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LOWER SARMATIAN MICROFAUNA FROM THE HYDROGEOLOGICAL WELL FA HÂRLĂU (IAŞI COUNTY)

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Abstract: FA HARLAU well was drilled in order to permit some hydrogeological research of Sarmatian deposits which develop in Hârlău area, Iaşi County.

The well has 170 m depth and pierced alternation of clays and marls with sands and argillaceus sands intercalations.

The micropaleontological analyis of the 92 – 94 depth interval had shown an association of foraminifers and ostracods which permit to establish that the age of these deposits is Lower Sarmatian (Upper Volhynian).

The paper represents a short note concerning this micropaleontological association.

Keywords: hydrogeological well, Lower Sarmatian (Upper Volhynian), micropaleontological association.

INTRODUCTION

FA HARLAU well was drilled in 2002 and pertains to the National Hydrogeological Network for Depth Groundwater. The main research objective of this well was, from hydrogeological point of view, the study of Sarmatian deposits which develop in Hârlău area, Iaşi county.

The well is located in the north-eastern part of Hârlău locality, in the Bahlui river floodplain, at approximately 140 meters altitude. (Fig.1)

GEOMORPHOLOGICAL CONSIDERATIONS

The study area is located in the southern part of Moldova Plaine, known under the name of Lower Jijia and Bahlui Plaine. This plaine is characterized by a rippled relief, with large valleys, developed terraces and planes, with sculptural very fragmented interfluves.

The southern part of Moldova Plaine is constituted by many small geomorphological units, one of them being the Hârlău – Hodora Depression.

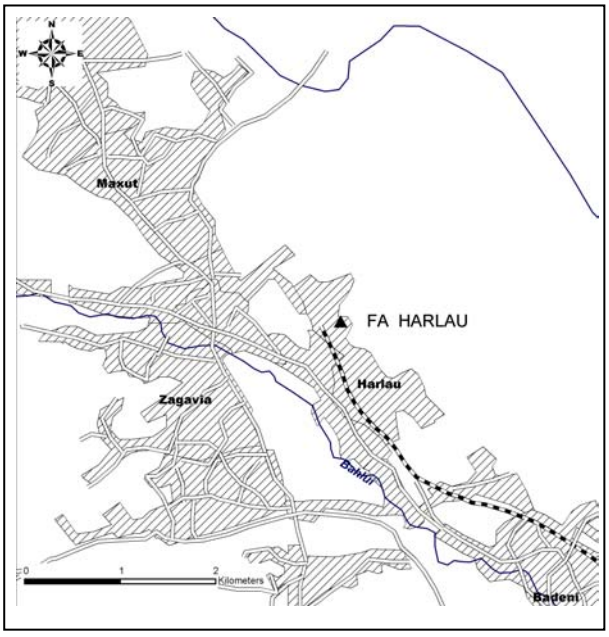

Fig.1 Location of the FA Hârlău Well

Hârlău – Hodora Depression has an oblong configuration on the NW - SE direction (12 km length), with approximately 4 km width. The main characteristic is the superposition of this depression across the Bahlui valley, which extends a lot downstream, just after it leaves the Dealu Mare high unit.

GEOLOGICAL CONSIDERATIONS

From structural point of view the Hârlău area belongs to Moldavian Platform. This platform is constituted by a Precambrian peneplain basement and a sedimentary cover formed by Ordovician, Silurian, Cretacic, Miocene and Quaternary deposits, with some important stratigrafical gaps.

Sarmatian deposits sink from north to south, older terms ("Buglovian") cropping out in north part, in Prut area, and new term (Chersonian) cropping out in southern part of Iaşi.

In Hârlău area crop out deposits belonging to Volhynian, Basarabian and Quaternary (Fig.2).

