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Paleocene genus *Incisiochiton* Van Belle, 1985 (Mollusca: Polyplacophora) with the description of a new species from Ukraine

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ABSTRACT

The intraspecific variability of the type species of the genus *Incisiochiton* is discussed and a new species of this genus from Paleocene deposits of Ukraine is described. The new species differs from the type species of the genus by the presence of oval pustules near the jugum and strongly curved ribs in the central area.

Key words: Cenozoic, fossil chitons, new species, Schizochitonidae, variability

Палеоценовый род *Incisiochiton* Van Belle, 1985 (Mollusca: Polyplacophora) с описанием нового вида из Украины

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РЕЗЮМЕ

Обсуждается внутривидовая изменчивость типового вида рода *Incisiochiton* и описывается новый вид этого рода из палеоценовых отложений Украины. Новый вид отличается от типового вида рода наличием овальных пустул около югума и сильно изогнутыми ребрами в центральном поле.

Ключевые слова: Кайнозой, Schizochitonidae, ископаемые хитоны, новый вид, изменчивость

INTRODUCTION

The family Schizochitonidae Dall, 1889, with the characteristic deep cutting of the postmucronal area of the tail valve, includes only two shallow-water Recent species: *Schizochiton incisus* (Sowerby, 1841), widespread in the Indo-West Pacific, and *S. jousseau-meii* Dupuis, 1917, known only from the northeastern

Indian Ocean (Gulf of Aden and the entrance of the Red Sea) (Kaas et al. 2006). The first fossil species of the family, *Chiton baylei* Briart et Cornet, 1887, was described at the end of the 19th century from the Paleocene deposits of Belgium, Mons (Briart and Cornet 1887). Ladd (1966) added two more species: *Schizochiton incisus goikulensis* Ladd, 1966 and *S. marshallensis* Ladd, 1966. Since then, only in 1969

and 1976, *C. baylei* was mentioned in the literature in connection with new finds also in Paleocene deposits near the village of Luzanovka, Ukraine (Makarenko 1969, 1976), and more recently in the Paleocene of the Paris Basin (Merle et Pacaud 2018a, 2018b; Pacaud 2018). It should be noted here that in 1985 Van Belle described a new genus, *Incisiochiton* Van Belle, 1985, taking *C. baylei* as the type species. In 1999, Bielokrys (Bielokrys 1999) added three more extinct species to this family from the Upper Eocene deposits on the left bank of the Dnieper River in the vicinity of the city of Dnepropetrovsk: *Schizochiton parvus* Bielokrys, 1999, *S. carinatus* Bielokrys, 1999 and *S. hirtus* Bielokrys, 1999. Dell'Angelo et al. (2018) added one more fossil chiton, *S. tasteti*, from Gaas (Lagouarde), France, Aquitaine Basin, Oligocene (Rupelian). Thus, two recent and seven fossil species of the family are now known. The new material collected by B. Sirenko and part of the old material provided to us by D.E. Makarenko allowed us to obtain new data on the variability of the sculpture of the tegmentum of *Incisiochiton baylei* and describe a new species.

MATERIAL AND METHODS

All valves of two species were collected in the Luzanovka Beds, corresponding to the Danian and Selandian stages (59.2–66.0 Mya) (Makarenko 1976). This outcrop is situated near the small village of Luzanovka, south of Cherkassy, Ukraine. In order to get to the layer with fossil mollusks, a hole about 1.7 m deep had to be dug on the river bank. At the bottom of this hole, a 5–6 cm thick layer was found that consisted of whole mollusk shells (Polyplacophora, Scaphopoda, Bivalvia, and Gastropoda) and their fragments, as well as single corals and remains of sea urchin shells, polychaete tubes and fish teeth. The contents of the layer with the remains of fossil animals were washed in the river through a set of sieves with a mesh size of 10 mm, 5 mm and 1 mm. The separate valves of the chitons from the upper two sieves were selected under a magnifying glass and from the lower sieve under a MBS-9 microscope. The material contains 2 head valves, 24 intermediate valves, 11 tail valves and 61 fragments of valves, all separate from one another. One head, intermediate and tail valves of *S. baylei* were photographed using a Cannon G9 camera. Two intermediate and one tail valves of *S. baylei* and holotype and paratype of *S. pustulifer* sp. nov.

were examined under a FEI SEM Quanta 250 scanning electron microscope, following the method of Sirenko and Saito (2020).

