

SUPPLEMENTARY INFORMATION

APPENDIX A – SUPPLEMENTAL DATA

Tables listing all caterpillars and host plants, by site, are at the following URL: <http://www.caterpillars.org>

The host plants that were included in the random selection algorithm for calculation of β diversity are identified in these tables.

Additional analyses using 6 and 14 focal host plants to compare tropical versus temperate diet breadths and to calculate β diversity are summarized in Figures S1 and S2. Identical methods were used for these subsets of host plants as those described for the 8 focal host plants, with the exception that the Connecticut data set did not have more than 14 focal host genera or species, so the 14 focal plants were not randomly chosen for that site (i.e. all data were used).

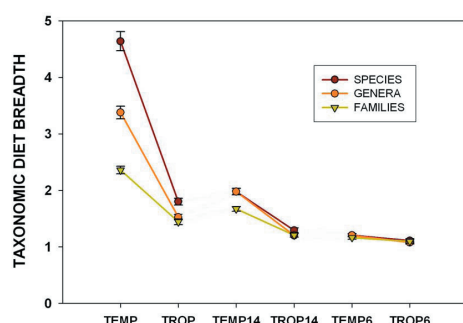


Figure S1: Mean caterpillar diet breadth ($\pm$ 95% confidence intervals) for 1052 temperate caterpillar species (TEMP) from two subtropical and two temperate sites and 1585 tropical caterpillar species (TROP) from four sites in Central and South America. Diet breadth was measured as the number of taxa (families, genera, species) of host plants per caterpillar taxon. Six (TEMP6, TROP6) and fourteen (TEMP14, TROP14) focal host plant species (from different genera) were chosen randomly from each site, to reflect similar diet breadth studies.

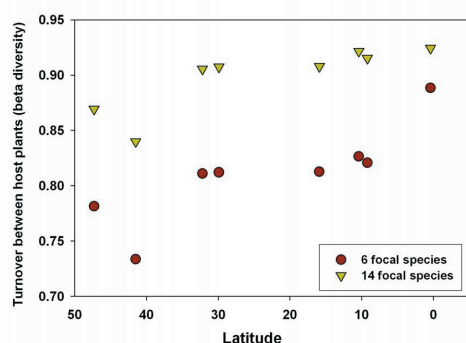


Figure S2: Modified Whittaker's β for two temperate (Canada, Connecticut), two subtropical (Arizona, Louisiana), and four tropical (Brazil, Costa Rica, Panama, Ecuador) sites, ordered by an approximate modal latitude for each site. With this measure, insect species turnover across 6 (red circles) or 14 (green triangles) randomly selected host plants from different genera is used as an index of host plant specialization, with higher values of β indicating higher levels of specialization. Symbol size is larger than 95% confidence intervals in all cases (see text for details on computation of β). The Connecticut site did not have replication for the diversity estimate.

APPENDIX B – SUPPLEMENTARY METHODS

Panama Site

We collected Lepidopteran larvae on Barro Colorado Island (BCI), Panama (9°N, 80°W) from 1996–2005. The island is maintained and protected by the Smithsonian Tropical Research Institute and is part of a larger forested corridor that extends from the Atlantic to Pacific coasts. BCI experiences a marked dry season that is usually four months long, and the vegetation is classified as tropical, moist forest (Holdridge et al.

1971, Croat 1978, Leigh 1999).

Caterpillars were collected opportunistically from the island's diverse understory of shade-tolerant plants representing a variety of life histories. The plant species included shrubs, juvenile lianas and immature trees with growth strategies that differed widely, even within plant genera. Between 2004 and 2005 collection efforts focused on 10 species of *Inga* (Fabaceae).

We reared all caterpillars individually in closed plastic containers or plastic bags at ambient temperature in a screened and shaded porch. We fed them leaves of the same species and age as those on which they were initially found. Leaves were replaced with fresh ones at least every other day. We photographed and reared specimens and entered them into our database (<http://www.biology.utah.edu/~coley/database.htm>). Using larvae and adult specimens, we identified the lepidopterans to the lowest taxon possible. Voucher specimens are stored on BCI, and some duplicate specimens are with experts for identification. Host plants were identified to species using Croat (1978) and by comparison with herbarium specimens.

Croat, T. B. 1978. The flora of Barro Colorado Island. Stanford University Press, Palo Alto, California.

Holdridge, L., W. Grenke, W. Hatheway, T. Liang and J. Tosi. 1971. Forest environments in tropical life zones. Pergamon, New York.

Leigh, E. G. 1999. Tropical forest ecology: A view from Barro Colorado Island. Oxford University Press, New York, NY.

Brazil Site

We collected lepidopteran larvae on the cerrado sensu stricto areas near Brasília, DF, Brazil (15°45'S, 47°50'W) from 1991 to 2005. The region experiences a marked dry season from May through September (mean month precipitation of 24 mm). Caterpillars were collected on 108 plant species representing 43 families. Some caterpillars were collected opportunistically but on most of the plant species we collected once a week throughout a year. The plants examined included shrubs, trees and some herbs, varying in height from 0.50 to 2.50 m. All were censused during morning hours. The caterpillars were individually reared in plastic jars on leaves of the plant on which they were found, at ambient temperature and humidity. Leaves were replaced every two days. The duration of the pupal stage, and parasitoid emergence were recorded. Voucher specimens ($n=5,614$ individuals) were deposited at the Entomological Collection of Zoology Department, University of Brasília, and were identified by Vitor Osmar Becker, Associate Researcher, Department of Zoology, University of Brasília.

