



Ammonites (Phylloceratina, Lytoceratina and Ancyloceratina) and organic-walled dinoflagellate cysts from the Late Barremian in Boljetin, eastern Serbia

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ABSTRACT

Late Barremian ammonite fauna from the epipelagic marlstone and marly limestone interbeds of Boljetin Hill (Boljetinsko Brdo) of Danubic Unit (eastern Serbia) is described. The ammonite fauna includes representatives of three suborders (Phylloceratina, Lytoceratina and Ancyloceratina), specifically *Hypophylloceras danubiense* n. sp., *Lepenicerias lepense* Rabrenović, *Holcophylloceras avrami* n. sp., *Phyllopachyceras baborensense* (Coquand), *Phyllopachyceras petkovici* n. sp., *Phyllopachyceras eichwaldi eichwaldi* (Karakash), *Phyllopachyceras ectocostatum* Drushchits, *Protetragonites crebrisulcatus* (Uhlig), *Macroscaphites perforatus* Avram, *Acantholytoceras* cf. *subcirculare* (Avram), *Dissimilites* cf. *trinodosus* (d'Orbigny) and *Argvethites?* sp. The taxonomic composition and percent abundance of the identified ammonites indicate that their taxa are predominantly confined to the Tethyan realm. Ammonites with smooth and slightly sculptured shells predominate among the studied fauna. The ammonite-bearing succession from Boljetin represents the lower part of the Upper Barremian, ranging in ammonite zonation from the *Toxancyloceras vandenheckei* Zone to the lower part of the *Imerites giraudi* Zone. The associated organic-walled dinoflagellate cysts confirm the Late Barremian age of the ammonite-bearing levels.

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1. Introduction

Most of the ammonite specimens under study were collected in the 1980s by Dragoman Rabrenović in a geological section formed in association with the construction of a road near the municipality of Boljetin. During a new joint visit to the Boljetin section in August 2010, additional ammonites were collected, and samples from the pelitic marlstone layers were taken to study the organic-walled dinoflagellate cysts. The ammonites were discussed in two studies. The first study (Vašíček et al., 2013) addresses the ammonites of the suborder Ammonitina. The second study, described in this report, addresses the remaining ammonite suborders.

The aims of this report are threefold: 1) a detailed taxonomic study of the new ammonite collection, 2) the stratigraphic

assignment of the section in terms of the current ammonite zonation of the Barremian Stage and 3) a comparison with ammonite faunas of similar age abroad. This work presents the first analysis of organic-walled dinoflagellates in the investigated area and interval, allowing biostratigraphic and palaeoecological conclusions based on the ammonites.

Rabrenović (1991) was mostly concerned with stratigraphic processing and the evaluation of the collection of ammonites from the Boljetin locality. The taxonomic study of the ammonites was performed by Zdeněk Vašíček in Ostrava, where samples were processed for organic-walled dinoflagellates and studied by Petr Skupien. This contribution was prepared based on a co-operative study by the Department of Palaeontology and Department of Historical and Dynamic Geology, Faculty of Mining and Geology, University of Belgrade and the Institute of Geonics, Academy of Sciences of the Czech Republic in Ostrava within the framework of Serbian Project No. 176015, "Geodiversity, lithostratigraphy and geological evolution of the central Balkan peninsula basin and adjacent regions".

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2. Geological setting

The fossils described herein were obtained from an exposure in a new road-cut on the Boljetin Hill, 12 km northwest of the town of Donji Milanovac, near the right bank of the Danube River (see Fig. 1 for location of the Boljetin Hill; GPS coordinates: 44°31'51.2"N latitude; 22°02'24.3"E longitude). Detailed information on the location of the ammonites at Boljetin was given in Vašíček et al. (2013).

The outcrop containing the ammonites belongs to the morpho-tectonic Poreč-Stara Planina Unit (Tchoumatchenco et al., 2011), a part of the tectono-stratigraphic Danubic Unit of the Carpatho-Balkanides, also known as the Milanovac-Novo Korito structural-facies zone, within the Balkan autochthon (Andjelković and Nikolić, 1974, 1980).

