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The First Record of *Pachydiscus (Pachydiscus) launayi* (De Grossouvre) (Pachydiscidae, Ammonoidea) in the Lower Campanian Deposits (Upper Cretaceous) of Southwestern Crimea

E. Yu. Baraboshkin* (ORCID: 0000-0003-4373-1543)

Moscow State University, Moscow, 119991 Russia

**e-mail: EJBaraboshkin@mail.ru*

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Abstract—In the Lower Campanian, *Pachydiscus (Pachydiscus) launayi* (De Grossouvre) was found for the first time above a soap (bentonite) clay layer, which has been described well in the literature, in an abandoned quarry on the outskirts of Kudrino village in Southwestern Crimea. This finding expands our understanding of the distribution of this species and precises the biostratigraphic position of the soap clay layer.

Keywords: ammonite, *Pachydiscus launayi*, Upper Cretaceous, Lower Campanian, biostratigraphy, Southwestern Crimea

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INTRODUCTION

Findings of ammonites in Lower Campanian deposits of Crimea are very rare and known only from following publications. N.P. Mikhailov [1951] found Early Campanian ammonites above the soap clay layer in the Kuibyshevo (Belbek River) and Bakhchisaray districts: *Baculites vertebralis* Lam. (without illustration), *Pachydiscus* cf. *pseudostobaei* Mob., *P.* cf. *launayi* Grossouv. (without illustration), *Hauericeras* cf. *pseudogardeni* Schlüter. The first species characterizes Maastrichtian deposits, while the latter probably belongs to another species (Kennedy and Kaplan, 1995, p. 18). In (Moskvin, 1959), there is information (without figures) about findings of Early Campanian *Hauericeras pseudogardeni* (Schlüter) in the Belbek and Churyuk-Su river basins. It is possible that this determination is taken from a previous work. Previously, the rich assemblage of Campanian ammonites from the Belbek River basin was mainly attributed to the Late Campanian (Arkadiev and Bogdanova, 1997).

MATERIALS AND METHODS

The ammonite shell was found by the author in 2018 during the study of the Campanian section in the central part of an abandoned quarry on the northwestern outskirts of the Kudrino village (N 44°42′20.4″, E 33°56′29.4″), 20 cm above the top of a soap (bentonite) clay layer mined in the quarry. This interval characterizes the unit XVII of alternated clays and marls (wacke- and mudstones) of the Upper Cretaceous sequence belonging to the Lower Campanian Globotruncana elevata foraminiferal Zone (Kopaevich and Khotylev, 2014). This first finding of ammonite, made in the study area, confirms the Early Campanian age of rocks and the soap clay layer.

RESEARCH RESULTS AND THEIR DESIGNATIONS

Taxonomy

For our research, the standard terminology and measurements of shells given in (Arkadiev and Bogdanova, 1997) were used. Collection no. 149 is kept in the Earth Science Museum of Moscow State University.

Order Ammonoidea Zittel, 1884

Suborder Ammonitina Hyatt, 1889

Superfamily Desmoceratoidea Zittel, 1895

Family Pachydiscidae Spath, 1922

Subfamily Desmoceratinae Zittel, 1895

Genus and subgenus *Pachydiscus* Zittel, 1884

***Pachydiscus (Pachydiscus) launayi* De Grossouvre, 1894**

Figs. 1, 2.

1894 *Pachydiscus launayi*: de Grossouvre, p. 184, pl. 19.

? 1951 Pachydiscus cf. launayi: Mikhailov, p. 61.

