

UPPERMOST CRETACEOUS RED BEDS IN IALOMIȚA VALLEY (EAST CARPATHIANS, ROMANIA)

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Abstract. Red beds belonging to the Gura Beliei Formation (uppermost Cretaceous in age) from the SW part of the East Carpathians (Romania) were investigated from lithological and biostratigraphical points of view. Two main lithological sequences were observed in the red bed succession: a lower one, mainly made from red-cherry marls and marlstones, thin bedded and an upper one, consisting in an alternation of marls and sandstones. The age of the investigated red beds was assigned, based on calcareous nannofossil biostratigraphy, to the uppermost Campanian-lowermost Paleocene interval. Similarities with other red beds, covering the same interval in the European Tethyan areas (Italy, Austria, Poland, Slovakia and Serbia) were observed.

Key words: uppermost Cretaceous; marine red beds; East Carpathians; Romania

INTRODUCTION

The present paper discusses the biostratigraphical features of uppermost Cretaceous marine red beds - the Gura Beliei Formation - from the southern part of the East Carpathians.

These sediments were first identified by Popovici-Hatzeg (1898), being described as "red marls". The lithostratigraphical unit was also named "Gura Beliei Beds" (Băncilă, 1958), "couches rouges" (Murgeanu *et al.*, 1963) and "Gura Beliei Marls" (Ștefănescu, 1971).

The red marls of the Gura Beliei Formation were first assigned to the Senonian, based on the presence of the belemnite genus *Belemnitella* (Popovici-Hatzeg, 1898). According to the identified planktonic foraminiferal assemblages, their depositional interval was restricted to the Campanian and Maastrichtian stages (Tocorjescu, 1963; Neagu & Georgescu, 1991).

As concerning their tectonical position, the uppermost Cretaceous red beds represent the post-tectonical cover, common to several nappes: Ceahlău, Bobu, Teleajen and Audia, folded during the Subhercynian and Early Laramian tectonical phases (Săndulescu, 1984).

The marine red beds of the Gura Beliei Formation outcrop as strips trending east-westward, in the southwestern part of the East Carpathians (Fig. 1), between the Ialomița Valley, to the west and the Prahova Valley, towards the east.

MATERIAL AND METHODS

Our investigations focused on the red bed development from Ialomița Valley, outcropping in the vicinity of the Pietroșița locality (Ialomița County), representing the southwestern occurrence of the uppermost Cretaceous red beds.

The Gura Beliei Formation was studied in detail in the field and sampled for calcareous nannofossil investigations. The samples were taken every 8 cm, including from the underlying white marls of the Plaiu Formation and from the overlying violaceous marls and clays of the Sotriș Formation.

RESULTS

The red beds of the Gura Beliei Formation conformably covered the white-gray marls of the Plaiu Formation. From lithological point of view, the Gura Beliei Formation (which is 60m thick in the Ialomița Valley) is characterized by the presence of red-cherry marls and marlstones with numerous white and green spots and manganese dendrites. A detailed lithology of the red beds outcropping in the Ialomița Valley is presented in Fig. 2.

To note the presence of pyrite concretions, more frequent close to the base of Gura Beliei Formation. White calcareous sand-stones, with parallel lamination, were observed at the upper part of the Gura Beliei Formation, becoming more frequent and thicker (up to 50 cm) to the top of the rock-sequence.

