

## EARLY ONTOGENY OF THREE CALLOVIAN AMMONITE GENERA (*BINATISPHINCTES*, *KOSMOCERAS* AND *HECTICOCERAS*)

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In the past many workers have documented features from the early whorls of different ammonite genera from the Paleozoic and the Mesozoic. Here, the early whorls of three Callovian ammonite genera, *Kosmoceras*, *Binatisphinctes* and *Hecticoceras*, from Ryazan, SE of Moscow, Russia, will be described.

**Shell of ammonitellae:** The protoconch wall consists in the apical and dorsal parts of a single prismatic layer, which is enriched with organic components. In the ventral part, there are three prismatic layers. The wall of the first whorl is composed of two prismatic layers. The first nacre appears with the nepionic swelling and in the first septum after the prosepium, as was elucidated in *Kosmoceras* by Landman & Bandel (1982).

**Internal structures:** The flange consists in *Kosmoceras* and in *Binatisphinctes* only of a narrow ledge, whereas the flange in *Hecticoceras* is broad and extends into the lumen of protoconch. Differences in the structure of the attachment zone of the prosiphon to the protoconch wall exist between *Kosmoceras* and *Binatisphinctes*.

**Size of ammonitellae:** In cross sections the width of the ammonitella, in median sections the ammonitella diameter, protoconch size (minimum and maximum) and the ammonitella angle were measured. *Hecticoceras* has the smallest ammonitellae. This is obvious both in the ammonitella diameter (mean 0,58 mm) and in the ammonitella width (0,49 mm). The other two genera had bigger (mean more than 0,7 mm) and wider (more than 0,55 mm) ammonitellae. The ammonitella diameter is positively correlated with the maximum and minimum protoconch diameter. In all examined genera the ammonitella angle comprises about 280 degrees.

**Microornament of the ammonitellae:** On the ammonitella surface of all three genera a microtubercular ornament is present. Some authors give average values of the tubercle diameter for different genera, so for example in *Sphenodiscus* and *Quenstedtoceras* 2-3 µm, in scaphitids and *Baculites* 4-8 µm (Bandel et al. 1982). The genera examined show a normal distribution of the tubercle diameter. The mean in *Binatisphinctes* is 3,30 µm, in *Kosmoceras* 3,02 µm and in *Hecticoceras* 2,38 µm. The distribution of the circular tubercles shows little variability between the examined forms. In *Hecticoceras*, the inner side of the flank is free from ornamentation. In *Binatisphinctes*, there are elongated tubercle clusters on the inner flank near the protoconch, whereas in *Kosmoceras* they are randomly distributed on the whole outer ammonitella shell.

**Microornament on the juvenile shell:** On the shell of the first post-embryonic whorl there is in *Binatisphinctes* and in *Kosmoceras* a tuberculate microornament in addition to growth lines. These tubercles are oval to longish in outline and they are arranged in rows which are not parallel to the growth lines.

Bandel, K.; Landman, N.H. & Waage, K.M. 1982. Micro-ornament on early whorls of Mesozoic ammonites: Implications for early ontogeny. - J. Paleont. 56(2): 386-391.

Landman, N.H. & Bandel, K. 1985. Internal structures in the early whorls of Mesozoic ammonites. - Am. Mus. Nov. 2823: 1-21.

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