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COMMENTS ON THE BADENIAN FAUNA (MIDDLE MIOCENE) FROM BAHNA (SOUTHERN CARPATHIANS, ROMANIA)

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Abstract. I collected a Badenian fauna, mainly consisting in molluscs and corals, from the marl-limy level of the lower sandy horizon, with clay, marl and chalk stones of Curchia dried river bed, laying in Bahna Depression, South of the Mehedinți Plateau (South-West Romania). Taxonomically, the molluscs are numerous. They are small and medium in size and characterize a marine basin of relatively reduced dimensions. The corals have less species, but quantitatively are numerous and well developed, this thing explaining normal life conditions in the littoral area of the basin.

Résumé. Dans la vallée du torrent séché de Curchia, située dans la dépression de Bahna, qui se trouve au Sud du plateau de Mehedinți (Sud-Ouest de la Roumanie), nous avons récolté du niveau marneux-calcaire de l'horizon inférieur sablonneux, avec des argiles, des marnes et des calcaires, une faune badénienne composée surtout de mollusques et de coraux. Les mollusques sont nombreux du point de vue taxonomique. Ils sont de petites et de moyennes dimensions et caractérisent un bassin marin ayant des dimensions relativement réduites. Les coraux ont moins d'espèces, mais ils sont plus nombreux du point de vue quantitatif et bien développés, ce qui s'explique par des conditions normales de vie dans la zone littorale du bassin.

Key words: stratigraphy, palaeoecology, Badenian, Bahna.

INTRODUCTION

Bahna Basin is one of the intramontane depression post-tectonic basins of the Southern Carpathians, being placed in the southern part of the Mehedinți Plateau. It is crossed by Bahna River and its tributaries: Racovăț, Curchia, etc.

Deposits which fill this basin belong to Neogene and are disposed directly on the crystalline bed of the Getic Domain.

The faunal richness and variety of Bahna make this area to become very important from the Badenian fauna point of view, joining to the Romanian classic basins, Lăpușiu, Coștei, Buituri.

Marine macrofauna is rich and varied from taxonomical point of view; the molluscs (gastropods and bivalves) and corals are prevalent.

The palaeontologic study of Bahna association was the subject of numerous papers, Ștefănescu (1876) being the first author which made a geological map of the basin, also reporting a similar fauna to that of the Vienna basin. Macovei (1909) published an ample paper where the Miocene deposits are minutely described and a faunal list, characteristic to each level, is presented. Marinescu & Marinescu (1962, 1963) grouped the Badenian deposits in two complexes and presented a faunal list with over 200 invertebrate species.

MATERIAL AND METHOD

The material after which this paper was made was collected during a short trip in 2006 and was taken from the Curchia dried river bed, near Bahna village.

English translation by Mihaela Barcan Achim.

From marls I collected the largest part of the molluscs, but their extraction is very difficult because the marl is very compact.

During rainy periods, the flowing water brings out numerous specimens, well preserved which can be easily collected.

The identification of the species was made using the following papers: Hoernes & Auinger (1879), Strausz (1966), Marinescu (1958), Moisescu (1955), Kojumdgieva & Strachimirov (1960), Rado (1970), Studencka (1986), Bařuk (2006).

The collected material is identified and preserved in the scientific palaeontological collection of "Grigore Antipa" National Museum of Natural History (Bucharest).

RESULTS AND DISCUSSIONS

Litho-stratigraphic characterization

Base stratigraphical sketch of Bahna Basin belongs to Macovei (1909), next papers basing on it, without important changes or completions (see Marinescu, 1965 - fig. 1).

Almost the entire Badenian fauna of Bahna, studied as yet, originates in the limy and marl deposits developed along the northern border of the basin.

The richest fossil point lies in the Curchia dried river bed, in the marl-limy level of the lower sandy horizon, with clay, marl and chalk stones (Marinescu & Marinescu, 1962) (Fig. 2). This level has the following litho-stratigraphical sequence: directly disposed over the crystalline schists of Sebeř-Lotru series; in the northern side of the basin there is a limy littoral facies - Curchia chalk stone (of Leitha type), coralligenous, of 6-8 m thick. It is rich in hexacorallians (*Tarbelastraea conoidea* Reuss, *T. reussiana* M.-Edward et Haime), mould-like molluscs and echinoderms being difficultly identified.

In the upper side, the chalk stone bank penetrates a limy marl, violet-blue whitish, friable and fossil, from where I collected *Syzygophyllia brevis* Reuss, *Venus (Ventricoloidea) multilamella* (Lamarck), *Cardita (Venericardia) partschi* Goldfuss, *Ostraea* sp., *Chama (Psilopus) griphoides* Linné, *Turritella (Haustator) vermicularis* Brocchi., *Ancilla (Baryspira) glandiformis* Lamarck, *Dentalium (Entalis) badensis* Partsch etc.

Fossils are not well preserved, there are many inner and outer moulds which keep shell remains.

