OSTRACODS FROM THE PURBECK OF THE SOUTHERN DOBROGEA (ROMANIA)

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Marius STOICA

University of Bucharest, Faculty of Geology and Geophysics, Department of Geology & Paleontology, Bd. N. Bălcescu no. 1, 70111, Bucharest, Romania

Abstract: In this paper for the first time ostracods from the Romanian Purbeck are presented and figured. The samples come from boreholes situated in southern Dobrogea. Ostracod faunas allow us to correlate the non-marine Purbeckian sediments in Romania with the lower and middle Purbeck in southern England, as well as with sediments in France, Germany and Poland. *Cypridea dunkeri* and *Cypridea granulosa* zones have been recognized. The influence of salinity in the composition of the ostracod fauna is also discussed.

Key words: Ostracoda, Purbeckian, Romania

Introduction

In many regions of western Europe the Jurassic-Cretaceous boundary sequence is developed in Purbeckian facies in the form of marine-brackish and brackish-fresh water sediments. Lots of works have been devoted to this type of facies in England, Germany and France. Detailed biozonations on the basis of ostracod faunas were made for different basins.

In Romania, the Purbeckian facies was recognised for the first time by Băncilă and Neagu, 1973, Neagu & Dragastan 1984, Dragastan, 1985 in borehole samples from southern Dobrogea but no systematic studies have been undertaken so far. In this paper preliminary dates will be presented. More detailed data are to follow.

Micropaleontological material was offered for study by Prof. Neagu from his collection.

The samples come from short boreholes (about 300 m in depth) located in southern Dobrogea, along the Danube-Black Sea channel (F1- Dunărea, FII– Mircea Vodă, FIII–Medgidia, FIV- Poarta Albă, FV- Valul lui Traian, FVI-Nazarcea, FVII- Remus Opreanu, FVIII- Nazarcea, F106-Ilie Barza, F130, 131, 132 – Cernavodă, F 133, 134, 135 Fetești. (Fig. 1).

