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The paleoecology of the Late Miocene mammals from the Optima Local Fauna of Oklahoma, USA

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The Optima Local Fauna represents an important glimpse into the ecological transition between savannah and grassland during the late Miocene (Hemphillian) of what is now the southcentral Great Plains of North America. Though dominated by horses, herbivores from the Optima are morphologically diverse, bearing adaptations for both browsing and grazing lifestyles. Likewise, the carnivorans show similar ranges of size and presumed dietary behavior. In this study, we used carbonate isotope, mesowear, and tooth breakage and wear analyses to investigate the dietary complexity of mammals from a single site collected by the Oklahoma Museum of Natural History. Seventeen taxa were analyzed, including five perissodactyls (*Teleoceras hicksi, Dinohippus interpolatus, Neohipparion eurystyle, Nannippus ingenuus,* and *Astrohippus ansae*), four artiodactyls (*Texoceros guymonensis, Pediomeryx hemphillensis, Megatylopus matthewi,* and *Platygonus* sp.), a single proboscidean (*Mammut* sp.), two rodents (*Dipoides* indet. and *Umbogaulus monodon*), and five carnivorans (*Agriotherium schneideri, Amphimachairodus coloradensis, Borophagus secundus, Eucyon davisi, Pliotaxidea* cf. *nevadensis*). Both stable isotope analysis and dental mesowear indicate a broad dietary partitioning occurred among the Optima herbivores, where the artiodactyls were identified as mixed feeders and the perissodactyls were recovered as grazers. In the carnivorans, the large felid *Amphimachairodus coloradensis* was a hypercarnivore with limited tooth breakage and an enriched $\delta^{13}C$ signature, indicating low carcass utilization and a prey preference for horses. The canids had a more generalized diet, with *B. secundus* showing a greater proportional consumption of carcasses through a higher tooth breakage rate. The large ursid *Agriotherium schneideri* is here interpreted as an omnivore based on depleted $\delta^{13}C$ values. Overall, we found evidence for a diversity of dietary niches in both carnivores and herbivores during the late Hemphillian in Oklahoma, likely driven by the expansion of grasslands in the region.

Key words: Mammalia, grassland, mesowear, savanna, stable isotopes, tooth breakage, Neogene, North America.

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