

Middle Miocene (Badenian) gastropods from Korytnica, Poland; Part V Addenda et Corrigenda ad Prosobranchia

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ABSTRACT:

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This report is the fifth part of the monograph of the rich assemblage of gastropods occurring in the so-called *Pleurotoma Clays* of Middle Miocene (Badenian) age, exposed in the environs of Korytnica in the Holy Cross Mountains, Central Poland. Besides 73 species, described earlier, the report contains descriptions of 52 species omitted from the earlier parts; of which, 50 were not recorded previously from Korytnica. Five species are established as new: *Cocculina (Dallia) unica* sp.nov., *Turritella (Peyrotia) circumcisa* sp.nov., *Caecum korytnicense* sp.nov., *Morula valdemari* sp.nov., and *Ocinebrina recognita* sp.nov. A new name, *Megalomphalus palazzii* nom.nov. is proposed for *Narica depressa* BOETTGER, 1907 [= *Megalomphalus depressus* (BOETTGER, 1907)], which is a homonym of *Megalomphalus depressus* (SEGUENZA, 1876).

Key words: Prosobranch gastropods, Middle Miocene, Korytnica.

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INTRODUCTION

The famous Miocene marine invertebrate site at Korytnica in the Holy Cross Mountains, Central Poland, was first noted by JAŚKIEWICZ (1787). The gastropod species were first reported by ZEUSCHNER (1830), and subsequently by PUSCH (1837) in his comprehensive classic monograph “*Polens Paläontologie*”. Since that time, Korytnica has become one of the best known localities for Miocene faunas in Europe, having been visited and/or sampled by such prominent 19th century geologists/palaeontologists as Sir Roderick MURCHISON (1845), Edouard d'EICHWALD (1853) and Moriz HÖRNES (1856). These were followed in the 20th century by Wilhelm FRIEDBERG (1911-1928, 1934-1936, 1938) and Kazimierz KOWALEWSKI (1930).

The fossiliferous sequence at Korytnica developed during the Middle Miocene (Badenian) transgression onto the southern slopes of the Holy Cross Mountains. The Paratethyan sea had then encroached upon pre-Miocene topography, with its shore-zone, characterised by several bays, the largest of which is the *Korytnica Bay* (see RADWAŃSKI 1964, 1969). Up to the the 1970s, the Korytnica sequence was assigned to the Polish ‘Lower Tortonian’ (see BAŁUK & RADWAŃSKI 1977, pp. 90-91), which corresponds to the Langhian/Serravallian interval in the Mediterranean, and to the Lower Badenian of the Vienna Basin (see RÖGL & BRANDSTÄTTER 1993, HARZHAUSER & *al.* 2003).

The present author started the study of the Korytnica fossils in the mid-1960s, concentrating primarily on the gastropods that were then abundantly dispersed over the arable cropland, especially after heavy rainfall and/or seasonal ploughing. Smaller forms were obtained by sieving or sifting clay samples. This resulted in the collection of a very large number of gastropod shells, the description of which formed the subject of the four-part monograph entitled “*Middle Miocene (Badenian) gastropods from Korytnica*”, published successively since 1975. During that time there have been numerous finds, either of new species or of new specimens that enabled previous descriptions to be supplemented or amended. Several publications of that time also focused on the taxonomy of the species occurring at Korytnica, which has necessitated revision of some of the names used previously. All supplementary and/or revised data have now been combined into a single publication, which is treated herein as Part V of the Monograph and subtitled *Addenda et Corrigenda ad Prosobranchia*.

Parts I to IV of the Monograph comprise the following descriptions:

Part I (BAŁUK 1975) – 178 species (or subspecies), of which 138 had not been recorded previously from Korytnica;

Part II (BAŁUK 1995) – 133 species, of which 87 had not been recorded previously from Korytnica [135 species described, of which 2 are now excluded];

Part III (BAŁUK 1997) – 90 species, of which 60 had not been recorded previously from Korytnica;

Part IV (BAŁUK 2003) – 101 species, of which 72 had not been recorded previously from Korytnica.

Part V includes descriptions of 52 species that were omitted from the earlier parts; of these, 50 have not been previously recorded from Korytnica. In addition, descriptions are provided of specimens belonging to 73 species described previously that supplement their variability data; such species are indicated in the *Contents* by an asterisk.

To summarize, in the five parts of this Monograph as many as 554 species are described, of which 407 were previously unknown at Korytnica. Forty-two species have been recognized as new to science, and seven have been accorded *nomina nova*. All the species reported previously from Korytnica have been discussed and illustrated, and their taxonomy revised and/or updated. Only three previously reported species have not been found again, viz: *Surcula laurae* (HOERNES & AUINGER, 1891), recorded by FRIEDBERG (1912, pp. 209-210, pl. 13, fig. 10), *Sveltia lyrata* (BROCCHI, 1814), recorded by FRIEDBERG (1913, pp. 246-247, pl. 15, fig. 9), and *Callistoma korytnicense* described by FRIEDBERG (1928, p. 516, pl. 33, fig. 9)

The present Part V makes the study of prosobranch gastropods from Korytnica almost complete. However, any future new finds may always be taken into account. The other groups of gastropods, being under investigation, include relatively common diverse opisthobranchs and some extremely rare air-breathing snails (marine pulmonates). It is intended that Part VI will cover representatives of the orders Cephalaspidea, Notospidea, Sacoglossa, and Anaspidea, of which the first is rich taxonomically and very abundant at Korytnica.

In the Miocene sequence of Korytnica, in the so-called *Pleurotoma Clays* in particular, the gastropods are associated with ubiquitous micro- and macrofossils of various kinds, both invertebrates and vertebrates (exclusively fish), the majority of which have been subjected to monographic treatment by specialists both in Poland and abroad. The key references will be found in the earlier parts of this Monograph (BAŁUK 1975, pp. 15-17; 1995, p. 161; 1997, pp. 5-6; see also BAŁUK & RADWAŃSKI 1977, 1979, 1984; HOFFMAN 1987).

SYSTEMATIC ACCOUNT

Family Fissurellidae FLEMING, 1822

Genus *Emarginula* LAMARCK, 1801

Emarginula clathrataeformis EICHWALD, 1853

(Pl. 1, Figs 7-8)

1975. *Emarginula clathrataeformis* EICHWALD; W. BAŁUK, p. 23, pl. 1, fig. 6 (*cum synonym.*).

1981. *Emarginula clathrataeformis* EICHWALD; W. KRACH, pp. 40-41, pl. 12, figs 2-4; pl. 23, fig. 4.

NEW MATERIAL: Seven specimens.

DIMENSIONS: The largest specimen (Pl. 1, Fig. 8) is ca 8.5 mm long, 6.0 mm wide, and 4.0 mm high.

REMARKS: The previous material (BAŁUK 1975) consisted of shell fragments only. Two of the new specimens are almost complete and agree with those described by KRACH (1981) from Łychów, although the largest one (see Pl. 1, Fig. 8) exceeds in size those from Łychów.

Genus *Scutus* MONTFORT, 1810
Scutus bellardii (MICHELOTTI, 1847)
(Pl. 1, Fig. 5)

1975. *Scutus bellardii* (MICHELOTTI); W. BAŁUK, p. 26, pl. 2, figs 11 (*cum synonym.*).

NEW MATERIAL: One specimen.

DIMENSIONS: Length 7.2 mm, width ca 4.0, height 1.4 mm.

REMARKS: The new specimen, which is as incomplete as the one described previously (BAŁUK 1975), shows the shell sculpture characteristic of this species

Genus *Diodora* GRAY, 1821
Diodora graeca (LINNAEUS, 1758)
(Pl. 1, Figs 3-4)

1975. *Diodora (Diodora) graeca* (LINNAEUS); W. BAŁUK, p. 26, pl. 1, figs 12-14 (*cum synonym.*).

1981. *Diodora (Diodora) graeca* LINNAEUS; W. KRACH, p. 41, pl. 12, figs 5-8.

NEW MATERIAL: Twenty-five specimens.

DIMENSIONS: The largest, completely preserved specimen (Pl. 1, Fig. 4) is 14.5 mm long, 9.6 mm wide, and 6.4 mm high.

REMARKS: The new specimens are identical with those described previously (BAŁUK 1975), but are much better preserved (see Pl. 1, Figs 3-4). All occur solely in oyster shell-beds at Mt. Łysa.

Diodora sp. an *Diodora italica* (DEFRANCE, 1820)
(Pl. 1, Figs 1-2)

MATERIAL: Five juvenile specimens.

DIMENSIONS: The largest specimen (Pl. 1, Fig. 1) is 5.0 mm long, 3.3 mm wide, and 2.3 mm high.

REMARKS: These juvenile specimens differ distinctly from all previously reported *Diadora* from Korytnica (see BAŁUK 1975, pl. 1, figs 12-16). They probably represent *Diodora (Diodora) italica* (DEFRANCE), since they are indistinguishable from the juvenile parts of this species illustrated by CAPROTTI (1974, pp. 67-68, pl. 1, fig. 6). This is the first record of this taxon from Korytnica.

Family Lepetidae GRAY, 1850
Genus *Propilidium* FORBES, 1849
Propilidium circulare BOETTGER, 1901
(Pl. 1, Fig. 6)

1901. *Propilidium circulare* n.sp.; O. BOETTGER, pp. 173-174.

1907. *Propilidium circulare* BITTGR.; O. BOETTGER, p. 199.

1934. *Propilidium circulare* BOETTGER; A. ZILCH, p. 200, pl. 2, fig. 24.

MATERIAL: Six specimens.

DIMENSIONS: The largest specimen (Pl. 1, Fig. 6) is ca 3 mm long, 2.5 mm wide, and 1.0 mm high.

REMARKS: The specimens agree with the holotype of the species, described by BOETTGER (1901) from Kostej in Transylvania.

The species *Propilidium circulare* BOETTGER has not been recorded previously from the Miocene of Poland.

Family Trochidae RAFINESQUE, 1815
Genus *Jujubinus* MONTEROSATO, 1884
Jujubinus exasperatus (PENNANT, 1777)
(Pl. 2, Fig. 3)

partim 1928. *Callistoma trigonum* EICHW.; W. FRIEDBERG, pp. 506-507, pl. 32, figs 2-4 [*non* fig. 1].

?1966. *Calliostoma trigonum* EICHWALD; L. STRAUSS, p. 34, pl. 13, figs 8-9.

2004. *Jujubinus exasperatus* (PENNANT); C. CHIRLI, pp. 79-80, pl. 32, figs 10-12; pl. 33, figs 1-4.

MATERIAL: Seven specimens.

DIMENSIONS: The largest specimen (Pl. 2, Fig. 3) is 7.5 mm high and 6.1 mm wide.

REMARKS: These specimens agree with some of those described under the name "*Callistoma trigonum* EICHWALD" by FRIEDBERG (1928) from Olesko, now Ukraine. The other specimens, from Hołubica (Ukraine), are larger and less distinctly ornamented (see FRIEDBERG 1928, pl. 32, fig. 1). All specimens from Korytnica display spiral riblets densely sculptured by pearl-like tubercles over the whole teleoconch. Initially, there are 3, followed by 4 such ribs, the number of which on the three last whorls increases to 5, including the one running along the margin. No secondary riblets are observed.

FRIEDBERG (1928) considered *Trochus trigonum* EICHWALD to be close to *Trochus cingulatus* BROCCHI. This cannot be justified, as is apparent from the photograph of the holotype (PINNA & SPEZIA 1978, pl. 54, fig. 2). A more similar taxon is *Trochus crenulatus* BROCCHI, the holotype of which (see PINNA & SPEZIA 1978, pl. 56, fig. 2) displays a more acute apical angle, more pronounced tubercles on spiral ribs, and the marginal riblet divided into three smaller ones, separated by narrow furrows. According to ROSSI RONCHETTI (1951, p. 10), the latter name is a junior subjective synonym of *Trochus exasperatus* PENNANT, 1777, as commonly used for Italian specimens. Recently, CHIRLI (2004) has recorded five such specimens from the Pliocene of Tuscany, one of which (CHIRLI 2004, pl. 33, fig. 4) is very close to these from Korytnica. The variability in shape and ornament of this species has also been noted by LANDAU & al. (2003, p. 43).

A specimen from Várpalota in Hungary recorded by STRAUZ (1966) displays the last whorl adorned with four beaded ribs, alternating with thin, thread-like secondary riblets; its accordance with the Korytnica specimens remains unclear.

The species *Jujubinus exasperatus* (PENNANT, 1777) has not been recorded previously from the Miocene of Poland.

Genus *Gibbula* RISSO, 1826

Subgenus *Gibbula* RISSO, 1826

Gibbula (Gibbula) varia (LINNAEUS, 1766)

(Pl. 2, Figs 1-2)

1975. *Gibbula (Gibbula)* cf. *varia* (LINNAEUS); W. BAŁUK, p. 35, pl. 3, fig. 1 (*cum synonym.*).

1996. *Gibbula* cf. *varia* (LINNÉ); J. KÓKAY, p. 455, pl. 1, figs 4-5.

NEW MATERIAL: Five specimens.

DIMENSIONS: The largest specimen (Pl. 2, Fig. 1) is 5.2 mm high and wide.

REMARKS: The newly collected specimens agree with those reported previously (BAŁUK 1975), but they are better preserved. Nevertheless, their systematic position is still problematic. They clearly differ from all other Trochidae from Korytnica. A similar case was noted earlier by BOETTGER (1907) for Trochidae in Kostež, Transylvania. It should be noted that the specimen recorded by LANDAU & al. (2003, p. 48) under the name "*Gibbula (Gibbula?) varia* (LINNAEUS)" is quite different in shape.

Subgenus *Colliculus* MONTEROSATO, 1888

Gibbula (Colliculus) boettgeri L. ILJINA, 1993

1975. *Gibbula (Colliculus) pseudangulata* BOETTGER; W. BAŁUK, pp. 36-37, pl. 3, figs 4-7 (*cum synonym.*).

1982. *Gibbula (Colliculus) affinis pseudoangulata* BOETTGER; J. ŠVAGROVSKÝ, p. 7, pl. 1, fig. 4.

1993. *Gibbula (Colliculus) boettgeri* L. ILJINA, nom.nov.; L. ILJINA, pp. 30-31, pl. 2, figs 21-22.

REMARKS: L. ILJINA (1993) recognized the species name *pseudangulata* as a junior subjective synonym of a species of the same family, established by SINZOW; her new name is herein accepted.

A Miocene specimen from Budapest described by KÓKAY (1996, p. 455, pl. 1, fig. 8) under the name "*Gibbula (Colliculus) affinis pseudoangulata* BOETTGER" is not conspecific with those from Korytnica. Its overall shape is reminiscent of that of specimens classified by the present author (BAŁUK 1975) as *Jujubinus (Strigosella) vexans* BOETTGER.

Genus *Granulifera* O.YU. ANISTRATENKO, 2000

Granulifera hoernesi (DODERLEIN, 1862)

(Pl. 2, Fig. 4)

1896. *Clanculopsis Hoernesi* (DOD.); F. SACCO, p. 22, pl. 3, fig. 4.

1970. *Clanculus (Clanculopsis) aronis tuberculatus* (EICHWALD); W. BAŁUK, p. 117, pl. 8, fig. 3.

1975. *Clanculus (Clanculopsis)* cf. *cruciatus* (LINNAEUS); W. BAŁUK, pp. 42-43, pl. 5, fig. 8 (*excl. synonym.*).

2000. *Granulifera pulla* gen.n. et sp.n.; O.YU. ANISTRATENKO, pp. 4-6, fig. 1.

NEW MATERIAL: Three specimens.

DIMENSIONS: The largest specimen (Pl. 2, Fig. 4) is 3.8 mm high and 4.7 mm wide.

REMARKS. The new specimens agree with those described previously (BALUK 1970, 1975). The largest, best preserved complete specimen enables the species assignment of the previously studied material to be corrected. The specimens from Korytnica should now be classified as *Clanculus (Clanculopsis) hoernesii* (DODERLEIN), a species known from the Miocene of Montegibbio in northern Italy. Moreover, the Korytnica specimens agree with those from Niskowa (BALUK 1970), the largest of which exceeds in size those from Korytnica, and attains the size of those from Montegibbio (up to 6 mm high and 7 mm wide).

The specimens from Korytnica and Niskowa are seemingly identical with those described as "*Granulifera pulla* gen.n. et sp.n." from the Middle Miocene (Badenian) of Ukraine by ANISTRATENKO (2000). In the present author's opinion, the distinction of this species is not justified, but the proposal for it of a separate genus is quite reasonable and fully accepted when the shape of the aperture, different from that of the species of the genus *Clanculus* MONTFORT, is taken into account (cf. LANDAU & al. 2003, p. 39, text-fig. 2).

Family Turbinidae RAFINESQUE, 1815

Genus *Astraea* RÖDING, 1798

Subgenus *Bolma* RISSO, 1826

Astraea (Bolma) granosa BORSON, 1821
(Pl. 2, Fig. 7)

1896. *Astralium (Bolma) granosa* (BORS.); F. SACCO, pp. 12-13, pl. 1, fig. 27.

1896. *Astralium (Bolma) granosa* var. *miocenica* (MICHT.); F. SACCO, p. 13, pl. 1, fig. 28.

1949. *Astraea (Bolma) granosa* (BORSON); M. GLIBERT, pp. 75-76, pl. 4, fig. 7.

1976. *Astraea (Bolma) granosa* (BORSON); G. PAVIA, p. 150, pl. 1, fig. 4.

2003. *Bolma (Bolma) granosa* (BORSON); B. LANDAU & al., pp. 30-31, pl. 7, fig. 2.

MATERIAL: One specimen.

DIMENSIONS: Height 36 mm, width 40 mm.

REMARKS: The specimen agrees with the holotype of the species from the Miocene of Piedmont, re-illustrated by PAVIA (1976), as well as with other specimens from northern Italy, presented by SACCO (1896), and from the Miocene of the Loire Basin in France, described by GLIBERT (1949). The Korytnica specimen, about 1.5 whorls larger than the holotype, seems to be the largest ever recorded in this species. The specimens from the Miocene of Aquitaine, described under this name by

COSSMANN & PEYROT (1917, p. 184, pl. 6, figs 9-11) do not belong to this species, as earlier indicated by GLIBERT (1949).

The species *Astraea (Bolma) granosa* BORSON, 1821 has not been recorded previously from the Miocene of Poland.

Astraea (Bolma) mehelyi (BOETTGER, 1896)
(Pl. 3, Figs 1-3)

1975. *Astraea (Bolma) mehelyi* (BOETTGER); W. BALUK, pp. 44-45, pl. 6, fig. 1 (*cum synonym.*).

NEW MATERIAL: Ten specimens.

DIMENSIONS: The largest specimen (Pl. 3, Fig. 2) is 18 mm high and 23 mm wide.

REMARKS: The new specimens agree with those described previously (BALUK 1975) but are larger and better preserved. All are typified by the spiny nodes on the marginal circumference of the shell, which are variably developed from well pronounced (see Pl. 3, Fig. 1) to almost inconspicuous (see Pl. 3, Fig. 3). A specimen taken by ZILCH (1934) as the lectotype of the species is intermediate in this respect.

FRIEDBERG (1928, p. 468) reported one specimen (not illustrated) from Korytnica, classified as "*Turbo mamillaris* EICHW.". As this specimen is not commented on in his Catalogue (FRIEDBERG 1938), it may only be guessed whether or not it is similar to the specimen illustrated (Pl. 3, Fig. 3).

Astraea (Bolma) meynardi (MICHELOTTI, 1847)
(Pl. 3, Fig. 5)

1975. *Astraea (Bolma) meynardi* (MICHELOTTI); W. BALUK, pp. 43-44, pl. 6, figs 5-7 (*cum synonym.*).

NEW MATERIAL: Six specimens.

DIMENSIONS: The largest specimen (Pl. 3, Fig. 5) is 35 mm high and 37 mm wide.

REMARKS. The new specimens agree with those described previously (BALUK 1975); one large, complete and very well preserved specimen is illustrated here.

Astraea (Bolma) tuberculata (DE SERRES, 1829)
(Pl. 3, Fig. 4)

1856. *Turbo tuberculatus* SERR.; M. HÖRNES, pp. 434-435, pl. 44, fig. 5.
 1896. *Bolma rugosa* var. *tuberculata* SERR.; F. SACCO, p. 10, pl. 1, fig. 18.
 1960. *Bolma* (*Bolma*) *rugosa* var. *tuberculata* (SERRES); E. KOJUMDIEVA, p. 87, pl. 29, fig. 2.

MATERIAL: A single, much damaged specimen; Collection of the Museum of the Earth, Warsaw (Catalogue No. VIII Mg-4254).

DIMENSIONS: Estimated as 26–28 mm high and 30–32 mm wide.

REMARKS. The specimen was labelled by Ewa NOSOWSKA as “*Bolma* aff. *rugosa tuberculata* (SERRES)”. The assignment to *tuberculata* is herein accepted. Although the specimen is damaged, it agrees with that illustrated by HÖRNES (1856) from Steinebrunn in the Vienna Basin. The present author follows HÖRNES (1856) in regarding the taxon *tuberculata* as a separate species.

The species *Astraea* (*Bolma*) *tuberculata* (DE SERRES, 1829) has not been recorded previously from the Miocene of Poland.

Subgenus *Ormastraliium* SACCO, 1896
Astraea (*Ormastraliium*) *carinata* (BORSON, 1821)
 (Pl. 2, Fig. 5)

1856. *Turbo carinatus* BORSON; M. HÖRNES, p. 435, pl. 44, fig. 6.
 1896. *Ormastraliium carinatum* (BORS.); F. SACCO, pp. 17-18, pl. 2, fig. 15.
 1928. *Bolma carinata* BORS.; W. FRIEDBERG, pp. 468-469, pl. 29, fig. 10.
 1956. *Astraea* (*Astraliium*) *carinata* BORSON; I. CSEPREGHY-MEZNERICS, p. 431, pl. 1, fig. 15.
 1966. *Turbo* (*Bolma*?) *carinatus* BORSON; L. STRAUZ, p. 44, pl. 53, figs 10-12.
 non 1975. *Astraea* (*Ormastraliium*) *carinata* (BORSON); W. BAŁUK, pp. 45-46, pl. 6, fig. 1.
 1976. *Astraea* (*Ormastraliium*) *carinata* (BORSON); G. PAVIA, p. 152, pl. 1, figs 1, 3.

NEW MATERIAL: One incomplete specimen.

DIMENSIONS: Estimated as 25–26 mm high and 30 mm wide.

REMARKS: The previously described (BAŁUK 1975) juvenile specimen was classified incorrectly. The new

specimen, although also incomplete, displays features clearly indicative of this species. This is the second specimen known from Korytnica; the first was the specimen illustrated by FRIEDBERG (1928), and commented on by KOWALEWSKI (1930, p. 150).

The specimen from Bóta (Hungary) assigned to this species by CSEPREGHY-MEZNERICS (1969, p. 19, pl. 1, figs 20-21) reveals different ornamentation, particularly in the widest (ambital) parts of the whorls, and therefore its conspecificity is doubted.

Family Cyclostrematidae P. FISCHER, 1885
 Genus *Cirsonella* ANGAS, 1877
Cirsonella sp.
 (Text-fig. 2A)

MATERIAL: One specimen.

DIMENSIONS: Height 1.1 mm, width 1.2 mm.

REMARKS: The only specimen collected seems to belong to the genus *Cirsonella* ANGAS, 1877, reported by WENZ (1938, p. 329) from the Miocene of New Zealand. The Korytnica specimen resembles the species *Cirsonella australis* ANGAS, 1877, although it is slightly smaller, and its spire is slightly higher.

The genus *Cirsonella* ANGAS, 1877 has not been recorded previously from the Miocene of Poland.

Family Phasianellidae SWAINSON, 1840
 Genus *Tricolia* RISSO, 1826
Tricolia (*Tricolia*) *globosa* (FRIEDBERG, 1928)
 (Pl. 2, Fig. 6)

1928. *Phasianella globosa* FRIEDB.; W. FRIEDBERG, pp. 475-476, pl. 30, fig. 3.
 1938. *Phasianella globosa* FRIEDB.; W. FRIEDBERG, p. 59.

MATERIAL: Eighty-five specimens.

DIMENSIONS: The largest complete specimen is 4.2 mm high and 3.2 mm wide.

REMARKS: The specimens seem to be fully concordant with those described by FRIEDBERG (1928) from Zborów and Dryszczów, both in Ukraine; the size, shape, and ghosts of colour pattern are identical.

The species *Tricolia* (*Tricolia*) *globosa* (FRIEDBERG) was recorded from Korytnica by FRIEDBERG (1938, p. 59). The present author was formerly (BAŁUK 1975, p. 58) of the opinion that this species, missing from FRIEDBERG's

collection, could be confused with obese specimens of *Tricolia eichwaldi* (HÖRNES).

Family Neritidae RAFINESQUE, 1815
Genus *Nerita* LINNAEUS, 1758
Nerita gigantea BELLARDI & MICHELOTTI, 1840
(Pl. 2, Fig. 8)

1856. *Nerita gigantea* BELL. et MICHT.; M. HÖRNES, pp. 530-531, pl. 47, fig. 10.

1896. *Nerita gigantea* BELL. e MICHT.; F. SACCO, p. 47, pl. 5, fig. 38.

1966. *Nerita gigantea* BELLARDI & MICHELOTTI; L. STRAUZ, p. 57, pl. 49, fig. 23; pl. 50, figs 1-2.

1984. *Nerita gigantea* BELLARDI & MICHELOTTI; E. FERRERO MORTARA & *al.*, p. 253, pl. 44, fig. 6.

MATERIAL: One specimen.

DIMENSIONS: Height 24.5 mm, width 23.0 mm.

REMARKS: Although badly preserved, with a worn outer surface, the specimen displays the typical dense spiral striation diagnostic of this species, which is very rare in all European sites. For instance, HÖRNES (1856) and STRAUZ (1966) each reported only a single specimen, from Austria and Hungary respectively.

The species *Nerita gigantea* BELLARDI & MICHELOTTI, 1840, has not been recorded previously from the Miocene of Poland.

Family Cocculinidae
Genus *Cocculina* DALL, 1882
Cocculina (Cocculina) miocaenica BOETTGER, 1901
(Pl. 5, Fig. 4)

1901. *Cocculina miocaenica* n. sp.; O. BOETTGER, p. 174.

1934. *Cocculina miocaenica* BOETTGER; A. ZILCH, p. 207, pl. 4, fig. 61.

1984. *Cocculina (Cocculina) miocaenica* BOETTGER; A.W. JANSSEN, p. 121, pl. 44, fig. 1.

MATERIAL: One specimen.

DIMENSIONS: Height 1.0 mm, length 2.2 mm, width 1.7 mm.

REMARKS: The specimen agrees with the holotype of the species from Kosteĵ in Transylvania (BOETTGER 1901) and with the specimen from Winterswijk-Miste, The Netherlands (JANSSEN 1984).

The species *Cocculina miocaenica* BOETTGER, 1901,

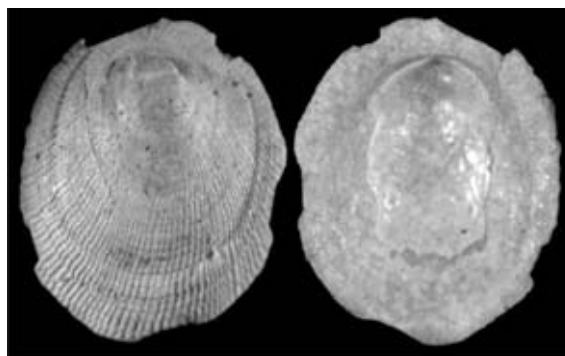


Fig. 1. *Cocculina (Dallia) unica* sp.nov., x 10; holotype, U.W., BkK-G1146

has not been recorded previously from the Miocene of Poland.

Subgenus *Dallia* JEFFREYS, 1882
Cocculina (Dallia) unica sp.nov.
(Pl. 5, Fig. 3; Text-fig. 1)

HOLOTYPE: The specimen (Z.PAL.U.W., No BkK-G1146) illustrated in Pl. 5, Fig. 3 and on Text-fig. 1.

TYPE HORIZON: Middle Miocene (Lower Badenian).

TYPE LOCALITY: Korytnica, 24 km SSW of Kielce, southern slopes of the Holy Cross Mountains, Central Poland.

DERIVATION OF THE NAME: *unica*, Latin adjective – single.

DIAGNOSIS: Oval shell of low-capped shape; protoconch lacking spiral coiling; teleoconch ornamented by densely spaced, radial riblets, slightly arched leftwards; muscle scar *Patella*-like.

MATERIAL: One specimen.

DIMENSIONS: Height 0.8 mm, length *ca* 4.0 mm, width 3.0 mm.

DESCRIPTION: The oval shell is a low-cap in shape, with a slightly prominent apex, distinctly placed anteriorly. The convex protoconch lacks spiral coiling. Near the apex, the outer surface of the shell is smooth. Very thin radial riblets appear at the first concentric growth line. The riblets, slightly arched leftwards, are composed of pearl-like tubercles. There are 12–13 riblets per 1 mm in the posterior part of the shell margin. On the inner side of the shell, there is a clearly discernible horseshoe-shaped muscle scar, of the *Patella*-like type,

more prominent anteriorly, that is towards the open arms of the horseshoe.

REMARKS: No identical or even similar specimen has been found in the accessible literature and it is accordingly proposed to establish a new species for this single specimen. Its external sculpture is very similar to that of a unique specimen, described recently under the name "*Neopilina pliocenica* CHIRLI", by CHIRLI (2004, pp 18-19, pl. 7, figs 1-13), from the Pliocene of Ponte Mattoni in Tuscany (Italy). CHIRLI clearly assigned his new species to the class Monoplacophora. However, the basic feature of the monoplacophorans, viz. muscle scars consisting of eight pairs organized in two arched rows paralleling the shell margin, has not been demonstrated. The Korytnica specimen is slightly smaller, 0.7 mm in height, and 1.0 mm in length, thus relatively lower, with a less prominent apex. Its ornamentation is also different, the radial riblets being thicker, amounting to 12-13 per 1 mm of the margin, instead of 200 in CHIRLI's specimen [The number 200 is certainly a printer's error; estimated from the photograph it is only 20; see CHIRLI 2004, pl. 7, fig. 1]. Indicative of its gastropod, rather than monoplacophoran nature is its *Patella*-like muscle scar.

A generic assignment of this Korytnica specimen to the class Gastropoda cannot be doubted. It should most probably be assigned to the subgenus *Cocculina* (*Dallia*) JEFFREYS, 1882, to the species of which it is best comparable (see WENZ 1938, p. 449).

Family Littorinidae GRAY, 1840
Genus *Littorina* FÉRUSAC, 1821
Littorina obsoleta BOETTGER, 1907
(Pl. 4, Fig. 6)

1975. *Littorina obsoleta* BOETTGER; W. BAŁUK, p. 62, pl. 8, fig. 23
(*cum synonym.*).

NEW MATERIAL: Forty specimens.

DIMENSIONS: The largest specimen (Pl. 4, Fig. 6) is 5.0 mm high and 3.3 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1975), but some of them are larger and display their original (overall orange), non-patterned shell colour.

