Predicting size distributions of insects in patchy landscapes

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Size is a crucial factor in explaining variation in metabolic rate between individuals. On its turn, metabolic rate interacts with crucial aspects of organisms such as their developmental strategies and dispersal, thereby shaping an individual's life history.

Because of the size dependency of both life history and dispersal, we expect the spatial distribution of resources to induce a strong selection pressure on the mean size and its variance on species associated in food webs. The inclusion of size evolution among- and within species within food webs is thus essential to understand the trait-distribution of species belonging to different trophic levels in spatially structured populations and communities. Such evolutionary community responses are then again expected to feedback on food web properties and functioning.

Starting from a simple individual-based resource-consumer model we demonstrate how variation in habitat fragmentation affects the optimal size distribution within food webs of incremental complexity. The model outcome clearly indicates different shifts in body size according to mobility. The aim of the project is to link observational data to the model to test its validity in natural systems and to infer which mobility measures most likely shape the distribution of herbivore arthropods in locations that vary both in the amount and spatial contagion of the habitat/resources.

Predictions of the model in case of fully informed and uninformed movement. P: proportion of suitable habitat/resources in the landscape; H: the level of spatial contagion (0: dispersed – 1 fully connective).