

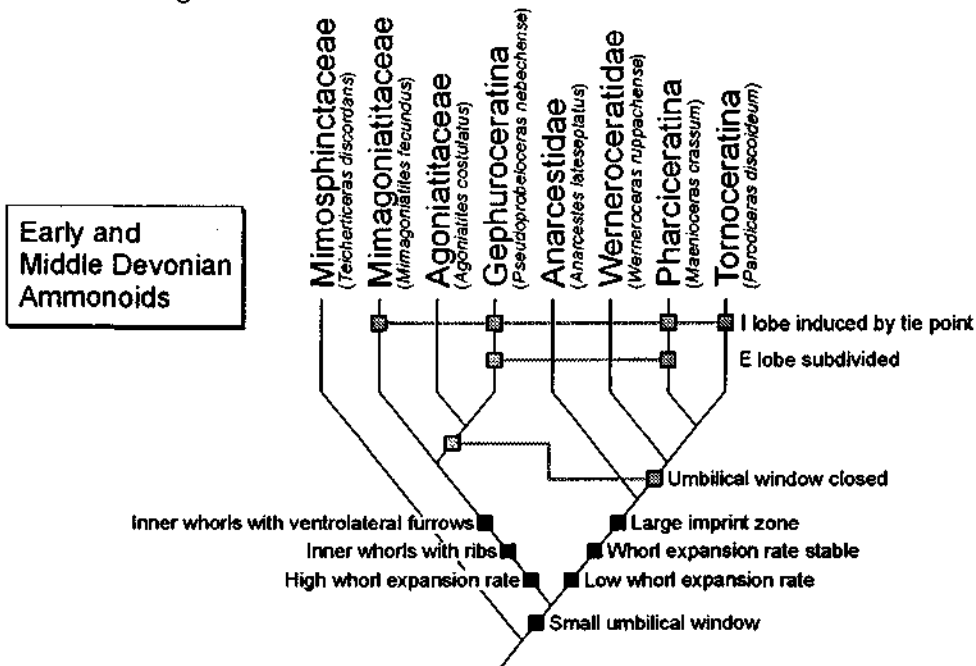
**PHYLOGENY OF EARLY AND MIDDLE DEVONIAN AMMONOIDS**

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Cladistic analyses of Devonian ammonoids have not yet been achieved, although these fossils display a considerably large set of characters that would justify the application of such a method. To unravel the phylogenetic relationships of these forms, simultaneous stratophenetic and cladistic analyses were made, whose results partly support the scheme introduced by Erben (1964), but contradict in other respects.

The application of the two methods is based on characteristics regarding the coiling (whorl expansion rate, width of imprint zone, whorl cross section, and umbilical width), the septal apparatus (number and shape of lobes and their influence on septal geometry), and the ornamentation (growth lines and ribs). A new classification scheme is proposed in which the oldest ammonoids (order Agoniatitida) is subdivided into four suborders: Agoniatitina (paraphyletic), Gephuroceratina (monophyletic), Anarcestina (paraphyletic), and Pharciceratina (monophyletic). The suborders Gephuroceratina and Pharciceratina are regarded as independent phylogenetic lineages. The first are derived from agoniatitid ammonoids and the latter from anarcestids. Separation of the two units happened already in the Emsian Stage.



A separate analysis on the base of higher taxa which probably derived from the superfamily Mimocerataceae was made for the ammonoids of the Late Emsian, Eifelian and Givetian Stages. The most parsimonious cladogram, based on 18 informative characters, shows a separation of two independent evolutionary lineages of agoniatitid and anarcestid ammonoids. The analysis leads to the conclusion that the anarcestid ammonoids are distinguished from the agoniatitids by their very low whorl expansion rate which is stable during ontogeny and by their wider imprint zone of succeeding whorls. The closing of the umbilical window in the Emsian ammonoids and tridentation of the external lobe in gephuroceratids as well as pharciceratids are regarded as homoplasies.

ERBEN, Heinrich K. (1964): Die Evolution der ältesten Ammonoidea (Lieferung I). - Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, 120 (2): 107-212, fig. 1-15, pl. 7-10; Stuttgart.