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Macroflora from of the Mariovo coal deposit, Republic of Macedonia

Макрофлора от находище Мариово, Република Македонија

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Introduction

The area of the Mariovo coal deposit is located in the southeastern part of the Republic of Macedonia, about 46 km SE of the town of Prilep. It comprises the border area between the Vardar zone and the Pelagonia massif (Fig. 1).

The Mio-Pliocene basin of Mariovo is a neotectonic depression formed in the Late Miocene, i.e. during the 2nd and 3d Neogene sedimentation cycle of Macedonia (Dumurdzanov et al., 2002). The 4th cycle belongs to the Late Pliocene. Increased vertical movements during the Pliocene lead to widening of the basin and its persistence into the Middle Pleistocene. The accumulated mass of the basin has been studied in outcropped profiles, and the deeper parts have been investigated with a detailed net of holes on the coal horizon. Namely, the Neogene sedimentary complex lies transgressively and discordantly on the Upper Cretaceous base, and is overlid by Quaternary sediments. The age of the sediments was previously determined by fossil macroflora as Upper Pliocene (Pantić, 1956). In the last 20 years, new paleontological and biostratigraphic data for the Neogene of Mariovo and neighboring regions were published (Ognjanova-Rumenova, 2000; Mihajlović, Lazarević, 2004), and a regional study of the Neogene in Macedonia (Dumurdzanov et al., 2003, 2005) gave an opportunity for more detailed research.

This study aims to achieve a further understanding of the age of the sediments from the Mariovo coal deposit by means of macroflora.

Geological setting

The section in Mariovo basin was divided into four lithostratigraphic units (Dumurdzanov et al., 2002): Nerezi, Solnje, Vitacevo and Mariovo Formations.

The Nerezi Formation could be subdivided into three units. A basal one, consisting of gravel and sandstone (~120 m), that is known from drill holes only. The middle unit comprises siltstone and silty claystone



Fig. 1. Sketch map of the Mariovo basin in Republic of Macedonia: 1, Mariovo basin; 2, tectonic boundary; SMM, Serbian-Macedonian Massif; VZ, Vardar Zone; PM, Pelagonia massif; WMZ, Western Macedonian Zone

(~70 m), grading upwards into coal and claystone, and finally into a continuous coal layer (6–15 m). The last one is overlid by marly and silty containing numerous macrofloral imprints, which yield a Late Miocene age (Mihajlović, Lazarević, 2004). The planktonic algae, determined by Ognjanova-Rumenova (2000) from the claystone, are very similar to those in the Novi Iskar Formation of the Sofia Basin and considered to be of Late Miocene age. The upper unit consists of well-bedded siltstone and sandstone (~60 m). A tooth of *Zygodon borsoni* was found near the village of Gradesnica (Petronijević, 1952). According to Nikolov (1985) it determines Meotian–Pliocene age.

The Solnje Formation overlies unconformably the Miocene strata and it is characterized by yellow-red and grey, poorly stratified gravel and sandstone (~60–80 m). The age of the Solnje Formation is Pliocene (cycle IV).

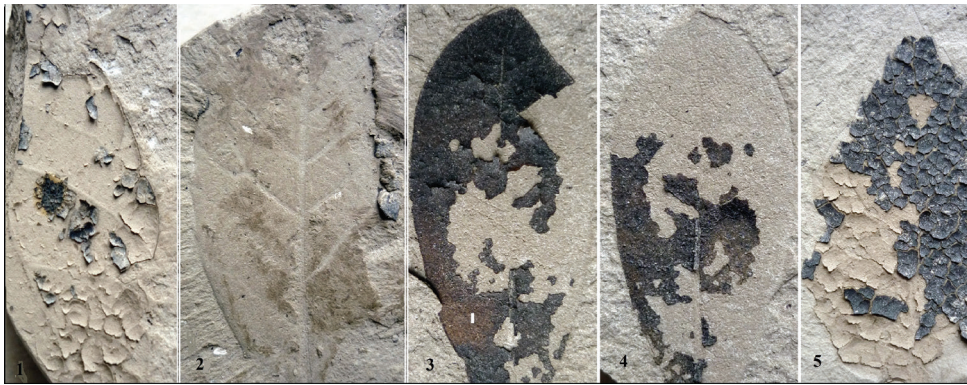


Fig. 2. Photographs of the fossil flora from the Mariovo basin: 1, *Acer tricuspidatum* Bronn.; 2, *Quercus sosnowskyi* Kol.; 3–4, *Olea* aff. *europaea* var. *sylvestris* L.; 5, *Quercus mediterranea* Ung.

The Vitacevo Formation overlies the Solnje Formation without a break and begins with stratified tuff. The tuff is covered by ~50 m sandstone and gravel interbedded with beds of diatomite, tuff, and sandy claystone. From the diatomite Ognjanova-Rumenova (2000) established a Pliocene age for the Vitacevo Formation.

The Mariovo Formation covers concordantly the Vitacevo Formation and it is composed of numerous travertine beds which alternate with pyroclastics. A 20 m thick limestone plaque covering about 20 km² is developed at the top of the unit. In the lower part of the limestone plaque there still are intercalations of tuff and diatomite, which marks the end of the existence of Mariovo Lake. The total thickness of the formation is 60–70 m. Certain species of mollusks (*Pisidium amnicum* (Muell.), *Sphaerium corneum* (L.), *Bithynia tentaculata* (L.), *Lymnaea* cf. *stagnalis* (L.), *Planorbium corneum* (L.), *Vitrea crystalina* (Muell.) and the age of quartz-lattice magmatism of Voras/Kozjak Mountain (Kolios et al., 1980), determine its stratigraphy of the sediments, containing tephra, to the Pliocene and Pleistocene age of the formation (Dumurdzanov et al., 1976).

Results

Our macrofloral investigations were made on the basis of paleontological material derived of the sediments in drill-holes of the Nerezi Formation from the Mariovo basin. The drill cores of ID 28/XV (siltstone sediments from the depth interval 178–164 m), ID 23/XVII and ID 16/XVII (clayey-carbon sediments from the depth interval 162–157 m) were sampled. Four new species of macroflora were identified (Fig. 2): *Acer tricuspidatum* Bronn. (Middle Oligocene–Upper Pliocene), *Quercus sosnowskyi* Kol. (Upper Miocene–Lower Pliocene), *Quercus mediterranea* Ung. (Middle Oligocene–Lower Pliocene), *Olea* aff. *europaea* var. *sylvestris* L. (Upper Miocene to Recent).

This macrofossil assemblage confirms the Upper Miocene age of the Nerezi Formation from Mariovo basin.

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