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MAIN FEATURES OF THE PLIOCENE FRUIT-SEED FLORA FROM RUSZÓW NEAR ŻARY (WEST POLAND)

Główne cechy plioceńskiej flory owocowo-nasiennej
z Ruszowa koło Żar (zachodnia Polska)

ABSTRACT. Paper contains preliminary result of investigations of a fruit-seed flora from Pliocene deposits of Ruszów. 51 taxa were determined, including a new species, 2 extinct species and 4 species which were noted for the first time in the Pliocene of Poland.

INTRODUCTION

The site with a fossil flora at Ruszów near Żary has been of interest of many Polish paleobotanists. In 1967 the first paper was published by Stachurska and Sadowska in which the authoresses presented results of palynologic investigations and also a list of 36 taxa of plants that were determined on the basis of their macrofossils, mostly to their genus names.

Numerous hornbeam fruits in this site were partly described in the paper of Jentys-Szaferowa (1975) whereas a leaf flora was studied by Hummel (1983, in press).

This report comprises main results of investigations a fruit-seed flora from this site. Taxonomic descriptions with a photographic documentation and detailed results of paleobotanic analysis are prepared for a publication in *Prace Muzeum Ziemi*.

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GEOLOGY

Geologic studies of described area were carried through by Dyjor (1964, 1966, 1985) who found also a fossil flora in this site. Beds with plant remains occur within the so-called Gozdnicza Series, the oldest sediments of which fill an

erosive channel cut in the Poznań Clays due to action of fluvial waters of branches of the pra-Nysa Łużycka River. These sediments are composed of sands and gravels with thin interbeds of clays, clayey and sandy silts rich in a plant detritus.

TAXONOMIC CONTENTS OF THE FLORA

A composition of the fossil flora is represented in the table 1. Analyzed material contains remains of fossil mushrooms, mosses, club mosses, water

Table 1. List of plants determined in the Pliocene deposits from the outcrop at Ruszów on the base of carpological investigations

Abbreviations: fr — fruit, fruc — fructification, infl — inflorescence, mi — microsporangium, mg — megaspore, ms — moss stem, os — ovuliferous scale, s — seed, sp — spine, tw — twig.

Quantity of specimens: + 1–20, ++ above 20, +++ above 30, ∞ above 100.

<i>Fungi</i>		
<i>Hypoxyylon</i> sp.	fruc	+
<i>Musci</i>		
<i>Neckera pennata</i> (L.) Hedw. foss.	ms	+
<i>Eurhynchium swartzii</i> Curnow	ms	+
<i>Lycopodinae</i>		
<i>Selaginella pliocenica</i> Dorof.	mg	+
<i>Filicinae</i>		
<i>Salvinia crispa</i> var. <i>verruculosa</i> Negru	mg	+
<i>Salvinia</i> sp.	mi	+
<i>Azolla nikitini</i> Dorof.	mg	+++
<i>A. tomentosa</i> Nikitin	mg	∞
<i>A. glabra</i> Nikitin	mg	∞
<i>Coniferae</i>		
<i>Taxodium dubium</i> (Sternb). Heer	s	+
<i>Glyptostrobus europaeus</i> (Brongn). Heer	s tw	+
<i>Angiospermae — Dicotyledones</i>		
<i>Carpinus</i> sp.	fr	+++
<i>Corylus</i> sp.	fr	+
<i>Betula longisquamosa</i> Mädlar	os	+++
<i>Betula</i> sp.	infl	+
<i>Magnolia cor</i> Ludwig	s	+
<i>Liriodendron geminata</i> Kirehh.	s	+
<i>Nymphaeaceae</i> gen.	s	+
<i>Ceratophyllum pannonicum</i> Dorof.	fr	+
<i>C. submersum</i> L. foss.	fr	+
<i>Hypericum</i> cf. <i>holy</i> Friis	s	+
<i>H. cf. tertiaerum</i> Nikitin	s	+
<i>Rubus laticostatus</i> Kirehh.	s sp	+++
<i>Prunus</i> sp.	fr	+
<i>Pyracantha acuticarpa</i> (C. et E. M. Reid) Szafer	fr	+
<i>Phellodendron elegans</i> C. et E. M. Reid	s	+

<i>Acer pseudodiabolicum</i> n. sp.	fr	+++
<i>Acer</i> sp.	fr	+
<i>Meliosma wetteraviensis</i> (Ludwig) Mai	fr	+
<i>Vitis parasylyvestris</i> Kirchh.	s	+
<i>Mneme menzelii</i> (E. M. Reid) Eyde	s	+
<i>Decodon globosus</i> (E. M. Reid) Nikitin	s	+
<i>Trapa</i> sp.	sp	+
<i>Proserpinaca reticulata</i> C. et E. M. Reid	fr	+
<i>Nyssa ornithobroma</i> Unger	s	+
<i>Cornus controversa</i> Hemsley	s	+
<i>Weigela</i> cf. <i>krishtofovichiana</i> Dorof.	s	+
<i>Sambucus pulchella</i> C. et E. M. Reid	s	+
<i>S.</i> cf. <i>racemosa</i> L.	s	+
<i>Monocotyledones</i>		
<i>Potamogeton</i> sp. div.	s	++
<i>Najas</i> sp.	s	+
<i>Epipremnum crassum</i> C. et E. M. Reid	s	+
<i>Aracispermum canaliculatum</i> Nikitin	s	+
<i>A. johnstrupii</i> Nikitin	s	+
<i>Sparganium neglectum</i> Beeby foss.	s	+++
<i>S. haentzschelii</i> Kirchh.	s	+
<i>Dulichium marginatum</i> (C. et E. M. Reid) Dorof.	fr	∞
<i>D. vespiforme</i> C. et E. M. Reid	fr	++
<i>Carex flagellata</i> C. et E. M. Reid	s	+
<i>Scirpus</i> sp.	s	+

