Ecography

ECOG-03514
Dallas, T. and Poisot, T. 2017. Compositional turnover in host and parasite communities does not change network structure. – Ecography doi: 10.1111/ecog.03514

Supplementary material

Appendix 1

Supplemental materials:

Distance decay in host-parasite networks

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Distance-decay in host and parasite sharing networks in the United States of America

We tested if our global findings were robust to smaller spatial scales by focusing on states within the United States of America. Similar to our global analyses, host and parasite community similarity decayed quickly with geographic distance (see Figure 4), while host and parasite sharing network dissimilarity was not found to decay with increasing geographic distance (Figure S1). Host and parasite network dissimilarity may be better explained by other variables, or perhaps our failure to detect a relationship suggests that host and parasite species serve functionally redundant roles in communities, perhaps driven by their relative abundances; this would suggest that host-parasite networks may be a result of neutral dynamics (Canard et al., 2014). This could explain, in part, the lack of a relationship between geographic distance and network dissimilarity observed here. On the other hand, in many instances there appears to be a trait-basis for host-parasite interactions (Dallas et al., 2017a,b), which would suggest that host-parasite interactions are not

the result of neutral dynamics. Differential host utilization among locations could also promote the predictable decay in host and parasite community similarity, but not in network structure, as the structure of the network changes while the interactors may remain the same.

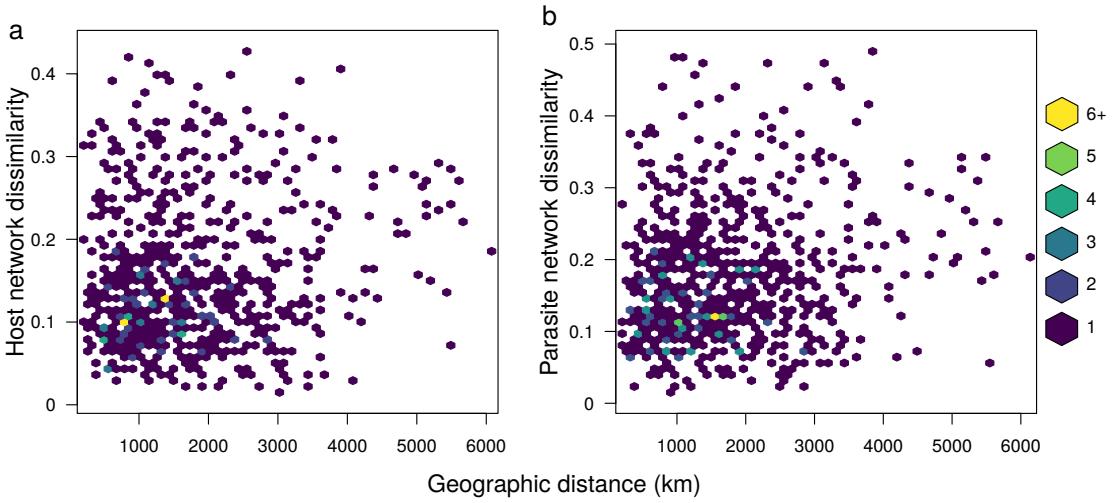

Figure S1: Host (a) and parasite (b) network dissimilarity as a function of geographic distance between states in the United States of America. There is no clear relationship in network dissimilarity – quantified using the D statistic – and geographic distance between sites. Color of hexagonal bins indicates data concentration (yellow colors correspond to highest concentration of data points).

Relationship between community dissimilarity and graph dissimilarity

Similar communities may result in more similarly structured host or parasite sharing networks. That is, if more species are conserved between sites, the interaction patterns those species have may also be conserved. This would result in a positive relationship between community and network dissimilarity. However, we failed to detect a strong relationship betwen community and network dissimilarity between sites for either hosts (Figure S2) or helminth parasites (Figure S3).

The variability observed in the relationship between community and network dissimilarity could allude to high interaction turnover among sites. This would be the case if species interactions were highly variable among sites. However, network dissimilarity is determined using information on all interactors of one trophic level (i.e., host or parasite species). By example, a similar pair of host communities could have dissimilar parasite sharing networks if the interaction patterns of the shared host species are not conserved among sites. In this scenario, the identity of the parasite species linked to host species are not important, but the distribution of links does matter.

Lastly, host and parasite network dissimilarity (D) were related to one another.

This is unsurprising, as the underlying data on host-helminth associations is used to create both host and parasite networks.

