

Supplementary Information

Sugar transporters enable a leaf beetle to accumulate plant defense compounds

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This file includes:

Supplementary Figures 1-10

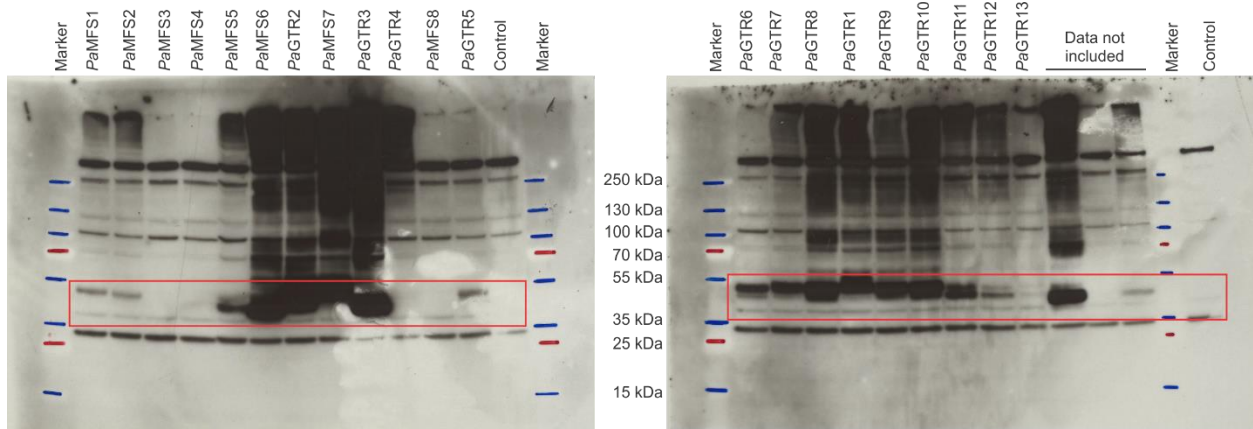
Supplementary Tables 1-9

Additional Supplementary files for this manuscript include the following:

Supplementary Data 1 (Excel Table)

Supplementary Data 2 (PDF Figure)

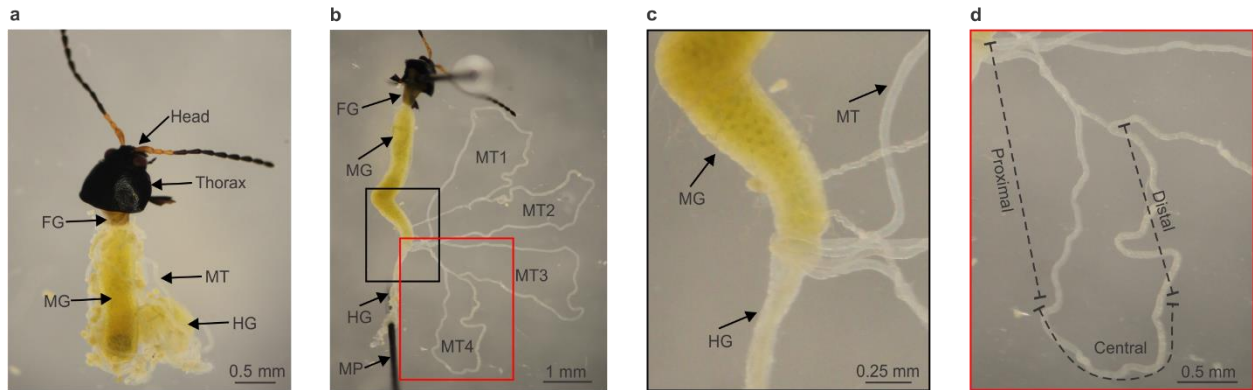
22 **Supplementary Figures 1-10**



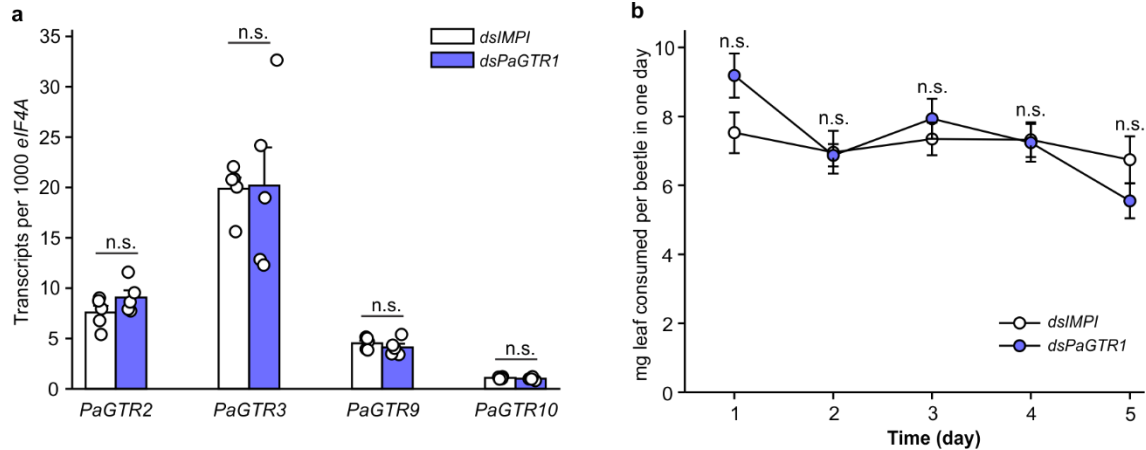
23

24 **Supplementary Figure 1. Detection of recombinant transporters expressed in High Five insect cells**
25 **by Western blotting.** The region containing bands that correspond to recombinant proteins are framed in
26 red. Protein marker bands were highlighted with blue and red lines on the film.

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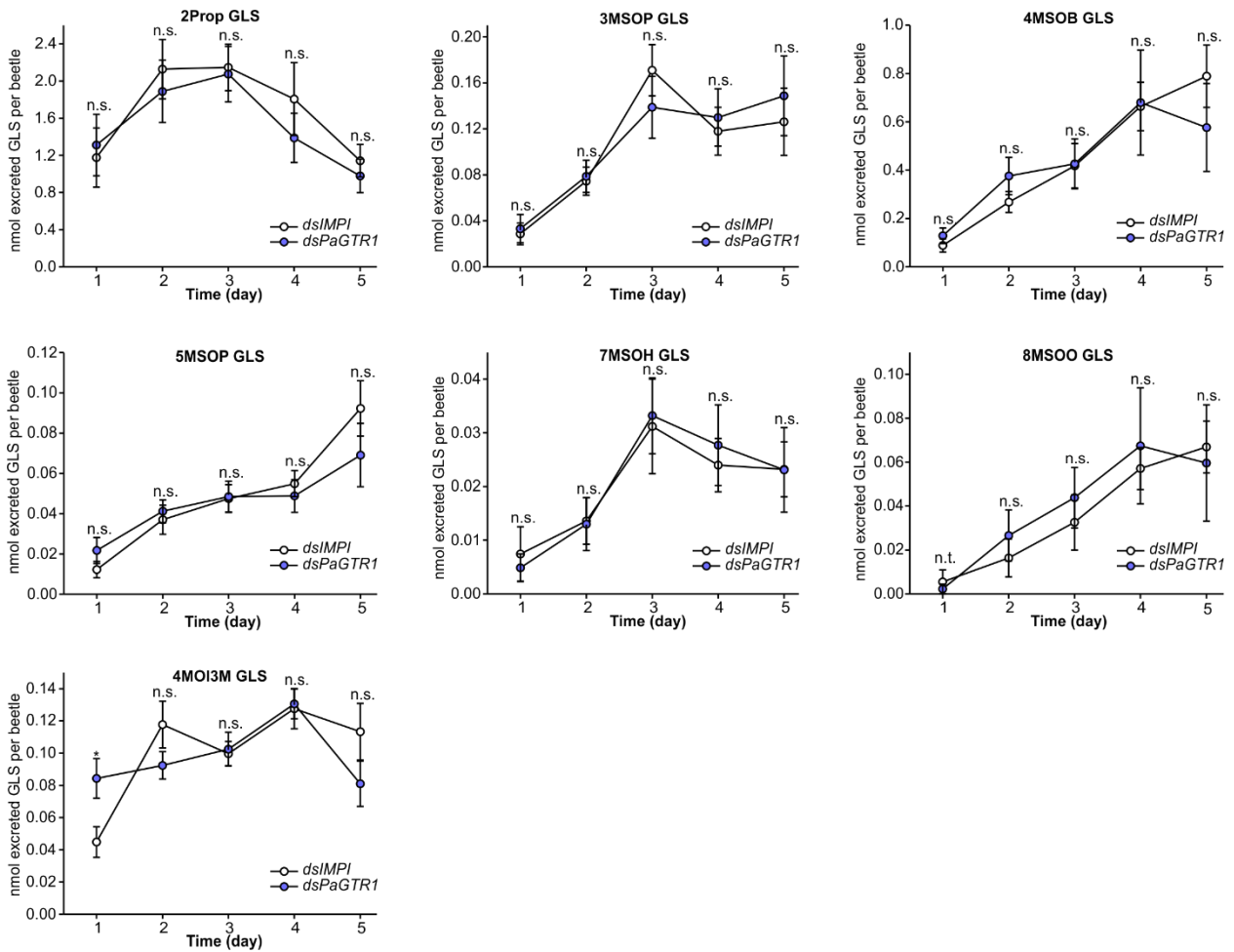


28 **Supplementary Figure 2. Morphology of Malpighian tubules.** a Gut with Malpighian tubules dissected
29 from a four-day old *P. armoraciae* adult. b Malpighian tubule system consisting of four similar tubules
30 (MT1-4) that empty at their proximal ends near the midgut-hindgut junction. Two tubules each fuse at
31 their distal ends and appear to be attached to the midgut. c Magnification of the midgut-hindgut junction
32 framed in black in panel b. d Magnification of one tubule (MT4) framed in red in panel b. FG, foregut;
33 MG, midgut; HG, hindgut; MT, Malpighian tubules; MP, metal pin.



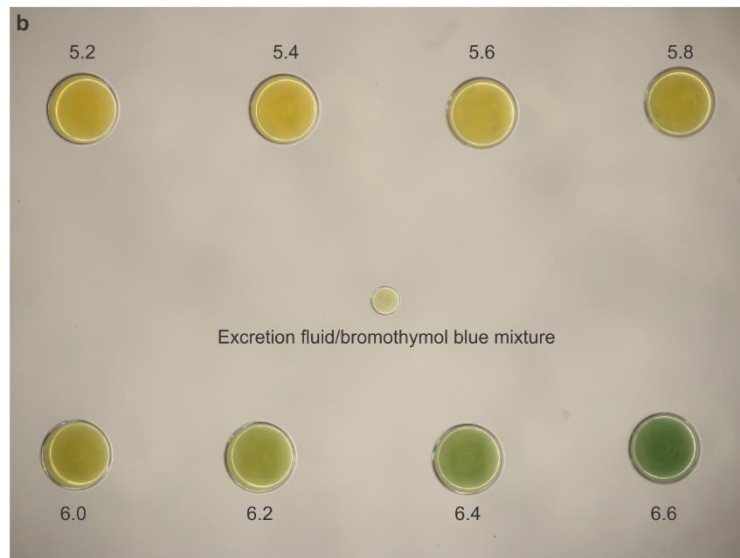
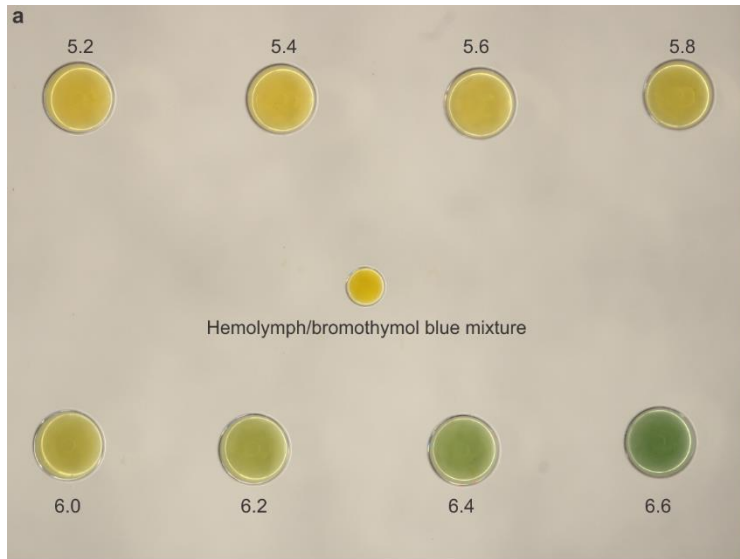
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35 **Supplementary Figure 3. Analysis of potential off-target effects of *dsPaGTR1*-injection and**
 36 **comparison of beetle feeding on *Arabidopsis* leaves. a** Four days after dsRNA injection, the gene
 37 expression of *PaGTR2*, *PaGTR3*, *PaGTR9* and *PaGTR10* was determined by quantitative PCR to assess
 38 whether there was off-target silencing on other *PaGTRs*. The nucleotide sequence of *PaGTR1* was most
 39 similar to *PaGTR9* and *PaGTR10* in the *P. armoraciae* transcriptome. Upon heterologously expressed in
 40 High Five insect cells, *PaGTR2*, *PaGTR3* and *PaGTR9* showed activity towards indol-3-ylmethyl
 41 glucosinolate ($n = 5$). **b** Four days after dsRNA injection, adults were allowed to feed on *Arabidopsis*
 42 leaves for five days. Treatments were compared by two-tailed Student's *t*-test or Mann-Whitney *U* test (n
 43 = 10). Data are shown as mean \pm s.e.m. n.s., not significantly different.



