

New gastropod records from the Cenozoic of Hungary

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Új adatok a hazai kainozoos gastropodák ismeretéhez

Összefoglalás

Tanulmányunk a magyarországi kainozoos tengeri molluszkafauna pontosabb megismeréséhez járul hozzá 2 lutetiai, 2 egri és 22 badeni korú Gastropoda-faj leírásával, melyek többsége hazánkból ismeretlen volt, vagy csupán faunalistákon szerepelt. 21 faj új előfordulás Magyarországon, 22 esetében ez az első ábrázolás a hazai szakirodalomban. Bemutatjuk a fajok rétegtani és ősföldrajzi elterjedését. Közelmúltbeli terepmunkák, valamint a Magyar Természettudományi Múzeum gyűjteménye alapján egy új faj, *Lautoconus harzhauseri* KOVÁCS nov. sp. is leírásra került.

Tárgyszavak: *Gastropoda*, *Paratethys*, *kainozoos*, *lutetiai*, *egri*, *badeni*

Abstract

In this paper 26 recently collected Cenozoic marine gastropod species from Hungary are briefly described. Two Lutetian (Eocene), two Egerian (Oligocene) and 22 Badenian (Miocene) species are represented; most of them are newly-recorded, while others are illustrated for the first time as being present in Hungary. The extended stratigraphic and palaeogeographic ranges of the respective species are summarized and a new taxon is introduced: *Lautoconus harzhauseri* KOVÁCS nov. sp.

Keywords: *Gastropoda*, *Paratethys*, *Cenozoic*, *Lutetian*, *Egerian*, *Badenian*

Introduction

The aim of this paper is to describe and illustrate 26 Cenozoic gastropod species from the Transdanubian and the North Hungarian Mountain Ranges, Hungary. Most of the taxa were hitherto unrecorded from Hungary or only mentioned in faunal lists in the Hungarian literature. The studied materials were collected in the last ten years as a result of new field works at well-known palaeontological sites (*Figure 1*), and most of them belong to private collections. Amateur fossil collectors have traditionally contributed to palaeontological researches by discovering new fossiliferous localities, donating materials to museums or publishing new data. We hope that our new records may also help to understand better the palaeobiogeographical range of the studied species and the diversity of the Cenozoic mollusc faunas of the Western Tethys and the Paratethys.

Geological setting

The litho- and biostratigraphy of the Eocene epicontinental formations of the Hungarian Palaeogene Basin were summarized by KECSKEMÉTI (1998), the Middle Eocene deposits of the Vértes Mts were thoroughly discussed by BUDAI & FODOR (2008). The fossiliferous beds of the Gánt Depression with grey silty clay or marl and thin coaly clay intercalations represent the upper part of the late Lutetian – early Bartonian Forna Formation. Mollusc assemblages from the vicinity were described e.g. by SZÓTS (1953), STRAUSZ (1962), MIHÁLY & VINCZE (1984), and DELL'ANGELO et al. (2015). A new locality was exposed by us, it is located on the Szőlő-hegy of Gánt, close to the “Gánti-szőlők” roadcut mentioned by SZÓTS (1953). It is composed of brown clay or clayey sand facies of 1 m thickness, and yielded one of the *Eopustularia* specimens figured herein. The Middle Eocene palaeogeography and the lithological formations of the



Figure 1. Locations of the studied Hungarian Eocene, Oligocene, and Miocene localities

1. ábra. A szövegben említett magyarországi eocén, oligocén és miocén lelőhelyek

Dudar–Jásd and the Balinka Basins (NE Bakony Mts) was treated e.g. by SZÓTS (1956), BÁLDI-BEKE & BÁLDI (1990) and BÁLDI-BEKE (2003). The diverse Lutetian deposits of Dudar and Balinka known from boreholes and coal mines were discussed by KNAUER & KOPEK (1982) and BERNHARDT (1985), respectively. The clayey sand with brown coal strings, the nummulitic sandstone and the grey marl or siltstone represent the Csernye Formation and have yielded very rich invertebrate assemblages. Mollusc faunas from Dudar were described by STRAUZ (1966a, 1969), and from Balinka by KECSKEMÉTI-KÖRMENDY (1980). Molluscs can be collected nowadays in the abandoned mine dumps of the villages (OZSVÁRT 2007).

The Late Oligocene (Egerian) stratigraphy and lithological formations of the Eger Brickyard were thoroughly analysed by BÁLDI (1973) and of the Esztergom Basin by SZTANÓ et al. (1998). The diverse Egerian mollusc assemblages from Hungary were described by BÁLDI (1973). The locality of Esztergom-Szentgyörgymező and its gastropod fauna were dealt with by KOVÁCS & VICIÁN (2016), the clayey siltstone deposits belong to the lower member of the Törökbálint Formation.

The Middle Miocene palaeogeography and lithological formations of the Neogene Pannonian Basin were summarized by HÁMOR (2001). All Lower Badenian rocks from the North Hungarian Mountains mentioned in this paper represent the Sámsonháza Formation. Fossiliferous localities of Borsodbóta (Western Bükk Mts) are characterized by a tuffaceous sandy facies. The site with the mollusc fauna were described by CSEPREGHY-MEZNERICS (1969, 1970), while the rich bryozoan fauna and the palaeoenvironment were studied by MOISSETTE et al. (2007). Around Márkháza (East Cserhát Mts) the fossiliferous beds are characterized by clay, clayey sand and tuffaceous sandstone, limestone and andesite conglomerate. The site was mentioned by NOSZKY (1940), later discussed in detail by HEGEDŰS & JANKOVICH (1972), the mollusc fauna was described by CSEPREGHY-MEZNERICS (1954). Deposits of Letskés (Western Börzsöny Mts) consist of limonitic clayey sand with andesite rock fragments and andesitic tuff. The mollusc fauna shows exceptional high diversity among the Hungarian as-

semblages (CSEPREGHY-MEZNERICS 1956, KOVÁCS & VICIÁN 2014, HARZHAUSER & LANDAU 2016, HARZHAUSER et al. 2017). Near Bánd (Bakony Mts, Transdanubian Range) Lower Badenian clayey sand facies yielded rich marine invertebrate assemblages consisting of numerous coral, gastropod, bivalve, scaphopod, polyplacophoran, brachiopod, scleractinian, cirripedian, echinoid, calcareous algae, bryozoan, decapod and fish taxa (KÓKAY 1966, JAKUS 1980, DULAI 2005, 2007). From the Lower Badenian of Márkháza, Borsodbóta and Bánd new Cypraeidae, Pediculariidae and Triviidae species were described by FEHSE & VICIÁN (2004, 2006, 2008).

Systematic Palaeontology

Family Strombidae RAFINESQUE, 1815

Genus *Europrotomus* KRONENBERG et HARZHAUSER, 2012

Europrotomus schroeckingeri (HÖRNES in HOERNES & AUINGER 1884) (Plate 1, figs 1–2)

1884 *Strombus (Monodactylus) Schroeckingeri* M. HOERN. — HOERNES & AUINGER, p. 165, pl. 19, figs 6–7.

2012 *Europrotomus schroeckingeri* (HÖRNES in HOERNES & AUINGER) comb. nov. — KRONENBERG & HARZHAUSER, p. 151, figs 2–3 (*cum syn.*).

