LATE PLIOCENE VEGETATION FROM THE DRAVA RIVER FLOOD-PLAIN (NORTHERN CROATIA)

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Pliocene deposits in the Drava River valley, near the town Virovitica in Northern Croatia contain plant megafossils and palynomorphs with characteristics of mixed mesophytic forest. Megafossils are scarce, but well preserved. Leaves and fructifications belong mostly to deciduous plants pollinated by wind. Collection includes one of the latest evidence of Ginkgo in Europe before the glaciation. Palynoflora partly coincides with megafossils, but shows wider variety of vegetation along the river basin. Arborescent and herbaceous components are both present and non-pollen grains are typical for fresh-water marshes within the flood-plain, in which all plant fossils were accumulated and preserved.

Pliocene clastic deposits with remnants of land flora in the Vicinity of Virovitica outcrop as erosional windows within the Pleistocene fine-grained loess and/or lacustrine-marsh silt and clay. They transgressive overly Pontian-Lower Pliocene Rhomboidea beds (Fig. 1) and were deposited during the 3rd depositional megacycle proposed by Saftić et al. (2003). During the basic geological mapping their age was interpreted as Late Pliocene – Early Pleistocene, due to the lack of fossils (Galović et al., 1981).

The best outcrops are present in quarries Rezovac, Cabuna and Bistrica south of the Drava River, between Virovitica and Podravska Slatina (Fig. 2).

Well preserved megaflora was found in siltose clays in the vicinity of Virovitica. Mrinjek et al. (2006) published a short list of collected samples, noticing that megaflora is well preserved, and dominated by maple leaves and hornbeam fructifications. During this research megaflora from the vicinity of Virovitica was studied in detail. Thirty-five specimens were found in siltose clays. Twenty-six taxa were determined. The most diverse are fagaceans and betulaceans, represented by leaves and fructifications. Dicotyledonous leaves are the most common, often medium to small sized. Toothed leaves predominate over simply ovate forms. Dicotyledones: Parottia, Liquidambar, Quercus mediterranea, Q. kubinyi, Myrica lignitum and Zelkova represent relics of the Miocene warm period. Beech (Betula sp.) and alder (Alnus julianaeformis (Sternberg) Kvacek & Holly) were introduced in this area during the Late Pliocene cooling.
Maple and hornbeam are known as colonizers of unconsolidated soils. Maple leaves belong to the fossil species *Acer integrimum*, common in European Neogene deposits. *Ginkgo adiantoides* (equivalent of the recent *G. biloba*) was generally common in disturbed streamside and levee environments during the Cretaceous, Paleogene and Neogene (Del Tredici, 2000; Royer et al., 2003.). Escaping the unfavourable conditions during the glaciation it disappeared from Europe ca. 2.5 Ma ago. Megaflora from the vicinity of Virovitica shows significant similarity with other Late Miocene and Pliocene floras from Europe.

Palynomorphs were extracted from the same clay samples from the vicinity of Cabuna, which contained the best preserved megafossils. Percentages of pollen taxa were calculated based on the complete pollen assemblage. Taxa have been grouped according to their ecological significance with respect to the Nix's (1982) classification: (1) *Cathaya*, an altitudinal conifer living today in Southern China; (2) Mesothermic (i.e. warm–temperate) elements (deciduous *Quercus*, *Carya*, *Pterocarya*, *Carpinus*, *Ulmus*, *Liquidambar*, *Myrica*, *Tilia* and *Fagus*) (3) *Pinus* and poorly preserved Pinaceae pollen grains; (4) microthermic (i.e. high-altitude) trees (*Abies* and *Picea*); (5) non-significant pollen grains (undetermined, poorly preserved pollen grains); (6) Mediterranean xerophytes (evergreen *Quercus*) and (7) herbs and shrubs (*Asteraceae Asteroideae*, *Asteraceae Cichorioidae*, *Chenopodiaceae*). There are no megathermic (i.e. tropical) elements, mega-mesothermic (i.e. subtropical) elements, *Cupressaceae* and steppe, while meso-microthermic (i.e. mid-altitude) trees (*Tsuga*) are sporadic. There are some non-pollen palynomorphs (NPP) that indicate the deposition within a flood-plain (freshwater marshes and oxbow lakes).

Megaflora from the Late Pliocene deposits of Drava river basin is well preserved, with no
fragmentation and/or size selection, which excludes long transportation and high water energy. The vegetation along the Drava river was organized in altitudinal belts. Considering the ecological needs of collected taxa, palaeovegetation from the vicinity of Virovitica dominantly belongs to a lower horizon of an evergreen and deciduous mixed forest, today growing above 700 m altitude. Within this vegetation the following arboreal taxa appear: Quercus, Fagus, Carpinus and Acer. Riparian vegetation of this horizon is composed of Alnus, Carya, Ulmus and Liquidambar. The shrub level was dominated by Asteraceae (Asteroideae and Cichorioideae) and Chenopodiaceae. Freshwater marshes and oxbow lakes contain algal remains, and ferns in marginal parts. Myrica is a component of a broad-leaved evergreen forest, present from coastal plains to 700 m, while Betula, Fagus, Pinus, Cathaya and Tsuga belonged to a mid-altitude deciduous and coniferous mixed forest. Finally, above 1800 m in altitude, a coniferous forest with Abies and Picea existed.

References


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