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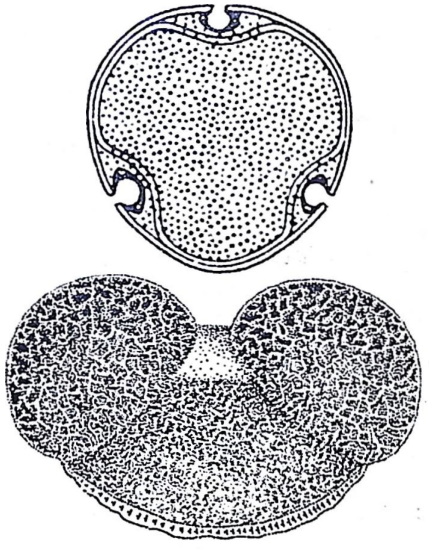
Dr. Hans-Joachim Gregor



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FLORA TERTIARIA MEDITERRANEA VI.4

Miocene Palynomorphs from the Southern part of the Forecarpathian basin (Northwest Bulgaria)

von D. A. IVANOV

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Miocene palynomorphs from the Southern part of the Forecarpathian basin (Northwest Bulgaria)

by DIMITER A. IVANOV

Zusammenfassung

In der vorliegenden Arbeit werden die Ergebnisse palynologischer Studien der marin-brackischen Sedimente aus vier Bohrungen aus NW Bulgarien zusammengefasst. Es handelt sich um mittelmiozäne und obermiozäne (Badenien - Pontien) Sedimente, dessen Alter auf der Basis der enthaltenen Mollusken, Foraminiferen und Ostracoden bestimmt ist. Solche ausführliche Angaben für die Zusammensetzung der Palynomorphen in diesen Sedimenten sind bis heute nicht veröffentlicht. Eine taxonomische Revision der altbeschriebenen Taxa wird gemacht und auch neue Angaben für die Zusammensetzung der Mikroflora werden gegeben. Die fossile Mikroflora (148 Taxa) wird durch LM und REM dokumentiert.

Abstract

The marine-brackish sediments from four boreholes drilled in Nortwest Bulgaria (Central Paratethys area) have been palynologically studied. The sediments are dated as Middle and Upper Miocene (Badenian - Pontian) by contained molluscs, foraminifers and ostracods. So far no complete information about the palynomorph content from these sediments has been published. The taxonomic revision of previously published taxa and new data about the composition of the microflora are presented. The fossil microflora (148 taxa) is documented by LM and SEM photographs.

Key words: Spores, Pollen, Miocene, Central Paratethys, Bulgaria.

Contents

1. Introduction

Palynological studies on the Miocene sediments have been undertaken in Northwest Bulgaria (Southern part of Forecarpathian basin, Central Paratethys area) in recent years. The studied palynomorph assemblages originate from the marine-brackish sediments defined by foraminifers, molluscs and ostracods. They represent the guide microfloral assemblages ranging in age from the Badenian to the Pontian (Middle and Upper Miocene). So far no complete information about the study of palynomorphs from this area has been published. So this is to be the basis for microfloristic studies of Miocene sediments in Bulgaria, which they have not been well studied till now. Partly I published the taxonomic composition of the fossil spores and pollen find out in sediments of one borehole (IVANOV 1994a, b), where the fossils were referred to extant genera and families. In the present study new data about the composition of fossil microflora, on the base of another three boreholes studied, are presented and taxonomic revision of previously published fossils was done. In addition SEM studies of selected palynomorphs were carried out. All taxa are presented using their fossil names and they are presented in order to their botanical affinity to plant families. In synonymy I only take in consideration the first denomination of a species and fundamental change as well as the name under which it was already published in Bulgaria. Descriptions are given only to limited taxa where it is required, and the author where the species is firstly (or more completely) described is cited.

2. Materials and methods

Materials from four boreholes (Fig. 1) in Northwest Bulgaria were studied: C-1, near the village of Slavotin; C-37, near the village of Makresh; C-12, near the village of Deleina, and C-1, near the village of Drenovets. The studied parts of the drillings comprise marine-brackish sediments of middle and late Miocene age (Fig. 2). KOJUMDGIEVA ET AL. (1978) distinguished four structural-paleogeographical regions in Northwest Bulgaria during the Miocene. The sediments studied originate from Miocene longitudinal depression and from Marginal stable region near the border line of the Miocene longitudinal depression. Evolution and paleogeography of the basin were discussed by KOJUMDGIEVA & POPOV (1989). The lithostratigraphic units (Fig. 3) were described and summarised by KOJUMDGIEVA & POPOV (1988). The biostratigraphic subdivisions after molluscs, foraminifers and ostracods were correlated by KOJUMDGIEVA ET AL. (1989).

The studied materials were processed following standard methodology for disintegrating Tertiary sediments. The SEM studies of palynomorphs were carried out using Joel-35-CF scanning electron microscope. The following abbreviations are used in the text: E - equatorial diameter; P - polar axis, D - diameter of the spores or pollen grains, and NWBg - Northwest Bulgaria.

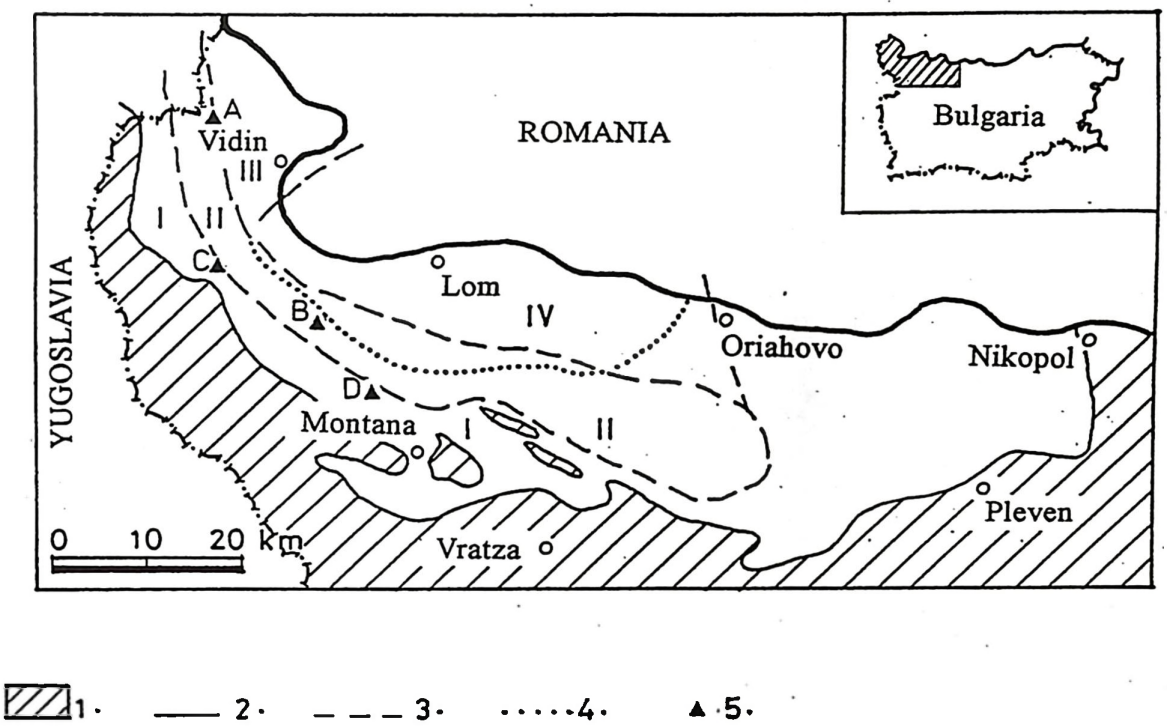

Fig. 1. Sketch map showing structural-paleogeographical areas in Northwest Bulgaria during the Neogene, and locality of the studied boreholes (after KOJUMDGIEVA & POPOV 1988):

Legend: 1. Areas outside the Neogene basin; 2. Boundaries of the basin; 3. Boundaries of structural-paleogeographical areas; 4. Boundary of Lom depression; 5. Borehole sections.

Structural-paleogeographical areas: I. Marginal stable region; II. Miocene longitudinal depression; III. Vidin rise; IV. Lom depression.

Borehole sections: **A**. C-12 Deleina; **B**. C-1 Drenovets; **C**. C-37 Makresh; **D**. C-1 Slavotin.

