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36 **Supplementary Table 1.** Summary of purification of *Bombyx mori* fatty acid hydroperoxide
 37 dehydratase (BmFHD) from middle silk glands.

Purification steps	Total protein (mg)	Specific activity (mkat mg ⁻¹)	Total enzyme activity (mkat)	Purification (fold)	Yield (%)
Crude enzyme	9.58	0.17	1.60	1.0	100.0
Dialysis	9.59	0.16	1.53	0.9	95.6
Cellufine Q-500	1.94	0.47	0.92	2.8	57.5
HiTrap Butyl HP (Wash)	0.30	2.43	0.73	14.3	45.6
HiTrap Butyl HP (30% of glycerol)	0.0337	8.91	0.30	52.4	18.8

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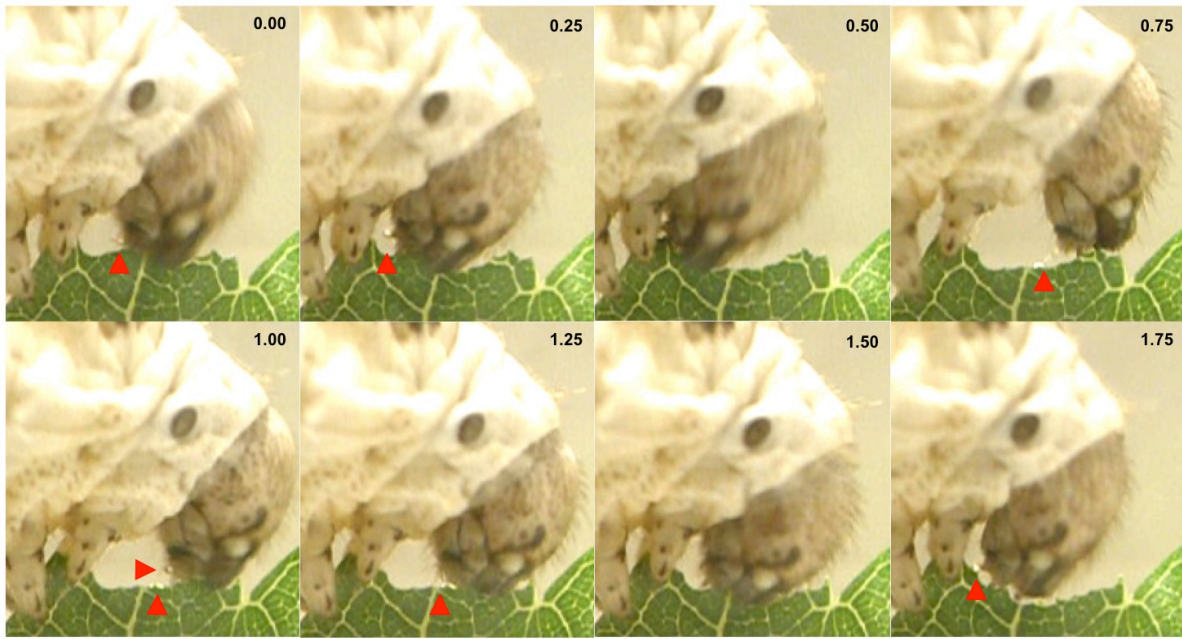
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40 **Supplementary Table 2.** Primers used in this study.

Name	Sequence (5'-3' end)	Object
SF001	CACCATGAAGGCTTTGGCAGCTGTACTATTG	RT-PCR for XM_004923484.2
SF002	TCACTGCCACAGGCAACTGACCAACCATGG	RT-PCR for XM_004923484.2
BmFHD_F	TCCAAGGTCACCTGGAAGAGGT	qRT-PCR for <i>BmFHD</i>
BmFHD_R	TACAAGGCGAGCGAAGGAA	qRT-PCR for <i>BmFHD</i>
rp49_RF2	CCCAACATTGGTTACGGTTC	qRT-PCR for <i>rp49</i>
rp49_RR2	GCTCTTCCACGATCAGCTT	qRT-PCR for <i>rp49</i>

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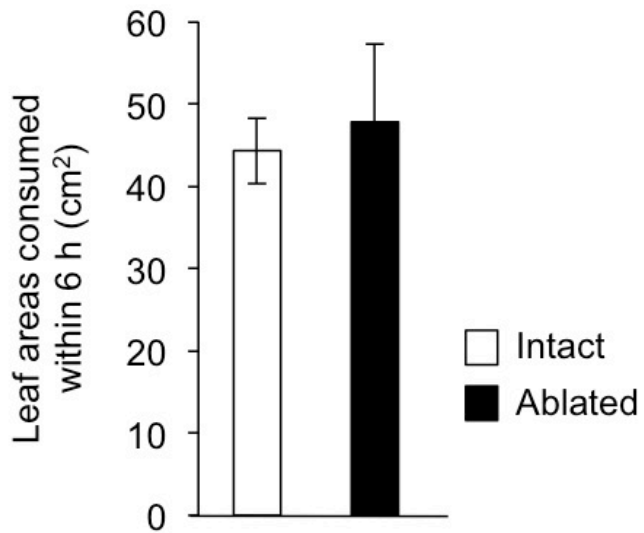
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44 **Supplementary Fig. 1.** Photos captured a silkworm, *Bombyx mori*, feeding on a mulberry
45 leaf, *Morus alba*. Before starting a new bite, the silkworm secreted a droplet (at 0 sec, arrow
46 head) that attached to a section of the damaged leaf edge (at 0.50 sec). Thereafter, the
47 silkworm re-oriented its head for another bite and as a result, it made a thread (at 0.75 sec,
48 arrow head).