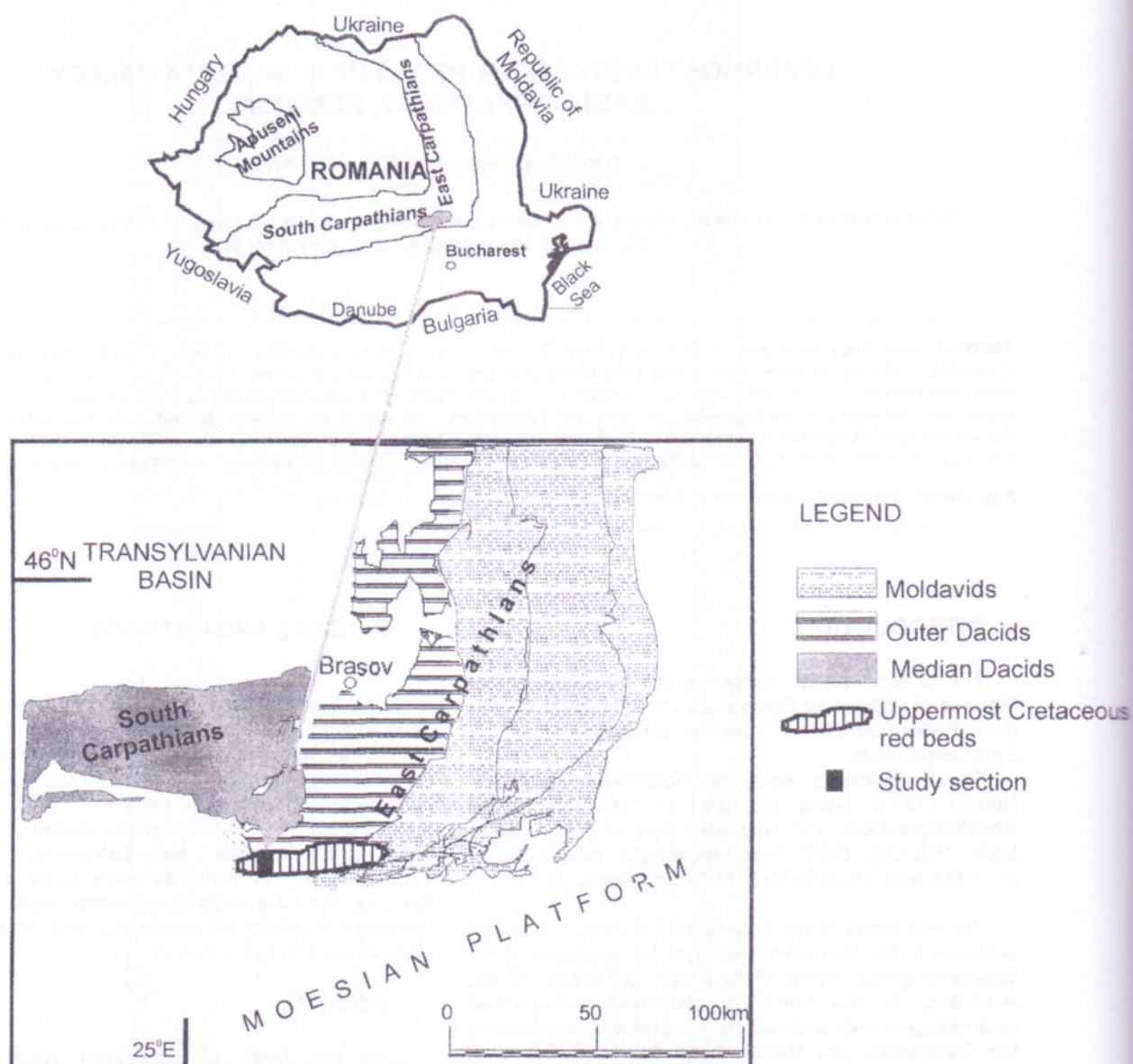


Fig. 1 Location of the uppermost Cretaceous marine red beds in Romania

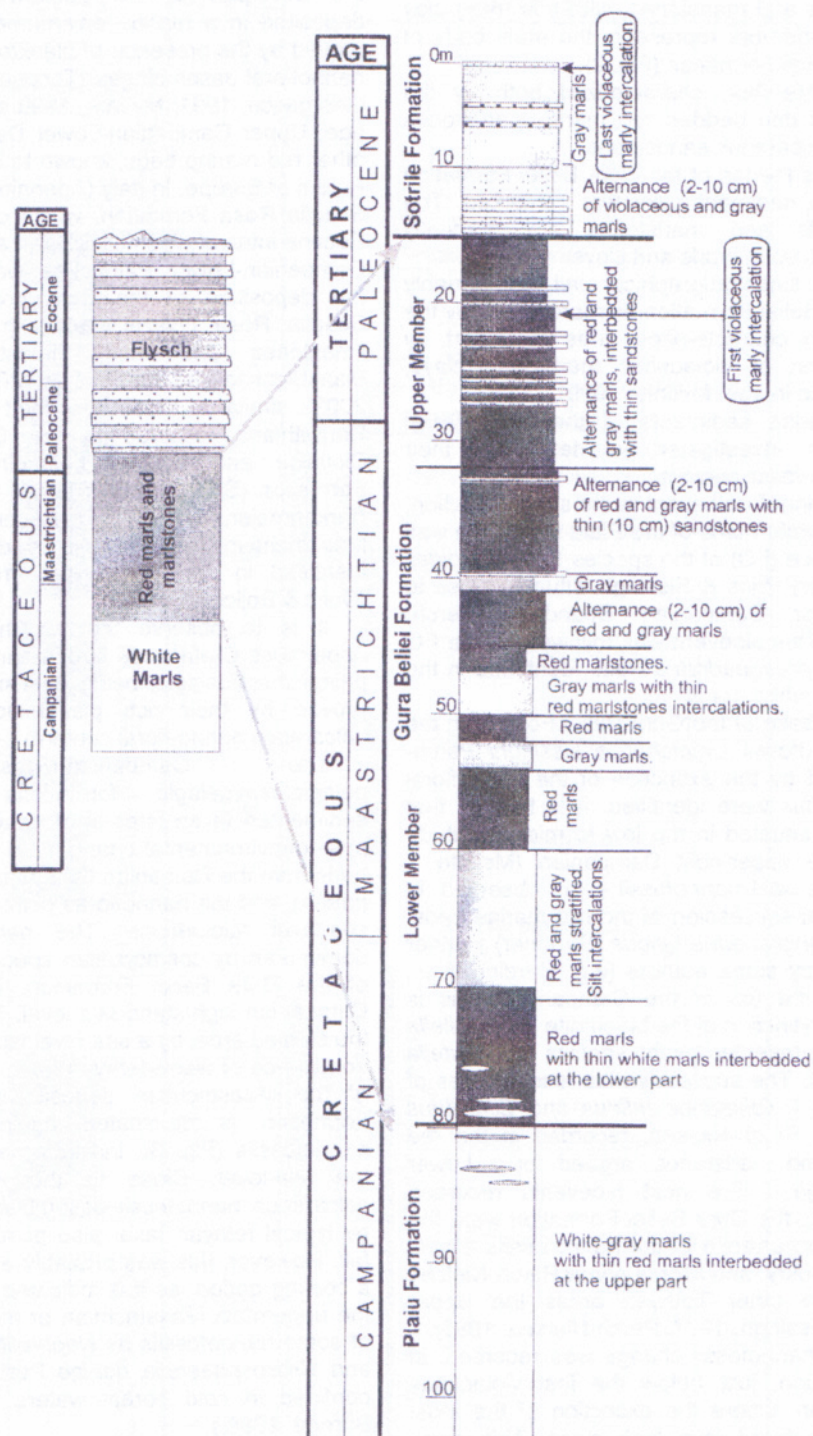


Fig. 2 Lithostratigraphy of the studied section

Based on our data, the succession of the red beds of the Gura Beliei Formation was divided into two members, as follows:

- a Lower Member, predominantly made of red-cherry marls and marlstones, with thin (mm) clay beds. This member represents the main body of the Gura Beliei Formation (Fig. 2).
- an Upper Member, characterized both by the presence of thin bedded red marls, marl-stones and white calcareous sandstones.

Towards the top of the Gura Beliei Formation a change of the sediment color was remarked. The red-cherry marls and marlstones are gradually replaced by violaceous marls and clays.

The next on lithostratigraphical unit, conformably laying the Gura Beliei Formation, is represented by the Sotriș Formation, characterized, in its lower part, by the sedimentation of violaceous marls and clays, (Lower Paleocene in age, Melinte, 1999).

The red marine sediments of the Gura Beliei Formation were investigated in detail for their calcareous nannofossil content.

The oldest nannofossil event in the studied section, recorded in the white marls of the Plaiu Formation was the first occurrence (FO) of the species *Ceratolithoides aculeus* (Stradner) Prins & Sissingh, situated close to the Lower/Upper Campanian Boundary (Perch-Nielsen, 1985). This bioevent was followed by the FO of *Lithraphidites praequadratus* Roth, identified in the upper part of the white marls.

Close to the base of the Gura Beliei Formation the FO of the nannofossil *Uniplanarius sissinghi* Perch-Nielsen, followed by the extinction of the nannofloral genus *Nannoconus* were identified. It is to note that both events are situated in the low to middle latitude areas within the uppermost Campanian (Melinte & Odin, 2001). The next nannofossil event observed, in the stratigraphical succession of the red marine beds, was the FO of *Uniplanarius trifidus* (Stradner) Hattner & Wise, placed by some authors (e.g. Gardini *et al.*, 2001) close to the top of the Campanian. This is followed by the extinction of the belemnite *Belemnitella* genus (mainly represented by the species *Belemnitella carpatica* Neagu). The successive last occurrences of the nannofossils *Uniplanarius trifidus* and *Eiffellithus eximius* (Stover) Perch-Nielsen, recorded in the red bedded marls and marlstones, argued for a Lower Maastrichtian age. The next bioevents recorded towards the top of the Gura Beliei Formation were the successive first occurrence of the nannofossils *Micula murus* (Martini) Bukry, and *Micula prinsii* Perch-Nielsen (characterizing in other Tethyan areas the Upper Maastrichtian - Sissingh, 1977; Perch-Nielsen, 1985).