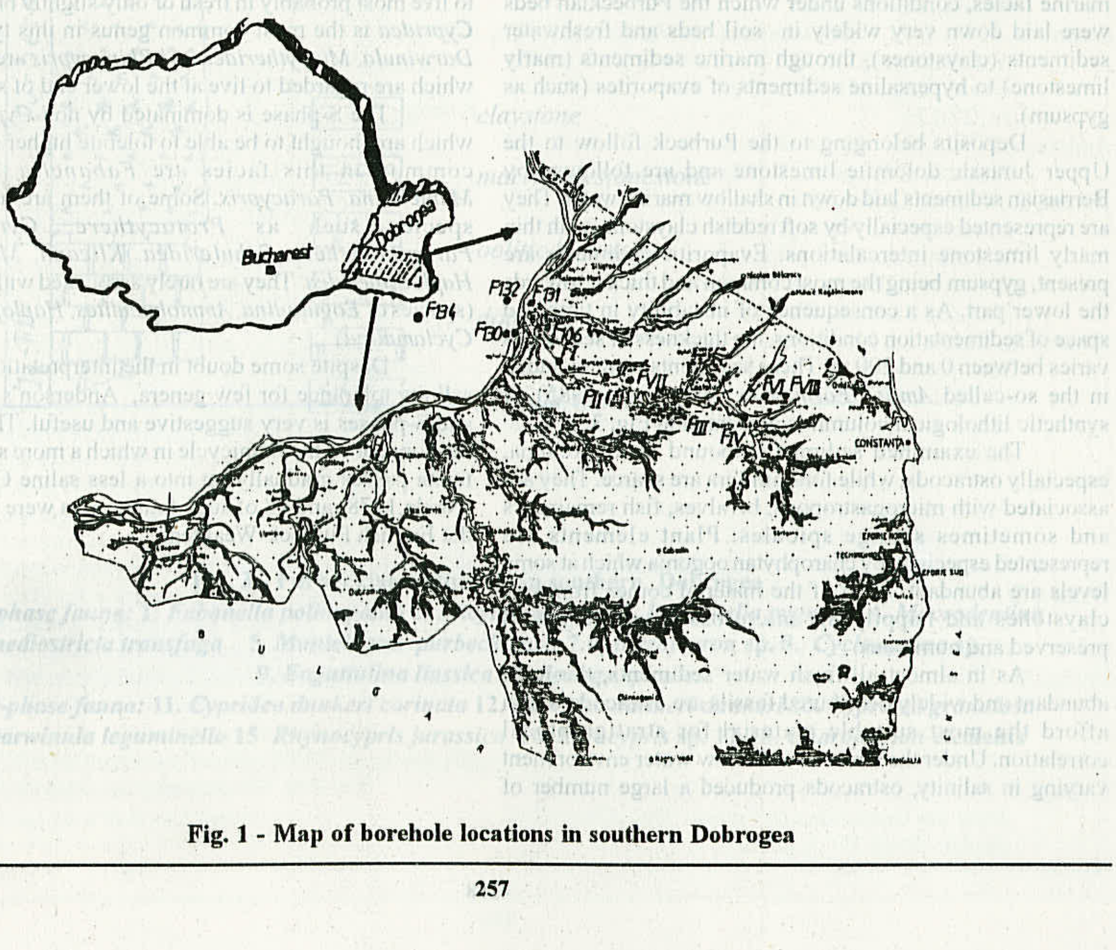

Fig. 1 - Map of borehole locations in southern Dobrogea

No outcrops exist today in Purbeckian sediments (a few years ago these sediments were artificially exposed when the sluice for channel had been made). Drilling for hydrocarbons has offered indications that this facies also extends into the eastern Moesian Platform (an approximate extension is presented in Fig. 2).

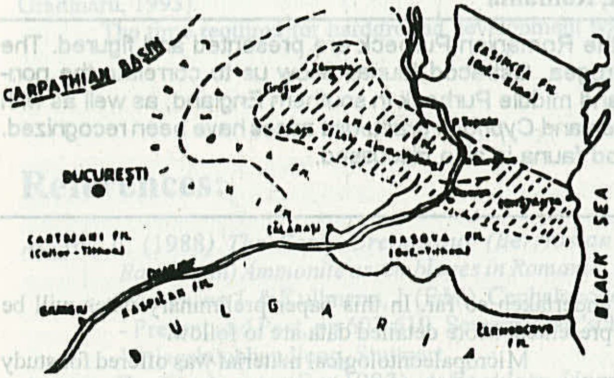

Fig. 2 - The extension of Purbeckian sediments in Romania (after Avram et al., 1995)

Litho and biostratigraphical considerations

In many European regions, the Jurassic-Cretaceous boundary was a period of widespread regression causing the isolation of sedimentary basins which evolved into non-marine facies, conditions under which the Purbeckian beds were laid down very widely in soil beds and freshwater sediments (claystones), through marine sediments (marly limestone) to hypersaline sediments of evaporites (such as gypsum).

Deposits belonging to the Purbeck follow to the Upper Jurassic dolomite limestone and are followed by Berriasian sediments laid down in shallow marine water. They are represented especially by soft reddish claystone, with thin marly limestone intercalations. Evaporitic sediments are present, gypsum being the most common and thicker towards the lower part. As a consequence of instability in time and space of sedimentation conditions, the thickness of sequences varies between 0 and 200 m. These sediments were included in the so-called *Amara Formation* (Dragastan, 1985). A synthetic lithological column is presented in Fig. 3.

The examined sediments abound in microfauna, especially ostracods, while foraminifera are scarce. They are associated with microgastropods, bivalves, fish remainders and sometimes sponge spicules. Plant elements are represented especially by charophytan oogonia which at some levels are abundant. Most of the material comes from soft claystones and happily the microfossils are very well preserved and numerous.

As in almost all fresh water sediments, the most abundant and widely distributed fossils are ostracods which afford the most suitable material for stratigraphical correlation. Under the stress of a shallow water environment varying in salinity, ostracods produced a large number of species and variety, some of which have a limited salinity tolerance with consequent variations in their numbers in any particular assemblage (Anderson, 1985). In this environment the salinity was the principal ecological control factor.

