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MACROSCOPIC PLANT REMAINS FROM THE MIOCENE DEPOSITS AT STARA WIEŚ NEAR WILAMOWICE (SOUTHERN POLAND)

Szczątki makroskopowe roślin z osadów mioceńskich w Starej Wsi koło Wilamowic

ABSTRACT. The macroscopic remains of plants obtained from the Miocene deposits of Stara Wieś belong to 28 taxa, comprising trees, shrubs and herbs. Most of them are known from the florae of the Upper Miocene of Poland. The species *Aralia* cf. *crassa* Dorof. and *Brasenia* cf. *baltica* Dorof. have been found in the Tertiary of Poland for the first time.

MATERIAL

Samples for palaeobotanical studies were taken from an exposure of Miocene deposits at Stara Wieś near Wilamowice in 1971. The samples for palynological studies come from the lower part of the profile, including above 4 m of deposits, which consisted of clays and silty clays varying in thickness and interstratified by beds of varigrained sands (cf. Materiały z Sympozjum..., 1978; Oszast 1980). At the same time some other samples were collected for a study of macroscopic plant remains from a layer between 6·47 and 3·30 m; they corresponded to palynological samples Nos. 5–31. In the course of sampling the layers of dark sandy silts, at a height of about 5 m, seemed to be particularly promising as regards macroscopic analysis. The samples taken from these layers were large in volume and provided relatively abundant plant material (samples 9 and 11, corresponding to palynological samples 6–7 and 20–21, respectively).

Fine undeterminable plant detritus was present in many samples, but the identifiable specimens come only from 5 samples. The plant remains (small fruits, seeds, pieces of wood, leaves, etc.) are badly damaged, heavily carbonized, sometimes pyritized and nearly always corroded by sand grains. No forms of a lower degree of fossilization have been found.

Table 1

The occurrence of macroscopic plant remains in the Miocene deposits of Stara Wieś near Wilamowice

No. of macroscopic sample	Nos. of palynological samples	Position of samples in profile (in m)	Lithology	Number of specimens	Number of taxa	Taxa and number of specimens
15	29–31	3·30–3·51	dark stratified clay	36	10	cf. *Amblystegiaceae* (12), cf. *Amblystegium* sp. (12), cf. *Carex* sp. (1), *Coniferae* gen. (1), *Gramineae* gen. (2), *Microthyriaceae* (1), *Pinus* sp. 1 (2), *Pinus* sp. 2 (2), *Selaginella pliocenica* (2), *Sphagnum* sp. (1), fragments of twigs and leaves, rootlets, sclerotia of fungi
14	27, 28	3·51–3·76	dark sandy clay with plant remains	1	1	*Sambucus lucida* (1), sclerotia of fungi
13	25, 26	3·76–4·64	fine-grained sand, at the bottom coarse-grained	—	—	
12	22–24	4·64–4·83	laminated clay with fine-grained sandy interbeds	—	—	
11	20, 21	4·83–4·97	dark sandy silt with a large amount of plant detritus and lignites	77	6	*Aralia* cf. *crassa* (1), *Brasenia* sp. (1), *Eurya stigmosa* (1), *Selaginella pliocenica* (4), *Sparganium camenzianum* (67), *Sparganium* sp. (3), sclerotia of fungi
				3	2	*Apiculatisporites zerndti* (1), *Zonalesporites brasseti* (2) — Upper Carboniferous
10	18, 19	4·97–5 08	dark clay with sand intercalations	—	—	

9	16, 17	5·08–5·22	dark sandy silt with a large amount of plant detritus and lignites	131 1	18 1	*Actinomyces alni* (3), *Aralia* cf. *crassa* (1), *Coniferae* gen. (4), cf. *Cyperus* sp. (2), *Eurya stigmosa* (2), *Pinaceae* gen. (8), *Pinus* sp. 1 (1), *Pinus* sp. 2 (2), *Pyrenomycetes* gen. (2), *Rubus microspermus* (6), cf. *Rumex* sp. (2), *Sambucus* cf. *lucida* (1), *Schoenoplectus* sp. (1), *Selaginella pliocenica* (57), *Sparganium camenzianum* (34), *Sparganium* sp. (3), *Toddalia maii* (1), *Typha fusisperma* (1), fragments of twigs and leaves, rootlets, sclerotia of fungi *Apiculatisporites zerndti* (1) — Upper Carboniferous
8	14, 15	5·22–5·54	fine-grained sand	—	—	
7	13	5·54–5·59	clay	—	—	
6	12	5·59–5·67	laminated fine-grained sand	4	2	*Fungi* gen. (1), *Sparganium camenzianum* (3), sclerotia of fungi
5	11	5·67–5·72	clay	—	—	
4	10	5·72–5·86	fine-grained sand at the bottom coarse-grained	—	—	
3	9	5·86–5·92	clay	—	—	
2	8	5·92–6·17	medium-grained sand, diagonally stratified	—	—	
1	5–7	6·17–6·47	fine-grained sand	—	—	
			Total	253		

