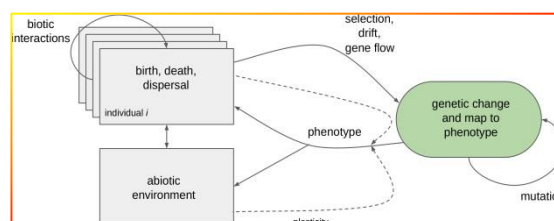


Feedbacks in ecology and evolution – what theoreticians say

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Climate Feedbacks, that is, when A affects B and B in turn affects A, are relevant throughout biology and are central to ecology and evolutionary biology. While ecology aims at understanding the interactions between individuals and their environment, for example, who eats whom, evolution refers to changes in heritable properties over time, such as the emergence of antibiotic resistant bacteria in hospitals. Throughout the history of both disciplines the fields have mostly developed in isolation.

However, some scientists have already for quite some time developed theory and a deep conceptual understanding of how these fields interact. This work, bridging between ecology and evolution, has become extremely relevant in recent years, as scientists have realized that evolution is not limited to the fossil record, but can be extremely rapid and happen under our eyes. Especially today, as the environment changes, often due to human-mediated impacts, animals are forced to adapt or they might go extinct. These environmental changes can lead to evolution, such as when moths evolved darker colours during industrialization in order to camouflage themselves on polluted surfaces. Such evolutionary changes can have ecological consequences, in this case that the birds eating these moths can't find them any more.



In our work, we review what technical approaches theoreticians have used to capture this interplay between ecology and evolution and we use our overview to suggest future work. Most importantly, we advocate models that are based on individual-level mechanisms and we call for more exchange between theoreticians and empiricists.