

BADENIAN MOLLUSKS FROM RĂCHITOVA (HAȚEG DEPRESSION, ROMANIA)

MIRELA POPA¹, CONSTANTIN IANOLIU¹

ABSTRACT. The paper presents in systematic order the mollusk assemblage collected from one outcrop on Lacului Brook (left tributary to Răchitova Valley). There were identified 33 taxa (22 gastropods, 9 bivalves and 2 scaphopods) and the whole assemblage is characteristic to the Badenian deposits in the studied area.

Keywords: bivalves, gastropods, scaphopods, Badenian, Hațeg Depression, Romania

INTRODUCTION

From a paleogeographic point of view, the Hațeg Depression, situated in the north-western part of the Southern Carpathians, represents a former gulf of the Paratethyan realm (Papp et al., 1978).



Fig.1 - Location of the studied area

The Badenian deposits occur on the western part of the depression on the Răchitova Valley and its tributaries. These deposits were previously studied by Laufer (1925) and Mamulea (1953), who noticed the rich mollusk fauna.

The material presented here was collected from the Lacului Brook, a left tributary of the Răchitova Valley. Beside mollusks, the assemblage also includes foraminifera, bryozoans, otoliths and sponge spicules.

So far¹ there were identified 33 well preserved mollusk taxa. The gastropods are dominant (22 species), followed by bivalves (9 species) and scaphopods (2 species). The specimens are either juvenile forms (*Latirus* sp., *Bela sparsa*) or different ontogenetic stages.

SYSTEMATIC PART

Class: *Bivalvia* LINNÉ, 1758

Order: *Mytiloidea* FÉRUSSAC, 1822

Superfamily: *Mytilacea* RAFINESQUE, 1815

Family: *Mytilidae* RAFINESQUE, 1815

Genus: *Modiolula* SACCO, 1898

Modiolula phaseolina (PHILIPPI, 1844)

¹ Babeș-Bolyai University, Dept. of Geology- Paleontology, 3400, Cluj-Napoca, Romania

1986 *Modiolula phaseolina* (PHILIPPI) - STUDENCKA, p. 31, pl. 3, fig. 2, 6a-b, 7a-b

Material: One incomplete valve.

Stratigraphic range: Middle Miocene (Glibert, 1945) – Recent (fide Studencka, 1986).

Order: *Veneroida* H. & A. ADAMS, 1856

Superfamily: *Lucinacea* FLEMING, 1828

Family: *Lucinidae* FLEMING, 1828

Genus: *Loripes* POLI, 1791

Subgenus: *Microloripes* COSSMANN, 1910

Loripes (Microloripes) dentatus (DEFRANCE, 1823)

Pl. I, Fig. 1

1986 *Parvilucina (Microloripes) dentata* (DEFRANCE)–STUDENCKA, p. 50, pl. 8, fig. 2a-b, 3, 5, 6a-b

1996 *Loripes (Microloripes) dentatus* (DEFRANCE)–JAKUBOWSKY, p. 683, pl. 202, fig. 2-4

Material: One right valve.

Dimensions: Height, 1.5 mm, Length, 1.4 mm.

Stratigraphic range: Lower Miocene – Late Pliocene.

Superfamily: *Chamacea* LAMARCK, 1809

Family: *Chamidae* LAMARCK, 1809

Genus: *Chama* LINNÉ, 1758

Subgenus: *Psilopus* POLI, 1795

Chama (Psilopus) gryphoides LINNÉ, 1758

Pl. I, Fig. 2

1981 *Chama (Chama) gryphoides* LINNÉ – SVAGROVSKY, p. 408, pl. 3, fig. 2

1986 *Chama (Psilopus) gryphoides* LINNÉ - STUDENCKA, p. 57, pl. 8, fig. 8a-b, 9, pl. 9, fig. 1a-b, 2a-b

Material: One right juvenile valve.

Dimensions: Height, 1.5 mm, Length, 1.3 mm.

Stratigraphic range: Lower Miocene – Recent (Svagrovsky, 1981).

Superfamily: *Carditacea* FLEMING, 1820

Family: *Carditidae* FLEMING, 1828

Genus: *Cardita* BRUGUIÈRE, 1792

Cardites diversicosta (REUSS, 1860)

Pl. I, Fig. 3

1981 *Cardites diversicosta* (REUSS) - SVAGROVSKY, p. 410, pl. 3, fig. 8

Material: One left valve.

Dimensions: Height, 1.55 mm, Length, 1.6 mm.

Stratigraphic range: Badenian (Svagrovsky, 1981).