SYSTEMATICS

Class Polyplacophora Gray, 1821

Subclass Loricata Schumacher, 1817

Order Chitonida Thiele, 1909

Suborder Chitonina Thiele, 1909

Superfamily Schizochitonoidea Dall, 1889

Family Schizochitonidae Dall, 1889

Genus *Incisiochiton* Van Belle, 1985

Type species. *Chiton baylei* Briart et Cornet, 1887 by original designation.

When describing the new genus *Incisiochiton*, Van Belle (1985) placed it in the family *Heterochitonidae* Van Belle, 1978 together with only superficially similar Mesozoic genera, without explaining the reasons. Later Sirenko (1993) transferred *Incisiochiton* to the family Schizochitonidae with the type genus *Schizochiton*, from which it differs little. The main features similar for both genera are the unique shape of the posterior valve with a deep and wide caudal fissure and the presence of large ocelli on the radial ridges. *Incisiochiton* differs from *Schizochiton* mainly by the sculpture of the tegmentum. The tegmentum of the first valve has 10–12 wide, flat radial ridges, with smooth interspaces between them in *Incisiochiton* (the tegmentum of the first valve is sculpted by six radial ridges concentrically crossed by many small zigzag or V-shaped grooves in *Schizochiton*).

Genus distribution. Mons, Belgium and Paris Basin, France. Luzanovka beds, Ukraine, Lower Paleocene.

***Incisiochiton baylei* (Briart et Cornet, 1887)**
(Figs 1, 2)

Chiton baylei Briart et Cornet, 1887: 78, pl. XXIV, fig. 11.

Lepidochiton baylei; Makarenko 1969: 26, figs 1–12.

Schizochiton baylei; Makarenko 1976: 163, pl. XVIII, figs 1–6, 15, 16, 19–25.

Incisiochiton baylei; Van Belle 1985: 55.

Schizochiton cf. *baylei*; Pacaud 2018: 24; Merle and Pacaud 2018a: 309, fig. 233J-K; Merle and Pacaud 2018b: 362, fig. 251D.