Plant macrofossils determined from the Miocene of Stara Wieś
Localities in brackets are those for which the degree of relationship is not univocally defined

Taxa	Kind and number of remains	Localities in Poland		Stratigraphy
		Miocene	Pliocene	
Schizomycetes				
Actinomyces alni Harz	3 specimens	Czarny Dunajec, "Gdów Bay", Gliwice, Koniówka, Nowy Sącz	Domański Wierch, Krościenko	Miocene—Pleistocene
Fungi				
Fungi gen.	1 specimen			
Microthyriaceae gen.	1 specimen	Chyżne, "Gdów Bay", Gliwice, Nowy Sącz, Rypin		Eocene—Pliocene
Pyrenomycetes gen.	2 pieces of lignite with traces of perithecia	("Gdów Bay", Nowy Sącz)		
Musci (det. R. Ochyra)				
cf. *Amblystegiaceae* gen.	12 leaf fragments			
cf. *Amblystegium* sp.	12 leafy stems	(Nowy Sącz)	(Krościenko, Sośnica)	
Sphagnum sp., sect. *Sphagnum*	1 leaf fragment	(Gliwice)	Mizerna	
Filicinae				
Apiculatisporites zerndti Danzé, Levet-Carette et Loboziak	2 megaspores			Upper Carboniferous
Zonalesporites brasseti (Stach, Zernt) Potonié et Kremp	2 megaspores			Upper Carboniferous
Lycopodinae				
Selaginella pliocenica Dorof.	63 megaspores	Chyżne, Cz. Dunajec, "Gdów Bay", Jabłonka, Koniówka, Lipnica Wlk., Morsko, Nowy Sącz, Rypin, Skopanie	Domański Wierch, Krościenko, Mizerna, Sośnica	Miocene—Pliocene

Coniferae				
Coniferae gen.	5 needle fragments			
Pinaceae gen.	8 needle fragments			
Pinus sp. 1	3 needle fragments	"Gdów Bay"		
Pinus sp. 2	4 needle fragments	"Gdów Bay", Gliwice, Gozdnica		
Angiospermae: Dicotyledones				
Aralia cf. *crassa* Dorof.	2 endocarps			Oligocene
Brasenia sp. (*B.* cf. *baltica* Dorof.)	1 seed fragment			Oligocene
Eurya stigmosa (Ludw.) Mai	4 seeds	"Gdów Bay", Wieliczka		Eocene/Oligocene—Miocene
Rubus microspermus C. et E. M. Reid	6 endocarps	"Gdów Bay", Koniówka, Nowy Sącz		Oligocene—Miocene
cf. *Rumex* sp.	2 fruits	("Gdów Bay", Nowy Sącz)		
Sambucus cf. *lucida* Dorof.	2 seeds	Nowy Sącz, Rypin		Oligocene—Miocene
Toddalia maii Gregor	1 seed	Turów, Wieliczka		Upper Oligocene—Lower Pliocene
Angiospermae: Monocotyledones				
cf. *Carex* sp.	1 fruit	("Gdów Bay", Nowy Sącz)		
cf. *Cyperus* sp.	2 fruits	("Gdów Bay", Nowy Sącz)		
Gramineae gen.	2 caryopses	("Gdów Bay", Gozdnica, Koniówka, Nowy Sącz, Rypin)		
Schoenoplectus sp.	1 fruit	("Gdów Bay")		
Sparganium camenzianum Kirchh.	42 endocarps and 62 tegmina	"Gdów Bay", Gliwice, Nowy Sącz		Miocene
Sparganium sp.	6 endocarps			
Typha fusisperma Negru	1 seed	Chłapowo, Dobrzyń, "Gdów Bay", Gliwice, Nowy Sącz, Rypin		Miocene
Total	253 specimens			

A survey of macroscopic plant remains found in particular samples is given in Table 1. A strikingly large amount of plant material was collected from samples 9 (18 taxa, 131 identified specimens), 11 (6 taxa, 77 identified specimens) and 15 (10 taxa, 36 identified specimens). These three samples, besides, contained many unidentifiable remains, i.e. very badly damaged fruits and seeds and pieces of wood, leaves, rootlets, sclerotia of fungi, etc. The other samples contained only single identifiable specimens or were entirely devoid of organic remains. A total of 253 macroscopic remains of plants have been identified.

