKEEQHPEDIEIISYESELQMPPEIMRLIQKDLSEPYSIYTYRYFIHNWP  
KLCFLATHEGKCIGAIVCKLDMHRNVVVRGYIAMLAVDEKYRKRKIGSRLVRKAIQAMIK  
DNADEVVLETEITNKPALKLYENLGFVRDKRLFRYYLNGVDALRLKLWLR

>XP\_022826548.1 N-alpha-acetyltransferase 38-B, NatC auxiliary subunit [*Spodoptera litura*]

MSNTVSEQLTDAIKNTEDGKAKLRKWLNMNFRIEMTDGRVLIGVFLCTDRDANVILGAC  
SEYLKSGDGETEPRVLGLVMVPGRHIVSIQLDDTTPPQMYCYDE

>XP\_022823402.1 N-alpha-acetyltransferase 15, NatA auxiliary subunit [*Spodoptera litura*]

MPPSNPLPPKENALFKRILRCYEHKQYKNGLKFAKQILSNPKFAEHGETLAMKGLTLNCL  
GRKEEAYEYVRRGLRNDLKSPVCWHVYGLLQRSDDKYDEAIKCYRNALKWEKENIQILR  
DLSLLQIQMRDLEGYKDTRYQLFMLRPTQRASWIGFAMSYHLLGDYEMASILDARTNQ  
MKGTDDEYHSELLYQNMVLAESGQYERLQHLQKFSSQILDKLSIKETSGEYYLKLKRF  
KEAESVYEDLLKRNPEENVMYYEKLEAKQLVDPDEKVAFFEYKKEFPRAIAPRRLQLTE  
ALAQPVFEEKLVDEYLRHGLHKGIPPLFVDLRSYIAIQDKAETIEKLILQYLENLSKNGTFGP  
DPSEVKQPASALLWAYYYAAQHFDYKKDTRALQYIDAAIDHTPTLIELFIVKGRIYKHAG  
DPVSAYQWLEEAQAMDTADRYVNSKCARYMLRAGHVKRAEDMCAKFTREGVPATENL  
NEMQCMWFQTEAAAAYKRLQQWGEALKKAHEVDRHFSEIMEDQFDFHSYCMRKMTLR  
SYVGLLRLEDVLRHPFYFRAAKVAVDVYLRDLQHPLQDAPQTAEPDTENLAPSELKKLR  
NKQRKAKRKAQESALQAQVQVKREQHHKARQQEQGDPEAPQLDELIPDKLARAEDP  
LEQALKFLQPLRTLAAADRIDTHLMAFEIYFRDKPLLMLQSIKRAHRLDAAHHHLHDCLL  
RFQGWLDNLAGLNPAAVITKEIEMVRGRSTEEMAEQFVSQPGAARCQAGALSAAR  
ALRRLRPPRALHALQLATSLDYPDLISQGCVDVLDLRLDGDGFPCEKEIEQYIEACRKKFP  
YAIAFKPASELSELADHDHVADDAPLQPKEIAVNN

>XP\_022821908.1 N-alpha-acetyltransferase 35, NatC auxiliary subunit isoform X2 [*Spodoptera litura*]