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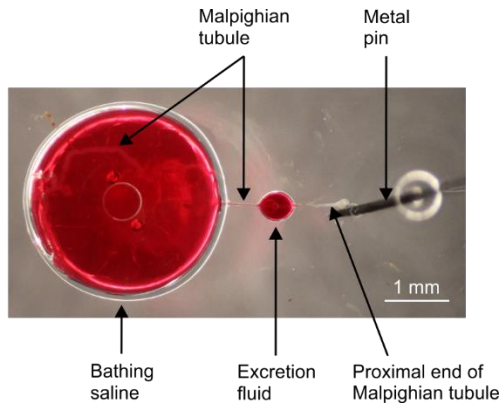
45 **Supplementary Figure 4. Time course of glucosinolate excretion during feeding on *Arabidopsis* by**
 46 **adult *P. armoraciae* after *dsIMPI*- or *dsPaGTR1*-injection.** The excreted glucosinolate amounts on
 47 each day were compared by two-tailed Student's *t*-test or Mann-Whitney *U* test ($n = 9$ for day 4, $n = 10$ for
 48 other days). Data are shown as mean \pm s.e.m. n.t., not tested; n.s., not significantly different; * $P < 0.05$;
 49 2Prop, 2-propenyl; 3MSOP, 3-methylsulfinylpropyl; 4MSOB, 4-methylsulfinylbutyl; 5MSOP, 5-
 50 methylsulfinylpentyl; 7MSOH, 7-methylsulfinylheptyl; 4MOI3M, 4-methoxyindol-3-ylmethyl.



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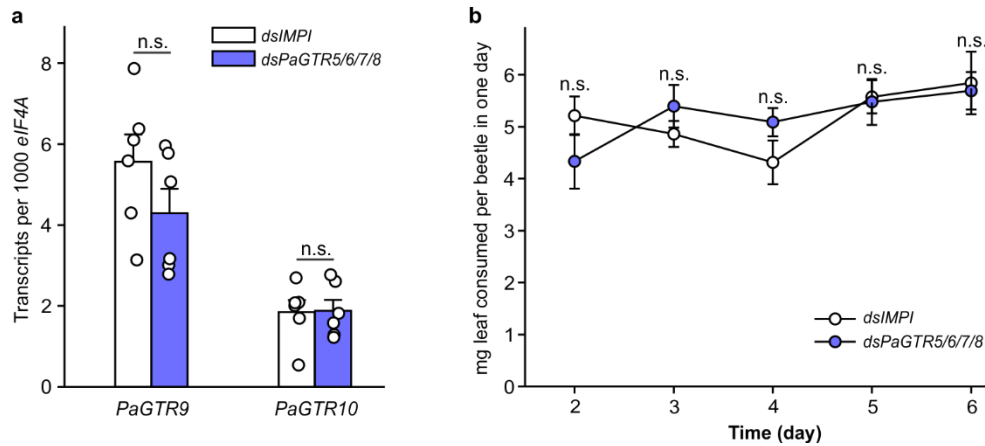
52 **Supplementary Figure 5. pH of hemolymph (a) and excretion fluid of isolated Malpighian tubules**
 53 **(b) of *P. armoraciae* adults.** Hemolymph and excretion fluid were mixed with an equal volume of 0.16%
 54 (w/v) bromothymol blue. Buffered standard solutions from pH 5.2 to 6.6 containing 0.08% bromothymol
 55 blue are shown as reference.

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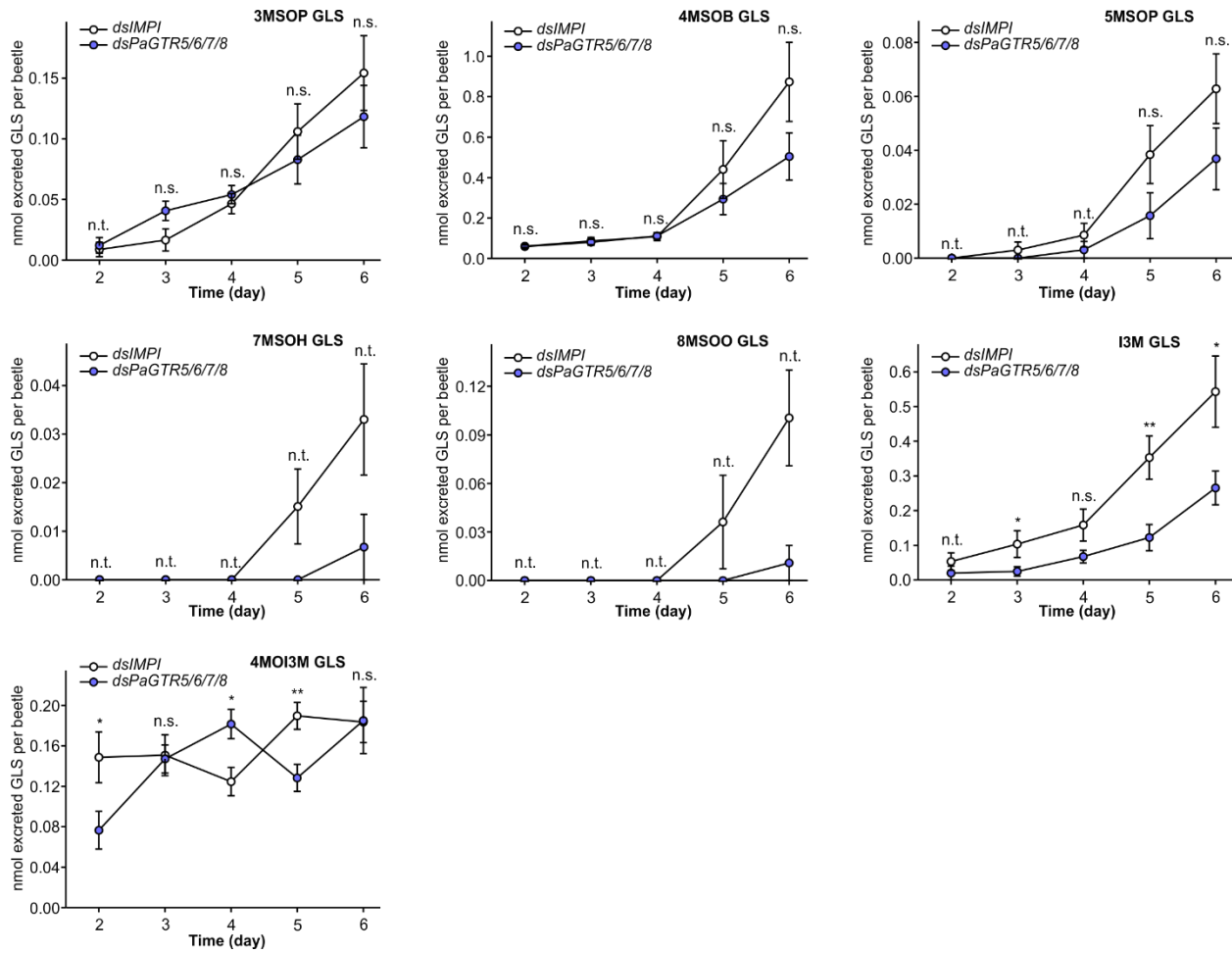
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58 **Supplementary Figure 6. Preparation of *P. armoraciae* Malpighian tubule for glucoside excretion**
59 **assay (Ramsay assay).** The dissected Malpighian tubule was placed in a droplet of bathing saline under
60 water-saturated paraffin-oil, the proximal end was drawn out of the droplet and attached to the Sylgard-
61 coated petri dish with a metal pin, and cut to allow the collection of excretion fluid. A mixture of eight
62 different plant glucosides, each at a concentration of 6.7 mM, and 0.1% (w/v) amaranth was added to the
63 saline. After 2-3 h, the bathing saline, Malpighian tubule and excretion fluid were sampled.



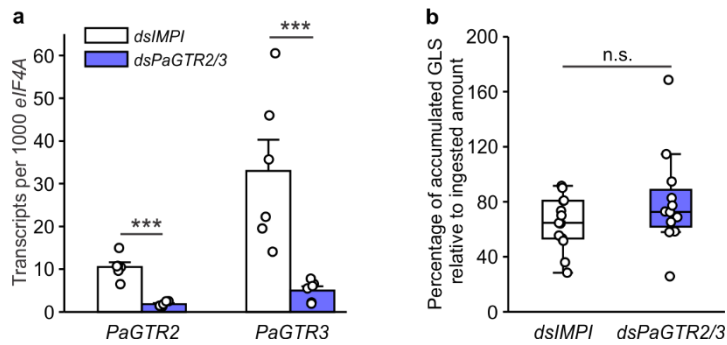
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65 **Supplementary Figure 7. Analysis of potential off-target effects of *dsPaGTR5/6/7/8*-injection and**
 66 **comparison of beetle feeding on *Arabidopsis* leaves. a** Six days after dsRNA injection, the gene
 67 expression of *PaGTR9* and *PaGTR10* was determined by quantitative PCR to assess whether there was
 68 off-target silencing on other *PaGTRs* ($n = 6$). The nucleotide sequence of *PaGTR5/6/7/8* was most similar
 69 to *PaGTR9* and *PaGTR10* in the *P. armoraciae* transcriptome. **b** After dsRNA injection, adults were
 70 allowed to feed on *Arabidopsis* leaves for six days. Feeding amount of each day was recorded from the
 71 second to the sixth day ($n = 10$). Data are shown as mean \pm s.e.m. n.s., not significantly different.



72

73 **Supplementary Figure 8. Time course of glucosinolate excretion during feeding on *Arabidopsis* by**
 74 **adult *P. armoraciae* after *dsIMPI*- or *dsPaGTR5/6/7/8*-injection.** The excreted glucosinolate amounts
 75 on each day were compared by two-tailed Student's *t*-test or Mann-Whitney *U* test ($n = 10$). Data are
 76 shown as mean \pm s.e.m. n.t., not tested; n.s., not significantly different; * $P < 0.05$; ** $P < 0.01$; I3M,
 77 indol-3-ylmethyl.



78

79 **Supplementary Figure 9. Accumulation of ingested glucosinolates in adult *P. armoraciae* beetles**

80 **after knock-down of *PaGTR2* and *PaGTR3* expression.** **a** *PaGTR2* and *PaGTR3* expression determined

81 by quantitative PCR in adult *P. armoraciae* after injection of dsRNA targeting *PaGTR2* and *PaGTR3*

82 (*dsPaGTR2/3*) or *IMPI* as a control ($n = 6$). Data are shown as mean \pm s.e.m. **b** Accumulation of the

83 ingested glucosinolates in adult *P. armoraciae*. Three days after dsRNA-injection, adults were fed for one

84 day with *Arabidopsis* leaves, starved for one day, and collected for glucosinolate extraction. Accumulated

85 glucosinolates: sum of 3-methylsulfinylpropyl GLS, 3-methylthiopropyl GLS, 4-methylsulfinylbutyl GLS,

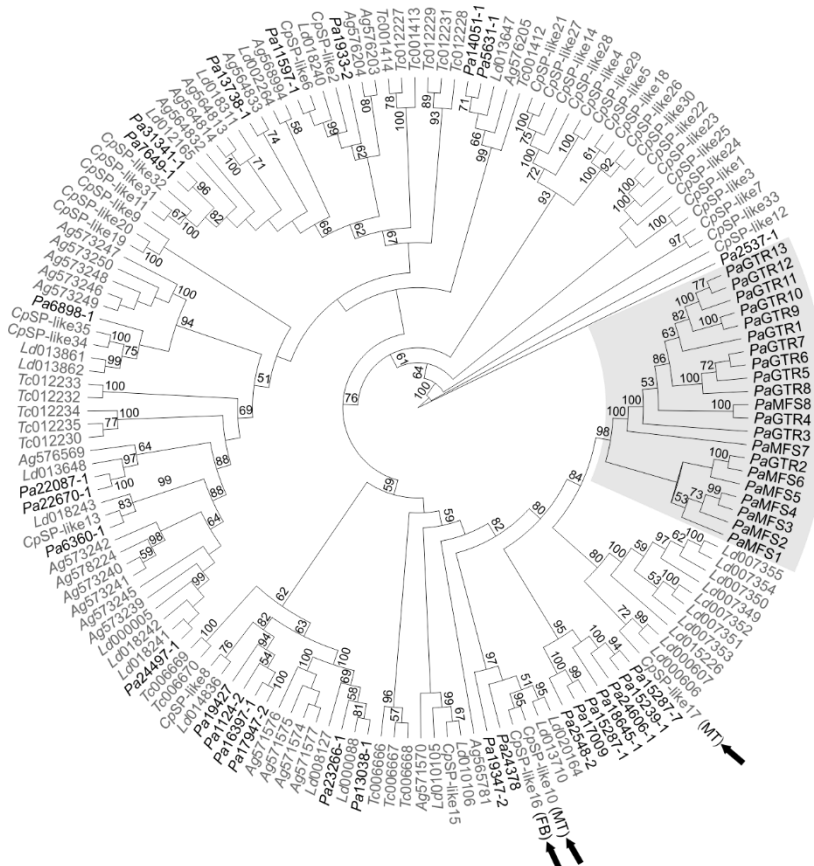
86 4-methylthiobutyl GLS, 7-methylsulfinylheptyl GLS and 8-methylsulfinyloctyl GLS. Due to a high

87 background of indolic GLS, it was not possible to quantify the accumulation of ingested indolic GLS

88 from *Arabidopsis*. Box plots show the median, interquartile range, and outliers of each data set ($n = 13$ for

89 the *dsIMPI*-injected beetles, $n = 12$ for the *dsPaGTR2/3*-injected beetles). Treatments were compared by

90 two-tailed Student's *t*-test. n.s., not significantly different; *** $P < 0.001$.



