

Larval diet type and voltinism are linked with adult body size in European Erebidæ (Lepidoptera)

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Appendix 1 – Phylogenetic reconstruction

The best-fitting partitioning schemes for mitochondrial and nuclear genes are given in Table S1. Both BEAST runs converged on the same likelihood space, mean posterior values were as follows: run1 (used for downstream analyses): -82814.573, run2: -82816.019. Upper and lower bounds for secondary time calibrations were respected in all three calibration points, >99% of all trees in the sample showed values for the respective node age within the boundaries of Wahlberg et al. (2013). ESS values were above 200 for posterior, likelihood, and prior likelihood as well as all tree likelihoods and most other parameters. Exceptions were limited to a few rate and frequency parameters which are known to be difficult to estimate in incomplete datasets with skewed base composition caused by mitochondrial sequences (Seifert et al. (2025): <https://doi.org/10.25625/WF4GFC>).

Table S1 The best-fitting partitioning schemes as obtained from PartitionFinder.

Partition	Gene	Codon position	Best Model
partition1	COI	1	SYM+I+G
partition2	COI	2	GTR+G
partition3	COI	3	GTR+I+G
partition4	Ef1a	1	TrN+I+G
partition5	Ef1a	2	GTR+I+G
partition5	GAPDH	1	GTR+I+G
partition5	IDH	1	GTR+I+G
partition5	RPS5	1	GTR+I+G
partition6	Ef1a	3	GTR+I+G
partition6	RPS5	2	GTR+I+G
partition7	GAPDH	2	GTR+I+G
partition7	IDH	2	GTR+I+G
partition7	MDH	1	GTR+I+G
partition8	GAPDH	3	GTR+I+G
partition8	IDH	3	GTR+I+G
partition8	RPS5	3	GTR+I+G
partition8	MDH	2	GTR+I+G
partition8	wgl	1	GTR+I+G
partition9	MDH	3	K80+I
partition9	wgl	2	K80+I
partition10	wgl	3	K80+I+G

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Appendix 2 - Sources used to obtain species trait information

Table S2 List of references that were used to obtain information on larval host plant use (i.e., dietary specialisation and resource type), body size, voltinism and adult diel activity in European Erebidæ moths.

Reference	Host use	Body size	Voltinism	Diel activity
Africanmoths.com*	X			
Ahola & Silvonen (2005)			X	
Berlov et al. (2015)	X			
Bladmineerders.nl*	X			
DeFreina (2006)			X	
DeFreina & Witt, Band 1		X		
Ebert (1990)	X			X
Fibiger et al. (Bd. 12)			X	X
Forster & Wohlfahrt (1971)			X	
Forster & Wohlfahrt (1984)			X	
Goater et al. (2003)	X	X	X	X
Hacker (1989)			X	
Kravchenko et al. (2004)	X		X	
Kravchenko et al. (2006)	X		X	
Lepidoptera.eu*	X		X	
Lepiforum.org*	X	X		
Leps.it*	X			
Leraut (2006)	X			X
Macek et al. (2007)		X		
Macek et al. (2008)		X		
Macià et al. (2013)		X		
Macià et al. (2019)	X	X	X	X
Macià et al. (2022)			X	X
Matov & Kononenko (2012)	X			
Murzin (2003)	X		X	
Nardelli (2010)			X	
Ortiz et al (2016)			X	
Panis (1974)			X	
Parenzan & Scalercio (2001)	X			
Pro Natura (2000)	X		X	X
Pyrgus.de*	X		X	
Rákosy (1996)			X	X
Seppänen (1954)	X			
Seven (2017)				X
Templado Castaño, J., & Ortiz de Vega (1985)			X	
Top et al. (2023)			X	
Ulrich (2018)				X
Weidemann & Köhler (1996)				X
Witt & Ronkay (2011)	X	X	X	

* Webpages last accessed: August, 2024

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Appendix 3 – List of Erebidae species included in this study

Table S3 Taxonomic list of the 220 Erebidae species included in the study.