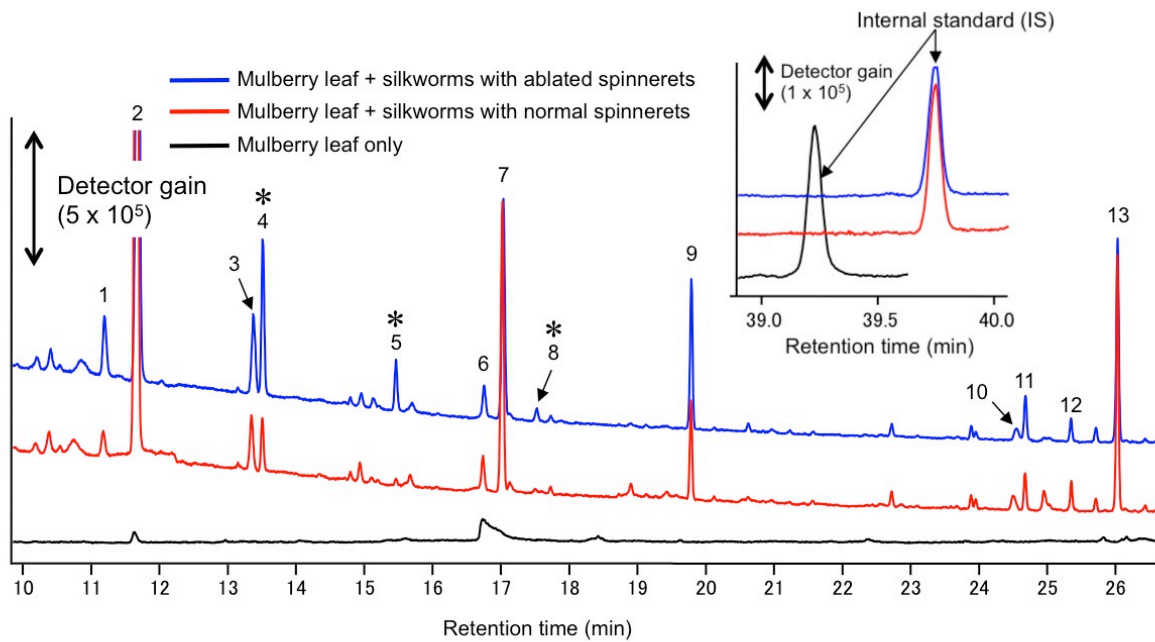
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51 **Supplementary Fig. 2.** Leaf area consumed by silkworms. Leaf areas consumed after 6 h by
52 silkworms with spinnerets (white) or without spinnerets (black) are shown. The means are
53 shown with SE ($n = 5$). The leaf areas were not significantly different (t -test, $P = 0.74$).

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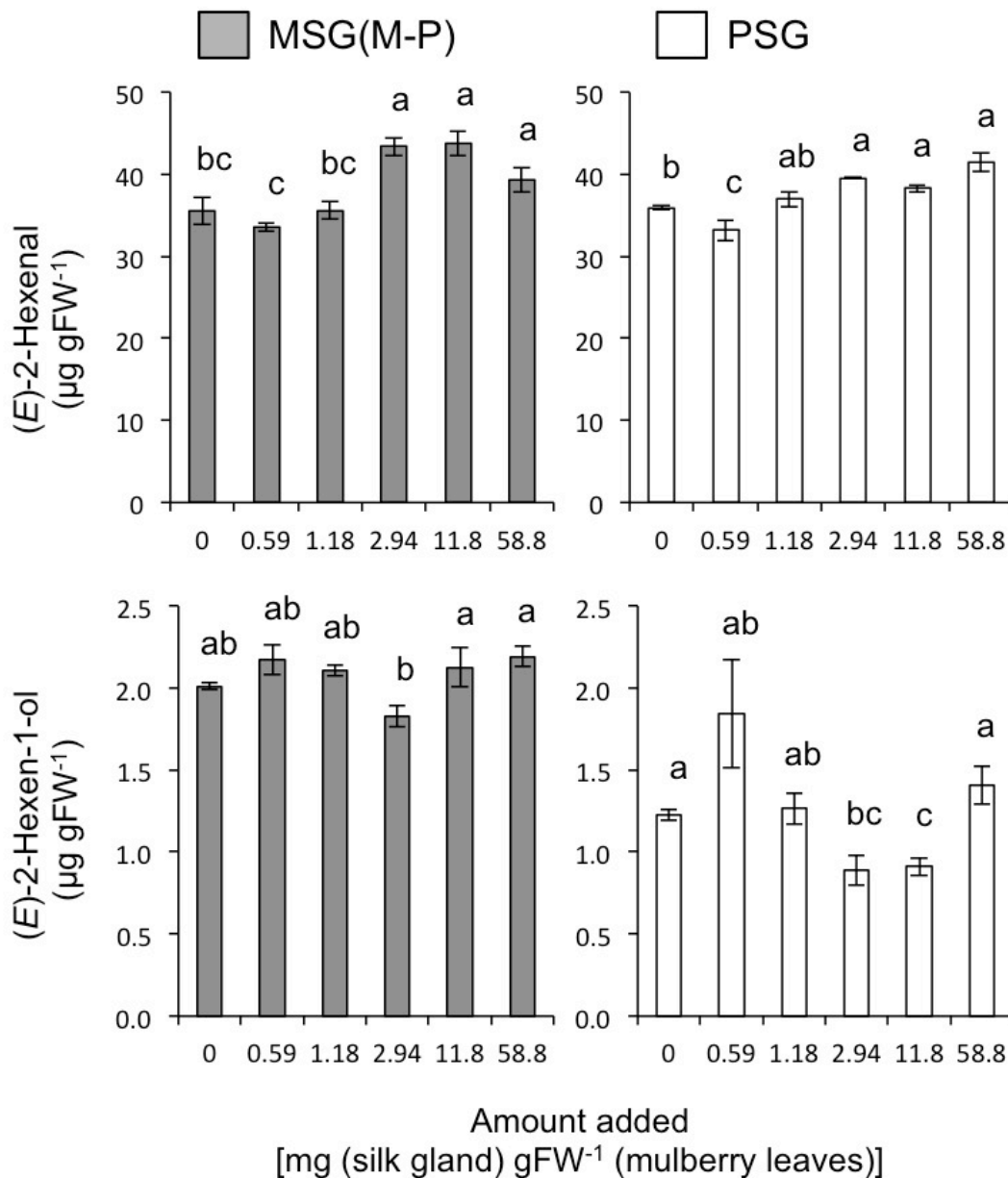
Compound	Retention time (min)
1 : (Z)- β -ocimene	1 : 11.2
2 : (E)- β -ocimene	2 : 11.6
3 : geranyl nitrile	3 : 13.3
4 : (Z)-3-hexen-1-yl acetate *	4 : 13.5
5 : (Z)-3-hexen-1-ol *	5 : 15.5
6 : unknown monoterpene 1	6 : 16.8
7 : unknown monoterpene 2	7 : 17.0
8 : (Z)-3-hexen-1-yl butanoate *	8 : 17.5
9 : linalool	9 : 19.8
10 : α -farnesene	10 : 24.5
11 : methyl salicylate	11 : 24.7
12 : 2-methyl-3-buten-2-ol	12 : 25.4
13 : (Z)- <i>p</i> -menth-2,8-dien-1-ol	13 : 26.0
IS : Vanillin	IS : 39.7

