

AMPHIBIANS AND REPTILES
OF
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By

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Zoogeography of Nepalese amphibians and reptiles

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I. The background for herpetofaunal evolution in South Asia

I.1. Plate tectonics



Originally, the old cores of the continents formed a single mass, referred to as Pangaea, which, around 160 million years ago, broke up into two supercontinents: the northern Laurasia and the southern Gondwana (fig. 1a) (after a Central Indian tribe, the land of the Gond). The latter fragmented into continental plates 140 million years ago during the early Cretaceous period (fig. 1b) which were later separated by oceans. With an annual speed of up to 15 cm per year, the Indian plate moved northwards until it came in contact with the Eurasian plate 35 million years ago. After the collision, the Indian plate was subducted below the Eurasian one (fig. 1c), the margin was thrust upward and formed the Himalayan Range and the Tibetan Plateau. The Indian Plate continues to move at an annual speed of about 5 cm per year, and at present, both plates overlap by about 100 km.



For about 20 millions of years, the Indian continent was still separated from Eurasia by 700-2,000 km of the Tethys Sea. The uplift of the Himalayas was accompanied by heavy erosion, and the oceanic trough slowly filled with deposits until about 12 million years before the present time, when the gap was bridged with firm solid land, and a massive interchange of the Indian and Eurasian faunas started. After initial contact, these migrations between the Indian and Indo-Malayan Subregions were blocked over the millennia by the Assam-Burma embankment.

Today's distribution of amphibians and reptiles is the result of a complex process which is difficult to reconstruct as fossil evidence is extremely scarce. The following glimpses must, therefore, remain largely speculative.

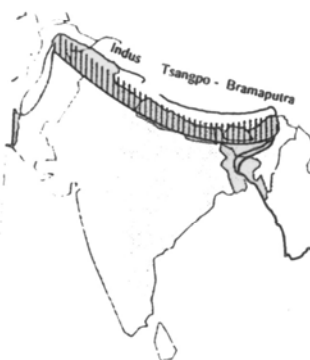


Fig. 1. (a) 160 million years ago the Indian Plate (black) is still a part of Gondwana. Future initial fractures are shown in broken, recent outlines in thin lines.

(b) A fraction of Gondwana broke off 140 million years ago. The frog families Microhylidae and Rhacophoridae evolved on it. At 100 m.y. it left behind Madagascar, at 64 m.y. the Seychelles and Indian plates separated. The latter collided with Eurasia 35 m.y. ago.

(c) The subduction of the Indian (dotted) below the Eurasian Plate

(bold outline) for about 100 km (hatched area) lead to the formation of the Himalayas, highest mountain chain on earth, and the uplift of the Tibetan Plateau. The upper reaches of the Indus and Bramaputra rivers are deflected by roughly 1,000 km to the west respectively east before taking the direct way towards the ocean. Critics (e.g. Rage, 1986) consider this view as rather simplistic and assume a series of collisions with parts of Asia and first contacts anterior to 65 m.y. ago.