Ecography

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Appendix 1

Table A1. Review of the literature reporting elevational gradients in insect herbivory (measured as damage, abundance and species richness) and plant defences. We carried out an extensive literature search in the ISI Web of Knowledge database using a combination of the following keywords: '(elevation or altitude) and (herbivory) and (defences)'. To complete our dataset, we also surveyed the cited references in some relevant review articles about elevational gradients in plant–herbivore interactions (Hodkinson 2005, Rasmann et al. 2014a, b). Information presented for each study includes organization level (whether gradients were studied within or among plant species), region of the study (tropical, temperate or polar), and observed pattern of herbivory and defences (i.e. sign of association with elevation). We only included studies performed in natural field conditions.

Study ID	Organization level	Elevational gradient (m a.s.l.)	Region	Pattern in herbivory	Pattern in defences
1	Among-species	15-2440	Tropical	➢ Species richness of seed predators and twig borers decreased with increasing elevation	
2	Within-species	600-1650	Tropical	➢ Leaf herbivory damage increased with increasing elevation ➢ Abundance of leaf herbivores did not vary with elevation	➢ Direct chemical defences in leaves increased with increasing elevation ➢ Indirect defences (ants) decreased with increasing elevation

3	Within-species	15-610	Temperate	➢ Greater damage and abundance of seed predators at mid elevations	
4	Within-species	3530-4025	Temperate	➢ Abundance of phloem-feeders decreased with increasing elevation	
5	Among-species	0-3400	Tropical	➢ Species richness of leaf herbivores decreased with increasing elevation	
6	Within-species	400-100	Temperate		➢ Physical defences in leaves decreased with increasing elevation
7	Within-species	795-1347	Temperate	➢ Leaf herbivory damage decreased with increasing elevation	
8	Within-species	150-1400	Temperate	➢ Compensatory feeding increased with increasing elevation	➢ Chemical defences in leaves decreased with increasing elevation
9	Among-species	300-2150	Temperate	➢ Abundance and species richness of leaf herbivores decreased with increasing elevation	
10	Within-species	988-1220	Temperate	➢ Abundance of flower and leaf herbivores decreased with increasing elevation	
11	Within-species	800-1550	Temperate	➢ Abundance of phloem-feeders decreased with increasing elevation	
12	Among-species	800-1500	Tropical	➢ Species richness of specialist phloem-feeders decreased with increasing elevation	
13	Within-species	4-1461	Temperate	➢ Leaf herbivory damage decreased with increasing elevation	➢ Physical defences in leaves decreased with increasing elevation
14	Within-species	600-1100	Tropical	➢ Leaf herbivory damage decreased with increasing elevation	➢ Physical defences increased with increasing elevation, but chemical defences did not vary with elevation

15	Within-species	1300-1700	Temperate	➢ Leaf herbivory damage decreased with increasing elevation	
16	Within-species	1700-2000	Temperate		➢ Greater physical defences in needles at mid elevations
17	Within-species	195-1280	Temperate		➢ Chemical defences in bloodroot rhizomes decreased with increasing elevation
18	Within-species	200-1142	Temperate	➢ Leaf herbivory damage decreased with increasing elevation in three species ➢ Leaf herbivory damage did not vary with elevation in the other three species	
19	Among-species	800-1500	Tropical	➢ Richness of leaf herbivores decreased with increasing elevation in xeric habitats, but did not vary with elevation at mesic habitats	
20	Within-species	2800-3400	Temperate	➢ Seed predation decreased with increasing elevation	
21	Within-species	200-1142	Temperate	➢ Leaf herbivory damage decreased with increasing elevation for one plant species, but did not vary with elevation for the other two species ➢ Capitule damage by generalist herbivores (but not by specialists) increased with increasing elevation for one plant species, but did not vary with elevation for the other two species	
22	Within-species	1180-3190	Tropical		➢ Chemical defences did not vary with elevation
23	Within-species	884-1475	Temperate		➢ Chemical defences in leaves decreased with increasing elevation
24	Among-species	100-1800	Tropical	➢ No relationship between leaf herbivore	