Generally, the Volhynian is represented by clays and marls with sands and oolithic sandstones intercalations and the Basarabian is represented by the marly clayey facies of *Cryptomactra* Beds belonging to Lower Basarabian. In the western part of Hârlău area, this interval is constituted by sandy clay and sands, with rare clayey intercalations and oolithic sandstones.

The Quaternary, represented by Holocene, is developed in the floodplain Bahlui river and is constituted by silty clays, rarely sands and gravels.

In a geological study of the Dealu Mare – Hârlău region, published in 1997, Stefan separates in Upper Volhynian frame two litological units*: Onega Clays* (without fossils), in base and *Lespezi - Tudora Sands and Sandstones* (rich fossiliferous) in the upper part.

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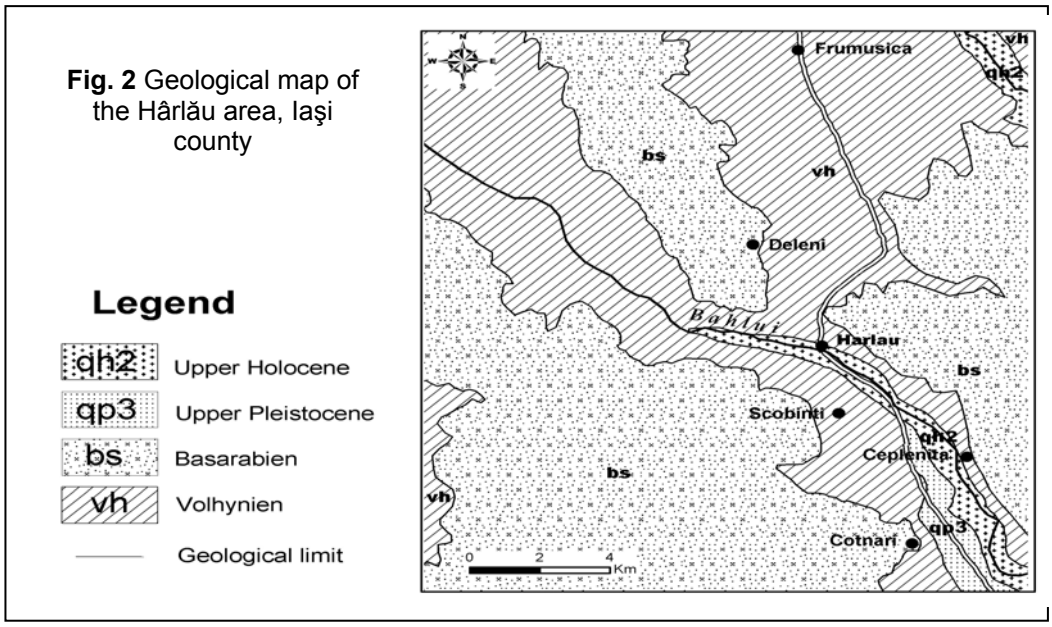

Fig. 2 Geological map of the Hârlău area, Iaşi county

FA HARLAU well intercepted Holocene deposits (vegetal soil, black clay) up to 5 meters depth and Lower Sarmatian deposits (grey clayey marls, clays, with fine sands between 143,5 and 157 m depth) up to the final depth of the well, respectively 170 m. (Fig.3).

BIOSTRATIGRAPHICAL CONSIDERATIONS

In order to set out exacly the age of intercepted deposits in FA HARLAU well it was analysed, from micropaleontological point of view, the 92 – 94 m depth interval.

It was identified a microfaunistical association constituted by foraminifera and ostracods, relatively poor in number of species, but relatively rich in number of specimens.

The identified foraminifers belong to the following species, first three having the greatest number of specimens:

Ammonia beccarii (Linné)
Elphidium macellum (Fichtel et.Moll)
Porosononion subgranosus subgranosus (Egger)
Quinqueloculina consobrina d'Orbigny
Gyroidina sp.