Above stones, sometimes beneath them or instead of them there are Curchia marls, of dark grey – violet bluish colour, schistose, very compact, sandy and micaceous, where the largest part of the Badenian fauna exists. From this marl I collected the largest part of the molluscs (*Corbula (Varicorbula) gibba* (Olivi), *Venus (Ventricoloidea) multilamella* (Lamarck.), *Conus (Conolithus) dujardini* Deshayes, *Turritella subangulata* Brocchi, *Strombus coronatus* DeFrance., *Ancilla (Baryspira) glandiformis* Lamarck., *Pleurotoma coronata* Hoernes, *Columbella (Mitrella) nassoides* Grateloup, *Natica millepunctata* Lamarck., *Natica (Euspira) helicina* (Brocchi), *Latirus (Dolicholatirus) bilineatus* Partsch, *Dentalium (Entalis) badensis* Partsch etc.) but also coral colonies (*Favia magnifica* Reuss and *Tarbelastraea reussiana* Reuss).

In marls a sorting or a specific orientation of the fossils in the stratum cannot be observed. There are many fragments but also entire specimens of molluscs,

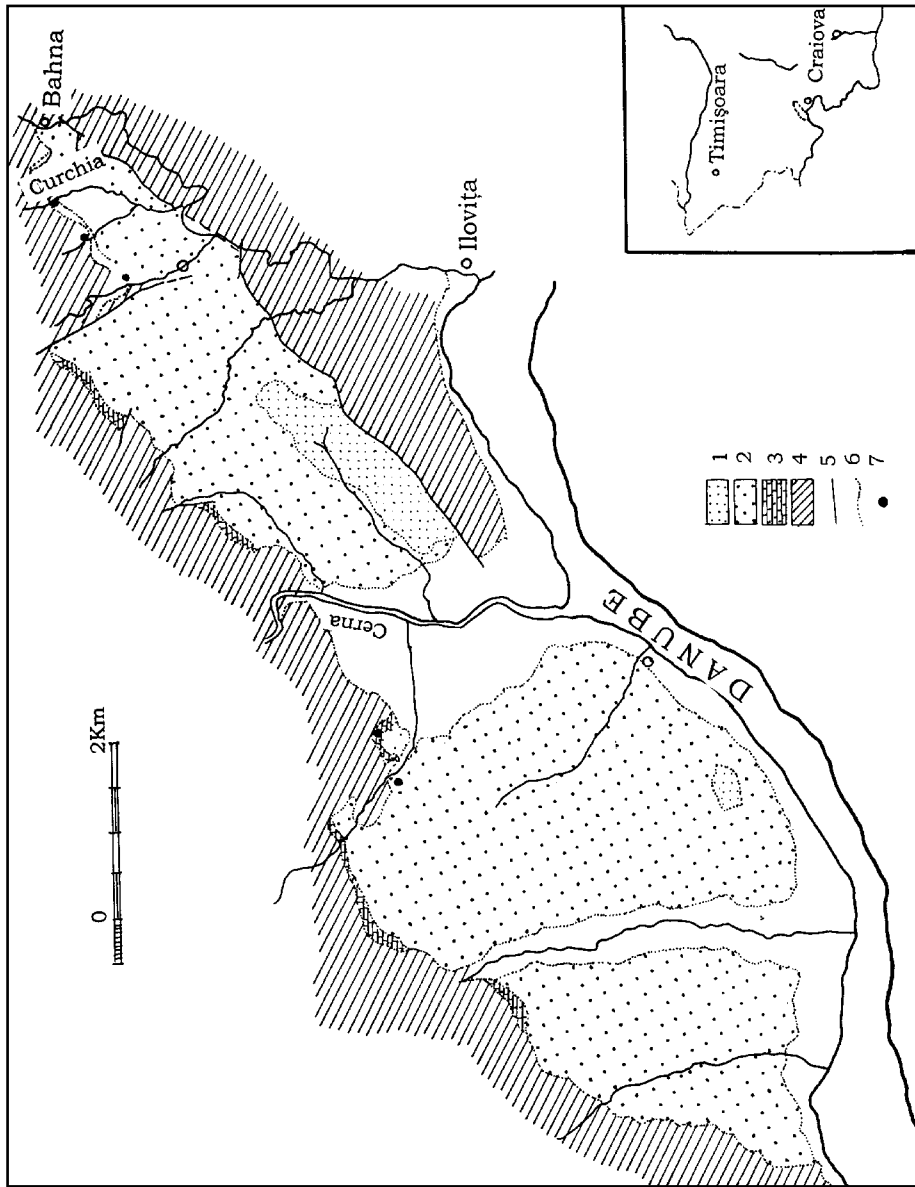


Fig. 1 – Geological sketch of Bahna-Orșova basin: 1, Sarmatian; 2, Badenian schist and gravel; 3, Badenian marl and chalk; 4, anteneogene base; 5, fault; 6, geological limit; 7, fossil point. (after Marinescu, 1965).

