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Middle Miocene (Badenian) chitons (Mollusca, Polyplacophora) from the Central Paratethys 3: additional data from Devecser (Bakony Mts, Hungary)

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Abstract – From the fossil-rich Middle Miocene sediments of Devecser, Tik-hegy only two Polyplacophora species have been identified so far (*Ischnochiton rissoi* (Payraudeau) and *Cryptoplax weinlandi* Šulc). In Tibor Berta's private collection and a small material by the author, fossil remains of six additional chiton species have been distinguished (*Leptochiton sulci* Bałuk, *Parachiton africanus* (Nierstrasz), *Lepidochitona* cf. *lepida* (Reuss), *Rhyssoplax corallina* (Risso), *R. olivacea* (Spengler), and *Acanthochitona lacrimulifera* Bałuk). The early Badenian chiton material of Devecser contains elements of the typical shallow-water Polyplacophora assemblages of the Central Paratethys. This is the first record of *L. sulci* and *A. lacrimulifera* from Hungary. *P. africanus* was also detected only recently for the first time in Hungary from the nearby Várpalota locality. With 29 figures.

Key words – *Acanthochitona*, *Cryptoplax*, *Ischnochiton*, *Lepidochitona*, *Leptochiton,* lower Badenian, *Parachiton,* polyplacophorans, *Rhyssoplax*

INTRODUCTION

Until recently, very little information was known on the Middle Miocene Polyplacophora fauna of Hungary, but nowadays more and more data are becoming available. This statement is also valid for the Bakony Mts, where the species *Lepidochitona subgranosa* Bałuk and *Acanthochitona faluniensis* (Rochebrune) were mentioned from Várpalota, Szabó sandpit by Polish researchers without illustrations and descriptions (Jakubowski & Musiał 1977; Studencka & Studencki 1988). Later, Dulai (2005) published a paper with detailed descriptions and SEM illustrations of eight chiton species from the Bánd and Devecser sites. The latter publication was based mainly on the material from Bánd locality, and described only two species from the Devecser, Tik-hegy site, based on five specimens (*Ischnochiton rissoi* (Payraudeau): 1 tail valve; *Cryptoplax weinlandi* Šulc: 2 intermediate and 2 tail valves). From the same site, based on the private collection of Tibor Berta (Veszprém) and the small material collected by the author, further polyplacophorans became known,

which significantly increase the number of known chiton species from Devecser, Tik-hegy. The aim of this paper is to describe briefly these new Devecser materials.

In parallel, further publications on the Polyplacophora fauna of other Hungarian Middle Miocene (Badenian) sites are being prepared. Eight species were described from two sites in Várpalota (Szabó sand pit and a temporary excavation in the Faller Street) (Dulai & Katona 2024), while three species from Borsodbóta (Schwabe & Dulai 2024), eight species from Letkés (Dulai 2025), and about a dozen species from Mecsekpölöske (Dulai & Szabó in prep.) were identified.

GEOLOGICAL SETTINGS

The Paratethys was a huge epicontinental sea that formed in the Early Oligocene and spread from the Rhône Basin in France towards Inner Asia during its maximum extent (Popov *et al.* 2004). The Central Paratethys includes the Eastern Alpine, and Carpathian Foreland Basins and the Pannonian Basin System. The Badenian (16.303 to 12.829 Ma) is a regional stage used in the Central Paratethys for part of the Middle Miocene (Langhian to middle Serravallian) (Papp *et al.* 1978; Hohenegger *et al.* 2014; Piller *et al.* 2007). Highly fossiliferous algal-bryozoan limestones and sands were deposited in the shallow marine warm-water environments during the Badenian (Kováč *et al.* 2007; Harzhauser & Piller 2007). The corallinacean limestones are ubiquitous but some coral patch reefs are also present, mainly in the early Badenian.

Devecser is located in the Bakony Mts, in the Devecser-Nyirád Basin (Fig. 1). The geology of the area was summarised by Selmeczi (2003). The basement of the basin is largely composed of Mesozoic and Eocene formations. After the Oligocene – Early Miocene terrestrial period, a marine transgression reached the area in the early Badenian. The sediments deposited during this period are classified as part of the Pécsszabolcs Member of the Lajta Formation (Selmeczi *et al.* 2024).

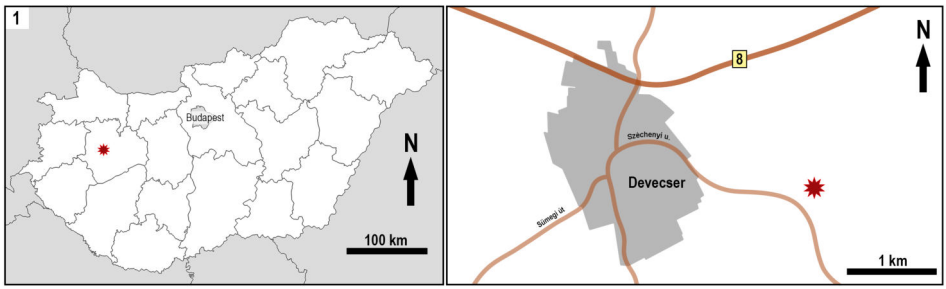


Fig. 1. Locality map showing the position of the early Badenian (Middle Miocene) fossil locality in Devecser, Tik-hegy

The Miocene Mollusca fauna of Devecser was published by Csepreghy-Meznerics (1958) without any illustrations and more accurate localization (29 Gastropoda, 8 Bivalvia, and 3 Scaphopoda species were listed). Later some gastropods were illustrated by Strausz (1966), while the cancellariid gastropods of the locality were discussed recently by Kovács & Vicián (2021). On the Tik-hegy (Tik Hill) east of Devecser (46.10221° N, 17.46773° E), amateur fossil collectors excavated some artificial trenches in 2004 and 2005 (Németh 2005) (Fig. 2). The 190-cm-thick, yellow calcareous sand yielded much richer mollusc material than the fauna previously known from this site (163 Gastropoda, 48 Bivalvia, 2 Scaphopoda; Németh 2005). This material was the source of the small Polyplacophora fauna of Devecser published by Dulai (2005), but later on additional chiton valves were found in the screen-washed residues, which are presented in this paper.

