# **Supporting Information**

## Abdel-latief et al. 10.1073/pnas.0801559105

#### SI Text

DNA NG

**Preparation of (±)-[<sup>13</sup>C<sub>18</sub>]-Erythro-12,13-Epoxy-9Z-Octadecenoic acid** ((±)-[<sup>13</sup>C<sub>18</sub>]-Vernolic Acid). Ten milliliters of methanol and 1 ml of acetyl chloride were stirred under dry nitrogen at 0°C for 10 min. One hundred milligrams of (0.34 mmol) [<sup>13</sup>C<sub>18</sub>]-linoleic acid (Campro Scientific) was added and the solution was stirred for 1 h at room temperature. Subsequently, the mixture was diluted with 5 ml of a 5% NaHCO<sub>3</sub> solution and extracted twice with 50 ml of hexane. The hexane phase was washed with brine, dried with Na<sub>2</sub>SO<sub>4</sub>, and evaporated under reduced pressure. The crude ester was dissolved in 8 ml of CH<sub>2</sub>Cl<sub>2</sub> and 58.6 mg (0.34 mmol) of *m*-chloroperbenzoic acid was added and stirred overnight. Sixty milligrams (1.5 mmol) of CaO was added to the solution and subsequently stirred for 20 min, filtrated, and evaporated.

The mixture of reaction products was subjected to flash chromatography with 30 g of silica gel (Merck; 0.015-0.04 mm) with gradient elution using a mixture of petroleum benzene and ethyl acetate (200 ml of 95:5, 100 ml of 92.5:7.5, and 200 ml of 90:10). The elution sequence and amount of products was: (*i*) [<sup>13</sup>C<sub>18</sub>]-methyl linoleate 30 mg, (*ii*) (±)-[<sup>13</sup>C<sub>18</sub>]-erythro-12,13-epoxy-9*Z*-octadecenoic acid methyl ester ((±)-[<sup>13</sup>C<sub>18</sub>]-vernolic

acid methyl ester) 7 mg, (iii)  $(\pm)$ -[<sup>13</sup>C<sub>18</sub>]-erythro-9,10-epoxy-12Zoctadecenoic acid methyl ester  $((\pm)-[^{13}C_{18}]$ -coronaric acid methyl ester) 7 mg, 4) 9,10,12,13-diepoxystearic acid methyl ester 35 mg. 7 mg (23  $\mu$ mol) of (±)-[<sup>13</sup>C<sub>18</sub>]-vernolic acid methyl ester was dissolved in 100 µl of acetonitrile, 0.55 mg (46 µmol) of LiOH was added and stirred for 48 h at room temperature. The solution was neutralized with 1 N HCl, stirred for 1 h, diluted with 10 ml, water, acidified to pH 3 with 1 N HCl, and finally extracted with diethyl ether (3  $\times$  30 ml). The combined ether phase was washed with brine, dried over Na<sub>2</sub>SO<sub>4</sub>, and evaporated. The crude acid was applied to a LC column containing 5 g of silica gel (Merck, 0.063-0.2 mm) and eluted with 200 ml of petroleum benzene:ethyl acetate:acetic acid 94:5:1 to yield 5 mg of pure  $(\pm)$ -[<sup>13</sup>C<sub>18</sub>]-erythro-12,13-epoxy-9Z-octadecenoic acid. GC-MS-analysis of the product was done with the methyl ester by derivatization with trimethylsulfonium hydroxide (Macherey & Nagel). The <sup>13</sup>C-labeled compound coeluted with an unlabeled reference chemical (vernolic acid methylester, purity 99%, Sigma-Aldrich). The mass spectrum of the labeled product is shown in Fig. S4.

(Nas.EH1.F4)

1 ATGTGGAAGGGCGCTGCGGTTTTCCTACTAGCCACGCTGGCCATCGGCTGGCATCTCAGG 1 W Α Α VF L L A Т LА Ι G W Η LR Κ G 61 TATCAAGGACCCGTGGAGGTACCTGACTTGCCGAATCAATACTGGGGTCCTGGAAAGCCT Κ 21 Y G Ρ V Ε V Ρ D L Ρ Ν Q Υ W G Ρ G Ρ 121 GTGCCAGATCCCAAGGATATCAAACCGTTCAAAATCGACGTTCCAAAAGAGGTAATCGAT PFΚ D41 V Ρ D Ρ Κ D Ι Κ Τ VΡ Κ EVΤ D 181 GATCTAAACAAACGCCTTGATAGTACGAGATCATTTGTGGAACCGCTGGAAGGTTCTGCC 61  $\mathbf{L}$ Ν Κ R L D STR SFVEΡ LEG SΑ D 241 TGGACTTACGGTATCTCGTCGACCTACTTGAAGACCGTCTTGAACCACTGGAGGAAGAAA 81 Υ G I S S T Υ LΚ Т VL NΗ R W Т W Κ Κ (Nas.EH1.F3) 301 TATAACTGGAGCCAACGGCAGGCTCTGCTCAACAAATACCCGCAGTTCAAGACCAAGATT 101 W R Α LLNΚ Υ Ρ Q FТ Т Y Ν S 0 0 Κ Κ  ${\tt CAAGGTCTGGACATCCACTTCTACCATGTAAAGCCCCAGGTACCTAAAGACCGCAAGGTC}$ 361 121 G L DΤ Η FΥ Η VΚ Ρ Q V Ρ Κ D R Κ V 421 CGTGTTCTGCCACTTTTGATGCTCCACGGCTGGCCAGGATCCATCGTCGAGTTCCAGAAG 141 R V T, Ρ L LM LHGW Ρ G SΙ V Ε F 0 Κ ATTATCCCCATGCTCACGACAGCCAAGCCCGATGAAAACTTCGTCTTCGAGCTGATCATC 481 161 Т ТАК ΡD Ε Ν F V F Τ Τ Т Т Ρ Μ T. Е L 541 CCATCTCTGCCCGGATATGGATTCTCCCAAGCTGCCGCTAGACCCGGTCTTGGACCTGCT 181 Ρ S L Ρ G Y GFS Q Α Α Α R P G ь G Ρ Α (Nas.EH1.dF1 and F1)  ${\tt CAGATGGCTGTTGTCTTCAAAAACCTGATGCAAAGACTC}{\tt GGTTTCGAGCAGTTCTACACT}$ 601 ь 201 0 м Α v v F ĸ N L М Q R G F Е Q F Y т 661 CAGGGTGGTGACTGGGGCAGTCTCATCACTGCCAACATGGCTGTGCTGTATCCCAAAAAG 221 0 G G D W G S ь Ι т Α Ν м Α v  $\mathbf{L}$ Y Ρ к Κ (Nas.EH1.F2) 721 GTCATAGGAACTCACCTGAATATGTGCTTCATCGAATCGCATAAGGCTCACTTCTTATCG 241 v Т G н ь Ν м С F Т Е S н к Α н F L S 781 CTCGTCGGCGCGTACATCCCATCTCTGGTCGTCGACAGCGAGCATTACTCCAAGATGTAT 261 ь v G Α Y Ι Ρ S L v v D S Е н Y SKM Y (Nas.EH1.R2)  ${\tt CCGTTGTCCTACCACTTCGGCCGCTTGATCGAAGAGACCG} {\tt GTTACTTGCACATCCAGGC} {\tt CCGTTGTCCTACCACCACGCCTGATCGAAGAGACCG} {\tt CCGTTGTCCTACCACATCCAGGC} {\tt CCGTTGTCCTACCTACCACATCCAGGC} {\tt CCGTTGTCCTACCTACCACATCCAGGC} {\tt CCGTTGTCCTACCTGCACATCCAGGC} {\tt CCGTTGTCCTACCTTGCACATCCAGGC} {\tt CCGTTGTCCACATCCAGGC} {\tt CCGTTGTCCTACCTTGCACATCCAGGC} {\tt CCGTTGTCCACTTGCACATCCAGGC} {\tt CCGTTGTCCACTTGCACATCCAGGC} {\tt CCGTTGTCCACTTGCACATCCAGGC} {\tt CCGTTGTCCACTTGCACATCCAGGC} {\tt CCGTTGTCCACTTGCACATCCAGGC} {\tt CCGTTGCACTTGCACATCCAGGC} {\tt CCGTTGCACTTGCACATCCAGGC} {\tt CCGTTGCACTTGCACATCCAGGC} {\tt CCGTTGCACTTGCACATCCAGGC} {\tt CCGTTGCACTTGCACTTGCACATCCAGGC} {\tt CCGTTGCACTTGCACTTGCACTTCCAGGC} {\tt CCGTTGCACTTGCACTTGCACTTCCAGGC} {\tt CCGTTGCACTTGCACTTCCAGGC} {\tt CCGTTGCACTTGCACTTGCACTTCCAGGC} {\tt CCGTTGCACTTGCACTTCCAGGC} {\tt CCGTTGCACTTGCACTTCCAGGC} {\tt CCGTTGCACTTGCACTTGCACTTCCAGGC} {\tt CCGTTGCACTTGCACTTCCAGGC} {\tt CCGTTGCACTTGCACTTCCA$ 841 F г Ι Е т 281 Ρ ь S н G R Е G Y  $\mathbf{L}$ н Α Y т 0 901 ACGAAACCTGAAACAGTTGGCGCCGCACTTACGGATTCGCCGGCTGGTCTCGCCGCGTAC 301 т к Ρ Е т v G Α А ь т D S Ρ Α G ь А А Y (Nas.EH1.dR1 and R1) 961 ATCCTTGAGAAGTTCAGCACCTGGACGAATCCAGACTATAGGTTCCGCGACGATGGTGGA 321 W т Ν Р D Y Т L Е к F S т R F R D D G G 1021 CTTCTGGAGAAGTTCACCATGGACGAGCTTTTGGACAACCTCATGGTCTACTGGGTGACC 341 ь L Е ĸ F т M D Е ь L D N L М v Y W V Т 1081 AACTCCATCACCAGCCAGCCGACTCTACGCCGAATGCTTCAGCAAGGCCAACAGGGAG 361 S Ι Т Т S Q R L Υ Α Ε С F S Κ Α Ν R Ε (Nas.EH1.R3) CTCGGAGTTGACAAAATGCCGATCTTCGTGCCAACCGCCTGTGCCAACTTCCCGCACGAG 1141 381 Ι F V Т G V D Κ М Ρ Ρ Α С Α Ν F Ρ Η Ε L 1201 TTGGCCTACAGGTCGGAAACCATCCTCAAGGAACGTTTCACGAACCTGGTCCAGTTCACT 401 S Ε Т Ι L Κ Ε R F Т Ν Α Υ R L V 0 F Т 1261 CATCCTCCACGAGGTGGTCACTTCGCCGCTTTTGAGGAGCCCGAACTTCTGGCCAACGAC 421 Η Ρ Ρ G G H F А Α F Ε Ε Ρ Ε L L Α Ν D R 1321 GTCTGGAGCTTTGTGCACAAGCTCGAGCAGCGACTCAGTGATGAGAAACGACAGAAGCAG 441 S F V Н R L S D Ε Κ R V W KLEQ Κ Q 0 (Nas.EH1.R4) GAGGCCAAGAAAGAAAAGGCGAAGAAGGCGTGA 1381 461 Ε А Κ ΚE Κ А Κ Κ Α