Superfamily: *Cardiacea* LAMARCK, 1809

Family: *Cardiidae* LAMARCK, 1809

BADENIAN MOLLUSKS FROM RĂCHITOVA (HAȚEG DEPRESSION, ROMANIA)

Genus: *Plagiocardium* COSSMANN, 1886

Subgenus: *Papillicardium* SACCO, 1899

Plagiocardium (Papillicardium) papillosum (POLI, 1791)

Pl. I, Fig. 4

1974 *Cardium (Parvicardium) papillosum* (POLI) – NICORICI, p. 98, pl. I, Fig. 13-18

1981 *Plagiocardium (Papillicardium) papillosum* (POLI) - SVAGROVSKY, p. 414, pl. 4, fig. 5

Material: One left valve.

Dimensions: Height, 1.7 mm, Length, 1.75 mm.

Stratigraphic range: Lower Miocene – Recent (Svagrovsky, 1981).

Plagiocardium (Papillicardium) sonense (COSSMANN, 1896)

Pl. I, Fig. 5

1986 *Plagiocardium (Papillicardium) sonense* (COSSMANN) - STUDENCKA, p. 70, pl. 11, fig. 7a-b, 8-11

Material: One right incomplete valve.

Dimensions: Height, 1.1 mm, Length, 1.25 mm.

Stratigraphic range: Lower Miocene (Cossmann & Peyrot) – Middle Miocene (Senes, 1958) (fide Studencka, 1986).

Superfamily: *Veneracea* RAFINESQUE, 1815

Family: *Veneridae* RAFINESQUE, 1815

Genus: *Gouldia* C. B. ADAMS, 1847

Gouldia minima (MONTAGU, 1803)

Pl. I, Fig. 6

1984 *Gouldia (Gouldia) minima* (MONTAGU) – JANSSEN, p. 98, pl. 37, fig. 1a-b

1986 *Gouldia minima* (MONTAGU) - STUDENCKA, p. 96, pl. 14, fig. 7a-b

Material: Two right valves.

Dimensions: Height, 1.7 mm, Length, 1.9 mm.

Stratigraphic range: Lower Miocene – Recent.

Order: *Myoidea* STOLICZKA, 1870

Superfamily: *Myacea* LAMARCK, 1809

Family: *Corbulidae* LAMARCK, 1818

Genus: *Corbula* BRUGUIERE, 1797

Subgenus: *Varicorbula* GRANT and GALE, 1931

Corbula (Varicorbula) gibba (OLIVI, 1792)

1986 *Corbula (Varicorbula) gibba* (OLIVI) - STUDENCKA, p. 103, pl. 16, fig. 13-15, pl. 18, fig. 2,3,6,8,10

1996 *Corbula (Varicorbula) gibba* (OLIVI) – JAKUBOWSKY, p. 700, pl. 214, fig. 1-10

Material: Two incomplete right valves.

Stratigraphic range: Late Eocene – Recent (Studencka, 1986).

Superfamily: *Hiatellacea* GRAY, 1824
Family: *Hiatellidae* GRAY, 1824
Genus: *Hiatella* BOSC (ex DAUDIN, MS) 1801
Subgenus: *Hiatella*

Hiatella (Hiatella) arctica (LINNÉ, 1767)
Pl. I, Fig. 7

1984 *Hiatella (Hiatella) arctica arctica* (LINNÉ) - JANSSEN, p. 102, pl. 39, fig. 3-4
1986 *Hiatella (Hiatella) arctica* (LINNÉ) - STUDENCKA, p. 104, pl. 15, fig. 10a-b, 12a-b

Material: One right valve.
Dimensions: Height, 1.1 mm, Length, 2.5 mm.
Stratigraphic range: Middle Oligocene (Baldi, 1973) – Recent (fide Studencka, 1986).

Class: ***Gastropoda*** CUVIER, 1797
Subclass: *Prosobranchia* MILNE-EDWARDS, 1848
Order: *Archaeogastropoda* THIELE, 1925
Superfamily: *Fissurellacea* FLEMING, 1822
Family: *Fissurellidae* FLEMING, 1822
Genus: *Fissurellidea* ORBIGNY, 1841
Subgenus: *Fissurellidea*

Fissurellidea (Fissurellidea) clypeata (GRATELOUP, 1827)
Pl. I, Fig. 8

1966 *Fissurellidea (Fissurellidea) clypeata* GRATELOUP - STRAUSZ, p. 28, pl. 76, fig. 17-19
1975 *Fissurellidea (Fissurellidea) clypeata* (GRATELOUP) – BALUK, p. 28, pl. II, fig. 12-16
1981 *Fissurellidea clypeata* GRATELOUP – KRACH, p. 41, pl. XII, fig. 13,14

Material: One juvenile and incomplete specimen.
Stratigraphic range: Middle Miocene (Krach, 1981).

