



First evidence for distribution of Maastrichtian inoceramid bivalves in the Yankovo Formation from the East Fore-Balkan (Bulgaria)

Първи находки на мастрихтски иноцерамидни бивалвии в Янковската свита в Източния Предбалкан (България)

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Introduction

The area of the Golyama Kamchiya River Valley, near the village of Komunari (Varna District, East Bulgaria), contains spectacular sections of varied Upper Cretaceous to Lower Paleogene epicontinental sediments that provide almost continuous depositional record from the Cenomanian to the Upper Paleocene (e.g. Jolkičev, 1989; Sinnyovsky, Vangelov, 2007). The earlier efforts for the age assessment of the rocks from this sequence were based mostly on echinoid, brachiopod and bivalve occurrence (see Jolkičev, 1989 and references cited therein). However, the scarcity of valuable fossils has led some of the age definitions to be poor and even quite conditional. This failure incited Sinnyovsky and Vangelov (2007) to attempting the accuracy of the age assessment to be enhanced, by using nanofossils. At the same time many new details on the lithology and depositional settings appeared. Thus the Yankovo Formation was introduced as a new unit of the Upper Cretaceous formal lithostratigraphic scheme of the East Fore Balkan area (Sinnyovsky, Vangelov, 2007). The latter was defined on the account of the grey sandy to silty limestones from the upper parts of the Mezdra Formation *sensu* Jolkičev (1989), and referred to the Lower Maastrichtian (*Arkhangelskiella cymbiformis* Zone). Apart from the nanofossils, no other biostratigraphically purposeful fossils have been obtained from the Yankovo Formation before, since it usually contains scattered thick-shelled bivalves of *Pycnodonta vesicularis* (Lamarck), some brachiopods and badly preserved echinoids. Recently, the uppermost beds of the Yankovo Formation yielded a relatively abundant and varied inoceramid assemblage. This report represents the first record of inoceramids on the both escarpments of the Golyama Kamchiya River at the village

of Komunari. More detailed study on the specimens collected is forthcoming.

Notes on the inoceramid assemblage

The bulk of the inoceramids studied are preserved as internal moulds, without shell fragments attached. Unfortunately, most of them are fragmentary, and small number of specimens displays complete morphological features (e.g. umbo, beak, and posterior auricle). Nevertheless, they are taxonomically determinable to be assigned to the genera *Cataceramus* Heinz, 1932 and *Endocostea*, Whitfield, 1877. The second genus is identified for the first time in Bulgaria.

Cataceramus specimens are small to medium-sized, having different outline (elongated parallel to the growth axis, more or less oblique, ovate, rounded, subrounded, subtriangular), differing length and curving of the anterior, anteroventral, posterior, and posteroventral margins. They have distinct umbonal area with beak projecting more or less markedly above the hinge line. The latter is usually long and straight. The valves are moderately inflated with variably developed geniculation. The ornament consists of concentric rugae, with or without increasing rugae interspaces towards the ventral margin.

Endocostea specimens are small, slightly to moderately inflated, with prosocline valves. The beak is small, curved anteriorly, medium-sized, projecting slightly to moderate above the hinge line, which is long and straight. Some specimens display clear internal ribs that are visible on both internal and external moulds.

At the present state of study, the following taxa were identified: *Cataceramus subcircularis* (Meek, 1871), *C. barabini* (Morton, 1834), *C. goldfusianus* (d'Orbigny, 1847), *Endocostea typica* (Whitfield, 1880), *Endocostea* sp., and “*Inoceramus*” sp.

Discussion

The first incoming of the *Endocostea typica* (Whitfield) defines the base of the Lower Maastrichtian (i.e. the Campanian/Maastrichtian boundary) (Walaszczyk et al. 2001, 2002). Above this event is the first appearance of "*Inoceramus*" *incurvus*. Combined stratigraphic distribution of these taxa defines the extent of the *E. typica* Interval Zone, which is the basal inoceramid zone of the Lower Maastrichtian. The occurrence of *E. typica* in the Yankovo Formation from the section at the village of Komunari unequivocally refers this stratigraphic level to the Lower Maastrichtian, and this agrees with the age previously obtained by nanofossils (Sinnyovsky, Vangelov, 2007). Besides, it indicates the presence of the *E. typica* Zone, and this is the first proper record of the zone in Bulgaria.

It seems that the *Endocostea typica* Zone includes mixed *Endocostea*–*Cataceramus*–"*Inoceramus*" assemblage that occur in 2 m thick interval, located in the close proximity below the upper boundary of the Yankovo Formation. The beds placed lower than this inoceramid-bearing level did not yield inoceramids. It is known that genus *Endocostea* emerges in the latest Campanian times (Walaszczyk et al. 2001, 2002). Having in mind stratigraphic position of the examples of the genus in the Yankovo Formation, it is reasonable to assume that this is the highest record of *Endocostea* in the section. Potentially, it could be recorded downwards and thus the total range of the genus would be extended towards the Upper Campanian. This will be corresponding to the previous evidence given by Sinnyovsky and Vangelov (2007), where

the Campanian/Maastrichtian boundary is placed above the lower boundary of the Yankovo Formation. However, further investigations are necessary to be done in order to confirm that.

Regarding *Cataceramus*, the total range of the genus is known to be from the Upper Santonian to the Upper Campanian (Walaszczyk et al. 2001, 2002). The record from the Yankovo Formation suggests a lengthened stratigraphic distribution of the genus into the Lower Maastrichtian.

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