

Supplementary File S3: 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--
DLQNDGIVMFQQRFYWVLYGIIFFLLPLNAPMEYWDESILSTFFIIGILRYAFILHGSWLIE
SGVCVWGLQEGEKYPPDSNTVFILNRTF---WPEYHYIYPQDYKSGEYG-
TYGSGCSTAFIRMFVAVMGLAKDLRTLESATLQ-KALAEYARTKQ-----
-----PLDVCFKNALNNQVLPEEHLKRD-----

Hme_ctg10_HMEL002311-PA

-----MAD-----SSS-----MDLSRLSK-----SRE-----
---ANWPAVLFIYIHVHLLSLYGIWLIFFEA---KLL-
TILLVVLTLTATLGVTVGSHRLWAHRTYKANLELRIFLMLCQTLAGHGPIYDWVQHHR
LHHAHFKTDSDLHDSRKGFLYAQFITRFSKLSPYQEELKNSIDMS--
DLEADSVVMFQRRYYWVLYAVIFLILPLNAPLEYWNDSVLSTVFVMGFVRYALVLHAS
WLLESGVCLWGLKEGEKYPPDSNSVFILNKTF---WPEYHYIYPQDYKSGEFG-TY-----

Ofu_Z/E14

-----MAD-----IDATNHYDLQDKSEDDKPEDTEGEL---TIVGTDYSY---
-----THR-----IIWPVIMVYVVMHIGAITGLLLVLGGN----
VKIASIHWAVFYSLVATEGAHMGAHRCFSHRAFKAKPLLKVILLIMQTISGQHSTYIWC
DHRQHHRYSDTDGDPHNSKRGMFYCHVGWLMTSRHPLCKKLRKTIDMS--
DLQQDPLVMFQYRYFRSLFFTFGFLLPVWVPMHFFQESFTNAVVFVCFRLRYVYALHVTY
FINSLAHKYGTRPYDKTIQPVETWVSVLSLGEGWNYHHAYPWDYKAAEIG--
MPLNSTASLIRLCASGLAYDLKSVDPETLN-KRIMNKGDGTY-----
EVKYLQEHVTAIGPLHPLNPSYRGTCPDPEIKLKVRMKP-----

Onu_Z/E14

-----MAD-----IDATNPYDLQDKSEDDKPEDTEGEL---TIVGTDYSY---
-----THR-----IIWPVIMVYVVMHIGAITGLLLVLGGN----
VKIASIHWAVFYSLVATEGAHMGAHRCFSHRAFKAKPLLKVILLIMQTISGQHSTYIWC
DHRQHHRYSDTDGDPHNSKRGMFYCHVGWLMTSRHPLCKKLRKTIDMS--
DLQQDPLVMFQYRYFRSLFFTFGFLLPVWVPMHFFQESFTNAVVFVCFRLRYVYALHVTY
FINSLAHKYGTRPYDKTIQPVETWVSVLSLGEGWNYHHAYPWDYKAAEIG--
MPLNSTASLIRLCASGLAYDLKSVDPETLN-KRIMNKGDGTY-----
EVKYLQEHVTAIGPLHPLNPSYRGTCPDPEIKLKVRMKP-----

Bmo_13_AGO45858

-----MTA-----EVQNPKSVDENGLNGTTKFDSFLI-STKYIGTDYSY--
-----KHQ-----IVWKNAIGFLILHLLALWGVVLIVTGN----
IGLKTFLWTVLFMYAATIGITIGAHRRFFTHKTFKGTPLLKVFLLCQTVAGQNSTFIWARD
HRLHHRYSDDADPHNSKRGFFFCHIGWLMMKKHPYVIELGRRIDMS--
DLQADKMIMFQKKYYYYLYFVVAFLIPVVFVPIYFFNEHWLSSFLVCYCARYILQLNGTW
LVNSAAHLYGTRPYDRKLQPVESWVSCISLGEGWHNYHHAFPWDYKAAEES--
MHFNSNATIIRFFERIGLAYDLKIASPDMVR-NRIVRSGDGTH-----H-----

VLGNDEAKSAVSAIGPLHPLNPTYNSTLKSPDAILKPEGLPLFHEKDVLINDLTRNVAG
Bmo_4_AGO45856

-----MTA-----VSENGNLNNTTKLNSLLINSK-----YIGTDYSY-----
-----KHE-----IVWKNAIGYLILHLLCLWGVGLIVTEL---EGLK-
SCLWTLHMYAGSTGVTVGARHLFTHKSFKATPLLKVFLLCQTIAGQNSTFIWVRDHR
LHHRYSDDADPHNSKRGFFFCHIGWLMMKKHPYVIELGRRIDMS--
DLQADKMIMFQKKYYYYLYFMVAFLIPVVFVPIYFFNEHWLSSFLVCYCARYILQLNLTW
LVNSAAHMYGTRPYDRKLQPVESWVSCISLGEGWHNYHHAFPWDYKAAEES--
MHFNCNATIIRFFERIGLAYDLKTASPD MIR-NRILRSGDGTH-----Y-----

VLGNDKAKSAVSAIGPLHPLNPTYNSTLKSPDAILKPEGLPLFHENDVLISDVIRGNIAE
Bmo_12_AGO45857

-----MTAVSENEENLNNTTKLNSLLINSK-----YIGTDYSY-----
-----KHE-----IVWKNAIGFLILHLLGLWGVGLMVTGN----
IGLKSCWTLILYMYAGSTGVTVGARHLFTHKSFKATPLLKVFLLCQTIAGQNSTFIWAR
DHRLHHRYSDDADPHNSKRGFFFCHIGWLMMKKHPYVIELGRTIDMS--
DLQADKMIMFQKKYYYYLYFVVAFLIPVVFVSIYFFNEHWLSSFLVCYCARYILQLNGTW
LVNSAAHLYGTRPYDRKLQPVESWVSCISLGEGWHNYHHAFPWDYKAAEES--
MHFNCNATIIRFFERIGMAYDLKTASPD MIR-NRILRSGDGTH-----H-----

VLGNDEAKSAVSAIGPLHPLNPTYNSTLKSPDAILKPEGLPLFHENDVLINDIIRGNIAE
Dpl_ctg8

-----MTV-----N---TDILHPNHYNTDVKISKQPNSNFDNDIIKNIGTDYSY-
-----KHQ-----VWVKNAIGFFILHLLGIWGHLLIVFTGG---IYWQ-
TFMWTSLLLFTSTEGITIGARHLWSHRTFKATPLLKTILMIFQTLAGQNSIFTWCRDHRLH
HRYSDTDADPHNAKRGFFFCHIGWLLCKKHPYVKELGKRIDMS--
DLQNDWMIMAQKKYYYYLYLIFAVIIPVSVPIYFFNEHWLSSFLVCYFARYVFQLNGT
WLVNSAAHLYGTRPYDKKLQPVESWVSCISLGEGWHNYHHAFPWDYKAAELS--
MHFNQSAKFIRIFEKLGAYDLKTASPEMVY-NFEMF-----

Hme_ctg8
-----MSP-----NSVIESETQNGSSIIEDKNIITKRIGTDYSY-----
---RHE-----IVWKNAIGFLILHILAVWGLFILFTGG----
ISLKTYLWSAFLMVCSEGVGTIGARHLFSHRSFKATPLLKAVLLFFFTMSGQNSAYIWCR

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

Dpl_ctg5

-----MRQ-----KTKHSIADQLNEDIIDNKSDSDFDL---MKYEALEF-----
-----KPR-----IKWPDLLVQLCLHSTTVYGFYLILVNR----
VKLYTILFVFFTIYTSFGGITAGVHRLWSHRAYKANLPLRILLALLFTVTGQORDIYTWALD
HRVHHKYTETVADPHDVRRGFWFAHVGWLVLT PHPAVEDRRISLRKTSLLADPVVR
WQKIFFIPLFVLLNVFLPIAIPVYFWHESYINSFVLSFVTRFTITLNIAYSVNSFAHMGWGNK
PYDRFIKSVENRIVSLAALGEGWHNYHHVFPWDYRTSELG---
MINISTTFIDAFKIGWAYDLKVATNEMIR-NRARRNGDRSL-----R-----
-----HLEEDPSVSSE-----

