

The first recording of the presence of nautiloids (*Eutrephoceras ex gr. boissieri*) from the Lower Cretaceous of the Mecsek Mountains, southern Hungary

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Az első kréta időszaki nautilida-előfordulás (*Eutrephoceras ex gr. boissieri*) a Mecsekből

Összefoglalás

Új terepi gyűjtés korábban ismeretlen alsó-kréta rétegsor megismeréséhez vezetett a közgazgatásilag Zengővárkonyhoz (Mecsek hegység) tartozó mészkemencék közelében. A rétegsor a Hidasivölgyi Márga Formációt tárja fel, kora bio- és litosztratigráfiai megfontolások alapján valószínűleg valangini (hauterivi?). A rétegsor vékonyrétegzett szürkés-barna színű márga- és mészkőrétegek ritmikus váltakozásából épül fel. A rétegsor gazdag, de rossz megtartású cephelopoda-faunát tartalmaz, melyből az *Eutrephoceras ex gr. boissieri* az első publikált nautilida említés a mecseki krétából.

Tárgyszavak: Zengővárkony, valangini, cephelopodák, *Eutrephoceras*, Hidasivölgyi Márga Formáció

Abstract

Fieldwork around the lime-kilns at Zengővárkony (southern Hungary, eastern Mecsek Mts.) has led to the discovery of previously unknown beds of the Hidasivölgy Marl Formation. Based on bio- and lithostratigraphic considerations, here a Valanginian (Hauterivian?) age is assumed. This recently discovered section consists of thin-bedded, grey-brownish turbiditic marls and limestones laid down in rhythmic alterations. Excavations of the marl beds have yielded a poorly-preserved, but rich cephalopod fauna. Furthermore, *Eutrephoceras ex gr. boissieri* has been identified here, and this is the first record of Cretaceous nautiloids from the Mecsek Mountains.

Keywords: Zengővárkony, Valanginian, cephalopods, *Eutrephoceras*, Hidasivölgy Marl Formation.

Introduction

Nautiloids are useful signifiers of former depositional environments, mostly indicating shallow-marine settings (FRANK et al. 2013) or storm accumulations (CICHOWLSKI et al. 2012). In the literature it is generally considered that Early Cretaceous (especially Valanginian–Hauterivian) nautiloids were rare in the Western Tethyan Realm (LUKENEDER & ASPMAIR 2006), for example only poorly-preserved nautiloids have been found in the Upper Valanginian (i.e. the Hochkogel section in the Northern Calcareous Alps, Austria; LUKENEDER 2005). This age was later revised and designated to be late early Valanginian by LUKENEDER & REHAKOVA (2007) (compare LUKENEDER 2014). The ammonoid-nautiloid bearing siliciclastic sedimentary rocks in the upper part of the Schrambach Formation (not Rossfeld Formation: LUKENEDER

& REHAKOVA 2007) were attributed to the Oravice Event. The latter coincided with a third-order sea-level lowstand (REHAKOVA 2000). In addition, the diversity of early Cretaceous nautiloids was low and their distribution on the southern hemisphere is limited (EVANS et al. 2014).

Research on nautiloid fossils is a favourite topic in Hungarian palaeontology. From the beginning of serious geological–palaeontological research in the former and present area of Hungary (HOFMANN 1884, PRINZ 1906, VOGL 1908, VADÁSZ 1911, SOMOGYI 1914), and right up to the present day (NAGY 1960, GÉCZY 1961, GALÁCS 1987, 2004; FÓZNY 2001, VÖRÖS 2001) there has been a continuous interest in the Mesozoic and Cenozoic nautiloids. With reference to geological localities, all reported Cretaceous and Eocene areas are restricted to the Transdanubian Range in north-western Hungary. In his summary of the Hungarian Cretaceous

nautiloids, NAGY (1960) reported these fossils only from the Bakony and Gerecse Mountains. VADÁSZ (1935) in his monograph on the geology of the Mecsek Mts, mentioned only non-nautiloid cephalopods. BUJTOR (2011, 2013) referred to the presence of Valanginian nautiloids (gen. et sp. indet.) in the Kisújbánya and Zengővárkony area, but that material was never documented and its details have been lost. From the Anisian Zuhány Limestone Formation (Middle Triassic) in the Mecsek Mts KONRÁD & SEBE (2014) reported the nautiloid taxon (*Germanonautilus salinarius*) from the Zuhány Limestone Formation, which is Anisian (Middle Triassic) according to KONRÁD & BUDAI (2009). Therefore the present discovery is important, and the aim of this paper is to describe the first Cretaceous nautiloid from the Mecsek Mts, i.e. a part of the Tisza Mega-unit.