Figs 2. Temporary excavation at Devecser, Tik-hegy (Photo by Tamás Németh)

MATERIAL AND METHODS

Abbreviations used in the text: H = head valve; I = intermediate valve; T = tail valve; II = second valve of *Cryptoplax*; fr = fragments; HNHM = Hungarian National Museum Public Collection Centre – Hungarian Natural History Museum, Budapest.

The Polyplacophora material found in the Devecser, Tik-hegy site by private collector, Tibor Berta is the following:

Leptochiton sulci (Bałuk, 1971), 1 I (Figs 3–4), 2 T (Figs 5–8);
Parachiton africanus (Nierstrasz, 1906), 1 I (Figs 9–11);
Ischnochiton cf. *rissoi* (Payraudeau, 1826), 2 fr (Figs 12–13);
Rhyssoplax corallina (Risso, 1826), 2 I (Fig. 14);
Lepidochiona cf. *lepida* (Reuss, 1860), 3 I (Figs 16–18);
Acanthochitona lacrimulifera Bałuk, 1971, 7 I (Fig. 19), 3 T (Figs 20–21);
Cryptoplax weinlandi Šulc, 1934, 1 H (Fig. 22), 4 II (Figs 23–24), 10 I (Figs 25–29), 1 T.

The specimens investigated are currently in the private fossil collection of Tibor Berta (Veszprém), a retired teacher, but later will possibly be deposited in the collection of the Hungarian National Museum Public Collection Centre, Bakony Natural History Museum, Zirc.

Some additional chiton specimens were collected by the author, and deposited in the Palaeontological Collection of the Hungarian National Museum Public Collection Centre – Hungarian Natural History Museum, Budapest:

Rhyssoplax olivacea (Spengler, 1797), 2 I (HNHM INV 2024.591; Fig. 15);
Lepidochitona cf. *lepida* (Reuss, 1860), 1 I, 1 T (HNHM INV 2024.592);
Acanthochitona lacrimulifera Bałuk, 1971, 1 H, 5 I, 3 T (HNHM INV 2024.593);
Cryptoplax weinlandi Šulc, 1934, 2 H, 2 I (HNHM INV 2024.594).

The SEM photos were taken at the Plant Protection Institute, Centre for Agricultural Research, Martonvásár (Hitachi FlexSEM 1000 II).

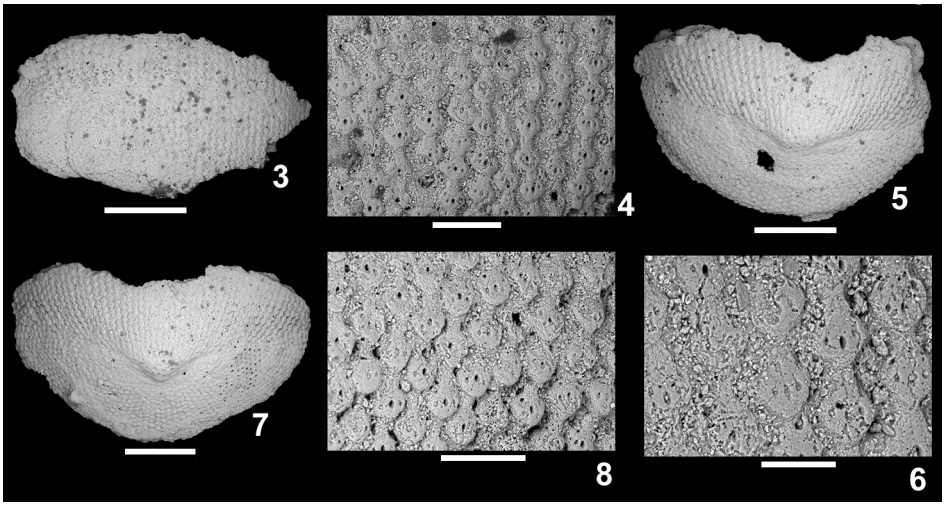
SYSTEMATIC PALAEONTOLOGY

Class Polyplacophora Gray, 1821
Subclass Neoloricata Bergenhayn, 1955
Order Lepidopleurida Thiele, 1909
Family Leptochitonidae Dall, 1889
Genus *Leptochiton* Gray, 1847

Leptochiton sulci (Bałuk, 1971)
(Figs 3–8)

1971 *Lepidopleurus sulci* sp. n. – Bałuk, pp. 455–456, pl. 2, figs 1–4.
2015 *Leptochiton sulci* (Bałuk, 1971) – Ruman & Hudáčková, p. 158, fig. 2.2.–2.6. (cum syn.)

Material – 1 intermediate, and 2 tail valves.