55

56 **Supplementary Fig. 3.**

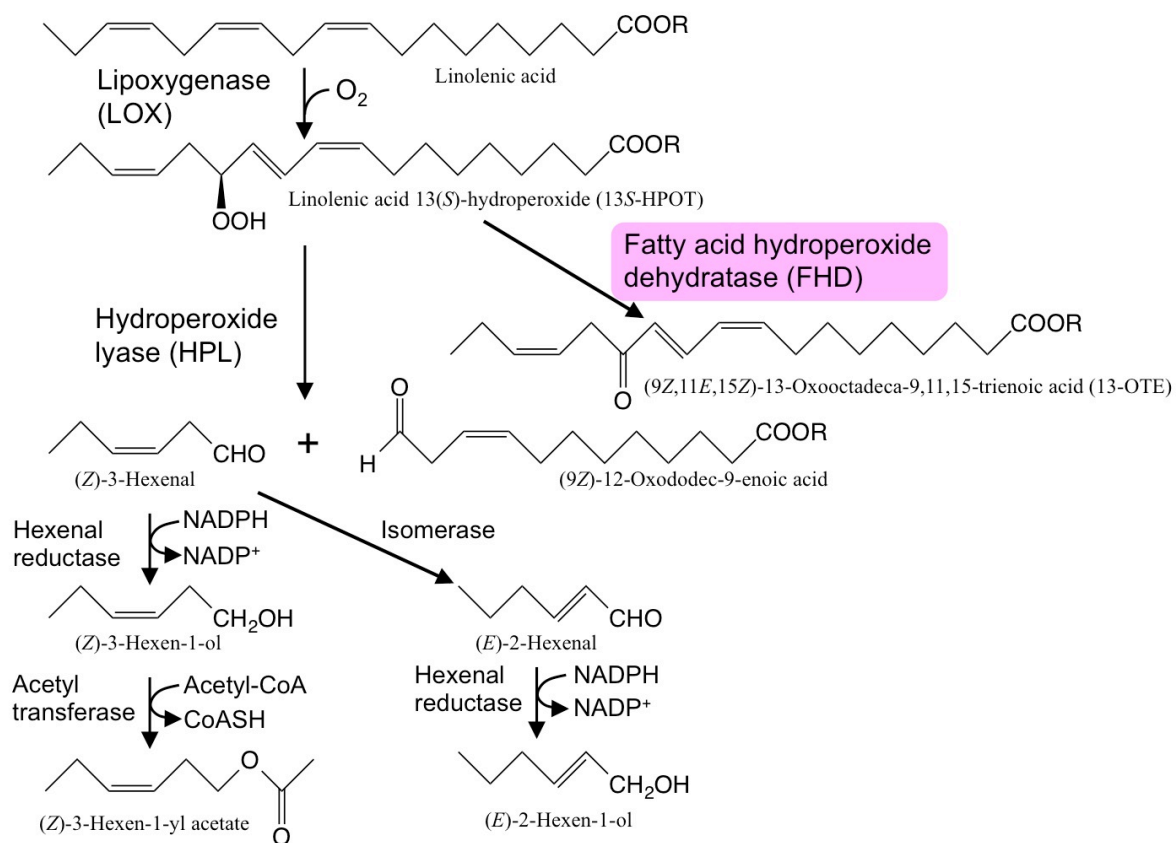
57 Representative chromatograms of volatiles collected from mulberry leaves cut at the petiole
 58 (black trace), those infested with silkworms with normal spinnerets (red trace), and those
 59 infested with silkworms with ablated spinnerets (blue trace). Peaks of internal standard are
 60 shown in the inset. The compound name and retention time for each peak number is also
 61 shown.

62



63

64 **Supplementary Fig. 4.** The middle to posterior parts of silk gland extract showed little effect
 65 on formation of green leaf volatiles. Green leaf volatile formation in the presence of silk gland
 66 extract was analyzed as shown in Fig. 3b. The amounts of (*E*)-2-hexenal and (*E*)-2-hexen-1-ol
 67 formed in the absence or presence of the silk gland extract that was obtained from the
 68 middle-to-posterior parts of the middle silk gland [MSG(M-P)] and the posterior silk gland
 69 (PSG). Averages with error bars (SE, $n = 3$, technical replicate) are shown. The lowest
 70 amount of the silk gland extract (0.59 mg) corresponded to 0.0047 [MSG(M-P)] or 0.059
 71 (PSG) equivalent of that derived from one silkworm. Different letters above the bars indicate
 72 significant differences among treatments for each extract ($P < 0.05$, GLM following Holm's
 73 P -value adjustment).



74

75 **Supplementary Fig. 5.** Biosynthetic pathway to form green leaf volatiles from linolenic acid.

76 In the pathway, lipxygenase (LOX) adds dioxygen at position 13 of linolenic acid to produce

77 linolenic acid 13(*S*)-hydroperoxide (13*S*-HPOT). The hydroperoxide is cleaved by

78 hydroperoxide lyase (HPL) at the C12–C13 bond to produce (*Z*)-3-hexenal, which can be

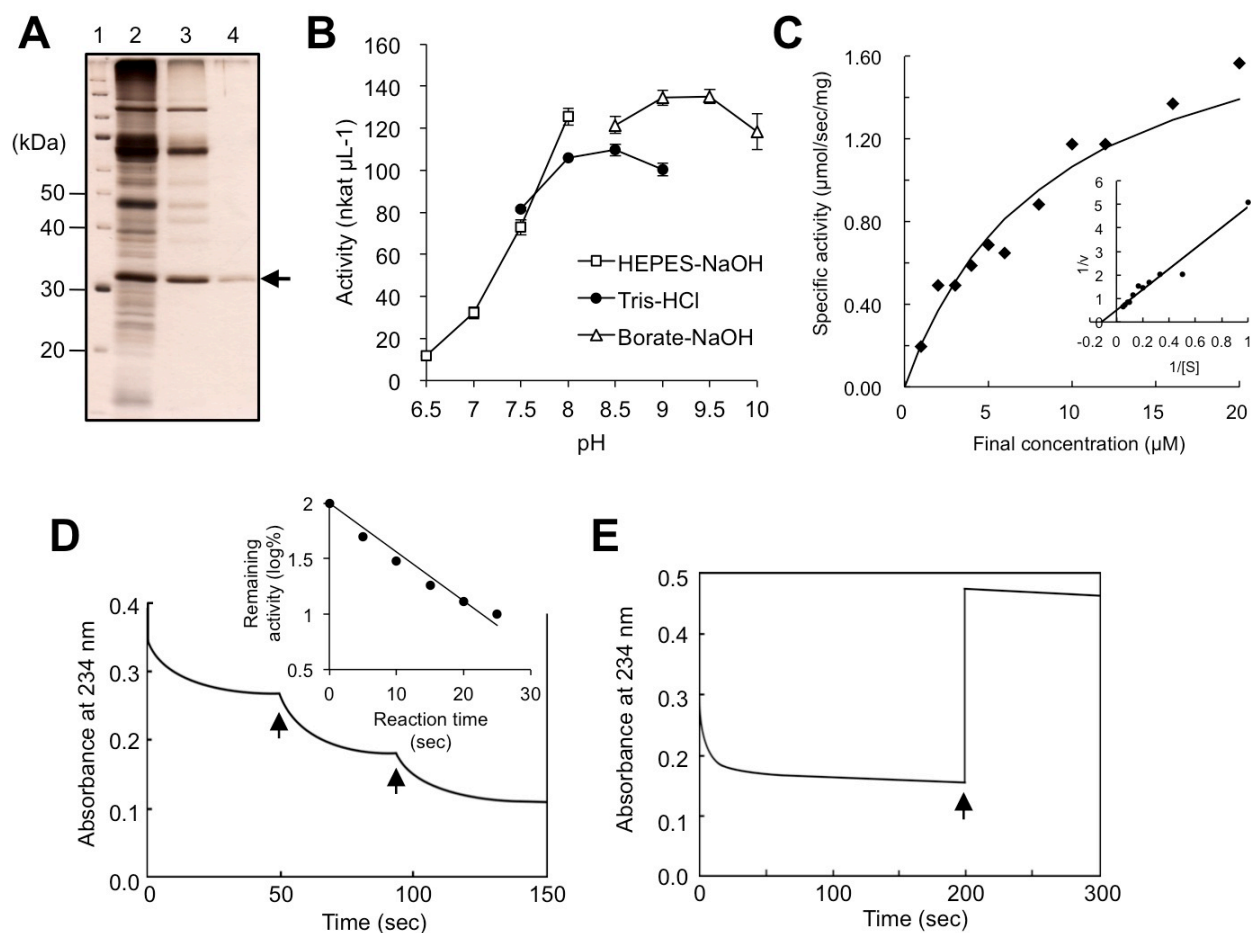
79 reduced to form (*Z*)-3-hexen-1-ol. A portion of (*Z*)-3-hexen-1-ol is further converted to