From the ostracods species the following were identified:

Aurila merita (Zal.)
Callistocythere egregia (Méhes)
Leptocythere tenuis (Reuss)
Leptocythere sp.
Cyprideis pannonica (Méhes)
Hemicytheria omphalodes omphalodes (Reuss)
Loxoconcha sp.

The identified microfaunistical association is characteristic for the Upper part of Volhynian and it can be set into the biozone with *Rotalia beccarii, Porosononion subgranosus* and *Quinqueloculina consobrina*, sensu Bica Ionesi (1968), from the Upper Volhynian.

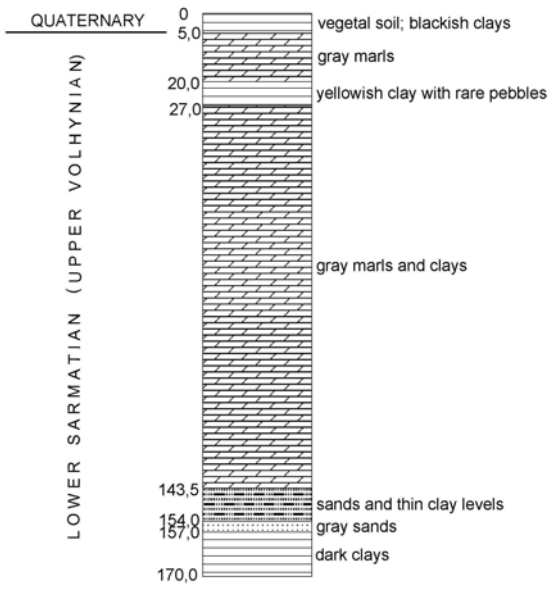

Fig. 3 Lithological column of the FA Hârlău well

SYSTEMATICAL DESCRIPTION

Class FORAMINIFEREA d'Orbigny,1826
Order MILIOLIDA Lankester, 1885
Superfamily MILIOLACEA Ehrenberg, 1893
Family HAUERINIDAE Schwager,1876
Genus QUINQUELOCULINA d'Orbigny,1826
***Quinqueloculina consobrina* d'Orbigny,1846**
Pl.1, Figs. 1-3

1968 *Quinqueloculina consobrina* d'Orb. - Ionesi, p.261, pl.XIII, fig.1-4.

1970 *Quinqueloculina consobrina consobrina* d'Orb. - Didkowski et. Satanovskaia, p.21, pl.10, fig.2 a,b.

1975 *Quinqueloculina consobrina* (d'Orb.) - Venglinski, p.157, pl.XV, fig.2 a,b.

1999 *Quinqueloculina consobrina* d'Orb. - Brânzilă, pl.VI, fig.6.

Order ROTALIIDA Lankester, 1885
Superfamily ROTALIACEA Ehrenberg, 1839
Family ROTALIIDAE Ehrenberg, 1839
Genus AMMONIA Brünnich, 1772
***Ammonia beccarii* (Linné), 1758**
Pl.1, Figs. 8-12

1968 *Rotalia beccarii* Linné - Ionesi, p.286, pl.XXI, fig.5-7;9-12.
1970 *Streblus beccarii* (Linné) - Didkowski et. Satanovskaia, p.113,pl.69,fig.5 a-c.
1975 *Ammonia beccarii* (Linné) - Venglinski, p.190, pl.XXIX, fig.5 a-c, pl.XXX, fig.1 a-c; 3-4.
1999 *Ammonia beccarii* (Linné) - Brânzilă, pl.XII, fig.1,2.

Family ELPHIDIIDAE Galloway, 1933
Genus ELPHIDIUM Montfort, 1808
***Elphidium macellum* (Fichtel et.Moll), 1803**
Pl.1, Figs. 13-19

1968 *Elphidium macellum* (Fichtel et.Moll) - Ionesi, p.280, pl.XV, fig.11-14.
1970 *Elphidium macellum* (Fichtel et.Moll) - Didkowski et. Satanovskaia, p.121, pl.72, fig.7 a,b.
1999 *Elphidium macellum macellum* (Fichtel et.Moll) - Brânzilă, pl.XII, fig.3,4.