Subfamily	Species
Arctiinae	<i>Amata marjana</i> (Stauder, 1913)
Arctiinae	<i>Amata phegea</i> (Linnaeus, 1758)
Arctiinae	<i>Amata ragazzii</i> (Turati, 1917)
Arctiinae	<i>Apaidia barbarica</i> Legrand, 1939
Arctiinae	<i>Apaidia mesogona</i> (Godart, [1824])
Arctiinae	<i>Apaidia rufeola</i> (Rambur, 1832)
Arctiinae	<i>Apantesis quenseli</i> (Paykull, 1793)
Arctiinae	<i>Arctia alpina</i> (Quensel in Acerbi, 1802)
Arctiinae	<i>Arctia aulica</i> (Linnaeus, 1758)
Arctiinae	<i>Arctia caja</i> (Linnaeus, 1758)
Arctiinae	<i>Arctia dejeanii</i> (Godart, [1823])
Arctiinae	<i>Arctia festiva</i> (Hufnagel, 1766)
Arctiinae	<i>Arctia flavia</i> (Fuessly, 1779)
Arctiinae	<i>Arctia lapponica</i> (Thunberg, 1791)
Arctiinae	<i>Arctia matronula</i> (Linnaeus, 1758)
Arctiinae	<i>Arctia menetriesii</i> (Eversmann, 1846)
Arctiinae	<i>Arctia plantaginis</i> (Linnaeus, 1758)
Arctiinae	<i>Arctia testudinaria</i> (Geoffroy in Fourcroy, 1785)
Arctiinae	<i>Arctia tigrina</i> (de Villers, 1789)
Arctiinae	<i>Arctia villica</i> (Linnaeus, 1758)
Arctiinae	<i>Artimelia latreillii</i> (Godart, [1823])
Arctiinae	<i>Atolmis rubricollis</i> (Linnaeus, 1758)
Arctiinae	<i>Callimorpha dominula</i> (Linnaeus, 1758)
Arctiinae	<i>Chelis arragonensis</i> (Staudinger, 1895)
Arctiinae	<i>Chelis caecilia</i> (Kindermann, 1853)
Arctiinae	<i>Chelis cantabrica</i> Macià, Gastón, Redondo & Ylla, 2013
Arctiinae	<i>Chelis cervini</i> (Fallou, 1864)
Arctiinae	<i>Chelis maculosa</i> ([Denis & Schiffermüller], 1775)
Arctiinae	<i>Chelis puengeleri</i> (Bang-Haas, 1927)
Arctiinae	<i>Chelis simplonica</i> (Boisduval, 1840)
Arctiinae	<i>Coscinia chrysocephala</i> (Hübner, [1810])
Arctiinae	<i>Coscinia cribraria</i> (Linnaeus, 1758)
Arctiinae	<i>Coscinia mariarosae</i> Expósito, 1991
Arctiinae	<i>Cybosia mesomella</i> (Linnaeus, 1758)
Arctiinae	<i>Cymbalophora pudica</i> (Esper, [1785])
Arctiinae	<i>Cymbalophora rivularis</i> (Ménétriés, 1832)
Arctiinae	<i>Diacrisia metelkana</i> (Lederer, 1861)
Arctiinae	<i>Diacrisia purpurata</i> (Linnaeus, 1758)
Arctiinae	<i>Diacrisia sannio</i> (Linnaeus, 1758)
Arctiinae	<i>Diaphora mendica</i> (Clerck, 1759)
Arctiinae	<i>Diaphora sordida</i> (Hübner, [1803])
Arctiinae	<i>Dysauxes ancilla</i> (Linnaeus, 1767)
Arctiinae	<i>Dysauxes famula</i> (Freyer, [1836])
Arctiinae	<i>Dysauxes punctata</i> (Fabricius, 1781)
Arctiinae	<i>Dysauxes servula</i> (Berce, 1862)
Arctiinae	<i>Eilema albicosta</i> (Rogenhofer, 1894)
Arctiinae	<i>Eilema bipuncta</i> (Hübner, [1824])
Arctiinae	<i>Eilema caniola</i> (Hübner, [1808])