Genus *Medoriopsis* COSSMANN, 1888
Medoriopsis detrita (BOETTGER, 1907)
(Pl. 4, Fig. 8)

1975. *Medoriopsis detrita* (BOETTGER); W. BAŁUK, pp. 62-63, pl. 8, fig. 22 (*cum synonym.*).

NEW MATERIAL: One specimen.

DIMENSIONS: Height 3.9 mm, width 2.2 mm.

REMARKS: This very rare species is now represented by the second specimen from Korytnica. It is slightly larger than the previous one (see BAŁUK 1975), albeit not fully grown and lacking the final aperture.

Family Lacunidae GRAY, 1857
Genus *Lacuna* TURTON, 1827
Subgenus *Pseudocirsope* BOETTGER, 1906
Lacuna (*Pseudocirsope*) *banatica* BOETTGER, 1901
(Pl. 4, Fig. 9)

1975. *Lacuna* (*Pseudocirsope*) *banatica* BOETTGER; W. BAŁUK, p. 63, pl. 8, fig. 25 (*cum synonym.*).

NEW MATERIAL: Ten specimens.

DIMENSIONS: The largest specimen is 4.7 mm high and 3.0 mm wide.

REMARKS: The new specimens are distinctly larger than those described previously (see BAŁUK 1975).

Lacuna (*Pseudocirsope*) *hoernesi* BOETTGER, 1901
(Pl. 4, Fig. 10)

1975. *Lacuna* (*Pseudocirsope*) *hoernesi* BOETTGER; W. BAŁUK, p. 64, pl. 8, fig. 24 (*cum synonym.*).

NEW MATERIAL: Seventy specimens.

DIMENSIONS: The largest specimen is 4.5 mm high and 3.1 mm wide.

REMARKS: The new material, much richer than that described previously (BAŁUK 1975) indicates this species to be not uncommon at Korytnica. Some of the new specimens are larger (see Pl. 4, Fig. 10).

Family Rissoidae GRAY, 1847
Genus *Cingula* FLEMING, 1828
Subgenus *Peringiella* MONTEROSATO, 1878
Cingula (*Peringiella*) *nitida* (BRUSINA, 1870)
(Text-fig. 2B)

1939. *Cingula (Peringiella) nitida* (BRUSINA); W. WENZ, p. 609, text-fig. 1686.

MATERIAL: One specimen.

DIMENSIONS: Height 2.0 mm, width 0.8 mm.

REMARKS: The specimen seems to be conspecific with the present-day specimens from the Mediterranean Sea, described by WENZ (1939). From the fossil species *Cingula (Peringiella) tauroatava* SACCO from the Miocene of northern Italy, described by SACCO (1895, p. 34, pl. 1, fig. 93), it differs only in its less slender shape. The present author is not convinced whether this difference is sufficient to justify treating SACCO's species as separate, particularly as the specimens under discussion are extremely rare both in Colli Torinesi and at Korytnica and their variability range cannot be ascertained.

The species *Cingula (Peringiella) nitida* (BRUSINA, 1870) has not been recorded previously from the Miocene of Poland.

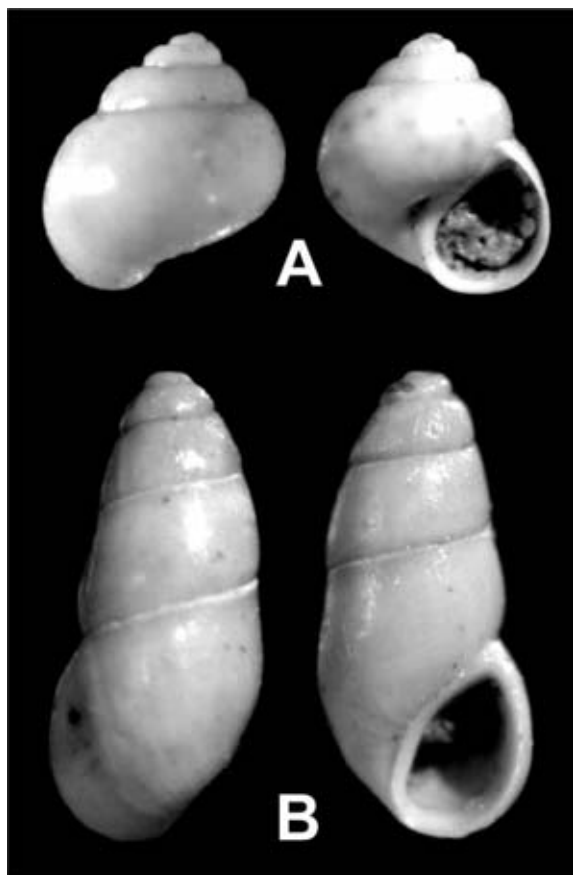


Fig. 2. A – *Cirsonella* sp., $\times 32$, U.W., BkK-G1257; B – *Cingula (Peringiella) nitida* (BRUSINA), $\times 32$, U.W., BkK-G1258

Subgenus *Ceratia* H. & A. ADAMS, 1852
Cingula (Ceratia) friedbergi (BALUK, 1975)

1975. *Cingula (Ceratia) friedbergi* sp.n.; W. BALUK, pp. 67-68, pl. 8, fig. 19 (cum synonym.).

1989. *Rhombostoma diabolicum* sp.n.; S. PALAZZI, pp. 178-181, text-figs 3-4.

REMARKS: In the previous report, the present author (BALUK 1975) described two similarly-shaped species under the names *Cingula (Ceratia) friedbergi* BALUK, and *Cingula (Ceratia) striata* (HÖRNES). Shells of the former species differ from those of the latter in being slightly less slender, with less convex whorls, wider interspaces between spiral furrows, and a larger aperture. The lack of intermediate forms substantiates the treatment of those species as separate.

It is suggested that HÖRNES (1856) had presumably similar material at his disposal and described it as one species, "*Chemnitzia striata* HÖRN.". This was claimed by PALAZZI (1989, and in a letter), according to whom HÖRNES (1856) described a taxon different from that illustrated. PALAZZI (1989, p. 178) argues that the specimen from Steinebrunn kept in the *Naturhistorisches Museum* in Vienna (PALAZZI 1989, text-fig. 3) differs from that illustrated by HÖRNES. PALAZZI (1989) distinguished such described, but not illustrated, forms as a separate species "*Rhombostoma diabolicum* PALAZZI, 1989"; this name, however, is evidently a junior synonym of *Rhombostoma friedbergi* (BALUK, 1975).

HÖRNES (1856), followed by BOETTGER (1901), regarded the specimens they studied as conspecific with those described under the name "*Bulimus acicula* DRAP." by DU BOIS DE MONTPÉREUX (1831, pp. 48-49) from Białoźurka in the Volhynia. FRIEDBERG (1923, p. 408, pl. 24, fig. 13) synonymized the species described by DU BOIS DE MONTPÉREUX (1831) with a quite different one, namely "*Aclis acicula* DUB. (non DRAP.)"; this treatment was also used by KÓKAY (1966, p. 48, pl. 5, fig. 8).

Cingula (Ceratia) striata (HÖRNES, 1856)

1975. *Cingula (Ceratia) striata* (HÖRNES); W. BALUK, pp. 66-67, pl. 8, fig. 20 (cum synonym.).

1989. *Rhombostoma* sp.; S. PALAZZI, pp. 181-182, text-fig. 5.

REMARKS: It was previously indicated (BALUK 1975) that specimens described as "*Cingula (Ceratia) striata* (HÖRNES)" agree with that illustrated by HÖRNES (1856, pl. 43, fig. 21). This is evidenced by a photo of the specimen from Enzesfeld in the Vienna Basin (PAVIA 1976, pl. 4, fig. 26), described as being of the holotype. This very

specimen was supposedly illustrated by HÖRNES, who had, however, not provided details of the locality from which it was collected.

The Korytnica specimens are also conspecific with a specimen illustrated by PALAZZI (1989, text-fig. 5) as *Rhombostoma* sp. According to PALAZZI, this specimen agrees with that illustrated by HÖRNES (1856); he regards, however, the name used by HÖRNES as preoccupied, and thus requires to be substituted by another one. The name "*Chemnitzia striata*" was really used earlier by PIETTE (1855, p. 1092), but without description, only to report the occurrence site of the gastropod. The present author uses the name validly introduced by HÖRNES (1856).

Genus *Rissoa* DESMAREST, 1814

Rissoa sp.
(Pl. 4, Fig. 7)

MATERIAL: Four specimens.

DIMENSIONS: The largest specimen (Pl. 4, Fig. 7) is 3.7 mm high and 1.9 mm wide.

REMARKS: These rare specimens are evidently different from all others of the family Rissoidae from Korytnica. As no similar specimens may be found in the accessible literature, it is reasonable to keep their assignment at generic level.

Genus *Rissoina* D'ORBIGNY, 1840
Subgenus *Zebinella* MÖRCH, 1876
Rissoina (Zebinella) decussata (MONTAGU, 1803)
(Pl. 4, Fig. 5)

1975. *Rissoina (Zebinella) decussata* (MONTAGU); W. BAŁUK, pp. 91-92, pl. 10, figs 8-9 (*cum synonym.*).

2004. *Rissoina (Zebinella) decussata* (MONTAGU); B. LANDAU & *al.*, pp. 53-54, pl. 12, fig. 2.

NEW MATERIAL: Sixty-five specimens.

DIMENSIONS: The largest specimen (Pl. 4, Fig. 5) is 7.6 mm high and 3.4 mm wide.

REMARKS: The new specimens agree with those reported previously (BAŁUK 1975), although all are slightly larger and better preserved.

Rissoina (Zebinella) sororcula BOETTGER, 1901
(Pl. 4, Fig. 4)

1975. *Rissoina (Zebinella) sororcula* BOETTGER; W. BAŁUK, pp. 93-94, pl. 10, fig. 1 (*cum synonym.*).

NEW MATERIAL: Three specimens.

DIMENSIONS: The largest specimen (Pl. 4, Fig. 4) is 8.5 mm high and 3.7 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1975), albeit of more advanced growth (over two whorls), with the ornamentation of the last whorls clearly discernible: the axial ribs become gradually thinner and thinner, less advanced than the spiral striae. This confirms an earlier suggestion (BAŁUK 1975) of their close relation with *Rissoina loueli* HÖRNES, 1856, the two final whorls of both species being identical. The two initial whorls of *Rissoina (Zebinella) sororcula* bear more conspicuous but less numerous axial riblets (15-20 in Korytnica specimens) and the midwhorls are furnished with a distinct ridge. These two features distinguish the species under discussion (compare also GLIBERT 1949, pl. 6, fig. 7), which was also evident for BOETTGER (1901, p. 150), for whom the basic difference was in the overall shape of the coiling.

Rissoina (Zebinella) eleonora BOETTGER, 1901
(Pl. 4, Fig. 2)

1901. *Rissoina (Zebinella) eleonora* n.sp.; O. BOETTGER, pp. 150-151.

1907. *Rissoina (Zebinella) eleonora* BOETTGER; O. BOETTGER, p. 164.

1934. *Rissoina (Zebinella) eleonora* BOETTGER; A. ZILCH, p. 215, pl. 6, fig. 1.

MATERIAL: Three specimens.

DIMENSIONS: The figured specimen (Pl. 4, Fig. 2) is 5.6 mm high and 2.2 mm wide; another, incomplete specimen is 2.8 mm wide.

REMARKS: These poorly preserved specimens seem to be concordant with those described by BOETTGER (1901, 1907) from Kostež and Lapugy in Transylvania, which are characterized by a variable number of axial ribs on the penultimate whorl, ranging from 27 to 41, as against 24 to 28 axial ribs in the Korytnica specimens.

The species *Rissoina (Zebinella) eleonora* BOETTGER, 1901 has not been recorded previously from the Miocene of Poland.

Rissoina (Zebinella) varicosa BOETTGER, 1907
(Text-fig. 3A)

1975. *Rissoina (Zebinella) varicosa* BOETTGER; W. BAŁUK, pp. 92-93, pl. 10, figs 2-3 (*cum synonym.*).

NEW MATERIAL: Three specimens.

DIMENSIONS: The largest specimen is 5.6 mm high and 2.3 mm wide.

REMARKS: The new specimens agree with the six described previously (BAŁUK 1975), but the largest possesses a varix at the beginning of the last whorl that is identical to that at the apertural margin. In fact, BOETTGER (1907, p. 164) observed that such an additional varix was not uncommon in the numerous specimens from Kostej, and he used this feature in the name of his new species. The specimens described previously from Korytnica were devoid of this ornamentation feature (BAŁUK 1975, p. 93).

Rissoina (Zebinella) sp.
(Pl. 4, Fig. 3)

MATERIAL: One specimen.

DIMENSIONS: Height 8.8 mm, width 3.4 mm.

REMARKS: This unique specimen differs markedly from all other representatives of the genus *Rissoina* from Korytnica. It is most similar to *Rissoina varicosa* BOETTGER, although it is of a larger size at the same number of whorls. It is also similar to *Rissoina brandenburgi* BOETTGER from Kostej in Transylvania, the holotype of which (ZILCH (1934, pl. 6, fig. 97), is twice as large, with the teleoconch about two whorls longer. *Rissoina (Zebinella) nogradensis* CSEPREGHY-MEZNERICS, established upon a single specimen from Sámsonháza in Hungary (see CSEPREGHY-MEZNERICS 1954, pl. 1, fig. 20), is comparable in size and shape, but possesses traces of axial ribs that disappear on the dis-

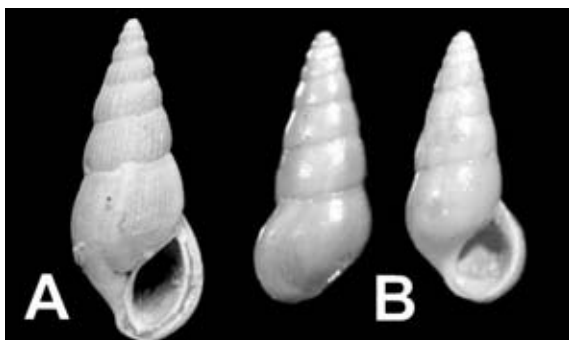


Fig. 3. A – *Rissoina (Zebinella) varicosa* BOETTGER, × 8; U.W., BkK-G1259;
B – *Zebina (Zebina) neriniformis* (BOETTGER), × 16; U.W., BkK-G1260

tal whorls, which are furnished with densely-spaced spiral riblets only. In the Korytnica specimen, the axial ribs disappear by the end of the penultimate whorl. The single specimens from Korytnica and Sámsonháza are too poor to enable recognition of the variability of the two species involved, and to allow discussion of their possible conspecificity.

Subgenus *Phosinella* MÖRCH, 1876
Rissoina (Phosinella) steinabrunnensis SACCO, 1895
(Pl. 4, Fig. 1)

1975. *Rissoina (Phosinella) steinabrunnensis* SACCO; W. BAŁUK, p. 95, pl. 10, figs 4-5 (*cum synonym.*).

NEW MATERIAL: Eight specimens.

DIMENSIONS: The largest specimen is 6.5 mm high and 2.8 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1975), but are of more advanced growth, and are better preserved.

Genus *Alvania* RISSO, 1826
Alvania (Alvania) schwartzi (HÖRNES, 1856)

1975. *Alvania (?Galeodinopsis) schwartzi* (HÖRNES); W. BAŁUK, p. 89, pl. 9, fig. 3 (*cum synonym.*).

2004. *Alvania (Alvania) schwartzi* (HÖRNES); T. KOWALKE & M. HARZHAUSER, p. 122, fig. 7D.

NEW MATERIAL: Nine specimens.

DIMENSIONS: The largest specimen is 2.4 mm high and 1.7 mm wide.

REMARKS: The new specimens agree with the one described previously (BAŁUK 1975). They show that the species is not rare at Korytnica, where its variability is rather low, typified by 15-19 axial ribs and a broad varix on the last whorl.

At Korytnica, this species occurs in one site only, namely the Korytnica Forest (see RADWAŃSKA 1992, fig. 2A), with clay facies. Such a clay habitat has also been noted recently by KOWALKE & HARZHAUSER (2004) in the Vienna Basin.

Genus *Zebina* H. & A. ADAMS, 1854
Subgenus *Zebina* H. & A. ADAMS, 1854

Zebina (Zebina) neriniformis (BOETTGER, 1901)
(Text-fig. 3 B)

1901. *Rissoina (Zebina) neriniformis* n.sp.; O. BOETTGER, p. 151.
1934. *Zebina neriniformis* (BOETTGER); A. ZILCH, p. 214, pl. 6,
fig. 96.

MATERIAL: Two specimens.

DIMENSIONS: Both specimens are 2.3 mm high and 1.0 mm wide.

REMARKS: The two specimens are regarded as conspecific with those described by BOETTGER (1901) from Kosteĵ in Transylvania. Both BOETTGER (1901), from Kosteĵ and Lapugy, and earlier also HÖRNES (1856), from Steinebrunn in the Vienna Basin, reported the occurrence of a similarly shaped species, *Zebina nerina* (D'ORBIGNY). According to BOETTGER (1901), specimens of his species *Zebina neriniformis* differ from the latter in a slightly more slender shape, and in the absence of two nodulous teeth on the inner part of the outer lip. The Korytnica specimens possess a smooth outer lip, but do not differ significantly in the slenderness of the shell.

The species *Zebina neriniformis* (BOETTGER, 1901) has not been recorded previously from the Miocene of Poland.

Subgenus *Stossichia* BRUSINA, 1870

Zebina (Stossichia) multicingulata (BOETTGER, 1887)
(Pl. 4, Fig. 11)

1975. *Zebina (Stossichia) multicingulata* (BOETTGER); W. BAŁUK, pp. 73-74, pl. 8, fig. 26 (*cum synonym.*).

NEW MATERIAL: Thirty specimens.

DIMENSIONS: The largest, completely preserved specimen is 6.1 mm high and 2.8 mm wide.

REMARKS: The new specimens, concordant with those described previously (BAŁUK 1975), albeit slightly larger, show that this species is not rare at Korytnica.

Family Tornidae SACCO, 1896

Genus *Tornus* JEFFREYS, 1867

Tornus parvillimus (SACCO, 1896)
(Pl. 6, Fig. 15)

1896. *Tinostoma woodi* (HÖRNES) var. *parvillima* SACC.; F. SACCO, p. 52, pl. 4, fig. 66.

1975. *Tornus pseudotinostoma* (BOETTGER); W. BAŁUK, p. 99, pl. 11, fig. 10 (*sine synonym.*).

NEW MATERIAL: Twelve specimens.

DIMENSIONS: The largest specimen (Pl. 6, Fig. 15) is 0.7 mm high and 1.8 mm wide.

REMARKS: The specimens described previously (BAŁUK 1975) as *Tornus pseudotinostoma* (BOETTGER, 1975) were classified incorrectly. They differ from BOETTGER's specimen from Kosteĵ in the larger number of whorls but smaller size, the distinctly narrower axial umbilicus, and the less prominent spiral stria at the base of the last whorl. They are thus not conspecific with this specimen. The Korytnica specimens seem to be very close to those described by SACCO (1896) from the Pliocene of northern Italy under the name "*Tinostoma woodi* (HÖRNES) var. *parvillima* SACCO", and more recently re-illustrated by FERRERO MORTARA & al. (1984, pl. 50, fig. 8). In the present author's opinion, the distinction by SACCO of a separate taxon was justified, albeit its rank should have been at species level. The species *Teinostoma (Solariorbis) woodi* (HÖRNES) is characterised by high variability (cf. HÖRNES 1856, pp. 440-441, pl. 44, fig. 4; BAŁUK 1975, pp. 100-101, pl. 11, figs 7-8), but the taxon *parvillima* cannot be accommodated therein.

The species *Tornus parvillimus* (SACCO, 1896) has not been recorded previously from the Miocene of Poland.

Genus *Teinostoma* H. & A. ADAMS, 1853

Subgenus *Solariorbis* CONRAD, 1865

Teinostoma (Solariorbis) affine (BOETTGER, 1901)
(Pl. 6, Fig. 16)

1901. *Tinostoma affine* n.sp.; O. BOETTGER, p. 169.

1907. *Tinostoma affine* BOETTGER; O. BOETTGER, p. 192.

1934. *Teinostoma (Solariorbis) affine* (BOETTGER); A. ZILCH, p. 204, pl. 3, fig. 47.

partim 2004. *Solariorbis woodi* (HÖRNES); B. LANDAU & al., pp. 59-60, pl. 13, fig. 4 [*non* fig. 5].

MATERIAL: Ten specimens.

DIMENSIONS: The largest specimen is 1.5 mm high and 3.5 mm wide.

REMARKS: The present author previously suggested (BAŁUK 1975, p. 100) that this species could be united with *Teinostoma (Solariorbis) woodi* (HÖRNES). The new material indicates, however, that BOETTGER (1901, 1907) was right to erect a separate species, *Teinostoma*

(*Solariorbis*) *affine* (BOETTGER) in present-day nomenclature.

With regard to *Teinostoma (Solariorbis) woodi* (HÖRNES), BAŁUK (1975) was of the opinion, as quoted by LANDAU & *al.* (2004, p. 59), of its high variability. Its extent is, however, much smaller than that, ascribed by LANDAU & *al.* (2004), who illustrated only two specimens. One of these (LANDAU & *al.* 2004, fig. 4) really belongs to *Teinostoma (Solariorbis) affine* (BOETTGER), while the other (LANDAU & *al.* 2004, fig. 5) most probably represents a completely different genus.

The species *Teinostoma (Solariorbis) affine* (BOETTGER, 1901) has not been recorded previously from the Miocene of Poland.

Teinostoma (Solariorbis) microdiscus (BOETTGER, 1901)
(Pl. 6, Figs 17-18)

1901. *Tinostoma microdiscus* n.sp.; O. BOETTGER, pp. 169-170.

1934. *Teinostoma (Solariorbis) microdiscus* (BOETTGER); A. ZILCH, p. 205, pl. 3, fig. 49.

MATERIAL: Seven specimens.

DIMENSIONS: The largest specimen (Pl. 6, Fig. 18) is 1.9 mm high and 4.0 mm wide.

REMARKS: These specimens agree with those described by BOETTGER (1901) from Kostej in Transylvania.

The species *Teinostoma (Solariorbis) microdiscus* (BOETTGER, 1901) has not been recorded previously from the Miocene of Poland.

Subgenus *Idioraphe* PILSBRY, 1922
Teinostoma (Idioraphe) minimum BOETTGER, 1907
(Pl. 6, Figs 13-14)

1975. *Teinostoma (Idioraphe) minimum* BOETTGER; W. BAŁUK, pp. 101-102, pl. 11, fig. 6 (*cum synonym.*).

NEW MATERIAL: Four specimens.

DIMENSIONS: The largest specimen (Pl. 6, Fig. 14) is 1.8 mm high and 3.3 mm wide.

REMARKS: The new specimens are larger than those described previously (BAŁUK 1975), as well as those from Kostej and Lapugy in Transylvania. This certainly results from the fact that the species is more common at Korytnica (11 specimens altogether),

where the more fully grown specimens are likely to be found.

Family Turritellidae LOVÉN, 1847
Genus *Turritella* LAMARCK, 1799
Subgenus *Peyrotia* COSSMANN, 1912
Turritella (Peyrotia) circumcisa sp.nov.
(Pl. 6, Figs 3-4)

1975. *Turritella* sp.; W. BAŁUK, p. 114, pl. 12, fig. 11.

MATERIAL: Two specimens, including the one described previously by BAŁUK (1975).

DIMENSIONS: The larger specimen (containing 7 median whorls only) is 33 mm high and 10.5 mm wide.

HOLOTYPE: The specimen (Z.PAL.U.W., No BkK-G1164) illustrated in Pl. 6, Fig. 4.

TYPE HORIZON: Middle Miocene (Lower Badenian).

TYPE LOCALITY: Korytnica, 24 km SSW of Kielce, southern slopes of the Holy Cross Mountains, Central Poland.

DERIVATION OF NAME: Latin *circumcisa* – sloping, steep; in reference to the outline of whorls.

DIAGNOSIS: Whorls flat, sloping distinctly, ornamented by 7 spiral riblets.

DESCRIPTION: The shell is medium-sized, not very thin-walled, turret-like. Both the protoconch and initial teleoconch are not preserved (the earliest whorl of the paratype is 3.5 mm wide), the same as the aperture and final whorls of the teleoconch (the last whorl of the holotype is 10 mm wide). All whorls of the teleoconch are uniform in shape: a sharp ridge runs at the base (=anteriorly), above which the whorl becomes flat, sloping distinctly, and below which it is also flat; the angle between these flat parts is about 115°. All whorls are ornamented by seven spiral riblets (or cords), of which the two lowest are more conspicuous, the remaining ones being equal. Some riblets are separated by thread-like secondaries. On the preserved parts, there are still thinner ones, up to five on the last whorl.

REMARKS: The present author described a specimen (BAŁUK 1975, p. 114, pl. 12, fig. 11) that differed from all known turritellids in its whorl profile and ornamentation, and suggested its separation as a distinct species. The new specimen, of a more advanced size, is herein desig-

nated the holotype of a new species, *Turritella (Peyrotia) circumcisa* sp.nov.; the specimen recorded previously is herein re-illustrated (Pl. 6, Fig. 3), to demonstrate the variability of the new species.

The whorl outline of the new species resembles, to some extent, that of the final whorls of "*Turritella (Peyrotia) strangulata* GRATELOUP mut. *gossa* COSSMANN & PEYROT" from the Miocene of the Aquitaine Basin (COSSMANN & PEYROT 1922, pp. 50-52, pl. 2, fig. 3) but the whorl size and ornamentation are quite different.

Subgenus *Zaria* GRAY, 1847

Turritella (Zaria) subacutangula D'ORBIGNY, 1852

(Pl. 6, Fig. 2)

1853. *Turrit. subangulata* BRONN; E. EICHWALD, pp. 279-280, pl. 10, fig. 22.
1856. *Turritella subangulata* BROCC.; M. HÖRNES, pp. 428-429, pl. 43, figs 5-7.
1895. *Zaria subangulata* var. *spirata* BR.; F. SACCO, p. 10, pl. 1, fig. 34.
1909. *Turritella subangulata* BROCC. var. *polonica* FRIEDB.; W. FRIEDBERG, pp. 21-22, pl. 14, figs 25-26.
1914. *Turritella subangulata* BROCC. var. *polonica* FRIEDB.; W. FRIEDBERG, pp. 331-332, pl. 19, figs 17-18.
1922. *Turritella (Zaria) subangulata* BROCCHI; var. *subacutangula* D'ORB.; M. COSSMANN & A. PEYROT, p. 18, pl. 1, figs 13-14.
1930. *Turritella subangulata* BROCC. var. *polonica* FRIEDB.; K. KOWALEWSKI, p. 143.
1938. *Turritella subangulata* BROCC. var. *spirata* BROCC.; W. FRIEDBERG, pp. 92-93.
- partim 1955. *Turritella (Torculoidella) subangulata* BROCC. var. *polonica* FRIEDBERG; G. MOISESCU, pp. 128-129, pl. 11, fig. 1 [non figs 2-10].
1956. *Turritella (Zaria) spirata* (BROCCHI); I. CSEPREGHY-MEZNERICS, p. 385, pl. 2, fig. 29.
1960. *Turritella (Torculoidella) subangulata* var. *subacutangula* (ORBIGNY); E. KOJUMDIEVA, p. 114, pl. 32, figs 5-6.
1966. *Turritella subangulata spirata* BROCCHI; L. STRAUSZ, pp. 84-85, pl. 2, fig. 4.
1968. *Archimediella (Torculoidella) spirata* (BROCCHI); E. ROBBIA, pp. 511-513, pl. 39, fig. 12.
1968. *Turritella subangulata spirata* BROCC.; W. KRACH, p. 487, pl. 2, fig. 6.
1975. *Turritella (Zaria) spirata* BROCCHI; W. BAŁUK, pp. 104-105, pl. 12, fig. 14.
1978. *Turritella (Zaria) spirata* (BROCCHI); F. STEININGER, p. 333, pl. 3, figs 8-10.
2004. *Turritella spirata* (BROCCHI); B. LANDAU & al., pp. 17-18, pl. 2, fig. 11; pl. 3, fig. 7.

NEW MATERIAL: Three specimens.

DIMENSIONS: The new illustrated specimen, consisting of 12 early whorls (including the protoconch), is 12.5 mm high and 4.0 mm wide.

REMARKS: These specimens agree with those described previously (BAŁUK 1975), but the species assignment of all of them must be corrected. This results from the discovery, apparent from the Catalogue of BROCCHI's holotypes, published by PINNA & SPEZIA (1978), that they are compatible neither with *Turbo spiratus* BROCCHI (see PINNA & SPEZIA 1978, pl. 58, fig. 4), nor with *Turbo subangulatus* BROCCHI (see PINNA & SPEZIA 1978, pl. 59, fig. 6). The holotypes of these two species differ so markedly that their conspecificity suggested by CAPROTTI (1975) cannot be accepted.

The Korytnica specimens are clearly conspecific with those from the Miocene of the Aquitaine Basin, described by COSSMANN & PEYROT (1922) under the name "*Turritella subangulata* BROCCHI, var. *subacutangula* D'ORB.". In the present author's opinion, the latter variety should be treated as separate at species level.

Turritella (Zaria) subacutangula was first reported from Korytnica under the name "*Turritella subangulata* BROCC., v. *polonica* FRIEDB." by KOWALEWSKI (1930), followed by FRIEDBERG (1938), who modified his early opinion (FRIEDBERG 1909) and postulated that his variety was indistinguishable from *Turbo spiratus* BROCCHI.

Family Siliquariidae ANTON, 1838

Genus *Tenagodus* GUETTARD, 1770

Subgenus *Siliquaria* BRUGUIÈRE, 1789

Tenagodus (Siliquaria) ponderosus MÖRCH, 1860

(Pl. 5, Figs 1-2)

1969. *Tenagodus anguinus* L.; I. CSEPREGHY-MEZNERICS, p. 20, pl. 3, fig. 10.
1975. *Tenagodus (Tenagodus) anguinus miocaenicus* COSSMANN & PEYROT; W. BAŁUK, pp. 124-125, pl. 14, fig. 16 (*cum synonym.*).
1998. *Siliquaria (Siliquaria) anguinea* (LINNÉ); O. SCHULTZ, p. 58, pl. 22, fig. 8.
2004. *Tenagodus (Tenagodus) obtusus* (SCHUMACHER); B. LANDAU & al., p. 14, pl. 2, fig. 7A, 7B.

NEW MATERIAL: 58 apical shells, and numerous fragments of the adult part.

DIMENSIONS: Width of the specimen illustrated (Pl. 5, Fig. 2) is 12 mm, maximum diameter of the uncoiled whorl ca. 10 mm.

REMARKS: The new specimens come from the same locality as described previously (BALUK 1975), that is oyster shellbeds of Mt. Łysa. Although badly preserved, they should be regarded as conspecific with the unique specimen from Grund in the Vienna Basin, described by HÖRNES (1856) and SCHULTZ (1998), as well as with those recorded by SACCO (1896) from northern Italy. The Korytnica specimens are largely the juvenile parts of shells, lacking the open slit, which is discernible only as a trace in the form of a spiral ridge and in the course of the growth lines. An identical trace of the slit is observed in comparable parts of shells of the present-day species *Tenagodus ponderosus* (MÖRCH, 1860).

