

## **An Early Triassic gladius associated with soft tissue remains from Idaho, USA—a squid-like coleoid cephalopod at the onset of Mesozoic Era**

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We describe an Olenekian (Early Triassic) “fossil squid” belonging to the oldest complex Mesozoic marine biota collected in the Lower Shale unit of the Lower Triassic Thaynes Group in Idaho, USA. The studied specimen shows a tapered structure embedded in a cylindrical soft body. Morphological, ultrastructural and geochemical features of the specimen suggest that it corresponds to an internally-shelled cephalopod exhibiting a tapered micro-laminated gladius with rachis, narrow median and lateral fields and a large conus; a pair of posterior large fin-supported cartilages and fins; ventral and dorsal mantle band-shape structures, the dorsal one being cartilaginous; mantle patches; a stomach containing undigested arm-hooks and sheet-like pieces of potential flooded ink. Coupled SEM/EDS analyses show that (i) arm-hooks and ink were pseudomorphed by nanoparticles (less than 0.6 mm in diameter) of carbon, (ii) gladius and soft tissues were substituted by granules of calcium phosphate, (iii) cartilage canalicula's were partially filled with calcium phosphate grains and crystals of Zn- and S-containing minerals. The specimen was hence probably fossilized due to metabolism of P- and C-accumulating bacteria. Based on this specimen, *Idahoteuthis parisiensis* Doguzhaeva and Brayard gen. et sp. nov. and Idahoteuthidae Doguzhaeva and Brayard fam. nov. are erected. This family is characterized by an elongated, cylindrical, dorsally cartilaginous muscular mantle; well-developed, about 0.2 mantle length, rounded anteriorly and acute posteriorly, fin-supported cartilages and similarly shaped two fins at conical mantle termination, and thin slender gladius with narrow median and lateral fields, rachis and breviconic conus. This family assumedly falls in Myopsida (Decabrachia). A streamlined body, large fin-supported cartilages and eroded arm-hooks in the stomach of *Idahoteuthis* Doguzhaeva and Brayard gen. nov. suggest that this was a maneuverable cannibal predator that dwelled in the subequatorial shallow sea of the west coast of Pangaea.

**Key words:** Cephalopoda, Coleoidea, phylogeny, gladius, soft tissue preservation, Triassic, USA, Idaho.

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