Acta Palaeontologica Romaniae (1997), 1.

21

PTEROPOD ASSEMBLAGE IN THE MIOCENE SEDIMENTS OF THE BAIA MARE REGION

Monica VELCESCU

S.C "Prospecţiuni" S.A., Str. Caransebeş 1, 78344, Bucharest

Abstract: The research for the present paper was carried out on material from S.C. "CUARŢ" S.A. Baia Mare - Băile Dăneşti Well H9. The paleontological study emphasizes a pteropod assemblage. The species figured and described have not been cited in the literature on the Baia Mare region. Also, the age identification represents a novelty for our country. Four taxa are described and figured: *Clio sinuosa* (Bellardi, 1873); *C. coebana* Robba, 1972; *C. braidensis* (Bellardi, 1873); *C. pulcherrima* (Mayer, 1868).

Key words: Early Miocene, Baia Mare, pteropods

The research on marine planktonic gastropods carried out in recent years has clearly verified that this group of mollusks represents an important biostratigraphic tool for the regional and interregional correlations of Cenozoic marine sediments.

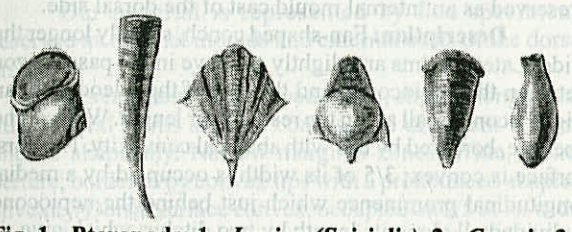

Fig. 1 - Pteropods: 1 - *Lucina (Spirialis)*, 2 - *Creseis*, 3 - *Clio*, 4 - *Cavolinia*, 5 - *Vaginella*, 6 - *Cuvierina*

There are two groups of planktonic gastropods which are preserved in fossil records: heteropods and pteropods. Heteropods are rather rare and recorded only from the Early Badenian. The pteropods of the Central Paratethys are represented by eight genera - *Limacina(Spirialis)*, *Creseis*, *Clio*, *Cavolinia*, *Vaginella*, *Cuvierina*, *Styliola* and *Praehyalocylis* (Fig. 1) - which are distributed from the Middle Eocene to the Middle Miocene in this area.

The research for the present paper was carried out on material from Băile Dăneşti Well H9, the Baia Mare region (Fig. 2).

Fig. 2 - Geographical position of the studied area

The paleontological study of this material emphasizes a monogenus pteropod assemblage, with four species of the *Clio* genus which belongs to the Euthecosomata suborder, the Cavoliniidae family. Pteropods are planktonic gastropods which belong to the Opistobranchyata subclass. The recent specimens of the Pteropoda order belong to two suborders: *Euthecosomata* (with two families - *Spiratellidae* (=*Limacinidae*) and *Cavoliniidae*) and *Pseudothecosomata* (with three families - *Peraclidae, Cymbulidae* and *Desmopteridae*).

Generally, the conch of Cavoliniidae is calcified but thin, conic, with axial or bilateral symmetry, with a sharp apical end, straight or curved. The general shape is variable, conic, straight or curved, swollen out or flat, enlarged, coiled or uncoiled. The conch of *Euclio* genus (recent correspondent of the fossil genus *Clio*), of the *Diacria* and *Cavolinia* genera seems to result from a "face to face" disposal of two "valves" more or less swollen out, equal or unequal, partially or completely united on the edges, beginning in the apical region. These "valves" often have an ornamentation of ribs and striaes; their ribs or angles may continue laterally as sharped tips (ex: *Euclio cuspidata*).

Research on recent *Euthecosomata* led to the idea that the "aberrant" form of their conch, except for the Spiratellidae, results from that of the Spiratellidae by an uncoiling and dorso-ventral flattening process, developing afterwards to different directions (Boas 1886, in Grasse 1968).

