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FORAMINIFERAL BIOSTRATIGRAPHY OF UPPER EOCENE SEDIMENTS FROM THE OVČE POLE BASIN, REPUBLIC OF MACEDONIA

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A b s t r a c t: The paper the results of the micropaleontological investigations on the foraminiferal fauna, found in the upper flysch unit of six open Paleogene cross sections Čardaklija, Eževo Brdo, Karaorman, Kadrifakovo, Madžarica, Nemanjici, and one drill OP-1. Foraminiferal biostratigraphy of the Upper Eocene sediments in the Ovče Pole basin is represented by one benthic biostratigraphical zone and planktonic foraminiferal concurrent zone.

Key words: foraminiferal fauna; biostratigraphy; biozones; paleogene sediments; Ovče Pole basin

INTRODUCTION

The Paleogene is one of the most intriguing intervals in the Earth history, marked by significant changes in palaeoclimate, marine productivity and in global carbon cycle (Aubry et al., 1996; Zachos et al., 2001). The palaeogeography of the European Tethys Realm significantly changes during the Oligocene, due to the isolation of the Paratethys Realm (in the Central and Eastern European regions – Báldi, 1980) from the Mediterranean Realm (in the western and southern part of Europe). The pattern of evolution of the Paleogene with sea biotas (and especially the most vulnerable planktonic forms) is reflected worsening climate and palaeoenvironmental changes.

Paleogene sediments are vastly spread within the territory of Republic of Macedonia, especially considering the central and the eastern part, which is named as Vardar zone and the Serbo-Macedonian massif. One of the Macedonian areas where the Paleogene deposits are well preserved, allowing, based on the foraminiferal content to decipher their biostratigraphy, is the Ovče Pole basin, located in the NE part of the territory of the Republic of Macedonia (Figure 1).

The first data for Late Eocene (Priabonian) age, based on gastropods, bivalves, corals, and nummulitids from the Ovče Pole basin, gave Maksimović et al. (1954). Important data in determining the thickness and lithostratigraphy of Paleogene in the Ovče Pole basin have been derived from deep structural drilling performed by oil exploration carried by NAFTAGAS – Novi Sad, done in the 60s and 70s of the last century (drill OP-1). Later on Mitrović-Petrović et al. (1990), confirmed the Priabonian age on the base of echinoids, and noted that the uppermost levels of the sediments of the Ovče Pole basin are of Early Oligocene age. Stojanova (Stojanova, 2008; Stojanova et al., 2011, 2012) also confirmed the Upper Eocene-Oligocene range of the sediments, but pointed out that it is difficult to place the E/O boundary by means of benthic foraminifera because of their broad stratigraphical distribution.

The purpose of this paper is to present an foraminiferal biostratigraphy of the Upper Eocene sediments in the Ovče Pole basin.

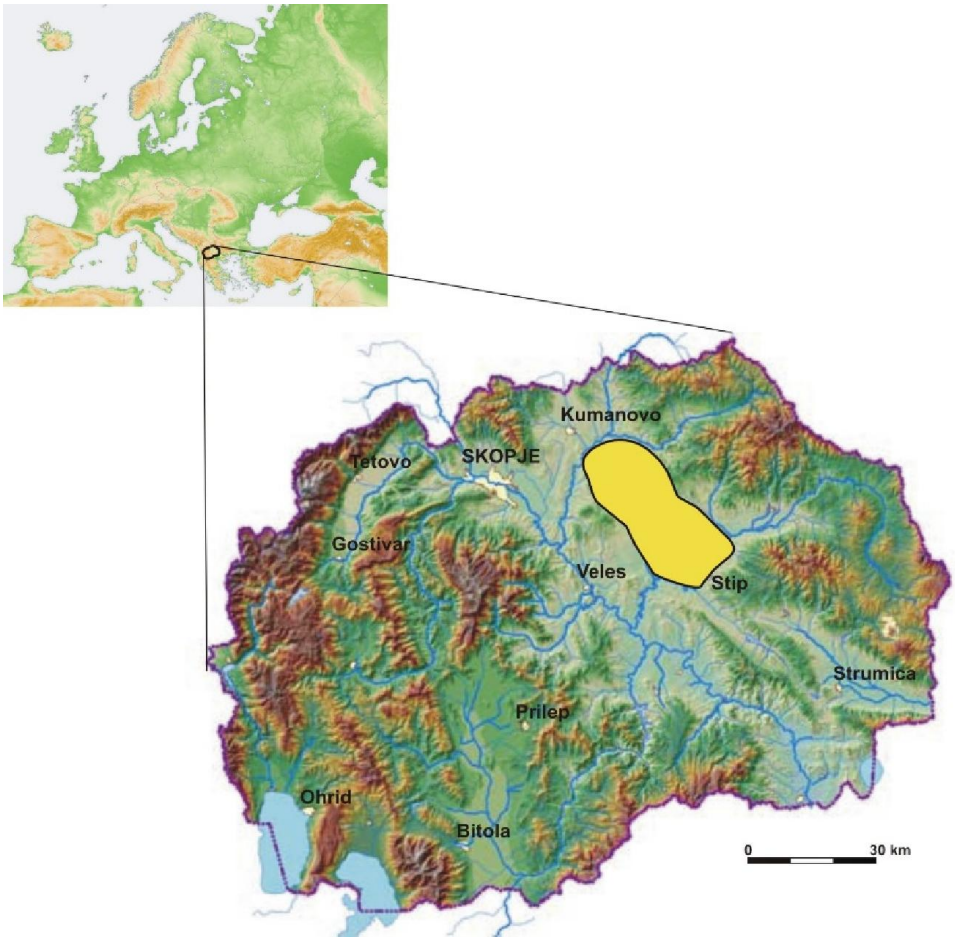

Fig. 1. Ovče Pole basin

MATERIALS AND METHODS

The micropaleontological research of the foraminiferal fauna includes sediments of the upper flysch unit of six Paleogene cross sections Čardaklija, Eževo Brdo, Karaorman, Kadrifakovo, Madžarica, Nemanjici, and one drill OP-1, from where 118 samples were taken and positive results were obtained for foraminiferal fauna (Figure 2). Technical work was carried out by using classical methods for the micropaleontological analysis (chemical break up, washing, drying, selection and determination).

LITHOSTRATIGRAPHY OF PALEOGENE IN THE OVČE POLE BASIN

The Ovče Pole basin is a large Paleogene sedimentary mass with NW–SE trend that is superimposed on varied rocks from the eastern part of the Vardar zone in the territory of the Republic of Macedonia. It is composed of 3.5 km thick succession, which is subdivided into four units: basal unit, lower flysch unit, unit of yellow sandstones and upper flysch unit (Figure 2).

Lithologic composition of basal lithozone is represented by conglomerates, sandstones, clays and carbonate layers (represented by limestones and marls). The lower flysch lithozone is represented by rhythmic occurrence and prevalence of sandstones over conglomerates and with rare interlayers of clays, marls and aleurolites. Lithologic composition of the lithozone of yellow sandstones is represented with sandstones with yellow-brown colour and thin interlayers of clays. Lithologic composition of the upper flysch lithozone is represented with clay-marly layers that rhythmically

alternate with sandstones, siltstones, clays with marly clays and oolitic limestones.

