Supplementary Materials

Figure S1. Complete cDNA sequence of the Eurygaster integriceps prolyl endoprotease. The boxed nucleotides represent the 5' UTR. The coding region begins at nucleotide 330 and ends 2483 bp.

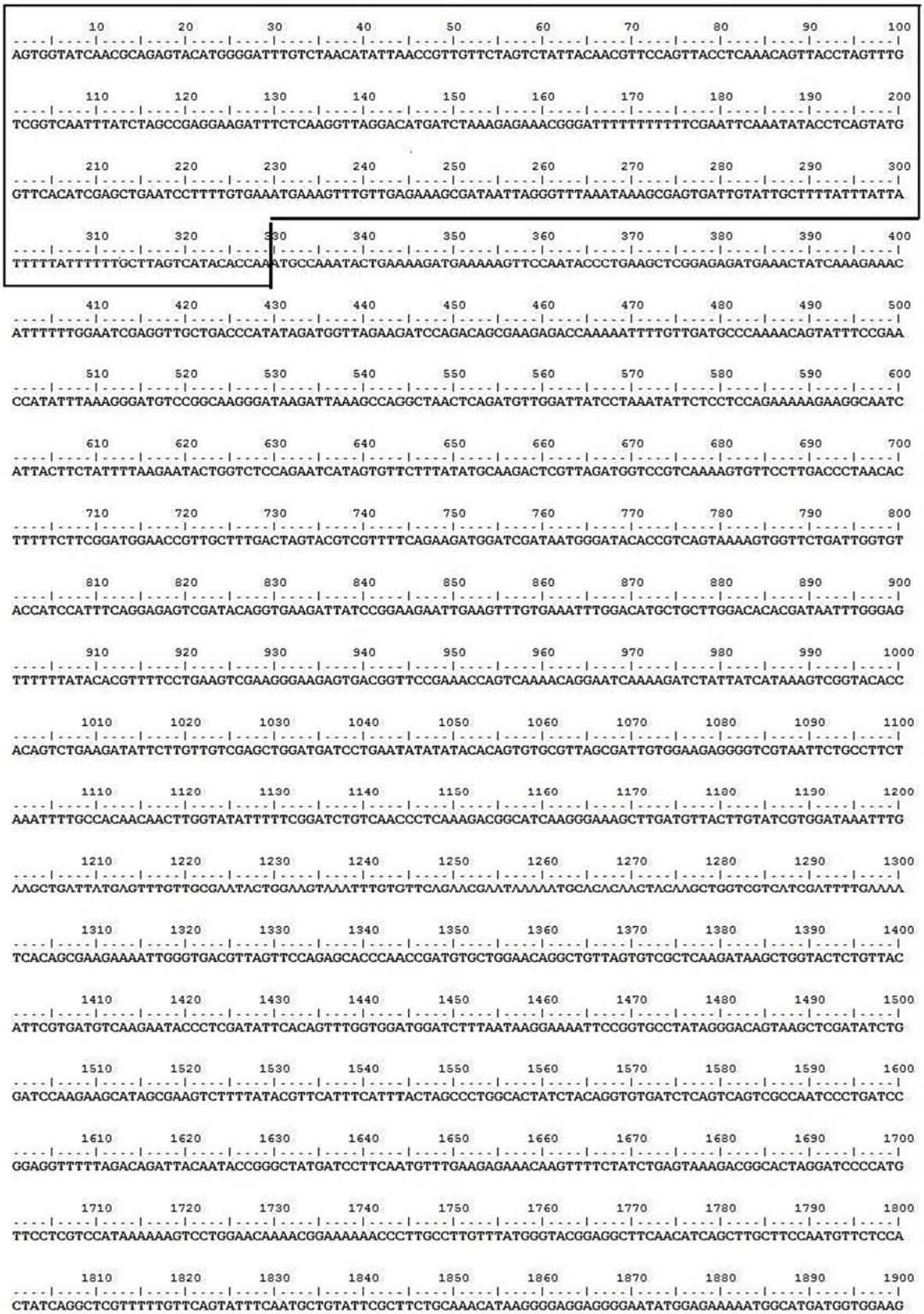

Figure S1. *Cont.*

```
        1910       1920       1930       1940       1950       1960       1970       1980       1990       2000
----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
ATTATTGAACAAGCAGAATTCCTTCGATGATTTTATTGCTGCTGGAGAATATTTAATCGCCGAGAAATACACCAATAAGAGTTGTCTGGCGATTCAGGGA

        2010       2020       2030       2040       2050       2060       2070       2080       2090       2100
----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
GCTTCTAATGGAGGCCTCCTCATTGGTGCATCGGTTAAACCCCCCTACTGGTTGCTGGAGGATCCTGAATATATATACACAGTGTGCGTTAGCGATTGTG

        2110       2120       2130       2140       2150       2160       2170       2180       2190       2200
----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
GAAGATGGGCAGTAATTCTGCCTTCTAAATTTTGCTACAACAACTTGGTATATTTTTCCGTTTTGTTCCAGGAGGAGCATTTCAAAAACGTCCTCAAGTA

        2210       2220       2230       2240       2250       2260       2270       2280       2290       2300
----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
TTCTCCTCTCCATAACATCAGAGTACCTGAAGATCAGTATCCAGCCTTGCTACTTCTAACTGCTTCTCACGACGATAGAGTCGTACCGCTGCACTCACTT

        2310       2320       2330       2340       2350       2360       2370       2380       2390       2400
----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
AAATATATCGCACAATTGCAACATGTAATGAGGGACAATCCTAAACAGGAAAATCCTCTCTTGATCCAAGTTGAAACGAAAGCTGGTCACGGCGCAGGCA

        2410       2420       2430       2440       2450       2460       2470       2480       2490       2500
----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
AACCCACAAATAAAAGAATCGAGGAACAAGTCGATATCCTTTGCTTCTTGATGAATTCAATGAATTTAAAATTTATAGAATAAGTTGTTTGTCAGATCAT

        2510       2520       2530       2540       2550       2560       2570       2580       2590       2600
----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
TTGACAACATTATCTGTGCTGCAAAATGTTTCTATACCTGAAAATAGTAACGATGGTCAACGCTGGGTGATTTCCAGTATATTTATTGTATTTTAGGATA

        2610       2620       2630       2640       2650       2660       2670       2680       2690       2700
----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
AAAGTTGAGTGACAGATGTAATGATACTTTCCCATATTGTTGCCATATTCCTTATCGGAACAGTTTTATTTGTATTGTACTATATTACTGTATCAAGTAT

        2710       2720       2730       2740       2750       2760       2770       2780       2790       2800
----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
TTACATCTTGCTTCCTATTTTTTAAATTAAATATCATTTATTAACAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAGTACTCTGCGTTGATACCACTGCTTG

        2810       2820
----|----|----|----|--
CCCTATAGTGAGTCGTATTAGA
```

Figure S2. Schematic of the 5' UTR transcription factor binding sites.

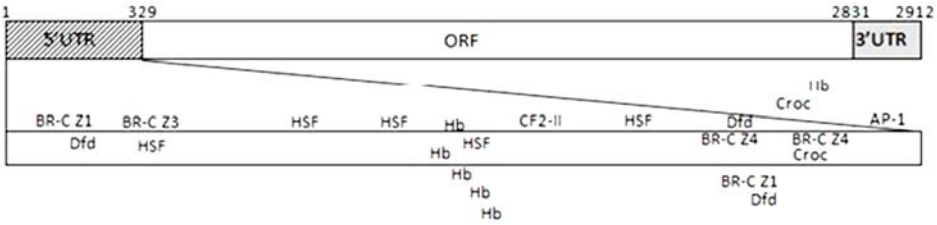

Figure S3. ClustalW2 analysis of top 25 hits resulting from BLASTX with the addition of the insects used to design degenerate primers if not present in the top 25 and three bacterial PEPs, *Elizabethkingia meningoseptica*, *Sphingomonas capsulata*, and *Myxococcus xanthus*.

```
NP_610129.3[Drosophila       -------------------------------------------------MS 2
XP_005177748.1[Musca         ------------------------------------------------------
ETN62890.1[Anopheles         ------------------------------------------------------
KFB39311.1[Anopheles         ------------------------------------------------------
XP_001659779.1[Aedes         MISLLRRRQFLSASGSLRIVLQQQRDSFLSPLPQQLQSSKQRPLKTSAAA 50
XP_001843671.1[Culex         ------------------------------------------------------
ACI03586.2[Eurygaster        ------------------------------------------------------
EFX79244.1[Daphnia           ------------------------------------------------------
NP_001004050.1[Sus           ------------------------------------------------------
XP_006061999.1[Bubalus       ------------------------------------------------------
NP_001244843.1[Macaca        ------------------------------------------------------
NP_112614.1[Rattus           ------------------------------------------------------
XP_005368679.1[Microtus      ------------------------------------------------------
NP_035286.1[Mus              ------------------------------------------------------
XP_005154718.1[Melopsittacus ------------------------------------------------------
XP_005518296.1[Pseudopodoces ------------------------------------------------------
```