Almost all of the genera found in southern Dobrogea are also known in England (Anderson 1966, 1967, 1985, Kilenyi 1978), Germany (Martin 1940,1961, Woburg 1959, 1962, Wich and Woburg 1962), France (Colin and Oertli 1985), Poland (Sztejn 1991). There are also some species that seem to be new. This is normal, taking into account that instability of the environment conditions could produce endemic forms. In this first paper just a few species are presented, more studies for correct determinations being necessary (see Plate I, II).

As in the other European regions, the Purbeckian sediments in southern Dobrogea are mainly characterised by the abundance in the large, highly distinctive genus *Cypridea*. This occurs in enormous numbers, sometimes with the exclusion of other genera. *Cypridea* genus has been used for zonal purposes. Anderson (1973) established 12 *Cypridea* zones which cover the Purbeck-Wealden interval in southern England (in England this time interval from Upper Jurassic to Upper Barremian).

The sequence of ostracod faunas in the Purbeck shows that there is a repeated alternation between those developed in fresher water conditions and those in waters with higher salinity. To separate the two types of ostracod faunas, Anderson (1967) introduced the useful terms C-phase and S-phase.

The C-phase is dominated by ostracods which are believed to live most probably in fresh or only slightly brackish water. *Cypridea* is the most common genus in this type of facies. *Darwinula*, *Miocytheridea* and *Rhinocypris* are other genera which are regarded to live at the lower end of salinity range.

The S-phase is dominated by non-*Cypridea* genera which are thought to be able to tolerate higher salinity. Most common in this facies are *Fabanella*, *Damonella*, *Mantelliana*, *Paracypris*. Some of them are normal marine species such as *Protocythere*, *Cytheropteron*, *Paranatocythere*, *Schuleridea*, *Klieana*, *Macrodentina*, *Haplocytheridea*. They are rarely associated with foraminifera (species of *Eoguttulina*, *Ammobaculites*, *Haplophragmoides*, *Cyclammina*)

Despite some doubt in the interpretation concerning salinity tolerance for few genera, Anderson's concept of C and S-phases is very suggestive and useful. This led him to the concept of the faunicycle in which a more saline S-phase fauna passes gradually up into a less saline C-phase fauna (Neale,1978) and 98 of such faunicycles were recognised in the English Purbeck-Wealden.