Remarks: The species is known from the Lower Badenian of North Hungary (Sámsonháza, Márkháza, Mátraverebély; Cserhát Mts), but only a fragmentary specimen was represented (STRAUSZ 1966b, fig. 104). As the type species of the genus is significant from palaeobiogeographical point of view, a well-preserved specimen from Márkháza is figured here.

Distribution: Badenian: Central Paratethys (Styrian Basin: Austria; Făget Basin: Romania; Pannonian Basin: Bosnia and Herzegovina, Hungary; Forecarpathian Basin: NW Bulgaria).

Family Xenophoridae TROSCHER, 1852

Genus *Xenophora* FISCHER VON WALDHEIM, 1807

Xenophora italica (GRATELOUP, 1845) (Plate 1, figs 3–4)

1845 *Trochus conchyliophorus* var. *Italica* — GRATELOUP, pl. 13, fig. 2.

2013 *Xenophora italica* (GRATELOUP) — LANDAU et al., p. 99, fig. 19/1, pl. 10, figs 1–3, pl. 62, fig. 3 (*cum syn.*).

Remarks: Two xenophorids are known from the Lower Badenian of Hungary, *X. deshayesi* (MICHELOTTI) (Mecsek and Cserhát Mts, STRAUZ 1966b) and *Stellaria testigera* (BRONN) (Bükk Mts, CSEPREGHY-MEZNERICS 1969). The specimen from Letskés represents a third taxon, *X. italica*. It differs from *X. deshayesi* in straight sided whorls with finer sculpture, and showing a preference for agglutinating smaller pebbles, bivalve fragments and small gastropod

shells. The specimen bears several *Amalda glandiformis* (LAMARCK) and a *Projenneria albopunctata* FEHSE et VICIÁN shells.

Distribution: Langhian: NE Atlantic (Aquitaine Basin: France), Badenian: Central Paratethys (Pannonian Basin: Hungary), Serravallian: Proto-Mediterranean Sea (Karaman Basin: Turkey).

Family Cypraeidae RAFINESQUE, 1815
Genus *Eopustularia* FEHSE, 2010

Eopustularia balinka FEHSE, 2010
(Plate 1, figs 5–9)

2010 *Eopustularia balinka* n. sp. — FEHSE, p. 6, pl. 5, figs 1–5.
2014 *Eopustularia balinka* FEHSE — LORENZ, p. 11, text-fig. 2/3.

Remarks: This recently described species (type of the genus) is a rare element of the Lutetian mollusc faunas of Italy, but is abundant at Balinka (Hungary). Two other *Eopustularia* species are known from Hungary: *E. moloni* (BAYAN) differs in finer teeth, shorter terminals, and rounded sides and dorsal profile, while *E. gregorioi* (SCHILDER) has a larger shell with less keeled sides and less margined anterior extremity. As all types of *E. balinka* are deformed specimens, we represent here a well-preserved specimen from Gánt (Szőlő-hegy), and another from Balinka. (Note: the type locality of the species is Balinka in Hungary. *Fejér* is the name of the county where village Balinka is located.)

Distribution: Lutetian: W Tethys (Hungarian Palaeogene Basin), Bartonian: W Tethys (N Italian Basin).

Genus *Propustularia* SCHILDER, 1927

Propustularia neugeboreni
(HOERNES et AUINGER, 1880)
(Plate 1, figs 10–12)

1880 *Cypraea* (e. *Aricia*) *Neugeboreni* nov. form. — HOERNES & AUINGER, p. 60, pl. 7, figs 5–6, pl. 8, fig. 6.
1998 *Propustularia neugeboreni neugeboreni* (HOERNES et AUINGER) — DOLIN, p. 107 (pars), fig. 9.

Remarks: The species differs from other Miocene cypraeids in a unique morphological feature: the teeth are very long, they reach the margins on both sides. *P. neugeboreni* is a new record from Hungary. It rarely occurs in the Lower Badenian deposits of North Hungary (Márkháza, Sámsonháza, Borsodbóta), but is unknown from the highly diverse cypraeid assemblage of Letkés. The western boundary of its range is probably the Cserhát Mts region in the Central Paratethys.

Distribution: Badenian: Central Paratethys (Făget and Hațeg Basins: Romania; Pannonian Basin: Bosnia and Herzegovina, Hungary; Forecarpathian Basin: NW Bulgaria).

Family Cassidae LATREILLE, 1825
Genus *Cassis* SCOPOLI, 1777

Cassis postmamillaris SACCO, 1890
(Plate 1, figs 13–14)

1890 *Cassis postmamillaris* SACCO — SACCO, p. 16, pl. 1, fig. 11.
2013 *Cassis postmamillaris* SACCO — LANDAU et al., p. 123, pl. 17, figs 2–4, pl. 79, fig. 8 (*cum syn.*).

Remarks: The species was recorded from Hungary as *C. mamillaris* GRATELOUP without illustration by NOSZKY (1925, 1940) (N Börzsöny Mts, E Cserhát Mts). *C. postmamillaris* is abundant in the early Badenian mollusc assemblages of Letkés and Sámsonháza. (The highly diverse Tonnoidea fauna of Letkés is described by KOVÁCS & VICIÁN *in press.*)

Distribution: Langhian: Proto-Mediterranean Sea (Torino Hills: Italy), Badenian: Central Paratethys (Vienna Basin: Austria, Czech Republic, Slovakia; Pannonian Basin: Hungary; Făget Basin: Romania), Serravallian: Proto-Mediterranean Sea (Mezohellenic Basin: Greece; Karaman Basin: Turkey). Tortonian: Proto-Mediterranean Sea (Po Basin: Italy).

Family Epitoniidae BERRY, 1910
Genus *Sthenorytis* CONRAD, 1862

Sthenorytis cf. *pseudoretusa* (Sacco, 1891)
(Plate 1, figs 15–16)

1891 *Cirsotrema?* *pseudoretusum* SACC. — SACCO, p. 43, pl. 2, fig. 7.
1912 *Sthenorytis pseudoretusa* SACCO — DE BOURY, p. 233, pl. 12, figs 7–8.
1984 *Cirsotrema?* *pseudoretusum* SACCO — FERRERO MORTARA et al., p. 46, pl. 5, fig. 9a, b.

Remarks: Only a single epitoniid was recorded from the Upper Oligocene of Hungary (NOSZKY 1936), a *Scalaria rusticum* cf. *transiens* SACCO, but the specimen was destroyed by fire during the Hungarian Uprising of 1956. Our fragmentary specimen (donation of Tamás NÉMETH) was collected *ex situ* at the Egerian locality of Esztergom-Szentgyörgymező. It corresponds to the type of *S. pseudoretusa* in overall morphology (turbinate shell, rounded whorls, thick, spined axial ribs, rounded aperture). The type, however, bears 15 axial ribs on the last whorl, while our specimen has only 13 ribs, and is ornamented with fine spiral cords. The sculpture is similar to that of the Middle Oligocene *S. subpyrenaica* TOURNOUËR, but the latter is characterized by somewhat finer ribs with varices. *S. subpyrenaica depexa* (ROVERETO) differs by the lack of spines.

Distribution: Early Oligocene: W Tethys (N Italy), Egerian: Paratethys (Hungary).

Family Harpidae BRONN, 1849
Genus *Morum* RÖDING, 1798

Morum cythara (Brocchi, 1814)
(Plate 1, fig. 17)

- 1814 *Buccinum cythara* — BROCCHI, p. 330, pl. 5, fig. 5.
1966b *Morum (Oniscidia) cithara* BROCCHI — STRAUZ, p. 242, pl. 64, figs 8–9.
2016 *Morum cythara* (BROCCHI) — STEIN et al., p. 101, pl. 46, figs 1–2 (*cum syn.*).