Figure S3. *Cont.*

```
NP_001006410.1[Gallus        ------------------------------------------------
XP_009046664.1[Lottia        ------------------------------------------------
XP_005095067.1[Aplysia       ------------------------------------------------
EFN66352.1[Camponotus        ------------------------------------------------
EZA56288.1[Cerapachys        ------------------------------------------------
EFN76622.1[Harpegnathos      ----------MGKRYQKVYQHRRDNAKDCQHLHKNALTVFSINVGKGTR 39
XP_003394688.1[Bombus        ----------MAMFLIANISTKICSRKIQTGIYKNLLSKRPQFICASAF 39
XP_395364.2[Apis             ------------------------------------------------
XP_001603578.2[Nasonia       ------------------------------------------------
XP_008556849.1[Microplitis   ------------------------------------------------
KDR21572.1[Zootermopsis      ------------------------------------------------
ERL94303.1[Dendroctonus      ------------------------------------------------
XP_008193477.1[Tribolium     ------------------------------------------------
AAA24925.1[Elizabethkingia   -------------------------------------------------MKY 3
pdb|1YR2|[Sphingomonas       ----------------------------------MKNRLWLAMAAPLA 14
AAD31004.1[Myxococcus        ------------------------------------------------


NP_610129.3[Drosophila       RSDALVQSPTDLSRSVEEASLRIVYPEARKDGRFEEMIHGYKIKDVYRWL 52
XP_005177748.1[Musca         ----------------------LKYPVARKDESVVETHHGVEVKDVYRWL 28
ETN62890.1[Anopheles         --------------TEG-HKVPQYPEARRDDSVADEFHGVKIADPYRWL 34
KFB39311.1[Anopheles         ---------------------RFNYPEARRDESVVDEFHGVKIADPYRWL 29
XP_001659779.1[Aedes         PSPTSKFSRIAMPEAQEC-AASFRYPEARRDDSIKEEIHGVTIPDPYRWL 99
XP_001843671.1[Culex         -----------MPEAQEAGTTAFQYPVARRDDSVVDEIHGQQIADPYRWL 39
ACI03586.2[Eurygaster        -------------------MKKFQYPEARRDETIKETFFGIEVADPYRWL 31
EFX79244.1[Daphnia           -------------------MSSFTYPIAKR-TDFSENLHGIAVEDPYRWL 30
NP_001004050.1[Sus           -------------------MLSFQYPDVYRDETAIQDYHGHKVCDPYAWL 31
XP_006061999.1[Bubalus       -------------------MLSFQYPDVYRDETAVQDYHGHKICDPYAWL 31
NP_001244843.1[Macaca        -------------------MLSLQYPDVYRDETAVQDYHGHKICDPYAWL 31
NP_112614.1[Rattus           -------------------MLSFQYPDVYRDETSVQDYHGHKICDPYAWL 31
XP_005368679.1[Microtus      -------------------MLSFQYPDVYRDETSVQDYHGHKICDPYAWL 31
NP_035286.1[Mus              -------------------MLSFQYPDVYRDETSVQEYHGHKICDPYSWL 31
XP_005154718.1[Melopsittacus --------------PPLPAMQAFQYPAVYRDETAVLDYHGCKISDPYCWL 36
XP_005518296.1[Pseudopodoces --------------PPQPVMQAFQYPEVYRDETAVSDYHGCKISDPYCWL 36
NP_001006410.1[Gallus        -------------------MQAFQYPEVYRDEAAVLDYHGHQISDPYCWL 31
XP_009046664.1[Lottia        -------------------MGVFKYPEVRRDETVVEEYHGTKVEDPYRWL 31
XP_005095067.1[Aplysia       -------------------MGKFQYPTPRRDETVADNYHGQEVKDPYRWM 31
EFN66352.1[Camponotus        -------------------MTRIQYPEARRDESVVDNYHGVEIADPYRWL 31
EZA56288.1[Cerapachys        -------------------MTRIQYPEARRDDSVVDNYHGVEITDPYRWL 31
EFN76622.1[Harpegnathos      KSLEATNYREQKDKGQSEVMTRIQYSMARRDESIVDDYHGTEIADPYRWL 89
XP_003394688.1[Bombus        STVKVLDPTIRKHIENHKIMEKLQYPEAYRDETIVDNYHGVEVQDSYRWL 89
XP_395364.2[Apis             -----------------KKMEKLQYPEAYRDESIIDNYHGIEVQDPYRWL 33
XP_001603578.2[Nasonia       ---------------------KFTYPKARRDETAVDVYHGVEIKDPYKWL 29
XP_008556849.1[Microplitis   --------------------KMFKYPEARRD-NTKDVYHGVEIQDPYRWL 29
KDR21572.1[Zootermopsis      -----------------QKQMKLIYPIARRDEDVVDNYHGHKILDPYRWL 33
ERL94303.1[Dendroctonus      ---------------------FTYPKPRRDETVKDDFFGTQVSDPYRWL 28
XP_008193477.1[Tribolium     ---------------TKRNMSFKYPDARRDETVKDNYFGTEITDPYRWL 34
AAA24925.1[Elizabethkingia   KKLSVAVAAFAFAAVSAQNSNSLKYPETKK-VNHTDTYFGNQVSDPYRWL 52
pdb|1YR2|[Sphingomonas       LATPVAFAQTPPTLAKDQAMPSLPPYPASPQVPLVEDHFGEKVSDPWRWL 64
AAD31004.1[Myxococcus        ----------------------MSYPATRAEQVVDTLHGVQVADPYRWL 27
                                                        .*  : * : *:

NP_610129.3[Drosophila       EDPD--SVDTQQFVNAQNNISQSFLERSAERE--NINSKLTKLWNFPKYG 98
XP_005177748.1[Musca         EDPD--AEETQKYVEEQNKISQPFLEGCESWK--KINEKLTKLWNYEKYG 74
ETN62890.1[Anopheles         EDPD--SEETREYVERQNEISKPFLDTCPEWK--KLNEKLRKRWNYPKYS 80
KFB39311.1[Anopheles         EDPD--SEETQAYVEKQNEISKPFLDTCPEWK--KLNEKLRKRWNYPKYS 75
XP_001659779.1[Aedes         EDPD--AEETQAYVEKQNEISKPFLDSCEQWK--ILNEKLTKRWNYPKYS 145
XP_001843671.1[Culex         EDPD--AEETQAYVEQQNKIAQPFLESCDEWK--KLNAKLTKRWNYPKYS 85
ACI03586.2[Eurygaster        EDPD--SEETKNFVDAQNSISEPYLKGCPARD--KIKARLTQMLDYPKYS 77
EFX79244.1[Daphnia           EDPD--SAETQEFVRLQNELTTPYIQGSPALS--SIKTRLTELWNFPKYS 76
NP_001004050.1[Sus           EDPD--SEQTKAFVEAQNKITVPFLEQCPIRG--LYKERMTELYDYPKYS 77
XP_006061999.1[Bubalus       EDPD--SEQTKAFVEAQNKITVPFLEQCPIRG--LYKERMTELYDYPKYS 77
NP_001244843.1[Macaca        EDPD--SEQTKAFVEAQNKITVPFLEQCPIRG--LYKERMTELYDYPKYS 77
NP_112614.1[Rattus           EDPD--SEQTKAFVEAQNKITVPFLEQCPIRG--LYKERMTELYDYPKYS 77
XP_005368679.1[Microtus      EDPD--SEQTKAFVEAQNKITVPFLEQCPIRG--LYKERMTELYDYPKYS 77
NP_035286.1[Mus              EDPD--SEQTKAFVEAQNKITVPFLEQCPIRG--LYKERMTELYDYPKYS 77
XP_005154718.1[Melopsittacus EDPD--SEQTKAFVEAQNKLTVPFLEQCPVRG--LFKERMTELYDYPKYS 82
```

Figure S3. *Cont.*

```
XP_005518296.1[Pseudopodoces EDPD--SEQTKAFVEAQNKLTVPFLEQCPVRG--LFKERMTELYDYPKYS 82
NP_001006410.1[Gallus        EDPD--SEQTKAFVEAQNKLTVPFLEQCPVRG--LFKERMTELYDYPKYS 77
XP_009046664.1[Lottia        EDPD--SEETKAFVEAQNKISEPFLEKCPVKE--KIKNRITDIWDYPKYG 77
XP_005095067.1[Aplysia       EDPD--GEETKAFVDAQNSISRPFINACPVKE--QIQKRITEVWDYPKYG 77
EFN66352.1[Camponotus        EDPD--STETKAFVDAQNAITKPYLAACKVRD--SIHERLTQLWDFPKYS 77
EZA56288.1[Cerapachys        EDPD--SAETKAFVDAQNAITKPYLAACKARD--NIHERLTQLWDFPKYS 77
EFN76622.1[Harpegnathos      EDPD--SEETKAFVEAQNAITKPYLASCSVRN--NIHKRLKQLWDFPKYS 135
XP_003394688.1[Bombus        EDPD--SEKTKAFVDAQNSVTIPYLASCKARQ--DIHDRLKQLWDFPKYS 135
XP_395364.2[Apis             EDPD--SEKTKAFVDAQNSITTPYLTSCKARQ--DIHDRLKQLWDFPKYS 79
XP_001603578.2[Nasonia       EDPE--SEETKAYVDAQNAITVPFIQACPKRQ--AIHDRLKQLWDYPKYS 75
XP_008556849.1[Microplitis   EDPE--ADEVKAFVDKQNALSRPFLSTCDSVDPEVILERLKQLWDFPKYS 77
KDR21572.1[Zootermopsis      EDPD--SPNTSKFVDEQNALTRPILENCSSRS--DILARLTELWNFPKYS 79
ERL94303.1[Dendroctonus      EDPD--SEETRSFVNAQNEISRPYLENCPYKD--SIRSRITQLWDFMRFS 74
XP_008193477.1[Tribolium     EDPD--SEETKKYVDGQNAVTRPYLDGCSFKE--SIKKKITQLWNYPKFS 80
AAA24925.1[Elizabethkingia   EDDR--AEDTKAWVQQEVKFTQDYLAQIPFRG--QIKKQLLDIWNYEKIS 98
pdb|1YR2|[Sphingomonas       EADVRTDAKVAAWVQAQSAYTAAYLKQLPERA--ALEKRMKALIDYERFG 112
AAD31004.1[Myxococcus        EDEK--APEVQTWMTAQNAHAREALAKFPGRE--ALAARFKELFYTDSVS 73
                             *       ..  ::  :   :   :            ::         .

NP_610129.3[Drosophila       CPMRHGNYYYFFKNTGLQNQSVLMQQKT---LESPESIFLDTNSISSDGT 145
XP_005177748.1[Musca         CPMKHGKYYYFYKNSGLQNQSVMYQQDS---LDGEPRLFFDPNALSSDGT 121
ETN62890.1[Anopheles         CPFKHGNKYFFFMNTGLQNQDVLYVQDS---LKGEPKVFLDPNTLSTDGT 127
KFB39311.1[Anopheles         CPFKHGNKYFFFMNTGLQNQDVLYVQDK---LDGEPRVFLDPNTLSTDGT 122
XP_001659779.1[Aedes         CPFKHGSRYFFFMNTGLQNQDVLYVQNS---LEDEPKVFLDPNALSKDGT 192
XP_001843671.1[Culex         CPFKHASRYFFFMNTGLQNQDVLYVQNS---LDDEPKVFLDPNALSKDGT 132
ACI03586.2[Eurygaster        PPEKEGNHYFYFKNTGLQNHSVLYMQDS---LDGPSKVFLDPNTFSSDGT 124
EFX79244.1[Daphnia           CPTKKGNHYFFYKNSGLQNHSVLFVQDS---LESEPRIFLDPNTLSDDGT 123
NP_001004050.1[Sus           CHFKKGKRYFYFYNTGLQNQRVLYVQDS---LEGEARVFLDPNILSDDGT 124
XP_006061999.1[Bubalus       CHFKKGKRYFYFYNTGLQNQRVLYVQDS---LEGEARVFLDPNTLSDDGT 124
NP_001244843.1[Macaca        CHFKKGKRYFYFYNTGLQNQRVLYVQDS---LEGDARVFLDPNILSDDGT 124
NP_112614.1[Rattus           CHFKKGKRYFYFYNTGLQNQRVLYVQDS---LEGEARVFLDPNTLSDDGT 124
XP_005368679.1[Microtus      CHFKKGKRYFYFYNTGLQNQRVLYVQDS---LEGEARVFLDPNTLSDDGT 124
NP_035286.1[Mus              CHFKKGKRYFYFYNTGLQNQRVLYVQDS---LEGEARVFLDPNTLSDDGT 124
XP_005154718.1[Melopsittacus CHFKKGKRYFHFYNTGLQNQRVLYVQDS---LDADAKVFLDPNKLSDDGT 129
XP_005518296.1[Pseudopodoces CHFKKGKRYFHFYNTGLQNQRVLYVQDS---LDAEAKVFLDPNKLSDDGT 129
NP_001006410.1[Gallus        CHFKKGKRYFHFYNTGLQNQRVLYVQDS---LDADAKVFLDPNKLSDDGT 124
XP_009046664.1[Lottia        CPRKHGDHFYYSYNTGLQNQSVTYVQDS---LEAEARVFLDPNKLSEDGT 124
XP_005095067.1[Aplysia       CPKKHGDHYYYFHNSGLQNQSVMYVQDS---LDAEPRVFLDPNKLSDDGT 124
EFN66352.1[Camponotus        CPAKHGGKYYFYKNTGLQNQSVLYVQDT---LESEPKVFLDPNTLSEDGT 124
EZA56288.1[Cerapachys        CPAKHGGKYYFYKNTGLQNQSVLYVQDT---LESEPKVFFDPNTLSEDGT 124
EFN76622.1[Harpegnathos      CPAKYGGKYYFYKNTGLQNQSVLYVQDT---LESEPRVFLDPNTFSEDGT 182
XP_003394688.1[Bombus        CPARYGNKYYFYKNTGLQNQSVLYVQDT---LDSEPRIFLDPNTFSEDGT 182
XP_395364.2[Apis             CPARYGNKYYFYKNTGLQNQSVLYVQDT---LDSEPRVFLDPNTLSEDGT 126
XP_001603578.2[Nasonia       CPAKKGSKYYFFMNTGLQNQSVFYVQDS---LDGEPRVFLDPNTFSTDGT 122
XP_008556849.1[Microplitis   CPRKHGDKYFFYKNTGLQNQSVIYSQNSPTDSEEEAKVFFDPNTLSDDGS 127
KDR21572.1[Zootermopsis      CPYRHGDKYFFYMNTGLQNQSVLYIQDS---LDSKPRVFLDPNLLSDDGT 126
ERL94303.1[Dendroctonus      VPFKHGNKYFQYRNTGLQNQSVLYVQDS---LKGKERVFLDLNGFSEDGT 121
XP_008193477.1[Tribolium     TPYRHGTKYYQYRNTGLQNQSVIYVQKD---LASKAEIFLDPNTFSEDGT 127
AAA24925.1[Elizabethkingia   APFKKGKYTYFYKNDGLQAQSVLYRKDA----SGKTEVFLDPNKFSDKGT 144
pdb|1YR2|[Sphingomonas       LPQRRGASVFYSWNSGLMNQSQLLVRPADAPVGTKGRVLLDPNTWAKDGA 162
AAD31004.1[Myxococcus        TPSRRNGRFFYVRTHKDKEKAILYWRQGES---GQEKVLLDPNGWSKDGT 120
                               :     :   .     :     :           :::* *  : .*:

NP_610129.3[Drosophila       TAISHIKFSEDGAFMAYGLSESGSDWNKIRIRNTKEG-IDLPEILEKVKF 194
XP_005177748.1[Musca         IALAQKSFSEDGKYMAYGLSASGSDWIKIYIRDVETG-KDQEEVLEKVKF 170
ETN62890.1[Anopheles         IALVGSRFSDDGQLYAYGLSQSGSDWTKLKIRNVETG-EDFPETIEHTKF 176
KFB39311.1[Anopheles         IALVGSRFSDDGQLYAYGLSQSGSDWTKLKIRNVETG-EDFPETIEHTKF 171
XP_001659779.1[Aedes         IALVGSRFSDDGSLFAYGLSQSGSDWTKLKVRNVSTG-EDFPETLEHTKF 241
XP_001843671.1[Culex         IALVGSRFSDDGNLFAYGLSQSGSDWTKLKVRDVNTG-EDFPETIEHTKF 181
ACI03586.2[Eurygaster        VALTSTSFSEDGSIMGYTVSKSGSDWCTIHFRRVDTG-EDYPEELKFVKF 173
EFX79244.1[Daphnia           VSLSMKKFSEDGEIFAYGLSQSGSDWNSIHFKCVKTG-EDFPEVLEKIKF 172
NP_001004050.1[Sus           VALRGYAFSEDGEYFAYGLSASGSDWVTIKFMKVDGA-KELPDVLERVKF 173
XP_006061999.1[Bubalus       VALRGYAFSEDGEYFAYGLSASGSDWVTIKFMKVDGA-KELPDVLERVKF 173
NP_001244843.1[Macaca        VALRGYAFSEDGEYFAYGLSASGSDWVTIKFMKVDGA-KELPDVLERVKF 173
NP_112614.1[Rattus           VALRGYAFSEDGEYFAYGLSASGSDWVTIKFMKVDGA-KELPDVLERVKF 173
XP_005368679.1[Microtus      VALRGYAFSEDGEYFAYGLSASGSDWVTIKFMKVDGA-KELPDVLERVKF 173
NP_035286.1[Mus              VALRGYAFSEDGEYFAYGLSASGSDWVTIKFMKVDGA-KELPDVLERVKF 173
```