MDSL GATPEVIYNWVDITS DFFKHIQDLQLGELLHDGHLFGLFEAMSAIEMMDPKMDAG  
MLCNRGNPKPLNFQQAVAAGKLIKIDDLEPELIGIIDATMACIVSWLEGHSLAQTVFTNLY  
LHQPHSIVNKT LKAYCIAVYKLLDCIRDCINKAQVFEEEDFQPMGYGYRLG SNPQSGNTY  
DARLEVSEQKCVLMLREQEEELNKKARSCDDEDNLWAALQARIRFTRMFYRALLMITKR  
DSQSGADC VALLNGCSEMMKVIIKTSGKGTQPVENS DSPNPMGFEPMINQRLLPPTFP RYT  
RIKPRAEALHYFDELVARLRHAWKITSCTNFHTALDFFMEFSRQRACILSR SALQLLYLSPS  
PANTASMAQSAMNGPVGQPRPQHHPFVEILRESVKNFVNPPALTPKSPMVSTPQAREFVENF  
LARCVRPFAVLLQVCGHNRRARQRDKLALLLDEFAALQEEAESVDAVVSGAAGTGPRACF  
GTWLLYHVL RVMIA YLLSGLELELYSVHEYHYIFWYLYEFLYGWLVSALGRAENLSGDSG  
RRDSRDSRRRKTKKRVRPYAREGLLCNVMQNLCCGGYYKALVAFKLQ GKIRQPQSEFDNE  
AVRYKHRFAPLSVLT PPQVHYHEFCENTQPLQYENPVILYLG GCKHFQQARS LLETITTPD  
QEVQDLLKVAKT NFVVLKLLAGGHKRDSTVPPEFDFSVHRHFPIIKLV

>XP\_022817999.1 N-alpha-acetyltransferase 40 [*Spodoptera litura*]

MGKKTQANVNKNKEKRNARKQEQRRIADGMSSVNSANKLKDLATLCKELLVYRNNELE  
VEMYIQRVTELDKNVLEWIDLTERNMKHLYETCAWGWNDRDKVEEMTDEGA WYLIAR  
EKKGTLLAFSHFRFDMDFGDPVLYCYEVQVEAEGRRRGLGQRVLSVLEKLADATRMRCV  
RLTALTHNPSASAFFRACGYSLDETSPGQDEAAHYEILSKLTENQQDGDATQEK CPLSDGM  
KAVQVGNPQ

>XP\_049691873.1 N-alpha-acetyltransferase 35, NatC auxiliary subunit isoform X3 [*Helicoverpa armigera*]

MDSL GATPEVIYNWVDITS DFFFSHIQDLQLGELLHDGHLFGLFEAMSAIEMMDPKMDAG  
MLCNRGNPKPLNFQQAVAAGKLIKIDDLEPSELIGIIDATMACIVSWLEGHSLAQTVFTNLY  
LHQPHSINNKT LKAYCIAVYKLLDCIRDCINKAQVFEEEDFQPMGYGYRLG SNPQSGNTY  
DARLEVSEQKCVLMLREQEEELNKKARSSDDEDNLWAALQARIRFTRMFFQALLMITKR  
DSQSGADC VALLNGCSEMMKVIIKTSGKGTQPVENS DSPNPMGFEPMINQRLLPPTFP RYT  
RIKHRAEALHYFDELVARLRHAWKITSCTNFHTALDFFMEFSRQRACILSR SALQLLYLSPS  
PANTAAMAQSAMNGPAGQPRPHHPFVEILRESVKNFVNPPALTPKSPMVSTPQAREFVEN  
FLARCVRPFAVLLQVCGHNRRARQRDKLALLLDEFAALQEEAEGVDAVVSGAAGTGPRAC  
FGTWLLYHVL RVMIA YLLSGLELELYSVHEYHYIFWYLYEFLYGWLVSALGRAENLAGDA  
ARRDARDSRKQRKSKKRVRPYAREGLLCNVMQNMCGGYKALVAFKLQ GKIRQPQSEF  
DNEAVRYKHRFAPLSVLT PPQVHYHEFCENTQPLQYENPVILYLG GCKHFQQARS LLETIT  
TPDQEVQDLLKVAKT NFVVLKLLAGGHKRDSTVPPEFDFSVHRHFPIIKLV

>XP\_049691871.1 N-alpha-acetyltransferase 35, NatC auxiliary subunit isoform X2 [*Helicoverpa armigera*]

