

FLOODPLAINS AND PALEOSOLS IN THE SIWALIK MIOCENE SEQUENCE:
IMPLICATIONS FOR TAPHONOMY AND PALEOECOLOGY OF FAUNAS.

BEHRENSMEYER*, Anna K., Dept. of Paleobiology, MRC NHB 121, Smithsonian Institution, Washington, DC 20560 U.S.A.; QUADE, Jay, Dept. of Geosciences, Gould-Simpson Building, University of Arizona, Tucson, AZ 85721 U.S.A.; WILLIS, Brian, Dept. of Paleobiology, MRC NHB 121, Smithsonian Institution, Washington, DC 20560, U.S.A.

The Siwalik fluvial deposits of Pakistan are characterized by varying proportions of red to brown silts, fine sands, and minor clays representing overbank deposition. In the Chinji Formation (~15-10.5 Ma), floodplain facies consist of overlapping packages of: 1) well-bedded siltstones and occasional sheet sands or small channel sands, 2) an overlying transitional zone with increased bioturbation and minor pedogenesis, 3) a capping paleosol. These packages are 5-6 m thick and pinch out laterally over 1-2 km; they appear to represent crevasse-splay lobes that aggraded rapidly into low-lying wet areas and then became stable land surfaces. The cycle was repeated as aggradation of the major rivers and/or local subsidence transformed the topographic highs into lows where sedimentation again buried soil surfaces. Floodplains in the Nagri Formation (~10.5-9 Ma) were associated with a larger channel system and were less complex, and those of the Dhok Pathan Formation (~9-6 Ma) were influenced by several contemporaneous river systems and again became more complex.

Paleosols are superimposed on all lithofacies and occur every 4-10 m throughout the 3500 m sequence where overbank deposits are dominant. Paleomagnetic calibration of the Siwalik sequence indicates that paleosols represent 10-50K yrs, on average. Individual paleosols are red-orange or red-brown, 1.6-4.8 m thick, have abundant evidence of bioturbation, ped structure, clay cutans and a zone depleted in matrix carbonate above a lower zone with carbonate precipitates. A long-term record of Siwalik vegetation in Pakistan is contained in the carbon isotope ratios of paleosol carbonate. There is no evidence that paleosols varied in maturity with distance from the major channels; instead vertical and lateral facies relationships were controlled by shifting crevasse-splay lobes and overbank channels.

The processes of overbank sedimentation in the Siwalik sequence have important consequences for preservation of vertebrate faunas. Most of the 800+ fossil localities occur in channel fills within overbank facies; relatively few are associated with paleosols or the coarse deposits of major channels. The frequency of overbank channel fills varies through the different formations, resulting in uneven sampling of the vertebrate faunas. Most skeletal remains are attritional, and bones are disassociated and fragmentary but otherwise well-preserved. This is partly a consequence of bioturbation and minor transport followed by rapid burial within the abandoned channels. The ecological setting of the Siwalik biota was controlled by a mosaic of floodplain environments that changed in complexity through time. In contrast to the Eocene Bighorn Basin floodplains, there was no simple lateral relationship of habitat types with distance from the major channels.