

NANOMOLLUSCS IN HYDROGEOLOGICAL DRILLINGS F2 TÂRGUL LOGREȘTI (GORJ COUNTY) AND F3 CĂLĂRAȘI (DOLJ COUNTY) SW OF ROMANIA (DACIAN BASIN)

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Abstract. In this paper we propose a description of the paleontological material (namely, nanomolluscs) resulted after the sieve collecting of the material triturated from drillings F2 Târgul Logrești, village Frunza (Gorj County), and drilling F3 Călărași (Dolj County), which were executed by hoe. Out of these drillings there came 20 species of nanomolluscs (gastropods and lamellibranchiates) which proved instrumental in establishing the age of the formations there encountered. Among these fossil elements we were also able to discover a new subspecies of nanogastropods, *Lithoglyphus acutus* var. *emiliae*.

Keywords: nanomolluscs, Oltenia, hydrogeological drillings.

Rezumat. Nanomoluște din forajele hidrogeologice F2 Târgul Logrești (județul Gorj) și F3 Călărași (județul Dolj) din sud-vestul României (Bazinului Dacic). În cuprinsul lucrării este prezentată descrierea materialului paleontologic (nanomoluște) rezultat în urma colectării la sită a materialului triturat din forajele F2 Târgul Logrești, sat Frunza (jud. Gorj), și forajul F3 Călărași (jud. Dolj), executate în sapă. Din forajele respective au rezultat 20 de specii de nanomoluște (gastropode și lamelibranchiate) cu ajutorul cărora s-a putut stabili vârsta formațiunilor întâlnite. În materialul fosil a fost descoperită și o nouă subspecie de nanogastropode *Lithoglyphus acutus* var. *emiliae*.

Cuvinte cheie: nanomoluște, Oltenia, foraje hidrogeologice.

INTRODUCTION

The necessity of correlating the aquifer horizons found in the context of hydrogeological drillings encounters some difficulties, especially in areas where there are no geological drillings with continuous logging able to establish a local stratigraphic column. As hydrogeological drillings are done by hoe, the lithological column is established by samples obtained in the sieve out of the material brought out by the water circulating inside the drilling.

Triturating material during digging does not allow us to obtain full shapes in the case of macrogastropods and lamellibranchiates. Nanofossils, instead, are largely kept intact, but these are not noticeable by the naked eye. Because of that we have initiated a thorough collecting of the material obtained in the sieve with each meter of the hoe advancing in the ground. After being washed and looked at with a magnifying glass, this material revealed the existence of a great number of nanogastropods and bivalves, as well as, sometimes, fragments of molluscs which are definite indicators of the stages and substages being crossed through, thus making possible the putting together of a lithostratigraphic, and not just lithological succession.

MATERIAL AND METHOD

The paleontological material analysed here comes from the hydrogeological drillings F2 Târgul Logrești, village Frunza (Gorj County) and drilling F3 Călărași (Dolj County), carried out by hoe.

The samples were washed in order to remove the fine parts (dust, clay). The pieces, picked up with a pair of tweezers, under a magnifying glass, were cleaned with a needle, also under a magnifying glass. The exemplars thus prepared were sorted according to various sizes and examined, as needed, either under a magnifying glass or under a microscope, for appropriate determination.

The identified forms were then photographed and described according to international rules of nomenclature, applicable in paleozoology.

RESULTS

By taking pictures, under a binocular or a microscope, we were able to highlight enough details concerning the collected nanomolluscs, which allowed us to accurately determine the species.

The photographed and determined forms subsequently made possible the reproduction and description, according to international norms, of the following taxa:

Prosodacnomya stenopleura (Sabba), 1896

Figs. 1-4

1942 *Prosodacna (Stylodacna) stenopleura*, WENZ, p. 59, Pl. V, Figs. 11-14.

1972 *Prosodacna (Stylodacna) stenopleura*, MACAROVICI & TURCULEȚ, p. 220, Pl. LXXI, Figs. 8-9.

1981 *Prosodacnomya stenopleura*, PANĂ IOANA et al., p. 78-79, Pl. 46, Fig. 9.