Subfamily	Species
Arctiinae	<i>Eilema cereola</i> (Hübner, [1803])
Arctiinae	<i>Eilema complana</i> (Linnaeus, 1758)
Arctiinae	<i>Eilema costalis</i> (Zeller, 1847)
Arctiinae	<i>Eilema depressa</i> (Esper, [1787])
Arctiinae	<i>Eilema griseola</i> (Hübner, [1803])
Arctiinae	<i>Eilema interposita</i> (Rothschild, 1914)
Arctiinae	<i>Eilema lurideola</i> ([Zincken], 1817)
Arctiinae	<i>Eilema lutarella</i> (Linnaeus, 1758)
Arctiinae	<i>Eilema marcida</i> (Mann, 1859)
Arctiinae	<i>Eilema muscula</i> (Staudinger, 1899)
Arctiinae	<i>Eilema palliatella</i> (Scopoli, 1763)
Arctiinae	<i>Eilema predotae</i> (Schawerda, 1927)
Arctiinae	<i>Eilema pseudocomplana</i> (Daniel, 1939)
Arctiinae	<i>Eilema pygmaeola</i> (Doubleday, 1847)
Arctiinae	<i>Eilema sororcula</i> (Hufnagel, 1766)
Arctiinae	<i>Eilema uniola</i> (Rambur, 1858)
Arctiinae	<i>Epatolmis luctifera</i> ([Denis & Schiffermüller], 1775)
Arctiinae	<i>Euplagia quadripunctaria</i> (Poda, 1761)
Arctiinae	<i>Lerautia bifasciata</i> (Rambur, 1832)
Arctiinae	<i>Lithosia quadra</i> (Linnaeus, 1758)
Arctiinae	<i>Miltochrista miniata</i> (Forster, 1771)
Arctiinae	<i>Nudaria mundana</i> (Linnaeus, 1761)
Arctiinae	<i>Ocnogyna boeticum</i> (Rambur, [1837])
Arctiinae	<i>Ocnogyna corsicum</i> (Rambur, 1832)
Arctiinae	<i>Ocnogyna nogelli</i> Lederer, 1865
Arctiinae	<i>Ocnogyna parasita</i> (Hübner, 1790)
Arctiinae	<i>Ocnogyna zoraida</i> (De Graslin, 1837)
Arctiinae	<i>Paidia cinerascens</i> (Herrich-Schäffer, [1847])
Arctiinae	<i>Paidia minoica</i> de Freina, 2006
Arctiinae	<i>Paidia rica</i> (Freyer, 1855)
Arctiinae	<i>Pelosia muscerda</i> (Hufnagel, 1766)
Arctiinae	<i>Pelosia obtusa</i> (Herrich-Schäffer, [1852])
Arctiinae	<i>Phragmatobia fuliginosa</i> (Linnaeus, 1758)
Arctiinae	<i>Sagarriella libyssa</i> (Püngeler, 1907)
Arctiinae	<i>Sagarriella romei</i> (Sagarra, 1924)
Arctiinae	<i>Setina aurita</i> (Esper, [1787])
Arctiinae	<i>Setina flavicans</i> (Geyer, [1836])
Arctiinae	<i>Setina irrorella</i> (Linnaeus, 1758)
Arctiinae	<i>Setina roscida</i> ([Denis & Schiffermüller], 1775)
Arctiinae	<i>Spilarctia lutea</i> (Hufnagel, 1766)
Arctiinae	<i>Spilosoma lubricipeda</i> (Linnaeus, 1758)
Arctiinae	<i>Spilosoma urticae</i> (Esper, 1789)
Arctiinae	<i>Spiris slovenica</i> (Daniel, 1939)
Arctiinae	<i>Spiris striata</i> (Linnaeus, 1758)
Arctiinae	<i>Thumatha senex</i> (Hübner, [1808])
Arctiinae	<i>Tyria jacobaeae</i> (Linnaeus, 1758)
Arctiinae	<i>Utetheisa pulchella</i> (Linnaeus, 1758)
Arctiinae	<i>Watsonarctia deserta</i> (Bartel, 1903)
Boletobiinae	<i>Calymma communimacula</i> ([Denis & Schiffermüller], 1775)
Boletobiinae	<i>Eublemma amoena</i> (Hübner, [1803])
Boletobiinae	<i>Eublemma candidana</i> (Fabricius, 1794)
Boletobiinae	<i>Eublemma elychrysi</i> (Rambur, 1833)

