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Understanding global drivers of changes in species interactions is vital, both in terms of improving our knowledge of fundamental large-scale ecology, and in order to predict and protect against human-driven changes to ecosystems. Here we present the LifeWebs project, which aims to collate existing data on interaction networks in order to understand their large-scale patterns. Initially we will collate data relating to plant–herbivore interactions, and this article is a call for contributions. We outline the kinds of data in which we are interested, the procedure for making contributions, and what contributors can expect in terms of co-authorship on subsequent papers and access to the database for conducting their own analyses.



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The LifeWebs project: A call for data describing plant-herbivore interaction networks

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Abstract. Understanding global drivers of changes in species interactions is vital, both in terms of improving our knowledge of fundamental large-scale ecology, and in order to predict and protect against human-driven changes to ecosystems. Here we present the LifeWebs project, which aims to collate existing data on interaction networks in order to understand their large-scale patterns. Initially we will collate data relating to plant–herbivore interactions, and this article is a call for contributions. We outline the kinds of data in which we are interested, the procedure for making contributions, and what contributors can expect in terms of co-authorship on subsequent papers and access to the database for conducting their own analyses.

Keywords. Herbivory, food web, trophic interaction, biogeography of interactions

It is becoming increasingly apparent that, in order to understand large-scale ecology, we need to document not only responses of individual species to the environment, but how those species interact with each other. A particularly striking example of this is the co-extinction of obligate natural enemies whose hosts have disappeared (Koh et al. 2004), but all biotic interactions, whether positive or negative, are likely to have impacts on individuals, populations and communities. This is important, both from a pure ecology perspective, and because we need to account for species interactions when predicting responses to global challenges such as anthropogenic habitat degradation and climate change (Tylianakis et al. 2008). To date, individual studies have documented changes in network structure in relation to a range of environmental drivers including altitude (e.g. Novotny et al. 2005), latitude (e.g. Forister et al. 2015), and habitat degradation (e.g. Valladares et al. 2006).

However, the degree to which the patterns reported in these studies generalise across different types of interaction networks and between different environmental gradients remains unclear.

In order to test for the generality of these patterns, we have launched the LifeWebs project¹. The objective of the project is to take advantage of the increasing availability of interaction network data to assess the generality of patterns along environmental gradients. We will do this by collating datasets and analysing changes in network structure in relation to gradients of altitude, latitude and anthropogenic habitat modification (e.g. selective logging of forests, clear felling, forest fragmentation, conversion to agricultural land). We chose these gradients because they allow us to address questions relating to important global-change drivers. A similar approach has proved powerful in investigating impacts of anthropogenic land-use change on biological com-

¹ <http://lifewebs.net/>, last accessed 19th December 2016

munity composition (Newbold et al. 2013). We currently focus on the ecologically important interactions between herbivorous arthropods and their plant hosts, including leaf feeders, sap suckers, gallers and fruit feeders. Understanding the shifts in these networks is important because different insect herbivore guilds display different network topologies (Novotny et al. 2010), and network topology affects community stability (Vieira and Almeida-Neto 2015).

To date the LifeWebs project, supported by a ‘Centrum of Excellence’ grant from the Czech Science Foundation (14-36098G), has generated a database comprising 119 datasets documenting interactions between a minimum of 4100 insect species and 2350 plant species (note that for a small proportion of datasets currently being processed, summary statistics are preliminary), with a mean of 51.2 insect species and 38.7 plant species per dataset (Figure 1). Spatial coverage is highest in the southern parts of North America, Europe and some parts of South America. We are very grateful to the researchers who have contributed

to the database so far. However, we need more data if we are to understand global responses of species interaction networks to the environment, hence this call for data.

We would like to receive contributions to the database from anyone with community data describing interactions between herbivorous arthropods and plants. We are interested both in data collected from multiple sites that differ in altitude, latitude or anthropogenic disturbance, and in data from single sites. We are particularly interested in data that would allow better spatial coverage at global scales, specifically from Africa, Southeast Asia, China and other parts of central and northern Asia, western and central Australia, the Amazon, the northern part of North America, the southern part of South America and the Arabian Peninsula (Figure 1). However, data increasing sampling intensity for areas with existing coverage would also be valuable.

Our project website² gives full details on how to submit your data and on quality control procedures. Submissions to the database are wel-