The species assignment of the Korytnica specimens remains uncertain. Markedly similar, and supposedly conspecific with those from Korytnica, are many specimens from the European Miocene that are referred commonly to *Tenagodus anguinus* vel *Siliquaria anguina* (LINNAEUS). COSSMANN & PEYROT (1922) distinguished a separate rank, mutation *miocaenicus*, and SACCO (1896) described specimens from northern Italy under the name "*Tenagodes anguinus* (L.) (an *T. obtusus*)". Surprisingly, WENZ (1939, p. 680) documented as *Tenagodus* (*Tenagodus*) *anguinus* (LINNAEUS) a completely different gastropod, bearing no relationship to those from Korytnica and other European Miocene localities.

The Miocene specimens should be assigned either to *Tenagodus* (*Tenagodus*) *obtusus* SCHUMACHER (see WENZ 1939, p. 680) or, more probably, to *Tenagodus* (*Siliquaria*) *ponderosus* MÖRCH (see ABBOTT & DANCE 1990, p. 61; WYE 1998, p. 68), to which they are thought to have been the Miocene ancestors. In the present author's opinion, the latter treatment is preferable. According to MÖRCH (1860), the present-day representatives of the subgenus *Tenagodus* s.s. live attached to rocks or corals, whereas those of the subgenus *Siliquaria* BRUGUIERE inhabit sponges.

Family Vermetidae RAFINESQUE, 1815

Genus "*Vermetus*" *sensu lato*

"*Vermetus*" aff. *desmoulini* COSSMANN & PEYROT, 1922
(Pl. 5, Fig. 9a-c)

MATERIAL: One specimen

DIMENSION: Maximum diameter of the preserved shell fragment is 10.5 mm.

REMARKS: This enigmatic specimen, displaying a prismatic layer, is clearly a gastropod not a polychaete serpulid, albeit it lacks the protoconch. It was growing simul-

taneously with the coral upon which it settled, and to which it was certainly a commensal. During growth, it was gradually embedded by the coral, the skeleton of which is incorporated in the uncoiled shell of the gastropod.

The taxonomic position of the specimen is unclear. The only ornamentation consists of numerous, densely-spaced but slightly wavy growth lines, combined with very fine, delicate longitudinal striae. Traces of original coloration are preserved in the form of yellow-tinted thread-like bands paralleling growth lines. These features are compatible with those described by COSSMANN & PEYROT (1922, pp. 84-85, pl. 3, fig. 5) in another unique specimen embedded in a coral from the Miocene of Mérignac in the Aquitaine Basin, and classified as "*Vermetus* (*Spirogyphus*?) *Desmoulini*". In this specimen, the shell width increases slowly to attain 5 mm, whereas in the Korytnica specimen it increases rapidly to as much as 10 mm. The taxonomic significance of such a difference is unclear, particularly as they inhabited different corals with certainly different growth modes and growth rates. Consequently, the Korytnica specimen is herein regarded as close to, but not conspecific with, the French one. The assignment of the latter to the genus (or subgenus) *Spirogyphus* DAUDIN, 1800, cannot, however, be accepted if the genus treatment by WENZ (1939, p. 677, text-fig. 1935) is followed.

Another possible candidate, with a similar ornamentation, is the gastropod illustrated by WENZ (1939, text-fig. 1930), referred to as *Siphonium* J.E. GRAY, 1850.

Any form comparable to "*Vermetus*" aff. *desmoulini* COSSMANN & PEYROT, 1922, has not been recorded previously from the Miocene of Poland.

Genus *Petalococonchus* H. & C. LEA, 1843

Petalococonchus intortus (LAMARCK, 1818)

(Pl. 5, Figs 5-7)

1975. *Petalococonchus intortus* (LAMARCK); W. BALUK, pp. 120-121, pl. 14, figs 8-10 (*cum synonym.*).

1985. *Petalococonchus intortus* (LAMARCK); A.W. JANSSEN, pp. 150-151, pl. 7, fig. 2; pl. 48, fig. 10.

2004. *Petalococonchus glomeratus* (LINNAEUS); B. LANDAU & *al.*, pp. 27-28. pl. 3, figs 15-16.

NEW MATERIAL: Several hundred specimens.

DIMENSIONS: The largest, completely preserved specimen (Pl. 5, Fig. 6) measures 17 mm, in length, and 12 mm in width; the diameter of the distal part of the tube is 2.2 mm. Another specimen (Pl. 5, Fig. 5), with the straight part of the tube preserved, is 8 mm long at 1.3 mm diameter.

REMARKS: These specimens show great variability in their mode of coiling. In some, the distal part of the tube is more or less straightened and erect. This part, commonly broken-off and found isolated, resembles a specimen from the Miocene of the Aquitaine Basin, described by COSSMANN & PEYROT (1922, pl. 4, fig. 30) under the name "*Vermetus (Burtinella) cf. semisurrectus BIVONA*". Similarly-shaped specimens from the Neogene of northern Italy were distinguished by SACCO (1896, pl. 1, figs 17-17c) as *Petalococonchus intortus var. solutella* SACCO.

Genus *Lemintina* RISSO, 1826
Lemintina sexcarinata (BOETTGER, 1901)
 (Pl. 5, Fig. 8)

1975. *Lemintina sexcarinata* (BOETTGER); W. BAŁUK, pp. 123-124, pl. 14, figs 6-7 (*cum synonym.*).

NEW MATERIAL: Seven specimens, all preserved as fragmented shells.

DIMENSIONS: The width of the fragments varies from 2.5 to 4 mm.

REMARKS: The new specimens are concordant with those described previously (BAŁUK 1975). Their number indicates that the species is not so uncommon as suggested earlier, and allows the shell variability to be recognized to a much greater extent. One specimen is loop-shaped, the other fragments are almost straight, with the tube constant in width. The number of longitudinal ribs varies from 5 to 7, instead of being always 6, as stated previously (BAŁUK 1975).

Genus *Vermicularia* LAMARCK, 1799
Vermicularia milleti (DESHAYES, 1839)
 (Pl. 6, Figs 5-6)

1975. *Vermicularia milleti* (DESHAYES); W. BAŁUK, pp. 123-124, pl. 14, figs 6-7 (*cum synonym.*).

2004. *Vermicularia milleti* (DESHAYES); B. LANDAU & *al.*, p. 26, pl. 3, fig. 18.

NEW MATERIAL: Six young specimens and three fragments of adults, the largest of which is in the private collection of Mr. J. GUBAŁA.

DIMENSIONS: The largest specimen (Pl. 6, Fig. 6), preserved as three distal whorls, is 25 mm high and 18 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1975) but are better preserved.

The genus *Vermicularia* LAMARCK, 1799, having usually been accommodated in the family Vermetidae RAFINESQUE, 1815, has recently been revised by BANDEL & KOWALKE (1997), who, on the basis of a phylogenetic model of vermetoid gastropods, have proposed that it be included in the family Turritellidae LOVÉN, 1847.

Family Caecidae GRAY, 1847
 Genus *Caecum* FLEMING, 1817
Caecum tenuicostulatum DE PORTA, MARTINELL &
 GONZALEZ DELGADO, 1993
 (Pl. 6, Figs 11-12)

partim 1975. *Caecum (Caecum) trachea* (MONTAGU); W. BAŁUK, pp. 125-126.

1993. *Caecum tenuicostulatum* nov.sp.; J. DE PORTA & *al.*, p. 6, pl. 2, figs 3-7.

MATERIAL: Three specimens.

DIMENSIONS: The largest specimen (Pl. 6, Fig. 11) is 2.7 mm long (measured in a straight line), and 0.6 mm in diameter at the aperture.

REMARKS: Amongst the specimens described previously (BAŁUK 1975) under the name *Caecum (Caecum) trachea* (MONTAGU), there were three with delicate longitudinal striations. They appear similar to those described by DE PORTA & *al.* (1993) from the Pliocene of Spain, although the striation of the latter is more conspicuous. It is questionable whether or not such a difference justifies the distinction of a separate species.

The species *Caecum tenuicostulatum* DE PORTA, MARTINELL & GONZALEZ DELGADO, 1993, has not been recorded previously from the Miocene of Poland.

Caecum korytnicense sp.nov.
 (Pl. 6, Figs 7-8)

HOLOTYPE: The specimen (Z.PAL.U.W., No BkK-G1179) illustrated in Pl. 6, Fig. 8.

TYPE HORIZON: Middle Miocene (Lower Badenian).

TYPE LOCALITY: Korytnica, 24 km SSW of Kielce, southern slopes of the Holy Cross Mountains, Central Poland.

DERIVATION OF NAME: *korytnicense* – Latinized adjective of Korytnica.

DIAGNOSIS: Ornamentation composed of annular swellings, wavy in their course; aperture with a broad swelling externally, and a delicate furrow internally.

MATERIAL: Thirty specimens.

DIMENSIONS: The largest specimen is 2.5 mm long, another one (the holotype) is 2.4 mm long, both 0.6 mm in diameter at the aperture.

DESCRIPTION: The adult specimens are shaped like a curved tube of a slightly increasing diameter. Their outer surface is furnished with densely spaced annular swellings, wavy in their course, and variably pronounced. Amongst the swellings, there appears very delicate, but extremely dense furrowing. The aperture is circular, furnished with a conspicuous, collar-like swelling externally, and a delicate furrow internally, close to the margin. The septum (closing the tube after discarding the juvenile part) is slightly regular, variably convex, and usually asymmetrical.

REMARKS: The specimens display ornamentation quite different from that of other congeners occurring at Korytnica, as well as of any hitherto known representatives of the genus *Caecum* FLEMING, 1817. Illustrated herein for comparison (Pl. 6, Figs 9-10) are specimens of the two species that are very common in the Korytnica Clays, viz. *Caecum (Caecum) trachea* (MONTAGU, 1803) and *Caecum (Brochina) glabrum* (MONTAGU, 1803).

All presented specimens of *Caecum korytnicense* sp.nov. were found outside the main occurrence area of the Korytnica Clays, on the slopes of Mt. Grodzisko.

Family Architectonicidae GRAY, 1840

Genus *Architectonica* BOLTEN in RÖDING, 1798

Subgenus *Solariaxis* DALL, 1892

Architectonica (Solariaxis) kostejana (BOETTGER, 1907)
(Pl. 7, Figs 6-7)

1907. *Solarium (Granulosolarium) kostejanum*; O. BOETTGER, pp. 135-136.

1915. *Solarium (Solariaxis) kostejense* BOETTGER; M. COSSMANN, p. 170, pl. 12, figs 10-12.

1934. *Solarium (Solariaxis) kostejanum* (BOETTGER); A. ZILCH, p. 218, pl. 7, fig. 17.

MATERIAL: Five specimens

DIMENSIONS: The largest specimen (Pl. 7, Fig. 7), preserved without one-fourth of the last whorl, is estimated to have had a total height of 2 mm and a total width of 6 mm.

REMARKS: The specimens agree with those described by BOETTGER (1907) from Kosteĵ in Transylvania. However, all Korytnica specimens bear 6 spiral ribs on the upper (anterior) side of the last whorl, whereas of the specimens from Kosteĵ, only one has such a number, the other three having 7 ribs.

The species *Architectonica (Solariaxis) kostejana* (BOETTGER, 1907) has not been recorded previously from the Miocene of Poland.

Subgenus *Nipteraxis* COSSMANN, 1915

Architectonica (Nipteraxis) marthae (BOETTGER, 1901)
(Pl. 7, Fig. 8)

1901. *Solarium (Torinia) marthae* n.sp.; O. BOETTGER, p. 115.

1915. *Solarium (Nipteraxis) Marthae* BOETTGER; M. COSSMANN, p. 168, pl. 12, figs 13-15.

1934. *Solarium (Nipteraxis) marthae* (BOETTGER); A. ZILCH, p. 217, pl. 13, fig. 16.

1960. *Architectonica (Nipteraxis) marthae* (BOETTGER); E. KOJUMDGIEVA, p. 93, pl. 29, fig. 17.

1975. *Architectonica (Calodisculus) planulata* (GRATELOUP); W. BALUK, pp. 119-120, pl. 13, fig. 6.

NEW MATERIAL: Twenty-two specimens.

DIMENSIONS: The largest specimen (Pl. 7, Fig. 8) is 2.3 mm high and 5.8 mm wide.

REMARKS: The new specimens agree with those described previously (BALUK 1975), but some are distinctly larger. This enables correction of the former statement that the species *Architectonica marthae* (BOETTGER, 1901) from Kosteĵ in Transylvania is conspecific with *Architectonica planulata* (DUJARDIN, 1835) from the Miocene of the Aquitaine Basin. These two species differ in the ornamentation of the basal side of the whorls. The largest of the Korytnica specimens is over a half whorl larger than one indicated by ZILCH (1934) as the lectotype of BOETTGER's species.

Subgenus *Pseudotorinia* SACCO, 1892

Architectonica (Pseudotorinia) misera (DUJARDIN, 1837)
(Pl. 7, Fig. 5)

1919. *Solarium (Pseudotorinia) miserum* DUJARDIN; M. COSSMANN & A. PEYROT, pp. 676-677, pl. 15, figs 62-67.

1975. *Architectonica (Pseudotorinia) misera berthae* (BOETTGER, 1901); W. BAŁUK, p. 118, pl. 13, figs 7-8 (*cum synonym*).

NEW MATERIAL: One hundred and five specimens.

DIMENSIONS: The largest specimen (Pl. 7, Fig. 5) is 6.0 mm high and 10.2 mm wide.

REMARKS: The new specimens, all from oyster shellbeds at Mt. Łysa, are markedly more numerous than reported earlier (BAŁUK 1975), and include some larger individuals. The latter show that the distinction of the subspecies *Architectonica (Pseudotorinia) misera berthae* (BOETTGER, 1901) is not justified, because it does not differ from the nominative subspecies from the Miocene of the Aquitaine Basin. The largest of the Korytnica specimens is almost two whorls larger than the specimen from Kosteĵ in Transylvania, designated by ZILCH (1934) as the lectotype of the species *Architectonica berthae* (BOETTGER); it is also half a whorl longer than the specimen of *Architectonica misera* (DUJARDIN) from the Miocene of the Aquitaine Basin described by COSSMANN & PEYROT (1919).

Family Mathildidae DALL, 1889

Genus *Mathilda* SEMPER, 1865

Mathilda monilis SEMPER, 1865

(Pl. 7, Fig. 3)

1865. *Mathilda monilis*, O. SEMPER; O. SEMPER, pp. 344-345, pl. 13, fig. 6.

1901. *Mathilda monilis* O. SEMP.; O. BOETTGER, p. 155.

MATERIAL: Two specimens.

DIMENSIONS: The larger specimen (Pl. 7, Fig. 3), preserved without its apical part, is ca 7 mm high and 2.9 mm wide.

REMARKS: These poorly preserved specimens seem to belong to this species. They are similar in size, or even larger, than the holotype from Lapugy in Transylvania; the shape and ornamentation of the whorls are identical. According to BOETTGER (1901), identical specimens also occur at Kosteĵ.

The species *Mathilda monilis* SEMPER, 1865, has not been recorded previously from the Miocene of Poland.

Mathilda praeclara BOETTGER, 1901

(Pl. 7, Fig. 4)

1901. *Mathilda praeclara* n.sp.; O. BOETTGER, p. 155.

1934. *Mathilda praeclara* BOETTGER; A. ZILCH, p. 216, pl. 7, fig. 10.

MATERIAL: One specimen.

DIMENSIONS: Height 4.2 mm, width 1.7 mm.

REMARKS: The only specimen agrees with the holotype, described by BOETTGER (1901) from Kosteĵ in Transylvania; they both bear three thin, spiral striae at the base of the last whorl. This species differs from the previously (BAŁUK 1975) reported *Mathilda clara* BOETTGER, 1901, from Korytnica, in having a protoconch that is only half as wide.

The species *Mathilda praeclara* BOETTGER, 1901, has not been recorded previously from the Miocene of Poland.

Family Melanopsidae H. & A. ADAMS, 1858

Genus *Melanopsis* FÉRUSSAC, 1807

Melanopsis impressa KRAUSS, 1852

(Pl. 7, Figs 1-2)

1856. *Melanopsis impressa* KRAUSS; M. HÖRNES, pp. 596-597, pl. 49, fig. 10.

1919. *Melanopsis (Lyrcaea) impressa* KRAUSS; M. COSSMANN & A. PEYROT, pp. 694-695, pl. 16, figs 79-80.

1966. *Melanopsis impressa* KRAUSS; L. STRAUZ, p. 126, pl. 40, figs 7-11.

1966. *Melanopsis (Lyrcaea) impressa bonelli* (SISM.); J. KÓKAY, p. 40, pl. 3, figs 22-23.

1971. *Melanopsis impressa* KRAUSS; I. CSEPREGHY-MEZNERICS, p. 27, pl. 9, fig. 3.

1975. *Melanopsis aquensis* GRATELOUP; W. BAŁUK, pp. 127-128, pl. 13, fig. 10.

NEW MATERIAL: Three specimens.

DIMENSIONS: The largest specimen (Pl. 7, Fig. 2) is 39 mm high; its complete height is estimated as 44 mm at a width of 20-21 mm.

REMARKS: Amongst the new specimens, which agree with those reported previously (BAŁUK 1975), one more fully grown specimen seems to be concordant with the specimen of *Melanopsis impressa* KRAUSS described by HÖRNES (1856) from the brackish facies of Moravia (locality Čejč near Hodonin). The previous assignment by the present author (BAŁUK 1975) of the Korytnica specimens to *Melanopsis aquensis* GRATELOUP must therefore be corrected. *Melanopsis impressa* KRAUSS is common in various Miocene sequences of Europe, particularly at Lapugy in Transylvania; it can consequently be argued

that this extinct species was euryhaline rather than solely brackish.

The species *Melanopsis impressa* KRAUSS, 1852, has not been recorded previously from the Miocene of Poland.

Family Diastomidae COSSMANN, 1895
Genus *Scaliola* A. ADAMS, 1860
Scaliola semperi BOETTGER, 1901
(Pl. 6, Fig. 1)

1901. *Scaliola semperi* n.sp.; O. BOETTGER, pp. 146-147.
1907. *Scaliola semperi* BTGR.; O. BOETTGER, p. 162.
1919. *Scaliola Degrangei* DE BOURY mss.; M. COSSMANN & A. PEYROT, pp. 601-602, pl. 16, figs 3-6.
1934. *Scaliola semperi* BOETTGER; A. ZILCH, p. 220, pl. 8, figs 26-27.

MATERIAL: Three specimens.

DIMENSIONS: The largest specimen is ca 3 mm high and 1.2 mm wide, another one (Pl. 6, Fig. 1) is 2.3 mm and 0.8 mm, respectively.

REMARKS: The specimens are concordant with the description presented by BOETTGER (1901) of the species from Kosteĵ in Transylvania, where only two shells have been found.

COSSMANN & PEYROT (1919) classified this species as "*Scaliola Degrangei* DE BOURY mss. (= *S. Semperi* BOETTGER in litt.)", which is an evident misinterpretation. The specimens from several Miocene localities in the Aquitaine Basin do not differ in shape from those described by BOETTGER, although some are slightly larger.

Placement of the well defined genus *Scaliola* A. ADAMS, 1860, at family level remains controversial: ZILCH (1934) included it in the family Finellidae, whereas COSSMANN & PEYROT (1919) placed it in the Rissoidae, and WENZ (1940, p. 753) in the Diastomidae. A characteristic feature of the shells of this genus is the agglutination of sand grains, which leave pits when detached.

The species *Scaliola semperi* BOETTGER, 1901, has not been recorded previously from the Miocene of Poland.

Family Litiopidae
Genus *Alaba* H. & A. ADAMS, 1862
Alaba elata BOETTGER, 1901
(Pl. 8, Fig. 1)

1975. *Alaba elata* BOETTGER; W. BALUK, pp. 139-140, pl. 16, figs 5-6 (cum synonym.).

NEW MATERIAL: Two specimens.

DIMENSIONS: The larger specimen (Pl. 8, Fig. 1) is 5.7 mm high and 1.7 mm wide.

REMARKS: The new specimens are undoubtedly conspecific with those described previously (BALUK 1975), albeit more slender. It is thus apparent that the shape variability of this species is greater than stated earlier.

Family Potamididae H. & A. ADAMS, 1854
Genus *Pirenella* GRAY, 1847
Pirenella moravica (HÖRNES, 1856)
(Pl. 8, Fig. 5)

1975. *Pirenella moravica* (HÖRNES, 1856); W. BALUK, pp. 129-130, pl. 15, figs 9-15 (cum synonym.).

NEW MATERIAL: Twelve specimens, the largest of which (Pl. 8, Fig. 5) is kept in the collection of Mr. Roman GAD.

DIMENSIONS: The largest specimen is 31 mm high and 9.7 mm wide.

REMARKS: The new specimens agree with those described previously (BALUK 1975). One of them (Pl. 8, Fig. 5), distinguished by its size and state of preservation, possesses ornamentation close to that of the two specimens illustrated earlier (BALUK 1975, pl. 15, figs 9 and 11).

Family Cerithiidae FÉRUSAC, 1819
Genus *Cerithium* BRUGUIÈRE, 1789
Subgenus *Thericium* MONTEROSATO, 1890
Cerithium (Thericium) europaeum MAYER, 1878
(Pl. 8, Figs 8-9)

1975. *Cerithium (Thericium) vulgatum europaeum* MAYER; W. BALUK, pp. 144-146, pl. 17, figs 1-3 (cum synonym.).

NEW MATERIAL: Twenty specimens.

DIMENSIONS: A larger specimen, preserved without half of the last whorl (Pl. 8, Fig. 9) is 21 mm high and 12.5 mm wide.

REMARKS: The new specimens agree with those described previously (BALUK 1975), but display the species variability to a much greater extent. One of them (Pl. 8, Fig. 8) is markedly less slender, another one (Pl. 8, Fig. 9) has very inconspicuous ornamentation, particular-

ly at the base of the last whorl. The strength of ornamentation of the juvenile part of the teleoconch (5-7 initial whorls) is also variable.

Previously, this taxon was regarded (BAŁUK 1975) a subspecies of *Cerithium vulgatum* BRUGUIÈRE.

Cerithium (Thericium) obliquistoma (SEGUENZA, 1880)
(Pl. 8, Fig. 6)

1895. *Pithocerithium obliquistoma* (SEGU.) et var.; F. SACCO, p. 34, pl. 2, figs 81, 87-88.
partim 1966. *Cerithium rubiginosum pseudobliquistoma* SZALAI; L. STRAUZ, pp. 132-133, pl. 9, figs 15-18 [non figs 11-14].
 1968. *Cerithium (Thericium) obliquistoma* SEGUENZA; E. ROBBA, p. 519, pl. 40, fig. 5.
 1975. *Cerithium (Thericium) obliquistoma attritum* (BOETTGER); W. BAŁUK, pp. 149-150, pl. 18, figs 10-11.

NEW MATERIAL: One specimen.

DIMENSIONS: Height 10.8 mm, width 5.7 mm.

REMARKS: The new specimen agrees with those described previously (BAŁUK 1975), but is distinctly larger and better preserved. The taxonomic assignment should, however, be corrected. The Korytnica specimens were classified previously at subspecies level, as *Cerithium (Thericium) obliquistoma attritum* (BOETTGER). This taxon, established by BOETTGER (1906) under the name "*Cerithium (Pithocerithium) attritum*", comprises juvenile, very weakly ornamented specimens (cf. ZILCH 1934, pl. 8, fig. 30), which are thus different from these occurring at Korytnica.

Cerithium (Thericium) miospinosum SACCO, 1895

1975. *Cerithium (Thericium) vulgatum miospinosum* SACCO; W. BAŁUK, pp. 143-144, pl. 17, figs 13-16 (*cum synonym.*).

NEW MATERIAL: Eight specimens, including one in the private collection of Mr. M. BUDZIASZEK, of Chorzów.

DIMENSIONS: The largest is a specimen, the four last whorls of which are 52 mm high and 28 mm wide

REMARKS: The new material, which agrees with that described previously (BAŁUK 1975), includes a fragment of the largest specimen ever found at Korytnica.

Previously, this taxon was regarded (BAŁUK 1975) a subspecies of *Cerithium vulgatum* BRUGUIÈRE.

Subgenus *Ptychocerithium* SACCO, 1895
Cerithium (Ptychocerithium) procrenatum SACCO, 1895
 (Pl. 8, Figs 10-11)

1969. *Cerithium procrenatum* SACCO; I. CSEPREGHY-MEZNERICS, p. 21, pl. 3, fig. 18.
 1975. *Cerithium (Ptychocerithium) procrenatum* SACCO; W. BAŁUK, pp. 152-153, pl. 17, figs 17-19 (*cum synonym.*).
 1982. *Cerithium (Ptychocerithium) procrenatum* SACCO; J. ŠVAGROVSKÝ, pp. 19-20, pl. 8, fig. 5.

NEW MATERIAL: Three specimens.

DIMENSIONS: The largest specimen (Pl. 8, Fig. 11), missing half of the last whorl, is 32.5 mm high and 10 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1975), but are much better preserved, particularly in respect of their ornamentation. In size, overall shape and ornamentation of the adult shell (3-4 distal whorls), they do not differ from the syntype of the species from the Miocene of Colli Torinesi (northern Italy) figured by FERRERO MORTARA & *al.* (1984, pl. 34, fig. 12).

The two specimens illustrated (Pl. 8, Figs 10-11) differ from each other in the ornamentation of the initial part (5-6 whorls) of the teleoconch, having the axial ribs variably pronounced and adorned or not by a prickly tubercle.

Genus *Hemicerithium* COSSMANN, 1893
Hemicerithium subcostatum BAŁUK, 1975
 (Pl. 8, Fig. 7)

1975. *Hemicerithium (Hemicerithium) subcostatum* BAŁUK; W. BAŁUK, pp. 154-155, pl. 18, figs 1-3.

NEW MATERIAL: Eight specimens.

DIMENSIONS: The largest specimen (Pl. 8, Fig. 7) is 10.0 mm high and 4.5 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1975) but some are larger, better preserved, and more variable in shape.

Genus *Bittium* LEACH *in* GRAY, 1847
 Subgenus *Bittium* LEACH *in* GRAY, 1847

Bittium (Bittium) benoisti COSSMANN & PEYROT, 1922
(Pl. 8, Fig. 2)

1922. *Bittium benoisti* nov.sp.: M. COSSMANN & A. PEYROT, pp. 287-288, pl. 7, figs 44-45.

MATERIAL: Twenty specimens.

DIMENSIONS: The largest specimen is 5.8 mm high and 1.9 mm wide.

REMARKS: These specimens are quite different from all hitherto reported forms of the genus *Bittium* occurring at Korytnica (see BAŁUK 1975). In general, they agree with those described by COSSMANN & PEYROT (1922) from the Miocene of the Aquitaine Basin, albeit slightly smaller. Their small size results certainly from their being not fully grown, since the largest of the Korytnica specimens has a teleoconch about one whorl less than that of the holotype.

The species *Bittium (Bittium) benoisti* COSSMANN & PEYROT, 1922, has not been recorded previously from the Miocene of Poland.

Bittium (Bittium) sp.
(Pl. 8, Fig. 3)

MATERIAL: One specimen, preserved without a half of the last whorl.

DIMENSIONS: Height 5.5 mm, width 1.9 mm.

REMARKS: This peculiar specimen, belonging to the genus *Bittium*, differs from all Korytnica congeners in its ornamentation composed of tiny prickly tubercles arranged in spiral and axial rows, instead of a pattern of two criss-crossed ribs. Having one specimen only, lacking the base of the last whorl, the present author cannot decide whether this is an anomalous specimen of *Bittium reticulatum* DA COSTA with extremely weakly developed ornamentation, or a representative of a separate, possibly new, species.

Subgenus *Semibittium* COSSMANN, 1896
Bittium (Semibittium) multiliratum BRUSINA, 1877
(Pl. 8, Fig. 4)

1877. *Bittium multiliratum* BRUSINA; S. BRUSINA, pp. 380-382.

1975. *Bittium (Semibittium) multiliratum* BRUSINA; W. BAŁUK, pp. 141-142, pl. 16, figs 8-9, (*cum synonym.*).

NEW MATERIAL: Thirty specimens.

DIMENSIONS: The largest specimen (Pl. 8, Fig. 4) is 7.5 mm high and 2.2 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1975), but are generally larger.

Family Cerithiopsidae H. & A. ADAMS, 1854
Genus *Cerithiopsis* FORBES & HANLEY, 1849
Subgenus *Cerithiopsis* FORBES & HANLEY, 1849
Cerithiopsis (Cerithiopsis) elsae BOETTGER, 1901
(Pl. 9, Fig. 4)

partim 1975. *Cerithiopsis (Cerithiopsis) elsae* BOETTGER; W. BAŁUK, pp. 156-157, pl. 19, figs 6-7 [*non* Fig. 8] (*cum synonym.*).

NEW MATERIAL: Four specimens.

DIMENSIONS: The largest specimen is 4.9 mm high and 1.5 mm wide.

REMARKS: One of the previously described specimens (BAŁUK 1975, pl. 19, fig. 8) was classified incorrectly. It bears three spiral ribs at the beginning of the teleoconch, a feature typical of another species, *Cerithiopsis (Cerithiopsis) tubercularis* (MONTAGU), with which it is evidently conspecific. To illustrate the species *Cerithiopsis (Cerithiopsis) elsae* BOETTGER, a larger, almost completely preserved specimen, albeit lacking the initial whorls of the protoconch, is shown herein.

*Cerithiopsis (Cerithiopsis) johanna*e BOETTGER, 1901
(Pl. 9, Fig. 3)

1901. *Cerithiopsis johanna*e n.sp.; O. BOETTGER, p. 127.

1907. *Cerithiopsis johanna*e BTTR.; O. BOETTGER, p. 146.

1934. *Cerithiopsis johanna*e BOETTGER; A. ZILCH, p. 222, pl. 8, fig. 36.

non 1975. *Cerithiopsis (Cerithiopsis) aff. johanna*e BOETTGER; W. BAŁUK, p. 158, pl. 19, fig. 13

MATERIAL: Two specimens.

DIMENSIONS: The larger specimen (Pl. 9, Fig. 3), preserved without its apical whorls, is 5.2 mm high and 2.1 mm wide.

REMARKS: The new specimens approximate to those described by BOETTGER (1901) from Kostej in Transyl-

vania. The smaller specimen bears 18 axial ribs on the last whorl, the same as the number given by BOETTGER (1901), while the larger specimen (see Pl. 9, Fig. 3) bears as many as 20. This is due either to the width of the larger specimen being larger than the maximum width noted by BOETTGER (2 mm), or to the still unrecognized range of intraspecific variability.

The present author previously illustrated (BAŁUK 1975), under the name "*Cerithiopsis (Cerithiopsis) aff. johannae* BOETTGER", some specimens from Korytnica that clearly differ from that species in the slenderness of their shell. It is now apparent that these specimens should be classified as *Cerithiopsis (Cerithiopsis) opaca* BOETTGER, 1901, described below.