Figs 3–8. *Leptochiton sulci* (Bałuk, 1971). – **Figs 3–4.** Fragmentary intermediate valve. – **Fig. 3.** Dorsal view. – **Fig 4.** Enlarged detail of surface ornamentation. – **Figs 5–6.** Fragmentary tail valve. – **Fig. 5.** Dorsal view. – **Fig 6.** Enlarged detail of surface ornamentation. – **Figs 7–8.** Tail valve. – **Fig. 7.** Dorsal view. – **Fig. 8.** Enlarged detail of surface ornamentation. Scale bars: 3, 5, 7: 0.5 mm; 4, 8: 100 μm; 6: 50 μm

Remarks – The species *L. sulci* was described from Korytnica by Bałuk (1971), who recognized its similarity to *L. cancellatus* (Sowerby) but regarded the Miocene species to be its ancestral form, and emphasized the larger size of the fossil species. Laghi (1977) considered the two species to be conspecific, which was not accepted by Bałuk (1984) because of the high variability in the ornamentation of *L. cancellatus*. At the same time, however, he does add two important distinguishing characters for the diagnosis of the species *sulci*: the granules in the longitudinal rows are connected with a ridge, and the granules in adjacent rows form a regular quincuncial pattern (Bałuk 1984: pl. 3, figs 1–2). These differences are also illustrated in a drawing by Macioszczyk (1988: textfig. 3a) (although he used the word bridges instead of ridges), who also points out the difference in the number of microaesthetes on the granules (*sulci*: 3–4, *cancellatus*: 5–7). Studencka & Dulai (2010) described the species *L. cancellatus* from the Ukrainian Miocene, and also argued for the validity of the species *L. sulci*. In some publications it was indicated that *L.* cf. *cancellatus*, described without illustration in Šulc (1934), may also belong to the species *sulci*.

The studied valves from Devecser show a good correspondence with the descriptions and illustrations in the cited references. The dense longitudinal rows of granules in the central area of the intermediate valve (Figs 3–4) and in the antemucronal area of the tail valve (Figs 5–6, 7–8) show the characteristic ornamentation of the species. In all three specimens, ridges connect the granules within

longitudinal rows, a quincuncial arrangement of the adjacent rows can be seen, and 3–4 microaesthetes on granules are observed (Figs 4, 6, 8). The number of longitudinal rows is reported to be around 60 in the literature. On the highly fragmentary intermediate valve, 40–41 rows are counted, while 53 and 56 longitudinal rows are observable on the two (also partly fragmentary) tail valves.

So far, the species *sulci* has been described from the Central Paratethys, and mainly from its northernmost regions (Poland, Slovakia, Austria?). It is the first record of *L. sulci* from Hungary. The Devecser, Tik-hegy occurrence is the southernmost record known so far, but *L. sulci* has also found in the Mecsekpölöske site in Southern Hungary, which is being processed after the Devecser material (Dulai & Szabó in prep.).

Habitat – *L. sulci* is an extinct species in the Central Paratethys. Its closely related modern species, *L. cancellatus* is an eurybathial taxon, with a wide bathymetric range, known between 0 and 920 m, but more common between 10 and 100 m (Dell'Angelo *et al.* 1998), and frequently found in detritus of the coralligenous biocoenosis (Dell'Angelo & Smriglio 1999).

Distribution within the Central Paratethys – Austria? (Šulc 1934; without illustration), Hungary (this paper; Dulai & Szabó in prep.), Poland (Bałuk 1971, 1984; Macioszczyk 1988; Studencka & Studencki 1988), and Slovakia (Tomašových 1998; Ruman & Hudáčková 2015).

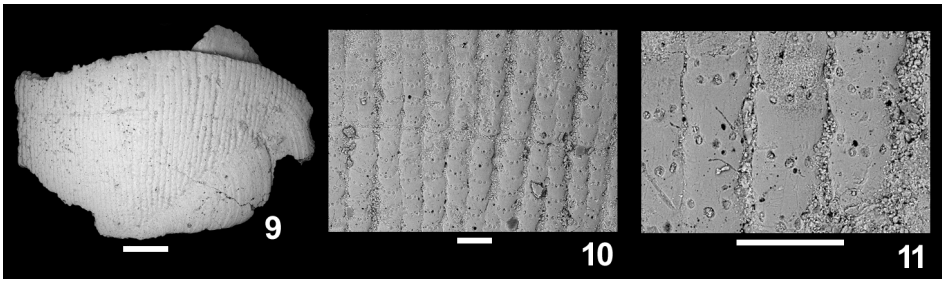
Genus *Parachiton* Thiele, 1909

Parachiton africanus (Nierstrasz, 1906) (Figs 9–11)

2015 *Parachiton africanus* (Nierstrasz, 1906) – Ruman & Hudáčková, p. 158, fig. 2.1. (cum syn.)
2024 *Parachiton africanus* (Nierstrasz, 1906) – Dulai & Katona, pp. 35–37, figs 8–9.

Material – 1 intermediate valve.

Remarks – The species *P. africanus* (Nierstrasz) was unknown from the Hungarian Miocene until recently, but in the previous part of this study series Dulai & Katona (2024) described a tail valve from the temporary excavation of Várpalota, Faller Street locality. In the present study, the species is identified in another site from the Bakony Mts, also in very limited numbers, a single intermediate valve was recovered. Although the specimen is fragmentary, it is well identifiable with the species *africanus*. The available valve is laterally elongated, rectangular, the lateral margin may be slightly curved (but fragmented on both sides), and no visible apex was formed (Fig. 9). The lateral area is not elevated, can be separated only by its ornamentation. The lateral area is almost completely smooth, ornamented only by growth lines of variable thickness. Jugal area is not distinct, the central area is orna-



Figs 9–11. *Parachiton africanus* (Nierstrasz, 1906). Fragmentary intermediate valve. – **Fig. 9.** Dorsal view. – **Figs 10–11.** Enlarged details of surface ornamentation of the central area. Scale bars: 9: 0.5 mm, 10, 11: 100 μm

mented with very flat granules arranged in longitudinal rows. The granules in the rows are completely confluent to form almost continuous costellae, but the flattened granules are often also almost convergent laterally, sometimes leaving no space between the two ribs (Figs 10–11) (cf. Dell'Angelo & Smriglio 1999: pl. 24, fig. K; Ruman & Hudáčková 2015: fig. 21b). For more information on the species *africanus*, see the previous paper in this series by Dulai & Katona (2024).