Geological setting

The studied site (N46 11.035 E18 27.488, *Figure 1*) is located in the Mecsek Unit; it represents the northernmost

tectonic sub-unit of the Tisza Mega-unit (KOVÁCS *et al.* 2011, HAAS *et al.* 2011, with references therein). Furthermore, it embodies the Valanginian to Hauterivian part of the Jurassic to Cretaceous deepening sequence. The argillaceous limestone to black marl succession (*Figure 2*) is attributed to the Hidasivölgy Marl Formation.

The lime-kilns valley north-northeast of the small town of Zengővárkony (*Figure 1*) was first studied by BÖCKH (1880, p. 17). He presented geological description of the lime-kilns at Zengővárkony, and mentioned the Kimmeridgian (*Ammonites tenuilobatus* = *Streblites tenuilobatus* referring to the lower Kimmeridgian Divisum and Hypselocyclum zones), and the Tithonian (*Terebratula diphya* = *Pygope diphya*). On his geological map, VADÁSZ (1935) also indicated the presence of the lower Liassic, and beds of Aalenian, Bajocian and Tithonian age. MOLNÁR (1961) noted the presence of the whole Jurassic sequence in his study about the iron-ore deposit, located in a northwesterly direction from the lime-kilns.

Above the condensed nodular to thick-bedded grey micritic limestones of Tithonian to Berriasian age, argillaceous

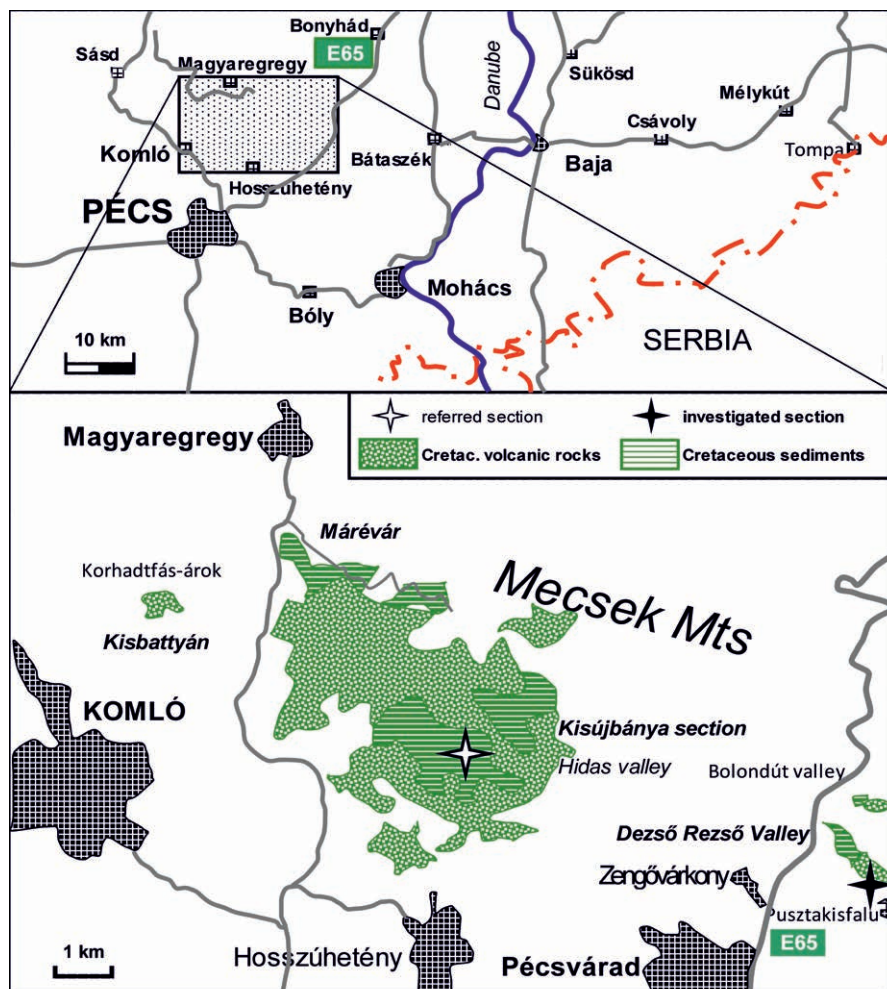


Figure 1. Position of the study site of the Hidasivölgy Marl Formation in an unnamed lateral valley, in a south-south-easterly direction from the lime-kilns of Zengővárkony. An asterisk marks the outcrop

