

Supplementary File 3: Phylogenetic reconstructions for the delta desaturase gene family

Aligned amino acid sequences used for the delta-desaturase phylogenetic reconstruction:

Dpl_ctg10

-----MEA-----SPAASDV-----EKLSK-----LRE---
----ANWPPVLFFIYIHILSFFGLWLLFVEA---KLM-
TILFLVFLVSVGLLGMTTGAHRLWAHRTYEANSALRIALMLFQTLAGIGPIYDWVQYHR
LHHAYFKTESDPYNPKNGFLHAHFFTRLQKLSPKMTALKDAIDMS--
DLQNDGIVMFQQRFYWVLYGIIFLLLPLNAPMEYWDESILSTFFIIGILRYAFILHGSWLIE
SGVCVWGLQEGEKYPPDSNTVFILNRTF---WPEYHYIYPQDYKSGEYG-
TYGSGCSTAFIRMFAMGLAKDLRTLESATLQ-KALAEYARTKQ-----
-----PLDVCFKNALNNQVLPEEHYLRD-----

Hme_ctg10_HMEL002311-PA

-----MAD-----SSS-----MDLSRLSK-----SRE-----
---ANWPAVLFYIHVHLLSLYGIWLIFFEA---KLL-
TILLVVLTLTATLGVTVGSHRLWAHRTYKANLELRIFLMLCQTLAGHGPIYDWVQHHR
LHHAHFKTDSDLHDSRKGFLYAQFITRFSKLSPLYQEELKNSIDMS--
DLEADSVVMFQRRYYWVLYAVIFLILPLNAPLEYWNDSVLSTVFVMGFVRYALVLHAS
WLLESGVCLWGLKEGEKYPPDSNSVFILNKTF---WPEYHYIYPQDYKSGEFG-TY-----

Ofu_Z/E14

-----MAD-----IDATNHYDLQDKSEDDKPEDTEGEL---TIVGTDYSY---
-----THR-----IIWPIVMVYVVMHIGAITGLLLVLGGN----
VKIASIIWAVFYSLVATEGAHMGAHRCFSHRAFKAKPLLKVILLIMQTISGQHSTYIWC
DHRQHHRYSDDTDGDPHNSKRGMFYCHVGWLMTSRHPLCKKLRKTIDMS--
DLQQDPLVMFQYRYFRSLFFTFGFLLPVWVPMHFFQESFTNAVFCFFLRYVYALHVTY
FINSLAHKYGTRPYDKTIQPVETWVFSLLSLGEGWHNYHHAYPWDYKAAEIG--
MPLNSTASLIRLCASGLAYDLKSVDPETLN-KRIMNKGDTY-----
EVKYLQEHVTAIGPLHPLNPSYRGTCPDPEIKLKVRMKP-----

Onu_Z/E14

-----MAD-----IDATNPYDLQDKSEDDKPEDTEGEL---TIVGTDYSY---
-----THR-----IIWPIVMVYVVMHIGAITGLLLVLGGN----
VKIASIIWAVFYSLVATEGAHMGAHRCFSHRAFKAKPLLKVILLIMQTISGQHSTYIWC
DHRQHHRYSDDTDGDPHNSKRGMFYCHVGWLMTSRHPLCKKLRKTIDMS--
DLQQDPLVMFQYRYFRSLFFTFGFLLPVWVPMHFFQESFTNAVFCFFLRYVYALHVTY
FINSLAHKYGTRPYDKTIQPVETWVFSLLSLGEGWHNYHHAYPWDYKAAEIG--
MPLNSTASLIRLCASGLAYDLKSVDPETLN-KRIMNKGDTY-----
EVKYLQEHVTAIGPLHPLNPSYRGTCPDPEIKLKVRMKP-----

Bmo_13_AGO45858

-----MTA-----EVQNPKSVDENGNLNGTTKFDSFLI-STKYIGTDYSY--
-----KHQ-----IVWKNAIGFLILHLLALWGVVLIVTGN----
IGLKTFLWTVLFMYAATIGITIGAHRRFFTHKTFKGTPLLKVFLLCQTVAGQNSTFIWARD
HRLHHRYSDDADPHNSKRGFFFCHIGWLMMKKHPYVIELGRRIDMS--
DLQADKMIMFQKKYYYYLYFVVAFLIPVFPYFFNEHWLSSFLVCYCARYILQLNGTW
LVNSAAHLYGTRPYDRKLQPVESWVSCISLGEGWHNYHHAFPWDYKAAEES--
MHFNSNATIIRFFERIGLAYDLKIASPDMVR-NRIVRSGDGTH-----H-----

VLGNDEAKSAVSAIGPLHPLNPTYNSTLKSPDAILKPEGLPLFHEKDV LINDLTRNVAG
Bmo_4_AGO45856

-----MTA-----VSENGNLNNTTKLNSLLINSK-----YIGTDYSY-----
-----KHE-----IVWKNAIGYLILHLLCLWGVGLIVTEL---EGLK-
SCLWTLHMYAGSTGVTGVAHRLFTHKSFKATPLLKVFLLCQTIAGQNSTFIWVRDHR
LHHRYSDDADPHNSKRGFFFCHIGWLMMKKHPYVIELGRRIDMS--
DLQADKMIMFQKKYYYYLYFMVAFLIPVFPYFFNEHWLSSFLVCYCARYILQLNLTW
LVNSAAHMYGTRPYDRKLQPVESWVSCISLGEGWHNYHHAFPWDYKAAEES--
MHFNCNATIIRFFERIGLAYDLKTASPD MIR-NRILRSGDGTH-----Y-----

VLGNDKAKSAVSAIGPLHPLNPTYNSTLKSPDAILKPEGLPLFHENDVLISDVIRGNIAE
Bmo_12_AGO45857

-----MTAVSENEENLNNTTKLNSLLINSK-----YIGTDYSY-----
-----KHE-----IVWKNAIGFLILHLLGLWGVGLMVTGN----
IGLKSCLWTLILMYAGSTGVTGVAHRLFTHKSFKATPLLKVFLLCQTIAGQNSTFIWAR
DHRLHHRYSDDADPHNSKRGFFFCHIGWLMMKKHPYVIELGRTIDMS--
DLQADKMIMFQKKYYYYLYFVVAFLIPVFSIYFFNEHWLSSFLVCYCARYILQLNGTW
LVNSAAHLYGTRPYDRKLQPVESWVSCISLGEGWHNYHHAFPWDYKAAEES--
MHFNCNATIIRFFERIGMAYDLKTASPD MIR-NRILRSGDGTH-----H-----

VLGNDEAKSAVSAIGPLHPLNPTYNSTLKSPDAILKPEGLPLFHENDVLINDIIRGNIAE
Dpl_ctg8

-----MTV-----N---TDILHPNHYNTDVKISKQPNSNFDNDIKNIGTDYSY-
-----KHQ-----VWVKNAIGFFILHLLGIWGH LIVFTGG---IYWQ-
TFMWTSLLLFTSTEGITIGAHRLWSHRTFKATPLLKTILMIFQTLAQNSIFTWCRDHLH
HRYSDTDADPHNAKRGFFFSHIGWLLCKKHPYVKELGKRIDMS--
DLQNDWMIMAQKKYYYYLYLIFAVIIPVSVPYFFGESLKNLLVCYFARYVFQLNGT
WLVNSAAHLYGTRPYDKKLQPVESWVFSISFGEGWHNYHHAFPWDYKAAELS--
MHFNQSAKFIRIFEKLG LAYDLKTASPEMVY-NFEMF-----

Hme_ctg8
-----MSP-----NSVIESETQNGSSIIEDKNIIITKRIGTDYSY-----
---RHE-----IVWKNAIGFLILHILAVWGLFILFTGG---
ISLKYTLWSAFLMVCGSEGV TIGAHRLFSHRSFKATPLLKAVLLFFFTMSGQNSAYIWCR

DHRLHHRYSDTDADPHNSKRGFFFSHVGLMCKKHPYVKS LGKRIDMS--
DLEADWMIMFQKKY YLYVISAIIPVCIPY YFGESFKNSLLFCYFTRYLAQLNGTWL
VNSAAHLYGTRPYDKKLQPVESW FVSFISLGEGWHNYHHTFPWDYKAAEW--
NMHFNSSATFIRWFEKLGLAYDLKTASSKMVR-RLI-----

Dpl_ctg5

-----MRQ-----KTKHSIADQLNEDIIDNKSDSDFDL---MKYEALEF-----
-----KPR-----IKWPDLLVQLCLHSTTVYGFYLILVNR----
VKLYTILFVFFTIYTSGFGITAGVHRLWSHRAYKANLPLRILLALLFTVTGQRDIYTWALD
HRVHHKYTETVADPHDVRRGFWFAHVGWLVLTTPH PAVEDRRISLRKTSLDLLADPVVR
WQKIFFIPLFVLLNVFLPIAIPVYFWHESYINSFVLSFVTRFTITLNIAYSVNSFAH MWGNK
PYDRFIKSVENRIVSLAALGEGWHNYHHVFPWDYRTSELG---
MINISTTFIDAFKIGWAYDLKVATNEMIR-NRARRNGDRSL-----R-----
-----HLEEPDPSVSSE-----