The Paleogene sediments of the Ovče Pole basin usually contain abundant foraminiferal associations, which are represented by a large number of specimens, referred to diverse planktonic and benthic species.

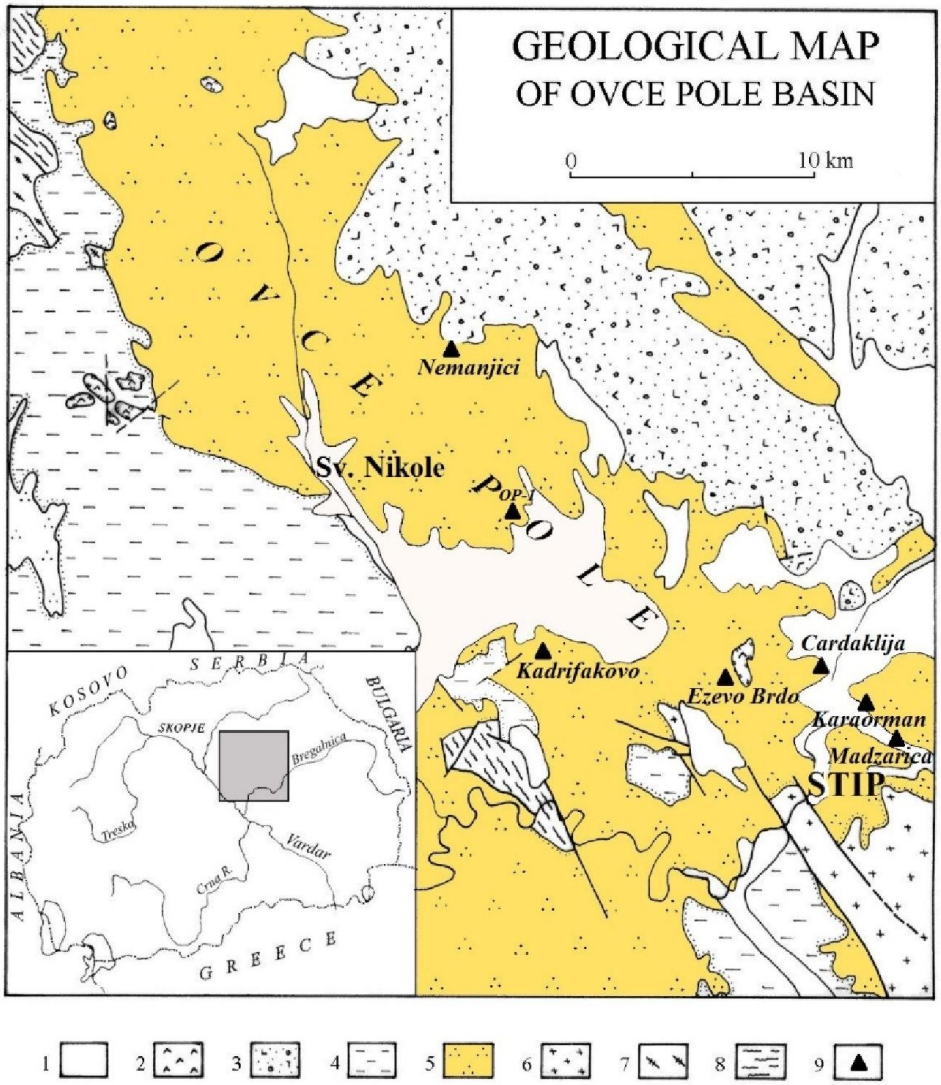

Fig. 2. Geological map of the Ovče Pole basin: 1 – Quaternary; 2 – Neogene effusive rocks; 3 –Tertiary volcano-sedimentary rocks; 4 – Neogene sediments; 5 – Upper Eocene sediments; 6 – Jurassic granites; 7 – Jurassic gabbro-diabases; 8 – Paleozoic schists; 9 – studied sections

Čardaklija section

The Čardaklija site is located about 5 km north of Štip. The section from which samples were taken and trials of foraminiferal fauna conducted was made in the eastern part of the village. The investigated section is located in the upper flysch unit with a section thickness of 85 meters. The section is built of gray clays with transitions into gray marl clays, marls and siltstones, which include layers with a thickness up to 70 cm represented by gray-white and yellowish sandy and oolite limestones rich in nummulites and more rarely in layers of sandstone (Figure 3). Eight samples were taken from the section, and sampling was done on every 7 to 8 meters in the clay-marly layers (samples 1, 2, 3, 4, 5, 6) with the exception of samples 7 and 8 that were taken from yellowish sandy and oolite limestone, found in higher levels of the section with a low representation of foramin-

ifers. Faunal material was found in the section represented by benthic foraminiferal fauna and nummulites. Benthic foraminifers is represented by the gender representatives: *Spiroloculina communis communis* Cushman et Todd, *Quinqueloculina juleana* d'Orbigny, *Quinqueloculina* sp., *Triloculina angularis* d'Orbigny, *Triloculina gibba* d'Orbigny, *Hauerina* sp., *Eponides minima* Cushman, *Cibicides carinatus* (Terquem), *Pararotalia subinermis* Bhatia, *Nonionella winiana* Howe, *Pararotalia audoini* (d'Orbigny), *Lenticulina yaguatensis* (Bermudez), *Textularia broniana* d'Orbigny, *Textularia minuta* Terquem, *Lagena humifera* Bandy, *Lagena striata* (d'Orbigny), *Fursenkoina dibollensis* (Cushman et Applin), *Cibicides tallahatensis* Bandy, *Cibicides* cf. *westi* Howe, *Bulimina trigona* Terquem, *Nonion graniferum* (Terquem).