Habitat – *P. africanus* typically associated with rhodalgal facies between 25–150 m, loose valves are not rare within calcareous algal-rich biogenic sediments (Dell'Angelo *et al*. 1998).

Distribution within the Central Paratethys – It is one of the rare Polyplacophora species of the Central Paratethys, but more and more occurrences are known: ?Austria (Šulc 1934), Hungary (Dulai & Katona 2024; this paper; Dulai 2025), Poland (Bałuk 1971, 1984), and Slovakia (Ruman & Hudáčková 2015).

Order Chitonida Thiele, 1909
Suborder Chitonina Thiele, 1909
Superfamily Chitonoidea Rafinesque, 1815
Family Ischnochitonidae Dall, 1889
Genus *Ischnochiton* Gray, 1847

Ischnochiton cf. *rissoi* (Payraudeau, 1826)
(Figs 12–13)

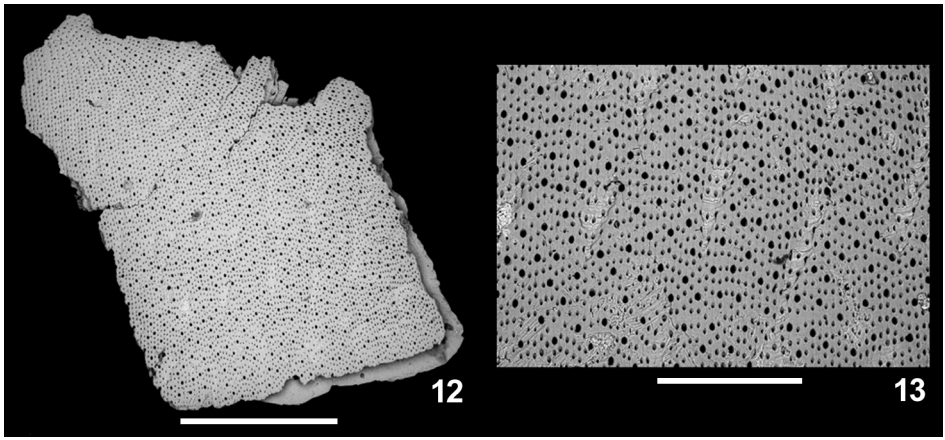
1999 *Ischnochiton* (*Ischnochiton*) *rissoi* (Payraudeau, 1826) – Dell'Angelo & Smriglio, pp. 100–105, pl. 29–31, figs 40–48. (cum syn.)

2005 *Ischnochiton rissoi* (Payraudeau, 1826) – Dulai, pp. 33–36, pl. III, figs 1–5. (cum syn.)

Material – 2 fragments.

Remarks – Although only very fragmentary valves were found in the available

limited material, on the basis of the characteristic micro-ornamentation (cf. Dulai 2005, Pl. III, fig. 3), and as the species *I. rissoi* was already known from the site (Dulai 2005), the presence of this species from Devecser can be confirmed. It is common in the Miocene sediments of the Central Paratethys, and it was referred to as *I. rudolticensis* (Šulc) in some earlier literature (Šulc 1934; Bałuk 1971). Among other Middle Miocene sites in the Bakony Mts it is unknown from Bánd (Dulai 2005), but was found to be common in the Várpalota sites (Dulai & Katona 2024).



Figs 12–13. *Ischnochiton rissoi* (Payraudeau, 1826). Eroded fragment. – **Fig. 12.** Dorsal view. – **Fig. 13.** Enlarged part of the surface showing the pore system. Scale bars: 12: 0.5 mm, 13: 200 μm

Habitat – *I. rissoi* (Payraudeau) adhers to stones and dead shells in very shallow water (1–5 m, rarely down to 100 m, always on hard substrate) (Dell'Angelo & Smriglio 1999; Dell'Angelo *et al.* 1998).

Distribution within the Central Paratethys – Austria (Kroh 2003), Czech Republic (Šulc 1934), Hungary (Dulai 2005, 2025; Dulai & Katona 2024; this paper), Poland (Bałuk 1971, 1984), Romania (Dell'Angelo *et al.* 2007), and Ukraine (Studencka & Dulai 2010).

Family Chitonidae Rafinesque, 1815
Subfamily Chitoninae Rafinesque, 1815
Genus *Rhyssoplax* Thiele, 1893

Rhyssoplax corallina (Risso, 1826)
(Fig. 14)

1999 *Chiton* (*Rhyssoplax*) *corallinus* (Risso, 1826) – Dell'Angelo & Smriglio, pp. 174–178, pls 58–59, figs 97–107. (cum syn.)

2015 *Chiton corallinus* (Risso, 1826) – Ruman & Hudáčková, pp. 160–162, figs 3.7, 4.1. (cum syn.)
2024 *Rhyssoplax corallina* (Risso, 1826) – Dulai & Katona, pp. 41–42, figs 27–29.
2024 *Rhyssoplax corallina* (Risso, 1826) – Schwabe & Dulai, pp. 60–61, figs 8–10.

Material – 2 intermediate valves.

Remarks – It is a common Polyplacophora species in the Central Paratethys, generally known from many localities, but usually occurring in small numbers. In earlier literature, sometimes it was referred to as *Ch. denudatus* Reuss from the Central Paratethys (e.g. Reuss 1860; Rochebrune 1883; Procházka 1895; Bałuk 1971). The species is mainly preserved as its intermediate valves, which can be distinguished from the other *Rhyssoplax* species (*R. olivacea*) of the Central Paratethys even in fragmentary form, if the lateral area is preserved. The lateral area is smooth in *corallina* and ribbed in *olivacea* (compare Figs 14 and 15).