An unrolling process of a *Spiratella* conch, with a flat whorl, allows us to imagine a straight conch, with a downward apical end. Consequently, the pallial cavity, from dorsal, became ventral, so that the apical curve is directed upwards, as we can see in the *Euclio* and *Cavolinia* genera and less evident in *Creseis* genus. A dorso - ventral flattening appears in certain species of *Euclio*: *E. antarctica, E. chaptali.* Unequal growing of the ventral and dorsal surfaces, a thickening of the lateral side and the appearance of a median rib, confer to other *Euclio* species characteristic features: *E. pyramidata, E. cuspidata.* The aperture becomes a slot (Fig. 3). The conch is translucent or may present a slight colour. The operculum is thin, glassy, transparent, with an opposite winding as compared

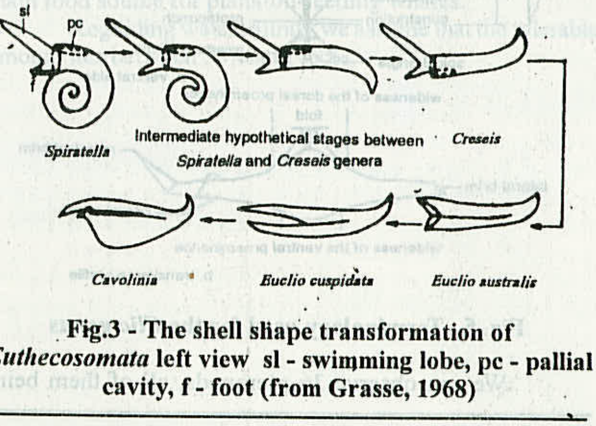

Fig.3 - The shell shape transformation of *Euthecosomata* left view sl - swimming lobe, pc - pallial cavity, f - foot (from Grasse, 1968)

to the shell's one. It is attached by a little part of its surface to the ventral lobe of the foot (=metapod).

Euthecosomata have a transparent body. The foot is much widened laterally. The ventral foot is made of a median, thin lobe and two lateral ones which unite above the mouth and prolonged themselvs into two swimming lobes.

The abdomen (Fig. 4) is twisted 180 degrees regarding the anterior part and, consequently, the pallial cavity becames ventral.

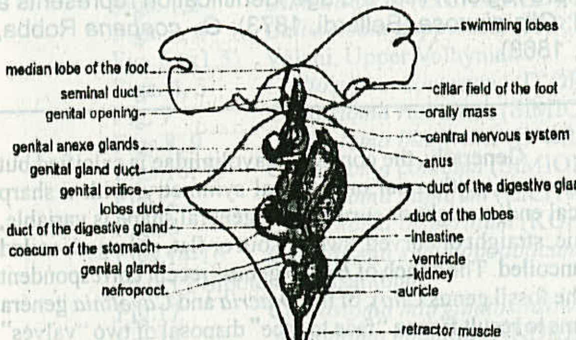

Fig. 4 - *Euclio cuspidata*, ventral side (after Meisenheimer, in Grasse 1968)

We can find, as fossils, mostly the initial part of the conch (nepioconch and more or less the protoconch) and seldom the last whorl or the entire teleoconch which, in most cases appears as internal or external casts. We consider it useful to present the terminology and the measurements accomplished which are illustrated in Fig. 5.

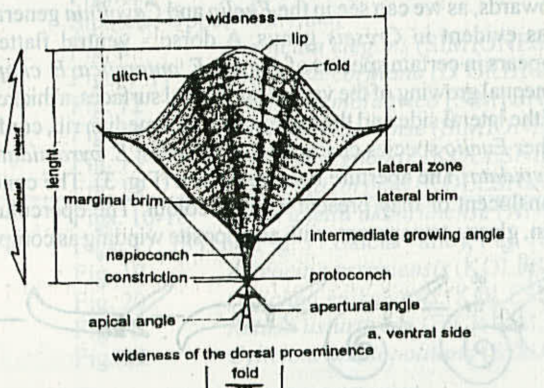

Fig. 5 - Terminology used for the *Clio* genus

We can observe 36 pteropods, all of them being species of the same genus, *Clio*. We described and figured four species: *Clio sinuosa* (Bellardi), *C. coebana* Robba, *C. braidensis* (Bellardi) and *C. pulcherrima* (Mayer).