Remarks: The species is abundant in Badenian localities of Hungary, but has never been recorded from Egerian deposits. The strong nodulose sculpture of the specimen is close to the forms described by SACCO (1890) from the Italian Oligocene. *M. dunkeri* SPEYER from the Chattian of the North Sea Basin is similar in sculpture, but differs in lower spire and in broad and flat spiral cords. Two *M. cythara* specimens are recorded herein from the Eger Brickyard.

Distribution: Oligocene: N Tethys (Italy), Egerian: Paratethys (Hungary), Aquitanian–Langhian: NE Atlantic (Aquitaine Basin: France), Burdigalian: Proto-Mediterranean Sea (Italy), late Burdigalian – Langhian: North Sea Basin (the Netherlands), Serravallian–Tortonian: NE Atlantic (Portugal), Badenian: Paratethys (Vienna Basin: Austria, Korytnica Basin: Poland, Pannonian Basin: Bosnia, Hungary; Transylvanian Basin: Romania; Forecarpathian Basin: Ukraine, NW Bulgaria), Serravallian: Proto-Mediterranean Sea (Karaman Basin: Turkey), Tortonian: Proto-Mediterranean Sea (Po Basin, Italy).

Family Muricidae RAFINESQUE, 1815
Genus *Pterynotus* SWAINSON, 1833

Pterynotus granuliferus (GRATELOUP, 1833)
(Plate 2, figs 1–2)

- 1833 *Murex granuliferus* Nob. — GRATELOUP, p. 96.
2013 *Pterynotus granuliferus* (GRATELOUP) — LANDAU et al., p. 148, pl. 21, figs 12–13 (*cum syn.*).

Remarks: As with the rich early Badenian Conidae fauna of Letkés (see KOVÁCS & VICIÁN 2013, HARZHAUSER & LANDAU 2016), the family Muricidae also shows a much higher diversity than previously recognized. Seven hitherto unrecorded muricids are described herein from the locality. *Pterynotus granuliferus* is a new record from Hungary, it was a rare element of the mollusc assemblage.

Distribution: Burdigalian–Langhian: NE Atlantic (Aquitaine Basin: France), Badenian: Central Paratethys (Vienna Basin: Austria; Făget Basin: Romania; Korytnica Basin: Poland; Pannonian Basin: Hungary; Forecarpathian Basin: NW Bulgaria), Serravallian: Proto-Mediterranean Sea (Karaman Basin: Turkey), Tortonian: Proto-Mediterranean Sea (Po Basin: Italy).

Genus *Purpurellus* JOUSSEAUME, 1880

Purpurellus cyclopterus (MILLET, 1865)
(Plate 2, figs 3–4)

- 1865 *Murex cyclopterus* — MILLET, p. 592.
2016 *Purpurellus cyclopterus* (MILLET) — LANDAU et al., p. 224, pl. 1, fig. 3 (*cum syn.*).

Remarks: *P. cyclopterus* has an unusually long stratigraphical and a wide palaeogeographical range, however, it is very rare in the Badenian gastropod faunas of the Paratethys. The specimen figured here came from Letkés.

Distribution: Early–Middle Miocene: NE Atlantic (Aquitaine Basin, Loire Basin: France), Langhian–Serravallian: Proto-Mediterranean Sea (Torino Hills: Italy; Karaman Basin: Turkey), Badenian: Central Paratethys (Făget Basin: Romania; Korytnica Basin: Poland; Pannonian Basin: Hungary), Tortonian: NE Atlantic (France, Portugal), Proto-Mediterranean Sea (Italy). (For Pliocene range see LANDAU et al. 2016)

Genus *Dermomurex* MONTEROSATO, 1890
Subgenus *Dermomurex* s.s.

Dermomurex (s.s.) *distinctus*
(CRISTOFORI et JAN, 1832)
(Plate 2, figs 5–8)

- 1832 *Murex distinctus* — CRISTOFORI & JAN, p. 11.
2011 *Dermomurex* (s.s.) *distinctus* (CRISTOFORI et JAN) — MERLE et al., p. 215, text-fig. 72/F, pl. 166, figs 1–8.

Remarks: *Dermomurex distinctus* is a new record for the Hungarian assemblages, it is a rare element of the mollusc faunas of Letkés and Bánd. *D. scalaroides* (BLAINVILLE) is similar in size and morphology, but differs in more slender shell with higher spire, and finer sculpture.

Distribution: Middle Miocene: NE Atlantic (Loire Basin: France), Badenian: Central Paratethys (Vienna Basin: Austria; Korytnica Basin: Poland; Pannonian Basin: Hungary), Late Miocene – Pliocene: Proto-Mediterranean Sea (Italy).

Genus *Favartia* JOUSSEAUME, 1880
Subgenus *Pygmaeptyrys* VOKES, 1978

Favartia (Pygmaeptyrys) transsylvanica
(HOERNES et AUINGER, 1885)
(Figure 2, Plate 2, figs 9–10)

- 1885 *Murex (Muricidea) transsylvanicus* nov. form. — HOERNES & AUINGER, p. 207, pl. 24, fig. 12.
1906 *Murex (Muricidea) transsylvanicus* HOERNES et AUINGER — BOETTGER, p. 44.

Remarks: As it is the first appearance of *P. transsylvanica* outside of the type locality (Lăpuşiu de Sus, Coşteiu

de Sus), a revised description is provided here: Small shell (SL max. 14 mm), protoconch of 1.75 smooth, rounded whorls, teleoconch of five rounded whorls. Last whorl 57–60% of total length of teleoconch, ovate aperture, six denticles within the outer lip (ID, D1–D5), columellar lip weakly plicate with six fine, narrow plications, siphonal canal (26% of total length of teleoconch) open and slightly dorsally recurved. Scabrous shell surface, spiral sculpture of strong primary cords (P) (first whorl: appearance of P1, P2 and infrasutural primary cord [IP]; last whorl: adapical secondary cord (adis) and weakly developed IP on ramp, strong P1–P4, weakly developed P5–P6 and adapical [ADP], median [MP] and abapical [ABP] primary cords). Axial sculpture of seven slightly lamellose varices since the first whorl, small spinelets on varices (Figure 2). The specimens figured here agree with the type, and with specimens from Coșteiu (collection of the Hungarian Natural History Museum) in overall morphology, but due to better state of preservation their sculpture are much stronger. The species shows intraspecific variability in number of varices. We searched 26 specimens from which two bear eight varices and two bear only six.

The genus level arrangement is ambiguous in the literature. The species was cited as *Dermomurex* by VOKES (1971) and STOJASPAL (1978) without any description, but it was not mentioned by MERLE et al. (2011) among *Dermomurex* taxa. Based on morphological characteristics (small shell with seven winged varices, strong spiral sculpture, crenulate axial growth lamellae, denticulate aperture) we assign the species to subgenus *Pygmaeptyrys* (see VOKES 1978, 1994). Two other *Pygmaeptyrys* species are known from the Early – Middle Miocene of Europe: *F. (P.) subdecussata* (D'ORBIGNY) and *F. (P.) giselae* (BOETTGER). The first has a more slender shell with weaker spiral sculpture and bears well-developed denticles within the inner lip (VOKES 1994, pl. 25, fig. 3), while the second differs in wider shell with lower spire, and longer spinelets (ZILCH 1934, pl. 15, fig. 79). *P. transsylvanica* is common in the mollusc assemblage of Bánd.