91

92 **Supplementary Figure 10. Diversification of coleopteran sugar porters.** Maximum-likelihood inferred
 93 phylogeny of a subset of predicted coleopteran sugar porters (Transporter Classification Database ID
 94 2.A.1.1) identified in the *P. armoraciae* transcriptome (written in black) and the genomes of *Leptinotarsa*
 95 *decemlineata*, *Anoplophora glabripennis*, and *Tribolium castaneum* (marked with a black frame in
 96 Supplementary Data 2), and 35 sugar porters identified in the proteome of *Chrysomela populi* (written in
 97 grey). The *P. armoraciae*-specific clade investigated in this study is highlighted with a grey background.
 98 Tissue-specific localization of three sugar porters from *C. populi* that are closely related to *PaGTRs* is
 99 written in parentheses. MT, Malpighian tubules; FB, fat body. Bootstrap support values higher than 50%
 100 are indicated on the corresponding branches. The tree was rooted with a putative vesicular
 101 neurotransmitter transporter (Transporter Classification Database ID 2.A.1.14) from *P. armoraciae*
 102 (*Pa2537-1*).

103 **Supplementary Tables 1-9**

104 **Supplementary Table 1.** Numbers of putative transporters in *Phyllotreta armoraciae*
 105 transcriptome predicted by the Transporter Automatic Annotation Pipeline (TransAAP).

Transporter family	Transporter number
The Major Facilitator Superfamily (MFS)	353
The ATP-binding Cassette (ABC) Superfamily	174
The H ⁺ - or Na ⁺ -translocating F-type, V-type and A-type ATPase (F-ATPase) Superfamily	93
The Voltage-gated Ion Channel (VIC) Superfamily	71
The Mitochondrial Carrier (MC) Family	69
The Neurotransmitter Receptor, Cys loop, Ligand-gated Ion Channel (LIC) Family	39
The P-type ATPase (P-ATPase) Superfamily	38
The HlyC/CorC (HCC) Family	33
The Epithelial Na ⁺ Channel (ENaC) Family	29
The Drug/Metabolite Transporter (DMT) Superfamily	26
The Major Intrinsic Protein (MIP) Family	26
The Transient Receptor Potential Ca ²⁺ Channel (TRP-CC) Family	23
The Amino Acid/Auxin Permease (AAAP) Family	22
The Glutamate-gated Ion Channel (GIC) Family of Neurotransmitter Receptors	22
The Neurotransmitter:Sodium Symporter (NSS) Family	21
The Amino Acid-Polyamine-Organocation (APC) Family	18
The Equilibrative Nucleoside Transporter (ENT) Family	18
The Mitochondrial Protein Translocase (MPT) Family	17
The Ca ²⁺ :Cation Antiporter (CaCA) Family	14
The Sulfate Permease (SulP) Family	14
The Ferrous Iron Uptake (FeoB) Family	12
The Resistance-Nodulation-Cell Division (RND) Superfamily	12
The YhaG Putative Tryptophan Uptake Permease (YhaG) family	12
The Unknown BART Superfamily-1 (UBS1) Family	11

The Solute:Sodium Symporter (SSS) Family	10
The Zinc (Zn ²⁺)-Iron (Fe ²⁺) Permease (ZIP) Family	10
The Choline Transporter Like (CTL) Family	9
The MerTP Mercuric Ion (Hg ²⁺) Permease (MerTP) Family	9
The Multidrug/Oligosaccharidyl-lipid/Polysaccharide (MOP) Flippase Superfamily	9
The Chloride Carrier/Channel (ClC) Family	8
The Glycoside-Pentoside-Hexuronide (GPH):Cation Symporter Family	8
The Gap Junction-forming Innexin (Innexin) Family	8
The Annexin (Annexin) Family	7
The Cation-Chloride Cotransporter (CCC) Family	7
The Cation Diffusion Facilitator (CDF) Family	7
The Divalent Anion:Na ⁺ Symporter (DASS) Family	7
The Organo Anion Transporter (OAT) Family	7
The Polycystin Cation Channel (PCC) Family	6
The Proton-dependent Oligopeptide Transporter (POT) Family	6
The Twin Arginine Targeting (Tat) Family	6
The Arsenite-Antimonite (ArsAB) Efflux Family	5
The Inward Rectifier K ⁺ Channel (IRK-C) Family	5
The Ammonia Transporter Channel (Amt) Family	4
The Intracellular Chloride Channel (CLIC) Family	4
The Dicarboxylate/Amino Acid:Cation (Na ⁺ or H ⁺) Symporter (DAACS) Family	4
The Mg ²⁺ Transporter-E (MgtE) Family	4
The Cytochrome Oxidase Biogenesis (Oxa1) Family	4
The Inorganic Phosphate Transporter (PiT) Family	4
The Anion Exchanger (AE) Family	3
The Arsenite-Antimonite (ArsB) Efflux Family	3
The ATP Exporter (ATP-E) Family	3
The Monovalent Cation:Proton Antiporter-1 (CPA1) Family	3
The Ca ²⁺ Release-activated Ca ²⁺ (CRAC) Channel (CRAC-C) Family	3
The Double Stranded RNA Transporter (dsRNA-T) Family	3

The H ⁺ -translocating Pyrophosphatase (H ⁺ -PPase) Family	3
The Iron/Lead Transporter (ILT) Superfamily	3
The Mitochondrial Tricarboxylate Carrier (MTC) Family	3
The Metal Ion (Mn ²⁺ -iron) Transporter (Nramp) Family	3
The Presenilin ER Ca ²⁺ Leak Channel (Presenilin) Family	3
The ATP:ADP Antiporter (AAA) Family	2
The Anion Channel-forming Bestrophin (Bestrophin) Family	2
The Monovalent Cation:Proton Antiporter-2 (CPA2) Family	2
The Copper Transporter (Ctr) Family	2
The Type II (General) Secretory Pathway (IISP) Family	2
The Lysosomal Cystine Transporter (LCT) Family	2
The Branched Chain Amino Acid:Cation Symporter (LIVCS) Family	2
The CorA Metal Ion Transporter (MIT) Family	2
The Oligopeptide Transporter (OPT) Family	2
The 2-Hydroxycarboxylate Transporter (2-HCT) Family	1
The Auxin Efflux Carrier (AEC) Family	1
The Bile Acid:Na ⁺ Symporter (BASS) Family	1
The Betaine/Carnitine/Choline Transporter (BCCT) Family	1
The Chloroplast Envelope Protein Translocase (CEPT or Tic-Toc) Family	1
The Concentrative Nucleoside Transporter (CNT) Family	1
The C ₄ -Dicarboxylate Uptake (Dcu) Family	1
The C ₄ -dicarboxylate Uptake C (DcuC) Family	1
The Epithelial Chloride Channel (E-CIC) Family	1
The Glutamate:Na ⁺ Symporter (ESS) Family	1
The PTS Glucitol (Gut) Family	1
The Nucleotide-sensitive Anion-selective Channel, ICln (ICln) Family	1
The Magnesium Transporter1 (MagT1) Family	1
The 4 TMS Multidrug Endosomal Transporter (MET) Family	1
The H ⁺ - or Na ⁺ -translocating Bacterial Flagellar Motor 1ExbBD Outer Membrane Transport Energizer (Mot/Exb) Family	1
The Mitochondrial and Plastid Porin (MPP) Family	1

The Malonate:Na ⁺ Symporter (MSS) Family	1
The NIPA Mg ²⁺ Uptake Permease (NIPA) Family	1
The Non-selective Cation Channel-2 (NSCC2) Family	1
The OmpA-OmpF Porin (OOP) Family	1
The Reduced Folate Carrier (RFC) Family	1
The Tellurite-resistance/Dicarboxylate Transporter (TDT) Family	1
The Homotrimeric Cation Channel (TRIC) Family	1
The Anion Channel Tweety (Tweety) Family	1
The Urea Transporter (UT) Family	1

106 **Supplementary Table 2.** Glucosinolate concentrations in the hemolymph of seven-day old adult *P. armoraciae*.

Glucosinolate	Glucosinolate concentration (mM)						Mean \pm SD
	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Replicate 5	Replicate 6	
2Prop GLS	55.769	59.682	97.330	67.331	67.277	80.198	71.265 \pm 15.263
3But GLS	1.081	4.937	3.670	3.791	3.725	2.373	3.263 \pm 1.343
2PE GLS	0.157	0.302	0.938	0.704	0.280	0.342	0.454 \pm 0.300
Benzyl GLS	0.345	0.386	0.634	0.735	0.401	0.258	0.460 \pm 0.184
I3M GLS	1.948	1.811	3.118	2.626	1.289	1.702	2.082 \pm 0.668
Total	59.300	67.118	105.689	75.187	72.972	84.873	77.523 \pm 16.210

107

108 **Supplementary Table 3.** Glucosinolate levels in *PaGTRI*-silenced and control beetles.

Glucosinolate	nmol sequestered glucosinolate per adult (mean \pm SD; $n = 10$)		Statistical method ¹	Statistics	<i>P</i> value
	<i>dsIMPI</i>	<i>dsPaGTRI</i>			
3MSOP GLS	1.231 \pm 0.195	1.394 \pm 0.282	Two-tailed Student's <i>t</i> -test	<i>t</i> = -1.507	0.149
3MTP GLS	0.188 \pm 0.051	0.232 \pm 0.088	Two-tailed Student's <i>t</i> -test	<i>t</i> = -1.343	0.196
4MSOB GLS	3.487 \pm 0.491	4.087 \pm 1.096	Two-tailed Student's <i>t</i> -test	<i>t</i> = -1.581	0.131
4MTB GLS	10.256 \pm 2.100	11.200 \pm 3.071	Two-tailed Student's <i>t</i> -test	<i>t</i> = -0.803	0.433
5MSOP GLS	0.191 \pm 0.046	0.222 \pm 0.032	Two-tailed Student's <i>t</i> -test	<i>t</i> = -1.753	0.097
7MSOH GLS	0.119 \pm 0.032	0.158 \pm 0.030	Two-tailed Student's <i>t</i> -test	<i>t</i> = -2.830	0.011
8MSOO GLS	1.135 \pm 0.286	1.306 \pm 0.441	Two-tailed Student's <i>t</i> -test	<i>t</i> = -1.028	0.317
2Prop GLS	55.841 \pm 7.800	52.509 \pm 3.984	Mann-Whitney <i>U</i> test	<i>U</i> = 38.000	0.385
3-butenyl GLS	0.935 \pm 0.161	1.007 \pm 0.295	Two-tailed Student's <i>t</i> -test	<i>t</i> = -0.683	0.503
I3M GLS	2.830 \pm 0.467	0.889 \pm 0.303	Two-tailed Student's <i>t</i> -test	<i>t</i> = 10.975	< 0.001
4OHI3M GLS	0.002 \pm 0.004	0.002 \pm 0.002	Mann-Whitney <i>U</i> test	<i>U</i> = 50.000	1
4MOI3M GLS	0.159 \pm 0.084	0.227 \pm 0.095	Two-tailed Student's <i>t</i> -test	<i>t</i> = -1.687	0.109
1MOI3M GLS	0.026 \pm 0.008	0.004 \pm 0.002	Mann-Whitney <i>U</i> test	<i>U</i> = 0.000	< 0.001
Total	76.399 \pm 8.738	73.248 \pm 4.350	Two-tailed Student's <i>t</i> -test	<i>t</i> = 1.021	0.321

109 ¹Analyses were performed using SigmaPlot 14.0.

110 **Supplementary Table 4.** Glucosinolate levels in *PaGTR5/6/7/8*-silenced and control beetles.

