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Brachiopods from the Middle Miocene sandy facies of western Ukraine, with an exceptionally well-preserved *Megerlia* (Brachiopoda: Kraussinidae)

Alfréd Dulai

Hungarian National Museum Public Collection Centre, Budapest – Hungarian Natural History Museum, Department of Palaeontology and Geology,
H-1083 Budapest, Ludovika tér 2-6, Hungary.
E-mail: dulai.alfred@nhmus.hu; https://orcid.org.0000-0002-9366-5217

Abstract – Compared with other areas of the Miocene Central Paratethys Sea, only limited data are available on the brachiopod fauna of Western Ukraine. We have particularly little information on the upper Badenian sandy facies. The Kowalewski Collection, housed in the Museum of the Earth (Polish Academy of Sciences, Warsaw, Poland), contains three species from two localities within the sandy facies (Shushkovitsi and Rydoml), from which no brachiopods had previously been reported. The species *Terebratulina* cf. *retusa* (Linnaeus, 1758), *Megathiris detruncata* (Gmelin, 1791) and *Megerlia truncata* (Linnaeus, 1767) are well known from other areas of the Central Paratethys. One of the *Megerlia* specimens from Rydoml particularly noteworthy in the material examined, as its brachidium has been preserved in perfect condition, which is uncommon in Miocene and other fossil materials.
Key words – Brachiopoda, Central Paratethys, *Megathiris*, *Megerlia*, *Terebratulina*, upper Badenian

INTRODUCTION

Brachiopods were a particularly important component of marine benthic communities during the Palaeozoic and, to some extent, even during the Mesozoic. Their importance declined significantly by the Cenozoic, but they occur in varying quantities in many places, particularly the small, so-called micromorphic species. Their remains are also known from the Miocene Central Paratethys Sea, though the data from individual areas have been analysed to varying degrees. Among the less well-known areas is the north-eastern margin of the Central Paratethys, which lies within present-day western Ukraine.

The aim of this paper is to briefly present the information on some Miocene brachiopod specimens from Ukraine held in the collection of the Museum of the

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Earth (Muzeum Ziemi) in Warsaw, Poland, which form part of the Kowalewski Collection. The specimens examined were recovered from two sites [Rydoml and Shushkovitsi (former Szuszkowce)] situated to the east of the Medobory Hills (Fig. 1).

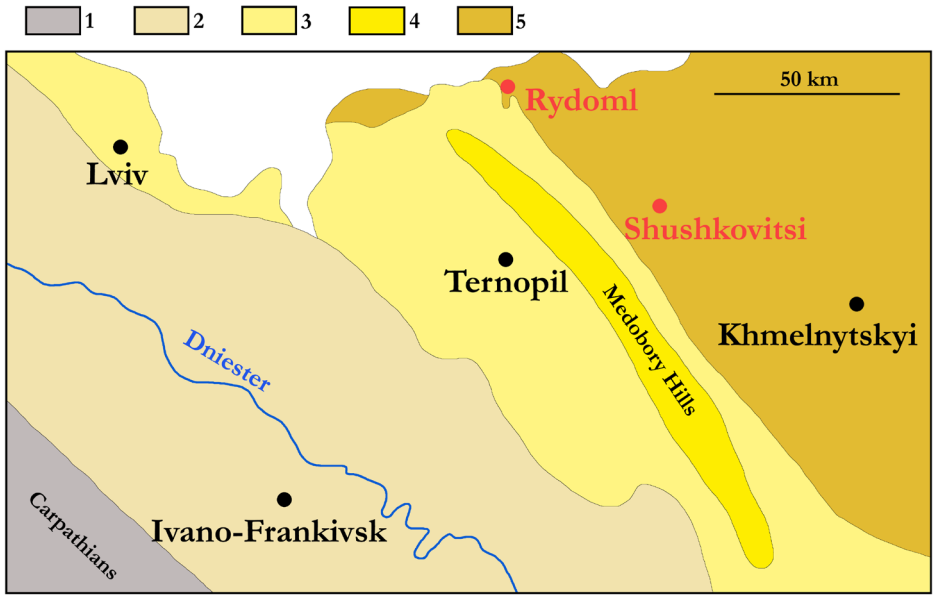


Figure 1. Map showing the distribution of the Middle Miocene (upper Badenian) deposits in western Ukraine during the maximum phase of transgression (modified after Bitner & Bakayeva 2026 and Studencka & Dulai 2010). 1 – Carpathians; 2 – Clay; 3 – Coralline algal marl and limestone; 4 – Coralline algal reef limestone; 5 – Sand. The names marked in red indicate the fossil sites under investigation.

Previous research

Hilber (1882) published his work on the geology and palaeontology of Eastern Galicia (now western Ukraine and south-eastern Poland), in which he described a form very similar to the species *Terebratula styriaca* Dreger, 1889 under the names *Terebratula* forma nova and *Terebratula* forma indeterminata. Somewhat surprisingly, Dreger (1889), in his paper analysing the Miocene brachiopod assemblage from the Vienna Basin, described and partially illustrated three species (*Argiope decollata* Chemnitz, 1785; *Cistella squamata* Eichwald, 1853; and *Platidia anomioides* Scacchi et Philippi, 1844) from Ukraine. A few years later, Łomnicki (1897) also listed three species from the area without providing descriptions or illustrations: *Terebratula ampulla* (Brocchi, 1814), *Argiope decollata*, and *Discina* sp. The most important paper on the Miocene

