

## DIMORPHISM IN MIDDLE CARBONIFEROUS AMMONOIDS FROM THE SOUTHERN MIDCONTINENT, UNITED STATES

Manger, Walter L., Meeks, Lisa K., Russell, Richard A.

Department of Geosciences, University of Arkansas, Fayetteville, Arkansas 72701 USA;  
<wmanger@comp.uark.edu>

Approximately 78 species, representing 47 genera and 22 families, comprise the ammonoid assemblage recovered from Chesterian (Upper Mississippian) and Morrowan (Lower Pennsylvanian) strata exposed across northern Arkansas and eastern Oklahoma. For most taxa, large collections numbering hundreds of specimens are available for morphometric analysis from single horizons at single localities. Most individuals are approximately the same size at a particular locality, and these occurrences are interpreted as reflecting semelparous mass mortality of sexually mature individuals. Thus, it seems reasonable to assume that both sexes are represented in these accumulations, since sexes are separate in extant cephalopods.

Middle Carboniferous ammonoid species from the southern midcontinent exhibit predictable changes in both their basic conch parameters (width, height, umbilical diameter) and sutures that clearly reflect ontogeny (expressed as increasing diameter). The bulk of the taxa do not display variation that can be attributed to dimorphism. Only eight genera (17%) exhibit exceptions to this generalization, including the Chesterian girtyoceratid *Tumulites varians* McCaleb, Quinn & Furnish and the cravenoceratid *Emstites fayettevillae* (Gordon), and the Morrowan glaphyritid *Syngastrioceras globosum* (Easton), the reticuloceratids *Retites semiretia* McCaleb, *Arkanites relictus* (Quinn, McCaleb & Webb), *Quinnites henbesti* (Gordon) and *Q. textum* (Gordon), the schistoceratid *Branneroceras branneri* (Smith), and the welleritids *Axinolobus modulus* Gordon and *A. quinni* McCaleb & Furnish. Antidimorphic pairs occur in all assemblages that contain these taxa. The antidimorphs are characterized by a subglobose form with large umbilicus and depressed whorls, and a subdiscoidal form with a comparatively more narrow umbilicus and compressed whorls. For the most part, the antidimorphs occur in equal numbers. In genera with strong external ornament, the subglobose antidimorph is typically more coarsely ornamented when compared with subdiscoidal antidimorphs. There is no significant difference in the sutural configuration between antidimorphs, and early ontogenetic stages appear to exhibit identical patterns of change in conch proportions.

The well known microconch-macroconch dimorphism displayed by most Mesozoic ammonoids has never been described in Paleozoic taxa. It is worth noting that the prolecanitids *Pronorites* and *Pseudopronorites*, presumably within the ancestral lineage, do not exhibit either conch or sutural dimorphism. Antidimorphic pairs have not been recognized as separate species in the Middle Carboniferous of the southern midcontinent with exception of the two species of *Quinnites* and *Axinolobus*, the junior synonyms of which (*Q. textum* and *A. quinni*) should be suppressed.

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Autor(en)/Author(s): Manger Walter L., Meeks Lisa K., Russell Richard A.

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