

THE FLORISTIC REPERTORY OF THE MIO-PLIOCENE MACROFLORAS FROM DANUBE – MOTRU SECTOR (MEHEDIŢI DISTRICT)

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Abstract. The paper presents the results of the macrofloras researches achieved for reconstitution the conditions of the milieu existents during accumulation the mio-pliocene deposits from Danube – Motru sector. The floristic repertory of Mio-Pliocene floras from Danube-Motru sector had been based on the personal researches carried on in the period 2000-2007 just same sites: Batoți, Crăguiești, Cariera Husnicioara, Dedovița și Bâcleș. The floristic repertory of the mio-pliocene macrofloras from Danube – Motru sector contains 67 species, belonging to 33 genera, 22 families, 3 classes and 2 phylum. The paleoecological study of the floristic repertory of the mio-pliocene macrofloras from Danube – Motru sector indicated the presence of distinctive paleobiotopes: coniferous forest, deciduous forests, deciduous forests hygrophyte, river meadows and marsh.

Key words: macroflora, Mio-Pliocene, Danube-Motru sector, Mehediți

Rezumat. Repertoriul floristic al macroflorei mio-pliocene din sectorul Dunăre – Motru (județul Mehediți). Lucrarea prezintă rezultatul cercetărilor macrofloristice întreprinse în vederea reconstituirii condițiilor de mediu existente în timpul acumulării depozitelor miocen superior-pliocene din sectorul Dunăre – Motru. Repertoriul floristic al macroflorei mio-pliocene din sectorul Dunăre – Motru a fost elaborat pe baza cercetărilor proprii efectuate în perioada 2000-2007, precum și a cercetărilor anterioare în punctele fosilifere: Batoți, Crăguiești, Cariera Husnicioara, Dedovița și Bâcleș. Repertoriul floristic cuprinde 67 de specii, repartizate în 33 genuri, 22 familii, 3 clase și 2 încregături. Analiza paleoecologică a macroflorei identificate în sectorul Dunăre – Motru arată prezența unor paleobiotopuri distincte: pădure de conifere, pădure de foioase, pădure de foioase higrofite, pădure de luncă și mlaștină.

Cuvinte cheie: macroflora, Mio-Pliocen, sector Dunăre-Motru, Mehediți

INTRODUCTION

Due to the large development of the lacustrine and palustre deposits, the Pliocene formations of Oltenia have rich fossil plants contents. This drew the attention of the paleobotanists even since the down of the geologic researches in this side of the country.

The first studies of the Pliocene flora of Oltenia belong to LAURENT & MARION (1898) who assigned some of the plants of the collection send by Ștefănescu to the famous paleobotanist G. Saporta. In his doctorate thesis, named “*Flora fosilă din Terțiarul Olteniei*” BARBU (1954) resumed all the previous researches carried out until his work in Oltenia, this synthesis being a keystone for each paleofloristic study in this area.

Țicleanu brought an important contribution to the paleobotanic researches of Oltenia (between 1982- 1992) and has had the first attempts to reconstruct the coal forming vegetation of Oltenia’s Pliocene, which were mainly based on macroflora data. In 1992, in his doctorate thesis named “*Studiul genetic al principalelor zăcăminte de cărbuni neogeni din România pe baza paleofitocenozelor caracteristice, cu privire specială la Oltenia*”, ȚICLEANU did a complete revision of all the former paleobotanic researches regarding the macroflora and Dacian vegetation from the Dacian Basin and settles the main coal forming paleophytocoenosys.

Pontian deposits

PETRESCU et al. (2002) were the first to study the fossil plant-bearing deposits from Batoți (Mehediți District) focusing on the exceptional palynologic content of the Early Pontian content. In this study, five species of macroflora have been identified: *Glyptostrobus europaeus* (BRONGNART) Unger, *Alnus kefersteini* (GOEPPERT) UNGER, *Salix varians* GOEPPERT, *Fagus pliocaenica* SAPORTA and *Quercus pseudocastanea* GOEPPERT.

