ANNALES MUSEI HISTORICO-NATURALIS HUNGARICI
Volume 117 Budapest, 2025 pp. 121–130

HU-ISSN 0521-4726 (print) ISSN 2786-1368 (online)
arrived: 2025. 09. 15. published: 2025. 10. 30.

Taxonomic revision of some Central Paratethyan Middle Miocene brachiopod species described by Matyasovszky in 1880 (Terebratulida; Megathyrididae; Terebratulidae)

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 – Very limited information is known about the Miocene brachiopod fauna of southern Hungary and northeastern Croatia. The single significant paper from this area was published by Jakab Matyasovszky, who described five new species from Baranyavár (currently Branjin Vrh, Croatia) locality at the end of the 19th century. This material requires a significant taxonomic revision, but the studied specimens are no longer available in the collection of the former Geological Institute of Hungary, Budapest. Based on the descriptions and illustrations in Matyasovszky's publication, four of the five new species are junior synonyms of previously introduced brachiopod species (*Argiope baanensis* = *Joania cordata*; *Argiope hofmanni* = *Argyrotheca cuneata*; *Argiope baranyaense* = *Joania cordata*; *Argiope boeckhi* = *Megathiris detruncata*), while the fifth one is a juvenile specimen that cannot be identified at the species or genus level (*Terebratulina parva* = Terebratulidae juv. indet.). With 25 figures.

Key words – Brachiopoda, Megathyrididae, Badenian, Ban Hills, Baranja, Croatia

INTRODUCTION

Shallow marine fauna of the Middle Miocene Central Paratethys was extremely diverse, and the various sedimentary formations contain abundant fossil remains of many invertebrate and vertebrate groups (e.g. Moissette et al. 2006; Hyžný & Dulai 2021; Szabó *et al.* 2022; Harzhauser et al. 2024). Although brachiopods generally play a subordinate role in the Cenozoic, they can be found regularly in the Neogene formations in smaller to larger quantities (Dulai 2021). This is particularly true for the small-sized, so-called micromorphic brachiopod species, which can sometimes be significantly enriched in screen-washed residues.

DOI: *https://doi.org/10.53019/AnnlsMusHistNatHung.2025.117.121*

Compared to other Central Paratethyan areas, there are very few publications and limited data available on Miocene brachiopods from southern Hungary and northeastern Croatia. The need for a taxonomic revision of the species published in the single significant paper (Matyasovszky 1880) had already been raised earlier, but this was not carried out due to the lack of type material. Now, in connection with the new Middle Miocene brachiopod material processed and published from the nearby Hungarian locality (Mecsekpölöske; Dulai 2025), this question has been raised again, and the revision published here has been prepared in connection with this project.

HISTORICAL BACKGROUND

Matyasovszky (1880) described the small-sized Middle Miocene brachiopods found during geological mapping in the Baranja (Baranya) areas belonging to southern Hungary at that time. The examined specimens were collected, with one exception, in the coarse sandy and marly layers of the Leitha limestone in the abandoned limestone quarry near the village of Baranyavár (Fig. 1.). Baranyavár (Branjin Vrh) is located in Croatia, less than 3 km from the Croatian-Hungarian border. This area is dominated by Pleistocene eolian loess deposits, but there are also some scattered outcrops of Middle Miocene sedimentary and volcanic formations (Banak *et al*. 2010). The geological map by Banak *et al*. (2012: fig. 1) shows that Middle Miocene limestones and marls appear in patches on the NNW edge of the Ban Hills.

Matyasovszky was not a brachiopod specialist, and in his paper, he thanks János Böckh, who had experience in the study of Mesozoic brachiopods, for his help. Apart from a few references from Hungary (e.g. Strausz 1926; Meznerics 1944; Bitner & Dulai 2004), this work was hardly cited, one reason for this may have been that the paper was published in a local natural history journal that was difficult to access for brachiopod specialists abroad.

