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## First Paleocene *Lepidozona* (Mollusca: Polyplacophora: Chitonida) from Ukraine

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### ABSTRACT

A new species *Lepidozona luzanovkensis* sp. nov. from Paleocene deposits of Ukraine is described. This find is much earlier than the known finds from the late Eocene or Early Oligocene, which increases the age of the genus *Lepidozona* Pilsbry, 1892 by several million years.

**Keywords:** Cenozoic, Ischnochitonidae, new species, Paleocene chitons

## Первая палеоценовая *Lepidozona* (Mollusca: Polyplacophora: Chitonida) из Украины

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### РЕЗЮМЕ

Описан новый вид *Lepidozona luzanovkensis* sp. nov. из палеоценовых отложений Украины. Эта находка оказывается намного более ранней, чем известные до сих пор находки из поздне-эоценовых или ранне-олигоценовых отложений, что увеличивает возраст рода *Lepidozona* Pilsbry, 1892 на несколько миллионов лет.

**Ключевые слова:** кайнозой, Ischnochitonidae, новый вид, палеоценовые хитоны

## INTRODUCTION

The genus *Lepidozona* Pilsbry, 1892 was subsequently divided into the subgenera *Lepidozona* sensu stricto and *Tripoplax* Berry, 1919 by Kaas and Van Belle (1980) and later the rank of the latter was raised to generic level (Clark 2008). Since the controversy of dividing the genus *Lepidozona* into two subgenera has already been discussed by Sirenko (2016), this issue will not be touched upon further in this paper. Fifty seven Recent species of *Lepidozona* (including *Tripoplax*) inhabit the northern Indian Ocean (Arabian Gulf) and mainly the northern Pacific Ocean,

from the Bering Sea down to Western Australia and deep waters of Peru and Chile (Kaas and Van Belle 1987, 1990, 1998; Schwabe and Sellanes 2004; Sirenko 2016).

Members of the genus *Lepidozona* have a wide fossil record with 2 extinct species (*Lepidozona kanakoffi* Vondrasco et al., 2012 from the late Pliocene, San Diego formation, USA and *L. cowlitzensis* Dell'Angelo et al., 2012 from the latest Eocene or earliest Oligocene, Western Washington, USA), 4 Recent species from the late Pliocene, San Diego formation, California, USA, 3 Recent species from Pleistocene and Holocene, Boso and Miura Peninsulas,

Japan and 5 species from the Pleistocene and Miocene, Japan (Itoigawa and Nishimoto 1975; Itoigawa et al. 1976, 1981, 1982; Kuroda et al. 1980; Dell'Angelo et al. 2011; Vendrasco et al. 2012). Thus, to date, the oldest record of *Lepidozonia* is from the late Eocene or Early Oligocene. Species of *Lepidozonia* from the Paleocene sediments treated herein turn out to be several million years earlier than the known ones, which significantly increases the age of the genus under consideration. The following is an updated diagnosis of the genus.

**Diagnosis of genus *Lepidozonia* (modified from Kaas and Van Belle 1987)**

Chitons of small to large size, tegmentum usually sculptured with radial rows of pustules or graniferous ribs on end valves (15–70 or more radial ribs on head valve) and lateral areas of intermediate valves (3 or more ribs), with longitudinal riblets, interstices often latticed on central areas. Valves II–VIII with a delicately denticulate jugal plate, separated from apophyses by small notches. Girdle scale strongly convex, smooth or striated, in some species with a nipple-like prolongation near top.

It should be noted that there are significant similarities between some species of the genera *Lepidozonia* and *Callistochiton*, which apparently indicates an origin from common ancestors. Strack (1991) has already discussed this and I agree with his reasoning.

Species of *Lepidozonia* differ from species of *Callistochiton* by having more ribs (15–70 or more) on the head valve (*vs.* 6–15 in callistochitons), 3 or more ribs on the lateral area (*vs.* 1–4 ribs in callistochitons), tubercles on ribs (*vs.* coarsely nodulose ribs in callistochitons), dorsal scale of the girdle smooth or striated and often with a nipple on the top (*vs.* dorsal scale with longitudinal ribs and with no nipple in callistochitons).