80 (*Z*)-3-hexen-1-yl acetate. In some plants, (*Z*)-3-hexenal is converted to (*E*)-2-hexenal

81 spontaneously or enzymatically, and further reduced. The reduction and acetylation needs

82 NADPH and acetyl-CoA. Fatty acid hydroperoxide dehydratase (FHD) convert 13*S*-HPOT to

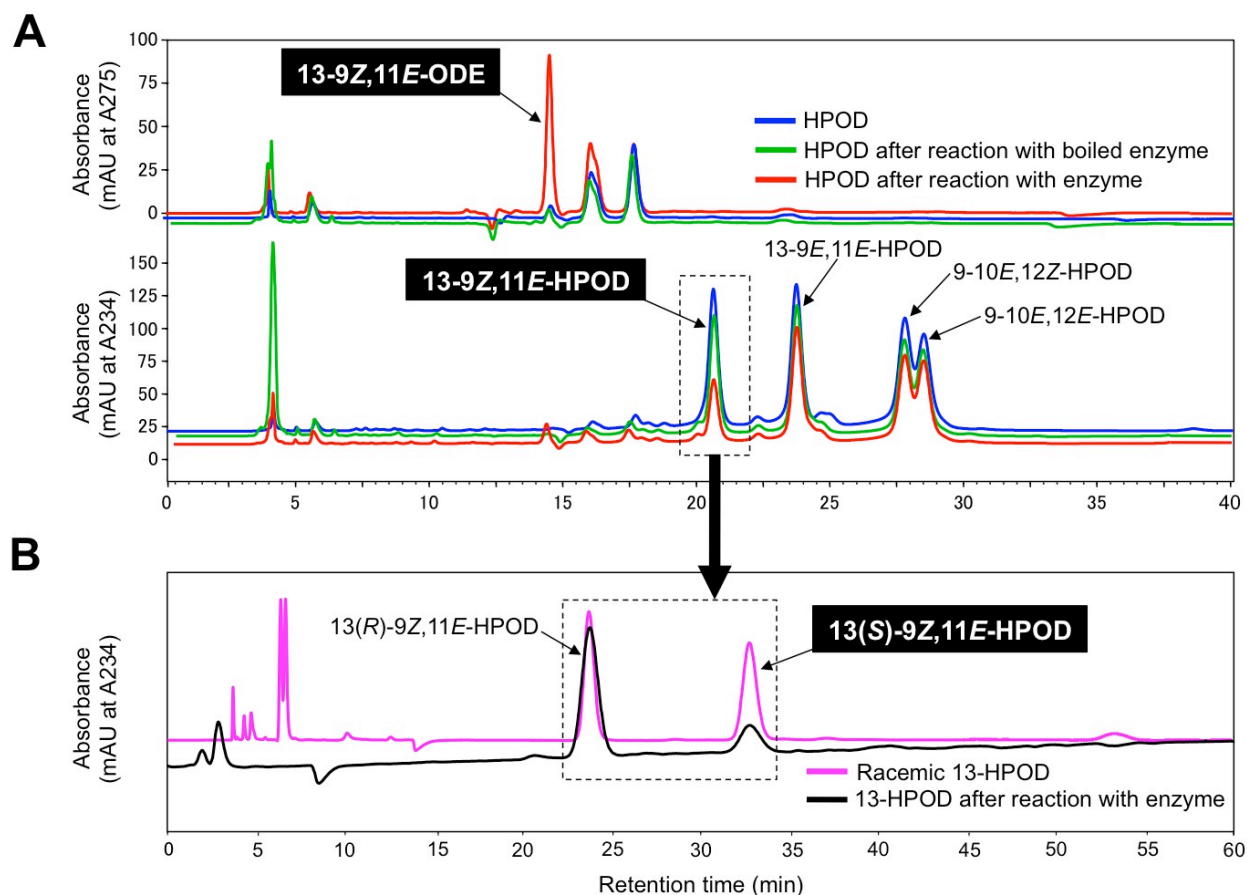
83 (*9Z*,11*E*,15*Z*)-13-oxooctadeca-9,11,15-trienoic acid (13-OTE).



84

85 **Supplementary Fig. 6.** Properties of purified enzyme. (A) Protein profiles of each fraction
 86 obtained during purification of BmFHD from middle silk glands. Lane 1: molecular mass
 87 markers; 2: crude enzyme solution; 3: the anion exchange chromatography (Cellufine Q-500)
 88 fraction; 4: the hydrophobic interaction chromatography (HiTrap Butyl HP) fraction. The
 89 band corresponding to BmFHD is indicated with an arrow. (B) pH-activity profile of purified
 90 BmFHD. Buffers used are 50 mM HEPES-NaOH (6.5–8.0), 50 mM Tris-HCl (7.5–9.0) and
 91 50 mM sodium borate (8.5–10.0). (C) Activity-substrate concentration plot of the purified
 92 BmFHD with 13S-HPOT. The activity with 13S-HPOT was evaluated by initial rate (for 5 sec
 93 from the onset of reaction) in 50 mM sodium borate buffer (pH 9.0). *inset*: The
 94 double-reciprocal plot of the data. (D) Purified BmFHD (60 ng) was incubated with 20 μM
 95 13-HPOT in 50 mM sodium borate buffer (pH 9.0). At 50 and 90 sec after the start of reaction,
 96 60 ng of purified BmFHD was repeatedly added (indicated with arrows). Inset: A
 97 semi-logarithmic plot of the remaining activity at the time indicated. (E) Purified BmFHD (60
 98 ng) was incubated with 20 μM 13S-HPOT in 50 mM sodium borate buffer (pH 9.0). At 200
 99 sec after the start of reaction, 20 μM 13S-HPOT was added again (indicated with arrows).