				abundance and richness and elevation	
25	Among-species	20-1964	Temperate	➢ Abundance of leaf herbivores increased with increasing elevation ➢ Species richness of leaf herbivores did not vary with elevation	
26	Within-species	600-900	Temperate	➢ Greater abundance of leaf herbivores at mid elevations ➢ Density of leaf herbivores and predators increased with increasing elevation	
27	Within-species	1600-2875	Temperate	➢ No relationship between herbivory and elevation	➢ Physical defences in leaves increased with increasing elevation
28	Within-species	1670-1790	Temperate	➢ Abundance and damage of leaf herbivores decreased with increasing elevation	
29	Within-species	310-610	Temperate	➢ Greater abundance of phloem-feeders at mid elevations	
30	Within-species	980-1570	Temperate	➢ Density of leaf herbivores increased with increasing elevation ➢ Density of phloem-feeders did not vary with elevation	➢ Chemical defences in leaves did not vary with elevation
31	Among-species	40-3200	Tropical	➢ Abundance of specialist leaf herbivores increased with increasing elevation	
32	Among-species	74-2166	Temperate	➢ Abundance of one leaf herbivore increased with increasing elevation ➢ Abundance of another leaf herbivore decreased with increasing elevation	
33	Among-species	300-1100	Temperate	➢ Abundance and richness of leaf herbivores did not vary with elevation	➢ Indirect defences (ants) decreased with increasing elevation
34	Within-species	800-1800	Temperate	➢ Abundance and damage of leaf herbivores decreased with increasing elevation	➢ Physical defences in leaves decreased with increasing elevation

35	Among-species	800-3210	Temperate	➢ Abundance and species richness of specialist leaf herbivores decreased with increasing elevation	
36	Within-species	600-1800	Temperate	➢ Leaf herbivory damage decreased with increasing elevation	➢ Physical and chemical defences in leaves decreased with increasing elevation
37	Within- and among-species	500-2500	Temperate	➢ Leaf herbivory damage in woody species increased with increasing elevation ➢ Abundance of leaf herbivores in herbaceous species decreased with increasing elevation	➢ Physical defences in leaves of woody species increased with increasing elevation ➢ Chemical defences in leaves of herbaceous and woody species increased with increasing elevation
38	Within-species	490-2200	Temperate	➢ Leaf herbivory damage decreased with increasing elevation	➢ Constitutive indirect defences in leaves decreased with increasing elevation ➢ Inducibility of indirect defences in leaves increased with increasing elevation
39	Among-species	200-3700	Tropical		➢ Indirect defences by ants decreased with increasing elevation ➢ Indirect defences by birds increased with increasing elevation
40	Among-species	500-1000	Polar		➢ Chemical defences in leaves increased with increasing elevation
41	Within-species	35-869	Temperate	➢ Leaf herbivory damage increased with increasing elevation	➢ Chemical defences in leaves increased with increasing elevation
42	Among-species	300-3000	Temperate	➢ Leaf herbivory damage decreased with increasing elevation	➢ Constitutive chemical defences in leaves increased with increasing elevation ➢ Inducibility of chemical defences in leaves decreased with increasing elevation ➢ Direct:indirect defence ratio

					increased with increasing elevation
43	Within-species	2050-3580	Temperate	➢ Leaf herbivory damage decreased with increasing elevation	➢ Inducibility of direct and indirect chemical defences in leaves decreased with increasing elevation ➢ Constitutive direct and indirect chemical defences in leaves did not vary with elevation
44	Within-species	800-1500	Temperate		➢ Chemical defences in leaves increased with increasing elevation
45	Among-species	500-3000	Temperate		➢ Physical and chemical defences in leaves decreased with increasing elevation
46	Among-species	375-3210	Temperate	➢ Abundance and species richness of leaf herbivores decreased with increasing elevation	➢ Physical defences in leaves decreased with increasing elevation