Subfamily	Species
Boletobiinae	<i>Eublemma minutata</i> (Fabricius, 1794)
Boletobiinae	<i>Eublemma ostrina</i> (Hübner, [1808])
Boletobiinae	<i>Eublemma panonica</i> (Freyer, [1840])
Boletobiinae	<i>Eublemma parva</i> (Hübner, [1808])
Boletobiinae	<i>Eublemma purpurina</i> ([Denis & Schiffermüller], 1775)
Boletobiinae	<i>Eublemma rosea</i> (Hübner, 1790)
Boletobiinae	<i>Eublemma scitula</i> (Rambur, 1833)
Boletobiinae	<i>Eublemma viridula</i> (Guenée, 1841)
Boletobiinae	<i>Laspeyria flexula</i> ([Denis & Schiffermüller], 1775)
Boletobiinae	<i>Metachrostis dardouini</i> (Boisduval, 1840)
Boletobiinae	<i>Metachrostis velox</i> (Hübner, [1813])
Boletobiinae	<i>Odice arcuinna</i> (Hübner, 1790)
Boletobiinae	<i>Parascotia fuliginaria</i> (Linnaeus, 1761)
Boletobiinae	<i>Phytometra sanctiflorentis</i> (Boisduval, 1834)
Boletobiinae	<i>Phytometra viridaria</i> (Clerck, 1759)
Boletobiinae	<i>Trisateles emortualis</i> ([Denis & Schiffermüller], 1775)
Calpinae	<i>Calyptra thalictri</i> (Borkhausen, 1790)
Catocalinae/ Erebiniae*	<i>Catephia alchymista</i> ([Denis & Schiffermüller], 1775)
Catocalinae/ Erebiniae*	<i>Catocala adultera</i> Ménétriés, 1856
Catocalinae/ Erebiniae*	<i>Catocala conjuncta</i> (Esper, [1787])
Catocalinae/ Erebiniae*	<i>Catocala conversa</i> (Esper, 1787)
Catocalinae/ Erebiniae*	<i>Catocala dilecta</i> (Hübner, [1808])
Catocalinae/ Erebiniae*	<i>Catocala disjuncta</i> (Geyer, [1828])
Catocalinae/ Erebiniae*	<i>Catocala diversa</i> (Geyer, [1828])
Catocalinae/ Erebiniae*	<i>Catocala electa</i> (Vieweg, 1790)
Catocalinae/ Erebiniae*	<i>Catocala elocata</i> (Esper, [1787])
Catocalinae/ Erebiniae*	<i>Catocala eutychea</i> Treitschke, 1835
Catocalinae/ Erebiniae*	<i>Catocala fraxini</i> (Linnaeus, 1758)
Catocalinae/ Erebiniae*	<i>Catocala fulminea</i> (Scopoli, 1763)
Catocalinae/ Erebiniae*	<i>Catocala hymenaea</i> ([Denis & Schiffermüller], 1775)
Catocalinae/ Erebiniae*	<i>Catocala lupina</i> Herrich-Schäffer, [1851]
Catocalinae/ Erebiniae*	<i>Catocala mariana</i> Rambur, 1858
Catocalinae/ Erebiniae*	<i>Catocala nupta</i> (Linnaeus, 1767)
Catocalinae/ Erebiniae*	<i>Catocala nymphaea</i> (Esper, [1787])
Catocalinae/ Erebiniae*	<i>Catocala nymphagoga</i> (Esper, [1787])
Catocalinae/ Erebiniae*	<i>Catocala oberthuri</i> Austaut, 1879
Catocalinae/ Erebiniae*	<i>Catocala optata</i> (Godart, 1824)
Catocalinae/ Erebiniae*	<i>Catocala pacta</i> (Linnaeus, 1758)
Catocalinae/ Erebiniae*	<i>Catocala promissa</i> ([Denis & Schiffermüller], 1775)
Catocalinae/ Erebiniae*	<i>Catocala puerpera</i> (Giorna, 1791)
Catocalinae/ Erebiniae*	<i>Catocala separata</i> Freyer, 1847
Catocalinae/ Erebiniae*	<i>Catocala sponsa</i> (Linnaeus, 1767)
Catocalinae/ Erebiniae*	<i>Cerocala scapulosa</i> (Hübner, [1808])
Catocalinae/ Erebiniae*	<i>Clytie illunaris</i> (Hübner, [1813])
Catocalinae/ Erebiniae*	<i>Clytie syriaca</i> (Bugnion, 1837)
Catocalinae/ Erebiniae*	<i>Drasteria cailino</i> (Lefèbvre, 1827)
Catocalinae/ Erebiniae*	<i>Drasteria caucasica</i> (Kolenati, 1846)
Catocalinae/ Erebiniae*	<i>Dysgonia algira</i> (Linnaeus, 1767)
Catocalinae/ Erebiniae*	<i>Euclidia glyphica</i> (Linnaeus, 1758)
Catocalinae/ Erebiniae*	<i>Euclidia mi</i> (Clerck, 1759)
Catocalinae/ Erebiniae*	<i>Euclidia triquetra</i> ([Denis & Schiffermüller], 1775)
Catocalinae/ Erebiniae*	<i>Grammodes bifasciata</i> (Petagna, 1786)