Small shell, with oval, convex, unequilateral valves, with a short, curved anterior side and a more developed posterior side. Slightly flattened umbo prosogyre. Outer surface with 20-24 ribs which are narrow, flattened, separated by linear channels. On the inner surface (Figs.1-2) there are about 20 flattened ribs, corresponding to the intercostal channels which do not reach under the umbo. The right valve possesses a rudimentary cardinal tooth, two anterior lamellar teeth and a posterior lateral tooth. The left valve has a rudimentary cardinal tooth, an anterior linguiform lateral tooth and a posterior lateral lamellar one. The impression of the anterior muscle is smaller and more sunken, while that of the posterior muscle is larger and less sunken. It differs from *Stylodacna sturi* and *Prosodacnomya sturiogrinensis* by the oval elongated aspect of the shell, the flattened umbo, the lack of inner ribs under the umbo and the existence of a cardinal tooth.

Drilling F3 Calarași-Dolj, ad. 40-45 m.
Upper Dacian (Getian).

Dacicardium rumanum (Fontannes), 1886

Figs. 5-12, 15

1942 *Prosodacna rumana*, WENZ, p. 126, Pl. 64, Figs. 680-681, 684-685.

1975 *Dacicardium rumanum*, PAPAIANOPOL, p. 256, Pl. I, Figs. 1-4.

1981 *Dacicardium rumanum*, PANĂ IOANA et al., p. 93-94, Pl. 46, Figs. 1-8; Pl. 47, Figs. 1-12.

Small, convex shell with oval-rounded valves, with an umbo slightly emphasized over the cardinal margin. The outer surface has 15-19 ribs, among those the ones in the anterior field being more pronounced and 2 well shaped ribs which are thicker and ridged, separated by an intercostal interval, larger and deeper in the median zone, with the ribs gradually becoming thinner towards the posterior margin. The right valve has an underdeveloped cardinal tooth, a rudimentary anterior cardinal one and a posterior lamellar one. The left valve has a cardinal tooth, an anterior linguiform lateral tooth and an underdeveloped posterior lateral one. The anterior muscular impression is smaller and deeper, while the posterior one is larger and superficial. The line of the mantle is intact.

Drilling F3 Calarași-Dolj, ad. 40-45 m.
Upper Dacian (Getian).

Pachyprionopleura munieri (Sabba), 1896

Fig. 16

1897 *Limnocardium zujovci* BRUSINA, p. 34, Pl. XX, Figs. 1-2.

1902 *Limnocardium zujovci* BRUSINA, p. 34, Pl. XXVII, Figs. 1-2.

1907 *Prosodacna munieri*, TEISSEYRE p. 256, Pl. 10, Fig. 60.

1942 *Prosodacna (Prosodacna) munieri*, WENZ, p. 122, Pl. 62, Figs. 653-656.

1966 *Prosodacna munieri*, PANĂ IOANA & MUNIZ, Pl. II, Figs. 17-22.

1981 *Pachyprionopleura munieri*, PANĂ IOANA et al., p. 87-88, Pl. 48, Figs. 18-22; Pl. 49, Figs. 1-3, 5.

Medium shell (10-30 mm), oval-rounded, convex, thin, with a prosogyre umbo and strongly twisted. The anterior side is shorter and rounded while the posterior one is more developed. The outer surface has 10-13 slightly rounded ribs, but which are ridged on the umbo and become larger towards the posterior side. The intercostal spaces are equally widening towards the posterior side of the shell. The left valve (Fig. 16) has a cardinal tooth, a strongly developed anterior lateral tooth, and a posterior lateral lamellar tooth. On the inner face there are broad ribs, crossed over in the median zone by a thread-like depression. Large muscular impressions, with the posterior one being the largest.

Drilling F3 Calarași-Dolj, ad. 40-45 m.
Upper Dacian (Parscovian).

Dreissena rostriformis (Deshayes), 1838

Figs. 13-14, 19-20

1918 *Dreissena corniculata*, IONESCU-ARGETOAIA, p. 421, Pl. 15, Figs. 7, 7a.

1942 *Dreissena rostriformis*, WENZ, p. 118, Pl. 60, Figs. 626, 630-631.

1962 *Dreissena rostriformis*, PANĂ IOANA, Pl. V, Figs. 70-73.

2013 *Dreissena rostriformis*, ENACHE & CĂRLAN, p. 53, Fig. 2.

Oval, convex valves, with a terminal umbo curved as a rostrum. Strongly curved dorsal edge, with a convex ventral edge. The outer surface has under the umbo a thick growing streak.