Fig. S1. Nucleotide and deduced amino acid sequences of the putative Nasonia vitripennis epoxide hydrolase gene Nasvi-EH1. The sequences are numbered at the left. Stop codon indicated by asterisk. The Nasvi-EH1 N terminus (EHN) is coded in italics, the abhydrolase\_1 region is encoded in bold. Nucleotide sequences (5–3') of primers that were used in the gene amplification are underlined and written in italics. The primer names are given above the respective sequences.

Athro-JHEH Nasvi-EH1* Apime-EH	MTILKYSLIGVGLIVGISYLFNQGGNQKAPKLGDQWWGPGKE-QKIVKDVVPFKVNFSKG MGVLLWGFLGIVLIGGATIFISPP-VQQPPKLTDVYWGPGDEPKKTDTSVRPFKITFQKE MYYFHFIYLFSVN-ELNVPTLPETNWGSKKN-EKESIEIRPFKIDVSKS * * ** ** * ** *	59 59 47
Athro-JHEH Nasvi-EH1* Apime-EH	DIEDLKTRLKNTRNLTPALENAGWTYGVDGKFVPKIVDYWLNKYDFKKREQYLNQYDQFV MLDDLRNRLKNTRKMQPPLENVGWTYGLSGDFVPVIVDHWLNKYDFKKREAHLNQYPQFI VLDDLKYRLAHRRTFKKPLENVGWTYGISTTYLNTVLDYWRDKYNWTERQALLNKYPQFM ** ** * ** ****** *** ****	119 119 107
Athro-JHEH Nasvi-EH1* Apime-EH	TNIQGLNIHFLHVRPKNSGGKRVLPLLIQHGWPGSVVEFYKIIPMLTTPRDDYDFVF TNVQGLDIHFIHVKPQLPKNSK-IQVLPLYLQHGWPGSIVEFQKIIPMLTTPRSDRNFVF TTIQGLDIHFYHVKPNLPNNKN-LKVLPLLMLHGWPGSVVEFQKIIPMLTKPWPNQNFVF * *** *** ** * * * * * * ***********	176 178 166
Athro-JHEH Nasvi-EH1* Apime-EH	EVIAPSLPGFGFPSGAVRPGLGAAQIAVVLKNLMLRLGFNKFYTQGGDWGAIITAHMAVL EVVAPSLPGFGYSQAASKAGLGAVQMAHLMKNLMLRLGFDKFYTQGGDWGAVIGANMASM EVIVPSLPGYGFSEGAVRPGMANAQIAVIFKNLMQRLGFEKFYVQGGDWGSVIASDMAVL ** ***** * * * * * * * * * **** ****	236 238 226
Athro-JHEH Nasvi-EH1* Apime-EH	FPEHVLGIHSNMCAVLQPQTFFTTYLYSYWPSLLVPDEDYHLMYPLSKKWSRTIEETGYF         YPQHVLGMHSNMCLVVRPWTWLKIAAYSLMPSLLPEDE-RQLMFPLSTKLALGIEETGYL         FPEKIIGLHNNMCTSLNLSNLFWLFVGTYFPSLIGANEHYSKFFPVSEILSFLIEESGYF         *       * * * * * * * * * * * * * * * * * * *	296 297 286
Athro-JHEH Nasvi-EH1* Apime-EH	HIQATKPDTLGAALADSPAGLAAWILEKFSTGTNPELRFKEDGGLFDIHSPDELLDNVML HLQATKPDTIGIGVSDSPAGLAAYILEKMAYCTKPDNKFTDDGNLLEKFTMDELIDNLMM HIQATKPDTIGAALTASPDALAAYILEKFSVWTNKTYKKQDDGGITEKFVLDELLDNIMI * ******* * ** *** * * ** *** *	356 357 346
Athro-JHEH Nasvi-EH1* Apime-EH	YWMPNSMTTAIRIYAETFSAANRALRMDYVPIEVPSACAQFPHEISYQPPSLLSARYKKL YWAPNKASSSFRIYAESFNKQTFGYKMDNVPVTVPSACAQFPYEIIFQSANFLRDRFVNL YWITNSITTSVRLYAENYTSSYRSLKIDQLPIKVFTACAVFPNEILVLPESLLKQKYPNI ** * * * *** * * * * * * * * * * * *	416 417 406
Athro-JHEH Nasvi-EH1* Apime-EH	IRARKMPKGGHFAAFEQPQLLADEVWTSIGIMEADKKQRE-DKLKKSA- 463 LRVTKMPRGGHFAVLEEPQLLADDIWASVQAFRDYYAAQEQERLEKQKS 466 IQYNIISRGGHFAAFEEPRLLADDIFSFVKKIENLTSKSS 446	

Fig. S2. Amino acid sequence alignment of Nasvi-EH1 from Nasonia vitripennis with epoxide hydrolase genes from Apis mellifera (Apime-EH) and Athalia rosae (Athro-JHEH), using CLUSTAL W analysis. Name of gene sequences are given to the left and amino acids are numbered to the right. Identical amino acid positions are indicated by asterisks.