Cerithiopsis (Cerithiopsis) opaca BOETTGER, 1901
(Pl. 9, Figs 1-2)

1901. *Cerithiopsis opaca* n.sp.; O. BOETTGER, p. 129.
1907. *Cerithiopsis opaca* BTTR.; O. BOETTGER, p. 146.
1934. *Cerithiopsis opaca* BOETTGER; A. ZILCH, p. 222, pl. 8, fig. 39.
1975. *Cerithiopsis (Cerithiopsis) aff. johannae* BOETTGER; W. BAŁUK, p. 158, pl. 19, fig. 13.

MATERIAL: Twelve specimens.

DIMENSIONS: The largest specimen (Pl. 9, Fig. 2) is 7.5 mm high and 2.1 mm wide.

REMARKS: The specimens agree with those described by BOETTGER (1901) from Kosteĵ in Transylvania. Two of them are better grown, with one or two additional whorls, and bear 19 or 21 axial ribs on the last whorl, and their fourth basal spiral stria (*circumbasali*, according to BOETTGER) is also sculptured by tubercles, numbering the same as those on the remaining striae.

Assigned to this species are two other specimens from Korytnica referred incorrectly (BAŁUK 1975) to as *Cerithiopsis (Cerithiopsis) aff. johannae* BOETTGER.

The species *Cerithiopsis (Cerithiopsis) opaca* BOETTGER, 1901, has not been recorded previously from the Miocene of Poland.

Subgenus *Cerithiopsida* BARTSCH, 1911
Cerithiopsis (Cerithiopsida) irmae BOETTGER, 1901
(Pl. 9, Figs 6-7)

1975. *Cerithiopsis (Cerithiopsida) irmae* BOETTGER; W. BAŁUK, p. 159, pl. 19, figs 9-11 (*cum synonym.*).

MATERIAL: Two specimens.

DIMENSIONS: The larger specimen, preserved as 10 adult whorls (Pl. 9, Fig. 7), is 5.5 mm high and 1.4 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1975) but are more fully grown. The larger one (see Pl. 9, Fig. 7) is estimated as being 7 mm high, and thus surpasses the topotypic specimens from Kosteĵ in Transylvania, which attain 4.5-5.0 mm (see BOETTGER 1901, p. 126).

Subgenus *Dizoniopsis* SACCO, 1895
Cerithiopsis (Dizoniopsis) bilineata HÖRNES, 1856
(Pl. 9, Figs 8-9)

1901. *Cerithiopsis (Dizoniopsis) ventricosa* BRUS. typ.; O. BOETTGER, pp. 130-131.
1975. *Cerithiopsis (Dizoniopsis) bilineata* HÖRNES; W. BAŁUK, pp. 161-162, pl. 19, fig. 21 (*cum synonym. sed excl. signa interrogationes*).

NEW MATERIAL: Six specimens.

DIMENSIONS: The largest specimen (Pl. 9, Fig. 8) is 6.1 mm high and 1.6 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1975); one specimen is distinctly higher (1.5 mm), and larger than any from Kosteĵ. Such variability in size shows that the species diversity is greater than stated previously (BAŁUK 1975).

Subgenus *Metaxia* MONTEROSATO, 1884
Cerithiopsis (Metaxia) subsoluta BOETTGER, 1907
(Pl. 9, Figs 10-13)

1907. *Cerithiopsis (Metaxia) subsoluta* n.sp.; O. BOETTGER, pp. 148-149.
1934. *Cerithiopsis (Metaxia) subsoluta* BOETTGER; A. ZILCH, p. 224, pl. 9, fig. 51.

MATERIAL: Thirty-five specimens.

DIMENSIONS: The largest specimen, preserved as 8 adult whorls, including the aperture (Pl. 9, Fig. 11), is 7.8 mm high and 2.0 mm wide; another one (Pl. 9, Fig. 12) is 2.6 mm wide.

REMARKS: These specimens are clearly conspecific with those described by BOETTGER (1907) from Kosteĵ in Transylvania. At Korytnica, they are more numerous than in the type locality (2 specimens found at Kosteĵ),

and they display higher morphological variability.

The protoconch is composed of *ca* 2.5 whorls, the last one of which is wider than the penultimate one, and it is ornamented by densely spaced, weak axial riblets. The strongly ornamented teleoconch bears 10-11 axial and 8-9 spiral ribs on the last whorl (according to BOETTGER, 11 and 9 respectively). One of the specimens studied (Pl. 9, Fig. 13) bears 14 axial ribs on the last whorl; this higher rib density may possibly be indicative of a separate taxon.

The species *Cerithiopsis (Metaxia) subsoluta* BOETTGER, 1907, has not been recorded previously from the Miocene of Poland.

Cerithiopsis sp. an *Cerithiopsis (Metaxia) norae*
BOETTGER, 1901
(Pl. 9, Fig. 5)

MATERIAL: Seven specimens.

DIMENSIONS: The largest specimen, preserved as the last whorl of the protoconch and 10 whorls of the teleoconch (Pl. 9, Fig. 5), is 4.3 mm high and 1.1 mm wide.

REMARKS: These specimens differ clearly from all congeners known from Korytnica (see BALUK 1975). It is suggested herein that they can be assigned to the species *Cerithiopsis (Metaxia) norae* BOETTGER, 1901, described from Kosteĵ in Transylvania (see ZILCH 1934, p. 224, pl. 9, fig. 50). In this species, according to BOETTGER, the median spiral riblet is conspicuous, forming a kind of ridge. The specimens from Korytnica do not display such a feature. The lectotype from Kosteĵ is a more fully grown specimen, composed of 8 whorls. The number and shape of the axial ribs are broadly similar; the largest of the Korytnica specimens bears 12 axial ribs, whereas those from Kosteĵ bear 13-15. At Kosteĵ, according to BOETTGER (1901, pp. 131-132), there is a similar species, *Cerithiopsis (Metaxia) angustissima* FORBES, in which the median spiral rib is obsolete, and there are 19-20 axial ribs. In this context, the Korytnica specimens remain in open taxonomy.

Neither of the species discussed has been recorded previously from the Miocene of Poland.

Genus *Ataxocerithium* TATE, 1893
Ataxocerithium christinae (BOETTGER, 1901)
(Pl. 9, Fig. 16)

1975. ?*Cerithiella christinae* BOETTGER; W. BALUK, pp. 164-165, pl. 19, fig. 25 (*cum synonym.*).

1997. *Ataxocerithium christinae* (BOETTGER); R. MARQUET, pp. 29-31, fig. 1.

NEW MATERIAL: One specimen.

DIMENSIONS: Width 3.0 mm.

REMARKS: The new specimen, preserved as three adult whorls, agrees perfectly with those described by BOETTGER (1901, 1907), although it is assumed that the first report of 13 axial ribs on the last whorl (BOETTGER 1901) is correct, and not the second one of 9 ribs on the larger specimen (BOETTGER 1907). The Korytnica specimen is even more fully grown, with 15 axial ribs.

A more complete specimen with a partly preserved protoconch of whorls with axial ribs, illustrated previously (BALUK 1975, pl. 19, fig. 25), was classified (as with ?*Cerithiella kostejana*, discussed below) as belonging possibly to the genus *Cerithiella* VERILL, 1882. MARQUET (1997), when studying the species under discussion from the Miocene of Belgium, recognized that his specimens were conspecific with those from Korytnica, and accommodated them in the genus *Ataxocerithium* TATE, 1893; this generic assignment is accepted herein.

Ataxocerithium kostejanum (BOETTGER, 1901)
(Pl. 9, Figs 14-15)

1975. ?*Cerithiella kostejana* BOETTGER; W. BALUK, pp. 165-166, pl. 19, figs 26-27 (*cum synonym.*).

NEW MATERIAL: Ten specimens.

DIMENSIONS: The width of the largest specimen (Pl. 9, Fig. 14), preserved as 9 initial whorls of the teleoconch, is 3.4 mm.

REMARKS: The new specimens agree with those described previously (BALUK 1975), but are more fully grown. All are incompletely preserved, lacking the protoconch. The only individual having the last whorl of the protoconch with its axial ribbing preserved is the one illustrated previously (BALUK 1975, pl. 19, fig. 27). All specimens of this species come exclusively from oyster shell-beds exposed at Mt. Łysa, where they are not so uncommon as formerly reported.

Family Triphoridae GRAY, 1847
Genus *Triphora* DE BLAINVILLE, 1828
Triphora aequalirata (BOETTGER, 1901)
(Pl. 8, Figs 12-15)

1901. *Triforis aequalirata* n.sp.; O. BOETTGER, p. 124.

1907. *Triforas aequalirata* BOETTGER; O. BOETTGER, p. 144.

1934. *Triforis aequalirata* BOETTGER; A. ZILCH, p. 226, pl. 9, fig. 59.

MATERIAL: Twenty-five specimens.

DIMENSIONS: The largest specimen (Pl. 8, Fig. 13), lacking the early whorls, is 10.6 mm high and 2.8 mm wide.

REMARKS: The specimens agree with those described by BOETTGER (1901, 1907) from Kosteĵ in Transylvania. In his second description, BOETTGER (1907) noted that particularly this species very often displayed striking growth anomalies. Such an anomaly is shown by eight out of 25 specimens from Korytnica (for two of these see Pl. 8, Figs 14-15). The anomalies appear just after damage to the distal whorls. They are absent from the early whorls, both of this species, as well as of all other species of the genus *Triphora* from Kosteĵ and Korytnica.

The species *Triphora aequalirata* (BOETTGER, 1901) has not been recorded previously from the Miocene of Poland.

Family Scalidae BRODERIP, 1839

Genus *Scala* KLEIN, 1753

Subgenus *Clathrus* OKEN, 1815

Scala (Clathrus) expectata (DE BOURY, 1913)
(Pl. 10, Fig. 2)

1922. *Circuloscala expectata* DE BOURY; M. COSSMANN & A. PEYROT; pp. 142-143, pl. 4, figs 53-54.

MATERIAL: Two specimens.

DIMENSIONS: The larger specimen (Pl. 10, Fig. 2) is 4.5 mm high and 2.7 mm wide.

REMARKS: These specimens differ clearly from all other representatives of the family Scalidae, so far recognized at Korytnica, in their apical angle attaining about 45°. They are seemingly conspecific with those described by COSSMANN & PEYROT (1922) under the name "*Circuloscala expectata* DE BOURY" from Saint-Aviz in the Aquitaine Basin, France. This is apparent from the identity in size, apical angle, number of axial ribs, and the sculpture between ribs on the shell surface.

The species *Scala (Clathrus) expectata* (DE BOURY, 1913) has not been recorded previously from the Miocene of Poland.

Scala (Clathrus) kunstleri (DE BOURY in COSSMANN, 1912)
(Pl. 10, Fig. 3)

1912. *Fuscoscala Kunstleri* DE BOURY; E. DE BOURY in M. COSSMANN, pp. 174-175, pl. 2, figs 7-8.

1922. *Fuscoscala Kunstleri* DE BOURY; M. COSSMANN & A. PEYROT, p. 100, pl. 3, fig. 80.

MATERIAL: One specimen.

DIMENSIONS: Height 6.4 mm, width 2.5 mm.

REMARKS: The specimen, preserved as *ca* 5.5 median whorls (without apex and aperture), appears to be conspecific with those described by DE BOURY from the Miocene of Saucats in the Aquitaine Basin, France. The Korytnica specimen bears 8 lamellary riblets, lacking any spines, and the riblet interareas are densely covered by very indistinct spiral striations. It is similar to *Scala (Clathrus) parilis* (DE BOURY in COSSMANN), in the number of riblets, but differs in being more slender, with furrows between the riblets.

The species *Scala (Clathrus) kunstleri* (DE BOURY in COSSMANN, 1912) has not been recorded previously from the Miocene of Poland.

Scala (Clathrus) parilis (DE BOURY in COSSMANN, 1912)
(Pl. 10, Fig. 4)

1975. *Scala (Clathrus) parilis* (DE BOURY in COSSMANN); W. BAŁUK, pp. 173-174, pl. 20, fig. 13 (*cum synonym.*).

1982. *Scala (Clathrus)* cfr. *parilis* (BOURY in COSSMANN); J. ŠVAGROVSKÝ, p. 29, pl. 9, fig. 6.

NEW MATERIAL: Twenty-six specimens.

DIMENSIONS: The largest specimen, preserved without the first whorl of the protoconch (Pl. 10, Fig. 4), is 7.2 mm high and 3.4 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1975), but some are more fully grown, more complete, and much better preserved.

Scala (Clathrus) sp.
(Pl. 10, Fig. 5)

MATERIAL: One specimen, preserved without early whorls.

DIMENSIONS: Height *ca* 7 mm, width 2.5 mm.

REMARKS: The specimen differs from all congeneric

forms recognized at Korytnica in its ornamentation of lamellar axial ribs (numbering 16 on the last whorl), the majority of which bear very short spiny processes. It is certainly close to *Scala* (*Clathrus*) *kostejana* (BOETTGER), the shells of which bear a smaller number of axial ribs that lack spiny processes. The taxonomic status of the latter species is, however, unclear (cf. BAŁUK 1975, p. 172).

Genus *Acirsa* MÖRCH, 1857

Subgenus *Hemiacirsa* DE BOURY, 1890

Acirsa (*Hemiacirsa*) *oscari* DE BOURY in COSSMANN, 1912
(Pl. 10, Fig. 11)

1856. *Scaloria lanceolata* BROCC; M. HÖRNES, pp. 481-482, pl. 46, fig. 14.
partim 1901. *Clathroscala* (*Hemiacirsa*) *lanceolata* (BROCC.); O. BOETTGER, p. 88.
partim 1906. *Clathroscala* (*Hemiacirsa*) *lanceolata* (BROCC.); O. BOETTGER, p. 98.
partim 1906. *Clathroscala* (*Hemiacirsa*) *prolanceolata* SACCO; O. BOETTGER, p. 98.
 1912. *Hemiacirsa Oscari* DE BOURY; E. DE BOURY in M. COSSMANN, pp. 196-197, pl. 6, fig. 10.
 1934. *Acirsa* (*Hemiacirsa*) *osacari* DE BOURY; A. ZILCH, p. 227, pl. 10, fig. 65.
 ?1956. *Acirsa* (*Hemiacirsa*) aff. *lanceolata* BROCCHI; CSEPREGHY-MEZNERICS, p. 389, pl. 3, figs 36-37.
 ?1966. *Acirsa* (*Hemiacirsa*) aff. *lanceolata* BROCCHI; L. STRAUZ, p. 180, pl. 1, figs 41-42.

MATERIAL: One specimen, preserved as 7 teleoconch whorls (in the private collection of Mr. M. BUDZIASZEK).

DIMENSIONS: Height 18.2 mm (estimate of *ca* 21-22 mm), width 6.1 mm.

REMARKS: This specimen seems to be conspecific with a specimen from Baden in the Vienna Basin, described by HÖRNES (1856), as well as with some of those from Kostej in Transylvania, recorded by BOETTGER (1901, 1906), all of which were classified as *Turbo lanceolatus* BROCCHI. Such an assignment is evidently erroneous, as the holotype of BROCCHI's species, illustrated by PINNA & SPEZIA (1978, pl. 60, fig. 3) is quite different. This error was earlier evident to DE BOURY (1912), who established a separate species, *Hemiacirsa oscari* DE BOURY. The Korytnica specimen, more fully grown than the holotype from Kostej, and of the same size as the Baden specimen, differs from these in having slightly more densely spaced axial ribs, numbering 19 plus 2 varices on the last whorl. The species is

rare everywhere in the Miocene of Europe, and its variability is therefore still difficult to ascertain.

The conspecificity of the Korytnica specimen with a specimen from Szob in Hungary, illustrated by CSEPREGHY-MEZNERICS (1956) and STRAUZ (1966), is doubted; it seems to be generally markedly more slender.

The species *Acirsa* (*Hemiacirsa*) *oscari* DE BOURY, 1912, has not been recorded previously from the Miocene of Poland.

Genus *Acrilla* H. ADAMS, 1860

Acrilla interposita SACCO, 1891

(Pl. 10, Fig. 7)

1891. *Acrilla interposita* SACC.; F. SACCO, p. 66, pl. 2, fig. 63.
 1975. *Acrilla* (*Acrilla*) *orientalis* (FRIEDBERG); W. BAŁUK, pp. 176-177, pl. 21, figs 1-3 (*cum synonym.*).
 1984. *Acrilla interposita* SACCO; E. FERRERO MORTARA & *al.*, p. 50, pl. 6, fig. 10.

NEW MATERIAL: Five specimens.

DIMENSIONS: The largest specimen, preserved without the protoconch and outer lip (Pl. 10, Fig. 7), is 10.5 mm high and 4.4 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1975) under the name "*Acrilla* (*Acrilla*) *orientalis* (FRIEDBERG)". The specimen illustrated (Pl. 10, Fig. 7) appears to be the largest ever found at Korytnica.

As a result of photographic documentation of the holotypes of species established by SACCO, the present author is aware that the species *Scala orientalis* FRIEDBERG, 1928, is conspecific with *Acrilla interposita* SACCO, 1891, which name is used herein for the Korytnica specimens studied.

Acrilla subreticulata (D'ORBIGNY, 1852)

(Pl. 10, Fig. 6)

1969. *Scala* (*Acrilla*) *amoena subreticulata* D'ORB.; I. CSEPREGHY-MEZNERICS, p. 22, pl. 4, fig. 3.
 1975. *Acrilla* (*Acrilla*) *subreticulata* (D'ORBIGNY); W. BAŁUK, pp. 175-176, pl. 21, figs 5-7 (*cum synonym.*).

NEW MATERIAL: Five specimens.

DIMENSIONS: The largest specimen (Pl. 10, Fig. 6) is 50 mm high and 14.5 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1975) but are better preserved; the largest (Pl. 10, Fig. 6) is almost complete.

Genus *Opalia* H.&A. ADAMS, 1853
 Subgenus *Pliciscala* DE BOURY, 1887
Opalia (Pliciscala) scacchii (HÖRNES, 1856)
 (Pl. 10, Figs 8-10)

1856. *Scalaria Scacchii* HÖRN.; M. HÖRNES, pp. 479-480, pl. 46, fig. 12.
 1901. *Pliciscala (Nodiscala) sacchii* (M. HÖ.); O. BOETTGER, pp. 86-87, no. 272.
 1912. *Nodiscala rugatina* DE BOURY; E. DE BOURY in M. COSSMANN, pp. 193-194, pl. 5, figs 23, 25.
 1912. *Nodiscala angulipunctata* DE BOURY nov.sp.; E. DE BOURY in M. COSSMANN, p. 191, pl. 6, fig. 20.
 1975. *Opalia (Pliciscala) scacchii* (HÖRNES, 1856); W. BAŁUK, pp. 179-180, pl. 21, fig. 13 (*cum synonym.*).

NEW MATERIAL: Eighty-five specimens.

DIMENSIONS: The largest specimen, preserved without the protoconch (Pl. 10, Fig. 8), is 9.0 mm high and 3.2 mm wide; another one, with the protoconch preserved (Pl. 10, Fig. 9), is 8.2 mm high and 2.9 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1975), but include some larger, fully grown individuals. All were found exclusively in oyster shell-beds exposed at Mt. Łysa, where they appear to be not uncommon.

Among the forms referred so far to *O. (P.) sacchii*, the specimens from Korytnica are the closest to forms from Kosteĵ, Romania, described by BOETTGER (1901). Although DE BOURY (in COSSMANN 1912) referred, subsequently, the BOETTGER's material to a new species, *Nodiscala rugatina*, the Romanian specimens are undoubtedly conspecific with the type material of the HÖRNES' species. Consequently, *N. rugatina* should be put into synonymy of *O. (P.) sacchii*.

Some Korytnica specimens bear on the last whorl two rounded, spiral margins, the upper (posterior) one of which is usually adorned with inconspicuous nodes. Such specimens from Kosteĵ in Transylvania were distinguished by DE BOURY (in COSSMANN 1912) as a separate, new species, *Nodiscala angulipunctata*, which should also be regarded as falling within the variability of HÖRNES' species. In view of the above-discussed species variability, the separateness of the closely related species *Opalia (Pliciscala) bimonilifera* (BOETTGER, 1901), known from Kosteĵ, as well as from

Korytnica (see BAŁUK 1975, pl. 21, fig. 4), is open to question

Family Fossaridae
 Genus *Megalomphalus* BRUSINA, 1871
Megalomphalus palazzii nom.nov.

1907. *Narica depressa* n.sp.; O. BOETTGER, p. 175.
 1934. *Vanicaro depressa* (BOETTGER); A. ZILCH, p. 247, pl. 13, fig. 60.
 1995. *Megalomphalus depressus* (BOETTGER); W. BAŁUK, p. 169, pl. 5, fig. 7.

LECTOTYPE: The specimen from Kosteĵ in Transylvania, figured by ZILCH (1934, pl. 13, fig. 60).

DERIVATION OF NAME: *palazzii* – to honour Dr. Stefano PALAZZI, of Modena, a prominent student of Miocene and Mediterranean faunas.

MATERIAL: Two specimens, one of which was described previously (BAŁUK 1995, pl. 5, fig. 7).

REMARKS: As kindly indicated by Dr. S. PALAZZI, of Modena (personal communication), the species name *Megalomphalus depressus* (BOETTGER, 1907), used previously by the present author (BAŁUK 1995), is preoccupied by *Megalomphalus depressus* (SEGUENZA, 1876), which clearly has priority. Consequently, BOETTGER's name, being a junior homonym, must be substituted by a new one, proposed herein as *Megalomphalus palazzii* nom.nov.

Genus *Couthouyia* A. ADAMS, 1860
 Subgenus *Micreschara* COSSMANN, 1888
Couthouyia (Micreschara) roberti (DE MORGAN, 1915)
 (Pl. 10, Fig. 1)

1915. *Escharella Roberti* n.sp.; J. DE MORGAN, pp. 229-230, text-fig. 12.

MATERIAL: One specimen.

DIMENSIONS: Height 1.9 mm, width 1.4 mm.

REMARKS: The specimen agrees with that described by DE MORGAN (1915) from the Miocene near Pontlevoy in the Loire Basin, France, albeit the inner lip is partly crushed, which makes the umbilicus appear slightly narrower.

The species *Couthouyia (Micreschara) roberti* (DE

MORGAN, 1915) has not been recorded previously from the Miocene of Poland.

Family Hipponicidae
Genus *Hipponix* DEFRANCE, 1819
Subgenus *Sabia* GRAY, 1847
Hipponix (Sabia) phlepsi BOETTGER, 1896
(Pl. 7, Figs 9-10)

1901. *Hipponyx (Amalthea) phlepsi* BTGR.; O. BOETTGER, p. 160.
1907. *Hipponyx (Amalthea) phlepsi* BTGR.; O. BOETTGER, p. 173.
1934. *Amalthea phlepsi* (BOETTGER); A. ZILCH, pp. 247-248, pl. 13, fig. 63.
1960. *Amalthea phlepsi* (BOETTGER); E. KOJUMDIEVA, p. 124, pl. 34, figs 3-4, 6.

MATERIAL: Two specimens.

DIMENSIONS: The larger specimen (Pl. 7, Fig. 9) is 4.2 mm long, 3.6 mm wide, and 1.6 mm high.

REMARKS: The two specimens, of extreme rarity at Korytnica, agree with those occurring commonly in the Miocene of Transylvania, described by BOETTGER (1896, 1901, 1907), and of Bulgaria, as reported by KOJUMDIEVA (1960).

The species *Hipponix (Sabia) phlepsi* BOETTGER, 1896, has not been recorded previously from the Miocene of Poland

Family Cypraeidae GRAY, 1824
Genus *Apiocypraea* SCHILDER, 1927
Apiocypraea amygdalum (BROCCHI, 1814)

1955. *Zonarina (Zonarina) amygdalum* (BROCCHI); C. ROSSI RONCHETTI, pp. 162-163, fig. 83.
1995. *Apiocypraea subamygdalum* (D'ORBIGNY); W. BALUK, p. 187, pl. 11, fig. 4 (cum synonym.).
1995. *Apiocypraea voeslauensis* (SACCO); W. BALUK, p. 188, pl. 11, figs 2-3 (cum synonym.).

REMARKS: The present author previously distinguished at Korytnica two similarly shaped species (see: *synonymy*) with almost identical shell parameters (BALUK 1995, figs 1-2). After a re-examination of the collection, it seems reasonable to classify the whole material studied as representing one species only, *Apiocypraea amygdalum* (BROCCHI, 1814), the holotype of which, as studied by ROSSI RONCHETTI (1955), has its parameters falling into the cen-

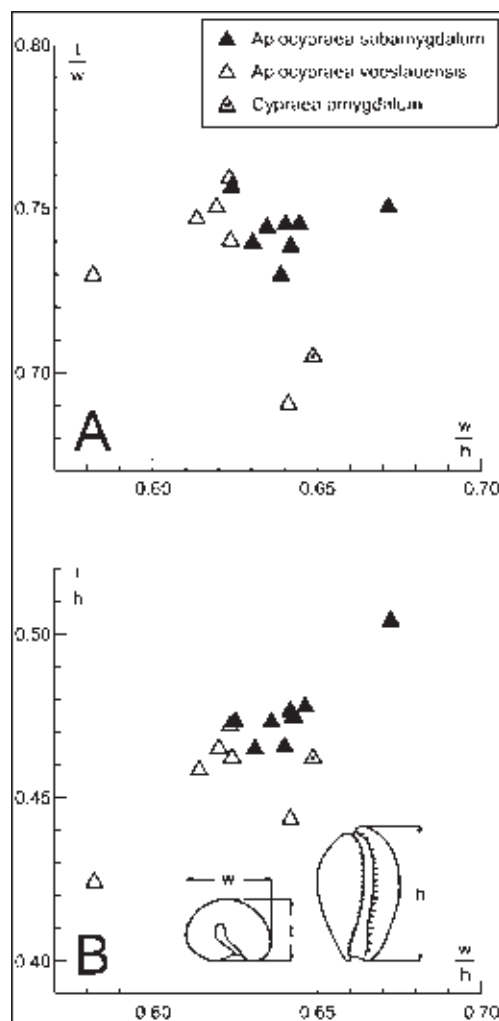


Fig. 4. The t/w versus w/h ratio (A) and the t/h versus w/h ratio (B) of shells of *Apiocypraea amygdalum* (BROCCHI) collected from the Korytnica Clays [formerly described (BALUK 1995, pp. 182-183) as *A. subamygdalum* and *A. voeslauensis*] and of the holotype of the species (dimensions according ROSSI RONCHETTI 1955, p. 162)

tre of the variability range of the Korytnica specimens (see Text-fig. 4). The species *Apiocypraea amygdalum* (BROCCHI) thus appears to be highly variable, particularly in respect of its overall shape and development of the limbus.

Apiocypraea amygdalum (BROCCHI, 1814) was reported from Korytnica by PUSCH (1837), HÖRNES (1856), and KOWALEWSKI (1930), but never illustrated. The specimens illustrated and described under this name by FRIEDBERG (1912, pl. 8, figs 6-7) do not belong to this species but, as indicated earlier (BALUK 1995, pp. 186-187), to *Monetaria brocchii* (DESHAYES, 1844).

Family Naticidae FORBES, 1838
Genus *Natica* SCOPOLI, 1777

Natica tigrina RÖDING, 1798
(Pl. 3, Fig. 6)

1995. *Natica tigrina* RÖDING; W. BAŁUK, pp. 194-195, pl. 15, figs 10-14 (*cum synonym.*).

REMARKS: The present author had the pleasure of seeing specimens in the private collection of Przemysław DEGÓRSKI, M.Sc., of Gniezno, a student of Moon Snails modern and ancient. One of these, illustrated herein (Pl. 3, Fig. 6) bears a colour pattern unknown in the specimens so far studied from Korytnica. It is close to specimens of *Natica tigrina* RÖDING, 1798, illustrated previously (BAŁUK 1995, pl. 15, figs 11 and 13). The colour pattern consists of regularly distributed large yellowish spots, separated from one another by a distance slightly less than the spot diameter. The spots are markedly larger than those reported in this species from the Neogene of Italy by SACCO (1891, pl. 2, figs 17-18) and ABATINO & BARBERA-LAMAGNA (1972, fig. 1A).

SACCO (1891) considered that the preserved colour pattern could be used to distinguish some varieties in the species *Natica millepunctata* LAMARCK, 1822. According to newer data by ABATINO & BARBERA-LAMAGNA (1972, fig. 3A-D), the diversity of colour pattern in this species is much wider. At Korytnica, in a very large assemblage, numbering over 3,000 specimens (see BAŁUK 1995, p. 194), the coloured specimens are extremely rare (less than 1%). Consequently, colour patterns are of no or insignificant taxonomic value.

Genus *Nacca* RISSO, 1826
Nacca unica BAŁUK, 1995
(Pl. 3, Figs 8-9)

1995. *Nacca unica* sp.n.; W. BAŁUK, pp. 195-196, pl. 15, fig. 9.

NEW MATERIAL: Two specimens (in the private collection of Mr. P. DEGÓRSKI, M.Sc.).

DIMENSIONS: Larger specimen (Pl. 3, Fig. 9) is 22.5 mm high and 22 mm wide.

REMARKS: The new specimens agree with the specimen described previously by the present author (BAŁUK 1995) as a separate species, *Nacca unica*, based solely on the holotype. The larger specimen (Pl. 3, Fig. 9) is almost half the size of the holotype, the other features being identical. The smaller one bears a more pronounced inner lip, which thus encroaches more distinctly upon the umbilicus.

Genus *Polinices* MONTFORT, 1810
Polinices pseudoredemptus (FRIEDBERG, 1923)
(Pl. 3, Fig. 7)

1995. *Polinices pseudoredemptus* (FRIEDBERG); W. BAŁUK, pp. 197-198, pl. 15, fig. 6 (*cum synonym.*).

NEW MATERIAL: One specimen (in the private collection of Mr. P. DEGÓRSKI, M.Sc.).

DIMENSIONS: Height 20 mm, width 15.5 mm.

REMARKS: All the previously described specimens (BAŁUK 1995) were collected at the site "No. 1" of Korytnica (see RADWAŃSKI 1969, p. 88, fig. 31), which is typified by a peculiar molluscan assemblage (see BAŁUK & RADWAŃSKI 1977, pp. 93-94), with poorly preserved shells. The illustrated specimen (Pl. 3, Fig. 7) comes from the main area where the Korytnica Clays are exposed. It differs in being well preserved, like the the majority of the Korytnica gastropods, and in the more pronounced callosity, which fills the umbilicus almost completely.

Family Muricidae FLEMING, 1828
Genus *Murex* LINNAEUS, 1758
Subgenus *Bolinus* PUSCH, 1837
Murex (Bolinus) partschi HÖRNES, 1856
(Pl. 11, Figs 3-4)

1995. *Murex (Bolinus) partschi* HÖRNES; W. BAŁUK, pp. 211-212, pl. 24, figs 5-7 (*cum synonym.*).

NEW MATERIAL: Two specimens [in the private collections of Mr. J. GUBAŁA, of Kielce (Pl. 11, Fig. 3), and of Mr. M. BUDZIASZEK (Pl. 11, Fig. 4)].

DIMENSIONS: The larger specimen (Pl. 11, Fig. 4) is 52.5 mm high and 30.5 mm wide.

