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Appendix 1

Table A1. Detailed information about rearing material.

Species, family	Popu- lation	Locations	Coordinates	No. of broods in experiment		No. of gene- rations in the lab
				ME	AE	
<i>A. rumicis</i> (Noctuidae)	Estonia	Karilatsi	58°7'N, 26°55' E	7	6	0
	Georgia	Bakuriani	41°45'N, 43°32'E	1	1	0
		Lagodekhi	41°49'N, 46°17'E	1	.	0
		Marelisi	41°57'N, 43°16'E	6	5	0
		Sadgeri	41°48'N, 43°25'E	3	1	0
<i>C. pusaria</i> (Geometridae)	Finland	Oulu	65°1'N, 25°28'E	18	14	1–2
	Estonia	Karilatsi	58°7'N, 26°55'E	9	7	1–2
		Tõstamaa	58°20'N, 23°59'E	1	1	2
		Tähtvere	58°24'N, 26°39'E	3	2	1–2
		Tüki	58°26'N, 26°35'E	2	.	0–3
	Germany	Schlettau	51°27'N, 11°54'E	4	.	1
	Georgia	Marelisi	41°57'N, 43°16'E	2	.	1–3
<i>O. gothica</i> (Noctuidae)	Finland	Oulu	65°1'N, 25°28'E	4	.	3
		Dragsfjärd	60°4'N, 22°28'E	6	.	3
	Estonia	Piusa	57°50'N, 27°27'E	7	.	1
	UK	Lymington	50°45'N, -1°33'E	5	.	0
<i>E. atomaria</i> (Geometridae)	Estonia	Karilatsi	58°7'N, 26°55'E	2	3	1–3
		Tõstamaa	58°20'N, 23°59'E	2	1	1–2
	Georgia	Marelisi	41°57'N, 43°16'E	6	3	2–3
<i>H. punctinalis</i> (Geometridae)	Estonia	Karilatsi	58°7'N, 26°55'E	4	7	2
	Georgia	Marelisi	41°57'N, 43°16'E	3	5	2
		Mtirala	41°41'N, 41°53'E	5	2	2

<i>P. populi</i> (Lasiocampidae)	Finland	Oulu	65°1'N, 25°28'E	3	5	0
	Estonia	Salinõmme	58°50'N, 22°56'E	2	3	0
		Viilupi	58°51'N, 22°54'E	2	2	0
		Sõrve	57°55'N, 22°3'E	2	1	0–1
		Tähtvere	58°24'N, 26°39'E	1	1	0
		Tüki	58°26'N, 26°35'E	3	2	0
	Czechia	Sumava	48°49'N, 13°47'E	2	2	0

Table A2. Mixed ANOVA results for the alternatively expressed* differential growth rate (DGR) in the main experiment (ME).

Species	Effect	Full model					Reduced model				
		Ndf	ddf	F	p	ω^2	Ndf	ddf	F	p	ω^2
<i>A. rumicis</i>	(P)opulation	1	15	0.04	0.84	0					
	Initial mass	1	120	0.22	0.64	0					
	Sex	1	15	1.1	0.31	0.0007					
	(H)ost plant	1	13	19	0.0006	0.078	1	14	24	0.0002	0.096
	(T)emperature	2	26	24	<0.0001	0.18	2	28	37	<0.0001	0.31
	P × H	1	13	0.30	0.59	0					
	P × T	2	26	2.7	0.087	0.014					
<i>E. atomaria</i>	(P)opulation	1	8	0.56	0.47	0					
	Initial mass	1	115	1.7	0.19	0.0026	1	120	4.4	0.039	0.017
	Sex	1	9	0.17	0.69	0					
	(H)ost plant	2	16	24	<0.0001	0.23	2	18	25	<0.0001	0.24
	(T)emperature	2	16	10	0.0013	0.091	2	18	11	0.0008	0.094
	P × H	2	16	0.61	0.56	0					
	P × T	2	16	0.49	0.62	0					
<i>C. pusaria</i>	(P)opulation	3	32	1.7	0.19	0.0064					
	Initial mass	1	182	18.1	<0.0001	0.052	1	189	19	<0.0001	0.062
	Sex	1	29	0.02	0.88	0					
	(T)emperature	2	51	12	<0.0001	0.067	2	57	39	<0.0001	0.23
	P × T	6	51	0.89	0.51	0					