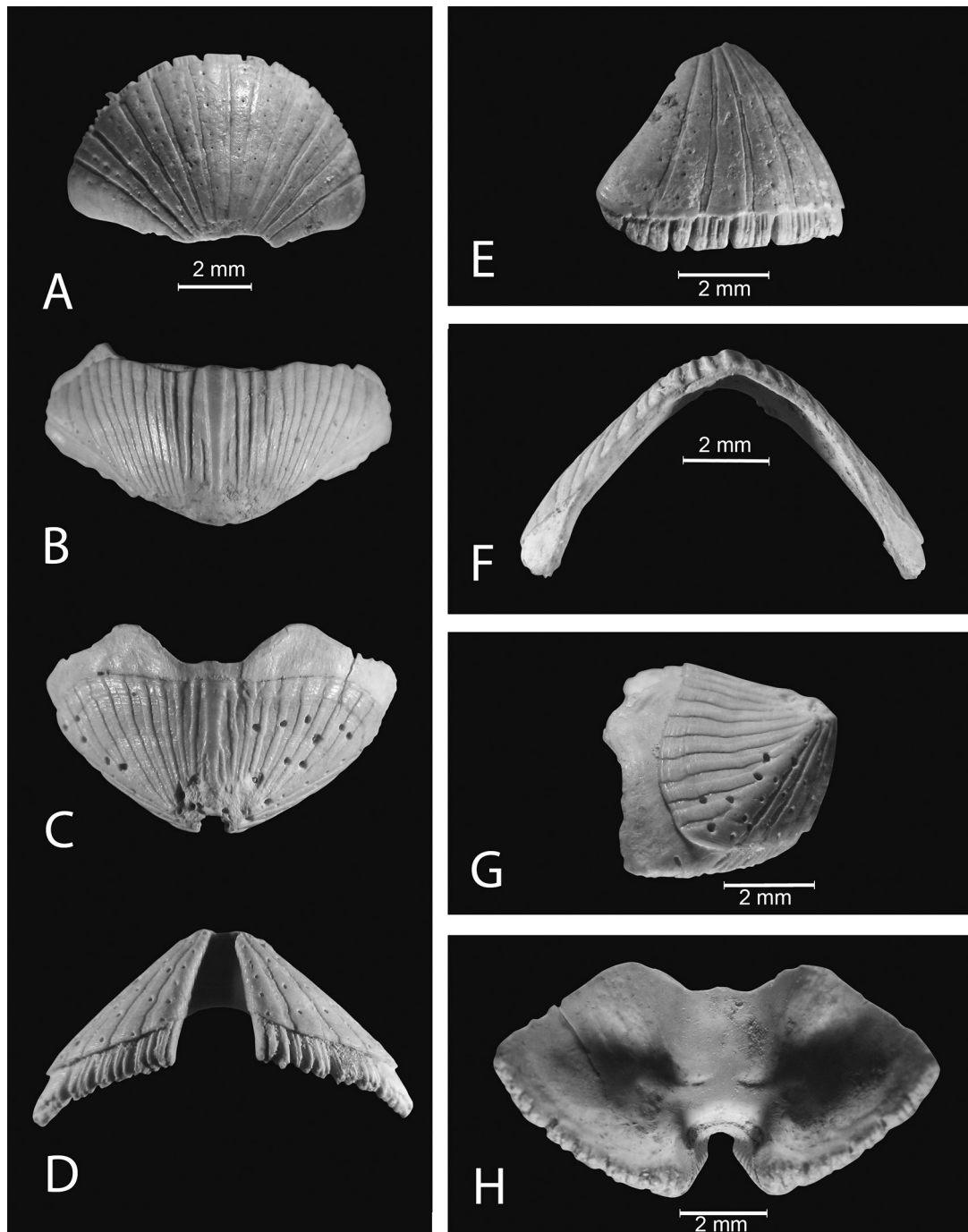


Fig. 1. *Incisiochiton baylei*. (ZIN 2448). A – head valve, dorsal view; B – intermediate valve, dorsal view; C – tail valve, dorsal view; D – tail valve, rear view; E – tail valve, lateral view; F – intermediate valve, rostral view; G – tail valve, lateral view; H – tail valve, ventral view.