Distribution: Badenian: Central Paratethys (Făget Basin: Romania; Pannonian Basin: Hungary).

Genus *Ocinebrina* JOUSSEAUME, 1880

Ocinebrina kojumdievae (BALUK, 1995)
(Plate 2, figs 11–12)

1995 *Purpura (Tritonalia) kojumdievae* nom. n. — BALUK, p. 228, pl. 30, fig. 8.

2013 *Ocinebrina kojumdievae* (BALUK) — GORET & PONS, p. 60, pl. 3, fig. 3 (cum syn.).

Remarks: The morphological differences between *O. lassaignei* (BASTEROT) and *O. kojumdievae*, as well as the close morphological and evolutionary relationship between the middle Miocene *O. kojumdievae*, the late Miocene *O. saccoi* (COSSMANN et PEYROT), and the Pliocene *O. ariesi-*

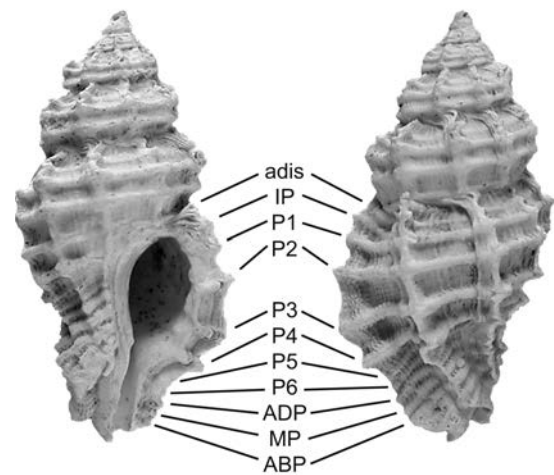


Figure 2. *Favartia (Pygmaeptyrys) transsylvanica* (HOERNES et AUINGER), shell length 14 mm (4×), Bánd, collection Zoltán Vicián

2. ábra. *Favartia (Pygmaeptyrys) transsylvanica* (HOERNES et AUINGER), ház hossza: 14 mm (4×), Bánd, Vicián Zoltán gyűjteménye

nensis (FONTANNES) were discussed in detail by LANDAU et al. (2007). The species is a new record from Hungary, it rarely occurs in the Lower Badenian deposits of Márk-háza.

Distribution: Miocene: W Paratethys (Hérault Basin: France), Badenian: Central Paratethys (Vienna Basin: Austria; Korytnica Basin: Poland; Făget Basin: Romania; Pannonian Basin: Hungary; Forecarpathian Basin: NW Bulgaria), Serravallian: Proto-Mediterranean Sea (Karaman Basin: Turkey).

Genus *Ceratostoma* HERRMANNSEN, 1846

Ceratostoma subaustriacus (STOJASPAL, 1978)
(Plate 2, figs 13–14)

1853 *Murex Genei* — HÖRNES, p. 231, pl. 24, figs 6–7 (non *Murex genei* BELLARDI et MICHELOTTI, 1840).

1885 *Murex austriacus* — HOERNES & AUINGER, p. 194 (new name for *Murex Genei* in HÖRNES, 1853).

1978 *Jaton (Ceratostoma) subaustriaca* nom. nov. — STOJASPAL, p. 335 (nom. nov. pro *austriaca* HOERNES et AUINGER 1885).

Remarks: The morphological differences between *Murex genei* BELLARDI et MICHELOTTI and the specimens figured by HÖRNES (1853, pl. 24, figs 6–7) were emphasized by HOERNES & AUINGER (1885), and a new name, *Murex austriacus* was proposed for the specimens of the Vienna Basin. This name is an objective homonym of *Murex austriacus* TOURNOUËR, 1875, and must be replaced according to the ICZN, although VOKES (1971) placed the species within genus *Ceratostoma*, while TOURNOUËR's taxon belongs to genus *Hexaplex (Trunculariopsis)* (MERLE et al. 2011). STOJASPAL (1978) introduced a new name in a list indicating “pro *austriaca* HÖRNES et AUINGER, 1885”. Although this arrangement is not very satisfying as STOJASPAL did not discuss any details, the name is available, and is used herein.

As all *Jaton* species differ from *Ceratostoma* species in strongly shouldered whorls (LANDAU et al. 2007), we assign *subaustriacus* to *Ceratostoma* that was treated in genus level within the Ocenebrinae by VERMEIJ & VOKES (1997). The shell morphology of *C. subaustriacus* agrees with the diagnosis of the latter authors, the labral tooth is present; however, the specific cancellate sculpture of the early whorls, due to poor state of preservation, cannot be traced.

Distribution: Badenian: Central Paratethys (Vienna Basin: Austria; Pannonian Basin: Hungary).

Genus *Murexsul* IREDALE, 1915

Murexsul sandbergeri (HÖRNES, 1856)
(Plate 2, figs 15–16)

1856 *Murex Sandbergeri* HÖRN. — HÖRNES, p. 674, pl. 51, fig. 5.
2013 *Murexsul sandbergeri* (HÖRNES) — LANDAU et al., p. 160, pl. 24, figs 3–4 (*cum syn.*).

Remarks: The species is widely distributed in the Paratethys, but is a rare element of the mollusc assemblages. Our specimen is the first record from Hungary, it came from Letkés.

Distribution: Badenian: Central Paratethys (Vienna Basin: Austria; Korytnica Basin: Poland; Făget Basin: Romania; Pannonian Basin: Hungary), Serravallian: Proto-Mediterranean Sea (Karaman Basin: Turkey).

Genus *Subpterynotus* OLSSON et HARBISON, 1953

Subpterynotus graniferus (MICHELOTTI, 1841)
(Plate 2, figs 17–18)

1841 *Murex graniferus* mihi — MICHELOTTI, p. 11, pl. 5, fig. 6.
2013 *Subpterynotus graniferus* (MICHELOTTI) — LANDAU et al., p. 162, pl. 24, figs 6–7 (*cum syn.*).

Remarks: The species is abundant in Miocene localities of Europe, however, it has not yet been recorded from Hungary. Our specimen came from Letkés.

Distribution: Aquitanian–Burdigalian: NE Atlantic (Aquitaine Basin: France), Burdigalian: Proto-Mediterranean Sea (Torino Hills: Italy), Badenian: Central Paratethys (Vienna Basin: Austria, Czech Republic; Făget Basin: Romania; Pannonian Basin: Hungary), Serravallian: Proto-Mediterranean Sea (Karaman Basin: Turkey), Tortonian: Proto-Mediterranean Sea (Po Basin: Italy).

Genus *Tripterotyphis* PILSBRY et LOWE, 1932

Tripterotyphis wenzelidesi (HÖRNES, 1853)
(Plate 2, fig. 19)

1853 *Murex (Typhis) Wenzelidesi* HÖRNES — HÖRNES, p. 264, pl. 26, fig. 12.
1978 *Typhis wenzelidesi* (HÖRNES) — STOJASPAL, p. 335.

Remarks: The shell morphology of *T. wenzelidesi* and *T. tripterus* (GRATELOUP) is closely affiliated and the two taxa were frequently considered as conspecific. We do not know any modern revision or comparison of the types, so provisionally accept the validity of both taxa, and treat *wenzelidesi* as a species typical of the Badenian of the Central Paratethys. It is a new record from Hungary.