Bmo_6_AGO45854

MAPAQQNIEVCTEVM EPALELRLTSDGCKDEN-----
NVEHSKNNNTVKQNNILNEKTNNETDFDI---SKYEAMEF-----TPR-----
IRWPDLVVQVSLHLVSIYGIFLIVTNE---
VKLLTTLFALATIYTSGFGITAGVHRLWSHRAYKARTPLRILL AFLFTITGQRDIYTWALD
HRVHHKYSETVADPHDVRRGFWFAHVGWLVLTTPH PAVEDRRVALRKCSLDLIEDPVVR
IQQKIFIPLFLLLNIPIWIPWYFWNESLVT SFVISFVLRFTTTLNIAFSVNSFAHLWGNKPY
DRFIKPAENS VVSLAALGEGWHNYHHVFPWDYRTSELG---
RINVSTNFIDFFAKIGWAYDLKAATSSMIE---IELRGAVMA-----
--L-----

Hme_ctg5

-----MHLIN-----KLEHIENNNTVLAQEYSDKI--NDTDFNI---SNYEAVEF--
-----RPQ-----IKWPD LIVQVMLHLVSIYGCFLVITSE----
VRFLTTLFAFATIYTSGFGITAGVHRLWSHRAYRARLPLRILLALLFTITGQKDIYTWALD
HRVHHKYSETVADPHDVRRGFWFAHVGWLVLTTPH PAVENRRKALKKTSIDLNDPVVR
LQRRFFIPLFIILNVLVPVGV PVYFWEEALLYSFVVSFVTRFTITLNI AFCVNSFAH MWGN
KPYDRFIKPVENS VVSLAALGEGWHNYHHVFPWDYRTSELG---
RLNLSTKFIDTFARIGWAYDCEFVV-----FLSF-----

Ape_E6

-----MK-----IIFDEILR-----RFERVFAF-----DND--
-----IKWGSVFVIFGYHALAVYWCYNYS LPV---KWQ-
TVIFAYCTYVLSGMGITLG VHRYWSHRCFKATKPLQIILFLMFALTGQTSIRIWVRNHRL
HHKASDTPGDPHNATRGLFYSHIGWLMMKKTDQLIEQGKKIDMR--
DIDSDPLL R WYDRNVFMVNLMAAFVLPTMVNIWCLGESWRC A VAWQCFVRYLGV LH
AQMTINSLAHKFGNRPFNSRIKPAENMFVSYITFGE GFHNYHHVFPYDYRTT--
GDYFILDY G KILLKFFEKIGWAYNLRKASPETIA-SAVGR-----
-----LNCAESDDLKS-----

Bmo_15_XP_004933819

MIIVSGAGITCGVHRLWTHRSYKAKAPMKLLLMACFCSSGQNSIYNWVRDHLHKKFA
DTDADPHNVKRGFFFSHIGWLMVKKNESVLTKGKLIDMS--
DIESDSHLMFEHKYHNQLTILFCFLIPTLMNIFLIGEDWKCAVAWQCFIRYLYVLHCELT
NSLAHMYGYKPYNVNIEASENILVSVLTYGEGYHNFHHVFPDFRAAET--
MDFFSLSTKIISTFEKIGWTYDLKQASPEMIEAARDKLGGDGSK-----
-----AHN-----

Bmo_14_AGO45859

-----MERDKKVMKKITPER--SLSEIFR---TFEKS LGF-----
---QND-----IKWPSFIITLYHVIGAYWCYNFAFPV---KWQ-
TVVFAAIMYVATGFGITGGAHRLWTHKSYKAKLPLKLFLLCFSAAGQNSLYQWVRDH
RIHHKFSDDADPHNANRGLFFSHIGWLMMKKNNEVILRGKQIDMS--
DIENDPFLRFYDKNFNSLKLVCYIPPTMLGILLWNEEWKCAVAWQCFIRFLGMFHSELT
VNSLAHTFGYKPYNKNIVPAENRFVSICTLGEGWHNYHHAFFPDYKAAEH--
FDFNFNGTKFIKLFKIGWAYDLKEATPEMIN-AIAKKLGDGTP-----V-----
-----HPILVTKTN-----

Dpl_ctg6

-----MEN-----INLKHLPPISETF-----AFEKS LGF-----
KND-----IKWTSAILLTLYHIAAVYWCYHYALPV---KMQ-
TVIFAAIMYVATGFGITGGAHRLWTHKSYKATLPLKLFLLMCFASAGQNSLEQWVRDH
RLHHKHSDTNADPHNANRGLFFSHIGWLMMKKNKEVIIRGKQMDMT--
DIHEDPILIFYNKHFAFYRLLFCFVLPFMINVYILKESWQCTIAWQWFIRFLSMFHSELT
SLAHAYGYRPYNKNIVPRENRFVATCTLGEGWHNYHHAFFPDYKAAEH--
FDLFNWGTLFIQAFEKLGLAYGLRMATPEMIS-NLSKRLGENAQ-----

Hme_ctg6

-----MEK-----INKRSTLSLSEIFR-----SFEKNLGF-----
KND-----IKWTTAILIVLYHVA AVYWC SLYTFPV---KWQ-
TVVLAAIFYVITGFGITGGAHRLWTHKSYKATLPLKLFLLMCFSCAGQNSLEQWVRDHR
VHHKFSDDADPHNSNRGLFFSHIGWLMMKKNAQVRNSGKLIDMT--
DITNDPLLKFYNKYFSYFKLFFCYVLPVSINVYLFGESWQCAVAWQWFIRFLSMFHSELT
VNSLAHAYGYKPYNKNLIPTENRFVATCTLGEGWHNYHHAFFPDYKAAEH--
FDMFNWCTRFIQGFELGWAYDLREATPEMIN-SIAQRLGDGTP-----V-----
-----HFPLKSQNEL-----

Hme_ctg7

-----MGF-----LTP-----
IRWTMVITITLFIITLVGFFNSVFTEGRLPMWK-
TIYFATFVG VFGGFGVTGGVHRYWTHRSYKAKLPLQIILMSGFAISGQNNIFNWVRDHR
VHHKLSETSADPHNAHRGFFFSHVGWLMMKKHPH VISEGNKIDMT--

DILNDTVVQFHTRYFVWIKLLLCFLLPTAIPYFWGESVVASLIT-
TAVRYMLGLHMTWAVNSFAHIWGNKPYDTNITPVENWKVSFVAMGEGWHNYHHTFP
WDYKAAELA--YFINITILIDLFATIGWAYDLKKAAPSLIK-AVVKSRRGRQTK-----
-----KMS-----

Bmo_7

-----MAP-----
LNIVDTPYSDLTKLEDSENNKPNQANKPNNFECTNTVDPYDEVKLNPIFLAPIRKWEK
RMGFVTPIRWTNAILITTFHVTVVWGFYTLFYEQKQPMWQ-
SVIFGIFMGQLAGFGVTAGAHRYWCHRSYKAKLPLQLALCYSAAGQNTIYEWVRDHR
VHHKFSETSADPHDANRGFFFSHIGWLMMKKHPDVVKQGSKIDMS--
DIIHDPVVIFCTKYFILFKITFCWIIPSALPVYAWGELWNIAILSQAFWRYMLSLHFTWSVN
SFAHLWGNKPYDRYIMPCENKGVSIAMGEGWHNYHHTFPWDYKAAELG--
VPNNTTFLDLFARIGWAYDLKQASPALVR-AVAKQRGECKE-----

Dpl_ctg7

-----MGF-----ITP-----
IRWTNAILISSFHIMAVITFLYTFSSG-MVPTLE-
TVFFGFLCGWIGGFGVTAGAHRYWTHRAYKAKIPLQIILIIAYSVAGQNSIPNWVRDHRV
HHKMSETSADPHDANRGFFFSHVGLMMKKHPDVVKEGKKIDMS--
DILEDPLVRFHNTKYFNTFKILFCFVIPILPTIYMWKETLFI SVTA-
SLVRYMSNLNCTWAVNSVAHIWGQKPYDINITPVENWKVSIVAMGEGWHNYHHTFPW
DYKASELA--YFINVTFLIDIFGKIGWAYDFKVASPALVK-AVIRKRGPRF-----

Bmo_3_AGO45851

-----MPP-----QV--DPIPSGVVFESDTQTD--DLGLDKD--VSVLKKATPK--
-----KHE-----LVWFNIIWFLFLHISSLYGLYLVTSA---KWQ-
TNVFAFGVHLMCAIGIGAGSHRLWTHRSFKARTPLRIVLMIWQTMGFQDCIFEWARDHR
THHKYADTDADPHNAERGLFFSHMGWLCKKKSPEVIEGGRRIDLS--
DLYADPVVMFQKKHYMKMMPILCFVLPTVIPVYFWEDETWLNAFFIPTILRYTCGINVWV
SVNSFAHTFGYRYPYDKSLNPRENIGVWMICV-
EGFHNYHHTFPWDYRATEHPLYNMLTPTIVFIDAMAMIGQAYDLKTVPHDIK-
QRTHRTGDGTH-----Q-----
LWGWDDPEFNEKLKEKYSRVSYAERKCG-----