A significant nannofossil change was recorded, in the studied section, just below the first violaceous marly intercalation, where the extinction of the most Cretaceous nannofossil taxa took place. This mass extinction is known to occur at the K/T Boundary in low and middle latitude areas (Romein, 1977; Pospical, 1994). Above the extinction of the most Cretaceous calcareous nannofloras, two successive blooms, that of the dinoflagellate genus *Thoracosphaera* Kampfner, and of the nannofossil *Braarudosphaera bigelowii* (Gran & Braarud) Deflandre, were observed.

DISCUSSION

The uppermost Cretaceous red beds, occurring in the SW part of the Eastern Carpathians, were deposited in a marine environment, above CCD, as proved by the presence of planktonic foraminiferal and nannofloral assemblages (Tocorjescu, 1963; Neagu & Georgescu, 1991; Melinte, 1999 and this study). Their age, Upper Campanian-Lower Danian, is similar with other red marine beds, known to occur in the Tethyan Realm of Europe. In Italy (Apenninic area) outcrops the Scaglia Rosa Formation, which covers the Turonian-Eocene interval (Premoli Silva *et al.*, 1976). The Upper Campanian-Lower Paleocene was characterized by the deposition of the Calcarene Member of the Scaglia Rosa (Wezel, 1979), made up of reddish limestones and marly limestones. Campanian-Maastrichtian red beds (Bağ, 2000; Michalik *et al.*, 2002), similar to those described from the Romanian Carpathians, occurred in the Carpathian area of Slovakia and Poland, belonging to the Puchov Formation (Štur, 1860) or to the Malinowa Formation (Birkenmajer, 1977). Recently, Campanian-Maastrichtian red pelagic sediments were also identified in northern Serbia, from Vojvodina area (Dulić & Bojicević, 2002).

It is to observe that all the above-mentioned uppermost Cretaceous red marine beds are mainly pelagic/hemipelagic, being deposited above CCD (as proved by their rich planktonic foraminiferal and calcareous nanno-floral content).

The Campanian-Maastrichtian red pelagic/hemipelagic formations were probably sedimented in an interval of palaeogeographical and palaeoenvironmental changes. In the investigated red beds from the Romanian Carpathians, the depositional pattern, and the nannofloras point out several regional sea-level fluctuations. The nannofossil character, dominated by cosmopolitan species in the lower part of the Gura Beliei Formation, indicates an Upper Campanian high-stand sea-level. This was followed, in the studied area, by a sea-level fall, as indicated by the dominance of warm-tethyan taxa. Then, the main part of the Maastrichtian deposits of the Gura Beliei Formation is dominated again by cosmopolitan nannofossils (Fig. 3), indicating a new high-stand of the sea-level. Close to the K/T Boundary, the calcareous nannofossil assemblages are dominated by typical tethyan taxa, also pointing out a sea level fall. However, this was probably accompanied also by a cooling period, as it is indicated by the presence, in the uppermost Maastrichtian of the East Carpathians, of some nannofossils as *Nephrolithus frequens* Górka and *Cribrosphaerella daniae* Perch-Nielsen, normally confined to cold boreal waters (Švabenická, 1995; Burnett, 1998.).

As concerning the palaeoclimatic mode of the interval of Gura Beliei deposition, it is to remind that, the Late Cretaceous was considered to be a global "very warm" climatic interval by Frakes *et al.* (1992), while a continuous cooling from the Turonian up to Maastrichtian was emphasized by Barrera & Savin (1999).