In view of the above-mentioned problems, a revision of Matyasovszky's brachiopods and especially the type specimens would be advisable, but this material is no longer available in the collection of the former Geological Institute of Hungary (current name: Supervisory Authority for Regulatory Affairs, SARA; Ottilia Szíves pers. comm). Strausz (1926), examining the fossil fauna of the same area, mentioned foraminifers and bryozoans from the bryozoan marl layer that provided Matyasovszky's brachiopods. He already recognized that these brachiopod species needed revision, and even stated that the species *A. boeckhi* could be classified as *Megathyris decollata* (= *Megathiris detruncata*). Meznerics (1944) also mentioned that she saw these specimens in the collection of the Geological Institute of Hungary, but two decades later Boda (1964) in his catalogue of fossil species described from Hungary mentioned only the species *Argiope boeckhi*, without locality information. For the moment, in the absence of

Matyasovszky's material, we can only make an approximate taxonomic revision based on the original descriptions and (not necessarily accurate) drawings of Matyasovszky (1880), as well as the useful comments of Mezneric s (1944). Because of the previously mentioned difficult-to-obtain publication record, the most typical views of Matyasovszky's species are re-illustrated here to support the revision, and in absence of the type specimens, we represent the senior synonyms of Matyasovszky's species with SEM images of specimens from similar fossil assemblages studied and published by the author.

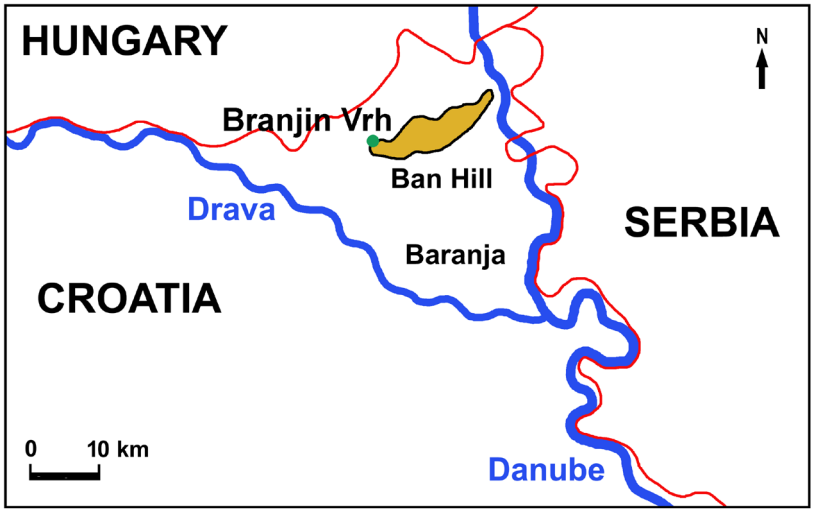
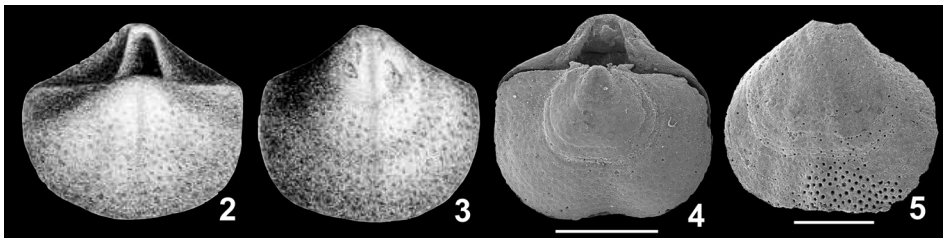


Figure. 1. Geographic location of Baranyavár (Branjin Vrh, Baranja, Croatia) fossil site.