Bmo_6_AGO45854

MAPAQQNIEVCTEVMEPALELRITSDGCKDEN-----
NVEHSKNNNTVKQNNILNEKTNNETDFDI---SKYEAMEF-----TPR-----
IRWPDLVVQVSLHLVSIYGIFLIVTNE----
VKLLTTLFALATIYTSFGGITAGVHRLWSHRAYKARTPLRILLAFLLFTITGQORDIYTWALD
HRVHHKYSETVADPHDVRRGFWFAHVGWLVLT PHPAVEDRRVALRKCSLDLIEDPVVR
IQKIFIPFLFLLNILIPIWIPWYFWNESLVT SFVISFVLRFTTTLNIAFSVNSFAHLWGNKPY
DRFIKPAENSVVSLAALGEGWHNYHHVFPWDYRTSELG---
RINVSTNFIDFFAKIGWAYDLKAATSSMIE--IELRGAVMA-----
--L-----

Hme_ctg5

-----MHLIN-----KLEHIENNNTVLAQEYSDKI--NDTDFNI---SNYEAVEF--
-----RPQ-----IKWPD LIVQV MLHLVSIYGCFLVITSE----
VRFLTTLFAFATIYTSFGGITAGVHRLWSHRAYRARLPLRILLALLFTITGQKDIYTWALD
HRVHHKYSETVADPHDVRRGFWFAHVGWLVLT PHPAVENRRKALKKTSIDLINDPVVR
LQRRFFIPLFIILNVLPVGVVPVYFWEEALLYSFVVSFVTRFTITLNI AFCVNSFAHMGWGN
KPYDRFIKPVENSVVSLAALGEGWHNYHHVFPWDYRTSELG---
RLNLSTKFIDTFARIGWAYDCEFVV-----FLSF---

Ape_E6

-----MK-----IIFDEILR-----RFERVFAF-----DND--
-----IKWGSV FVIFGYHALAVYWCYNYS LPV---KWQ-
TVIFAYCTYVLSGMGITLG VHYRWSHRCFKATKPLQIILFLMFALTGQTSIRIWVRNHRL
HHKASDTPGDPHNATRGLFYSHIGWLM MKKTDQLIEQGKKIDMR--
DIDSDPLL RWYDRNVFMVNLMAAFVLPTMVNIWCLGESWRC A VAWQCFVRYLGV LH
AQMTINSLAHKFGNRPFNSRIKPAENMFVSYITFGE GFHNYHHVFPYDYRTT--
GDYFILDY GKILLKFFEKIGWAYNL RKASPETIA-SAVGR-----
-----LNCAESDDLK S-----

Bmo_15_XP_004933819

MIIVSGAGITCGVHRLWTHRSYKAKAPMKLLLMACFCSSGQNSIYNWVRDHRLHHKFA
DTDADPHNVKRGFFFSHIGWLMVKKNESVLTKGKLIDMS--
DIESDSHLMFEHKYHNQLTILFCFLIPTLMNIFLIGEDWKCAVAWQCFIRYLYVLHCELT
NSLAHMYGYKPYNVNIEASENILVSVLTYGEGYHNFHHVFPDFRAAET--
MDFFSLSTKIISTFEKIGWTYDLKQASPEMIEAARDKLGGDGSK-----
-----AHN-----

Bmo_14_AGO45859

-----MERDKKVMKKITPER--SLSEIFR---TFEKS LGF-----
---QND-----IKWPSFIITLYHVIGAYWCYNFAFPV---KWQ-
TVVFAAIMYVATGFGITGGAHRLWTHKSYKAKLPLKLFLLLCFSAAGQNSLYQWVRDH
RIHHKFSDTDADPHNANRGLFFSHIGWLMMKKNNEVILRGKQIDMS--
DIENDPFLRFYDKNFNSLKLVCYIPPTMLGILLWNEEWKCAVAWQCFIRFLGMFHSELT
VNSLAHTFGYKPYNKNIVPAENRFVSICITLGEGWHNYHHAFFPDYKAAEH--
FDFNFNGTKFIKLFEEKIGWAYDLKEATPEMIN-AIAKKLGDGTP-----V-----
-----HFPILVTKTN-----

Dpl_ctg6

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

Hme_ctg6

-----MEK-----INKRSTLSLSEIFR-----SFEKN LGF-----
KND-----IKWTTAILIVLYHVAAVYWCSLYTFPV---KWQ-
TVVLAAIFYVITGFGITGGAHRLWTHKSYKATLPLKLFLLMCFSCAGQNSLEQWVRDHR
VHHKFSDTDADPHNSNRGLFFSHIGWLMMKKNAQVRNSGKLIDMT--
DITNDPLLKFYNKYFSYFKLFFCYVLPVSINVYLFGESWQCAVAWQWFIRFLSMFHSELT
VNSLAHAYGYKPYNKNLIPTENRFVATCTLGEGWHNYHHAFFPDYKAAEH--
FDMFNWCTRFIQGFEEKLGLWAYDLREATPEMIN-SIAQRLGDGTP-----V-----
-----HFPLKSQNEL-----

Hme_ctg7

-----MGF-----LTP-----
IRWTMVITITLFIITLVGFFNSVFTEGRLPMWK-
TIYFATFVGVFGGFGVTGGVHRYWTHRSYKAKLPLQIILMSGFAISGQNNIFNWVRDHR
VHHKLSETSADPHNAHRGFFFSHVGVWLMMKKHPHWISEGNKIDMT--

DILNDTVVQFHTRYFVWIKLLLCFLLPTAIIYFWGESVVASLIT-
TAVRYMLGLHMTWAVNSFAHIWGNKPYDTNITPVENWKVSFVAMGEGWHNYHHTFP
WDYKAAELA--YFINITLIDLFATIGWAYDLKKAAPSLIK-AVVKSRRGRQTK-----
-----KMS-----

Bmo_7

-----MAP-----
LNIVDTPYSDLTKLEDSIENKPNNQANKPNNFEKTNTVDPYDEVKLNEPIFLAPIRKWEK
RMGFVTPIRWTNAILITTFHVTVVWGFYTLFYEKQKPMWQ-
SVIFGIFMGQLAGFGVTAGAHRYWCHRSYKAKLPLQLILALCYSAAGQNTIYEWVRDHR
VHHKFSETSADPHDANRGFFFSHIGWLMMKKHPDVVKQGSKIDMS--
DIIHDPVVFCTKYFILFKITFCWIIPSALPVYAWGELWNIAILSQAFWRYMLSLHFTWSVN
SFAHLWGNKPYDRYIMPCENKGVSIAMGEGWHNYHHTFPWDYKAAELG--
VPNNTTFLDLFARIGWAYDLKQASPALVR-AVAKQRGECKE-----

Dpl_ctg7

-----MGF-----ITP-----
IRWTNAILISSFHIMAVITFLYTFSSG-MVPTLE-
TVFFGFLCGWIGGFVGTAGAHRYWTHRAYKAKIPLQIILIIAYSVAGQNSIPNWVRDHRV
HHKMSETSADPHDANRGFFFSHVGWLMMKKHPDVVKEGKKIDMS--
DILEDPLVRFHNTKYFNTEFKILFCFVIPILPTYMWKETLFI SVTA-
SLVRYMSNLNCTWAVNSVAHIWGQKPYDINITPVENWKVSIVAMGEGWHNYHHTFPW
DYKASELA--YFINVTFLIDIFGKIGWAYDFKVASPALVK-AVIRKRGPRF-----

Bmo_3_AGO45851

-----MPP-----QV--DPIPSGVVFESDTQTD--DLGLDKD--VSVLKKATPK--
-----KHE-----LVWFNIIWFLFLHISSLYGLYL VFTSA---KWQ-
TNVFAFGVHLMCAIGIGAGSHRLWTHRSFKARTPLRIVLMIWQTMGFQDCIFEWARDHR
THHKYADTDADPHNAERGLFFSHMGWLCKKSPEVIEGGRRIDLS--
DLYADPVVMFQKKHYMKMMPILCFVLPTVIPVYFWDETWLNAFFIPTILRYTCGINVVW
SVNSFAHTFGYRPYDKSLNPRENIGVWMICV-
EGFHNYHHTFPWDYRATEHPLYNMLTPTIVFIDAMAMIGQAYDLKTVPHDIK-
QRTHRTGDGTH-----Q-----
LWGWDDPEFNEKLKEKYSRVSYAERKCG-----

