Natural Selection Favors Diversity in Tropical Forests

An analysis of seven tropical forests around the world has found that locally rare tree species tend to live longer and out-compete their more common neighbors. This finding, and its potential underlying mechanisms, suggests that diversity may be favored by evolutionary processes. In other words, being different is adaptive.

The landmark study was conducted by 33 ecologists from 12 countries and published in Science. Christopher Wills with colleagues from Smithsonian Tropical Research Institute (STRI) and around the world conducted the study on seven undisturbed forest plots maintained and studied by research institutions in India, Puerto Rico, Panama, Thailand, Sri Lanka, and Malaysia, under the coordination of STRI’s Center for Tropical Forest Science (CTFS).

 Researchers sampled the forests at five or ten year intervals, counting every tree over 1 cm in diameter at chest height. They also noted dead trees and tracked the number of trees that had grown big enough to be counted since the previous census. Because of the central coordination by the Smithsonian, the same protocols were used at each location and the data can be compared accurately.

The scientists found that regardless of the forest, or the size of the plot sampled, more trees of the locally common species died over time than did members of the rarer species, increasing the relative representation of rare species. In an article featuring this study, in the 27 January 2006 issue of Science, ecologist Theodore Fleming (University of Miami, Florida) noted that around the globe, “One would not expect to find such congruence unless similar processes are operating.”

This success of the rare species is being attributed to the possibility that, with fewer relatives around, there is lower competition for the specific resources like light and nutrients on which that species thrives. This isolation also lessens the possibilities for the less abundant trees to share potentially fatal diseases.

This new finding is at odds with the “neutral theory” of forest diversity which holds that plant species are gained and lost randomly. The new result suggests a mechanism that drives an ecosystem toward increased diversity.

“The great scientific value of these tropical forest observatories is that each of them has undergone a complete census more than once, so that the researchers know what has happened to hundreds of thousands of trees from one census to the next,” says Stuart Davies, director of CTFS. “These tropical forest observatories, along with others in our network, represent some of the most important, detailed and long-running ecological studies in the world today.”

If this process can be seen to repeat with other plant and animal species in other ecosystems, it could represent a more universal feature of evolution, providing further evidence that increasing diversity is an adaptive and self-perpetuating feature of life.

Information Highway Hi-Lites

The trade in wild species is difficult to regulate, despite the presence of numerous international organizations dedicated to this cause. One such organization is TRAFFIC <http://www.traffic.org/> which is a wildlife trade monitoring network primarily concerned with making sure that this trade does not pose a threat to the conservation of nature. Since its founding in 1976, the group has been concerned with monitoring wildlife trade activities, and their website provides detailed information on their work.

First-time visitors may want to first look at the “What is TRAFFIC?” section, then proceed to the “Priority” area, which give specific material on the species and ecoregions that are of the greatest concern to the organization. As one might imagine, there are also a number of...


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