TAXONOMIC REVISION OF MATYASOVSZKY'S SPECIES

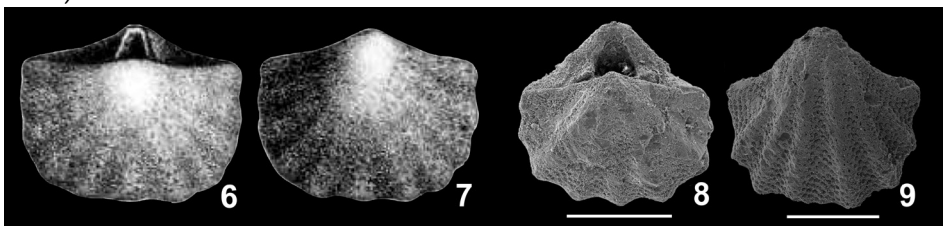
Most of the new species published by Matyasovszky (1880) (four species: *Argiope baanensis*, *A. hofmanni*, *A. baranyaense*, and *A. boeckhi*) belong to the family Megathyrididae, while *Terebratulina* is a member of the family Cancellothyrididae (Kaesler 2006).

1. *Argiope baanensis* Matyasovszky, 1880 (Figs 2–5) has small and smooth shell, with strongly punctate valves. The outline is rounded, subcircular. Although it is not visible in the figures, Matyasovszky mentioned a narrow sulcus in the middle part of both valves that can be traced to the anterior margin. Agreeing with Mezneric s (1944) that this is probably a juvenile specimen, the general external morphological characters suggest that this may be assigned to the species *Joania cordata* (Risso, 1826) with some uncertainty (knowledge of the internal morphology would be necessary for confident identification).



Figures 2–5. *Argiope baanensis* Matyasovszky, 1880 = *Joania cordata* (Risso, 1826). 2–3 = *A. baanensis* reproductions from the original publication (Matyasovszky (1880): pl. X, figs 1b, 1c), articulated specimen, dorsal and ventral views; 4–5 = *J. cordata* articulated specimens: 4 = Mecsekpölöske, Middle Miocene, dorsal view from Dulai (2025); 5 = Devecser, Middle Miocene, ventral view from Dulai (2007). Scale bars: 1 mm.

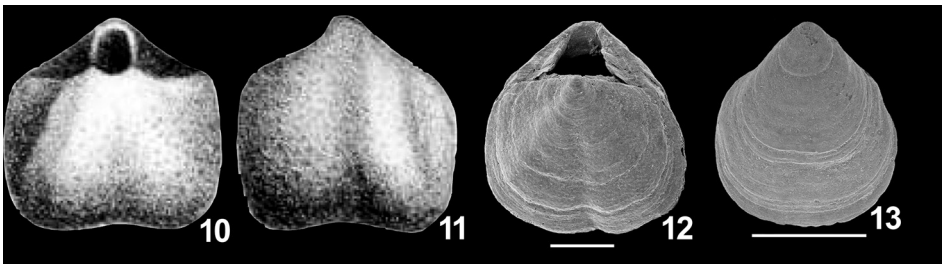
2. *Argiope hofmanni* Matyasovszky, 1880 (Figs 6–9) is a small-sized, angular, laterally elongated form with a slightly prominent beak. The strongly punctate valves are evenly ribbed, the rounded ribs appearing on the anterior half of the shell. Matyasovszky mentioned ten ribs, Meznerics (1944) stated that the central four-six ribs are more prominent than the lateral ones. Matyasovszky (1880) considered this species to be a transitional form between *Argiope decollata* Chemnitz, 1785 and *A. costulata* Seguenza, 1866, a view disagreed with by Meznerics (1944). In any case, it has weaker ribs than *Megathiris* and looks more like a specimen of *Argyrotheca*. Based on the external morphology, it may be identical with *Argyrotheca cuneata* (Risso, 1826) (see also in Bitner & Dulai 2004).



Figures 6–9. *Argiope hofmanni* Matyasovszky, 1880 = *Argyrotheca cuneata* (Risso, 1826). 6–7 = *A. hofmanni* reproductions from the original publication (Matyasovszky (1880): pl. X, figs 2b, 2c), articulated specimen, dorsal and ventral views; 8–9 = *A. cuneata* articulated specimen, Mátraverebély, Middle Miocene, dorsal and ventral views from Dulai (2021). Scale bars: 1 mm.