**MATERIAL AND METHODS**

Valves of the new 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. The materials including two head and one second valves, as well as six halves of intermediate valves were collected by

the author in 2001. All the valves were examined under a scanning Electron Microscope FEI SEM Quanta 250.

According to Makarenko (1976), the bed in which various mollusk shells are found consists of clay, fine-grained, glauconite, carbonate, dark greenish-gray sand. The thickness of this bed is 0.6 m. In addition to the valves of chitons, shells of gastropods, scaphopods and bivalves, skeletons of single and colonial corals, fragments of skeletons of sea urchins, brachiopods, bryozoans, shark teeth, vertebrae and otoliths of fish were found in the Luzanovka deposits (Makarenko 1976).

**SYSTEMATICS**

**Class Polyplacophora Gray, 1821**

**Subclass Neoloricata Bergenhayn, 1955**

**Order Chitonida Thiele, 1909**

**Suborder Chitonina Thiele, 1909**

**Superfamily Chitonoidea Rafinesque, 1815**

**Family Ischnochitonidae Dall, 1889**

**Genus *Lepidozonia* Pilsbry, 1892**

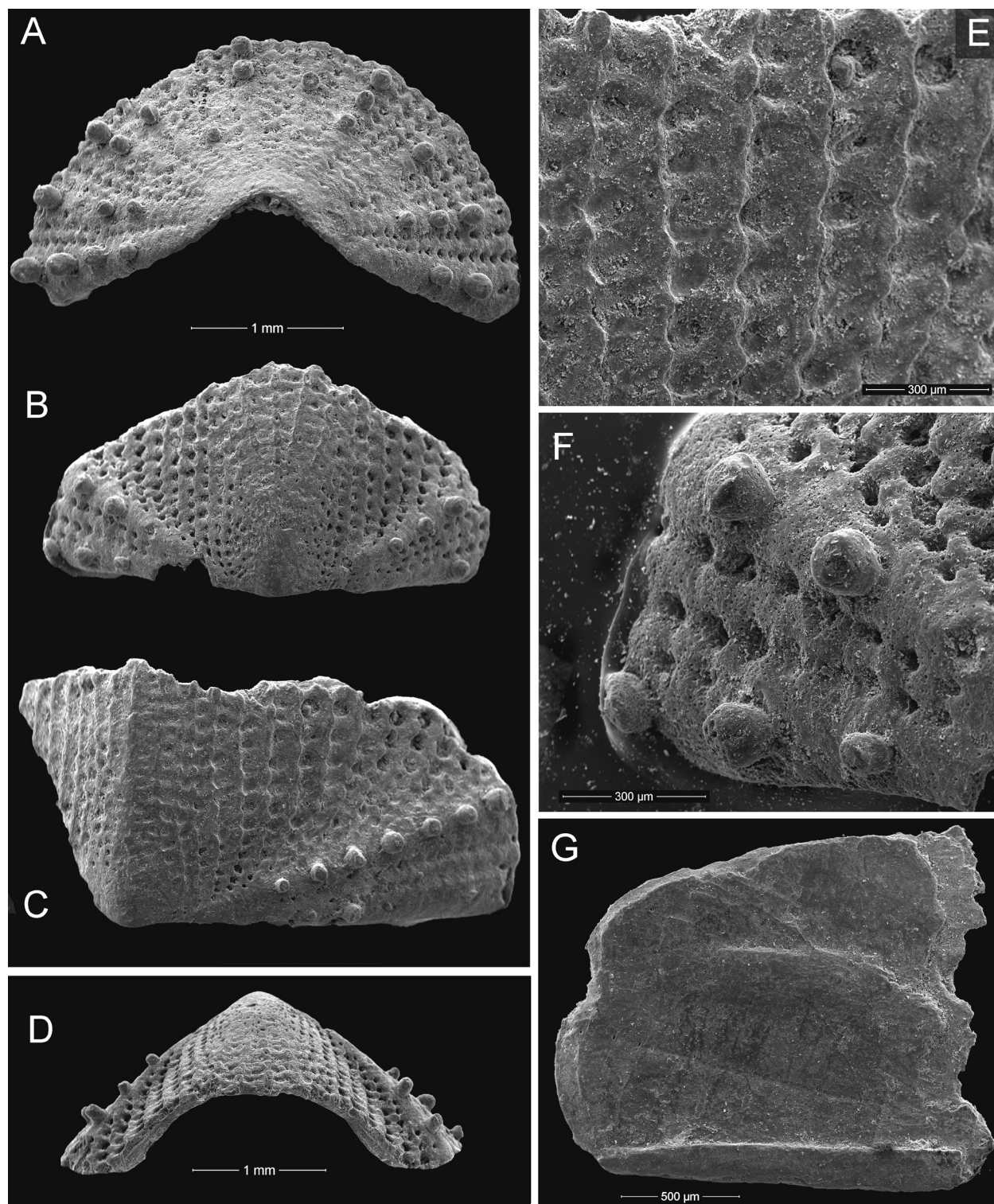
Type species. *Chiton mertensi* Middendorff, 1847 by original designation.