Dpl_ctg4

-----MPP-----QA--DPTPSGVLFETDTQTP--DLGLDKD--VSILKKARPR---
-----KYE-----YVWFNIMWFLFLHVASAYGIYL VFTSA---KWQ-
TNVFAFLVHLCCAIGIGAGSHRLWTHRSFAKTPLRILLMIWQTMGFQDCIFEWARDHR
THHKYADTDADPHNAERGLFYSHMGWLCVKKKSPEVLEGGRRIELK--
DLYDDPVVMFQKRHYLKMMPILCFVFPTIIPVYFWNETWLNAFLIPTILRYTCGINIVWS
VNSFAHVFGYRPYDKSLNPRENIAVWMFCV-
EGFHNYHHTFPWDYRATEHPILNMLTPTIMFIDLMAKLGQAYDLKTVTPDIK-

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

Hme_ctg4

-----MPP----LV--DPTPSGVLFESDTQTA--DLGLDKD--VTGLKKAAPR--
-----KYE-----YVWFNIFWFLFLHASSAYGIYLGLTSA---KWQ-
TNVFAFAVHLMCAIGIGAGSHRLWTHRSYKARTPLRTLLMIWQTMGFQDCIFEWARDH
RTHHKYADTDADPHNAERGLFYSHMGWLCCKKSPEVIEGGRRIDVS--
DLYDDPVVMFQKRHYMKMMPVLCFVLPITIPVYFWGETWLNAFFIPTILRYTIGINVVW
SVNSFAHKYGYRPHYDKSLNPRENIAVWMVCV-
EGFHNYHHTFPWDYRATEHPILNMLTPTIMFIEGMAKIGQAYDLKAVSPDIK-
QRSQRTGDGTH-----H-----
LWGWDDPEFTEKLKSRYGVVNKPERKCA-----

Dpl_ctg9

-----MTA-----SAFLHDPMHQKN-----IGELSQLDPPRQRRDY-----
-----EWQ-----IVWRNVLA FVYLH MATLYGIYLILIGK----
TKILTLIFAVTISAMSAMGVTAGAHRLWAHRA YKARWPLRIFLAVMQTMAFQNHIEW
VRDHRVHHKFTETDADPHNAKR GFFFSHMGWLMVRKHKA VFEKGASVDMS--
DLEKDPIVMFQKKTYLVLMPLL CFVVP AWLPVVLWNENPWVSWYVASMLRYTISLHFT
WLVNSAAHIWGNRPYDQYIGATDNKA VAICAFGEGWHNYHHVFPWDYKAAELG-
NYSTNLSTALIDFAAKYGLAYDLKTVSIEMIR-KRVSRTGDGSH-----
PLSSKKESLNQH----DHHHPENPVWGWGDEDMTEEEKKLAEIAHKLN-----

Hme_ctg9_HMEL015726-PA

-----MTA-----ST--FLRANGSYAKADCNTP-----SLI----TQGKRRDY-----
-----EWQ-----IVWRNVLA FVYLHVAAA YAFYLIFSGR----
IWTSTVVFALLFAAMSALGITAGAHRLWAHRA YKARWPLRVFLALMQTMAFQNHIE
WVRDHRVHHKYTETDADPHNARR GFFFSHMGWLMVRKHKEVFEKGGSVDMS--
DLEKDPIVMFQKRTYLFVMPLLCFILPTWIPVALWNESPWNSWYVAAIMRYTVSLHFTW
LVNSAAHIWGNRPYDKYIGATDNKTVAICAFGEGWHNYHHVFPWDYKAAELG-
NYSTNFS TALIDVA AKYGLAYDLKTVSAEMIR-KRVARTGDGSH-----PL--
DKKSKQDD----GHHHPENPIWGWDDKDMTEDEKQLAEIAHKLS-----

Has

-----MAA-----MSSTSLLLANTMLSSK--
LQDHDDLRYAEPRKPNRDY-----EWQ-----
VVWRNVLA FVYLHVSAVYGLYMLTGK----
VKSYTILFGALFAIMSGMGVTAGARRLWAHRSYKARWPLRVFLALMQTMAFQNHIE
WVRDHRVHHKFTETDADPHNAKR GFFFSHIGWLMVRKHKDVFEKGATVDMS--
DLEQDPIVMFQKKTYLVVMPILCFVIPAWIPVHFWDENPWTSWYTAATRYTIALHFTW
LVNSAAHIWGNRPYDKNIGATDNKMVAICAFGEGWHNYHHVFPWDYKAAELG-
DYSTNLSTALIDFAAKHGYAYDLKTVSADMIR-KRVNRTGDGSH-----P-----

WTK--GKVEGDHYHPENPVWGWEDTDMTEEEKQFAEIVHRKTE-----

Dpu

-----MEF-----IMAGSKIIAKNVDHDE--DPRIVSA----PQMKNRDY-----
-----EWH-----IVWRNVLAFIYLVHAAAAYGLYLMFTGK----
VNAFTILFAFSFAAMSAMGVTAGAHRLWAHRA YKARWPLRLYLALMQTMAFQNHIE
WVRDHRVHHKFTETDADPHNARRGFFFSHMGWLMVRKHKDVFEKGATVDMS--
DLEKDPIVMFQKKTYLVVMPLLCFLIPSYIPVWLWNEDPWSSWYVASITRYTLTLHFTW
LVNSAAHIWGTRPYDKNIGATDNVAVAIGAFGEGWHNYHHVFPWDYKAAELG-
NYRTNLSTALIDIAAKYGLAYDLKTVSKEMIE-QRVSRTGDGSH-----P-----
WAQQTEDCSDEHHHPENPVWGWDDTDMPEEDKQLAKIVHRKTE-----

Lca_NF

-----MAPNILGSSLFLADTTLGKNVDDDHSSN---FSASDN----
YSGKR RDY-----EWQ-----IVWRNVFGFIYLHTGMLYGFYLIFTGQ----
VKFFT VLFVLFVLAFAILSAMGVTAGAHRLWAHRA YKARWPLRLILAFQTMAFQNHLYEW
VRDHRVHHKFTETDADPHNAKR GFFFSHIGWLMIRKHKDVFEKGASIDMS--
DLEADPIVMFQKKTYLVVMPILCFVLPAYIPIVWWGEVPWTSWYVATILRFTVSLNFTW
LVNSAAHIWGNRPYDENIGATDNKTVAIFGEGWHNYHHVFPWDYKAAELG-
NYSTNMSTAIIDYAAKHGWAYDLKTVSVD MIR-KRVARTGDGTH-----
PSNDDTKKKLEE----DHHHPDNPVWGWDDTDLKDEDRKFAEIAHPKEQ-----

Cpa_Z9

-----MTT-----GT--SLALAGTYFAAKNKKVDDDDITTPLT---RISGKR RDY-
-----EWQ-----IVWRNVLA FVYLHVGLLYGFYLILTGR--VKLW--
TPVFAVTFTVLSALGVTAGAHRLWAHRA YKARWPLRLILALLQTMAFQNHIEWVRDH
RVHHKFTETDADPHNAKR GFFFSHIGWLMVRKHKKEVFEKGASIDMS--
DLEKDPIV MLQKKTYLVVMPILCFLLPSWIPVYFWGEDPWTSWYVASIWRYTMSLNFT
WLVNSAAHIWGNKPFDKNIGATDNLTVAICAIGEGWHNYHHVFPWDYKAAELG-
NYRTNISTAIIDLAAKYGWAYDLKTVSTQMIL-NRVTRTGDGSH-----
PSVSGDSKQLEETEHDHHPENPVFGWTDADISEEDRMLVEITHKIDENDD-----

Obr_tdes

-----MAP-----N---TLKEDVMIVNEE-----TSEKL----VV-GAAPR-----
----KYK-----VVWFIVAYATYVHIAAVYGLYLAVTSA----MWP-
TIALTFINNILSILGLTAGVHRLWTHKSYKAKLPLQIFLMLCHTASNTFTSISWIRDHILHH
KYTDTDADPHNSTRGFFFSHIGWAMVKKQPEARAKGKSIDLS--
ELYANPVLR FQQKNVWLTLVAYIIPSLVPL-IWNETFTVAYHM-
NLLRVTVVFNTFLLINSVAHMGWTRPYDETILPAQNKTVSFFTLGEGFHNYHHVFP HDY
RTAELG-DNFLNLTTKFIDFCAWMGQAYDRRYVPDDVIA-ARMKRTGETNE-----
-----KNT-----