Genus POROSONONION Putrya, 1958
***Porosononion subgranosus subgranosus* (Egger), 1857**
Pl.1, Figs.20-27

1968 *Porosononion subgranosus* (Egger) - Ionesi, p.270, pl.XVIII, fig.1-4.
1969 *Porosononion subgranosus* (Egger) - Paghida –Trelea,p.170,pl.XIV, fig.1 a-e.
1970 *Porosononion subgranosus* (Egger) - Didkowski et. Satanovskaia, p.100, pl.63, fig.9 a,b.
1999 *Porosononion subgranosus* (Egger) - Brânzilă, pl.XV, fig. 9,10, pl.XVI, fig.1-4.

Superfamily CHILOSTOMELLACEA Brady, 1881
Family GAVELINELLIDAE Hofker, 1956
Genus GYROIDINA d'Orbigny, 1826
Gyroidina sp.
Pl.1, Fig.28

Class **OSTRACODA** Latreille, 1806
Subclass **PODOCOPA** Sars, 1866
Order **PODOCOPIDA** Sars, 1866
Suborder **CYTHEROCOPINA** Baird, 1850
Superfamily **CYTHERACEA** Baird, 1850
Family **CYTHERIDEIDAE** Sars, 1925
Genus **CYPRIDEIS** Jones, 1857
Cyprideis pannonica (Méhes, 1908)
Pl. 2, Figs. 9-11

1908 *Cytheridea pannonica* n.sp. - Méhes, p. 553, pl. 11, fig. 6-14.
1974 *Cyprideis pannonica* (Méhes)- Cernajsek, p. 473, pl.. 2, fig.5.
1975 *Cyprideis pannonica* (Méhes)- Ionesi & Chintăuan, pl. 1, fig. 3.

Family **HEMICYTHERIDAE** Puri, 1953
Genus **AURILA** Pokorný, 1955
Aurila merita (Zalányi, 1913)
Pl. 2, Figs. 1-8

1913 *Cythereis merita* n.sp. - Zalányi, p. 133, fig. 27 a-e.
1963 *Mutilus (Aurila) meritus* (Zalányi)- Stancheva, p. 28, pl. 5, fig. 3.
1975 *Aurila merita* (Zálanyi) - Cernajsek, p. 466, pl. 1, figs. 4.
1999 *Aurila merita* (Zálanyi) - Filipescu et al., pl. II, fig. 10.

Genus **HEMICYTHERIA** Pokorný,1955
Hemicytheria omphalodes omphalodes (Reuss, 1850)
Pl. 2 Fig. 7

1850 *Cypridina omphalodes* n.sp. - Reuss, p. 75, pl.. 10, fig. 7.
1963 *Mutilus (Aurila) omphalodes* (Reuss) - Stacheva, p. 28, pl. 5, fig. 1.
1975 *Hemicytheria omphalodes omphalodes* (Reuss) - Cernajsek, p. 468, pl. 1, figs. 7,8.

Family **LEPTOCYTHERIDAE** Hanai, 1957
Genus **LEPTOCYTHERE** Sars, 1925
Leptocythere tenuis (Reuss, 1850)
Pl. 3, Figs. 9-11

1850 *Cythere tenuis* n.sp. - Reuss, p. 53, pl. 8, fig. 14.
1908 *Krithe parallela* Méhes - Méhes, p. 615, pl. 10., figs. 4-7.
1975 *Leptocythere tenuis* (Reuss) - Cernajsek, p. 475, pl. 2, fig.6.

Leptocythere sp.
Pl. 3 Fig. 12

Genus **CALISTOCYTHERE** Ruggieri, 1953
Callistocythere egregia (Méhes, 1908)
Pl. 3 Figs. 1-8

1908 *Krithe egregia* n.sp - Méhes, p. 611, pl. 9, figs. 17-23.
1975 *Callistocythere egregia* (Méhes) - Cernajsek, p. 468, pl. 1, fig.8.