REMARKS: The two specimens agree with those illustrated previously (BAŁUK 1995), but are of larger size, and better preserved. The larger one (see Pl. 11, Fig. 4) has a part of its siphonal canal broken-off (when complete it was ca 60 mm high). Nevertheless, it is fully grown, having its spire half a whorl longer than that of the specimen from Baden in the Vienna Basin (see HÖRNES 1856, pl. 26, fig. 5), which is regarded as the holotype of the species.

Subgenus *Tubicauda* JOUSSEAUME, 1880
Murex (Tubicauda) spinicosta BRONN, 1831
(Pl. 11, Figs 1-2)

1995. *Murex (Tubicauda) spinicosta* BRONN; W. BAŁUK, p. 213, pl. 22, figs 1-2 (*cum synonym.*)
 1998. *Murex (Bolinus) spinicostus* BRONN; O. SCHULTZ, p. 64, pl. 25, fig. 4.
 2000. *Murex spinicosta* BRONN; C. CHIRLI, p. 3, pl. 1, figs 1-6.

NEW MATERIAL: Two specimens (in the private collection of Mr. M. BUDZIASZEK).

DIMENSIONS: The larger specimen (Pl. 11, Fig. 2) is 63 mm high and 33 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1995), but are larger and better preserved, albeit displaying a slightly variable overall shape. The teleoconch of the larger specimen is composed of 7 whorls (some 2/3 longer than the smaller one), although its last whorl is less inflated; with less pronounced prickles, particularly on the siphonal canal.

Genus *Pterynotus* SWAINSON, 1833

Subgenus *Pterynotus* SWAINSON, 1833

Pterynotus (Pterynotus) tortuosus (J. SOWERBY, 1823)
 (Pl. 11, Fig. 6)

1853. *Mur. affinis* m.; E. EICHWALD, pp. 189-190, pl. 8, fig. 10.
 1856. *Murex tortuosus* SOW.; M. HÖRNES, pp. 249-250, pl. 25, fig. 12.
 1912. *Murex tortuosus* SOW.; W. FRIEDBERG, pp. 164-166, pl. 10, figs 1-2.

MATERIAL: One specimen in the Collection of the Museum of the Geological Survey of Poland, Warsaw (Catalogue No. 27.II. 60).

DIMENSIONS: Height 26 mm, width 13.2 mm.

REMARKS: This unique specimen in the Collection of the Geological Survey of Poland was personally labelled by K. KOWALEWSKI as "*Tritonium tarbelianum* GRAT.", which is clearly incorrect. The specimen is not fully grown; it has weakly developed varices and lacks prickles at the junction of varices and the margin. The number of longitudinal riblets situated between the varices is four, instead of 2-3 as usually noted, although 4 was mentioned by FRIEDBERG (1912, pl. 10, fig. 1), when describing the specimen from Podhorce, now in Ukraine.

The specimen displays a slight similarity to those from the Vienna Basin determined as *Pterynotus trinodosus* (BELLARDI) by HOERNES & AUINGER (1885, pl. 29, figs 5-7). The Korytnica specimen differs, however, in having a margin of the whorls, and in a differently shaped aperture. Nevertheless, the juvenile nature of the specimen

studied means that it is impossible to ascertain whether its adult features would fall within the variability range of the *P. (P.) tortuosus*, or whether it would be classified as separate.

The species *Pterynotus (Pterynotus) tortuosus* (J. SOWERBY, 1823) has not been recorded previously from the Miocene of Poland.

Subgenus *Purpurellus* JOUSSEAUME, 1880

Pterynotus (Purpurellus) cyclopterus (MILLET, 1866)
 (Pl. 11, Fig. 5)

1995. *Pterynotus (Purpurellus) cyclopterus* (MILLET); W. BAŁUK, p. 216, pl. 22, figs 9-11 (*cum synonym.*)
 2000. *Pterynotus veranyi* (PAOLUCCI); C. CHIRLI, pp. 18-19, pl. 9, figs 4-10.

NEW MATERIAL: One specimen (in the private collection of Mr. W. KACZMARCZYK).

DIMENSIONS: Height 33 mm, width 18 mm.

REMARKS: The new specimen agrees with the incompletely preserved specimens illustrated previously (BAŁUK 1995), but is almost complete. Its species assignment remains unclear (see BAŁUK 1995, p. 216), as conspecific specimens from the Pliocene of Tuscany were distinguished in the same year (1866) as *Murex veranyi* PAOLUCCI, and this name has been in common use by Italian authors up to now (see CHIRLI 2000).

Genus *Homalocantha* MÖRCH, 1852

**Homalocantha heptagonata* (BRONN, 1831)
 (Pl. 11, Fig. 7)

1995. *Homalocantha heptagonata* (BRONN); W. BAŁUK, pp. 216-217, pl. 22, figs 3-5 (*cum synonym.*)
 1998. *Aspella (Favartia) heptagonata* (BRONN); O. SCHULTZ, p. 66, pl. 26, fig. 7.

NEW MATERIAL: One specimen (in the private collection of Mr. P. CZECH).

DIMENSIONS: Height 55.5 mm, width 32 mm.

REMARKS: The new specimen agrees with those illustrated previously (BAŁUK 1995), but is more fully grown, and better preserved. It seems to be the largest ever collected in Miocene sequences of the Paratethys. The spines on particular varices of the Korytnica specimens

tend to be slightly less pronounced than in the fully grown Viennese forms; however, the spines on the siphonal canal are better developed.

Genus *Morula* SCHUMACHER, 1817

Morula valdemari sp.nov.

(Pl. 12, Figs 1-2)

1995. *Morula* sp.; W. BAŁUK, p. 221, pl. 29, fig. 8; pl. 30, figs 3-4; ?pl. 29, fig. 7.

HOLOTYPE: The specimen (Z.PAL.U.W., No. BkK-G1227) illustrated in Pl. 12, Fig. 1; kindly donated by Mr. Waldemar KACZMARCZYK.

TYPE HORIZON: Middle Miocene (Lower Badenian).

TYPE LOCALITY: Korytnica, 24 km SSW of Kielce, southern slopes of the Holy Cross Mountains, Central Poland.

DERIVATION OF NAME: *valdemari* – after the Christian name of the finder.

DIAGNOSIS: Teleoconch composed of about 6 whorls, with a conspicuous ridge at mid-height; ornamentation composed of axial ribs, always 6 on the last whorl, and spiral ribs (usually 3 above, and 4 or 5 below the ridge); aperture oval, with 5 node-like teeth internally.

MATERIAL: Five specimens, including the three specimens described previously (BAŁUK 1995) as *Morula* sp., and one in the private collection of Mr. J. GUBAŁA.

DIMENSIONS: The largest specimen, the holotype, is 25 mm high and 14 mm wide.

DESCRIPTION: Shell of moderate size; protoconch not preserved (in all specimens), teleoconch composed of about 6 whorls. The second and third whorls are adorned at mid-height by a conspicuous ridge that depresses on succeeding whorls. Above that ridge, the whorl slopes like a roof, but beneath it is nearly vertical. Ornamentation is conspicuous, composed of axial and spiral ribs, the former of which are slightly sloped, and correspond to sharp varices of former apertures. The early whorls bear 7 or 8 such ribs, the penultimate whorl 7 ribs, and the last whorl always 6 ribs. These ribs on the final whorls continue as far as the ridge of the preceding whorl. The spiral ribs appear on the second whorl of the teleoconch, and the most conspicuous one runs along the ridge. On the last whorl, above

the ridge, there are usually 3 more distinct spiral ribs (the median one is the thickest) and a few very thin ribs; below the ridge there are 4 or 5 thick ribs, associated with numerous secondaries and tertiaries. The spiral ribs, when crossing the pronounced growth lines, become rough, and the whole surface looks ragged. The aperture (preserved only in the holotype) is oval, and it passes into the long siphonal canal anteriorly. The outer lip is thick and broad, with numerous wavy laths, and adorned with 5 node-like teeth internally. The inner lip is quite smooth, and thick. The siphonal canal is partly open; it is closed in its anteriormost part.

REMARKS: The specimens studied are evidently concordant with the three larger ones illustrated previously (BAŁUK 1995, pl. 29, fig. 8 and pl. 30, figs 3-4). The specific assignment of the smallest of the specimens illustrated previously (BAŁUK 1995, pl. 29, fig. 7) is unclear; since it bears more numerous axial ribs (10-8, instead 8-7) on the early whorls. Although only one of the two new specimens has its aperture preserved, this indicates that the formerly postulated opinion on the similarity of Korytnica specimens to the present-day species *Morula funicululus* (WOOD, 1828) is correct. The Korytnica specimens are, however, more slender and their spire is higher at the same shell height, which justifies their treatment as separate.

Genus *Thais* RÖDING, 1798

Subgenus *Stramonita* SCHUMACHER, 1817

Thais (Stramonita) exilis PARTSCH in HÖRNES, 1856

(Pl. 12, Figs 3-6)

1995. *Thais (Stramonita) exilis* (PARTSCH in HÖRNES, 1856); W. BAŁUK, pp. 222-223, pl. 27, figs 1-4 (*cum synonym.*).

NEW MATERIAL: Seven specimens: two in the private collection of Mr. J. GUBAŁA, two in the hands of Mr. P. CZECH, and three in the hands of Mr. M. BUDZIASZEK.

DIMENSIONS: The largest specimen is 38.5 mm high and 25.5 mm wide.

REMARKS: The new specimens, concordant with those described previously (BAŁUK 1995), and evidently conspecific with those from the Vienna Basin, are characterized by their larger size and a diverse number of elongate teeth on the outer lip. One of the larger specimens (Pl. 12, Fig. 4) has 5 teeth (the posterior one being less pronounced), as in the case of the Viennese specimens. Another specimen (Pl. 12, Fig. 3) has 8 teeth (the poste-

rior one being also weaker), but the third has only 4 teeth. The slightly different overall shape of these specimens justifies the assumption (BAŁUK 1995, pp. 222-223) of two morphologic groups within the species. In the new material, four specimens belong to the then distinguished "first group" of larger and more squabby shells, and the remaining three belong to the "second group" of smaller and more slender shells.

Genus *Ocinebrina* JOUSSEAUME, 1880

Ocinebrina recognita sp.nov.

(Pl. 11, Figs 8-9)

1885. *Murex (Occenebra) Renieri* MICHTL.; R. HOERNES & M. AUINGER, pp. 225-226, pl. 27, fig. 5.

1978. *Ocenebra (Ocinebrina) renieri* (MICHELOTTI); F. STOJASPAL, p. 335.

HOLOTYPE: The specimen (Z.PAL.U.W., No. BkK-G1228), presented in Pl. 11, Fig. 8.

TYPE HORIZON: Middle Miocene (Lower Badenian).

TYPE LOCALITY: Korytnica, 24 km SSW of Kielce, southern slopes of the Holy Cross Mountains, Central Poland.

DERIVATION OF NAME: *recognita* – Latin *recognosco* = newly recognized.

DIAGNOSIS: Teleoconch composed of about 6 whorls; ornamentation in the form of axial ribs numbering always 10, and spiral striae numbering 20 - 24 on the last whorl; oval aperture adorned with 8 lath-like teeth internally.

MATERIAL: Two specimens; one of which (Pl. 11, Fig. 9) is in the private collection of Mr. W. KACZMARCZYK.

DIMENSIONS: The larger specimen (Pl. 11, Fig. 9) is 23.5 mm high and 14.5 mm wide.

DESCRIPTION: Shell of moderate size; protoconch not preserved in both specimens, teleoconch composed of about 5-6 whorls, all of which are slightly convex, but slightly concave in their upper (distal) part. Ornamentation is moderately pronounced, composed of axial ribs and spiral striae. Axial ribs are wide, and inter-rib furrows narrower; their number is always 10 on each whorl. Spiral striae are almost equally pronounced; numbering 8 (9) or 9 (10) on the last but one whorl, and 20 or 24 on the last whorl. The aperture is

oval, with a deep siphonal notch. The outer lip is adorned externally with the last axial rib, and internally with 8 long, lath-like teeth. The inner lip is wholly smooth.

REMARKS: The specimens studied are clearly conspecific with that from Forchtenau in the Vienna Basin illustrated by HOERNES & AUINGER (1885), who had 5 specimens at their disposal, which they classified as *Murex renieri* MICHELOTTI, although noting (HOERNES & AUINGER 1885, p. 225) their difference from the Miocene specimens from Colli Torinesi in Italy (see BELLARDI 1872, p. 126, pl. 8, fig. 17). Moreover, the Italian specimens show more densely spaced spiral striation. Consequently, the specimens from the Vienna Basin and Korytnica are assigned herein to a separate species, *Ocinebrina recognita* sp.nov.

Genus *Purpura* (MARTYN, 1784)

Purpura (Tritonalia) vindobonensis (HÖRNES, 1856)

(Pl. 13, Figs 4-8)

1966. *Tritonalia vindobonensis* (HÖRNES) var.; J. KÓKAY, p. 57, pl. 8, fig. 6.

1995. *Purpura (Tritonalia) vindobonensis* (HÖRNES); W. BAŁUK, pp. 227-228, pl. 30, fig. 5 (*cum synonym.*).

NEW MATERIAL: Five specimens (three in the private collection of Mr. J. GUBAŁA).

DIMENSIONS: The largest specimen (Pl. 13, Fig. 6) is 33.5 mm high and 20.5 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1995), but are better preserved and more fully grown.

The specimen from the Miocene of Spain, illustrated as *Tritonalia* aff. *vindobonensis* (HÖRNES) by MARTINELL & DE PORTA (1981, pl. 1, fig. 5), has nothing in common with either the Viennese, or the Korytnica specimens. The axial ribbing on the last whorl, and the shape of the outer lip are quite different, and thus it should be rejected from the synonymy of HÖRNES' species.

All hitherto collected specimens come from the site "No. 1" at Korytnica (see RADWAŃSKI 1969, p. 88, fig. 31), which is typified by a peculiar assemblage of molluscs (see BAŁUK & RADWAŃSKI 1977, pp. 93-94), and is located south of Mt. Łysa.

Purpura (Tritonalia) confluens (EICHWALD, 1853)

(Pl. 13, Figs 1-3)

1853. *Mur. confluens* m.; E. EICHWALD, pp. 192-193, pl. 8, fig. 11.
 1882. *Murex Galicianus* HILBER, nova forma; V. HILBER, p. 5, pl. 1, figs 7-8.
 1885. *Murex (Chicoreus) Galicianus* HILB.; R. HOERNES & M. AUINGER, pp. 209-210, pl. 29, figs 11-12.
 1912. *Murex confluens* EICHW.; W. FRIEDBERG, pp. 166-167, pl. 10, figs 6-7.
 1970. *Murex confluens* EICHWALD; W. BAŁUK, p. 118, pl. 12, figs 2a-2b.
 1971. *Tritonalia confluens* EICHWALD; I. CSEPREGHY-MEZNERICS, p. 27, pl. 10, fig. 6.
 1995. *Purpura* sp.; W. BAŁUK, p. 229, pl. 30, figs 1-2.

NEW MATERIAL: Three specimens (in the private collection of Mr. J. GUBAŁA).

DIMENSIONS: The largest specimen (Pl. 13, Fig. 3) is 17.6 mm high and 10.2 mm wide

REMARKS: The new specimens, apparently conspecific with those illustrated previously (BAŁUK 1995) as "*Purpura* sp.", are better preserved and thus determinable at species level. They agree with specimens from Hołubica and Podhorce in Podolya (now Ukraine), distinguished by HILBER (1882, pl. 1, figs 7-8) as "*Murex Galicianus* HILBER" and subsequently re-illustrated by HOERNES & AUINGER (1885, pl. 29, figs 11-12).

Identical specimens from the same localities in Podolya were illustrated by FRIEDBERG (1912), who used the name *Murex confluens* EICHWALD, 1853, which has priority over that of HILBER (1882).

The species *Purpura (Tritonalia) confluens* (EICHWALD, 1853) in the Miocene of Poland has hitherto been recorded only from Niskowa in the Carpathians (BAŁUK 1970).

Genus *Vitularia* SWAINSON, 1840
Vitularia linguabovis (BASTEROT, 1825)
 (Pl. 12, Fig. 7)

1995. *Vitularia linguabovis* (BASTEROT); W. BAŁUK, p. 229, pl. 30, fig. 9 (*cum synonym.*).

NEW MATERIAL: One specimen.

DIMENSIONS: Height 69 mm, width 42.5 mm.

REMARKS: The new specimen, concordant with those described previously (BAŁUK 1995), is evidently more fully grown. It is probably the largest one ever reported from Korytnica [no measurement data by KOWALEWSKI (1930)].

Family Coralliophilidae CHENU, 1859
 Genus *Coralliophila* H. & A. ADAMS, 1853
Coralliophila sp.
 (Pl. 13, Fig. 9)

MATERIAL: One specimen.

DIMENSIONS: Height 22.5 mm, width 14.5 mm.

REMARKS: This unique specimen is slightly deformed by the commensal growth of a vermetid, which resulted in the partial uncoiling of the shell and a consequent increase in its height. The species assignment is uncertain. It may belong to *Coralliophila sacyi* (COSSMANN & PEYROT, 1924), which has a similar distinct ridge on the whorls, but it differs in less the pronounced riblets than those on the holotype (see COSSMANN & PEYROT 1924, pp. 537-538, pl. 14, figs 51-52). Of the specimens presented by LOZOUET & RENARD (1998, p. 175, pl. 3, figs 1-4), the Korytnica specimen is close to that illustrated in their pl. 3, fig 4.

Such a taxon as the *Coralliophila* sp. illustrated herein has not been recorded previously from the Miocene of Poland.

Family Olividae LATREILLE, 1825
 Genus *Oliva* BRUGUIÈRE, 1789
Oliva sp.
 (Pl. 14, Fig. 7)

MATERIAL: One specimen.

DIMENSIONS: Height 8.5 mm, width 3.8 mm.

REMARKS. At first sight, this specimen could be thought to represent those described previously (BAŁUK 1997, pl. 7, figs 3-4) as *Agaronia? vindobonensis* (CSEPREGHY-MEZNERICS, 1954). However, its protoconch is distinctly larger, and the spire is lower. The protoconch, measured as proposed by TURSCH & GREIFENEDER (2001, pp. 235-239), comprises 3.7 whorls (NW = 3.70), with a height (= RES4) of 1.15 mm, and a width (= RES5) of 1.50 mm. Consequently, it seems that this specimen may be classified only as a specifically indeterminate juvenile *Oliva* sp. The specimens of *Oliva dufresnei* (BASTEROT, 1825) previously illustrated (BAŁUK 1997, pl. 7, figs 1-2) lack their protoconch, and thus cannot be used for comparison.

Genus *Amalda* H. & A. ADAMS, 1853
Amalda glandiformis (LAMARCK, 1810)

1992. *Amalda glandiformis anomala* (SCHLOTHEIM); P. LOZOUET, p. 29, pl. 1, figs 5-8.

1997. *Ancilla (Baryspira) glandiformis* (LAMARCK); W. BAŁUK, pp. 24-26, pl. 6, figs 1-11 (*cum synonym.*).

REMARKS: The numerous specimens of this species, so common at Korytnica (see BAŁUK 1997), have recently been considered to belong to a genus other than *Ancilla* and/or *Baryspira*. Namely, LOZOUET (1992, p. 28), with reference to the papers by KILBURN (1977, 1981), stated that some features of the shell, in particular the 'divided basal fasciole', were typical of the genus *Amalda* H. & A. ADAMS, 1853. The Korytnica shells are compatible with the scheme presented by KILBURN (1977, p. 13, fig. 1) for the genus *Amalda* (see also KILBURN 1981, p. 349), and differ from the scheme (KILBURN 1981, p. 350, fig. 10) typical of the genus *Ancilla* LAMARCK, 1799. The two genera under discussion differ in the structure of the fasciolar band, which is undivided in *Ancilla*, but double in *Amalda*, being composed of the *anterior* and *posterior* fasciolar bands, as treated also by TURSCH & GREIFENEDER (2001, p. 116).

Amalda obsoleta (BROCCHI, 1814)

1992. *Amalda obsoleta* (BROCCHI); P. LOZOUET, p. 29, pl. 1, figs 9-12.

1997. *Ancilla (Baryspira) obsoleta* (BROCCHI); W. BAŁUK, pp. 26-27, pl. 7, figs 7-8 (*cum synonym.*).

REMARKS: This species, as in the case of the preceding one, is assigned herein to the genus *Amalda* H.&A. ADAMS, 1853. The species is extremely rare at Korytnica (see BAŁUK 1997); the new specimen is kept in the private collection of Mr. P. CZECH.

Family Pyrenidae

Genus *Pyrene* RÖDING, 1798

Pyrene (Mitrella) perminuta (BOETTGER, 1906)

(Pl. 14, Figs 1-3)

1906. *Columbella (Mitrella) perminuta* n.sp.; O. BOETTGER, pp. 16-17.

1934. *Pyrene (Mitrella) perminuta* (BOETTGER); A. ZILCH, p. 253.

1935. *Pyrene (Mitrella) perminuta* (BOETTGER); A. ZILCH, pp. 226-227, figs 3-4.

MATERIAL: Twenty-six specimens.

DIMENSIONS: The largest specimen (Pl. 14, Fig. 3) is 7.0 mm high and 2.6 mm wide; another one is 6.0 and 2.5 mm, respectively.

REMARKS: The specimens studied are fully concordant with those described by BOETTGER (1906) and revised by ZILCH (1935). All specimens from Korytnica display traces of their primary coloration, characterised by a pattern of five fine spots, described by BOETTGER (1906) and ZILCH (1935) as being in the form of a regular quincunx. There are also spiral rows of larger spots, located just above the suture. The overall shape of the specimens studied is highly variable, as shown by the extremes illustrated herein (Pl. 14, Figs 1-3).

The species *Pyrene (Mitrella) perminuta* (BOETTGER, 1906) has not been recorded previously from the Miocene of Poland.

Family Fascioliariidae

Genus *Fusinus* RAFINESQUE, 1815

Fusinus hontensis (CSEPREGHY-MEZNERICS, 1956)

(Pl. 14, Figs 4-5)

1995. *Fusinus hontensis* (CSEPREGHY-MEZNERICS); W. BAŁUK, p. 245, pl. 35, fig. 6 (*cum synonym.*).

NEW MATERIAL: Two specimens, one of which (Pl. 14, Fig. 4) is donated by Mr R. BOREK, of Dąbrowa Górnicza, and the second (Pl. 14, Fig. 5) is kept in the private collection of Mr. M. BUDZIASZEK.

DIMENSIONS: The larger specimen (Pl. 14, Fig. 4) is 49 mm high and 20.5 mm wide.

REMARKS: The new specimens agree with those described previously (BAŁUK 1995); one of them (Pl. 14, Fig. 4) is not fully grown, but is almost complete.

Genus *Latirus* MONTFORT, 1810

Latirus moravicus (HOERNES & AUINGER, 1880)

(Pl. 14, Fig. 6)

1880. *Fasciolaria Moravica* nov.form.; R. HOERNES & M. AUINGER, p. 266, pl. 31, fig. 9.

MATERIAL: One specimen

DIMENSIONS: Height *ca* 14 mm, width 6 mm.

REMARKS: This poorly preserved specimen, lacking the early whorls and the distal part of the siphonal canal, displays features (size, shape, and ornamentation) identical with those of the specimens from Niederleis in the Vienna Basin, described by HOERNES & AUINGER (1880).

The species *Latirus moravicus* (HOERNES & AUINGER,

1880) has not been recorded previously from the Miocene of Poland.

Family Nassariidae IREDALE, 1916
Genus *Nassarius* DUMÉRIL, 1806
Nassarius hochstetteri (HOERNES & AUINGER, 1882)
(Pl. 15, Fig. 8)

1882. *Buccinum (Hima) Hochstetteri* nov.form.; R. HOERNES & M. AUINGER, p. 138, pl. 13, fig. 41.

1997. *Hinia (Hinia)* sp.; W. BAŁUK, pp. 13-14, pl. 3, fig. 7.

NEW MATERIAL: Ten specimens.

DIMENSIONS: The largest specimen is 10.6 mm high and 5.8 mm wide.

REMARKS: The new specimens agree with that designated previously (BAŁUK 1997) as *Hinia (Hinia)* sp., to represent supposedly an unknown species. However, these specimens, all occurring exclusively in oyster shell-beds on the slopes of Mt. Łysa, appear to be conspecific with those from Niederleis in the Vienna Basin, described by HOERNES & AUINGER (1882) as "*Buccinum (Hima) Hochstetteri*". The diversity of the Korytnica specimens is marked by their more or less bulbous shape, and by the density of the axial ribs, amounting to 17 on the penultimate whorl, and 12 plus broad varix on the last whorl (BAŁUK 1997, pl. 3, fig. 7); or 19 and 14 plus varix respectively, in the specimen illustrated here-in (Pl. 15, Fig. 8).

The species *Nassarius hochstetteri* (HOERNES & AUINGER, 1882) has not been recorded previously from the Miocene of Poland.

Nassarius notterbecki (HOERNES & AUINGER, 1882)
(Pl. 15, Fig. 7)

1997. *Hinia (Hinia) notterbecki* (HOERNES & AUINGER); W. BAŁUK, pp. 9-10, pl. 3, fig. 8 (*cum synonym.*).

NEW MATERIAL: Ten specimens.

DIMENSIONS: The largest specimen (Pl. 15, Fig. 7) is 10.3 mm high and 5.2 mm wide.

REMARKS: The new material, concordant with that described previously (BAŁUK 1997), includes one large specimen (see Pl. 15, Fig. 7) which is higher, and thus distinctly more slender than the others. In comparison with the specimen illustrated previously (BAŁUK 1997,

pl. 3, fig. 8), the varix on the outer lip appears one whorl later, that is at the end of the sixth whorl of the teleoconch.

Nassarius schroeckingeri (HOERNES & AUINGER, 1882)
(Pl. 15, Fig. 6)

1882. *Buccinum (Caesia) Schröckingeri* nov.form.; R. HOERNES & M. AUINGER, p. 132, pl. 14, figs 31-32.

1960. *Nassa (Hinia) schroekingeri* (HOERNES und AUINGER); E. KOJUMDGIEVA, p. 179, pl. 44, figs 16-17.

MATERIAL: One specimen.

DIMENSIONS: Height *ca* 9.5 mm, width *ca* 4.5 mm.

REMARKS: This single specimen, from the oyster shell-beds on Mt. Łysa, is clearly conspecific with those described by HOERNES & AUINGER (1882) from Kostež in Transylvania. The Korytnica specimen, however, is slightly smaller, with its shell half a whorl shorter.

The species *Nassarius schroeckingeri* (HOERNES & AUINGER, 1882) has not been recorded previously from the Miocene of Poland.

Nassarius tonsura (HILBER, 1879)
(Pl. 15, Figs 1-2)

1879. *Buccinum tonsura* HILB.; V. HILBER, p. 423, pl. 1, fig. 8.

1882. *Buccinum (Tritia) tonsura* HILB.; R. HOERNES & M. AUINGER, p. 142, pl. 13, fig. 16.

?1968. *Nassarius (Uzita) rosthorni tonsura* (HILBER); L. HINCULOV, p. 145, pl. 36, figs 2-4.

MATERIAL: Three specimens (in the private collection of Mr. J. GUBAŁA).

DIMENSIONS: The largest specimen (Pl. 15, Fig. 1) is 15 mm high and 9 mm wide.

REMARKS: These specimens agree with the specimen from Pöls in Styria (Steiermark), described by HILBER (1879) and HOERNES & AUINGER (1882). Two of them are the same size as the holotype, the third is slightly smaller, 14 mm high.

All the specimens collected from Korytnica come from the site "No. 1" (see RADWAŃSKI 1969, p. 88, fig. 31), which is typified by a peculiar assemblage of molluscs (see BAŁUK & RADWAŃSKI 1977, pp. 93-94), and is located south of Mt. Łysa.

The species *Nassarius tonsura* (HILBER, 1879) has not been recorded previously from the Miocene of Poland.

Nassarius sp.
(Pl. 15, Fig. 3)

MATERIAL: One specimen.

DIMENSIONS: Height 5.5 mm, width 3.1 mm

REMARKS: This specimen differs from all representatives of the family Nassariidae at Korytnica. It seems to be not fully grown, with the teleoconch composed of three and half whorls only, and the aperture furnished with numerous thin and relatively long teeth on the outer lip. The teleoconch is ornamented by densely spaced spiral grooves, whereas inconspicuous, dense axial 'riblets' appear on the early whorls. The first and sixth grooves are slightly wider than the others. There are 16 grooves on the last whorl.

The only comparable specimen may be the one described by BELLARDI (1882), as "*Nassa sulcatula* BELL.", from the Upper Miocene of Tetti Boretti in northern Italy. To judge from the photograph (FERRERO MORTARA & al. 1981, pl. 26, fig. 5), this specimen has more conspicuous axial riblets, and the shell seems to be thicker.

Nassarius auingeri (HÖRNES in HOERNES & AUINGER, 1882)
(Pl. 15, Fig. 4)

1997. *Amyclina auingeri* (HÖRNES in HOERNES & AUINGER); W. BALUK, pp. 18-19, pl. 5, figs 7-8 (*cum synonym.*).

NEW MATERIAL: Four specimens.

DIMENSIONS: The largest specimen (Pl. 15, Fig. 4), preserved without final aperture is 7.2 mm high and 3.9 mm wide.

REMARKS: The new specimens agree with those described previously (BALUK 1997) but are slightly larger, and thus similar in size to those from the Vienna Basin (see HOERNES & AUINGER 1882).

Nassarius karreri (HOERNES & AUINGER, 1882)
(Pl. 15, Fig. 5)

1882. *Buccinum (Nassa) Karreri* nov.form.; R. HOERNES & M. AUINGER, p. 123, pl. 14, figs 25-28.

?1960. *Nassa (Hinia) karreri* (HOERNES und AUINGER); E. KOJUMDGIEVA, p. 178, pl. 44, fig. 13.

MATERIAL: One specimen.

DIMENSIONS: Height 11.8 mm, width 6.0 mm.

REMARKS: The only specimen collected from Korytnica agrees with those described by HOERNES & AUINGER (1882), particularly with those from Kostej and Lapugy in Transylvania. It is apparently more fully grown, having the last two whorls smooth, and its inner lip more distinctly developed.

The species has also been reported from Bivolare and Urovene in the Miocene of north-western Bulgaria, but the specimen illustrated by KOJUMDGIEVA (1960) is slightly smaller, with a differently shaped aperture, and it lacks axial ribs; its conspecificity with the Korytnica and Viennese specimens is therefore problematic.

The species *Nassarius karreri* (HOERNES & AUINGER, 1882) has not been recorded previously from the Miocene of Poland.

Family Cancellariidae FORBES & HANLEY, 1853
Genus *Aneurystoma* COSSMANN, 1899
Aneurystoma afenestrata (SACCO, 1894)

1997. *Narona (Aneurystoma) austropolonica* nom.n.; W. BALUK, pp. 51-52, pl. 17, figs 3-4 (*cum synonym.*).

