

Paper Number: 4456

## On the evolutionary history of the Gorgonopsia, with new information on their global first and last appearances

Kammerer, C.F.<sup>1,2</sup>

<sup>1</sup>Museum für Naturkunde, Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Berlin, Germany, [christian.kammerer@mfn-berlin.de](mailto:christian.kammerer@mfn-berlin.de)

<sup>2</sup> Evolutionary Studies Institute, University of the Witwatersrand, Johannesburg, South Africa

---

Gorgonopsia is one of the primary subdivisions of the Therapsida and includes the dominant terrestrial vertebrate predators of the Late Permian. The majority of gorgonopsian fossils have been found in the South African Beaufort Group, which has yielded over 500 specimens (mostly skulls), but this group is also known from Permian deposits in Malawi, Russia, Tanzania, and Zambia. Despite the richness of the gorgonopsian record and their palaeoecological and biostratigraphic importance, they have received little scientific attention in the past few decades. Gorgonopsian taxonomy is very poorly resolved and identification of individual specimens to even the genus level has long proven problematic. Recently, however, work has been undertaken to completely revise Gorgonopsia, establish a meaningful alpha taxonomic and phylogenetic framework for the clade, and review the geographic and temporal ranges of gorgonopsian taxa [1,2,3,4].

Re-evaluation of supposed gorgonopsian specimens from the Middle Permian *Eodicynodon* Assemblage Zone (AZ) of South Africa reveals that the majority of this material is actually dinocephalian. However, a single snout tip from the *Eodicynodon* AZ is referable to Gorgonopsia and represents the earliest record of the group worldwide. Similarly, the majority of supposed gorgonopsian specimens from the Middle Permian of Russia instead represent dinocephalians or biarmosuchians. The earliest definitive gorgonopsian specimens from Russia are from the Kotelnich fauna, here considered equivalent with the South African *Priesterognathus* AZ. This fauna includes two gorgonopsian taxa: *Viatkogorgon ivakhnenkoi* and a new, currently undescribed genus characterized by unusual 'twinned' postcanines and a weak mandibular symphysis. Both Russian taxa and the Middle Permian South African *Eriphostoma* are very small (10-15 cm skull length) compared with coeval therocephalian predators, supporting the hypothesis that a 'size swap' between the major carnivorous therapsid clades occurred worldwide across the end-Capitanian extinction.

Gorgonopsia has long been considered one of the major tetrapod victims of the end-Permian mass extinction, and the South African record has indeed produced gorgonopsian fossils very close to the Permo-Triassic boundary [5]. However, gorgonopsians have been thought to be absent from terminal Permian layers in Russia, victims of an earlier pulse of extinction that also claimed large-bodied pareiasaurian herbivores [6]. Re-examination of some supposed therocephalian specimens from the latest Permian Vyazniki Assemblage of Russia, however, indicates that this material is actually

gorgonopsian. This suggests that gorgonopsians survived to the end of the Permian worldwide, and the extinction of the clade as a whole is attributable to a single global event.

*References:*

- [1] Kammerer C (2014) In: *Evolutionary History of the Synapsida*: Springer, 171-184
- [2] Kammerer C et al. (2015) *Papers in Palaeontol* 1(2): 201-221
- [3] Kammerer C (2015) *Papers in Palaeontol* 1(1): 41-58
- [4] Kammerer C (2016) *PeerJ* 4:e1608
- [5] Viglietti P et al. (2016) *J African Earth Sci* 113: 153-164
- [6] Ivakhnenko M (2008) *Paleontol J* 42(4): 409-413