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**Fig. S3.** Effect of the injection of dsRNA corresponding to *Nasvi-EH1* (EH1) on the quantity of gene transcripts of the nontarget gene *Nasvi-EH2* in male rectal vesicles as estimated by quantitative real time RT-PCR analysis. Control males were injected with  $1 \times$  DEPC-PBS buffer. No significant differences were found (*t* test for independent samples).

DNAS





Trini-JHEH	MARLLFI-LPVLALVFLPVYFLFLQSPPPVPNVDMNDWWGPESAKEKQDTS	50
Trini-mEH	MGRLLFL-VPVLAIVLLPVYYLFLQGPPPLPDLDYNEWWGPESGKQKQDTS	50
Bommo-JHEH	MSRLLFIALPLLVLASIPLYLLVLKSPPPMPKLDLEEWWGPPELKQKQDTS	51
Spoex-JHEH	MG-FIVKAVLVAALGVAAWYYFIGCCPKTIPKLDNNEWWGPKELVGKQDNA	50
Manse-JHEH	MYKILSSFVAGVAIGSGLVITYVLYNVPEPPELDLQRWWGIGTRPTEEDKS	51
Nasvi-EH2	MWKGAAVFLLATLAIGWHLRYQGPVEVPDLPNQYWGPGKP-VPDPKD	46
Apime-EH	MYYFHFIYLFSVNELNVPTLPETNWGSKKN-EKESIE	36
Athro-JHEH	MTILKYSLIGVGLIVGISYLFNQGGNQKAPKLGDQWWGPGKE-QKIVKD	48
Nasvi-EH1*	MGVLLWGFLGIVLIGGATIFISPP-VQQPPKLTDVYWGPGDEPKKTDTS	48
Trica-EH	MGCGCVIVTAIAVIFILKFVHKIKRFFKVPTVPYLEETWWGPRDK-TEEDDS	51
Trica-mEH	MNALIKFIVLLIALAIGNVIYKINTKESVKVPPETWWGPGDP-SKEDTR	48
Ctefe-JHEH2	MSNCCRILWIAIVIGLGVLYYEITKEFPKPNIPLDTWWGTGKS-QKIDTS	49
Ctefe-JHEH1	MGKCCRMLIFAAIAGIAVLYYQITKELPKPNIPLDTWWGPGKP-QNVDIS	49
Drome-mEH	MANIWPRILVGALTILVAVGYKNYRDLSAPGKRPDLDNNAYWGPTLKEPYRENK	54
Drome-JHEH2	MANIWPRILVGALTILVAVGYKNYRDLSAPGKRPDLDNNAYWGPTLKEPYRENK	54
Drome-JHEH1	MGVTVKILVLILAIAGGLVYRNVTQLWADLPAPKLDPQEWWGDEAQPKDYEAYLKNN	57
Drome-JHEH3	-MKCLIVFGLIVALFGAFVGYGYVVFTELTKPLPKPEFKDDTYWGPGDAKDFVPDE	55
Aedae-EH1	MGFCARVLFVGATLLLAVSYKQYKDATGPLPVPSLDPNEYWGPGDVRQYKEDV	53
Anoga-EH	MGFMLRVLFVGISLATAVVFKQYRNLTAPMPVPDLNMKQYWGPGDVKQYREDT	53
		52
Aedae-EH2	MGFAGRFVLVIFILLVGVLFKVFQDLSAFAAIPAIDIQEIWGPGDVKNNKENV	55
Aedae-EH2	**	55
Aedae-EH2 Trini-JHEH	RGFRGRFVEVIFILLVGVEFKFQDESAFAATATIGEENGFGDVRANKENV ** IRPFKISFGNNNVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAKDYN	106
Aedae-EH2 Trini-JHEH Trini-mEH	RGFRGRFVEVIFILLVGVEFKVFQDESAFAATFAIDIQEIWGFGDVRWNRENV ** IRPFKISFGNNNVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAEGYN	106 106
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH	RGFRGRFVEVIFIELGGUFRCFQDDSAFRAFFRIDIQEINGFGDVRANRENV **IRPFKISFGNNNVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAKDYNVRPFKINFGENLVKDLKDRLKRTRPLTPPLEGVGFEYGFNTNEINSWLKYWAEGYNIKPFEITFSETMVKELKERIKKRRPFAPPLEGVGFKYGFNSKQLDSWLKYWAEEYP	106 106 107
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH		106 106 107 106
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH Manse-JHEH		106 107 106
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH Manse-JHEH Nasvi-EH2	IRPFKISFGNNNVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAKDYN    VRPFKINFGENLVKDLKDRLKRTRPLTPPLEGVGFEYGFNTNEINSWLKYWAEGYN     -IKPFEITFSETMVKELKERIKKRRPFAPPLEGVGFEYGFNTAQIDSWLKYWAEEYP     -IRPFKVKFDEAMIKDLKLRLKNRRAFRPPLEGVGFEYGFNTAQIDSWINYWADKYN     -IRPFSIDFNDTVILDLKERLKNRRPFTKPLEGINSEYGMNTEYLETVLEYWLNEYN     -IKPFKIDVPKEVIDDLNKRLDSTRSFVEPLEGSAWTYGISSTYLKTVLNHWRKKYN	106 106 107 106 107 102
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH Manse-JHEH Nasvi-EH2 Apime-EH		106 106 107 106 107 102 92
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH Manse-JHEH Nasvi-EH2 Apime-EH Athro-JHEH		106 106 107 106 107 102 92 104
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH Manse-JHEH Nasvi-EH2 Apime-EH Athro-JHEH Nasvi-EH1*		106 106 107 106 107 102 92 104
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH Manse-JHEH Nasvi-EH2 Apime-EH Athro-JHEH Nasvi-EH1* Trica-EH	**IRPFKISFGNNNVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAKDYNVRPFKINFGENLVKDLKDRLKRTRPLTPPLEGVGFEYGFNTNEIDSWLKYWAEGYNIRPFEITFSETMVKELKERIKKRRPFAPPLEGVGFEYGFNTAQIDSWLKYWAEGYNIRPFFSIDFNDTVILDLKERLKNRRPFTKPLEGINSEYGMNTEYLETVLEYWLNEYNIRPFFKIDVPKEVIDDLNKRLDSTRSFVEPLEGSAWTYGISSTYLKTVLNHWRKKYNIRPFFKIDVSKSVLDDLKYRLAHRRTFKKPLENVGWTYGISTTYLNTVLDYWLNKYDVVPFKVNFSKGDIEDLKTRLKNTRNLTPALENAGWTYGVDGKFVPKIVDHWLNKYDVRPFKITFQKEMLDDLRNRLKNTRKMQPPLENVGWTYGLSGDFVPVIVDHWLNKYD	106 107 106 107 102 92 104 104
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH Manse-JHEH Nasvi-EH2 Apime-EH Athro-JHEH Nasvi-EH1* Trica-EH Trica-mEH	**IRPFKISFGNNNVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAKDYNVRPFKINFGENLVKDLKDRLQRTRPLTPPLEGVGFEYGFNTNEIDSWLKYWAKDYNIRPFEITFSETMVKELKERIKKRRPFAPPLEGVGFEYGFNTAQIDSWLKYWAEEYPIRPFSIDFNDTVILDLKERLKNRRPFTKPLEGINSEYGMNTEYLETVLEYWLNEYNIRPFKIDVPKEVIDDLNKRLDSTRSFVEPLEGSAWTYGISSTYLKTVLNHWRKKYNIRPFKIDVSKSVLDDLKYRLAHRRTFKKPLENVGWTYGISSTYLKTVLNHWRKKYNVVPFKVNFSKGDIEDLKTRLKNTRNLTPALENAGWTYGVDGKFVPKIVDYWLNKYDVRPFKITFQKEMLDDLRNRLKNTRKMQPPLENVGWTYGLSGDFVPVIVDHWLNKYDIQPFTVKVPDEVITDLQQRLQNARPLTPPLEGVQHQYGINTNLLKKIVDFWRNEYNIVPFKIQVPNQILEDLRQRLKNARKFAPPLEGVHQHYGINTNLLKEIVNYWLTKYD-	106 107 106 107 102 92 104 104