Drilling F1 Frunza, depth 243-254 m
Drilling F2 Frunza, depth 251-256 m
Drilling F3 Călărași-Dolj, depth 40-45 m.
Lower Dacian (Parscovian)

Dreissena rimestiensis (Fontannes), 1886

Figs. 21-28

1942 *Dreissena rimestiensis*, WENZ, p. 119, Pl. 61, Figs. 634, 636, 641b.

1962 *Dreissena rimestiensis*, PANĂ IOANA, Pl. V, Figs. 55-69.

1976 *Dreissena rimestiensis*, PAPAÏANOPOL, p. 121, Pl. 11, Figs. 5-6.

1981 *Dreissena rimestiensis*, PANĂ IOANA et al., p. 64, Pl. 43, Figs. 12, 14.

2013 *Dreissena rimestiensis*, ENACHE & CÂRLAN, p. 53, Fig. 3.

Ovate-oblong valves, slightly curved, with a small umbo situated on the anterior terminal side. Rounded rear part. On the inside (fig. 24-26) it has dysodont teething, represented by a ligamental moat. Integripaleat shell impressions. The dorsal (Fig. 27) has more developed growth streaks.

Drilling F1 Frunza, depth 243-254 m

Drilling F2 Frunza, depth 228-234, 234-240, 251-256 m

Drilling F3 Călărași-Dolj, depth 40-45 m.

Lower Dacian (Parscovian)

Stylodacna rumana (Fontannes), 1886

Figs. 17-18

1942 *Prosodacna (Stylodacna) rumana*, WENZ, p. 126, Pl. 64, Figs. 64-65.

Thin, oval, unequilateral, bulging valves, with a short anterior side rounded on the margin and a more developed posterior side. On the outer surface there are broad but thin ribs, which are larger towards the posterior side, and separated among them by linear channels. The ribs are obviously curving towards the anterior side. On the inner side, there is a dextrogyr umbo. The inner surface is covered by strong ribs corresponding to the channels on the outer side, and there are also oval-rounded muscular impressions. The line of the mantle is intact. It has a single anterior lateral tooth in the shape of a dagger.

Drilling F3 Călărași-Dolj, ad. 45-50 m.

Dacian (Getian-Parscovian).

Sulcopotomida cymatoides (Brusina), 1874

Fig. 29

1897 *Unio cymatoides*, BRUSINA, p. 31, Pl. XVIII, Fig. 3.

1918 *Unio clivosus*, IONESCU-ARGETOAIA, p. 385, Pl. 1, Fig. 6.

1818 *Unio gorjensis*, IONESCU-ARGETOAIA, p. 410-411, Pl. XI, Figs. 9-10.

1918 *Unio subclivosus*, IONESCU-ARGETOAIA, p. 388-389, Pl. III, Figs. 1-2.

1942 *Psilunio (Psilunio) cymatoides*, WENZ, p. 97, Pl. 38, Figs. 535a, 536b.

1981 *Sulcopotomida cymatoides*, PANĂ IOANA et al., p. 50-51, Pl. 4, Fig. 1-9.

2013 *Sulcopotomida cymatoides*, ENACHE & CÂRLAN, p. 56, Fig. 6.

Fragment of thick valve, with numerous concentric "ribs", wave-shaped, characteristic for this species.

Frunza Drilling F2 Depth 21-27 m

Romanian (Pelendavian)

Gyraulus (Gyraulus) rumanus Wenz, 1931

Figs. 35-38

1942 *Gyraulus (Gyraulus) rumanus*, WENZ, p. 72, Pl. 27, Figs. 411-415.

1972 *Gyraulus (Gyraulus) rumanus*, MACAROVICI & TURCULEȚ, p. 232, Pl. IXXVI, fig. 15.

1981 *Gyraulus (Gyraulus) rumanus*, PANĂ IOANA et al., p. 123-124, Pl. 68, Figs. 2-3.

Discoid shell, with a flattened face (Figs. 35-36) and the other one slightly bulging (Figs. 37-38), made of four spiral turns rapidly growing in diameter, so that the navel presents depressions on both sides. The last spiral turn has a double width compared with the rest of the turns.

Drillings F3 Călărași-Dolj, depth 45-50 m.