Dpl_ctg4

-----MPP-----QA--DPTPSGVLFETDTQTP--DLGLDKD--VSILKKARPR---
-----KYE-----YVWFNIMWFLFLHVASAYGIYLVFTSA---KWQ-
TNVFAFLVHLCCAIGIGAGSHRLWTHRSFKAKTPLRILLMIWQTMGFQDCIFEWARDHR
THHKYADTDADPHNAERGLFYSHMGWLCVKKKSPEVLEGGRRIELK--
DLYDDPVVMFQKRHYLKMMPILCFVFPTIIPVYFWNETWLNAFLIPTILRYTCGINIVWS
VNSFAHVFGYRYPYDKSLNPRENIAVWMFCV-
EGFHNYHHTFPWDYRATEHPILNMLTPTIMFIDLMAKLGQAYDLKTVTPDIK-

QRAQRTGDGTH-----H-----
LWGWDDPEFTEKMKLRYGITNSERKTA-----

Hme_ctg4

-----MPP----LV--DPTPSGVLFESEDTQTA--DLGLDKD--VTGLKKAAPR--
-----KYE-----YVWFNIFWFLFLHASSAYGIYLGLTSA----KWQ-
TNVFAFAVHLMCAIGIGAGSHRLWTHRSYKARTPLRTLLMIWQTMGFQDCIFEWARDH
RTHHKYADTDADPHNAERGLFYSHMGWLCKKSPEVIEGGRRIDVS--
DLYDDPVVMFQKRHYMKMMPVLCFVLPTIIPVYFWGETWLN AFFIPTILRYTIGINVVW
SVNSFAHKYGYRKYDKSLNPRENIAVWMCV-
EGFHNYHHTFPWDYRATEHPILNMLTPTIMFIEGMAKIGQAYDLKAVSPDIK-
QRSQRTGDGTH-----H-----
LWGWDDPEFTEKLSRYGVVNKPERKCA-----

Dpl_ctg9

-----MTA-----SAFLHDPMHQKN-----IGELSQLDPPRQRDY-----
-----EWQ-----IVWRNVLAFFVYLHMATLYGIYLILIGK----
TKILTLIFAVTISAMSAMGVTAGAHRLWAHRAKARWPLRIFLAVMQTMAFQNHIEY
VRDHRVHHKFTETDADPHNAKRGFFFSHMGWLMVRKHKA VFEKGASVDMS--
DLEKDPIVMFQKKTYLVLMPLLCFVVPWLPVVLWNENPWVSWYVASMLRYTISLHFT
WLVNSAAHIWGNRPYDQYIGATDNKAVAICAFGEGWHNYHHVFPWDYKAAELG-
NYSTNLSTALIDFAAKYGLAYDLKTVSIEMIR-KRVSRRTGDGSH-----
PLSSKKESLNQH----DHHHPENPVWGWGDEDMTEEEKKLAEIAHKLN-----

Hme_ctg9_HMEL015726-PA

-----MTA-----ST--FLRANGSYAKADCNTN-----SLI---TQGKRRDY-----
-----EWQ-----IVWRNVLAFFVYLHVAAAAYAFYLIFSGR----
IWTSTVVFALLFAAMSALGITAGAHRLWAHRAKARWPLRVFLALMQTMAFQNHIEY
WVRDHRVHHKYTETDADPHNARRGFFFSHMGWLMVRKHKEVFEKGGSVDMS--
DLEKDPIVMFQKRTYLVFMPLLCFILPTWIPVALWNESPWNSWYVA AIMRYTVSLHFTW
LVNSAAHIWGNRPYDKYIGATDNKTVAICAFGEGWHNYHHVFPWDYKAAELG-
NYSTNFSTALIDVAAKYGLAYDLKTVSAEMIR-KRVARTGDGSH-----PL--
DKKSKQDD----GHHHPENPIWGWDDKDMTEDEKQLAEIAHKLS-----

Has

-----MAA-----MSSTSLLLANTMLSSK--
LQDHDDLRYAEPRKPNRDY-----EWQ-----
VVWRNVLAFFVYLHVSAVYGLYMLTGK----
VKSYTILFGALFAIMSGMGVTAGARRLWAHRSYKARWPLRVFLALMQTMAFQNHIEY
WVRDHRVHHKFTETDADPHNAKRGFFFSHIGWLMVRKHKDVFEKGATVDMS--
DLEQDPIVMFQKKTYLVVMPILCFVIPAWIPVHFWDENPWTSWYTAATRYTIALHFTW
LVNSAAHIWGNRPYDKNIGATDNKMVAICAFGEGWHNYHHVFPWDYKAAELG-
DYSTNLSTALIDFAAKHGYAYDLKTVSADMIR-KRVNRTGDGSH-----P-----

WTK--GKVEGDHYHPENPVWGWEDTDMTEEEKQFAEIVHRKTE-----

Dpu

-----MEF-----IMAGSKIIAKNVDHDE--DPRIVSA---PQMKNRDY-----
-----EWH-----IVWRNVLAFIYLVHVAAYGLYLMFTGK----
VNAFTILFAFSFAAMSAMGVTAGAHRLWAHRAVKARWPLRLYLALMQTMAFQNHIE
WVRDHRVHHKFTETDADPHNARRGFFFSHMGWLMVRKHKDVFEKGATVDMS--
DLEKDPIVMFQKKTYLVVMPLLCFLIPSYIPVWLWNEDPWSSWYVASITRYTLTLHFTW
LVNSAAHIWGTRPYDKNIGATDNVAVAIGAFGEGWHNYHHVFPWDYKAAELG-
NYRTNLSTALIDIAAKYGLAYDLKTVSKEMIE-QRVSRTGDGSH-----P-----
WAQQTEDCSDEHHHPENPVWGWDDTDMPEEDKQLAKIVHRKTE-----

Lca_NF

-----MAPNILGSSLFLADTTLGKNVDDDHSSN---FSASDN---
YSGKRRDY-----EWQ-----IVWRNVFGFIYLHTGMLYGFYLIFTGQ----
VKFFTVLFAVLFAILSAMGVTAGAHRLWAHRAVKARWPLRLILAFQTMAFQNHLYEW
VRDHRVHHKFTETDADPHNAKRGFFFSHIGWLMIRKHKDVFEKGASIDMS--
DLEADPIVMFQKKTYLVVMPILCFVLPAYIPIVWWGEVPWTSWYVATILRFTVSLNFTW
LVNSAAHIWGNRPYDENIGATDNKTVAILAFGEGWHNYHHVFPWDYKAAELG-
NYSTNMSTAIIDYAAKHGWAYDLKTVSVD MIR-KRVARTGDGTH-----
PSNDDTKKKLEE---DHHHPDNPVWGWDDTDLKDEDRKF AEIAHPKEQ-----

Cpa_Z9

-----MTT-----GT--SLALAGTYFAAKNKKVDDDITPLT---RISGKRRDY-
-----EWQ-----IVWRNVLAFFVYLHVGLLYGFYLILTGR--VKLW--
TPVFAVTFTVLSALGVTAGAHRLWAHRAVKARWPLRLILALLQTMAFQNHIEWVRDH
RVHHKFTETDADPHNAKRGFFFSHIGWLMVRKHKEVFEKGASIDMS--
DLEKDPIVMLQKKTYLVVMPILCFLLPSWIPVYFWGEDPWTSWYVASIWRYTMSLNFT
WLVNSAAHIWGNKPFDKNIGATDNLTVAICAIGEGWHNYHHVFPWDYKAAELG-
NYRTNISTAIIDLA AKY GWAYDLKTVSTQMIL-NRVTRTGDGSH-----
PSVSGDSKQLEETEHDHHHPENPVFGWTDADISEEDRMLVEITHKIDENDD-----

Obr_tdes

-----MAP-----N---TLKEDVMIVNEE-----TSEKL----VV-GAAPR-----
---KYK-----VWVFIVAYATYVHIAAVYGLYLAVTSA---MWP-
TIALTFINNLSILGLTAGVHRLWTHKSYKAKLPLQIFLMLCHTASNTFTSISWIRDHILHH
KYTDTDADPHNSTRGFFFSHIGWAMVKKQPEARAKGKSIDLS--
ELYANPVLRFQQKNAVWLTLLVAYIIPSLVPL-IWNETFTVAYHM-
NLLRVTVVFNFTLLINSVAHMGWTRPYDETILPAQNKTVSFFTLGEGFHNYHHVFPHDY
RTAELG-DNFLNLTTKFIDFCAWMGQAYDRRYVPDDVIA-ARMKRTGETNE-----
-----KNT-----

Bmo_11_ABD36148

-----MAQ-----NQTYNGLIVTEIEDSS---LEHDSV---KPSVVGPR-----
-----EYE-----IVYKNIFIHIYLVHTMFYGLYLCCTTA---KWP-
SVGFAYLCYVAATIGVTAGAHRLWSHKSYKARLPLQILLMVFLSLANQRAT-
HWVRDHRVHHKYSDDADPHNASRGFFYSHIGWLFVRKHPEVKKKGKLDLS--
DLFDNPALMFQHRYSKTFIIVCFGLPTILPVILWDELLVVAWNL-
TIMRYVINFHVFFLVNSVAHIWGNKPYDKTIKSAENNLVAFATLGEGYHNYHHVFPWD
YRCTELG-RTWLNYSKLFIDLCAKVGLAYDLKVVSDDVIL-RRVKRTGDRSH-----
-----FIEN-----