Superfamily: *Trochacea* RAFINESQUE, 1815
Family: *Trochidae* RAFINESQUE, 1815
Genus: *Gibbula* RISSO, 1826
Subgenus: *Gibbula*

Gibbula (Gibbula) mimula BOETTGER, 1906

1906 *Gibbula (Phorculellus) mimula* n. sp. – BOETTGER, p. 180
1934 *Gibbula (Colliculus) mimula* (BOETTGER) – ZILCH, p. 201, pl. 2, fig. 30
1975 *Gibbula (Gibbula) mimula* BOETTGER - BALUK, p. 35, pl. IV, fig. 6

Material: One specimen.
Stratigraphic range: Badenian.

Subgenus: *Gibbula (Colliculus)* MONTEROSATO, 1888
Gibbula (Colliculus) pseudangulata BOETTGER, 1907
Pl. I, Fig. 9

1907 *Gibbula (Colliculus) pseudangulata* n. sp. – BOETTGER, p. 181

BADENIAN MOLLUSKS FROM RĂCHITOVA (HAȚEG DEPRESSION, ROMANIA)

1934 *Gibbula (Colliculus) pseudangulata* BOETTGER – ZILCH, p.201, pl. 2, fig. 27

Material: One specimen.

Dimensions: Height, 1.7mm, width, 2.0 mm.

Stratigraphic range: Badenian (Svagrösky, 1984).

Family: *Turbinidae* RAFINESQUE, 1815

Genus: *Collonia* GRAY, 1850

Collonia transsilvanica BOETTGER, 1901

Pl. I, Fig. 10

1901 *Collonia transsilvanica* n. sp. – BOETTGER, p. 163

1934 *Collonia transsilvanica* BOETTGER - ZILCH, p.206, pl. 4, fig. 53

1975 *Collonia transsilvanica* BOETTGER - BALUK, p. 46, pl. V, fig. 13-14

Material: One specimen.

Dimensions: Height, 1.5mm, width incomplete (having a damaged aperture).

Stratigraphic range: Badenian.

Genus: *Cirsochilus* COSSMANN, 1888

Cirsochilus granulosus (GRATELOUP, 1840)

1975 *Cirsochilus granulosus* (BOETTGER) - BALUK, p. 48, pl. V, fig. 6

Material: Three specimens.

Stratigraphic range: Lower and Middle Miocene (Baluk, 1975).

Family: *Phasianellidae* SWAINSON, 1840

Genus: *Tricolia* RISSO, 1826

Subgenus: *Tricolia*

Tricolia (Tricolia) eichwaldi (HOERNES, 1856)

Pl. II, Fig. 1

1856 *Phasianella Eichwaldi* HÖRN. - M. HOERNES, p. 440, pl. 44, fig. 1

1975 *Tricolia (Tricolia) eichwaldi* (HOERNES) - BALUK, p. 57, pl. VII, fig. 1-4

Material: One specimen.

Dimensions: Shell incomplete (having a damaged aperture, Pl. II, Fig. 1).

Stratigraphic range: Lower and Middle Miocene (Svagrösky, 1981a).

Order: *Caenogastropoda* COX, 1959

Superfamily: *Littorinacea* RAFINESQUE, 1815

Family: *Littorinidae* GRAY, 1840

Genus: *Tectarius* VALENCIENNES, 1833

Tectarius kostejanus (BOETTGER, 1901)

Pl. II, Fig. 2

1901 *Littorina (Tectarius) kostejana* n.sp. – BOETTGER, p. 135

1934 *Tectarius kostejanus* (BOETTGER) - ZILCH, p.209, pl. 5, fig. 68

1981 *Tectarium kostejense* BOETTGER - KRACH, p. 46, pl. XXIII, fig. 21

Material: One specimen.
Dimensions: Height, 1.3mm, width, 1.0 mm
Stratigraphic range: Badenian.

Superfamily: *Rissoacea*
Family: *Rissoidae* H. & A. ADAMS, 1854
Genus: *Turboella* LEACH in GRAY, 1847
Subgenus: *Turboella*

Turboella (Turboella) acuticosta SACCO, 1895
Pl. II, Fig. 3

1975 *Turboella (Turboella) acuticosta* SACCO – BALUK, p. 69, pl. VIII, fig. 9 -11
1981 *Turboella (Turboella) acuticosta* SACCO - KRACH, p. 47, pl. XV, fig. 19 - 21
1981a *Turboella (Turboella) acuticosta* SACCO - SVAGROVSKY, p. 121, pl. XXXVII, fig. 8,9

Material: Two specimens.
Dimensions: Height, 2.0mm, width, 1.0 mm.
Stratigraphic range: Badenian (Svagrinsky, 1981a).

