



A proposed higher taxonomy of anomodont therapsids

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Abstract

A higher-level taxonomic framework for the Permo-Triassic anomodont therapsids (dicynodonts and their relatives) is presented in order to bring concordance between reconstructions of anomodont phylogeny and nomenclature. Taxonomic histories, remarks on current usage, and phylogenetic definitions are provided for twenty-two higher level (*i.e.*, suprageneric) anomodont taxa: Anomodontia, Bidentalia, Chainosauria, Cistecephalidae, Cryptodontia, Dicynodontia, Dicynodontoidea, Emydopidae, Emydopoidea, Endothiodontia, Eumantelliidae, Geikiidae, Geikiinae, Kingoriidae, Kistecephalia, Lystrosauridae, Myosauridae, Oudenodontidae, Pylaecephalidae, Rhachiocephalidae, Therochelonina, and Venyukovioidea. Additionally, lists of diagnostic characters supporting each of these higher taxa are given, utilizing the results of several recent phylogenetic analyses of anomodont relationships.

Key words: nomenclature, Synapsida, Dicynodontia, Permian, Triassic

Introduction

Non-mammalian synapsids represent one of the best-known and most widely cited examples of a major evolutionary transition in the fossil record. Despite the importance of the group for understanding mammal origins and the structure of Carboniferous through Triassic terrestrial ecosystems, as well as the presence of numerous excellent specimens in collections, only recently have non-mammalian synapsids been studied using modern methods of phylogeny reconstruction. Nevertheless, great progress has been made in unraveling synapsid phylogeny, and there now exist well-supported phylogenetic hypotheses for several major synapsid clades, including Biarmosuchia (Sidor & Welman 2003; Rubidge & Kitching 2003; Sidor & Rubidge 2006; Sidor & Smith 2007), Caseidae (Maddin *et al.* 2008), Cynodontia (Hopson & Kitching 2001; Abdala & Ribeiro 2003; Abdala *et al.* 2006; Abdala 2007), and Varanopidae (Reisz & Berman 2001; Reisz & Laurin 2004; Anderson & Reisz 2004).

Unfortunately, advances in non-mammalian synapsid taxonomy have not kept pace with these phylogenetic breakthroughs. This largely stems from the nigh-impenetrable quagmire of synapsid taxonomic literature, involving hundreds of nominal taxa established over the past 170 years, most of which are probably invalid (Wyllie 2003). The problems plaguing synapsid taxonomy have been self-perpetuating, as the difficulties of navigating through dense literature continue to result in the unnecessary creation of yet more invalid taxa. For example, within the same year Reisz & Berman (2001) and Modesto *et al.* (2001) established the subfamilies Varanodontinae and Mycterosaurinae to refer to the two major varanopid subclades, despite the fact that the preexisting names Varanopinae Romer, 1936, and Mesenosaurinae (Romer, 1956), have priority for the subclades in question, respectively.

Anomodontia is an excellent example of a synapsid clade that has experienced major advances in the understanding of its phylogenetic relationships yet lacks any consistent taxonomic framework with which to