The first macrofloral researches at Batoți (ȚICLEANU et al., 2002) stressed out the following taxa: *Taxodium dubium* (SERBERG) HEER, *Glyptostrobus europaeus* (BRONGNART) UNGER, *Platanus platanifolia* (ETTINGSHAUSEN) KNOBLOCH, *Alnus ducalis* (GAUDIN) KNOBLOCH, *Alnus cecropiaefolia* (ETTINGSHAUSEN) BERGER, *Betula insignis* GAUDIN, *Fagus silesiaca* WALTH. & ZAST., *F. pliocaenica* SAPORTA, *Quercus kovatsi* E. KOVACS, *Q. pontica* C. KOCH *miocaenica* KUBAT, *Quercus* cf. *macrantheroides* ANDREANSZKI, *Ulmus pyramidalis* GOEPPERT, *Pterocarya paradisiaca* (UNGER) Ijinskaya, *Populus populina* (BRONGNART) KNOBLOCH and *Byttneriophyllum tiliaefolium* (AL. BRAUN) KNOBLOCH & KVACEK.

Later, DIACONU (2002b) added seven new taxa to the floral list of this site: *Sequoia gigantea* L., *Liquidambar europaea* AL. BRAUN, *Castanea* cf. *crenata* SIEBOLD & ZUCCARINI, *Carya serraefolia* (GOEPPERT) KRAUSEL, *Acer integerrimum* (VIVIANI) MASSAL, *Vitis teutonica* AL. BRAUN, *Cornus* sp. and reconfirmed the presence of *Alnus cecropiaefolia* (ETTINGSHAUSEN) BERGER.

Corroborating the results of the previous researches DIACONU et al. (2004), pointed out the importance of micro-and macroflora from Batoți in the frame of the paleofloristic heritage of Romania. The recent researches

(DIACONU, 2004a, 2004b) reaching the conclusion, in the actual stage of the knowledge that Pontian flora from Batoți involves 50 taxa.

Recently, in 2005 was discovered a new fossil site at Crăguiești, were in Pontian deposits represent by clay marl, I identified 4 taxa: *Liquidambar europaea* AL. BRAUN, *Alnus* sp., *Betula insignis* GAUDIN and *Fagus silesiaca* WALTH.& ZAST. These researches are only at the beginning.

Dacian deposits

Although in the Danube - Motru sector the majority of the Pliocene deposits are sandy, because of the large development of the Berbesti Formation, even if in these were found fossil plants too, just like in the case of the fossil site from Dedovita, from were ȚICLEANU et al. (1982) described and illustrated a Dacian age flora with: *Pinus* sp., *Sequoia abietina* (BRONGNART) KNOBLOCH, *Glyptostrobus europaeus* (BRONGNART) Unger, *Alnus* sp., *Betula* cfr. *macrophylla* (GOEPPERT) HEER, *Carya serraefolia* (GOEPPERT) KRAUSEL, *Juglans acuminata* AL. BRAUN, *Salix integra* GOEPPERT, *Salix* sp. aff. *S. varianus* AL. BRAUN, *Liquidambar europaeum* AL. BRAUN, *Rhamnus* cfr. *gaudinii* HEER, flora with is considered by the authors belonging to the superior Dacian.

The fossil plants derive from the layer IV roof coal in Husnicioara open pit (Mehedinți District), were identified (DIACONU, 2000) the following taxa: *Bytneriophyllum tilliaefolium* (AL. BRAUN) KNOBLOCH & KVACEK, *Glyptostrobus europaeus* (BRONGNART) HEER, *Glyptostroboxylon tenerum*, *Salix ștefănescui* LAURENT & MARION, *Salix* sp., *Potamogeton* cf. *nodosus* POIR, *Phragmites oeningenussis* AL. BRAUN, *Ceratophyllum* sp. aff. *C. demersum* LINNÉ, *Quercus* sp. and *Acer* sp.

Later, in the same site, but above layer VI (DIACONU, 2002a) identified the following species: *Bytneriophyllum tilliaefolium* (AL. BRAUN) KNOBLOCH & KVACEK, *Glyptostrobus europaeus* (BRONGNART) HEER. Recently researches (DIACONU & ȚICLEANU, in press) were discovered in the adjacent layer IV deposits of coal, a three species of *Pandanus*, and above layer VI of coal was identified *Carya denticulata* (WEBER) ILJINKAIA, *Platanus platanifolia* (ETTINGSHAUSEN) KNOBLOCH and *Carpinus betulus* LINNÉ.