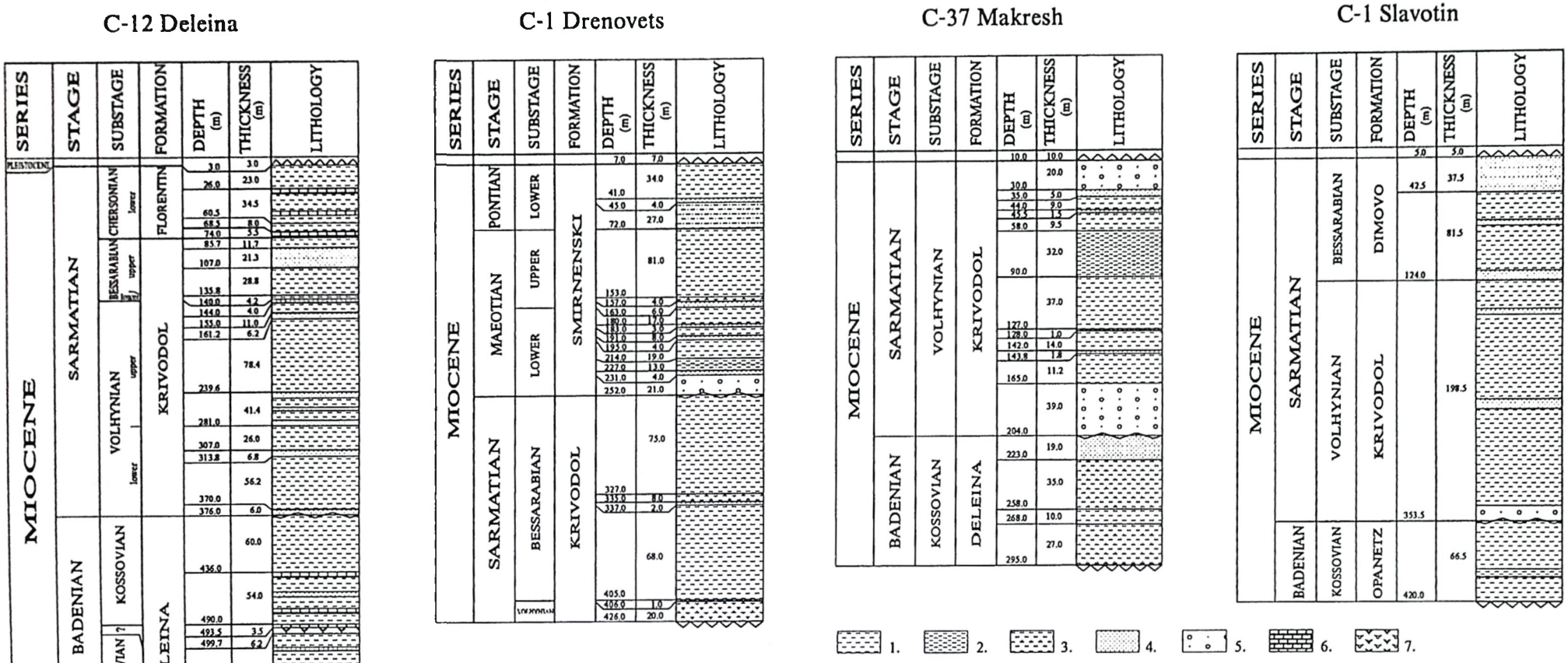

Fig. 2. Lithologic columns of the studied borehole sections.

Legend: 1. Clays; 2. Sandy clays; 3. Siltstones; 4. Sands; 5. Conglomerates; 6. Limestones; 7. Gyps.

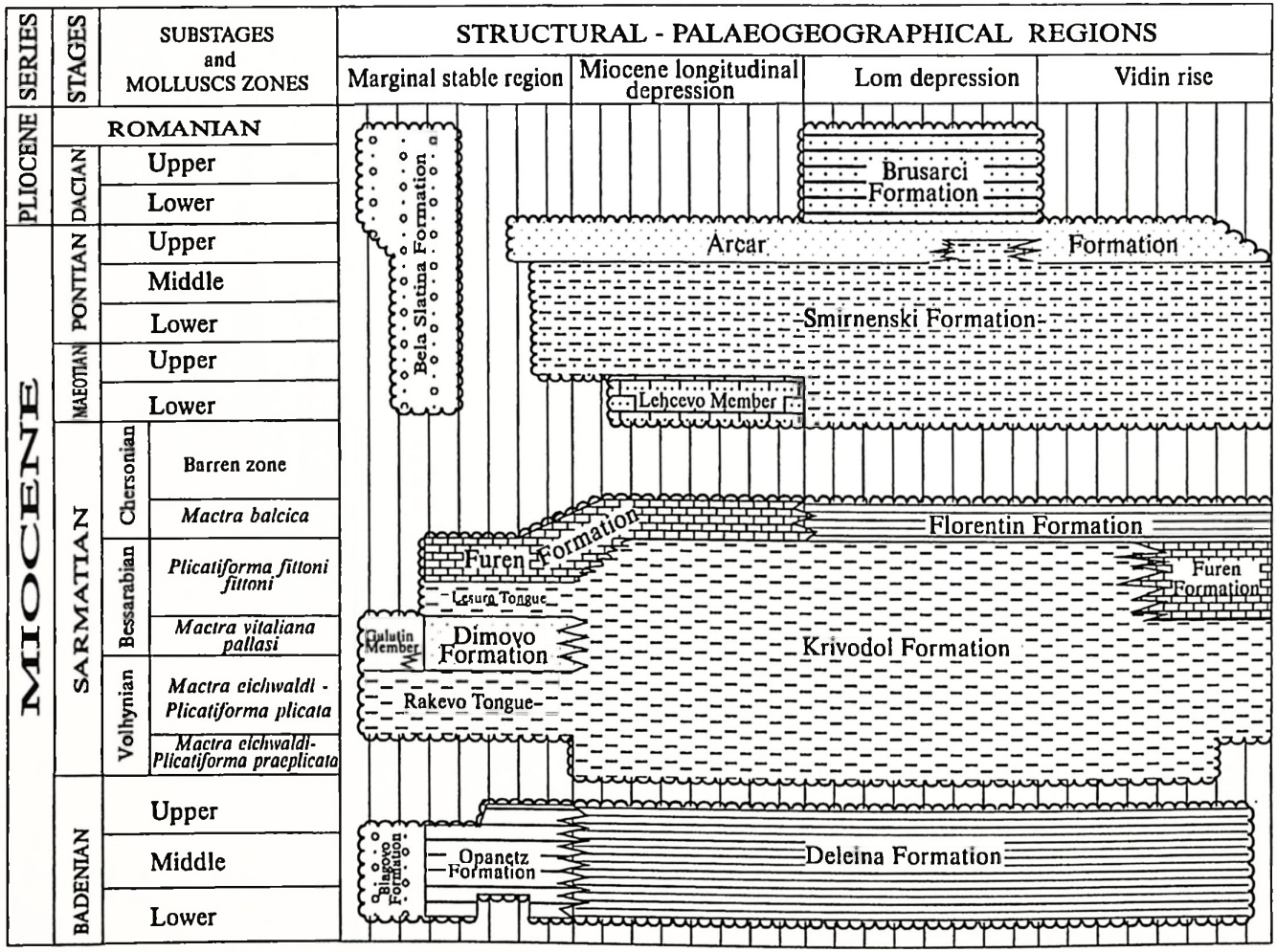

Fig. 3. Scheme showing spatial and temporal relations of Neogene Sediments in Northwest Bulgaria (redrawn from KOJUMDGIEVA & POPOV 1989).

3. Taxonomic part

3. 1. Division BRYOPHYTA

Genus *Saxosporis* KRUTZSCH 1963
Type species: *Saxosporis duebenensis* KRUTZSCH 1963

(1) *Saxosporis duebenensis* KRUTZSCH 1963
Pl. 1, Fig. 1.

1963a *Saxosporis duebenensis* n. fsp. - KRUTZSCH, p. 48, Pl. 5, Fig. 1-8.
1995 *Saxosporis duebenensis* KRUTZSCH 1963 - ASHRAF & MOSBRUGGER, p. 104, Pl. 5, Fig. 4-5.

Description: after KRUTZSCH (1963a). Size range: 49.6 μm.
Botanical affinity: fam. Anthocerothaceae DUM., genus *Phaeoceros* PROSK., *Ph. laevis* ssp. *carolinianus* (L.) PROSK.
Stratigraphic range: Miocene.
Occurrence in NWBg: Sarmatian (Volhynian).

Genus *Phaeocerosporites* NAGY 1968
Type species: *Phaeocerosporites baranyaënsis* NAGY 1968

(2) *Phaeocerosporites transversus* NAGY 1968
Pl. 1, Fig. 2, 3.

1968 *Phaeocerosporites transversus* n. sp. - NAGY, p. 122, Pl. IV, 1-2.
1970 *Foraminisporites transversus* (NAGY 1968) n. c. - PACLTOVÁ & SIMONCSICS, P. 601, Pl. CV, Fig. 4, 8-10.
1985 *Phaeocerosporites transversus* NAGY 1968 - NAGY, p. 57, Pl. II, Fig. 8-10.
1994a cf. *Phaeoceros* - IVANOV, p. 30, Pl. I, Fig. 2.

Description: after NAGY (1968) and IVANOV (1994a). Size range: 62.0-66.8 μm.
Botanical affinity: fam. Anthocerothaceae DUM., genus *Phaeoceros* PROSK.
Stratigraphic range: Middle Miocene.
Occurrence in NWBg: Sarmatian (Volhynian and Bessarabian).

Genus *Stereisporites* THOMSON & PFLUG 1953
Type species: *Stereisporites stereoides* (POTONIÉ & VENITZ 1934) THOMSON & PFLUG 1953

(3) *Stereisporites minor* (RAATZ 1937) KRUTZSCH 1959 ssp. *minor*
Pl. 1, Fig. 4.