REMARKS: The present author previously (BALUK 1997) stated that the Korytnica specimens, conspecific with those described by HÖRNES (1856, p. 312, pl. 34, fig. 9) as "*Cancellaria dufouri*", should represent a separate species. A similar opinion in respect of HÖRNES' specimens was earlier advocated by SACCO (1894, p. 67) who proposed to classify them as "*Aphera Bronni* var. *afenestrata* SACC." (see PETIT & HARASEWYCH 1990, p. 9). The name *austropolonica* BALUK, 1997, proposed by the present author, must thus be rejected as a junior synonym.

Genus *Cancellaria* LAMARCK, 1799
Subgenus *Merica* H. & A. ADAMS, 1854
Cancellaria (Merica) jansseni BALUK, 1997

1997. *Cancellaria (Merica) jansseni* nom.n.; W. BALUK, pp. 44-45, pl. 14, fig. 1 (*cum synonym.*).

NEW MATERIAL: One specimen.

DIMENSIONS: Height 21.5 mm, width 13.5 mm.

REMARKS: As in the case of the preceding species, the present author previously suggested (BAŁUK 1997) that the Korytnica specimens, conspecific with those described by HÖRNES (1856, pp. 314-315, pl. 34, fig. 18) as "*Cancellaria bellardii*", should be treated as a separate species. The present author was kindly informed by R.E. PETIT (*personal communication*) that this was also evident to SACCO (1894, p. 46), who did not, however, then establish a new taxon. The first to name this new taxon was the present author, who introduced the name *Cancellaria (Merica) jansseni* (BAŁUK, 1997) for it.

Cancellaria (Merica) callosa PARTSCH, 1856
(Pl. 16, Fig. 1)

1856. *Cancellaria callosa* PARTSCH; M. HÖRNES, p. 314, pl. 34, figs 14-16.
?1928. *Merica callosa* PARTSCH; W. FRIEDBERG, p. 577, pl. 37, fig. 21.

MATERIAL: One specimen (in private collection of Mr. M. BUDZIASZEK).

DIMENSIONS: Height 35 mm, width 22.5 mm.

REMARKS: This poorly preserved specimen, with its outer surface worn, displays identical features (size, overall shape, spiral ornamentation between axial ribs, and conspicuously thick-walled shell) to the specimens from the Vienna Basin, illustrated by HÖRNES (1856).

The present author previously questioned (BAŁUK 1997, p. 47) the specific attribution of the Korytnica specimen described by FRIEDBERG (1928) as *Merica callosa*. This uncertainty remains unsolved since this specimen was lost during the Second World War.

In the Miocene of Poland, *Cancellaria (Merica) callosa* PARTSCH, 1856, has only been reported from Korytnica.

Genus *Trigonostoma* DE BLAINVILLE, 1827
Trigonostoma imbricatum (HÖRNES, 1856)
(Pl. 16, Figs 3-4)

1856. *Cancellaria imbricata* HÖRN.; M. HÖRNES, p. 327, pl. 35, fig. 16.
1894. *Trigonostoma imbricatum* (HOERN.) var. *crassocostata* SACC.; F SACCO, p. 13, pl. 1, fig. 32.
1936. *Cancellaria (Trigonostoma) imbricata* HÖRNES; R. SIEBER, p. 83

MATERIAL: Three specimens (in the private collection of Mr. J. GUBAŁA).

DIMENSIONS: The largest specimen (Pl. 16, Fig. 4) is 33 mm high and 22.5 mm wide.

REMARKS: These specimens are fully concordant with those described by HÖRNES (1856) from several localities in the Vienna Basin [however, it appears there is a *lapsus calami* concerning the width of the specimen illustrated from Enzesfeld: "8 *W. Lin.*" does not equal 10 mm]. According to SIEBER (1936), the shells of this species are highly variable in shape, being either more slender or more squabby. The three Korytnica specimens display similar characteristics, and it is therefore apparent that the varieties proposed by SACCO (1894) are not justified.

All the specimens collected at Korytnica come from the site "No. 1" (see RADWAŃSKI 1969, p. 88, fig. 31) which is typified by a peculiar assemblage of molluscs (see BAŁUK & RADWAŃSKI 1977, pp. 93-94), and is located south of Mt. Łysa.

The species *Trigonostoma imbricatum* (HÖRNES, 1856) has not been recorded previously from the Miocene in Poland.

Genus *Narona* H.&A. Adams, 1854
Subgenus *Tribia* JOUSSEAUME, 1887
Narona (Tribia) unianguolata (DESHAYES, 1830)
(Pl. 16, Fig. 2)

1997. *Narona (Tribia) unianguolata* (DESHAYES); W. BAŁUK, pp. 49-50, pl. 16, fig. 2 (*excl. synonym.*).
2002. *Narona unianguolata* (DESHAYES); C. CHIRLI, pp. 64-65, pl. 32, figs 1-10.

NEW MATERIAL: One specimen (in the private collection of Mr. J. GUBAŁA).

DIMENSIONS: Height 17.5 mm, width 9.0 mm.

REMARKS: The new specimen agrees with those described previously (BAŁUK 1997), but is more fully grown and exceptionally well preserved. All Korytnica specimens are compatible with those described by DAVOLI (1982, 1995) and CHIRLI (2002), albeit their spiral ornamentation is more pronounced.

Narona (Tribia) sp.
(Pl. 16, Fig. 5)

?1856. *Cancellaria unianguolata* DESH.; M. HÖRNES, pp. 306-307, pl. 34, fig. 2.

MATERIAL: One damaged specimen, preserved as the

last whorl plus half of the preceding one, aperture broken.

DIMENSIONS: The width of the penultimate whorl is about 6 mm.

REMARKS: Regardless of its preservation, the morphology of this specimen does not compare with any species of this genus known hitherto. Its whorls are characterized by a strong margin, above which the whorls are almost flat, but they are slightly convex below it, having been not vertical but sloping toward opposite side (i.e. shaped like the sides of a rhomb). Its ornamentation is composed of strong axial ribs (8 on the last whorl) and 5 spiral striae above the margin, and 9 below it on the penultimate whorl (including those on the margin), where they are stronger but not equal. The inner lip is biplicate, the umbilicus narrow and relatively deep.

The specimen under discussion is most similar to the specimen from Steinebrunn in the Vienna Basin, described by HÖRNES (1856) under the name "*Cancellaria uniangularata* DESH.". That specimen displays an identical whorl outline (see HÖRNES 1856, p. 307), but its spiral ornamentation is weaker. The specimen from Korytnica is therefore classified to genus level only.

No form comparable to *Narona (Tribia)* sp. has been recorded previously from the Miocene of Poland.

Family Mitridae SWAINSON, 1831

Genus *Mitraria* RAFINESQUE, 1815

Mitraria (Mitraria) hilberi (HOERNES & AUINGER, 1880)

(Pl. 14, Fig. 8)

1880. *Mitra Hilberi* nov.form.; R. HOERNES & M. AUINGER, p. 76, pl. 9, figs 9-10.

MATERIAL: One specimen (in the private collection of Mr. J. GUBALA).

DIMENSIONS: Height 11.8 mm, width 6.0 mm.

REMARKS: This specimen is certainly conspecific with the one described by HOERNES & AUINGER (1880) from Lapugy in Transylvania, but it is less fully grown, with a teleoconch about 2 whorls shorter. Moreover, its outer lip is provided with long teeth distant from the margin, whereas HOERNES & AUINGER (1880) described it as smooth internally.

To this species CSEPREGHY-MEZNERICS (1956, p. 414) assigned, albeit with some doubts, four specimens from Szob and Letkes in Hungary, labelled "*Mitra hilberi* HOERNES et AUINGER an sp. dist.". These specimens are

distinctly more slender, and their whorls are flatter, the last one being higher. STRAUZ (1966, pp. 363-364, pl. 12, figs 10-11) classified them as "*Mitra hilberi pseudopolygyrata* STRAUZ".

The species *Mitraria (Mitraria) hilberi* (HOERNES & AUINGER, 1880) has not been recorded previously from the Miocene in Poland.

Family Turridae SWAINSON, 1840

Genus *Cythara* SCHUMACHER, 1817

Cythara (Mangelia) rugulosa (PHILIPPI, 1844)

(Pl. 16, Fig. 7)

2003. *Cythara (Mangelia) rugulosa* (PHILIPPI); W. BAŁUK, p. 60, pl. 22, figs 6-10 (*cum synonym.*).

NEW MATERIAL: One specimen.

DIMENSIONS: Height 7.0 mm, width 2.9 mm.

REMARKS: The new specimen is similar to those described previously (BAŁUK 2003) as *Cythara (Mangelia) rugulosa* (PHILIPPI), but it is distinctly larger. At the same number of whorls, it is 1.2 mm higher and 0.6 mm wider than the largest of the 370 specimens described earlier (see BAŁUK 2003, pl. 22, fig. 10). It was found outside the main occurrence area of the Korytnica Clays, on the slopes of Mt. Grodzisko, where local biotope conditions could favour attaining its extreme size.

Genus *Peratotoma* HARRIS & BURROWS, 1891

Peratotoma ringicula BOETTGER, 1901

(Text-fig. 5)

1901. *Peratotoma ringicula* n.sp.; O. BOETTGER, p. 60.

1906. *Peratotoma ringicula* BOETTGER.; O. BOETTGER, p. 75.

1934. *Peratotoma ringicula* BOETTGER; A. ZILCH, p. 274, pl. 21, fig. 99.

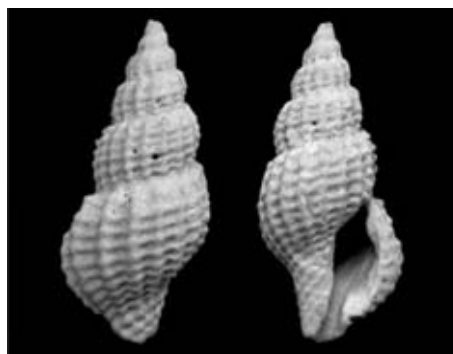


Fig. 5. *Peratotoma ringicula* BOETTGER, x 8, U.W., BkK-G1261

partim 2003. *Peratotoma echinus* BOETTGER; W. BAŁUK, p. 73, pl. 29, fig. 8 [*non* figs 5-7].

NEW MATERIAL: Four specimens.

DIMENSIONS: The largest specimen, illustrated previously (BAŁUK 2003, p. 73, pl. 29, fig. 8) is 6.6 mm high and 2.9 mm wide; another one is 6.0 mm high and 2.7 mm wide

REMARKS. One specimen out of the forty specimens described previously (BAŁUK 2003) under the name "*Peratotoma echinus* BOETTGER" differed slightly from the others in its more slender shape and more densely spaced axial ribs (16-18, instead of 13-14 on the last whorl). The new material contains four such specimens, all of which may be regarded as conspecific with *Peratotoma ringicula* BOETTGER, 1901, described from Kostej in Transylvania. The specific assignment is still open to question in that BOETTGER's specimens are not fully grown, being about one whorl shorter than these from Korytnica.

The species *Peratotoma ringicula* BOETTGER, 1901, has not been recorded previously from the Miocene in Poland.

Family Conidae RAFINESQUE, 1815

Genus *Conus* LINNAEUS, 1758

Subgenus *Leptoconus* SWAINSON, 1840

Conus (Leptoconus) elongatus BORSON, 1820
(Pl. 16, Fig. 8)

partim 1856. *Conus Haueri* PARTSCH; M. HÖRNES, pp. 34-35, pl. 4, fig. 4 [*non* fig. 5].

1879. *Conus (Leptoconus) Haueri* PARTSCH; R. HOERNES & M. AUINGER, p. 33.

1960. *Conus (Leptoconus) extensus* PARTSCH; E. KOJUMGDIEVA, pp. 210-211, pl. 49, fig. 6.

?1960. *Conus (Leptoconus) haueri* PARTSCH *in* HOERNES; E. KOJUMGDIEVA, pp. 210, pl. 49, fig. 1.

1964. *Conus elongatus* BORSON; C.A. HALL, p. 145, pl. 25, figs 6, 10-13.

1966. *Conus (Leptoconus) extensus* PARTSCH; L. STRAUZ, pp. 453-454, pl. 67, figs 11-12.

1976. *Conus elongatus* BORSON; G. PAVIA, p. 157, pl. 2, fig. 11 (= the holotype of the species).

1972. *Conus elongatus* BORSON; F. DAVOLI, pp. 105-107, pl. 25, figs 18-20, 22-24.

MATERIAL: One specimen.

DIMENSIONS: Height 77 mm, width 31 mm; height of the spire 15 mm.

REMARKS: This specimen seems to be fully concordant with the specimen from Gainfahrn in the Vienna Basin, described by HÖRNES (1856) as "*Conus haueri* PARTSCH". According to HALL (1964), the Gainfahrn specimen belongs to the species *Conus elongatus* BORSON, 1820, established earlier, and thus PARTSCH's (1879) name is apparently a junior synonym. The dimensions of this unique Korytnica specimen fall into the median of the range of dimensions of the 13 specimens described by DAVOLI (1972) from the Miocene of Montegibbio in Italy.

In the present author's opinion, a specimen described by STRAUZ (1966) from Szob in Hungary should also be assigned to this species; it differs from another one from this locality, classified by CSEPREGHY-MEZNERICS (1956, p. 421, pl. 11, figs 7-8) correctly as *Conus (Leptoconus) extensus* PARTSCH.

The species *Conus (Leptoconus) elongatus* BORSON, 1820, has not been recorded previously from the Miocene in Poland.

Family Terebridae H.&A. ADAMS, 1853

Genus *Terebra* BRUGUIÈRE, 1789

Subgenus *Terebra* BRUGUIÈRE, 1789

Terebra (Terebra) sophiae HALAVÁTS, 1884
(Pl. 16, Fig. 6)

1884. *Terebra (Myurella) Sophiae* nov.form.; J. HALAVÁTS, p. 180, pl. 4, fig. 7.

1997. *Terebra (Terebra) sophiae* HALAVÁTS; W. BAŁUK, p. 69, pl. 25, figs 6-7 (*cum synonym.*)

NEW MATERIAL: One specimen.

DIMENSIONS: Height (without initial whorls) 26.5 mm, width 5.2 mm.

REMARKS: The new specimen of this species is concordant with those described previously (BAŁUK 1997), but is markedly larger.

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PLATES 1-16

PLATE 1

Families **Fissurellidae** and **Lepetidae**

- 1-2** – *Diodora* sp. an *Diodora italica* (DEFRANCE), 1 × 8; 2 × 5; 1 – U.W., BkK-G1134; 2 – U.W., BkK-G1135
- 3-4** – *Diodora graeca* (LINNAEUS), 3 × 8, 4 × 4; 3 – U.W., BkK-G1132; 4 – U.W., BkK-G1133
- 5** – *Scutus bellardii* (MICHELOTTI), × 4; U.W., BkK-G1131
- 6** – *Propilidium circulare* BOETTGER, × 16; U.W., BkK-G1136
- 7-8** – *Emarginula clathrataeformis* EICHWALD, × 8; 7 – U.W., BkK-G1129; 8 – U.W., BkK-G1130

All photos taken by B. MALINOWSKA

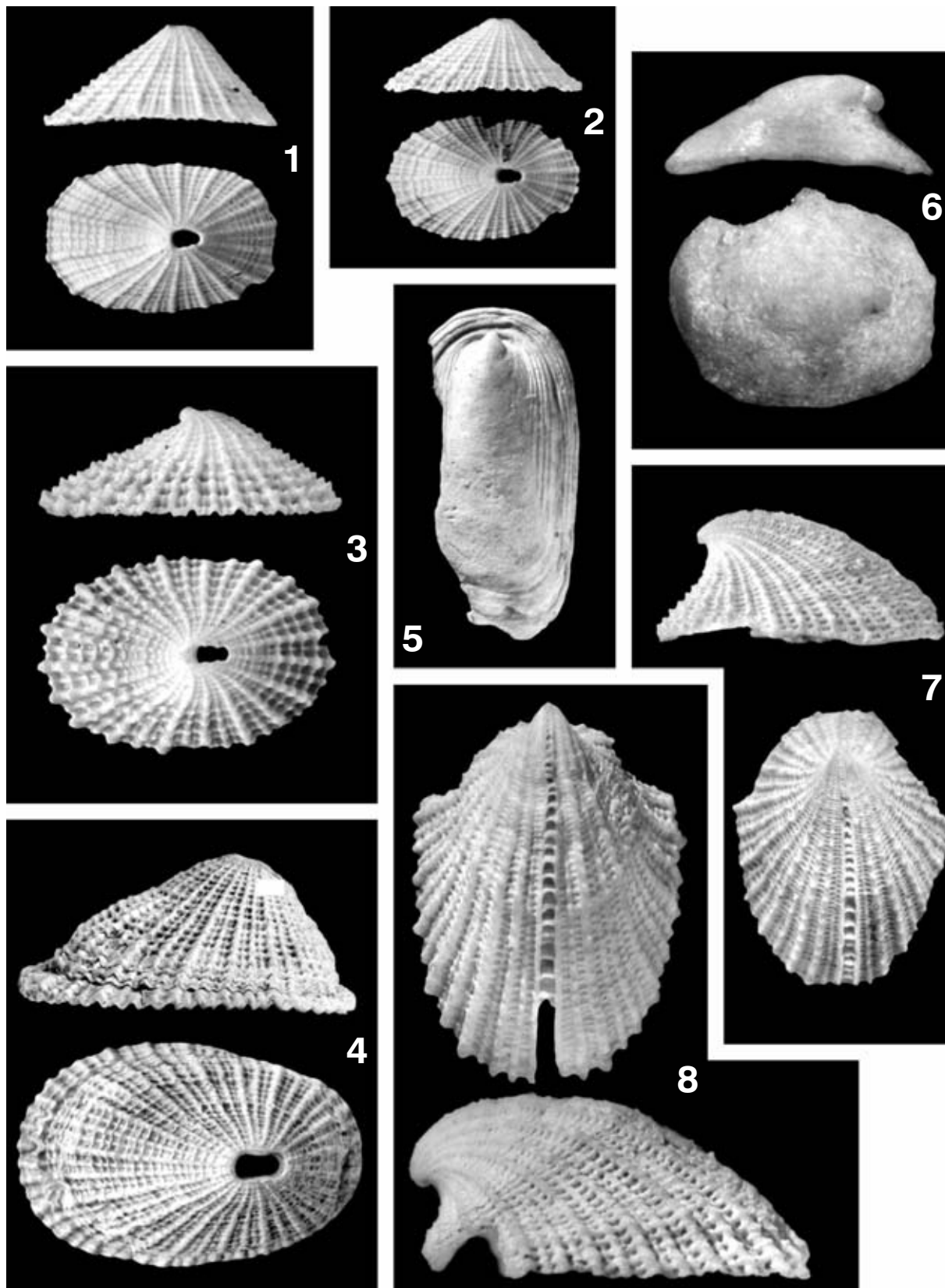


PLATE 2

Families **Trochidae**, **Turbinidae**, **Phasianellidae**, and **Neritidae**

- 1-2** – *Gibbula (Gibbula) varia* (LINNAEUS), × 8; 1 – U.W., BkK-G1138; 2 – U.W., BkK- G1139
3 – *Jujubinus exasperatus* (PENNANT), × 8; U.W., BkK-G1137
4 – *Granulifera hoernesii* (DODERLEIN), × 8; U.W., BkK-G1140
5 – *Astraea (Ormastraliium) carinata* BORSON, × 2; U.W., BkK-G1143
6 – *Tricolia (Tricolia) globosa* (FRIEDBERG), × 8; U.W., BkK-G1244
7 – *Astraea (Bolma) granosa* BORSON, × 1; U.W., BkK-G1141
8 – *Nerita gigantea* BELLARDI & MICHELOTTI, × 2; U.W., BkK-G1144

Photos 1-5 and 7-8 taken by B. MALINOWSKA; 6 by S. KOLANOWSKI

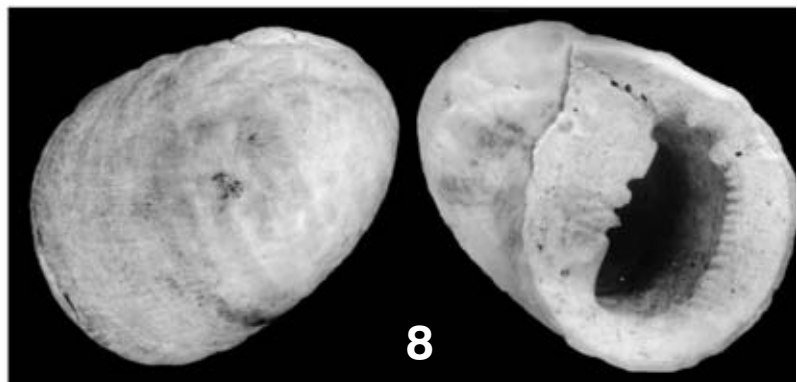
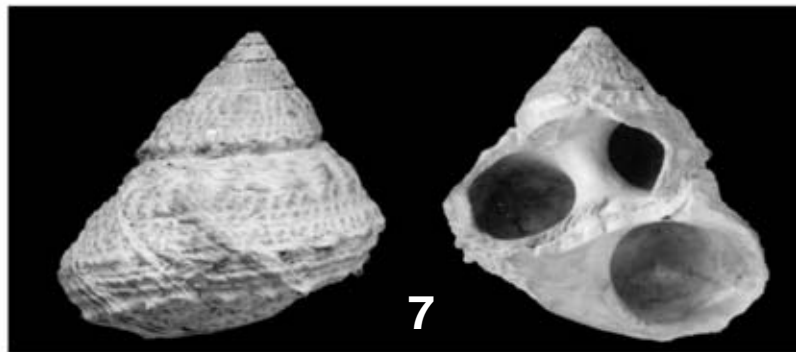
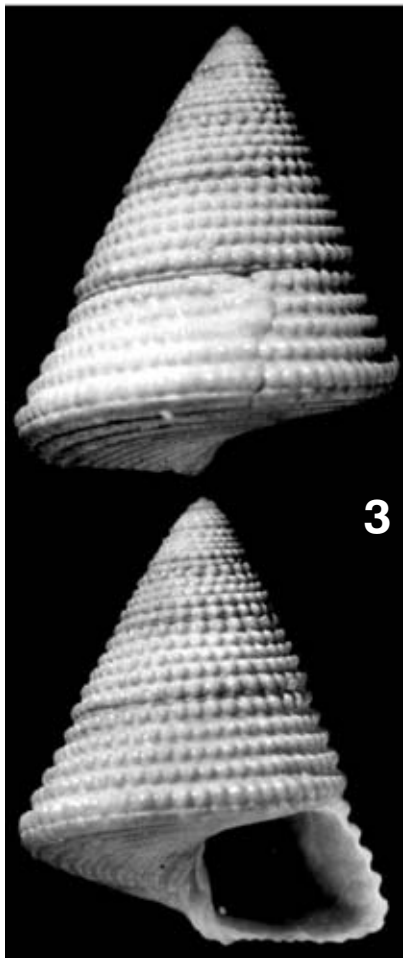
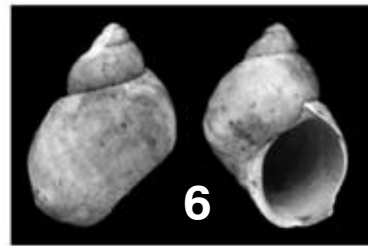
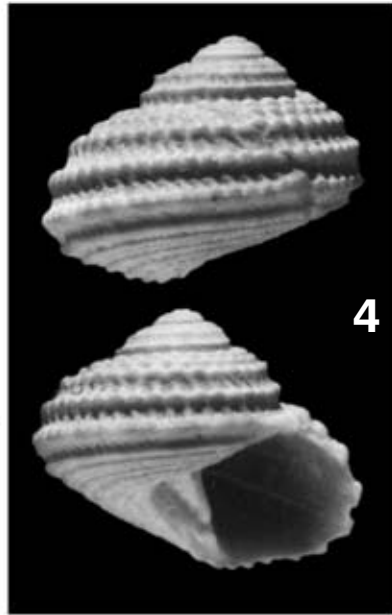
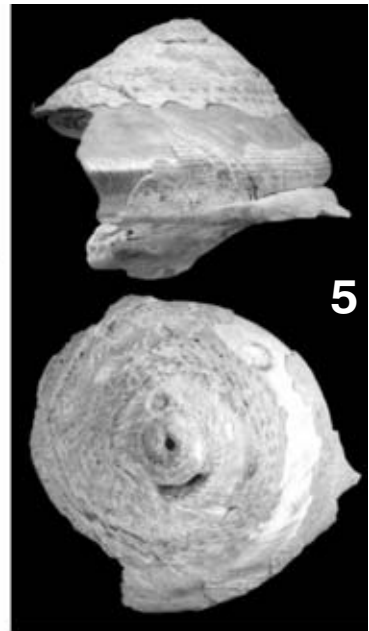
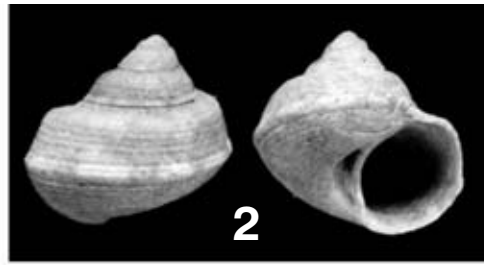
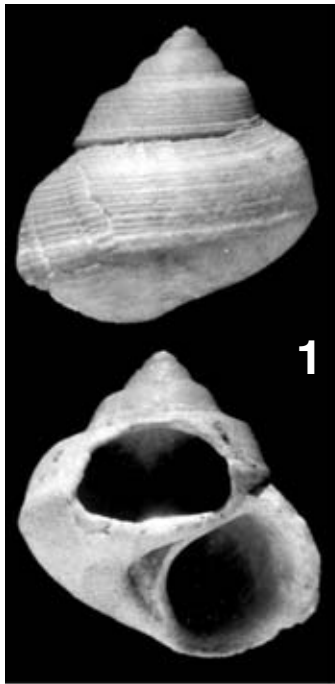


PLATE 3

Families **Trochidae** and **Naticidae**

- 1-3** – *Astraea (Bolma) mehelyi* (BOETTGER), × 2; 1 – U.W., BkK-G1142; 2 – U.W., BkK-1253; 3 – U.W., BkK-G1254
- 4** – *Astraea (Bolma) tuberculata* (DE SERRES), × 1; Collection of the Museum of the Earth, Warsaw, VIII Mg - 4254
- 5** – *Astraea (Bolma) meynardi* (MICHELOTTI), × 1; U.W., BkK-G1255
- 6** – *Natica tigrina* RÖDING, × 2; Private collection of P. DEGÓRSKI, M.Sc.
- 7** – *Polinices pseudoredemptus* (FRIEDBERG), × 2; Private collection of P. DEGÓRSKI, M.Sc.
- 8-9** – *Nacca unica* BAŁUK, × 2; Private collection of P. DEGÓRSKI, M.Sc.

Photos 1-5 taken by S. KOLANOWSKI; 6-9 by P.DEGÓRSKI, M.Sc.