brachiopods from Ukraine is attributed to Friedberg (1921), who identified 13 species/subspecies from numerous localities (*Lingula* aff. *dumontieri* Nyst; *Discina leopolitana* Łom. in litt., *Terebratula* cf. *grandis* Blum., *Liothyrina punctatissima* Łom., *Mühlfeldtia truncata* L., *Mühlfeldtia truncata* L. var. *oblita* Micht., *Megathyris decollata* Chemn., *M. decollata* Chemn. var. *austriaca* Dreg., *M. decollata* Chemn. var. *pertransversa* Sacco, *Cistella squamata* Eichw., *Cistella neapolitana* Scacchi, *Cistella dertomutinensis* Sacco, *Cistella zboroviensis* Friedb.). Kudrin (1961) described a new species from the area in addition to *Terebratula grandis* Blumenbach, 1803 (*Terebratula makridini* Kudrin, 1961), however, Garcia-Ramos (2006) regards it as a synonym of *Terebratula macrescens* Dreger, 1889. Bitner & Dulai (2004), whilst processing the Miocene brachiopod collection of the Hungarian Natural History Museum in Budapest, mentioned an unidentified *Terebratula* sp. from Horodenka (south-western Ukraine). Friedberg's important collection was long considered lost, but part of it has recently been rediscovered at the State Museum of Natural History of the National Academy of Sciences of Ukraine in Lviv. Based on 157 specimens from 21 sites, Bitner & Bakayeva (2026) confirmed the presence of eight species in the Middle Miocene of north-western Ukraine: *Lingula dregeri* Andreae, 1893, *Discinisca leopolitana* (Friedberg, 1921), *Terebratula styriaca* Dreger, 1889, *Gryphus miocenicus* (Michelotti, 1847), *Megathiris detruncata* (Gmelin, 1791), *Argyrotheca cuneata* (Risso, 1826), *Joania cordata* (Risso, 1826), *Megerlia truncata* (Linnaeus, 1767). Bitner & Bakayeva (2026) provide a detailed list of the Friedberg material that has been recovered, and plot the 21 sites on a facies map. This shows that the overwhelming majority of Friedberg's sites are located in clayey and marly areas. The sandy facies is represented by a single site, Tarnoruda, from which a single specimen of *Megerlia truncata* is known (N–3718).

Geological background

The brachiopods studied originate from western Ukraine, which during the Middle Miocene formed the north-eastern margin of the Central Paratethys Sea (Wysocka *et al.* 2016). The epicontinental sea known as the Paratethys was formed in the Early Oligocene and was intermittently connected to the Mediterranean (Rögl 1998). The late Badenian (Middle Miocene) was the last interval of normal salinity in the history of the Central Paratethys (Kováć *et al.* 2007). The Volhynian–Podolian region, situated along the south-western margin of the Eastern European Platform, was covered by this sea. The warm subtropical climate favoured the formation of coralline algae–vermetid reefs. The present-day distribution of these reefs is illustrated by the narrow but more than 150 km long chain of the Medobory Hills. These reefs separated the deeper environments of the Carpathian Foredeep basin—characterised by marls and clays—from

the sandy sediments of the nearshore facies. These fine-grained, white quartz sands are found along the eastern slopes of the Medobory Hills and lie discordantly on the pre-Neogene basement. The 10–20-metre-thick sandy sequence was referred to as the Tarnopol Beds by Maslov & Utrobin (1958), whilst Muratov & Nevesskaya (1986) and Andreyeva-Grigorovich *et al.* (1997) referred to it as the Podhortse/Podgirtsi Beds.

Shushkovitsi is a classic Middle Miocene site along the Medobory Hills range, which has been known since the 19th century for its well-preserved mollusc fauna. Dubois de Montpereux (1831) described numerous new mollusc species from this locality in his monograph, including Pectinidae species of stratigraphic importance (e.g. *Aequipecten malvinae*, *A. flavus*, *A. diaphanus*). Friedberg (1911–1928), one of the leading investigators in Miocene mollusc research, carried out extensive work in the area. Kazimierz Kowalewski focused primarily on the stratigraphy of the Miocene sands of Volhynia and Podolia, but devoted a separate study to the fauna of the Shushkovitsi sands (Kowalewski 1937). Studencka & Dulai (2010) published the Polyplacophora fauna of the Miocene sands of western Ukraine (with particular emphasis on Shushkovitsi). Since then, numerous revisionary studies have dealt, to a greater or lesser extent, with the Mollusca material from the Shushkovitsi site (Studencka & Popov 1996; Landau *et al.* 2009; Nosowska 2020). In addition to the molluscs, Szörényi (1953) published a study on the Miocene echinoid fauna of the Podolia region, mentioning the genera *Prionechinus*, *Arbacina* and *Schizechinus* from the Shushkovitsi site.

Rydoml is another important, though perhaps less well-known, Miocene site where marine (Badenian) and brackish-water (Sarmatian) strata deposited in the Central Paratethys Sea were laid down. It is the type locality for numerous species of gastropods and bivalves; Friedberg (1911–28, 1934–36) described many new species from this site in his multi-volume work. Particularly noteworthy are the exceptionally well-preserved microgastropods (e.g. Anistratenko 2005), the detailed study of which is still ongoing (Landau *et al.* 2026). Apart from molluscs, other noteworthy faunal elements include foraminifers, bryozoans, echinoderms and fish remains.

MATERIAL AND METHODS

The specimens under examination were found in the collection of the Museum of the Earth (Polish Academy of Sciences, Warsaw, Poland), as part of the Kowalewski Collection, which refers to a significant palaeontological and malacological fossil material. The collection was accumulated in the 1930s by Dr. Kazimierz Kowalewski, a prominent Polish geologist and researcher of the Miocene epoch. The invaluable scientific collection consisting of extensive fossil materials from numerous exploratory field trips conducted in the historical

regions of Volhynia and Podolia (modern-day Ukraine). It is a major collection of fossilized Neogene invertebrates, and exceptionally rich in Middle Miocene (Badenian) bivalves and gastropods but contains also some other fossil groups, such as polyplacophorans. According to the collection labels, the brachiopod specimens were collected in 1935 and 1936.

SYSTEMATIC PALAEONTOLOGY

In the following systematic section, the classification of the revised „Treatise" is followed (Lee *et al*. 2006*a*, *b*; Lee & MacKinnon 2006). As the species under investigation are well documented in the literature, we shall omit the detailed formal descriptions, and the lists of synonyms contain only the most important references to the Central Paratethys. At the same time, we provide detailed literature references regarding the distribution data known from the Central Paratethys.