Bmo_11_ABD36148

-----MAQ-----NQTYNGLIVTEIEDSS---LEHDSV----KPSVVGPR-----
-----EYE-----IVYKNIFIHIYLHVTFYGLYLCCTTA---KWP-
SVGFAYLCYVAATIGVTAGAHLWSHKSYKARLPLQILLMVFLSLANQRAT-
HWVRDHRVHHKYSDDADPHNASRGFFYSHIGWLFVRKHPEVKKKGKLDLS--
DLFDNPALMFQHRYSKTFIPIVCFGLPTILPVILWDELLVVAWNL-
TIMRYVINFHVFFLVNSVAHIWGNKPYDKTIKSAENNLVAFATLGEGYHNYHHVFPWD
YRCTELG-RTWLNYSKLFIDLCAKVGLAYDLKVVSDDVIL-RRVKRTGDRSH-----
-----FIEN-----

Bmo_8_AGO45853

-----MSRFQAP-----S---NEDRDDVFSEEE-----TRLEKL----IAPQAEPR-----
-----EFK-----VVYRNIIVLLYYHMAGIYGLYLGLIAA---KWA-
TVISAFITYCISVIGVTAGSHRLWSHKSYKATKPLQLFLMLCQSVSNQHSVAYWVMVHR
LHHKYSDDADPHNATRGIFYSHMGWLMVRKHPEIEKRGKLLDLS--
DIYGNPYLKFQDTHYYWFLPLMSFLLPTIIPMYFWGETCSVAWNV-
NMCRYVMNLNAIFLVNSVAHMGWGYKPYDKNIAPSQNLSVSVLSLGEGFHNYHHVFPW
DYKCELS-SFRNPTTVFIELCAKLGLAYDLRSASDDLIE-GRAKRTGDGSY-----
-----LTLKKS-----

Dpu_Z/E11_1

-----MAP-----N---ITNEEIIVSETDHDQS-----KRPQAEPR-----
-QYH-----IVYRNIAVFLYYHAGIYGLYLCFGNA---MWT-
TIFWNVFTFIIAGLGVTAGAHLWSHKAYKATRPLQIFLVLAQSVANQHSVAHWARDHR
LHHKYSETDADPHNSTRGFFYSHVGVLMVRKHPEVTRRGKTVDMS--
DIYNNPYLKLQDKHSYWFIPLLSFFIPTYIPT-LWGESLTNAWHI-
NMFYILNLNATFCVNSVAHLWGQKPYDKHIAPSQSPKVNVTTLGEGFHNYHHCFPWD
YRSDELG--LTFNFTTGFDICEKLGLAYDLRSASEEVIA-ARAERTGDGSR-----
-----IKSL-----

Pex_tdes

-----MVP-----D---VLREAERLQDDA-----KL---VAPQAEPW-----
---KFQ-----LSYTNVVIFGYLHISGIYGLLFCVSKA---HWA-
TIFFSFILLVASVIGVTAGAHLWSHRSYKANLPLQIILMLFHSLSGQYTAFNWARDHRLH
HKYSDDADPHNATRGFFYSHIGWLLVVKHPEVRKRGEAIDLS--
DLLRNPVLTQQRKNVVLILALLCYIMPTAVPMYFWGETFHNAWHI-
MALRFVLCLNFISLINSAAHTFGNKPYDKSIMPTQNMSVTLATLGEGFHNYHHVFPFDYR
AAELG-NNTFNLTTKFIDFFAMIGWATALKTVGHESIA-RAAQRRTGDGSL-----
-----TWKSDCEVVPGLKSG-----

Lca_Z9

-----MPP-----N---VTEANGVLFENDVQTP--DMGLEVA---PVQKADER---
-----KIQ-----LVWRNIIAFAYLHLAAVYGAYLFF TSA---KWQ-
TDIFAYILYVMSGLGITAGAHLWAHKSYSKAKWPLRLILVAFNTLAFQDSAIWARDHR
MHHKYSETDADPHNATRGFFFSHIGWLLCRKHPELKRKGQGLDLS--

DLYADPILRFQKKYYLLLMPLACFVLPTIIPVYLWGESWKNALFVAAMFRYTFILNVTW
LVNSAAHKWGGKPYDKNIQPAQNISVAIFALGEGFHNYHHTFPWDYKTAELG-
NNRLNFTTSFINFFASFGWAYDLKTVSDEIIQ-QRVKRTGDGSH-----H-----
-----LWGWGDQDIPAEAAQAALRINRKDD-----

Has_Z9

-----MAP-----NI--SEDVNGVLFESDAATP--DLALSTP---PVQKADNR---
-----PKQ-----LVWRNILLFAYLHLAAQYGGYLFLFSA---KWQ-
TDIFAYILYVISGLGITAGAHRLWAHKSYSKAKWPLRVILVIFNTVAFQDAAMDWARDHR
MHHKYSETDADPHNATRGGFFFSHIGWLLVRKHDPDLKEKGKGLDMS--
DLLADPILRFQKKYYLILMPLACFVMPTVIPVYFWGETWTNAFFVAAMFRYAFILNVTW
LVNSAAHKWGDKPYDKSIKPSENLSVAMFALGEGFHNYHHTFPWDYKTAELG-
NNKLNFTTTFINFFAKIGWAYDLKTVSDDIVK-NRVKRTGDGSH-----H-----
-----LWGWGDENQSKKEIDAAIRINPKDD-----

Sli_Z9

-----MAP-----NI--SEDVNGVLFESDAATP--DLALARP---PVQKADNK---
-----PKQ-----LVWRNIILFAYLHLAALYGGYLFLFSA---KWQ-
TDIFAYILYVISGLGITAGAHRLWAHKSYSKAKWPLKVILIFNTVAFQDAAMDWARDHR
MHHKYSETDADPHNATRGGFFFSHIGWLLVRKHDPDLKEKGKGLDMS--
DLLADPVLRQKKYYLLLMPLACFVMPTMIPVYLWGETWTNAFFVAAMFRYAFNLNV
TWLVNSAAHKWGDKPYDKSIKPSENMSVAMFALGEGFHNYHHTFPWDYKTAELG-
NNKLNFTTAFINFFAKIGWAYDMKTVSEDIVK-NRVKRTGDGSH-----H-----
-----LWGWGDENQPKKEIEAATRINPKDD-----

Poc_Z9

-----MAP-----N---VTEENGVLFESEDAVTP--DLAMARA---PVQQADST---
-----PRV-----YVWRNIIFAYLHLAAVYGFYLLLVSA---KWQ-
TDIFAYILLYVASGLGITAGAHRLWAHKSYSKAKWPLRVILTLFNTIAFQDSAIDWARDHR
MHHKYSETDADPHNATRGGFFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYADPILRFQKKYYLLLMPLACFVLPTVIPVYLWSETWTNAFFVAALFRYTFILNVTWL
VNSAAHKWGDKPYDKDIKPSENMSVSLFAFGEGFHNYHHTFPWDYKTAELG-
NHRLNFTTKFINFFAKLGWAYDMKTVPDTIVQ-QRVKRTGDGSH-----H-----
-----LWGWGDKDHAQEEINAAIRINPKDD-----

Epo_Z9

-----MAP-----N---VTEENGVLFESEDAATP--DLALARE---PVQQADSS---
-----PRV-----YVWRNIILFAYLHIAAVYGGYLFLFSA---KWQ-
TDIFAYILLYVASGLGITAGAHRLWAHKSYSKAKWPLRLILTIFNTTAFQDSAIDWARDHR
MHHKYSETDADPHNATRGGFFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYADPILRFQKKYYLILMPLACFILPTVIPVYLWNETWSNAFFVAALFRYTFILNVTWL
VNSAAHKWGDKPYDKSIKPSENLSVSLFAFGEGFHNYHHTFPWDYKTAELG-
NHRLNFTTKFINFFAKIGWAYDMKTVSHEIVQ-QRVKRTGDGSH-----H-----
-----LWGWGDKDHAQEEIDAAIRINPKDD-----

Ave_Z9

-----MAP-----NVTENGVL FESDAATP--DLALGTA----PVEQADDS-----
-----PRV-----YVWRNIILFAYLHLAAIYGGYLFLFSA----KWQ-
TDIFAYFLYVASGLGITAGAHRLWAHKSYSKAKWPLRVILTTFNTIAFQDSAIDWARDHR
MHHKYSETDADPHNATRGGFFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYADPILRFQKKYYLLLMPLACFILPTVIPVYLWNETWTNAFFVAALFRYTFILNVTWL
VNSAAHKWGDKPYDKSIKPSENMSVSLFAFGEGFHNYHHTFPWDYKTAELG-
NHRLNFTTKFINFFAKIGWAYDMKTVSNEIVQ-QRVKRTGDGSH-----H-----
-----LWGWGDKDHAQEEINAAIRIHPKDD-----