ferns, conifers and angiosperms. They are preserved as pericarps of mushrooms, twigs of mosses, megaspores, fruits and seeds. Besides there were numerous fragments of leaves (Hummel 1983, in press) and pieces of wood. 51 taxa of fossil plants were distinguished of 27 genera belonging to the following families: *Xylariaceae*, *Neckeraceae*, *Brachytheciaceae*, *Lycopodiaceae*, *Salviniaceae*, *Azollaceae*, *Taxodiaceae*, *Betulaceae*, *Magnoliaceae*, *Nymphaeaceae*, *Ceratophyllaceae*, *Hypericaceae*, *Rosaceae*, *Rutaceae*, *Aceraceae*, *Sabiaceae*, *Vitaceae*, *Lythraceae*, *Haloragaceae*, *Nyssaceae*, *Cornaceae*, *Caprifoliaceae*, *Potamogetonaceae*, *Najadaceae*, *Araceae*, *Sparganiaceae*, *Cyperaceae*.

With the exception of two extinct genera *Mneme* and *Aracispermum*, all the others belong to the presently existing ones. In total about 1200 fossil remains were determined. The most abundant are megaspores of genus *Azolla*, seed scales of *Betula* and fruits of genera *Carpinus*, *Ceratophyllum*, *Sparganium* and *Dulichium*.

Fruits of *Carpinus* were found for very interesting ones and are studied in detail at present. The same is true for fruits of *Acer* from section *Lithocarpa* Pax, previously unknown in fossils of Europe. They were considered for a new species.

Family *Aceraceae*
 Section *Lithocarpa* Pax
Acer pseudodiabolicum n. sp.
 Pl. I, figs 1, 3, 4, 6, 7, 9, 10, 11

Holotypus. M. Z. VII/65/30; Museum of the Earth, Polish Academy of Science, Warsaw; Pl. I, fig. 1.

Locus typicus. Ruszów near Żary.

Stratum typicum. Gozdnicza Series, Pliocene.

Derivatio nominis. After the name of the recent species *Acer diabolicum* Blume, which is most similar but not identical with the fossil species.

Diagnosis. Fruit 5.5×7.5 mm, subglobular in shape, convex on both sides, shrunk towards a wings. Side planes intensively folded, covered with stiff hair irregularly arranged.

Remarks. Fruits of *Acer* of the section *Lithocarpa* Pax have thick angular nuts and intensively hairy surface. Previously known only from the Pliocene of Japan where Endo (1950) described the species *Acer palaeodiabolicum* on the basis of prints of leaves and a single samara. It is most close, similarly as *Acer pseudodiabolicum* n. sp. to the present *Acer diabolicum* Blume that occurs now in Japan (Pl. I, figs 2, 5, 8).

REMARKS TO VEGETATION, CLIMAT AND AGE

Determined taxa allow to describe at least three plant communities: marshy forest, forest that sheds leaves in winter and assemblage of water and wet-soil plants on shores of a water reservoir. Marshy forest was composed of conifers trees of *Taxodium* and *Glyptostrobus* genera, accompanied by *Nyssa*. Deciduous forests of slightly drier habitats, that is more distant from sedimentary areas, included trees and bushes of such genera as *Acer*, *Betula*, *Carpinus*, *Cornus*, *Corylus*, *Liriodendron*, *Magnolia*, *Meliosma*, *Pyracantha*, *Phellodendron*, *Rubus*, *Sambucus*, *Weigela* and also herbaceous plants — lianas of genera *Epipremnum* and *Vitis*.

Assemblage of water and wet-soil plants was composed of genera: *Ceratophyllum*, *Potamogeton*, *Sparganium*, *Trapa*, water ferns *Azolla* and *Salvinia*, and also *Carex*, *Decodon*, *Dulichium*, *Proserpinaca*.

Most determined taxa is close to present species of mesophilous deciduous forests, known from a temperate and temperate warm zones of eastern Asia and northeastern part of North America. Numerous genera occur also in forests of Central Europe (*Carpinus*, *Corylus*, *Betula*, *Quercus*, *Sambucus*, *Rubus*, *Acer*).

Determined taxa occur mainly in late Tertiary deposits of Central Europe. This fact and presence of two extinct genera speak for their age to be older than the Quaternary. A comparison with other fruit-seed floras from Neogene of

southwestern and southern Poland (Gozdnica, Sośnica, Kłodzko and Mizerna) supports its Pliocene age.

The site at Ruszów is the first one from the Pliocene of Poland in which seeds of *Glyptostrobus europaeus* Heer and *Sparganium haentschelli* Kirchh. were found, accompanied by *Betula longisquamosa* Madl., *Nyssa ornithobroma* Unger and *Epipremnum crassum* C. et E. M. Reid.

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Plate I

Acer pseudodiabolicum n. sp. — fruit

1. Holotype, specimen No VII 65 30. M. Z. $\times 5$
- 3, 4, 6, 10. Other specimens, $\times 5$
- 9, 11. Ditto, $\times 8$
7. The fossil hair preserved on surface, \times ca 100

Acer diabolicum Blume — recent fruit

2. General habit, $\times 5$
5. Inner side of fruit, $\times 5$
8. Hair from recent fruit, \times ca 100