Phyllum MOLLUSCA
Class GASTROPODA Cuvier, 1787
Subclass OPISTOBRANCHIA
Order THECOSOMATA
Suborder EUTHECOSOMATA
Suprafamily SPIRATELLACEA
Family CAVOLINIIDAE

Clio sinuosa (Bellardi) 1873
Pl. I, Fig. 1, 2; Pl. II, Fig. 1

1873 *Balantium sinuosum* Bellardi, Bellardi, p. 62, tav. 3, fig. 11

1977 *Clio sinuosa* (Bellardi), Robba, p. 503, tav. 22, fig. 5, tav. 23, fig. 1-2

The material is represented by only a conch, preserved as an internal mould cast of the dorsal side.

Description: Fan-shaped conch, slightly longer than wide. Lateral brims are slightly concave in the passage zone between the nepioconch and the rest of the teleoconch, and slightly convex all along the rest of their length. Wide, arched aperture, bordered by lips with abapical convexity. The dorsal surface is convex; 3/5 of its width is occupied by a median, longitudinal prominence which just behind the nepioconch is divided all along its length by two ditches which give rise to three subequal, rounded folds. The lateral zones are flat, triangular, slightly inclined towards the lateral brims.

The whole surface presents colabral, well marked, regular ribs, separated by shallow striaes.

Observations: Our specimen is similar to the one figured and described by Robba, 1977.

Age: Eggerian (Late Chattian - Aquitanian)

Provenience: Băile Dăneşti Well, Baia Mare.

Distribution: Italy, Miocene (Serrav, Tort) L.P.P. 321

Clio coebana Robba, 1972
Pl. I, Fig. 3, 4; Pl. II, Fig. 2

1972 *Clio coebana* sp. n., Robba, p. 499, tav. 59, fig. 8 - 10, tav. 60, fig. 1 - 4.

Our material is represented by three specimens, preserved as internal moulds and external casts.

Description: Subtriangular conch, slightly longer than wide, with a very sharp apex, straight, slightly curved towards the dorsal face. Lateral brims are acute, convex and more curved adapically. The arched apertural lip has an abapically convexity in the median zone. The dorsal face is occupied on 2/3 of its width by a median, longitudinal prominence which, just behind the apex, is divided all along its length by two shallow ditches which give rise to three rounded, rather depressional folds. The middle one is twice wider than the other two. Marginal subtriangular areas gradually narrowing towards the apex, more widened ventrally, present a rather narrow fold which attenuates abapically. All over the surface.colabral ribs, more or less regular, are preserved.

Observations: Our specimen is similar to the one figured and described by Robba, 1972.

Age: Eggerian (Late Chattian - Aquitanian)

Provenience: Băile Dăneşti Well, Baia Mare region

Distribution: Italy: Late Oligocene - Early Aquitanian

L.P.P. 322

***Clio braidensis* (Bellardi, 1873)**

Pl. I, Fig. 5, 6; Pl. II, Fig. 3

1873 *Balantium braidense* Bellardi, p. 62, tav. 3, fig. 12

1977 *Clio braidensis* (Bellardi), Robba, p. 594, tav. 19, fig. 6, tav. 20, fig. 2, 3

Our material is represented by five specimens, preserved as internal moulds and external casts of the dorsal surface.

Description: Fan-shaped conch, slightly longer than wide. Lateral brims slightly convex and divergent become concave abapically. Narrow marginal zones. Wide, arched aperture, bordered by convex lips with a pronounced abapical convexity. Dorsal surface convex, occupied on 2/5 of its width by a median, longitudinal prominence which, just behind the nepioconch is divided all along its length by two narrow, superficial ditches which give rise to three rounded, slightly depressed folds. The lateral zones are not preserved. The dorsal area is covered with colabral ribs which attenuate on the median prominence.

Observations: Their state of preservation does not allow a precise attribution of our material to this species. However, all the five specimens highly resemble those figured by Robba, p. 628, tav. 20, fig. 3, 1977.

