



Smithsonian Tropical Research Institute
Instituto Smithsonian de Investigaciones Tropicales

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Contact: Carlos Jaramillo: jaramilloc@si.edu, 202 786-2094 ext 8089 or 011+507 212-8089 or Beth King, Science Interpreter, kingb@si.edu, 202 786 2094 ext 8216 or 011+507 212-8216

Tropical pollen biodiversity tracks global warming over millions of years

“Plant diversity seems to increase when tropical forests cover large areas. Shrinking ecosystems may experience biodiversity loss lasting for millions of years.” Carlos Jaramillo, at the Smithsonian Tropical Research Institute (STRI), and colleagues seek explanations for the longest Central and South America pollen record, published in the March 31, 2006 issue of the journal *Science*.

“Jaramillo’s intriguing findings provide an evolutionary perspective on a modern crisis,” William Laurance of STRI and the Biological Dynamics of Forest Fragments project in Brazil comments, “They suggest that the rapid contemporary loss and fragmentation of rainforests will lead to striking, long-term biodiversity declines.”

Jaramillo et al. used cores drilled through 5km of rock in eastern Colombia and western Venezuela to get at the fossil pollen record in a sequence of samples representing 10 to 82 million years before present. Then they correlated pollen diversity with global temperature estimates for the middle part of that sequence (20-65 mybp).

“We found that pollen diversity tracks global temperature through time over millions of years. Diversity increases as the planet warms and decreases as it cools. The mystery is that even when global temperatures vary enormously, average temperatures in the tropics don’t change much, so why do we see global temperature patterns reflected in tropical plant diversity?” Jaramillo proposes that changes in area drive speciation and extinction in the tropics.

“There is good correlation between area and number of species: more rainforest area implies more species. During global warming, tropical areas expand and diversity goes up, the opposite happens during global cooling. If this is the case, fragmentation of modern tropical forest could be equated to a global cooling period, because forested areas are shrinking dramatically, resulting in plummeting diversity in the forests that remain.”

This work was supported by the Colombian Petroleum Institute, the 1923 Fund, the Fondo para la Investigacion de Ciencia y Tecnología Banco de la Republica of Colombia, and Carbones del Cerrejón. For more information scipak@aaas.org, <http://www.nmnh.si.edu/paleo/geotime/index.htm>

Ref. Jaramillo, C., Rueda, M.J. and Mora, G. 2006. Cenozoic Plant Diversity in the Neotropics. *Science* (March 31). *The Smithsonian Tropical Research Institute (STRI), a unit of the Smithsonian Institution, headquartered in Panama City, Panama, furthers our understanding of tropical nature and its importance to human welfare, trains students to conduct research in the tropics and promotes conservation by increasing public awareness of the beauty and importance of tropical ecosystems.*

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Smithsonian Institution
Smithsonian Tropical Research Institute
Apartado 2072
Balboa, Ancón
República de Panamá
Tel. 507.212.8216
FAX 507.212.8148
Email: kingb@tivoli.si.edu