3. *Argiope baranyaense* Matyasovszky, 1880 (Figs 10–13) is a small-sized, smooth, strongly punctate form. The outline of the specimen is subpentagonal, rounded at the margins, the beak is moderately high. A definite sulcus is observed in the central part of both valves, which gradually widens as it approaches the anterior margin, but Meznerics (1944) noted that it is not as indented at the anterior margin as Matyasovszky's figure shows. Based on external morphological

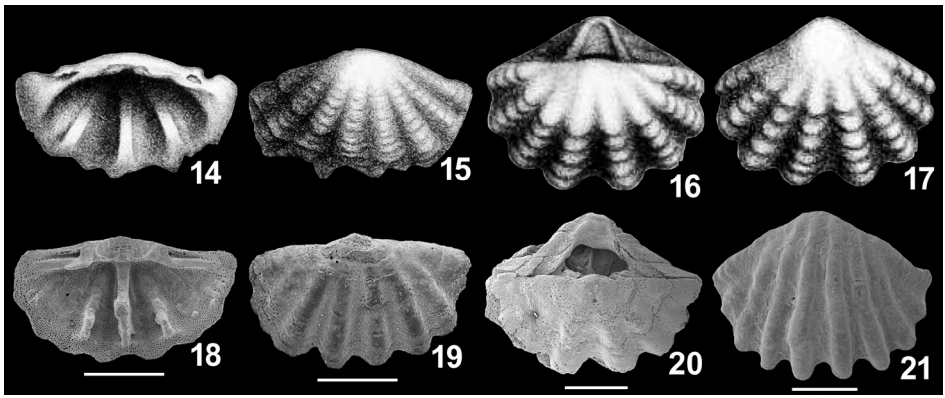
characters, this specimen and this species can also be identified with *Joania cordata* (Risso, 1826), much more definitely and clearly than in the case of *Argiope baanensis*.



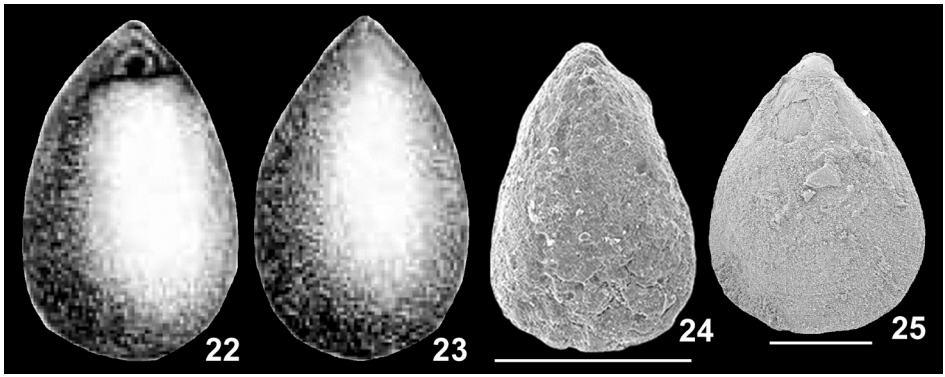
Figures 10–13. *Argiope baranyaense* Matyasovszky, 1880 = *Joania cordata* (Risso, 1826). 10–11 = *A. baranyaense* reproductions from the original publication (Matyasovszky (1880): pl. X, figs 3b, 3c), articulated specimen, dorsal and ventral views; 12–13 = *J. cordata* articulated specimens: 12 = Bánd, Middle Miocene, dorsal view from Dulai (2007); 13 = Mecsekpölöske, Middle Miocene, ventral view from Dulai (2025). Scale bars: 1 mm.

4. *Argiope boeckhi* Matyasovszky, 1880 (Figs 14–21) is a small, strongly rounded form, width greater than length. The surface of the shells is strongly ribbed, except around the beak. The few ribs are distinct and strongly rounded. Since Matyasovszky also illustrated a dorsal valve of this species, in addition to the articulated specimen, some of the internal morphological characters are also known. The presence of three septa is clearly visible inside the dorsal valve. Both the external and internal morphology suggest the genus *Megathiris*, and there is no reason why it should not be classified species *detruncata* (as it was already noted by Strausz 1926), a species with a very wide geographical and stratigraphic distribution (Eocene to Recent).

