

EVALUATION OF SEPTAL CROWDING AS AN INDICATION OF SEXUAL MATURITY IN SOME LOWER AND MIDDLE CARBONIFEROUS AMMONOIDS FROM THE NORTH AMERICAN MIDCONTINENT, UNITED STATES

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As most extant *Nautilus* approach sexual maturity, their last few (1-3) septa are thickened and approximated before growth (expressed as lengthening of the living chamber) ceases. However, change in septal spacing does not occur in all mature *Nautilus*, and only about half the individuals from large populations actually exhibit approximation. Septal crowding is also characteristic of many ammonoids and it has been cited commonly as evidence for the attainment of sexual maturity, in spite of the relationship displayed by *Nautilus*.

Many Carboniferous ammonoid assemblages from the North American midcontinent yield large numbers of specimens, presumed to represent both sexes, from single horizons at single localities that are interpreted as reflecting semelparous mass mortality of sexually mature individuals. A small number of the taxa (17%) comprising these assemblages occur as dimorphic pairs. Typically, one antidimorph possesses a subglobose conch with depressed whorls and a wide umbilicus, while the associated antidimorph has a subdiscoidal conch with compressed whorls and a more narrow umbilicus. If the taxon is ornamented, the subglobose form displays coarser ornament. The antidimorphs occur in approximately equal numbers.

In a large population (>100 individuals) of the muensteroceratid *Muensteroceras* from the famous Lower Carboniferous (Osagean-Upper Tournaisian) Rockford Limestone, southern Indiana, septal crowding occurs in only about 5% of the individuals. Phragmocone diameter at the initiation of crowding varies from as small as 14.8 mm to as large as 51.7 mm, and as many as 13 approximated septa have been observed in a single specimen to the termination of its phragmocone. Both antidimorphs exhibit crowding, but it is more common in the subdiscoidal form.

A large population of the Upper Carboniferous (Morrowan-Kinderscoutian-Serpukovian) reticuloceratid *Arkanites* from the basal Prairie Grove Member, Hale Formation, northern Arkansas, exhibits septal crowding in more than 60% of the subdiscoidal antidimorphs with diameters > 30 mm, but it has never been observed in the subglobose antidimorphs even at diameters > 60 mm. As many as 12 approximated septa have been observed in a single specimen extending to the termination of its phragmocone.

It can be observed that ammonoids continued to grow, in some cases for more than a quarter whorl, beyond the initiation of septal crowding. While approximated septa may be associated with the onset of sexual maturity, the two are probably not related directly. Approximation may have more to do with "trimming" the conch than the onset of reproductive capability.

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