Age: Eggerian (Late Chattian - Aquitanian)

Provenience: Băile Dăneşti Well, Baia Mare region

Distribution: Italy, Middle Miocene, Pliocene

L.P.P. 323

***Clio pulcherrima* (Mayer, 1868)**

Pl. I, Fig. 7, 8; Pl II, Fig. 4

1873 *Balantium pulcherrimum* Bellardi, p. 63, tav. 3, fig. 13

1971 *Clio pulcherrima* Robba, p. 85, tav. 3, fig. 10 - 11

1977 *Clio pulcherrima* Robba, p. 597, tav. 22, fig. 1

Our material consists of about 27 specimens preserved as internal moulds or external casts of the dorsal area.

Description: Fan-shaped conch, almost twice longer than wide. Conical, straight nepioconch, with a length representing about 1/5 of the total length of the conch. Lateral brims are concave in the passage zone between the nepioconch and the remaining conch, then slightly convex. Slightly arched aperture, bordered by lips with reduced abapically convexity; the dorsal lip is subangular in the median zone. The dorsal surface is convex. Five divergent ditches appear just behind the nepioconch, giving rise to seven folds. The ditches attenuate in the apertural zone. The middle fold is the best marked. The whole area is covered with colabral, regular, numerous ribs, which are continuous on the folds and less marked on the lateral zones.

Observations: Our material shows a great number of common features with the material figured and described by Robba (1971, 1977).

Unfortunatelly, the available material does not allow the separation of more species. The reduced size and the extreme fragility of the conch may account for the appearance of internal moulds and external casts in sediments. Frequently, those casts are deformed because of either the conservation process or the plasticity of the sediment, situations which make the specific determination difficult. Also, because of the fossilization conditions, the conches are usually compressed dorso-ventrally, so we can not reconstruct the transverse profile. As a result of the same compression or breaking process, transversal ribs may appear on the surface of the conch.

The research on recent pteropods reveal the fact that they swarm in the ocean in vast numbers. During storm gales pteropods are "pushed" to the shore zone where they are included in sediments as taphocenoses. Also, pteropods occur in tremendous abundance in some deep-sea sediments. In such a case they are covered by one another so that only the isolated conch can be studied more in detail.

Recent pteropods float during the day at depths between 100 and 400 meters, rising to the surface only after the sunset when the light is dimming or absent, a fact that indicates that pteropods are photophobic.

Displacement is made by movements of the swimming lobes, which are analogous to the movements of butterfly wings. Pteropods may float at the water surface or deeper, at a certain level, by a simple spreading of the swimming lobes; sinking is accomplished by gathering up. Such a manner of life makes these gastropods not significant as bathymetric indicators.

We know that most pteropods prefer temperate and tropical waters. However there are species like *Euclio australis* which prefer boreal and austral temperate waters and even species of northern latitudes which represent the main food source for plankton-feeding whales.

Regarding water salinity we assume that the tolerable amount lies between 35‰and 39‰.

References:

Bellardi R. (1986) - I molluschi dei terreni terziari del Piemonte e della Liguria, vol. 1

Bogoescu C. et al. (1980) - Atlas zoologic, Ed. Didactică şi Pedagogică, Bucureşti

Bohn - Havas M., Zorn I (1995) - Biostratigraphic studies on planktonic gastropods of the Neogene of the Central Paratethys, Dări de Seamă ale sedintelor Inst. de Geol. şi Geofiz, 4 Stratigrafie, vol. 76, supl. nr. 7, Bucureşti

Easton W.H. (1960) - Invertebrate paleontology, Publ. Harper & Brothers, Ed. Carey Coronei, New York

Fuchs T. (1905) - Über Pteropoden und Globigerinen Schlamm in Lagunes von Koralleninseln Verh. K.K. Geol., Reich., Jahr 1905, no. 7- 8, Wien

Gheorghian M., Gheorghian Mihaela (1962) - Asupra unor marne cu Spirialis in bazinul Lăpuş, Dări de Seamă, vol. 49/2