Subfamily	Species
Catocalinae/ Erebiniae*	<i>Grammodes stolidus</i> (Fabricius, 1775)
Catocalinae/ Erebiniae*	<i>Minucia lunaris</i> ([Denis & Schiffermüller], 1775)
Catocalinae/ Erebiniae*	<i>Ophiusa tirhaca</i> (Cramer, [1777])
Herminiinae	<i>Herminia grisealis</i> ([Denis & Schiffermüller], 1775)
Herminiinae	<i>Herminia tarsicrinalis</i> (Knoch, 1782)
Herminiinae	<i>Herminia tarsipennalis</i> Treitschke, 1835
Herminiinae	<i>Herminia tenuialis</i> (Rebel, 1899)
Herminiinae	<i>Idia calvaria</i> ([Denis & Schiffermüller], 1775)
Herminiinae	<i>Macrochilo cribrumalis</i> (Hübner, 1793)
Herminiinae	<i>Orectis proboscidata</i> (Herrich-Schäffer, [1851])
Herminiinae	<i>Paracolax tristalis</i> (Fabricius, 1794)
Herminiinae	<i>Pechipogo strigilata</i> (Linnaeus, 1758)
Herminiinae	<i>Polypogon gryphalis</i> (Herrich-Schäffer, [1851])
Herminiinae	<i>Polypogon plumigeralis</i> (Hübner, [1825])
Herminiinae	<i>Polypogon tentacularia</i> (Linnaeus, 1758)
Herminiinae	<i>Simplicia rectalis</i> (Eversmann, 1842)
Herminiinae	<i>Zanclognatha lunalis</i> (Scopoli, 1763)
Herminiinae	<i>Zanclognatha zelleralis</i> (Wocke, 1850)
Hypeninae	<i>Colobochyla salicalis</i> ([Denis & Schiffermüller], 1775)
Hypeninae	<i>Hypena crassalis</i> (Fabricius, 1787)
Hypeninae	<i>Hypena lividalis</i> (Hübner, 1796)
Hypeninae	<i>Hypena obesalis</i> Treitschke, 1828
Hypeninae	<i>Hypena obsitalis</i> (Hübner, [1813])
Hypeninae	<i>Hypena proboscidalis</i> (Linnaeus, 1758)
Hypeninae	<i>Hypena rostralis</i> (Linnaeus, 1758)
Hypeninae	<i>Zekelita antiqualis</i> (Hübner, [1809])
Hypenodinae	<i>Hypenodes humidalis</i> Doubleday, 1850
Hypenodinae	<i>Schrankia costaestrigalis</i> (Stephens, 1834)
Hypenodinae	<i>Schrankia taenialis</i> (Hübner, [1809])
Lymantriinae	<i>Albarracina warionis</i> (Oberthür, 1881)
Lymantriinae	<i>Arctornis l-nigrum</i> (Müller, 1764)
Lymantriinae	<i>Calliteara abietis</i> ([Denis & Schiffermüller], 1775)
Lymantriinae	<i>Calliteara pudibunda</i> (Linnaeus, 1758)
Lymantriinae	<i>Euproctis chrysorrhoea</i> (Linnaeus, 1758)
Lymantriinae	<i>Gynaephora fascelina</i> (Linnaeus, 1758)
Lymantriinae	<i>Gynaephora selenitica</i> (Esper, 1789)
Lymantriinae	<i>Laelia coenosa</i> (Hübner, [1808])
Lymantriinae	<i>Leucoma salicis</i> (Linnaeus, 1758)
Lymantriinae	<i>Lymantria dispar</i> (Linnaeus, 1758)
Lymantriinae	<i>Lymantria monacha</i> (Linnaeus, 1758)
Lymantriinae	<i>Ocneria atlantica</i> (Rambur, 1837)
Lymantriinae	<i>Ocneria detrita</i> (Esper, [1785])
Lymantriinae	<i>Ocneria rubea</i> ([Denis & Schiffermüller], 1775)
Lymantriinae	<i>Orgyia antiqua</i> (Linnaeus, 1758)
Lymantriinae	<i>Orgyia antiquoides</i> (Hübner, [1822])
Lymantriinae	<i>Orgyia aurolimbata</i> (Guenée & de Villiers, 1835)
Lymantriinae	<i>Orgyia dubia</i> (Tauscher, 1806)
Lymantriinae	<i>Orgyia recens</i> (Hübner, [1819])
Lymantriinae	<i>Orgyia rupestris</i> (Rambur, 1832)
Lymantriinae	<i>Orgyia trigotephra</i> Boisduval, [1828]
Lymantriinae	<i>Penthopha morio</i> (Linnaeus, 1767)
Lymantriinae	<i>Sphrageidus similis</i> (Fuesslin, 1775)