Glucosinolate	nmol sequestered glucosinolate per adult (mean \pm SD; $n = 10$)		Transformation	Statistics ¹	P value
	<i>dsIMPI</i>	<i>dsPaGTR5/6/7/8</i>			
3MSOP GLS	1.859 \pm 0.217	1.713 \pm 0.251	-	$t = 1.388$	0.182
3MTP GLS	0.432 \pm 0.098	0.318 \pm 0.087	-	$t = 2.739$	0.013
4MSOB GLS	4.555 \pm 0.802	4.582 \pm 0.855	-	$t = -0.073$	0.943
4MTB GLS	14.793 \pm 1.872	12.287 \pm 2.012	-	$t = 2.882$	0.010
5MSOP GLS	0.295 \pm 0.048	0.315 \pm 0.077	Square-root	$t = -0.648$	0.525
7MSOH GLS	0.218 \pm 0.026	0.220 \pm 0.045	-	$t = -0.139$	0.891
8MSOO GLS	1.317 \pm 0.195	1.281 \pm 0.376	-	$t = 0.263$	0.795
2Prop GLS	54.667 \pm 5.272	47.919 \pm 5.412	-	$t = 2.825$	0.011
3-butenyl GLS	1.287 \pm 0.360	1.456 \pm 0.584	Log ₁₀	$t = -0.791$	0.439
I3M GLS	4.227 \pm 0.487	5.225 \pm 0.907	-	$t = -3.069$	0.007
4MOI3M GLS	0.301 \pm 0.140	0.440 \pm 0.173	-	$t = -1.977$	0.064
1MOI3M GLS	0.070 \pm 0.010	0.070 \pm 0.017	-	$t = -0.010$	0.992
Total	84.021 \pm 5.319	75.828 \pm 4.321	-	$t = 3.781$	0.001

111 ¹Analyses were performed with two-tailed Student's *t*-test using SigmaPlot 14.0.

112 **Supplementary Table 5.** Primers used in this study.

Gene	Primer name	Primer sequence 5' - 3'	Use
<i>PaGTR1</i>	PaMFS28-CL1	GTAAGTTTAAAGTGTTATCTTCAAATTATCAA GGT	Cloning in pCR4-TOPO vector for sequencing; fwd
	PaMFS28-CL2	CGATGAATGTGACGGAAGCA	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS28-SEQ1	ACAGAGGGAAATTCGGTTGT	Internal sequencing
	PaMFS28-SEQ2	GCAGTTTCTGGTTCCGTTGT	Internal sequencing
	PaMFS28-IEX4-1	ACGCGTCGACATGAACAATTGGACAAAAGA ACATTTT	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS28-IEX4-2	ATAAGAATGCGGCCGCGCCTTTTAATATCG CCTGAATTTT	Expression of gene without stop codon in pIEx-4 vector; rev
	PaMFS28-QPF1	AGTTTCTGGTTCCGTTGTGC	qPCR; fwd
	PaMFS28-QPR1	GGTTGCCCAATGATTCGGAT	qPCR; rev
	PaMFS28-NB1u-F1	GGCTTAAUATGAACAATTGGACAAAAGAAC ATTTT	Cloning in pNB1u vector for protein expression in <i>Xenopus</i> oocytes; fwd
	PaMFS28-NB1u-R1	GGTTTAAUTTAAGCGTAATCTGGAACATCG TATGGGTAGCCTTTTAATATCGCCTGAATTT C	Cloning in pNB1u vector for protein expression in <i>Xenopus</i> oocytes; rev
	T7-PaMFS28-F2	TAATACGACTCACTATAGGGAGAGGTTTCG TTATTGGTCCATATTTTCAGT	Amplification of DNA templates for dsRNA synthesis; fwd
	T7-PaMFS28-R2	TAATACGACTCACTATAGGGAGAGCATTTCG TCTTCTTTGCCCTTTT	Amplification of DNA templates for dsRNA synthesis; rev (141-bp amplified fragment of <i>PaGTR1</i> using the forward and reverse primers)
	<i>PaGTR2</i>	c6623-1-CL1	GCAGAAAGTGTCCGACAAATG
c6623-1-CL2		CATAACAACAATGTACAACCTGTCGAG	Cloning in pCR4-TOPO vector for sequencing; rev
c6623-1-EX1		TGTCGACATGGTCAAAAAACGATACGAAAT C	Expression of gene without stop codon in pIEx-4 vector; fwd
c6623-1-EX2		TGCGGCCGCATACTCTTTCAAATCTTTTGT ATTTCAAT	Expression of gene without stop codon in pIEx-4 vector; rev
c6623-1-S1		ACTTTCACGCAACCCACAAT	Internal sequencing
c6623-1-S2		GATTGGTGTGTTGCCACGTT	Internal sequencing
c6623-1-S3		CAGCTTCGGCTATCCTTTGT	Internal sequencing
C6623-1-QPF2		GCCTGCGATACAACAACCTGA	qPCR; fwd

	C6623-1-QPR2	TCAAAGGAAGAGACCCGAGA	qPCR; rev
	T7-c6623-1-F1	TAATACGACTCACTATAGGGAGAGGAAGCG	Amplification of DNA templates for dsRNA synthesis; fwd
	T7-c6623-1-R1	TAATACGACTCACTATAGGGAGAGCTAGAA GCAGCAGGGACAT	Amplification of DNA templates for dsRNA synthesis; rev (298-bp amplified fragment of <i>PaGTR2</i> using the forward and reverse primers)
<i>PaGTR3</i>	PaMFS27-CL1	ACGGAATCTATGAATGATGTGCT	Cloning in pCR4-TOPO vector for sequencing; fwd
	PaMFS27-CL2	AACCACCTGCATTTTCGGAAC	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS27-SEQ1	AGCATCCTCTACATGACCCTG	Internal sequencing
	PaMFS27-SEQ2	CTCGGTGGTGACGTCCAT	Internal sequencing
	PaMFS27-SEQ3	GGGATTTCTACTCATGGTGATCT	Internal sequencing
	PaMFS27-IEX4-1	ACGCGTCGACATGAAGGACGAGATATCTCT GAAG	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS27-IEX4-2	ATAAGAATGCGGCCGCATAACTCTTGAGCT CCGCCT	Expression of gene without stop codon in pIEx-4 vector; rev
	PaMFS27-QPF1	CGCGTTGTTATTGGGATGCT	qPCR; fwd
	PaMFS27-QPR1	GCTTGTGTTTGGTTCGA	qPCR; rev
	T7-PaMFS27-F2	TAATACGACTCACTATAGGGAGATATCCTC CACAGCCACAGGAAT	Amplification of DNA templates for dsRNA synthesis; fwd
	T7-PaMFS27-R2	TAATACGACTCACTATAGGGAGAGAACAGC TCGGTGACCAGCA	Amplification of DNA templates for dsRNA synthesis; rev (182-bp amplified fragment of <i>PaGTR3</i> using the forward and reverse primers)
<i>PaGTR4</i>	PaMFS43-CL1	TACCGTCTGCCTCATACTCG	Cloning in pCR4-TOPO vector for sequencing; fwd
	PaMFS43-CL2	TGCCTGACTAGTCTACACCA	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS43-SEQ1	TGAGCGTTGTACCTGTATACAT	Internal sequencing
	PaMFS43-IEX4-1	ACGCGTCGACATGAAGGTAACAAGATG AAGATTACC	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS43-IEX4-2	ATAAGAATGCGGCCGCTCTTTTAAGTAATTT TTCTATTTCACTGTAATT	Expression of gene without stop codon in pIEx-4 vector; rev
	PaMFS43-QPF2	GTTACACGGGAATGCTGCAT	qPCR; fwd
PaMFS43-QPR2	CGGGCATCAAAGGAAACACA	qPCR; rev	
<i>PaGTR5</i>	PaMFS15_3R_a	TACGCAGCTGAAGTTAGCGAGGATCACA	3' RACE
	PaMFS15_3R_b	AGCACCGTTTTTAGACCAAGCAGGCACT	3' RACE

	PaMFS15-5R	TATAGCGGTACCAGTGGAAGATATAACAAG CA	5' RACE
	PaMFS15-CL1	GTAAAAGGTGCGACAAAAGTGT	Cloning in pCR4-TOPO vector for sequencing; fwd
	PaMFS15-CL2	TACTGCACATTATTAATAATTGACAATT	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS15-SEQ1	TTCCCGGAGCTTGGATAGTT	Internal sequencing
	PaMFS15-IEX4-1	ACGCGTCGACATGGATAACAAAAAATATGA GAATATTCAAAAAG	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS15-IEX4-2	ATAAGAATGCGGCCGCTTTTTTCGCATAATT TCTCAATATTTCT	Expression of gene without stop codon in pIEx-4 vector; rev
	PaMFS15-QPF1	GGTTTAGGTCCTATTCCTACTAGCT	qPCR; fwd
	PaMFS15-QPR1	GTTACCCAAAGATTCCGACACTAG	qPCR; rev
	T7-PaMFS15-F6	TAATACGACTCACTATAGGGGAGAACAGTTT GCTGCTTTGGATCC	Amplification of DNA templates for dsRNA synthesis; fwd
	T7-PaMFS15-R6	TAATACGACTCACTATAGGGGAGATACCCAA AGATTCCGACACTAGG	Amplification of DNA templates for dsRNA synthesis; rev (169-bp amplified fragment of <i>PaGTR5</i> using the forward and reverse primers)
<i>PaGTR6</i>	PaMFS41_5R_a	AGTCACCGCTCTGAGCTCTGGTAATGGT	5' RACE
	PaMFS41_5R_b	ACGCCTGAAAGCAGCATTACAAGCCCTGA	5' RACE
	PaMFS41-CL1	CGTCTAAATCAAGTGAAATTGTATCGAAT	Cloning in pCR4-TOPO vector for sequencing; fwd
	PaMFS41-CL2	GTGAGGGTCAATTTGTAATATAAATCGT	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS41-SEQ1	CAATAGAGGAAAATTCGGTTGTTATTTT	Internal sequencing
	PaMFS41-IEX4-1	ACGCGTCGACATGGATAACCAAATGAGAA TAATCAAAA	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS41-IEX4-2	ATAAGAATGCGGCCGCAATATTCTTCGAGA CATCATAGTTTTTCA	Expression of gene without stop codon in pIEx-4 vector; rev
	PaMFS41-QPF3	TCCAACAAATTGGGCATCTAT	qPCR; fwd
	PaMFS41-QPR3	AACGAATACCAACAAAGGAGAAGT	qPCR; rev
	T7-PaMFS41-F1	TAATACGACTCACTATAGGGGAGAT GGATTAGGTTTAGGTCCAATTG	Amplification of DNA templates for dsRNA synthesis; fwd
	T7-PaMFS41-R1	TAATACGACTCACTATAGGGGAGAG TTAATGCAAATCCTACAACACTACC	Amplification of DNA templates for dsRNA synthesis; rev (120-bp amplified fragment of <i>PaGTR6</i> using the forward and reverse primers)
<i>PaGTR7</i>	PaMFS40_3R	TATTCAGGGCTCGTAATGCTGCTGGCTA	3' RACE
	PaMFS40-CL1	AGGTGCATTAGAATTTTAAATTGGATTG	Cloning in pCR4-TOPO vector for sequencing; fwd

	PaMFS40-CL2	CCAAGAAGTCCATAACTATTAAGATAGACT	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS40_SEQ1	ACACCAATACATTTGTTGGTTAA	Internal sequencing
	PaMFS40_SEQ2	TATTACAGTAACACCCGAGCAGT	Internal sequencing
	PaMFS40-IEX4-1	ACGCGTCGACATGGATAACCAAATAAGAA AAATCAAAA	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS40-IEX4-2	ATAAGAATGCGGCCGCTTTTTTCGCATAATT TCTCAATATTTCT	Expression of gene without stop codon in pIEx-4 vector; rev
	PaMFS40-QPF1	CCAAAGGAAGCATAAAGGAGCAT	qPCR; fwd
	PaMFS40-QPR1	CAGTAACACCCGAGCAGTATTTAT	qPCR; rev
	T7-PaMFS40-F1	TAATACGACTCACTATAGGGAGAT TACAGTTTGCTTCTTTGGATTGG	Amplification of DNA templates for dsRNA synthesis; fwd
	T7-PaMFS40-R1	TAATACGACTCACTATAGGGAGAG ATATAAAAATGTAAACGTAGAAGATGCAA	Amplification of DNA templates for dsRNA synthesis; rev (147-bp amplified fragment of <i>PaGTR7</i> using the forward and reverse primers)
<i>PaGTR8</i>	PaMFS48_3R	ACCGCGCCTGCGTTGTTATTCGTTGTTA	3' RACE
	PaMFS48_5R	AGTCTCCCGATAAGCTGGTGCCTGCT	5' RACE
	PaMFS48-CL1	GCTGAGCAAATAAAGTGTCGAATT	Cloning in pCR4-TOPO vector for sequencing; fwd
	PaMFS48-CL2	ATGTATATTTTTGTAACATAAAGAGCCAA AA	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS48-QPF1	CTAATGCCCAAACCTCTGCGAC	Internal sequencing
	PaMFS48-IEX4-1	ACGCGTCGACATGAGAAAAATGAGTTTAGA AGACCAT	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS48-IEX4-2	ATAAGAATGCGGCCGCATTTTTTCACGTTACT TTTCAACATTTCT	Expression of gene without stop codon in pIEx-4 vector; rev
	PaMFS48-QPF4	GGTTTAATACCGTTGCTGACG	qPCR; fwd
	PaMFS48-QPR4	CCTACCGAATCTCTCGATAACG	qPCR; rev
	T7-PaMFS48-F1	TAATACGACTCACTATAGGGAGAT CAATTCATCATTATTGGTACAACCTC	Amplification of DNA templates for dsRNA synthesis; fwd
	T7-PaMFS48-R1	TAATACGACTCACTATAGGGAGAA AGATGCAGAACCTGCCGATT	Amplification of DNA templates for dsRNA synthesis; rev (180-bp amplified fragment of <i>PaGTR8</i> using the forward and reverse primers)
<i>PaGTR9</i>	PaMFS16_5R_a	TGCGCCACTGAAACCTAAACCTACGCCT	5' RACE
	PaMFS16_5R_b	ACACCGTAACCGCCCTGATCTCGGCT	5' RACE
	PaMFS16-CL3	AATGGTGCTTGCAGTGGTTT	Cloning in pCR4-TOPO vector for sequencing; fwd

