iFAST: The International Forum on Advanced Environmental Sciences and Technology

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Rob Pringle, an ecologist and conservation scientist, is professor of ecology and evolutionary biology at Princeton University. Pringle's research combines field ecology, molecular biology, remote sensing and modeling to gain mechanistic insight into species interactions, food webs and the impacts of human activity on the biosphere. Pringle is particularly known for discoveries about the form of ecological niche differentiation and its role in regulating species coexistence; the effects of large herbivores, carnivores and ecosystem engineers on biodiversity and ecosystem functions; and the sensitivity and resilience of biological systems to natural and anthropogenic disturbances. Much of this work has focused on African ecosystems and their threatened megafauna, with special emphasis on Mozambique's Gorongosa National Park, a pioneering experiment in large-scale rewilding. Pringle received his doctorate from Stanford University in 2009 and subsequently was a Junior Fellow in the Harvard Society of Fellows. He joined the Princeton faculty in 2012, where he currently serves as director of undergraduate studies.

Explaining and maintaining animal biodiversity

Abstract: Understanding how biodiversity is maintained in the face of both natural and human pressures is ecology's greatest challenge. While recent decades have yielded advances in the theoretical understanding of species coexistence, there has been little empirical progress over the last half-century in identifying the mechanisms that actually regulate the diversity of wild animals (with one crucial exception). Pioneering studies in the 1950s and '60s highlighted the roles of resource partitioning, spatial heterogeneity and predation in preventing competitive exclusion, but the difficulty of quantifying the exact form and impacts of these factors in nature stymied further progress. That is now changing. Tools such as DNA metabarcoding and GPS tracking enable precise measurement of empirical patterns of resource partitioning, while high-resolution remote sensing enables ultra-granular reconstruction of spatial structure. To illustrate the power of these tools, I present recent work showing (a) the ubiquity of subtle spatial and dietary niche differentiation among sympatric species, along with some of their underlying causes; and (b) that predation may more often impede than promote prey coexistence, contrary to the classical notion of keystone predation. Despite these advances, we are still far from being able to harness empirical data from wild systems to the machinery of coexistence theory. The key exception to our inability to explain the regulation of animal biodiversity is the predatory and competitive impacts of humans, which are well documented. A proliferation of restoration, translocation and rewilding efforts represent a facilitative human impact and offer precious opportunities to plug gaps in the understanding of species coexistence and (re)assembly in animal communities. I highlight this potential with reference to research in Gorongosa National Park, Mozambique. The mechanics of coexistence and the dynamics of rewilding are linked, and we need a better grasp of both to secure a bright and biodiverse future for animals in the Anthropocene.

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