Twenty-eight taxa have been distinguished, 11 of them identified to specific level, 10 to generic and 4 to family level, while in three cases only their position in still broader taxonomic groups could have been determined (Table 2). Many determinations are too general and for this reason only for some taxa I was able to give their localities known from the Tertiary of Poland (if the taxon is not identical, the localities are given in brackets) and their general stratigraphic occurrence.

The identified macroscopic plant remains complement the picture of vegetation obtained by Oszast (1980) by the method of spore and pollen analysis. This however refers only to the middle portion of the profile (samples 9–15, corresponding to palynological samples 16–31), since no samples were taken from the top portion of the profile and its bottom part was almost completely void of macroscopic material.

RESULTS

The identified plant remains from the Miocene deposits of Stara Wieś represent trees and shrubs (10 taxa) and herbs (9 of these taxa are cryptogamous plants and 9 vascular plants). The share of coniferous trees of the family *Pinaceae* is fairly large, notably that of *Pinus*, which was also aboundant in pollen spectra (Oszast 1980). The deciduous shrubs include some fossil species of the genera *Aralia*, *Eurya*, *Rubus*, *Sambucus* and *Toddalia*. These genera have not been found in palynological analysis. The proportion of herbs in the macroscopic material is marked, they even outnumber the remains of trees and shrubs (212 specimens against 41). This is a common occurrence, if the plant material obtained from Tertiary deposits is examined under a low power binocular microscope, which permits us to spot very small remains. Herbs, except ferns, occur very rarely in the palynological spectra from Stara Wieś (Oszast 1980).

The taxa distinguished indicate a damp, moderately warm, and even subtropical climate. Most of them are known from the florae of the Middle and Upper Miocene of Poland, some still from those of the Pliocene (cf. Table 2). Several fossil species are particularly interesting, rarely encountered in the Tertiary of this country. Here belong *Eurya stigmosa* (Ludw.) Mai of the family *Theaceae* (known from the Lower Tortonian of "Gdów Bay" and Wieliczka) and *Toddalia maii* Gregor of the family *Rutaceae* (known from Wieliczka and

from the flora of Turów, older than the last). Other species characteristic of the Middle and Upper Miocene florae are *Rubus microspermus* Reid, *Sambucus lucida* Dorof., *Sparganium camenzianum* Kirchh. and *Typha fusisperma* Dorof. Two of the taxa distinguished are new to the Tertiary of Poland: *Aralia* cf. *crassa* Dorof., first described from the Oligocene of Western Siberia (Dorofeev 1963), and *Brasenia* cf. *baltica* Dorof., described from the Tertiary of the Baltic area (Dorofeev 1963b).

On the basis of the palaeontological studies carried out by W. Szotowa, geological studies made by W. Nowak and T. Wieser and palynological ones by J. Oszast (Materiały z Sympozjum..., 1978) the Tertiary deposits at Stara Wieś have been referred to the Upper Miocene (Lower Badenian). The plants identified on the basis of the macroscopic remains may have belonged to the flora of the lower part of the Upper Miocene or even the Middle Miocene. They are however contaminated with plant material from older deposits. Two species of megaspores of the Upper Carboniferous ferns have been found in samples 9 and 11 and determined by Dr. E. Turnau as *Apiculatisporites zerndti* Danzé, Levet-Carette et Loboziak and *Zonalesporites brasseti* (Stach, Zerndt) Potonié et Kremp. In the same samples there occur, in addition, some small remains (1·0–2·0 mm in diameter), strongly carbonized and with a shining surface, very similar to the fruits and seeds described by Knobloch (1977) from the Carpathian flysch. This material calls for a separate study.

DESCRIPTION OF SOME OF THE TAXA DISTINGUISHED

Family **Theaceae**

Eurya stigmosa (Ludw.) Mai

Pl. II, figs. 1–3

Description of material: The dimensions of three seeds preserved whole are 1·45×1·85 mm; 1·5×1·6 mm and 1·15×1·25 mm. The bilaterally flattened seeds, kidney-shaped, broadly oval or even sub-triangular with a long base, have their lateral surfaces sculptured in a very characteristic manner — fine and somewhat elongated depressions are arranged in regular stripes, which extend parallel to the external margin of the seed (cf. Łańcucka-Środoniowa 1966). Although the surface of the seeds is damaged and corroded, the sculpture is well seen and the determination of species is based, among other characters, on it.

Notes: This species is characteristic of the Miocene florae of Europe, although in its western part it probably occurred as early as the Oligocene, and even at the boundary of the Eocene and Oligocene (Watts 1963). In Poland it has been known from two Miocene florae so far, i.e. from the florae of "Gdów Bay" and Wieliczka (Łańcucka-Środoniowa 1966). Knobloch (1977) described the seeds of some other fossil species of this genus — *Eurya*

crassitesta Knobl., *E. maii* Knobl. and *E. holyi* Knobl. — from older formations, i.e. the Upper Cretaceous and the Palaeocene of the Carpathian flysch. Two seed fragments from samples 9 and 11 at Stara Wieś belong probably to *E. crassitesta* Knobl., but this determination needs verifying.