In the Danubic Unit, the Mesozoic Era is represented by a succession of Jurassic and Lower Cretaceous deposits that lie discordantly on the Pre-Cambrian and Palaeozoic deposits. The Jurassic and Lower-Cretaceous deposits were subdivided into three formations: Pesača Formation (siliciclastics and limestone), Boljetin Formation (limestone) and Donji Milanovac Formation (limestone and marlstone; Vasić et al., 1998). The first formation, corresponding to the Lias and Lower Dogger, formed in a transitional shallow-water marine environment and is associated with the Lias transgression. The second formation, part of the Middle and Upper Dogger and the Malm, originated in a deep-water marine environment and is connected to the eastern margin of the Danube

trough, between the Gethicum and Moesia (the marginal part of the European craton), i.e., to a narrow, deep basin with submarine swells where sedimentation of condensed deposits took place. The third unit, the Donji Milanovac Formation, represents the Lower Cretaceous and has two components: deep-water limestone and marly limestone with black cherts from the Berriasian–Early Hauterivian age and marl and marly limestone without cherts from the Late Hauterivian–Albian in age. These latter strata were deposited in a deep-water (pelagic) environment under reducing conditions on the sea bottom. Gradual shallowing in the Aptian and Albian is documented for these strata (Vasić et al., 1998).

The 34 m thick Upper Barremian sediments from which the ammonites described herein were collected consist mainly of grey calcareous marlstone intercalated with thinner, harder layers of light grey marly limestone. In addition to the ammonites, the fauna include rare fragments of belemnites, bivalves and several predominantly calcified radiolarians in the upper layers of the succession. There is a total absence of clastic components in the studied strata. These deposits have the greatest distribution and are much richer and diverse in ammonite fauna compared with the other Lower Cretaceous sediments in the study area.

3. Material and methods

Geological documentation of the exposed section was performed by staff of the University of Belgrade. After the section was documented, macrofauna were collected bed-by-bed. In 2010,

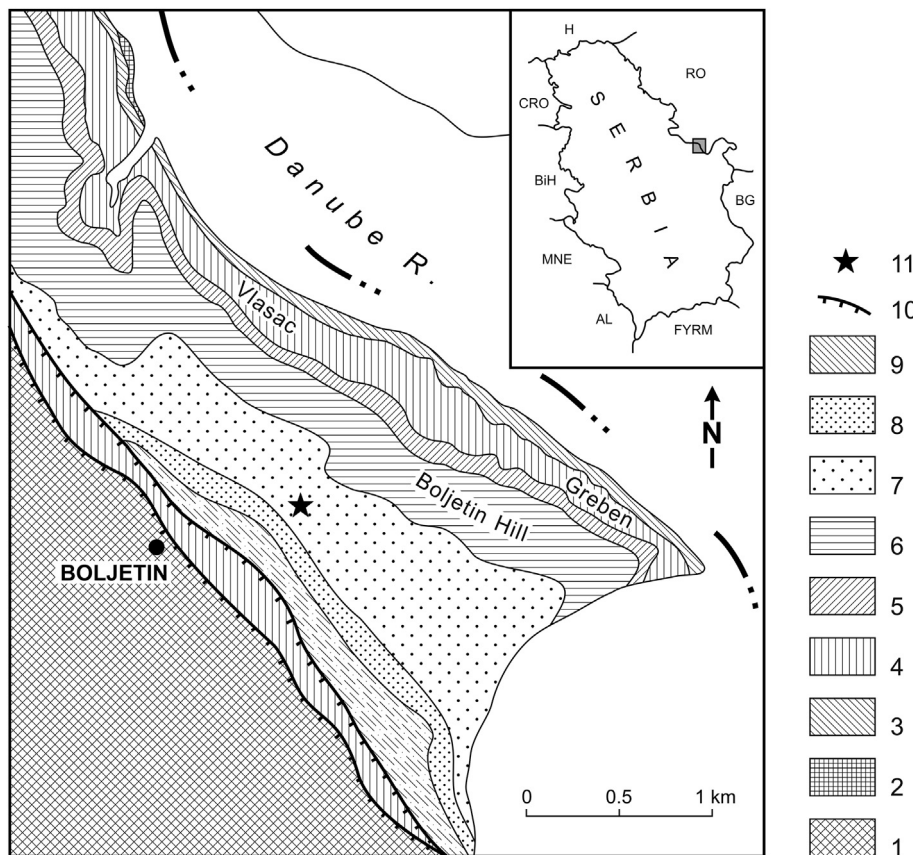


Fig. 1. Geological map of the Boljetin area and location (star) of the Boljetin Hill section, eastern Serbia. 1, Rifeo-Cambrian; 2, Permian red sandstones; 3, Middle Jurassic: red ferruginous limestones ("Klaus beds"); 4, Late Jurassic: Oxfordian micritic limestones with cherts, Kimmeridgian red nodular limestones Ammonitico Rosso, and Tithonian micritic limestones; 5, Berriasian–Valanginian thin bedded micritic limestones with cherts; 6, Hauterivian marly limestones with cherts and marlstones; 7, Barremian marlstones and marly limestones with described ammonites; 8, Aptian marlstones and marly sandstones; 9, Albian marlstones and sandy marlstones. 10, overthrust. 11, studied ammonite site (GPS coordinates: 44°31'51.2"N; 22°02'24.3"E).

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