Figure S3. *Cont.*

```
XP_005154718.1[Melopsittacus VALRGYAFSEDGEYFAYGLSSSGSDWVTIKFMKVEGP-EDLPDTLERVKF 178
XP_005518296.1[Pseudopodoces VALRGYAFSEDGEYFAYGLSSSGSDWITIKFMKVEGP-EDLPDTLERVKF 178
NP_001006410.1[Gallus        VALRGYAFSEDGEYFAYGLSSSGSDWVTIKFMKVEGA-EELPDTLERVKF 173
XP_009046664.1[Lottia        ISLRGSSFTEDGSVYAYGLSKSGSDWISIHFKKAPSG-EDLPDVLERCKF 173
XP_005095067.1[Aplysia       VSLRGSAFTENGLTLAYGLSKSGSDWITVKFKKAPSG-EDLPDVLEQVKF 173
EFN66352.1[Camponotus        VAITSSSFSEDGSIFAYGLSESGSDWSTIHFLNAQTG-EKYPEILEKVKF 173
EZA56288.1[Cerapachys        VAISSSSFSEDGNIFAYGLSKSGSDWSTIHFLNTQTG-EKYPEVLEKVKF 173
EFN76622.1[Harpegnathos      VAITSSSFSEDGSIFAYGLSKSGSDWSTIHFLNAETG-EKYPEILEKVKF 231
XP_003394688.1[Bombus        IAITSSKFSEDGSIYAYGLSISGSDWCTIHFMNTETG-EKYPEILEKVKF 231
XP_395364.2[Apis             IAITISKFSEDGSIYAFGLSASGSDWCTIHFMNTETG-EKYPEILEKVKF 175
XP_001603578.2[Nasonia       VAISSGEFSEDGGIYAYALSASGSDWNTIHFINTKTG-EKYPEVLEKVKY 171
XP_008556849.1[Microplitis   VAISNTEFSKDGSIFAYGLSKSGSDWSEIHFKNVNTG-ENYPEVLEKIKY 176
KDR21572.1[Zootermopsis      VALSRTRFSEDGKILAYGLSSSGSDWVTIHFKLVDTG-EDYPEVLEKVKF 175
ERL94303.1[Dendroctonus      VALSGNCFSDDGSTFAYGLSSSGSDWIEIRFRDVETG-EDHPETLKKVKY 170
XP_008193477.1[Tribolium     VALSGTAFSEDGQTFAYGLSSSGSDWLEIKFKDVETG-KDYKEILKKVKF 176
AAA24925.1[Elizabethkingia   TSLANLSFNKKGTLVAYSISEGGSDWNKIIILDAETK-KQIDETLLDVKF 193
pdb|1YR2|[Sphingomonas       TALDAWAASDDGRLLAYSVQDGGSDWRTVKFVGVADG-KPLADELKWVKF 211
AAD31004.1[Myxococcus        VSLGTWAVSWDGKKVAFAQKPNAADEAVLHVIDVDSGEWSKVDVIEGGKY 170
                              ::     . .*   .:  . ..:*   : .  .       : :   *:

NP_610129.3[Drosophila       SNVSWTKDSKGFFYGRYTDQDGIFDGSETK-LAENQKLYYHLLGESPHQD 243
XP_005177748.1[Musca         SEISWTKDNKGFFYGRYPNQEGKTDGSETK-SNENQKLYYHYVGQPQEKD 219
ETN62890.1[Anopheles         VTASWTKDNKGFFYARYPVVDGKADGSETA-ANENQKLYYHRVGDSQDKD 225
KFB39311.1[Anopheles         VTASWTKDNKGFFYARYPAVDGKADGSETA-ANENQKLYYHRVGESQDKD 220
XP_001659779.1[Aedes         VTASWAKDNKGFFYARYPVVDGKADGSETA-ANENQKLYFHRVGDSQDKD 290
XP_001843671.1[Culex         VTASWTKDNKGFFYARYPVVEGKADGSETA-ANENQKLYYHRIGEPQDKD 230
ACI03586.2[Eurygaster        GHAAWTHDNLGVFYTRFPEVEGKSDGSETS-QNRNQKIYYHKVGTPQSED 222
EFX79244.1[Daphnia           SSISWTHDRKGVFYSCYPEQQGKTDGSETT-SNENHKLFYHRIGTQQSED 221
NP_001004050.1[Sus           SCMAWTHDGKGMFYNAYPQQDGKSDGTETS-TNLHQKLYYHVLGTDQSED 222
XP_006061999.1[Bubalus       SCMAWTHDGKGMFYNAYPQQDGKSDGTETS-TNLHQKLCYHVLGTDQSED 222
NP_001244843.1[Macaca        SCMAWTHDGKGMFYNSYPQQDGKSDGTETS-TNLHQKLYYHVLGTDQSED 222
NP_112614.1[Rattus           TCMAWTHDGKGMFYNSYPQQDGKSDGTETS-TNLHQKLCYHVLGTDQSED 222
XP_005368679.1[Microtus      TCMAWTHDGKGMFYNSYPQQDGKSDGTETS-TNLHQKLCYHVLGTDQSED 222
NP_035286.1[Mus              TCMAWTHDGKGMFYNSYPQQDGKSDGTETS-TNLHQKLCYHVLGTDQSED 222
XP_005154718.1[Melopsittacus SCMAWTHDGKGMFYNCYPTQDGKSDGTETS-TNLHQKLHYHVLGTNQSED 227
XP_005518296.1[Pseudopodoces SCMAWTHDGKGMFYNCYPEQDGKSDGTETS-TNLHQKLHYHVLGTNQSED 227
NP_001006410.1[Gallus        SCMAWTHDGKGMFYNCYPKQDGKSDGTETS-TNLHQKLHYHVLGTNQSED 222
XP_009046664.1[Lottia        SSMAWMHDHTGFFYNSYPEQDGKTDGTETT-TNLHQKLYYHKLGTKQSDD 222
XP_005095067.1[Aplysia       SSMAWTHDHTGFFYNSYPNQEGKVDGTETT-SNLHQKLYFHRLGTEQTAD 222
EFN66352.1[Camponotus        SPITWTHDNRGIFYGQYRDQQGKTDGSETL-GNQNQKLCYHIVGTSQSDD 222
EZA56288.1[Cerapachys        SPITWTHDNRGIFYGQYRDQQGKTDGSETL-GNQNQKLCYHIVGTSQADD 222
EFN76622.1[Harpegnathos      SPITWTHDNRGIFYGQYRDQQGKTDGSETL-GNQNQKLCYHVVGTSQSDD 280
XP_003394688.1[Bombus        SPITWTHDNRGIFYGCYPDQKGKTDGSETE-GNRDQKLCYHIVGTPQSED 280
XP_395364.2[Apis             SPITWTHDNYGIFYGCYPDQKGKTDGSETE-GNRDQKLCYHIIGTPQSED 224
XP_001603578.2[Nasonia       SSITWTHDNVGVFYACYPEQLEKADGSETF-VNKNQKLCYHKVGTPQSED 220
XP_008556849.1[Microplitis   STIAWTHDNKGIFYGTYLEQQGIVDGSETL-KARDQKLCYHKIATKQSED 225
KDR21572.1[Zootermopsis      SSMTWTHDNEGLFYGRYPDQVGKADGSETV-GMQHQKLYYHRVGTPQSED 224
ERL94303.1[Dendroctonus      SPMTWMHDNKGFFYGGYLNQTGKADGSETT-SSENQKLYYHELGTDQSQD 219
XP_008193477.1[Tribolium     SPMTWMHDNKGFFYGAYLDQTGKADGSETK-TNENQKLYYHELGTDQSQD 225
AAA24925.1[Elizabethkingia   SGISWLGD-EGFFYSSYDKPK---DGSVLSGMTDKHKVYFHKLGTKQSQD 239
pdb|1YR2|[Sphingomonas       SGLAWLGNDALLYSRFAEPKEGQAFQALNY----NQTVWLHRLGTPQSAD 257
AAD31004.1[Myxococcus        ATPKWTPDSKGFYYEWLPTDPSIKVDERPG----YTTIRYHTLGTEPSKD 216
                                  *  :   .:                      .:  * :.     *

NP_610129.3[Drosophila       ILIAEFPEHPSWRFKTDISDCGKYLILSISHTVR-DNMLYYAELGS--EE 290
XP_005177748.1[Musca         VLIAEFPEEPTWRIQSVVSDCGKYLILAIVKDCR-DNIVYYADLEP--GA 266
ETN62890.1[Anopheles         VLIAEFPEEPSWRLMPEVSDCGKYLMLFIMKGCK-DMLLYFSNLEQ--AG 272
KFB39311.1[Anopheles         VLIAEFPEEPSWRLMPEVSDCGKYLMLFIMKGCK-DMLLYFSNLEK--AG 267
XP_001659779.1[Aedes         VLIAEFPEEPSWRLMPEVSDCGKYLMLFIMKGCK-DMLLYFSKLES--SD 337
XP_001843671.1[Culex         VLIAEFPEEPSWRLMPEVSDCGKYLMLFIMKGCK-DMLLYFSNLEK--AG 277
ACI03586.2[Eurygaster        ILVVELDD-PEYIYTVCVSDCGRGVVILPSKFCH-NNLVYFSDLSTLK-D 269
EFX79244.1[Daphnia           ILVVEFSEEPKWRIQGGVTDCGRYLIVTTGRDCQ-YNNVYFCDLTALPNQ 270
NP_001004050.1[Sus           ILCAEFPDEPKWMGGAELSDDGRYVLLSIREGCDPVNRLWYCDLQQ-ESN 271
XP_006061999.1[Bubalus       ILCAEFPDEPKWMGGAELSDDGRYVLLSIREGCDPVNRLWYCDLHQ-EPN 271
NP_001244843.1[Macaca        ILCAEFPDEPKWMGGAELSDDGRYVLLSIREGCDPVNRLWYCDLQQ-ESN 271
NP_112614.1[Rattus           VLCAEFPDEPKWMGGAELSDDGRYVLLSIWEGCDPVNRLWYCDLQQ-GSN 271
XP_005368679.1[Microtus      VLCAEFPDEPKWMGGAELSDDGRYVLLSIWEGCDPVNRLWYCDLQQ-ESN 271
```