In the present-day flora the genus *Eurya* is represented by a considerable number of shrubs and small trees, which grow, almost exclusively, in the tropical and subtropical zones of south-eastern Asia and Central and South America. Some dozen species go beyond the bounds of the subtropical zone, reaching China, Japan and Korea in the north. One of these species is *E. japonica* Thunb., to the seeds of which the Tertiary remains of *E. stigmosa* (Ludw.) Mai are comparable.

Family **Rutaceae**

Toddalia maii Gregor

Pl. II, figs. 4–6

Description of material: A seed, 3·0 × 2·5 mm, reniform, with somewhat flattened lateral walls. The middle part of the ventral side has a big depression, in which the hilum is situated and the micropylar aperture above it. The testa of the seed is of marked thickness, its external surface being smooth with the outlines of fine isodiametrical cells. The seed was noticed when samples were being taken from the exposure and owing to these circumstances its impression has been found in the sandy silt of sample 9 (Pl. II, fig. 6).

Notes: Fossil seeds similar in structure and size and also those 2–3 times as large have long been known and were included in the family *Leguminosae* for a long time. They were compared, among other forms, to the genera *Cytisus*, *Robinia* and *Dalbergia*. While describing the genus *Toddaliaespermum* from the older Tertiary of England, Chandler (1963) first drew attention to the fact that similarly built seeds belong to the family *Rutaceae* (cf. Gregor 1975, p. 124). Recently, Gregor (1975, 1978, 1979) included the seeds of this structure in the genus *Toddalia*. In his opinion, many fossil species of the genus *Toddalia* occurred in the Tertiary of Europe, among them *T. maii*, marked by the small size of its seeds.

T. maii Gregor, first described from the Middle Miocene brown coal of Wackersdorf (Gregor 1975), has seeds 2·5–4·0 × 1·5–3·0 mm in size and rounded in shape. In the European Tertiary it is known from the lower part of the Upper Oligocene to the Lower Pliocene. In Poland it has been found only in the Miocene of Wieliczka and Turów (Gregor 1975, 1978, 1979).

At the present time the genus *Toddalia* is distributed in the tropical and subtropical zones of south-eastern Asia and south-eastern Africa. *T. asiatica* (L.) Lam. has a similarly wide distribution. Its seeds, obtained from Nepal, Kwangtung and Hongkong as well as from Nyasaland in eastern Africa, most resemble the seeds of the fossil species under study (cf. Gregor 1978).

Family Araliaceae

Aralia cf. *crassa* Dorof.

Pl. I, figs. 10, 11

Description of material: Two endocarps, 2·7×1·8 and 2·3×1·5 mm in size, bilaterally flattened, with a straight or slightly convex ventral side and a semicircular dorsal side. They are comparatively broad, their top being somewhat extended and turned to the ventral side, the base rounded. The walls of the endocarps are rather thick but heavily damaged, especially on the larger specimen. The external surface is smooth, without wrinkles and a crest along the dorsal side, and only finely transversely striated, which is characteristic of the endocarps of *Aralia*.

Notes: This species has been described from the Oligocene of western Siberia and also reported from the Miocene of Mamontova Gora in eastern Siberia (Dorofeev 1963a, 1969). From among the present-day species, the endocarps of North-American *A. nudicaulis* L. resemble it most but are somewhat larger.

Nowadays the genus *Aralia* has about 30 species. These are small trees, shrubs or herbs, growing usually in damp habitats of the tropical, subtropical and temperate zones of south-eastern Asia and North and Central America. In the Tertiary this genus played an important role in the area of Europe and northern Asia, which is evidenced by a large number of fossil species, distinguished chiefly on the basis of the structure of endocarps (cf. Łańcucka-Środoniowa 1966). Ours is the first find of remains of *A. crassa* Dorof. in the Tertiary of Poland.

Family Nymphaeaceae

Brasenia sp. (*B.* cf. *baltica* Dorof.)

Pl. I, fig. 12

Description of material: Only a small fragment of the lower part of a seed is preserved. Its width was probably 1·1 mm. The testa is thick and fragile and the columnar cells are well seen in the surface of transverse fracture. The external surface of the seed is smooth, shining, void of papillae, and with very poorly seen outlines of isodiametrical cells.

Notes: The genus *Brasenia* is represented in the modern flora only by one species, *B. purpurea* Mich., characteristic of waters in the subtropical zone (central and North America, southern Africa, south-eastern Asia and Australia).