MHIGRMDSL GATPEVIYNWVDITS DFFFSHIQDLQLGELLHDGHLFGLFEAMSAIEMMDPK  
MDAGMLCNRGNPKPLNFQQAVAAGKLIKIDDLEPSELIGIIDATMACIVSWLEGHSLAQTV  
FTNLYLHQPHSINNKT LKAYCIAVYKLLDCIRDCINKAQVFEEEDFQPMGYGYRLG SNPQSG  
GNTYDARLEVSEQKCVLMLREQEEELNKKARSSDDEDNLWAALQARIRFTRMFFQALLM  
ITKRDSQSGADC VALLNGCSEMMKVIIKTSGKGTQPVENS DSPNPMGFEPMINQRLLPPTF  
PRYTRIKHRAEALHYFDELVARLRHAWKITSCTNFHTALDFFMEFSRQRACILSR SALQLL  
YLSPSPANTAAMAQSAMNGPAGQPRPHHPFVEILRESVKNFVNPPALTPKSPMVSTPQARE  
FVENFLARCVRPFAVLLQVCGHNRRARQRDKLALLLDEFAALQEEAEGVDAVVSGAAGTG  
PRACFGTWLLYHVL RVMIA YLLSGLELELYSVHEYHYIFWYLYEFLYGWLVSALGRAENL  
AGDAARRDARDSRKQRKSKKRVRPYAREGLLCNVMQNMCGGYKALVAFKLQ GKIRQP

QSEFDNEAVRYKHRFAPLSVLTPPVHYHEFCMTQPLQYENPVILYLGCKHFQQARSL  
LETITTPDQEVQDLLKVAKTNFVVLKLLAGGHKRDSTVPPEFDFSVHRHFPIIKLV

>XP\_021192852.1 N-alpha-acetyltransferase 10 [*Helicoverpa armigera*]

MNIRCARPSDLNMQHNCNLLCLPENYQMKYYFYHGLSWPQLSYVAEDEKGHIVGYVLA  
KMEEDGEDNRHGHITSLAVKRSHRRLGLAQKLMNQASLAMVECFQAKYVSLHVRKSNR  
AALNLYTNSLGFKILEIEPKYYADGEDAYSMMRDLSAFAAESKDTQPTENLEIKSESAIISQ  
C

>XP\_021193614.2 N-alpha-acetyltransferase 40 [*Helicoverpa armigera*]

MGKKTQASATKNKEKRQARKLEQRKIADGMSSVTSANKLKDMATLCKELLVYRNNELE  
VEMYIQRVTELDKNVLQWAILDTERNMKRLYETCAWGWNRDRKVEEMTDEGAWYLIAR  
EKNGTLLAFSHFRFDMDFGDPVLYCYEVQVEAEGRRRGLGQRVLIVLEKLANATRMRCV  
RLTALTHNPSASAFFRACGYSLDETSPSKDEAAHYEILSKSTDGPDGESSEDKCSLTDGMR  
AVQVANTQ

>XP\_021198318.1 N-alpha-acetyltransferase 80 [*Helicoverpa armigera*]

MKMETQNLQVVRLHENPHYLKACCELINDEWPRSETARMMSLQASCNHLPTSLILIDDM  
KRLLGHCCLKTAIPSIPESCFIETVVISKSMRGKRLGSLMRQVEEYCKNILKMLHLSTKG  
QENFYAKLGYENCAPVSIYGVRSFNSVPTISDKIPNQVPVINNIVEGAPPPPPMPKPKETM  
VNNTLKSTKTFMFKYL

>XP\_021195271.1 N-alpha-acetyltransferase 20 [*Helicoverpa armigera*]

MTTIRPFTCEDMLKFNNVNLDPLETETYGLSFYTQYLAHWPEYFQVVESPSGEIMGYIMGK  
AEGHGDNWHGHVLTALTVGPEYRRLGLAATLMNILEDVSEKKKAYFVDLFVRVSNKVAIN  
MYKNLGYIVYRTVLEYYSGDPDEDAYDMRKACSRDVNKKSVIPLTHPVRPEDVD

>XP\_021190653.2 N-alpha-acetyltransferase 38-B, NatC auxiliary subunit [*Helicoverpa armigera*]