Subfamily	Species
Rivulinae	<i>Rivula sericealis</i> (Scopoli, 1763)
Scoliopteryginae	<i>Scoliopteryx libatrix</i> (Linnaeus, 1758)
Toxocampinae	<i>Apopestes spectrum</i> (Esper, [1787])
Toxocampinae	<i>Autophila asiatica</i> (Staudinger, 1888)
Toxocampinae	<i>Autophila cataphanes</i> (Hübner, [1813])
Toxocampinae	<i>Autophila dilucida</i> (Hübner, [1808])
Toxocampinae	<i>Autophila hirsuta</i> (Staudinger, 1870)
Toxocampinae	<i>Autophila ligaminosa</i> (Eversmann, 1851)
Toxocampinae	<i>Autophila limbata</i> (Staudinger, 1871)
Toxocampinae	<i>Exophyla rectangularis</i> (Geyer, [1828])
Toxocampinae	<i>Lygephila cracca</i> ([Denis & Schiffermüller], 1775)
Toxocampinae	<i>Lygephila ludicra</i> (Hübner, 1790)
Toxocampinae	<i>Lygephila lusoria</i> (Linnaeus, 1758)
Toxocampinae	<i>Lygephila pastinum</i> (Treitschke, 1826)
Toxocampinae	<i>Lygephila procax</i> (Hübner, [1813])
Toxocampinae	<i>Lygephila viciae</i> (Hübner, [1822])

* mixed clade based on our phylogenetic reconstruction and thus treated as a single subfamily

Appendix 4 – Test for an interactive effect of dietary specialisation and resource type on adult body size

Table S4 Parameter estimates of the PGLS model that tested for an interactive effect of larval dietary specialisation and resource type on adult body size (log-transformed mean wingspan) in European Erebidæ moths.