<i>H. punctinalis</i>	(P)opulation	1	10	0.02	0.89	0					
	Initial mass	1	70	7.2	0.0093	0.050	1	73	19	<0.0001	0.14
	Sex	1	8	5.5	0.047	0.036	1	8	6.4	0.036	0.042
	(H)ost plant	1	7	5.6	0.049	0.037	1	8	6.1	0.039	0.040
	(T)emperature	2	5	11	0.015	0.16	2	7	12	0.0059	0.17
	P × H	1	7	0.38	0.55	0					
	P × T	2	5	0.17	0.85	0					
<i>P. populi</i>	(P)opulation	2	12	0.56	0.58	0					
	Initial mass	1	235	10	0.0016	0.018	1	244	7.3	0.0073	0.012
	Sex	1	14	2.0	0.18	0.0020					
	(H)ost plant	2	24	22	<0.0001	0.079	2	28	50	<0.0001	0.19
	(T)emperature	2	24	39	<0.0001	0.15	2	28	73	<0.0001	0.28
	P × H	4	24	2.4	0.075	0.011					
	P × T	4	24	0.30	0.87	0					
<i>O. gothica</i>	(P)opulation	2	19	0.48	0.62	0					
	Initial mass	1	81	0.00	0.99	0					
	Sex	1	15	0.74	0.40	0.0008					
	(T)emperature	2	22	8.0	0.0025	0.11	2	26	7.3	0.0030	0.094
	P × T	4	22	0.81	0.53	0					

*Expressed as $\log(3\text{rd day mass}/2\text{nd day mass})/\text{time}(\text{days})$. 'Population' refers to the country of origin (Table 1). 'Brood' (offspring of an individual female) was included in all models as a random factor. Reduced model was obtained through backward elimination ($\alpha = 0.05$). Effect sizes are presented as estimates of the proportions of variance accounted by respective factors (semi-partial ω^2 ; some negative estimates are replaced with zeroes; SAS PROC GLM).

Table A3. Values of the alternatively expressed DGR in ME.

Species	Population	LSMEANS±SE
<i>A. rumicis</i>	Estonia	0.281±0.022
	Georgia	0.276±0.013
<i>E. atomaria</i>	Estonia	0.325±0.014
	Georgia	0.309±0.013
<i>C. pusaria</i>	Finland	0.276±0.009
	Estonia	0.263±0.009
	Germany	0.324±0.033
	Georgia	0.236±0.028
<i>H. punctinalis</i>	Estonia	0.179±0.018
	Georgia	0.175±0.019
<i>P. populi</i>	Finland	0.267±0.013
	Estonia	0.268±0.005
	Czechia	0.267±0.011
<i>O. gothica</i>	Finland	0.243±0.012
	Estonia	0.246±0.016
	United Kingdom	0.279±0.034

*Expressed as $\log(3\text{rd day mass}/2\text{nd day mass})/\text{time}(\text{days})$. LSMEANS and standard error (SE) from the full model in Table A2.

Table A4. Pairwise comparisons of DGR* in ME on different host plants for Table 2.

Species	Effect	Tukey HSD			
		NomDF	ddf	t	p
<i>E. atomaria</i>	Host plant				
	<i>S. alba</i> vs <i>T. repens</i>	2	16	8.2	<0.0001
	<i>S. alba</i> vs <i>V. myrtillus</i>	2	16	3.6	0.0083
	<i>T. repens</i> vs <i>V. myrtillus</i>	2	16	5.1	0.0006
<i>P. populi</i>	<i>A. incana</i> vs <i>B. pendula</i>	2	24	0.34	0.94
	<i>A. incana</i> vs <i>P. tremula</i>	2	24	6.5	<0.0001
	<i>B. pendula</i> vs <i>P. tremula</i>	2	24	6.6	<0.0001

* DGR expressed as $(final\ mass^{\frac{1}{3}} - initial\ mass^{\frac{1}{3}}) * time(days)^{-1}$. Tukey HSD pairwise comparisons for host plant pairs by species for main experiment, the contrasts were computed for the model in which temperature treatment and host plant manipulations were added as categorical factors in addition to population and sex, the model also included population \times host plant and population \times temperature interactions and brood as a random factor.

Table A5. Host plant specific values of DGR in ME.