Phylum Brachiopoda Duméril, 1805
Subphylum Rhynchonelliformea
Williams, Carlson, Brunton, Holmer et Popov, 1996

Class Rhynchonellata Williams, Carlson, Brunton, Holmer et Popov, 1996
Order Terebratulida Waagen, 1883
Suborder Terebratulidina Waagen, 1883
Superfamily Cancellothyridoidea Thomson, 1926
Family Cancellothyrididae Thomson, 1926
Subfamily Cancellothyridininae Thomson, 1926

Genus *Terebratulina* d'Orbigny, 1847
Type species: *Anomia retusa* Linnaeus, 1758

Terebratulina cf. *retusa* (Linneaeus, 1758)
(Figs 2–3)

Terebratulina Karreri n. sp. – Dreger 1889: 190, pl. 2, figs 5a–e.
Terebratulina caputserpentis (Linné, 1758) – Meznerics 1944: 32–33.
Terebratulina caputserpentis Linné var. *granosa* Ponzi, 1876 – Meznerics 1944: 33.
Terebratulina retusa (Linnaeus, 1758) – Bitner & Dulai 2004: 74, pl. 3, fig. 1; Bitner *et al*. 2024: 178–179, figs 2F–J.
Terebratulina retusa (Linné, 1758) – Mikuž 2011: 32–33, pl. 2, figs 1–7; pl. 3, figs 1–2.

Material examined (n = 2) – fragmentary valves from Shushkovitsi.

Remarks – Terebratulina retusa is a common member of the Neogene and Recent brachiopod assemblages in the Mediterranean but less common in the Central Paratethyan and Atlantic – North Sea provinces (Logan 1979; Gaetani & Saccà 1985; Bitner & Dulai 2004; Brunton & Curry 1979). Its rarer occurrence in the Central Paratethys can be attributed to the palaeoenvironmental conditions. *T. retusa* is regarded as relatively deeper-water eurybathic species (Logan 1979; Logan *et al*. 2004); in the Central Paratethys, however, surface outcrops typically reveal shallower marine sediments. *Terebratulina karreri*, described by Dreger (1889) from the Vienna Basin, is considered to be a junior synonym of *T. retusa* (Bitner *et al*. 2024). Meznerics (1944) referred to this form from the Miocene of Hungary as *T. caputserpentis* (Linnaeus, 1758) and *T. caputserpentis* var. *granosa* Ponzi, 1876, which Bitner & Dulai (2004) regarded as a synonym of *T. retusa*. The complex nomenclatural problems of *Terebratulina retusa – T. caputserpentis* (Linnaeus, 1767) species group were discussed in detail by Brunton *et al*. (1967) and Emig *et al*. (2015).

Occurrence within the Central Paratethys: Austria (Dreger 1889); Czech Republic (Bitner *et al*. 2024); Hungary (Meznerics 1944; Bitner & Dulai 2004); Slovenia (Mikuž 2011); Ukraine (Dulai this paper).

Suborder Terebratellidina Muir-Wood, 1955
Superfamily Megathyridoidea Dall, 1870
Family Megathyrididae Dall, 1870

Genus *Megathiris* d'Orbigny, 1847
Type species: *Anomia detruncata* Gmelin, 1791

Megathiris detruncata (Gmelin, 1791)
(Fig. 4)

Megathiris detruncata (Gmelin, 1790) – Bitner 1990: 135, text-figs 3, 4, pl. 3, figs 1–8, pl. 6, figs 1–7 (cum syn.); Popiel-Barczyk & Barczyk 1990: 175, text-figs 10, 11, pl. 6, figs 6–11, pl. 7, figs 1–13; Bitner & Dulai 2004: 74, pl. 3, figs 11–15; Dulai 2007: 2, figs 2.1–2; *Megathiris detruncata* (Gmelin, 1791) – Bitner *et al*. 2013: 83, figs 3j–l; Bitner & Motchurova-Dekova 2016: 10, figs 3a–l; Bitner *et al*. 2024: 179–180, figs 3A–F.

Material examined (n = 1) – dorsal valve from Rydoml.

Remarks – Megathiris detruncata shows very wide distribution both stratigraphically and geographically. It is the most common species in Neogene and Recent shallow water assemblages in the Mediterranean (Logan 1979), the eastern Atlantic (Brunton & Curry 1979) and the Central Paratethys (Bitner 1990; Bitner & Dulai 2004), but Paleogene records are also known (e.g., Dulai 2011; Bitner & Müller 2017). Its long stratigraphic range and calcite

shell, which is resistant to recrystallisation, mean that both fossil and modern shells of this species can be used in isotope geochemical analyses to reconstruct the ancient palaeoenvironment (Kocsis *et al*. 2020). The three septa of the dorsal valve in the Kowalewski Collection leave no doubt as to the identification of the specimen under examination. The abundant fossil record known from the Central Paratethys (including the few occurrences in Ukraine) is listed in detail in the following chapter.

Occurrence within the Central Paratethys: Austria (Dreger 1889; Meznerics 1944; Kroh 2003; Kroh *et al*. 2003; Bitner & Dulai 2004); Bulgaria (Bitner & Motchurova-Dekova 2016); Croatia (Matyasovszky 1880; Dulai 2025); Czech Republic (Reuss 1860; Zágoršek *et al*. 2012; Pavézková *et al*. 2013; Bitner *et al*. 2013, 2023, 2024); Germany (Bitner & Schneider 2009); Hungary (Meznerics 1944; Bitner & Dulai 2004; Dulai 2007); Poland (Krach 1950; Radwański 1969; Barczyk & Popiel-Barczyk 1977; Jakubowski & Musiał 1979*a*, *b*; Popiel-Barczyk 1980; Studencki 1988; Bitner 1990; Popiel-Barczyk & Barczyk 1990; Popiel-Barczyk 1996; Bitner 2002; Taddei Ruggiero & Bitner 2008; Dulai & Stachacz 2011); Romania (Boettger 1901; Zilch 1934; Meznerics 1944; Bărbulescu & Rado 1984; Bitner & Dulai 2004); Ukraine (Friedberg 1921; Bitner & Bakayeva 2026; Dulai this paper).