Genus: *Alvania* RISSO, 1826
Subgenus: *Alvania*

Alvania (Alvania) montagui ampulla (EICHWALD, 1853)
Pl. II, Fig. 5

1975 *Alvania (Alvania) montagui ampulla* (EICHWALD) - BALUK, p. 79, pl. IX, fig. 9
1981 *Alvania (Alvania) montagui ampulla* (EICHWALD) - KRACH, p. 49, pl. XV, fig. 1

Material: Nine specimens.
Dimensions: Height, 1.4 mm, width, 1.1 mm.
Stratigraphic range: Eggenburgian-Badenian (Svagrinsky, 1981a).

Subgenus: *Turbona* LEACH in GRAY, 1847

Alvania (Turbona) anabaptizata (BOETTGER, 1906)
Pl. II, Fig. 4

1906 *Alvania (Acinus) anabaptizata* n.sp. -BOETTGER, p. 158
1934 *Alvania (Turbona) anabaptizata* (BOETTGER) – ZILCH, p. 212, pl. 5, fig. 86a-b

Material: Two specimens.
Dimensions: Height, 3.1 mm, width, 1.9 mm.
Stratigraphic range: Badenian.

Alvania (Turbona) perregularis (SACCO, 1895)
Pl. II, Fig. 6

1981 *Alvania (Turbona) perregularis* SACCO - KRACH, p. 51, pl. XV, fig. 5,6
1981a *Alvania (Turbona) perregularis* (SACCO) - SVAGROVSKY, p. 118, pl. XXXVI, fig. 4

BADENIAN MOLLUSKS FROM RĂCHITOVA (HAȚEG DEPRESSION, ROMANIA)

Material: Seven specimens.
Dimensions: Height, 1.3 mm, width, 1.0 mm.
Stratigraphic range: Badenian (Svagrovsky, 1981a).

Genus: *Rissoina* ORBIGNY, 1840
Subgenus: *Rissoina*

Rissoina (Rissoina) cf. vindobonensis SACCO, 1895
Pl. II, Fig. 7

1975 *Rissoina (Rissoina) vindobonensis* SACCO - BALUK, p. 91, pl. X, fig. 6-7
1981 *Rissoina (Rissoina) vindobonensis* SACCO - KRACH, p. 52, pl. XV, fig. 23,24,29,30

Material: One specimen.
Dimensions: Height, 2.0 mm, width incomplete (having a damaged aperture, Pl. II, Fig. 7).
Stratigraphic range: Badenian (Krach, 1981).

Superfamily: *Cerithiacea* FLEMING, 1821
Family: *Turritellidae* CLARK, 1851
Genus: *Turritella* LAMARCK, 1799
Subgenus: *Eichwaldiella* FRIEDBERG, 1933

Turritella (Eichwaldiella) bicarinata EICHWALD, 1830
Pl. II, Fig. 8

1975 *Turritella (Eichwaldiella) bicarinata* EICHWALD - BALUK, p. 109, pl. XII, fig. 1-6
1981a *Turritella (Archimediella) bicarinata* EICHWALD - SVAGROVSKY, p. 128, pl. XXXVIII, fig. 11
1982 *Turritella (Eichwaldiella) bicarinata* EICHWALD - SVAGROVSKY, p. 16, pl. IV, fig. 6

Material: One incomplete specimen.
Stratigraphic range: Lower Miocene - Middle Miocene (Svagrovsky, 1981a).
Family: *Cerithiidae* FLEMING, 1821
Genus: *Bittium* GRAY, 1847
Subgenus: *Bittium*

Bittium (Bittium) reticulatum (DA COSTA, 1779)
Pl. III, Fig. 1

1975 *Bittium (Bittium) reticulatum* (DA COSTA) - BALUK, p. 140, pl. XVI, fig. 10-15
1981a *Bittium (Bittium) reticulatum* (COSTA) - SVAGROVSKY, p. 136, pl. XLI, fig. 1-5
1982 *Bittium reticulatum* (COSTA) - SVAGROVSKY, p. 20, pl. VIII, fig. 1

Material: Twelve specimens.
Dimensions: Height, 2.4 mm, width, 1.0 mm.
Stratigraphic range: Lower Miocene - Recent.

Subgenus: *Semibittium* COSSMANN, 1896
Bittium (Semibittium) multiliratum BRUSINA, 1877
Pl. III, Fig. 2

1966 *Seilla multilirata* BRUSINA - STRAUSS, p. 169, pl. 5, fig. 28-29
1975 *Bittium (Semibittium) multiliratum* BRUSINA - BALUK, p. 141, pl. XVI, fig. 8-9

Material: Four specimens.
Dimensions: Height, 2.9 mm, width, 1.0 mm.
Stratigraphic range: Badenian (Baluk, 1975).