Cro_Z9

-----MAP-----N---VTEENGVL FESDAATP--DLALART----PVEQADDS-----
-----PRI-----YVWRNIILFAYLHLAAIYGGYLFLFSA----KWQ-
TDIFAYFLYVASGLGITAGAHRLWAHKSYSKAKWPLRLILTIFNTIAFQDSAIDWARDHRM
HHKYSETDADPHNATRGGFFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYSDPILRFQKKYYMILMPLACFILPTVIPVYMWNETWSNAFFVAALFRYTFILNVTWL
VNSAAHKWGDKPYDKSIKPSENMSVSLFAFGEGFHNYHHTFPWDYKTAELG-
NHRLNFTTKFINFFAKIGWAYDMKTVSQEIVQ-QRVKRTGDGSH-----H-----
-----LWGWGDKDHAQEEINAAIRINPKDD-----

Dpl_ctg3

-----MAP-----N---SSDANGVL FESDAATP--DLALPNT----PIQQADSY-----
-----PRK-----YVWRNIIAFAYLHIAALYGGYLFLFSA----KWQ-
TNIFAYILYVMSGLGITAGAHRLWAHKSYSKAKWPLRVILVIFNTLAFQDSAIDWARDHR
MHHKYSETDADPHNATRGGFFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYADPILRFQKKYYLLMPISCFILPTIIPVYLWGETWTNGYFVAAMFRYAFILNVTWL
VNSAAHKWGDKPYDKNIQPSENMSVSLFALGEGFHNYHHTFPWDYKTAELG-
NNRLNFTTTFINFFAKIGWAYDLKTVSDEIVK-QRVNRTGDGSH-----H-----
-----LWGWGDKDHSKEEIRAAIRINPTDDKEE-----

Hme_ctg3

-----MAP-----N---SGDANGVL FESDAATP--DMALPIT----PIQQADQY-----
-----PRK-----LVWRNIIAFAYLHLAALYGGYLFLFSA----KWQ-
TDIFAYILYVMSGLGITAGAHRLWAHKSYSKAKWPLRVILIIFNTLAFQDSAIDWARDHR
MHHKYSETDADPHNATRGGFFFSHIGWLLVRKHPELKKKGKGLDLS--
DLYADPILRFQKKYYLILMPIACFILPTLIPVYLWGESYINAYFVAAMFRYAFILNVTWL
NSAAHKWGDKPYDKNIQPSENISVSFALGEGFHNYHHTFPWDYKTAELG-
NNRLNFTTNFINFFAKIGWAYDLKTVSDEIVQ-KRVKRTGDGTH-----H-----
-----LWGWGDKDHAADKNAAIRINPKEDKDD-----

Bmo_1_AFK13829

-----MAP-----N---VKDANGVL FENDADTP--DLGLSST----PVQQADNY---
-----PKK-----LVWRNIILFTYLHIAALYGGYLFLFHA----KWQ-
TDLFAYILYVMSGLGITAGAHRLWAHKSYSKAKWPLRVILIIFNSLAFQDSALDWARDHR
MHHKYSETDADPHNATRGGFFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYADPILRFQKKYYLILMPIACFILPTVIPVYFWNESWINAFFVATLFRYTFILNVTWL
NSAAHKWGGKPYDKNIKPSENISVSFALGEGFHNYHHTFPWDYKTAELG-

NNRLNFTTNFINFFAKIGWAYDLKTVSDEIHK-NRVNRTGDGSH-----Y-----
-----LWGWGDKDLDKEEIKQAIRINPKDN-----

Mse_Z9

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

Onu_Z9

-----MAP-----NIKDGADLNGVLFEDDASTP--DYALATA---
PVQKADNY-----PRK-----LVWRNIILFAYLHLAAVYGAYLFLFSA---KWQ-
TDIFAYILYVISGLGITAGAHRLWAHKS YKAKWPLRLILIFNTVSFQDSALDWSRDHRM
HHKYSETDADPHNATR GFFFSHIGWLLVRKHPELKRKGKGLDLS--
DLYADPILRFQKKYYLLL MPLGCFIMPTVVPVYFWGETWTNAFFVAALFRYTFILNVTW
LVNSAAHKWGHKPYDSSIKPSENLSVSLFALGEGFHNYHHTFPWDYKTAELG-
NNRLNFTTNFINFFAKIGWAYDLKTVSDEIIQ-NRVKRTGDGSH-----H-----
-----LWGWGDKDQPKKEEVNAAIRINPKDE-----

Dpu_Z/E9

-----MAP-----K---EADVNGVLFESDATTP--DMALPTT---PVQQADNY---
-----PKK-----LVWRNILLFAYLHLAALYGGYLFLFSA---KWQ-
TDIFAYILYIMSG LGITAGAHRLWAHKS YKAKWPLRLILVLFNTLAFQDSAIDWARDHR
MHHKYSETDADPHNATR GFFFSHIGWLLVRKHPELKKKGKGLDIS--
DLYADPILRFQKKYYLLL MPLGCFILPTVIPVYLWNETWSNAFLVAALFRYAVILNVTWL
VN SAAHKWGD KPYDKSIKPSENLSVALFALGEGFHNYHHTFPWDYKTAELG-
NNRLNFTTTFINFFAKIGWAYDMKTVSDEIIQ-NRVKRTGDGSH-----H-----
-----LWGWGDKDHSKEEINAAIRINPKDD-----

Onu_Z9_b

-----MPP-----QG--AERDSFVLFESDAKDP---DVITH---MAPQAEKR-----
-----QTQ-----IVWRNVAIFTYLHLGFLYGAYLMLTTV---MWK-
TRLFCLILYVCSGLGITAGAHRLWAHKS YKAKLPLRIILTLFNTLAFQDAVVDWARDHR
MHHKYSETDADPHNATR GFFFSHVGWLLVRKHPPQIKAKGHTIDMS--
DLRADPVLR FQKKYYMYLMPLICFIMPSV VPA-
LWGETVWNGYFTCAVFRYVAVLN GTWLVNSWAHLWGD KPYDRHINPVETKVVSVA A
IGEGFHNYHHTFPWDYKAAELG-NYTFNITKFFIDTMATIGWAYDLKTVSTDVIQ-
KRITRTGDGSH-----P-----VWGWGDKNIPEEDKKVTTVINPEKEE--

Bmo_2_AF182406

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

Epo_Z9_b

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

Tni_Z9

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

Has_Z9_b

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

Sli_Z9_b

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

TSLFAVFLYICSGLGITAGAHRLWAHKSYPKARLPLRILLTLFNTLAFQDAVIDWARDHRM
HHKYSETDADPHNATRGGFFFSHVGVLLVRKHHPQIKAKGHTIDLS--
DLKNDPILRFQKKHYLILMPLVCFILPCYIPT-
LWGESLWNAYFVCSIFRYVYVLNVTWLVNSAAHLWGAKPYDKNINPVETKPVSLVVLG
EGFHNYHHTFPWDYKTTELG-DYPLNLTCLFIDFMAAIGWAYDLKTVSSDVIQ-
KRVKRTGDGSH-----A-----
VWGWDDHEVHQEDKELAAIINPDKTE-----

Hme_ctg2

-----MPP----QD--QQTGSWVLYEKD-LNK--NA--STS---VPPTAEKR----
-----KWQ-----IVWRNVILFLLLHIGGVYGAYLFLMKA---MWA-
TRIFAVVLYLCSGLGITAGAHRLWAHKSYPKAKLPLRILLTIFNTIAFQDSVLDWARDHRM
HHKYSETDADPHNATRGGFFFSHVGVLLVRKHPEIKSKGHTIDMN--
DLWSDPILRFQKKYYMLLMPVACFILPSYIPT-
LWGESLWNGYFVAAIFRYVYVLNATWLVNSAAHKWGSKPYPDKNINPVETKPVSLVVL
GEGFHNYHHTFPWDYKTAELG-DYSFNFSKLFIDGMSSIGWAYDLKTVSREVIE-
KRIKRTGDGSH-----Q-----EFGYEDLSSSEDKFNKE-----

