

Darwin 2.0: Scientists shed new light on how species diverge

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Macaws flying over the rainforest canopy at dawn. The study found that bird lineages that inhabit the forest canopy, such as these macaws, accumulate fewer species over evolutionary time than do bird lineages that inhabit the forest understory. Credit: Mike Hankey.

Birds that are related, such as Darwin's finches, but that vary in beak size

and behavior specially evolved to their habitat are examples of a process called speciation. It has long been thought that dramatic changes in a landscape like the formation of the Andes Mountain range or the Amazon River is the main driver that initiates species to diverge. However, a recent study shows that speciation occurred much later than these dramatic geographical changes. Researchers from LSU's Museum of Natural Science have found that time and a species' ability to move play greater parts in the process of speciation. This research was published today in the print edition of *Nature*.

"The extraordinary diversity of birds in South America is usually attributed to big changes in the landscape over geological time, but our study suggests that prolonged periods of landscape stability are more important," said Robb Brumfield, LSU Museum of Natural Science director and Roy Paul Daniels professor in the Department of Biological Sciences, one of the lead authors.

Brumfield and his colleagues examined the genealogy of 27 species of birds in the most bio-diverse region in the world, the Neotropics, which extends from southern Mexico through Central America to southern Brazil and includes the Amazon rainforest.

"By using detailed sampling of many bird lineages, we were able to get a clearer and larger picture of when and how species formed within those lineages," Brumfield said.

The genetic data showed multiple accounts of species divergence, from nine to 29 different instances across the Andes Mountains that varied over time. This shows that rather than being the primary cause of speciation, the formation of the Andes Mountains had an indirect effect on diversification as a semi-permeable barrier.

The researchers then investigated how the history and ecology affected

speciation among the 27 lineages of birds. They discovered the longer length of time a species can inhabit an area, the more likely it will disperse and diverge. Also, the less mobility a species has, the more likely it will diverge as well. For example, birds restricted to the forest floor showed significantly higher species diversity than birds that inhabited the forest's open canopy. These findings have conservation ramifications. If a species cannot inhabit the same area for an extended time, it will not have the opportunity to evolve and continue.

"Our results suggest that human alterations of the landscape can effectively kill the [speciation](#) process," Brumfield said.

Provided by Louisiana State University

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