FUNCTIONAL AND PHYLOGENETIC SIGNIFICANCE OF THE SEPTAL LOBE IN THE LYTOCERATACEAE

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The septal lobe (Is) is generated by median dorsal septal recesses of the internal lobe (I) which are curved backwards to a short tube and attached on the septal surface of the preceeding septa. Thus a funnel shaped septate tunnel lying within the phragmocone on the dorsal part of the chamber is formed. The attached part of the septal lobe is fluted in a complex manner like that of the septal periphery in contact with the outer shell wall (fig. 1a-e). This feature of the internal shell only occurs in the Lytoceratacеae Neumayr 1875 (which represent a monophyletic taxon of the Ammonitida sensu Guex 1995 & 2004 and Shigeta 2006). The character described above emerge within the Lytoceratacеae Neumayr 1875 during the early Liassic through the continuously backwards drifting of the internal lobe.

D´ Orbigny (1845) first represented a septal lobe of the Jurassic (late Bajocian) ammonite *Lytoceras eudesianum* and Yabe (1903) called this structure a “septal lobe” for the first time. Within the last two years, more than 150 septal lobes from a great variety of lytoceratid taxa have been found in the literature and more than 200 specimens with septal lobes have been discovered in various museum collections.

In contrast to the recognised significance of the development of the septal apparate for the ammonoid systematic, it is still remarkable that the phenomenon septal lobe was just little noted and not seriously investigated in a systematical and functional morphological way (see Schindewolf 1961-1968).

The complex structure of the septal lobe and the fact that it only occurs in the Lytoceratacеae Neumayr 1875 leads, unlike Arkell et al. 1957, to the assumption that all lytoceratid taxa with such a septal lobe can be combined into a monophyletic group.

Functional interpretations are given by Westermann (1971) and Henderson (1984).

Westerman (1971) states that the last septum is reinforced against hydrostatic pressure transmitted through the soft body and perhaps also to the strength of the entire loosely coiled phragmocone and Henderson (1984) favours the muscle attachment proposal. However, both theories are rejected by Keupp (2000) and Hoffmann & Keupp (2006).

As the septal lobe is built simultaneously with the whole septum, the septal tunnel must be completely filled with liquid. Therefore we propose a hydrostatic function for this complex structure. The complex fluted margin of the attached part of the septal lobe provides a large surface. In this way, the loss of space can be compensated and the hydrostatic apparatus is not influenced in its function.

Furthermore, the septal lobe provides a mechanism for stabilisation of the swimming position because of the stored liquid depots lying at the dorsal part of each whorl, next to the center of buoyancy.

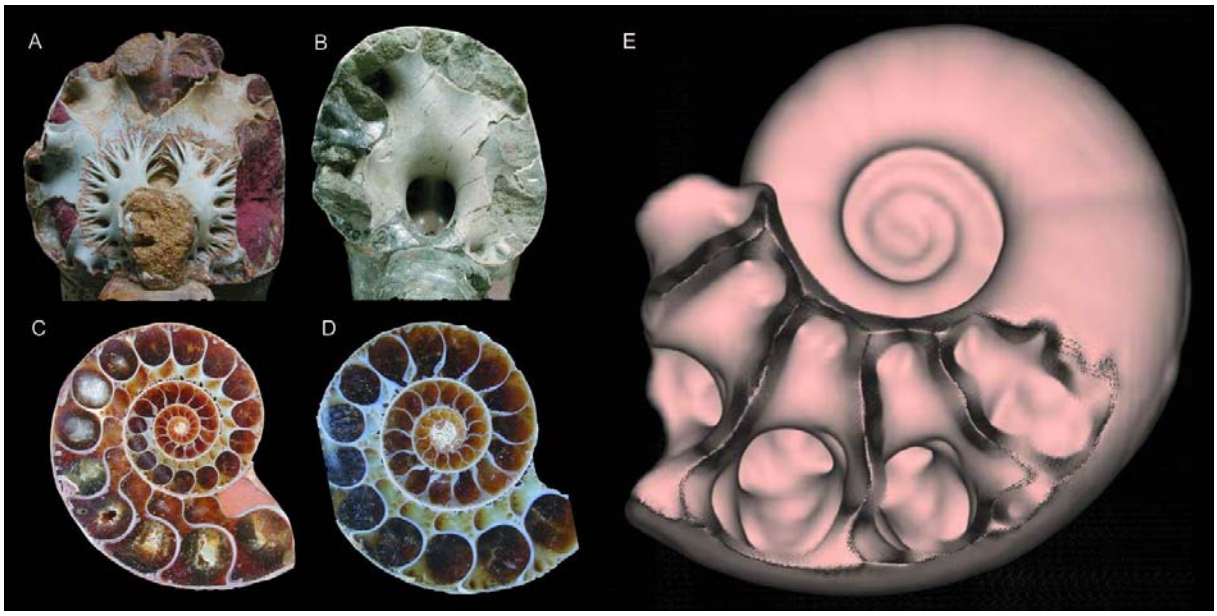

Fig. 1; a) septal lobe attached on the preceeding septum, b) view into the septal tunnel, c-d) median section with septal tunnel, e) ct-scan of the septal lobe structure

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