

Tropics are main source of global mammal diversity

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Ever since the nineteenth century scientists have recognised that some regions contain more species than others, and that the tropics are richer in biodiversity than temperate regions. But why are there more species in the tropics? A new study publishing 28 January in the Open Access journal *PLOS Biology* scrutinizes most of the living mammalian species and reveals a two-fold mechanism; the rate at which mammals arose was higher in the tropics, and the rate at which they became extinct lower. They also propose that the tropics have been a continuous source of diversity that has permitted repeated colonization of the temperate regions.

French researchers Jonathan Rolland, Fabien Condamine, Frédéric Jiguet and H  l  ne Morlon (  cole Polytechnique, CNRS and the MNHN), applied mathematical models to worldwide mammalian datasets to address a question that has fascinated ecologists and evolutionary biologists for decades, generating scores of hypotheses.

One of the main hypotheses argues that species have diversified more in the tropics than in temperate regions – diversification is the difference between the rates at which new species emerge and go extinct. However, recent publications have shown no link between diversification rate and latitude, suggesting that diversification may not differ between the tropics and temperate regions. Indeed, because the Earth was largely [tropical](#) 80 million years ago, the tropics may be richer merely because tropical lineages have had more time to diversify than temperate ones.

Combining the tree of the relationships between the 5,000 [mammal species](#) with latitude data, the researchers estimated speciation - the rate at which new species emerge -, extinction, and species migration associated with mammals living in tropical and temperate regions. Contrary to what has been suggested before, they found that diversification rates are strikingly consistent with current diversity patterns. Latitudinal peaks in species richness are associated with high speciation rates, low extinction rates, or both, depending on which mammalian order you look at (rodents, bats, primates, etc.).

They also found evidence that the migration of species through the ages has been asymmetrical, with more expansion "out of" the tropics than "into" them. Taken together, these results suggest that tropical regions are not only a reservoir of biodiversity, but also the main place where [biodiversity](#) has been, and presumably is being, generated.

This study shows that mathematical models can now detect the imprint of tropical versus temperate speciation and extinction on the tree of life, opening new perspectives in evolutionary research. It also allows us to assess old hypotheses and put diversification back in the spotlight as a major contributor to the well-known tropical abundance of mammal [species](#). Further research should now focus on the direct causes of these differences in diversification, such as temperature or precipitation, that may also impact mammal [diversification](#).

More information: Rolland J, Condamine FL, Jiguet F, Morlon H (2014) Faster Speciation and Reduced Extinction in the Tropics Contribute to the Mammalian Latitudinal Diversity Gradient. *PLoS Biol* 12(1): e1001775. [DOI: 10.1371/journal.pbio.1001775](https://doi.org/10.1371/journal.pbio.1001775)

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