Family: *Cerithiopsidae* H & A. ADAMS, 1854
Genus: *Cerithiopsis* FORBES & HANLEY, 1849

Cerithiopsis tubercularis astensis COSSMANN, 1906

1975 *Cerithiopsis (Cerithiopsis) tubercularis* (MONTAGU) - BALUK, p. 155, pl. XIX, fig. 1-5
1982 *Cerithiopsis tubercularis astensis* COSSMANN - SVAGROVSKY, p. 25, pl. IX, fig. 2

Material: One specimen.
Stratigraphic range: Lower Miocene – Recent (Svagrovsky, 1982).

Family: *Triphoridae* JOUSSEAUME, 1884
Genus: *Triphora* BLAINVILLE, 1828
Subgenus: *Triphora*

Triphora (Triphora) perversa (LINNÉ, 1758)
Pl. III, Fig. 3

1975 *Triphora perversa* (LINNAEUS) - BALUK, p. 168, pl. XX, fig. 3-5
1981a *Triphora (Triphora) perversa* (LINNÉ) - SVAGROVSKY, p. 138, pl. XLII, fig. 4

Material: Two specimens.
Dimensions: Height, 2.3 mm, width, 0.9 mm.
Stratigraphic range: Lower Miocene - Recent (Svagrovsky, 1981a).

Order: *Neogastropoda* WENZ, 1938
Superfamily: *Buccinacea*
Family: *Fasciolariidae*
Genus: *Latirus* MONTFORT, 1810

Latirus sp.
Pl. III, Fig. 4

Material: One juvenile specimen.
Dimensions: Height, 1.9 mm, width, 1.1 mm.

Superfamily: *Mitracea*
Family: *Mitridae* H. & A. ADAMS, 1853
Genus: *Vexillum* ROEDING, 1929
Subgenus: *Costellaria* SWAINSON, 1840

Vexillum (Costellaria) pseudorecticoستا vexans (BOETTGER, 1906)
Pl. III, Fig. 5

1906 *Mitra (Costellaria) pseudorecticoستا* n. nom. var. *vexans* – BOETTGER, p. 10
1934 *Vexillum (Costellaria) pseudorecticoستا vexans* (BOETTGER) - ZILCH, p. 259, pl. 17, fig. 16

Material: One specimen.
Dimensions: Height, 2.1 mm, width, 1.2 mm.
Stratigraphic range: Badenian.

Superfamily: *Conacea* RAFINESQUE, 1815
Family: *Turridae* SWAINSON, 1840

BADENIAN MOLLUSKS FROM RĂCHITOVA (HAȚEG DEPRESSION, ROMANIA)

Genus: *Bela* GRAY, 1847

Bela sparsa (BOETTGER, 1901)

Pl. III, Fig. 6

1901 *Raphitoma sparsa* n. sp. - BOETTGER, p. 74

1934 *Cythara (Mangelia) sparsa* (BOETTGER) - ZILCH, p. 266, pl. 19, fig. 58

1981a *Bela sparsa* (BOETTGER) - SVAGROVSKY, p. 157, pl. XLVIII, fig. 5

Material: One juvenile specimen.

Dimensions: Height, 2.1 mm, width, 1.0 mm.

Stratigraphic range: Badenian (Svagrinsky, 1981a).

Family: *Pleurotomidae*, CHEMNITZ

Genus: *Philbertia* MONTEROSATO, 1884

Philbertia microhystrix (BOETTGER, 1901)

Pl. III, Fig. 7

1901 *Peratotoma (Cordieria) microhystrix* n. sp. - BOETTGER, p. 54

1934 *Philbertia microhystrix* (BOETTGER) - ZILCH, p. 270, pl. 20, fig. 78

Material: One specimen.

Dimensions: Height, 1.9 mm, width, 1.0 mm.

Stratigraphic range: Badenian.

Subclass: *Opisthobranchia* MILNE-EDWARDS, 1848

Order: *Cephalaspidea* FISCHER, 1883

Superfamily: *Acteonacea* ORBIGNY, 1842

Family: *Ringiculidae* PHILIPPI, 1853

Genus: *Ringicula* DESHAYES, 1838

Subgenus: *Ringiculella* SACCO, 1892

Ringicula (Ringiculella) laevigata (EICHWALD, 1830)

Pl. III, Fig. 8

1966 *Ringicula (Ringiculina) auriculata laevigata* EICHWALD - STRAUZ, p. 470, pl. 41, fig. 7, 8

1984 *Ringicula (Ringiculella) laevigata* (EICHWALD) - SVAGROVSKY, p. 186, pl. III, fig. 2

Material: One specimen.