Distribution: Badenian: Central Paratethys (Vienna Basin: Austria; Făget Basin: Romania; Pannonian Basin: Hungary).

Genus *Coralliophila* H. ADAMS et A. ADAMS, 1853

Coralliophila gracilispira BOETTGER, 1906
(Plate 2, figs 20–21)

1906 *Coralliophila gracilispira* n. sp. — BOETTGER, p. 35.
1934 *Coralliophila gracilispira* BOETTGER — ZILCH, p. 252, pl. 15, fig. 82.
1995 *Coralliophila (Coralliophila) gracilispira* BOETTGER — BALUK, p. 230, pl. 27, figs 7–9.

Remarks: A brief revision of the species was rendered by BALUK (1995). According to the author the *C. alternata* (BELLARDI) specimen in HÖRNES & AUINGER (1885, pl. 27, fig. 8) can be attributed to *C. gracilispira*. In our opinion BOETTGER's taxon differs from *alternata* by a more elongated shell. The species is a new record from Márkháza and Letkés.

Distribution: Badenian: Central Paratethys (Făget Basin: Romania; Korytnica Basin: Poland; Pannonian Basin: Hungary).

Family Buccinidae RAFINESQUE, 1815
Genus *Aplus* DE GREGORIO, 1885

Aplus varians (MICHELOTTI, 1847)
(Plate 3, figs 1–3)

1847 *Triton varians* — MICHELOTTI, p. 250, pl. 16, fig. 10.
1872 *Pollia varians* (MICHELOTTI) — BELLARDI, p. 180, pl. 12, fig. 19.
1872 *Pollia angusta* BELLARDI — BELLARDI, p. 181, pl. 12, fig. 20.
1904 *Tritonidea varians* (MICHELOTTI) var. *productocostata* SACCO — SACCO, p. 59, pl. 14, figs 69, 70.

Remarks: The axial sculpture variability of the species was emphasized by BELLARDI (1872), HILBER (1879) and HÖRNES & AUINGER (1890), and it is confirmed by our material of 22 specimens. Adults can bear three varices on teleoconch whorls (Pl. 3, fig. 1), two varices on the last whorl (Pl. 3, fig. 2) or only the labral varix (Pl. 3, fig. 3). The number of varices can be interpreted as more or less advanced growth stages, otherwise the specimens share identical morphology. Based on a revised generic diagnosis (AISSAOUI et al. 2016) the species is assigned to genus *Aplus* herein. *Pollia angusta* was already regarded as a synonym by HÖRNES & AUINGER (1890), this arrangement is accepted here. *Pollia philippii* MICHELOTTI and *Philbertia*

hungarica CSEPREGHI-MEZNERICS are also very similar forms. The holotype of *hungarica* (HNHM M.61.4369) agrees well in morphology with *A. varians*; however, we do not know any modern discussion of *philippii*. In lack of comparisons of types it is not possible to determine the validities but new investigations might demonstrate that the four taxa are conspecific. The species occurs at Bánd, Letkés, Márkháza and Borsodbóta in Hungary.

Distribution: Burdigalian–?Langhian: Proto-Mediterranean Sea (Torino Hills: Italy), Badenian: Central Paratethys (Vienna Basin, Styrian Basin: Austria; Făget Basin: Romania; Pannonian Basin: Hungary).

Genus *Metula* H. ADAMS et A. ADAMS, 1850

Metula submitraeformis (D'ORBIGNY, 1852)
(Plate 3, figs 4–5)

1845 *Fusus mitraeformis* GRAT. — GRATELOUP, pl. 24, figs 36–38, pl. 46, fig. 25 (*non mitraeformis* BROCCHI).

1852 *Fusus submitraeformis* D'ORB. — D'ORBIGNY, p. 66 (new name for *Fusus mitraeformis* GRATELOUP).

2013 *Metula submitraeformis* (D'ORBIGNY) — LANDAU et al., p. 167, pl. 53, fig. 17, pl. 79, fig. 11 (*cum syn.*).

Remarks: *Metula submitraeformis* is widely distributed in Burdigalian–Langhian deposits from the North Sea Basin, southwards along the western Atlantic frontage, the Paratethys and the Proto-Mediterranean Sea. The species differs from the similar *M. mitraeformis* (BROCCHI) from the Italian Pliocene in multispiral protoconch and reticulated early teleoconch whorls. The species is a new record from Hungary.

Distribution: Burdigalian: Molasse Basin (Germany), late Burdigalian – Langhian: North Sea Basin (the Netherlands), Langhian: North Sea Basin (Germany), NE Atlantic (Aquitaine Basin: France), Badenian: Central Paratethys (Vienna Basin: Austria; Pannonian Basin: Hungary; Romania), Serravallian: Proto-Mediterranean Sea (Karaman Basin: Turkey).

Family Colubrariidae DALL, 1904

Genus *Colubraria* SCHUMACHER, 1817

Colubraria subobscura
(HOERNES ET AUINGER, 1884)
(Plate 3, figs 6–9)

1884 *Triton (Epidromus) subobscurum* nov. form — HOERNES & AUINGER, p. 181, pl. 22, figs 4–7.

1960 *Colubraria (Colubraria) subobscura* (HOERNES ET AUINGER) — KOJUMDIEVA, p. 139, pl. 38, fig. 3.

Remarks: The rare species is typical of the Central Paratethys. It is a new record from Letkés, Hungary.

Distribution: Badenian: Central Paratethys (Vienna Basin: Austria; Făget Basin: Romania; Pannonian Basin: Hungary; Forecarpathian Basin: NW Bulgaria).

Family Cancellariidae FORBES ET HANLEY, 1851

Genus *Scalptia* JOUSSEAUME, 1887

Scalptia neugeboreni (Hörnnes, 1856)
(Plate 3, fig. 10)

1856 *Cancellaria Neugeboreni* — HÖRNES, p. 680, pl. 52, fig. 6.

2012 *Scalptia neugeboreni* (HÖRNES) — HARZHAUSER & LANDAU, p. 46, fig. 9C (*cum syn.*).

Remarks: The presence of this extremely rare species in the Letkés assemblage is remarkable. Both *Scalptia leopoldinae* (TOURNOUËR) and *S. polonica* (PUSCH) are similar in morphology, but the first differs from *neugeboreni* in wider and deeper sutures and nearly closed umbilicus, while the second lacks a fold on the parietal part of the aperture and bears much stronger secondary spiral sculpture.

Distribution: Badenian: Central Paratethys (Vienna Basin: Czech Republic, Austria; Făget Basin: Romania; Pannonian Basin: Hungary).

Family Conidae FLEMING, 1822

Genus *Eoconus* TUCKER ET TENORIO, 2009

Eoconus cf. conotruncus (DE GREGORIO, 1880)
(Plate 3, figs 11–12)

1880 *Conus (Conus) conotruncus* DE GREG. — DE GREGORIO, p. 70, pl. 5, figs 3–4.

non 1970 *Conus conotruncus* DE GREGORIO — FERRERO & PICCOLI, p. 7, pl. 1, fig. 2. (= *Eoconus latissimus* KOCH in MÉSZÁROS, 1957).