Figure S3. *Cont.*

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NP_035286.1[Mus              ILCAEFPDEPKWMGGAELSDDGRYVLLSIWEGCDPVNRLWYCDLQQ-EPN 271
XP_005154718.1[Melopsittacus ILCAEFPDEPKWMGGAEVSDDGRYVLLSIREGCDPVNRLWYCDLQK-ESQ 276
XP_005518296.1[Pseudopodoces ILCAEFPDEPKWMGGAEVSDDGRYVLLSVREGCDPVNRLWYCDLQK-ESQ 276
NP_001006410.1[Gallus        ILCAEFPDEPKWMGGAEISDDGRYVLLSIREGCDPVNRLWYCDLQK-ESQ 271
XP_009046664.1[Lottia        ILVAEFPDHPKWMTGCEISDCGRYILIYVREGCEPVNRLFYVDIQT-LKN 271
XP_005095067.1[Aplysia       VLVGEMPDFPKWMIGAEVSDCGRYLLLTPSEGCDPVNRLFYVDLES-LEG 271
EFN66352.1[Camponotus        VVAIEFPEEPLWRIGAEVSDCGNWLIVTPLKDCR-DNLVYFTPLK--AGM 269
EZA56288.1[Cerapachys        VIAVEFPEEPLYRIGAEVSDCGNWLIVTPLKDCR-DNLVYFTPLK--AGM 269
EFN76622.1[Harpegnathos      VVAVEFPEEPLWRIGAQVSDCGNWLIITPLKDCR-DNLVFFTPLK--AEM 327
XP_003394688.1[Bombus        VIVVEFPEEPLWRIGAQVSDCGKWLIVTPVKDCR-DNLVYFTELK--PEK 327
XP_395364.2[Apis             IIVVEFPEEPLWRIGAQVSDCGKWLIVTPVKDCR-DNLVYFTELK--PEM 271
XP_001603578.2[Nasonia       VVVVDFPEHPLWRIDAKVTDCGRWLVVMPQQECR-DNLVFFAKLN--TAE 267
XP_008556849.1[Microplitis   VIAVEFPEEPLWRISSQVSDCGEYLIVSPRKDCR-DNLVYFTKLP--KDN 272
KDR21572.1[Zootermopsis      ILVVEFPEEPLWRIDAEVSDCGQWLIVMPQKDCR-DNLLFFCDLKSLPDN 273
ERL94303.1[Dendroctonus      VVVVEFED-KELRMGACVSHCGTYLVITPIKGCK-NNLLYFARIDP--TN 265
XP_008193477.1[Tribolium     VVVVEFDD-PHLRIGAHVSHCGKYLVITGTKGCK-NNLLYFAQLD---SG 270
AAA24925.1[Elizabethkingia   ELIIGGDKFPRRYLSGYVTEDQRYLVVSAANATN-GNELYIKDLKN---- 284
pdb|1YR2|[Sphingomonas       QPVFATPELPKRGHGASVSSDGRWVVITSSEGTDPVNTVHVARVTNG--- 304
AAD31004.1[Myxococcus        TVVHERTGDPTTFLQSDLSRDGKYLFVYILRGWS-ENDVYWKRPGE---- 261
                                          ::     :.:   .       :

NP_610129.3[Drosophila       KNA--FQLELKPIVDKFEADFD----------------------YITNEG 316
XP_005177748.1[Musca         EIT--GKLQVKKIVTKFESDYD----------------------YITNTG 292
ETN62890.1[Anopheles         GLS--GKLDFVKVVTEFDSDYD----------------------YVTNEG 298
KFB39311.1[Anopheles         NLE--SKLDFVKVVTEFDSDYD----------------------YVTNEG 293
XP_001659779.1[Aedes         NIT--GKLDFVKVVTEFDSDYD----------------------YITNEG 363
XP_001843671.1[Culex         GIT--GKLDFTKIVTEFDSDYDVSQCPQTSQINQQSHNSTAPFQYITNEG 325
ACI03586.2[Eurygaster        GIK--GKLDVTCIVDKFEADYE----------------------FVANTG 295
EFX79244.1[Daphnia           AIS--GKLELTTVVDKMEADYE----------------------YVTNTG 296
NP_001004050.1[Sus           GIT--GILKWVKLIDNFEGEYD----------------------YVTNEG 297
XP_006061999.1[Bubalus       GIT--GILKWVKLIDNFEGEYD----------------------YVTNEG 297
NP_001244843.1[Macaca        GIT--GILKWVKLIDNFEGEYD----------------------YVTNEG 297
NP_112614.1[Rattus           GIN--GILKWVKLIDNFEGEYD----------------------YITNEG 297
XP_005368679.1[Microtus      GIT--GILKWVKLIDNFEGEYD----------------------YVTNEG 297
NP_035286.1[Mus              GIT--GILKWVKLIDNFEGEYD----------------------YVTNEG 297
XP_005154718.1[Melopsittacus GIS--GILQWVKLIDNFEAEYE----------------------YVTNEG 302
XP_005518296.1[Pseudopodoces GIT--GILQWVKLIDNFEAEYE----------------------YVTNEG 302
NP_001006410.1[Gallus        GIS--GILQWVKLIDNFEAEYE----------------------YVTNEG 297
XP_009046664.1[Lottia        GID--GKLPYVKVVDNFDAEYE----------------------YITNEG 297
XP_005095067.1[Aplysia       GIS--GILPYVKIVDNFDAEYQ----------------------YITNEG 297
EFN66352.1[Camponotus        DIS--NNLPLTQVVDKLEADYE----------------------YITNVG 295
EZA56288.1[Cerapachys        TIS--NNLPLTQVVDKLEADYE----------------------YVTNIG 295
EFN76622.1[Harpegnathos      KIT--TNLPLTQVVDVLEADYE----------------------YVTNVG 353
XP_003394688.1[Bombus        KIA--EKLQLTQVVDKLEADYE----------------------YVTNDD 353
XP_395364.2[Apis             KIR--EKLHLTQVVDKLEADYE----------------------YVTNDD 297
XP_001603578.2[Nasonia       GIK--GKLPLTEVVGNLEADYE----------------------YVTNVG 293
XP_008556849.1[Microplitis   KIDNYKNLNLIKVVDKFEADYD----------------------YVTNDG 300
KDR21572.1[Zootermopsis      KIS--GKLNLTQVVYKLEADYE----------------------YVTNEG 299
ERL94303.1[Dendroctonus      RIN--KPLELTPVVTTFDADYK----------------------YITNVG 291
XP_008193477.1[Tribolium     KIT--GKLKLTEVVTEFVADFE----------------------YITNDK 296
AAA24925.1[Elizabethkingia   ------KTDFIPIITGFESNVG----------------------LVDTDG 306
pdb|1YR2|[Sphingomonas       -----KIGPVTALIPDLKAQWDF----------------------VDGVG 327
AAD31004.1[Myxococcus        -------KDFRLLVKGVGAKYE----------------------VHAWK 281
                                        ::  . ..                          :

NP_610129.3[Drosophila       SNLYFHTNKDAPNYRVIVIDVNNPAEEHWTTPIPEHKKDVLEWAKCVDGN 366
XP_005177748.1[Musca         SKVYFRTNKDASNYRVIMIDFENPAQENWQTLIPEHATDVLDWVHCVNED 342
ETN62890.1[Anopheles         SIFSFRTNKGAPNYRIVNIDFNEPSLENWKTLVPEHPKNVLDWTTCVNKD 348
KFB39311.1[Anopheles         SIFSFRTNKGAPNYRIVNIDFDQPAMEHWKTLVAEHPKNVLDWTTCVNKD 343
XP_001659779.1[Aedes         SIFSFRTNKGAPNYRVVNIDFDSPAMDNWKTLIEEHPKNVLDWSTCVNKD 413
XP_001843671.1[Culex         SIFSFRTNKGAPNYRVVNIDFDEPALDKWTTLIAEDPKNVLDWSSCVNGD 375
ACI03586.2[Eurygaster        SKFVFRTNKNAHNYKLVVIDFENHSEENWVTLVPEHPTDVLEQAVSVAQD 345
EFX79244.1[Daphnia           AVVVFRTNKDAPNYRLIQIDFNQPEREQWKTLLEADPSDVLDWVACINKD 346
NP_001004050.1[Sus           TVFTFKTNRHSPNYRLINIDFTDPEESKWKVLVPEHEKDVLEWVACVRSN 347
XP_006061999.1[Bubalus       TVFTFKTNRHSPNYRLINIDFTDPEESRWKVLVPEHEKDVLEWVACVRSN 347
NP_001244843.1[Macaca        TVFTFKTNRHSPNYRVINIDFRDPEESKWKVLVPEHEKDVLEWVACVRSN 347
NP_112614.1[Rattus           TVFTFKTNRNSPNYRLINIDFTDPDESKWKVLVPEHEKDVLEWVACVRSN 347
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Figure S3. *Cont.*

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XP_005368679.1[Microtus      TVFTFKTNRNSPNYRLINIDFMDPDESKWKVLVPEHEKDVLEWVACVRSN 347
NP_035286.1[Mus              TVFTFKTNRNSPNYRLINIDFTDPDESKWKVLVPEHEKDVLEWVACVRSN 347
XP_005154718.1[Melopsittacus TVFTFKTNRHSPNYRLINIDFSDPGESKWKVLVPEHERDVLEWAACVRSN 352
XP_005518296.1[Pseudopodoces TVFTFKTNRHSPNYRLINIDFSDPEESKWKVLVPEHEKDVLEWVACVRSN 352
NP_001006410.1[Gallus        TVFTFKTNRHSPNYRLINIDFSDPEESKWKVLIPEHERDVLEWVACVRSN 347
XP_009046664.1[Lottia        TVFTFKTNLKAPKYKLINIDFNQPEMAKWSTLVEEDEKSVLEWVGCVNQN 347
XP_005095067.1[Aplysia       PVFTFKTNLKAPNYKLINIDLTKPEPENWKTLVEEDASAVLEWATCVNND 347
EFN66352.1[Camponotus        TKAVFRTNKNAPNYKLIAIDLLDYGQDKWVDLLPEHPENVLDWADAVDGD 345
EZA56288.1[Cerapachys        TKAVFRTNKNAPNYKLIAIDLLDYGEDKWVDLLPEHSENVLDWATAVDGD 345
EFN76622.1[Harpegnathos      TKAVFRTNKNAPNYKLIAIDLLDHGQDKWVDLLPEHPENVLDWATAVDGD 403
XP_003394688.1[Bombus        TKAIFRTNKNAPNYKLIAIDLLDYKQEKWVDLLPEHPDNVLDWACAVDGD 403
XP_395364.2[Apis             TKAIFRTNKNAPNYKLIAIDLLDYKQEKWVDLLPEHPDNVLDWACAVDGD 347
XP_001603578.2[Nasonia       TKAVFRTNKNAPNFKLIATDFENYQENSWSELIAEHSRNVLDWATAVDKD 343
XP_008556849.1[Microplitis   AQMIFSTNRNAPNYRLVRINFEDYAEEKWTDLIPEDPKRVLDWALAVHGD 350
KDR21572.1[Zootermopsis      PICIFRTNKNAPNYHLIKIDFTNPSQENWTTLVPEHEKDVLDWASAVKND 349
ERL94303.1[Dendroctonus      SKFYFRTNKDAMNYRIIIINFNNPSESEWTNLIAEHPKDVLHDVKVINKT 341
XP_008193477.1[Tribolium     NLFYFHTNKNASNYRIVIIDFDNPKESEWKDLISEHPKDVLDWAHAINEN 346
AAA24925.1[Elizabethkingia   DTLFLHTDKNAPNMRMVKTTIQNPKPETWKDVIAETSEPMR---VNSGGG 353
pdb|1YR2|[Sphingomonas       DQLWFVSGDGAPLKKIVRVDLSG-STPRFDTVVPE-SKDNLESVGIAGN- 374
AAD31004.1[Myxococcus        DRFYVLTDEGAPRQRVFEVDPAKPARASWKEIVPEDSSASLLSVSIVGG- 330
                                 . :.  :   ::.           :   :