Grasse P (1968) - Traité de zoologie. Anatomie, Systématique, Biologie, Tom. V, Mollusques gasteropodes et Scapho-podes, Fasc. III, Ed Masson et Cie

Grossu Al. V. (1956) - Fauna R.P.R., Mollusca, vol. III, fasc. 2, Gastropode; Prosobranchia şi Opistobranchia, Ed. Academiei

Hoernes M (1856) - Die fossilen Mollusken des Tertiaer - Beckens von Wien, Abh. K.K., Geof., Reich., vol. 3, Wien

Iorgulescu T. (1952) - Elemente de micropaleontologie aplicată, Ed. Tehnică

Istocescu D. (1962) - Asupra prezenţei genului Balantium instratele de Buzas de la Lipotin, Dări de Seamă, vol. 49/2

Lapidus D.F., Coates D.R. (1990) - Dictionary of geology, Ed. Collins, Glasgow

Pauca M. (1967) - Creseis borodiana n. sp., pteropod din Bazinul Vadului, Dări de Seamă, vol. 54/2, Bucureşti

Robba E. (1971) - Associazioni a pteropodi della formazione di Cessole (Langhiano), Riv. Ital. Paleont., vol. 77, no. 1, Milano

Robba E. (1972) - Associazioni a pteropodi nel Miocene inferiore Del. Langhe, Riv. Ital. Paleont., vol. 78, nr. 3, Milano

Robba E. (1977) - Pteropodi serravalliani delle Langhe (Piemonte), Riv. Ital. Paleont., vol. 83, no. 3, Milano

Sabelli B. (1980) - Simon and Schuster's Guide to Shells, Ed. by Harold Feinberg, New York

Shepard F.P. et. al. (1967) - Submarine geology, IInd edition, Ed. Harper & Row, New York

Stancu Josefina (1974) - Asociaţia de heteropode şi pteropode badenian inferioare din depresiunea Getică, jud. Mehedinţi, Dări de Seamă, vol. 60/3, Bucureşti

Stancu Josefina (1977) - Asociaţia de pteropode şi heteropode din aria subcarpatică (Badenian inferior - Langhian), volum consacrat anului internaţional al femeii, Tipografia Universităţii Bucureşti

Stancu Josefina (1978) - Nouvelles espèces d'heteropoda et de pteropoda dans le Badenien inférieur (Langhien) en Roumanie, Dări de Seamă, vol. 49/3, Bucureşti

Captions of Plates

PLATE 21. I

Figs. 1 - 2. *Clio sinuosa* (Bellardi), x 4. Early Miocene, Băile Dăneşti well, Baia Mare region, M. Velcescu's coll., LPP no. 321

Figs. 3 - 4. *Clio coebana Robba*, x 4. Early Miocene, Băile Dăneşti Well, Baia Mare region, M. Velcescu's coll., LPP no. 322

Figs. 5 - 6. *Clio braidensis* (Bellardi), x 4. Early Miocene, Băile Dăneşti Well, Baia Mare region, M. Velcescu's coll., LPP no. 323

Figs. 7 - 8. *Clio pulcherrima* (Mayer), x 4. Early Miocene, Băile Dăneşti Well, Baia Mare region, M. Velcescu's coll., LPP no. 324

PLATE 21. II

Fig. 1. *Clio sinuosa* (Bellardi), x 2,5. Early Miocene, Băile Dăneşti Well, Baia Mare region, M. Velcescu's coll., LPP no. 321

Fig. 2. *Clio coebana Robba*, x 2,5. Early Miocene, Băile Dăneşti Well, Baia Mare region, M. Velcescu's coll., LPP no. 322

Fig. 3. *Clio braidensis* (Bellardi), x 2,5. Early Miocene, Băile Dăneşti Well, Baia Mare region, M. Velcescu's coll., LPP no. 323

Fig. 4. *Clio pulcherrima* (Mayer), x 2,5. Early Miocene, Băile Dăneşti Well, Baia Mare region, M. Velcescu's coll., LPP no. 324

Figs. 5 - 6 Pteropods assemblage