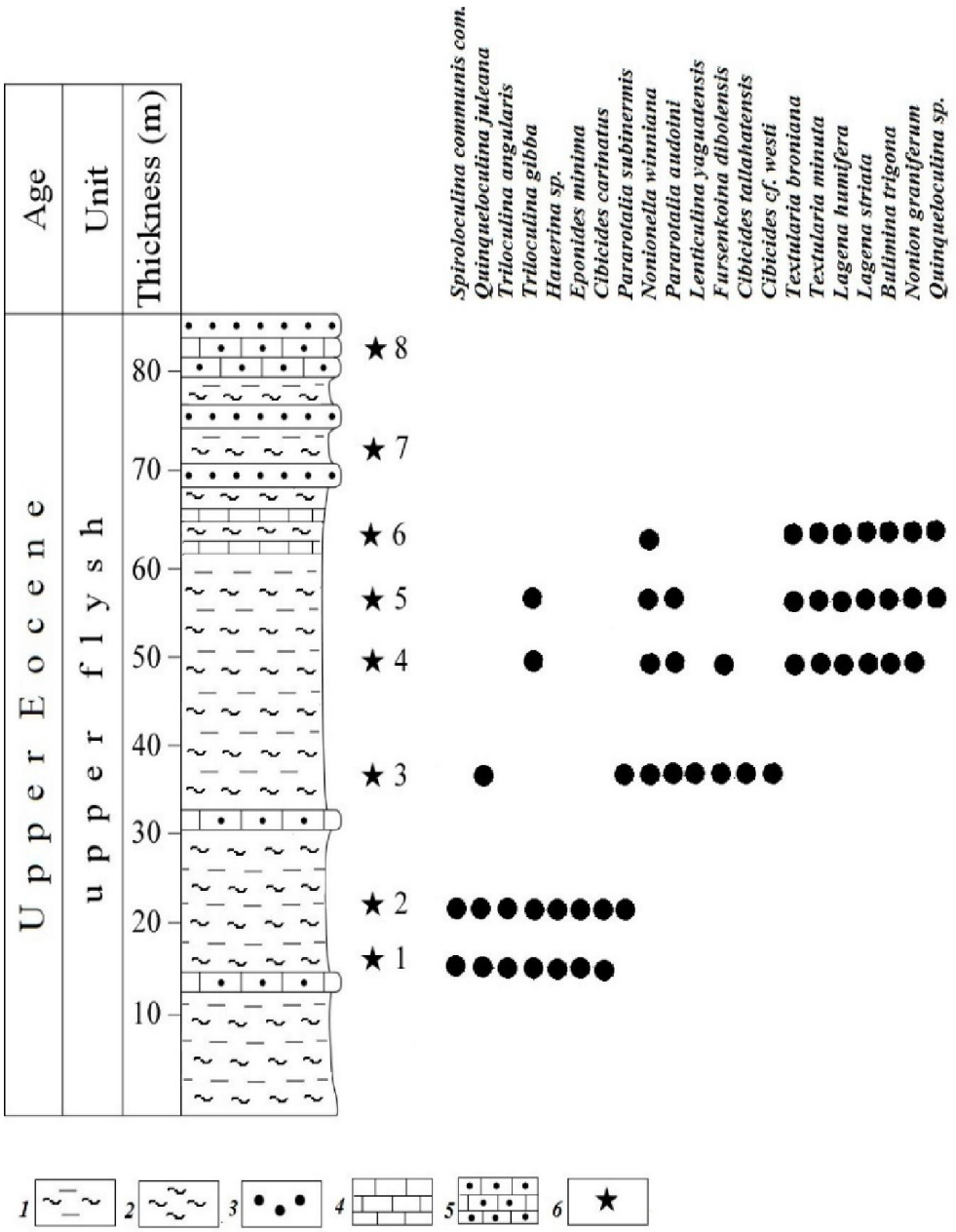

Fig. 3. Stratigraphical distribution of the foraminiferal fauna in the Čardaklija section
1 – marly-clayey sediments, 2 – clayey, 3 – sandstones, 4 – limestones, 5 – sandy-limestones, 6 – samples

Eževo Brdo section

The locality of Eževo Brdo is situated approximately 7 km north-northwest of the city of Štip. Micropaleontological examinations of foraminifera were made in the eastern part of the volcanic apparatus Eževo Brdo. The section is located in the upper flysch unit with thickness of about 95 meters. The section is built of marley-sandy sediments rhythmically intercalating, in the form of layers of clays, siltstones, clays with marly clays, marls and sandy limestones. 14 samples were taken from the section, and sampling was performed on every 4 to 5 meters in marls, clay-marly and marly-sandy layers (Figure 4). Faunal material was found in the section represented by benthic foraminiferal fauna. Benthic foraminifers is represented by generic representatives: *Quinqueloculina juleana* d'Orbigny, *Triloculina angularis* d'Orbigny, *Lenticulina yaguatensis* (Bermudez), *Bulimina trigona* Terquem, *Cibicides carinatus* (Terquem), *Nonionella winiana* Howe, *Pararotalia audoini* (d'Orbigny), *Quinqueloculina* sp., *Hauerina* sp., *Eponides minima* Cushman, *Pararotalia subinermis* Bhatia, *Triloculina gibba* d'Orbigny, *Textularia minuta* Terquem, *Spiroloculina communis communis* Cushman et Todd, *Lagena striata* (d'Orbigny), *Fursenkoina dibollensis* (Cushman et Applin), *Bulimina trigona* Terquem, *Cibicides* cf. *westi* Howe, *Cibicides tallahatensis* Bandy.

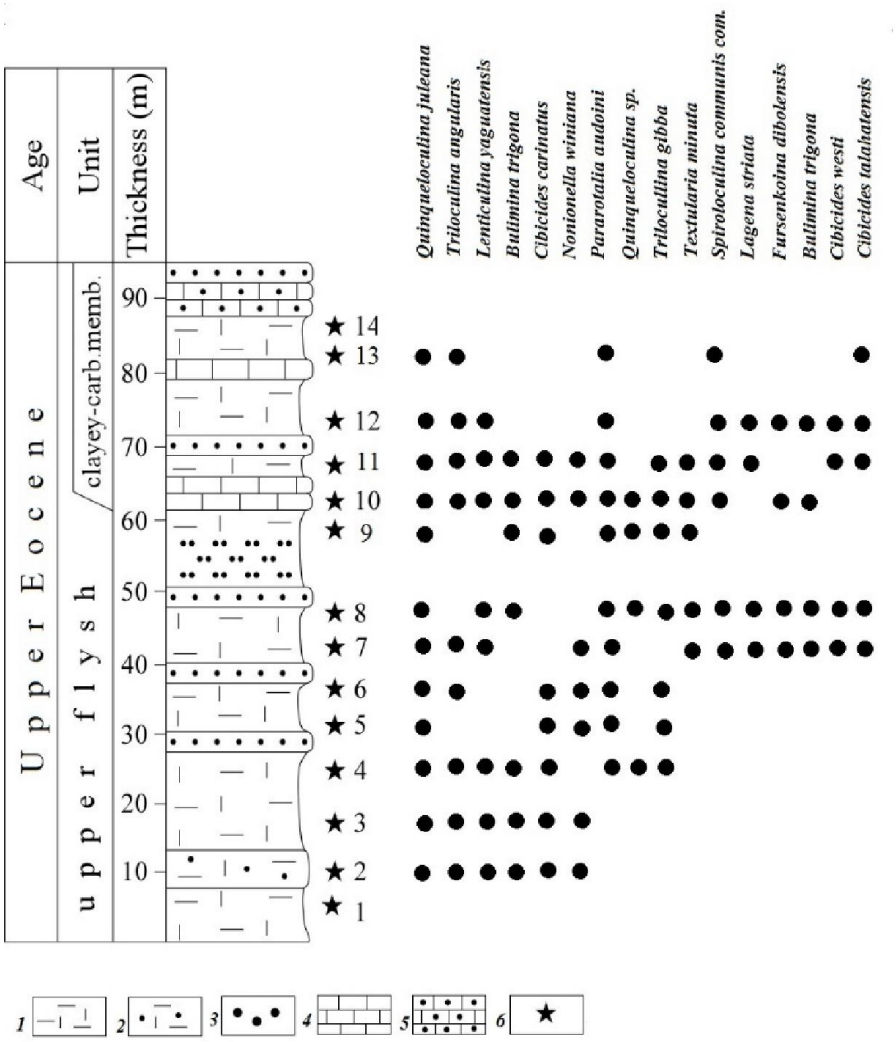

Fig. 4. Stratigraphical distribution of the foraminiferal fauna in the Eževo Brdo section
1 – clayey-carbonate sediments, 2 – clayey-carbonate-sandy sediments, 3 – sandstones, 4 – limestones, 5 – sandy limestones, 6 – samples