1937 *Sphagnum-sporites stereoides* POTONIÉ & VENITZ 1934 f. *minor* n. f. - RAATZ, p. 9, Pl. 1, Fig.5.
1959 *Stereisporites minor* (RAATZ 1937) n. c. subfsp. *minor* - KRUTZSCH, p. 107.
1963b *Stereisporites minor* (RAATZ 1937) KRUTZSCH 1959 subfsp. *minor* - KRUTZSCH, p. 36, Pl. 1, Fig. 1-40.
1994a *Sphagnum* sp. - IVANOV, p. 29, Pl. I, Fig. 1.
1995 *Stereisporites minor* (RAATZ 1937) KRUTZSCH 1959 subsp. *minor* - ASHRAF & MOSBRUGGER, p. 80, Pl. 2, Fig. 2.

Description: after KRUTZSCH (1963b). Size range: 23.0-27.0 μm.
Botanical affinity: fam. Sphagnaceae DUM., genus *Sphagnum* L.
Stratigraphic range: Upper Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(4) *Stereisporites stictus* (WOLFF 1934) KRUTZSCH 1959 ssp. *stictus*
Pl. 1, Fig. 5.

1934 *Sporites stictus* n. sp. - WOLFF, p. 65, Pl. 5, Fig. 31.
1959 *Stereisporites stictus* (WOLFF 1934) n. c. - KRUTZSCH, p. 74, Pl. 6, Fig. 39
1963b *Stereisporites* (*Stereisporites*) *stictus* (WOLFF 1934) KRUTZSCH 1959 subfsp. *stictus* - KRUTZSCH, p. 50, Pl. 7, Fig. 1-12.
1985 *Stereisporites* sg. *Stereisporites stictus* (WOLFF 1934) KRUTZSCH 1959 ssp. *stictus* - NAGY, p. 60-61, Pl. IV, Fig. 4.

Description: after KRUTZSCH (1963b). Size range: 32.0-35.0 μm.
Botanical affinity: fam. Sphagnaceae DUM., genus *Sphagnum* L.
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Sarmatian (Volhynian).

3.2. Divisions PTERIDOPHYTA AND LYCOPODIOPHYTA

Genus *Cicatricosisporites* POTONIÉ & GELLETICH 1933
Type species: *Cicatricosisporites dorogensis* POTONIÉ & GELLETICH 1933

(5) *Cicatricosisporites chattensis* KRUTZSCH 1961 ssp. *chattensis*
Pl. 1, Fig. 6.

1961 *Cicatricosisporites chattensis* n. fsp. - KRUTZSCH, p. 302, Pl. 1., Fig. 1-9.
1967 *Cicatricosisporites chattensis* KRUTZSCH 1961 ssp. *chattensis* - KRUTZSCH, p. 82, Pl. 23., Fig. 1-9, Pl. 24., Fig. 1-4.
1984 *Cicatricosisporites chattensis* KRUTZSCH 1961 subsp. *chattensis* KRUTZSCH 1967 - MOHR, p. 49, Pl. 4, Fig. 4.1, 4.2
1994a *Anemia* sp. - IVANOV, p. 30, Pl. I, Fig. 4.

Description: after KRUTZSCH (1967) and MOHR (1984). Size range: 62.2-65.1 μm.
Botanical affinity: fam. Schizaeaceae KAULF., genus *Anemia* SWARTZ, *Anemia* cf. *tomentosa* (SAV.) SW.
Stratigraphic range: Upper Eocene, Upper Oligocene, Miocene, Pliocene.
Occurrence in NWBg: Badenian - Sarmatian (Volhynian).

Genus *Leiotriletes* (NAUMOVA 1937) POTONIÉ & KREMP 1954
Type species: *Leiotriletes sphaerotriangulus* (LOOSE 1932) POTONIÉ & KREMP 1954

(6) *Leiotriletes maxoides* KRUTZSCH 1962 ssp. *maxoides*
Pl. 1, Fig. 7, 8, 9.

1962a *Leiotriletes maxoides maxoides* n. fsp. u. subfsp. - KRUTZSCH, p.18, Pl. 2, Fig. 1-5.
1980 *Leiotriletes maxoides* KRUTZSCH 1962 ssp. *maxoides* - THIELE-PFEIFFER, p. 103, Pl. 1, Fig. 1-6.
1994a *Lygodium* sp. 2 - IVANOV, p. 30, Pl. II, Fig. 1.

Description: after KRUTZSCH (1962a) and THIELE-PFEIFFER (1980). Size range: 78.0-88.5 μm. The specimen illustrated here on Pl. 1, Figs. 7, 8 and 9 posses partly preserved verrucate perisporium on distal side.
Botanical affinity: fam. Schizaeaceae KAULF., genus *Lygodium* SWARTZ.
Stratigraphic range: Upper Oligocene - Miocene.
Occurrence in NWBg: Badenian - Sarmatian (Volhynian).

(7) *Leiotriletes maxoides* KRUTZSCH 1962 ssp. *maximus*
(PFLUG IN THOMSON & PFLUG 1953) KRUTZSCH 1962
Pl. 1, Fig. 10.

1953 *Divisisporites maximus* n. sp. - PFLUG in THOMSON & PFLUG, p. 52, Pl. 1, Fig. 57-58.
1959 *Leiotriletes maximus* (PFLUG 1953) n. c. - KRUTZSCH, p. 57, Tab. III.
1962a *Leiotriletes maxoides* KRUTZSCH 1962 ssp. *maximus* (PFLUG 1953) KRUTZSCH 1959 - KRUTZSCH, p. 20, Pl. 3, Fig. 1-4.
1994a *Lygodium* sp. 1 - IVANOV, p. 30, Pl. I, Fig. 5.
1995 *Leiotriletes maxoides* KRUTZSCH 1962 subsp. *maximus* (PFLUG 1953) KRUTZSCH 1962 - ASHRAF & MOSBRUGGER, p. 76, Pl. 1, Fig. 11.

Description: after ASHRAF & MOSBRUGGER (1995) and IVANOV (1994a). Size range: 83.4-88.4 µm.
Botanical affinity: fam. Schizaeaceae KAULF., genus *Lygodium* SWARTZ.
Stratigraphic range: Oligocene - Middle Miocene.
Occurrence in NWBg: Badenian - Sarmatian (Volhynian).

(8) *Leiotriletes maxoides* KRUTZSCH 1962 ssp. *minoris* KRUTZSCH 1962
Pl. 1, Fig. 11.

1962a *Leiotriletes maxoides* KRUTZSCH 1962 ssp. *minoris* n. subfsp. - KRUTZSCH, , p. 16, Pl. 1, Fig. 2-8.

Description: after KRUTZSCH (1962a). Size range: 49.5-62.2 µm.
Botanical affinity: fam. Schizaeaceae KAULF., genus *Lygodium* Swartz.
Stratigraphic range: Upper Oligocene - Miocene.
Occurrence in NWBg: Badenian - Sarmatian (Volhynian).

(9) *Leiotriletes triangulatoides* KRUTZSCH 1962
Pl. 1, Fig. 12.

1962a *Leiotriletes triangulatoides* n. fsp. - KRUTZSCH, p. 24, Pl. 5, Fig. 1-10.
1984 *Leiotriletes triangulatoides* KRUTZSCH 1962 - MOHR, p. 38, Pl. 1, Fig. 4.
1994a *Dicksonia* sp. - IVANOV, p. 31, Pl. III, Fig. 2.

Description: after KRUTZSCH (1962a). Size range: 51.2-57.3 µm.
Botanical affinity: fam. Dicksoniaceae BOWER, genus *Dicksonia* L'HÉRIT.
Stratigraphic range: Oligocene, Lower and Middle Miocene.
Occurrence in NWBg: Badenian - Maeotian.

Genus *Gleicheniidites* ROOS 1949 emend. BOLCHOVITINA 1968
Type species: *Gleicheniidites senonicus* ROOS 1949

(10) *Gleicheniidites microstellatus* NAGY 1963
Pl. 1, Fig. 13.

1963 *Gleicheniidites microstellatus* n. sp. - NAGY, p. 400-401, Pl. 1, Fig. 1,2.
1994a *Gleicheniacee* gen. ind. - IVANOV, p. 31, Pl. III, Fig. 1.

Description: after NAGY (1963). Size range: 30.5-33.2 µm.
Botanical affinity: fam. Gleicheniacee (R. BR.) PRESL.
Stratigraphic range: Upper Oligocene - Lower Miocene.
Occurrence in NWBg: Badenian - Sarmatian (Volhynian).

Genus *Corrugatisporites* THOMSON & PFLUG 1953 emend. NAGY 1985

Type species: *Corrugatisporites solidus* (POTONIÉ 1934) THOMSON & PFLUG 1953

(11) *Corrugatisporites graphicus* NAGY 1985
Pl. 2, Fig. 1.

1985 *Corrugatisporites graphicus* n. sp. - NAGY, p. 90, Pl. XXVI, Fig. 9-17.