Remarks: Two *Eoconus* species are frequent in the Eocene localities of Hungary, *E. deperditus* (HWASS in BRUGUIÈRE) and *E. diversiformis* (DESHAYES). The first is characterized by relatively higher, the second by lower spire (STRAUSZ 1966a). Our specimen from the Lutetian of Dudar with shorter body whorl, flat spire and channeled spiral whorls represents a third taxon. Three *Eoconus* species are known from the Middle Eocene of the Western Tethys with depressed to flat spire, *E. planus* (SCHAUROTH), *E. latissimus* (KOCH in MÉSZÁROS) and *E. conotruncus* (DE GREGORIO). The first two differ by extremely broad shell, the closest form is the last one. Its type has a slender shell, and a depressed, almost flat spire with channeled and striate spiral whorls. Although our specimen is a moderately deformed internal mold, its shell proportion agrees with that of the type. However, the height of the early spiral whorls and the spiral striae of the late spiral whorls cannot be traced, so the specimen is referred here in open nomenclature. A poorly preserved *Conus* sp. with similar morphology was recorded by KECSKEMÉTI-KÖRMENDY & MÉSZÁROS (1980, p. 107, pl. 13, fig. 13) from the Eastern Bakony Mts, but it requires further research.

Distribution: Lutetian: W Tethys (N Italian Basin, Hungarian Palaeogene Basin).

Genus *Lautoconus* MONTEROSATO, 1923

Lautoconus oboesus (MICHELOTTI, 1847)
(Plate 3, figs 13–14)

1847 *Conus oboesus* — MICHELOTTI, p. 342.

1893 *Chelyconus oboesus* (MICHELOTTI) — SACCO, p. 58, pl. 5, fig. 31.

1966 *Conus oboesus* MICHELOTTI — HALL, p. 153, pl. 26, figs 17–18.

Remarks: The species was mentioned from Letkés as a new record by KOVÁCS & BALÁZS (2016). The shell morphology of the specimen figured here (spire of 8 subangulate whorls with straight outline, a faint spiral groove on shoulder, slightly convex and smooth body whorl with fine grooves at base, moderately deep growth lines, narrow aperture, asymmetrically curved subsutural flexure) is very close to that of *L. oboesus* from the Middle Miocene of Northern Italy. *L. pelagicus* (BROCCHI) differs in well-developed siphonal fasciole, *L. vindobonensis* (HOERNES et AUINGER) bears beaded early and striate late spiral whorls, while *Plagioconus puschi* (MICHELOTTI) has longer body whorl and shallower, diagonal flexure.

Distribution: Langhian: Proto-Mediterranean Sea (Tirreno Hills: Italy), Badenian: Central Paratethys (Pannonian Basin: Hungary).

Lautoconus? praelongus
(HOERNES et AUINGER, 1879)
(Plate 3, figs 15–16)

1879 *Conus (Chelyconus) praelongus* nov. form. — HOERNES & AUINGER, p. 45, pl. 1, fig. 16.

2016 *Varioconus praelongus* (HOERNES et AUINGER) — KOVÁCS & BALÁZS, p. 33, figs 77–78 (*cum syn.*).

2016 *Conus s.l. praelongus* HOERNES & AUINGER — HARZHAUSER & LANDAU, p. 146, figs 30L, 34B–D (*cum syn.*).

Remarks: This rare species was also recorded from Letkés by KOVÁCS & BALÁZS (2016). Its shell morphology was thoroughly revised by HARZHAUSER & LANDAU (2016), however, the genus level classification remained open.

Distribution: Badenian: Central Paratethys (Făget Basin: Romania; Eisenstadt-Sopron Basin: Austria; Pannonian Basin: Hungary; Forecarpathian Basin: NW Bulgaria).

Lautoconus harzhauseri KOVÁCS nov. sp.
(Plate 3, figs 17–21)

2014 *Monteiroconus mercati* — KOVÁCS & VICIÁN, figs 87–88 *only* [non *Monteiroconus mercati* (BROCCHI)].

2016 *Lautoconus* nov. sp. [ex. gr. *bitorosus* FONTANNES] — HARZHAUSER & LANDAU, p. 97, figs 17G, 22A.

Holotype: PAL 2017.49, Hungarian Natural History Museum, Department of Palaeontology and Geology, (SL 48, MD 28) (Plate 3, figs 17–18, refigured from KOVÁCS & VICIÁN 2014, figs 87–88).

Paratypes: 1st: PAL 2017.50 (SL 53, MD 30) (Plate 3, figs 19–20), 2nd: PAL 2017.51 (SL 41, MD 23), 3rd: PAL 2017.52.

Type strata: Lower Badenian (Middle Miocene) clayey sand (Sámsonháza Formation).

Type locality: Letkés, W Börzsöny Mts, Hungary.

Derivation of name: In honour of Mathias HARZHAUSER palaeontologist (Naturhistorisches Museum Vienna).

Material: five moderately preserved specimens.

Diagnosis: Medium-sized shell, low spire, seven spiral whorls with two striae, smooth, subcylindrical body whorl, narrow aperture, shallow, asymmetrically curved subsutural flexure.

Description: Medium-sized shell. Moderately low spire (spire angle 130–132°), outline straight, apex slightly projected. Seven spiral whorls, slightly convex to concave with two faint striae, suture deep, shoulder angulate. Body whorl angle 37–38°, whorl smooth with fine ridges at base, outline subcylindrical with maximum diameter somewhat below the shoulder. Aperture moderately narrow, siphonal fasciole slightly swollen and twisted, siphonal canal broad and short. Subsutural flexure asymmetrically curved, shallow. Colour pattern of the 1st paratype in normal light consists of dense spiral stripes of thin dashes on body whorl, while in UV light last whorl covered by three broad bands at about upper fourth, mid-whorl and lower fourth.

Remarks: In their comprehensive Conidae revision HARZHAUSER & LANDAU (2016) described and emphasized the specific shell morphology of two specimens from Letkés, but they refrained from introducing a new taxon. Based on newly collected material as well as the revision of the Conidae collection of the Hungarian Natural History Museum a new species is described herein. *L. harzhauseri* nov. sp. differs from other Miocene conoids in subcylindrical body whorl. The taxon is known only from Letkés, it is a rare element of the mollusc assemblage.

Distribution: Badenian: Central Paratethys (Pannonian Basin: Letkés, Hungary).

Family Clathurellidae H. ADAMS et A. ADAMS, 1858

Genus *Clathurella* CARPENTER, 1857

Clathurella vasta (BOETTGER, 1906)
(Plate 3, fig. 22)

1906 *Drillia (Crassispira) vasta* n. sp. — BOETTGER, p. 57.

1934 *Turris (Crassispira) vasta* (BOETTGER) — ZILCH, p. 261, pl. 17, fig. 29.

2003 *Clathurella vasta* (BOETTGER) — BALUK, p. 66, pl. 26, fig. 3–4.

Remarks: This rare species is characterized by the multitude of densely compressed, fine spirals, and in this regard it has a great similarity to another rare *Clathurella* species: *C. casilorica* BOETTGER, but *C. vasta* has been separated by its much more compact form. In the case of a larger number of finds, however, it could be possible that the

two taxa are conspecific. The species is a new record from Hungary, the specimen figured here came from Borsodbóta.

Distribution: Badenian: Central Paratethys (Fäget Basin: Romania; Korytnica Basin: Poland; Pannonian Basin: Hungary).