Family **LOXOCONCHIDAE** Sars, 1925
Genus **LOXOCONCHA** Sars, 1866
Loxoconcha sp.
Pl. 2 Fig. 8

CONCLUSIONS

FA HARLAU well (170 m depth) was drilled in order to research, from hydrogeological point of view, the Sarmatian deposits developed in Hârlău area, Iaşi County.

The concerned deposits consist of clayey marls and clays, with sands and argillaceus sands intercalations.

The micropaleontological analisis of the 92 – 94 m depth interval emphasized a microfaunistical association constituted from foraminifera - *Ammonia beccarii* (Linné), *Elphidium macellum* (Fichtel et.Moll), *Porosononion subgranosus subgranosus* (Egger), *Quinqueloculina consobrina* d'Orbigny, *Gyroidina* sp and ostracods - *Aurila merita* (Zal.), *Callistocythere egregia* (Mehes), *Leptocythere tenuis* (Reuss), *Leptocythere* sp., *Cyprideis pannonica* (Mehes), *Hemicytheria omphalodes omphalodes* (Reuss) and *Loxoconcha* sp., wich made possible the establishment of deposits age, respectively Lower Sarmatian (Upper Volhynian).

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PLATE CAPTIONS

PLATE 1 – Foraminifers from FA Hârlău Well (Iaşi County)

Figs. 1.-3. *Quinqueloculina consobrina* d'Orbigny; FA Hârlău Well, m 92-94
Fig. 4-12. *Ammonia beccarii* (Linné); FA Hârlău Well, m 92-94.
4, 6, 8. - spiral side view;
5, 7, 9-12. - umbilical side view;
Figs. 13-19. *Elphidium macellum* (Fichtel et.Moll); FA Hârlău Well, m 92-94; lateral view
Fig. 20-27. *Porosononion subgranosus subgranosus* (Egger); FA Hârlău Well, m 92-94; umbilical side view;
Fig. 28. *Gyroidina sp.*; FA Hârlău Well, m 92-94 lateral view;

PLATE 2 – Ostracods from FA Hârlău Well (Iaşi County)

Figs. 1-6. *Aurila merita* (ZALÁNYI.); FA Hârlău Well, m 92-94
1. - left valve, external view;
2. - right valve, external view;
3. - left valve, external view;
4. - right valve, external view;
5. - left valve, external view;
6. - details of ornamentation and pores; coccoliths can be seen on the valve surface;
Fig. 7. *Hemicytheria omphalodes omphalodes* (REUSS); FA Hârlău Well, m 92-94, left valve, external view.
Fig. 8. *Loxoconcha sp.*; FA Hârlău Well, m 92-94; right valve, external view, fragment.
Figs. 9-11. *Cyprideis pannonica* (MEHES); FA Hârlău Well, m 92-94;
9. - left valve, external view;
10. - juvenile specimen, right valve external view;
11. - detail of sieve-pore canal;

PLATE 3 – Ostracods from FA Hârlău Well (Iaşi County)

Figs. 1-8. *Callistocythere egregia* (MEHES); FA Hârlău Well, m 92-94.
1. - left valve, external view;
2. - right valve, external view;
3. - left valve; external view;
4, 5. - left valve, internal view;
6, 7. - right valve external view;
8. - details of ornamentation and pores;
Figs. 9-11. *Leptocythere tenuis* (REUSS); FA Hârlău Well, m 92-94.
9. - right valve, external view;
10. - left valve, external view;
11. - right valve, external view;
Fig. 12. *Leptocythere sp.*; FA Hârlău Well, m 92-94, right valve, external view.