Description: after THOMSON & PFLUG 1953 and KRUTZSCH (1967). Size range: 40.5-44.2 μm.
Botanical affinity: fam. Schizaeaceae KAULF., genus *Lygodium* SWARTZ.
Stratigraphic range: Upper Oligocene - Miocene.
Occurrence in NWBg: Sarmatian.

(12) *Corrugatisporites* cf. *pseudovallatus* NAGY 1985
Pl. 2, Fig. 2, 3.

1985 *Corrugatisporites pseudovallatus* n. sp. - NAGY, p. 92, Pl. XXIII, Fig. 4-8.
1994a *Pteris* sp. 1- IVANOV, p. 30, Pl. II, Fig. 2.

Description: after NAGY (1985). Size range: 37.2-46.5 μm.
Botanical affinity: fam. Pteridaceae REICHENB., cf. *Pteris* L.
Stratigraphic range: Middle Miocene.
Occurrence in NWBg: Badenian - Sarmatian.

Genus *Polypodiaceoisporites* POTONIÉ 1956
Type species: *Polypodiaceoisporites speciosus* (POTONIÉ 1931) POTONIÉ 1956

(13) *Polypodiaceoisporites corruratus* NAGY 1985
Pl. 2, Fig. 4, 5.

1985 *Polypodiaceoisporites corruratus* n. sp. - NAGY, p. 96, Pl. XXVI, Fig. 14-16, Pl. XXVIII, Fig. 1-6.

Description: after NAGY (1985). Size range: 34.2-38.5 μm, cingulum 4.6-6.2 μm thick, at the angles of the spore thinner.
Botanical affinity: cf. fam. Pteridaceae REICHENB.
Stratigraphic range: Miocene.
Occurrence in NWBg: Badenian - Sarmatian.

(14) *Polypodiaceoisporites gracillimus* NAGY 1963
ssp. *semiverrucatus* KRUTZSCH 1967
Pl. 2, Fig. 6.

1967 *Polypodiaceoisporites gracillimus semiverrucatus* n. subfsp. - KRUTZSCH, p. 108, Pl. 36, Fig. 1-13.
1994 *Pteris* sp. 2 - IVANOV, p. 31, Pl. II, Fig. 3-4.

Description: after KRUTZSCH (1967). Size range: 35.5-38.5 μm.
Botanical affinity: fam. Pteridaceae REICHENB.
Stratigraphic range: Upper Oligocene - Miocene.
Occurrence in NWBg: Badenian - Pontian.

(15) *Polypodiaceoisporites paucirugosus* NAGY 1985
Pl. 2, Fig. 7.

1985 *Polypodiaceoisporites paucirugosus* n. sp. - NAGY, p. 100-101, Pl. XXXIII, Fig. 1-4.

Description: after NAGY (1985). Size range: 34.6 μm, the cingulum 2.0-4.0 μm thick.
Botanical affinity: cf. fam. Gleicheniaceae, cf. genus *Dicranopteris* BERNH.
Stratigraphic range: Lower and Middle Miocene.
Occurrence in NWBg: Sarmatian (Volhynian).

(16) *Polypodiaceoisporites snopkovae* KEDVES 1973
Pl. 2, Fig. 11.

1973 *Polypodiaceoisporites snopkovae* n. fsp. - KEDVES, p. 47-48, Pl. XV, Fig. 3,4.
1985 *Polypodiaceoisporites snopkovae* KEDVES 1973 - NAGY, p. 102, Pl. XXXIV, Fig. 7,8.

Description: after Kedves (1973). Size range: 32.7 μm.
Botanical affinity: unknown.
Stratigraphic range: Middle Eocene, Lower Miocene.
Occurrence in NWBg: Middle Badenian.

(17) *Polypodiaceoisporites spiniverrucatus* TREVISAN 1967
Pl. 2, Fig. 8, 9, 10.

1967 *Polypodiaceoisporites spiniverrucatus* n. sp. - TREVISAN, p. 10-11, Pl. III, Fig. 1,2.
1985 *Polypodiaceoisporites spiniverrucatus* TREVISAN 1967 - NAGY, p. 103, Pl. XXXIV, Fig. 10-12.

Description: after TREVISAN (1967). Size range: 32.5 - 41.0 μm.
Botanical affinity: fam. Pteridaceae REICHENB, *Pteris pelucida* BL., *P. amoena* BL.
Stratigraphic range: Middle and Upper Miocene.
Occurrence in NWBg: Badenian, Sarmatian.

(18) *Polypodiaceoisporites torosus* NAGY 1969
Pl. 2, Fig. 12, 13.

1969 *Polypodiaceoisporites torosus* n. sp. - NAGY, p. 120-121, Pl. XX, Fig. 9, 11.
1980 *Polypodiaceoisporites torosus* NAGY 1969 - THIELLE-PFEIFFER, p. 110-111, Pl. 4, Fig. 10-11.
1995 *Polypodiaceoisporites torosus* NAGY 1969 - ASCHRAF & MOSBRUGGER, p. 120-121, Pl. 8, Fig. 12.

Description: after NAGY (1969) and THIELE-PFEIFFER (1980). Size range: 31.0-33.5 μm, cingulum 2.0 - 3.2 μm thick.
Botanical affinity: fam. Pteridaceae REICHENB.
Stratigraphic range: Miocene.
Occurrence in NWBg: Sarmatian (Volhynian and Bessarabian).

(19) *Polypodiaceoisporites triangulus* KRUTZSCH 1967
ssp. *trianguloides* KRUTZSCH 1967
Pl. 2, Fig. 14.

1967 *Polypodiaceoisporites triangulus trianguloides* n. subfsp. - KRUTZSCH, p. 140, Pl. 34, Fig. 9-13.

Description: after KRUTZSCH (1967). Size range: 49.5 μm.
Botanical affinity: cf. fam. Pteridaceae REICHENB.
Stratigraphic range: Upper Oligocene - Badenian.
Occurrence in NWBg: Badenian.

(20) *Polypodiaceoisporites* sp.
Pl. 2, Fig. 15.

Description: Trilete spore. Outlines: triangular. Aperture: trilete. Sporoderm: 2.0 μm thick, up to 3.4 μm at the angles of the spore. Ornamentation: laevigate. Size range: 40.5 μm. Comments: The spore is similar to *Polypodiaceoisporites paucirugosus* NAGY 1985 but differs by the thicker cingulum at the angles of the spore.
Botanical affinity: cf. fam. Pteridaceae REICHENB, cf. fam. Schizaeaceae KAULF.
Occurrence in NWBg: Sarmatian (Volhynian).

Genus *Mecsekisporites* NAGY 1968 emend. NAGY 1985
Type species: *Mecsekisporites miocenicus* NAGY 1968

(21) *Mecsekisporites zengoevarconyensis* NAGY 1968
Pl. 2, Fig. 16, 17.

1968 *Mecsekisporites zengoevarconyensis* n. sp. - NAGY, p. 361-362, Pl. III, Fig. 1-4.

Description: after Nagy (1968). Size range: 52.7-55.0 μm.
Botanical affinity: fam. Pteridaceae REICHENB, genus *Anogramma* Link.
Stratigraphic range: Carpathian-Lower Badenian.
Occurrence in NWBg: Badenian.

Genus *Criptogrammasporis* SKAWINSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Type species: *Criptogrammasporis magnoides* (KRUTZSCH 1963) SKAWINSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994

(22) *Criptogrammasporis crispiformis* sp. n.
Pl. 3, Fig. 1, 2, 3, 4.

Holotypus: C-37, Makresh: 34.90 m; No T528 M20, Pl. 3, Fig. 1, 2.
Isotypus: C-37, Makresh: 65.10 m; No T529 M21, Pl. 3, Fig. 3, 4.
Derivatio nominis: After the name of the extant species *Criptogramma crispa* (L.) R. BR.
Stratum typicum: Krivodol Formation (Volhynian).
Diagnosis: Trilete spores. Outlines: triangular with rounded apices. Aperture: trilete, laesurae strait, almost extending equatorial margin. Size range: 64.2-69.8 μm. Sporoderm: 1.5-1,9 μm thick (without sculptural elements). Ornamentation: verrucate, verrucae densely spaced, more rounded, with diameter = 2.5-4.7 μm.
Differential diagnosis: The *Criptogrammasporis crispiformis* sp. n. differs from *Criptogrammasporis magmoides* (KRUTZSCH 1963) SKAWINSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994 by its larger dimensions, size of verrucae and its rounded shape.
Botanical affinity: fam. Pteridaceae REICHENB, *Criptogramma crispa* (L.) R. BR.
Occurrence in NWBg: Sarmatian (Volhynian).
Synonymy: 1984 *Criptogramma crispa* (L.) R. BR. - SHATILOVA, Pl. VII, Fig. 4-6, without description (Pliocene).

Genus *Monoleiotriletes* KRUTZSCH 1959
Type species: *Monoleiotriletes angustus* KRUTZSCH 1959

(23) *Monoleiotriletes gracilis* KRUTZSCH 1959
Pl. 3, Fig. 5.