Karaorman section

The Karaorman site is located 6 km north of the city of Štip. The section from which the samples were taken and where micropaleonthological research was performed was made in the south-southwest part of the village. The investigated section is located in the upper flysch unit with thickness of about 80 m. This section is built of gray-greenish marly-clay sediments rhythmically intercalate with thin layers of clays. 11 samples were taken from the section and sampling was done on 4–5 meters between samples in marly-clay layers (Figure 5). Faunal material was found in the section represented by benthic and planktonic foraminiferal fauna. Benthic foraminifers is represented by the following generic representatives: *Quinqueloculina juleana* d'Orbigny, *Pararotalia audoini* (d'Orbigny), *Cibicides carinatus* (Terquem), *Cibicides tallahatensis* Bandy, *Nonion graniferum* (Terquem), *Nonionella winiana* Howe, *Quinqueloculina* sp., *Triloculina gibba* d'Orbigny, *Textularia minuta* Terquem, *Lenticulina yaguatensis* (Bermudez), *Textularia broniana* d'Orbigny. Planktonic foraminiferal fauna is represented by only one generic representative *Globigerina officinalis* Subb. (poorly represented in quantity).

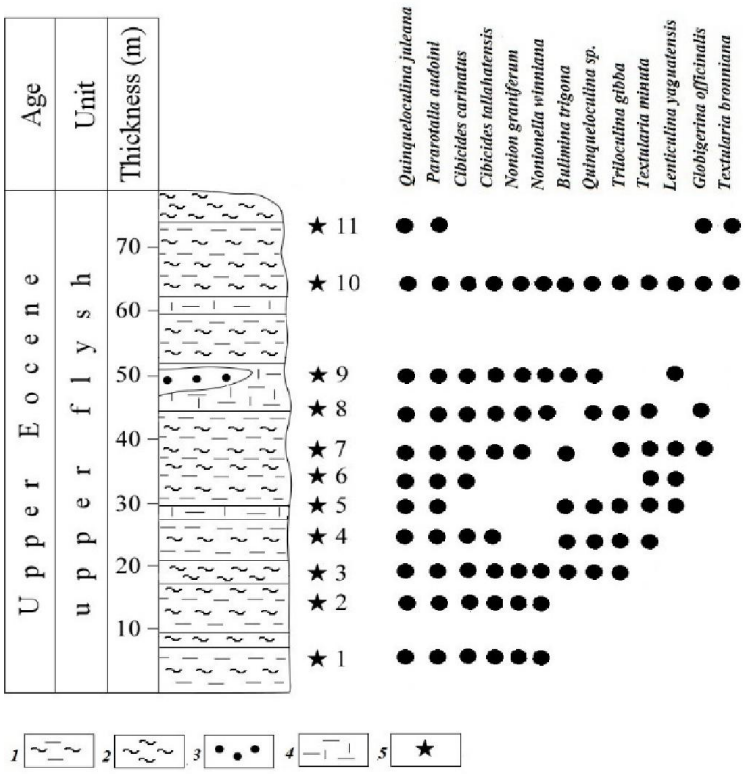

Fig. 5. Stratigraphical distribution of the foraminiferal fauna in the Karaorman section
1 – marly-clayey sediments, 2 – clayey, 3 – sandstones, 4 – clayey-carbonate sediments, 5 – samples

Kadrifakovo section

The Kadrifakovo site is located about 15 km north-west of Štip. The section from which samples were taken and micropaleontological research of foraminifera performed was made in the southern part of the village. The section is located in the upper flysch unit with a thickness of 100 m. The section is built from marly-clay sediments rhythmically intercalate in the form of layers of sandstone, clays, marls, and sandy clays. 10 samples were taken from the section, and sampling was performed in marly-clay layers at a distance of 6–7 meters between samples. Fauna material of benthic and planktonic foraminifera was found in the section (plankton foraminifera quantity is poorly represented in quantity compared to benthic foraminifera, as shown in Figure 6).

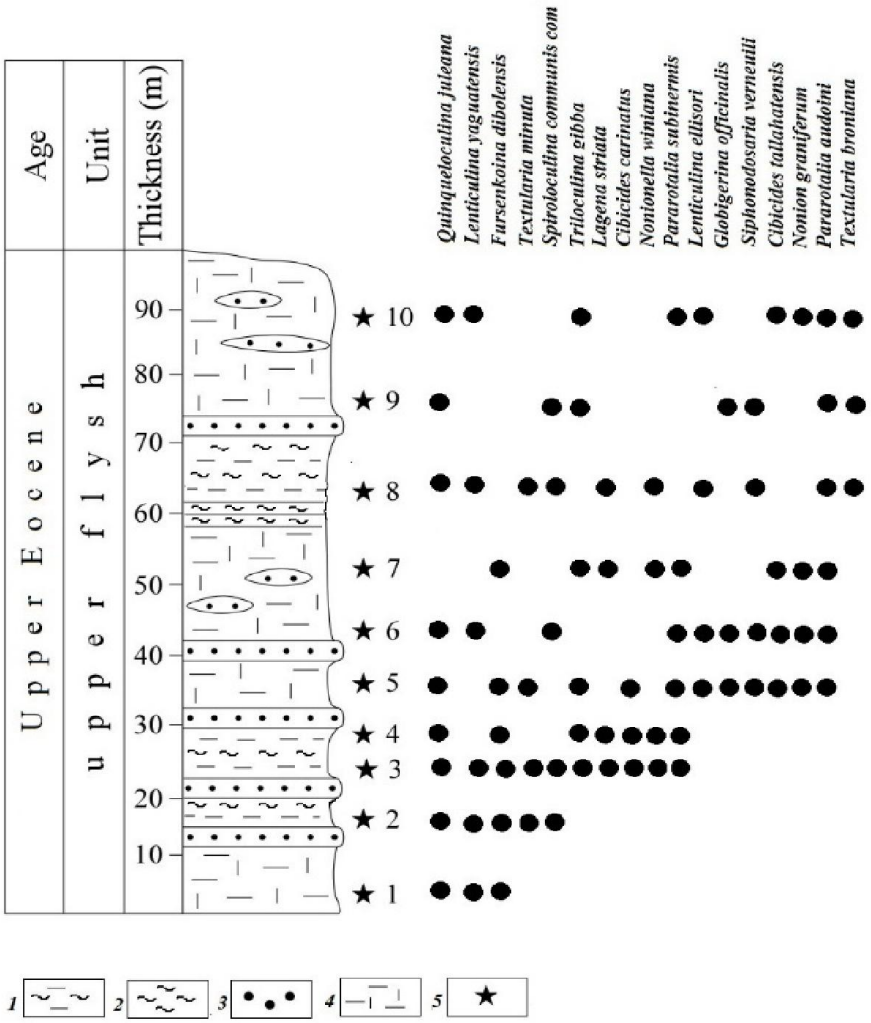

Fig. 6. Stratigraphical distribution of the foraminiferal fauna in the Kadrifakovo section
1 – marly-clayey sediments, 2 – clayey, 3 – sandstones, 4 – clayey-carbonate sediments, 5 – samples