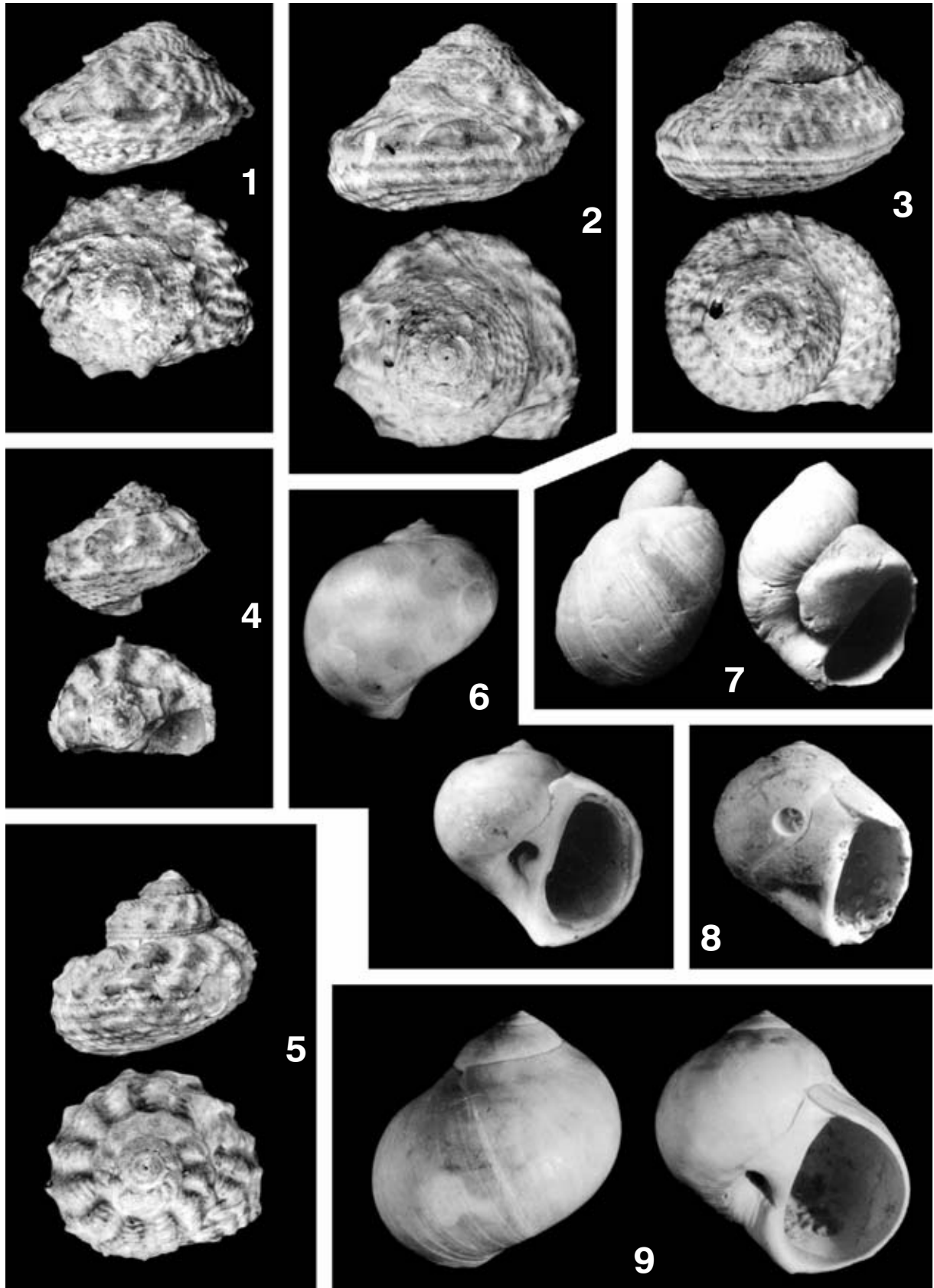


PLATE 4

Families **Littorinidae**, **Lacunidae**, and **Rissoidae**

- 1 – *Rissoina (Phosinella) steinabrunnensis* SACCO, × 8; U.W., BkK-G1156
- 2 – *Rissoina (Zebinella) eleonora* BOETTGER, × 8; U.W., BkK-G1153
- 3 – *Rissoina (Zebinella) sp.*, × 8; U.W., BkK-G1155
- 4 – *Rissoina (Zebinella) sororcula* BOETTGER, × 8; U.W., BkK-G1154.
- 5 – *Rissoina (Zebinella) decussata* (MONTAGU), × 8; U.W., BkK-G1152
- 6 – *Littorina obsoleta* BOETTGER, × 8; U.W., BkK-G1147
- 7 – *Rissoa sp.*, × 8; U.W., BkK-G1151
- 8 – *Medoriopsis detrita* (BOETTGER), × 8; U.W., BkK-G1148
- 9 – *Lacuna (Pseudocirsope) banatica* BOETTGER, × 8; U.W., BkK-G1149
- 10 – *Lacuna (Pseudocirsope) hoernes* BOETTGER, × 8; U.W., BkK-G1150
- 11 – *Zebina (Stossichia) multicingulata* (BOETTGER), × 8; U.W., BkK-G1157

All photos taken by B. MALINOWSKA

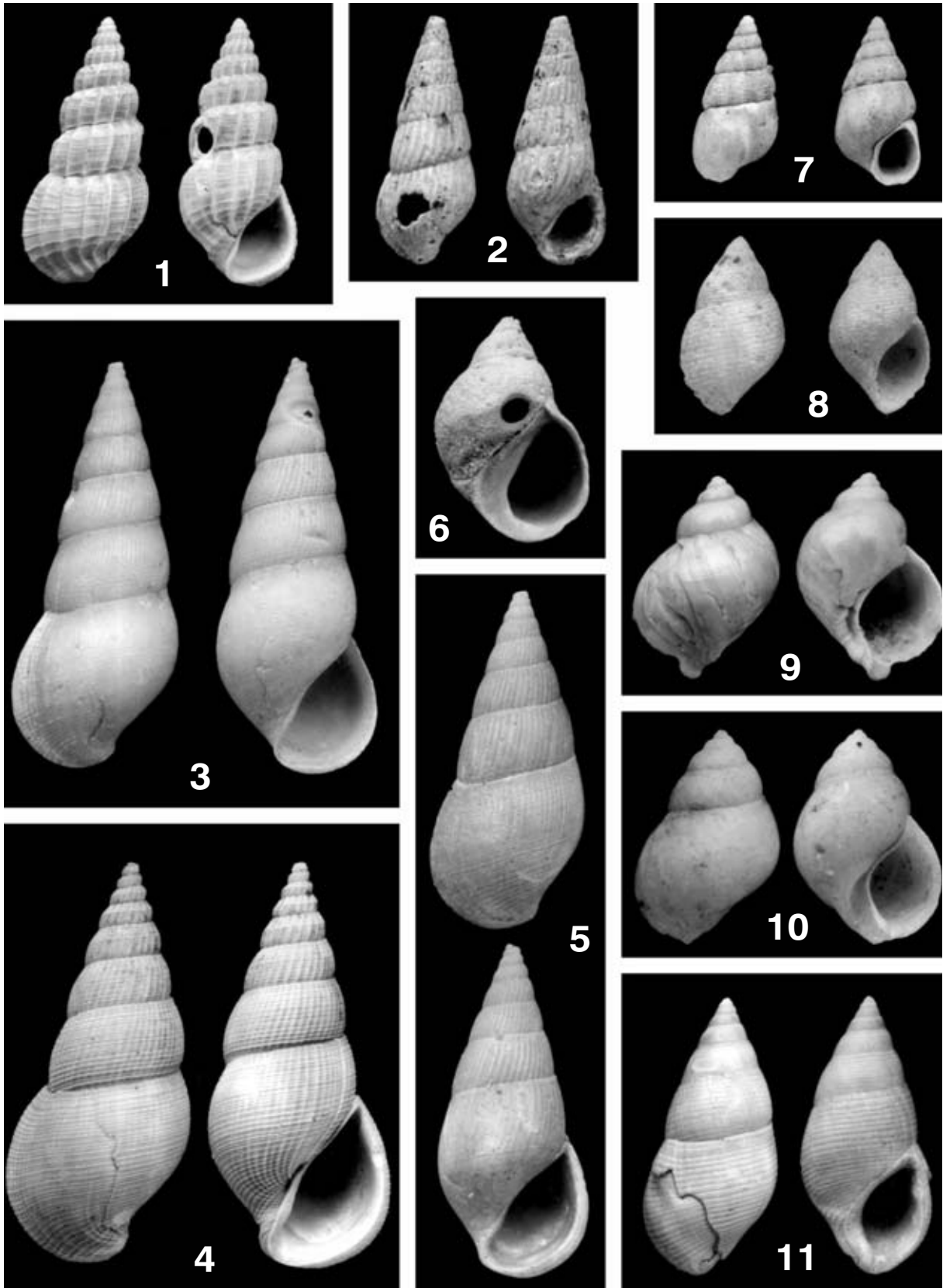


PLATE 5

Families **Cocculinidae**, **Siliquariidae**, and **Vermetidae**

- 1-2** – *Tenagodus (Siliquaria) ponderosus* MÖRCH, 1 × 8, 2 × 4; 1 – U.W., BkK-G1166, 2 – U.W., BkK-G1167
- 3** – *Cocculina (Dallia) unica* sp. nov., × 8; **holotype**, U.W., BkK-G1146
- 4** – *Cocculina (Cocculina) miocaenica* BOETTGER, × 16; U.W., BkK-G1145
- 5-7** – *Petalconchus intortus* (LAMARCK), × 4; 5 – U.W., BkK-G1169, 6 – U.W., BkK-G1170, 7 – U.W., BkK-G1171
- 8** – *Lemintina sexcarinata* (BOETTGER), × 4; U.W., BkK-G1172
- 9** – “*Vermetus*” aff. *desmoulinsi* COSSMANN & PEYROT domiciled in the coral *Tarbellastraea reussiana*, × 1; 9a top view, 9b side view, 9c top view, after preparation; U.W., BkK-G1168

Photos 1-8 taken by B. MALINOWSKA; 9 by B. DROZD, M. Sc.

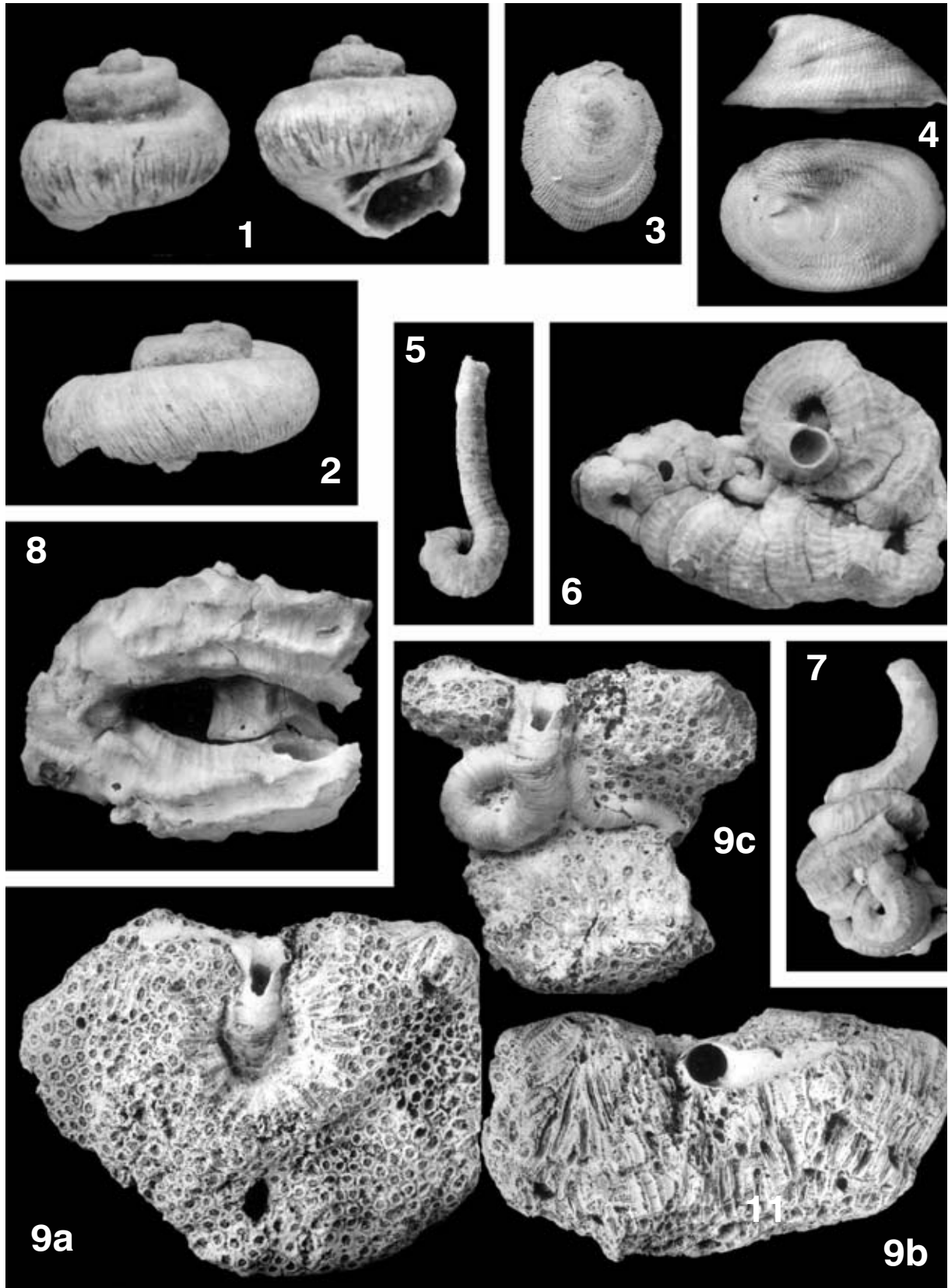


PLATE 6

Families Vermetidae, Tornidae, Turritellidae, Caecidae and Finellidae

- 1 – *Scaliola semperi* BOETTGER, × 16; U.W., BkK-G1188
2 – *Turritella (Zaria) subacutangula* D'ORBIGNY, × 2; U.W., BkK-G1165
3-4 – *Turritella (Peyrotia) circumcisa* sp.nov., 3 × 4, 4 × 2; 3 – U.W., BkK-G199, 4 – **holotype**, U.W., BkK-G1164
5-6 – *Vermicularia milleti* (DESHAYES), 5 × 8, 6 × 2; 5 – U.W., BkK-G1173, 6 – Private collection of Mr. J. GUBAŁA
7-8 – *Caecum korytnicense* sp.nov., × 8; 7 – U.W., BkK-G1178, 8 – **holotype**, U.W., BkK-G1179
9 – *Caecum (Caecum) trachea* (MONTAGU), × 8; U.W., BkK-G1176
10 – *Caecum (Brochina) glabrum* (MONTAGU), × 8; U.W., BkK-G1177
11-12 – *Caecum tenuicostulatum* DE PORTA, MARTINELL & GONZALEZ DELGADO, × 8; 11 – U.W., BkK-G1174, 12 – U.W., BkK-G1175
13-14 – *Teinostoma (Idioraphe) minimum* BOETTGER, × 8; 13 – U.W., BkK-G1162, 14 – U.W., BkK-G1163
15 – *Tornus parvillimus* (SACCO), × 16; U.W., BkK-G1158
16 – *Teinostoma (Solariorbis) affine* (BOETTGER), × 8; U.W., BkK-G1159
17-18 – *Teinostoma (Solariorbis) microdiscus* (BOETTGER), × 8; 17 – U.W., BkK-G1160, 18 – U.W., BkK-G1161

Photos 1-2 and 4-18 taken by B. MALINOWSKA; 3 by B. DROZD, M.Sc

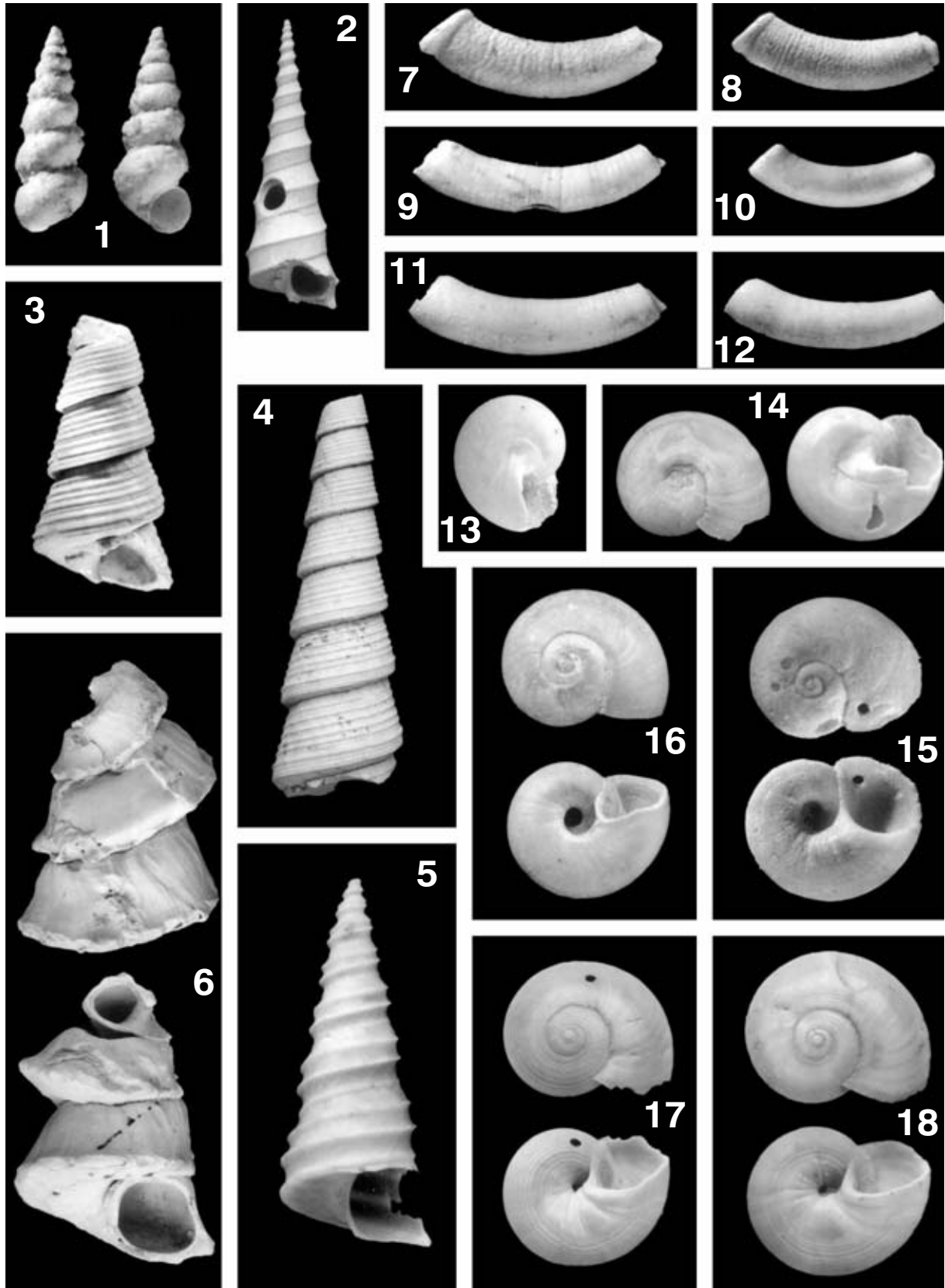


PLATE 7

Families **Architectonicidae**, **Mathildidae**, **Melanopsidae**, and **Hipponicidae**

- 1-2** – *Melanopsis impressa* KRAUSS, 1 × 8, 2 × 1; 1 – U.W., BkK-G1186, 2 – U.W., BkK-G1187
3 – *Mathilda monilis* SEMPER, × 8; U.W., BkK-G1184
4 – *Mathilda praeclara* BOETTGER, × 8; U.W., BkK-G1185
5 – *Architectonica (Pseudotorinia) misera* (DUJARDIN), × 4; U.W., BkK-G1183
6-7 – *Architectonica (Solariaxis) kostejana* (BOETTGER), × 8; 6 – U.W., BkK-G1180, 7 – U.W., BkK-G1181
8 – *Architectonica (Nipteraxis) marthae* (BOETTGER), × 8; U.W., BkK-G1182
9-10 – *Hipponix (Sabia) phlebsi* BOETTGER, × 8; 9 – U.W., BkK-G1250, 10 – U.W., BkK-G1251

Photos 1-8 taken by B. MALINOWSKA; 9-10 by S. KOLANOWSKI

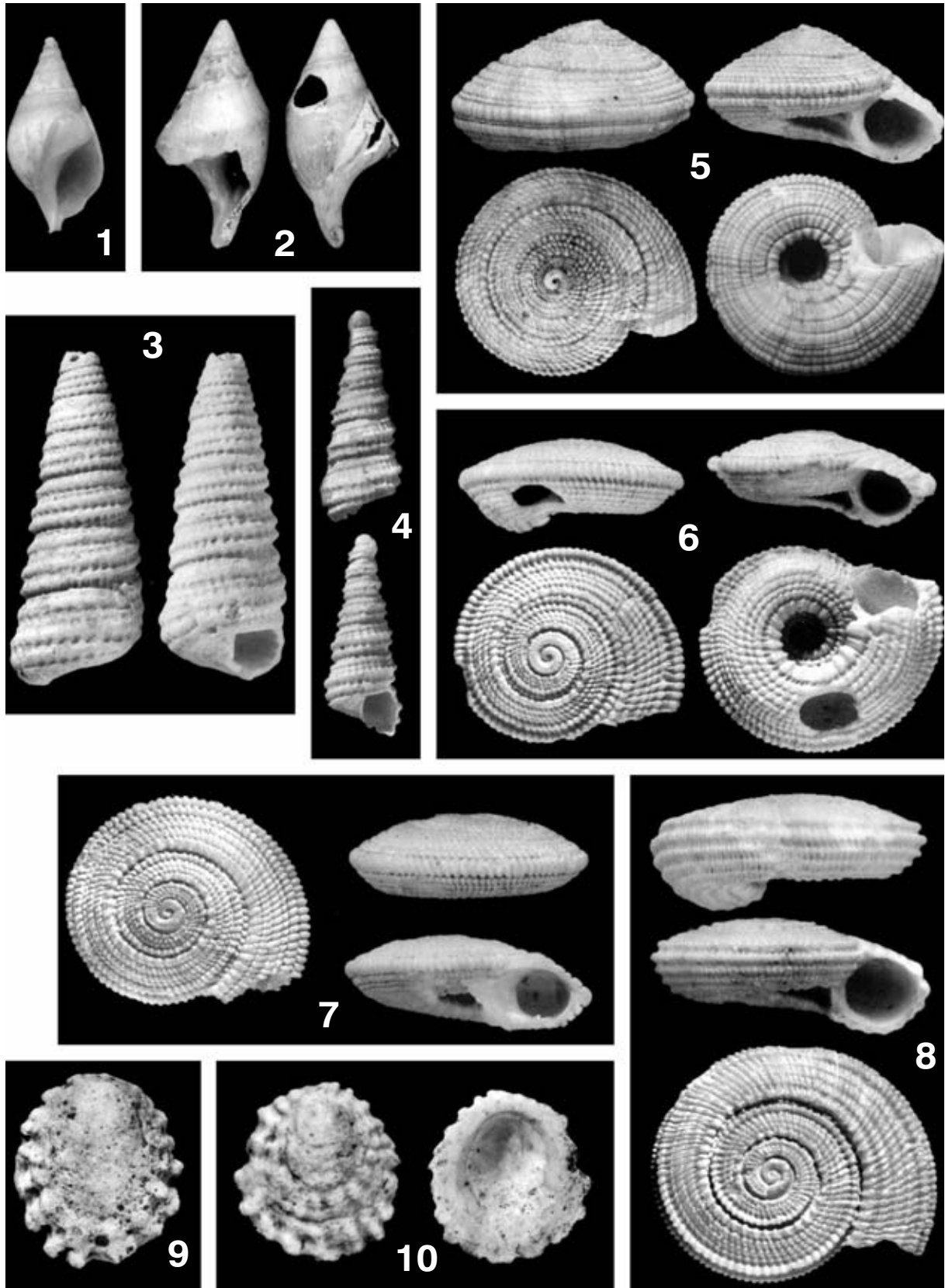


PLATE 8

Families **Litiopidae**, **Potamididae**, **Cerithiidae**, and **Triphoridae**

- 1 – *Alaba elata* BOETTGER, × 8; U.W., BkK-G1189
2 – *Bittium benoisti* COSSMANN & PEYROT, × 8; U.W., BkK-G1190
3 – *Bittium* sp., × 8; U.W., BkK-G1191
4 – *Bittium (Semibittium) multiliratum* BRUSINA, × 8; U.W., BkK-G1192
5 – *Pirenella moravica* (HÖRNES), × 2; Private collection of Mr. R. GAD
6 – *Cerithium (Theridium) obliquistoma* (SEGUENZA), × 4; U.W., BkK-G1195
7 – *Hemicerithium subcostatum* BAŁUK, × 4; U.W., BkK-G1198
8-9 – *Cerithium (Theridium) europeum* MAYER, × 2; 8 – U.W., BkK-G1193, 9 – U.W., BkK-G1194
10-11 – *Cerithium (Ptychocerithium) procrenatum* SACCO, × 2; 10 – U.W., BkK-G1196, 11 – U.W., BkK-G1197
12-15 – *Triphora aequalirata* (BOETTGER), × 8; 12 – U.W., BkK-G1212, 13 – U.W., BkK-G1213, 14 – U.W., BkK-G1214, 15 – U.W., BkK-G1215

All photos taken by B. MALINOWSKA

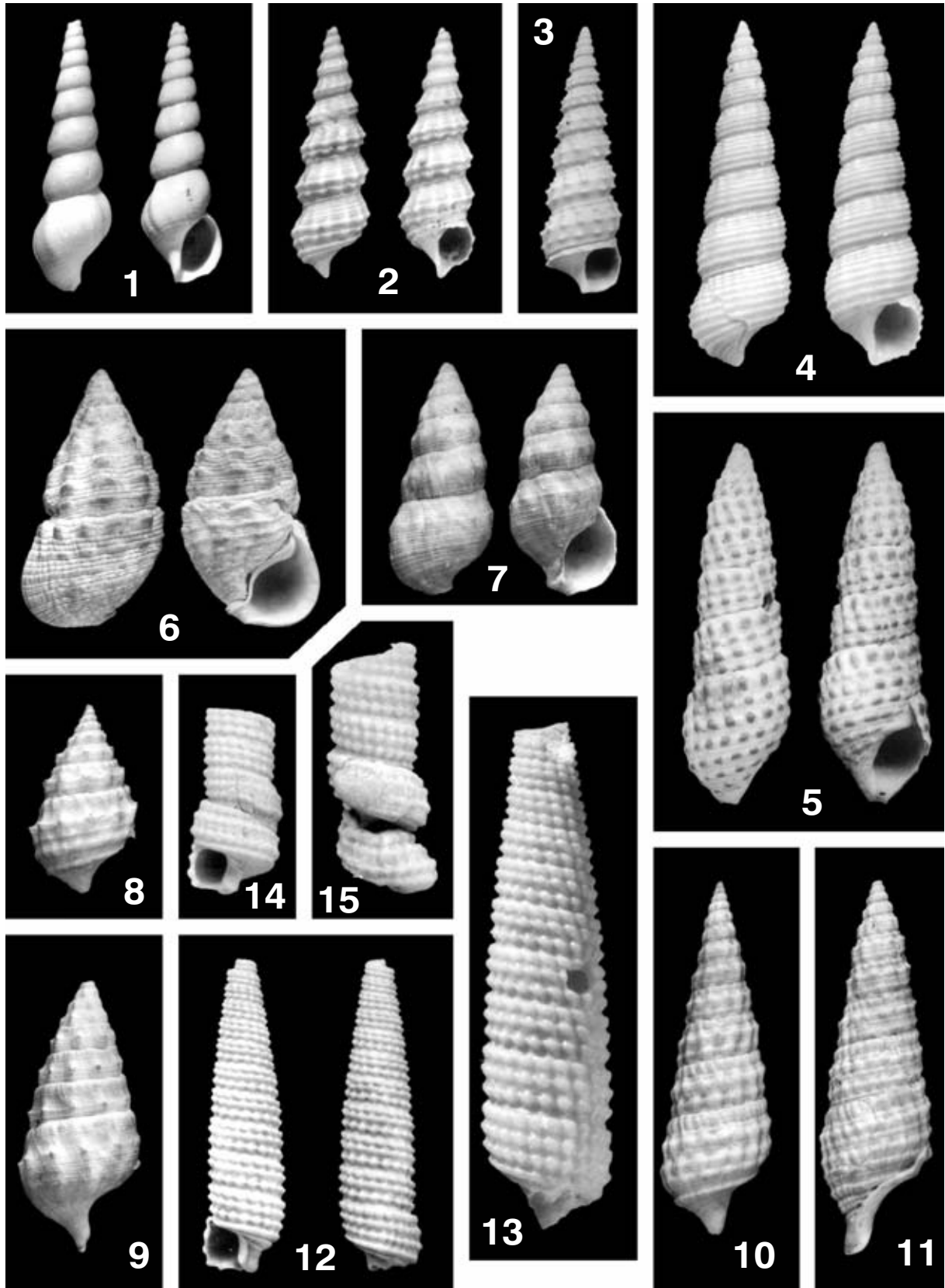


PLATE 9

Family **Cerithiopsidae**

- 1-2** – *Cerithiopsis (Cerithiopsis) opaca* BOETTGER, × 8; 1 – U.W., BkK-G1202, 2 – U.W., BkK-G1203
- 3** – *Cerithiopsis (Cerithiopsis) johanna*e BOETTGER, × 8; U.W., BkK-G1201
- 4** – *Cerithiopsis (Cerithiopsis) elsae* BOETTGER, × 8; U.W., BkK-G1216
- 5** – *Cerithiopsis* sp. an *Cerithiopsis (Metaxia) norae* BOETTGER, × 8; U.W., BkK-G1249
- 6-7** – *Cerithiopsis (Cerithiopsida) irmae* BOETTGER, × 8; 6 – U.W., BkK-G1199, 7 – U.W., BkK-G1200
- 8-9** – *Cerithiopsis (Dizoniopsis) bilineata* HÖRNES, × 8; 8 – U.W., BkK-G1204, 9 – U.W., BkK-G1205
- 10-13** – *Cerithiopsis (Metaxia) subsoluta* BOETTGER, × 8; 10 – U.W., BkK-G1206, 11 – U.W., BkK-G1207, 12 – U.W., BkK-G1208, 13 – U.W., BkK-G1209
- 14-15** – *Ataxocerithium christinae* (BOETTGER), × 8; 14 – U.W., BkK-G1248, 15 – U.W., BkK-G1210
- 16** – *Ataxocerithium kostejanum* (BOETTGER), × 8; U.W., BkK-G1211

Photos 1-4, 6-13, and 15-16 taken by B. MALINOWSKA; 5 and 14 by S. KOLANOWSKI

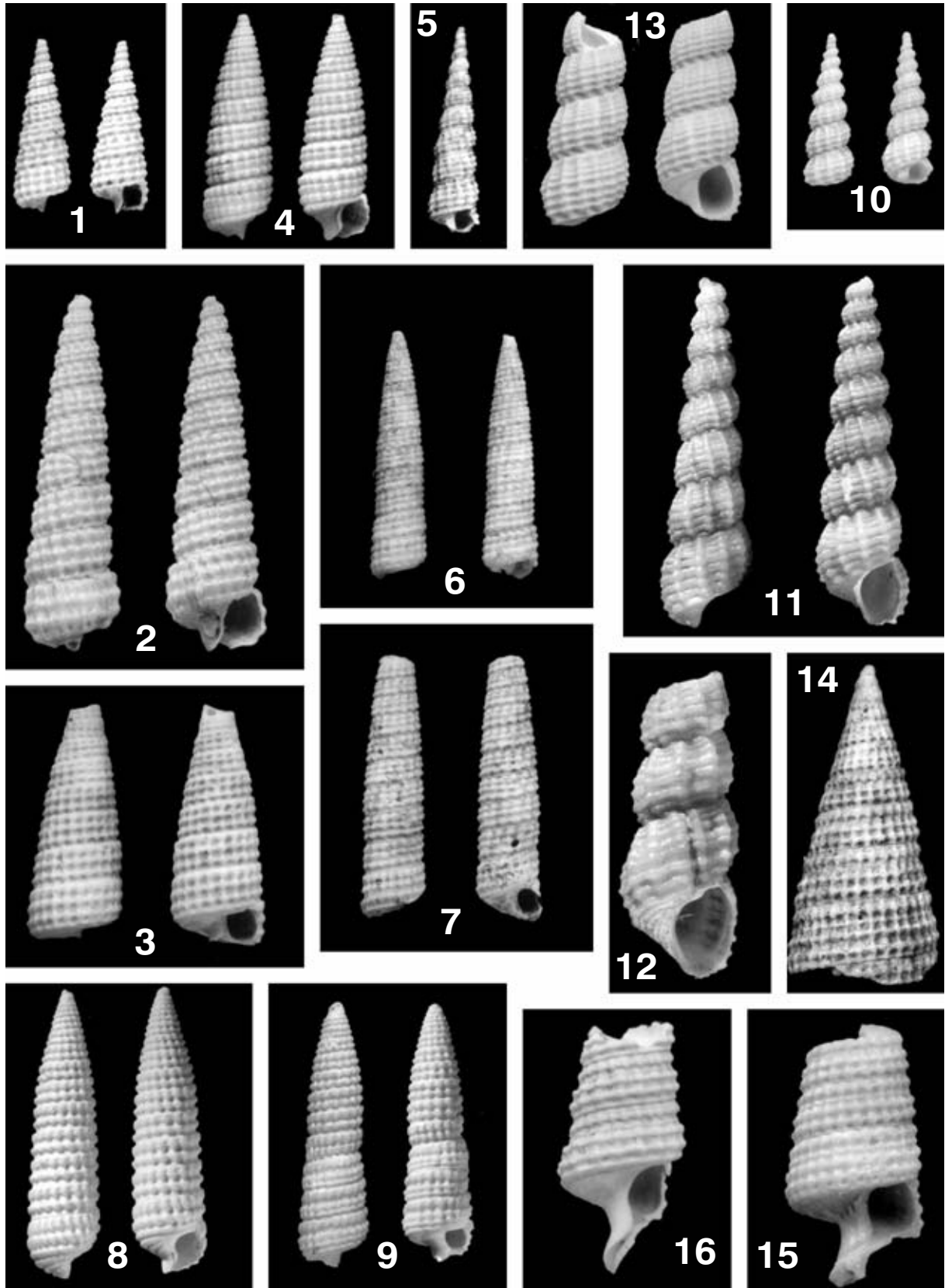


PLATE 10

Families **Fossaridae** and **Scalidae**

- 1 – *Couthouyia (Micreschara) roberti* (DE MORGAN), × 16; U.W., BkK-G1226
- 2 – *Scala (Clathrus) expectata* (DE BOURY), × 8; U.W., BkK-G1217
- 3 – *Scala (Clathrus) kunstleri* (DE BOURY in COSSMANN), × 8; U.W., BkK-G1218
- 4 – *Scala (Clathrus) parilis* (DE BOURY in COSSMANN), × 8; U.W., BkK-G1219
- 5 – *Scala (Clathrus) sp.*, × 8; U.W., BkK-G1220.
- 6 – *Acrilla subreticulata* (D'ORBIGNY), × 1; U.W., BkK-G1222
- 7 – *Acrilla interposita* SACCO, × 8; U.W., BkK-G1221
- 8-10 – *Opalia (Pliciscala) scacchii* (HÖRNES), × 8; 8 – U.W., BkK-G1223, 9 – U.W., BkK-G1224, 10 – U.W., BkK-G1225
- 11 – *Acirsa (Hemiacirsa) oscari* DE BOURY in COSSMANN, × 4; Private collection of Mr. M. BUDZIASZEK