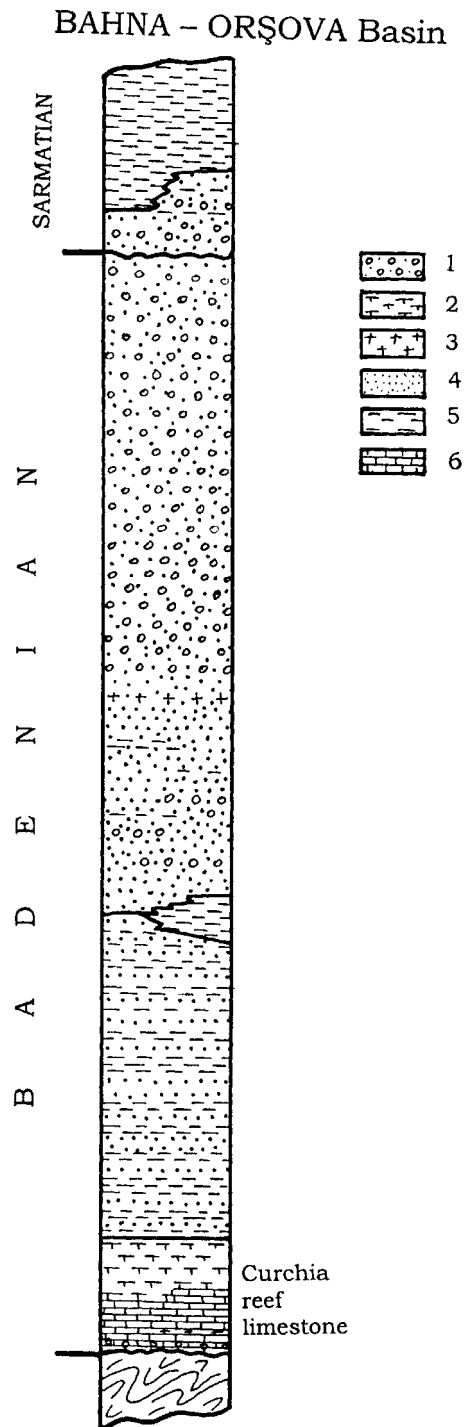


Fig. 2 – Stratigraphical column of Bahna – Orșova basin: 1, gravel;
2, marl clay; 3, tuffs; 4, sand; 5, schists clay;
6, chalk stones. (after geological map Orșova, scale 1:50 000, 1987).

unrolled, in a very good state of conservation, but very friable. Also, the marls contain bryozoans, microgastropods and a rich association of foraminiferans.

Faunal characteristics

At a brief observation it can be seen that the mollusc fauna of Bahna is of small and medium size, large specimens being rare.

In comparison with the Badenian fauna of Delinești (Banat), collected and studied by the author, it can be easily observed the robustness of the specimens of Delinești than those of Bahna, which are more fragile and reduced in size. The deposits of Bahna include 26 common molluscs and coral species similar to those from Delinești.

The studied macrofauna, originating in the marl-limy level, is very varied from taxonomical point of view. From 190 specimens, 53 mollusc species and 4 coral species from 22 fragments of reef chalk were identified.

Bivalves are less represented than gastropods. From a total of 26 specimens I identified 8 families, 8 genera and 8 species, families Veneridae and Carditidae being well represented in the number of individuals: *Venus (Ventricoloidea) multilamella* (Lamarck) (9 specs) and *Cardita (Venericardia) partschi* Goldfuss (6 specs).

Table 1

The bivalve distribution in marls (M) and marl chalk stones (CM) from Curchia dried river bed and the size – length (L) and height (H) of the large specimens.

Bivalves		M	CM	L (mm)	H (mm)
Arcidae	<i>Anadara (Anadara) diluvi</i> (Lamarck)	1	-	15	13
Glycymeridae	<i>Glycymeris (Glycymeris) deshayesi</i> (Mayer)	1	-	7	8
Ostreidae	<i>Ostraea</i> sp.	-	2	-	-
Pectinidae	<i>Chlamys seniensis lomnicki</i> Hilber	-	1	16	15
Chamidae	<i>Chama (Psilopus) griphoides</i> Linné	1	-	9	9
Carditidae	<i>Cardita (Venericardia) partschi</i> Goldfuss	-	6	15	15
Veneridae	<i>Venus (Ventricoloidea) multilamella</i> (Lamarck)	3	6	15	15
Corbulidae	<i>Corbula (Varicorbula) gibba</i> (Olivi)	4	1	7	7
Total		10	16		

Table 2

Gastropod distribution in marls (M) and marl chalk stones (CM) from Curchia dried river bed and the size – length (L) and height (H) of the large specimens.

Gastropods		M	CM	H (mm)	L (mm)
Turbinidae	<i>Astraea carinata labiosa</i> Grateloup (operculi)	3	-	15	12
Neritidae	<i>Nerita radula</i> Linné	1	-	8	12
Turritellidae	<i>Turritella subangulata</i> Brocchi	23	2	-	-
	<i>Turritella (Archimediella) pulchra</i> Friedberg	2	-	-	-
	<i>Turritella (Haustator) vermicularis</i> Brocchi	-	3	-	-
Cerithiidae	<i>Cerithium vulgatum europaeum</i> Mayer	-	6	20	9
	<i>Potamides (Terebralia) bidentata</i> Defrance	1	-	-	8
Strombidae	<i>Strombus coronatus</i> Defrance	1	-	70	50
Naticidae	<i>Natica millepunctata</i> Lamarck	1	-	15	17
	<i>Natica (Euspira) helicina</i> (Brocchi)	1	-	12	12

Table 2 (continued)