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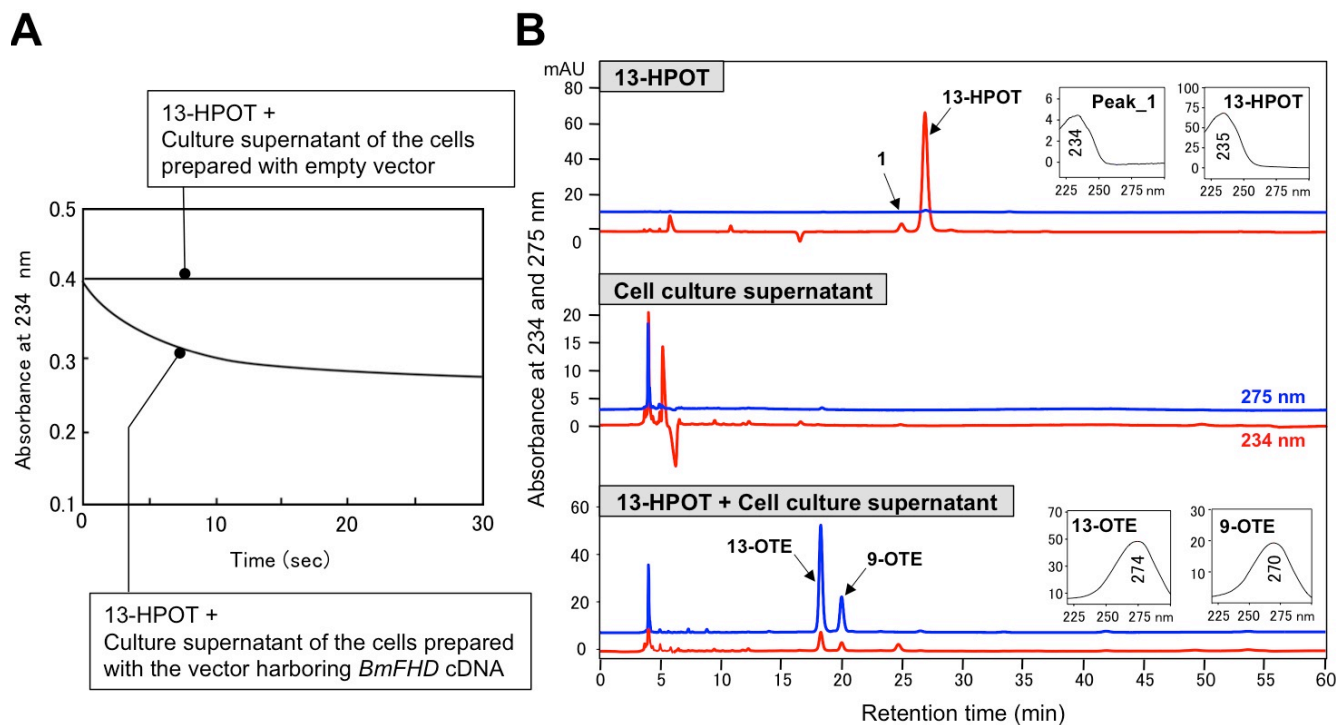


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 102 **Supplementary Fig. 7.** HPLC analysis of the substrates remaining after the reaction of
 103 purified BmFHD with HPOD mixture prepared via autooxidation. (A) The chromatograms on
 104 straight phase-HPLC of HPOD before reaction (blue), after reaction with heat-denatured
 105 BmFHD (green) and after reaction with active BmFHD (red) are shown. The chromatograms
 106 that were drawn by following A234 are shown at the bottom, and those drawn using A275 are
 107 shown at the top. (B) The chiral phase-HPLC of
 108 13(*R/S*)-hydroperoxy-(9*Z*,10*E*)-octadecadienoic acid (13-HPOD) before reaction with
 109 BmFHD (magenta) and after reaction with BmFHD (black). 13(*R/S*)-HPOD was fractionated
 110 with straight phase HPLC and delivered to chiral phase HPLC. Under HPLC conditions, the
 111 13(*R*)-enantiomer eluted faster than 13(*S*)-enantiomer.
 112

M	K	A	L	A	A	V	L	L	10	L	V	V	A	V	N	G	A	W	K	20	G
G	L	R	T	T	W	G	V	G	30	L	G	L	G	T	D	F	F	Y	E	40	I
P	R	S	L	E	E	V	K	S	50	Q	G	W	V	L	T	D	K	A	D	60	G
L	P	L	P	S	L	A	L	Y	70	C	S	E	D	R	I	L	C	G	F	80	F
D	E	T	E	Y	V	V	G	L	90	Q	V	S	L	P	V	D	E	V	T	100	D
I	I	F	D	M	P	T	Q	G	110	F	I	I	W	E	T	E	V	D	G	120	E
L	K	K	F	Y	S	I	Q	Q	130	Y	F	I	N	E	D	T	L	K	140	S	Q
V	E	D	R	L	S	K	W	D	150	S	S	K	T	L	Q	E	K	S	I	160	W
V	T	G	F	N	G	T	L	L	170	E	I	S	T	V	A	D	D	I	A	180	N
G	D	D	F	T	K	Q	A	C	190	V	P	W	M	G	R	H	Y	Y	Y	200	K
M	S	A	K	T	E	C	K	A	210	D	T	L	L	P	W	F	P	I	V	220	E
S	G	E	L	I	A	T	G	F	230	I	S	F	L	K	L	S	N	T	Y	240	K
W	F	E	K	P	S	K	A	A	250	V	Q	F	I	V	P	D	G	P	K	260	C
L	Y	D	L	A	E	D	S	G	270	L	T	T	M	H	I	Y	Y	V	N	280	Q
P	W	L	V	S	C	L	W	Q	290	*											

