

The Structure of Parasites in Food Webs

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We have developed the first model of food web structure that explicitly includes parasites, an often neglected but very important component of ecosystems. Our analysis of a unique data set for a salt marsh ecosystem, a comprehensive network of the links between species representing both predation and parasitism, shows that the structure of parasitic links is not random but clustered and nested, as shown in the enclosed figure. Specifically, parasites that share one host are more likely to share other hosts. Also, a parasite's set of hosts is more likely to be a subset of those of parasites with more hosts. Lastly, a prey and its predator are more likely to be hosts to the same parasite species.

Previous models of food web structure were inspired by the idea that, at least for animals, there was a general hierarchy governing who ate whom, possibly based upon size, that influenced how food webs were structured. However, for parasites and their hosts, this hierarchy is reversed -- parasites are generally smaller than the hosts that support them. Using this idea, our model, building upon a successful predator-prey food web model called the niche model, is able to capture these features found in the real food web. The proposed model provides a simple tool to create realistic network structures with which to study how structure influences function and dynamics in ecosystems.

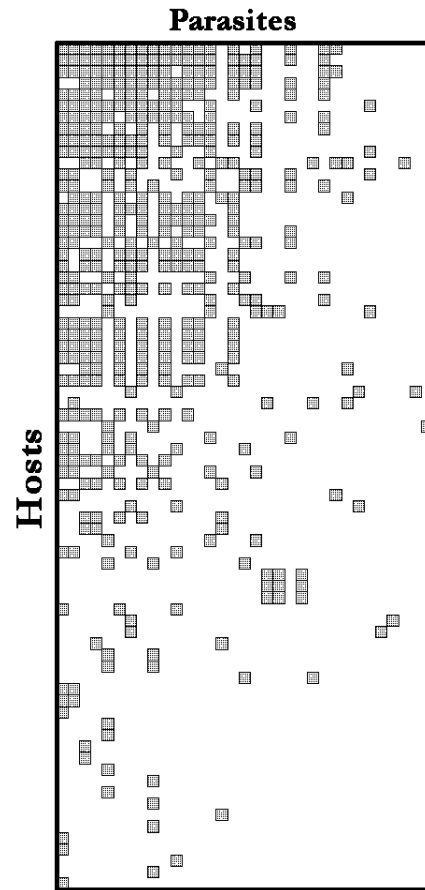


Figure 1. A graph of the parasite-host interactions. A shaded box indicates that parasite parasitizes that host.