Conclusion

The gastropod records described in the present paper contribute to the knowledge of the Cenozoic marine mollusc faunas of the W Tethys and the Paratethys. Extended palaeogeographic distribution of 21 relatively rare species in the Central Paratethys [e.g. *Xenophora italica* (GRATELOUP), *Propustularia neugeboreni* (HOERNES et AUINGER), *Pterynotus granuliferus* (GRATELOUP), *Favartia (Pygmaepterys) transsylvanica* (HOERNES et AUINGER), *Ocinebrina kojumdgievae* (BALUK), *Tripterotyphis wenzelidesi* (HÖRNES), *Colubraria subobscura* (HOERNES et AUINGER), *Clathurella vasta* (BOETTGER)] is demonstrated. The occurrence of *Morum cythara* (BROCCHI) in the Egerian proves the long stratigraphic range of the taxon. *Cassis postmamillaris* SACCO is illustrated for the first time from Hungary. The discussion of *Aplus varians* (MICHELOTTI) may help to understand genus *Aplus* and the related forms. The occurrence of *Lautoconus oboesus* (MICHELOTTI) and *L. ? praelongus* (HOERNES et AUINGER) in Hungary, as well as the introduction of *Lautoconus harzhauseri* KOVÁCS nov. sp. illustrate well the high diversity of the family Conidae in the early Badenian of the Central Paratethys.

Both the new field works and the revisions of private fossil collections presented here give a more detailed picture of the Lutetian, Egerian and Badenian gastropod diversity in Hungarian sites. Mainly the research of the mollusc assemblage from Letkés provides remarkable results. Similarly to the diverse superfamilies Conoidea, Tonnoidea and Ficoidea mentioned above, the Cypraeidea and Muricoidea faunas of the locality are also characterized by an outstanding richness — descriptions of these groups are in progress.

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- Kézirat beérkezett: 2017. 03. 30.

Plate 1 — I. tábla*

- 1–2. *Europrotomus schroeckingeri* (HÖRNES in HOERNES & AUINGER), SL 45, MD 28 (1.3×), Márkháza, collection NÁDAI.
- 3–4. *Xenophora italica* (GRATELOUP), SL 70, MD 80 (1×), Letkés, collection VICIÁN.
- 5–7. *Eopustularia balinka* FEHSE, SL 19, MD 12 (2.5×), Gánt, collection VICIÁN.
- 8–9. *Eopustularia balinka* FEHSE, SL 20, MD 12.5 (2.2×), Balinka, collection VICIÁN.
- 10–12. *Propustularia neugeboreni* (HOERNES et AUINGER), SL 23, MD 13.5 (2.2×), Márkháza, collection VICIÁN.
- 13–14. *Cassis postmamillaris* SACCO, SL 83, MD 65 (1×), Letkés, collection HIRMETZL.
- 15–16. *Sthenorytis* cf. *pseudoretusa* (SACCO), SL 15, MD 13 (2.5×), Esztergom, HNHM INV 2017.302.
7. *Morum cythara* (BROCCHI), SL 31, MD 20.5 (1.5×), Eger, collection NÉMETH.

*Shell length (SL) and maximum diameter (MD) in mm. Photographs without indication made by Z. KOVÁCS.