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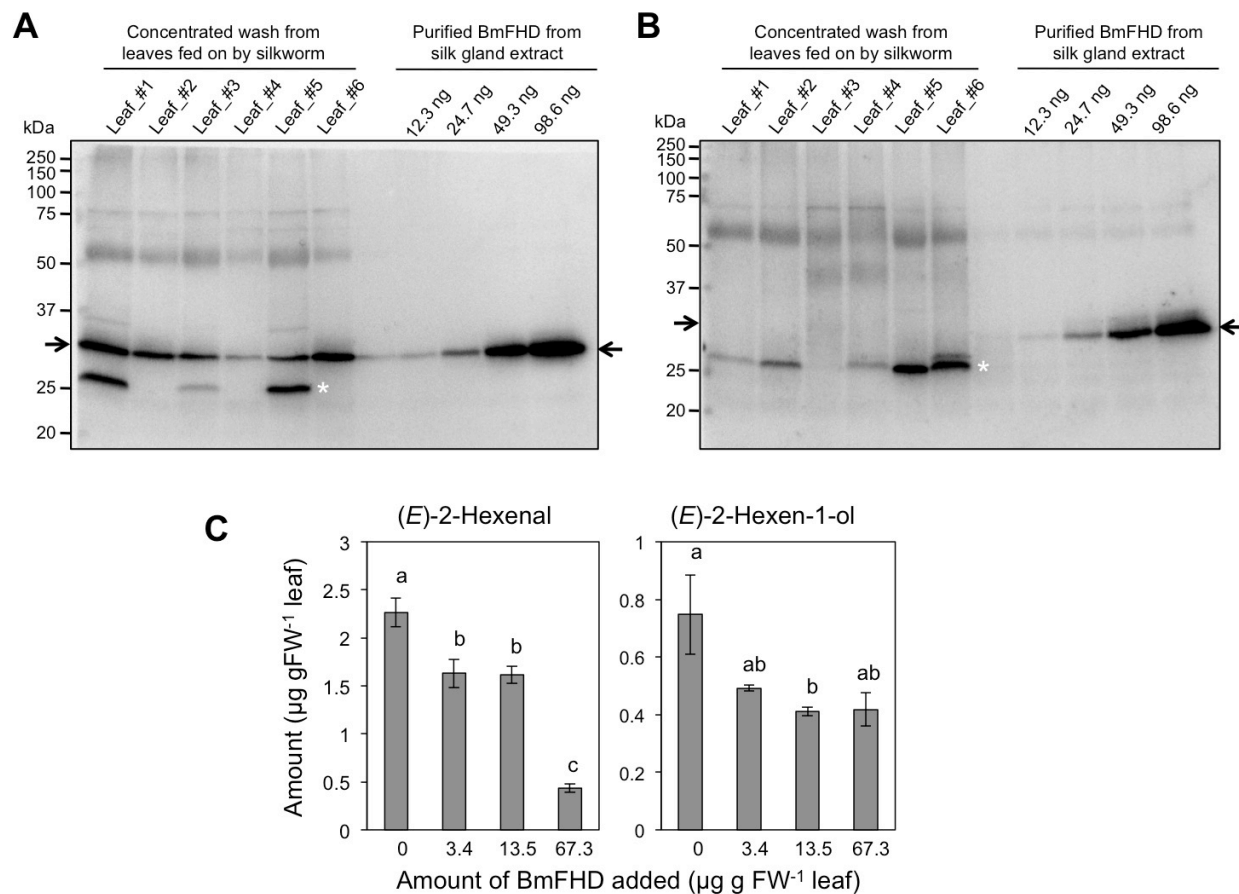
114 **Supplementary Fig. 8.** Amino acid sequence of BmFHD. The sequences identified with
 115 Mascot analyses are shown and underlined in red. The signal peptide can be identified as
 116 having a pink background. The exon/intron junctions predicted by SilkBase
 117 (<http://silkbases.ab.a.u-tokyo.ac.jp>) are shown with triangles.
 118



119

120 **Supplementary Fig. 9.** Reaction of the culture supernatant of BmN4 cells infected with the
 121 recombinant baculoviruses harboring BmFHD cDNA with 13S-HPOT. (A) Time course of
 122 decrease of A₂₃₄ derived from 13S-HPOT (20 μM) by the cleared culture broth. (B) The
 123 normal phase HPLC analysis of the products formed by the cell culture supernatant with
 124 13S-HPOT. Products were monitored at A₂₇₅ (blue line), and the remained substrates were
 125 monitored at A₂₃₄ (red line). UV spectra of each peak are shown in the inset.

126



127
 128 **Supplementary Fig. 10.** Confirmation of BmFHD left on the edges of a leaf fed on by
 129 silkworms. Rinse from the fed edge on a leaf (#1 to #6) made by a silkworm with a spinneret
 130 (A) and without a spinneret (B) was served for immunoblot analysis with purified BmFHD of
 131 a known amount. The position of BmFHD is indicated with the arrow. The bands indicated
 132 with the white asterisk are unknown. (C) The mulberry leaf powder was homogenized in the
 133 presence of a given amount of BmFHD purified from the silk gland of silkworms and
 134 incubated for 20 min to facilitate enzyme reaction to form (E)-2-hexenal (left) and
 135 (E)-2-hexen-1-ol (right). Averages with error bars (SE, $n = 4$, technical replicate) are shown.
 136 Different letters above the bars indicate significant differences among treatments ($P < 0.05$,
 137 GLM followed by Holm's P-value adjustment).
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BmFHD 1 -----MRLAAVLLVAVV-----NGAWKGLRTTIVG-LGLGDFDFEYELPRLSLEEVEKSSQVLLVDRKAG--
Bm_2 1 -----MKLGDYSVAKGWSDAADIEYFVSPFRKIKDINDGQRREPPPP--
Pax_1 1 -----MKQLVLIHALVCSST-LGAWESGLRVRFVVG-LIGSDFPIPHARTVDEVSVEGQIQVHP--
Pax_2 1 -----MNVFLPILFALICGA--FGAWESGLRVRFVVG-MAIGTEAIPILPFRLSAAKSSQWAKKARPPS--
Pax_3 1 -----MKVFPALMGSLASLA--TGLQYDQWRVFGWSDAADKKEYFSPRVRVSDABAKWRRRPP--
Hm_1 1 -----MKVFPALMGSLASLA--TGLQYDQWRVFGWSDAADKKEYFSPRVRVSDABAKWRRRPP--
Hm_2 1 -MTVPFAPECLYKLAENHPVLSLHIYYIDNPMIDIKRCHDNPTMKRLVFPGLALAC--VSARKRFRVRVFG-LVGSDFPEEFLNMRRAVUGKTLRPP--
Hm_3 1 -----MKVFPALMGSLASLA--TGLQYDQWRVFGWSDAADKKEYFSPRVRVSDABAKWRRRPP--
At_1 1 -----MIATLLLLIALAAAPV--LGDWTGGLRVRFVVG-FSG--YMSOPRSISEAKTSRMOQVAPPE--
At_2 1 -----MKGLVLIHALVCSST-LGAWESGLRVRFVVG-LIGSDFPIPHARTVDEVSVEGQIQVHP--
Px_1 1 -----MKATFAIFLALAG-ASAGIQLKLTALRVKNGLP--LVDSEYFIDLPBELMIISEGLRVLVRPSSFP--
Px_2 1 -----MKAVLAIIVVALAG-ATAQIGLKNTRVRKNGLP--LHSDFLYEYFPHRELLIISGIVRVARPPDSL--
Px_3 1 -----MKAVLAIIVVALAG-ATAQIGLKNTRVRKNGLP--LHSDFLYEYFPHRELLIISGIVRVARPPDSL--
Px_4 1 -----MKAVLAIIVVALAG-ATAQIGLKNTRVRKNGLP--LHSDFLYEYFPHRELLIISGIVRVARPPDSL--
Px_5 1 -----MKAVLAIIVVALAG-ATAQIGLKNTRVRKNGLP--LHSDFLYEYFPHRELLIISGIVRVARPPDSL--
Px_6 1 -----MKIAGVFFLALAG-ASAGIQLKLTALRVKNGLP--LVDSEYFIDLPBELMIISEGLRVLVRPSSFP--
Cs_1 1 -----MQSP-----MHLSC-----
Cs_2 1 -----MKGFAPLVAIVSVA--TGVRYNGLRVFGWSDAADKKEYFSPRVRVSDABAKWRRRPP--
Pr_1 1 -----MKGLVLIHALVCSST-LGAWESGLRVRFVVG-LIGSDFPIPHARTVDEVSVEGQIQVHP--
Pr_2 1 -----MKRLVLIHALVCSST-LGAWESGLRVRFVVG-LIGSDFPIPHARTVDEVSVEGQIQVHP--
S1_1 1 -----MAYRTMLMCFPLAAP--ATGAWQCGVNRVFDIVVGIQVTAPELPSQNTTLEKSLVQVTFPEGPA--
S1_2 290 LHSYFIETPRQLLCLSATIYRVSGHLCSSTSSVAVVGTTATMIRKLVLCFLAAP--AFIDARTVCHARRDESLNFGTKN--NSRANASASQVNRVPEVSAE--
S1_3 1 -----MIRTVLACLLA--AFIDAP-EVCGRRKFLGSLPFDN--VMDGPKNANASAKSSVNVVPEVSAE--
S1_4 1 -----MIRTVLACLLA--AFIDAP-EVCGRRKFLGSLPFDN--VMDGPKNANASAKSSVNVVPEVSAE--
S1_5 1 -----MINORVIVLDSVAVV--CGVQYDGLRVKFGWTDADKKEYFSPRVRVSDABAKWRRRPP--