In the Tertiary of Eurasia it played an important role and its frequently found seeds are included in various fossil species (cf. Kirchheimer 1957; Dorofeev 1974). The specimen from Stara Wieś most resembles the seeds of *B. baltica*. Dorof. which, compared with the seeds of other fossil species,

are very small and narrow (1·5–2·0 × 0·9–1·0 mm); their surface is quite smooth and the columnar cells of the testa narrow and relatively low. This species has been described by Dorofeev (1963b, 1974) from the Baltic Oligocene (earlier Miocene flora of Sambia, elaborated by Heer in 1869).

Taxon new to the Tertiary of Poland, but its determination is not quite reliable because of the fragmentary state of the specimen.

Family **Sparganiaceae**

Sparganium camenzianum Kirchh.

Pl. II, figs. 10–17

Description of material: Endocarps, 1·1–1·85 × 0·8–1·1 mm, bottle-shaped, narrowed in a wedge-like manner at the base, strongly narrowed with a large micropylar opening at the top and generally broadest above the middle of height. The walls are very thick, ligneous, with a smooth external surface, delicate longitudinal edges can be seen, especially in the upper portion of some better preserved specimens. The endocarp walls often crumble and fall off, uncovering the seeds inside them. The tegmina of these seeds, i.e. the inner membraneous layer of the seed coat, are preserved (Pl. II, figs. 15–17). The tegmina (0·7–1·15 × 0·6–0·95 mm) are barrel-shaped, extended into a long neck at the top and rounded at the base. Most specimens are preserved in the form of semitransparent, shining flattened circles, yellow-brown in colour.

Notes: The remains described occur in large numbers, notably in samples 9 and 11. A total of 104 specimens have been found (above 40% of all the macroscopic remains determined), of which 42 are endocarps and 62 tegmina. In shape and size they most resemble the species *S. camenzianum* Kirchh., described from the Miocene of Wiese (Kirchheimer 1941). They are admittedly somewhat smaller, but lie within the range of variation of this species. The specimens of *S. camenzianum* Kirchh. from the Miocene of the Nowy Sącz Basin (Łańcucka-Środoniowa 1979) have similar dimensions.

We might also see their resemblance to the endocarps of *S. minimum* Fr. var. *minutissimum* Nikit., described from the Pliocene of Uryv on the River Don (Nikitin 1957). These, however, are still smaller (1·3–1·4 × 0·8–0·95 mm), pointed at the base and broadest halfway up. The small endocarps of *S. nanum* Dorof., the species distinguished in the Pliocene of Duab (Dorofeev, in Kolakovskij 1958), have an asymmetrical shape and those of *S. chomutovense* Bůžek et Holý, recorded from the Middle Miocene of Chomutov (Bůžek & Holý 1964), are nearly round.

S. camenzianum Kirchh. is a characteristic species of the Miocene florae of Europe, in Poland it is also known only from the Miocene: Stare Gliwice (Szafer 1961), "Gdów Bay" and Nowy Sącz Basin (Łańcucka-Środoniowa 1966, 1979).

The numerous species that in the modern flora represent the genus *Sparganium* are herbs growing in various climatic zones, but always in very

wet and marshy places. The Miocene endocarps of *S. camenzianum* Kirchh. do not resemble the present-day species.

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REFERENCES

Bůžek Č. & Holý F. 1964. Small-sized plant remains from the Coal Formation of the Chomutov-Most-Teplice Basin. Sborník Geol. Věd. Paleont., 4: 105–138.

Chandler M. E. J. 1963. The Lower Tertiary floras of Southern England III. Flora of the Bournemouth Beds, the Boscombe, and the Highcliff Sands. Brit. Mus. (Nat. Hist.), London.

Dorofeev P. I. 1963a. Tretičnye flory Zapadnoj Sibiri (The Tertiary floras of Western Siberia). Izd. Bot. Inst. AN SSSR, Moskva—Leningrad.

— 1963b. O tretičnoj flore g. Svetlogorska Kaliningradskoj obl. Dokl. AN SSSR, 152 (4): 983–984.

— 1969. Miocenovaja flora Mamontovoj Gory na Aldane (Summary: The Miocene flora of the Mammoth-Mountain on the Aldan River). Izd. Bot. Inst. im. Komarova, Leningrad.

— 1974. *Cabombaceae* in: Iskopaemye cvetkovye rastenija SSSR (Fossil flowering plants of the USSR). Izd. Bot. Inst. An SSSR, Leningrad.

Gregor H. J. 1975. Die Rutaceen aus dem Mittel-Miozän der Oberpfälzer Braunkohle. Cour. Forsch. Inst. Senckenberg, 13: 119–128, Frankfurt/M.

