AOGS 2005

Rodent-Based Biostratigraphy and Palaeoecology of the Siwaliks

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In terrestrial sequences rodent teeth provide the same kind of data and resolution as foraminifers do in the marine sequences and hence are known as foraminifers of terrestrial deposits. Rodents with their high evolutionary rates and sensitivity to climatic changes have proven utility in constructing biochronology and palaeoecology of the Neogene-Quaternary terrestrial sequences all over the world. They occur in large numbers and are found confined to definite horizons which can be studied on a reproducible basis. Here, a biostratigraphic scheme of the Siwaliks is presented, based on known and inferred ranges of rodents such as murids, cricetids, gerbillids, rhizomyids and ctenodactylids. The present rodent-based biostratigraphic resolution has allowed a temporal constraint of 100,000 to 500,000 years for the last ~18 Ma of sedimentation in the Himalayan foreland basin.

Since murine rodents are very good indicators of palaeoclimatic changes, they have been integrated with other proxies to explain Late Miocene climate changes. Enamel microstructure studies of these rodents have revealed their dietary preferences providing indirect evidence of presence of various vegetation types and palaeoecological niches. It has been observed that Neogene-Quaternary climatic changes in south Asia have influenced the diversity and turnover of successive rodent communities. A dramatic shift in the muroid rodent assemblage has been noticed, leading to the replacement of cricetines by murines in the Late Miocene. Murines are specialized in surviving in unpredictable climatic conditions such as monsoons. Therefore, this replacement of survival-oriented cricetines by the reproduction-oriented murines indicates the start of inter-annual seasonal variations due to the intensification of monsoons.

In the Siwaliks cricetids such as *Potwarmus, Myocricetodon, Dakkamys, Punjabemys, Megacricetodon* and *Democricetodon* dominated 18-14 Ma. The Murine rodents (rats and mice) probably originated in the Siwaliks at around 14 Ma ago from cricetines and the first form to appear was *Antemus*. *Antemus* gave rise to *Progonomys* at around 11.3 Ma, which in turn is followed closely by *Karnimata* that makes its first appearance at 11.2 Ma. *Parapodemus* and *Parapelomys* appear at 9.2 and 8.2 Ma respectively. The first modern taxa *Mus* evolves from *Progonomys* at 7.3 Ma. A very large extinct murine *Dilatomys,* the Indian bush rat *Golunda* and the field rats *Cremnomys* and *Millardia* makes their appearance at ~4 Ma. By 2.5-2 Ma modern genera such as *Bandicota, Hadromys* and *Nesokia* had emerged. The evolution of Siwalik murines is rather complex and both anagenesis and cladogenesis has been observed. Based on 25 derived and primitive characters and analyzing them using Hennigs 86 software a phylogenetic relationship among Siwalik murine rodent has been developed.

Keywords: Rodent; Biostratigraphy; Palaeoecology; Siwaliks.