Superfamily Kraussinoidea Dall, 1870
Family Kraussinidae Dall, 1870
Subfamily Megerliinae Hiller, MacKinnon & Nielsen, 2008

Genus *Megerlia* King, 1850
Type species: *Anomia truncata* Linnaeus, 1767

Megerlia truncata (Linnaeus, 1767)
(Figs 5, 6, 7–9)

Megerlia truncata (Linnaeus, 1767) – Bitner 1990: 145–147, text-fig. 10, pl. 2, figs 6–9, pl. 7, figs 3–6, pl. 8, figs 1–7 (cum syn.); Bitner & Dulai 2004: 76, pl. 4, figs 11–15; Bitner *et al*. 2013: 86, figs 4H, I; Bitner & Motchurova-Dekova 2016: 16, figs 6F–H; Bitner *et al*. 2024: 180–181, figs 4A–F.

Material examined (n = 3) – Shushkovitsi: dorsal valve (n = 1); Rydoml: ventral valve (n = 1) and articulated specimen (n =1).

Remarks: *Megerlia truncata* belongs to the eurybathic brachiopods; it is a common component of Neogene and Recent deeper-water environments (Logan 1979; Logan *et al*. 2004), but first appeared as early as the Early Oligocene (Bitner & Müller 2022). The earliest record of the genus *Megerlia* dates from the Middle Eocene (Dulai *et al*. 2021). The Central Paratethyan (including Ukrainian) occurrences are listed in detail in the

following paragraph. *Megerlia* species, including *M. tuncata*, possess a brachidium composed of relatively complex, thin and therefore fragile elements. Consequently, they are mostly found in a fragmentary, incomplete state in the fossil record. One of the rare exceptions is the not fully adult articulated specimen recovered from the Rydoml site, where, after carefully opening the two valves and washing out the loose sandy sediment between them, an almost completely intact brachidium became visible. Cardinal process inconspicuous, crural bases attached to inner sides of divergent inner socket ridges that merge with outer hinge plates. Crura short, short and thick crural processes pointed inwards. Thick median septum extending beyond the half-length of valve. Loop bifurcate with distal extensions forming complete ring.

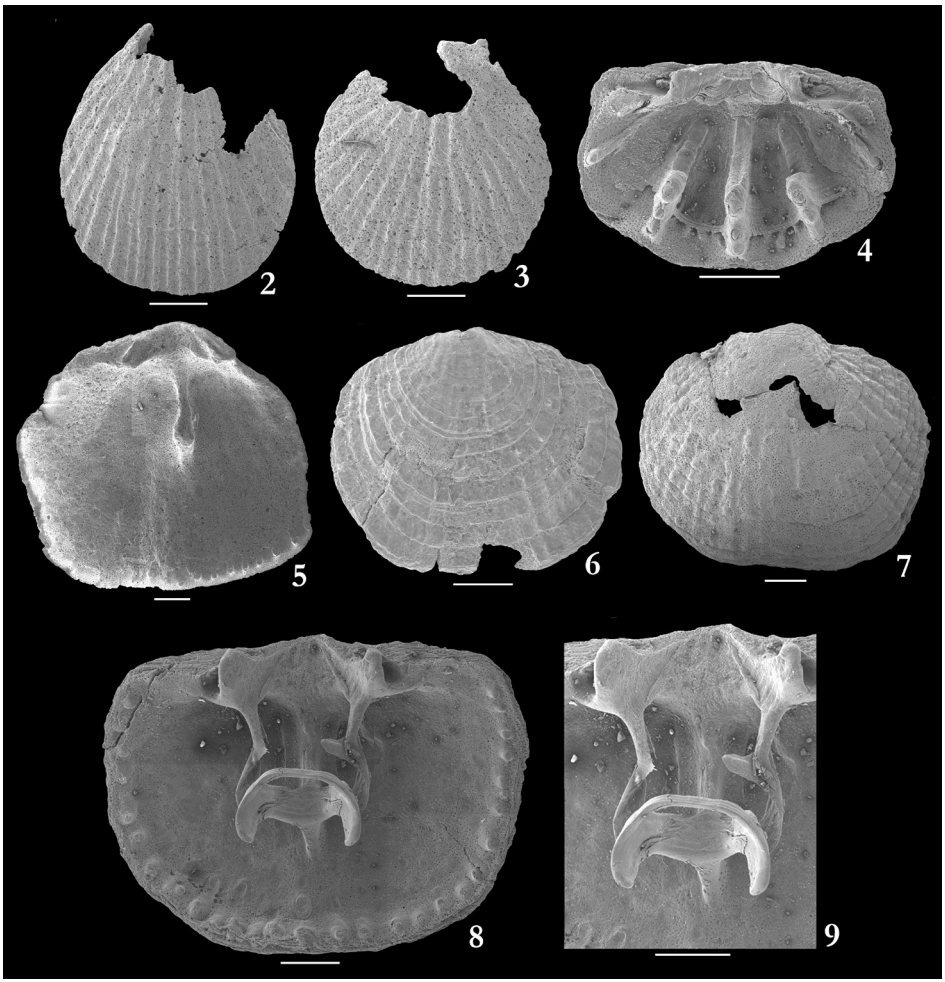
Occurrences within the Central Paratethys: Austria (Dreger 1889); Bulgaria (Kojumdgieva 1960; Bitner & Motchurova-Dekova 2016); Czech Republic (Reuss 1860; Bitner *et al*. 2013, 2024); Hungary (Meznerics 1944; Borza 1973; Bitner & Dulai 2004); Poland (Krach 1950; Radwański 1969; Jakubowski & Musiał 1979*a*; Studencki 1988; Popiel-Barczyk & Barczyk 1990; Bitner 1990, 2002; Popiel-Barczyk 1996; Taddei Ruggiero & Bitner 2008); Romania (Meznerics 1944; Bărbulescu & Rado 1984; Bitner & Dulai 2004); Serbia (Stevanović 1964); Slovenia (Mikuž 2011); Ukraine (Friedberg 1921; Bitner & Bakayeva 2026; Dulai this paper).