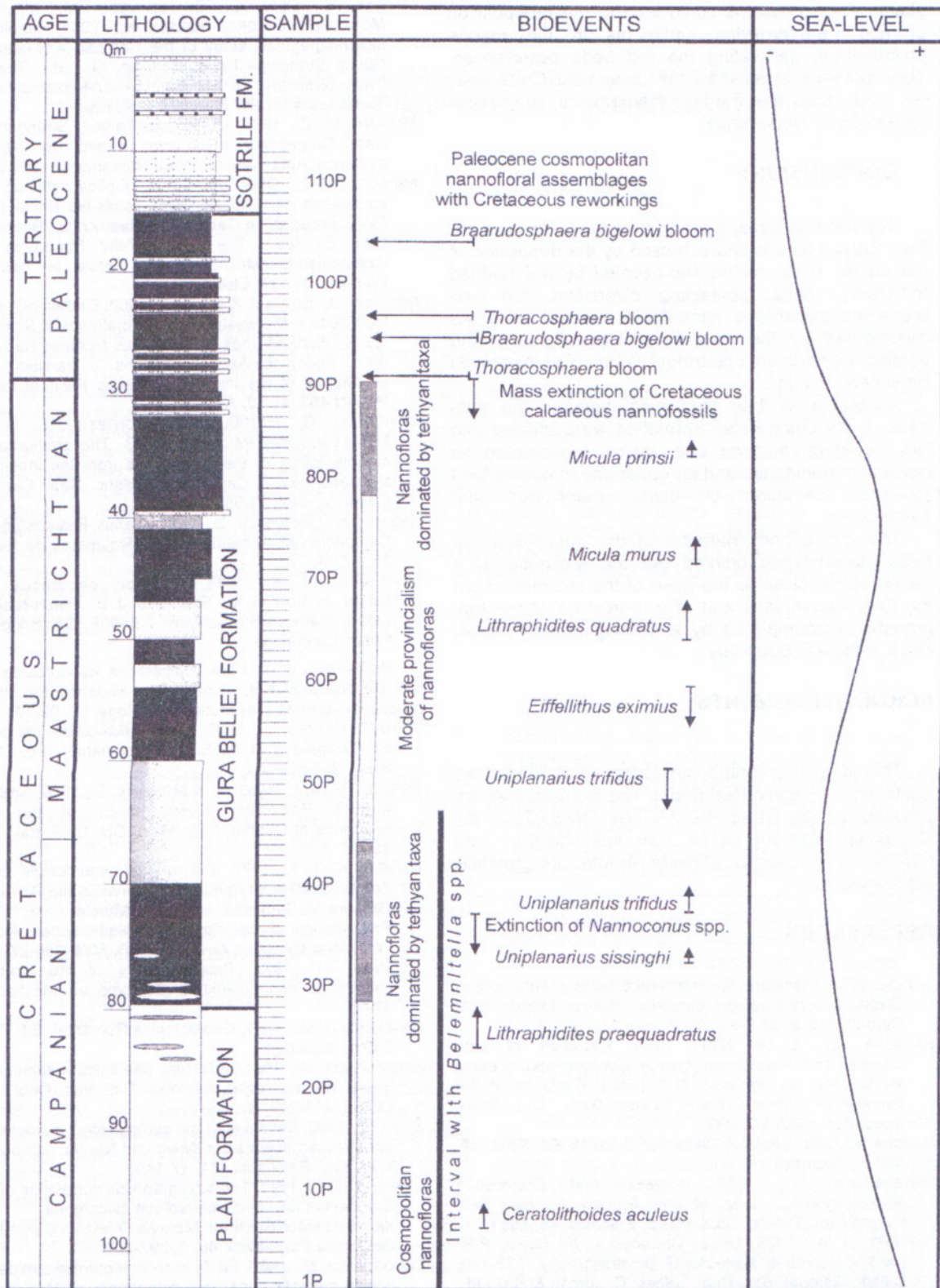


Fig. 3 Biostratigraphy of the studied section

In our opinion the establishment of an arid climate, at the end of a Cretaceous, could allow, in some areas, the accumulation of red soils on emerged coastal plains. Transgressions could lead to the redeposition of rich Fe-hydroxides sediments in the marine environment, generating the red beds occurrences. This could be, at least for the uppermost Cretaceous red beds from the Eastern Carpathians, a possible cause of their occurrence.

CONCLUSIONS

The Ialomita Valley Section from the SW part of the East Carpathians is characterized by the deposition of marine red beds, mainly represented by well-bedded red-cherry marls, containing diversified and well preserved calcareous nannofossil assemblages. As pointed out by the nannofloral biostratigraphy, the studied red beds are uppermost Campanian-lowermost Paleocene in age.

According to their lithological features the reds beds of the Gura Beliei Formation were divided into two members: a lower one, mainly represented by marls and marlstones and an upper one, characterized by the alternation of marls, marlstones and sandstones.

The nannofloral character of the observed red beds assemblages pointed out the presence of a transgression close to the base of the red marls from the East Carpathians and of a regression at the top, probably accompanied by a cooling climatic mode, close to the K/T Boundary.

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