	PaMFS16-CL4	CGCGTAAAATCGGCTTAATATGA	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS16-IEX4-3	GTCGACATGGATTTAGAAAATAAAACACAT CAAACA	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS16-IEX4-4	GCGGCCGCTTTTATTCGAAGCTTCGAATAAT TTAACA	Expression of gene without stop codon in pIEx-4 vector; rev
	PaMFS16-QPF1	CATCGTTAATAGCGTACCTTCAATG	qPCR; fwd
	PaMFS16-QPR1	CAATTCAGAGACCCACGCTTG	qPCR; rev, internal sequencing
<i>PaGTR10</i>	PaMFS42_5R	ACCATGTCGCCTGATAAGCTAGTGCCTGCT	5' RACE
	PaMFS42-CL5	GACGATACAAAATTTGAAAACCTCAATAAAT AAG	Cloning in pCR4-TOPO vector for sequencing; fwd
	PaMFS42-CL8	CATTCTAACATTATGGCATTAAAAGTATA AGT	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS42-SEQ1	CTGGTTGGGTGGTTTTCTCG	Internal sequencing
	PaMFS42-IEX4-1	ACGCGTCGACATGGATTTAGAAAATAAGCC GCAT	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS42-IEX4-3	ATAAGAATGCGGCCGCTTTTATTTGTAGCTT CGAATAATTTTTAGC	Expression of gene without stop codon in pIEx-4 vector; rev
	PaMFS42-QPF1	TCATCGTTAATAGCGTACCTTCAATG	qPCR; fwd
	PaMFS42-QPR1	GCAGTTCGGACGTCATCACTT	qPCR; rev
<i>PaGTR11</i>	PaMFS45_3R	CACTGGGAGTATCAATGGCTTGGACATC	3' RACE
	PaMFS45_3Rb	AGAGATGGAAGAGAGTCAACGTTGCGA	3' RACE
	PaMFS45_3Rc	ACCGAGGCTTATTCCGTGATGTCGATATAC GT	3' RACE
	PaMFS45_5R	CGGACCGATAATGTAACCAAGAAGATGCC CA	5' RACE
	PaMFS45-CL3	CATTAAGAAGCACCAACTACCGTAG	Cloning in pCR4-TOPO vector for sequencing; fwd
	PaMFS45-CL4	CGGTTGGTTATATTGGTTAAATTTACAA	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS45-SEQ1	CAAATGGGGCATCTTCTTGGT	Internal sequencing
	PaMFS45-IEX4-1	ACGCGTCGACATGGAAGAGAGTCAACGTT T	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS45-IEX4-2	ATAAGAATGCGGCCGCATGTATTTAAGTT CGGAATAATTTTTCAAC	Expression of gene without stop codon in pIEx-4 vector; rev
	PaMFS45-QPF1	TCACTGGGAGTATCAATGGCTT	qPCR; fwd
	PaMFS45-QPR1	ACACCGCAAATAACAAATATCTCTTC	qPCR; rev

<i>PaGTR12</i>	PaMFS14_3R_a	TGACTCTTTTCACTGGGAGCTTCAATGTCTTG GA	3' RACE
	PaMFS14_3R_b	TTCTCAATGGTGCCGAAACACCCATATAT TTG	3' RACE
	PaMFS14-CL1	AAAGAAAACCAAAAAAATTAATAATTTTTTT AAGAAA	Cloning in pCR4-TOPO vector for sequencing; fwd
	PaMFS14-CL2	CTAATTCATATTAACACAGCAAACCTTAGT	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS14_SEQ1	ACCGAAGCTTATTCCGTAACGT	Internal sequencing
	PaMFS14-IEX4-3	ACGCGTCGACATGCATTTAGAGATAAAAGA AAACCACAAAG	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS14-IEX4-2	ATAAGAATGCGGCCGCACGTATTTTAAGTT CGGAATAATTTTTTAAC	Expression of gene without stop codon in pIEx-4 vector; rev
	PaMFS14-QPF1 PaMFS14-QPR1	GTTTTCAAAGTAACTTCCTACGTTCT TATGAAGAACAAGATAGGGCAGTAC	qPCR; fwd qPCR; rev
<i>PaGTR13</i>	PaMFS46_3R_a	GAGCATCCCTAACTTGGACATCTCCAGT	3' RACE
	PaMFS46_5R_a	TATCGATGTCACGGAATGAGCCTCGGTA	5' RACE
	PaMFS46_5R_b	AATATATAGGTGTTTCCGGCGCCATTGAGA AA	5' RACE
	PaMFS46-CL1	GGCATTAAAGAACATTTAAGAAGTACCAA	Cloning in pCR4-TOPO vector for sequencing; fwd
	PaMFS46-CL2	CAACATTTAGAATGTCTGGAGATTTTTTAG	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS46_SEQ1	TCGATATTCCATCAAATGGGACA	Internal sequencing
	PaMFS46-IEX4-1	ACGCGTCGACATGCATTTAGAGATGGAAGA AAGTC	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS46-IEX4-2	ATAAGAATGCGGCCGCATGTATTTTAAGTT GGGAATAATTTTTTAACAT	Expression of gene without stop codon in pIEx-4 vector; rev
PaMFS46-QPF3 PaMFS46-QPR3	GTTTAGGACCTATTCCGCACAT GAAAACAAACACTACAACGTAACAGG	qPCR; fwd qPCR; rev	
<i>PaMFS1</i>	Pa3391-CL1	CATTCTCCTAATCTTGGCATTATCTAT	Cloning in pCR4-TOPO vector for sequencing; fwd
	Pa3391-CL2	GTCTGCCTGCAGAAGATTTTAC	Cloning in pCR4-TOPO vector for sequencing; rev
	Pa3391-EX1	TGTCGACATGAGTTCTGGCATAGATCAAAA AT	Expression of gene without stop codon in pIEx-4 vector; fwd
	Pa3391-EX2	TGCGGCCGCCCTGGTTTTTCAGGTATTCCTG	Expression of gene without stop codon in pIEx-4 vector; rev
	Pa3391-S1	GTGGGTCGGAAGAGATGCTT	Internal sequencing

	Pa3391-QPF1 Pa3391-QPR1	CAATTCGGCAGGTACCAGTT TTCGTCTCCTGCCAGTCTTT	qPCR; fwd qPCR; rev
<i>PaMFS2</i>	Pa6623-7-CL1 Pa6623-7-CL2 Pa6623-7-EX1	GAGCAATTACTTAATTAGATGGCAGT ATACACACAATGTACCACAGCTTAAA TGTCGACATGGTCGAAATGGGCAAAG	Cloning in pCR4-TOPO vector for sequencing; fwd Cloning in pCR4-TOPO vector for sequencing; rev Expression of gene without stop codon in pIEx-4 vector; fwd
	Pa6623-7-EX2	TGCGGCCGCATTTCCAATCTCCTCCTGGATT	Expression of gene without stop codon in pIEx-4 vector; rev
	Pa6623-7-S1 Pa6623-7-QPF2 Pa6623-7-QPR2	AGCGTTATCATGGCTGGATT ACAGTACATGAGCGGTGCAG GCGCTACACTATCGCCAGAT	Internal sequencing qPCR; fwd qPCR; rev
<i>PaMFS3</i>	Pa19756-1-CL1 Pa19756-1-CL2 Pa19756-1-EX1	GTTGAGGTGATTGCAGGAAC GTTAGACTGATTGCACTTGAGGA TGTCGACATGGGTAAATTGGAAGAAGTAAA ATATG	Cloning in pCR4-TOPO vector for sequencing; fwd Cloning in pCR4-TOPO vector for sequencing; rev Expression of gene without stop codon in pIEx-4 vector; fwd
	Pa19756-1-EX2	TGCGGCCGCAGCGCATTTTCTAAACAATTG AA	Expression of gene without stop codon in pIEx-4 vector; rev
	Pa19756-1-S1 Pa19756-1-QPF2 Pa19756-1-QPR2	CTGACGGAAGTGTGCGGAGAAT TGCAGTGTCTTTCTCCGTTG CCGTAAACAATCCCACGAAC	Internal sequencing qPCR; fwd qPCR; rev
<i>PaMFS4</i>	Pa20117-CL1 Pa20117-CL2 Pa20117-EX1	CACCCTGCATTGTATCAGGATT TTTACTTAAACTTGACAAACATGACTT TGTCGACATGCTCTCCGGAAGCGCC	Cloning in pCR4-TOPO vector for sequencing; fwd Cloning in pCR4-TOPO vector for sequencing; rev Expression of gene without stop codon in pIEx-4 vector; fwd
	Pa20117-EX2	TGCGGCCGCCCAACGTTTCAATTTAATTCGA TA	Expression of gene without stop codon in pIEx-4 vector; rev
	Pa20117-S1 Pa20117-QPF4 Pa20117-QPR4	GAGCTACAAGCCTTTCACGTT CACTGCGATAGTCGGTGTAGTT CCAGAGCAGAGCTTAACAGCA	Internal sequencing qPCR; fwd qPCR; rev
<i>PaMFS5</i>	Pa22183-CL1 Pa22183-CL2 Pa22183-EX1	TGTGGATTTAACATTACCTTACTCCTT GAACGCAATTCATATTTTCTAGCTT TGTCGACATGGCCAACCGCAAAAATG	Cloning in pCR4-TOPO vector for sequencing; fwd Cloning in pCR4-TOPO vector for sequencing; rev Expression of gene without stop codon in pIEx-4 vector; fwd

	Pa22183-EX2	TGCGGCCGCATAATTTGTAAACATTTCTTGT ATTTTCATG	Expression of gene without stop codon in pIEx-4 vector; rev
	Pa22183-S1	GATGCCAAATTTTCGCTGGTAT	Internal sequencing
	Pa22183-QPF1	GGTCGTTTCTGCTGCCTTAG	qPCR; fwd
	Pa22183-QPR1	TTGTGTTCCCTCGCACAAATTC	qPCR; rev
<i>PaMFS6</i>	Pa6623-3-CL1	TGAGTTGCTTTTATCCTGTGCTAT	Cloning in pCR4-TOPO vector for sequencing; fwd
	Pa6623-3-CL2	GATAAGGCTTACAAGCAGTAGATAGGT	Cloning in pCR4-TOPO vector for sequencing; rev
	Pa6623-3-EX1	TGTCGACATGACAGAAAATCGTGTAATTTTC G	Expression of gene without stop codon in pIEx-4 vector; fwd
	Pa6623-3-EX2	TGCGGCCGCATAATCGGCTAATATTTGCTG GATT	Expression of gene without stop codon in pIEx-4 vector; rev
	Pa6623-3-S1	CATTTGCATATCGATGGCATT	Internal sequencing
	Pa6623-3-QPF1	TTGGTTGGCTCAGTGTTTCAG	qPCR; fwd
	Pa6623-3-QPR1	TCTCCGGTGCTAAATGGAAC	qPCR; rev
<i>PaMFS7</i>	PaMFS13-CL1	GATATCAAGCAGTGTATTAAGCACAAT	Cloning in pCR4-TOPO vector for sequencing; fwd
	PaMFS13-CL2	TTTGTTTGAATCCAGTTGACCAA	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS13-SEQ1	TCCGGTCTTCAGCATCAAATACT	Internal sequencing
	PaMFS13-SEQ2	CCATAACCAGCGAGCTCTTC	Internal sequencing
	PaMFS13-IEX4-1	ACGCGTTCGACATGGAAGATCCCAACGTTTC A	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS13-IEX4-2	ATAAGAATGCGGCCGCAAACCTTTTCAACA TCTGCTGTATTT	Expression of gene without stop codon in pIEx-4 vector; rev
	PaMFS13-QPF2	GGGCATTTGTTTCGCGTATCT	qPCR; fwd
	PaMFS13-QPR2	GGCACGATGAAGAAGAGCAG	qPCR; rev
<i>PaMFS8</i>	PaMFS44_5R_a	TATCGCGCCGGCCACACAATTTACGCTA	5' RACE
	PaMFS44_5R_b	TCGACTACGAAGGATGCGACTGTGAAGA	5' RACE
	PaMFS44-CL8	GTGAATATGTGGGGAAATGGTATATT	Cloning in pCR4-TOPO vector for sequencing; fwd
	PaMFS44-CL7	GGTTCTAATGATTTTGTACAATTTACATAGG TAT	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS44-IEX4-1	ACGCGTTCGACATGTCCGTCGAAATAGCTGT TA	Expression of gene without stop codon in pIEx-4 vector; fwd
	PaMFS44-IEX4-2	ATAAGAATGCGGCCGCTCTTTCAAGCATTTT CTGTATTTTCATC	Expression of gene without stop codon in pIEx-4 vector; rev
	PaMFS44-QPF1	CACTGTCGCATCCTTCGTAGT	qPCR; fwd