1. ábra. A Hidasivölgyi Márga Formációt feltáró szelvény helye a zengővárkonyi mészkemencéktől DDK-i irányban, egy névtelen oldalvölgyben. A csillag a szelvényt jelöli

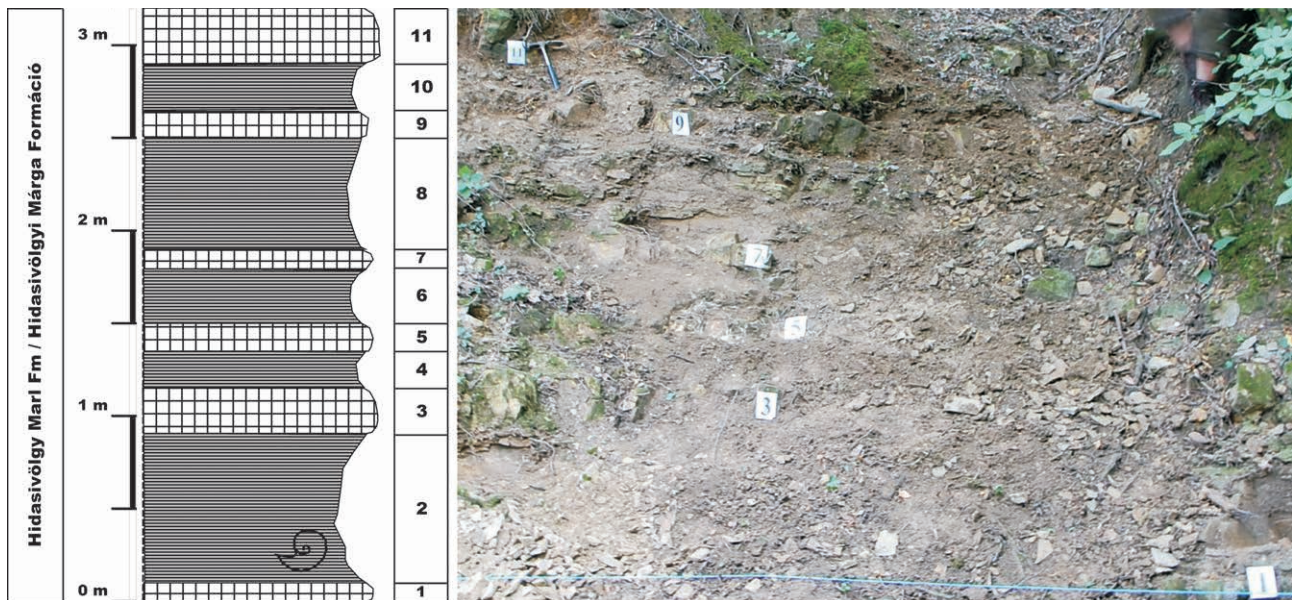


Figure 2. Lower Cretaceous section traversing the Hidasivölgy Marga Formation at the lime-kilns of Zengővárkony (Mecsek Mts, Hungary)
 2. ábra. A zengővárkonyi mészkemencék (Mecsek hegység) közelében található, a Hidasivölgyi Marga Formációt képviselő alsó-kréta rétegsor

limestones with dark-grey to black, and in parts organic-rich marls, were deposited. The Tithonian to Berriasian part of the succession is similar to the Biancone facies distributed in the whole Mediterranean (HAAS et al. 2011) (i.e. Márévár Limestone, but with a lesser thickness than in the type area). According to the description of the Hidasivölgy Marl Formation in the Mecsek Mountains (CSÁSZÁR 1997, CSÁSZÁR et al. 2000) it is characterized by yellowish-brown or grey, frequently bentonite containing clayey marl beds occasionally with sandy and silty marls that sometimes contains macrofauna. Based on the lithology of the reported sequence the studied succession unequivocally belongs to the Hidasivölgy Marl Formation of Valanginian-Hauterivian age. BUJTOR (1993) also described a similar Valanginian marl-limestone (with sandy marl beds) alternating sequence in the nearby Kisújbánya Basin.

Studied section

The studied part of the section consists of a 3-m-thick rhythmic alternation of marl and limestone beds (Figure 2). The grey-brownish and dark-grey limestone beds refer to wackestone microfacies. The thicknesses of the limestone beds vary between 10 and 30 centimetres. The laminated marl beds are dark-brown to dark-grey occasionally with increased sand contents. Only bed 2 contained a poorly-preserved cephalopod macrofauna. The thickness of the marl intercalations between the limestones varies between 20 and 80 centimetres.