The deposits of the layer IV coal in Husnicioara open pit, (PETRESCU et al, 1989) were also researched palynology viewpoint. The palynology researches were interpreted from a paleoclimatic viewpoint reaching the following conclusions: arctotertiary elements (*Sciadopitys*, *Picea*, *Tsuga*, *Pinus* s. *diploxylon*, *Carpinus*, *Fagus*, *Ulmus*, *Compositae* etc.) and intermediate ones (*Cedrus*, *Carya*, *Pterocarya*, *Zelkova* ș.a.) are dominated, but the thermophile elements (*Myrica*, *Reevesia*) are sporadically.

Romanian deposits

On Romanian deposits from Bâcleș (Mehedinți District), which are constituted by clays and silt clays, ȚICLEANU et al. (2001) determinate the following species: *Taxodium dubium* (STERNBERG) HEER, *?Platanus platanifolia* (ETT.) KNOBLOCH, *Ulmus laevis* LINNÉ, *Quercus roburoides* GAUDIN, *Quercus* cf. *muehlenbergii* ENGELMAN, *Carya serraefolia* (GOEPPERT) KRAUSEL, *Acer* cf. *tricuspidatum* BRONN. and *Salix* sp. At the floral list of this site DIACONU (in ENCIU et al., 2006) added four new taxa: *?Sequoia abietina* (BRONGNART) Knobloch, *Ulmus pyramidalis* Goeppert, *Acer* cf. *campestre* LINNÉ and *Alnus* sp.

MATERIAL AND METHOD

The fossils had been collected from clay and silty clay from the Batoți site, on clay marl from Crăguiești, from the gray clay in layer IV and VI coal roof at Husnicioara open pit, from clay marl at Dedovița and the silt clay from Bâcleș (fig. 1).

The floristic repertory of Mio-Pliocene floras from Danube-Motru sector had been based on the personal researches carried on in the period 2000-2007 just same sites.

RESULTS AND DISCUSSIONS

The floristic repertory of the mio-pliocene macrofloras from Danube – Motru sector contains 67 species, belonging to 33 genera, 22 families, 3 classes and 2 phylum (Table 1). The paleoecological study of the floristic repertory of the mio-pliocene macrofloras from Danube – Motru sector indicated the presence of distinctive paleobiomes: coniferous forest, deciduous forests, deciduous forests hygrophyte, river meadows and marsh.

Table 1. Floristic repertory of Mio-Pliocene macrofloras from Danube-Motru sector
Table 1. Repertoriul floristic al macroflorelor mio-pliocene din sectorul Dunăre – Motru

Phylum	Class	Family / Genus	Species	Actual correspondent	paleobiotope	Sites				
						BT (P)	CR (P)	HS (D)	DD (D)	BC (R)
P	P	Pinaceae	<i>Pinus</i> sp. - binae		CF	+			+	