	PaMFS44-QPR1	GCCATTGGAGTTGTTGCAGAG	qPCR; rev, internal sequencing
<i>PaMFS9_ps</i>	PaMFS50_3R	CCACTGCTAACTAAATACTGTTCCGGTGTTA CC	3' RACE
	PaMFS50_5R_a	AGAAACAGAGGTATAGCGGTA CTAGTGGTA GA	5' RACE
	PaMFS50_5R_b	GCTACAATGTCACCTGATAAGCTAGTACCT G	5' RACE
	PaMFS50-CL1	TATAAGGTGCTGAGTACTAACGGT	Cloning in pCR4-TOPO vector for sequencing; fwd
	PaMFS50-CL2	GGTATTAAGGGGTATTATAAAATGGTATTT G	Cloning in pCR4-TOPO vector for sequencing; rev
	PaMFS50_SEQ1	TGATATATTAGGCAGGAAGCGGT	Internal sequencing
<i>eIF4A</i>	qPaEiF4a_F	CACGGTGACATGGAGCAAAG	qPCR; fwd
	qPaEiF4a_R	ACCTCTGGCCAACAAATCGG	qPCR; rev
<i>RPL13a</i>	qPaRPL13a_F	CGTTCGTACGTTGGAGAGCA	qPCR; fwd
	qPaRPL13a_R	GCTTGGCAACCTTTTCAGTC	qPCR; rev
<i>RPS4e</i>	qPaRPS4e_F	CGTATTACTGCTGAAGAAGC	qPCR; fwd
	qPaRPS4e_R	ATCGTGGGTCACCAAGAACG	qPCR; rev
<i>RPL7</i>	qPaRPL7_F	AGGCTGAAGGAACGAGATGA	qPCR; fwd
	qPaRPL7_R	CTTCGGCTGGAACGTAGAAG	qPCR; rev
<i>IMPI</i>	T7-IMPI-F2	TAATACGACTCACTATAGGGAGAGTAATGA CAAGTGCTACTGTGAAGAT	Amplification of DNA templates for dsRNA synthesis; fwd
	T7-IMPI-R2	TAATACGACTCACTATAGGGAGAGGGGAGT CAATGCAGGAAAAC	Amplification of DNA templates for dsRNA synthesis; rev (223-bp amplified fragment of <i>IMPI</i> using the forward and reverse primers)

114 **Supplementary Table 6.** Gene expression variability across tissues among four tested reference genes.

Target gene	Tissue	Mean Cq value of four biological replicates	Standard deviation of the mean Cq values
<i>eIF4A</i>	Foregut	21.70	0.30
	Midgut	21.96	
	Hindgut	21.62	
	Malpighian tubules	21.39	
	Other tissues	21.17	
<i>RPL13a</i>	Foregut	20.81	0.31
	Midgut	20.44	
	Hindgut	20.98	
	Malpighian tubules	20.22	
	Other tissues	20.49	
<i>RPL7</i>	Foregut	21.42	0.42
	Midgut	20.39	
	Hindgut	21.12	
	Malpighian tubules	20.63	
	Other tissues	20.62	
<i>RPS4e</i>	Foregut	21.37	0.46
	Midgut	20.44	
	Hindgut	21.39	
	Malpighian tubules	20.77	
	Other tissues	20.52	

115 **Supplementary Table 7.** Multiple reaction monitoring (MRM) transitions for compounds determined by LC-MS/MS.

Compound	Q1 [m/z]	Q3 [m/z]	CE [eV]	Use
2Prop GLS	358	95.9	-60	
4MSOB GLS	435.9	95.8	-60	
4MTB GLS	419.9	95.9	-58	
2PE GLS	421.81	95.9	-50	
Benzyl GLS	408	95.9	-60	All samples except those of the pH-dependency experiment using the <i>Xenopus</i> oocyte expression system
4OHB GLS	424	95.9	-60	
I3M GLS	447	95.8	-50	
3-Butenyl	372	95.9	-60	
Salicin	285	123	-18	
Dhurrin	310	179	-10	
Linamarin (formiate adduct)	292	45	-26	
Aucubin (formiate adduct)	391	183	-18	
Catalpol (formiate adduct)	407	199	-18	
2Prop GLS	358	97.0 ^Q	22	
	358	75	30	
	358	259	20	
I3M GLS	447	97.0 ^Q	10	
	447	259	10	
	447	205	10	

116 ^Qquantifier ion, additional transitions are used for identification only.

117 **Supplementary Table 8.** *In silico* off-target prediction of the dsRNA designs against the local *P. armoraciae* transcriptome database.

Target gene	Hit	1-mismatch count	2-mismatch count	Sequence annotation
<i>IMPI</i>	<i>Parm_de_novo_new_c119</i>	0	1	Cytochrome c oxidase assembly protein COX15 homolog
	<i>Parm_de_novo_new_c2603</i>	0	1	Serotonin receptor
	<i>Parm_de_novo_new_c5811</i>	0	1	Acyl-CoA synthetase family member 4-like
	<i>Parm_de_novo_new_c12340</i>	0	1	Zinc finger protein 333 isoform X3
	<i>Parm_de_novo_new_c14305</i>	0	1	Retrovirus-related Pol polyprotein from transposon 412
<i>PaGTR1</i>	<i>Parm_de_novo_new_c331</i>	0	1	Nucleolar complex protein 3 homolog
	<i>Parm_de_novo_new_c506</i>	0	1	Methyl-CpG-binding domain protein 5
	<i>Parm_de_novo_new_c521</i>	0	5	Mannosyl-oligosaccharide alpha-1,2-mannosidase isoform A
	<i>Parm_de_novo_new_c800</i>	0	3	Cyclin-Y
	<i>Parm_de_novo_new_c1397</i>	0	5	Actin-related protein 2/3 complex subunit 4
	<i>Parm_de_novo_new_c1628</i>	0	1	Fanconi anemia group M protein
	<i>Parm_de_novo_new_c2850</i>	0	1	Sorting nexin-27
	<i>Parm_de_novo_new_c3233</i>	0	2	3-hydroxy-3-methylglutaryl-coenzyme A reductase
	<i>Parm_de_novo_new_c4725</i>	0	3	Max-binding protein MNT-like isoform X1
	<i>Parm_de_novo_new_c7102</i>	0	1	Integrator complex subunit 12
	<i>Parm_de_novo_new_c7238</i>	0	1	Not annotated
	<i>Parm_de_novo_new_c8110</i>	0	3	Protein tramtrack, beta isoform-like isoform X1
	<i>Parm_de_novo_new_c8310</i>	0	2	Ribonuclease P protein subunit p29-like
	<i>Parm_de_novo_new_c8643</i>	2	5	Arfaptin-2
	<i>Parm_de_novo_new_c10690</i>	0	5	Not annotated
	<i>Parm_de_novo_new_c10867</i>	0	2	Not annotated
	<i>Parm_de_novo_new_c14225</i>	0	6	Not annotated
	<i>Parm_de_novo_new_c15034</i>	0	1	Phosphatidylinositol 4-kinase type 2-beta
	<i>Parm_de_novo_new_c15387</i>	0	2	Not annotated

	<i>Parm_de_novo_new_c17921</i>	0	1	Formin 1,2/cappuccino	
	<i>Parm_de_novo_new_c23731</i>	0	1	Putative gag-pol protein	
	<i>Parm_de_novo_new_c23755</i>	0	1	Not annotated	
	<i>Parm_de_novo_new_c35063</i>	0	2	Hypothetical protein GGTG_04705	
<i>PaGTR2</i>	<i>Parm_de_novo_new_c1115</i>	0	3	Probable ATP-dependent RNA helicase DDX17-like	
	<i>Parm_de_novo_new_c2182</i>	1	2	Digestive organ expansion factor homolog	
	<i>Parm_de_novo_new_c3973</i>	0	3	Cullin-3 isoform X1	
	<i>Parm_de_novo_new_c4715</i>	0	3	Protein virilizer	
	<i>Parm_de_novo_new_c6467</i>	0	1	Alpha-tocopherol transfer protein-like isoform	
	<i>Parm_de_novo_new_c7416</i>	0	1	Not annotated	
	<i>Parm_de_novo_new_c16931</i>	0	1	Antennal esterase CXE13	
	<i>Parm_de_novo_new_c21176</i>	0	2	Not annotated	
	<i>Parm_de_novo_new_c23215</i>	0	1	Not annotated	
	<i>Parm_de_novo_new_c24939</i>	0	2	Not annotated	
	<i>Parm_de_novo_new_c25100</i>	0	1	Not annotated	
	<i>Parm_de_novo_new_c32959</i>	0	4	Not annotated	
	<i>PaGTR3</i>	<i>Parm_de_novo_new_c441</i>	0	1	Titin-like isoform X2
		<i>Parm_de_novo_new_c1351</i>	0	2	Protein lap4-like
<i>Parm_de_novo_new_c2147</i>		0	1	116 kDa U5 small nuclear ribonucleoprotein component-like	
<i>Parm_de_novo_new_c5806</i>		0	1	Serpin peptidase inhibitor 19	
<i>Parm_de_novo_new_c13822</i>		0	1	Slit homolog 3 protein-like	
<i>Parm_de_novo_new_c16099</i>		0	1	Encapsulation-relating protein	
<i>Parm_de_novo_new_c21949</i>		0	1	60 kDa lysophospholipase isoform X2	
<i>Parm_de_novo_new_c22379</i>		0	1	Not annotated	
<i>Parm_de_novo_new_c29293</i>	0	1	Surface antigen protein		
<i>PaGTR5</i>	<i>Parm_de_novo_new_c1898</i>	0	6	Golgi to ER traffic protein 4 homolog	
	<i>Parm_de_novo_new_c19031</i>	2	2	Not annotated	
	<i>Parm_de_novo_new_c20312</i>	0	4	Not annotated	

	<i>Parm_de_novo_new_c8428</i>	0	3	Not annotated
	<i>Parm_de_novo_new_c27983</i>	1	2	Not annotated
	<i>Parm_de_novo_new_c33950</i>	0	3	Solute carrier family 26 member 6-like
	<i>Parm_de_novo_new_c1413</i>	0	2	WD repeat and FYVE domain-containing protein 3
	<i>Parm_de_novo_new_c5502</i>	0	2	Not annotated
	<i>Parm_de_novo_new_c10910</i>	0	2	Haemolymph juvenile hormone binding protein
	<i>Parm_de_novo_new_c14862</i>	0	2	Serine-rich protein
	<i>Parm_de_novo_new_c1217</i>	0	1	Vacuolar protein sorting-associated protein 4B
	<i>Parm_de_novo_new_c2400</i>	0	1	Forkhead box protein P1-like isoform X9
	<i>Parm_de_novo_new_c2888</i>	0	1	[Pyruvate dehydrogenase (acetyl-transferring)] kinase, mitochondrial
	<i>Parm_de_novo_new_c3461</i>	0	1	Midasin-like
	<i>Parm_de_novo_new_c4615</i>	0	1	Not annotated
	<i>Parm_de_novo_new_c5804</i>	0	1	Small conductance calcium-activated potassium channel protein
	<i>Parm_de_novo_new_c6089</i>	0	1	GTP-binding protein Rit1
	<i>Parm_de_novo_new_c7402</i>	0	1	4-coumarate--CoA ligase 1
	<i>Parm_de_novo_new_c8215</i>	0	1	Not annotated
	<i>Parm_de_novo_new_c8314</i>	0	1	Dolichyldiphosphatase 1-like
	<i>Parm_de_novo_new_c9563</i>	0	1	Not annotated
	<i>Parm_de_novo_new_c10643</i>	0	1	Glycoside hydrolase family 28
	<i>Parm_de_novo_new_c10861</i>	0	1	Not annotated
	<i>Parm_de_novo_new_c11146</i>	0	1	Not annotated
	<i>Parm_de_novo_new_c14215</i>	0	1	Not annotated
	<i>Parm_de_novo_new_c33204</i>	0	1	Major antigen-like
	<i>Parm_de_novo_new_c33479</i>	0	1	Not annotated
<i>PaGTR6</i>	<i>Parm_de_novo_new_c30521</i>	0	3	Cellulose synthase A catalytic subunit 2 [UDP-forming]
	<i>Parm_de_novo_new_c665</i>	0	1	Activating signal cointegrator 1
	<i>Parm_de_novo_new_c5949</i>	0	1	Zinc finger and BTB domain-containing protein 49-like
	<i>Parm_de_novo_new_c6478</i>	0	1	Ras GTPase-activating protein-binding protein 2