Bmo_8_AGO45853

-----MSRFQAP----S---NEDRDDVFSEEE-----TRLEKL---IAPQAEPR-----
-----EFK-----VVYRNIIVLLYYHMAGIYGLYLGLIAA---KWA-
TVISAFITYCISVIGVTAGSHRLWSHKSYKATKPLQLFLMLCQSVSNQHSVAYWVMVHR
LHHKYSDSDADPHNATRGLFYSHMGWLMVRKHPEIEKRGKLLDLS--
DIYGNPYLKFQDTHYYWFLPLMSFLLPTIIPMYFWGETCSVAWNV-
NMCRYVMNLNAIFLVNSVAHMGWYKPYDKNIAPSQNLSVSVLSLGEGFHNYHHVFPW
DYKCDELS-SFRTNPTTVFIELCAKLGLAYDLRSASDDLIE-GRAKRTGDGSY-----
-----LTLKKS-----

Dpu_Z/E11_1

-----MAP----N---ITNEEIIVSETDHDQS-----KRPQAEPR-----
-QYH-----IVYRNIAVFLYYHIAGIYGLYLCFGNA---MWT-
TIFWNVFTFIIAGLGVTAGAHRLWSHKAYKATRPLQIFLVLAQSVANQHSVAHWARDHR
LHHKYSETDADPHNSTRGFFYSHVGWLMVRKHPEVTRRGKTVDMSS--
DIYNNPYLKLQDKHSYWFIPLLSFFIPTYIPT-LWGESLTNAWHI-
NMFRYILNLNATFCVNSVAHLWGQKPYDKHIAPSQSPKVNVTTLGEGFHNYHHCFPWD
YRSDELG--LTFNFTTGFDICEKLGLAYDLRSASEEVIA-ARAERTGDGSR-----
-----IKSL-----

Pex_tdes

-----MVP----D---VLREAERLQDDA-----KL---VAPQAEPW-----
---KFQ-----LSYTNVVIFGYLHISGIYGLLFCVSKA---HWA-
TIFFSFILLVASVIGVTAGAHRLWSHRSYKANLPLQIILMLFHSLSGQYTAFNWARDHRLH
HKYSDDADPHNATRGGFFYSHIGWLLVVKHPEVRKRGEAIDLS--
DLLRNPVLTFQRKNVVLILALLCYIMPTAVPMYFWGETFHNNAWHI-
MALRFVLCLNFISLINSAAHTFGNKPYDKSIMPTQNMSVTLATLGEGFHNYHHVFPFDYR
AAELG-NNTFNLTTFIDFFAMIGWATALKTVGHESIA-RAAQRRTGDGSL-----
-----TWKSDCEVVPGLKSG-----

Lca_Z9

-----MPP----N---VTEANGVLFENDVQTP--DMGLEVA---PVQKADER---
-----KIQ-----LVWRNIIAFAYLHLAAVYGAYLFFTS---KWQ-
TDIFAYILYVMSGLGITAGAHRLWAHKSYPKAKWPLRLILVAFNTLAFQDS AIDWARDHR
MHHKYSETDADPHNATRGGFFSHIGWLLCRKHPELKRKGQGLDLS--

DLYADPILRFQKKYYLLLMPLACFVLPTIIPVYLWGESWKNALFVAAMFRYTFILNVTW
LVNSAAHKWGGKPYDKNIQPAQNISVAIFALGEGFHNYHHTFPWDYKTAELG-
NNRLNFTTSFINFFASFGWAYDLKTVSDEIIQ-QRVKRTGDGSH-----H-----
-----LWGWGDQDIPAEQAALRINRKDD-----

Has_Z9

-----MAP-----NI--SEDVNGVLFESDAATP--DLALSTP---PVQKADNR----
-----PKQ-----LVWRNILLFAYLHLAAQYGGYLFLFSA---KWQ-
TDIFAYILYVISGLGITAGAHRLWAHKSYPKAKWPLRVILVIFNTVAFQDAAMDWARDHR
MHHKYSETDADPHNATRGGFFSHIGWLLVRKHPLDLKEKGKGLDMS--
DLLADPILRFQKKYYLILMPLACFVMPTVIPVYFWGETWTNAFFVAAMFRYAIFILNVTW
LVNSAAHKWGDKPYDKSIKPSENLSVAMFALGEGFHNYHHTFPWDYKTAELG-
NNKLNFTTTFINFFAKIGWAYDLKTVSDDIVK-NRVKRTGDGSH-----H-----
-----LWGWGDENQSKEEIDAAIRINPKDD-----

Sli_Z9

-----MAP-----NI--SEDVNGVLFESDAATP--DLALARP---PVQKADNK---
-----PKQ-----LVWRNIILFAYLHLAALYGGYLFLFSA---KWQ-
TDIFAYILYVISGLGITAGAHRLWAHKSYPKAKWPLKVILIFNTVAFQDAAMDWARDHR
MHHKYSETDADPHNATRGGFFSHIGWLLVRKHPLDLKEKGKGLDMS--
DLLADPVLRFQKKYYLLLMPLACFVMPTMIPVYLWGETWTNAFFVAAMFRYAFNLNV
TWLVNSAAHKWGDKPYDKSIKPSENMSVAMFALGEGFHNYHHTFPWDYKTAELG-
NNKLNFTTAFINFFAKIGWAYDMKTVSEIVK-NRVKRTGDGSH-----H-----
-----LWGWGDENQPKKEIEAATRINPKDD-----

Poc_Z9

-----MAP-----N---VTEENGVLFESDAVTP--DLAMARA---PVQQADST---
-----PRV-----YVWRNIIFAYLHLAAVYGFYLLLVSA---KWQ-
TDIFAYILLYVASGLGITAGAHRLWAHKSYPKAKWPLRVILTIFNTIAFQDSAIDWARDHR
MHHKYSETDADPHNATRGGFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYADPILRFQKKYYLLLMPLACFVLPTVIPVYLWSETWTNAFFVAALFRYTFILNVTWL
VNSAAHKWGDKPYDKDIKPSENMSVSLFAFGEGFHNYHHTFPWDYKTAELG-
NHRLNFTTKFINFFAKLGWAYDMKTVPDITVQ-QRVKRTGDGSH-----H-----
-----LWGWGDKDHAQEEINAAIRINPKDD-----

Epo_Z9

-----MAP-----N---VTEENGVLFESDAATP--DLALARE---PVQQADSS----
-----PRV-----YVWRNIILFAYLHIAAVYGGYLFLFSA---KWQ-
TDIFAYILLYVASGLGITAGAHRLWAHKSYPKAKWPLRLILTIFNTTAFQDSAIDWARDHR
MHHKYSETDADPHNATRGGFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYADPILRFQKKYYLILMPLACFILPTVIPVYLWNETWSNAFFVAALFRYTFILNVTWL
VNSAAHKWGDKPYDKSIKPSENLSVSLFAFGEGFHNYHHTFPWDYKTAELG-
NHRLNFTTKFINFFAKIGWAYDMKTVSHEIVQ-QRVKRTGDGSH-----H-----
-----LWGWGDKDHAQEEIDAAIRINPKDD-----

Ave_Z9

-----MAP-----NVTENGVL FESDAATP--DLALGTA---PVEQADDS-----
-----PRV-----YVWRNIILFAYLHLAAIYGGYLFLFSA---KWQ-
TDIFAYFLYVASGLGITAGAHRLWAHKS YKAKWPLRVILTTFNTIAFQDSAIDWARDHR
MHHKYSETDADPHNATR GFFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYADPILRFQKKYYLLLMPLACFILPTVIPVYLWNETWTNAFFVAALFRYTFILNVTWL
VNSAAHKWGD KPYDKSIKPSENMSVSLFAFGEGFHNYHHTFPWDYKTAELG-
NHRLNFTTKFINFFAKIGWAYDMKTVSNEIVQ-QRVKRTGDGSH-----H-----
-----LWGWGDKDHAQEEINAAIRIHPKDD-----

Cro_Z9

-----MAP-----N---VTEENGVL FESDAATP--DLALART---PVEQADDS-----
-----PRI-----YVWRNIILFAYLHLAAIYGGYLFLFSA---KWQ-
TDIFAYFLYVASGLGITAGAHRLWAHKS YKAKWPLRLILTIFNTIAFQDSAIDWARDHRM
HHKYSETDADPHNATR GFFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYSDPILRFQKKYYMILMPLACFILPTVIPVYMWNETWSNAFFVAALFRYTFILNVTWL
VNSAAHKWGD KPYDKSIKPSENMSVSLFAFGEGFHNYHHTFPWDYKTAELG-
NHRLNFTTKFINFFAKIGWAYDMKTVSQEIVQ-QRVKRTGDGSH-----H-----
-----LWGWGDKDHAQEEINAAIRINPKDD-----

Dpl_ctg3

-----MAP-----N---SSDANGVL FESDAATP--DLALPNT---PIQQADSY-----
-----PRK-----YVWRNIIFAYLHIAALYGGYLFLFSA---KWQ-
TNIFAYILYVMSGLGITAGAHRLWAHKS YKAKWPLRVILVIFNTLAFQDSAIDWARDHR
MHHKYSETDADPHNATR GFFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYADPILRFQKKYYLLMPISCFILPTIIPVYLWGETWTNGYFVAAMFRYAFILNVTWL
VNSAAHKWGD KPYDKNIQPSENMSVSLFALGEGFHNYHHTFPWDYKTAELG-
NNRLNFTTTTFINFFAKIGWAYDLKTVSDEIVK-QRVNRTGDGSH-----H-----
-----LWGWGDKDHSKEEIRAAIRINPTDDKEE-----

