STOCHASTICITY RULES THE PHOROPHYTE USE OF EPIPHYTIC LICHENS, BUT DETERMINISM MATTERS

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The distribution of epiphytic lichens across phorophytes (i.e. host plants) is complex and determines the community assembly in lichen communities. In this way, lichen-phorophyte specialism could be driven by stochastic mechanisms in which the range and abundance of epiphytic lichens determine their ability for using different host plants. On the other hand, deterministic mechanisms could shape lichen-phorophyte specialism when their range and abundance are determined by their ability to use a wide suite of host plants, both in number and functional traits. Here we studied the interactions between more than 720 epiphytic lichen species and 80 phorophyte species across the Mediterranean region in Spain. We used four different networks to depict: 1) the interactions between epiphytic lichens and phorophytes across the whole Mediterranean region (i.e. regional specialism), 2) the interactions of lichens among network modules (i.e. network specialism), 3) the phylogenetic relatedness among phorophytes (i.e. phylogenetic specialism), and 4) the interactions between epiphytic lichens and phorophytes within 10x10 km plots (i.e. local specialism). In addition, we computed the lichen species geographic range and the local abundance. We then applied structural equation modelling to evaluate the relationships between regional specialism, network specialism, phylogenetic specialism, local specialism, species range and local abundance under two theoretical frameworks, one purely stochastic and another purely deterministic. Overall, we found that the observed lichen-phorophyte interactions better fit to the stochastic theoretical model in which lichen range and local abundance determine lichen-phorophyte specialism at different scales. Thus, those lichen species more abundant and with a wider distribution range can interact with a wider range of phorophyte species. However, some deterministic relationships also drove lichen-phorophyte interactions since the ability of lichen species to interact with phorophytes belonging to different network modules was related to their phylogenetic specialism. In conclusion, stochasticity rules lichen-phorophyte interaction, but deterministic mechanisms matter.