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Connecting Hunter-Schreger Band microstructure to enamel microwear features: New insights from durophagous carnivores

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Several recent studies have clarified the link between microwear features and diet among living carnivorans, but it is still unclear whether previously interpreted evolutionary trends for dietary specialization, based on examination of enamel microstructure, are consistent with such insights from microwear analysis. This study examined the relationship between microwear and microstructure features using a sample of fossil hyaenids and canids. Hunter–Schreger Bands (HSB) and microwear features were examined at the same magnification level using optical stereomicroscopy. Multiple trials conducted on each specimen showed higher variance of smaller (0.03 mm) features. The number of pits was positively correlated with more derived HSB in both p4 and m1; fossil teeth with derived HSB possessed microwear features similar to patterns found in modern spotted hyenas. Microscopic scratches were not as closely associated with HSB patterns, but large scratches were more tightly linked to HSB than smaller ones on p4. An examination of evolutionary trends in HSB specialization in the two carnivoran lineages showed that derived HSB patterns evolved prior to the highly robust craniodental characteristics typical of later bone–cracking ecomorphologies. Therefore, the increase of hard food in the diet of less specialized hyaenids and canids was accompanied by a mosaic mode of evolution, with microstructural changes preceding key macrostructural morphological adaptations.

Key words: Mammalia, Borophagine, Canidae, Hyaenidae, durophagy, bone-cracking, Miocene, Cenozoic.

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