Benthic foraminifers are represented by the following generic representatives: *Quinqueloculina juleana* d'Orbigny, *Lenticulina yaguatensis* (Bermudez), *Fursenkoina dibollensis* (Cushman et Applin), *Textularia minuta* Terquem, *Spiroloculina communis communis* Cushman et Todd, *Triloculina gibba* d'Orbigny, *Lagena striata* (d'Orbigny), *Cibicides carinatus* (Terquem), *Nonionella winiana* Howe, *Pararotalia subinermis* Bhatia, *Lenticulina ellisori* Bowen, *Siphonodosaria verneuili* d'Orbigny, *Cibicides tallahatensis* Bandy, *Nonion graniferum* (Terquem), *Pararotalia audoini* (d'Orbigny), *Textularia broniana* d'Orbigny. Planktonic foraminiferal fauna are represented by only one generic representative *Globigerina officinalis* Subb.

Madžarica section

The section where micropaleontological research of the foraminiferal fauna was made is located 3 km SE of the village of Karaorman, on the right bank of the river of Madžarica. The investigated section is located in the upper flysch unit with a section thickness of 65 m. The section is built of greenish clay-marly sediments whith intercalate with sandstones, clays and limestone. 18 samples were taken from the section, and sampling was performed on every 3–3.5 m between samples, in marly-clay layers, with the exception of sample 17, which was performed in sandy clays. The faunistic material in the section of Madžarica is presented in Figure 7.

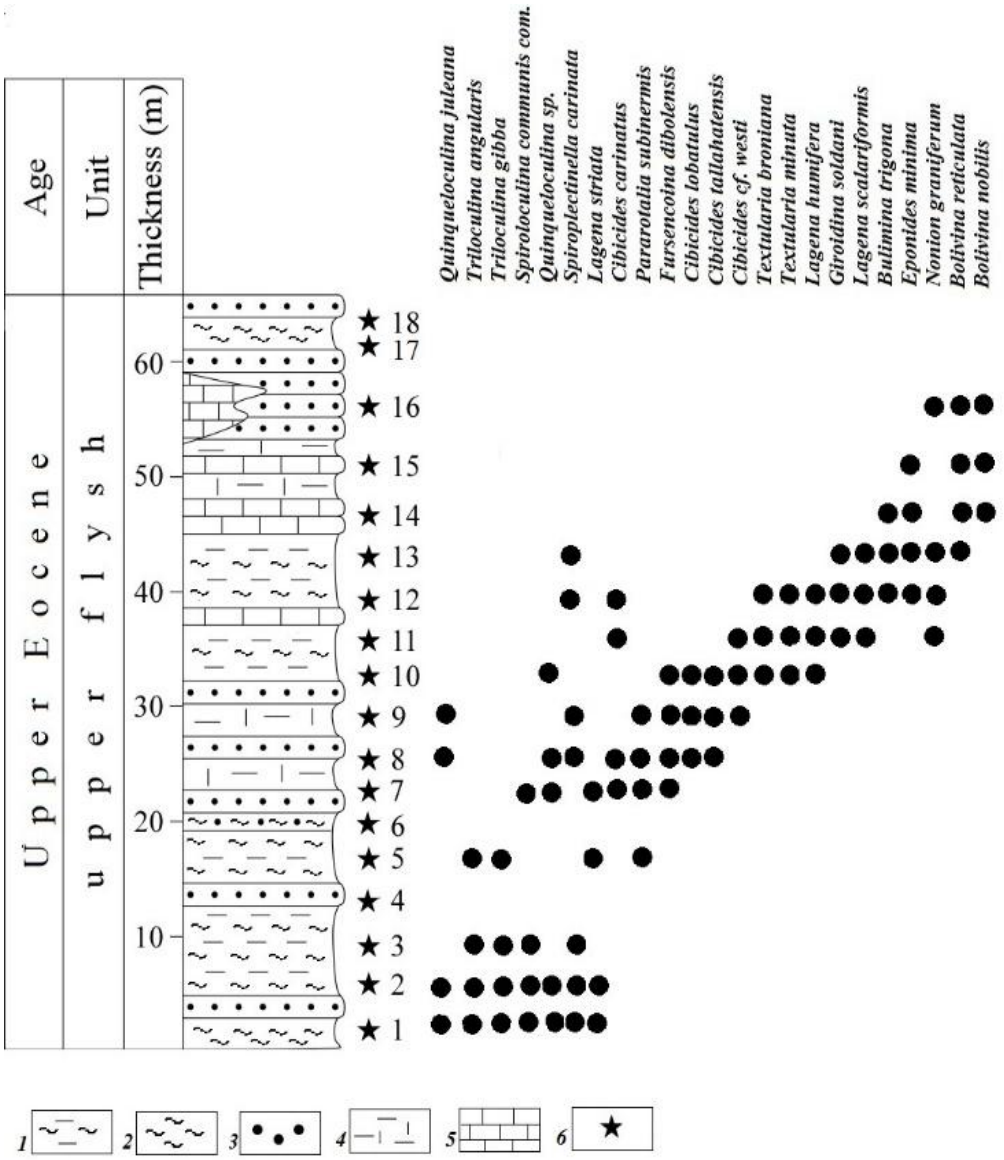

Fig. 7. Stratigraphical distribution of the foraminiferal fauna in the Madžarica section
1 – marly-clayey sediments, 2 – clayey, 3 – sandstones, 4 – clayey-carbonate sediments, 5 – limestones, 6 – samples

Benthic foraminifera is represented by the following generic representatives: *Quinqueloculina juleana* d'Orbigny, *Triloculina angularis* d'Orbigny, *Triloculina gibba* d'Orbigny, *Spiroloculina communis communis* Cushman et Todd, *Quinqueloculina* sp., *Spiroplectinella carinata* (d'Orbigny), *Lagena striata* (d'Orbigny), *Cibicides carinatus* (Terquem), *Cibicides lobatulus* (Walker and Jakobs), *Cibicides tallahatensis* Bandy, *Cibicides* cf. *westi* Howe, *Textularia broniana* d'Orbigny. *Textularia minuta* Terquem, *Lagena humifera* Bandy, *Gyroidinoides soldanii* (d'Orbigny), *Lagena scalariformis* (Williamson), *Bulimina trigona* Terquem, *Eponides minima* Cushman, *Nonion graniferum* (Terquem), *Bolivina reticulata* Hantken, *Bolivina nobilis* Hantken.