NP_610129.3[Drosophila       KLVVCYNCDVKHILQARDLSTGKLIRQFGLD-IGSINGISGKKSNSEIFY 415
XP_005177748.1[Musca         KLVLGYIQDVKSALQVNSLQTGELIHKFDLD-IGTIVALSGKKKESELFY 391
ETN62890.1[Anopheles         RIVLGYIDDVKSLLQVHSLADGSFVSKFPLE-IGTVVGFSGKKKYSEIFY 397
KFB39311.1[Anopheles         RIVLGYIDDVKSLLQVHSLADGAFVSKFPLD-IGTVVGFSGKKKYSEIFY 392
XP_001659779.1[Aedes         RVVLGYINDVKSVLQVHSLHDGSFVSKFPLE-IGTVVGFSGKKKYSEIFY 462
XP_001843671.1[Culex         KIVLGYIDDVKSVLQVHSLQDGRFLSKFPLA-IGNVVGFSGKKKYSEIFY 424
ACI03586.2[Eurygaster        KLVLCYIRDVKNTLDIHSLVDGSLIRKIPVP-IGTVSSISGSKKHSEVFY 394
EFX79244.1[Daphnia           KLIVCYMHDVKNILQLRDLQNGQLLKTYALE-MGTVREFSGKNTSSEFFF 395
NP_001004050.1[Sus           FLVLCYLHDVKNTLQLHDLATGALLKIFPLE-VGSVVGYSGQKKDTEIFY 396
XP_006061999.1[Bubalus       FLVLCYLHDVKNTLQLHDLATGALLKTFPLE-VGSIVGYSGQKKDTEIFY 396
NP_001244843.1[Macaca        FLVLCYLHDVKNILQLHDLTTGALLKTFPLE-VGSIVGYSGQKKDTEIFY 396
NP_112614.1[Rattus           FLVLCYLRNVKNILQLHDLTTGALLKTFPLD-VGSVVGYSGRKKDSEIFY 396
XP_005368679.1[Microtus      FLVLCYLHDVKNILQLHDLTTGALLKTFPLD-VGSVVGYSGRKKDSEIFY 396
NP_035286.1[Mus              FLVLCYLHDVKNILQLHDLTTGALLKTFPLD-VGSVVGYSGRKKDSEIFY 396
XP_005154718.1[Melopsittacus FLVLCYLHDVKNILQLHDLATGAHLKTFPLE-VGSIVGYSGQKKDTEIFY 401
XP_005518296.1[Pseudopodoces FLVLCYLHDVKNILQLHDLATGAHLKTFPLE-VGSIVGYSGQKKDTEIFY 401
NP_001006410.1[Gallus        FLVLCYLHDVKNILQLHDLATGAHLKTFPLD-VGSIVGYSGQKKDNEIFY 396
XP_009046664.1[Lottia        KLVLCYLEDVKNKLYIHDLALGTRKAELPLD-VGTIVGYSGRKKNTEIFY 396
XP_005095067.1[Aplysia       RLVLCYLRDVKNELYVYDLASGKQNYQFPLN-VGSVAGFSGKKKGTEIFY 396
EFN66352.1[Camponotus        KFVACYIQDVKNILQLHCLKTGKIIRTFPLD-LGTVVGFSGEKKYSEIFY 394
EZA56288.1[Cerapachys        KFVACYIQDVKNILQLHCLKTGEVLRTFPLD-LGTVVGFSGEKKYSEIFY 394
EFN76622.1[Harpegnathos      KFVACYIQDVKNILQLHCLSTGNVLRTFPLD-LGTVVGFSGEKKYSEIFY 452
XP_003394688.1[Bombus        KFVACYIADVKNILQLHSLTSGEKLRIFPLD-VGTIVNFAGQKKYSEIFY 452
XP_395364.2[Apis             KFVACYIEHVKNILQLHSLKSGDILRTFPLD-VGTIVNFAGQKKYSEIFY 396
XP_001603578.2[Nasonia       KLVVCYIEDVKNVLGVHSLETGKLIRQLPLD-VGTVVGFSGDLKYSEIFY 392
XP_008556849.1[Microplitis   KLVVCYIQDVKHILELHCLKTGKLLKTFPLD-LGTIVGISGEREYSEIFY 399
KDR21572.1[Zootermopsis      KLVVCYIHDVKSVLQLHELNTGALLKTFPLS-VGTVTGYSGKKKHTEIFY 398
ERL94303.1[Dendroctonus      MLVICYLKDVKHTMHIFDINTGNKIYDFKLD-VGTVSEISGKRHHSEMFY 390
XP_008193477.1[Tribolium     MLVVCYLQDVKNIMQLYDIKSSNKLHDFKLD-VGTISAISGKKYHKEMFF 395
AAA24925.1[Elizabethkingia   YFFATYMKDALSQIKQYDK-TGKLVREIKLPGSGTAGGFGGEKTEKELYY 402
pdb|1YR2|[Sphingomonas       RLFASYIHDAKSQVLAFDL-DGKPAGAVSLPGIGSASGLSGRPGDRHAYL 423
AAD31004.1[Myxococcus        HLSLEYLKDATSEVRVATL-KGKPVRTVQLPGVGAASNLMGLEDLDDAYY 379
                              .   *  ..   :       .       :   *      *     . :

NP_610129.3[Drosophila       GFSSFLSPGIIFYYDFAKPS-----------EKPTVLREISLNLEGFSR 453
XP_005177748.1[Musca         NFSSFLTPGTIYHYNFKWNN-----------FTPKVLREIKLNLEGFSP 429
ETN62890.1[Anopheles         HFVSFLTPGIIYHYDFAADS---------TATVEPTIFREVKI--EDFDN 436
KFB39311.1[Anopheles         HFVSFLTPGIIYHYDFEGSAKEESKEGSTEAVMKPTIFREVKI--EDFDN 440
XP_001659779.1[Aedes         HFVSFLTPGIIYHYDFAKEG-----------TEPKIFRQVKI--EDFDN 498
XP_001843671.1[Culex         HFVSFLTPGVIYHYDFAAGEG----------AEAKIFRQVKI--EDFDD 461
ACI03586.2[Eurygaster        TFISFTSPGTIYRCDLSQSPI----------PDPEVFRQITI--PGYDP 431
EFX79244.1[Daphnia           QFGSFLTPGVIYRCDIGESVE----------AEPTVFRQIEL--NGFDP 432
NP_001004050.1[Sus           QFTSFLSPGIIYHCDLTK-EE----------LEPRVFREVTV--KGIDA 432
XP_006061999.1[Bubalus       QFTSFLSPGIIYHCDLTK-EE----------LEPRVFREVTV--KGIDA 432
NP_001244843.1[Macaca        QFTSFLSPGIIYHCDLTK-EE----------LEPRVFREVTV--KGIDA 432
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Figure S3. *Cont.*

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NP_112614.1[Rattus            QFTSFLSPGVIYHCDLTR-EE-----------LEPRVFREVTV--KGIDA 432
XP_005368679.1[Microtus       QFTSFLSPGVIYHCDLTK-EE-----------LEPMVFREVTV--KGIDA 432
NP_035286.1[Mus               QFTSFLSPGVIYHCDLTK-EE-----------LEPMVFREVTV--KGIDA 432
XP_005154718.1[Melopsittacus QFTSFLSPGIIYHCDLTK-EE-----------LEPRVFREVTV--KGFDP 437
XP_005518296.1[Pseudopodoces QFTSFLSPGIIYHCDLTK-EE-----------LEPTVFREVTV--KGFDP 437
NP_001006410.1[Gallus         QFTSFLSPGIIYHCDLTK-EE-----------LEPRVFREVTV--KGFDP 432
XP_009046664.1[Lottia         QFMSFLTPGIIYRCDMTT-DN-----------YSPKVFREINV--KDFDV 432
XP_005095067.1[Aplysia        QFLSFLTPGVIYHCDMSG-RD-----------YQPKVFREITV--QGFDA 432
EFN66352.1[Camponotus         QFTSFLTPGIIYTIDLK--KE-----------EEPRILREIKV--KGFDA 429
EZA56288.1[Cerapachys         QFTSFLTPGIIYTIDLK--KE-----------QEPRVLREIKV--KGFDA 429
EFN76622.1[Harpegnathos       QFTSFLTPGIIYTIDLK--KE-----------EEPRVLREIKV--EHFDA 487
XP_003394688.1[Bombus         QFKSFLVPGIIYRVDLK--NE-----------EEPQVLREIKV--KNFDP 487
XP_395364.2[Apis              QFKSFLIPGIIYRVDLK--NE-----------EEPQVLREIKV--KNFDP 431
XP_001603578.2[Nasonia        QFTSFLTPGIIYTLDLKE-NE-----------EKPKVFREIKV--NDFDA 428
XP_008556849.1[Microplitis    QFTSILTPGKIFMVDLA--KE-----------EEPKMLREIKV--NGFDS 434
KDR21572.1[Zootermopsis       QFTSFLSPGIIYRCDLTK-SV-----------LEPEVFREIRV--HDFDA 434
ERL94303.1[Dendroctonus       SVCSFLTPSIIYRVQFNG-DQ-----------ITEERYYETKV--ADFDP 426
XP_008193477.1[Tribolium      SFCSFLTPNIIYKVDFDQ-GS-----------IKETLFHETKV--GDFES 431
AAA24925.1[Elizabethkingia    SFTNYITPPTIFKFSIDS--------------GKSEVYQKPKV---KFNP 435
pdb|1YR2|[Sphingomonas        SFSSFTQPATVLALDPAT--------------AKTTPWEPVHLT---FDP 456
AAD31004.1[Myxococcus         VFTSFTTPRQIYKTSVST--------------GKSELWAKVDVP---MNP 412
                               . .   *  :   .                          :     .