Parameter	Estimate ($\pm$ SE)	t	P
Intercept	3.34 $\pm$ 0.13	25.42	< 0.001
Resource type _{Woody}	0.342 $\pm$ 0.089	3.825	< 0.001
Dietary specialisation _{Specialist}	-0.022 $\pm$ 0.080	-0.270	0.788
Resource type _{Woody} x Dietary specialisation _{Specialist}	-0.092 $\pm$ 0.099	-0.929	0.354

Note: Only herb feeders and tree feeders were included in the model to avoid singularity (n = 154).

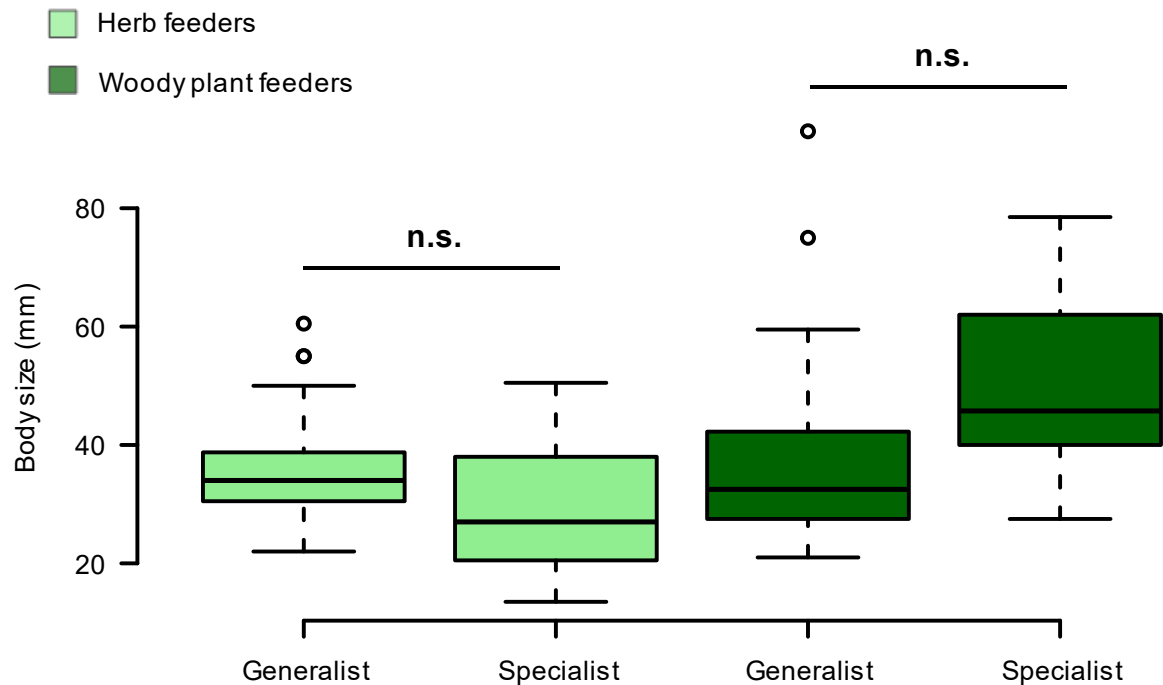


Figure S1 Relationship between adult body size (wingspan in mm) and larval dietary specialisation in dependence of utilised resource type for larval development (i.e., herbs/graminoids vs. woody plants) in European Erebidæ moths. P values for the two pairwise comparisons were obtained from a Tukey post hoc test on the PGLS model shown in Table S3.

Appendix 5 – Model of correlated trait evolution between body size and resource type

Table S5 Models testing for correlated trait evolution between adult body size and resource type (n = 154).

Model	df	Log(L)	AIC	weight
Independent model	4	-128.4	264.9	0.01
Interdependent model	8	-222.1	260.2	0.14
Body size depends on resource type	6	-222.6	457.2	0.64
Resource type depends on body size	6	-223.7	259.4	0.21

Appendix 6 – Model of correlated trait evolution between body size and voltinism

Table S6 Models testing for correlated trait evolution between adult body size and voltinism. Tests were run separately using the full (n = 220) and the reduced dataset (n = 144).