Cypraeidae	<i>Cypraea (Cypraeovula) eratoformis</i> Hoernes & Auinger	-	1	20	15
Cymatiidae	<i>Charonia (Sassia) tarbelliana</i> (Grateloup)	1	-	35	20
	<i>Charonia (Sassia) apenninica</i> (Sassi)	1	-	20	10
Muricidae	<i>Muricopsis cristata</i> Brocchi	1	-	21	13
	<i>Murex (Pteronotus) swainsoni</i> Michelotti	1	-	-	-
	<i>Murex (Muricanthus) pomiformis</i> Eichwald	1	-	-	-
Columbellidae	<i>Columbella (Mitrella) nassoides</i> Grateloup	10	-	25	9
	<i>Columbella (Mitrella) petersi</i> Hoernes & Auinger	-	1	-	15
Buccinidae	<i>Neptunea</i> sp.	1	-	32	14
Fasciolaridae	<i>Latirus (Dolicholatirus) bilineatus</i> Partsch	6	-	30	32
	<i>Fusus crispoideus</i> Hoernes	1	-	-	12
	<i>Fusus</i> sp.	1	-	25	7
	<i>Fusus</i> sp.	1	-	-	12
Olividae	<i>Ancilla (Baryspira) glandiformis</i> Lamarck	3	7	35	20
	<i>Ancilla obsoleta</i> Brocchi	-	1	25	11
Mitridae	<i>Vexillum (Uromitra) cupresianum</i> (Brocchi)	4	-	20	8
	<i>Mitra (Tiara) substriatula</i> d'Orbigni	1	-	40	11
	<i>Mitra (Vexillum) plicatula</i> Brocchi	3	-	20	7
Volutidae	<i>Lyria taurinia</i> Bonelli	1	-	-	22
Nassidae	<i>Nassa (Tritia) restitutiana</i> Fontannes	1	-	12	6
	Cancellariidae <i>Cancellaria lyrata</i> (Brocchi)	1	-	-	12
	<i>Cancellaria (Trigonostoma) spinifera</i> Grateloup	1	-	-	12
Marginellidae	<i>Marginella</i> sp.	-	1	18	11
Terebridae	<i>Terebra (Subula) fuscata</i> Tristan	1	-	13	-
Pleurotomidae	<i>Pleurotoma (Drillia) allioni</i> Bellardi	1	-	30	10
	<i>Pleurotoma coronata</i> Hoernes	26	-	30	10
	<i>Pleurotoma (Drillia) spinescens</i> Partsch	1	-	15	5
Conidae	<i>Conus (Cheliconus) fuscocingulatus</i> Bronn	3	2	35	20
	<i>Conus (Conolithus) dujardini</i> Deshayes	6	2	20	10
	<i>Conus (Lithoconus) mercati</i> Brocchi	-	1	-	-
	<i>Conus puschi</i> Michelotti	-	1	-	20
Ringiculidae	<i>Ringicula (Ringicula) auriculata</i> var. <i>buccinea</i> (Brocchi)	5	-	10	7
Total		116	29		

Gastropods are more numerous in species than the bivalves. From the total of 153 specimens, I identified 43 species belonging to 26 genera and 22 families. The following families are better represented in species: Turritellidae, Conidae, Mitridae, Fusidae, Muricidae, Pleurotomidae.

Table 3

The scaphopod distribution in marls (M) and marl chalk stones (CM) from Curchia dried river bed.

Scaphopods		M	CM
Dentaliidae	<i>Dentalium (Entalis) badensis</i> Partsch	7	2
	<i>Dentalium (Dentalium) micheloti</i> Hoernes	2	-
Total		9	2

Scaphopods are relatively numerous in marls and represented by the family Dentaliidae with the species *D. (Entalis) badensis* Partsch (9 specs) and *D. (D.) micheloti* Hoernes (2 specs).

Table 4

The anthozoan distribution in marls (M), marl chalk stone (CM) and chalk (C) from Curchia dried river bed.

Anthozoans		M	CM	C
Faviidae	<i>Tarbelastraea reussiana</i> M.-Edward & Haime			9
	<i>Tarbelastraea conoidea</i> M.-Edward.& Haime	7		
	<i>Favia magnifica</i> Reuss	6	2	
Mussidae	<i>Syzygophyllia brevis</i> Reuss		6	
Total		13	8	9

Corals are numerous and occur both in chalk stones and marl chalk stones and in the Curchia marls. They are represented by 4 species belonging to 3 genera and 2 families.

The most spread species is *Tarbelastraea reussiana* M.- Edward et Haime whose shells reach 10 – 15 cm in size.

Palaeoecology

Marine fauna of Bahna has specific characters because of the limited range where it lived, Bahna Basin being a bay of relatively reduced dimensions.

After the features of the faunal associations and lithology, I can conclude that the basin had a reduced depth; the species of genera *Chlamys*, *Ostraea*, *Venus*, *Corbula*, live up to 50-80 m deep now.

The development of a large number of mollusc genera and species, with adult and juvenile individuals shows us normal life conditions for a developing fauna within a marine basin. In the very neighbourhood of the littoral, the abundance of hexacorallians shows well aerated warm shallow water.