NP_610129.3[Drosophila        DNYSVEQVFYKSTDDTDIPMFIVQR--KRDIAEPRPCLLYGYGGFNYSLM 501
XP_005177748.1[Musca          SNYKVEQVFYESKDSTKIPMFIVYKNTKAEKRTPRPCFLYGYGGFNISMQ 479
ETN62890.1[Anopheles          SQYTVEQIFYHSKDGEKVPMFIVQR--KQKEKEHKPCLLYGYGGFNICVQ 484
KFB39311.1[Anopheles          SQYTVEQVFYHSKDGEKIPMFIVQR--RQDTKEHKPCLLYGYGGFNICVQ 488
XP_001659779.1[Aedes          SLYKVDQVFYESKDGERIPMFVVQR--KSDKQEKKPCLLYGYGGFNICIQ 546
XP_001843671.1[Culex          SLYKVEQVFYKSKDGERVPMFIVQK--KSDKQEKKPCLLYGYGGFNICIQ 509
ACI03586.2[Eurygaster         SMFEEKQVFYLSKDGTRIPMFLVHK-KVLEQNGKNPCLVYGYGGFNISLL 480
EFX79244.1[Daphnia            SLFETQQVFYPSKDGTRIPMFIVKK-KTVVLDGTNPCLMYGYGGFNISLE 481
NP_001004050.1[Sus            SDYQTVQIFYPSKDGTKIPMFIVHK-KGIKLDGSHPAFLYGYGGFNISIT 481
XP_006061999.1[Bubalus        SDYQTVQIFYPSKDGTKIPMFIVHK-KGIKLDGSHPAFLYGYGGFNISIT 481
NP_001244843.1[Macaca         SDYQTVQIFYLSKDGTKIPMFIVHK-KGIKLDGSHPAFLYGYGGFNISIT 481
NP_112614.1[Rattus            SDYQTIQVFYPSKDGTKIPMFIVHK-KGIKLDGSHPAFLYGYGGFNISIT 481
XP_005368679.1[Microtus       SDYQTIQVFYPSKDGTKIPMFIVHK-KGIKLDGSHPAFLYGYGGFNISIT 481
NP_035286.1[Mus               ADYQTIQIFYPSKDGTKIPMFIVHK-KGIKLDGSHPAFLYGYGGFNISIT 481
XP_005154718.1[Melopsittacus SVYQTIQVFYPSKDGTKIPMFIIHK-KGIKLDGSHPAFLYGYGGFNISIT 486
XP_005518296.1[Pseudopodoces SVYQTIQVFYPSKDGTKIPMFIIHK-KGIKLDGSHPAFLYGYGGFNISIT 486
NP_001006410.1[Gallus         SVYQTIQVFYPSKDGTKIPMFIIHK-KGIKLDGSHPAFLYGYGGFNISIT 481
XP_009046664.1[Lottia         SGFETKQVFYPSKDGTKIPMFIVHK-KGLNLDGSHPVLLYGYGGFSVSIS 481
XP_005095067.1[Aplysia        SLFETEQVFFKSTDGTKIPMFIVHK-KGLKKDGNNPTLLYGYGGFSISIT 481
EFN66352.1[Camponotus         SLYKTSQIFYPSKDGTKIPMFIVTK-SDAVLDGTMPALLYGYGGFNASIQ 478
EZA56288.1[Cerapachys         SLYKTSQIFYTSKDGTKIPMFIVTK-NDAVLDGKMPALLYGYGGFNASIQ 478
EFN76622.1[Harpegnathos       SLYKTSQIFYPSKDGTKIPMFIVTK-SDAVLDGTMPALLYGYGGFNASIQ 536
XP_003394688.1[Bombus         SLYKTSQIFYTSKDGTKIPMFIVMK-HDAVLDGSMPALLYGYGGFNVSIQ 536
XP_395364.2[Apis              SLYKTSQIFYTSKDGTKIPMFIVMK-HDAVLDGSMPALLYGYGGFNVSIQ 480
XP_001603578.2[Nasonia        SSYKTTQIFYSSKDGTKIPMFIVHK-KDLVLDGSSPALLYGYGGFNVSIQ 477
XP_008556849.1[Microplitis    TAYKMSQIFYSSKDGTKIPMFIVTR-TDAVLDGSLPALLYGYGGFNVSIY 483
KDR21572.1[Zootermopsis       SQYETKQVFYESKDGTKIPMFLVYK-TGLVRDGKQPCLLHGYGGFNVSIL 483
ERL94303.1[Dendroctonus       SLYETKQVFYKSKDGTNIPMFIINK-IGFVNDGSQPCLLYGYGGFNVNLT 475
XP_008193477.1[Tribolium      SKYETKQVFYKSKDGTEIPMFIINK-KGLVNDGSKPCLLYGYGGFNVNLT 480
AAA24925.1[Elizabethkingia    ENYVSEQVFYTSADGTKIPMMISNK-KGLKKDGKNPTILYSYGGFNISLQ 484
pdb|1YR2|[Sphingomonas        ADFRVEQVFYPSKDGTKVPMFIVRR-KDAK--GPLPTLLYGYGGFNVALT 503
AAD31004.1[Myxococcus         EQYQVEQVFYASKDGTKVPMFVVHR-KDLKRDGNAPTLLYGYGGFNVNME 461
                                :   *:*: * *.  :**::  :          * :::.****.  :

NP_610129.3[Drosophila        PSFGILSLMFMDTFDGVLAFPNLRGGGEYGMEWHNGGRMLSKQNVFNDFQ 551
XP_005177748.1[Musca          PSFGITGLMFIDTFDGVIAYPNLRGGGEYGEKWHNAGRLLNKQNVFNDFQ 529
ETN62890.1[Anopheles          PSFSITGLVFIDSFDGILAYPNIRGGGEYGERWHNSGRLLKKQNVFDDFQ 534
KFB39311.1[Anopheles          PSFSITGLVFIDSFDGILAYPNIRGGGEYGERWHNAGRLLKKQNVFDDFQ 538
XP_001659779.1[Aedes          PSFSITGLVFIDSFDGILAYPNIRGGGEYGERWHNAGRLLKKQNVFDDFQ 596
XP_001843671.1[Culex          PSFSITGLVFIDSFDGILAYPNIRGGGEYGERWHNAGRLLKKQNVFDDFQ 559
ACI03586.2[Eurygaster         PMFSTIRLVFVQYFNAVFASANIRGGGEYGEKWHDGGRLLNKQNSFDDFI 530
EFX79244.1[Daphnia            PAFSVTRIVFMQHFNGVFAVPNIRGGGEYGEAWHDGGRLFNKQNSFDDFH 531
NP_001004050.1[Sus            PNYSVSRLIFVRHMGGVLAVANIRGGGEYGETWHKGGILANKQNCFDDFQ 531
XP_006061999.1[Bubalus        PNYSVSRLIFVRHMGGVLAVANIRGGGEYGETWHKGGILANKQNCFDDFQ 531
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Figure S3. *Cont.*

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NP_001244843.1[Macaca         PNYSVSRLIFVRHMGGILAVANIRGGGEYGETWHKGGILANKQNCFDDFQ 531
NP_112614.1[Rattus            PNYSVSRLIFVRHMGGVLAVANIRGGGEYGETWHKGGILANKQNCFDDFQ 531
XP_005368679.1[Microtus       PNYSVSRLIFVRHMGGVLAVANIRGGGEYGETWHKGGILANKQNCFDDFQ 531
NP_035286.1[Mus               PNYSVSRLIFVRHMGGVLAVANIRGGGEYGETWHKGGILANKQNCFDDFQ 531
XP_005154718.1[Melopsittacus PSYSVSRLIFVRHLGGVLAVANIRGGGEYGETWHKGGILANKQNCFDDFQ 536
XP_005518296.1[Pseudopodoces PSYSVSRLIFVRHLGGVLAVANIRGGGEYGETWHKGGILANKQNCFDDFQ 536
NP_001006410.1[Gallus         PSYSVSRLIFVRHLGGVLAVANIRGGGEYGETWHKGGILANKQNCFDDFQ 531
XP_009046664.1[Lottia         PTFSPSRLVLLQHLNVVYALANIRGGGEYGETWHKAGCLGNKQNGFDDFQ 531
XP_005095067.1[Aplysia        PSFSPSRVVFLQHLGGVYALANIRGGGEYGETWHKDGSLGNKQNCFNDFQ 531
EFN66352.1[Camponotus         PTFSVTRLVFIQHLNGILAVANVRGGGEYGERWHNAGRFFNRQNVFDDFQ 528
EZA56288.1[Cerapachys         PTFSVTRLVFIQHLNGVLAVANVRGGGEYGEKWHNAGRFFNRQNVYDDFQ 528
EFN76622.1[Harpegnathos       PTFSVTRLVFIQHLDGVLAVANVRGGGEYGEKWHNAGRFFNRQNVFDDFQ 586
XP_003394688.1[Bombus         PTFSVTKLVFVQHLNGVLAVANIRGGGEYGEKWHNGGRFFNKQNVFDDFQ 586
XP_395364.2[Apis              PTFSVTKLVFVQHLNGVLAVANIRGGGEYGEKWHNGGRFFNKQNVFDDFQ 530
XP_001603578.2[Nasonia        PTFSVTRLVFLQHLNGVLAIPNIRGGGEYGEKWHNGGRFTNKQNVFDDFQ 527
XP_008556849.1[Microplitis    PTFSVMRLAFVQHLRGVFAIANIRGGGEYGEKWHNSGRLDNKQNVFDDFQ 533
KDR21572.1[Zootermopsis       PTFSVTHLVFIQHFGGILAVPNIRGGGEYGERWHNAGRLLNKQNGFDDFQ 533
ERL94303.1[Dendroctonus       PSFAISRLVFVGNFNGVYALANIRGGGEYGDNWHNGGRFANKQNCFDDFQ 525
XP_008193477.1[Tribolium      PSFGVSRLVFIENFDGVYALANIRGGGEYGDNWHNGGRFGKKQNCFDDFQ 530
AAA24925.1[Elizabethkingia    PAFSVVNAIWMEN-GGIYAVPNIRGGGEYGKKWHDAGTKQQKKNVFNDFI 533
pdb|1YR2|[Sphingomonas        PWFSAGFMTWIDS-GGAFALANLRGGGEYGDAWHDAGRRDKKQNVFDDFI 552
AAD31004.1[Myxococcus         ANFRSSILPWLDA-GGVYAVANLRGGGEYGKAWHDAGRLDKKQNVFDDFH 510
                              . :       :       * .*:*******  **. *   .::* ::**