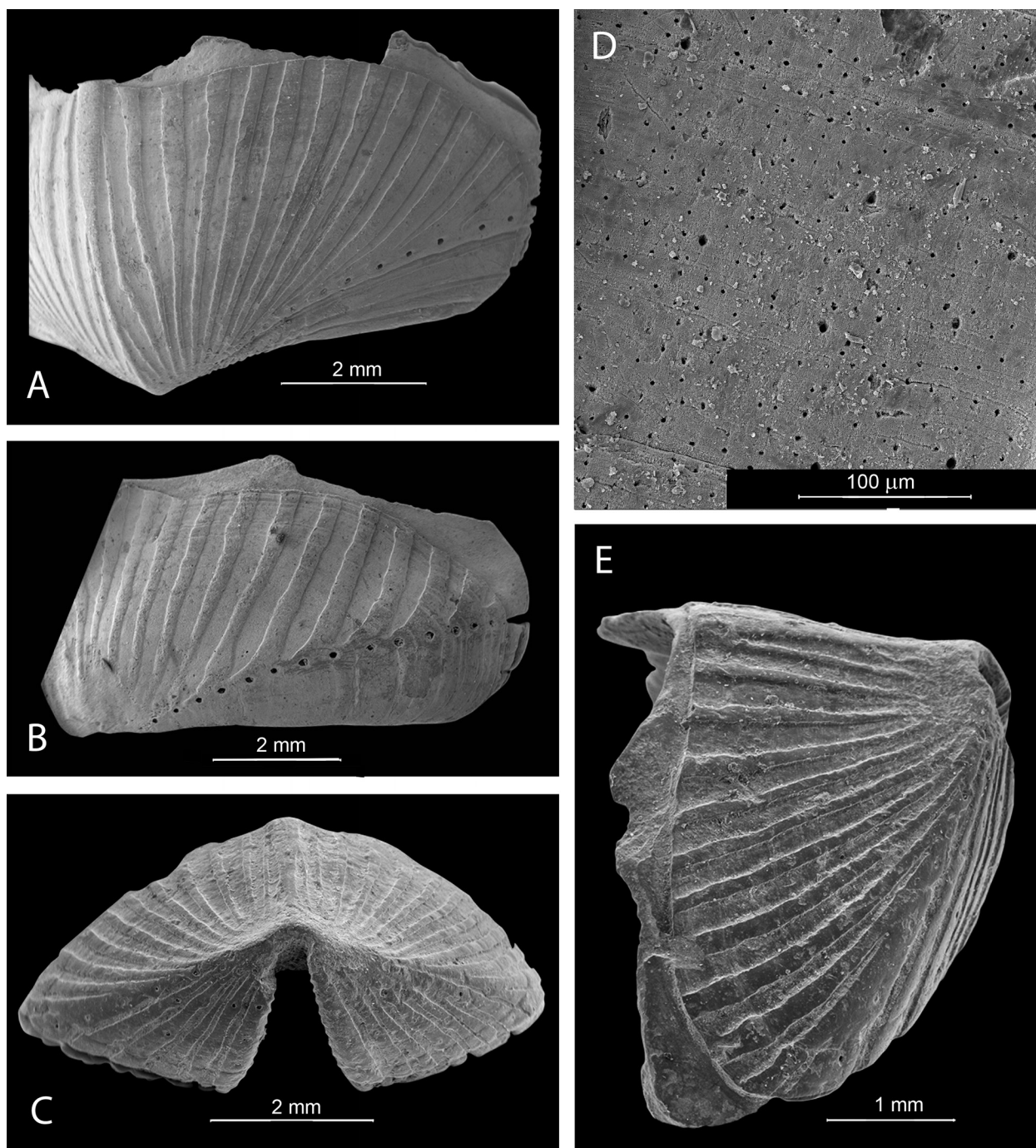


Fig. 2. *Incisiochiton baylei*. (ZIN 2448). A – intermediate valve with almost radial ribs in pleural area; B – intermediate valve with longitudinal ribs in central area; C – tail valve, rear view; D – intermediate valve, detail of sculpture of tegmentum with megal aesthetes and microaesthetes; E – tail valve, lateral view.