The presence of the corals as well as of some molluscs as *Glycyameris* sp., *Cardita* sp., *Anadara* sp., *Dentalium* sp., which are very sensitive to the salinity variation, is the best indicator that I dealt with a basin with a normal salinity. Rich ornaments of the mollusc shells show us a basin rich in Calcium salt and a pH within normal limits (8.1-8.3).

Oxygen limit passed through the substratum, fact demonstrated by the presence of the infaunal mollusc species (*Venus* sp., *Fusus* sp.).

Temperature of the Bahna basin was high (18-21°C), characteristic to a present subtropical basin, with corals and molluscs of *Venus* sp., *Chama* sp., *Ostraea* sp., *Chlamis* sp.

Within the faunal association the herbivorous bivalves and gastropods (*Turritella* sp., *Cerithium* sp.) are present, on which the carnivorous gastropods relied (*Nassa* sp., *Conus* sp., *Natica* sp., *Murex* sp., *Cerithium* sp.).

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CONSIDERAȚII ASUPRA FAUNEI BADENIENE (MIOCEN MEDIU) DE LA BAHNA
(CARPAȚII MERIDIONALI, ROMÂNIA)

REZUMAT

De la Bahna, de pe ogașul Curchia a fost colectată o asociație faunistică foarte diversă din punct de vedere taxonomic, de vârstă Badenian, care cuprinde în principal moluște și corali. Specimenele sunt bine conservate. Au fost identificate 57 specii de nevertebrate.

Coralii se evidențiază printr-o dezvoltare normală și printr-un număr mare de colonii și fragmente de colonii (30), mai frecventă fiind specia *Tarbellastraea reussiana* Reuss (9 ex.) urmată de *Favia magnifica* Reuss (8 ex.), *Tarbellastraea conoidea* M.-Edward et Haime (7 ex.), *Syzygophyllia brevis* Reuss (6 ex.).

Moluștele prezintă o particularitate în ceea ce privește dimensiunile cochiliilor, fiind de talie mică și medie.

Gastropodele sunt prezente cu o mare diversitate taxonomică (43), mai frecvente fiind *Pleurotoma coronata* Hoernes (26 ex.), *Turritella subangulata* Brocchi (26 ex.), *Columbella (Mitrella) nassoides* Grateloup (10 ex.), *Ancilla (Baryspira) glandiformis* Lamarck (10 ex.).

Bivalvele sunt mai puțin numeroase din punct de vedere taxonomic (8), dar și numeric (26 ex.), mai frecvente fiind speciile *Venus (Ventricoloidea) multilamella* (Lamarck) (9 ex.), *Cardita (Venericardia) partschi* Goldfuss (6 ex.) și *Corbula (Varicorbula) gibba* (Oliv) (5 ex.).

Scafopodele sunt prezente cu două specii din genul *Dentalium*, mai frecventă fiind *D. (Entalis) badensis* Partsch (9 ex.).

Considerațiile paleoecologice ale asociației faunistice de la Bahna indică existența, în Badenian, a unui bazin marin de dimensiuni relative reduse, în care viețuitoarele aveau toate condițiile pentru menținerea unui lanț trofic.

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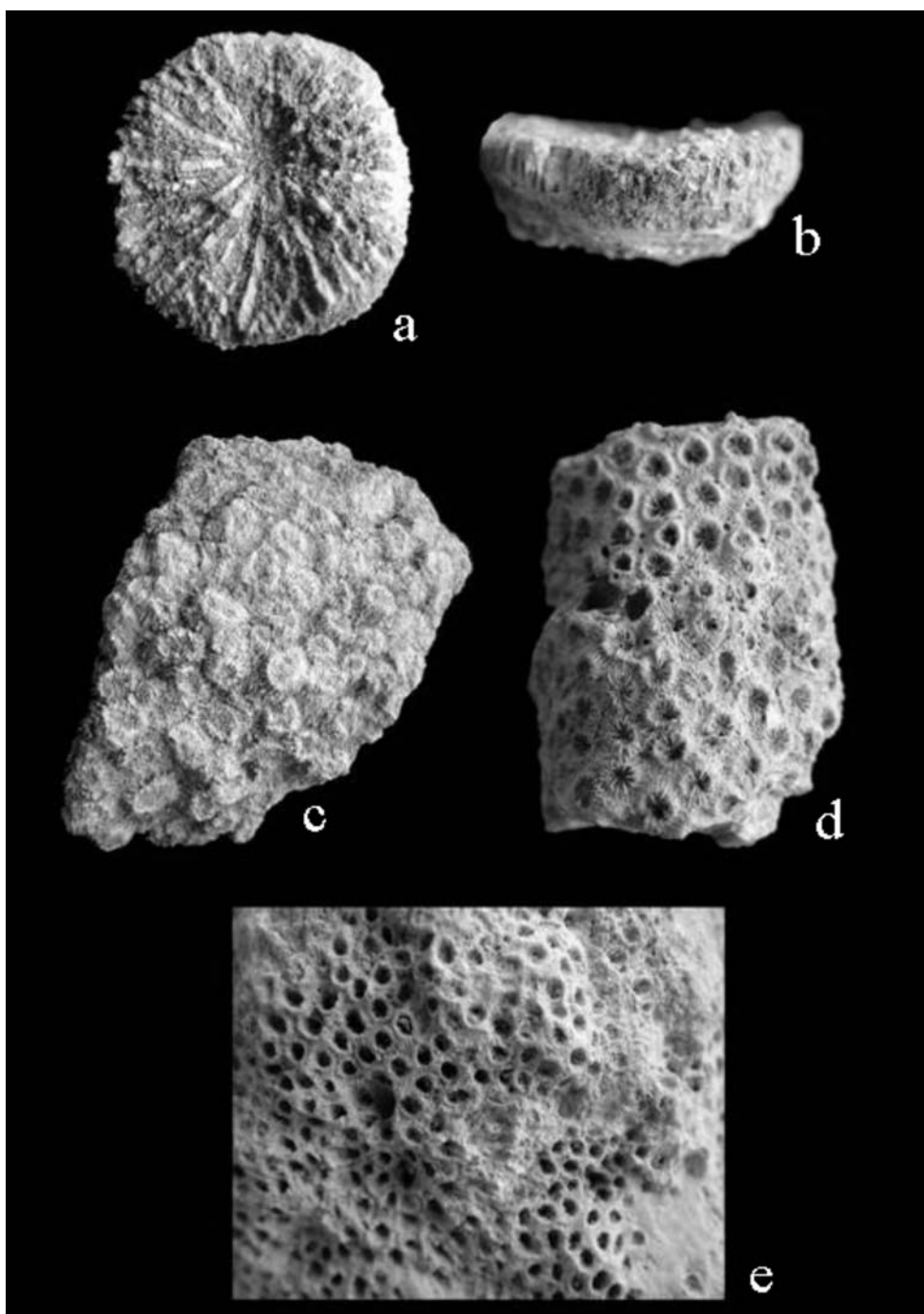