NP_610129.3[Drosophila        AAAEFLTKNNYTTKDRLAIQGASNGGLLVGACIN------QRPD-LFGAA 594
XP_005177748.1[Musca          AAAEYLVANNYTTKDRLVIQGGSNGGLLVGACIN------QRPD-LFGAA 572
ETN62890.1[Anopheles          YAAQYLVEHGYTRHEKIAIQGGSNGGLLVGACIN------QRPD-LFGAA 577
KFB39311.1[Anopheles          YAAQFLVEQGYTRHEKIAIQGGSNGGLLVGACIN------QRPD-LFGAA 581
XP_001659779.1[Aedes          HAAQFLVESGYTTHDQIVIQGGSNGGLLVGACIN------QRPD-LFGAA 639
XP_001843671.1[Culex          YAAQYLVESGYTSHDQIVIQGGSNGGLLVGACIN------QRPD-LFGAA 602
ACI03586.2[Eurygaster         AAGEYLIAEKYTNKSCLAIQGASNGGLLIGASVKPPYWLLEDPEYIYTVC 580
EFX79244.1[Daphnia            SAAEYLIANGYTSSSKLAIQGASNGGLLIGACVN------QRPE-LYAAG 574
NP_001004050.1[Sus            CAAEYLIKEGYTSPKRLTINGGSNGGLLVATCAN------QRPD-LFGCV 574
XP_006061999.1[Bubalus        CAAEYLIKEGYTSPKMLTINGGSNGGLLVATCAN------QRPD-LFGCV 574
NP_001244843.1[Macaca         CAAEYLIKEGYTSPKRLTINGGSNGGLLVAACAN------QRPD-LFGCV 574
NP_112614.1[Rattus            CAAEYLIKEGYTTSKRLTINGGSNGGLLVAACAN------QRPD-LFGCV 574
XP_005368679.1[Microtus       CAAEYLVKEGYTSPKRLTINGGSNGGLLVAVCAN------QRPD-LFGCV 574
NP_035286.1[Mus               CAAEYLIKEGYTSPKRLTINGGSNGGLLVAACAN------QRPD-LFGCV 574
XP_005154718.1[Melopsittacus CAAKYLIKEGYTSPKKLTINGGSNGGLLVAACAN------QRPD-LFGCA 579
XP_005518296.1[Pseudopodoces CAAKYLIKEGYTSPKKLTINGGSNGGLLVAACAN------QRPD-LFGCA 579
NP_001006410.1[Gallus         YAAKYLIREGYTAPKKLTINGGSNGGLLVAACAN------QRPD-LFGCV 574
XP_009046664.1[Lottia         SAAQYLIDNKYTSPNRIAIQGGSNGGLLVAACSN------QRPD-LFGAA 574
XP_005095067.1[Aplysia        SAAEYLVAQGYTSSKKLVINGGSNGGLLVGACLN------QRPD-LFAGG 574
EFN66352.1[Camponotus         YAAKYLVENGYTTSTKLTIQGGSNGGLAVAVCIN------QRPD-LFGAA 571
EZA56288.1[Cerapachys         YAAKYLVENGYTTSAKLTIQGGSNGGLAVAVCIN------QRPD-LFGAA 571
EFN76622.1[Harpegnathos       YAAKYLIENGYTSSAKLTIQGGSNGGLAVATCIN------QRPD-LFGAA 629
XP_003394688.1[Bombus         AAAEYLVEKGYTTSSKLSILGASNGGLLVAACVN------QRPD-LFGAA 629
XP_395364.2[Apis              TAAEYLIENGYTTSSKLSILGASNGGLLIAACIN------QRPD-LFGAA 573
XP_001603578.2[Nasonia        CAAEYLIDNRYTSPKKLIIQGGSNGGLLVGACIN------QRPD-LFGAA 570
XP_008556849.1[Microplitis    SAAEYLIANKYTEAKKLTIHGGSNGGLLVAACIN------QRPE-LYGAA 576
KDR21572.1[Zootermopsis       SAAEYLLKEGYTCREKLTIRGGSNGGLLVAACIN------QRPD-LFGAA 576
ERL94303.1[Dendroctonus       HAAKYLIEENYTSASKLTIQGGSNGGLLVAACIN------QAPE-LFGAA 568
XP_008193477.1[Tribolium      YAAKYLVENKYTKVDKLIIQGGSNGGLLVAACIN------QAPE-LFGAA 573
AAA24925.1[Elizabethkingia    AAGEYLQKNGYTSKDYMALSGRSNGGLLVGATMT------MRPD-LAKVA 576
pdb|1YR2|[Sphingomonas        AAGEWLIANGVTPRHGLAIEGGSNGGLLIGAVTN------QRPD-LFAAA 595
AAD31004.1[Myxococcus         AAAEYLVQQKYTQPKRLAIYGGSNGGLLVGAAMT------QRPE-LYGAV 553
                               *.::*     *    : : * ***** :..  .        *: :

NP_610129.3[Drosophila        VAQVGVMDMLRFHKFTIGHAWCSDYGNPDE-KVHFANLIKFSPLHNVHIP 643
XP_005177748.1[Musca          VAQVGVMDMLRFHKFTIGHAWCSDYGNPDE-KEHFENLIKYSPLHNVHTP 621
ETN62890.1[Anopheles          IAQVGVMDMLRFHKFTIGRAWVSDYGDLNE-KDHFENLLRYSPLHNVRRP 626
KFB39311.1[Anopheles          IAQVGVMDMLRFHKFTIGRAWVSDYGDLNE-KDHFENLLRYSPLHNVRTP 630
XP_001659779.1[Aedes          IAQVGVMDMLRFHKFTIGRAWVSDYGDIDE-KEHFENLYKYSPLHNVHTP 688
XP_001843671.1[Culex          VAHVGVMDMLRFHKFTIGRAWVSDYGDITE-KEHFENLLRYSPLHNVHTP 651
ACI03586.2[Eurygaster         VSDCGRWAVILPSKFCYNN--LVYFSVLFQ-EEHFKNVLKYSPLHNIRVP 627
EFX79244.1[Daphnia            IAHVGVMDMLRFHKFTVGYCWVSDYGSPEE-KAAFENLLKFSPLHNLKVP 623
NP_001004050.1[Sus            IAQVGVMDMLKFHKYTIGHAWTTDYGCSDS-KQHFEWLIKYSPLHNVKLP 623
XP_006061999.1[Bubalus        IAQVGVMDMLKFHKYTIGHAWTTDYGCSDN-KQHFEWLIKYSPLHNVKLP 623
```

Figure S3. *Cont.*

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NP_001244843.1[Macaca         IAQVGVMDMLKFHKYTIGHAWTTDYGCSDS-KQHFEWLVKYSPLHNVKLP 623
NP_112614.1[Rattus            IAQVGVMDMLKFHKFTIGHAWTTDYGCSDS-KQHFEWLLKYSPLHNVKLP 623
XP_005368679.1[Microtus       IAQVGVMDMLKFHKFTIGHAWTTDYGCSDS-KQHFEWLLKYSPLHNVKLP 623
NP_035286.1[Mus               IAQVGVMDMLKFHKFTIGHAWTTDYGCSDT-KQHFEWLLKYSPLHNVKLP 623
XP_005154718.1[Melopsittacus IAQVGVMDMLKFHKYTIGHAWTTDYGCSDC-KEQFEWLFKYSPLHNIKLP 628
XP_005518296.1[Pseudopodoces IAQVGVMDMLKFHKYTIGHAWTTDYGCSDC-KEQFEWLHKYSPLHNVKLP 628
NP_001006410.1[Gallus         IAQVGAMDMLKFHKYTIGHAWTTDYGCSDH-KEQFEWLCKYSPLHNVKLP 623
XP_009046664.1[Lottia         IGQVGVLDMLRFHKFTIGHAWTTDYGCSDK-PEDFQWLYKYSPLHNINVP 623
XP_005095067.1[Aplysia        IAQVGVLDMLRFHKFTIGHAWITDYGSSDD-PEQFKWLIKYSPLH--NIP 621
EFN66352.1[Camponotus         IAQVGVMDMLRFHKFTIGSAWVSDYGSSDD-AKHFQNLLKYSPLHNVRIP 620
EZA56288.1[Cerapachys         IAQVGVMDMLRFHKFTIGSAWVSDYGSSDD-LKHFQNLLKYSPLHNVRIP 620
EFN76622.1[Harpegnathos       IAQVGVMDMLRFHKFTIGSAWVSDYGSADD-PKHFQNLLKYSPLHNVKVP 678
XP_003394688.1[Bombus         IAQVGVMDMLRFHKFTIGVAWVSDYGSSDD-PKHFENLLKYSPLHNVRIP 678
XP_395364.2[Apis              IAQVGVMDMLRFHKFTIGVAWVSDYGSSDD-SKHFENLIKYSPLHNVRVP 622
XP_001603578.2[Nasonia        IAQVGVMDMLKFHKFTVGYAWTSDYGSSDD-REHFKNLLKYSPLHNVKPP 619
XP_008556849.1[Microplitis    IADVGVMDMLRFHKFTIGYAWISDYGSSDD-DKQFKTLLKYSPLHNVKVP 625
KDR21572.1[Zootermopsis       IVQVGVLDMLRFHKFTIGYSWVSDYGSSDE-KEHYENLIKYSPLHNVKVP 625
ERL94303.1[Dendroctonus       ICQVGVLDMLRYHKFTIGYAWKSDYGCSDE-EDEFKYLYKYSPLHNITVP 617
XP_008193477.1[Tribolium      ICQVGVLDMLRFHKFTIGYAWKSDYGCSEE-QEQFEYLYKYSPLHNIRVP 622
AAA24925.1[Elizabethkingia    FPGVGVLDMLRYNKFTAGAGWAYDYGTAEDSKEMFEYLKSYSPVHNVKAG 626
pdb|1YR2|[Sphingomonas        SPAVGVMDMLRFDQFTAGRYWVDDYGYPEK-EADWRVLRRYSPYHNVRSG 644
AAD31004.1[Myxococcus         VCAVPLLDMVRYHLFGSGRTWIPEYGTAEK-PEDFKTLHAYSPYHHVRPD 602
                                      ::    :  .      :.        :  :  :** *

NP_610129.3[Drosophila        LNPNQEYPSTLILTADHDDRVSPLHSYKFVAALQEAVRYSEYQLNPILLR 693
XP_005177748.1[Musca          KSPSEEYPSTLVLTADHDDRVSPLHSLKFIAALQEAVRNSEYQKNPILLR 671
ETN62890.1[Anopheles          TSEKEQYPATLVLTADHDDRVSPLHSLKFVAALHHAINGCEHQRNPLLLR 676
KFB39311.1[Anopheles          AAEKEQYPATLVLTADHDDRVSPLHSLKFMAALHQAVKDCEHQKNPLLLR 680
XP_001659779.1[Aedes          KSEKEQYPATLVLTADHDDRVSPLHSLKFVAALHHAIKDSEHQKNPLLLR 738
XP_001843671.1[Culex          SSEREQYPATLVLTADHDDRVSPLHSLKFMAALHHAVRDSKYQKNPLLLR 701
ACI03586.2[Eurygaster         ED---QYPALLLLTASHDDRVVPLHSLKYIAQLQHVMRDNPKQENPLLIQ 674
EFX79244.1[Daphnia            ETG--QYPAMLLLTADHDDRVVPLHSLKYMAQMHHTFRDCPKQTNPLMIR 671
NP_001004050.1[Sus            EADDIQYPSMLLLTADHDDRVVPLHSLKFIATLQYIVGRSRKQNNPLLIH 673
XP_006061999.1[Bubalus        EADDIQYPSMLLLTADHDDRVVPLHSLKFIATLQHLVGRSRKQNNPLLIH 673
NP_001244843.1[Macaca         EADDIQYPSMLLLTADHDDRVVPLHSLKFIATLQYIVGRSRKQSNPLLIH 673
NP_112614.1[Rattus            EADDIQYPSMLLLTADHDDRVVPLHSLKFIATLQYIVGRSRKQSNPLLIH 673
XP_005368679.1[Microtus       EADDIQYPSMLLLTADHDDRVVPLHSLKFIATLQYIVGRSRKQSNPLLIH 673
NP_035286.1[Mus               EADDIQYPSMLLLTADHDDRVVPLHSLKFIATLQYIVGRSRKQSNPLLIH 673
XP_005154718.1[Melopsittacus EEDGIQYPSTLLLTADHDDRVVPLHSLKFIATLQYVVGRSSKQTNPLLIH 678
XP_005518296.1[Pseudopodoces EEDGIQYPSTLLLTADHDDRVVPLHSLKFIATLQYIVGRSSKQTNPLLIH 678
NP_001006410.1[Gallus         EEDGIQYPATLLLTADHDDRVVPLHSLKFIATLQYVVGRSRKQTNPLLIH 673
XP_009046664.1[Lottia         DGN-IQYPSMLLLTGDHDDRVVPLHSLKYIAEVQRKVGSTEKQKNPLIIR 672
XP_005095067.1[Aplysia        KGV-EQYPALLLLTGDHDDRVVPLHSLKFIAELQSVVGSSDTQTNPVIIR 670
EFN66352.1[Camponotus         P-DDVQYPATLLLTADHDDRVVPLHTLKLIATLQYTFRNVSKQENPILAR 669
EZA56288.1[Cerapachys         A-DDTQYPAMLLLTADHDDRVVPLHTLKLTATLQHTLGNVPKQENPLLAR 669
EFN76622.1[Harpegnathos       Q-DDIQYPATLLLTADHDDRVVPLHTLKLIATLQYTLGNVPKQTNPLLAR 727
XP_003394688.1[Bombus         --ENGQYPATLLLTADHDDRVVPLHSLKLIATLQCTLGKLPQQTNPLLIK 726
XP_395364.2[Apis              --ENGQYPATLLLTADHDDRVVPLHSLKLIATLQYTLGKLPQQTNPLLIK 670
XP_001603578.2[Nasonia        K-DGGQYPATLLLTADHDDRVVPLHSLKLIATLQHEIGSLPQQTNPILIR 668
XP_008556849.1[Microplitis    A-NDVQYPATLLLTADHDDRVVPLHTLKLIATLQHVLGKLPQQTNPILAR 674
KDR21572.1[Zootermopsis       HGDIIQYPATLLLTADHDDRVVPLHSLKFIATLHHVLRNCSDQTNPLLIR 675
ERL94303.1[Dendroctonus       K-NGAQYPATLLLTADHDDRVVPLHSLKFCAELQEKIGNLPQQENPLLIR 666
XP_008193477.1[Tribolium      Q-NGGQYPATLLLTADHDDRVVPLHSLKFIAELQNKIGRLPTQKNPLMIR 671
AAA24925.1[Elizabethkingia    T----CYPSTMVITSDHDDRVVPAHSFKFGAELQAKQAC----KNPVLIR 668
pdb|1YR2|[Sphingomonas        ----VDYPAILVTTADTDDRVVPGHSFKYTAALQ----TAAIGPKPHLIR 686
AAD31004.1[Myxococcus         ----VRYPALLMMAADHDDRVDPMHARKFVAAVQ----NSPGNPATALLR 644
                                    **: :: :.. **** * *: *  * ::          . : :

NP_610129.3[Drosophila        VYTKAGHGAGKPTKMRISEATDIITFFKKTLNVDCINL------------ 731
XP_005177748.1[Musca          VYSKAGHGAGKPTSKRIEEATDVLTFMLRSLNI----------------- 704
ETN62890.1[Anopheles          VYSKAGHGMGKPTAKKIEESTDILTFMYKTLGLKL--------------- 711
KFB39311.1[Anopheles          VYSKAGHGMGKPTAKKIEEATDILTFMYKTLGLKL--------------- 715
XP_001659779.1[Aedes          VYSKAGHGMGKPTAKKIEEATDILTFMYKTLKLKLHV------------- 775
XP_001843671.1[Culex          VYSKAGHGMGKPTAKKIEESTDILTFIYKTLKLKLTF------------- 738
ACI03586.2[Eurygaster         VETKAGHGAGKPTNKRIEEQVDILCFLMNSMNLKFIE------------- 711
EFX79244.1[Daphnia            IETKAGHGANKPTSKIIDEHSDVFAFLARALNLEFQS------------- 708
NP_001004050.1[Sus            VDTKAGHGAGKPTAKVIEEVSDMFAFIARCLNIDWIP------------- 710
```

