

Origin of the Cephalopoda

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Cephalopods are postulated to have evolved from planktic monoplacophorans possibly related to the circothecid hyoliths. It is suggested that secretion of a liquid characterized by a density lower than sea water preceded development of a gas containing phragmocone. Phragmocone formation was due to a prolongation of the functioning of the larval hydrostatic apparatus in the adult stages. Attachment of the larval pedal retractor to the apex of the larval shell was a reason why the soft tissue (siphon) remained in the apical parts of the shell and was subsequently surrounded by diaphragms (septa). A possible mode of producing of the light liquid is removal of salt by an ionic pump. The origin of the rhythmic alteration in the septa and liquid secretion was the next step. An osmotic pressure caused by removal of salt from the liquid resulted in slow removal of cameral liquid from older chambers and diffusion of gas from the liquid under conditions of lowered pressure. A model for the evolutionary transformation of the monoplacophoran operculum into the cephalopod lower jaw is presented. Externally calcifying aptychi of the Palaeozoic orthoceratids and the Mesozoic ammonites were produced in the same way as opercula of Recent gastropods *Natica* and *Turbo*. The early evolution of the class is reviewed.

Key words: Origin, Cephalopoda, Nautiloidea, phylogeny, phragmocone, larval development, aptychi, jaws.

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