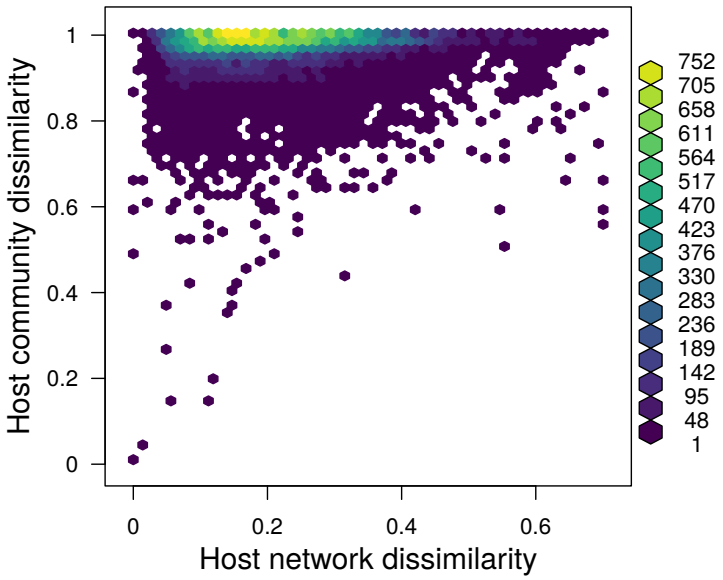

Figure S2: A very weak positive relationship observed between community and network dissimilarity for host communities/networks. Color of hexagonal bins indicates data concentration (yellow colors correspond to highest concentration of data points).

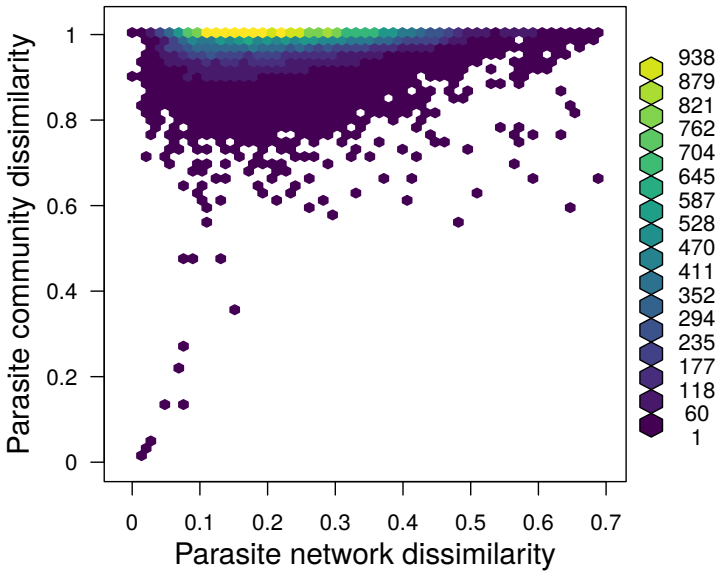

Figure S3: A very weak positive relationship observed between community and network dissimilarity for helminth parasite communities/networks. Color of hexagonal bins indicates data concentration (yellow colors correspond to highest concentration of data points).

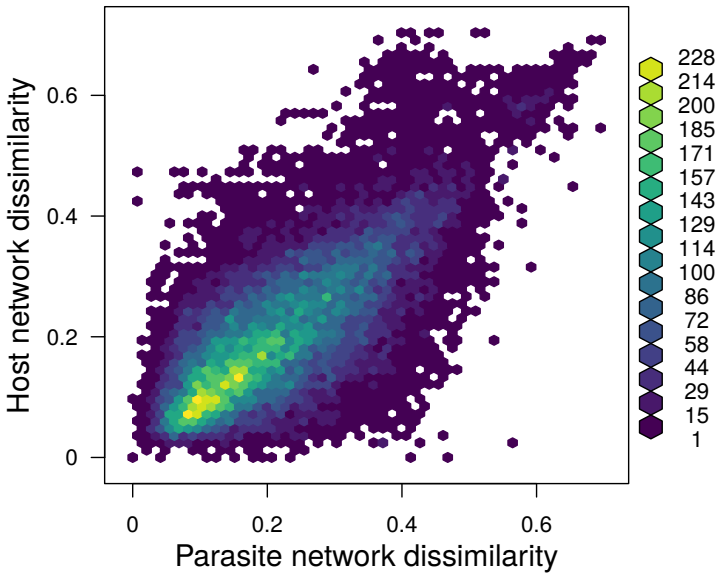

Figure S4: Host and parasite network dissimilarity were related to one another, as the underlying host-helminth relationships that make up both networks were the same. That is, host networks implicitly contain information on parasites in links between host species, and parasite networks are linked by shared host species. Color of hexagonal bins indicates data concentration (yellow colors correspond to highest concentration of data points).