5. *Terebratulina parva* Matyasovszky, 1880 (Figs 22–25) has a very small, flat, elongated raindrop shaped shell. The surface of both valves is smooth. As Meznerics (1944) correctly assumed, it is a juvenile specimen, which makes the identification difficult. Although the external morphology and the outline of the specimen are reminiscent of the genus *Terebratulina*, the absence of ribs on the shell surface makes the identification uncertain. In very rare cases, the ribs may be almost completely absent from the surface of very small juvenile *Terebratulina* specimens (Fig. 24). At the same time, however, in the juvenile stage, smooth-shelled Neogene terebratulids (e.g. *Terebratula*, *Gryphus*) may also have a similar shape (Fig. 25). Knowledge of the internal morphology could help to advance the identification. Apart from the uncertainty of generic classification, the description of such a juvenile specimen as a new species is unjustified. Based on the available information, we can only conclude that this is a juvenile Terebratulidae. According to Meznerics (1944), the specimen was severely damaged after description and illustration.



Figures 14–21. *Argiope boeckhi* Matyasovszky, 1880 = *Megathiris detruncata* (Gmelin, 1791). 14–17 = *A. boeckhi* reproductions from the original publication (Matyasovszky (1880): pl. X, figs 5b, 5c, 6b, 6c): 14–15 = dorsal valve, internal and external views; 16–17 = articulated specimen, dorsal and ventral views; 18–21 = *M. detruncata* specimens: 18–19 = Dorsal valve, Devecser, Middle Miocene, internal and external views from Dulai (2007); 20 = articulated specimen, Mecsekpölöske, Middle Miocene, dorsal view from (Dulai 2025); 21 = articulated specimen, Novaj, upper Oligocene, ventral view from Dulai (2021). Scale bars: 1 mm.



Figures 22–25. *Terebratulina parva* Matyasovszky, 1880 = juvenile Terebratulidae. 22–23 = reproductions from the original publication (Matyasovszky (1880): pl. X, figs 4b, 4c), articulated specimen, dorsal and ventral views; 24–25 = Juvenile Cenozoic terebratulides: 24 = *Terebratulina johansenae* Dulai, 2011, paratype, juvenile articulated specimen, Perwang-1 borehole, Austria, upper Eocene, dorsal view from Dulai (2011); 25 = *Gryphus*? sp., Messina, Italy, Lower Pleistocene, ventral view from Dulai (2021). Scale bars: 0.5 mm.

CONCLUSIONS

The type material of the five new brachiopod species described by Matyasovszky (1880) from the Baranja region in northeastern Croatia has been lost. The taxonomic revision based on his descriptions and illustrations suggests that these new species are junior synonyms of previously described species (*Argiope baanensis* = *Joania cordata*; *Argiope hofmanni* = *Argyrotheca cuneata*; *Argiope baranyaense* = *Joania cordata*; *Argiope boeckhi* = *Megathiris detruncata*), or unidentifiable juvenile specimens (*Terebratulina parva* = Terebratulidae juv. indet.), and thus all the five can be regarded as invalid names.

*

Acknowledgements – The SEM photos were taken at the SEM Laboratory of the Hungarian Natural History Museum, Budapest. The study was supported by Hungarian Scientific Research Fund (NKFI/OTKA K146962). I would like to thank the reviewer (Attila Vörös, Budapest) for his constructive suggestions, which have significantly improved the quality of this paper. The previous version of this paper was reviewed by Aleksandra Bitner (Warsaw, Poland) and Finn Surlyk (Copengagen, Denmark), thanks are due also to them.

REFERENCES

Banak A., Mandic O., Kovačić M. & Pavelić D. 2012: Late Pleistocene climate history of the Baranja loess plateau – evidence from the Zmajevac loess-paleosol section (northeastern Croatia). – *Geologica Croatica* **65**(3): 411–422.