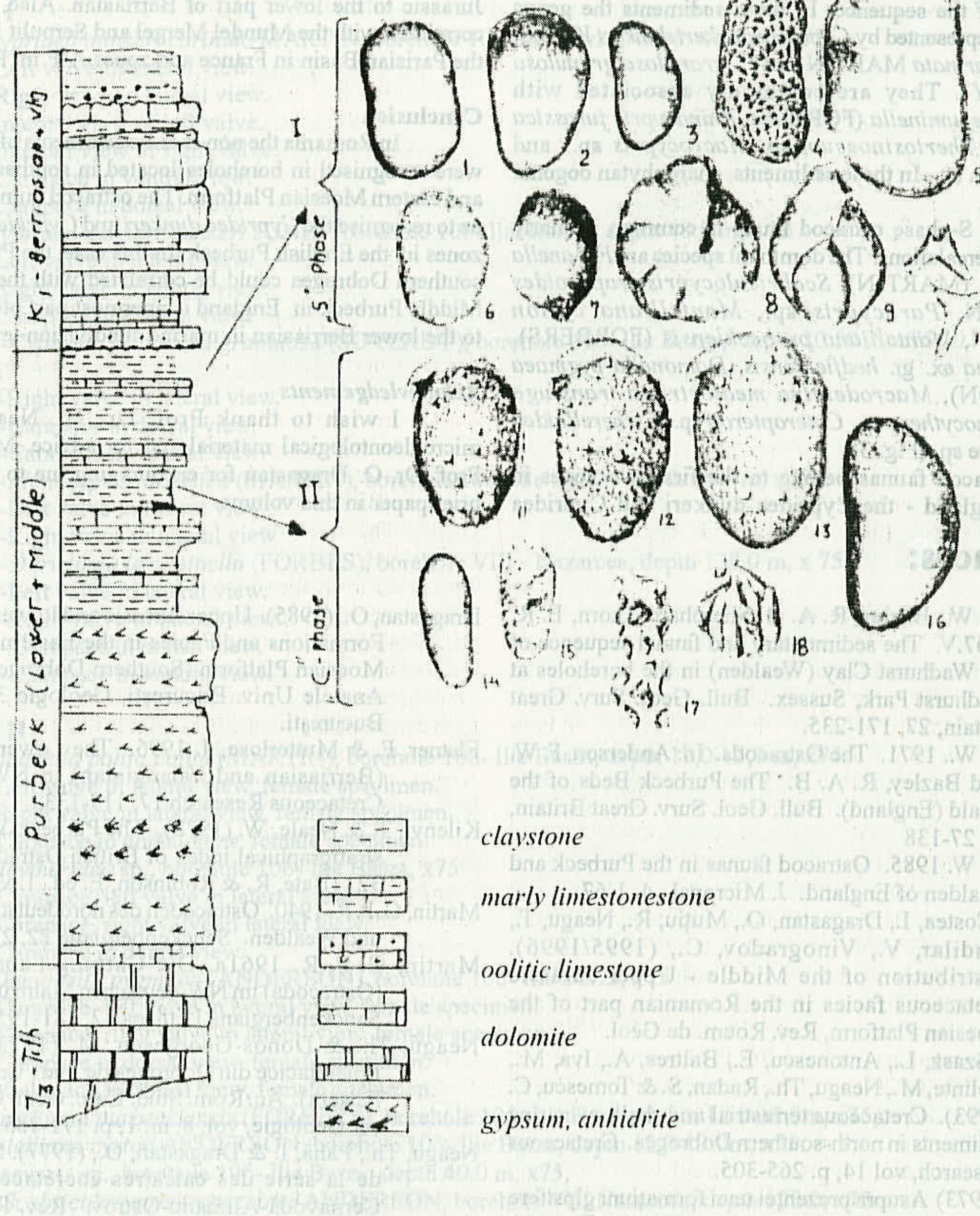

Fig. 3 - Purbeckian sediments in southern Dobrogea.
The S-phase fauna: **1. *Fabanella polita polita* 2. *Micytheridea* sp. 3. *Damonella pygmaea* 4. *Macrodentina mediostricta transfuga* 5. *Mantelliana purbeckiensis* 7. *Cytheropteron* sp. 8. *Cyclammina* sp. 9. *Eoguttulina liassica* 10. *Sponge spicules.***
The C-phase fauna: **11. *Cypridea dunkeri carinata* 12. *Cypridea dunkeri dunkeri* 13. *Cypridea granulosa* 14. *Darwinula leguminella* 15 *Rhynocypris jurassica* 16. *Paracypris* sp. 17-18. *Charophytan* elements**

Generally, ostracod faunas in the Purbeckian in southern Dobrogea show the same characters.

The so-called S-phase ostracod fauna was mainly founded in soft reddish clays which are dominated in the upper part of the sequence. In these sediments the genus *Cypridea* is represented by *Cypridea dunkeri dunkeri* JONES, *C. dunkeri carinata* MARTIN and *C. granulosa granulosa* (SOWERBY). They are commonly associated with *Darwinulla leguminella* (FORBES), *Rhinocypris jurassica* (MARTIN), *Theriosinoecum* sp. *Macrocypris* sp. and Miocytheridea sp.. In these sediments, charophytan oogonia are abundant.

The S-phase ostracod fauna is common in marly limestone intercalations. The dominant species are *Fabanella polita polita* (MARTIN), *Scabriculocypris trapezoides* ANDERSON, *Paracypris* sp., *Mantelliana cyrton* ANDERSON, *Mantelliana purbeckiensis* (FORBERS), *Miocytheridea* ex. gr. *hedfieldensis, Damonella pygmaea* (ANDERSON), *Macrodentina mediostricta transfuga* MALZ, *Limnocythere* sp. *Cyteropteron* sp., *Cytherelloidea* sp. Procythere sp. (Fig. 3)

Ostracod faunas belong to the first two zones in southern England - the Cypridea dunkeri and Cypridea granulosa zones (Lulworth beds). This fauna assemblage allows us to correlate Romanian Purbeckian sediments with the lower and middle part of the English Purbeck. In terms of marine stratigraphy, this facies ranges in time from the Upper Jurassic to the lower part of Berriasian. Also, it could be correlated with the Mundel Mergel and Serpulit in Germany, the Parisian Basin in France and zones A-F in Poland.