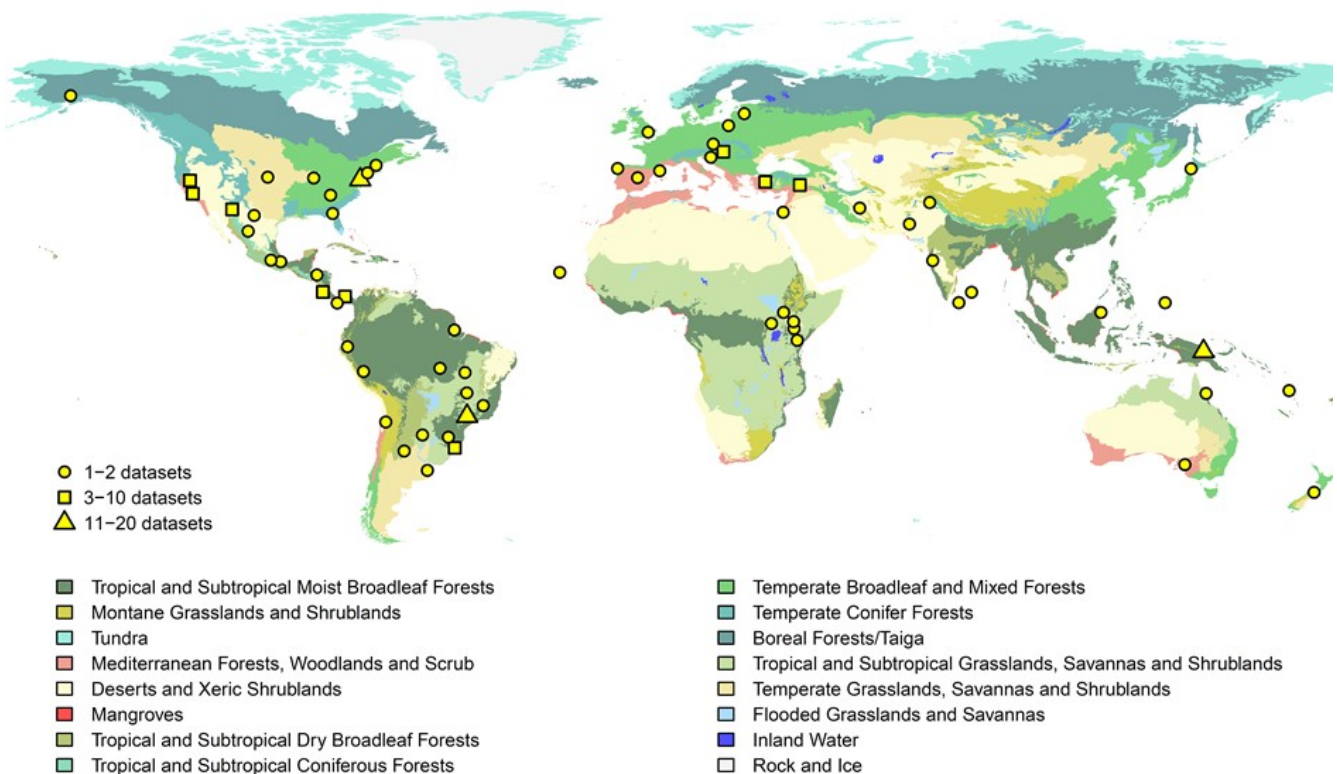


Figure 1. Global distribution of plant–herbivore datasets currently included in the LifeWebs database plotted in relation to biomes (The Nature Conservancy). Note that where multiple points occupy similar coordinates, these have been separated slightly to aid interpretation.

² <http://lifewebs.net/contribute.html>, last accessed 19th December 2016

come at any time, although we plan to start work on a data-driven paper, led by the project PIs, in June 2017. Only contributions submitted before this date will be included in this manuscript. Once this manuscript is underway, we will open the database for use to all database contributors, with the eventual aim that it will be made publicly available online. However, we emphasise that we operate a flexible policy regarding data access, and contributors can opt to have their data remain accessible only to other database contributors in perpetuity if they wish. Contributors can also retract their dataset at any time, although datasets may still be included in analyses that are already underway. The standard system for co-authorship will be one co-author per contributed dataset, although we appreciate that larger datasets may merit multiple authorships, at the discretion of the project PIs. There is also an opportunity to be involved through the collation of existing published datasets, for which we require each author to submit data from a minimum of five publications. Once the database is opened up for contributors, we envisage that it will become an important global resource for researchers interested in all aspects of network response to environmental gradients. With the planned future expansion of the project to include networks from a range of different taxa and interactions types, the range of potential uses for the data will be further increased. For more information please email us at personal email addresses or at global.foodwebs@gmail.com, and visit our website³. We very much look forward to collaborating with you!

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References

- Forister, M.L., Novotny, V., Panorska, A.K. et al. (2015) The global distribution of diet breadth in insect herbivores. *Proceedings of the National Academy of Sciences, USA*, 112, 442–447.
- Koh, L.P., Dunn, R.R., Sodhi, N.S., Colwell, R.K., Proctor, H.C. & Smith, V.S. (2004) Species coextinctions and the biodiversity crisis. *Science*, 305, 1632–1634.
- Newbold, T., Hudson, L.H., Purves, D., Scharlemann, J.P., Mace, G. & Purvis, A. (2013) PREDICTS: Projecting Responses of Ecological Diversity In Changing Terrestrial Ecosystems. *Frontiers of Biogeography*, 4, 155–156.
- Novotny, V., Miller, S.E., Basset, Y., Cizek, L., Darrow, K., Kupa, B., Kua, J. & Weiblen, G.D. (2005) An altitudinal comparison of caterpillar (Lepidoptera) assemblages on *Ficus* trees in Papua New Guinea. *Journal of Biogeography*, 32, 1303–1314.
- Novotny, V., Miller, S.E., Baje, L., et al. (2010) Guild-specific patterns of species richness and host specialization in plant–herbivore food webs from a tropical forest. *Journal of Animal Ecology*, 79, 1193–1203.
- Tylianakis, J.M., Didham, R.K., Bascompte, J. & Wardle, D.A. (2008) Global change and species interactions in terrestrial ecosystems. *Ecology Letters*, 11, 1351–1363.
- Valladares, G., Salvo, A. & Cagnolo, L. (2006) Habitat fragmentation effects on trophic processes of insect–plant food webs. *Conservation Biology*, 20, 212–217.
- Vieira, M.C. & Almeida-Neto, M. (2015) A simple stochastic model for complex coextinctions in mutualistic networks: robustness decreases with connectance. *Ecology Letters*, 18, 144–152.

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³ www.lifewebs.net, last accessed 19th December 2016