Dimensions: Height, 1.5 mm, width, 0.9 mm.

Stratigraphic range: Miocene - Pliocene (Svagrinsky, 1984).

CONCLUSIONS

The stratigraphic distribution of the studied taxa is typical for the Badenian stage. The same age is also suggested by the calcareous nannoplankton assemblage *Sphenolithus heteromorphus* – NN5 Zone (Ianolu, conference presentation).

This assemblage is similar to those described in the famous fossiliferous sites from Coștei, Lăpugiu, Buituri and Tusa (Romania). The same type of fauna was described in other regions of the Central Paratethys, in Slovakia (Svagrinsky, 1981, 1982, 1984), Poland (Studencka, 1986; Baluk, 1975; Krach, 1981) and Hungary (Strausz, 1966).

Except *Corbula gibba*, which was mentioned by Mamulea (1953), the presented species are mentioned for the first time in the western part of the Hațeg Depression.

REFERENCES

1. Baluk, W., 1975: *Lower Tortonian Gastropods from Korytnica, Poland*, I, Polska Akad. Nauk, Palaeo. Pol., 32, 186p., 21 pl, Warsawa - Krakow.
2. Boettger, O., 1901-1907: *Zur Kenntnis der Fauna der mittelmiozänen Schichten von Kosteĳ im Krassó - Szórényer Komitat*, Verhand. und Mitt. des Siebenbürg für Naturw. zu Hermannstadt, 51, 54, 55, Sibiu.
3. Hörnes, M., 1856: *Die Fossilen Mollusken des Tertiaer-Beckens von Wien*, Abhand. der k. k. Geol. Reich, I, Univalven, 52 pl., Wien.
4. Jakubowsky, G., în Malinowska, L.,:1996: *Atlas skamienialosci przewodnich i charakterystycznych. Budowa geologiczna Polski*, Polska Agencja Ekologiczn, Tom III, Neogen, p. 500 - 1074, pl. 141 - 324, Warsawa.
5. Janssen, A., W., 1984: *Mollusken uit het mioceen van winterswijkmiste*, Nederlande Geol. Vereniging, 430 p., 22 pl., Leiden.
6. Krach, W., 1981: *The Baden reef formations in Roztocze Lubelskie*, Polska Akad. Nauk., Prace Geol., 91 p., 24 pl., Warsawa.
7. Laufer, F., 1925: *Contribuĳii la studiul geologic al împrejurimilor oraşului Haĳeg*, Anuarul Inst. Geol. Rom., X, p. 301- 333, Bucureşti.
8. Mamulea, A., 1953: *Cercetări geologice în partea de vest a Bazinului Haĳeg (reg. Sarmisegetuza-Răchitova)*, D. S. Inst. Geol. Rom., XXXVII, p. 142-148, Bucureşti.
9. Moore, R.,C., 1960, 1969A, 1969B: *Treatise on Invertebrate Paleontology, Part. I, Mollusca I, p. 351; Part. N., I, Mollusca 6, Bivalvia, p. 489; Part. N II, Mollusca 6 Bivalvia, p. 952*, Geol. Soc. Am. Univ. Kansas Press, Lawrence, Kansas.
10. Nicorici, E., 1974: *Minutinele badenian-superioare de la Tusa (Bazinul Īimleu)*, D. S. (Paleont.), LX, (1972-1973), 3, p.94-114, 6 pl., Bucureşti.
11. Papp, A., Senes, J., Steininger, F., 1978: *Diskution der Äequivalente des Badenien in Europa*, in Chronostratigraphie und Neostatotypen, Miozän, Veda, VI, p. 55-59, Bratislava.
12. Strausz, L., 1966: *Die Miozän - Mediterranen Gastropoden Ungarns*, Akad. Kiadó, 535 p., 79 pl., 221 fig., Budapest.
13. Studencka, B., 1986: *Bivalves from the Badenian (Middle Miocene) marine Sandy Facies of Southern Poland*, Polska Akad. Nauk., Paleont.Pol., 47, 18 pl., Warsawa – Krakow.
14. Svagrovsky, J., 1981: *Lithofazielle Entwicklung und Molluskenfauna des oberen Badeniens (Miozän M4d) in dem Gebiet Bratislava-Devinska Nova Ves,Západné Karpaty*, Paleo., 7, 203 p., 53 pl., Bratislava.
15. Svagrovsky, J., 1981a: *Bivalvia des oberen Badeniens (Miozän) von Borský Mikulás (NO - Teides Wiener Beckens) und ihr Lebensmilieu*. Geologický Zbornik, Geologica Carpathica, 32/4, p. 385 - 426, 6 pl., Bratislava.
16. Svagrovsky, J., 1982: *Gastropoda, Prosobranchia Teil 1. Archaeogastropoda und Mesogastropoda des oberen Badeniens von Borský Miculás (NO - Teil des Wiener Beckens) und ihre stratigraphische Bedeutung*, Geologický Zbornik, Geologica Carpathica, p.3-49, 10
17. Svagrovsky, J., 1984: *Gastropoda, Euthyneura, Opisthobranchia des obereb Badeniensis aus der Umgebung von Borský Miculás (NO - Teil des Wiener Beckens) und ihre stratigraphische Bedentung*, Geologický Zbornik, Geologica Carpathica, 35/2, p. 165 - 194, 3 pl., Bratislava.
18. Zilch, A., 1934: *Zur Fauna des Mittel - Miozäns von Kosteĳ (Banat) Typus-Bestimmung und Tafeln zu O. Boettger's Bearbeitungen*, Senckbergiana, 16, 4/6, p.193-302, 22 pl., Frankfurt a Main.