Fig. 3 – a-b: *Syzygophyllia brevis* Reuss (x 1.5); c, *Favia magnifica* Reuss (x 1); d, *Tarbellastraea conoidea* M.- Édward et Haime (x 1.5); e, *Tarbellastraea reusiana* M.- Édward et Haime (x 2). (Photo: Rodica Tiță)

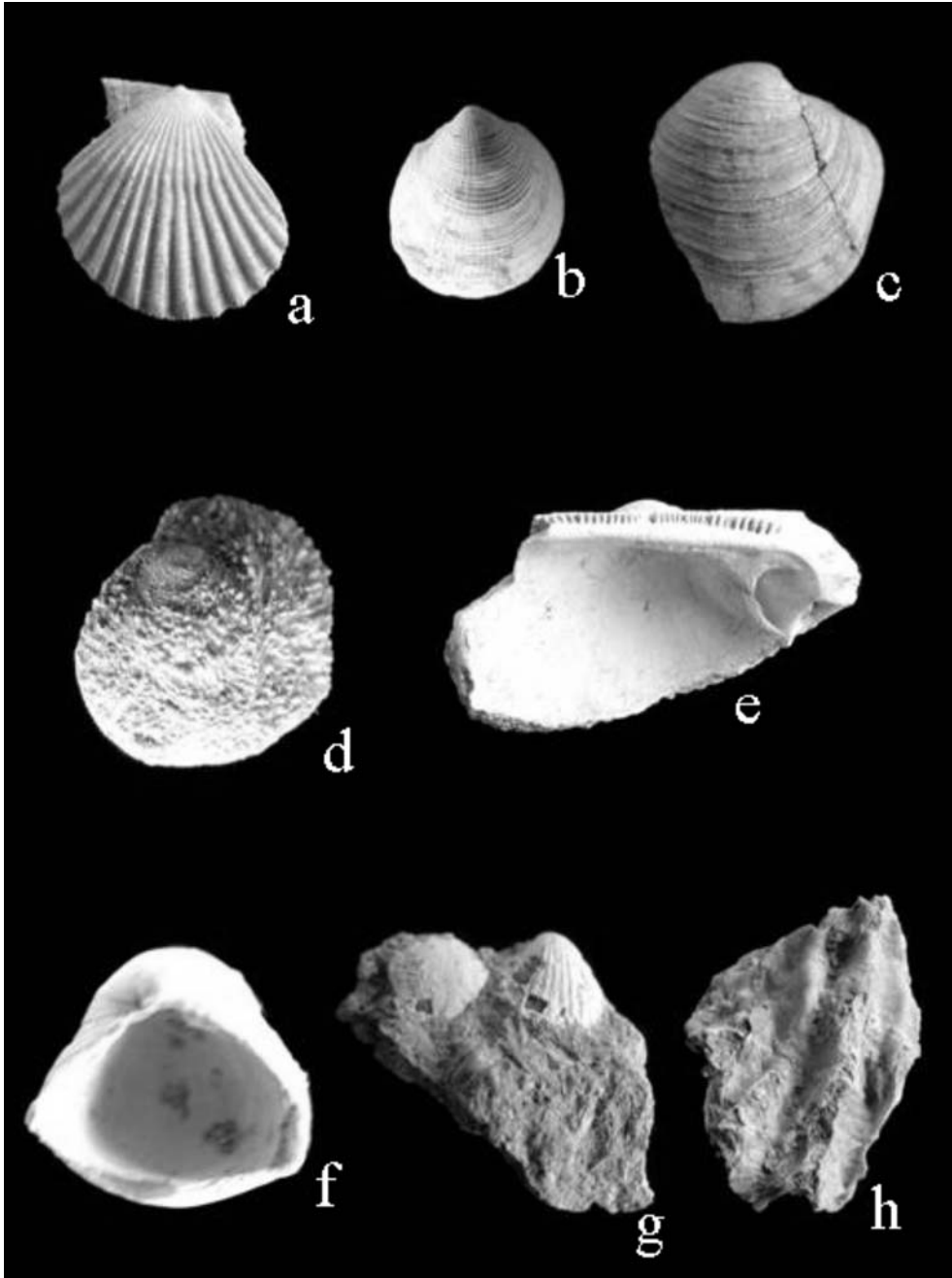


Fig. 4 – a, *Chlamys seniensis lomnickii* Hilber, exterior view, left valve; b, *Glycymeris (Glycymeris) deshayesi* (Mayer), exterior view, right valve; c, *Venus (Ventricoloidea) multilamella* (Lamarck.), exterior view, right valve; d, *Chama (Psilopus) griphoides* Linné, exterior view, right valve; e, *Anadara (Anadara) diluvii* (Lamarck.), interior view, right