Model	Full dataset				Reduced dataset		
	df	Log(L)	AIC	weight	Log(L)	AIC	weight
Independent model	4	-230.1	468.2	< 0.001	-130.3	268.7	0.01
Interdependent model	8	-220.1	456.3	0.36	-124.0	264.0	0.14
Body size depends on voltinism	6	-228.0	470.0	< 0.001	-126.3	264.6	0.10
Voltinism depends on body size	6	-221.6	455.1	0.64	-124.3	260.7	0.75

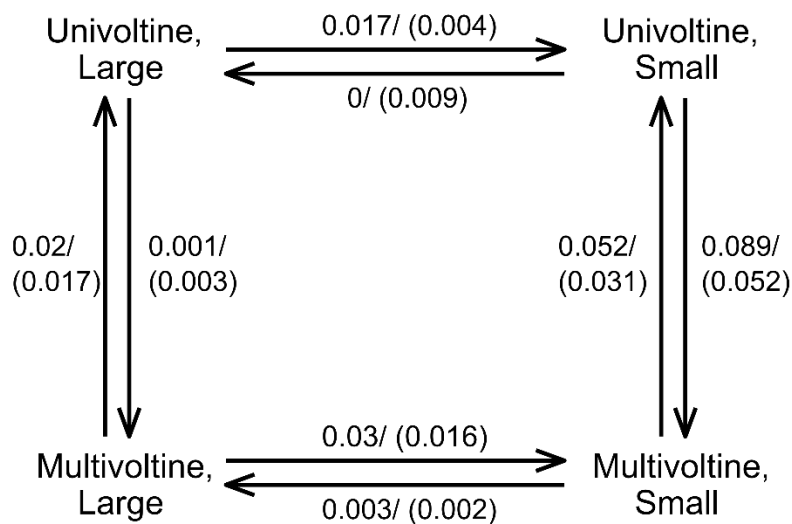


Figure S2 State combinations of voltinism (univoltine/ multivoltine) and body size (small/ large). Arrows present transition rates of the interdependent model and resulted from Pagel's test of correlated trait evolution of two binary traits. The first number was derived from the model of the full dataset (n = 220), whereas the second number in brackets resulted from the model on the reduced dataset (n = 144).

Appendix 7 – Model of correlated trait evolution between resource type and voltinism

Table S7 Models testing for correlated trait evolution between resource type and voltinism (n = 154).

Model	df	Log(L)	AIC	weight
Independent model	4	-133.7	275.4	0.09
Interdependent model	8	-127.8	271.7	0.57
Resource type depends on voltinism	6	-131.1	274.2	0.16
Voltinism depends on resource type	6	-131.0	273.9	0.18

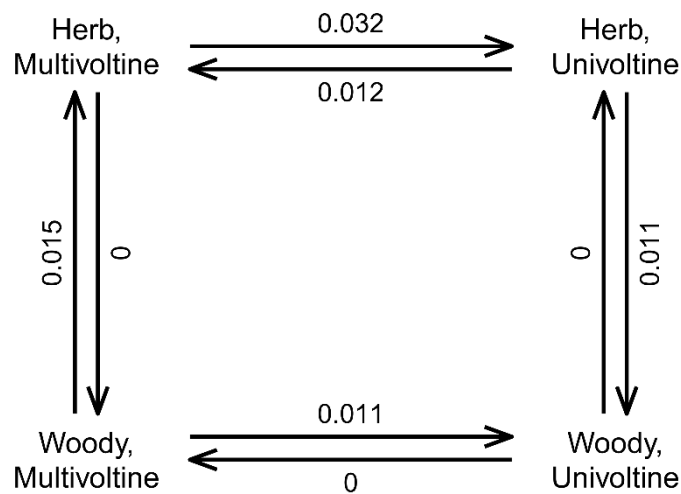


Figure S3 State combinations of voltinism (univoltine/ multivoltine) and resource type (herb feeders/ woody plant feeders) (n = 154). Arrows present transition rates based on the best-fitting model (i.e., interdependent model) of Pagel's test for correlated trait evolution of two binary traits.