Plates

Plate I

1. *Loripes (Microloripes) dentatus* (DEFRANCE) x 14
2. *Chama (Psilopus) gryphoides* LINNÉ x 13
3. *Cardites diversicosta* (REUSS) x 14
4. *Plagiocardium (Papillicardium) papillosum* (POLI) x 12.5
5. *Plagiocardium (Papillicardium) sonense* (COSSMANN) x 16.5
6. *Gouldia minima* (MONTAGU) x 14
7. *Hiatella (Hiatella) arctica* (LINNÉ) x 14.5
8. *Fissurellidea (Fissurellidea) clypeata* (GRATELOUP) x 15
9. *Gibbula (Colliculus) pseudangulata* BOETTGER x 13
10. *Collonia transsilvanica* BOETTGER x 14

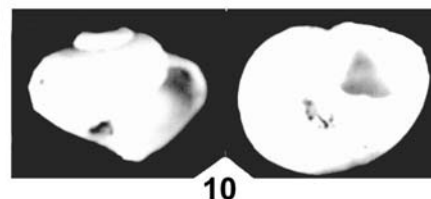
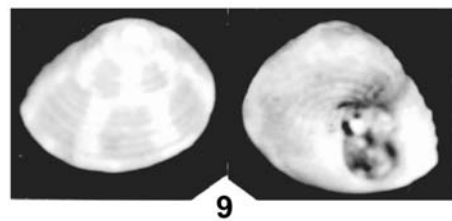
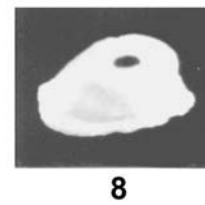
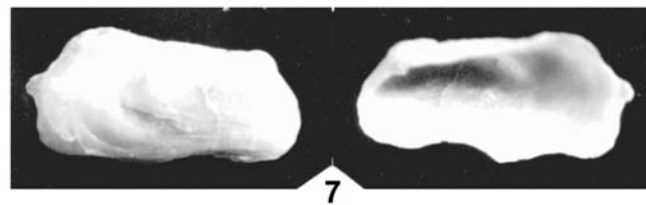
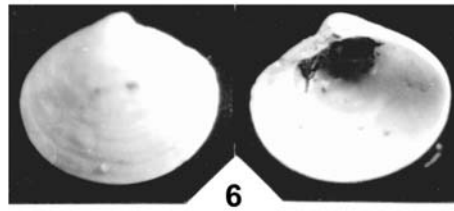
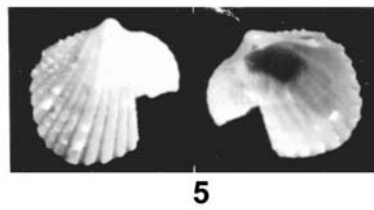
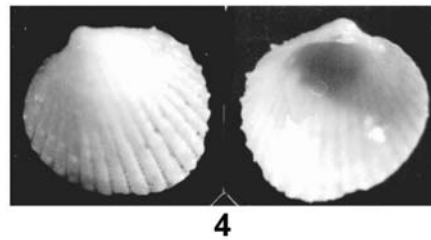
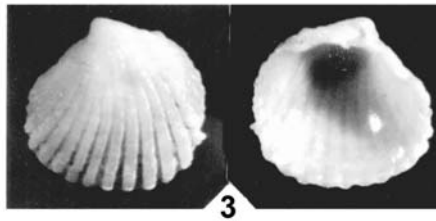
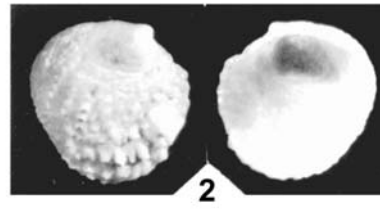
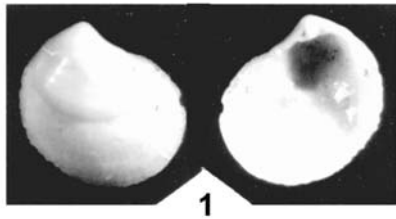
Plate II