1959 *Monoleiotriletes gracilis* n. sp. - KRUTZSCH, p. 65-66, Pl. 4, Fig. 24.
1962a *Monoleiotriletes gracilis* KRUTZSCH 1959 - KRUTZSCH, p. 44, Pl. 15, Fig. 1-9.
1995 *Monoleiotriletes gracilis* KRUTZSCH 1959 - ASHRAF & MOSBRUGGER, p. 79, Pl. 1, Fig. 18.

Description: after KRUTZSCH (1962a). Size range: 46.1 μm.
Botanical affinity: unknown.
Stratigraphic range: Upper Oligocene - Middle Miocene.
Occurrence in NWBg: Sarmatian (Bessarabian).

Genus *Verrucatisporites* NAGY 1969 emend. NAGY 1985
Type species: *Verrucatisporites inaequalis* NAGY 1969

(24) *Verrucatisporites tekeresensis* NAGY 1985
Pl. 3, Fig. 6.

1985 *Verrucatisporites tekeresensis* n. sp. - NAGY, p. 88, Pl. XX, Fig. 18-21, Pl. XXI, Fig. 1-4.

Description: after NAGY (1985). Size range: 48.5 μm.
Botanical affinity: unknown.
Stratigraphic range: Miocene.
Occurrence in NWBg: Badenian.

Genus *Camarozonosporites* PANT 1954 EX POTONIÉ 1956
Type species: *Camarozonosporites cretaceous* (WEYLAND & KRIEGER 1953) POTONIÉ 1956

(25) *Camarozonosporites hamulatis* (KRUTZSCH 1959) KRUTZSCH 1963
Pl. 3, Fig. 7, 8.

1959 *Hamulatisporites hamulatis* n fsp. - KRUTZSCH, p. 157-158, Pl. 29, Fig. 326-328.
1963a *Camarozonosporites* (*Hamulatisporites*) *hamulatis* (KRUTZSCH 1959) n. c. - KRUTZSCH, p. 23.

Description: after KRUTZSCH (1959). Size range: 34.2-36.1 μm.
Botanical affinity: fam. Lycopodiaceae MIRBEL.
Stratigraphic range: Eocene.
Occurrence in NWBg: Badenian.

Genus *Retitriletes* (VAN DER HAMMEN 1956 EX PIERCE 1961) DÖRING, KRUTZSCH, MAI & SCHULZ IN KRUTZSCH 1963
Type species: *Retitriletes globisus* PIERCE 1961

(26) *Retitriletes pseudoclavatus* KRUTZSCH 1963
Pl. 3, Fig. 9, 10.

1963a *Retitriletes pseudoclavatus* n. fsp. - KRUTZSCH, p. 110, Pl. 36, Fig. 1-11.
1985 *Lycopodiumsporites pseudoclavatus* (KRUTZSCH 1963) n. c. - NAGY, p. 65, Pl. VI, Fig. 12-15.
1994 *Lycopodiaceaesporis* (*Retitriletes ex.* KRUTZSCH 1963) *pseudoclavatus* (KRUTZSCH 1963) - WAZYNSKA IN ZIEMBINSKA-TWORZYDLO ET AL., p. 11, Pl. 3, Fig. 8 a, b.
1995 *Retitriletes pseudoclavatus* KRUTZSCH 1963 - ASHRAF & MOSBRUGGER, p. 110-111, Pl. 6, Fig. 7-8.

Description: after KRUTZSCH (1963a). Size range: 39.7-41.5 μm.
Botanical affinity: fam. Lycopodiaceae MIRBEL, *Lycopodiella inundata* type (after the type described by JONES & BLACKMORE 1988).
Stratigraphic range: Miocene - Pliocene.
Occurrence in NWBg: Sarmatian (Volhynian).

(27) *Retitriletes reticuloides* KRUTZSCH 1963 ssp. *reductoides* KRUTZSCH 1963
Pl. 3, Fig. 11, 12.

1963a *Retitriletes reticuloides reductoides* n. subfsp. - KRUTZSCH, p. 104, Pl. 33, Fig. 1-6.
1985 *Lycopodiumsporites reticuloides* (KRUTZSCH 1963) n. c. ssp. *reductoides* KRUTZSCH 1963 - NAGY, p. 65, Pl. VI, Fig. 16-21.
1995 *Retitriletes reticuloides* KRUTZSCH 1963 ssp. *reductoides* KRUTZSCH 1963 - ASHRAF & MOSBRUGGER, p. 112.

Description: after KRUTZSCH (1963a). Size range: 37.5-40.2 μm.
Botanical affinity: fam. Lycopodiaceae MIRBEL, *Lycopodium clavatum* type (after the type described by JONES & BLACKMORE 1988).
Stratigraphic range: Miocene - Middle Pliocene.
Occurrence in NWBg: Sarmatian - Pontian.

Genus *Selagosporis* KRUTZSCH 1963
Type species: *Selagosporis selagoides* KRUTZSCH 1963

(28) *Selagosporis* sp. A.
Pl. 3, Fig. 13.

1963 *Selagosporis* sp. A - KRUTZSCH, p. 138, Pl. 50, Fig. 1-4.
1985 *Selagosporis* sp. A - NAGY, p. 66, Pl. VII, Fig. 4,5.

Description: after KRUTZSCH (1963). Size range: 32.5-35.5 μm.
Botanical affinity: fam. Lycopodiaceae MIRBEL, *Huperzia selago* type (after the type described by JONES & BLACKMORE 1988).
Stratigraphic range: Miocene.
Occurrence in NWBg: Sarmatian - Maeotian.

Genus *Lusatisporis* KRUTZSCH 1963
Type species: *Lusatisporis punctatus* KRUTZSCH 1963

(29) *Lusatisporis punctatus* KRUTZSCH 1963
Pl. 3, Fig. 14.

1963b *Lusatisporis punctatus* n. fsp. - KRUTZSCH, p. 98, Pl. 30, Fig. 1-9.

Description: after KRUTZSCH (1963b). Size range: 54-57 μm.
Botanical affinity: fam. Selaginellaceae MILDE, genus *Selaginella* BEAUV. (*S. sibirica*-group).
Stratigraphic range: Middle Miocene.
Occurrence in NWBg: Sarmatian (Volhynian).

(30) *Lusatisporis perinatus* KRUTZSCH 1963
Pl. 4, Fig. 1, 2.

1963b *Lusatisporis perinatus* n. fsp. - KRUTZSCH, p. 98, Pl. 30, Fig. 10-11.

Description: after KRUTZSCH (1963b). Size range: 55-58 μm.
Botanical affinity: fam. Selaginellaceae MILDE, genus *Selaginella* BEAUV. (*S. sibirica*-group).
Stratigraphic range: Middle and Upper Miocene.
Occurrence in NWBg: Badenian - Sarmatian.

Genus *Echinatisporis* KRUTZSCH 1959
Type species: *Echinatisporis longiechinus* KRUTZSCH 1959

(31) *Echinatisporis cycloides* KRUTZSCH 1963
Pl. 4, Fig. 3.

1963b *Echinatisporis cycloides* n. fsp. - KRUTZSCH, p. 108, Pl. 35, Fig. 7-14.

Description: after KRUTZSCH (1963b). Size range: 35-40 µm.
Botanical affinity: fam. Selaginellaceae MILDE, genus *Selaginella* BEAUV.
Stratigraphic range: Oligocene - Miocene.
Occurrence in NWBg: Sarmatian (Volhynian).

(32) *Echinatisporis echinoides* KRUTZSCH & PACLTOVÁ IN KRUTZSCH 1963
ssp. *echinoides*
Pl. 4, Fig. 4.

1963b *Echinatisporis echinoides echinoides* n. fsp et n. subfsp. - KRUTZSCH & PACLTOVÁ in KRUTZSCH, p. 114, Pl. 38, Fig. 1-5.

Description: after KRUTZSCH (1963b). Size range: 43.7-45.5 µm.
Botanical affinity: fam. Selaginellaceae MILDE.
Stratigraphic range: Oligocene-Miocene.
Occurrence in NWBg: Badenian - Sarmatian (Volhynian).

Genus *Verrucatosporites* THOMSON & PFLUG 1953
Type species: *Verrucatosporites alienus* (POTONIÉ 1931) THOMSON & PFLUG 1953

(33) *Verrucatosporites favus* (POTONIÉ 1931) THOMSON & PFLUG 1953 ssp. *favus*
Pl. 4, Fig. 5, 6.

1931d *Polypodii* (?)-*Sporites favus* n. sp. - POTONIÉ, p. 556, Abb. 3.
1953 *Verrucatosporites favus* (POTONIÉ 1931) n. c. - THOMSON & PFLUG, p. 60, Pl. 3, Fig. 52-55, Pl. 4, Fig. 1-4.
1994a *Polypodium* sp. - IVANOV, p. 31, Pl. II, Fig. 5.

Description: after THOMSON & PFLUG (1953). Size range: 56.5-67.8 x 38.2-46.5 µm.
Botanical affinity: fam. Polypodiaceae BERCHT. & PRESL, *Polypodium* type.
Stratigraphic range: Middle Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(34) *Verrucatosporites favus* (POTONIÉ 1931) THOMSON & PFLUG 1953
ssp. *pseudosecundus* (KRUTZSCH 1959) KRUTZSCH 1967
Pl. 4, Fig. 7.

