

# The problem of ontogenesis and phylogenesis of the Lower Cretaceous belemnites

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The study of the ontogenesis of belemnites has become traditional today, because it is impossible to establish genetic links to the huge amount of fossil remains of extinct organisms.

It is widely recognized that the individual development history of organism is depicted along the rostrums and transverse sections. However, such representations are not comprehensive, because cut in one plane definitely does not give us the full scope of all the changes that are taking place in such a multidimensional structure as the rostrum. Therefore, it is necessary to test on multiple materials for any changes in ontogenesis to avoid errors that occur naturally during phylogenetic reconstructions.

The first requirement for transverse cuts, which is prepared for the study of rostrum ontogenesis - indication of the exact location of the cutting with respect to the protoconch. If we do not have this, there is a possibility of some distortions in the representations of the belemnites as ontogenesis, mostly about phylogenesis. We must carefully and cautiously use transverse cuts of the rostrums with the growth lines fixed therein with different distances from the protoconch for the ontogenetic purposes and especially in phylogenetic reconstructions.

Longitudinal cuts give us a very clear picture of ontogenesis, the decryption of which is sometimes complicated by fossilization processes. The growth of the rostrums fixed with the growth lines allows us to track the development process of the rostrums from the initial stage to the adult forms.

Early stages of the rostrum development are strongly fixed in the morphological elements of the skeleton. The discrepancies in the literature regarding the early stages of the belemnites development can be explained by the absence of specific data. The separation of the embryonic (the process was going in the egg), post-embryonic, nectonic, planktonic and even "larval" phases or individual stages of the belemnites development was based only on assumptions and comparisons among modern Cephalopods.

In belemnites ontogenesis, we believe, there are two stages: embryonic and post-embryonic. At the embryonic stage, there were formation of protoconch, primordial rostrum, fusion membrane, fixator, first septum of the fragmocon and initial part of proostracum [1]. The belemnite hatched from an egg from an adult differed only in size. The primordial rostrum performed the same function as the adult rostrum, playing the role of a pillar and helping to maintain a horizontal position. It can be assumed that the newly hatched animals were involved in necto-planktonic life.

## References:

[1] Sh. Keleptrishvili. The primordial rostrum and Early ontogeny of Belemnitids. IV International Symposium Cephalopods – Present and Past. Granada, (1996) 83