Material and methods

In addition to several ammonoids from the studied part of the Hidasivölgy Marl Formation one nautiloid was found in the dark-grey to black laminated sandy marls.

Abbreviations: D: diameter of the conch; Wb: whorl breadth; Wh: whorl height; U: diameter of the umbilicus; FO: first occurrence. Numbers are given in mm.

Repository: Specimen stored in the Hungarian Natural History Museum, Budapest (HNHM).

Systematic Palaeontology

Class Cephalopoda CUVIER, 1795
 Subclass Nautiloidea AGASSIZ, 1847
 Order Nautilida AGASSIZ, 1847
 Superfamily Nautiloidea DE BLAINVILLE, 1825
 Family Nautilidae DE BLAINVILLE, 1825
 Subfamily Nautilinae DE BLAINVILLE, 1825
 Genus *Eutrephoceras* HYATT, 1894
 Type species: *Nautilus dekayi* MORTON, 1894

Eutrephoceras ex gr. *boissieri* (Pictet, 1866) Figures 3a–b

1866 *Nautilus Boissieri* — PICTET pl. 8, fig. 4.
 1956 *Eutrephoceras boissieri* (PICTET) — KUMMEL, p. 379, fig. 13.B.
 1960 *Eutrephoceras boissieri* (PICTET) — NAGY, p. 205.
 1971 *Eutrephoceras ?boissieri* (PICTET) — NAGY, p. 15. [in lit.]

Material: A single, poorly-preserved, flattened internal mould from sandy marl layer no. 2.

Table 1. Dimensions of *Eutrephoceras* ex gr. *boissieri*
 1. táblázat. A *Eutrephoceras* ex gr. *boissieri* méretei

Dimensions	D	Wh	Wh/D	Wb	U	U/D
PAL 2019.9.1	55.5	27	0.48	–	5.5	0.1

Abbreviations: D: diameter of the conch; Wh: whorl height; Wb: whorl breadth; U: diameter of the umbilicus; Wh/D: whorl height and diameter ratio; U/D: umbilicus and diameter ratio. FO: first occurrence. D, Wh, U are given in mm

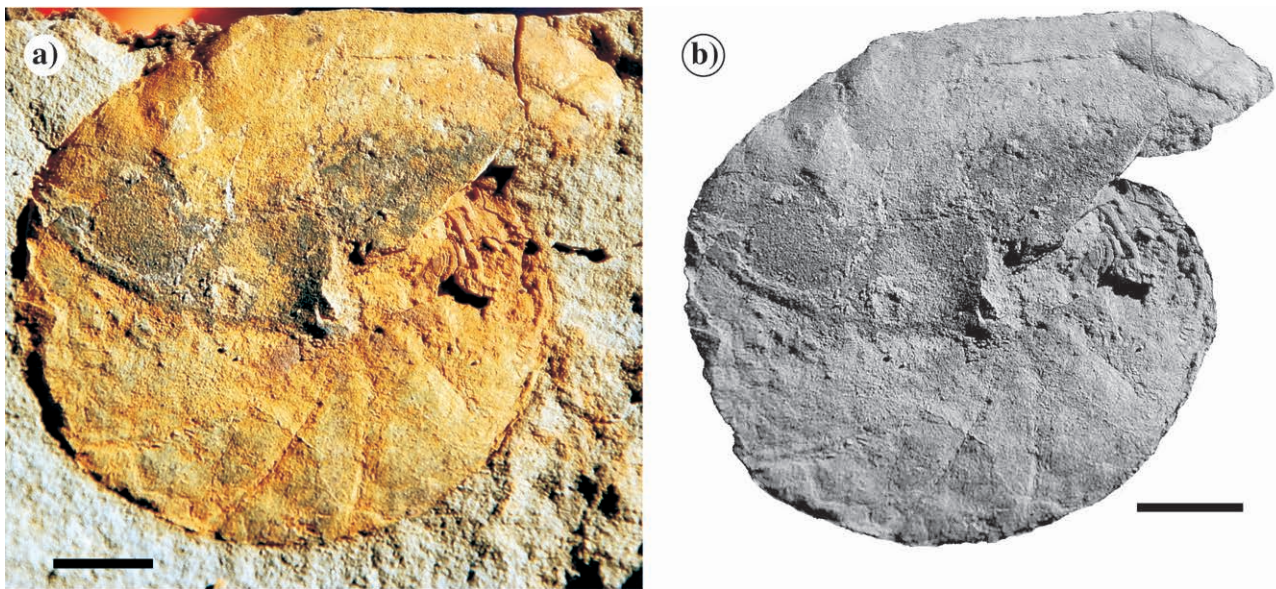


Figure 3. *Eutrephoceras* ex gr. *boissieri* specimen No. PAL 2019.9.1 from the Lower Cretaceous of the lime-kilns at Zengővárkony, Mecsek Mts., Hungary, bed 2
a) Specimen with rock sample, b) Specimen without hosting rock. Scale bar indicates 1 cm