		Pinus	<i>Pseudotsuga cf. taxifolia</i> BRITT.	<i>P. taxifolia</i> BRITT.	CF	+				
		Taxodiaceae Sequoia	? <i>Sequoia gigantea</i> LINNÉ	<i>S. gigantea</i> LINNÉ	CF	+				
			<i>Sequoia abietina</i> (BRONGNART) KNOBLOCH	<i>S. sempervirens</i> (LAUB.) ENDL.	CF				+	+
		Taxodium	<i>Taxodium dubium</i> (STERNBERG) HEER	<i>T. distichum</i> RICH.	RM	+				+
		Glyptostrobus	<i>Glyptostrobus europaeus</i> (BRONGNART) UNGER	<i>G. pensilis</i> (STOUNT) KOCH	M	+		+	+	
MAGNOLIOPHYTA MAGNOLIATAE		Magnoliaceae Magnolia	<i>Magnolia</i> sp. aff. <i>M. acuminata</i> LINNÉ	<i>M. acuminata</i> LINNÉ	DF	+				
		Lauraceae Sassafras	<i>Sassafras subtriloba</i> (KONNO) TANAI et ONOE	<i>S. tzumu</i> HEMSL <i>S. sassafras</i> KRARST	DF	+				
		Ceratophyllaceae Ceratophyllum	<i>Ceratophyllum</i> sp. aff. <i>C. demersum</i> LINNÉ	<i>C. demersum</i> LINNÉ	M			+		
		Hamameliadaeaceae Liquidambar	<i>Liquidambar europaea</i> AL. BRAUN	<i>L. styraciflua</i> LINNÉ	M	+	+		+	+
		Platanaceae Platanus	<i>Platanus platanifolia</i> (ETTINGSHAUSEN) KNOBLOCH	<i>P. occidentalis</i> LINNÉ	RM	+		+		+
		Betulaceae Alnus	<i>Alnus cecropiaefolia</i> (ETTINGSHAUSEN) BERGER	Uncertain	DFh	+				
			<i>Alnus ducalis</i> (GAUDIN) KNOBLOCH	<i>A. serrulata</i> (AIT.) WILD.	DFh	+				
			<i>Alnus</i> sp.		DFh	+	+		+	+
		Betula	<i>Betula insignis</i> GAUDIN	<i>B. luminifera</i> WINKLER	DF	+	+			
			<i>Betula pseudoluminifera</i> GIVULESCU	<i>B. luminifera</i> WINKLER	DF	+				
			<i>Betula</i> cfr. <i>macropylla</i> (GOEPPERT) HEER	<i>B. papyfera</i> MARSHAL	DF				+	
		Carpinus	<i>Carpinus grandis</i> UNGER	<i>C. betulus</i> LINNÉ	DF	+			+	
			<i>Carpinus betulus</i> LINNÉ	<i>C. betulus</i> LINNÉ	DF			+		
			<i>Carpinus betulus</i> LINNÉ - bractee	-	DF			+		
			<i>Carpinus pyramidalis</i> GAUDIN - bractee	<i>C. betulus</i> LINNÉ	DF				+	
		Ostrya	<i>Ostrya</i> sp. aff. <i>O. virginiana</i> (MILLER) C. KOCH	<i>O. virginiana</i>	DF	+				
		Fagaceae Fagus	<i>Fagus silesiaca</i> WALTH. ET ZAST.	<i>F. grandifolia</i> HER.	DF	+	+		+	
			<i>Fagus sylvatica</i> LINNÉ	<i>F. sylvatica</i> LINNÉ	DF	+				
			<i>Fagus pliocaenica</i> SAPORTA	<i>F. sylvatica</i> LINNÉ	DF	+				
		Castanea	<i>Castanea</i> cf. <i>sativa</i> MILLER	<i>C. sativa</i> MILLER	DF	+				
			<i>Castanea kubinyii</i> KOVATS	<i>C. vesca</i> GAERTN.	DF	+				
			<i>Castanea gigas</i> (GOEPPERT) ILJINKAIA		DF	+				
			<i>Castanea</i> cf. <i>crenata</i> SIEBOLD et ZUCCARINI	<i>C. crenata</i> SIEBOLD & ZUCCARINI	DF	+				
			<i>Castanea</i> cf. <i>crenata</i> SIEBOLD et ZUCCARINI	<i>C. crenata</i> SIEBOLD & ZUCCARINI	DF	+				
		Quercus	<i>Quercus drymeja</i> UNGER	<i>Q. serrata</i> THBG.	DF	+				
			<i>Quercus pontica</i> C. KOCH miocaenica KUBAT	<i>Q. pontica</i> C. KOCH	DF	+				
	<i>Quercus</i> cf. <i>kodorica</i> KOLAKOVSKI		<i>Q. mirbeckii</i> și <i>Q. hartwissiana</i>	DF	+					
	<i>Quercus</i> cf. <i>macrantheroides</i> ANDREANSZKY		Uncertain	DF	+					
	<i>Quercus kovatsi</i> E. KOVACS		<i>Q. petraea</i> (MATT.) LIEBL.	DF	+					
	<i>Quercus</i> cf. <i>pseudocastanea</i> GOEPPERT		<i>Q. muehlenbergii</i> ENGELMANN	DF	+					
	<i>Quercus</i> cf. <i>muehlenbergii</i> ENGELMANN		<i>Q. muehlenbergii</i> ENGELMANN	RM	+				+	

