
Coupled but highly contrasting symbiont networks inside and outside ant nests in heathland

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Résumé

Ants are key partners in diverse host-symbiont networks. Although ant symbiont networks typically involve multiple types of interactions, such as mutualists and parasites, most studies typically focus on only one, making it unclear whether evolutionary (e.g., host relatedness) and ecological (e.g., colony size) factors shape the composition and structure of the subnetworks of different interaction types in similar ways. We reconstructed a multilayered ant-symbiont network in heathland. Specifically, the network comprised three interconnected bipartite subnetworks: (1) an aboveground plant-aphid subnetwork, (2) a mutualistic aphid-ant subnetwork, and (3) an underground ant-myrmecophile subnetwork, consisting primarily of parasitic and agonistic arthropods living strictly inside ant nests. The number of underground myrmecophilous symbionts differed substantially among ant taxa, with mound-building ants supporting the highest species richness. The number of aphid symbionts outside the nest was less variable among ant species and was highest in species that forage across both canopy and herbaceous layers. The subnetworks varied markedly in their degree of specialization. The plant-aphid subnetwork was highly specialized, whereas the aphid-ant mutualistic subnetwork was strongly generalized, with ants showing little preference for specific aphid species. The underground ant-myrmecophile subnetwork exhibited an intermediate specialization level. Evolutionary factors had little effect on either aboveground or belowground subnetworks, while the ecological factors colony size and presence of organic material in the nest clearly shaped the structure and diversity of the belowground myrmecophile subnetwork. Overall, our findings show that aboveground and belowground interaction patterns of ants with symbionts markedly differ.

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