Habitat – *R. corallina* is regarded an eurybathial species, living between 0 and over 100 m mostly on coralligenous bottoms (Dell'Angelo *et al.* 1998; Dell'Angelo & Smriglio 1999).

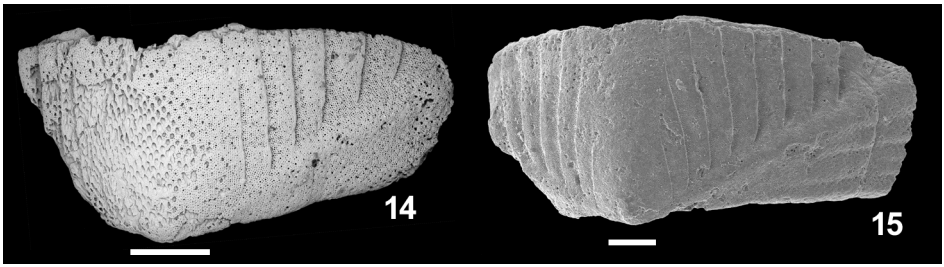


Fig. 14. *Rhyssoplax corallina* (Risso, 1826). Eroded fragmentary intermediate valve, dorsal view. – **Fig. 15.** *Rhyssoplax olivacea* (Spengler, 1797). Fragmentary intermediate valve, dorsal view. Scale bars: 0.5 mm

Distribution within the Central Paratethys – Austria, Czech Republic, Hungary (Dulai 2005, 2025; Dulai & Katona 2024; Schwabe & Dulai 2024; this paper; Dulai & Szabó in prep.), Poland, Romania, Slovakia, and Ukraine (see details in Ruman & Hudáčková 2015 and Schwabe & Dulai 2024).

Rhyssoplax olivacea (Spengler, 1797)
(Fig. 15)

2007 *Chiton* (*Rhyssoplax*) *olivaceus* Spengler – Dell'Angelo *et al.*, pp. 42–43, fig. 4d, f. (cum. syn.)
2015 *Chiton olivaceus* Spengler, 1797 – Ruman & Hudáčková, pp. 162–164, fig. 4.2. (cum syn.)

Material – 2 intermediate valves.

Remarks – According to Dell'Angelo *et al.* (2007), *R. olivacea* is the most common and best-known recent Mediterranean Polyplacophora species. It is also ubiquitous in the Miocene of the Central Paratethys, however, some other species (e.g., *Acanthochitona faluniensis* (Rochebrune), or *Cryptoplax weinlandi* Šulc) are more frequent, and even the other *Rhyssoplax* species, *corallina* seems to be more common. It can be differentiated from *R. corallina* by the radial grooves on the lateral area of the intermediate valves (compare Figs 14 and 15). Another similar fossil species from the European Neogene is *Chiton miocenicus* described from the Turin Hills by Michelotti (1847). This species is considered by some authors to be conspecific with the species *olivacea*, while others suggest that in *miocenicus* the number of radial grooves is much higher in the head valve, in the pleural area of the intermediate valve and in the postmucronal area of the tail valve (e.g. Dell'Angelo *et al.* 2001, 2004). The species *olivacea* was often referred to as *Chiton bohemicus* or *Gymnoplax bohemicus* in earlier literature from the Central Paratethys (Rochebrune 1883; Šulc 1934; Marinescu 1964; Bałuk 1965), while Van Belle (1980) used the name *rudelsdorfensis*.

Habitat – *R. olivacea* lives under stones and rocky fragments, from the lower mesolittoral down to a depth of 5–6 metres, rarely down to 35–40 metres, sometimes on rocks covered with algae and vermetids (trottoir) (Dell'Angelo & Smriglio 1999).

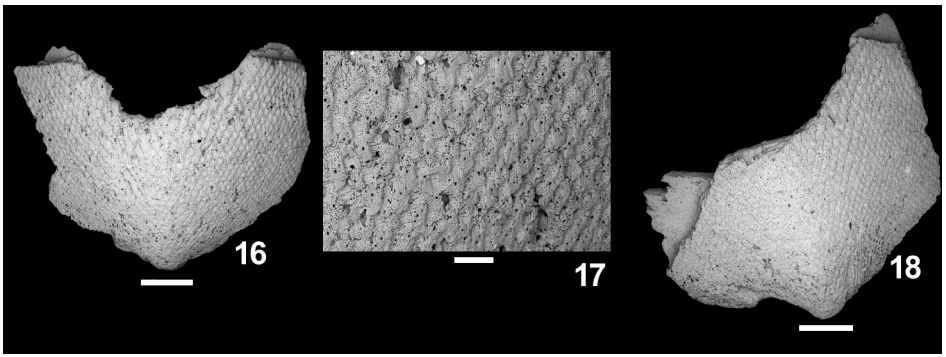
Distribution within the Central Paratethys – Austria (Šulc 1934), Czech Republic (Šulc 1934), Hungary (Dulai 2005, 2025, this paper; Dulai & Szabó in prep.), Poland (Bałuk 1965; Macioszczyk 1988), Romania (Šulc 1934; Zilch 1934; Marinescu 1964; Dell'Angelo *et al.* 2007), Slovakia (Ruman & Hudáčková 2015), and Ukraine (Studencka & Dulai 2010).