CONCLUSIONS

Although the three species (*Terebratulina* cf. *retusa*, *Megathiris detruncata*, and *Megerlia truncata*) found are known from the Central Paratethys, the material is worth presenting for three reasons. Firstly, it comprises specimens from two sites (Shushkovitsi and Rydoml) from which no brachiopods were known until now; on the other hand, they represent brachiopods from the upper Badenian sandy facies, which is hardly known (from the 21 localities of the Friedberg's material, only one is from the sandy facies, see Bitner & Bakayeva 2026, fig. 1). Finally, the excellent state of preservation of a *Megerlia* specimen from the Rydoml site is a rarity amongst fossil materials, thus enabling the documentation of internal morphological characteristics of the dorsal valve.

*

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Figures 2–9. Upper Badenian brachiopods from Shushkovitsi (former Szuszkowce) and Rydoml localities, western Ukraine (Kowalewski collection, Museum of the Earth, Warsaw, Poland). 2, 3 = *Terebratulina* cf. *retusa* (Linneaeus, 1758) shell fragments, Shushkovitsi, MZ VIII Bra 1726–27; 4 = *Megathiris detruncata* (Gmelin, 1791), dorsal valve, internal view, Rydoml, MZ VIII Bra 1729. Figures 5, 6, 7–9: *Megerlia truncata* (Linnaeus, 1767) 5 = dorsal valve internal view, Shushkovitsi, MZ VIII Bra 1728; 6 = ventral valve, external view, Rydoml, MZ VIII Bra 1724, Figures 7–9 = separated valves of articulated specimen, Rydoml, MZ VIII Bra 1725: 7 = ventral valve, external view, 8–9 = dorsal valve, internal view and enlarged view of brachidium. Scale bars: 1 mm.

REFERENCES

Andreyeva-Grigorovich A. S., Kulchytsky Y. O., Gruzman A. D., Lozynyak P. Y., Petrashkevich M. I., Portnyagina L. O., Ivanina A. V., Smirnov S. E., Trofimovich N. A., Savitskaya N. A. & Shvareva N. J. 1997: Regional stratigraphic scheme on Neogene formations of the Central Paratethys in the Ukraine. – *Geologica Carpathica* **48**(2): 123–136.

Anistratenko V. 2005: Morphology and taxonomy of Late Badenian to Sarmatian *Mohrensternia* (Gastropoda: Rissooidea) of the Central Paratethys. – *Acta Geologica Polonica* **55**(4): 371–392.

Bărbulescu A. & Rado G. 1984: Contributions à la connaissance des brachiopodes badéniens de Roumanie. – *75 years of the Laboratory of Paleontology*, Special Volume, pp. 173–184.

Barczyk W. & Popiel-Barczyk E. 1977: Brachiopods from the Korytnica Basin (Middle Miocene; Holy Cross Mountains, Poland). – *Acta Geologica Polonica* **27**: 157–167.

Bitner M. A. 1990: Middle Miocene (Badenian) brachiopods from the Roztocze Hills, south-eastern Poland. – *Acta Geologica Polonica* **40**: 129–157.

Bitner M. A. 2002: Size-frequency distributions of Miocene micromorphic brachiopods: interpretation tool for population dynamics. – *P.S.Z.N.: Marine Ecology* **23**(1): 19–30. https://doi.org/10.1046/j.1439-0485.2002.02771.x

Bitner M. A. & Bakayeva S. 2026: Lost and found: Wilhelm Friedberg's Miocene brachiopod collection. – *Annales Societatis Geologorum Poloniae* 96: 145–155. https://doi.org/10.14241/asgp.2026.09

Bitner M. A. & Dulai A. 2004: Revision of Miocene brachiopods of the Hungarian Natural History Museum, with special regard to the Meznerics collection. – *Fragmenta Palaeontologica Hungarica* **22**: 69–82.

Bitner M. A., Hladilová Š. & Hrouzek S. 2023: New record of Middle Miocene (Badenian) brachiopods from Moravia, Czech Republic. – *Geological Research in Moravia and Silesia* **30**: 38–44. https://doi.org /10.5817/GVMS2023-34376

Bitner M. A., Hladilová Š., Šamánek J. & Turek T. 2024: Middle Miocene (Badenian) brachiopods from the Borač area (Carpathian Foredeep, Moravia, Czech Republic). – *Annales Societatis Geologorum Poloniae* **94**: 175–186. https://doi.org/10.14241/asgp.2024.06

Bitner M. A. & Motchurova-Dekova N. 2016: Middle Miocene (Badenian) brachiopods from Yasen, northwestern Bulgaria: taxonomic composition and biogeographical significance. – *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen* **279**(1): 7–22. https://doi.org/10.1127/njgpa/2016/0536

Bitner M. A. & Müller A. 2017: Late Eocene (Priabonian) brachiopod fauna from Dnipropetrovsk, eastern Ukraine. – *Bulletin of Geosciences* **92**(2): 211–231. https://doi.org/10.3140/bull.geosci.1661

Bitner M. A. & Müller A. 2022: Early Oligocene brachiopods from the rocky-shore deposits of Mammendorf, central Germany. – *Annales Societatis Geologorum Poloniae* **92**: 87–107. https://doi.org/10.14241/asgp.2022.02

Bitner M. A. & Schneider S. 2009: The Upper Burdigalian (Ottnangian) brachiopod fauna from the northern coast of the Upper Marine Molasse Sea in Bavaria, Southern Germany. – *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen* **254**(1–2): 117–133. https://doi.org/10.1127/0077-7749/2009/0006

Bitner M. A., Zágoršek K. & Hladilová Š. 2013: Deep-water brachiopod assemblage from the Middle Miocene of Kralice nad Oslavou, Moravia, southeastern Czech Republic. – *Comptes Rendus Palevol* **12**: 81–89. https://doi.org/10.1016/j.crpv.2013.01.004

Boettger O. 1901: Zur Kenntniss der Fauna der mittelmiozänen Schichten von Kostej im Krassó-Szörényer Komitat. – *Verhandlungen und Mitteilungen des siebenbürgischen Vereines für Naturwissenschaften zu Hermannstadt* **51**: 1–200.