Upper Dacian (Parscovian)

Prososthenia vilcensis Pană, 1989

Fig. 30

1989 *Prososthenia vilcensis*, PANĂ IOANA, p. 283, Pl. III, Figs. 1-12.

3-5 mm high shell, turriculate, with an apical angle of 22–25°, made of 7-8 convex spiral turns, the last of them representing 2/5 of the height of the shell. The aperture is oval- subrhomboidal with a thin labrum and a labium slightly thickened and twisted. No umbilical slot.

Drilling F3 Călărași-Dolj, depth 40-45 m.

Upper Dacian (Parscovian)

Micromelania laevis (Fuchs), 1879

Figs. 31-34

1897 *Micromelania laevis*, BRUSINA, p. 17, Pl. XI, Figs. 11-12.

1989 *Micromelania laevis*, PANĂ IOANA, p. 289, Pl. IV, Figs. 15-18.

Slender, turriculate shell, with 8-9 slightly convex spiral turns and deep sutures. The apical angle is 10-15°. The aperture is oval-subromboidal with a thin labrum and a labium slightly thickened and twisted.

Drilling F3 Călărași-Dolj, depth 40-50 m
Upper Dacian (Parscovian)

Micromelania freyeri Brusina, 1897

Figs. 40, 45

1897 *Micromelania freyeri*, BRUSINA, p. 17, Pl. XI, Figs. 9-10.

1989 *Micromelania freyeri*, PANĂ IOANA, p. 288, Pl. IV, Figs. 10-14.

Small turriculate shell, made of 9-10 slightly convex spiral turns, separated by linear sutures. The last spiral turn represents ¼ of the height of the shell. The aperture is oval-rhomboidal, holostomperistom, thin labrum, slightly deformed and a labium which is very slightly twisted and a little thickened. The apical angle is 10-15°.

Drilling F3 Călărași-Dolj, depth 40-50 m
Upper Dacian (Parscovian)

Micromelania fucsiana Brusina, 1874

Figs. 41-44, 46

1897 *Micromelania fucsiana*, BRUSINA, p. 17, Pl. XI, Figs. 7-8.

1989 *Micromelania fucsiana*, PANĂ IOANA, p. 288, Pl. IV, Figs. 5-9.

Small turriculate shell, made of 9-10 slightly flattened spiral turns, separated by linear sutures. The last spiral turn represents ¼ of the height of the shell. The aperture is oval-rhomboidal, holostomperistom, thin labrum, slightly deformed and a labium which is very slightly twisted and a little thickened. The apical angle is 10-15°.

Drilling F3 Călărași-Dolj, depth 40-50 m
Upper Dacian (Parscovian)

Hydrobia syrmica Neumayr, 1875

Fig. 39

1942 *Hydrobia syrmica* WENZ, p. 46, Pl. 13, Figs. 169-176.

1972 *Hydrobia syrmica* MACAROVICI & TURCULEȚ, p. 231, pl. LXXVI, Fig. 16.

Shell consisting of 6 slightly bulging spiral turns, separated by deep sutures. The last spiral turn represents 1/3 of the height of the shell. Subrhombic aperture.

Drilling F3 Călărași-Dolj, depth 40-45 m
Upper Dacian (Parscovian)

Hydrobia grandis Cobălcescu, 1883

Figs. 47-59

1942 *Hydrobia grandis*, WENZ, p. 46, Pl. 14, Figs. 177a-b.

1981 *Hydrobia grandis*, PANĂ IOANA et al., p. 108, Pl. 65, Figs. 1-4.

1989 *Hydrobia grandis*, PANĂ IOANA, p. 275-276, Pl. I, Figs. 1-2.

2013 *Hydrobia grandis*, ENACHE & CÂRLAN, p. 53, Fig. 8.

Small shell, conical oblong, turriculate, with 8 spiral turns of which usually the last ones are not preserved, and relatively flat. Deep oblique sutures facing anterior-posterior diameter. The shell surface is smooth. The aperture is suboval-subrhombical with an arched labrum, slightly flattened and also a curved labium.

Drilling F2 Frunza, depth 204-207 m
Drilling F3 Călărași-Dolj, depth 40-50 m
Upper Dacian (Parscovian).

Hydrobia gorjensis Enache, 2013

Figs. 60-61

2013 *Hydrobia gorjensis* ENACHE & CÂRLAN, p. 54, Fig. 9.