Hme_ctg3

-----MAP-----N---SGDANGVL FESDAATP--DMALPIT---PIQQADQY-----
-----PRK-----LVWRNIIFAYLHLAAALYGGYLFLFSA---KWQ-
TDIFAYILYVMSGLGITAGAHRLWAHKS YKAKWPLRVILIIFNTLAFQDSAIDWARDHR
MHHKYSETDADPHNATR GFFFSHIGWLLVRKHPELKKKGKGLDLS--
DLYADPILRFQKKYYLILMPIACFILPTLIPVYLWGESYINAYFVAAMFRYAFILNVTWL
VNSAAHKWGD KPYDKNIQPSENISVSFALGEGFHNYHHTFPWDYKTAELG-
NNRLNFTTNFINFFAKIGWAYDLKTVSDEIVQ-KRVKRTGDGTH-----H-----
-----LWGWGDKDHADEKNAAIRINPKEDKDD-----

Bmo_1_AFK13829

-----MAP-----N---VKDANGVL FENDADTP--DLGLSST---PVQQADNY---
-----PKK-----LVWRNIILFTYLHIAALYGGYLFLFHA---KWQ-
TDLFAYILYVMSGLGITAGAHRLWAHKS YKAKWPLRVILIIFNSLAFQDSALDWARDHR
MHHKYSETDADPHNATR GFFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYADPILRFQKKYYLILMPIACFILPTVIPVYFWNESWINAFFVATLFRYTFILNVTWL
VNSAAHKWGGKPYDKNIKPSENISVSFALGEGFHNYHHTFPWDYKTAELG-

NNRLNFTTNFINFFAKIGWAYDLKTVSDEIHK-NRVNRTGDGSH-----Y-----
-----LWGWGDKDLKDKEEIKQAIRINPKDN-----

Mse_Z9

-----MPP-----Y---TSDANGVLFESDAATP--DLALSST---PVQQADNR-----
-----PKQ-----LVWRNIILFAYLHIAALYGGYLFLVHA---KWQ-
TDIFAYLLYVMSG LGITAGAHRLWAHKS YKAKWPLRLILVVFNTMAFQDSAIDWARDH
RMHHKYSETDADPHNATR GFFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYADPILRFQKKYYLILMPITCFVMPTVIPVYLVGESWVN AFFVAALFRYAFILNVTWL
VNSAAHKWGD KPYDKSIKPSENISVSMFALGEGFHNYHHTFPWDYKTAELG-
NNRLNFTTNFINFFAKIGWAYDLKTVSDEIIQ-QRVQRTGDGSH-----H-----
-----LWGWGDKDHDKEEVNAAIRINPKDD-----

Onu_Z9

-----MAP-----NIKDGADLNGVLFEDDASTP--DYALATA---
PVQKADNY-----PRK-----LVWRNIILFAYLHLAAVYGAYLFLFSA---KWQ-
TDIFAYILYVISGLGITAGAHRLWAHKS YKAKWPLRLILIFNTVSFQDSALDWSRDHRM
HHKYSETDADPHNATR GFFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYADPILRFQKKYYLLLMPLGCFIMPTVVPVYFWGETWTNAFFVAALFRYTFILNVTW
LVNSAAHKWGH KPYDSSIKPSENLSVSLFALGEGFHNYHHTFPWDYKTAELG-
NNRLNFTTNFINFFAKIGWAYDLKTVSDEIIQ-NRVKRTGDGSH-----H-----
-----LWGWGDKDQPKKEEVNAAIRINPKDE-----

Dpu_Z/E9

-----MAP-----K---EADVNGVLFESDATTP--DMALPTT---PVQQADNY---
-----PKK-----LVWRNILLFAYLHLAALYGGYLFLFSA---KWQ-
TDIFAYILYIMSG LGITAGAHRLWAHKS YKAKWPLRLILVLFNTLAFQDSAIDWARDHR
MHHKYSETDADPHNATR GFFFSHIGWLLVRKHPELKKKGKGLDIS--
DLYADPILRFQKKYYLLLMPLGCFILPTVIPVYLVNETWSNAFLVAALFRYAVILNVTWL
VNSAAHKWGD KPYDKSIKPSENLSVALFALGEGFHNYHHTFPWDYKTAELG-
NNRLNFTTTTFINFFAKIGWAYDMKTVSDEIIQ-NRVKRTGDGSH-----H-----
-----LWGWGDKDHSKEEINAAIRINPKDD-----

Onu_Z9_b

-----MPP-----QG--AERDSFVLFESDAKDP---DVITH---MAPQAEKR-----
-----QTQ-----IVWRNVAIFTYLHLGFLYGAYLMLTTV---MWK-
TRLFCLILYVCSGLGITAGAHRLWAHKS YKAKLPLRIILTLFNTLAFQDAVVDWARDHR
MHHKYSETDADPHNATR GFFFSHV GWLLVRKHPPQIKAKGHTIDMS--
DLRADPVLRFQKKYYMYLMPLICFIMPSV VPA-
LWGETVWNGYFTCAVFRYVAVLNGTWLVNSWAHLWGD KPYDRHINPVETKVVSVA
IGEGFHNYHHTFPWDYKAAELG-NYTFNITKFFIDTMATIGWAYDLKTVSTDVIQ-
KRITRTGDGSH-----P-----VWGWGDKNIPEEDKKVTTVINPEKEE--

Bmo_2_AF182406

-----MPP----QR--KQEASWVLYEADANNL--PEDAPPH----VPPSAEKR---
-----PWK-----IVWRNVILFFILHVGGVYGGYLFLFKA---MWR-
TSIFAIFLYLCSGLGITAGAHRLWAHKSYPKARLPLRILLTIFNTIAFQDAVVDWARDHRM
HHKYSETDADPHNATRGGFFSHIGWLLLRKHPEIKAKGHTVDVN--
ELRNDPILRFQKKYYQILMPLACFIMPTYVPT-
LWGETVWNSFYVCAIFRYVYVLNITWLVNSAAHMGWGSKPYPDKNINPVETRPVSLVVLG
EGFHNYHHTFPWDYKTAELG-DYSLNLSKLFIDFMAKIDWAYDLKTVSTDVIQ-
KRTKRTGDGSH-----P-----
VWGYDVGEVATEDKTDITNLVNSKVL-----

Epo_Z9_b

-----MPP----QG--QPPAAWVLEESDATTD--DKDVAVA----VPPSAEKR--
-----KLS-----IVWRNVILFVLLHTGAVYGGYLFFTKA---MWA-
TKFFAFFLYLCSGLGITAGAHRLWAHKSYPKARLPLRILLTLFNTIAFQDSVLDWARDHR
MHHKYSETDADPHNATRGGFFSHVGVLLVRKHPPQIKAKGHTIDMS--
DLCSDPVLRFQKKYYLTLMPLFCFILPTYIPT-
LWGESLWNAFYVAAIFRYCYVLNVTWLVNSAAHKWGDPRYPDKNINPVETKPVSLVVF
GEGFHNYHHTFPWDYKTAELG-GYSLNLSKLFIDTMAKIGWAYDLKSVPDIVE-
KRVKRTGDGSH-----E-----
VWGWDDKDVPAEQKAAATIINPEKTE-----

Tni_Z9

-----MPP----QG--QTGGSWVLYETDAVNT--DTDAPVI----VPPSAEKR---
-----EWK-----IVWRNVILMGMLHIGGVYGYLFLTKA---MWL-
TDLFAFFLYLCSGLGITAGAHRLWAHKSYPKARLPLRLLTLFNTLAFQDAVIDWARDHR
MHHKYSETDADPHNATRGGFFSHVGVLLVRKHPPQIKAKGHTIDLS--
DLKSDPILRFQKKYYLTLMPLICFILPSYIPT-
LWGESAFNAFFVCSIFRYVYVLNVTWLVNSAAHLWGSKPYDKNINPVETRPVSLVVLGE
GFHNYHHTFPWDYKTAELG-DYSLNFTKMFIDFMASIGWAYDLKTVSTDVIQ-
KRVKRTGDGSH-----A-----
VWGWDDHEVHQEDKKLAAIINPEKTE-----

Has_Z9_b

-----MPP----QG--QTGGSWVLYETDAVNE--DTDTPVI----VPPSAEKR---
-----EWK-----IVWRNVILMGMLHIGGVYGYLFLTTA---MWR-
TCIFAVVLYICSGLGITAGAHRLWAHKSYPKARLPLRIMTLFNTLAFQDAVIDWARDHR
MHHKYSETDADPHNATRGGFFAHVGVLLVRKHPPQIKAKGHTIDLS--
DLKSDPILRFQKKHYLFLMPLVCFILPCYIPT-
LWGESLWNAFYVCSIFRYVYVLNVTWLVNSAAHLWGAKPYDKNINPVETRPVSLVVLG
EGFHNYHHTFPWDYKTAELG-DYSLNLTKLFIDTMAAIGWAYDLKTVSTDVIQ-
KRVKRTGDGSH-----P-----
VWGWDDHEVHQEDKKLAAIINPEKTE-----