	<i>Parm_de_novo_new_c14862</i>	0	1	Serine-rich protein
	<i>Parm_de_novo_new_c4682</i>	0	2	DNA topoisomerase 2-like protein
<i>PaGTR7</i>	<i>Parm_de_novo_new_c330</i>	0	1	Not annotated
	<i>Parm_de_novo_new_c3931</i>	0	1	Structure-specific endonuclease subunit slx1
	<i>Parm_de_novo_new_c13139</i>	0	1	CDP-diacylglycerol-glycerol-3-phosphate 3-phosphatidyltransferase
	<i>Parm_de_novo_new_c2804</i>	0	2	Vermiform, isoform G
	<i>Parm_de_novo_new_c24044</i>	0	2	RNA polymerase beta subunit-2
<i>PaGTR8</i>	<i>Parm_de_novo_new_c2121</i>	0	1	Sedoheptulokinase
	<i>Parm_de_novo_new_c3301</i>	0	1	Serine/threonine-protein kinase polo
	<i>Parm_de_novo_new_c17674</i>	0	1	Not annotated
	<i>Parm_de_novo_new_c20798</i>	0	1	Not annotated
	<i>Parm_de_novo_new_c25657</i>	0	1	Not annotated

Sample	Transformation	Method	Statistics	P value	Software	Figure	
<i>PaGTR1</i>	2Prop GLS	Square-root	Two-tailed Student's <i>t</i> -test	$t = -31.068$	< 0.001	SigmaPlot 14.0	Fig. 1b
	4MTB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -18.529$	< 0.001	SigmaPlot 14.0	
	4OHB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -37.191$	< 0.001	SigmaPlot 14.0	
	Benzyl GLS	-	Two-tailed Student's <i>t</i> -test	$t = -30.432$	< 0.001	SigmaPlot 14.0	
	2PE GLS	-	Two-tailed Student's <i>t</i> -test	$t = -33.231$	< 0.001	SigmaPlot 14.0	
	I3M GLS	-	Two-tailed Student's <i>t</i> -test	$t = -37.959$	< 0.001	SigmaPlot 14.0	
<i>PaGTR2</i>	2Prop GLS	-	Two-tailed Student's <i>t</i> -test	$t = -21.127$	< 0.001	SigmaPlot 14.0	
	4MSOB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -30.704$	< 0.001	SigmaPlot 14.0	
	4MTB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -28.404$	< 0.001	SigmaPlot 14.0	
	4OHB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -20.774$	< 0.001	SigmaPlot 14.0	
	Benzyl GLS	-	Two-tailed Student's <i>t</i> -test	$t = -13.320$	< 0.001	SigmaPlot 14.0	
	2PE GLS	-	Two-tailed Student's <i>t</i> -test	$t = -16.935$	< 0.001	SigmaPlot 14.0	
<i>PaGTR3</i>	I3M GLS	-	Two-tailed Student's <i>t</i> -test	$t = -25.150$	< 0.001	SigmaPlot 14.0	
	2Prop GLS	-	Two-tailed Student's <i>t</i> -test	$t = -22.769$	< 0.001	SigmaPlot 14.0	
	4MSOB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -15.055$	< 0.001	SigmaPlot 14.0	
	4MTB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -64.586$	< 0.001	SigmaPlot 14.0	
	4OHB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -43.066$	< 0.001	SigmaPlot 14.0	
	Benzyl GLS	-	Two-tailed Student's <i>t</i> -test	$t = -61.129$	< 0.001	SigmaPlot 14.0	
<i>PaGTR4</i>	2PE GLS	-	Two-tailed Student's <i>t</i> -test	$t = -24.741$	< 0.001	SigmaPlot 14.0	
	I3M GLS	-	Two-tailed Student's <i>t</i> -test	$t = -20.555$	< 0.001	SigmaPlot 14.0	
	2Prop GLS	-	Two-tailed Student's <i>t</i> -test	$t = -34.895$	< 0.001	SigmaPlot 14.0	
<i>PaGTR5</i>	2Prop GLS	-	Two-tailed Student's <i>t</i> -test	$t = -31.661$	< 0.001	SigmaPlot 14.0	
	4MSOB	-	Two-tailed Student's <i>t</i> -test	$t = -10.966$	< 0.001	SigmaPlot 14.0	

	GLS					
<i>PaGTR6</i>	4MTB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -98.236$	< 0.001	SigmaPlot 14.0
	Benzyl GLS	-	Two-tailed Student's <i>t</i> -test	$t = -10.207$	< 0.001	SigmaPlot 14.0
	2PE GLS	-	Two-tailed Student's <i>t</i> -test	$t = -46.917$	< 0.001	SigmaPlot 14.0
	2Prop GLS	-	Two-tailed Student's <i>t</i> -test	$t = -30.115$	< 0.001	SigmaPlot 14.0
	4MTB GLS	-	Generalized least squares	$LR = 13.019$	< 0.001	R 3.5.1
	Benzyl GLS	-	Two-tailed Student's <i>t</i> -test	$t = -33.478$	< 0.001	SigmaPlot 14.0
<i>PaGTR7</i>	2PE GLS	Square-root	Two-tailed Student's <i>t</i> -test	$t = -56.933$	< 0.001	SigmaPlot 14.0
	2Prop GLS	Square-root	Two-tailed Student's <i>t</i> -test	$t = -127.779$	< 0.001	SigmaPlot 14.0
<i>PaGTR8</i>	4MTB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -49.878$	< 0.001	SigmaPlot 14.0
	4OHB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -50.592$	< 0.001	SigmaPlot 14.0
<i>PaGTR9</i>	Benzyl GLS	-	Two-tailed Student's <i>t</i> -test	$t = -42.186$	< 0.001	SigmaPlot 14.0
	2PE GLS	-	Two-tailed Student's <i>t</i> -test	$t = -61.485$	< 0.001	SigmaPlot 14.0
	2Prop GLS	-	Two-tailed Student's <i>t</i> -test	$t = -84.908$	< 0.001	SigmaPlot 14.0
	4MTB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -66.857$	< 0.001	SigmaPlot 14.0
	Benzyl GLS	-	Two-tailed Student's <i>t</i> -test	$t = -134.168$	< 0.001	SigmaPlot 14.0
	2PE GLS	-	Two-tailed Student's <i>t</i> -test	$t = -99.949$	< 0.001	SigmaPlot 14.0
<i>PaGTR10</i>	I3M GLS	Log ₁₀	Two-tailed Student's <i>t</i> -test	$t = -26.343$	< 0.001	SigmaPlot 14.0
	2Prop GLS	Square-root	Two-tailed Student's <i>t</i> -test	$t = -61.124$	< 0.001	SigmaPlot 14.0
<i>PaGTR11</i>	4MTB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -74.811$	< 0.001	SigmaPlot 14.0
	2Prop GLS	-	Two-tailed Student's <i>t</i> -test	$t = -51.331$	< 0.001	SigmaPlot 14.0
	4MSOB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -49.142$	< 0.001	SigmaPlot 14.0
	4MTB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -44.957$	< 0.001	SigmaPlot 14.0
	4OHB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -42.624$	< 0.001	SigmaPlot 14.0
	Benzyl GLS	-	Two-tailed Student's <i>t</i> -test	$t = -57.609$	< 0.001	SigmaPlot 14.0

<i>PaGTR12</i>	2PE GLS	-	Two-tailed Student's <i>t</i> -test	$t = -66.217$	< 0.001	SigmaPlot 14.0	
	2Prop GLS	-	Two-tailed Student's <i>t</i> -test	$t = -1.118$	0.326	SigmaPlot 14.0	
	4MSOB GLS	Square-root	Two-tailed Student's <i>t</i> -test	$t = 3.092$	0.037	SigmaPlot 14.0	
	4MTB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -14.246$	< 0.001	SigmaPlot 14.0	
	Benzyl GLS	-	Two-tailed Student's <i>t</i> -test	$t = -1.138$	0.319	SigmaPlot 14.0	
<i>PaGTR13</i>	2PE GLS	-	Two-tailed Student's <i>t</i> -test	$t = -3.775$	0.02	SigmaPlot 14.0	
	4MSOB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -34.924$	< 0.001	SigmaPlot 14.0	
	4MTB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -64.164$	< 0.001	SigmaPlot 14.0	
	4OHB GLS	-	Two-tailed Student's <i>t</i> -test	$t = -22.168$	< 0.001	SigmaPlot 14.0	
<i>PaMFS2</i>	2PE GLS	-	Two-tailed Student's <i>t</i> -test	$t = -29.928$	< 0.001	SigmaPlot 14.0	
	Aucubin	-	Two-tailed Student's <i>t</i> -test	$t = -26.754$	< 0.001	SigmaPlot 14.0	
<i>PaMFS6</i>	Catalpol	Square-root	Two-tailed Student's <i>t</i> -test	$t = -15.421$	< 0.001	SigmaPlot 14.0	
	Aucubin	-	Two-tailed Student's <i>t</i> -test	$t = -18.699$	< 0.001	SigmaPlot 14.0	
Gene expression level		-	Mann-Whitney <i>U</i> test	$U = 0.000$	0.008	SigmaPlot 14.0	Fig. 2a
I3M GLS		-	Two-tailed Student's <i>t</i> -test	$t = 10.975$	< 0.001	SigmaPlot 14.0	Fig. 2b
1MOI3M GLS		-	Mann-Whitney <i>U</i> test	$U = 0.000$	< 0.001	SigmaPlot 14.0	
I3M GLS 1MOI3M GLS	Day 1	Square-root	Two-tailed Student's <i>t</i> -test	$t = -4.947$	< 0.001	SigmaPlot 14.0	Fig. 2c
	Day 2	-	Generalized least squares	$LR = 1.689$	0.194	R 3.5.1	
	Day 3	-	Two-tailed Student's <i>t</i> -test	$t = -1.585$	0.13	SigmaPlot 14.0	
	Day 4	-	Two-tailed Student's <i>t</i> -test	$t = -0.258$	0.799	SigmaPlot 14.0	
	Day 5	-	Two-tailed Student's <i>t</i> -test	$t = 0.365$	0.72	SigmaPlot 14.0	
	Day 1 ¹	-	-	-	-	-	
	Day 2	Square-root	Two-tailed Student's <i>t</i> -test	$t = -0.483$	0.635	SigmaPlot 14.0	
	Day 3	-	Two-tailed Student's <i>t</i> -test	$t = -3.204$	0.005	SigmaPlot 14.0	
	Day 4	-	Two-tailed Student's <i>t</i> -test	$t = -1.970$	0.066	SigmaPlot 14.0	
	Day 5	-	Two-tailed Student's <i>t</i> -test	$t = 0.651$	0.524	SigmaPlot 14.0	

2Prop GLS	Log ₁₀		Two-tailed Student's <i>t</i> -test	$t = -28.769$	< 0.001	SigmaPlot 14.0	Fig. 2d
4MSOB GLS	Square-root		Two-tailed Student's <i>t</i> -test	$t = -3.630$	0.011		
4MTB GLS	Log ₁₀		Two-tailed Student's <i>t</i> -test	$t = -22.118$	< 0.001		
4OHB GLS	Log ₁₀		Two-tailed Student's <i>t</i> -test	$t = -71.513$	< 0.001		
Benzyl GLS	Log ₁₀		Two-tailed Student's <i>t</i> -test	$t = -66.466$	< 0.001		
2PE GLS	Square-root		Two-tailed Student's <i>t</i> -test	$t = -47.387$	< 0.001		
I3M GLS	Square-root		Two-tailed Student's <i>t</i> -test	$t = -55.369$	< 0.001		
Transport activity	-		One-way ANOVA	$F = 30.803$	< 0.001	SigmaPlot 14.0	Fig. 2e
Transport activity	Square-root		One-way ANOVA	$F = 39.664$	< 0.001	SigmaPlot 14.0	Fig. 2f
Glucosides in beetles 30 min after the injection vs. after feeding for one day	2Prop GLS	-	Two-tailed Student's <i>t</i> -test	$t = 1.354$	0.192	SigmaPlot 14.0	-
	4OHB GLS	-	Two-tailed Student's <i>t</i> -test	$t = 0.929$	0.365		
	Salicin	Square-root	Two-tailed Student's <i>t</i> -test	$t = 7.307$	< 0.001		
	Linamarin	-	Mann-Whitney <i>U</i> test	$U = 0.000$	< 0.001		
	Catalpol	Square-root	Two-tailed Student's <i>t</i> -test	$t = 3.544$	0.002		
Glucosides in beetles	-		Generalized least squares	$LR = 117.719$	< 0.001	R 3.5.1	Fig. 3a
Glucosides in feces	-		Generalized least squares	$LR = 52.4334$	< 0.001		
Bathing saline vs. Malpighian tubules	2Prop GLS	-	Two-tailed Student's <i>t</i> -test	$t = 4.577$	0.001	SigmaPlot 14.0	Fig. 3b
	4MSOB GLS	-		$t = 4.189$	0.002		
	4OHB GLS	-		$t = 3.865$	0.003		
	2PE GLS	-		$t = 5.858$	< 0.001		
	I3M GLS	-		$t = 3.446$	0.006		
	Salicin	-		$t = -3.765$	0.004		
	Linamarin	-		$t = -4.168$	0.002		
	Catalpol	-		$t = -4.888$	< 0.001		
Malpighian tubules vs. excretion	2Prop GLS	-		$t = 5.492$	< 0.001		
	4MSOB GLS	-		$t = 3.250$	0.009		