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BmFHD 41 LQLPFLAKKMSSEDRLLGPFPEEYEVVGGVSLVAVVETDIFVMPPTQGIITETEVDG--ELKKFFSIQVYLNHDTKQSVEDLHKKDDSSKTLQEK--LIVVGFNPT
Bm_2 65 LQLPFLAKKMSSEDRLLGPFPEEYEVVGGVSLVAVVETDIFVMPPTQGIITETEVDG--ELKKFFSIQVYLNHDTKQSVEDLHKKDDSSKTLQEK--LIVVGFNPT
Pax_1 60 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
Pax_2 60 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
Pax_3 61 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
Hm_1 61 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
Hm_2 101 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
Hm_3 61 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
At_1 60 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
At_2 1 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
Px_1 66 MRLKMYCMRDYDSVCTLDYDPTGAGLQISLPPVQKTEPTALDITGSKWAPDNVE----YVNMDFPISPEYKKSSEHMLARADEBATEKGGVMPDLGGQ
Px_2 66 MRLKMYCMRDYDSVCTLDYDPTGAGLQISLPPVQKTEPTALDITGSKWAPDNVE----YVNMDFPISPEYKKSSEHMLARADEBATEKGGVMPDLGGQ
Px_3 66 MRLKMYCMRDYDSVCTLDYDPTGAGLQISLPPVQKTEPTALDITGSKWAPDNVE----YVNMDFPISPEYKKSSEHMLARADEBATEKGGVMPDLGGQ
Px_4 66 MRLKMYCMRDYDSVCTLDYDPTGAGLQISLPPVQKTEPTALDITGSKWAPDNVE----YVNMDFPISPEYKKSSEHMLARADEBATEKGGVMPDLGGQ
Px_5 60 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
Px_6 65 LQLPFLAKKMSSEDRLLGPFPEEYEVVGGVSLVAVVETDIFVMPPTQGIITETEVDG--ELKKFFSIQVYLNHDTKQSVEDLHKKDDSSKTLQEK--LIVVGFNPT
Cs_1 1 -----MTDAPPVWVQGTETMPEPNTQGVVETVQIQYFVDSVEAKTFAETARNADKTIQFNGLVMPGFNNG
Cs_2 18 -----KPIHATQDQVMDKTKGKANSGLVKSASLQDNVWREEN--TRVDMQNA--VMVGFNNG
Cs_3 61 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
Pr_1 61 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
Pr_2 56 IYNSNLDLYCASDRILGAFDITDRIR--EARRANNVPT-----PTNESVLREDA--LWVGTNKE
S1_1 67 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
S1_2 397 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
S1_3 62 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
S1_4 69 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG
S1_5 64 GRLPFLVMYCAPDRMKGALVYDQEGVAGLQIAAIAQDISGSLTNKTKGQVEMDATTADG-ETLKYNAIQYFVSODLIDLPKEBEIKITKSKELLREGA--VMVGFNNG

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BmFHD 168 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Bm_2 150 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Pax_1 168 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Pax_2 168 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Pax_3 167 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Hm_1 168 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Hm_2 193 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Hm_3 166 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
At_1 165 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
At_2 166 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Px_1 171 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Px_2 167 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Px_3 169 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Px_4 169 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Px_5 165 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Px_6 167 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Cs_1 73 RMRVSDRTEDIANFASG--TFKQACIIVMGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Cs_2 93 RMRVSDRTEDIANFASG--TFKQACIIVMGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Cs_3 166 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
Pr_1 135 -----LQTHYHNDVTEKSCD--DLPFPAITDSDVGVGQVGFANPPTPAGKRDQERYTEKNPSQYEMVIFPAKFKVLDVYASKY
Pr_2 114 MYKSGDEEDMKN--TIFKQACIIVMGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
S1_1 174 IYVASTNTSDIAHN--SDFTEQACIIVMGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
S1_2 499 IYVASTNTSDIAHN--SDFTEQACIIVMGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
S1_3 164 IYVASTNTSDIAHN--SDFTEQACIIVMGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
S1_4 170 KGSVSTSDIKLS--SVTEQACIIVMGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS
S1_5 168 LLEMSVAVDDMANG--DPEKQAVVWVGRHYHNMTRDLKCE--KADTIDMPPVIVESGQIATQHSFLKASNTY---KMFQKYS---KAVVQVWVQVQKQVAVDLEDS

