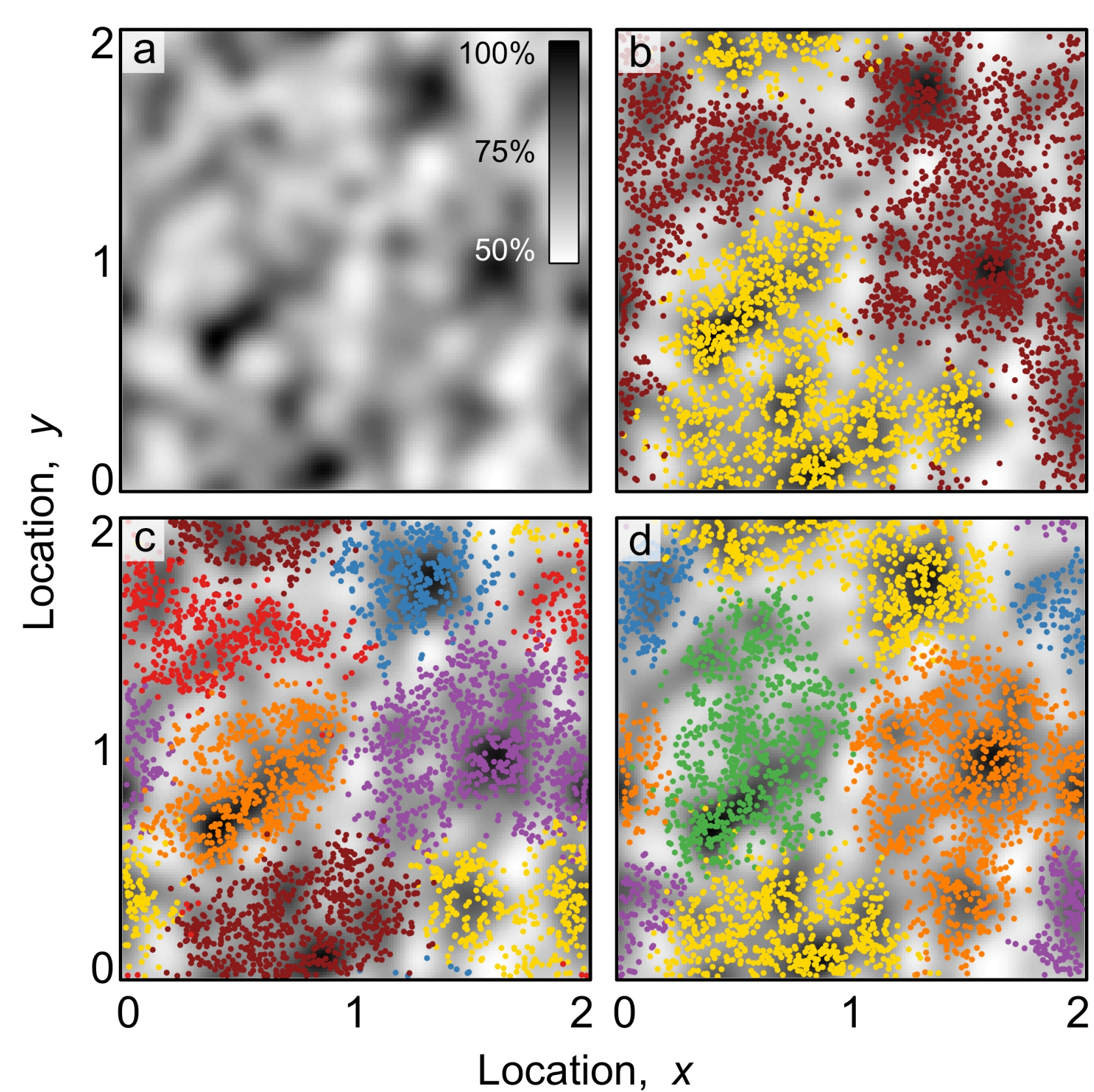


Biodiversity

As recognized by the Convention on Biological Diversity signed at the 1992 Rio Earth Summit, biological diversity is about more than plants, animals and micro-organisms and their ecosystems – it is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live. Yet the loss of biodiversity through the extinction of species, in which habitat destruction and fragmentation due to land-use changes play a key role, continues at an alarming rate.