Nemanjici section

Nemanjici section is located 6.5 km NE of the town of Sveti Nikole, 90–100 m of the upper flysch unit, represented by calcareous clay alternating with thin sandstone beds, crop out here. 18 samples were taken from the section, and sampling was performed in marly-clay layers at a distance of 3–4 meters between the samples (Figure 8).

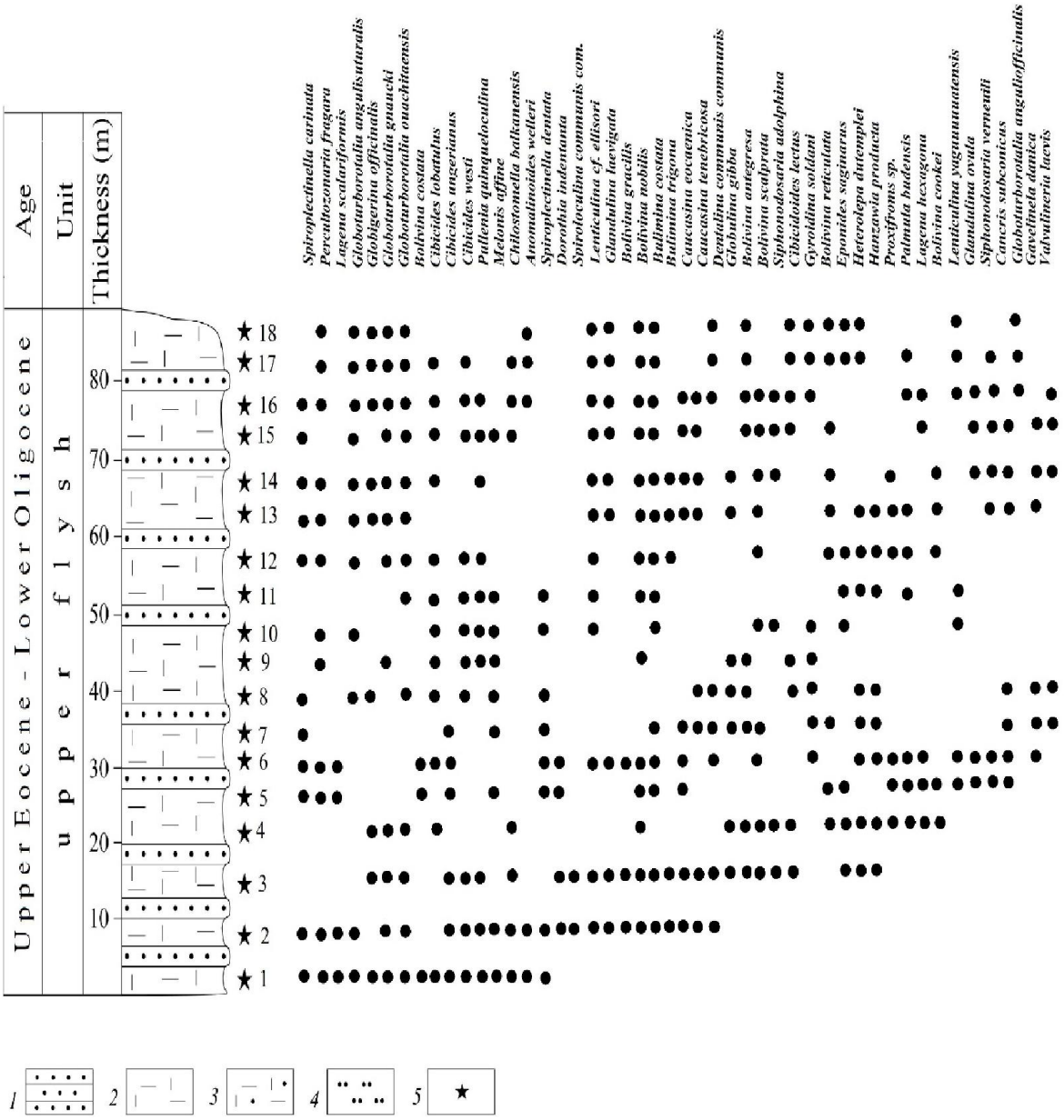

Fig. 8. Stratigraphical distribution of the foraminiferal fauna in the Nemanjici section
1 – sandstones; 2 – clayey-carbonate sediments; 3 – clayey-carbonate-sandy sediments; 4 – siltstones; 5 – samples

In the section faunal material of benthic and planktonic foraminifers was found. Benthic foraminifera is represented by the following generic representatives: *Spiroplectinella carinata* (d'Orbigny), *Percultozonaria fragara* (Gümbel), *Lagena scalariformis* (Williamson), *Bolivina costata* d'Orbigny, *Cibicides lobatulus* (Walker and Jakobs), *Cibicides ungerianus (*d'Orbigny), *Cibicides* cf. *westi* Howe, *Pullenia quinqueloba* (Reuss), *Melonis affine* (Reuss), *Chilostomelloides balkhanensis* (Dain et Chalilov), *Anomalinoides welleri* (Plummer), *Spiroplectinella dentata* (Alth), *Marssonella indentanta* (Cushman et Jarvis), *Spiroloculina communis communis* Cushman et Todd, *Lenticulina* cf. *ellisori* Bowen, *Glandulina laevigata* (d'Orbigny), *Bolivina gracilis* Cushman and Apllin, *Bolivina nobilis* Hantken, *Bulimina costata* d'Orbigny, *Bulimina trigona* Terquem, *Caucasina eocaenica* Chalilov, *Caucasina tenebricosa* Pishvanova, *Globulina gibba (*d'Orbigny), *Bolivina* cf. *antegressa* Subbotina, *Bolivina scalprata* Schwager, *Siphonodosaria adolphina* (d'Orbigny), *Cibi-*

cidoides lectus (Vasilenko), *Gyroidinoides soldanii* (d'Orbigny), *Bolivina reticulata* Hantken, *Eponides saginarus* Bykova, *Heterolepa dutemplei* (d'Orbigny), *Hanzawia producta* Terquem, *Proxifroms* sp., *Palmula budensis* (Hantken), *Lagena hexagona* (Williamson), *Bolivina* cf. *cookei* Cushman, *Lenticulina yaguatensis* (Bermudez), *Glandulina ovula* d'Orbigny, *Siphonodosaria verneuili* d'Orbigny, *Baggina subconica* (Terquem), *Gavelinela danica* (Brotzen), *Valvulineria laevis* Brotzen.