Sli_Z9_b

-----MPP----QG--QTGGSWVLYETDAVNV--DTEAPVI----VPPSAEKR---
-----EWK-----IVWRNVILMGLLHIGGVYGYLFLTTA---MWR-

TSLFAVFLYICSGLGITAGAHRLWAHKSYPKARLPLRILLTLFNTLAFQDAVIDWARDHRM
HHKYSETDADPHNATRGFFFSHVGVLLVRKHPPQIKAKGHTIDLS--
DLKNDPILRFQKKHYLLMPLVCFILPCYIPT-
LWGESLWNAFYVCSIFRYVYVLNVTWLVNSAAHLWGAKPYDKNINPVETKPVSLVVLG
EGFHNYHHTFPWDYKTTELG-DYPLNLTCLFIDFMAAIGWAYDLKTVSSDVIQ-
KRVKRTGDGSH-----A-----
VWGWDDHEVHQEDKELAAIINPDKTE-----

Hme_ctg2

-----MPP----QD--QQTGSWVLYEKD-LNK--NA--STS---VPPTAEKR-----
-----KWQ-----IVWRNVILFLLHIGGVYGYLFLMKA---MWA-
TRIFAVVLYLCSGLGITAGAHRLWAHKSYPKAKLPLRILLTIFNTIAFQDSVLDWARDHRM
HHKYSETDADPHNATRGFFFSHVGVLLVRKHPEIKSKGHTIDMN--
DLWSDPILRFQKKYYMLLMPVACFILPSYIPT-
LWGESLWNGYFVAIFRYVYVLNATWLVNSAAHKWGSKPYPDKNINPVETKPVSLVVL
GEGFHNYHHTFPWDYKTAELG-DYSFNFSKLFIDGMSSIGWAYDLKTVSREVIE-
KRIKRTGDGSH-----Q-----EFGYEDLSSSSSEDKFNKE-----

Ban_delta9-like_Lienard

-----MPP----QG--QQQGSWVLYESD-LNK--DATPPPL----VPPSAEKR-----
-----KWK-----IVWRNVILFMLLHLGGLYGYLFLTQA---MWT-
TRIFTVLLYLSSGLGITAGAHRLWAHKSYPKAKLPLRMLLTLFNTLAFQDSVLDWARDHR
MHHKYSETDADPHNATRGFFFSHVGVLLVRKHPEIKAKGHTIDMS--
DLWADPVLRFQKKYYLILMPLVCFILPTYIPT-
LWGESLWNAFYVSAIFRYVYVLNVTWLVNSAAHKWGSKPYPDKFINPVETKSVSLVVLG
EGFHNYHHTFPWDYKTAELG-NYSLNFSKLFIDTMAKIGWAYDLKTVSPDVIE-
KRVKRTGDGTH-----Q-----EWGFEELHKELHEHSQ-----

Ban_delta11-like_Lienard

-----MAP-----SATETTTITETE-----ETLPKL----VAPQAAPR-----
--KYD-----IIYFNLLTFGYAHLATLYGVYLAETTA---TWK-
TLMFHHVMMFILAAGVITAGTHRLWSHRAYKAKMPLQIILMVLNSFAFQNSAIQWVRDH
RMHHRYSDDADPHNATRGFFFSHMGWLLVRKHPEMLRRGKFIDMS--
DIYANPVLRFQKKYAPVFGTLCFALPTLIPMYFFGETLNTAWHL-
TIMRYVFNLHMTFLVNSAAHLWGNKPYDKNMLPAQNLPVSFIAFGEGFHNYHHAFPWD
YKTAELG-NNWLNFSKLFIDFFAWIGWAYDLKEVPLEVAR-ARAERTGDGSN-----
-----LWGRDKTE-----

Ban_delta9-like_Arun_ACO11.6.7

-----MPP----QG--QQQGSWVLYESD-LNK--DATPPPL----VPPSAEKR-----
-----KWK-----IVWRNVILFMLLHLGGLYGYLFLTQA---MWT-
TRIFTVLLYLSSGLGITAGAHRLWAHKSYPKAKLPLRMLLTLFNTLAFQDSVLDWARDHR
MHHKYSETDADPHNATRGFFFSHVGVLLVRKHPEIKAKGHTIDMS--
DLWADPVLRFQKKYYLILMPLVCFILPTYIPT-

LWGESLWNA YFVSAIFRYVYVLNVTWLVNSAAHKWGS KPYDKFINPVETKSVSLVVLG
EGFHNYHHTFPWDYKTAELG-NYSLNFSKLFIDTMAKIGWAYDLKTVSPDVIE-
KRVKRTGDGTH-----Q-----EWGFEELHKELHEHSQ-----

Ban_delta11-like_Arun_LOC692458.1.1

-----MAP-----SA--TETTTITETEETLPKL-----VAPQAARR-----
--KYD-----IIFYNLLTFGYAHLATLYGMYLACTTA----TWK-
TLMFHHVMFILAAVGITAGTHRLWSHRAYKAKMPLQIILMVLNSFAFQNSAIQWVRDH
RMHHRYSDDADPHNATRGGFFYSHMGWLLVRKHPEMLRRGKFIDMS--
DIYANPVLRFQKKYAI PVFGTLCFALPTLIPMYFFGETLNTAWHL-
TIMRYVFNLMHTFLVNSAAHLWGNKPYDKNMLPAQNLPVSFI AFGE GFHNYHHAFPWD
YKTAELG-NNWLNFS TKFIDFFAWIGWAYDLKEVPLEVA-RARAERTGDGSN-----
-----LWGFRDKTE-----

Bmo_5_AGO45855

-----MVE-----TKMEDGKQAATP-----AEEINLSN-----
KRE-----ANWPAVLFFIHIHLLSLYGIYLLIYEV---KWM-
TVIFLITLTFPAILAMTTGAHRLWAHRTYKASTELRIVLMLLQTLAGVGPIYNWVRHHRL
HHAHFATENDPFDYNQGFA YAHIFTRMRKLSPYQEKLKESIDMS--
DLENDSVVMFQKTL YWFM YATLFLLLPLNAPLEYWEDSVLSSV FVIGFLRYFILLHASW
LIESAICVWGLKPGEKSPPDSNSVFIITRTF--WPH-YHYLIPYDYKSGEYG-
TYDSGCSSAFIRVWAALGIATGLRTVETNTIQ-KALAEMAKTKK-----
-----PLQICLENALKDQSLSDQHLYLKRE-----

Dpl_ctg2

-----MPP-----QG--QQSESWVLNETDLNKD---ADTPI---VPPSAEKR-----
-----KLQ-----IVWRNVILFALLHIGGVY GAYLFFTQA---MWS-
TRLFAVVL YLC SGLGITAGAHRLWAHKS YKARLPLRMLLTLFNTIAFQDSVIDWARDHR
MHHKYSETDADPHNATRGGFFSHVGWLLVRKHPEIKAKGHTIDMS--
DLKSDPVLRFQKRHYLLLMPLACFILPTYIPT-
LWGETLWNA YFVCAIFRYVYVLNVTWLVNSAAHKWGD KPYDKNINPVETKPVSLVVL
GEGFHNYHHTFPWDYKTAELG-HYQLNFSKLFIDFMATIGWAYDLKTVSTDVIE-
KRVKRTGDGSH-----K-----EWGQEIKEKISQE-----

Poc_Z10

-----MPP-----N---SEETVLCEKE-----DHEKL---VAPQAATR-----
---KHE-----LAIVPISLFTYWHVAGLYGLYLIFAEA---KWQ-
TVVFTLFTYNAGILGITAGSHRLWAHKTYKAKRPLETLLMVFHSLTSQNTVRHWARDH
RFHHKYSDTDADPHNATRGGFFYSHVGWLLVKKHPEVLRRSKTIDMS--
DIYNNPVLRFQKNYGLPVITLFA YVLPALIPMYCWEETLNNAWHI-
NLLRIIANLHASCLVNSAAHAFGNKPYDKHIAATQISTLSFITLGECFHNYHHVFPWDYR
TAE LG-NNWLNMTTLFIDFFAWVGWAYDLK TASDGMVE-ARAKRTGDGTN-----
-----LWGWGDEDLGREEGGEEVFYGWGDRDMKDTSGVRVYSQE-----

Onu_Z/E11

-----MVP----Y---ATTADGHPEKDE-----CFEDN---EIKSNSLP-----
---KLE-----ILYFNVMTFTFLHLSALYGLYLGFSTV---KWA-
TIGLGIIFYFFAEIGITAGAHRLWSHRSYKAKLPLEILLMVFN SMAFQNTALSWARDHRV
HHKCPDTNGDPHNANRGFFYSHVGWLMTKKSDEVIKQGKLCDA--
DLYSNPVLRFQKKYAVPFIGTLCFVLPTLIPMYFWGETLNNAWHF-
NMFYVINLNATFCVNSVVHKWGYKPYDKNICPTQNVLLNLAVLGEAFHNYHHVFPW
DYRAAELG-NQKMNP TTLFIDFFAWIGWAYDLKTASKEMIK-SRSERTGDGTD-----
-----LWGHSAADKLK-----

Ape_Z11

-----MAP----Y---TEKEDELITCEG-----SIEKL---IAPQANKR-----
--KHQ-----IVYMNLF TFGYWYIAGLYGLYLFFTST---KWS-
TIILNIFLIASGLGITVGAHRLWAHKCFKAKLPLQIILMILNTLAFQNTAITWVRDHRMHH
KFTD TDADPHNATR GFFFSHVGWLLVKKHPELMKR SKHIDMS--
DIYGNPVLTFQKKYAFPLVATFTFILPTVVPYFWDESLNNAWHA-
TVFRYAYNLNITFLVNSAAHMGYR PYDKNIQPTQNI FTTLCTFGEGFHNYHHTFPWDY
RAAELG-NNYLN LSTKVIDFFAWIGWAYDLKTVPADIVN-SRAKRTGDGTD-----
-----LWGGNHKHTLDEKENRELD DYVHKSAF-----