Suborder Acanthochitonina Bergenhayn, 1930
Superfamily Mopalioidea Dall, 1889
Family Lepidochitonidae Iredale, 1914
Subfamily Lepidochitoninae Iredale, 1914
Genus *Lepidochitona* Gray, 1821

Lepidochitona cf. *lepida* (Reuss, 1860)
(Figs 16–18)

2015 *Lepidochitona lepida* (Reuss, 1860) – Ruman & Hudáčková, p. 164, fig. 5.6. (cum syn.)
2024 *Lepidochitona lepida* (Reuss, 1860) – Dulai & Katona, pp. 39–41, figs 19–26.

Material – 4 intermediate, and 1 tail valves.
Remarks – The *Lepidochitona* remains recovered from the site are in a tran-



Figs 16–18. *Lepidochiona* cf. *lepida* (Reuss, 1860). – **Figs 16–17.** Fragmentary intermediate valve. – **Fig. 16.** Dorsal view. – **Fig 17.** Enlarged details of surface ornamentation. – **Fig. 18.** Fragmentary intermediate valve, dorsal view. Scale bars: 16, 18: 0.5 mm; 17: 100 μm

sitional position in terms of abundance behind the dominant *Cryptoplax* and *Acanthochitona*, but ahead of the accessory elements, which occur in only 1–2 specimens. All known valves are fragmentary and eroded. The surface of the tegmentum is ornamented with fine granules arranged in intersecting rows. The *Lepidochitona* material of the Central Paratethys needs a comprehensive revision, until then the specimens from Devecser are provisionally assigned to the species *L. lepida*.

Habitat – *L. lepida* (Reuss) is an extinct, mainly Central Paratethyan species. Among the closely related recent species, *L. cinerea* (Linnaeus) prefers areas free of currents up to 10 m depth in the lower mesolittoral and infralittoral zones (Dell'Angelo & Smriglio 1999).

Distribution within the Central Paratethys – Czech Republic, Hungary, Poland, Romania, and Ukraine (see details in Dulai & Katona 2024).

Superfamily Cryptoplacoidea H. et A. Adams, 1858
Family Acanthochitonidae Pilsbry, 1893
Genus *Acanthochitona* Gray, 1821

Acanthochitona lacrimulifera Bałuk, 1971
(Figs 19–21)

1971 *Acanthochitona lacrimulifera* sp. n. – Bałuk, p. 464, pl. 2, figs 6–9.
1984 *Acanthochitona fascicularis* (Linnaeus, 1766) – Bałuk, p. 291, pl. 9, fig. 2.
1988 *Acanthochitona fascicularis* (Linnaeus, 1767) – Studencka & Studencki, p. 41, pl. 4, figs 1, 2.
1998 *Acanthochitona fascicularis* (Linné, 1767) – Dell'Angelo *et al*., p. 249, pl. 3, figs 8, 9.
2004 *Acanthochitona fascicularis* (Linnaeus, 1767) – Dell'Angelo *et al*., p. 40, pl. 3. fig. 8, pl. 4, fig. 1.

2004 *Acanthochitona crinita* (Pennant, 1777) – Dell'Angelo *et al*., p. 40, fig. 5. (non fig. 2, = *A. oblonga* Leloup, 1981).
2009 *Acanthochitona fascicularis* (Linnaeus, 1767) – Koskeridou *et al*., pp. 322–323, fig. 11.3–6.
2013 *Acanthochitona fascicularis* (Linnaeus, 1767) – Dell'Angelo *et al*., pp. 95–96, pl. 10, figs D–E.

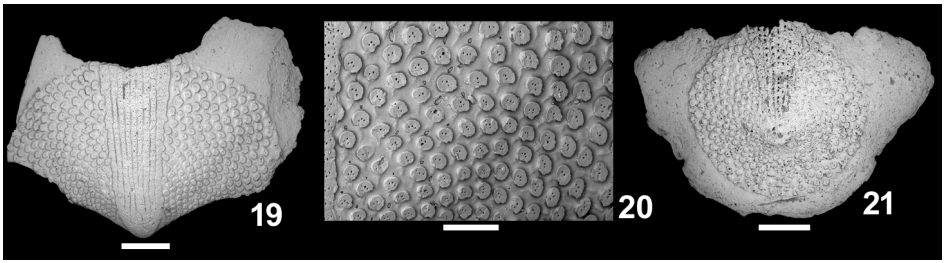
Material – 1 head, 12 intermediate, and 6 tail valves.

Remarks – This species is the second most abundant Polyplacophora species from the Devecser site. The surface of the lateropleural area of the intermediate valve is covered with rounded and flat granules with a narrow ridge pointing roughly towards the apex of the intermediate valve. This ridge is much lower than the granules, its length is approximately equal or near to the diameter of the granules, and it is directed between the two granules in the next row.

The species *lacrimulifera* was described by Bałuk (1971) from the Middle Miocene of Poland (Korytnica). According to the diagnosis, the tegmentum is ornamented with fine tear or raindrop-shaped granules. Bałuk recognised the similarity of his species to the recent *A. fascicularis* and considered the fossil species to be its Miocene ancestor. Laghi (1977) supposed the two species to be conspecific, which was later accepted by Bałuk (1984), who described the newly recovered specimens from Korytnica site as *A. fascicularis*. At the same time, he presented a larger magnification of the ornamentation of a head valve, which showed that the granules are more reminiscent of a semen cell in places: the rounded or slightly elongated granules have small tail-like projections facing roughly in the same direction. Following Bałuk (1984), Studencka & Studencki (1988) published a similarly ornamented specimen from Rybnica site in Poland as *A. fascicularis*.