Ban_delta9-like_Lienard

-----MPP----QG--QQQGSWVLYESD-LNK--DATPPPL---VPPSAEKR----
-----KWK-----IVWRNVILFMLLHLGGLYGAYLFLTQA---MWT-
TRIFTVLLYLSSGLGITAGAHRLWAHKSYPKAKLPLRMLLTLFNTLAFQDSVLDWARDHR
MHHKYSETDADPHNATRGGFFFSHVGVLLVRKHPEIKAKGHTIDMS--
DLWADPVLRFQKKYYLILMPLVCFILPTYIPT-
LWGESLWNAYFVSAIFRYVYVLNVTWLVNSAAHKWGSKPYPDKFINPVETKSVSLVVLG
EGFHNYHHTFPWDYKTAELG-NYSLNFSKLFIDTMAKIGWAYDLKTVSPDVIE-
KRVKRTGDGTH-----Q-----EWGFEELHKELHEHSQ-----

Ban_delta11-like_Lienard

-----MAP-----SATETTTITETE-----ETLPKL---VAPQAAPR-----
--KYD-----IIFYNLLTFGYAHLATLYGVYLAETTA---TWK-
TLMFHHVMFILAAVGITAGTHRLWSHRAKAKMPLQIILMVLNSFAFQNSAIQWVRDH
RMHHRYSDTDADPHNATRGGFFYSHMGWLLVRKHPEMLRRGKFIDMS--
DIYANPVLRFQKKYAI PVFGTLCFALPTLIPMYFFGETLNTAWHL-
TIMRYVFNLHMTFLVNSAAHLWGNKPYDKNMLPAQNLPVSFIAFGEGFHNYHHAFPWD
YKTAELG-NNWLNFSKTFIDFFAWIGWAYDLKEVPLEVAR-ARAERTGDGSN-----
-----LWGFRDKTE-----

Ban_delta9-like_Arun_ACO11.6.7

-----MPP----QG--QQQGSWVLYESD-LNK--DATPPPL---VPPSAEKR----
-----KWK-----IVWRNVILFMLLHLGGLYGAYLFLTQA---MWT-
TRIFTVLLYLSSGLGITAGAHRLWAHKSYPKAKLPLRMLLTLFNTLAFQDSVLDWARDHR
MHHKYSETDADPHNATRGGFFFSHVGVLLVRKHPEIKAKGHTIDMS--
DLWADPVLRFQKKYYLILMPLVCFILPTYIPT-

LWGESLWNAYFVSAIFRYVYVLNVTWLVNSAAHKWGSKPYDKFINPVETKSVSLVVLG
EGFHNYHHTFPWDYKTAELG-NYSLNFSKLFIDTMAKIGWAYDLKTVSPDVIE-
KRVKRTGDGTH-----Q-----EWGFEELHKELHEHSQ-----

Ban_delta11-like_Arun_LOC692458.1.1

-----MAP----SA--TETTTITETEETLPKL-----VAPQAARR-----
--KYD-----IIYFNLLTFGYAHLATLYGMYLACTTA---TWK-
TLMFHHVFMFILA AVGITAGTHRLWSHRAYKAKMPLQIILMVLNSFAFQNSAIQWVRDH
RMHHRYSDTDADPHNATRGGFFYSHMGWLLVRKHPEMLRRGKFIDMS--
DIYANPVLRFQKKY AIPVFGTLCFALPTLIPMYFFGETLNTAWHL-
TIMRYVFNLMHTFLVNSAAHLWGNKPYDKNMLPAQNLPVSFIAFGEGFHNYHHAFPWD
YKTAELG-NNWLNFSKLFIDFFAWIGWAYDLKEVPLEVA-RARAERTGDGSN-----
-----LWGFRDKTE-----

Bmo_5_AGO45855

-----MVE-----TKMEDGKQAATP-----AEEINLSN-----
KRE-----ANWPAVLFFIIHLLSLYGIYLLIYEV---KWM-
TVIFLITLTFPAILAMTTGAHRLWAHRTYKASTELRIVLMLLQTLAGVGPIYNWVRHHRL
HHAHFATENDPFDYNQGFAYAHIFTRMRKLSPYQEKLKESIDMS--
DLENDSVVMFQKTLYWFMYATLFLLLPLNAPLEYWEDSVLSSVFVIGFLRYFILLHASW
LIESAICVWGLKPGEKSPDSNSVFIITRTF--WPH-YHYLIPYDYKSGEYG-
TYDSGCSSAFIRVWAALGIATGLRTVETNTIQ-KALAEMAKTKK-----
-----PLQICLENALKDQSLSDQHLYLKRE-----

Dpl_ctg2

-----MPP----QG--QQSESWVLNETDLNKD----ADTPI---VPPSAEKR-----
-----KLQ-----IVWRNVILFALLHIGGVYGYLFFTQA---MWS-
TRLFAVVLYLCSGLGITAGAHRLWAHKSYPKARLPLRMLLTLFNTIAFQDSVIDWARDHR
MHHKYSETDADPHNATRGGFFSHVGWLLVRKHPEIKAKGHTIDMS--
DLKSDPVLRFQKRHYLLLMPLACFILPTYIPT-
LWGETLWNAYFVCAIFRYVYVLNVTWLVNSAAHKWGDKPYDKNINPVETKPVSLVVL
GEGFHNYHHTFPWDYKTAELG-HYQLNFSKLFIDFMATIGWAYDLKTVSTDVIE-
KRVKRTGDGSH-----K-----EWGQEIKEKISQE-----

Poc_Z10

-----MPP----N---SEETVLCEKE-----DHEKL---VAPQAATR-----
---KHE-----LAIVPISLFTYWHVAGLYGLYLIFAEA---KWQ-
TVVFTLFTYNAGILGITAGSHRLWAHKTYPKARPLETLLMVFHSLTSQNTVRHWARDH
RFHHKYSDTDADPHNATRGGFFSHVGWLLVKKHPEVLRRSKTIDMS--
DIYNNPVLRFQKNYGLPVITLFAVYLPALIPMYCWEETLNNAWHI-
NLLRIIANLHASCLVNSAAHAFGNKPYDKHIAATQISTLSFITLGECFHNYHHVFPWDYR
TAEGL-NNWLNMTTLFIDFFAWVGWAYDLKTASDGMVE-ARAKRTGDGTN-----
-----LWGWGDEDLGREEGGEEVFYGWGDRDMKDTSGVRVYSQE-----

Onu_Z/E11

-----MVP----Y---ATTADGHPEKDE-----CFEDN---EIKSNSLP-----
---KLE-----ILYFNVMTFTFLHLSALYGLYLGFTSV---KWA-
TIGLGIIFYFFAEIGITAGAHRLWSHRYSYKAKLPLEILLMVFN SMAFQNTALSWARDHRV
HHKCPDTNGDPHNANRGFFYSHVGWLMTKKSDEVIKQGKLCDDVA--
DLYSNPVLRFQKKYAVPFIGTLCFVLP TLIPMYFWGETLNNAWHF-
NMFYRVINLNATFCVNSV VHKWGYKPYDKNICPTQNVLLNLAVLGEAFHNYHHVFPW
DYRAAELG-NQKMNP TTLFIDFFAWIGWAYDLKTASKEMIK-SRSERTGDGTD-----
-----LWGH SADKLK-----

Ape_Z11

-----MAP----Y---TEKEDELITCEG-----SIEKL---IAPQANKR-----
--KHQ-----IVYMNLF TFGYWYIAGLYGLYLFFTST---KWS-
TIILNIFLIASGLGITVGAHRLWAHKCFKAKLPLQIILMILNTLAFQNTAITWVRDHRMH
KFTD TDADPHNATR GFFFSHVGWLLVKKHPELMKRSKHIDMS--
DIYGNPVLTFQKKYAFPLVATFTFILPTVVPIYFWDESLNNAWHA-
TVFRYAYNLNITFLVNSAAH MWGYR PYDKNIQPTQNI FTTLCTFGEGFHNYHHTFPWDY
RAAELG-NNYLN LSTKVIDFFAWIGWAYDLKTVPADIVN-SRAKRTGDGTD-----
-----LWGGNHKHTLDEKENRELD DYVHKSAF-----