valve; f, *Corbula (Varicorbula) gibba* (Olivé), interior view, right valve; g, *Cardita (Venericardia) partschi* Goldfus, exterior view; h, *Ostraea* sp. (Photo: Rodica Tiță)

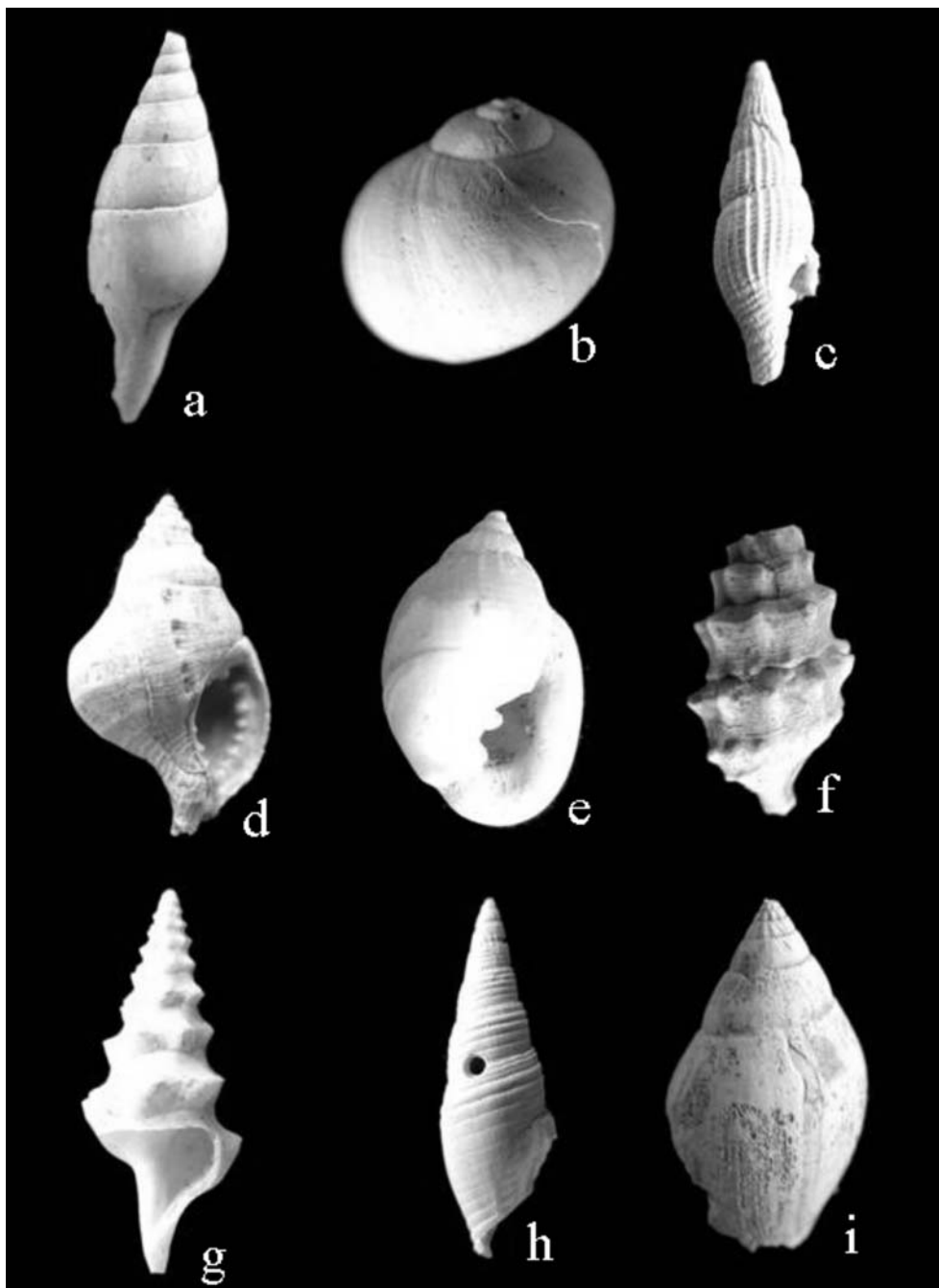


Fig. 5 – a, *Columbella (Mitrella) nassoides* Grateloup; b, *Natica (Euspira) catena* Da Costa; c, *Vexillum (Uromitra) cupressinum* Brocchi; d, *Charonia (Sassia) tarbellianum* Grateloup; e, *Ringicula (R.) auriculata buccinea* (Brocchi.); f, *Cerithium vulgatum europaeum* Mayer; g, *Pleurotoma (Drillia) spinescens* Partsch.; h, *Mitra (Mitra) orientalis* Oppenheim; i, *Lyria taurinia* Bonelli. (Photo: Rodica Tiță)