— 1978. Subtropische Elemente im europäischen Tertiär III. *Rutaceae*, die Gattungen *Toddalia* und *Zanthoxylum*. Acta Palaeob., 19 (1): 21–40.

— 1979. Systematics, biostratigraphy and paleoecology of the genus *Toddalia* Jusieu *(Rutaceae)* in the european Tertiary. Rev. Palaeobot., Palyn., 28: 311–363.

Kirchheimer F. 1941. Ein neuer Beitrag zur Kenntnis der Braunkohlenflora in der Lausitz. Beitr. z. Biologie d. Pflanzen, 27 (2): 189–231.

— 1957. Die Laubgewächse der Braunkohlenzeit. Halle (Salle).

Knobloch E. 1977. Paläokarpologische Charakteristik der Flyschzone der mährischen Karpaten. Sborník Geol. Věd. Paleont., 19: 79–137.

Kolakovskij A. A. 1958. Pervoe dopolnenie k Duabskoj pliocenovoj flore. Trudy Suchums. Bot. Sada AN GSSR, 11: 311–397.

Łańcucka-Środoniowa M. 1966. Tortonian flora from the "Gdów Bay" in the South of Poland. Acta Palaeob., 7 (1): 1–135.

— 1979. Macroscopic plant remains from the freshwater Miocene of the Nowy Sącz Basin (West Carpathians, Poland). Ibid., 20 (1): 3–117.

Materiały z Sympozjum Naukowego „Pozycja stratygraficzna cieszynitów i warunki ich występowania". Pod redakcją W. A. Nowaka i T. Wiesera, Kraków 1978.

Nikitin P. A. 1957. Pliocenovye i četvertičnye flory Voronežskoj oblasti. Izd. AN SSSR, Moskva—Leningrad.

Oszast J. 1980. Wyniki badań palinologicznych osadów trzeciorzędowych w Starej Wsi koło Wilamowic, Polska południowa (Summary: Results of palynological analysis of the Tertiary sediments at Stara Wieś near Wilamowice, South Poland). Manuscript.

Szafer W. 1961. Mioceńska flora ze Starych Gliwic na Śląsku (Summary: Miocene flora from Stare Gliwice in Upper Silesia). Prace Inst. Geol., 33: 1–206.

Watts W. A. 1963. Fossil seeds from the Lough Neagh Clays. The Irish Natur. Journ., 14 (6): 117–118.

STRESZCZENIE

SZCZĄTKI MAKROSKOPOWE ROŚLIN Z OSADÓW MIOCEŃSKICH W STAREJ WSI KOŁO WILAMOWIC

Z osadów górnomioceńskich (baden dolny) w Starej Wsi koło Wilamowic (Oszast 1980, pobrano 15 prób do badań nad szczątkami makroskopowymi roślin. Wydobyte szczątki (drobne owoce, nasiona, ułamki lignitów, liści itp.) są silnie uwęglone, często spirytyzowane i skorodowane ziarnami piasku. W trzech próbach stwierdzono obecność znacznej ilości materiału roślinnego (por. Tabela 1). Ogółem zidentyfikowano 253 szczątki makroskopowe roślin. Wyróżniono 28 taksonów, w tym 11 oznaczono do gatunku, 10 do rodzaju, 4 do rodziny, a dla 3 określono tylko przynależność do większej grupy systematycznej (por. Tabela 2).

Oznaczone szczątki należą do drzew i krzewów oraz roślin zielnych. Zaznacza się dość duży udział drzew szpilkowych z rodziny *Pinaceae*, a przede wszystkim przewaga szczątków roślin zielnych (212 okazów zaliczonych do 18 taksonów) nad szczątkami drzew i krzewów (41 okazów — 10 taksonów). Większość z wyróżnionych taksonów znana jest z flor środkowego i górnego miocenu Polski. Kilka gatunków jest szczególnie interesujących, rzadko w trzeciorzędzie Polski spotykanych: *Eurya stigmosa* (Ludw.) Mai, *Toddalia maii* Gregor, *Rubus microspermus* C. et E. M. Reid, *Sambucus* cf. *lucida* Dorof., *Sparganium camenzianum* Kirchh., *Typha fusisperma* Negru. Dwa oznaczone taksony są nowe dla trzeciorzędu Polski: *Aralia* cf. *crassa* Dorof. i *Brasenia* cf. *baltica* Dorof.

Lista flory dowodzi panowania wilgotnego, umiarkowanie ciepłego, a nawet subtropikalnego klimatu. Może ona reprezentować florę dolnej części górnego miocenu, a nawet miocenu środkowego. Flora ze Starej Wsi jest zanieczyszczona materiałem roślinnym, pochodzącym z osadów starszych. Stwierdzono dwa gatunki megaspor paproci górnokarbońskich oraz drobne owoce i nasiona podobne do opisywanych z fliszu karpackiego.