1. *Tricolia (Tricolia) eichwaldi* (HOERNES) x 18
2. *Tectarius kostejanus* (BOETTGER) x 15
3. *Turboella (Turboella) acuticosta* SACCO x 18
4. *Alvania (Turbona) anabaptizata* (BOETTGER) x 15
5. *Alvania (Alvania) montagui ampulla* (EICHWALD) x 18
6. *Alvania (Turbona) perregularis* (SACCO) x 18
7. *Rissoina (Rissoina) cf. vindobonensis* SACCO x 17.5
8. *Turritella (Eichwaldiella) bicarinata* EICHWALD x 13

Plate III

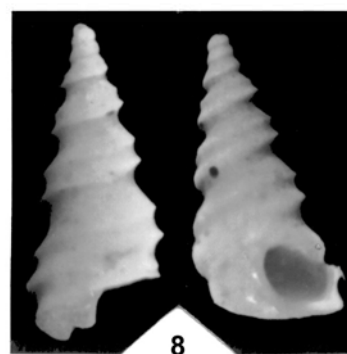
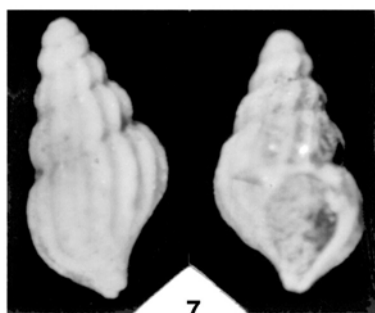
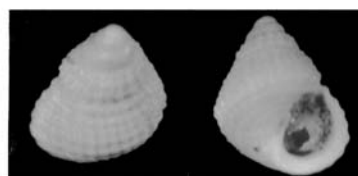
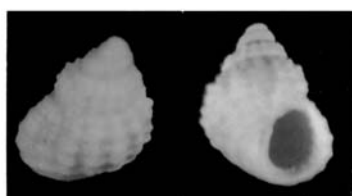
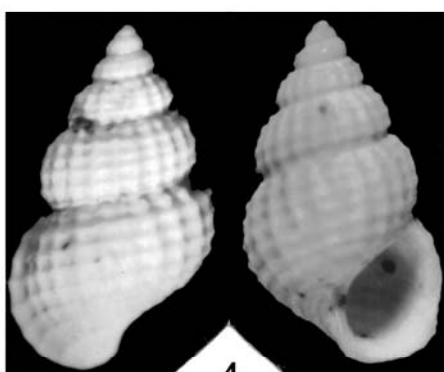
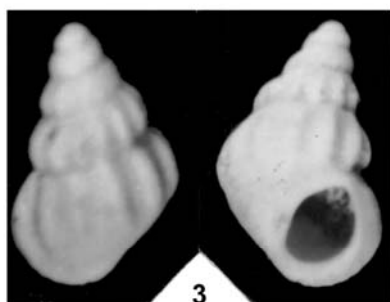
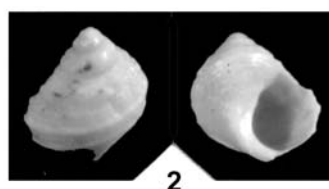
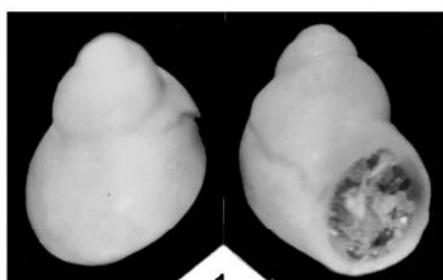
1. *Bittium (Bittium) reticulatum* (DA COSTA) x 17
2. *Bittium (Semibittium) multiliratum* BRUSINA x 17
3. *Triphora (Triphora) perversa* (LINNÉ) x 20
4. *Latirus* sp. x 14
5. *Vexillum (Costellaria) pseudorecticosta vexans* (BOETTGER) x 16.5
6. *Bela sparsa* (BOETTGER) x15
7. *Philbertia microhystrix* (BOETTGER) x13
8. *Ringicula (Ringiculella) laevigata* (EICHWALD) x 18
9. *Dentalium (Antale) vitreum* SCHROETER x 15
10. *Pulsellum (Entalina) tetragona* (BROCCHI) x 15

Pl. I



BADENIAN MOLLUSKS FROM RĂCHITOVA (HAȚEG DEPRESSION, ROMANIA)

Pl.II



Pl.III

