Research Highlights

Subject Categories: Ecology & evolution (/nchina/archive/nchina_s7_current_archive.html) Genetics (/nchina/archive/nchina_s8_current_archive.html)

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Phylogeography: River deep, mountain high

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Genetic analysis of Asian frogs reveals the sequence of geological events that led to the current geography of the Himalayas and Tibetan Plateau

Original article citation
Che, J. *et al.* **Spiny frogs (Paini) illuminate the history of the Himalayan region and Southeast Asia** (/nchina/api/jump.html?target=http://dx.doi.org/10.1073/pnas.1008415107). *Proc. Natl Acad. Sci. USA* **107**, 13765–13770(2010).

The tectonic collision between India and Asia around 50 million years ago (Mya) caused the formation of the Himalayas and Tibetan Plateau. There is much debate, however, about the sequence of geological events following the collision. Yaping Zhang at the Chinese Academy of Sciences in Kunming, David Wake at the University of California, Berkley, USA, and co-workers[1](#B1) have now used the evolutionary history of frogs in this region to trace this geological history.

Spiny frogs of the Paini tribe are native to Asia and live mostly in swift boulder-strewn streams in the mountains. They are poor overland dispersers and are therefore 'trapped' in their habitats when the mountains evolve.

The researchers sampled spiny frogs from 29 sites across the Himalayas, Indochina and southern China. Genetic analysis revealed two major clades (*Nanorana* and *Quasipaa*) and five distinct subclades (Tibetan plateau clade, Himalaya clade, environs of Himalaya–Tibetan plateau clade, South China clade and Indochina clade) of spiny frogs, each defined largely by geography.

Through molecular dating and ancestral area reconstruction analyses, the researchers hypothesized that spiny frogs originated from Indochina. The common ancestors of spiny frogs probably spread into adjacent western China around 27 Mya. As Asia changed climate around 24 Mya, the clade rapidly diversified and split into *Nanorana* and *Quasipaa* around 19 Mya.

The findings are in agreement with the tectonic hypothesis that the uplift of the Himalayas and Tibetan plateau occurred between 23–34 Mya because of India–Asia collision. The evolutionary history of spiny frogs also illuminates critical aspects of the timing of geological events responsible for the current geography of Southeast Asia.

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Reference

1. Che, J. *et al*. Spiny frogs (Paini) illuminate the history of the Himalayan region and Southeast Asia. *Proc. Natl Acad. Sci. USA* **107**, 13765–13770(2010). | **Article** (/nchina/api/jump.html?target=http://dx.doi.org/10.1073/pnas.1008415107) | **PubMed** (/nchina/api/jump.html?target=http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?holding=npg&cmd=Retrieve&db=PubMed&list_uids=20643945&dopt=Abstract) | **ADS** (/nchina/api/jump.html?target=http://adsabs.harvard.edu/abs/2010PNAS..10713765C)