1967 *Verrucatosporites favus pseudosecundus* (KRUTZSCH 1959) n. c. et emend. - KRUTZSCH, p. 186, Pl. 69, Fig. 7-14.

Description: after KRUTZSCH (1967). Size range: 60.5 x 41.8 µm.
Botanical affinity: cf. fam. Polypodiaceae BERCHT. & PRESL.
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Sarmatian.

(35) *Verrucatosporites clatriformis* (MÜRRIGER & PFLUG 1952
ex THOMSON & PFLUG 1953) KRUTZSCH 1967
Pl. 4, Fig. 8.

1953 *Reticuloidosporites clatriformis* (MÜRRIGER & PFLUG 1952) n. c. - THOMSON & PFLUG, p. 61, Pl. 74, Fig. 5-8.
1967 *Verrucatosporites clatriformis* (MÜRRIGER & PFLUG 1952 ex THOMSON & PFLUG 1953) n. c. - KRUTZSCH, p. 196, Pl. 74, Fig. 2-6.

Description: after KRUTZSCH (1967). Size range: 49.0 x 17.0 µm.
Botanical affinity: fam. Davaliaceae FRANK, the fossil spore is similar to the spores of the extant species *Davalia canariensis* (L.) SM. illustrated by TRYON & LUGARDON (1991: p. 379, Fig. 146. 7).
Stratigraphic range: Eocene, Oligocene, Miocene.
Occurrence in NWBg: Badenian.

Genus *Laevigatosporites* IBRAHIM 1933
Type species: *Laevigatosporites vulgaris* (IBRAHIM 1932) IBRAHIM 1933

(36) *Laevigatosporites nutidus* (MAMCZAR 1960) KRUTZSCH 1967 ssp. *nutidus*
Pl. 4, Fig. 9.

1960 *Polypodiaceae - Sporites haardti* R. POTONIÉ & VENITZ forma *nutida* - MAMCZAR, p. 197, Pl. 1, Fig. 9.
1967 *Laevigatosporites nutidus* (MAMCZAR 1960) emend. et n. c. subfsp. *nutidus* - KRUTZSCH, p. 149-150, Pl. 53, Fig. 4-12.

Description: after MAMCZAR (1960) and KRUTZSCH (1967). Size range: 38.0 - 49.0 µm.
Botanical affinity: cf. fam. Thelypteridaceae PIC.-SER. (*Cyclosorus* LINK), cf. fam. Polypodiaceae BERCHT. & PRESL.
Stratigraphic range: Miocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

3. 3. Division PINOPHYTA

Fam. Ginkgoaceae ENGLER
Genus *Ginkgorectina* MALJAVKINA 1953 EX POTONIE 1958
Type species: *Ginkgorectina punctata* MALJAVKINA 1953

(37) *Ginkgorectina neogenica* NAGY 1969
Pl. 4, Fig. 10, 11.

1969 *Ginkgorectina neogenica* n. sp. - NAGY, p. 141, Pl. XXX, Fig. 2-3.
1976 *Ginkgo*-Habitus - MENKE, p. 18, Pl. 47, Fig. 20.
1984 *Ginkgo*-Habitus - MOHR, p. 63, Pl. 8, Fig. 9.1, 9.2.
1994a *Ginkgo* sp. - IVANOV, p. 31, Pl. III, Fig. 4-5.

Description: after IVANOV (1994a). Size range: E1=28.0-35.0 µm, E2= 19.0-24.0 µm, P= 17.2-19.4 µm.
Botanical affinity: genus *Ginkgo* L.
Stratigraphic range: Upper Oligocene - Miocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Ephedraceae WETTST
Genus *Ephedripites* BOLCHOVITINA 1953
Type species: *Ephedripites mediolobatus* BOLCHOVITINA 1953

(38) *Ephedripites* (*Distachyapites*) *tertiarius* KRUTZSCH 1970
Pl. 4, Fig. 12.

(38) *Ephedripites* (*Distachyapites*) *tertiarius* KRUTZSCH 1970
Pl. 4, Fig. 12.

1970a *Ephedripites* (*Distachyapites*) *tertiarius* n. fsp. - KRUTZSCH, p. 156.
1978 *Ephedripites* (*Distachyapites*) *tertiarius* KRUTZSCH 1970 - HOCHULI, p. 73, Pl. 10, Fig. 15.
1994a *Ephedra distachya*-type - IVANOV, p. 31, Pl. III, Fig. 3.

Description: after IVANOV (1995a). Size range: E=31.0-33.6 µm; P= 49.6-53.5 µm.
Botanical affinity: *Ephedra distachya* type.
Stratigraphic range: Middle Eocene - Pliocene.
Occurrence in NWBg: Sarmatian - Maeotian.

Fam. Pinaceae LYNDLEY
Genus *Abiespollenites* THIERGART 1938
Type species: *Abiespollenites absolutus* THIERGART 1938

(39) *Abiespollenites latisaccatus* (TREVISAN 1967) KRUTZSCH 1971
Pl. 4, Fig. 13

1967 *Pityosporites latisaccatus latisaccatus* n. f.-sp. et subf.-sp. - TREVISAN, p. 21, Pl. 12, Fig. 4, Pl. 13, Fig. 1,2.
1971 *Abiespollenites latisaccatus* (TREVISAN 1967) n. c. - KRUTZSCH, p. 88, Pl. 16, Fig. 1-5.

Description: after KRUTZSCH (1971). Size range: 95.0 - 140.7 µm.
Botanical affinity: *Abies* type, genus *Abies* MILL.
Stratigraphic range: Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Keteleeriapollenites* NAGY 1969
Type species: *Keteleeriapollenites komloënsis* NAGY 1969

(40) *Keteleeriapollenites komloënsis* NAGY 1969
Pl. 4, Fig. 14.

1969 *Keteleeriapollenites komloënsis* n. sp. - NAGY, p. 149, Pl. XXXIV, Fig. 1.

Description: after NAGY (1969). Size range: 85.0 - 120.0 µm.
Botanical affinity: genus *Keteleeria* CARR.
Stratigraphic range: Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Tsugaepollenites* POTONIÉ & VENITZ 1934
Type species: *Tsugaepollenites igniculus* (POTONIÉ 1931) POTONIÉ & VENITZ 1934

(41) *Tsugaepollenites maximus* (RAATZ 1937) NAGY 1985
Pl. 5, Fig. 1, 4.

1937 *Tsuga-pollenites igniculus* POTONIÉ f. *maximus* n. f. - RAATZ, p. 15, Fig. 13
1971 *Zonalapollenites maximus* (RAATZ 1937) n. c. - KRUTZSCH, p. 138, Pl. 36.
1985 *Tsugaepollenites maximus* (RAATZ 1937) n. c. - NAGY, p. 135-136, Pl. LXVI, Fig. 1-2.
1994a *Tsuga* cf. *canadensis* (L.) CARR. - IVANOV, p. 32, Pl. III, Fig. 8.

Description: after NAGY (1985) and IVANOV (1994a). Size range: D= 65.0 - 97.0 µm.
Botanical affinity: *Tsuga canadensis* (L.) CARR.

Stratigraphic range: Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(42) *Tsugaepollenites spinulosus* (KRUTZSCH 1971) NAGY 1985
Pl. 5, Fig. 2, 3, 5.

1971 *Zonalapollenites spinulosus* n. fsp. (=*Tsuga spinulosa* n. sp.) - KRUTZSCH, p. 148, Pl. 41, Fig. 1-10.
1985 *Tsugaepollenites spinulosus* (KRUTZSCH 1971) n. c. - NAGY, p. 136, Pl. LXVII, Fig. 2.
1994a *Tsuga* cf. *heterophylla* (RAFIN) SARGENT - IVANOV, p. 32, Pl. IV, Fig. 1.

Description: after NAGY (1985) and IVANOV (1994a). Size range: D= 71.0 - 103.0 µm.
Botanical affinity: *Tsuga heterophylla* (RAFIN) SARGENT.
Stratigraphic range: Middle Miocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(43) *Tsugaepollenites minimus* (KRUTZSCH 1971) NAGY 1985
Pl. 5, Fig. 6, 7.

1971 *Zonalapollenites minimus* n. fsp. (=*Tsuga minima* n. sp.) - KRUTZSCH, p. 150, Pl. 42, Fig. 1-20.
1985 *Tsugaepollenites minimus* (KRUTZSCH 1971) n. c. - NAGY, p. 136, Pl. LXVI, Fig. 4-6.
1994a *Tsuga* sp. - IVANOV, p. 32, Pl. IV, Fig. 2.

Description: after NAGY (1985) and IVANOV (1994a). Size range: D= 50.0 - 54.0 µm.
Botanical affinity: *Tsuga* sp.
Stratigraphic range: Middle Miocene - Pliocene.
Occurrence in NWBg: Sarmatian - Pontian.

Genus *Piceapollis* KRUTZSCH 1971
Type species: *Piceapollis praemarianus* KRUTZSCH 1971

(44) *Piceapollis planoides* KRUTZSCH 1971
Pl. 5, Fig. 8, 9.