Small shell, conical, elongated and turriculate, with flattened spiral turns, with the last ones usually not preserved. Deep oblique sutures facing the anterior-posterior diameter. On both sides of the suture one weak burelet characteristic of this new species is noticeable. Shell surface without ornamentation. The aperture is suboval-subrhombical with an arched labrum, slightly flattened and also a curved labium.

Drilling F2 Frunza, depth 251-256 m
Drilling F3 Călărași-Dolj, depth 40-45 m
Upper Dacian (Parscovian).

Valvata (Valvata) simplex carinata (Fuchs), 1870

Figs. 62-63

1981 *Valvata (Valvata) simplex carinata*, PANĂ IOANA et al., p. 105-106, Pl. 68, Figs. 12-14.

Very small, globular shell, with a slightly elevated spire, rapidly growing, the last spiral turn being equal in diameter with the entire spire. Large navel. A median pronounced ridge can be noticed on both faces of the shell. Rhomboidal aperture.

Drilling F3 Călărași-Dolj, depth 40-50 m
Upper Dacian (Parscovian)

Lithoglyphus acutus acutus Cobălcescu, 1883

Figs. 64-76

1942 *Lithoglyphus acutus acutus*, WENZ, p. 48, Pl. 15, Figs. 195-198.

1972 *Lithoglyphus acutus acutus*, MACAROVICI & TURCULEȚ, p. 231-232, Pl. LXXVII, Fig. 7.

1981 *Lithoglyphus acutus acutus*, PANĂ IOANA et al., p. 110, Pl. 67, Figs. 1-5.

Oval shell, consisting of 5 spiral turns, with a bulging aspect and separated by relatively deep sutures. The last spiral turn represents 2/3 of the height of the shell. Oval aperture, getting narrower in the anterior zone. Holostomperistom, sharp labrum, arcuate, a slightly thickened and sinuous labium.

Drilling F3 Călărași-Dolj, depth 40-50 m
Upper Dacian (Parscovian)

Lithoglyphus acutus* var. *emiliae nov. ssp.

Figs. 77-78

Same features as in the standard species, except for the spire being ornamented with transversal stripes, which are more visible on the last spiral turn.

Drilling F3 Călărași-Dolj, depth 40-45 m
Upper Dacian (Parscovian)

Lithoglyphus amplus Brusina, 1878

Figs. 79-82

1897 *Lithoglyphus amplus*, BRUSINA, p. 23, Pl. XII, Figs. 4-5.

1902 *Lithoglyphus amplus*, BRUSINA, Pl. XI, Figs. 50-51.

1942 *Lithoglyphus amplus*, WENZ, p. 49, Pl. 15, Fig. 206.

2013 *Lithoglyphus amplus*, ENACHE & CÂRLAN, p. 55, Fig. 11.

Shell stuffed with very short winding. It shows 3-4 turns, with deep sutures and quite a blunt navel. The last turn is very broad, covering almost all previous windings. Large aperture, straight callous rim.

Drilling F2 Frunza, depth 204-207 m
Drilling F3 Călărași-Dolj, depth 40-50 m
Upper Dacian (Parscovian)

CONCLUSIONS

The research undertaken on the samples from the hydrogeological drillings for water supply F2 Frunza and F3 Călărași-Dolj, executed by hoe, has demonstrated that it is necessary for the collected detritus containing nanogastropods or nanolamellibranchiates to be treated and investigated from a paleontological point of view, in order to establish the relative age of the intervals being traversed. At least for Pliocene deposits we can thus establish a stratigraphic succession up to a substage level, by taking into account these nanomolluscs.