Banak A., Pavelić D., Mandic O., Sprovieri M. & Kovačić M. 2010: The sedimentary record of Bansko brdo hill (NE Croatia): from Badenian marine environment to Pleistocene eolian sediments. – *Abstract Volume of 18th International Sedimentological Congress*, Mendoza, Argentina, 26th September / 1st October 2010, 1 p.

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.

Boda J. 1964: *Magyarországi ősmaradványtípusok jegyzéke.* [*An inventory of the fossil types in Hungary. Fossil animals*]. Geological Institute of Hungary, Budapest. 229 pp. [in Hungarian]

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. 2021: *Szemelvények az európai kainozoós Brachiopoda fauna fejlődéstörténetéből.* [*Excerptions from the evolution of Cenozoic brachiopods of Europe*]. Unpublished DSc Thesis, Hungarian Natural History Museum, Budapest, 409 pp. [in Hungarian]

Dulai A. 2025: Seagrass-associated Middle Miocene brachiopods from the Central Paratethys, with description of a new species of *Bronnothyris*. – *Acta Palaeontologica Polonica*, **70**(4): 649–660.
https://doi.org/10.4202/app.01272.2025

Harzhauser M., Landau B., Mandic O. & Neubauer T.A. 2024: The Central Paratethys Sea—rise and demise of a Miocene European marine biodiversity hotspot. – *Scientific Reports* **14**: 16288. https://doi.org/10.1038/s41598-024-67370-6

Hyžný M. & Dulai A. 2021: *Badenian decapods of Hungary*. – GeoLitera, Szeged, 296 pp.

Kaesler R.L. (ed.) 2006: *Treatise on Invertebrate Paleontology, Part H, Brachiopoda, Revised, Volume 5, Rhynchonelliformea (part)*, pp. 1689–2320. Geological Society of America, Boulder, Colorado, and University of Kansas Press, Lawrence, Kansas.

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.

Moissette P., Dulai A. & Müller P. 2006: Bryozoan faunas in the Middle Miocene of Hungary: biodiversity and biogeography. – *Palaeogeography, Palaeoclimatology, Palaeoecology* **233**: 300–314.
https://doi.org/10.1016/j.palaeo.2005.10.001

Szabó M., Kocsis L., Tóth E., Szabó P., Németh T. & Sebe K. 2022: Chondrichthyan (Holocephali, Squalomorphii and Batomorphii) remains from the Badenian of southern Hungary (Tekeres, Mecsek Mountains): the first deepwater cartilaginous fishes from the Middle Miocene of the Central Paratethys. – *Papers in Palaeontology* **8**(6): e1471.
https://doi.org/10.1002/spp2.1471

Strausz L. 1926: A báni hegység mediterrán rétegei. (Die Mediterranschichten des Báner Gebirges). – *Földtani Közlöny* **56**: 118–122, 242. [in Hungarian with German abstract]

··•●•··

Matyasovszky által 1880-ban leírt Középső-paratethysi miocén Brachiopoda fajok taxonómiai revíziója (Terebratulida; Megathyrididae; Terebratulidae)

Dulai Alfréd

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

Összefoglaló – Dél-Magyarország és Északkelet-Horvátország miocén brachiopoda faunájáról nagyon kevés információval rendelkezünk. A területről származó egyetlen jelentős publikáció Matyasovszky Jakab nevéhez fűződik, aki a XIX század végén öt új fajt írt le Baranyavár (jelenleg Branjin Vrh, Baranja, Horvátország) területéről. Az anyag taxonómiai revízióra szorul, azonban az eredetileg vizsgált és leírt példányok nincsenek meg az egykori Földtani Intézet (jelenlegi nevén Szabályozott Tevékenységek Felügyeleti Hatósága) gyűjteményében. A publikációban közölt leírások és ábrázolások alapján az öt új fajból négy junior szinoníma (*Argiope baanensis* = *Joania cordata*; *Argiope hofmanni* = *Argyrotheca cuneata*; *Argiope baranyaense* = *Joania cordata*; *Argiope boeckhi* = *Megathiris detruncata*), míg az ötödik egy faj és nemzetség szinten azonosíthatatlan juvenilis példány (*Terebratulina parva* = Terebratulidae juv. indet.). 25 ábrával.
Kulcsszavak – Brachiopoda, Megathyrididae, badeni, Báni-hegység, Baranya, Horvátország