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH Manse-JHEH Nasvi-EH2 Apime-EH Athro-JHEH Nasvi-EH1* Trica-mEH Ctefe-JHEH2	**IRPFKISFGNNNVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAKDYNVRPFKINFGENLVKDLKDRLQRTRPLTPPLEGVGFEYGFNTNEIDSWLKYWAEGYNIRPFFINFGENLVKDLKDRLKRTRPLTPPLEGVGFEYGFNTAQIDSWLKYWAEGYNIRPFFSIDFNDTVILDLKERLKNRRPFTKPLEGINSEYGMNTEYLETVLEYWLNEYNIRPFFSIDFNDTVILDLKERLKNRRPFTKPLEGINSEYGMNTEYLETVLEYWLNEYNIRPFFKIDVPKEVIDDLNKRLDSTRSFVEPLEGSAWTYGISTTYLNTVLDYWRDKYNIRPFFKIDVSKSVLDDLKYRLAHRRTFKKPLENVGWTYGISTTYLNTVLDYWRDKYNVVPFFKVNFSKGDIEDLKTRLKNTRNLTPALENAGWTYGLSGDFVPVIVDHWLNKYDIQPFTVKVPDEVITDLQQRLQNARPLTPPLEGVQHQYGINTNLLKKIVDFWRNEYNIVPFFKIQVPNQILEDLRQRLKNARKFAPPLEGVHQHYGINTNLLKEIVNYWLTKYDMRPFFKIAINDEVLNTLKVKLSDVS-FTPPLEGUFQYGFNTNTLKKLVDFWRTQYN-	106 107 106 107 102 92 104 104 107 104
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH Manse-JHEH Nasvi-EH2 Apime-EH Athro-JHEH Nasvi-EH1* Trica-EH Trica-mEH Ctefe-JHEH2 Ctefe-JHEH1	**IRPFKISFGNNVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAKDYNVRPFKINFGENLVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAKDYNIRPFKINFGENLVKDLKDRLKRTRPLTPPLEGVGFEYGFNTAQIDSWLKYWAEGYNIRPFKIDTSETMVKELKERIKKRRPFAPPLEGVGFEYGFNTAQIDSWINYWADKYNIRPFKIDVPKEVIDDLNKRLDSTRSFVEPLEGSAWTYGISSTYLKTVLNHWRKKYNIRPFKIDVSKSVLDDLKYRLAHRRTFKKPLENVGWTYGISSTYLKTVLNHWRKKYNVVPFKVNFSKGDIEDLKTRLKNTRNLTPALENAGWTYGVDGKFVPKIVDYWLNKYDIQPFTVKVPDEVITDLQQRLQNARPLTPPLEGVQHQYGINTNLLKKIVDFWRNEYNIVPFKIAINDEVLNTLKVKLSDVS-FTPPLEGIDFQYGFNTNTLKKLVDFWRTQYNIRPFKIAINDEVLNTLKVKLSDVS-FTPPLEGIDFQYGFNTNTLKKLVDFWRTQYN	106 107 106 107 102 92 104 104 104 104
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH Manse-JHEH Nasvi-EH2 Apime-EH Athro-JHEH Nasvi-EH1* Trica-mEH Ctefe-JHEH1 Drome-mEH	**IRPFKISFGNNNVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAKDYNVRPFKINFGENLVKDLKDRLQRTRPLTPPLEGVGFEYGFNTNEIDSWLKYWAEGYNIRPFFINFSETMVKELKERIKKRRPFAPPLEGVGFEYGFNTAQIDSWLKYWAEGYNIRPFFIDFNDTVILDLKERLKNRRPFTKPLEGINSEYGMNTEYLETVLEYWLNEYNIRPFFIDVFKUDVFKEVIDDLNKRLDSTRSFVEPLEGSAWTYGISSTYLKTVLNHWRKKYNIRPFFKIDVSKSVLDDLKYRLAHRRTFKKPLENVGWTYGISTTYLNTVLDYWRDKYNVVPFFKVNFSKGDIEDLKTRLKNTRNLTPALENAGWTYGUSGFVPVIVDHWLNKYDIQPFTVKVPDEVITDLQQRLQNARPLTPPLEGVQHQYGINTNLLKKIVDFWRNEYNIVPFFKIQVPNQILEDLRQRLKNARKFAPPLEGVHQHYGINTNLLKEIVNYWLTKYDIRPFFKIAINDEVLNTLKVKLSDVS-FTPPLEGIDFQYGFNTNLLKKIVDFWRTQYNIRPFFKININNKVIENLKLKNDVQ-YTLPLEGINFEYGFNTDSLKKIVDFWRTQYNAILPFFUSVFFVIEDLIGQLSRPLKAQAPLEGVGFQYGFNANELAKVVKYWRDTYLPK	106 107 106 107 102 92 104 104 104 104 104
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH Manse-JHEH Nasvi-EH2 Apime-EH Athro-JHEH Nasvi-EH1* Trica-EH Trica-mEH Ctefe-JHEH2 Drome-mEH Drome-JHEH2	** IRPFKISFGNNNVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAKDYNVRPFKINFGENLVKDLKDRLQRTRPLTPPLEGVGFEYGFNTNEIDSWLKYWAEGYNIRPFEITFSETMVKELKERIKKRRPFAPPLEGVGFEYGFNTAQIDSWLKYWAEGYNIRPFSIDFNDTVILDLKERLKNRRPFTKPLEGINSEYGMNTEYLETVLEYWLNEYNIRPFSIDFNDTVILDLKERLKNRRPFTKPLEGINSEYGMNTEYLETVLEYWLNEYNIRPFKIDVPKEVIDDLNKRLDSTRSFVEPLEGSAWTYGISSTYLKTVLNHWRKKYNVVPFKVNFSKGDIEDLKTRLKNTRNLTPALENAGWTYGVDGKFVPKIVDYWLNKYDVRPFKITFQKEMLDDLRNRLKNTRKMQPPLENVGWTYGLSGDFVPVIVDHWLNKYDIQPFTVKVPDEVITDLQQRLQNARPLTPPLEGVQHQYGINTNLLKKIVDFWRNEYNIRPFKIAINDEVLNTLKVKLSDVS-FTPPLEGIDFQYGPNTNTLKKLVDFWRTQYNIRPFKIAINDEVLNTLKVKLSDVS-FTPPLEGIDFQYGPNTNTLKKLVDFWRTQYNAILPFDISVKPEVIEDLIGQLSRPLKAQAPLEGVGFQYGFNANELAKVVKYWRDTYLPK	106 107 106 107 102 92 104 104 104 104 104 113
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH Manse-JHEH Nasvi-EH2 Apime-EH Athro-JHEH Nasvi-EH1* Trica-mEH Ctefe-JHEH2 Ctefe-JHEH1 Drome-JHEH1	** IRPFKISFGNNNVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAKDYNVRPFKINFGENLVKDLKDRLQRTRPLTPPLEGVGFEYGFNTNEIDSWLKYWAEGYNIRPFFINFSETMVKELKERIKKRRPFAPPLEGVGFEYGFNTAQIDSWLKYWAEGYNIRPFFIDFNDTVILDLKERLKNRRPFTKPLEGINSEYGMNTEYLETVLEYWLNEYNIRPFFIDVKVFDEAMIKDLKLDSTRSFVEPLEGSAWTYGISSTYLKTVLNHWRKKYNIRPFFKIDVSKSVLDDLKYRLAHRRTFKKPLENVGWTYGISTTYLNTVLDYWRDKYNVVPFFKVNFSKGDIEDLKTRLKNTRNLTPALENAGWTYGLSGDFVPVIVDHWLNKYDIQPFTVKVPDEVITDLQQRLQNARPLTPPLEGVQHQYGINTNLLKKIVDFWRNEYNIVPFFKIQVPNQILEDLRQRLKNARKFAPPLEGVHQHYGINTNLLKEIVNYWLTKYDIRPFFKININNKVIENLKLKNDVQ-YTLPLEGINFEYGFNTDSLKKIVDFWRTQYNAILPFDISVKPEVIEDLIGQLSRPLKAQAPLEGVGFQYGFNANELAKVVKYWRDTYLPK SEVIGNRLSYPDKTIADLKERLNRTRLTPPLEGVAFEYGFNTNYLKEVVEYWRDDYLPR	106 107 106 107 102 92 104 104 104 104 104 113 113
Aedae-EH2 Trini-JHEH Trini-mEH Bommo-JHEH Spoex-JHEH Manse-JHEH Nasvi-EH2 Apime-EH Athro-JHEH Nasvi-EH1* Trica-EH Trica-mEH Ctefe-JHEH2 Ctefe-JHEH1 Drome-MEH Drome-JHEH1 Drome-JHEH3	** IRPFKISFGNNNVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAKDYNVRPFKINFGENLVKDLKDRLQRTRPLTPPLEGVGFDYGFNTNEIDSWLKYWAKDYNIRPFEITFSETMVKELKERIKKRRPFAPPLEGVGFEYGFNTAQIDSWLKYWAEGYNIRPFSIDFNDTVILDLKERLKNRRPFTKPLEGINSEYGMNTEYLETVLEYWLNEYNIRPFKIDVPKEVIDDLNKRLDSTRSFVEPLEGSAWTYGISSTYLKTVLNHWRKKYNIRPFKIDVSKSVLDDLKYRLAHRRTFKKPLENVGWTYGISTTYLNTVLDYWRDKYNVVPFKVNFSKGDIEDLKTRLKNTRNLTPALENAGWTYGVDGKFVPKIVDYWLNKYDIQPFTVKVPDEVITDLQQRLQNARPLTPPLEGVQHQYGINTNLLKKIVDFWRNEYNIRPFKIAINDEVLNTLKVKLSDVS-FTPPLEGIDFQYGFNTNTLKKLVDFWRNEYNIRPFKIAINDEVLNTLKVKLSDVS-FTPPLEGIDFQYGFNTNTLKKLVDFWRTQYNNRPFKIAINDEVLNTLKVKLSDVS-FTPPLEGIDFQYGFNTNTLKKLVDFWRTQYNAILPFDISVKPEVIEDLIGQLSRPLKAQAPLEGVGFQYGFNANELAKVVKYWRDTYLPK SEVIGNRLSYPDKTIADLKERLNRTLRLTPPLEGVAFEYGFNTNYLKEVVEYWRDDYLPR -KIYEFKLQVPQSEIDDLRKELNRTLRLTPPLEGVAFEYGFNTNYLKEVVEYWRDDYLPR	106 107 106 107 102 92 104 104 104 104 104 113 113 117 114