3. ábra. *Eutrephoceras* ex gr. *boissieri* PAL 2019.9.1 számú példány a zengővárkonyi mészkemencék lelőhelyről, 2. számú réteg (Mecsek hegység)
a) Pédány a beágyazó kőzettel, b) Pédány beágyazó kőzet nélkül. A méretskála 1 cm-t jelöl

Description: Small-sized and flattened (due to burial and early diagenetic processes) nautiloid specimen. The cross-section is not observable due to the high compaction. The conch is smooth and the suture is simple: almost straight with a very shallow sinus of the lateral lobe. The specimen consists of the phragmocone and partly of the body chamber; this represents a juvenile stage because there are no traces of sutural crowding.

Remarks: Based on the diagnosis of KUMMEL (1956, p. 377) *Eutrephoceras* comprises generally involute, smooth forms with straight or nearly straight sutures. The present specimen truly reveals these characters, and thus it unequivocally belongs to *Eutrephoceras*. Due to compaction, the cross-section is not observable (although the cross-section is essential for differentiating the various species of *Eutrephoceras*). Only an open nomenclature is applicable to this specimen. Based on the characteristics, this specimen belongs to that stock of *Eutrephoceras* species that are characterised by a smooth shell, no ornamentation, and a straight or almost straight suture line.

The specimen shows similarities to *E. sublaevigatum* (D'ORBIGNY); however, the latter has a much narrower umbilicus (cf. WANDERER 1909, Pl. 9. fig.1; WILMSEN 2016 Pl. 4. figs a1, b1). The FO of *E. sublaevigatum* is uppermost Cenomanian (WILMSEN 2016, fig. 3) and therefore the present specimen cannot belong to that species.

The present specimen has a similar shallow lateral lobe to that of *E. perlatum* (MORTON) and *E. sublaevigatum* (D'ORBIGNY); these latter two species occurred from the Albian to the Santonian (LESCHUKH *et al.* 2012, TAJIKA *et al.* 2017), but, they both have a wider umbilicus than *E. boissieri*.

NAGY (1960, p. 205) referred to a specimen of *E. boissieri* from the Hauterivian marls of the Gerecse Mts (Bersek Hill, collected by Gyula VÍGH in 1937 with no precise stratigraphic position). This is the closest to the present specimen with regard to its general characteristics

and the size of the umbilicus and the suture line. NAGY (1960, Pl. 3. fig. 1.) also described *Eutrephoceras boissieri* from the Bakony Mts, of Santonian age; however, this was later transferred to *Angulithes* by FÓZY (2001, p. 34, Pl. 5).

Occurrence: *Eutrephoceras boissieri* has a long stratigraphic range from the Hauterivian (possibly from the Valanginian) to the Campanian. Geographically, it has been reported from Hungary (Bersek Marl, Gerecse Mts NAGY 1960) and France (PICTET 1866).

Conclusions

With respect to Late Cretaceous representatives of the large, smooth-shelled nautiloid genera (*Angulithes*, *Eutrephoceras*), WILMSEN (2016) concluded that they predominantly occurred in the open-marine Pläner Marl (Cenomanian-Turonian). In contrast, ribbed forms of the members of the genera *Cymatoceras* and *Deltocymatoceras* have been identified from near-shore, coarse-grained sediments (CICHOWOLSKI *et al.* 2012, FRANK *et al.* 2013). Concerning the depositional environment of *Eutrephoceras* ex gr. *boissieri*, the present study assumes a hemipelagic marine milieu with an increasing sedimentation rate. In certain coarse-grained layers, remnants of leaves and other degraded organic tissues occur.

The first recording of the existence of nautiloids in the Lower Cretaceous of the Mecsek unit is important for palaeobiogeographic comparisons of Early Cretaceous successions in the whole Tisza and AlCaPa Mega-units. The described nautiloid resembles Early Cretaceous nautiloids described from the Gerecse Mts (Transdanubian Range) and from similar lithologies. However the poor preservation and diagenetic deformation of the specimen prevented further comparisons being made.

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