



## **Micropetrographic characteristic of the Campanian-Paleocene carbonate sediments in Boykin Dol section (East Fore-Balkan)**

### **Микропетрографска характеристика на кампан-палеоценските карбонатни седименти в разрез „Бойкин дол“ (Източен Предбалкан)**

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#### **Introduction**

The easternmost outcrops of the Upper Cretaceous-Paleogene carbonate rocks in the East Fore-Balkan (East Bulgaria) occur between the valleys of the Dodelen and Armera Rivers. These sediments have been studied in general geological and stratigraphic viewpoints by several authors (e.g. Atanasov, 1961; Yolkichev, 1989; Kanchev, 1995), and more recently by Sinnyovsky (2006), and Vangelov and Sinnyovsky (2007). However, previous micropetrographic investigations of the rocks are generalized and concern only the Upper Cretaceous sequences (Nachev, Sultanov, 1991). The present review is focused on the Campanian-Paleocene sediments exposed in Boykin Dol section, and represents preliminary results from detailed micropetrographic study on the carbonate rocks referred to the Dobrina, Kaylaka and Komarevo Formations.

#### **Macropetrographic description of the lithostratigraphic units**

The Upper Cretaceous-Paleogene sediments of Boykin Dol section crop out in a former quarry, located 5 km south of the Grozdyovo village (Varna District). They were previously described by Sinnyovsky (2006) and Vangelov and Sinnyovsky (2007). The sequence lies unconformably upon the Lower Cretaceous siliciclastic sediments of the Kamchiya Formation. It starts with 10 m thick Campanian-Maastrichtian sediments, referred to the Dobrina Formation. The latter is composed of indistinctly bedded, slightly consolidated greenish calcareous glauconitic sandstones and light creamy sandy limestones. Up section, the Dobrina Formation gradually grades into massive, creamy to beige, variably sandy limestones of the Kaylaka Formation. It is 19 m thick, spanning the Maastrichtian to the Early Paleocene, and containing common echi-

noids and large foraminifers. The sequence ends with thin- to medium-bedded, light grey to greenish-grey lithothamnium limestones (>20 m in thickness), belonging to the Komarevo Formation, Early-Middle Paleocene in age.

#### **Micropetrographic characteristic of the rocks**

Under microscope, the studied Campanian-Paleocene succession is composed of various limestone varieties, described herein using the textural classification of Dunham (1962), and expanded by Embry and Klovan (1971).

The limestones of the Dobrina Formation are represented by sandy bioclastic packstones and packstones/grainstones, which are composed of moderately to poorly sorted echinoderm bioclasts, and variable amount of bivalve shell detritus. Bryozoans, fragmented brachiopod shells, rare ostracods, and single foraminifers also occur. Some bioclasts are partly or completely micritized. Peloids and micritic rounded intraclasts are sporadically observed. The non-carbonate grains include sand-sized angular to slightly rounded clastic quartz and feldspar grains (10–15% of the rock volume) as well as scarce glauconitic pellets. The allochems are tightly packed and micritic/microsparitic matrix is only rarely presented. Syntaxial calcite overgrowths are present around some echinoderm skeletal grains.

The carbonate sediments of the Kaylaka Formation consist of bryozoan-shell-echinoderm grainstones and foraminiferal grainstones and rudstones. The first variety is composed of common echinoderm skeletal grains, bivalve and brachiopod shell detritus, bryozoan fragments, micritized benthic foraminifers and sparse broken gastropod and ostracod shells. Micritic intraclasts (up to 0.50 mm in size) and peloids also sporadically occur. Detritic quartz and feldspar grains

and glauconitic pellets are only rarely seen. The rock groundmass consists predominantly of blocky and syntaxial (around echinoderm bioclasts) sparite cements and poorly preserved granular cement.

The second limestone variety is characterized by grainstones and rudstones, containing common large foraminifers (mostly discocyclinids), less frequent brachiopod and bivalve shells, echinoderms (echinoid spines e.g.), other benthic foraminifers, bryozoans and rare ostracod valves. Peloids and micritic intraclasts (mudstones and bioclastic wackestones) are locally observed. Detritic sand-sized quartz and feldspar grains occur rarely (up to 10% of the rock volume). Sporadic glauconitic pellets are also presented. The rock groundmass is composed of variably presented micritic/microsparitic matrix, echinoderm syntaxial overgrowths and relic granular cement.

The Komarevo Formation is built up predominantly of floatstones/rudstones, rudstones and packstones that consist of abundant lithothamnium red algae remains plus discocyclinids and other benthic foraminifers, echinoderm fragments with syntaxial overgrowths, fenestrate bryozoans, brachiopod shells, and ostracods. The red algae are often observed as rounded skeletal grains of variable size (mostly >2 mm in floatstone/rudstone and rudstone varieties). The allochems are poorly sorted and locally concentrated in groups. Styliolitic, concave-convex and elongate grain contacts are commonly observed. Silt-sized detritic quartz and feldspar grains or glauconitic pellets are scarce (<5% of the rock volume). The matrix is micritic or rarely microsparitic. The skeletal grains in some lithothamnium packstones are very tightly packed and micritic matrix is sporadically presented.

Lithothamnium bindstones and bindstones/rudstones are likewise present in the Komarevo Formation. They are composed of well-preserved or broken red algae crusts, encrusting bryozoans, foraminifers and cyanobacteria as well as trapped brachiopod and bivalve shells, benthic foraminifers and rare siliciclastic grains.

Irregular or oval in shape interpartical and intraskel-etal open pores with variable size commonly occur in carbonate sediments of all studied lithostratigraphic units. Sometimes they contain relic, poorly-preserved granular cement, consisting of relatively equidimen-

sional small calcite crystals. A part of these pores are partly or completely filled with non-oxidized yellow to light brownish hydrocarbons.

## Conclusion

The Campanian-Paleocene sediments of Boykin Dol section are characterized by varieties of packstones, grainstones, floatstones/rudstones, rudstones, and bindstones. The results from this preliminary micro-petrographic study will be used in further interpretation of the depositional environment, porosity development and diagenetic history of the rocks.

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