***Lepidozonia luzanovkensis* sp. nov.**  
(Figs 1–2)

**Type material.** Ukraine, village of Luzanovka, south of Cherkassy: 9 valves (2 head, 1 valve II and 6 halves of intermediate valves). Holotype, ZIN 2431 (second intermediate valve, Fig 1B, D, F) and 8 paratypes ZIN 2432 (2 head valves, Fig 1A; 6 halves of intermediate valves, Figs 1C, E, G, 2A, B; and unfigured lot), coll. B. Sirenko.

**Etymology.** The specific name refers to the village Luzanovka.

**Diagnosis.** Head valve with 26 flattened, radial ribs, 11 of which twice as wide as other ribs and bear 3–4 round tubercles, each ribs separated from adjacent ones by a row of minute pits. Lateral area of valve II with four radial ribs, two of which twice as wide as other ribs and bear 3–5 round tubercles (some eroded away). Central area with about 8–9 longitudinal riblets per side with well-developed cross riblets, resulting in a marked clathrate appearance of round pits, five jugal tract riblets tend to diverge anteriorly forming a wedge-like figure.



**Fig. 1.** *Lepidozonia luzanovkensis* sp. nov. A, C, E, G – paratypes (ZIN 2432), B, D, F – holotype (ZIN 2431). A – valve I, dorsal view; B – valve II, dorsal view; C – half of intermediate valve, dorsal view; D – valve II, rostral view; E – part of intermediate valve, central area, dorsal view; F – valve II, lateral and central areas; G – intermediate valve, ventral view.



