

# Finds of a Unique Upper Toarcian Fauna from the SW Crimea (Ukraine)

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Field works, held in 2007-2009 in quarry “Lozovoe” (south to Simferopol, right bank of Salgir river), resulted in a rich collection of macrofauna, collected from a large block of cherry red limestones buried in dark grey mudstones. Collection includes numerous belemnite rostra, ammonites, bivalves, brachiopods, crinoids, several nautilus and aulacoceratids. Belemnites, bivalves and crinoid remains are the most common for the complex. Limestones are represented by shallow-water limestone conglomerate and crinoid limestones; the mudstones are flysh-like and do not reveal any macrofauna. Previous researchers indicated finds of Upper Triassic fauna in grey mudstones, but the tectonic structure here is extremely confusing and difficult for understanding. There are at least three independent models of geological interpretation and dating of these deposits, also known as “block horizon” in literature.

Our study of cephalopod fauna here showed that the collection comes from a condensed horizon in a block, including elements of all four upper Toarcian Mediterranean ammonite zones (Thouarsense, Dispansum, Pseudoradiosa, Aalensis). Most fauna represents terminal Aalensis Zone, other ones are represented by only several specimens. During the recent field works one specimen of the *Catacoeloceras* cf. *crassum* (Young et Bird) has been collected, thus indicating possible presence of the uppermost middle Toarcian (Crassum Subzone of the Bifrons Zone). Ammonites are quite typical for the Mediterranean Realm and show strong affinity with upper Toarcian ammonite fauna of other Mediterranean successions (Hungary, Italy). Almost a half of all retrieved ammonites are the oceanic Phyllo- and Lytoceratidae. Other ones show high diversity and include representatives of Grammoceratinae, Dumortieriinae, Hammatoceratidae, Erycitidae. They are *Pseudogrammoceras fallaciosum* (Bayle), *Bredya brancoi* (Benecke), *Pleydellia* (*Cotteswoldia*) *paucicostata* (Buckm.), *Pleydellia* spp., *Crestaites* cf. *victorii* (Bon.), *Pseudammatoceras clocheri* (Rulleau et Elmi) and *Erycites barodiscus* (Gemm.).

Belemnites also indicate upper Toarcian age, by the presence of several forms, very typical for Aalensis Zone – *Rhabdobelus* spp., which have an acme in terminal Toarcian, and also such characteristic species like *A. (A.) subgracilis* Kolb, *A. (O.) ernsti* (Schleg.), *A. (O.) curtus* (d’Orb.), which are characteristics of

Aalensis Zone in Germany. Other ammonite zones (see above) are not represented by any belemnite markers. Comparison with belemnite scales of Southern Germany and France confirms this age determination. No trace of Aalenian fauna was found. Totally belemnite fauna shows very high biodiversity and counts 25 species attributed to 10 genera and subgenera. The most common are *Acrocoelites* s.str., *A. (Odontobelus)*, *Megateuthis*, *Rhabdobelus*, “*Catateuthis*” and *Holcobelus*. A taxonomic revision shown that 11 species are new to science. In Crimea few Toarcian belemnites previously had been found only in deep-water sediments, and complexes of adjacent regions (Caucasus, Carpathians) are studied more purely. The fauna of Lozovoe shows several peculiarities, which make it remarkable among all upper Toarcian belemnite locations of the world. First of all, there is the highest known diversity of genus *Rhabdobelus* – 4 species (2 of them are new). Furthermore, the fauna is characterized by numerous species with elongated rostra (*Acrocoelites* s.str., *Catateuthis* spp., *Megateuthis* sp., *Holcobelus* sp.); both mentioned traits probably indicate open-sea environment for the upper Toarcian for this locality. There are also representatives of the most ancient undoubtable *Holcobelus* and *Megateuthis* species in the complex. As a whole, belemnite fauna is very close to those described from Southern France (described by Lissajous), Slovenia (numerous papers by E. Cincurova) and Carpathians.

The fossil complex also includes several finds, principally new for the territory of the former USSR. Among them are:

1. Unique serpulid community on sponge substrate. Although all specimens are indeterminable to the specific level, four morphotypes can be recognized, and this evokes some paleoecological interpretations;
2. First finds of Jurassic Nautiloidea from the territory Crimea;
3. First finds of aulacoceratid rests from the Toarcian (described by Ippolitov et al., 2009);
4. Two new species of Lower Jurassic cyrtocrinids, previously unknown for this age (Anekeeva, pers. comm.).

After analyzing the fauna and lithological characteristics of the rocks, we managed to find several brief mentions of the same type of rocks in literature, in several cases the age was determined erroneously as Lower Cretaceous on the basis of misidentification of

*Rhabdobelus* rostra as *Pseudobelus bipartitus*, leading some authors to very geodynamical reconstructions of the history of region. This scarce data of different authors let us discover several more localities of the same age, achievable at present: one is situated in Petropavlovski quarry, the other on the northern slope of Kermen mountain (Bodrak river basin)—but both of them are comparatively poor in macrofauna, except for bivalves.

Blocks limestones of different age, from Carboniferous to Lower Jurassic, are very common for the “block horizon”, whose matrix is usually dated by Middle Triassic-Lower-?Middle Jurassic. These blocks are interpreted as shallow-water olistolites buried in deep-water terrigenous sediments. There are several hypotheses in literature on genesis of shallow-water blocks, some are really fantastic ones and two deserve serious attentions. First model based on widely spread idea that to the north there was a margin of carbonate platform existing at least from Carboniferous to Lower Jurassic, and the second model implies that Lower Jurassic shallow water limestones, most numerous in the “block horizon”, formed at flat tops of guyots-eroded Triassic volcanic buildings.

Our material supports second hypothesis: Jurassic limestones are pure of terrigenous material, but often contain limestone conglomerates and cephalopod fauna (ammonites and belemnites) can be characterized as

oceanic, not epicontinental. Anyway, our finds widen the stratigraphic range of blocks (and of a probable carbonate platform/guyot sequence) to the very end of Lower Jurassic: previously the youngest dated blocks had Pliensbachian age. It is also worth to be mentioned that the lithotype of limestones is very similar to red limestones in Carpathians and Caucasus (Georgia) of the same age, and this can be explained from the point of view of geodynamics.

The studied community is unique for the territory of Crimea and also allows, in comparison with adjacent regions, to retrieve some biogeographical conclusions.

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**Key words:** Toarcian; Crimea; Belemnites; Ammonites; Unique fauna

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