Mse_Z11/10-12

-----MAP----N---FGTEMSAHIDAE--E-----SYGKL---IPPQAAPR-----
---KYK-----YLYANMIYFAYWHIAGLYGIYLAFTSA---KWA-
TIILAYLLFVAGDIGVTAGAHRLWAHKSYKAKLPLQILLMLFSTMAFQNTVITWVKDHR
MHHKYS DTDADPHNATR GFFFSHVGWLMV KRHP EAIKRGKSLDMS--
DIYNNPVLKFQKKYAIPLVT TIAFVLPTIIPMYFWDESFSVAWHM-
TMLKYIFGLNAAFLVNSVAHMGYKPYDKNIAPTQSYIATFATLGEGFHNYHHVFPWD
YRASELG-DNYLNFTTKFIDFFAWIGWAYDLKAAPEDLVQ-
KRIERTGDGTKLLNLTTKFIDFFAWIGWAYDLKTVPEDLLQKRMERTGDGTNLWGRGD
KNMKKD YVKSTDDHE-----

Bmo_Z11/10-12_BAD18122

-----MPP----NSVDKTNETEYLKDNH-----VDYEKL---IAPQASPI-----
-----KHK-----IVVMNVIRFSYLHIAGLYGLYLCFTSA---KLA-
TSVFAIVLFFLG NFGITAGAHRLWSHNGYKVKLPLEILLMVFN SIAFQNTIFTWVRDHRL
HHKYTD TDADPHNATR GFFFSHIGWLLVRKHPMVKIAGKSLDMS--
DIYCNPLLRFQKKYAI PFIGTICFIPTLAPMYFWGESLNNAWHI-
TVLRYIFSLNGTFLVNSAAHLWGYKPYDKSLKATQSGMANAFTFGEGFHNYHHVFPWD
YRADELG-DRYINLTTRFIDFFAWMGWAYDLKTASTNIE-KRALRTGDGTY-----
-KR-----PNGMN-----

Lca_Z11

-----MPP-----YP EEVDTKHIFEEDISHEESKPALKPL---VAPQADNR----
-----KPE-----IVPLNLITFGYGH LAAYGIYLCFTSA---KWA-
TIVFAFVLYICAELGITAGAHRLWSHRSYKAKLPLRLILLFNTLAFQNTAIDWVRDH RM

HHKYSDTDADPHNATRGGFFSHVGVLLTRKHPEVKKRGKDIDMM--
DIYNDSLLKFQKKYAIPFVGLVCFVIPTLMPMYFWNETLNNSWHIATMLRYIVNLNMTF
LVNSAAHIWGYKPYDKSIKPVQNITVSILILGEGFHNYHHVFPWDYRTSELG-
NDFLNFTTLFINLFAKIGWAYDLKTASDKVVA-ARRKRTGDGTN-----
-----LWGVEDKSLMKKATAATVLYPNKYLNLD-----

Dpu_Z/E11_2

-----MPP-----NTETFKKLKISEENLE---QFPKL---VAPQAAPR-----
----KYE-----IIYINVLTFSYWHLAAFYGIYLCFTSA----KWT-
SVFFVFLYCTMGEVGVTAGSHRLWSHKSYPKAKLPLQIILMTLSSIAFQNSVIDWVRNHRT
HHKYSDTDADPHNATRGGFFSHIGWLLVRKHSQTKLRGKTIDMS--
DIYNNSVLRQKKYAIPFIGTICFVLPVLPIMYCWNESFINAWHL-
NMLRYCLSLNFTFLVNSAAHLYGNKPYDKNILPAENKAVSFLTLGEGFHNYHHTFPWD
YRAAELG-NNKLNLTTFKIDFFAWVGWAYDMKTVDMMIR-SRAKRTGDGSI-----
-----IWDDGKETIEMGDVSDAIVIKNE-----

Epo_E11

-----MAP----N---VEEIEDLTETE-----EKWEKL---VAPQAAPR-----
----KHE-----ILYTNLLIFGYGHLAGLYGLYLCFTSA----RLQ-
TIILAFILHAMAILGITAGAHRLWTHRSYKATMPLQIILIFNSLSFQNSAINWVRDHRSHH
KYCDTDADPHNAARGLFYSHIGWLLVKKHPEVKKRGKMTDMS--
DVYRNPVLRQKKYAIPFIGTICFVLPVLPIMYFWGESLNNAWHI-
TLLRYIFSMHTIFLVNSVAHLWGNRPYDKNILPADNRTLSIATLGEASHNYHHTFPWDYR
STELG-YLPTNFTTNFIDFFAWIGWAYDLKTTSGEIIN-SRIQRTGDGTH-----
-----SRSKKNISTQDE-----

Ave_Z/E11

-----MAP----N---AEDIETNMPETE-----ENWETL---VAPQAAPR-----
----KYQ-----IVYKSLTTFGYGHLAGLYGLYLCFTSA----KWQ-
TIGLAILHAMAILGITAGAHRLWTHRAYKATVPLQIILIFNSLSFQNSAFTWIRDHRLHH
KYSDTDGDPHNATRGGFFYSHIGWLLVRKHPEVMKRGKMTDMS--
DIYSNPIIMFQKNYAIPFIGTVCFVLPVLPIMYFWGETLNNAWHI-
TVLRYIFSLNCIFLVNSAAHLYGYKPYDKNILPAENKAASIASFGAEAFHNYHHVFPWDYR
ASELG-NITMNWTIYFIDFFAWIGWAYDLKTASDETIK-SRIKRTGDGTD-----
-----FSGQQIYAR-----

Cpa_E11

-----MAP----N---VEDMESDMPSE-----KWEKL---VAPQAAPR-----
----KYE-----IIYTNLLTFGYGHIAGLYGLYLCFTSA----KWQ-
TVILAILNEMAILGITAGAHRLWSHRSYKAAVPLQIILMIFNSLAFQNSAINWVRDHRMH
HKYSDTDGDPHNASRGFFYSHVGVLLVKKHPEVKKRGKMIDMS--
DIYSNPVLRQKKYAIPFIGMICFVLPVLPIMYFWGETLSNAWHI-
TMLRYVFSLSIFLVNSAAHLYGYRYPYDKNILPAENKIALIACLGDSFHNYHHVFPWDYR
ASELG-NIGMNWTAQFIDFFAWIGWAYDLKTASDENIN-SRMKRTGDGTD-----
-----ISGQKYSCESEVLQ-----

Tni_Z11

-----MAVMAQ-----TVQETATVLEEEARTV-----TL----VAPKTTTPR-----
-----KYK-----YIYTNFLTFSYAHLAALYGLYLCFTSA----KWE-
TLLFSFVLFFHMSNIGITAGAHRLWTHKTFKAKLPLEIVLMIFNSLAFQNTAITWAREHRLH
HKYSDTDADPHNASRGFFYSHVGWLLVKKHPDVLKYGKTIDMS--
DVYNNPVLKFQKKYAVPLIGTVCFALPTLIPVYCWGESWNNAWHI-
ALFRYIFNLNVTFLVNSAAHIWGNKPYDKSILPAQNLLVSFLASGEGFHNYHHVFPWDY
RTAELG-NNFLNLTTFLFIDFCAWFGWAYDLKSVSEDIK-QRAKRTGDGSS-----
GV-----IWGWDDKMDMRDIKSKANIFYAKKE-----

Tpi_Z11/11-13

-----MAP-----NTRENETIYDEV-----EHKLEKL---VPPQAGPW-----
-----NYK-----IVYLNLLTFSYWLIAGAYGLYLCFTSA----KWA-
TIIFEFILFFFAEMGITAGAHRLWTHKSYKAKLPLEIFLMVLNSVAFQNTATDWVRDHRL
HHKYSDTDADPHNAARGLFFSHVGWLLVRKHDEVKKRGKFTDMS--
DIYNNPVLKFQKKYAIPIGAVCFILPTVIPMYFWGESLNNAWHI-
CILRYAMNLNVTFSVNSLAHIWGNKPYDKDIKPAQNFGVTLATFGEGFHNYHHVFPWD
YRTSELG-DNKNFTTKFINFFERIGLAYDLKTVSDDVIA-QRAKRTGDGTH-----
-----LWDCADKNNNDVVQTKAQIDTLCTKHE-----

Che_Z/E6

-----MPP-----NTKEKEMNKLAGISGRNEE-----LAPQAAPR-----
-----KFE-----IVYRNIVTFSFMHVAGLYGLYLCFTSA----KWQ-
TIVLAFVLYTFAEIGVTAGAHRLWAHKTYKAKTPLQIILMVLNSIAFQNSAIGWVRDPRL
HHKYSDTDADPHNATRGGFFYSHVGWLLVRKHPEVIKRGKTMEMS--
DIYSNPVLWFQKKYAVPFIGIICFGLPTLVPYFWGETLNNAWHI-
TMLRYIANLNVTFLVNSAAHMFNGKPYNKNILPAQNISVSILTFGEGFHNYHHVYPWDY
RTAELG-NNMLNMTTLFIDFFAWIGWAYDLKTVSSAAIE-SKAKRTGDGTN-----
-----LWGWGDKDMLREDQKAAEILFARLK-----