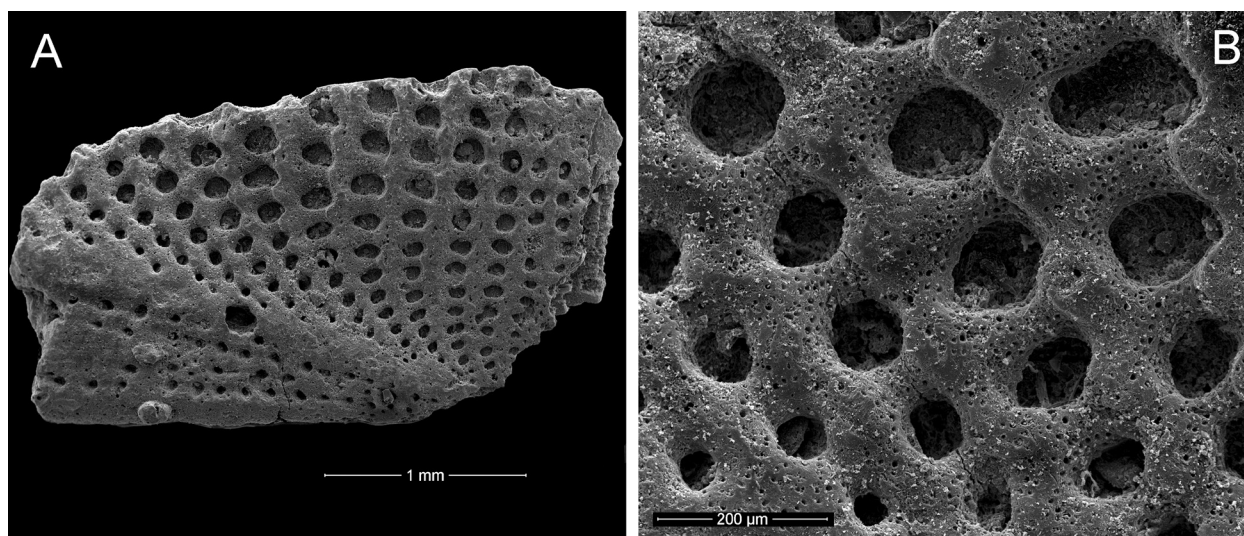


Fig. 2. *Lepidozона luzanovkensis* sp. nov., paratype (ZIN 2432). A – half of intermediate valve, dorsal view; B – intermediate valve, structure of tegmentum in central area.

**Description.** Animal of small size, about 8–9 mm, moderately raised (dorsal elevation 0.32 in holotype), carinated, valves not beaked. Measurements of valves: head valve: length – 1.0 mm, width – 3.3 mm; valve II: length – 1.6 mm, width – 2.8 mm; length of other valves: 1.2, 1.4, 1.5, 1.5, 1.7, 1.7, 1.7, 1.8 mm.

Head valve semicircular, front slope straight, posterior margin widely V-shaped, notched in middle. Valve II (holotype) with anterior margin somewhat produced in jugal part, slightly convex at pleurae, side margins straight, apices inconspicuous, lateral areas well defined, rather strongly elevated. Other intermediate valves more or less rectangular, front margin less convex, hind margin straight.

Tegmental surface richly sculptured. Head valve with 26 flattened, radial ribs, 11 of which twice as wide as other ribs and bear 3–4 round tubercles, each ribs separated from adjacent ones by a row of minute pits. Lateral area of valve II with four radial ribs, two of which twice as wide as other ribs and bear 3–5 round tubercles (some eroded away). Central area with about 8–9 longitudinal riblets per side with well-developed cross riblets, resulting in a marked clathrate appearance of round pits, five jugal tract riblets tend to diverge anteriorly forming a wedge-like figure. Lateral areas of other intermediate valves with five flattened riblets, two largest of which have up to 7 tubercles (some of them eroded away), central area with 12–13 longitudinal ribs per side and round pits.

Articulamentum well developed, apophyses and jugal plate probably broken, slit formula 9/1/?, slit rays hardly indicated, teeth short, not pectinated, eaves narrow, solid.

**Occurrence.** Lower Paleocene, Luzanovka Beds.

**Comparison.** New species is similar to *Lepidozона cowlitzensis* from the latest Eocene or earliest Oligocene, Western Washington, USA, but differs from the latter by having radial ribs of different width and pits between radial ribs in lateral areas of intermediate valves (*vs.* radial ribs are not visible and no pits in *L. cowlitzensis*). *Lepidozона luzanovkensis* sp. nov. slightly resembles the Recent species *L. andrijaschevi* (Jakovleva, 1952), *L. ima* Sirenko, 1975, *L. retiporosa* (Carpenter, 1864) and *L. balaenophylla* Schwabe et Sellanes, 2004 that have a characteristic pitted appearance on the central area. But the new species differs from them by having radial ribs of different width and pits between radial ribs in the head valve and lateral areas of intermediate valves (*vs.* radial ribs of the same width and no pits between radial ribs in *L. ima*, *L. retiporosa*, and *L. balaenophylla*), large tubercles only in 11 from 26 ribs in the head valve (*vs.* small tubercles in each radial ribs in *L. ima*, *L. retiporosa*, *L. andrijaschevi*, and *L. balaenophylla*). *L. luzanovkensis* sp. nov. differs from *Callistochiton pulchellus* (Gray, 1828), which has the same pitted appearance in the central area, by having pustules on radial ribs (*vs.* no pustules in *C. pulchellus*) and 26 radial ribs on the head valve (*vs.* 10–15 radial ribs in *C. pulchellus*).

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