MSDTTSEQPIDTIKNVEDGKAKLRKWLNMNFRIEMTDGRVLIGVFLCTDRDANVILGACS  
EYLKSSDGETEEPRVLGLVMVPGRHIVSIQLDDTTPPQMYCYDE

>XP\_021190649.2 N-alpha-acetyltransferase 30 [*Helicoverpa armigera*]

MNQLTEENVQNMKCSQKGTNIKNSKKAKDPSENPEISISNQENLSDTLANTLHINNINS  
NLTNGMSDHPNGSPEGPKDKSETREDATSGDVQDVNSVQCSDGMCKRECKDAPAQHTG  
RCIYDDALESLDNAISHEEHEPQDEIEIISYESELQMPEIMRLIQKDLSEPYSIYTRYFYHN  
WPKLCFLATHEGKCIGAIVCKLDMHRNVVKRGYIAMLAVDEKYRKRKIGSRLVRKAIQA  
MINDNADEVVLETEITNPKALKLYENLGFVRDKRLFRYYLNGVDALRLKLWLR

>XP\_049697255.1 N-alpha-acetyltransferase 15, NatA auxiliary subunit isoform X2 [*Helicoverpa armigera*]

MPPSNPLPPKENALFKRILRCYEHKQYKNGLKFAKQILSNPKFAEHGETLAMKGLTLNCL  
GRKDEAYEYVRRGLRNDLKSPVCWHVYGLLQRSDDKKYDEAIKCYRNALKWEKENIQIL  
RDLSSLQIQMRDLEGYKDTRYQLFMLRPTQRASWIGFAMSYHLLGDYEMANSILDAFRT  
NQMKGPYDYEHSELLLYQNMVLAESGQYERLQHLHKFSTQILDKLSIKETSGETEYLLKL  
KRFKEAEAVYEDLLKRNPNVEMYEKLIEAKQLVTPEEKVAFFDVYKKEYPRAIAPRRLQ  
LTEAVAQPVFQELVDEYLRHGLHKGIPPLFVDLRSLSYSDQSKADTIEKLILQYLEHLAKSGT  
FGPEESEQKQPASALLWAYYYAAQHFDKDKDTRALHYIDAAIEHTPTLIELFIVKGRIYKH  
AGDPVSAYQWLEEAQAMDTADRYVNSKCARYMLRAGHVKRAEEMCAKFTREGVPATE  
NLNEMQCMWFQTEAAAAYKRLHQWGEALKKAHEVDRLFSEIMEDQFDFHSYCMRKMT  
LRSYVGLLRLEDVLRHPFYFRCARVAIVYLRLYTQPLQDAPQTQEPDPTENLAPSELKKL  
RNKQRKAKRKAQESALQAQVKREQHHKARQQEQGDPEAPQLDELVPDKLARAEDPL

EQAIKFLQPLRTLAADRIDTHLMAFEIYYRKDKPLLMLQSIKRAFQLDSSHHHLHDCLLRF  
QRWLDDNLAGLNPAAVINKEIEMVRGRSAVQMAEEFIRSAADKTQANALWGARALR  
RLLPERAHQALKLATALHYPDLISIQGCVDVLDLREGDFGPCEKEIEQYIEACRSKFPYAIA  
FKPASALADLPDNHVADDAPLQPKEIAANN

>XP\_021190458.1 N-alpha-acetyltransferase 15, NatA auxiliary subunit isoform X1 [*Helicoverpa armigera*]