**Fig. S5.** CLUSTAL W amino acid sequences alignment of the epoxide hydrolase genes of *N. vitripennis* (*Nasvi-EH1*\*), (*Nasvi-EH2* = GenBank accession no. XP\_001602953), *Apis mellifera* (*Apime-EH*), *Athalia rosae* (*Athro-JHEH*), *Manduca sexta* (*Manse-JHEH*), *Bombyx mori* (*Bommo-JHEH*), *Spodoptera exigua* (*Spoex-JHEH*), *Trichoplusia ni* (*Trini-mEH*, and *EH*), *Drosophila melanogaster* (*Drome-JHEH1*, 2, and 3 and *mEH*), *Aedes aegypti* (*Aedae-JHEH1*, and 2), *Ctenocephalides felis* (*Canfe-EH1*, and *2*), and *Tribolium castaneum* (*Trica-EH*, and *mEH*). Gene names are given to the left, Identical amino acid positions are indicated by asterisks.

Anoga-EH	-SIKPFKVSYDAAVIEKLRGKLTDVPKLTPPLDGVAFEYGFNTNRLQDILKYWRTTYLDK	112
Aedae-EH2	-EVKSFELNYGEDVIGKLRNRLDDVPKFAEPLEGTAFEYGFNSKKLGEILKYWRSDYLER	112
	* * ** **	
Trini-JHEH	$\label{eq:pressure} FKERETFLNQFPQFKTNIQGLDIHFIRVTPKVPQGVEVVPLLLLHGWPGSVREFYEA$	163
Trini-mEH	FKERETFLNQFPQFKTNIQGLDIHFIKVTPKVPAGVQVVPMLLLHGWPGSVREFYES	163
Bommo-JHEH	$\label{eq:particle} FAERQKFLNQYPHFKTNIQGLNIHFMRITPKVPKDVEIVPLLLLHGWPGSVREFYEA$	164
Spoex-JHEH	FSEREAFLNKFPHFKTNIQGLDIHFIRVKPEVPKNVEVLPLLMIHGWPGSVREFYEA	163
Manse-JHEH	FKKRAELLNKFPHYKTRIQGLDLHFIRVKPEIKEGVQVLPLLMMHGWPSSSKEFDKV	164
Nasvi-EH2	WSQRQALLNKYPQFKTKIQGLDIHFYHVKPQVPKDRK-VRVLPLLMLHGWPGSIVEFQKI	161
Apime-EH	WTERQALLNKYPQFMTTIQGLDIHFYHVKPNLPNNKN-LKVLPLLMLHGWPGSVVEFQKI	151
Athro-JHEH	FKKREQYLNQYDQFVTNIQGLNIHFLHVRPKNSGGKRVLPLLIQHGWPGSVVEFYKI	161
Nasvi-EH1*	FKKREAHLNQYPQFITNVQGLDIHFIHVKPQLPKNSK-IQVLPLYLQHGWPGSIVEFQKI	163
Trica-EH	WKERETFLNKLPQFTVSVQGLRLHYIHVKPEKT-DGLKVLPLLMLHGWPGSVREFYEI	164
Trica-mEH	WRERENFLNQYPQFKTNIQGLDVHFIHVKPKNVPSGVKTQPLLLVHGWPGSVREFYEI	162
Ctefe-JHEH2	WREREALLNKYPHFKTNIQGLDIHYVHIKPQVSKNIHVLPMIMVHGWPGSFVEFYKI	161
Ctefe-JHEH1	WREREALLNKYPHFKTNIQGLDIHYVHIKPQVSKNIEVLPLVMIHGWPGSFVEFYKI	161
Drome-mEH	WSEREEYLKKLDHYQTEIQGLKIHFIHAKPSQVKGQKPKKVLPLLLMHGWPGTVREFYDF	173
Drome-JHEH2	WSEREEYLKKLDHYQTEIQGLKIHFIHAKPSQVKGQKPKKVLPLLLMHGWPGTVREFYDF	173
Drome-JHEH1	WREREVFLWQFNHFTTDIQGLRTHFLHLMVYDDNKVG-KKHYPVLLLHGWPGSVREFYDF	176
Drome-JHEH3	WDERQELFNSFKQYKTEIQGLNIHYIHEKVSEEAKEK-KHVYPLLLLHGWPGSVREFFDF	173
Aedae-EH1	WTEREAFLNKFPHFKTQIQGLNIHFIHVKPKVPAGTKVLPLLLLHGWPGSVREFYDV	169
Anoga-EH	WSEREKFLNKFPHFQTQIQGLNIHYIHVKPKVPAGTKVLPLLLLHGWPGSVREFYDI	169
Aedae-EH2	WDERQKYLNRFPQFKTQIQGLDIHFLRVKPEVQNPKRIVPLLMLHGWPGSVQKFYEI	169
	* *** * * **** *	
Trini-JHEH	IPLLTAVSKDRDFAFEVIVPSLPGYGFSDPAVRPGLGAPQIGVVMKNLMSRLGYKQFY	221
Trini-mEH	IPLLTAVSKDRDFALEVIVPSLPGYGFSDGAVRPGMGAPHIGIIMRNLMNRLGYKRYF	221
Bommo-JHEH	IPHLTAVSRDRNFALEIIAPSLPGYGFSDAAVRPGLAAAEVAVIFKNLMARLGYKQYY	222
Spoex-JHEH	IPLLTRQTAGYNFVFELIIPSIPGYGFSDPAVRPGLGMPQVAVIFRNLMNRLGHKKYY	221
Manse-JHEH	IPILTTPKHEYNIVFEVVAVDLPGYGFSEGTNKPGLNPVQIGVMMRNLMLRLGFEKFY	222
Nasvi-EH2	IPMLTTAKPDENFVFELIIPSLPGYGFSQAAARPGLGPAQMAVVFKNLMQRLGFEQFY	219
Apime-EH	IPMLTKPWPNQNFVFEVIVPSLPGYGFSEGAVRPGMANAQIAVIFKNLMQRLGFEKFY	209
Athro-JHEH	IPMLTTPRDDYDFVFEVIAPSLPGFGFPSGAVRPGLGAAQIAVVLKNLMLRLGFNKFY	219
Nasvi-EH1*	IPMLTTPRSDRNFVFEVVAPSLPGFGYSQAASKAGLGAVQMAHLMKNLMLRLGFDKFY	221
Trica-EH	IPLLTKPQPGRDFVFEVIAPSLPGYGFSEAAVRPGLGAIQMAVLFKNFMNRLGFQKYY	222
Trica-mEH	IPLLTTVQKDKKFVFEVIIPSLPGYGFSQAAVRPGLGAHQTAVIFKNLMKRLGFDRYY	220
Ctefe-JHEH2	IPMLTTPRTDYNFVFELILPSIPGYGFSQAAAKPGLGATQIAVIMHNLMDRIGFKKYY	219
Ctefe-JHEH1	IPMLTTPRAGYNFVFELILPSIPGYGFSQAAAKPGLGSTQVAVIMRNLMERIGFKKYY	219
Drome-mEH	IPLLTTPSDKSDYVFEVIAPSLPGYGWSQGSSKTGFGVAQVAVVMRNLMLRVGFDKFL	231
Deserve THERE		
DIOME-JHEHZ	IPLLTTPSDKSDYVFEVIAPSLPGYGWSQGSSKTGFGVAQVAVVMRNLMLRVGFDKFL	231