Figure S3. *Cont.*

```
XP_006061999.1[Bubalus        VDTKAGHGAGKPTAKVIEEVSDMFAFIARCLNIDWIQ---------- 710
NP_001244843.1[Macaca         VDTKAGHGAGKPTAKVIEEVSDMFAFIARCLNIDWI----------- 709
NP_112614.1[Rattus            VDTKAGHGPGKPTAKVIEEVSDMFAFIARCLNIEWIQ---------- 710
XP_005368679.1[Microtus       VDTKAGHGAGKPTAKVIEEVSDMFAFIARCLNIEWIQ---------- 710
NP_035286.1[Mus               VDTKAGHGAGKPTAKVIEEVSDMFAFIARCLNIEWIQ---------- 710
XP_005154718.1[Melopsittacus VDTKAGHGAGKPTAKVIEEVSDMFAFIARCLNLDWIE---------- 715
XP_005518296.1[Pseudopodoces VDTKAGHGAGKPTAKVIEEVSDMFAFIARCLNLEWIE---------- 715
NP_001006410.1[Gallus         VDTKAGHGAGKPTAKVIEEVSDMFAFIARCLNLDWIE---------- 710
XP_009046664.1[Lottia         IDTKSGHGAGKPTKKVIEEVTDIYSFLYTTLNLEW------------ 707
XP_005095067.1[Aplysia        VDTKSGHGFGKPTAKVIEEISDIYSFIYQTIGLEW------------ 705
EFN66352.1[Camponotus         IDTKAGHGGGKPTMKVLEESTDILSFIVQSLGLEFKS---------- 706
EZA56288.1[Cerapachys         IDTKAGHGGGKPTMKVIEESTDILSFIVQSLGLEF------------ 704
EFN76622.1[Harpegnathos       IDTKAGHGSGKPTMKVIEESTDILSFIVQSLGLVFKS---------- 764
XP_003394688.1[Bombus         IETKAGHGGGKPTMKVIEESTDILAFIVKSLNLEFKL---------- 763
XP_395364.2[Apis              IETKAGHGGGKPTMKVIEESTDILAFIVKSLDLEF------------ 705
XP_001603578.2[Nasonia        IDVKAGHGRGKPTSKVIDESTDILSFVVQTLNLEF------------ 703
XP_008556849.1[Microplitis    IDTKAGHGRGKPTTKVIEETRDILVFIIKTLNLKF------------ 709
KDR21572.1[Zootermopsis       IETKAGHGLGKPTAKLVSNYLNVCSF---------------------- 701
ERL94303.1[Dendroctonus       IETKAGHGAGKPTAKMIEEMTEIFCFISKALGLPFSE---------- 703
XP_008193477.1[Tribolium      IETRAGHGAGKPTSKIIEEVTDTFCFISRALNLTF------------ 706
AAA24925.1[Elizabethkingia    IETNAGHGAGRSTEQVVMENADLLSFALYEMGIKNLK---------- 705
pdb|1YR2|[Sphingomonas        IETRAGHGSGKPIDKQIEETADVQAFLAHFTGLTPRPWSSVDKLAAALEH 736
AAD31004.1[Myxococcus         IEANAGHGGADQVAKAIESSVDLYSFLFQVLDVQG----AQGGVAAQGR- 689
                              :  .:***       : .  :   *
```

Figure S4. Phylogenetic tree of Clustal W alignment *of Eurygaster integriceps* PEP. *Eurygaster integriceps* protein ID is boxed for clarification. The program phylogeny.fr [1] was used to generate the tree using the Clustal W output. PEP Isoforms obtained from the BLASTX were removed from the analysis.

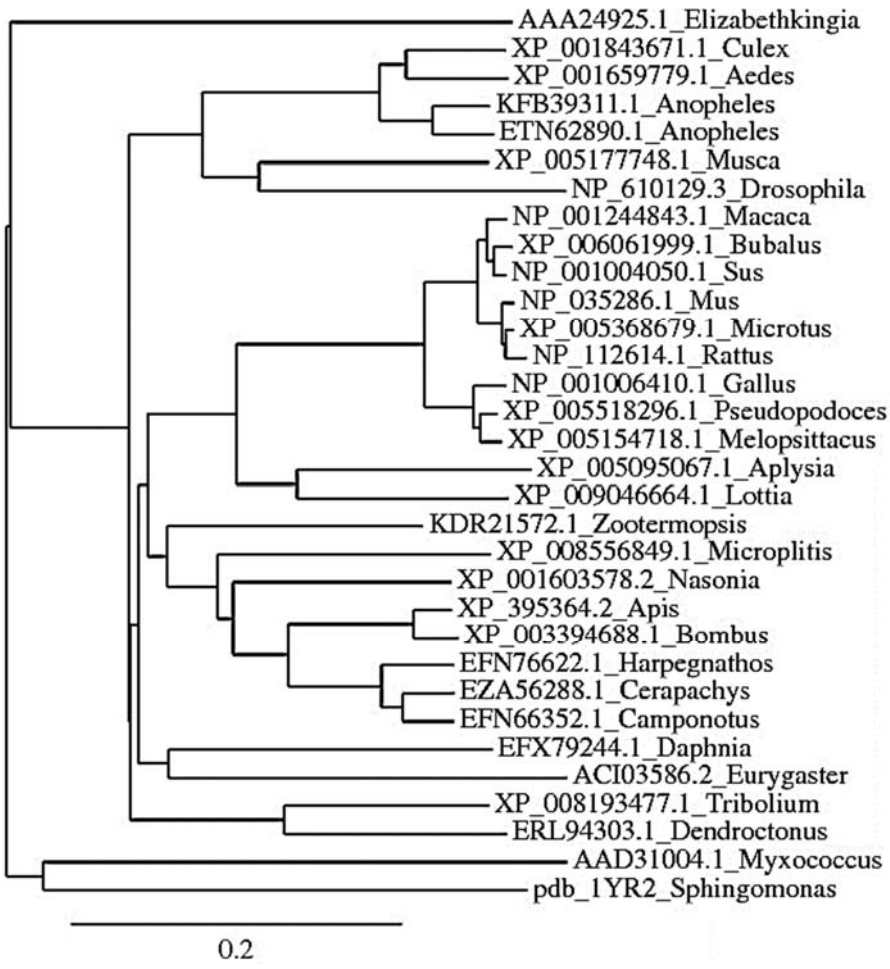

Table S1. Transcription Factor binding sites identified in the 5'UTR using TFSearch.

TF Matrix No.	ID	Location (5' bp No.)	Function Identified in Drosophila
M00012	CF2-II	185	Late activator in follicle cells
M00019	Dfd	35, 290	Deformed
M00022	Hb	169, 170, 171, 172, 173, 301	Hunchback
M00028	HSF	55,176, 178	Heat shock factor
M00091	BR-C Z1	28, 288	
M00093	BR-C Z3	50	Ecdysone-responsive key regulator of metamorphosis during 3rd instar and early pupal development.
M00094	BR-C Z4	292, 299	
M00199	AP-1	317	
M00266	Croc	289, 299	Required for normal head development

Table S2. BLAST results for the Eurygaster integriceps prolyl endoprotease compared to the following databases and individually when designated with the following symbols: eukaryotes (taxid:2759), insects (taxid:6960), bacteria (taxid:2), fungi (taxid:4751), archaea (taxid:2157), yeast (taxid:4932). PEP Isoforms obtained from the BLAST were removed from the analysis.

Accession	Organism	Query Coverage	Identity
ACI03586.2	*Eurygaster integriceps*	100%	100%
ERL94303.1	*Dendroctonus ponderosae*	75%	52%
XP_008193477	*Tribolium castaneum*	75%	50%
EFX79244.1	*Daphnia pulex*	75%	56%
NP_001004050.1	*Sus scrofa*	75%	50%
XP_006061999	*Bubalus bubalis*	75%	50%
NP_001244843	*Macaca mulatta*	75%	50%
NP_112614.1	*Rattus norvegicus*	75%	50%
XP_005368679	*Microtus ochrogaster*	75%	50%
NP_035286.1	*Mus musculus*	75%	50%
XP_005154718	*Melopsittacus undulates*	76%	50%
XP_005518296	*Pseudopodoces humilis*	76%	50%
NP_001006410	*Gallus gallus*	75%	50%
XP_009046664	*Lottia gigantean*	75%	52%
XP_005095067	*Aplysia californica*	75%	51%
EFN66352.1	*Camponotus floridanus*	75%	53%
EZA56288.1	*Cerapachys biroi*	75%	53%
EFN76622.1	*Harpegnathos saltator*	75%	53%
XP_003394688	*Bombus terrestris*	76%	55%
XP_395364.2	*Apis Mellifera*	75%	55%
XP_001603578	*Nasonia vitripennis*	75%	55%
XP_008556849	*Microplitis demolitor*	75%	51%
KDR21572.1	*Zootermopsis mevadensis*	74%	55%
ETN62890.1	*Anapholes darling*	75%	51%
KFB39311.1	*Anapholes sinensis*	75%	49%

Table S2. *Cont.*

Accession	*Organism*	Query Coverage	Identity
XP_005177748	*Musca domestica*	74%	51%
NP_610129.3	*Drosophila melanogaster*	76%	51%
AAA24925	*Elizabethkigia meningoseptica*	99%	35%
pdb|1YR2	*Sphingomonas capsulata*	97%	39%
AAD31004.1	*Myxococcus xanthus*	99%	33%

Reference

1. Dereeper, A.; Guignon, V.; Blanc, G.; Audic, S.; Buffet, S.; Chevenet, F.; Dufayard, J.F.; Guindon, S.; Lefort, V.; Lescot, M.; *et al. Phylogeny.fr: Robust Phylogenetic Analysis for the Non-Specialist*. *Nucleic Acids Res.* **2008**, *36*, W465–W469.