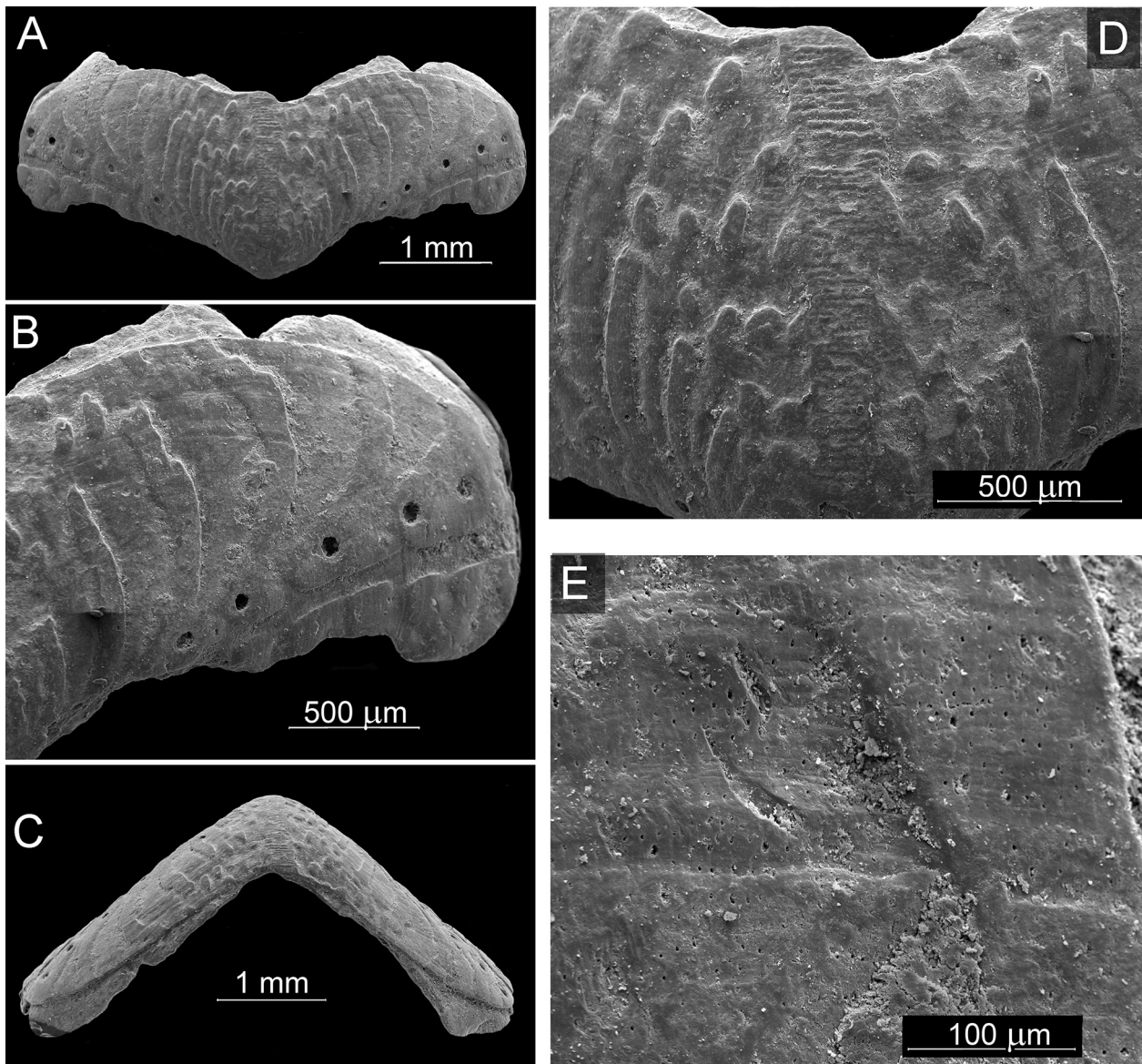


Fig. 3. *Incisiochiton pustulifer* sp. nov. holotype (ZIN 2446). A – intermediate valve, dorsal view; B – central and lateral areas of intermediate valve; C – intermediate valve, rostral view; D – jugal area of intermediate valve; E – intermediate valve, detail of sculpture of tegmentum in central area with megal aesthetes and microaesthetes.

Type material. Tail valve.

Occurrence. Lower Paleocene, Mons, Belgium, Paris Basin, France, and Luzanovka Beds, Ukraine.

Material examined. Lower Paleocene, Luzanovka Beds, Ukraine, 1 head valve, 9 intermediate valves and 5 tail valves collected by D.E. Makarenko; 1 head valve, 13 intermediate valves, 6 tail valves and 61 fragments of valves collected by B. Sirenko in 2001. The largest intermediate valve is 6 mm long and 13 mm

wide. The total length of the body of the chiton with an intermediate shield of this size should have been 40–45 mm, which is slightly larger than that of Makarenko (1969) (35 mm) and twice as small as that of Briart and Cornet (1887) (90–100 mm).

Remarks. The analysis of the available valves allowed us to make some additions to the description of the species in Briart and Cornet (1887) and Makarenko (1969) as well as to provide some data on the