fluid	4OHB GLS	-		$t = 3.741$	0.004		
	2PE GLS	-		$t = 6.026$	< 0.001		
	I3M GLS	-		$t = 0.585$	0.571		
	Salicin	-		$t = -11.754$	< 0.001		
	Linamarin	-		$t = -0.746$	0.473		
	Catalpol	-		$t = 3.543$	0.005		
<i>PaGTR5</i>		Log ₁₀	Two-tailed Student's <i>t</i> -test	$t = 8.711$	< 0.001	SigmaPlot 14.0	Fig. 4a
<i>PaGTR6</i>		-	Two-tailed Student's <i>t</i> -test	$t = 4.371$	0.001	SigmaPlot 14.0	
<i>PaGTR7</i>		Square-root	Two-tailed Student's <i>t</i> -test	$t = 9.197$	< 0.001	SigmaPlot 14.0	
<i>PaGTR8</i>		-	Mann-Whitney <i>U</i> test	$U = 0.000$	0.002	SigmaPlot 14.0	
2Prop GLS		-	Two-tailed Student's <i>t</i> -test	$t = 2.825$	0.011	SigmaPlot 14.0	Fig. 4b
2Prop GLS	Day 2	-	Mann-Whitney <i>U</i> test	$U = 39.000$	0.427	SigmaPlot 14.0	Fig. 4c
	Day 3	Square-root	Two-tailed Student's <i>t</i> -test	$t = -1.656$	0.115	SigmaPlot 14.0	
	Day 4	Square-root	Two-tailed Student's <i>t</i> -test	$t = -2.113$	0.049	SigmaPlot 14.0	
	Day 5	-	Two-tailed Student's <i>t</i> -test	$t = -2.304$	0.033	SigmaPlot 14.0	
	Day 6	-	Two-tailed Student's <i>t</i> -test	$t = -2.933$	0.009	SigmaPlot 14.0	
<i>PaGTR2</i>		-	Two-tailed Student's <i>t</i> -test	$t = -1.546$	0.161		Supplementary Figure 3a
<i>PaGTR3</i>		-	Mann-Whitney <i>U</i> test	$U = 11.000$	0.841	SigmaPlot 14.0	
<i>PaGTR9</i>		-	Two-tailed Student's <i>t</i> -test	$t = 0.910$	0.389		
<i>PaGTR10</i>		-	Two-tailed Student's <i>t</i> -test	$t = 0.866$	0.412		
Day 1		-	Two-tailed Student's <i>t</i> -test	$t = -1.907$	0.073		Supplementary Figure 3b
Day 2		-	Mann-Whitney <i>U</i> test	$U = 49.000$	0.97		
Day 3		-	Two-tailed Student's <i>t</i> -test	$t = -0.779$	0.446	SigmaPlot 14.0	
Day 4		-	Two-tailed Student's <i>t</i> -test	$t = 0.114$	0.91		
Day 5		-	Two-tailed Student's <i>t</i> -test	$t = 1.403$	0.178		
2Prop GLS	Day 1	-	Two-tailed Student's <i>t</i> -test	$t = -0.293$	0.773	SigmaPlot 14.0	Supplementary Figure 4
	Day 2	-	Two-tailed Student's <i>t</i> -test	$t = 0.517$	0.612	SigmaPlot 14.0	
	Day 3	-	Two-tailed Student's <i>t</i> -test	$t = 0.187$	0.854	SigmaPlot 14.0	

3MSOP GLS	Day 4	Square-root	Two-tailed Student's <i>t</i> -test	$t = 0.897$	0.383	SigmaPlot 14.0
	Day 5	-	Two-tailed Student's <i>t</i> -test	$t = 0.650$	0.524	SigmaPlot 14.0
	Day 1	-	Mann-Whitney <i>U</i> test	$U = 49.000$	0.968	SigmaPlot 14.0
	Day 2	-	Two-tailed Student's <i>t</i> -test	$t = -0.231$	0.82	SigmaPlot 14.0
	Day 3	-	Two-tailed Student's <i>t</i> -test	$t = 0.922$	0.369	SigmaPlot 14.0
4MSOB GLS	Day 4	Square-root	Two-tailed Student's <i>t</i> -test	$t = -0.256$	0.801	SigmaPlot 14.0
	Day 5	-	Two-tailed Student's <i>t</i> -test	$t = -0.500$	0.623	SigmaPlot 14.0
	Day 1	Square-root	Two-tailed Student's <i>t</i> -test	$t = -0.977$	0.341	SigmaPlot 14.0
	Day 2	-	Two-tailed Student's <i>t</i> -test	$t = -1.215$	0.24	SigmaPlot 14.0
	Day 3	Square-root	Two-tailed Student's <i>t</i> -test	$t = 0.0495$	0.961	SigmaPlot 14.0
5MSOP GLS	Day 4	Square-root	Two-tailed Student's <i>t</i> -test	$t = 0.276$	0.786	SigmaPlot 14.0
	Day 5	-	Two-tailed Student's <i>t</i> -test	$t = 0.954$	0.353	SigmaPlot 14.0
	Day 1	-	Two-tailed Student's <i>t</i> -test	$t = -1.253$	0.226	SigmaPlot 14.0
	Day 2	-	Two-tailed Student's <i>t</i> -test	$t = -0.461$	0.65	SigmaPlot 14.0
	Day 3	-	Two-tailed Student's <i>t</i> -test	$t = -0.105$	0.918	SigmaPlot 14.0
7MSOH GLS	Day 4	-	Two-tailed Student's <i>t</i> -test	$t = 0.580$	0.57	SigmaPlot 14.0
	Day 5	-	Two-tailed Student's <i>t</i> -test	$t = 1.112$	0.281	SigmaPlot 14.0
	Day 1 ¹	-	-	-	-	-
	Day 2	-	Mann-Whitney <i>U</i> test	$U = 47.000$	0.845	SigmaPlot 14.0
	Day 3	-	Two-tailed Student's <i>t</i> -test	$t = -0.176$	0.863	SigmaPlot 14.0
8MSOO GLS	Day 4	-	Mann-Whitney <i>U</i> test	$U = 37.500$	0.825	SigmaPlot 14.0
	Day 5	-	Mann-Whitney <i>U</i> test	$U = 44.000$	0.675	SigmaPlot 14.0
	Day 1 ¹	-	-	-	-	-
	Day 2	-	Mann-Whitney <i>U</i> test	$U = 43.000$	0.564	SigmaPlot 14.0
	Day 3	-	Mann-Whitney <i>U</i> test	$U = 44.000$	0.671	SigmaPlot 14.0
4MOI3M GLS	Day 4	-	Mann-Whitney <i>U</i> test	$U = 34.000$	0.595	SigmaPlot 14.0
	Day 5	-	Mann-Whitney <i>U</i> test	$U = 37.500$	0.358	SigmaPlot 14.0
	Day 1	-	Two-tailed Student's <i>t</i> -test	$t = -2.550$	0.02	SigmaPlot 14.0
	Day 2	-	Two-tailed Student's <i>t</i> -test	$t = 1.496$	0.152	SigmaPlot 14.0

	Day 3	-	Two-tailed Student's <i>t</i> -test	$t = -0.217$	0.831	SigmaPlot 14.0	
	Day 4	-	Two-tailed Student's <i>t</i> -test	$t = -0.190$	0.851	SigmaPlot 14.0	
	Day 5	-	Two-tailed Student's <i>t</i> -test	$t = 1.433$	0.169	SigmaPlot 14.0	
<i>PaGTR9</i>		-	Two-tailed Student's <i>t</i> -test	$t = 1.403$	0.191	SigmaPlot 14.0	Supplementary Figure 7a
<i>PaGTR10</i>		-	Two-tailed Student's <i>t</i> -test	$t = -0.0736$	0.943	SigmaPlot 14.0	
Day 2		-	Two-tailed Student's <i>t</i> -test	$t = 1.367$	0.188		Supplementary Figure 7b
Day 3	Square-root	-	Two-tailed Student's <i>t</i> -test	$t = -1.044$	0.310		
Day 4	-	-	Two-tailed Student's <i>t</i> -test	$t = -1.555$	0.137	SigmaPlot 14.0	
Day 5	-	-	Two-tailed Student's <i>t</i> -test	$t = 0.181$	0.859		
Day 6	-	-	Two-tailed Student's <i>t</i> -test	$t = 0.214$	0.833		
3MSOP GLS	Day 2 ¹	-	-	-	-	-	
	Day 3	-	Two-tailed Student's <i>t</i> -test	$t = -1.987$	0.062	SigmaPlot 14.0	
	Day 4	-	Two-tailed Student's <i>t</i> -test	$t = -0.675$	0.509	SigmaPlot 14.0	
	Day 5	-	Two-tailed Student's <i>t</i> -test	$t = 0.762$	0.456	SigmaPlot 14.0	
	Day 6	-	Two-tailed Student's <i>t</i> -test	$t = 0.894$	0.383	SigmaPlot 14.0	
4MSOB GLS	Day 2	-	Mann-Whitney <i>U</i> test	$U = 39.000$	0.427	SigmaPlot 14.0	
	Day 3	-	Mann-Whitney <i>U</i> test	$U = 39.000$	0.427	SigmaPlot 14.0	
	Day 4	Square-root	Two-tailed Student's <i>t</i> -test	$t = -0.261$	0.797	SigmaPlot 14.0	
	Day 5	Square-root	Two-tailed Student's <i>t</i> -test	$t = 0.808$	0.430	SigmaPlot 14.0	
	Day 6	-	Two-tailed Student's <i>t</i> -test	$t = 1.619$	0.123	SigmaPlot 14.0	
5MSOP GLS	Day 2 ¹	-	-	-	-	-	
	Day 3 ¹	-	-	-	-	-	
	Day 4 ¹	-	-	-	-	-	
	Day 5	-	Mann-Whitney <i>U</i> test	$U = 28.500$	0.090	SigmaPlot 14.0	
	Day 6	-	Two-tailed Student's <i>t</i> -test	$t = 1.505$	0.150	SigmaPlot 14.0	
7MSOH GLS	Day 2 ¹	-	-	-	-	-	
	Day 3 ¹	-	-	-	-	-	

8MSOO GLS	Day 4 ¹	-	-	-	-	-	
	Day 5 ¹	-	-	-	-	-	
	Day 6 ¹	-	-	-	-	-	
	Day 2 ¹	-	-	-	-	-	
	Day 3 ¹	-	-	-	-	-	
	Day 4 ¹	-	-	-	-	-	
I3M GLS	Day 5 ¹	-	-	-	-	-	
	Day 6 ¹	-	-	-	-	-	
	Day 2 ¹	-	-	-	-	-	
	Day 3	-	Mann-Whitney <i>U</i> test	<i>U</i> = 24.000	0.043	SigmaPlot 14.0	
	Day 4	-	Mann-Whitney <i>U</i> test	<i>U</i> = 33.000	0.211	SigmaPlot 14.0	
	Day 5	-	Two-tailed Student's <i>t</i> -test	<i>t</i> = 3.170	0.005	SigmaPlot 14.0	
4MOI3M GLS	Day 6	-	Two-tailed Student's <i>t</i> -test	<i>t</i> = 2.440	0.025	SigmaPlot 14.0	
	Day 2	-	Two-tailed Student's <i>t</i> -test	<i>t</i> = 2.304	0.033	SigmaPlot 14.0	
	Day 3	-	Two-tailed Student's <i>t</i> -test	<i>t</i> = 0.149	0.883	SigmaPlot 14.0	
	Day 4	-	Two-tailed Student's <i>t</i> -test	<i>t</i> = -2.835	0.011	SigmaPlot 14.0	
	Day 5	-	Two-tailed Student's <i>t</i> -test	<i>t</i> = 3.252	0.004	SigmaPlot 14.0	
	Day 6	-	Two-tailed Student's <i>t</i> -test	<i>t</i> = -0.0386	0.970	SigmaPlot 14.0	
<i>PaGTR2</i>	Square-root	Two-tailed Student's <i>t</i> -test	<i>t</i> = 9.832	< 0.001	SigmaPlot 14.0	Supplementary Figure 9a	
<i>PaGTR3</i>	Log ₁₀	Two-tailed Student's <i>t</i> -test	<i>t</i> = 5.679	< 0.001	SigmaPlot 14.0		
Accumulation of the ingested glucosinolates	-	Two-tailed Student's <i>t</i> -test	<i>t</i> = -1.365	0.185	SigmaPlot 14.0	Supplementary Figure 9b	

120 ¹Statistical analysis was not conducted if glucosinolate was only detected in one or two replicates.