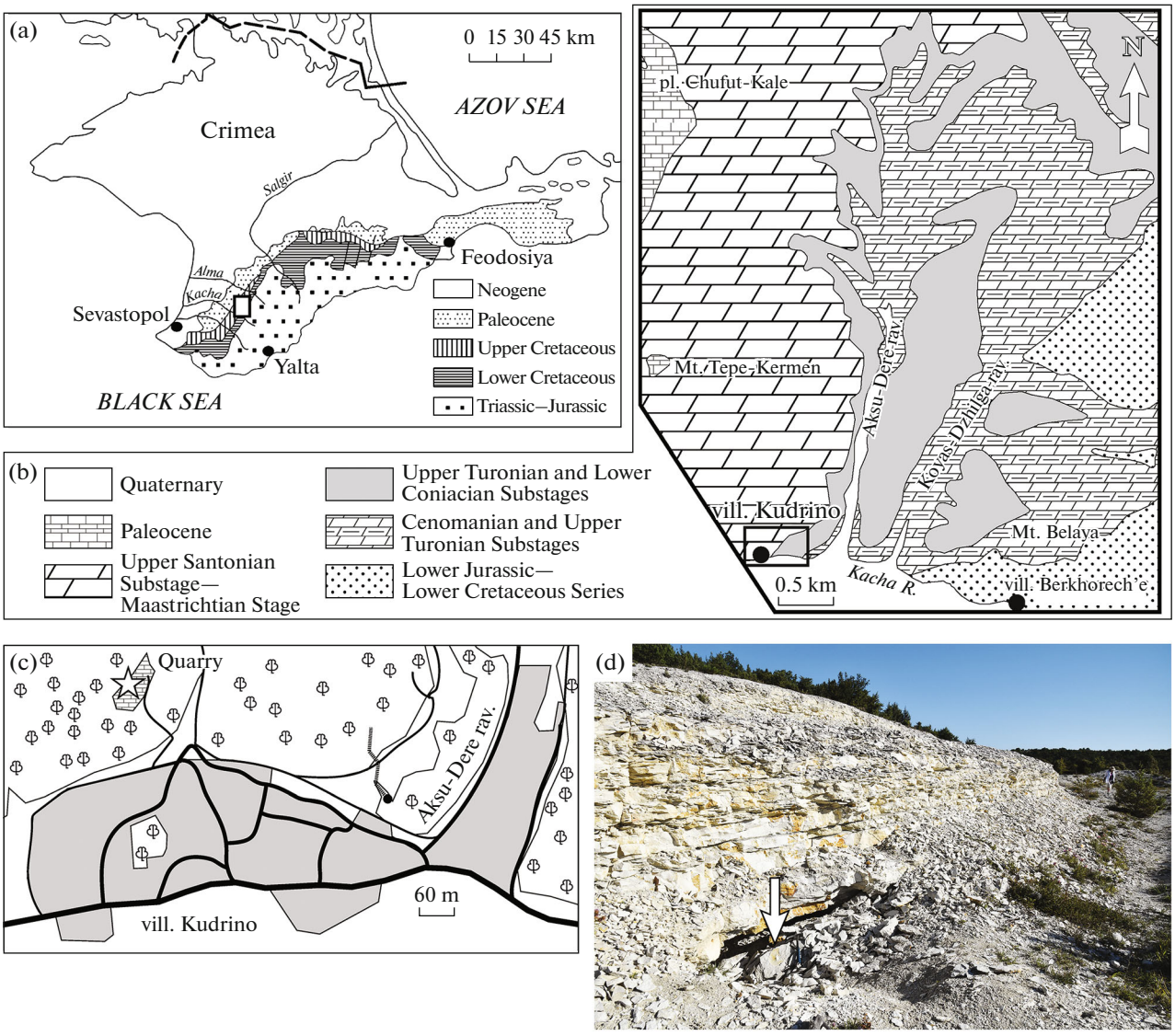

Fig. 1. The location scheme of the quarry (a–c); (d) the image of the ammonite locality (arrow) in abandoned quarry on the northwestern outskirts of the village of Kudrino. For scale, a 35-cm hammer to the right of the ammonite shell.

?1991 *Pachydiscus (Pachydiscus) launayi*: El-Asa'ad, p.140, text-Fig. 4.

?1998 *Pachydiscus (Pachydiscus) launayi*: Kennedy, Jagt, p.159, pl. 6, Fig. 1, 2 (with synonymy).

?1999 *Pachydiscus (Pachydiscus)* cf. *launayi*: Summesberger et al., p. 161, Pl. 3, Fig. 2; Pl. 4, Fig. 1; Pl. 5, Fig. 1 (with additional synonymy).

Holotype by monotypy, sample MNHN.F.J01912, Museum of Natural History, Paris, France. P. Arno's collection, holotype of A. de Grossouvre (de Grossouvre, 1894, pl. 19), Lower Campanian, the lower part of the Assiz-P1 Formation, Voulgézac (Charanta, France). Holotype is refigured in (Kennedy, 1986, p. 38, pl. 2, Figs. 1–2].

Description. Specimen is large, strongly and somewhat asymmetrically compressed laterally, so it is impossible to establish the shape of its section, the inclination angle of ribs on both sides of the specimen varies, and the dimensions given below do not correspond to the true ones. The specimen represents a large phragmocone 170 mm in diameter from the very beginning of the living chamber. The umbilicus has a diameter of 50 mm and a steep wall. On the phragmocone, ten primary (per half-whorl) ribs appear at the umbilical margin on medium whorls. Ribs are thin, slightly curved forward. Ribs on the ventral side are slightly thickened and curved forward. Intercalating ribs are present in the mid-whorl, which leads to a doubling of the number of ribs on the ventral side. The secondary ribs disappear at the end of the phragmocone; they are rare on adult whorls, thickened in the