Conclusion

In Romania the non-marine sediments of the Purbeck were recognised in boreholes located in southern Dobrogea and eastern Moesian Platform. The ostracod faunas permitted us to recognise the *Cypridea dunkeri* and *Cypridea granulosa* zones in the English Purbeck. In this case, the Purbeckian in southern Dobrogea could be correlated with the Lower and Middle Purbeck in England (uppermost part of the Jurassic to the lower Berriasian in marine subdivision terms).

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Captions of Plates

PLATE 36. I

Figs. 1-6 -*Cypridea dunkeri carinata* MARTIN, borehole 106- Ilie Barza, depth 40.0 m, x 75
1. -Left valve in lateral view.
2. -Rigth valve in lateral view.
3. -Internal view of left valve.
4. -Internal view of right valve.
5. -Carapace in ventral view.
6. -Carapace in dorsal view.

Figs. 7-9 -*Cypridea dunkeri dunkeri* JONES, borehole 106- Ilie Barza, depth 40.0 m, x 75
7. -Left valve in lateral view.
8. -Right valve in lateral view.
9. -Carapace in ventral view.

Figs. 10-13 -*Cypridea granulosa granulosa* (SOVERBY), borehole 106- Ilie Barza, depth 20.50 m, x75 10. -Left valve in lateral view.
11. -Right valve in lateral view.
12. -Carapace in dorsal view.
13. -Carapace in ventral view.

Figs. 14,15 -*Rhinocypris jurassica* (MARTIN), borehole 106- Ilie Barza, depth 40.0 m, x 75
14. -Left valve in lateral view
15. -Right valve in lateral view

Figs, 16-19 -*Darwinula leguminella* (FORBES), borehole VIII - Nazarcea, depth 138.0 m, x 75
16. -Left valve in lateral view.
17. -Right valve in lateral view.
18. - Carapace in dorsal view.
19. - Carapace in ventral view.

PLATE 36. II

Figs. 1-3-*Fabanella polita polita* (MARTIN), borehole 106- Ilie Barza, depth 12,0-13,0 m, x75
1. -Left valve in lateral view, female specimen.
2. -Right valve in lateral view, female specimen.
3. -Carapace in dorsal view, female specimen.

Figs 4-6 -*Micytheridea* sp., borehole 106- Ilie Barza, x75
4. -Carapace, left valve in lateral view.
5. -Carapace, right valve in lateral view.
6. -Carapace in dorsal view.

Figs. 7-10-*Damonella pygmaea* (ANDERSON), borehole 106- Ilie Barza, x75
7. -Carapace, left valve in lateral view, female specimen.
8. -Carapace, right valve in lateral view, female specimen.
9. -Carapace in dorsal view, female specimen.
10. -Carapace in dorsal view, female specimen.

Fig. 11 -*Mantelliana purbeckiensis* (FORBERS), borehole 106- Ilie Barza, depth 12.0-13.0m, x75,
Fig. 12-*Mantelliana cyrton* ANDERSON, borehole 106- Ilie Barza, depth 12.0-13.0m, x75.
Fig. 13-*Paracypris* sp., borehole 106- Ilie Barza, depth 40.0 m, x75,
Figs. 14,15-*Scabriculocypris trapezoides* ANDERSON, borehole VIII Nazarcea, depth 122.0, x75.
14. -Carapace, right valve in lateral view.
15. -Carapace in dorsal view.

Figs. 16-18-*Limnocythere fragilis* MARTIN, borehole VIII Nazarcea, depth 122.0, x75
16. -Left valve in lateral view
17. -Right valve in lateral view.
18. -Carapace in dorsal view.

Figs. 19,20 - *Cytheropteron* sp., borehole VIII Nazarcea, depth 68.0 m, x75.
19. -Left valve in lateral view.
20. -Carapace in ventral view.

Figs. 21,22-*Cytherelloidea* sp., borehole 106- Ilie Barza, depth 12.0-13.0m, x75.
21. -Left valve in lateral view.
22. -Carapace in dorsal view.