Mse_Z11/10-12

-----MAP----N---FGTEMSAHIDAE--E-----SYGKL---IPPQAAPR-----
---KYK-----YLYANMIYFAYWHIAGLYGIYLAFTSA---KWA-
TIILAYLLFVAGDIGVTAGAHRLWAHKS YKAKLPLQILLMLFSTMAFQNTVITWVKDHR
MHHKYS DTDADPHNATR GFFFSHVGWLMV KRHPEAIKRGKSLDMS--
DIYNNPVLKFQKKYAIPLVT TIAFVLPTIIPMYFWDESFSVAWHM-
TMLKYIFGLNAAFLVNSVAH MWGYKPYDKNIAPTQSYIATFATLGEGFHNYHHVFPWD
YRASELG-DNYLNFTTKFIDFFAWIGWAYDLKAAPEDLVQ-
KRIERTGDGTKLLNL TTKFIDFFAWIGWAYDLKTVPEDLLQKRMERTGDGTNLWGRGD
KNMKKD YVKSTDDHE-----

Bmo_Z11/10-12_BAD18122

-----MPP----NSVDKTN ETEYLKDNH-----VDYEKL---IAPQASPI-----
-----KHK-----IVVMNVIRFSYLHIAGLYGLYLCFTSA---KLA-
TSVFAIVLFFLG NFGITAGAHRLWSHNGYKV KLPLEILLMVFN SIAFQNTIFTWVRDHRL
HHKYTD TDADPHNATR GFFFSHIGWLLVRKH PMVKIAGKSLDMS--
DIYCNPLLRFQKKYAI PFIGTICFIPTLAPMYFWGESLNNAWHI-
TVLRYIFSLNGTFLVNSAAHLWGYKPYDKSLKATQSGMANAFTFGEGFHNYHHVFPWD
YRADELG-DRYINLTTRFIDFFAWMGWAYDLKTASTNII E-KRALRTGDGTY-----
-KR-----PNGMN-----

Lca_Z11

-----MPP-----YP EVDTKHIFEEDISHEESKPALKPL---VAPQADNR----
-----KPE-----IVPLNLITFGYGH LAIYGIYLCFTSA---KWA-
TIVFAFVLYICAELGITAGAHRLWSHRYSYKAKLPLRLILL LFN TLAFQNTAIDWVRDHRM

HHKYSDTDADPHNATRGGFFSHVGVLLTRKHPEVKKRGKDIDMM--
DIYNDSLLKFQKKYAIPFVGLVCFVIPTLMPMYFWNETLNNSWHIATMLRYIVNLNMTF
LVNSAAHIWGYKPYDKSIKPVQNITVSILILGEGFHNYHHVFPWDYRTSELG-
NDFLNFTTLFINLFAKIGWAYDLKTASDKVVA-ARRKRTGDGTN-----
-----LWGWEDKSLMKKATAATVLYPNKYLNLD-----

Dpu_Z/E11_2

-----MPP-----NTETFKKLKISEENLE----QFPKL----VAPQAAPR-----
----KYE-----IIYINVLTFSYWHLAAFYGIYLCFTSA----KWT-
SVFFVFLYCTMGEVGVTAGSHRLWSHKSYKAKLPLQIILMTLSSIAFQNSVIDWVRNHRT
HHKYSDTDADPHNATRGGFFSHIGWLLVRKHSQTKLRGKTIDMS--
DIYNNSVLRFQKKYAIPFIGTICFVLPVLPIMYCWNESFINAWHL-
NMLRYCLSLNFTFLVNSAAHLYGNKPYDKNILPAENKAVSFLTLEGGFHNYHHTFPWD
YRAAELG-NNKLNLTTKFIDFFAWVGWAYDMKTVSDDMIR-SRAKRTGDGSI-----
-----IWDDGKETIEMGDVSDAIVIKNE-----

Epo_E11

-----MAP----N---VEEIETDLTETE-----EKWEKL----VAPQAAPR-----
----KHE-----ILYTNLLIFGYGHLAGLYGLYLCFTSA----RLQ-
TIILAFILHAMAILGITAGAHRLWTHRSYKATMPLQIILIIFNSLSFQNSAINWVRDHRSHH
KYCDTDADPHNAARGLFYSHIGWLLVKKHPEVKKRGKMTDMS--
DVYRNPVLRQKKYAVPFIGTICFVLPPTIIPMYFWGESLNNAWHI-
TLLRYIFSMHTIFLVNSVAHLWGNRPYDKNILPADNRTLSTLGEASHNYHHTFPWDYR
STELG-YLPTNFTTNFIDFFAWIGWAYDLKTTSGEIIN-SRIQRTGDGTH-----
-----SRSKKNISTQDE-----

Ave_Z/E11

-----MAP----N---AEDIETNMPETE-----ENWETL----VAPQAAPR-----
----KYQ-----IVYKSLLTFGYGHLAGLYGLYLCFTSA----KWQ-
TIGLAILHAMAILGITAGAHRLWTHRAYKATVPLQIILIIFNSLSFQNSAFTWIRDHRLHH
KYSDTDGDPHNATRGGFFYSHIGWLLVRKHPEVMKRGKMTDMS--
DIYSNPIIMFQKNYAIPFIGTVCFVLPTIIPMYFWGETLNNAWHI-
TVLRYIFSLNCIFLVNSAAHLYGYKPYDKNILPAENKAASIASFGEAFHNYHHVFPWDYR
ASELG-NITMNWTIYFIDFFAWIGWAYDLKTASDETIK-SRIKRTGDGTD-----
-----FSGQQIYAR-----

Cpa_E11

-----MAP----N---VEDMESDMPPESE-----KWEKL----VAPQAAPR-----
----KYE-----IIYTNLLTFGYGHIAGLYGLYLCFTSA----KWQ-
TVILAILNEMAILGITAGAHRLWSHRSYKAAVPLQIILMIFNSLAFQNSAINWVRDHRMH
HKYSDTDGDPHNASRGFFYSHVGVLLVKKHPEVKKRGKMTDMS--
DIYSNPVLRQKKYAIPFIGMICFVLPPTIIPMYFWGETLSNAWHI-
TMLRYVFSLSIFLVNSAAHLYGYRKYDKNILPAENKIALIACLGDSFHNYHHVFPWDYR
ASELG-NIGMNWTAQFIDFFAWIGWAYDLKTASDENIN-SRMKRTGDGTD-----
-----ISGQKYSCESEVLQ-----

Tni_Z11

-----MAVMAQ-----TVQETATVLEEEARTV-----TL----VAPKTTPR-----
-----KYK-----YIYTNFLTFSYAHLAALYGLYLCFTSA----KWE-
TLLFSFVL FHM SNIGITAGAHRLWTHKTFKAKLPLEIVLMIFNSLAFQNTAITWAREHRLH
HKYSDTDADPHNASRGFFYSHVGWLLVKKHPDVLKYGKTIDMS--
DVYNNPVLKFQKKYAVPLIGTVCFALPTLIPVYCWGESWNNAWHI-
ALFRYIFNLNVTFLVNSAAHIWGNKPYDKSILPAQNLLVSFLASGEGFHNYHHVFPWDY
RTAELG-NNFLNLTTLFIDFCAWFGWAYDLKSVSEDIK-QRAKRTGDGSS-----
GV-----IWGWDDKDMDRDIKSKANIFYAKKE-----

Tpi_Z11/11-13

-----MAP-----NTRENETIYDEV-----EHKLEKL----VPPQAGPW-----
-----NYK-----IVYLNLLTFSYWLIAGAYGLYLCFTSA----KWA-
TIIFEFILFFFAEMGITAGAHRLWTHKSYKAKLPLEIFLMVLNSVAFQNTATDWVRDHRL
HHKYSDTDADPHNAARGLFFSHVGWLLVRKHDEVKKRGKFTDMS--
DIYNNPVLKFQKKYAIPFIGAVCFILPTVIPMYFWGESLNNAWHI-
CILRYAMNLNVTFSVNSLAHIWGNKPYDKDIKPAQNFGVTLATFGEGFHNYHHVFPWD
YRTSELG-DNKFNFTTKFINFFERIGLAYDLKTVSDDVIA-QRAKRTGDGTH-----
-----LWDCADKNNNDVVQTKAQIDTLCTKHE-----