Sli_Z11/10-12

-----MAQ-----CVQTTTILEQKEEKTV-----TL----LVPQAGKR-----
-----KFE-----IVYFNIITFAYWHIAGLYGLYLCFTST----KWA-
TVLFSFVLFFVVAEVGVTAGSHRLWSHKTYKAKLPLQILLMVMNSLAFQNTVIDWVRDH
RLHHKYSDTDADPHNASRGFFYSHVGWLLVRKHDPVKKRGKEIDIS--
DIYNNPVLRFQKKYAIPIGAVCFVLPTLIPVYGWGETWTNAWHV-
AMLRYIMNLNVTFLVNSAAHIYGKRPYDKKILPSQNIASVSIATFGEGFHNYHHVFPWDY
RAAELG-NNSLNFPTKFIDFFAWIGWAYDLKTVSKEMIK-QRSKRTGDGTN-----
-----LWGLEDDVDTPEDLKNTKGE-----

Has_Z11

-----MAQ-----SYQSTTVLSEEKEPTL-----TH----LVPQASPR-----
---KYQ-----IVYPNLITFGYWHIAGLYGLYLCFTSA----KWA-
TILFSYILFVLAEIGITAGAHRLWAHKTYKAKLPLELLLMVFNSIAFQNSAIDWVRDHRLH
HKYSDTDADPHNASRGFFYSHVGWLLVRKHPEVKKRGKELNMS--

DIYNNPVLRFQKKYAIPFIGAVCFALPTMIPVYFWGETWSNAWHI-
TMLRYIMNLTNTFLVNSAAHIWGNKPYDAKILPAQNVAVSVATGGEGFHNYHHVYPW
DYRAAELG-NNSLNLTTKFIDFFAAIGWAYDLKTVSEDMIK-QRIKRTGDGTD-----
-----LWGHEQKCDKSGSVNDKLS-----

Mbr_Z11

-----MDQ-----SVRTTTLRGKEEPTL-----TW----LVPQASPR-----
---KYQ-----IVYPNLFTFGYWHIAGLYGLYLCFTSA---KWQ-
TMIFSILFVLAEIGVTAGAHRLWAHKTYKAKLPLQILLMILNSIAFQNSAIDWVRDHRLH
HKFSDTDADPHNATRGGFFYSHVGWLLVRKHPEVKRRGKELDMS--
DIYNNPVLRFQKNYAIPFIGAVCFGLPTLIPVYCWGETWSTAWHI-
TMFRYVMNLTNTFLVNSAAHIWGGKPYDKKILPAQNIASVATCGEGFHNYHHVFPWD
YRAAELG-NNSLNLTTKFIDFFAWIGWAYDLKTVSQDMIK-HRALRTGDGSN-----
-----LWGLEDKYVCEKNEGKDE-----

Yev_Z/E11

-----MPP-----NSANSEPLLHDEVKEE---QLEKL---VAPQAGPR-----
-----KFQ-----IVYPNLITFGYGHISLLYGAYLMFTFA---KWQ-
TIVFAHVMILSGFGITAGAHRLWAHRTYKAKMPLQILLMLLNTLAFQNTAMDWVRDH
RLHHKYSDDTDADPHNATRRFFYSHVGWLLVRKHKEVKRRGKLIDLS--
DIENNPVLSFQKKYAIPLVSLVTFVMPTVIPMYFWGETLTNAWHVATLYRYVFLNATF
LVNSAAHYWGYKPYEKSILPSQNHVSLFALGEGFHNYHHVFPWDYRTAELG-
NNTLNPTTKFIDFFAWIGWAYDLKAVPDDMIN-NRKSRTGDGSS-----
-----LWGWGDKDQPKKEEMNAAIKYPDENDKDK-----

Ypa_Z/E11

-----MAP-----NSANSEPLLHDEVKEE---QLEKL---VAPQAGPR-----
-----KFQ-----IVYPNLITFGYGHISLLYGAYLMFTFA---KWQ-
TIVFAHVMILSGFGITAGAHRLWAHRTYKAKMPLQILLMLLNTLAFQNTAMDWVRDH
RLHHKYSDDTDADPHNATRGGFFYSHVGWLLVRKHKEVKRRGKLIDLS--
DIENNPVLSFQKKYAIPLVSLVTFVMPTVIPMYFWGETLTNNAWHVATLYRYVFLNVTF
LVNSAAHYWGCKPYEKSILPSQNHVSLFALGEGFHNYHHVFPWDYRTAELG-
NNTLNPTTKFIDFFAWIGWAYDLKAVPDDMIN-NRKSRTGDGSS-----
-----LWGWGDKDQPKKEEMNAAIKYPDENDKDK-----

Bmo_10_AGO45852

-----MSP-----NIATIVPSQETE-----NEYEKL---EPPQASER-----
-KYE-----IIYFNIFTFTFAHLSALYGVYLCFTSA---KRE-
SLILGYIIGVLAGFGVTAGAHRLWTHRTYKAKMPLQILLMLFYSFAYQNSAVHWIRDHR
LHHKYSDDTDADPHNATRGGFFYSHMGWLLVKKHPEVKRRGRSLDMS--
DIYSNRVLMFQKKYAIPITGTICFVIPTLLPMYLVGESFKNNAWHI-
TILRYIITLHVAFLVNSAAHIWGYKPYDKRILPTQNLVFSMAFGEFHNYHHVFPWDYR
TAEFG-NNYLNLTTMFIDFFAWLGWAYDLKSVPVSLAE-SRARKTGDGTG-----
-----LWGWGDKDMSEDLKRQTVGEN-----

Dpl_ctg1

-----M----S---CDETEESKSDD-----VFEKL---VAPQAAPR-----
-KYE-----IIHSNLLTFSYGHLLAALYGTLYLCVTVVA---SWK-
TLLFHFIIFVLAAIGVTAGAHRLWTHRAYKAKLPLQIILMLMNTLAFQNTVIDWVKKHRL
HHRYSDTDADPHNATRGGFFYSHVGWLLVKRHEEVRRREKLIDMS--
DIYDNPVLTFQKKYA VPFIGTLTFVLPTLIPMYFFGETFTWAWHL-
TVLRYILNLNGTFLVNSAAHMFNGKPYEEHIKPSQNLFSVFSFGEGFHNYHHVFPWDY
RTAELG-NNYLNLTTFIDFFAWLGWAYDRKTIPDDLIR-SRSKRTGDGTN-----
-----SWGFSKTE-----

Bmo_9_BAD18124

-----MEA-----KQNNLAPTLEEE-----AQFEKL---IAPQASDR-----
---KHE-----IIYANLITFAYGHISALYGLYLCFSSA---KWA-
TIIMAYVILIAAEVGVTAGAHRLWTHRAYKAKRPLQIILMVMNSFAFQNSAITWIRDHR
MHHRYSDDTDADPHNATRGGFFYSHIGWLLVRKHPEVKRRGKTIDMS--
DIYSNPVLVFQKKYAIPFIGAVCFVIPTLVPIYFWGETLTNAWHI-
TLLRYIISLHVTFLVNSAAHLWGTRAYDKRIFPAQNLIVSLLAVGEGFHNYHHVFPWDYR
TAELG-NNYLNLTTFIDFFAWLGWAYDLKSVPDSAVQ-SRAARTGDGTN-----
-----SWGWEEDANEDILKQTPPL-----

Hme_ctg0

-----MSP-----YIESTTTTTTTEEPLVD---HYEKL---VAPQADNR-----
-----KYE-----IVYQNLITFGYGHAAALYGLYLACTSA---TWS-
TIIFHYILFAAASIGITAGAHRLWTHRAYKAKMPLQIILLVMNSLAFQNTAITWVRDHRLH
HRYSDTDADPHNATRGGFFFSHMGWLLVRKHPEVKRRGKFIDMS--
DIYANPVLTFQKKYALPFIGTICFVLPTIIPMYFWGETLSTAWHL-
AVLRYVCNLHNAFLVNSAAHMGWGNKPYDKSIQPAQNLA VSILAFGEGFHNYHHVFPW
DYKTAELG-NNYLNATTYFIDFFSRLGWAYDLKS VSEDHIQ-SRSSRCGDGSD-----
-----SWGLKS-----

Hme_ctg1

-----MSP-----CTGTLIGTTTEEPLVD-HYEKL---IAPQAEPR-----
-----KYD-----IVYESVVTVVYLHAAALYGLYLACSTA---TWS-
TLIFHNILFALATLGVTAGAHRLWTHRAYKAKMPLQLILIVLNSLAYQYTAITWIRDHRL
HHRYSDTDADPHNATRGGFFFSHMGWILVRKHSEVKRRGKFIDMS--
DVYANPVLRFQKKYALPFIGTICFVLPTIVPIYFWGESLNTAWHL-
AILRYVCNLHNTCFVNSLAHLWGNGKPYDKSIKPSENLVISFLT LGEGFHNYHHVFPWDY
KTGELG-NNFLNVTTYFIDFFAWLGWAYDLKS VSEEHIQ-SRSSRCGDGSN-----
-----SWGIKGY-----