

# New theory on the origin of primates

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A new model for primate origins is presented in *Zoologica Scripta*, published by the Norwegian Academy of Science and Letters and The Royal Swedish Academy of Sciences. The paper argues that the distributions of the major primate groups are correlated with Mesozoic tectonic features and that their respective ranges are congruent with each evolving locally from a widespread ancestor on the supercontinent of Pangea about 185 million years ago.

Michael Heads, a Research Associate of the Buffalo Museum of Science, arrived at these conclusions by incorporating, for the first time, spatial patterns of primate diversity and distribution as historical evidence for [primate evolution](#). Models had previously been limited to interpretations of the [fossil record](#) and molecular clocks.

"According to prevailing theories, [primates](#) are supposed to have originated in a geographically small area (center of origin) from where they dispersed to other regions and continents" said Heads, who also noted that widespread misrepresentation of fossil molecular clocks estimates as maximum or actual dates of origin has led to a popular theory that primates somehow crossed the globe and even rafted across oceans to reach America and Madagascar.

In this new approach to molecular phylogenetics, vicariance, and [plate tectonics](#), Heads shows that the distribution ranges of primates and their nearest relatives, the tree shrews and the flying lemurs, conforms to a pattern that would be expected from their having evolved from a widespread ancestor. This ancestor could have evolved into the extinct

*Plesiadapiformes* in north America and Eurasia, the primates in central-South America, Africa, India and south East Asia, and the tree shrews and flying lemurs in South East Asia.

Divergence between strepsirrhines (lemurs and lorises) and haplorhines (tarsiers and anthropoids) is correlated with intense volcanic activity on the Lebombo Monocline in Africa about 180 million years ago. The lemurs of Madagascar diverged from their African relatives with the opening of the Mozambique Channel (160 million years ago), while New and Old World monkeys diverged with the opening of the Atlantic about 120 million years ago.

"This model avoids the confusion created by the center of origin theories and the assumption of a recent origin for major primate groups due to a misrepresentation of the fossil record and molecular clock divergence estimates" said Michael from his New Zealand office. "These models have resulted in all sorts of contradictory centers of origin and imaginary migrations for primates that are biogeographically unnecessary and incompatible with ecological evidence".

The tectonic model also addresses the otherwise insoluble problem of dispersal theories that enable primates to cross the Atlantic to America, and the Mozambique Channel to Madagascar although they have not been able to cross 25 km from Sulawesi to Moluccan islands and from there travel to New Guinea and Australia.

Heads acknowledged that the phylogenetic relationships of some groups such as tarsiers, are controversial, but the various alternatives do not obscure the patterns of diversity and distribution identified in this study.

Biogeographic evidence for the *Jurassic* origin for primates, and the pre-*Cretaceous* origin of major primate groups considerably extends their divergence before the fossil record, but Heads notes that fossils

only provide minimal dates for the existence of particular groups, and there are many examples of the fossil record being extended for tens of millions of years through new fossil discoveries.

The article notes that increasing numbers of primatologists and paleontologists recognize that the fossil record cannot be used to impose strict limits on primate origins, and that some molecular clock estimates also predict divergence dates pre-dating the earliest fossils. These considerations indicate that there is no necessary objection to the biogeographic evidence for divergence of primates beginning in the *Jurassic* with the origin of all major groups being correlated with plate tectonics.

Provided by Buffalo Museum of Science

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