Borza T. 1973: Rétegtani és őslénytani vizsgálatok Hont (É-Börzsöny) környékén. (Stratigraphical and paleontological investigations in the vicinity of Hont (northern Börzsöny Mountains.) – *Földtani Közlöny* **103**: 27–40. [in Hungarian with English abstract]

Brunton C. H. C., Cocks L. R. M. & Dance S. P. 1967: Brachiopods in the Linnaean Collection. – *Proceedings of the Linnean Society of London* **178**: 161–183. https://doi.org/10.1111/j.1095-8312.1967.tb00972.x

Brunton C. H. C. & Curry G. B. 1979: British brachiopods. – *Synopses of the British Fauna (New Series)* **17**: 1–64.

Dreger J. 1889: Die tertiären Brachiopoden des Wiener Beckens. – *Beiträge zur Paläontologie Österreich-Ungarns* **7**: 179–192.

Dubois de Montpereux F. 1831: *Conchiologie fossile et apercu geognostique des formations du plateau Wolhyni-Podolien*. – Schropp & Comp., Berlin, 76 pp.

Dulai A. 2007: Badenian (Middle Miocene) micromorphic brachiopods from Bánd and Devecser (Bakony Mountains, Hungary). – *Fragmenta Palaeontologica Hungarica* **24–25**: 1–13.

Dulai A. 2011: Late Eocene (Priabonian) micromorphic brachiopods from the Upper Austrian Molasse Zone. – *Memoirs of the Association of Australasian Palaeontologists* **41**: 295–313.

Dulai A. 2025: Taxonomic revision of some Central Paratethyan Middle Miocene brachiopod species described by Matyasovszky in 1880 (Terebratulida; Megathyrididae; Terebratuloidae). – *Annales Musei historico-naturalis hungarici* **117**: 121–130. https://doi.org/10.53019/AnnlsMusHistNatHung.2025.117.121

Dulai A. & Stachacz M. 2011: New Middle Miocene *Argyrotheca* (Brachiopoda; Megathyrididae) species from the Central Paratethys. – *Földtani Közlöny* **141**(3): 283–291.

Dulai A., Trif N. & Bălc R. 2021: Middle Eocene (Bartonian) brachiopods from Turnu Roşu (Transylvanian Basin, Romania): oldest record of *Megerlia* and Kraussinidae. – *Fragmenta Palaeontologica Hungarica* **37**: 49–64. https://doi.org/10.17111/fragmpalhung.2021.37.49

Emig C. C., Bitner M. A. & Álvarez F. 2015: Scientific death-knell against databases. – Errors indicated by database manipulations and its consequences. – *Carnets Geol.* **15**(16): 231–238. https://doi.org/10.4267/2042/57949

Friedberg W. 1921: Ramienionogi mioceńskie Zachodniego Podola. – *Prace Naukowe Uniwersytetu Poznańskiego, Sekcja Matematyczno-Przyrodnicza* **2**: 1–20. [in Polish with French summary]

Friedberg W. 1911–28: *Mięczaki mioceńskie Ziem Polskich. Część I – Ślimaki i łodkonogi.* – Muzeum im. Dzieduszyckich, Lwów, 628 pp.

Friedberg W. 1934–36: *Mięczaki mioceńskie Ziem Polskich. Część II – Małże.* – Polskie Towarzystwo Geologiczne, Kraków, 274 pp.

Gaetani M. & Saccà D. 1985: Brachiopodi Neogenici e Pleistocenici della provincia di Messina e della Calabria meridionale. – *Geologica Romana* **22**: 1–43.

Garcia Ramos D. A. 2006: Nota sobre Terebratulinae del Terciario de Europa y su relación con los representantes neógenos del sureste español. – *Boletin de la Asociación Cultural Paleontológica Murciana* **5**: 23–83.

Hilber V. 1882. Geologische Studien in den ostgalizischen Miozan-Gebieten. – *Jahrbuch der Kaiserlich Königlichen Geologischen Reichsanstalt* **32**: 193–330.

Jakubowski G. & Musiał T. 1979*a*: Lithology and fauna of the Middle Miocene deposits of Trzęsiny (Roztocze Tomaszowskie Region, South-eastern Poland). – *Prace Muzeum Ziemi* **32**: 37–70.

Jakubowski G. & Musiał T. 1979*b*: Middle Miocene sandy and carbonate deposits of Huta Lubycka and Huta Różaniecka (Roztocze Rawskie Region, South-eastern Poland) and their fauna. – *Prace Muzeum Ziemi* **32**: 71–100.

Kocsis L., Dulai A., Cipriani A., Vennemann T. & Yunsi M. 2020: Geochemistry of recent and fossil brachiopod calcite of *Megathiris detruncata* (Terebratulida, Megathyrididae): A modern baseline study to trace past environmental conditions. – *Chemical Geology* **533**: 119335.
https://doi.org/10.1016/j.chemgeo.2019.119335

Kojumdgieva E. 1960: Le Tortonien du type viennois. – In: Kojumdgieva E. & Strachimirov B.: *Les fossiles de Bulgarie; VII. Tortonien*, Academie des Sciences de Bulgarie, Sofia, pp. 1–246.

Kováč M., Andreyeva-Grigorovich A., Bajrakterević Z., Brzobohatý R., Filipescu S., Fodor L., Harzhauser M., Oszczypko N., Nagymarosy A., Pavelić D., Rögl F., Saftić B., Sliva L. & Studencka B. 2007: Badenian evolution of the Central Paratethys Sea: paleogeography, climate and eustatic sea level changes. – *Geologica Carpathica* **58**(6): 479–606.

Kowalewski K. 1937: Sur le faune des couches de Buhłów en Wolhynie, en rapport avec l'àge des sables de Szuszkowce. – *Posiedzenia Naukowe Państwowego Instytutu Geologicznego* **47**: 4–13. [In Polish]

Krach W. 1950: Matériaux pour la connaissance du Miocène des environs de Lublin. – *Annales Societatis Geologorum Poloniae* **19**(2): 292–313.

Kroh A. 2003: The Brachiopoda of the Langhian (Lower Badenian) of the Molasse Zone and the northern Vienna Basin (Austria). – *Annalen des Naturhistorischen Museum in Wien* **104A**: 145–153.

Kroh A., Harzhauser M., Piller W. E. & Rögl F. 2003: The Lower Badenian (Middle Miocene) Hartl Formation (Eisenstadt - Sopron basin, Austria). – In: Piller W. E. (ed): Stratigraphia Austriaca. – *Österreichische Akademie der Wissenschaften, Schriftenreihe der Erdwissenschaftlichen Kommission* **16**: 87–109.