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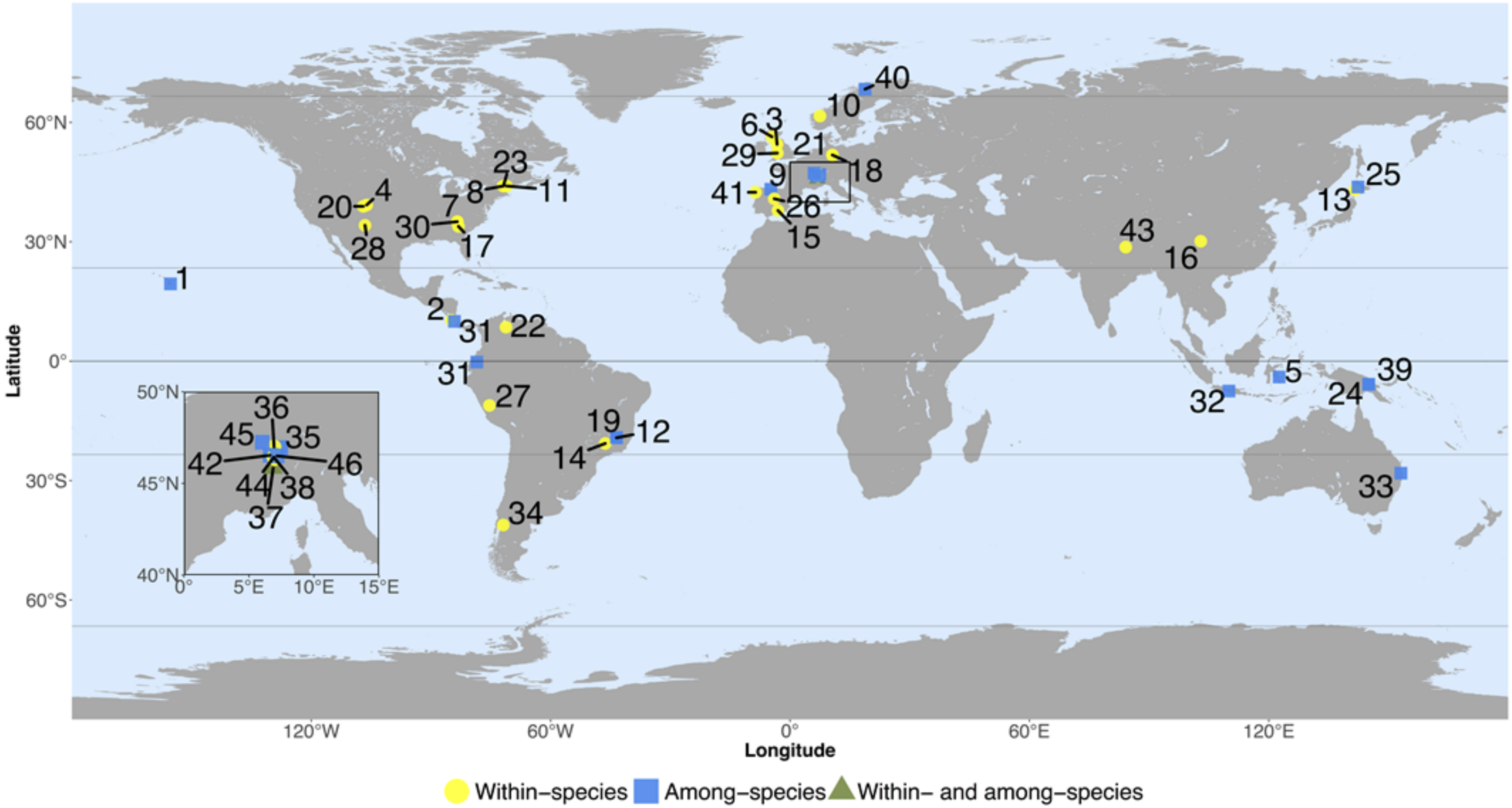

Figure A1. World map showing the locations of studies about elevational gradients in insect herbivory and plant defences. Each number corresponds to the “study ID” reported in Table A1. Comparisons within-species (yellow dots), among-species (blue square) and both within- and among-species (green triangles) are shown.