Drome-JHEH1	${\tt IHLLHQTNLDNNKYIFNVVVPSLPGYGWSQGTSRKGLGPAQVAVMMRNLMLRLGYNKFF}$	236
Drome-JHEH3	${\tt IPMLTKHSNITDYAFEVVAPSLVGYGWSDAATRPGFNAAEMATVMRNLMLRLGHKKFF}$	231
Aedae-EH1	IPKLTTKSDDKDFVFEVVVPSLPGYGWSEGASKQGLSPSRIAVIMKNLMDRVGHKKFY	227
Anoga-EH	IPLLTTSSKDKDFVFEVIVPSLPGYGWSQGSAKKGLSPSEVAIVMKNLMSRVGFEQFY	227
Aedae-EH2	${\tt IPRLVARSDDKEYVFEVIVPSLPGYGFSQGASKQGLSPAKIAVIMRNLMARLGFKKYY}$	227
	* * * * * * * * * * * * *	
Trini-JHEH	eq:loggdwgaligncivtlfpkdilgyhtnmpivmsakstlfellgsvfpsliledmstyer	281
Trini-mEH	VQGGDWGSVIGTSLATFFPEEVLGYHANIGLVLSTKAMVWQAIGSVWPSLIMDDLSLVDR	281
Bommo-JHEH	$\label{eq:construction} VQGGDWGALIGSAMATSFPKEIIGFHSYMALTLSPAATFLEFVGALFPSLIVEP-ELANR$	281
Spoex-JHEH	eq:VQGGDWGAGIVSTMSTLFPEDILGHHSNMLFTQHTCATVRTLVGAFLPSLIIEE-HLASR	280
Manse-JHEH	${\tt IQAGDWGSQCATHMATLFPDQVLGLHTNMPLSSRPLSTVKLFIGALFPSLIVDA-KYMDR}$	281
Nasvi-EH2	TQGGDWGSLITANMAVLYPKKVIGTHLNMCFIESHKAHFLSLVGAYIPSLVVDS-EHYSK	278
Apime-EH	$\label{eq:construct} \texttt{VQGGDWGSVIASDMAVLFPEKIIGLHNNMCTSLNLSNLFWLFVGTYFPSLIGAN-EHYSK}$	268
Athro-JHEH	$\tt TQGGDWGAIITAHMAVLFPEHVLGIHSNMCAVLQPQTFFTTYLYSYWPSLLVPD-EDYHL$	278
Nasvi-EH1*	${\tt TQGGDWGAVIGANMASMYPQHVLGMHSNMCLVVRPWTWLKIAAYSLMPSLLPED-E-RQL}$	279
Trica-EH	IQGGDWGAVITQHMATLYPEKILGLHSNMCFINTLKSQVKLFLFSFYPTLIVKQ-EHVNK	281
Trica-mEH	VQGGDWGSAVTSAMALYYPDRVKGIHLNMCVSNSYLAKLKLLAGSVWPSLVVEE-KQKHK	279
Ctefe-JHEH2	$\label{eq:construction} VQGGDWGSRIVSAMSTLFPENVLGHHSNLCFLNTLSSNIKSFVGSLFPEWFAGK-QNVHK$	278
Ctefe-JHEH1	$\label{eq:construction} VQGGDWGSMIISAMSTLFPENVLGQHSNMCFVNTPSSNIKAIIGSFFPESFAGT-GNAHK$	278
Drome-mEH	$\label{eq:construction} VQGGDWGSIIGSNVASLFPENVLGYHSNMCGNNSPMGQLKMVLASFFPSWFVDSE-YADF$	290
Drome-JHEH2	$\label{eq:construction} VQGGDWGSIIGSNVASLFPENVLGYHSNMCGNNSPMGQLKMVLASFFPSWFVDSE-YADF$	290
Drome-JHEH1	IQGGDWGSIIGSNIATLYPENVLGYHSNMCNNLSPKSLAKGLVAEFWPSLFVPSG-FEDF	295
Drome-JHEH3	IQGGDWGSIIGSNLATLYPENVIGYHSNMCVLHTPLAILKGIYGSFFPEKYLPSRFFVDH	291
Aedae-EH1	$\label{eq:construction} VQGGDWGSLIANLISTLYQDNVLGVHMNMCGANGLQAILKSIIASFRPSMFIEEK-YVDY$	286
Anoga-EH	${\tt IQGGDWGSLIGNYIATYFQSNVLGVHLNMCSIMTPLSYPKMFLAALKPSLFIDEQ-YTDF$	286
Aedae-EH2	$\verb VHGGDWGSVIGNLMATFFQDEVLGVHLTMCMNTAPIGTLKNILGAVAPSLVVESQ-YKDF  $	286
	**** * *	
Trini-JHEH	$\verb"LYPLSTRFANLLRETGYMHIQSTKPDTVGVALSDSPAGLLAYILEKFATWTRPDLMSKPN"$	341
Trini-mEH	${\tt IYPLSKTLSFQVRESGYLHIQASKPDTVGVALTDSPAGLLAYIVEKFSIWTRPELTSKPN$	341
Bommo-JHEH	$\verb"LYPLSEKYSTLLEELGYMHIQATKPDTVGIGLTDSPAGLLAYILEKFSTWTNPDLRSKED"$	341
Spoex-JHEH	${\tt IYPLSSFFAYVLEEFGYMHIQATKPDTVGVPLSDSPAGLLAYILEKFSTWTKKEYKFKAG$	340
Manse-JHEH	${\tt IYPLKNLFSYILRETGYFHIQATKPDTIGVALTDSPAGLAGYLIEKMAICSNRDQLDTPH$	341
Nasvi-EH2	${\tt MYPLSYHFGRLIEETGYLHIQATKPETVGAALTDSPAGLAAYILEKFSTWTNPDYRFRDD$	338
Apime-EH	${\tt FFPVSEILSFLIEESGYFHIQATKPDTIGAALTASPDALAAYILEKFSVWTNKTYKKQDD$	328
Athro-JHEH	${\tt MYPLSKKWSRTIEETGYFHIQATKPDTLGAALADSPAGLAAWILEKFSTGTNPELRFKED$	338
Nasvi-EH1*	MFPLSTKLALGIEETGYLHLQATKPDTIGIGVSDSPAGLAAYILEKMAYCTKPDNKFTDD	339

VYPLSSKFAKTLLETGYMHLQATKPDTVGVALNDSPIGLAAYILEKFITWTNPAWRDLED 341

IYPLSNYFSNALLEFGYMHLQATKPDTIGVALNDSPVGLAAYIIEKFTTWTNPEWKNRAD 339

IYPLSEHFFTLLEESGYFHIQATKPDTVGVALRDSPAGLAAYILEKFSTGTNKAWRSAKD 338

Fig. S5. (Continued)