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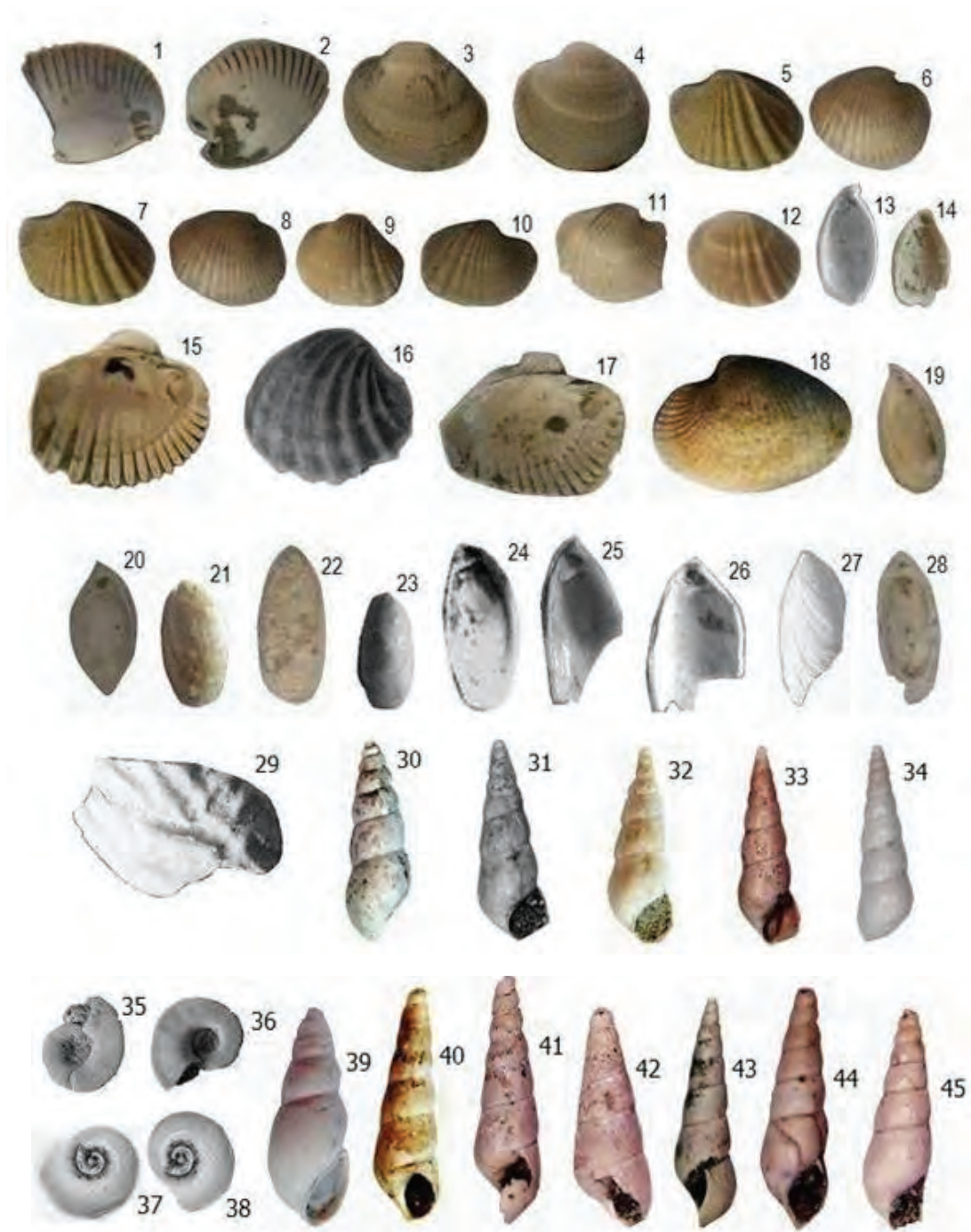
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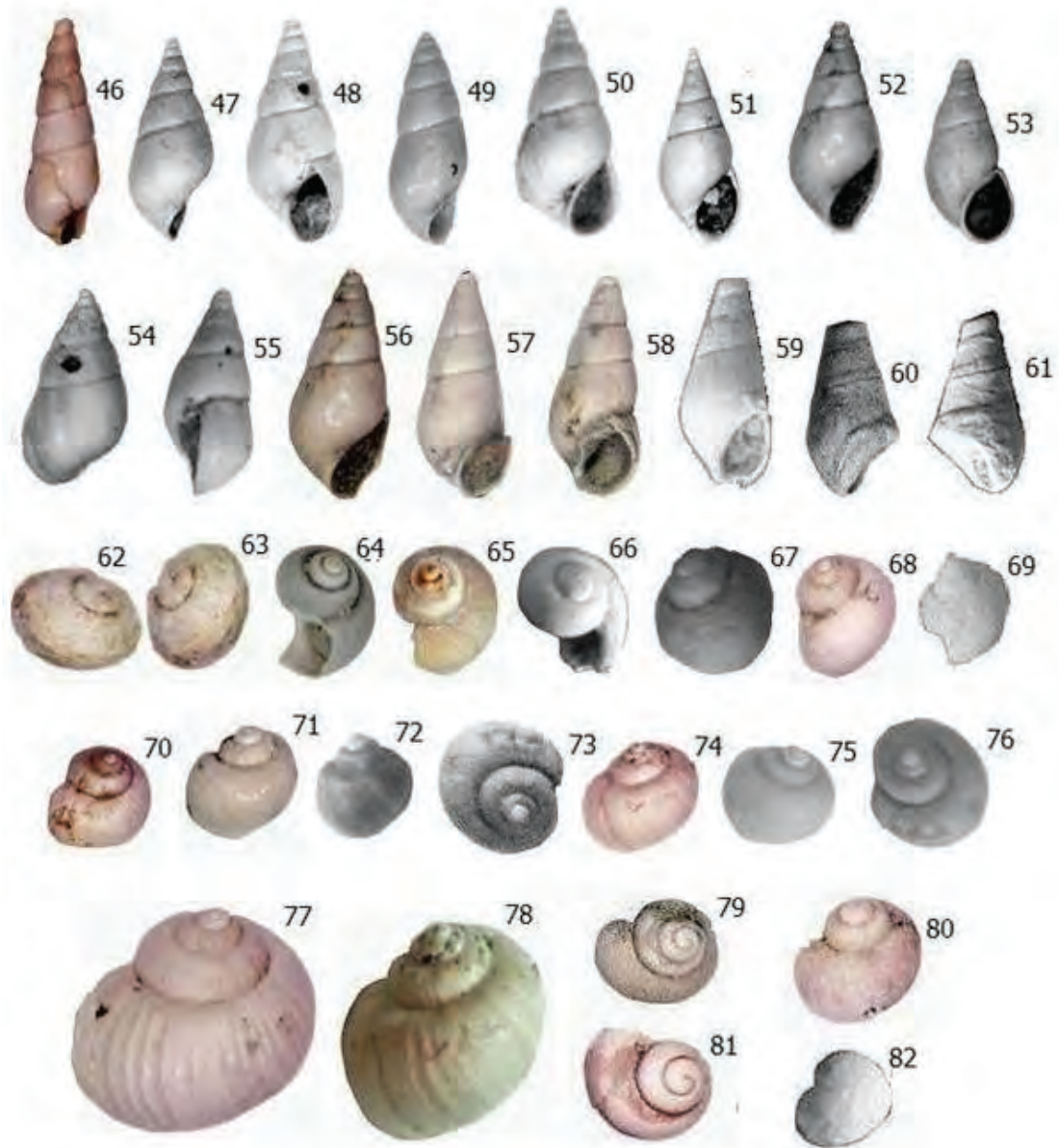
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PLATE I