Species	Effect Host plant	LSMEANS ± SE
<i>A. rumicis</i>	<i>Cirsium arvense</i>	0.45±0.034
	<i>Melilotus albus</i>	0.64±0.035
<i>E. atomaria</i>	<i>Salix alba</i>	0.24±0.016
	<i>Trifolium repens</i>	0.42±0.017
	<i>Vaccinium myrtillus</i>	0.31±0.017
<i>H. punctinalis</i>	<i>Betula pendula</i>	0.29±0.036
	<i>Tilia cordata</i>	0.21±0.024
<i>P. populi</i>	<i>Alnus incana</i>	0.63±0.031
	<i>Betula pendula</i>	0.65±0.028
	<i>Populus tremula</i>	0.92±0.031

*LSMEANS and standard error (SE) from the models in Table A4 or from Table 2.

Table A6. Sex specific values of DGR in ME.

Species	Effect	LSMEANS ± SE
	Sex	
<i>A. rumicis</i>	♀	0.57±0.03
	♂	0.52±0.03
<i>E. atomaria</i>	♀	0.33±0.02
	♂	0.32±0.01
<i>C. pusaria</i>	♀	0.295±0.013
	♂	0.291±0.013
<i>H. punctinalis</i>	♀	0.28±0.02
	♂	0.21±0.02
<i>P. populi</i>	♀	0.76±0.02
	♂	0.72±0.02
<i>O. gothica</i>	♀	0.55±0.04
	♂	0.53±0.03

*LSMEANS and standard error (SE) from the models in Table 2.

Table A7. Pairwise among-population comparisons of pupal masses, Fig. 2 and 3.

Species	Effect Population	Main experiment				Auxiliary experiment			
		Ndf	ddf	t	p	Ndf	ddf	t	p
<i>A. rumicis</i>	ESTvsGEO	1	1	4.5	0.0013	1	8	4.2	0.0082
<i>E. atomaria</i>	ESTvsGEO	1	1	21	<0.0001	1	9	4.2	0.0027
<i>C. pusaria</i>	DEUvsEST	3	36	4.7	0.0003	.	.	.	.
	DEUvsFIN	3	27	6.3	<0.0001	.	.	.	.
	DEUvsGEO	3	35	1.4	0.50	.	.	.	.
	ESTvsFIN	3	35	2.5	0.073	2	21	0.52	0.86
	ESTvsGEO	3	28	5.1	<0.0001	.	.	.	.
	FINvsGEO	3	32	6.2	<0.0001	.	.	.	.
<i>H. punctinalis</i>	ESTvsGEO	1	5	5.9	0.0017	1	8	9.3	<0.0001
<i>P. populi</i>	ESTvsFIN	2	16	2.1	0.13	2	9.3	2.1	0.13
	ESTvsCZE	2	9.3	3.3	0.20	2	9.3	3.3	0.018
	FINvsCZE	2	12	1.2	0.46	2	12	1.2	0.46
<i>O. gothica</i>	ESTvsFIN	2	13	1.7	0.23	.	.	.	.
	ESTvsUK	2	41	1.6	0.29	.	.	.	.
	FINvsUK	2	49	2.7	0.034	.	.	.	.

*The contrasts were computed for the model with population, temperature, sex and host plant as categorical factors and brood as a random factor. Populations abbreviated as in Table 1. ‘.’ indicates missing values: not all populations were represented in the auxiliary experiment.

Table A8. Pairwise among-population comparisons of developmental times, Fig. 2 and 3.

Species	Effect	Main experiment				Auxiliary experiment			
		Population	NomDF	ddf	t	p	Ndf	ddf	t	p
<i>A. rumicis</i>	ESTvsGEO	1	10	6.1	0.0001	1	10	10	<0.0001
<i>E. atomaria</i>	ESTvsGEO	1	8	21	<0.0001	1	8.1	4.1	0.0036
<i>C. pusaria</i>	DEUvsEST	3	19	0.94	0.78	.	.	.	.
	DEUvsFIN	3	19	2.4	0.11	.	.	.	.
	DEUvsGEO	3	21	0.19	0.99	.	.	.	.
	ESTvsFIN	3	22	3.9	0.0038	2	21	1.1	0.53
	ESTvsGEO	3	25	1.4	0.49	.	.	.	.
	FINvsGEO	3	25	3.2	0.021	.	.	.	.
<i>H. punctinalis</i>	ESTvsGEO	1	85	4.8	<0.0001	1	7	17	<0.0001
<i>P. populi</i>	ESTvsFIN	2	14	0.42	0.91	2	14	0.30	0.95
	ESTvsCZE	2	15	3.1	0.020	2	9	1.4	0.37
	FINvsCZE	2	15	2.9	0.028	2	11	0.2	0.34
<i>O. gothica</i>	ESTvsFIN	2	12	1.31	0.41	.	.	.	.
	ESTvsUK	2	48	0.18	0.98	.	.	.	.
	FINvsUK	2	59	0.94	0.62	.	.	.	.