1971 *Piceapollis planoides* n. fsp. - KRUTZSCH, p. 110-111, Pl. 25, 1-4
1994a *Picea* sp. - IVANOV, p. 32, Pl. IV, Fig. 3.

Description: after KRUTZSCH (1971). Size range: 75-118 x 58-81 µm.
Botanical affinity: genus *Picea* L.
Stratigraphic range: Upper Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Larixidites* MALJAVKINA 1958
Type species: *Larixidites orbipatelliformis* MALJAVKINA 1958

(45) *Larixidites gerceënsis* (NAGY 1985) NAGY 1992
Pl. 5, Fig. 10.

1985 *Laricispollenites gerceensis* n. sp. - NAGY, p. 141, Pl. LXXIV, Fig. 2-5.
1992 *Larixidites gerceënsis* (NAGY 1985) n. c. - NAGY, p. 347.
1994a cf. *Larix* - IVANOV, p. 32, Pl. IV, Fig. 4.

Description: after NAGY (1985). Size range: 54.0-73.0 µm.
Botanical affinity: genus *Larix* L.

Stratigraphic range: Miocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Cedripites* WODEHOUSE 1933
Type species: *Cedripites eocenicus* WODEHOUSE 1933

(46) *Cedripites deodaraesimilis* (NAGY 1969) NAGY 1985
Pl. 5, Fig. 11.

1969 *Cedripites deodaraeformis* n. sp. - NAGY, p.151, Pl. XXXV, Fig. 2.
1985 *Cedripites deodaraesimilis* (NAGY 1969) nov. nom. - NAGY, p. 142, Pl. LXXVI, Fig. 2-5.
1994a *Cedrus* sp. - IVANOV, p. 32, Pl. IV, Fig. 5.

Description: after NAGY (1985) and IVANOV (1994a). Size range: 55.0-84.0 x 35.0-42.0 μm.
Botanical affinity: *Cedrus deodara* LOUD.
Stratigraphic range: Miocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Pityosporites* SEWARD 1914
Type species: *Pityosporites antarcticus* SEWARD 1914

(47) *Pityosporites microalatus* (POTONIÉ 1931) THOMSON & PFLUG 1953
Pl. 5, Fig. 12, 13.

1931d *Pollenites microalatus* n. sp. - POTONIÉ, p. 3, Abb. 34.
1953 *Pityosporites microalatus* (POTONIÉ 1931) n. c. - THOMSON & PFLUG, p. 67, Pl. 5, Fig. 49-59.
1994a *Pinus haploxylon* RUDOLPH - type - IVANOV, p. 32, Pl. V, Fig. 1.

Description: after IVANOV (1994a). Size range: 65.0-90.0 x 35.0-48.0 μm.
Botanical affinity: *Pinus haploxylon* RUDOLPH - type (incl. genus *Cathaya* CHUN & KUANG).
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(48) *Pityosporites labdacus* (POTONIÉ 1931) THOMSON & PFLUG 1953
Pl. 5, Fig. 14.

1931d *Pollenites labdacus* n. sp. - POTONIÉ, p. 3, Abb. 32.
1953 *Pityosporites labdacus* (POTONIÉ 1931) n. c. - THOMSON & PFLUG, p. 68, Pl. 5, Fig. 60-62.
1994a *Pinus sylvestris* L. - type - IVANOV, p. 33, Pl. V, Fig. 2.

Description: after IVANOV (1994a). Size range: 66.0-98.0 x 38.0-54.0 μm.
Botanical affinity: *Pinus sylvestris* (*diploxylon*) type.
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Taxodiaceae WARMING
Genus *Sciadopityspollenites* RAATZ 1937
Type species: *Sciadopityspollenites serratus* (POTONIÉ & VENITZ 1934) RAATZ 1937

(49) *Sciadopityspollenites serratus* (POTONIÉ & VENITZ 1934) RAATZ 1937
Pl. 6, Fig. 1, 2, 3.

1934 *Pollenites serratus* n. sp. - POTONIÉ & VENITZ, p. 15, Pl. 1, Fig.6-7.
1937 *Sciadopitys-pollenites serratus* POTONIÉ & VENITZ - RAATZ, p.13, Pl. 1, Fig. 16.

Description: after MOHR (1984). Size range: 32.1-39.2 μm.
Botanical affinity: genus *Sciadopitys* SIEB. & ZUCC., *S* cf. *verticillata* (THBG.) SIEB. & ZUCC.
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Badenian - Maeotian.

Genus *Sequoiapollenites* THIERGART 1938
Type species: *Sequoiapollenites polyformosus* THIERGART 1938

(50) *Sequoiapollenites polyformosus* THIERGART 1937
Pl. 6, Fig. 4, 5.

1938 *Sequoiapollenites polyformosus* resp. *polyformosus* n. sp. - THIERGART, p. 301-302, Pl. 23, Fig. 5-11.
1971 *Sequoiapollenites polyformosus* THIERGART 1937 - KRUTZSCH, p. 212, Pl. 68.
1994a *Sequoia* sp. - IVANOV, p. 33, Pl.V, Fig. 4.

Description: after IVANOV (1994a). Size range: D= 28.1-35.2 μm.
Botanical affinity: genera *Sequoia* ENDL. and *Cryptomeria* D. DON (MOHR 1984).
Stratigraphic range: Middle Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Lower Maeotian.

(51) *Sequoiapollenites* cf. *rotundus* KRUTZSCH 1971
Pl. 6, Fig. 6, 7, 8.

1971 *Sequoiapollenites rotundus* n. fsp. - KRUTZSCH, p. 222, Pl. 73, Fig. 1-24.
1980 *Sequoiapollenites rotundus* KRUTZSCH 1971 - THIELE-PFEIFFER, p. 120, Pl. 7, Fig. 4
1994a *Taxodium* sp. - IVANOV, p. 33, Pl.V, Fig. 3.

Description: after IVANOV (1994a). Size range: D= 31.8-37.2 μm.
Botanical affinity: genus *Taxodium* RICHARD.
Stratigraphic range: Middle Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Lower Maeotian.

(52) *Sequoiapollenites* cf. *megaligulus* KRUTZSCH 1971
Pl. 6, Fig. 9.

1971 *Sequoiapollenites megaligulus* n. fsp. - KRUTZSCH, p. 222, Pl. 73, Fig. 25-35.
1994a *Taiwania* sp. - IVANOV, p. 33, Pl.V, Fig. 5.

Description: after IVANOV (1994a). Size range: D_1= 24.0-26.5 μm, D_2= 31.0-33.5 μm.
Botanical affinity: genus *Taiwania* HAYATA.
Stratigraphic range: Oligocene/Miocene - Lower Miocene.
Occurrence in NWBg: Badenian - Sarmatian (Volhynian and Bessarabian).

Genus *Inaperturopollenites* PFLUG & THOMSON IN THOMSON & PFLUG 1953
Type species: *Inaperturopollenites dubius* (POTONIÉ & VENITZ 1934) THOMSON & PFLUG 1953

(53) *Inaperturopollenites hiatus* (POTONIÉ 1931) THOMSON & PFLUG 1953
Pl. 6, Fig. 10, 11.

1931d *Pollenites hiatus* n. f. - POTONIÉ, p. 3, Abb. 27.
1953 *Inaperturopollenites hiatus* (POTONIÉ 1931) n. c. - THOMSON & PFLUG, p. 65, Pl. 5, Fig. 14-20.

1994a Taxodiaceae gen. ind. - IVANOV, p. 33, Pl.V, Fig. 6.

Description: after IVANOV (1994a). Size range: D= 21.0-39.0 μm.
Botanical affinity: fam. Taxodiaceae.
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Cupressaceae BARTLING
Genus *Cupressacites* BOLCHOVITINA 1956 emend. KRUTZSCH 1971
Type species: *Cupressacites coriaceus* (NAUMOVA 1937) BOLCHOVITINA 1956

(54) *Cupressacites bockwitzensis* KRUTZSCH 1971
Pl. 6, Fig. 12.

1971 *Cupressacites bockwitzensis* n. fsp. - KRUTZSCH, p. 196, Pl. 62, Fig. 19-25.
1994a Cupressaceae gen. ind. - IVANOV, p. 33, Pl.V, Fig. 7.

Description: after KRUTZSCH (1971) and IVANOV (1994a). Size range: D= 20.0-37.0 μm.
Botanical affinity: fam. Cupressaceae, the fossil pollen is similar to the pollen of genus *Thuja* (L.) TOURN.
Stratigraphic range: Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Podocarpaceae NEGER
Genus *Podocarpidites* COOKSON 1947 EX COUPER 1953
Type species: *Podocarpidites ellipticus* (COOKSON 1947) COUPER 1953

(55) *Podocarpidites* cf. *libellus* (POTONIÉ 1932) KRUTZSCH 1971
Pl. 6, Fig. 13.

1971 *Podocarpidites libellus* (POTONIÉ 1932) n. c. - KRUTZSCH, p. 128, Pl. 32, Fig. 1-22.
1985 *Podocarpidites libellus* (POTONIÉ 1932) KRUTZSCH 1971 - NAGY, p. 149, Pl. LXXXII, Fig.6-9.
1994a cf. *Podocarpus* - IVANOV, p. 33, Pl.V, Fig. 8.