PLATE 1

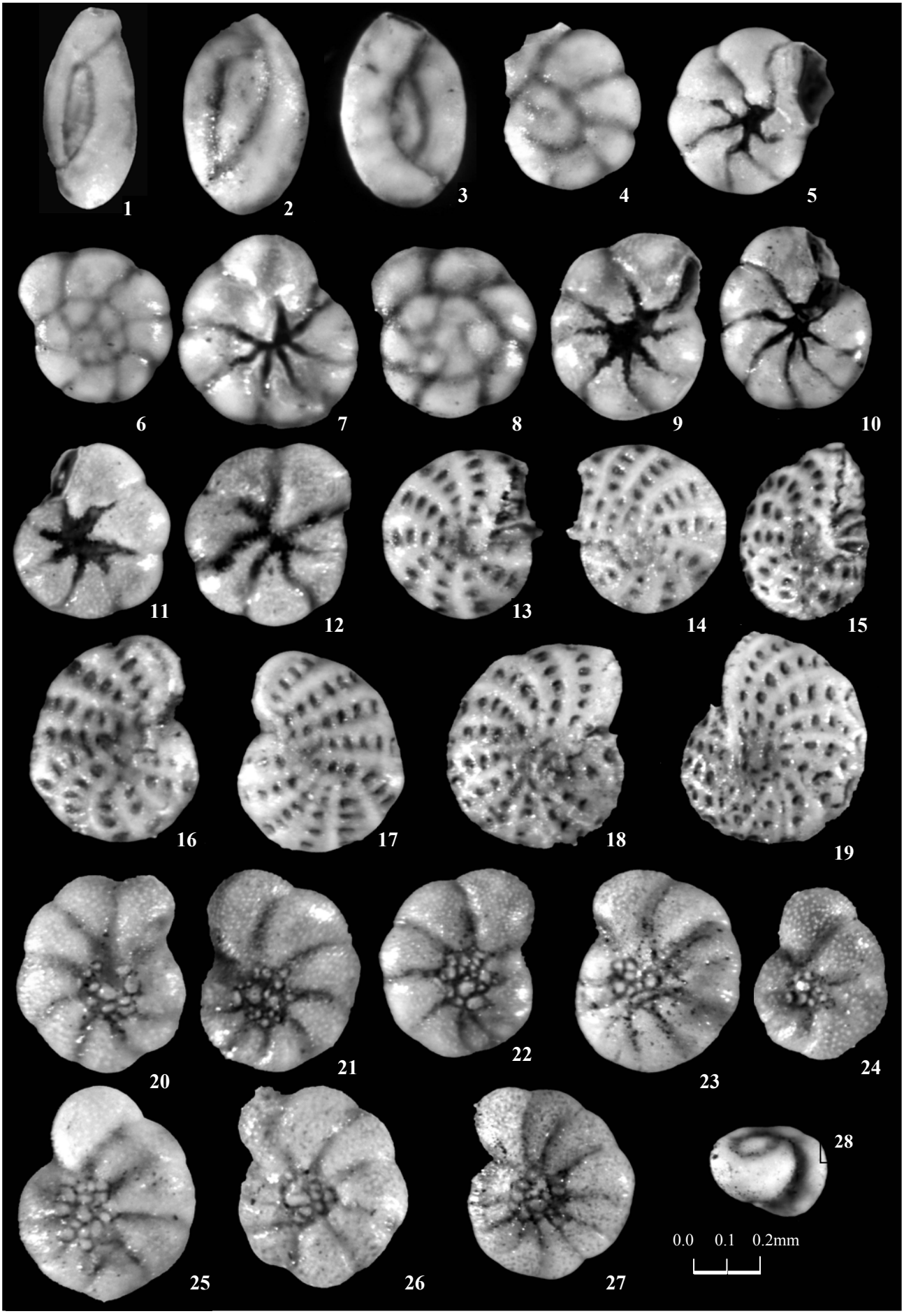
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PLATE 2