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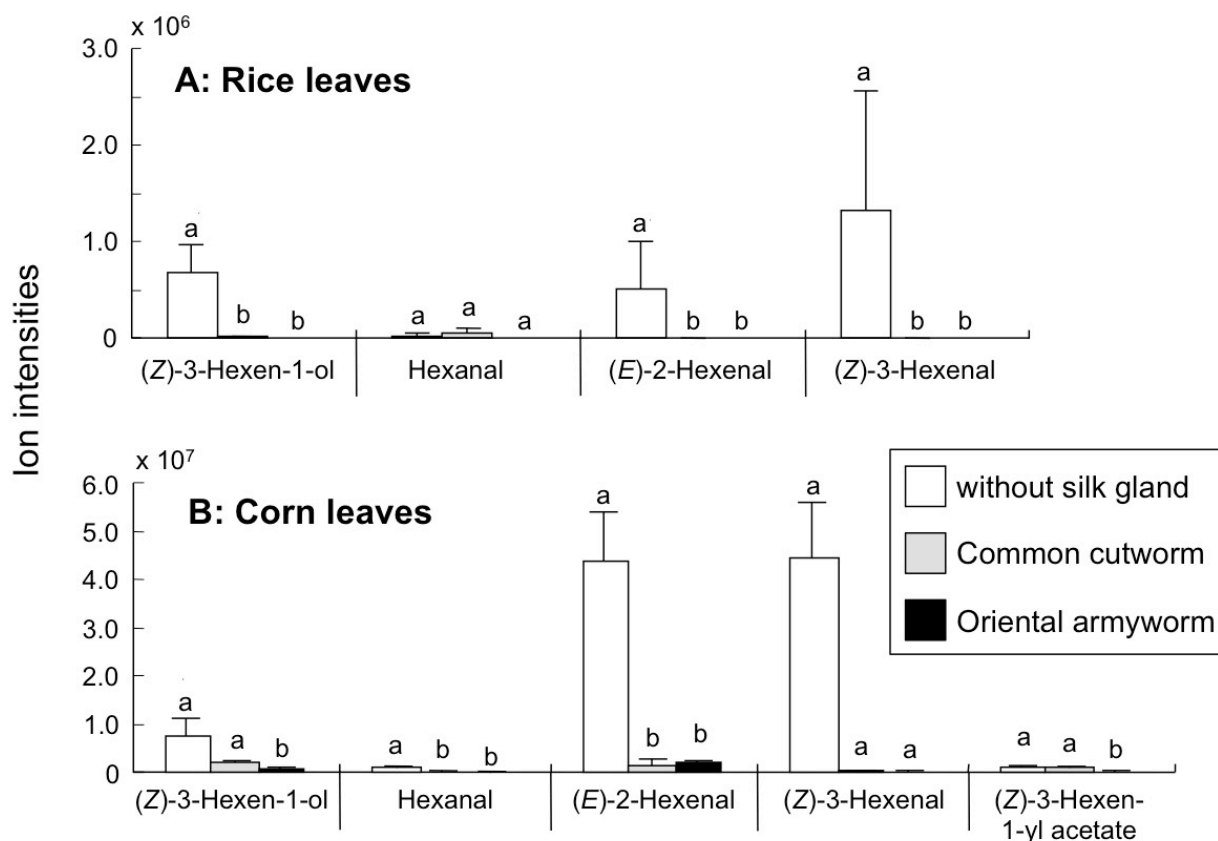
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Bm_2 254 GLTTHHVVVWVQVQKQVAVDLEDS
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Pax_2 272 GLTTHHVVVWVQVQKQVAVDLEDS
Pax_3 266 GLTTHHVVVWVQVQKQVAVDLEDS
Hm_1 271 GLTTHHVVVWVQVQKQVAVDLEDS
Hm_2 271 GLTTHHVVVWVQVQKQVAVDLEDS
Hm_3 268 GLTTHHVVVWVQVQKQVAVDLEDS
At_1 268 GLTTHHVVVWVQVQKQVAVDLEDS
At_2 269 GLTTHHVVVWVQVQKQVAVDLEDS
Px_1 273 GLTTHHVVVWVQVQKQVAVDLEDS
Px_2 270 GLTTHHVVVWVQVQKQVAVDLEDS
Px_3 271 GLTTHHVVVWVQVQKQVAVDLEDS
Px_4 271 GLTTHHVVVWVQVQKQVAVDLEDS
Px_5 269 GLTTHHVVVWVQVQKQVAVDLEDS
Px_6 271 GLTTHHVVVWVQVQKQVAVDLEDS
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Cs_2 228 -----GDAIRLEYLWRHSPILGLRPLG----SRRL----
Cs_3 216 NGIGLHVVFEDDNNMRCQPGDSAKSAVLDKRVKLNGLNRYANRMYDEVKSYFS--
Pr_1 217 GLTTHHVVVWVQVQKQVAVDLEDS
Pr_2 217 GLTTHHVVVWVQVQKQVAVDLEDS
S1_1 278 GLTTHHVVVWVQVQKQVAVDLEDS
S1_2 601 GLTTHHVVVWVQVQKQVAVDLEDS
S1_3 266 GAVMTHLNSYELVSCVLE
S1_4 272 GAVMTHLNSYELVSCVLE
S1_5 271 GAVMTHLNSYELVSCVLE

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140

141 **Supplementary Fig. 11.** Multiple alignment of FHD like proteins in Lepidoptera insects used
142 in phylogenetic tree analysis. Multiple alignment of amino acid sequences were performed
143 using ClustalW alignment software in MEGA5. Gaps are indicated by dashes, letters with
144 black background are identical amino acids, and letters with gray background are similar
145 amino acids. Amino acid sequences are BmFHD: LC259005, Bm_2: XP004921895, Pax_1:

146 XP013171137, Pax_2: XP013170622, Pax_3: XP013171136, Hm_1: HMEL037892g1.t1,
147 Hm_2: HMEL016940-PA, Hm_3: HMEL037893g1.t1, At_1: XP013182923, At_2:
148 XP013182934, Px_1: XP011552765, Px_2: XP011567647, Px_3: g11888.t1, Px_4:
149 XP011551596, Px_5: XP011552764, Px_6: XP011553122, Cs_1: CSUOGS104071-PA,
150 Cs_2: CSUOGS108782-PA, Cs_3: CSUOGS107732-PA, Pr_1: genscan-scaff143-1, Pr_2:
151 genscan-scaff143-2, Sl_1: XP022817470, Sl_2: XP022817942, Sl_3: XP022817893, Sl_4:
152 XP022817879, Sl_5: XP022817709. Sl_2: XP022817942 has two ranges showing homology
153 to BmFHD in one open reading frame, and the range corresponding to the C-terminal half was
154 used for alignment.
155



156

157 **Supplementary Fig. 12.** Effect of extract prepared from silk gland of oriental armyworms
 158 (*Mythimna separata*) and common cutworms (*Spodoptera litura*) on the production of green
 159 leaf volatiles in the homogenates of rice (*Oryza sativa*) or corn (*Zea mays*) leaves. Averages
 160 with error bars (SE, $n = 3$) are shown. Different letters above the bars indicate significant
 161 differences among samples ($P < 0.05$, GLM followed by Holm's P -value adjustment).

162



163

164 **Supplementary Movie 1.** A silkworm feeding on a mulberry leaf. A movie captured a
165 silkworm, *Bombyx mori*, feeding on a mulberry leaf, *Morus alba*. Initial 13 sec is the real time
166 movie, and after 13 sec a double-speed movie is shown.

167

168