Plate 1 — 1. tábla

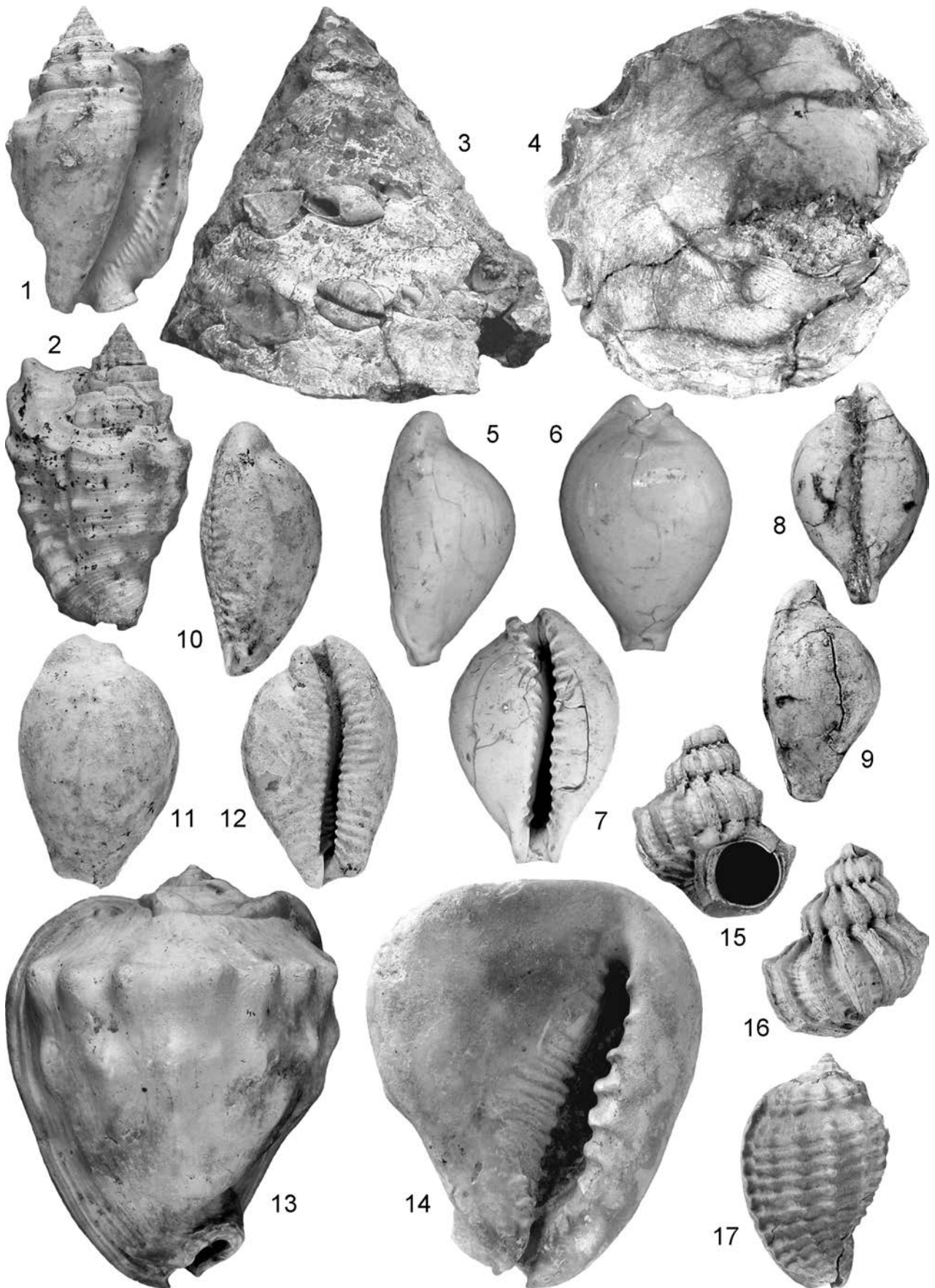


Plate 2 — 2. tábla

- 1–2. *Pterynotus granuliferus* (GRATELOUP), SL 47, MD 28 (1.6×), Letkés, collection HIRMETZL.
3–4. *Purpurellus cyclopterus* (MILLET), SL 45, MD 24 (1.7×), Letkés, collection HIRMETZL.
5–6. *Dermomurex* (s.s.) *distinctus* (CRISTOFORI et JAN), SL 10, MD 5.2 (3×), Letkés, collection KOVÁCS.
7–8. *Dermomurex* (s.s.) *distinctus* (CRISTOFORI et JAN), SL 15, MD 9 (2.5×), Letkés, collection KOVÁCS.
9–10. *Favartia* (*Pygmaeapterys*) *transylvanica* (HOERNES et AUINGER), SL 12.5, MD 6 (3.5×), Bánd, collection VICIÁN.
1–12. *Ocinebrina kojumdgievae* (BALUK), SL 31, MD 20 (2×), Márkháza, collection HIRMETZL.
13–14. *Ceratostoma subaustriaca* (STOJASPAL), SL 52, MD 35 (1.2×), Letkés, collection HIRMETZL.
15–16. *Murexsul sandbergeri* (HÖRNES), SL 34, MD 20.5 (2×), Letkés, collection HIRMETZL.
7–18. *Subptyernotus graniferus* (MICHELOTTI), SL 33, MD 21 (2×), Letkés, collection HIRMETZL.
19. *Tripterotyphis wenzelidesi* (HÖRNES), SL 6.3, MD 3.2 (9×), Letkés, collection KROCK (photo: G. STEIN).
20–21. *Coralliophila gracilispira* BOETTGER, SL 9.5, MD 5.2 (6×), Márkháza, collection KROCK (photo: G. STEIN).

Plate 2 — 2. tábla

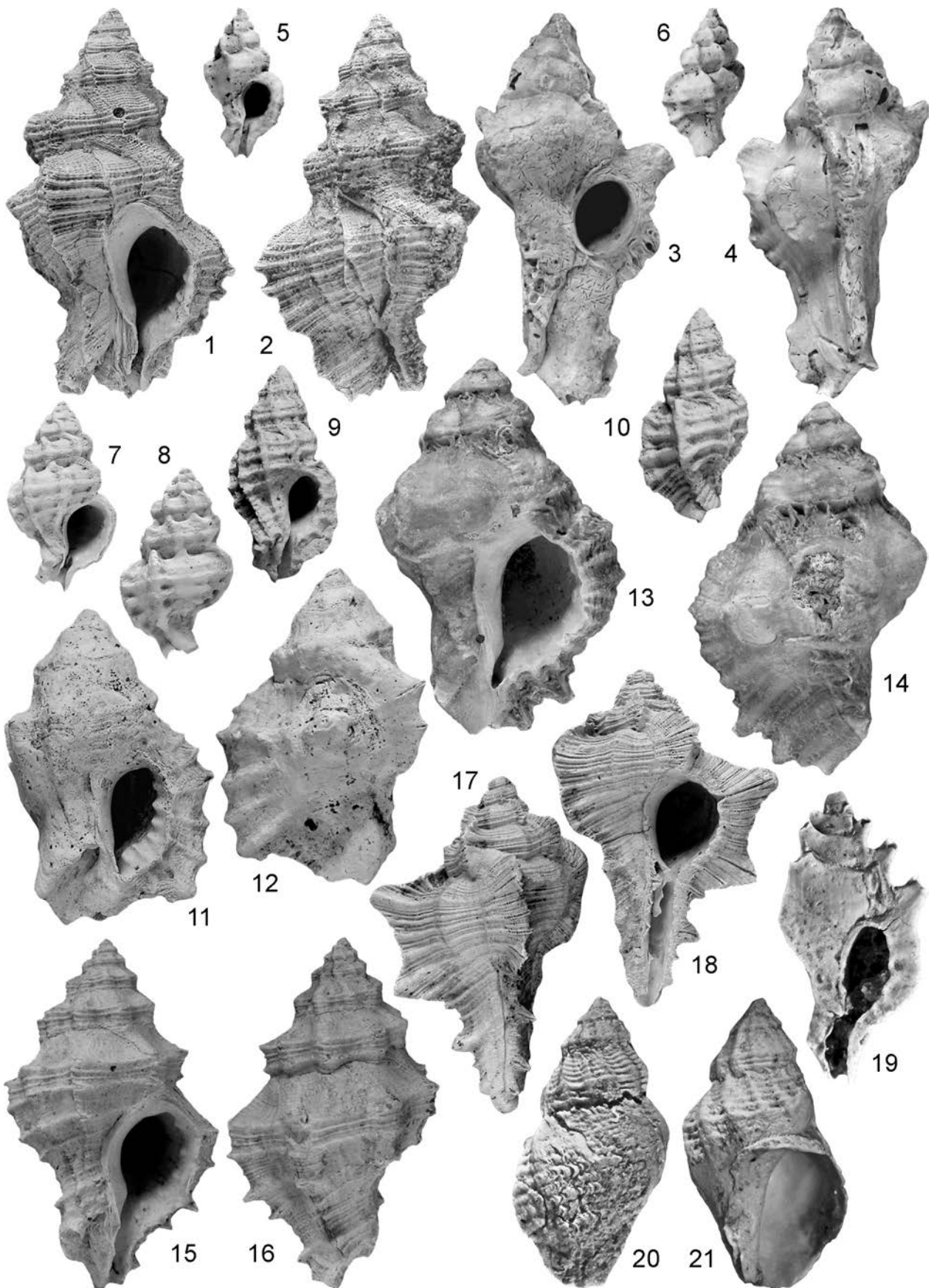


Plate 3 — 3. tábla

1. *Aplus varians* (MICHELOTTI), SL 13, MD 5.4 (4×), Letkés, collection KROCK (photo: G. STEIN).
2. *Aplus varians* (MICHELOTTI), SL 14.1, MD 5.2 (4×), Bánd, collection KROCK (photo: G. STEIN).
3. *Aplus varians* (MICHELOTTI), SL 13.4, MD 5.1 (4×), Márkháza, collection KROCK (photo: G. STEIN).
- 4–5. *Metula submitraeformis* (D'ORBIGNY), SL 32, MD 10.9 (2×), Letkés, collection KROCK (photo: G. STEIN).
- 6–7. *Colubraria subobscura* (HOERNES et AUINGER), SL 36, MD 15.2 (1.6×), Letkés, collection HIRMETZL.
- 8–9. *Colubraria subobscura* (HOERNES et AUINGER), SL 16.5, MD 6.8 (3×), Letkés, collection KROCK (photo: G. STEIN).
10. *Scalptia neugeboreni* (HÖRNES), SL 15, MD 9 (4×), Letkés, collection KROCK (photo: G. STEIN).
- 11–12. *Eoconus* cf. *conotruncus* (DE GREGORIO), SL 40 (1.5×), Dudar, collection VÍCIÁN.
- 13–14. *Lautoconus oboesus* (MICHELOTTI), SL 44 MD 22 (1.5×), Letkés, HNHM INV 2017.303.
- 15–16. *Lautoconus? praelongus* (HOERNES et AUINGER), SL 27, MD 11.5 (2×), Letkés, collection KOVÁCS.
- 17–18. *Lautoconus harzhauseri* KOVÁCS nov. sp., holotype, SL 48, MD 28 (1.2×), Letkés, HNHM PAL 2017.49.
- 19–20. *Lautoconus harzhauseri* KOVÁCS nov. sp., 1st paratype, SL 53, MD 30 (1.2×), Letkés, HNHM PAL 2017.50.
21. *Lautoconus harzhauseri* KOVÁCS nov. sp., SL 42, MD 25 (1.2×), Letkés, collection KOVÁCS.
22. *Clathurella vasta* (BOETTGER), SL 8.2, MD 4.3 (7×), Borsodbóta, collection KROCK (photo: G. STEIN).

Plate 3 — 3. tábla