The planktonic foraminifera in the Nemanjici section is greater in quantity, in relation to other sections. Planktonic foraminiferal association containing all five taxa: *Globigerina officinalis* Subb., *Globoturborotalia ouachitaensis* (Howe and Wallace), *Globoturborotalia anguliofficinalis* (Blow), *Globoturborotalia gnaucki* (Blow et Banner), *Globoturborotalia angulisuturalis* (Bolli). All species were recorded in the whole setion.

Section OP-1

The drill OP-1 is located in the east part of the Ovče Pole basin, approximately 1.5 km. north-east from v. Ergelija (near the town of Sv. Nikole). The drilling is deep 1910 m. The drilling cuts the complex of Paleogne sediments and ends in the base represented with Jurassic granite. Lithological members of the drilling from the bottom to the surface are represented with sediments from the basal lithozone (lake and continental red conglomerates, silstones, sandstone and claystone), from the lower flysch lithozone (dark gray sandstone, silstones and claystone) and upper flysch lithozone (marly, siltsones, sandstone, marly oolithic limestones and clayey). In the section of the drilling OP-1 micropaleonological sampling was performed, and 39 samples are analyzed (Figure 9).

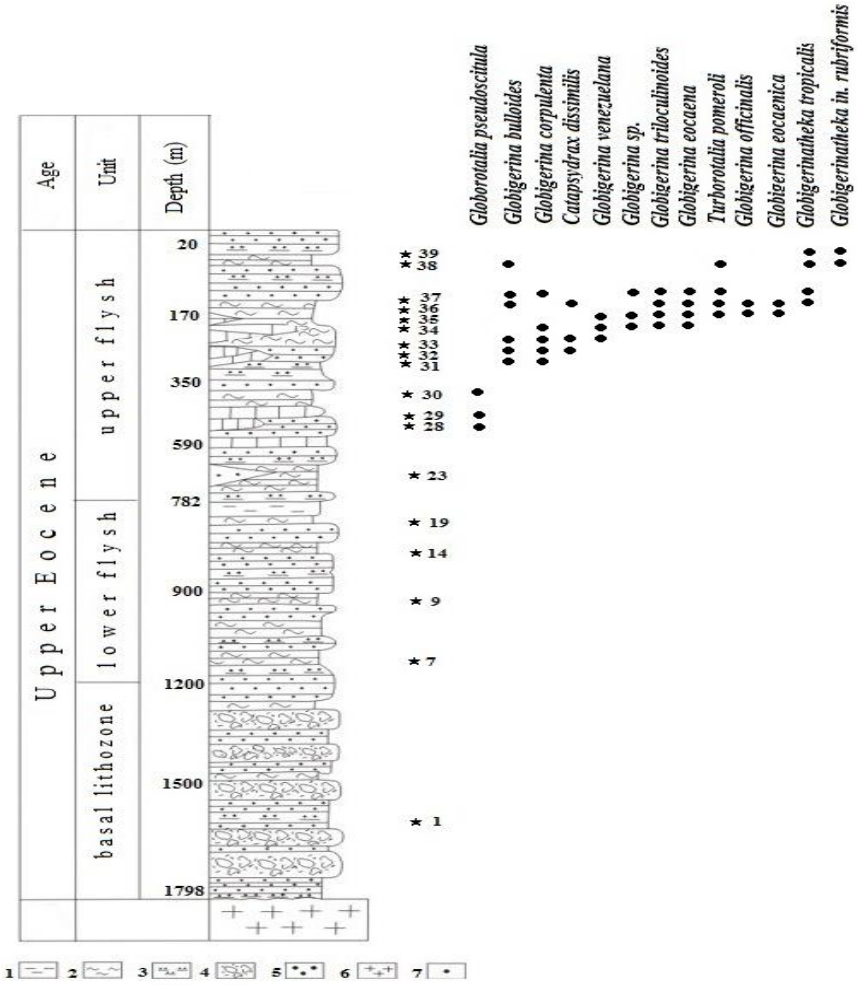

Fig. 9. Stratigraphical distribution of planktonic foraminifera in the OP-1 section
1 – marly, 2 – clayey, 3 – siltstones, 4 – conglomerates, 5 – sandstones, 6 – granites, 7– samples

Benthic foraminifera found in the section OP-1 is from the genera: *Cibicides, Robulus, Eponides, Gyroidina, Pullenia, Planulna, Quinqueloculina*, *Chysalogonium, Nonionella, Guttulina* and *Spiroplectammina* which are in the sediment series in the drilling OP-1, have wide vertical distribution in the Tertiary, and because of that they are not with special stratigraphic importance.

Planktonic foraminiferal fauna found in the sediments of the upper flysch lithozone, is represented with the fallowing representatives: *Globorotalia pseudoscitula* (Glaes) *Globigerina bulloides* d'Orbigny, *Globigerina corpulenta* Subbotina, *Globigerina eocaenica* Terquem*, Globigerina* sp., *Globigerina venezuelana* Hedberg, *Globigerina triloculinoides* Plummer, *Globigerina eocaena* Gümbel, *Turborotalia pomeroli* (Toumarkine & Bolli)*, Globigerina officinalis* Subbotina*, Catapsydrax dissimilis* (Cushman & Bermudez), *Globigerinatheka tropicalis* (Blow & Banner)*, Globigerina triloculinoides* Plummer, and *Globigerinatheka index rubriformis* Subbotina.

DISCUSSION

The biostratigraphic significance of the foraminiferal fauna in the Paleogene sediments of the Ovče Pole basin is manifested by the stratigraphic distribution of the foraminiferal species obtained from six sections and one drill. Previously obtained data have displayed that 57 species belong to benthic foraminifera (Džuranov et al., 1999; Stojanova et al., 2013; Valchev et al., 2013), whereas 5 species refer to planktonic foraminifera (Juranov, in: Stojanova et al., 2013) referring to the six sections.

The systematic classification of the foraminiferal fauna was done after Löeblich & Tappan (1988).

The benthic foraminiferal association is represented by agglutinated, porcelaneous and hyaline species, having a prominent high taxonomic diversity that was recorded in every studied section. According to the stratigraphic position of some diagnostic taxa, a Late Eocene age was confirmed in all sections. For instance, the presence of hyaline taxa *Lagena humifera* Bandy and *Pararotalia audouini* d'Orbigny enabled this age assessment to be defined in the Čardaklija and Madžarica sections, and sections of Eževo Brdo, Karaorman and Kadrifakovo, respectively. The occurrence of *Bolivina* cf. *antegressa* Subbotina in benthic foraminiferal association in the Nemanjici section allowed identifying the *Bolivina antegressa* Subzone of the *Planulina costata* Zone (Bugrova, 1988).