ÁBRAALÁÍRÁSOK

1. ábra. A baranyavári (Baranya, Horvátország) ősmaradvány lelőhely földrajzi helyzete.

2–5. ábrák. *Argiope baanensis* Matyasovszky, 1880 = *Joania cordata* (Risso, 1826). 2–3 = *A. baanensis* reprodukciók az eredeti publikációból (Matyasovszky (1880): pl. X, figs 1b, 1c), kétteknős példány, dorzális és ventrális nézet; 4–5 = *J. cordata* kétteknős példányok: 4 = Mecsekpölöske, középső miocén, dorzális nézet (Dulai (2025) alapján); 5 = Devecser, középső miocén, ventrális nézet (Dulai (2007) alapján). Méretarány: 1 mm.

6–9. ábrák. *Argiope hofmanni* Matyasovszky, 1880 = *Argyrotheca cuneata* (Risso, 1826). 6–7 = *A. hofmanni* reprodukciók az eredeti publikációból (Matyasovszky (1880): pl. X, figs 2b, 2c), kétteknős példány, dorzális és ventrális nézet; 8–9 = *A. cuneata* kétteknős példány, Mátraverebély, középső miocén, dorzális és ventrális nézet (Dulai (2021) alapján). Méretarány: 1 mm.

10–13. ábrák. *Argiope baranyaense* Matyasovszky, 1880 = *Joania cordata* (Risso, 1826). 10–11 = *A. baranyaense* reprodukciók az eredeti publikációból (Matyasovszky (1880): pl. X, figs 3b, 3c), kétteknős példány, dorzális és ventrális nézet; 12–13 = *J. cordata* kétteknős példányok: 12 = Bánd, középső miocén, dorzális nézet (Dulai (2007) alapján); 13 = Mecsekpölöske, középső miocén, ventrális nézet (Dulai (2025) nyomán). Méretarány: 1 mm.

14–21. ábrák. *Argiope boeckhi* Matyasovszky, 1880 = *Megathiris detruncata* (Gmelin, 1791). 14–17 = *A. boeckhi* reprodukciók az eredeti publikációból (Matyasovszky (1880): pl. X, figs 5b, 5c, 6b, 6c): 14–15 = dorzális teknő, belső és külső nézet; 16–17 = kétteknős példány, dorzális és ventrális nézet; 18–21 = *M. detruncata* példányok: 18–19 = Dorzális teknő, Devecser, középső miocén, belső és külső nézet (Dulai (2007) alapján); 20 = kétteknős példány, Mecsekpölöske, középső miocén, dorzális nézet (Dulai (2025) alapján); 21 = kétteknős példány, Novaj, felső oligocén, ventrális nézet (Dulai (2021) alapján). Méretarány: 1 mm.

22–25. ábrák. *Terebratulina parva* Matyasovszky, 1880 = juvenilis Terebratulidae. 22–23 = reprodukciók az eredeti publikációból (Matyasovszky (1880): pl. X, figs 4b, 4c), kétteknős példány, dorzális és ventrális nézet; 24–25 = Juvenilis kainozoós terebratulidák. 24 = *Terebratulina johansenae* Dulai, 2011, paratípus, juvenilis kétteknős példány, Perwang-1 mélyfúrás, Ausztria, felső eocén, dorzális nézet (Dulai (2011) alapján); 25 = *Gryphus*? sp., Messina, Olaszország, alsó pleisztocén, ventrális nézet (Dulai (2021) alapján). Méretarány: 0.5 mm.