Rare animals and plants organize in ghettos to survive

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Similar to the organization of human cities, animal and plant communities have ghettos or ethnic neighborhoods, where low-abundant species group to enhance their persistence against more competitive

species. This unexpected ecological pattern is the conclusion of an international study about biodiversity in competitive environments.

"Animal and plant communities organize like human cities, with ghettos. This organization could underlie the persistence of rare species as they escape from the pressure of better competitors by cooperating or by using different microhabitats," says Joaquín Calatayud, former postdoc in Integrated Science Lab at Umeå University.

The results of this study, published in *Nature Ecology & Evolution*, suggest a general explanation for maintained biodiversity in competitive environments, a Gordian knot in current ecological research.

"In highly competitive environments, more efficient competitors should eliminate rare species. Nevertheless, multiple rare species exist together in ecological communities, " Joaquín Calatayud explains.

The researchers analyzed more than 300 worldwide distributed communities, including mosses, plants, insects, and corals. Combining network theory to detect the ghettos and numerical simulations to explore the mechanisms behind them, they found that the spatial grouping of low-abundant species enhances their persistence.

These findings provide a better understanding of how species form ecological communities.

"The results can influence multiple applications where the coexistence of species is crucial, including conservation strategies and studies of human diseases related to the gut microbiome," says Joaquín Calatayud.

The fact that the specific mechanisms leading to groups of rare species remain unknown calls for a novel research agenda.

More information: Joaquín Calatayud et al. Positive associations among rare species and their persistence in ecological assemblages, *Nature Ecology & Evolution* (2019). DOI: 10.1038/s41559-019-1053-5

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