Che_Z/E6

-----MPP-----NTKEKEMNKLAGISGRNEE-----LAPQAAPR-----
-----KFE-----IVYRNIVTFSFMHVAGLYGLYLCFTSA----KWQ-
TIVLAFVLYTFAEIGVTAGAHRLWAHKTYKAKTPLQIILMVLNSIAFQNSAIGWVRDPRL
HHKYSDTDADPHNATRGGFFYSHVGWLLVRKHPEVIKRGKTMEMS--
DIYSNPVLWFQKKYAVPFIGIICFGLPTLVPMYFWGETLNNAWHI-
TMLRYIANLNVTFLVNSAAHMFNGKPNKNILPAQNISVSILTFGEGFHNYHHVYPWDY
RTAELG-NNMLNMTTLFIDFFAWIGWAYDLKTVSSAAIE-SKAKRTGDGTN-----
-----LWGWGDKDMLREDQKAAEILFARLK-----

Sli_Z11/10-12

-----MAQ-----CVQTTTILEQKEEKTV-----TL----LVPQAGKR-----
-----KFE-----IVYFNIITFAYWHIAGLYGLYLCFTST----KWA-
TVLFSFFLFVVAEVGVTAGSHRLWSHKTYKAKLPLQILLMVMNSLAFQNTVIDWVRDH
RLHHKYSDTDADPHNASRGFFYSHVGWLLVRKHHPDVKKRGKEIDIS--
DIYNNPVLRFQKKYAIPFIGAVCFVLPTLIPVYGWGETWTNAWHV-
AMLRyimnlNVTFLVNSAAHIYGKRPYDKKILPSQNIASVIAATFGEGFHNYHHVFPWDY
RAAELG-NNSLNFPTKFIDFFAWIGWAYDLKTVSKEMIK-QRSKRTGDGTN-----
-----LWGLEDVDTPEDLKNTKGE-----

Has_Z11

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

DIYNNPVLRFQKKYAIPFIGAVCFALPTMIPVYFWGETWSNAWHI-
TMLRYIMNLNVTFLVNSAAHIWGNKPYDAKILPAQNVAVSVATGGEGFHNYHHVYPW
DYRAAELG-NNSLNLTTKFIDFFAAIGWAYDLKTVSEDMIK-QRIKRTGDGTD-----
-----LWGHEQKCDKGSVNDKLS-----

Mbr_Z11

-----MDQ-----SVRTTILRGKEEPTL-----TW----LVPQASPR-----
---KYQ-----IVYPNLITFGYWHIAGLYGLYLCFTSA---KWQ-
TMIFSILFVLAIEGVTAGAHRLWAHKTAKLPLQILLMILNSIAFQNSAIDWVRDHRHLH
HKFSDTDADPHNATRGGFFYSHVGWLLVRKHPEVKRRGKELDMS--
DIYNNPVLRFQKNYAIPFIGAVCFGLPTLIPVYCWGETWSTAWHI-
TMFRYVMNLNVTFLVNSAAHIWGKKPYDKKILPAQNIASVATCGEGFHNYHHVFPWD
YRAAELG-NNSLNLTTKFIDFFAWIGWAYDLKTVSQDMIK-HRALRTGDGSN-----
-----LWGLEDKYVCEKNEGKDE-----

Yev_Z/E11

-----MPP-----NSANSEPLLHDEVKEE---QLEKL---VAPQAGPR-----
-----KFQ-----IVYPNLITFGYGHISLLYGAYLMFTFA---KWQ-
TIVFAHVMILSGFGITAGAHRLWAHRTYKAKMPLQILLMLLNTLAFQNTAMDWVRDH
RLHHKYSDDTDADPHNATRGGFFYSHVGWLLVRKHKEVKRRGKLIDLS--
DIENNPVLSFQKKYAIPVSLVTFVMPTVIPMYFWGETLTNAWHVATLYRYVFLNATF
LVNSAAHYWGYKPYEKSILPSQNHVSLFALGEGFHNYHHVFPWDYRTAELG-
NNTLNPTTKFIDFFAWIGWAYDLKAVPDDMIN-NRKSRTGDGSS-----
-----LWGWGDKDQPKKEEMNAAIKYPDENDKDK-----

Ypa_Z/E11

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

Bmo_10_AGO45852

-----MSP-----NIATIVPSQETE-----NEYEKL---EPPQASER-----
-KYE-----IIFYNIFTFTFAHLSALYGVYLCFTSA---KRE-
SLILGYIIGVLAGFGVTAGAHRLWTHRTYKAKMPLQILLMLFYSFAYQNSAVHWIRDRH
LHHKYSDDTDADPHNATRGGFFYSHMGWLLVKKHPEVKRRGRSLDMS--
DIYSNRVLMFQKKYAIPITGTICFVIPTLLPMYLWGESFKNAWHI-
TILRYIITLHVAFLVNSAAHIWGYKPYDKRILPTQNLVFSFMAFGEGFHNYHHVFPWDYR
TAEGL-NNYLNLTMTFIDFFAWLGWAYDLKSVPSLAESRARKTGDGTG-----
-----LWGWGDKDMSDLKRQTVGEN-----

Dpl_ctg1

-----M-----S---CDETEESKSDD-----VFEKL---VAPQAAPR-----
-KYE-----IIHSNLLTFSYGHLLAALYGTLYLCVTVA---SWK-
TLLFHFIIIFVLAAIGVTAGAHRLWTHRAYKAKLPLQIILMLMNTLAFQNTVIDWVKKHRL
HHRYSDTDADPHNATRGGFFYSHVGWLLVKRHEEVRRREKLIDMS--
DIYDNPVLTFFQKKYAVPFIGTLTFVLPTLIPMYFFGETFTAWHL-
TVLRYILNLNGTFLVNSAAHMFNGKPYEEHIKPSQNLVSVFVSFGEGFHNYHHVFPWDY
RTAELG-NNYLNLTTFIDFFAWLGWAYDRKTIPDDLIR-SRSKRTGDGTN-----
-----SWGFSKTE-----

Bmo_9_BAD18124

-----MEA-----KQNNLAPTLEEE-----AQFEKL---IAPQASDR-----
---KHE-----IIYANLITFAYGHISALYGLYLCFSSA---KWA-
TIIMAYVILIAAEVGVTAGAHRLWTHRAYKAKRPLQIILMVMNSFAFQNSAITWIRDHR
MHHRYSDTDADPHNATRGGFFYSHIGWLLVRKHPEVKRRGKTIDMS--
DIYSNPVLVFFQKKYAIPIFIGAVCFVIPTLVPIYFWGETLTNAWHI-
TLLRYIISLHVTFVLVNSAAHLWGTRAYDKRIFPAQNLIIVSLLAVGEGFHNYHHVFPWDYR
TAEELG-NNYLNLTTFIDFFAWLGWAYDLKSVPSASVQ-SRAARTGDGTN-----
-----SWGWPEDANEDILKQTPPL-----

Hme_ctg0

-----MSP-----YIESTTTTTTTEEPLVD---HYEKL---VAPQADNR-----
-----KYE-----IVYQNLITFGYGHAAALYGLYLACTSA---TWS-
TIIFHYILFAAASIGITAGAHRLWTHRAYKAKMPLQIILLVMNSLAFQNTAITWVRDHRLH
HRYSDTDADPHNATRGGFFFSHMGWLLVRKHPEVKRRGKFIDMS--
DIYANPVLTFQKKYALPFIGTICFVLPTIIPMYFWGETLSTAWHL-
AVLRYVCNLHNAFLVNSAAHMGWGNKPYDKSIQPAQNLAIVSILAFGEGFHNYHHVFPW
DYKTAELG-NNYLNATTYFIDFFSRLGWAYDLKSVSEDHIQ-SRSSRCGDGSD-----
-----SWGLKS-----

Hme_ctg1

-----MSP-----CTGTLLIGTTTEEPLVD-HYEKL---IAPQAEPR-----
-----KYD-----IVYESVTVVYLHAAALYGLYLACSTA---TWS-
TLIFHNILFALATLGVTAGAHRLWTHRAYKAKMPLQLILIVLNSLAYQYTAITWIRDHRL
HHRYSDTDADPHNATRGGFFFSHMGWILVRKHSEVKRRGKFIDMS--
DVYANPVLRFQKKYALPFIGTICFVLPTIVPIYFWGESLNTAWHL-
AILRYVCNLHNTCFVNSLAHLWGNKPYDKSIKPSNLVISFLTLGEGFHNYHHVFPWDY
KTGELG-NNFLNVTTFYFIDFFAWLGWAYDLKSVSEEHQ-SRSSRCGDGSD-----
-----SWGKGY-----