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New specimens of the multituberculate mammal *Sphenopsalis* from China: Implications for phylogeny and biology of taeniolabidoids

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Multituberculates are the most diverse and best known group of Mesozoic mammals; they also persisted into the Paleogene and became extinct in the Eocene, possibly outcompeted by rodents that have similar morphological and presumably ecological adaptations. Among the Paleogene multituberculates, those that have the largest body sizes belong to taeniolabidoids, which contain several derived species from North America and Asia and some species with uncertain taxonomic positions. Of the known taeniolabidoids, the poorest known taxon is *Sphenopsalis nobilis* from Mongolia and Inner Mongolia, China, represented previously by a few isolated teeth. Its relationship with other multituberculates thus has remained unclear. Here we report new specimens of *Sphenopsalis nobilis* collected from the upper Paleocene of the Erlian Basin, Inner Mongolia, China, during a multi-year field effort beginning in 2000. These new specimens document substantial parts of the dental, partial cranial and postcranial morphologies of *Sphenopsalis*, including the upper and lower incisors, partial premolars, complete upper and lower molars, a partial rostrum, fragments of the skull roof, middle ear cavity, a partial scapula, and partial limb bones. With the new specimens we are able to present a detailed description of *Sphenopsalis*, comparisons among relevant taeniolabidoids, and brief phylogenetic analyses based on a dataset consisting of 43 taxa and 102 characters. In light of the new evidence, we assess the phylogenetic position of *Sphenopsalis* and re-establish the family Lambdopsalidae. The monophyly of Taeniolabidoidea is supported in all our phylogenetic analyses. Within Taeniolabidoidea the Asian lambdopsalids and the North American taeniolabidids represent two significantly different trends of adaptations, one characterized by shearing (lambdopsalids) and the other by crushing and grinding (taeniolabidids) in mastication, which supports their wider systematic separation, as speculated when *Sphenopsalis* was named.

Key words: Mammalia, Multituberculata, Taeniolabidoidea, *Sphenopsalis*, Paleogene, Erlian Basin, Inner Mongolia, China.

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