PLATES

Plate I

1–3. *Selaginella pliocenica* Dorof., megaspores, × 28
4, 4a. *Sphagnum* sp., sect. *Sphagnum*, a leaf, × 175
4a. A fragment of the same leaf, × 350
5. cf. *Amblystegiaceae* gen., the apex of a leaf, × 54
6–9. cf. *Amblystegium* sp., leaved stems
6, 6a. × 52 and 144
7, 9. × 52
8, 8a. × 118 and 350
10, 11. *Aralia* cf. *crassa* Dorof., endocarps, × 16
12, 12a. *Brasenia* sp. (*B.* cf. *baltica* Dorof.), fragment of a seed, seen from the internal side, × 26

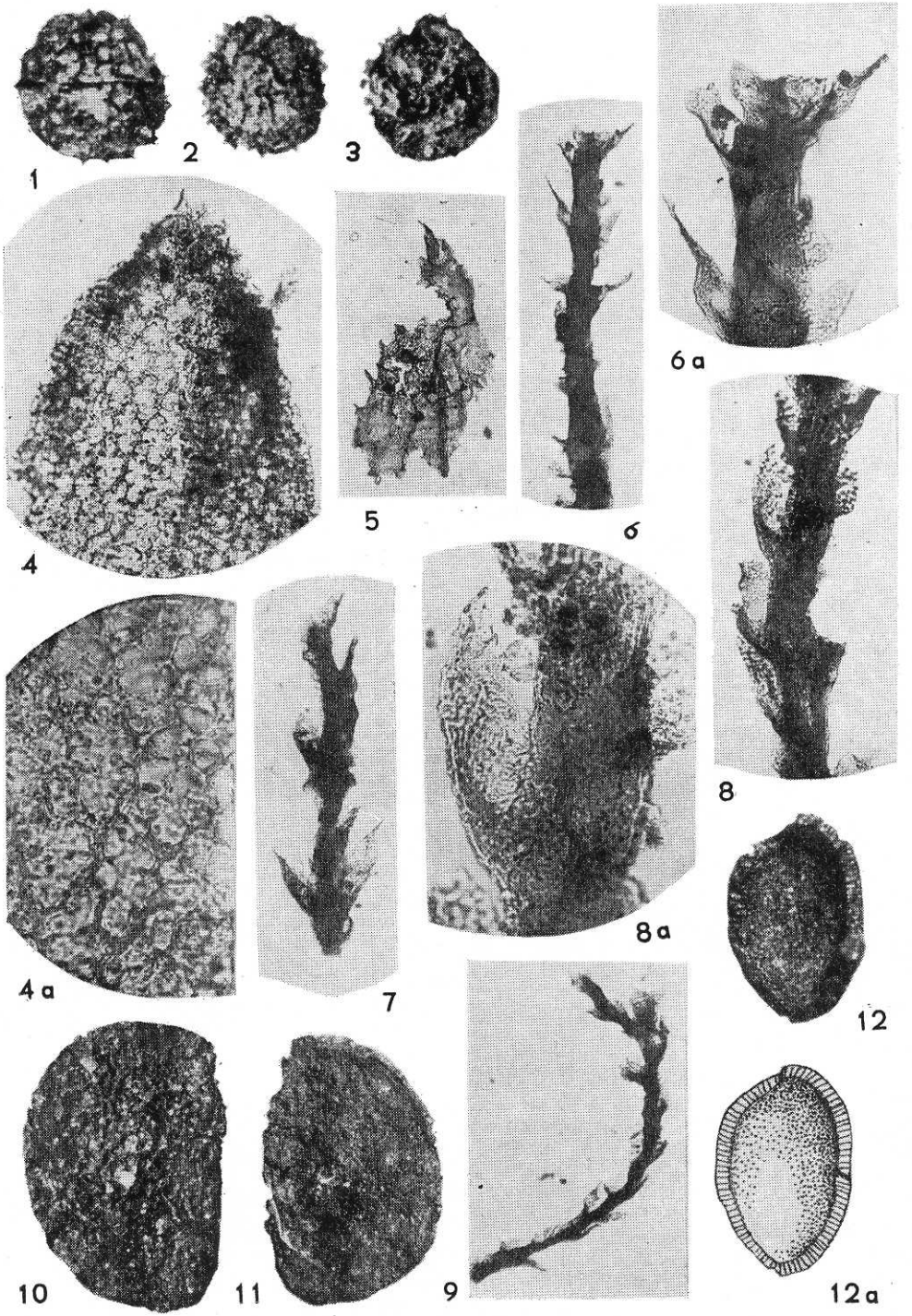
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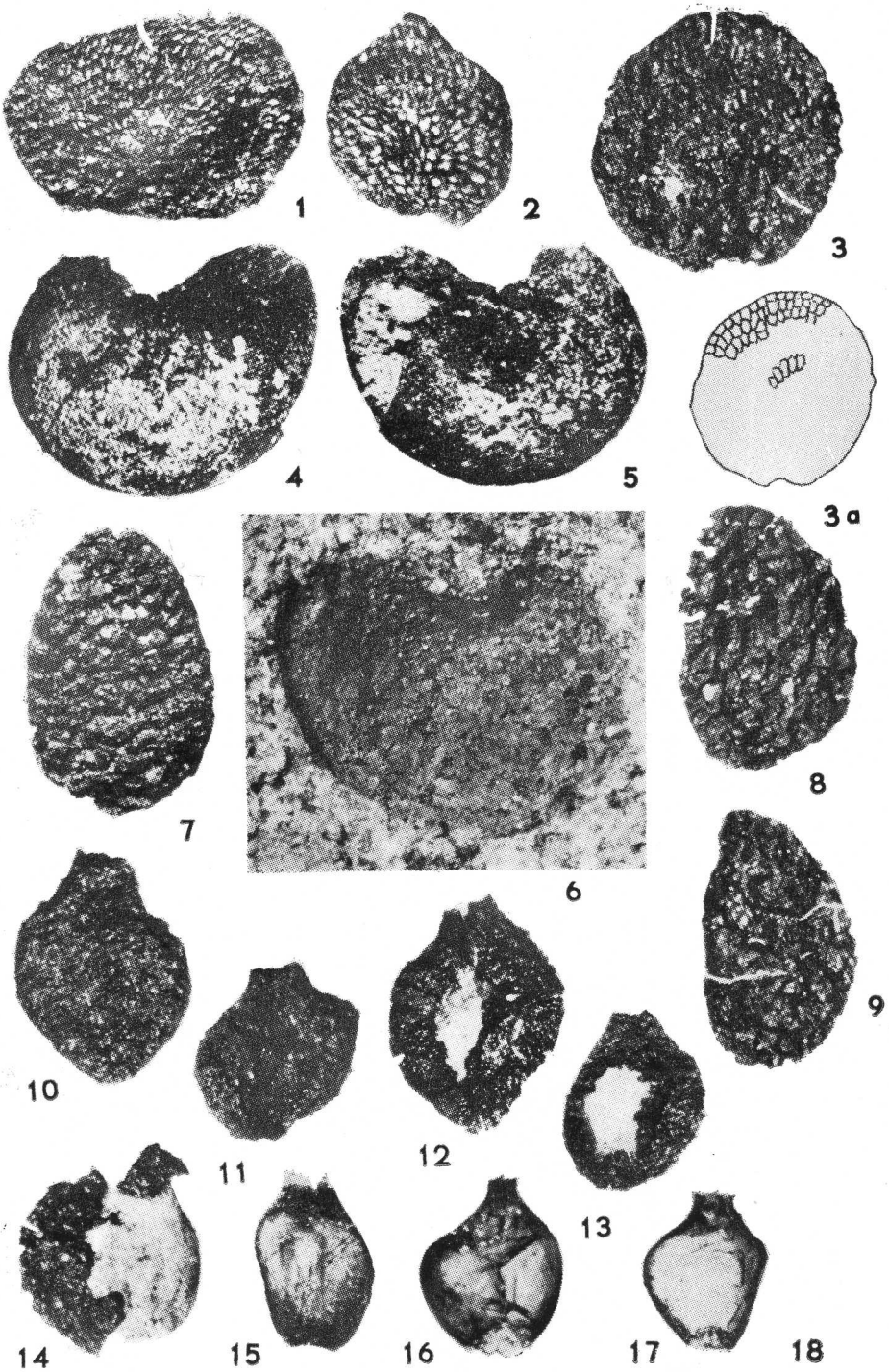
Plate II

1–3. *Eurya stigmosa* (Ludw.) Mai, seeds, × 22
4, 5. *Toddalia maii* Gregor, seed from two sides (fig. 5 — the testa on the left side destroyed), × 14
6. *Toddalia maii* Gregor, the impression of the same seed, × 14
7. *Sambucus* cf. *lucida* Dorof., a seed, × 19
8, 9. *Rubus microspermus* C. & E. M. Reid, endocarps, × 28 and 23
10–17. *Sparganium camenzianum* Kirchh., × 22
10, 11. Entire endocarps
12–14. The partly destroyed walls of the endocarps uncover the tegmina
15–17. Tegmina
18. *Typha fusisperma* Negru, tegmen, × 32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