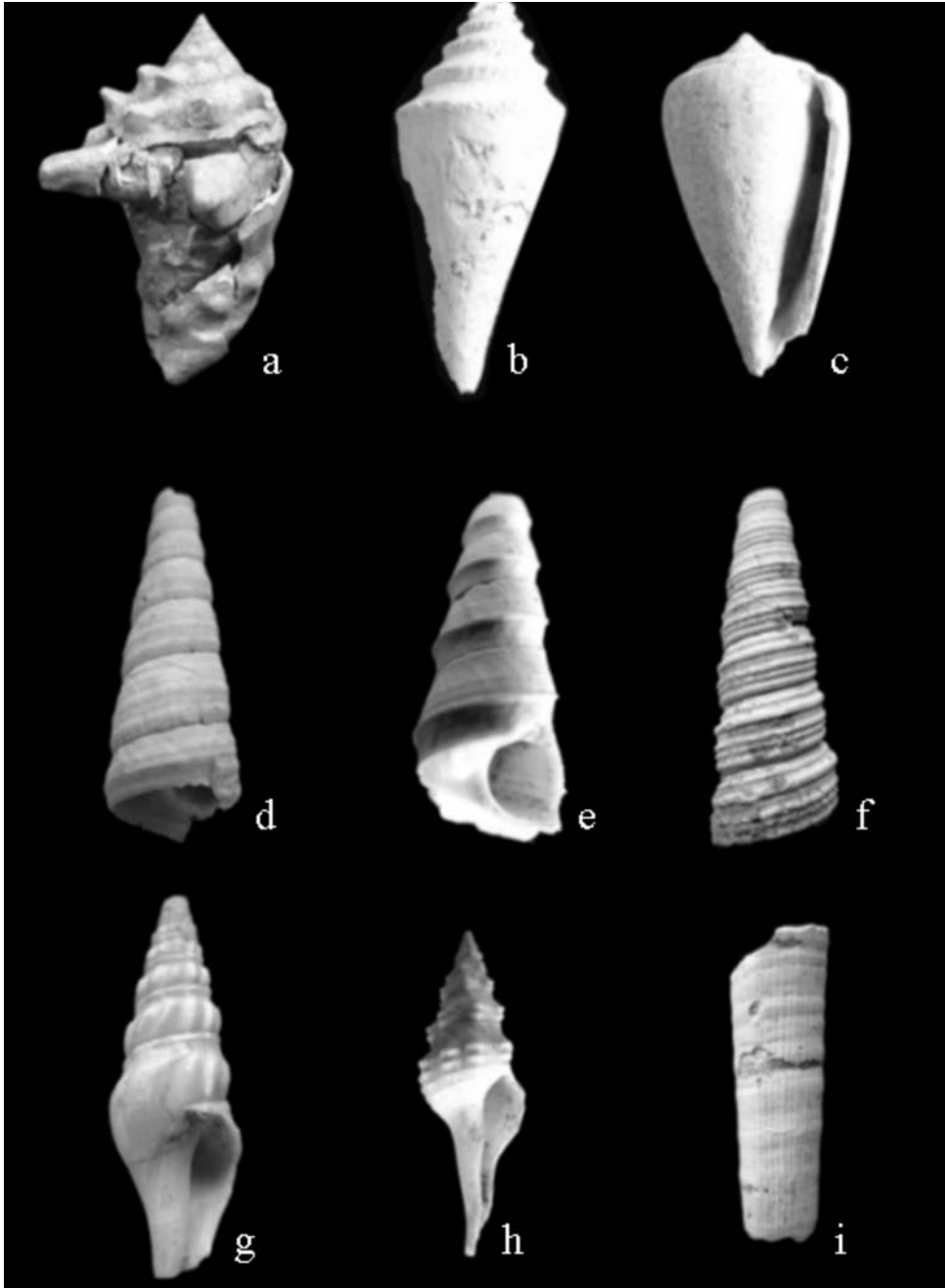


Fig. 6 – a, *Strombus coronatus* DeFrance; b, *Conus (Conolithus) dujardini* Deshayes; c, *Conus (Cheliconus) fuscocingulatus* Bronn; d, *Turritella (Archimediella) pulchra* Friedberg; e, *Turritella subangulata* Brocchi; f, *Turritella (Haustator) ermicularis* Brocchi; g, *Pleurotoma (Drillia) allionii* Bellardi; h, *Latirus (Dolicholatirus) bilineatus* Partsch; i, *Dentalium (Entalis) badensis* Partsch. (Photo: Rodica Tiță)