All photos taken by B. MALINOWSKA

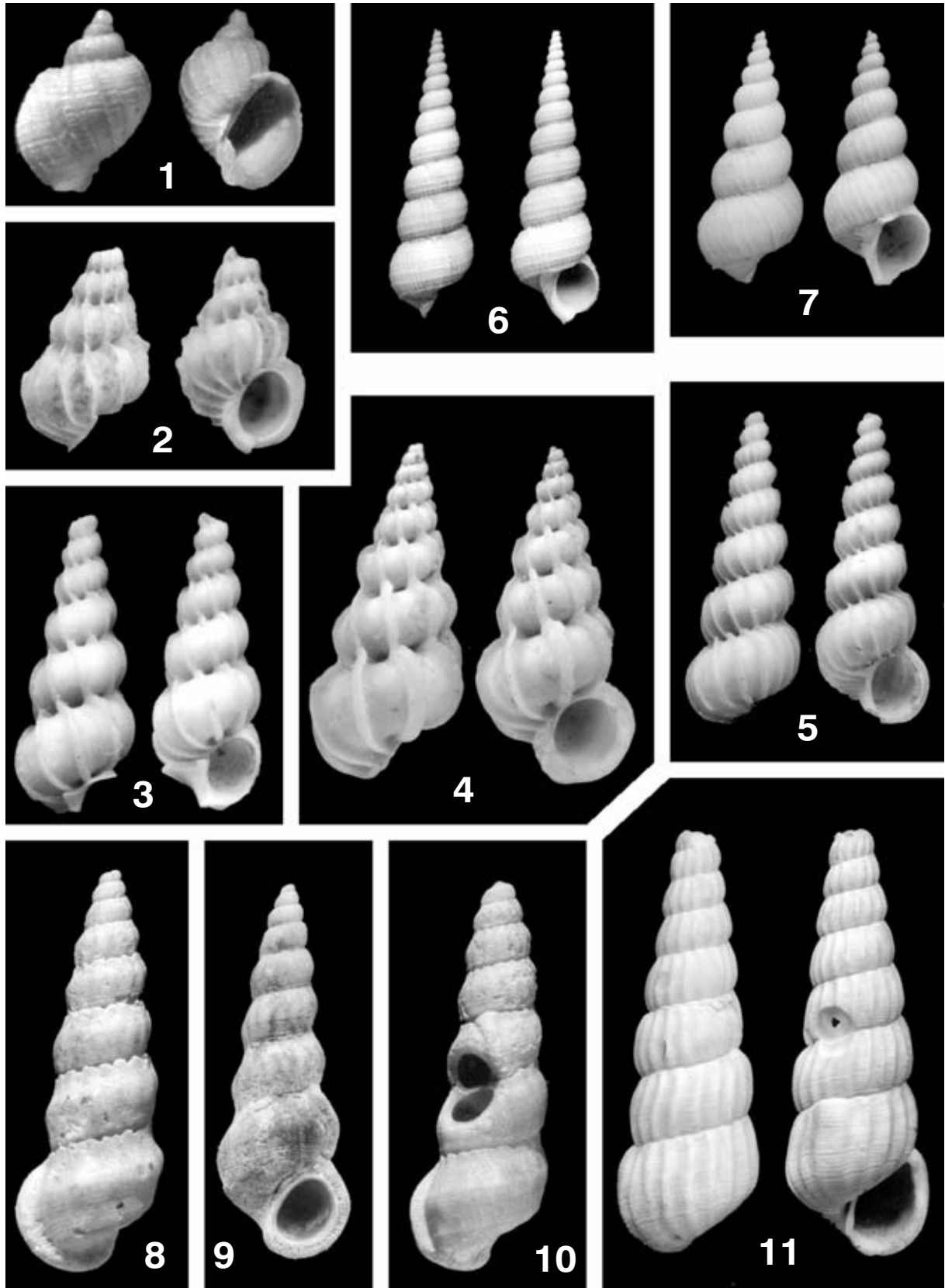


PLATE 11

Family **Muricidae**

- 1-2** – *Murex (Tubicauda) spincosta* BRONN, × 1; Private collection of Mr. M. BUDZIASZEK
3-4 – *Murex (Bolinus) partschi* HÖRNES, × 1; Private collection of Mr. J. GUBAŁA
5 – *Pterynotus (Purpurellus) cyclopterus* (MILLET), × 1; Private collection of Mr. W. KACZMARCZYK
6 – *Pterynotus (Pterynotus) tortuosus* (SOWERBY), × 2; Collection of the Museum of the Geological Survey of Poland, Warsaw, 27. II. 60
7 – *Homalocanthe heptagonata* (BRONN), × 1; Private collection of Mr. P. CZECH
8-9 – *Ocinebrina recognita* sp. nov., × 2; 8 – holotype, U.W., BkK-G1228, 9 – Private collection of Mr. W. KACZMARCZYK

Photos 1-5, 8-9 taken by B. MALINOWSKA; 6 by A. NOWICKA; 7 by S. KOLANOWSKI

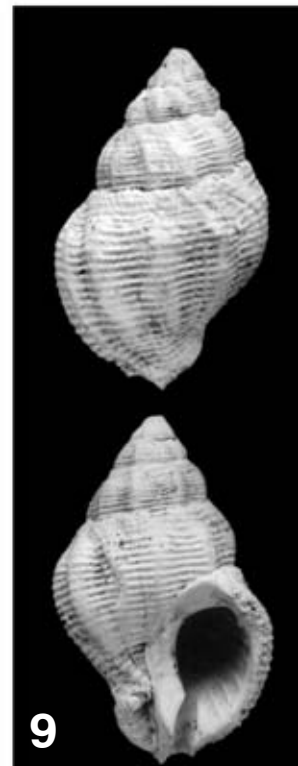
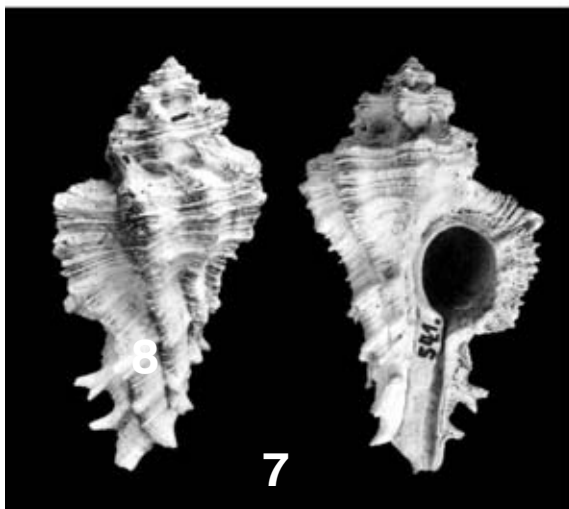
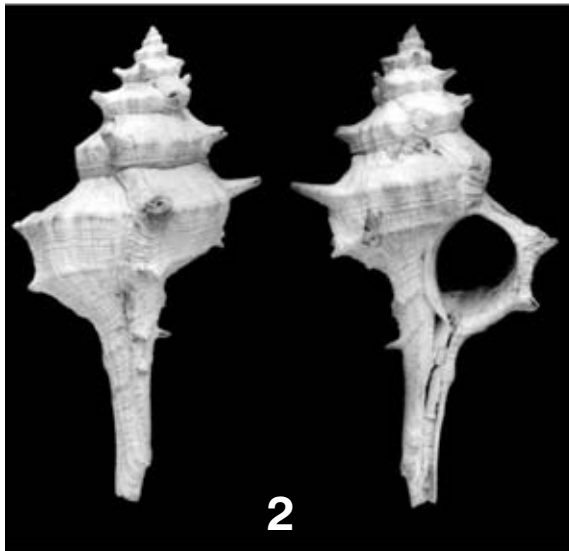
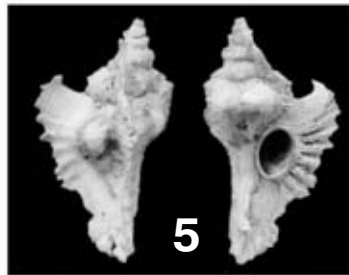
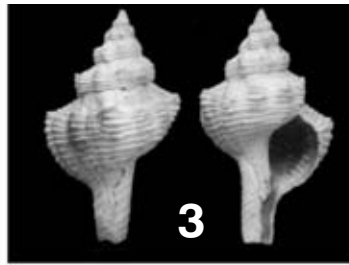
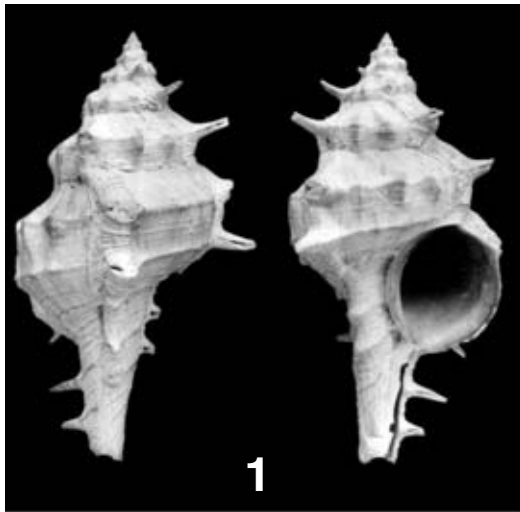


PLATE 12

Family **Muricidae**

- 1-2** – *Morula valdemari* sp.nov., × 2; 1 – **holotype**, U.W., BkK-G1227, 2 – Private collection of Mr. J. GUBAŁA
- 3-7** – *Thais (Stramonita) exilis* (PARTSCH *in* HÖRNES), 3-4 × 1, 5-7 × 2; 3-4, 7 – Private collection of Mr. J. GUBAŁA, 5-6 – Private collection of Mr. P. CZECH
- 8** – *Vitularia linguabovis* (BASTEROT), × 1; U.W., BkK-G1231

Photos 1-6 and 8 taken by B. MALINOWSKA; 7 by S. KOLANOWSKI

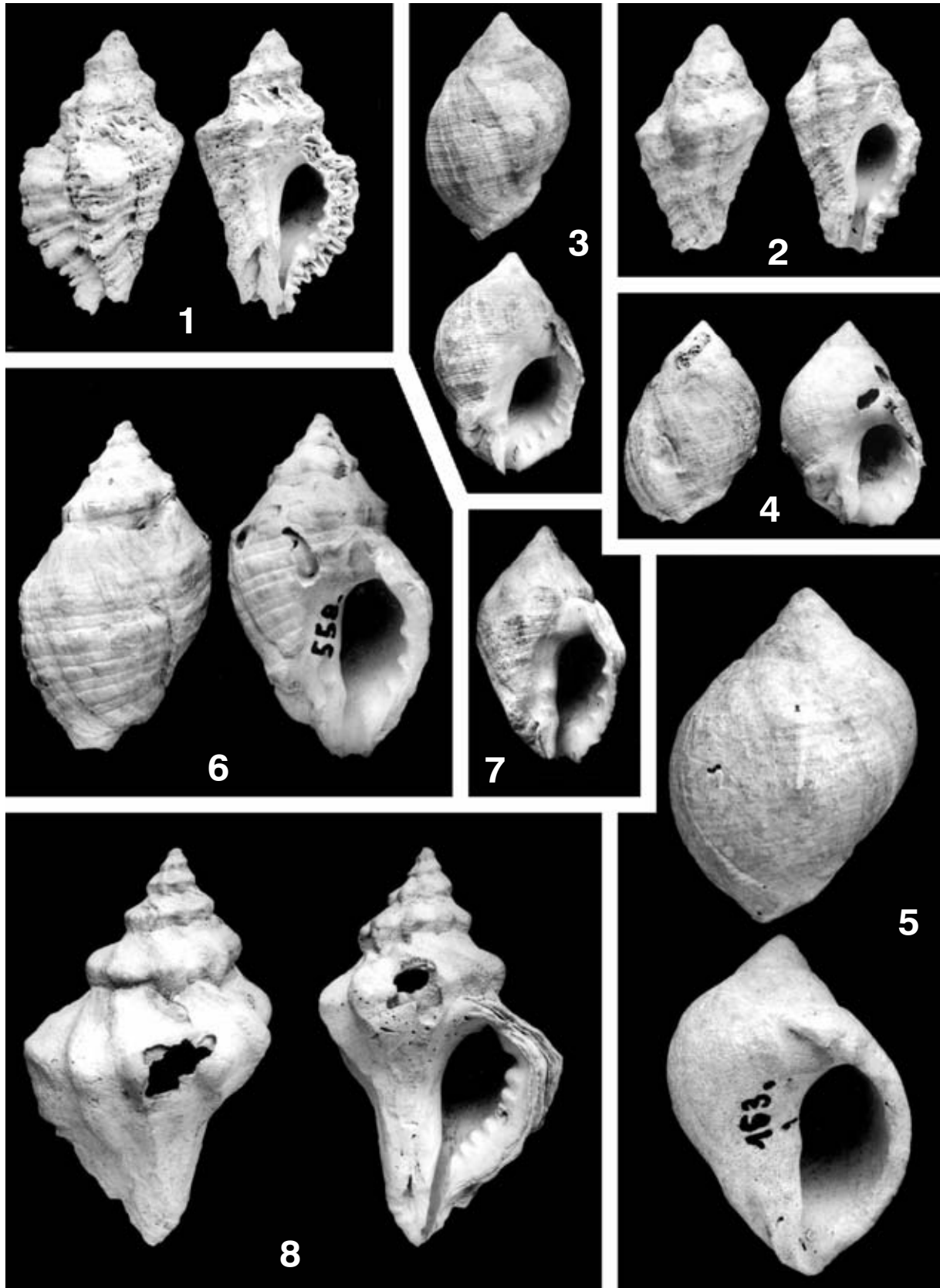


PLATE 13

Families **Muricidae** and **Coralliophilidae**

- 1-3** – *Purpura (Tritonalia) confluens* (EICHWALD), × 2; Private collection of Mr. J. GUBAŁA
4-8 – *Purpura (Tritonalia) vindobonensis* (HÖRNES), 4-5 × 8, 6 × 4, 7-8 × 2; 4 – U.W., BkK-G1229, 5 – U.W., BkK-G1230, 6-8 – Private collection of Mr. J. GUBAŁA
9 – *Coralliophila* sp., × 2; arrowed is a commensal vermetid causing partial uncoiling of the host shell, U.W., BkK-G1232

All photos taken by B. MALINOWSKA

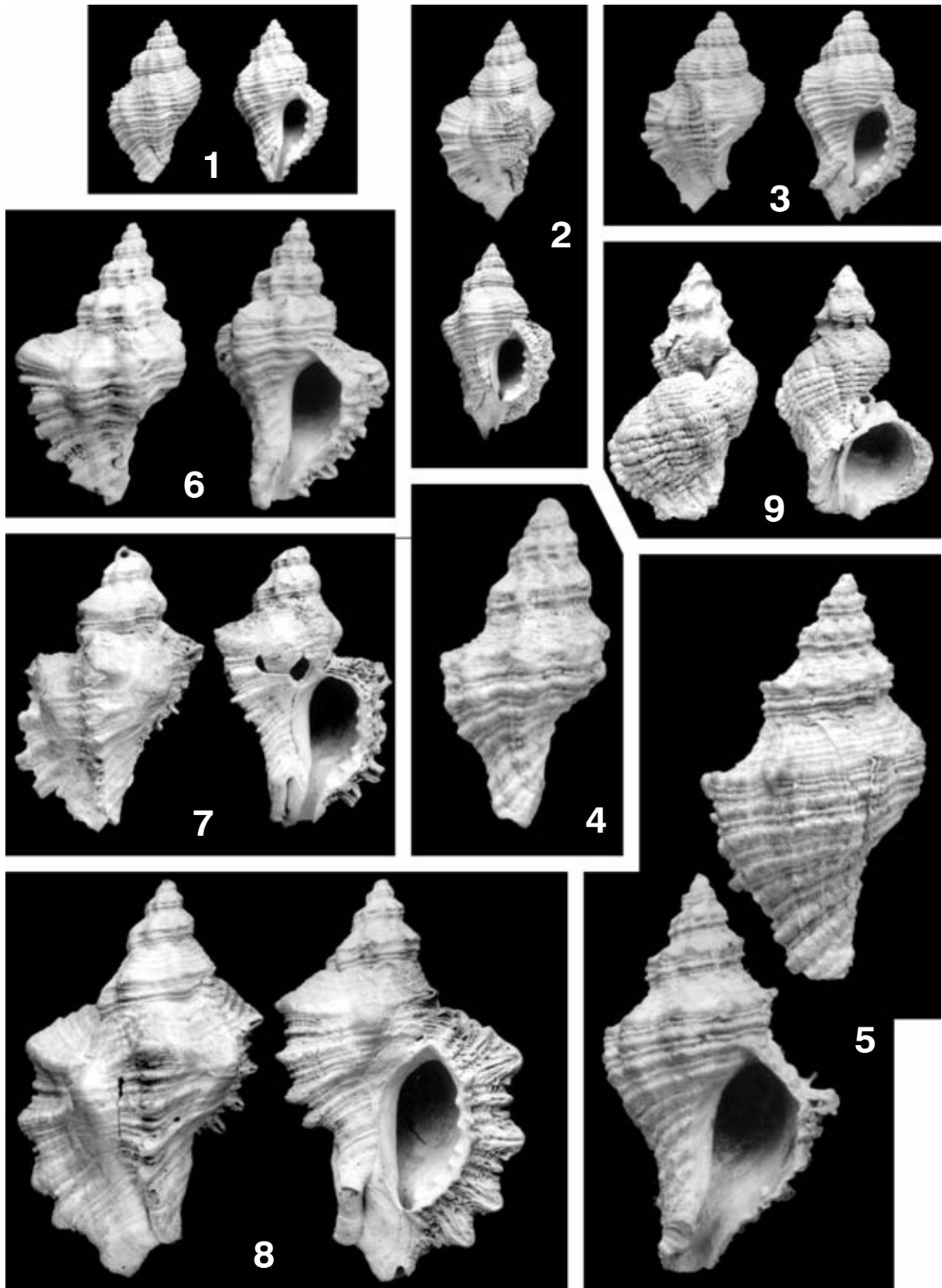


PLATE 14

Families **Pyrenidae**, **Olividae**, **Fascioliariidae**, and **Mitridae**

- 1-3** – *Pyrene (Mitrella) perminuta* (BOETTGER), × 8; 1 – U.W., BkK-G1236, 2 – U.W., BkK-G1237, 3 – U.W., BkK-G1238
- 4-5** – *Fusinus hontensis* (CSEPREGHY-MEZNERICS), × 1; 4 – U.W., BkK-G1234, 5 – Private collection of Mr. W. KACZMARCZYK
- 6** – *Latirus moravicus* (HOERNES & AUINGER), × 4; U.W., BkK-G1235
- 7** – *Oliva* sp., × 8; U.W., BkK-G1233
- 8** – *Mitraria (Mitraria) hilberi* (HOERNES & AUINGER), × 4; Private collection of Mr. J. GUBAŁA

All photos taken by B. MALINOWSKA

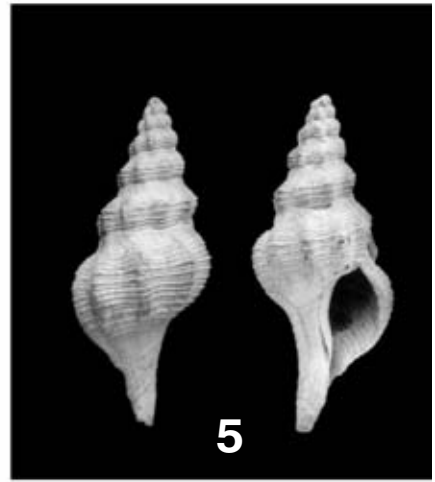
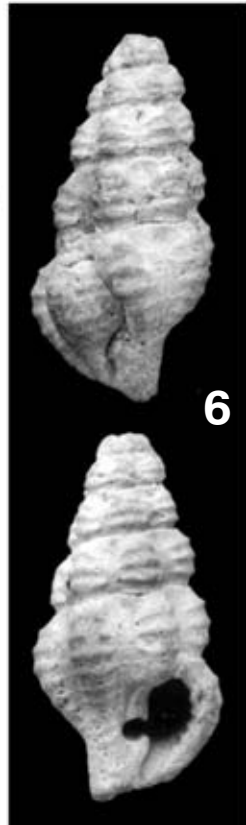
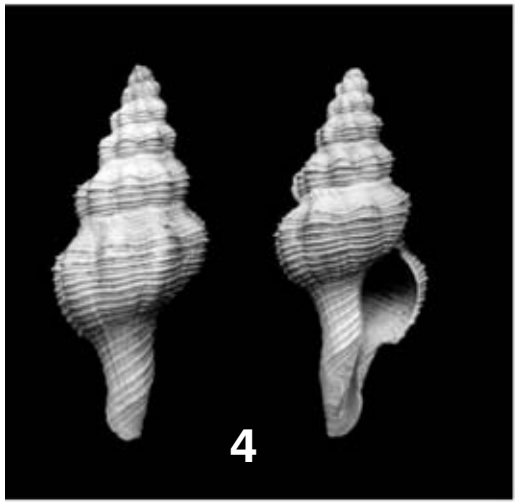
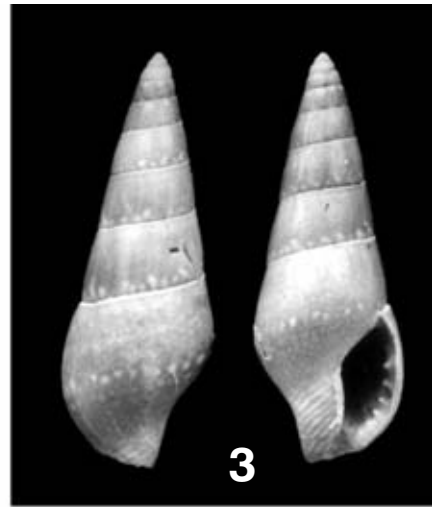
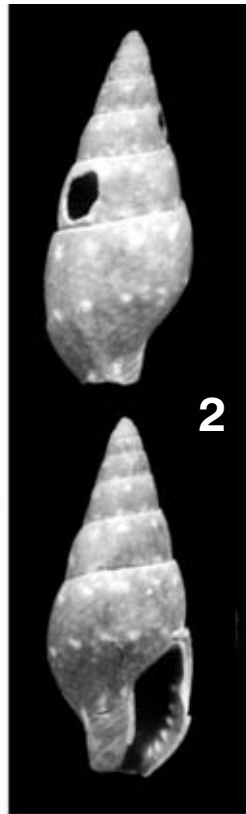
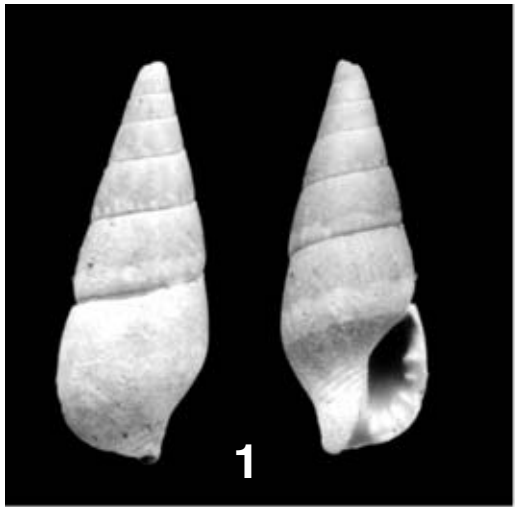


PLATE 15

Family **Nassariidae**

- 1-2** – *Nassarius tonsura* (HILBER), × 2; Private collection of Mr. J. GUBALA
- 3** – *Nassarius* sp., × 7; U.W., BkK-G1241
- 4** – *Nassarius auingeri* (HÖRNES in HOERNES & AUINGER), × 8; U.W., BkK-G1242
- 5** – *Nassarius karreri* (HOERNES & AUINGER), × 4; U.W., BkK-G1243
- 6** – *Nassarius schroeckingeri* HOERNES & AUINGER), × 4; U.W., BkK-G 1250
- 7** – *Nassarius notterbecki* (HOERNES & AUINGER), × 8; U.W., BkK-G1240
- 8** – *Nassarius hochstetteri* (HOERNES & AUINGER), × 8; U.W., BkK-G1239

Photos 1-5 and 7-8 taken by B. MALINOWSKA; 6 by S. KOLANOWSKI

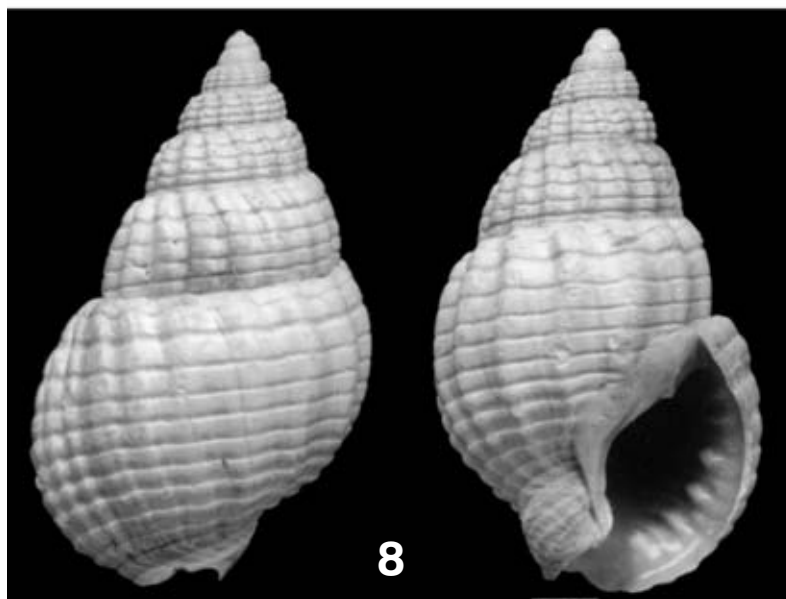
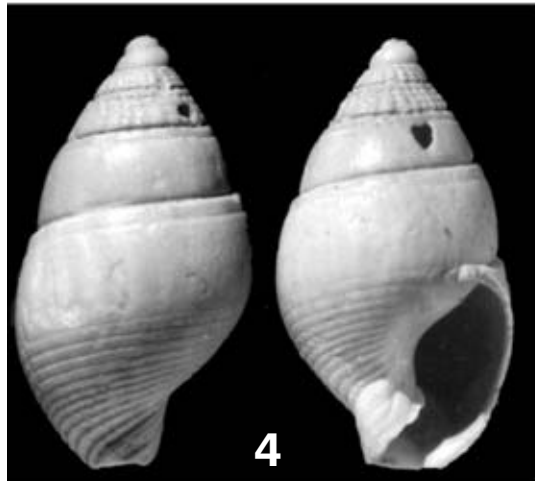
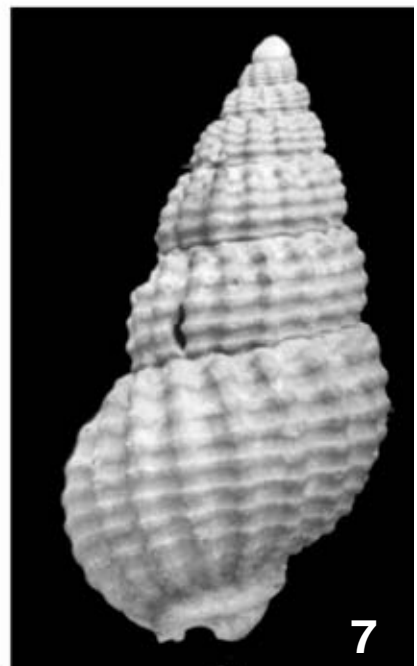
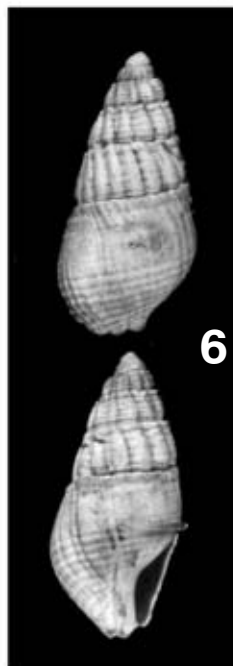
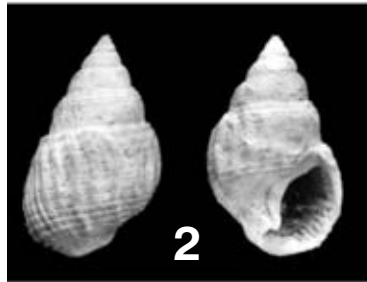
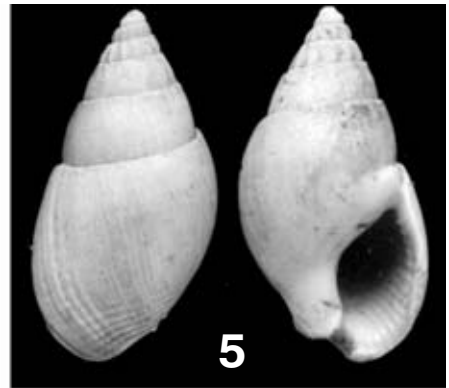
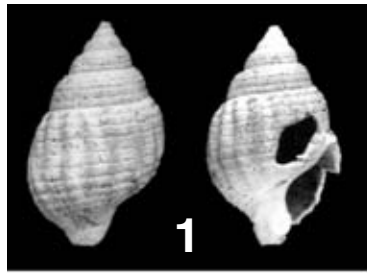


PLATE 16

Families **Cancellariidae**, **Turridae**, **Conidae**, and **Terebridae**

- 1 – *Cancellaria (Merica) callosa* PARTSCH, × 1; Private collection of Mr. M. BUDZIASZEK
- 2 – *Narona (Tribia) uniangulata* (DESHAYES), × 2; Private collection of Mr. J. GUBAŁA
- 3-4 – *Trigonostoma imbricatum* (HÖRNES), × 2; Private collection of Mr. J. GUBAŁA
- 5 – *Narona (Tribia) sp.*, × 4; U.W., BkK-G1245
- 6 – *Terebra (Terebra) sophiae* HALAVÁTS, × 2, U.W., BkK-G1247
- 7 – *Cythara (Mangelia) rugulosa* (PHILIPPI), × 8, U.W., BkK-G1256
- 8 – *Conus (Leptoconus) elongatus* BORSON, × 1; U.W., BkK-G1246

Photos 1-6 and 8 taken by B. MALINOWSKA; 7 by S. KOLANOWSKI