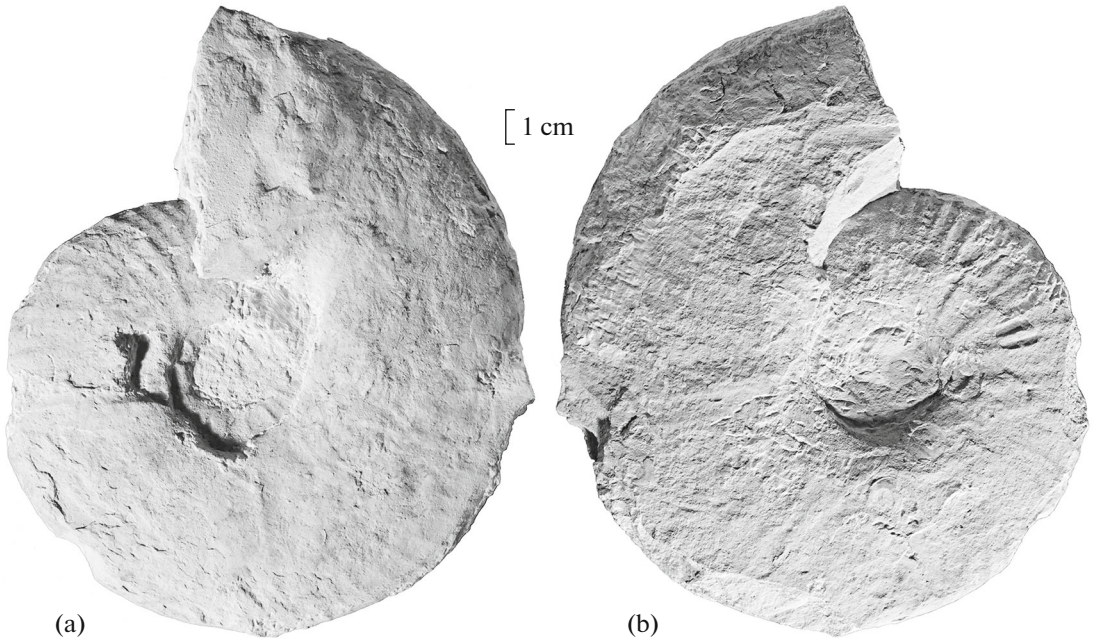

Fig. 2. *Pachydiscus (Pachydiscus) launayi* De Grossouvre: (1, 2) specimen no. 1/149, lateral view; an abandoned quarry on the northwestern outskirts of the Kudrino village, Bakhchisaray district, Republic of Crimea.

near-umbilical part, slightly inclined forward. Suture line is not observed.

Comparison. The most similar to *P.* (*P.*) *launayi* is *Pachydiscus* (*P.*) *duelmensis* (Schlüter), which is characterized by a thin dense ribbing (more than 60 ribs per a whorl). *Pachydiscus* (*P.*) *colligatus* (Binkhorst) has a narrower cross-section, a more involute shell and more densely arranged ribs, which start from a slight swelling.

Remarks. *Pachydiscus* cf. *launayi* from the Belbek River basin was not figured (Mikhailov, 1951), but is close in its description to the holotype. Due to this, it cannot be excluded that this species has already been found in the Crimean sections. Unfortunately, the place of its storage is not known.

Ribbing on the inner mould of *Eupachydiscus launayi* from Campanian deposits of Northern Caucasus (Moskvin, 1959, pl. XII, Fig. 2, p. 188) is not preserved. The same is characteristic of two other fragments of *Eupachydiscus* cf. *launayi* from Lower Campanian deposits of the Volga Region (Seltser and Ivanov, 2010). In both cases, the preservation of the findings seems insufficient to recoignize the species.

Pachydiscus (*P.*) cf. *launayi* de Grossouvre from (Wippich, 1995, p. 52, pl. 2, Fig. 3, 4) has widely spaced relatively rare ribs, resembling those in *Pachydiscus* (*P.*) *pseudostobaei* (Moberg). According to this, it differs from *Pachydiscus launayi*.

Distribution. Lower Campanian of Western Europe, Crimea, Arabian Peninsula, Madagascar.

Material. One specimen no. 1/149 (the Earth Science Museum of Moscow State University) from an abandoned quarry on the northwestern outskirts of Kudrino village, Bakhchisaray district, Republic of Crimea.

CONCLUSIONS

Thus, the discovery of the ammonite *Pachydiscus* (*P.*) cf. *launayi* de Grossouvre allowed us to confirm the Early Campanian age of the soap clay layer and the XVII unit of the Upper Cretaceous sequence.

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COMPLIANCE WITH ETHICAL STANDARDSs

Conflict of interests. The author declares that he has no conflicts of interest.

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