Prosodacnomya stenopleura (Sabba) Figs. 1-4 x 3
Dacicardium rumanum (Fontannes) Figs. 5-12 x 5, 15 x 8
Pachyprionopleura muniéri (Sabba) Fig. 16 x 3
Dreissena rostriformis (Deshayes) Figs. 13-14, 19-20 x 3
Dreissena rimestiensis (Fontannes) Figs. 21-28 x 4
Stylodacna rumana (Fontannes) Figs. 17-18 x 3
Sulcopotomida cymatoides (Brusina) – fragments Fig. 29 x 2
Prososthenia vilcensis Pană Fig. 30 x 8
Micromelania laevis (Fuchs) Figs. 31-34 x 8
Gyraulus (Gyraulus) rumanus Wenz Figs. 35-38 x 4
Hydrobia syrmica Neumayr Fig. 39 x 5
Micromelania freyeri Brusina Figs. 40, 45 x 8
Micromelania fusciana Brusina Figs. 41-44, 46 x 8

PLATE II



Hydrobia grandis COBĂLCESCU Figs. 47-59 x 8
Hydrobia gorjensis ENACHE Figs. 60-61 x 5
Valvata (Valvata) simplex carinata (FUCHS) Figs. 62-63 x 4
Lithoglyphus acutus acutus COBĂLCESCU Figs. 64-71 x 4, 72-76 x 5
Lithoglyphus acutus var. *emilie* nov. ssp. Figs. 77-78 x 12
Lithoglyphus amplus BRUSINA Figs. 79-82 x 5