The plankton foraminiferal association is represented by five species: *Globigerina officinalis* Subbotina, *Globoturborotalia ouachitaensis* (Howe and Wallace), *Globoturborotalia anguloffcinalis* (Blow), *Globoturborotalia gnaucki* (Blow and Banner) and *G. angulisuturalis* (Bolli). They were all found in the Nemanjici section. The Kadrifakovo section yielded only one species – *Globigerina officinalis* Subbotina. It was documented that the planktonic foraminifera *Globigerina officinalis* Subb., *Globoturborotalia ouachitaensis* (Howe and Wallace), *Globoturborotalia anguloffcinalis* (Blow) and *Globoturborotalia gnaucki* (Blow and Banner) co-occur within the interval from the Upper Eocene (Zone P 16) to the end of the Oligocene (Zone P 22), and the first listed species comes from lower levels of the Eocene. It was also found that *Globoturborotalia angulisuturalis* (Bolli) first appears in the Oligocene and continues ranging upwards. This species and the rest of the plankton taxa were determined in the lowermost sample of Nemanjici section. That defines the Oligocene age for this part of the section, which associates with the upper flysch unit. It is possible the lower levels of this unit to attain the Upper Eocene, but there are not exposures and foraminiferal record.

If analyses are made to the micropaleontologic section in whole, the maximal frequency and contents of planktons foraminifera is showing in the upper flysch unit on deepness interval from 550 to 20 m (samples 28 – 39), i.e. in the upper parts of the section of the drill hole, and under the deepth interval from 565 m (sample 27) planktonic foraminiferal fauna disappears. The planktonic foraminiferal association of the vertical distribution of selected taxa, contained in the OP-1: *Catapsydrax dissimilis* (Cushman & Bermudez), *Globigerina venezuelana* Hedbergs*, Globigerina* sp.*, Globigerina officinalis* Subbotina*, Globigerinatheka tropicalis* (Blow & Banner)*, Turborotalia pomeroli* (Toumarcine & Bolli), *Globigerina triloculinoides* Plummer*, Globigerina bulloides* d'Orbigny, *Globigerina eocaenica* Terquem, gave us the chance to identify one local biostratigraphic zone *Catapsydrax dissimilis – Globigerinatheka tropicalis* in the Ovče Pole basin. The biostratigraphic zone *Catapsydrax dissimilis – Globigerinatheka tropicalis* is characterized with the species *concurrent zone* – zone defined as the interval from the first appear-

ance of Catapsydrax dissimilis (Cushman & Bermudez), to the last occurrence of *Globigerinatheka tropicalis* (Blow & Banner). The bottom border of the zone is defined with the first occurrence of the index species *Catapsydrax dissimilis* (Cushman & Bermudez), and the upper border is positioned to the last disappearance of the index species *Globigerinatheka tropicalis* (Blow & Banner). The borders of the zone represent the intervalon the midle P 15 to the end of P 17 and are belonging to the Upper Eocene – Priabonian geological age (Tab. 1).

T a b l e 1

Correlation of the benthic foraminiferal zones and planktonic foraminiferal zone in the upper flysch unit of the Ovče Pole Paleogene basin

<table>
<tr><th rowspan="3">Period</th><th rowspan="3">Epoch</th><th rowspan="3" colspan="2">Standard stages</th><th colspan="4">Ovče Pole basin</th></tr>
<tr><th colspan="2">Section
OP-1</th><th colspan="2">Section
Nemanjici</th></tr>
<tr><th colspan="2">Planktonic foraminiferal zones
(Toumarkine Bolli, 1985)</th><th colspan="2">Benthic foraminiferal zones
(Bugrova, 1988)</th></tr>
<tr><td rowspan="9">P
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E</td><td rowspan="3">OLIGOCENE</td><td rowspan="3">LOWER</td><td rowspan="3">RUPELIAN</td><td>P20</td><td rowspan="3"></td><td rowspan="3" colspan="2"></td></tr>
<tr><td>P19</td></tr>
<tr><td>P18</td></tr>
<tr><td rowspan="6">EOCENE</td><td rowspan="3">UPER</td><td rowspan="3">PRIABONIAN</td><td>P17</td><td rowspan="3">*Catapsydrax dissimilis – Globigerinatheka tropicalis* concurrent zone</td><td rowspan="3">*Planulina castata*</td><td rowspan="3">*Bolivina antegrina* Subzone</td></tr>
<tr><td>P16</td></tr>
<tr><td>P15</td></tr>
<tr><td rowspan="3">MIDDLE</td><td rowspan="3">BARTONIAN</td><td>P14</td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td>P13</td></tr>
</table>

CONCLUSION

The stratigraphic distribution of foraminifer fauna have led to the biostratigraphic correlation of 6 outcrop sections from the Ovče Pole Paleogene basin. Five sections (Čardaklija, Eževo Brdo, Karaorman, Kadrifakovo and Madžarica) yielded benthic foraminifera with wide stratigraphic distribution, but the Eocene/Oligocene boundary is difficult to be drawn, because of the absence of benchmark Oligocene elements (planktonic foraminifera). Only the Nemanjici section contributed with Lower Oligocene planktonic foraminifera from the upper level of the upper flysch unit. Based on the results of the stratigraphic distribution of the plankton foraminiferal species in the sections OP-1 (Ovče Pole basin) is identify *Catapsydrax dissimilis* (Cushman and Bermudez) – *Globigerinatheka tropicalis* (Blow & Banner) local biostratigraphic zone of the Upper Eocene – Priabonian geological age.

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Р е з и м е

ФОРАМИНИФЕРНА БИОСТРАТИГРАФИЈА НА ГОРНО ЕОЦЕНСКИТЕ СЕДИМЕНТИ ОД ОВЧЕПОЛСКИОТ БАСЕН, Р. МАКЕДОНИЈА

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Клучни зборови: фораминиферна фауна; биостратиграфија; биозони; палеогени седименти; овчеполски басен.

Овчеполскиот палеогенски басен претставува голема седиментна маса сместена во североисточниот дел на територијата на Република Македонија.

Во трудот се презентирани резултатите од истражувањата на фораминиферната фауна пронајдена во седиментите на шест откриени палеогенски профили: Чардаклија, Ежево Брдо, Караорман, Кадрифаково, Мацарица, Немањици и една дупчотина ОП-1 од овчеполскиот басен.

Врз основа на стратиграфската распространетост на видовите во рамките на фораминиферната асоцијација во профилите Чардаклија, Ежево Брдо, Караорман, Кадрифаково, Мацарица, потврдено е дека геолошката старост на седиментите од горната флишна литозона е горноеоценска. Ве профилот Немањици е издвоена *Bolivina antegressa* (subzona) од *Planulina costata,* зона по бентосни фораминифери, а од стратиграфската распространетост на планктонски видови од фораминиферната асоцијација: *Globigerina officinalis* Subb., *Globoturborotalia ouachitaensis* (Howe and Wallace), *Globoturborotalia angulioffcinalis* (Blow) и *Globoturborotalia gnaucki* (Blow et Banner) (зона P 16 до зона P 22), утврдена е долноолигоценска старост за горните нивоа на горната флишна литозона за профилот Немањици од овчеполскиот басен. Врз основа на резултатите од стратиграфското распространение на планктонските фораминиферни видови во дупчотината ОП-1 е идентификувана конкурентна биостратиграфска зона *Catapsydrax dissimilis – Globigerinatheka tropicalis,* чија геолошка старост се однесува на горен еоцен-приабонски кат.