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Trica-EH

Trica-mEH

Ctefe-JHEH2

Ctefe-JHEH1	${\tt MYPMSEHFFTLLEEMGYLHLQATKPDTVGVALRDSPAGLAAYILEKFSTWTNRSWRSVKD$	338
Drome-mEH	$\label{eq:constraint} YKGLGHLFSTIMEEMGYAHIQASKPDTIGNALIDNPTGLASYILEKFSTWTNTAFRSLPD$	350
Drome-JHEH2	$\label{eq:construction} YKGLGHLFSTIMEEMGYAHIQASKPDTIGNALIDNPTGLASYILEKFSTWTNTAFRSLPD$	350
Drome-JHEH1	${\tt FFPKSNEmrylmeesgyfhiQatkpdtigaaltdnpvglaayilekfstwtnpsyrslpd$	355
Drome-JHEH3	${\tt HFPVWeKWLELLEESGYFHIQATKPDTIGAALTSSPVGLASYILEKFQTCTNPGLK-QDF}$	350
Aedae-EH1	$\verb"YYPSGPKFMQLLVESGYMHLQATKPDTIGTALVGNPVGLAAYIIEKFSTWTNPSYRQLAD"$	346
Anoga-EH	$\tt YFPLSAKFANIIEETGYMHIQSTKPDTIGTVLQGNPVGLAAYILEKFSTWTNPAYRNLAD$	346
Aedae-EH2	$\verb"YYPYLDRLKLLIAETGYMHIQATKPDTIGAVLTGNPVGLATYILEKFSTWTNPQYRSLAD"$	346
	* ** * * ** * * * **	
Trini-JHEH	${\tt GGLDYRFTRDQLIDNLMMYWTNRAITPAMRLYAENFNKRTVEMKLDEIPTPVPTWGLQTK$	401
Trini-mEH	${\tt GGLDFRFTKDQLIDNLMMYWTSKSITTSVRLYAESFNIKVLGYQLDDIFTPVPSWFIQGK}$	401
Bommo-JHEH	${\tt GGLSYRWTKDQLIDNLMLYWSTKSIVTSMRLYAESFSSRHFDLKLDEIQVQVPTWVLQAK}$	401
Spoex-JHEH	${\tt GGLSNRFTKDQLIDNLMIYWSTNSITTSMRFYAENFSHKIMSLNLDQIPTDVPTWGLQAK}$	400
Manse-JHEH	${\tt GGLEN-LNLDDVLDTVTINWINNCIVTSTRLYAEGFSWPEV-LIVHRIPSMVPTAGINFK}$	399
Nasvi-EH2	${\tt GGLLEKFTMDELLDNLMVYWVTNSITTSQRLYAECFSKANRELGVDKMPIFVPTACANFP}$	398
Apime-EH	${\tt GGITEKFVLDELLDNIMIYWITNSITTSVRLYAENYTSSYRSLKIDQLPIKVFTACAVFP}$	388
Athro-JHEH	${\tt GGLFDIHSPDELLDNVMLYWMPNSMTTAIRIYAETFSAANRALRMDYVPIEVPSACAQFP}$	398
Nasvi-EH1*	${\tt GNLLEKFTMDELIDNLMMYWAPNKASSSFRIYAESFNKQTFGYKMDNVPVTVPSACAQFP}$	399
Trica-EH	${\tt GGLTKKYSYTSLLDNVMIYWVTNSITTSMRLYAETFNKNQTKLGVAKIPTTVPTACARFS}$	401
Trica-mEH	GGLLERFTYDKILDNIMIYWVTNSITTSMRIYAESINK-ESNVFDDRAVITVPSACALFD	398
Ctefe-JHEH2	GNLQSKFTFTELLDNVMIYYVTGSITTSMRIYAESYSWDHLSLNMDRVPTIVPTACAKFP	398
Ctefe-JHEH1	${\tt GNLLLKYNIPELLDNVMIYYVTDSITTSMRLYAESFTKAHLALNLDRVRNHVPAACAKFP}$	398
Drome-mEH	${\tt GGLTKRFTYDQLLDNVMIYYVTNSITTSMRLYSESMVASQFALAVDSVPIKAKAGCTRFA$	410
Drome-JHEH2	${\tt GGLTKRFTYDQLLDNVMIYYVTNSITTSMRLYSESMVASQFALAVDSVPIKAKAGCTRFA$	410
Drome-JHEH1	${\tt GGLTKRYKMDALLDNLMIYYLTNSITTSQRLYAEQYAQAQRDLHLDRVPTRVPTGCARFK}$	415
Drome-JHEH3	${\tt GAIVTVFGLEavLdnlmvyyLtnsattaarfylenvsktyrdlqldrvqspvpmgcarfr}$	410
Aedae-EH1	${\tt GGLEKYFTLDSLLDNIMIYYLTDSITTSQRIYYEAFSASEFALAIDRIPIRVPTACAKFK}$	406
Anoga-EH	${\tt GGLEKYFSLDALLDNVMIYYLTDSITTSQRIYAEAFASDELKKEIDRIFTAVPAACAKFR}$	406
Aedae-EH2	${\tt GGLEKYFTLDTLLDNIMIYYLSDSITTSQRLYAETFNIKELSRELDRIPTHVPAACAKFR}$	406
	• • • • •	
Trini-JHEH	$\verb"Yelgyqpkyilkikfpnlvgttvlqegghfiafelpevftndvikavtefrklqkknvkt"$	461
Trini-mEH	$\tt YEIAYQPPFVLKLKYPNIVGVTVLDDGGHFFAFELPEVFSKDVLKAVTAFRKLQKNNEKT$	461
Bommo-JHEH	${\tt HELAYQPPCILKLKYTKLVNASVIEDgGHFLAFELPEIFAKDVLKAIGEFRKLKNVKT$	459
Spoex-JHEH	$\tt EELFYQPPAVLSAKFKNLIGTTVLDDGGHFLAFELPQVLSADVFKAVKAFKEWHQANKKT$	460
Manse-JHEH	$\verb"Yevlyqpdwildkfpnlvrstvldfgdhfaalhtpqaladdifasavqflkfhdrkrnq"$	459
Nasvi-EH2	${\tt HELAYRSETILKERFTNLVQFTHPPRGGHFAAFEEPELLANDVWSFVHKLEQRLSDEKRQ$	458
Apime-EH	$\verb"NEILVLPESLLKQKYPNIIQYNIISRGGHFAAFEEPRLLADDIFSFVKKIENLTSKSs$	446
Athro-JHEH	${\tt HEISYQPPSLLSARYKKLIRARKMPKGGHFAAFEQPQLLADEVWTSIGIMEADKKQRE-D$	457
Nasvi-EH1*	$\tt YEIIFQSANFLRDRFVNLLRVTKMPRGGHFAVLEEPQLLADDIWASVQAFRDYYAAQEQE$	459
	Fig. S5. (Continued)	

Trica-EH	YDLAYSPTAVLKEKYKNIVYESDYD-AGHFAAFEEPELLAKDIYKGVEKIEQFHKNNERL	460
Trica-mEH	HEIIYQPVSIFKDRFAKLVQVNEYD-GGHFAAFEVPESLAKDIWLAVSKFEEPPKPNK	455
Ctefe-JHEH2	$\tt HEIAYKTDFQLAEKYKTLLQSTIMPRGGHFAALEEPLLLAEDIFSAVKKFIDHHSKKDSK$	458
Ctefe-JHEH1	${\tt NELAYVTDCQLAEKYKTLLQSNDMPSGGHFAAFEEPGLLAEDIFTAVKKFKEFYSKK-AE$	457
Drome-mEH	HEITHFSDSVLANKFPNLVHSTHHRDGGHFPAFELPQQLYDDFVSFVQKANFS	463
Drome-JHEH2	HEITHFSDSVLANKFPNLVHSTHHRDGGHFPAFELPQQLYDDFVSFVQKANFS	463
Drome-JHEH1	${\tt SDIMQFLDVQLKDKYTNLVHSTYHKKGGHFAALEVPKVLYKDFIDFVETVERKFKIKTL-$	474
Drome-JHEH3	${\tt FDLASVTDWQLRDKFPNLTHSMYFQQGSHFAALEMPAMLFNDFTAFVGKIGLHGEKRK}$	468
Aedae-EH1	YELMHTIDWALKDHFTNLVQSNHFDDGGHFAAMQLPDVLYKDFVEFVKKVEK	458
Anoga-EH	HELFQQIDWVLKDHFTNLVQSNHFEDGGHFAAMQLPEVLYKDFVAFIASIQK	458
Aedae-EH2	YELFQQTDWALRDHFRNLIQSKHYDDGGHFVAMQLPDVLYEDIVEFVNRLYRREDQ	462