Healthy coral reef community, East Timor



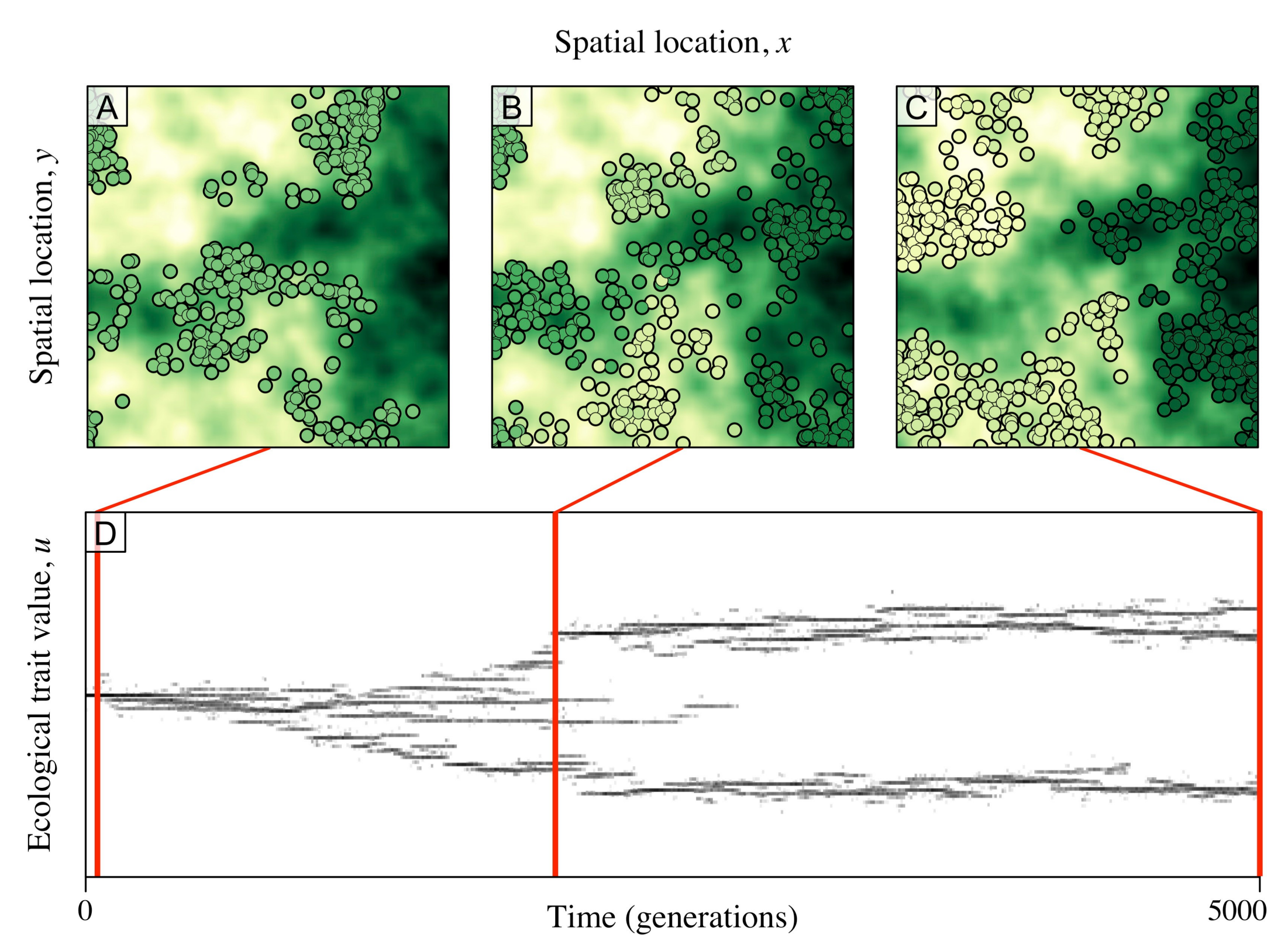
Species clusters stabilized by mating preferences.
M'Gonigle et al. (2012)

Speciation as adaptation

Traditionally, species were thought to come about as random by-products of divergent evolution in spatially separated (allopatric) populations. Now, we increasingly realize that spatio-phenotypic clusters emerge as a necessary consequence of the ongoing struggle to improve resource utilization in heterogeneous environments while being subject to inter- and intraspecific competition. In this modern view, such adaptive “speciation attempts” are frequent, although they commonly fail in stable environments; after extrinsic habitat alterations and extinctions, however, newcomer species can establish more easily because of the reduced competition.

Extinction and speciation

About 1.5 million species are currently described. These are only a tiny fraction of the species that ever existed, and probably even only a small fraction of the species currently existing. Most species are extinct. There have been several mass extinctions in the past, each followed by adaptive radiations from the surviving clades, leading to an explosion in species numbers. The reason why there is still life on Earth is that extinctions are, at least on geological timescales, naturally balanced by the formation of new species: speciation is an incessant driver of biodiversity. Stable species patterns represent a dynamical equilibrium between extinction and speciation.



Evolutionary branching in a heterogeneous environment.
Haller et al. (unpublished)



Rain forest, Fatu Hiva Island, French Polynesia

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