Arizona, Costa Rica, Ecuador, and Louisiana Sites

Collecting at all sites covered a broad range of latitude and longitude within the respective states and countries, including all of Arizona (USA; most collecting was at approximately 31°53'N, 109°12'W), all of Louisiana (USA; collecting was centered at 29°56'N, 90°7'W), all of Costa Rica (most collecting was at La Selva Biological Station, 10°26'N, 84°0'W), and all of Ecuador (collecting centered at approximately 0°35'S, 77°53'W). Lepidopteran larvae at all sites were collected both opportunistically along trails, watercourses, and on undirected walks through the forests, and quantitatively using 10 m diameter plots as search areas. Plots were divided into four equal wedges, and one person spent 30min looking for caterpillars on all the plants within each wedge. At all sites caterpillars were collected from all plant taxa and growth forms (herbs, vines, shrubs, trees) on which they were encountered.

All collected caterpillars were reared individually in clear plastic bags or glass jars in rearing facilities at ambient temperature and humidity. Fresh food in the form of new foliage from the same plant species from which the caterpillar was collected was placed in containers as needed. All pupae were checked daily to collect any adult Lepidoptera or parasitoids that emerged.

Voucher specimens of the focal plants and all first-time food plants were collected and pressed to insure accurate taxonomic identification and deposited at appropriate institutions. Initial identifications of insects were made by parataxonomists and then confirmed by taxonomic specialists. Voucher specimens of the insect species can be found at Tulane University, InBio (Costa Rica), the Museo Nacional de Ciencias Naturales (Ecuador), and other collaborating institutions (see www.caterpillars.org for a list of participating institutions).

Connecticut Site

Caterpillars were collected (1995-2006) both opportunistically across many communities throughout the state of Connecticut (centered at approximately 41°33'N, 72°39'W), as well as quantitatively using haphazardly chosen branches from focal tree taxa at three sites in Middlesex County, Connecticut (2004-2006). For quantitative sampling, collection effort on each of eight tree taxa (*Quercus rubra* group, *Quercus alba*, *Fagus grandifolia*, *Carya* spp., *Prunus serotina*, *Acer rubrum*, *Betula lenta*, *Hamamelis virginiana*) was equalized per collection day. Saplings and low branches of larger trees were sampled (ground level-3 m in height). Much of the opportunistic and all of the quantitative collecting occurred during the peak caterpillar season in Connecticut (late May-early July), although limited collecting efforts extended throughout the growing season.

Caterpillars were reared individually in vials, plastic cups, bags, or boxes in the laboratory at room temperature. Caterpillars were fed foliage from the plant taxon upon which they were collected. Reared adults were spread to allow for clear taxonomic identification. Identifications were based on the reared adult specimens, or, for relatively distinct and well-described species, on larval features using Wagner (2005) and Wagner et al. (1998, 2002). Voucher specimens are housed at the University of Connecticut (Storrs) and Wesleyan University.

Wagner, D. L. 2005. Caterpillars of Eastern North America: A Guide to Identification and Natural History. Princeton University Press.

Wagner, D. L., V. Giles, R.C. Reardon, and M. L. McManus. 1998. *Caterpillars of Eastern Forests*. USFS Technology Transfer Bulletin, FHTET-96-34.

Wagner, D. L., D. C. Ferguson, T. L. McCabe, and R. C. Reardon. 2002. *Geometroid Caterpillars of Northeastern and Appalachian Forests*. USFS Technology Transfer Bulletin, FHTET-2001-10.

Canada Site

All collection records (19,371,947) of individual larvae or groups of larvae that yielded adult moths were entered from hand-written rearing records provided by the Canadian Forest Insect Survey (CFIS, now the Forest Insect Disease Survey), Sault Ste. Marie, Ontario, Canada. Larvae were collected 1936-1955 by hand picking and beating foliage throughout the provinces of southern Canada (centered at approximately 53°N, 101°W). Collectors included forest biology rangers and associates of the CFIS (McGugan 1958a). Collected larvae were reared at regional centers on foliage from the host plant on which they were collected. Identifications of larvae and reared adults were made by the Insect Systematics Unit of the Survey. A combination of published data from these surveys (McGugan 1958b; Prentice 1962, 1963, 1965) and the original hand-written rearing records were used to construct the caterpillar-host plant database. Plant and insect nomenclature were updated as needed to reflect the current state of taxonomic understanding.

McGugan, B.M. 1958. The Canadian Forest Insect Survey. Proc. 10th Int. Congr. Entomol. 4, 219-232.

McGugan, B. M. 1958b. Forest Lepidoptera of Canada. Volume 1. Papilionidae to Arctiidae. Canada Department of Agriculture, Ottawa.

Prentice, R. M. 1962. Forest Lepidoptera of Canada. Volume 2. Nycteolidae, Noctuidae, Notodontidae, and Liparidae. Canada Department of Agriculture, Ottawa.

Prentice, R. M. 1963. Forest Lepidoptera of Canada. Volume 3. Lasiocampidae, Thyatiridae, Drepanidae, and Geometridae. Canada Department of Agriculture, Ottawa.

Prentice, R. M. 1965. Forest Lepidoptera of Canada. Volume 4. Microlepidoptera. Canada Department of Agriculture, Ottawa.