			<i>Quercus roburooides</i> GAUDIN	<i>Q. robur</i> LINNÉ	DF				+	+
			<i>Quercus</i> sp.		DF	+				
	Ulmaceae	<i>Ulmus</i>	<i>Ulmus pyramidalis</i> GOEPPERT	<i>U. americana</i> Wild.	RM	+				+
			<i>Ulmus leavis</i> LINNÉ	<i>U. leavis</i> LINNÉ	RM					+
	Zelkova		<i>Zelkova zelkovefolia</i> (UNGER) BUZEK ET KOTLABA	<i>Z. crenata</i> Spach – <i>Z. carpinifolia</i> PALLAS	DF	+				
	Myricaceae		? <i>Myrica lignitum</i> (UNGER) SAPORTA	<i>M. californica</i> CHAM. & SCH.	M			+		
	Juglandaceae	Juglans	<i>Juglans acuminata</i> AL. BRAUN	<i>J. regia</i>	DF	+		+		
	Carya		<i>Carya serraefolia</i> (GOEPPERT) KRAUSEL	<i>C. amara</i> și <i>C. tomentosa</i>	RM	+			+	+
			<i>Carya denticulata</i> (WEBER) ILJINSKAIA	<i>C. tomentosa</i> , <i>C. amara</i> and <i>C. ovata</i>	RM			+		
			<i>Pterocarya paradisiaca</i> (UNGER) ILJINSKAIA	<i>P. caucasiaca</i> C. A. MEY.	RM	+				
	Aceraceae	Acer	<i>Acer tricuspidatum</i> BRONN	<i>A. rubrum</i> LINNÉ	DF	+				+
			<i>Acer integerrimum</i> (VIVIANI) MASSAL	<i>A. pictum</i> THBG.	RM	+				
			<i>Acer</i> cf. <i>campestre</i> LINNÉ	<i>A. campestre</i> LINNÉ	DF	+				
	Rhamnaceae	Berchemia	<i>Berchemia multinervis</i> (AL. BRAUN) HEER	<i>B. volubilis</i> D.C. = <i>B. scadens</i> (HILL.) C. KOCH	DF	+				
	Rhamnus		<i>Rhamnus</i> cf. <i>gaudini</i> HEER	<i>R. grandifolius</i> FISCH. & MEYER	DF	+			+	
	Vitaceae	Vitis	<i>Vitis teutonica</i> AL. BRAUN	<i>V. cordifolia</i> MICHX. și <i>V. vulpina</i> L. <i>V. cordifolia</i>	DF	+				
	Cornaceae/Cornus		<i>Cornus</i> sp.	<i>C. mas</i>	DF	+				
	Silicaceae	Populus	<i>Populus populina</i> (BRONGNART) KNOBLOCH	<i>P. canadensis</i> MOENCH.	RM	+				
	Salix		<i>Salix integra</i> GOEPPERT		RM				+	
			<i>Salix</i> sp. aff. <i>S. varians</i> AL. BRAUN	<i>S. fragilis</i> LINNÉ	RM				+	
			<i>Salix varians</i> GOEPPERT	<i>S. fragilis</i> LINNÉ	RM	+				
			<i>Salix</i> sp.		RM	+		+		+
	Sterculiaceae	Byttneriophyllum	<i>Byttneriophyllum tiliaefolium</i> (AL. BRAUN) KNOBLOCH ET KVACEK	Not have	M	+		+	+	
	Ebenaceae	Diospios	<i>Diospyros anceps</i> HEER	<i>D. virginiana</i> LINNÉ	DF	+				
	Caprifoliaceae	Lonicera	<i>Lonicera</i> sp.	Not have	DF	+				
LILIATAE	Gramineae	Phragmites	<i>Phragmites oeningensis</i> AL. BRAUN	<i>Ph. communis</i> TRIN.	M	+		+		
	Typhaceae	Typha	<i>Typha latissima</i> A. BRAUN	<i>T. latifolia</i> LINNÉ	M	+		+		
	Pandanus		<i>Pandanus austriacus</i> ETTINGSHAUSEN		M			+		
			<i>Pandanus trinervis</i> ETTINGSHAUSEN		M			+		
			<i>Pandanus barbui</i> PETRESCU & DUSA		M			+		
TOTAL	22	33	67		52	4	15	15	12	

Legend:

Paleobiotopes: coniferous forest (CF), deciduous forests (DF), deciduous forests hygrophite (DFh), river meadows (RM), marsh (M)

Sites: Batoți (BT) Crăguiești (CR), Husnicioara (HS), Dedovița (DD), Bâcleș (BC)

Geological age: Pontian (P), Dacian (D), Romanian (R)

CONCLUSIONS

In this study were analyzed the researches issued from the following sites: the Early Pontian deposits from Batoși and Crăguiești, the Early Dacian deposits from Husnicioara open pit, the Superior Dacian deposits from Dedovița and the Romanian deposits from Bâcleș. At Batoși, Dedovița and Crăguiești the deciduous forest are dominating, at Bâcleș the river meadows, but at Husnicioara open pit marsh played the main role.

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Fig. 1 Map geologic of the Danube—Motru sector
 Fig. 1 Harta geologica a sectorului Danube—Motru