*The contrasts were computed for the model with population, temperature, sex and host plant as categorical factors and brood as a random factor. Populations abbreviated as in Table 1. ‘.’ indicates missing data: not all populations were represented in the due to lack of larvae available for the auxiliary experiment.

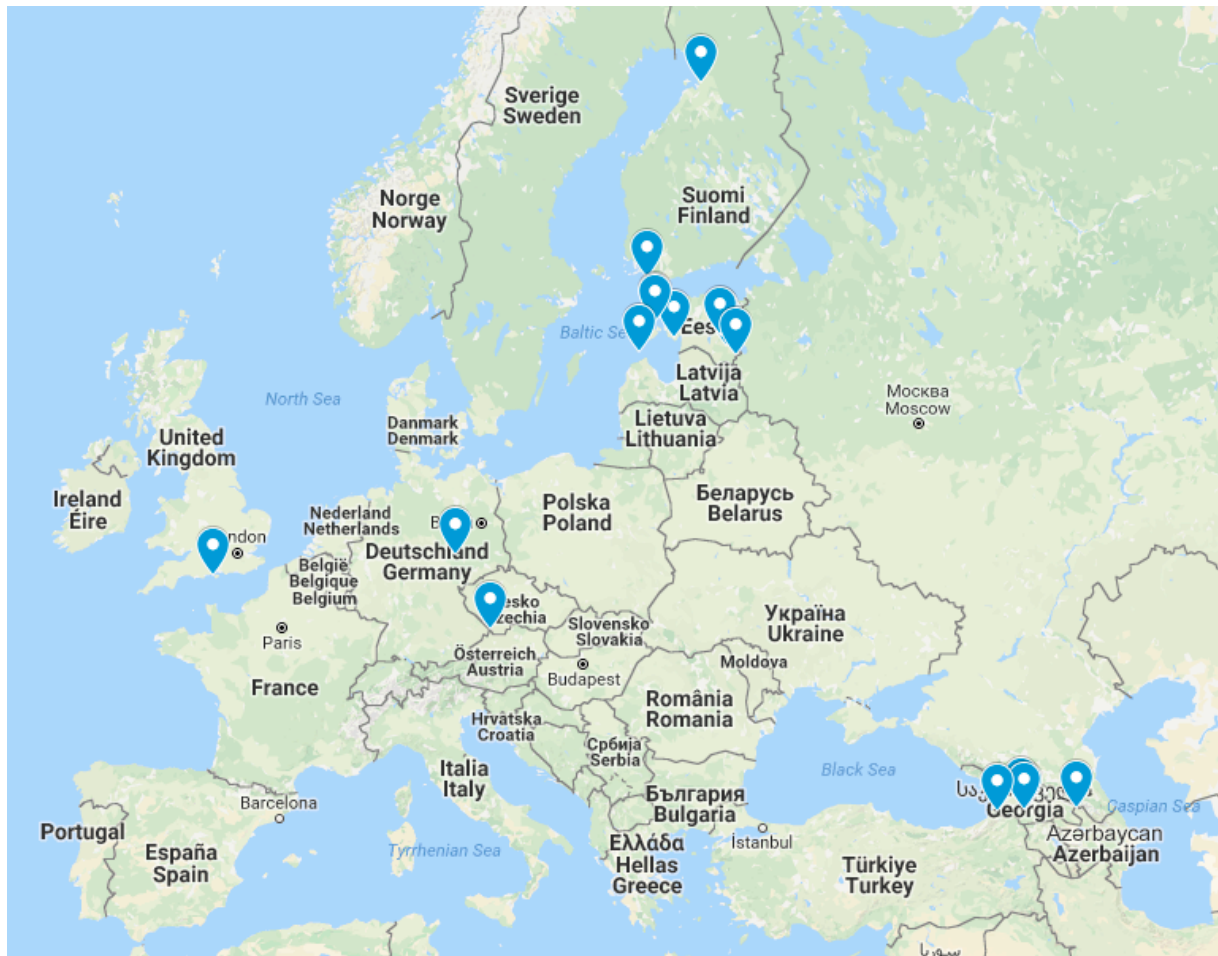


Figure A1. Map indicating the origin of the moths used in the experiments (blue stickers);

https://drive.google.com/open?id=1H_uYdUHYqhx4uLfA7gZEJiPblE0&usp=sharing.