Kudrin L. N. 1961: Miotsenovye terebratulidy iugo-zapadnoi okrainy Russkoi platformy. [Miocene terebratulids of the SW outlying district of the Russian Platform]. – *Paleontologi cheskii Sbornik Ivovskogo Geol. Obshchestva* (Lvov) **1**: 51–61.

Landau B. M., Harzhauser M. & Beu A. 2009: A revision of the Tonnoidea (Caenogastropoda, Gastropoda) from the Miocene Paratethys and their palaeobiogeographic implications. – *Jahrbuch der Geologischen Bundesanstalt* **149**(1): 61–109.

Landau B. M., Harzhauser M., Klots O. & Kovalchuk O. 2026: The Middle Miocene (Serravallian) Gastropods from the Medobory Reef complex (Ukraine). – *Palaeontographica, Abteilung A: Palaeozoology – Stratigraphy*, https://doi.org/10.1127/pala/0181

Lee D. E. & MacKinnon D. I. 2006: Kraussinoidea. – In: Kaesler R. L. (ed.): *Treatise on Invertebrate Palaeontology. Part H. Brachiopoda Revised, Volume 5. Rhynchonelliformea (part)*. Geological Society of America and University of Kansas, Boulder, Colorado and Lawrence, Kansas, pp. 2245–2246. https://doi.org/10.17161/dt.v0i0.5581

Lee D. E., MacKinnon D. I. & Smirnova T. N. 2006*a*: Megathyridoidea. – In: Kaesler R. L. (ed.): *Treatise on Invertebrate Palaeontology. Part H. Brachiopoda Revised, Volume 5. Rhynchonelliformea (part).* Geological Society of America and University of Kansas, Boulder, Colorado and Lawrence, Kansas, pp. 2217–2222. https://doi.org/10.17161/dt.v0i0.5581

Lee D. E., Smirnova T. N. & Dong-Li S. 2006*b*: Cancellothyridoidea. – In: Kaesler R. L. (ed.): *Treatise on Invertebrate Palaeontology. Part H. Brachiopoda Revised, Volume 5. Rhynchonelliformea (part).* Geological Society of America and University of Kansas, Boulder, Colorado and Lawrence, Kansas, pp. 2145–2162. https://doi.org/10.17161/dt.v0i0.5581

Logan A. 1979: The Recent Brachiopoda of the Mediterranean Sea. – *Bulletin de l'Institut Océanographique de Monaco* **72**: 1–112.

Logan A., Bianchi C. N., Morri C. & Zibrowius H. 2004: The present-day Mediterranean brachiopod fauna: diversity, life habits, biogeography and paleobiogeography. – In: Ros J. D., Packard T. T., Gili J. M., Pretus J. L. & Blasco D. (Eds): Biological oceanography at the turn of the Millenium. – *Scientia Marina* **68** (Suppl. 1): 163–170. https://doi.org/10.3989/scimar.2004.68s1163

Łomnicki M. 1897: Materiały do mioceńskiej fauny Lwowa i najbliższej okolicy. – *Kosmos* **22**: 18–37. [in Polish]

Maslov V. P. & Utrobin V. N. 1958: Distribution of the Tertiary Rhodophyceae of the Ukrainian Soviet Socialist Republic and their connection with sea transgression. – *Bulletin of the Academy of Sciences of the USSR, series Geology* **1958**(12): 73–93. [In Russian]

Matyasovszky J. 1880: Paläontologische beiträge zur Kenntnis der jüngeren Mediterranen Schichten des Baranyaer Comitates. – *Természetrajzi Füzetek* **4**: 243–248.

Meznerics I. 1944: Die Brachiopoden des ungarischen Tertiärs. – *Annales historico-naturales Musei nationalis hungarici* **36**: 10–60.

Mikuž V. 2011: Brachiopods from Miocene beds near Sentilj in Slovenske Gorice, Northeast Slovenia. – *Folia Biologica et Geologica* **52**(3): 29–46.

Muratov M. V. & Nevesskaya L. A. (eds) 1986: *Stratigraphy of the USSR. Neogene*. Vol. 1: 1–419. Nedra, Moscow. [In Russian]

Nosovska E. 2020: Gastropods [Trochoidea: Trochidae Rafinesque, 1815 and Calliostomatidae Thiele, 1924 (1847)] from the middle Miocene of Ukraine, Central Paratethys. – *Acta Geologica Polonica* **70**(4): 453–528.
https://doi.org/10.24425/agp.2019.126462

Pavézková J., Hladilová Š. & Bitner M. A. 2013: Miocene brachiopods from the Zidlochovice locality, Czech Republic. – *Geological Research in Moravia and Silesia* **20**: 56–59.
https://doi.org/10.5817/GVMS2013-1-2-56

Popiel-Barczyk E. 1980: Brachiopod genus *Cryptopora* Jeffreys from the Miocene deposits of the Lublin Upland. – *Acta Geologica Polonica* **30**(1): 111–120.

Popiel-Barczyk E. 1996: Typ Brachiopoda. – In: Malinowska L. & Piwocki M. (eds): *Budowa geologiczna Polski III. Atlas skamienialosci przewodnich i charakterys-tycznych*, **3a**, 1, kenozoik, trzeciorzęd, pp. 239–246. [in Polish]

Popiel-Barczyk E. & Barczyk W. 1990: Middle Miocene (Badenian) brachiopods from the southern slopes of the Holy Cross Mountains, Central Poland. – *Acta Geologica Polonica* **40**(3–4): 159–181.

Radwański A. 1969: Transgresja dolnego tortonu na poludniowych słokach Gór Świętokrzyskich (Strefa zatok i ich przedpola). – *Acta Geologica Polonica* **19**(1): 1–164. [in Polish]

Reuss A. E. 1860: Die marinen Tertiärschichten Böhmens und ihre Versteinerungen. – *Sitzungsberichte der Mathematisch-Naturwissenschaftlichen Classe der Kaiserlichen Akademie der Wissenschaften* **39**: 207–285.