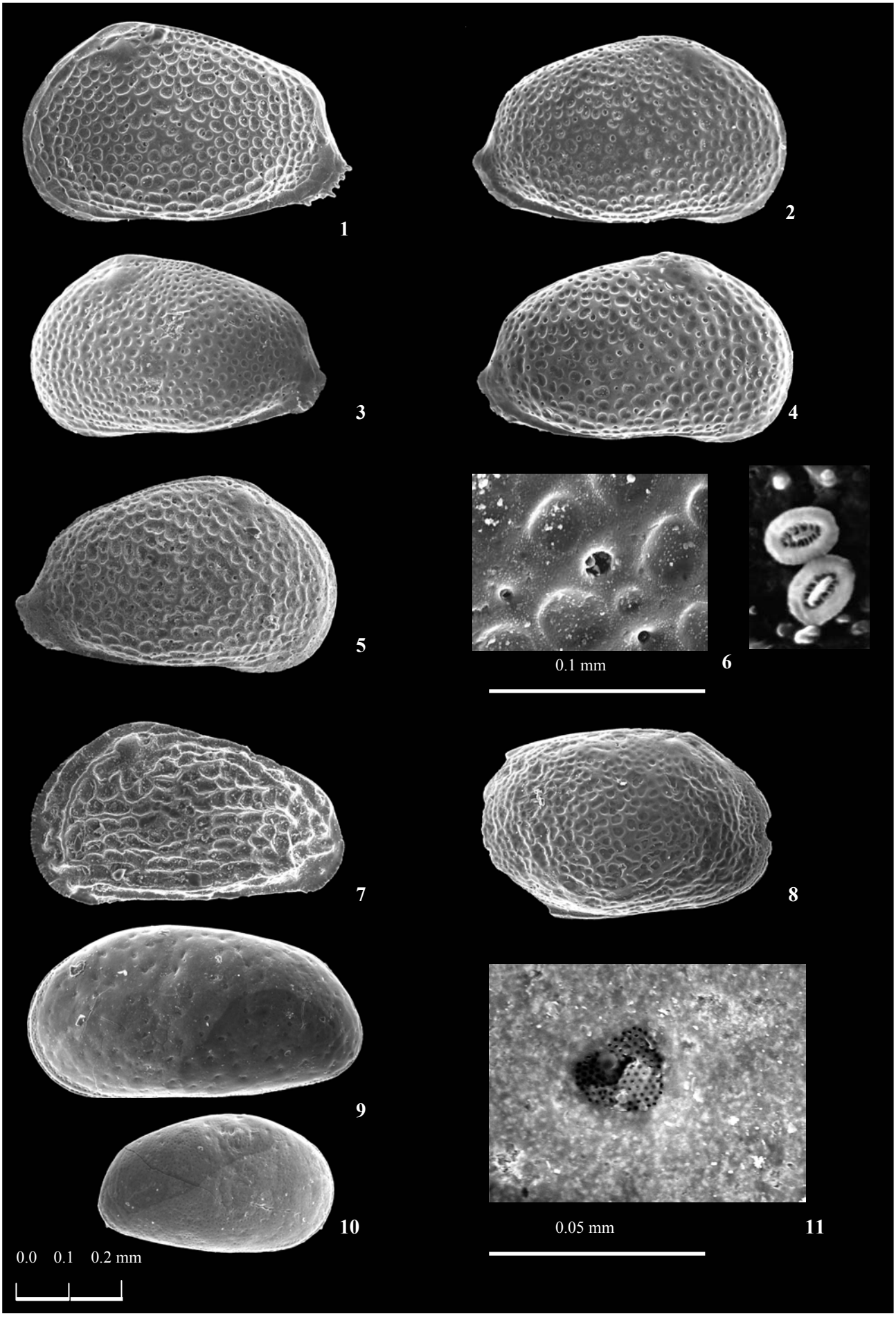

PLATE 3