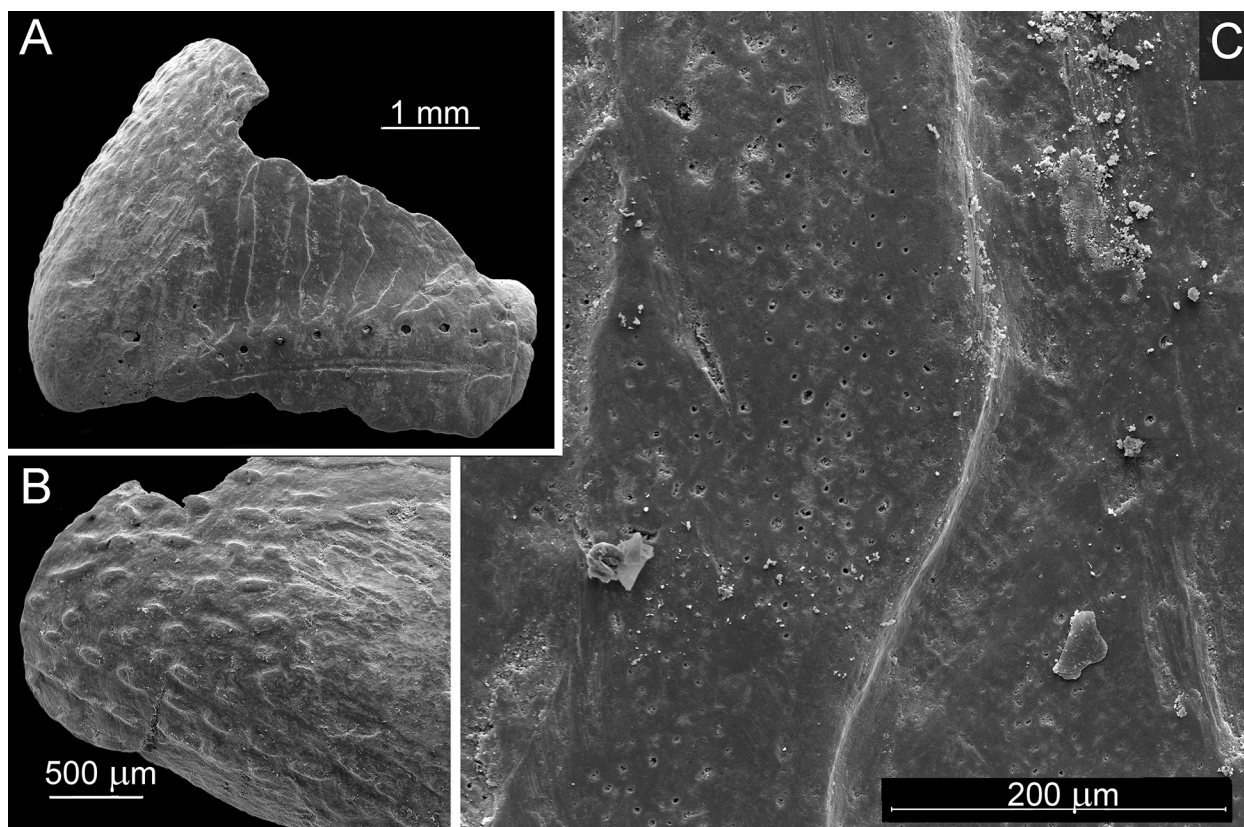


Fig. 4. *Incisiochiton pustulifer* sp. nov. paratype (ZIN 2447). A – intermediate valve, lateral view; B – intermediate valve, jugal area near apex; C – intermediate valve, detail of sculpture of tegmentum in central area with megal aesthetes and micro aesthetes.

variability of the sculpture of the tegmentum. The slit formula (13/1–rare 2/4+caudal fissure+4) was established on the valves with preserved insertion plates and slits. The head valve has about 12 flat, radial ribs. Each rib bears 8–9 large pores of ocelli in the middle. The central area of the intermediate valves on both sides of the jugal keel has 11–13 flat ribs with varying degrees of inclination to the diagonal ridge (Fig. 2A, B), from longitudinal to almost radial. In some specimens, the anterior parts of the 2–3 ribs closest to the jugum are bent to the jugum. Lateral areas are devoid of radial grooves or have 1, less often, 2 radial grooves. In addition to large ocelli, *I. baylei* has megal aesthetes (size 6–7 μm) and 20–25 micro aesthetes (size 2.5–3.0 μm) per one megal aesthete on the tegmentum.

***Incisiochiton pustulifer* sp. nov.**

(Figs 3, 4)

Type material. Ukraine, village of Luzanovka, south of Cherkassy: 2 intermediate valves, holotype,

ZIN 2446 (Fig. 3) and paratype, ZIN 2447 (Fig. 4), coll. B. Sirenko.

Etymology. The specific name is Latin noun *pustula* (pustule) with morpheme *fer* referring to the pustules that cover the tegmentum in this species.

Diagnosis. Intermediate valve rather short, broadly rectangular, carinated. Tegmentum near jugum covered with oval, elongate pustules (150–170 x 50–60 μm). Lateral areas with one wide radial groove. Diagonal ridge with six pores of ocelli in the middle. Central area with five flat bent ribs.

Description. Intermediate valve of holotype with 1.7 mm long and 4.6 mm wide, broadly rectangular, carinated, anterior margin concave, posterior margin slightly concave on either side of small pointed apex.

Tegmentum near jugum covered with oval, elongate pustules (150–170 x 50–60 μm). Lateral areas with one wide radial groove. Diagonal ridge with six pores of ocelli in the middle. Central area with five flat strongly curved ribs. In addition to large ocelli,

new species has 20–25 micraesthetes (size 2.0–3.0 µm) per one megal aesthete (size 6.0–7.0 µm).

Articulamentum well developed, apophyses wide and short, one slit per side.

Occurrence. Lower Paleocene, Luzanovka Beds, Ukraine.

Comparison. New species differs from *I. baylei* in having oval, elongate pustules near jugum, and strongly curved ribs in central area

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