Rögl F. 1998: Palaeogeographic considerations for Mediterranean and Paratethys Seaways (Oligocene to Miocene). – *Annalen des Naturhistorischen Museums in Wien* **99**: 279–310.

Stevanović P. M. 1964: Marines und Marin-brackisches Miozän des Ost- und Vorkarpathischen Hügellandes in Ostserbien. – *Bulletin de l'Academie serbe des Sciences et des Arts, Classe des Sciences mathématiques et naturelles, Sciences naturelles* **33**(10): 31–41.

Studencka B. & Dulai A. 2010: Chitons (Mollusca: Polyplacophora) from the Middle Miocene sandy facies of Ukraine, Central Paratethys. – *Acta Geologica Polonica* **60**: 257–274.

Studencka B. & Popov S. V. 1996: Genus *Acanthocardia* (Bivalvia) from the Middle Miocene of the Central Paratethys. – *Prace Muzeum Ziemi* **43**: 17–37.

Studencki W. 1988: Facies and sedimentary environment of the Pińczów Limestone (Middle Miocene; Holy Cross Mountains, Central Poland). – *Facies* **18**: 1–26.
https://doi.org/10.1007/BF02536793

Szörényi E. 1953: Miozäne Echinoiden aus den westlichen Teilen der Ukraine. – *Geologica Hungarica, Series Palaeontologica* **23**: 1–122.

Taddei Ruggiero E. & Bitner M. A. 2008: Bioerosion on brachiopod shells - a Cenozoic perspective. – *Earth and Environmental Science, Transactions of the Royal Society of Edinburgh* **98**: 369–378.
https://doi.org/10.1017/S1755691007080371

Wysocka A., Radwański A., Górka M., Bąbel M., Radwańska U. & Zlotnik M. 2016: The Middle Miocene of the Fore-Carpathian Basin (Poland, Ukraine and Moldova). – *Acta Geologica Polonica* **66**(3): 351–401.
https://doi.org/10.1515/agp-2016-0017

Zágoršek K., Nehyba S., Tomanová-Petrová P., Hladilová Š., Bitner M. A., Doláková N., Hrabovský J. & Jašková V. 2012: Local catastrophe caused by tephra input near Přemyslovice (Moravia, Czech Republic) during mid-Miocene. – *Geological Quarterly* **56**: 269–284.
https://doi.org/10.7306/gq.1021

Zilch A. 1934: Zur Fauna des Mittel-Miocäns von Kostej (Banat); Typus Bestimmung und Tafeln zu O. Boettger's Bearbeitungen. – *Senckenbergiana* **16**: 193–302.

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Brachiopodák a nyugat-ukrajnai középső miocén homokos fáciesből, egy kivételesen jó megtartású *Megerlia* példánnyal (Brachiopoda: Kraussinidae)

Dulai Alfréd

Magyar Nemzeti Múzeum Közgyűjteményi Központ – Magyar Természettudományi Múzeum, Őslénytani és Földtani Tár, 1083 Budapest, Ludovika tér 2–6, Magyarország.
E-mail: dulai.alfred@nhmus.hu; https://orcid.org.0000-0002-9366-5217

Összefoglaló – A miocén Középső-Paratethys-tenger más területeihez képest Nyugat-Ukrajna brachiopoda faunájáról csak korlátozott adat áll rendelkezésre. Különösen kevés információnk van a felső badeni homokos fáciesről. A Lengyel Tudományos Akadémiához tartozó Föld Múzeuma (Muzeum Ziemi, Varsó) Kowalewski-gyűjteménye három fajt tartalmaz a homokos fácies két lelőhelyéről [Shushkovitsi (Szuszkowce) és Rydoml], ahonnan korábban még nem publikáltak brachiopodákat. A *Terebratulina* cf. *retusa* (Linnaeus, 1758), *Megathiris detruncata* (Gmelin, 1791) és *Megerlia truncata* (Linnaeus, 1767) fajok jól ismertek a Középső-Paratethys egyéb területeiről. A vizsgált anyagból különösen figyelemre méltó az egyik, Rydoml lelőhelyről származó *Megerlia* példány, melynek a brachidiuma tökéletes állapotban maradt fenn, ami ritkaságnak számít a miocén és más fosszilis anyagok esetében.
Kulcsszavak – Brachiopoda, felső badeni, Középső-Paratethys, *Megathiris*, *Megerlia*, *Terebratulina*

ÁBRAALÁÍRÁSOK

1. ábra. A nyugat-ukrajnai középső miocén (felső badeni) üledékek elterjedését bemutató térkép a transzgresszió maximális szakaszában (Bitner & Bakayeva 2026, valamint Studencka & Dulai 2010 alapján módosítva). Jelmagyarázat: 1 – Kárpátok; 2 – agyag; 3 – vörösalgás márga és mészkő; 4 – vörösalgás zátonymészkő; 5 – homok. A vörös betűvel jelölt helységnevek mutatják a vizsgált lelőhelyeket.

2–9. ábra. A Shushkovitsi (korábbi nevén Szuszkowce) és Rydoml lelőhelyekről (Ny-Ukrajna) származó felső badeni brachiopodák (Kowalewski-gyűjtemény, Föld Múzeuma, Varsó, Lengyelország). 2, 3 = *Terebratulina* cf. *retusa* (Linneaeus, 1758) héjtöredékek, Shushkovitsi, MZ VIII Bra 1726–27; 4 = *Megathiris detruncata* (Gmelin, 1791), dorzális teknő, belső nézet, Rydoml, MZ VIII Bra 1729. 5, 6, 7–9 ábrák: *Megerlia truncata* (Linnaeus, 1767), 5 = dorzális teknő belső nézete, Shushkovitsi, MZ VIII Bra 1728; 6 = ventrális teknő, külső nézet, Rydoml, MZ VIII Bra 1724; 7–9 ábrák, ugyanaz, kétteknős példány szétválasztott teknői, Rydoml, MZ VIII Bra 1725, 7 = ventrális teknő, külső nézet, 8–9 = dorzális teknő, belső nézet és a brachidium nagyított képe. Méretlécek: 1 mm.