

## EMBRYONIC SHELLS OF THE AGONIATITINA AND THE HIGHER LEVEL SYSTEMATICS OF THE AMMONOIDEA

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Most ammonoid workers consider the suture to be the best, if not the only character to be used for higher level systematics. Other characters, such as conch shape, sculpture and ornament, are viewed as being subject to environmental influences. However, another set of characters exists that are also useful for higher level systematics. These are the features of the embryonic shell (ammonitella, including the protoconch). A small, egg-shaped initial chamber (protoconch) is one of the defining features of the Ammonoidea. As such, any variation in this feature should possess some systematic value. Investigations into the structure and formation of the initial chamber and ammonitella have largely been based on well preserved Mesozoic ammonoids, ignoring generally less well preserved Paleozoic forms. In order to assess the value of these characters for systematic study, data must be collected from as many groups as possible. To this end, some Lower-Middle Devonian Agoniatitina of the genera *Mimagoniatites* and *Agoniatites* from North Africa and New York State have been studied. Our observations confirm that these early members of the Ammonoidea possess similar embryonic structures to those of later ammonoids and probably share the same non-accretionary mode of growth.

The ammonitellas of these ammonoids are covered by a transverse ornament consisting of lirae. The apex of the initial chamber is free of ornament and is encircled by a lira. This "bald spot" may correlate to the thin apical portion of the initial chamber of Mesozoic ammonoids. No growth lines occur on the ammonitella, suggesting that the lirae probably represent ornamental features and did not form by accretionary growth. (Similar ornamental features have also been observed on the embryonic shells of some archaeogastropods.) The caecum and prosiphon are visible in the initial chamber and differ in shape from those in later ammonoids.

In conclusion, the presence of a small, egg-shaped initial chamber supports the monophyly of the Ammonoidea and implies a similarity in the mode of embryonic development. The variation observed in the embryonic features of ammonoids can be used in the higher level systematics of this group but more data needs to be collected.