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Diversity and evolution of Hunter-Schreger Band configuration in tooth enamel of perissodactyl mammals

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Four different Hunter–Schreger Band (HSB) configurations were observed in the teeth of fossil and extant Perissodactyla. This variability exceeds that observed in Artiodactyla or Proboscidea. The four HSB configurations represent two different evolutionary pathways. Transverse HSB found in many mammalian taxa outside the Perissodactyla represents the most primitive HSB configuration. It occurs in several primitive perissodactyl families and is retained in Palaeotheriidae and extant Equidae. Curved HSB evolved from transverse HSB and occurs in Tapiridae, Helaletidae, and Lophiodontidae, as well as in Ancylopoda and Titanotheriomorpha. This likely indicates independent evolution of curved HSB in two or more lineages, but the number of instances of parallelism of this configuration is obscured by uncertainty in the relationships among these taxa and by a lack of data for some important basal taxa. A second evolutionary pathway leads from transverse HSB via compound HSB to vertical HSB. Compound HSB were detected in Hyrachyidae, Deperetellidae, and the early rhinocerotid *Uintaceras*. Vertical HSB configuration characterizes the molar dentition of other Rhinocerotidae, Hyracodontidae, Indricotheriidae, andAmynodontidae. Often, the incisors of rhinocerotids retain traces of compound HSB. Thus theHSB configuration reflects phylogenetic relationships to some degree. The selective value of themodified HSB configurations is interpreted functionally as amechanismto reduce abrasion duringmastication, assuming that the perpendicular intersection of prismswith the actual grinding surfaces resists wear better than prisms running parallel to the occlusal surface.

Key words: Mammalia, Perissodactyla, Hunter-Schreger Bands, HSB, tooth enamel microstructure, functional adaptation, phylogeny.

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