The species name *A. fascicularis* was often mentioned later in connection with the Central Paratethyan Polyplacophora fauna, but rather as a senior synonym of *A. faluniensis* Šulc (e.g., Laghi 1977; Dell'Angelo & Smriglio 1999; Dell'Angelo *et al*. 2007). At the same time, the species *A. lacrimulifera* has been regarded as a junior synonym of the recent *A. crinita* (Pennant) (e.g., Dell'Angelo & Smriglio 1999), whose synonymy list includes the record of *A. fascicularis* by Bałuk (1984), too. The species *crinita* has also been interpreted quite broadly, and in addition to the ovally elongated granules, a representation of raindrop-like or seminal granules has also been found.

Recently, the species of *Acanthochitona* have been redefined in the Mediterranean Sea, partly on the basis of morphological characters and partly on the basis of molecular data. According to this approach, the granules characteristic of *A. fascicularis* are densely spaced, rounded, rather elevated, flat or concave on the top, and display a characteristic incision on their anterior margin. The single centrally positioned macroaesthete is surrounded by 1–5 microaesthetes in an irregular arrangement (Bonfitto *et al*. 2011, fig 1; Schmidt-Petersen *et al*. 2015: fig. 6). The granules of the species *A. crinita* are shorter than those of the species *ob-*



Figs 19–21. *Acanthochitona lacrimulifera* Bałuk, 1971. – **Figs 19–20.** Fragmentary intermediate valve. – **Fig. 19.** Dorsal view. – **Fig. 20.** Enlarged detail of surface ornamentation of the lateropleural area. – **Fig. 21.** Eroded tail valve, dorsal view. Scale bars: 19, 21: 0.5 mm, 20: 200 μm

longa, elongated oval in outline (1–2 times as long as wide), flat or slightly concave on the top, with the single posteriorly positioned macroaesthete surrounded by 12–16 irregularly arranged microaesthetes (Bonfitto *et al.* 2011, fig. 2; Schmidt-Petersen *et al.* 2015: fig. 6). Schmidt-Petersen *et al.* (2015) also discussed the species *A. oblonga* and *A. pilosa*; see in Dulai & Katona 2024.

In my opinion, neither the morphological interpretation of *A. fascicularis* above nor *A. crinita* fits the semen-cell-like granule pattern found in many localities, and therefore I suggest considering Bałuk (1971)'s species *A. lacrimulifera* to be a separate, valid taxon for this morphology. All the more so, because this species is also present in other Hungarian Miocene Polyplacophora materials that are under description (Letkés: Dulai 2025, and especially Mecsekpölöske: Dulai & Szabó in prep.).

Habitat – *A. lacrimulifera* is an extinct species. The closely related *A. crinita* (Pennant) occurs in both shallow-water (intertidal zone) and deeper (down to a depth of about 50 m) precoralligenous and coralligenous environments (Dell'Angelo & Smriglio 1999).

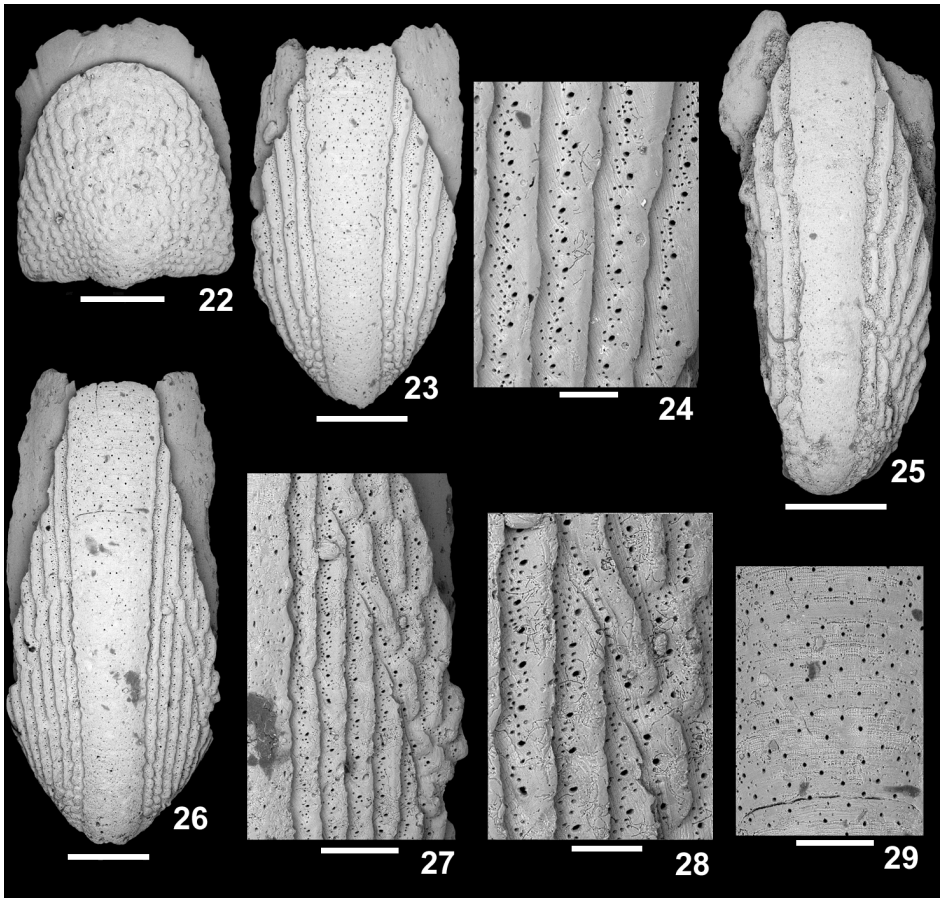
Distribution within the Central Paratethys – It has been recorded so far in Poland (Bałuk 1971, 1984; Studencka & Studencki 1988) and Hungary (this paper; Dulai 2025; Dulai & Szabó in prep.). It is probably more common, however, in earlier publications it is only recognizable at sufficiently high magnification. It was also found in the Neogene strata of the Mediterranean, based on some illustrations (e.g., Dell'Angelo *et al.* 1998, 2004, 2013; Koskeridou *et al.* 2009).