MPPSNPLPPKENALFKRILRCYEHKQYKNGLKFAKQILSNPKFAEHGETLAMKGLTLNCL  
GRKDEAYEYVRRGLRNDLKSPVCWHVYGLLQRSDDKKYDEAIKCYRNALKWEKENIQIL  
RDLSELLQIMRDLEGYKDTRYQLFMLRPTQRASWIGFAMS YHLLGDYEMANSILDAFRT  
NQMKGPYDYEHSELLLYQNMVLAESGQYERALQHLHKFSTQILDKLSIKETSGETYYLKL  
KRFKEAEAVYEDLLKRNPNENVMYEKLIEAKQLVTPEEKVAFFDVYKKEYPRAIAPRRLQ  
LTEAVAQPVFQELVDEYLRHGLHKGIPPLFVDLRSLSYSDQSKADTIEKLILQYLEHLAKSGT  
FGPEESEQKQPASALLWAYYYAAQHFDKDKDTRALHYIDAAIEHTPTLIELFIVKGRIYKH  
AGDPVSAYQWLEEAQAMDTADRYVNSKCARYMLRAGHVKRAEEMCAKFTREGVPATE  
NLNEMQCMWFQTEAAAYKRLHQWGEALKKAHEVDRHFSEIMEDQFDFHSYCMRKMT  
LRSYVGLLRLEDVLRAPFYFRCAVAIAVYLRLYTQPLQDAPQTQEPDTENLAPSELKKL  
RNKQRKAKRKAQESALQAQVQVKREQHHKARQQEQGDPEAPQLDELVPDKLARA  
E  
DPLEQAIKFLQPLRTLAADRIDTHLMAFEIYYRKDKPLLMLQSIKRAFQLDSSHHHLHDCL  
LRFQRWLDDNLAGLNPAAVINKEIEMVRGRSAVQMAEEFIRSAADKTQANALWGAR  
ALRLLPERAHQALKLATALHYPDLISIQGCVDVLDLREGDFGPCEKEIEQYIEACRSKFP  
YIAIAFKPASALADLPDNHVADDAPLQPKEIAANN

#### ACBP

>ARD71233.1 acyl-CoA binding protein [*Spodoptera exigua*]

MAEALPEYPDSDFSDDDEQSPLDKSFSKASDHVRKLTNVLNNNQLLELYGLYKQGTEGKC  
NIPKPGWLDGRGRKKWEAWNSLHNMPQDEAKQKYIALVQKYAPELTDLSNDNESGGKE  
AWVAVSSMLKLPEPELVHNELSILDAARENCADRVELLSKHPELRHERDEDGLSALHWA  
ADRNATEALKAALEGGCPVDAADCEGQTALHYAATCGHIESTTILLKAGAALLKDEDDCT  
PLDLASDDDIRKVLEGAK

>ARD71234.1 acyl-CoA binding protein [*Spodoptera exigua*]

MSLQEQFDKAAGDVKKLKSPLSDDLLELYALFKQATVGSDSPSKAPGFLDLKGKAKFE  
AWTKKKGLSKEDAQKAYIAKVEQLIASIGLQ

>ALJ30272.1 putative acyl-CoA binding protein ACBP1 [*Spodoptera litura*]

MAEALPEYPDSDFSDDDEQSPLDKSFSKASDHVRKLTNVLNNNQLLELYGLYKQGTEGKC  
NIPKPGWLDGRGRKKWEAWNSLRDMPQDEAKQKYIALVQKYAPELTDLSNDNESGVKE  
AWVAVSSMLKSPEPELVHNELSILDAARENCADRVELLSKHPELRHETDEDGLSALHWA  
ADRNATEALKAALEGGCPVDAVDECGQTALHYAATCGHIESTTILLKAGASLLKDEDDCT  
PLDLASDDDIRKVLEGAK

>ALJ30273.1 putative acyl-CoA binding protein ACBP2 [*Spodoptera litura*]

MSLQEQFDKAAGDVKKLKSPLSDADLLELYALFKQATVGSDSPSKAPGFLDLKGKAKFE  
AWSKKKGLSKEDAQKAYVAKVEQLIASIGLQ

>ABK29477.1 acyl-CoA binding protein [*Helicoverpa armigera*]

MSLDEQFSKVATSVRNWKTTPSNDENLALYSLYKQATIGDVNIAEPSGMVENAKFKAWSG  
RKGISQDDAKKQYIELAEKLAPKFA