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	Fig. S5.	(Continued)
Aedae-EH2		
Anoga-EH		
Aedae-EH1		
Drome-JHEH3		
Drome-JHEH1		
Drome-JHEH2		
Drome-mEH		
Ctefe-JHEH1	SQKKADL	464
Ctefe-JHEH2	NQENRDL	465
Trica-mEH		
Trica-EH	S	461
Nasvi-EH1*	RLEKQKS	466
Athro-JHEH	KLKKSA	463
Apime-EH		
Nasvi-EH2	KQEAKKEKAKKA	470
Manse-JHEH	KSS	462
Spoex-JHEH	EL	462
Bommo-JHEH	EL	461
Trini-mEH	DL	463
Trini-JHEH	DL	463

(A)																				
	Nasvi-EH1	MWKGAA	VFL	LATI	LAIG	WHL	RYQ	GPVE	EVP	-DLI	PNQ	YWGI	PG-I	KPVE	PDPK	DIK	CPF	KID	VPKEV	58
	Nasvi-EH2	MGVLLV	IGFL(	GIVI	LIGG	ATI	FIS	PPVÇ	QPI	PKLT	rdv:	YWGI	PGDI	EPKF	TDT	SVF	RPF	KIT	FQKEM	60
		*	* *	,	* *			* *	*	*	,	* * * *	* *	*			**	* *	* *	
	Nasvi-EH1	IDDLNF	RLD	STR	SFVE	PLE	GSAI	WTYC	SISS	STYI	LKTV	VLNI	HWRI	KYN	IWSQ	RQA	LL	NKY	PQFKT	118
	Nasvi-EH2	LDDLRN ***	IRLKI **	NTRI **	KMQP	PLE ***	NVGI	WTY( ****	GLS(	GDFV	VPV:	IVDI	HWL1 * *	VKYI **	FKK	REA * *	AHL	NQYI * *	PQFIT *** *	120
	Nasvi-EH1	KIQGLI	)IHF	YHVI	KPQV	PKD	RKVI	RVLE	PLL	1LHC	GWPO	GSIV	VEFQ	2KI1	PML	TTA	AKP	DEN	FVFEL	178
	Nasvi-EH2	NVQGLI	)IHF	IHVE	(PQL	PKN	SKI	QVLI	PLYI	QHQ	GWP	GSIV	VEFÇ	QKI1	PML	TTF	PRS	DRN	FVFEV	180
				~ ~ /		~ ~	^	~ ~ ^		~ ^ /		~ ~ ~ `	~ ~ ^ /			^ ^		<u> </u>	~ ~ ^ ^	
	Nasvi-EH1	IIPSLE	GYG	FSQA	AAR	PGL	GPA	7 AMQ	/VFI	NLN	4QRI	LGFI	EQFY	TQG	GDW	GSI	JIT	ANM	AVLYP	238
	Nasvi-EH2	VAPSLE ****	PGFG * *	YSQ/ ***	AASK	AGL( **	GAV(	QMAH * * *	ILMI	(NLN ***;	/LRI * *;	LGFI * * *	OKFY	YTQ0 * * * *	GDW ***	GAV *	/IG *	ANM/ ***	ASMYP * **	240
	Nasvi-EH1	KKVIGI	HLN	MCFI	ESH	KAH	FLSI	LVGA	AYII	PSLV	VDS	SEH	YSKI	IYPI	JSYH	FGF	r I	EET	GYLHI	298
	Nasvi-EH2	QHVLGN * *	IHSNI * *	MCL\ * *	/VRP	WTW:	LKI	AAYS	GLMI	PSLI ***	'PEI	DER(	2-LN	4FPI * *	JSTK	LAI	GI	EET(	GYLHL ****	299
	Nasvi-EH1	QATKPE	TVG	AALT	rdsp	AGL	AAY	ILEF	(FS:	rwri	VPD	YRFI	RDDO	GGLI	JEKF	TMI	)EL	LDN	LMVYW	358
	Nasvi-EH2	QATKPI ****	)TIG * *	IGVS	SDSP ****	AGL.	AAY: ***	ILEF ****	(MA)	ИСТІ *	KPDI **	NKF *	FDDC	GNLI * **	_EKF	TMI ***	)EL	IDN:	LMMYW * * * * *	359
	Nagyi - FH1	VTNGTT	ידיפהו	PT.VZ		יפאאו	NPFI		זאאר	7ਜ ਜਟ	זייסז	ומימ	IFDI	J G T . Z	VPC	<u>г</u> тт	т. <b>к</b>	'' ਸ ਹ ਸ		418
	Nasvi-EH2	Z DNKZ	SSSE1	RTVI	VESE	NKO	TFG	A K WL					יסיור	VET I	FUS	DNE	71.R	ידאת	ZNIT.T.R	419
		*	*	* **	** *	*	110	, 110111	, ,	. v _ v	** :	* * *	**	*	*	2 31 9 1	*	**	**	11)
	Nasvi-EH1	FTHPPF	RGGH	FAAI	FEEP	ELL	AND	VWSE	VHI	ζLEÇ	QRLS	SDEI	KRQI	KQEA	KKE	KAK	KA	47	C	
	Nasvi-EH2	VTKMPF	RGGH:	FAVI * *	LEEP ***	QLL **	ADD: * *	IWAS *	SVQI *	\FRI	DYY <i>I</i>	AAQI	EQEI	RLEF *	QKS *			46	5	

#### **(B)**

Nas.EH2.F1

### 1 AAGATCGCGGCCTACAGCCTGATGCCGTCGCTTCTGCCGGAGGACGAGAGGCAGCTGATG

- 61 TTCCCGCTGAGCACGAAACTGGCTTTGGGCATCGAGGAGACCGGTTACCTCCACTTGCAG
- 121 GCCACCAAGCCCGACACCATCGGAATCGGAGTGAGCGATTCTCCCGCTGGACTGGCGGCG
- 181 TACATCCTGGAAAAGATGGCTTACTGCACGAAAACCCGACAACAAGTTCACCGACGACGGT
- 241 AACCTCCTGGAAAAGTTCACCATGGACGAGCTCATCGACAATCTCATGATGTACTGGGCG
- 301 CCGAACAAGGCTAGCAGCTCCTTCCGAATCTACGCCGAGAGTTTCAACAAGCAAACCTTC
- 361 GGCTACAAGATGGACAACGTTCCAGTAACGGTACCAAGCGCCTGCGCCCAGTTCCCCTAC
- 421 GAGATAATCTTCCAATCGGCCAACTTCCTTCGCGACCGTTTCGTCAACCTCCTCAGGGTA
- 481 ACGAAGATGCCTCGAGGTGGCCATTTCGCGGTCCTCGAAGAACCCCAGCTTCTCGCCGAC

Nas.EH2.R

#### 541 GACATCTGGGCTTCGGTACAGGCGTTCCGAGACTACTACGCCGCG

Fig. S6. (A) Amino acid sequence alignment of the putative EH genes Nasvi-EH1 and Nasvi-EH2 (GenBank accession no. XP\_001602895) from Nasonia vitripennis, using CLUSTAL W analysis. Name of the gene sequences are given to the left, the amino acids are numbered to the right, and identical amino acids are indicated with asterisks. (B) Nucleotide sequence of the Nasvi-EH2 dsRNA that was used in RNAi analysis. Primer nucleotide sequences are in bold and their names are given above.

Table S1. Exon/Intron splice sites prediction of the Nasvi-EH1 DNA gene, usin	g
www.fruitfly.org/seq_tools/splice.html tools	

Start	End	Score	Exon/Intron
53	67	0.65	atctcag <b>gt</b> atcaag
72	86	0.88	cgtggag <b>gt</b> acctga
165	179	0.89	aaaagag <b>gt</b> aatcga
393	407	0.75	gccccag <b>gt</b> acctaa
411	425	0.62	ccgcaag <b>gt</b> ccgtgt