Family Cryptoplacidae H. et A. Adams, 1858
Genus *Cryptoplax* De Blainville, 1818

Cryptoplax weinlandi Šulc, 1934
(Figs 22–29)

Material – 3 head, 4 second (II), 12 intermediate, and 1 tail valves.

Remarks – The most common Polyplacophora remains at the Devecser site also occur in many other localities in the Central Paratethys, and in Hungary, such as the Szokolya-2 borehole (Dulai 2001), the nearby Bánd (Dulai 2005), and Várpalota (Dulai & Katona 2024). All valve types occur at Devecser, with intermediate valves being the most common. One of these valves shows a phenomenon rarely reported in the literature: traces of a healed pathological lesion (traces of microbioerosion are also common on these valves). The anomalies and abnormalities reported in the Polyplacophora literature mainly refer to problems in the



Figs 22–29. *Cryptoplax weinlandi* Šulc, 1934. – **Fig. 22.** Head valve, dorsal view. – **Figs 23–24.** Second (II) valve. – **Fig. 23.** Dorsal view. – **Fig. 24.** Enlarged detail of surface ornamentation of the lateropleural area. – **Fig. 25.** Fragmentary intermediate valve, dorsal view. – **Figs 26–29.** Intermediate valve. – **Fig. 26.** Dorsal view. – **Figs 27–28.** Enlarged detail of healed injury. – **Fig. 29.** Enlarged detail of surface of the jugal area. Scale bars: 22, 23, 25, 26: 0.5 mm; 24, 28: 100 μm; 27, 29: 200 μm

number of valves (Dell'Angelo & Tursi 1988; Dell'Angelo & Schwabe 2010). In the latter work, four main themes were addressed: hypomerism, hypermerism, coalescence and splitting. A more detailed study and description of the specimen presented here are planned in the near future.

Habitat – *C. weinlandi* Šulc is an extinct species, the living representatives of the genus occur in temperate and tropical areas of the Indo-Pacific and the Red Sea (Gowlett-Holmes 1998).

Distribution within the Central Paratethys – *C. weinlandi* Šulc was one of the most common Middle Miocene Polyplacophora species of the Central Paratethys: Austria, Czech Republic, Hungary, Poland, Romania, and Slovakia (for more details see Dell'Angelo *et al.* 2007 and Dulai & Katona 2024).

CONCLUSIONS

Only two Middle Miocene Polyplacophora species were previously known from Devecser, Tik-hegy site. Although the number of specimens available was again very limited, only a few dozen specimens, the 54 chiton valves examined allowed the identification of eight different species, i.e. six taxa in addition to the two species previously identified. The Polyplacophora assemblage from Devecser is dominated (as in many other Central Paratethyan sites) by *Cryptoplax* (37%) and *Acanthochitona* (35.2%). The genus *Cryptoplax* is represented by the ubiquitous Paratethyan species, *C. weinlandi*, while *Acanthochitona* is present with the species *lacrimulifera*, which is so far known only from the Polish part of the Central Paratethys, rather than the very widespread *A. faluniensis*. In addition, only *Lepidochitona* is relatively common (9.2%), which could only be assigned to species with uncertainty due to poor preservation (cf. *lepida*). All other species occur only as accessory elements, of which 3 taxa are among the species occurring in smaller or larger quantities in many Miocene sites (*I. rissoi*, *R. corallina*, *R. olivacea*). Of the remaining two species, *Parachiton africanus* was recently found for the first time in Hungary at Várpalota (Dulai & Katona 2024), and seems to have been a regular accessory element in the Miocene chiton assemblages of the Bakony Mts. This is the first known record of *Leptochiton sulci* in Hungary, but it also occurs at two other Badenian sites (Letkés and Mecsekpölöske) which are still being processed in this series of papers.

As this is the third Middle Miocene site from the Bakony Mts for which Polyplacophora material is known, a short comparison is worth making (Table 1).

So far, 13 different Polyplacophora species have been recorded from the area, from three, more or less contemporaneous (early Badenian) sites. Some of the species occur at all three sites, partly due to their proximity to each other and partly due to the wider ecological tolerance of each species. The taxonomic differ-

Table 1. Middle Miocene Polyplacophora fauna of the Bakony Mts (based on Dulai 2005, Dulai & Katona 2024, and this paper)

	Species	Bánd	Várpalota	Devecser
1.	*Leptochiton sulci*			+
2.	*Parachiton africanus*		+	+
3.	*Lepidopleurus cajetanus*	+		
4.	*Ischnochiton rissoi*	+	+	+
5.	*Lepidochitona lepida* (or sp.)	+	+	+
6.	*Rhyssoplax corallina*	+	+	+
7.	*Rhyssoplax olivacea*	+		+
8.	*Acanthochitona faluniensis*	+	+	
9.	*Acanthochitona lacrimulifera*			+
10.	*Acanthochitona oblonga*		+	
11.	*Acanthochitona* sp.		+	
12.	*Cryptoplax weinlandi*	+	+	+
13.	*Cryptoplax margitae*	+		

ences observed at each site are probably at least partly related to differences in palaeoenvironments (Bánd: patch reef environment, Várpalota: re-sedimented sandy beach, Devecser: corallinaceous algae facies). However, the available material is very limited and incidental for a detailed analysis of these, and the confounding effect of collection bias cannot be excluded.

*

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