Description: after KRUTZSCH (1971) and IVANOV (1994a). Size range: 55.0-95.0 μm.
Botanical affinity: fam. Podocarpaceae, genus *Podocarpus* L'HERIT.
Stratigraphic range: Oligocene - Miocene.
Occurrence in NWBg: Badenian - Pontian.

3.4. Division MAGNOLIOPHYTA

3.4.1. Class MAGNOLIOPSIDA

Fam. Magnoliaceae JUSSIEU
Genus *Magnolipollis* KRUTZSCH 1970
Type species: *Magnolipollis neogenicus* KRUTZSCH 1970

(56) *Magnolipollis neogenicus* KRUTZSCH 1970 ssp. *neogenicus*
Pl. 6, Fig. 16.

1970a *Magnolipollis neogenicus neogenicus* n. sp. et n. subfsp. - KRUTZSCH, p. 132, Pl. 32, Fig. 1-6.
1984 *Magnoliaepollenites neogenicus neogenicus* (KRUTZSCH 1970) n. c. - MOHR, p. 64, Pl. 8, Fig. 10.1, 10.2, 12.

1990 *Magnoliaepollenites neogenicus neogenicus* (KRUTZSCH 1970) n. c. - PLANDEROVÁ, p. 55-56, Pl. LIV, Fig. 17-19, Pl. LV, Fig. 5-6.
1994b *Magnolia piramidata*-type - IVANOV, p. 40, Pl. I, Fig. 1.

Description: after IVANOV (1994b). Size range: E1= 57.0-60.0 μm, E2= 25.0-29.0 μm.
Botanical affinity: *Magnolia pyramidata* PURSH., *M. virginiana* L.
Stratigraphic range: Middle Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(57) *Magnolipollis neogenicus* KRUTZSCH 1970 ssp. *minor* KRUTZSCH 1970
Pl. 6, Fig. 14, 15.

1970a *Magnolipollis neogenicus minor* n. subfsp. - KRUTZSCH, p. 132, Pl. 33, Fig. 1-18.
1994 *Magnolipollis neogenicus minor* KRUTZSCH 1970 - ZIEMBINSKA-TWORZYDLO ET AL., Pl. 11, Fig. 5.
1996 *Magnolipollis neogenicus* KRUTZSCH 1970 subsp. *minor* KRUTZSCH 1970 - ASHRAF & MOSBRUGGER, p. 21, Pl. 4, Fig. 9.

Description: after KRUTZSCH (1970a). Size range: E1= 43.2-46.5 μm, E2= 20.0-21.5 μm, exine: 0.9-1.1 μm thick, tectate-perforate. Ornamentation: scabrate.
Botanical affinity: genus *Magnolia* L.
Stratigraphic range: Middle Oligocene - Pliocene.
Occurrence in NWBg: Badenian.

Fam. Chloranthaceae R. BR. EX LINDL.
Genus *Chloranthacearumpollenites* NAGY 1969
Type species: *Chloranthacearumpollenites dubius* NAGY 1969

(58) *Chloranthacearumpollenites dubius* NAGY 1969
Pl. 6, Fig. 17, 18.

1969 *Chloranthacearumpollenites dubius* n. sp. - NAGY, p. 170-171, Pl. XLI, Fig. 6, 7, 12.
1994b *Chloranthus* sp. - IVANOV, p. 41, Pl. I, Fig. 6, 7.

Description: after IVANOV (1994b). Size range: 24.0 - 27.0 μm.
Botanical affinity: fam. Chloranthaceae R. BR. EX LINDL., *Chloranthus* spp.
Stratigraphic range: Middle Miocene.
Occurrence in NWBg: Badenian, Sarmatian (Volhynian and Bessarabian) and Maeotian.

Fam. Nymphaeaceae SALYSBURY
Genus *Nupharipollis* KRUTZSCH 1970
Type species: *Nupharipollis echinatus* KRUTZSCH 1970

(59) *Nupharipollis echinatus* KRUTZSCH 1970
Pl. 6, Fig. 19, 20.

1970a *Nupharipollis echinatus* n. sp. - KRUTZSCH, p. 89, Pl. 40.
1994b cf. *Nuphar* - IVANOV, p. 41, Pl. I, Fig. 2, 3.

Description: after IVANOV (1994b). Size range: E1= 52.0-57.5 μm, E2= 24.6-28.1 μm.
Botanical affinity: fam. Nymphaeaceae SALYSBURY, *Nuphar lutea* type.
Stratigraphic range: Miocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Nelumbonaceae DUMORTIER

Genus *Nelumbopollenites* SKAWINSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994

Type species: *Nelumbopollenites europaeus* (TARASEVICH 1983) SKAWINSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994

(60) *Nelumbopollenites* sp.
Pl. 6, Fig. 21.

Description: after IVANOV (1994b). Size range: E= 58.0-62.0 μm.
Botanical affinity: fam. Nelumbonaceae, *Nelumbo* cf. *caspicum* (D.C.) FISH.
Occurrence in NWBg: Badenian - Pontian.

Fam. Hamamelidaceae R. BR. IN ABEL

Genus *Retitricolpites* VAN DER HAMMEN 1956 EX PIERCE 1961

Type species: *Retitricolpites ovalis* VAN DER HAMMEN & WYMSTRA 1964 (lectogenotype - after VAN DER HAMMEN & WYMSTRA 1964)

(61) *Retitricolpites vulgaris* PIERCE 1961
Pl. 6, Fig. 22, 23.

1965 *Retitricolpites vulgaris* PIERCE 1961 - KREMP & AMES, 23-71, Fig. 101, 102.

Description: 3-colpate pollen grains. Outlines: rounded trilobate in polar view. Size range: E= 27.0-34.0 μm, apocolpium 7.0-9.0 μm in diameter, mesocolpium width = 17.0-18.0 μm. Apertures: colpi, colpus membrane destroyed. Exine: 1.7-2.2 μm thick, semitectate. Ornamentation: reticulate, diameter of lumens= 0.6-1.2 μm.
Botanical affinity: The fossil pollen is similar to the pollen of the extant species *Corylopsis pauciflora* SIEB. & ZUCC. (TSIN-TAN 1964). PALAMAREV & PETKOVA (1987) found in the Sarmatian sediments of Northwest Bulgaria leaf imprints which are similar to the extant species *C. villmottie* RHED. & WILS. The pollen of this species differs from the established by us pollen in its ornamentation.
Stratigraphic range: Upper Cretaceous of Dakota, USA (KREMP & AMES 1965).
Occurrence in NWBg: Badenian - Pontian.

Genus *Liquidambarpollenites* RAATZ 1937

Type species: *Liquidambarpollenites stigmosus* (POTONIÉ 1931) RAATZ 1937

(62) *Liquidambarpollenites formosanaeformis* NAGY 1969
Pl. 7, Fig. 1.

1969 *Liquidambarpollenites formosanaeformis* n. sp. - NAGY, p. 172-173, Pl. XLI, Fig. 9, 14.
1994b *Liquidambar formosana* HANCE foss.- IVANOV, p. 40, Pl. I, Fig. 4, 5.

Description: after NAGY (1969) and IVANOV (1994b). Size range: D= 34.0-44.0 μm, pores rounded, with diameter = 4.3-6.7 μm, ornamentation - reticulate, diameter of lumina = 0.8-1.2 μm.
Botanical affinity: *Liquidambar formosana* HANCE.
Stratigraphic range: Miocene.
Occurrence in NWBg: Badenian - Pontian.

(63) *Liquidambarpollenites orientaliformis* NAGY 1969
Pl. 7, Fig.2, 3.

1969 *Liquidambarpollenites orientaliformis* n. sp. - NAGY, p. 171-172, Pl. XLII, Fig. 1, 2.

Description: after NAGY (1969). Size range: D= 37.5-41.5 μm, pores elliptical, 3.5-4.7 x 4.5-6.5 μm, ornamentation - reticulate, diameter of lumina = 1.5-1.7 μm.
Botanical affinity: *Liquidambar orientalis* MILL.
Stratigraphic range: Miocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Periporopollenites* THOMSON & PFLUG 1953 emend. KRUTZSCH 1966
Type species: *Periporopollenites stigmosus* (POTONIÉ 1931) THOMSON & PFLUG 1953

(64) *Periporopollenites* sp.
Pl. 7, Fig. 4.

Description: Polyporate pollen grains. Outlines: almost rounded. Size range: D= 30.5-34.5 μm. Apertures: 10-11 pores, equally distributed around the whole pollen grain, rounded, diameter = 4.4-5.2 μm, pore membrane finely granulate. Exine: 1.9-2.1 μm thick, semitectate. Ornamentation: reticulate, homobrochate, diameter of lumina = 0.6-0.8 μm.
Botanical affinity: In its morphological features the fossil pollen grains are similar to the pollen of the extant genus *Altingia* NOR. (TSIN-TAN 1959, 1964). They differ from pollen grains of genus *Liquidambar* L. by its smaller dimensions and finer reticulum.
Occurrence in NWBg: Badenian - Pontian.

Fam. Platanaceae DUMORTIER
Genus *Platanipollis* GRABOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Type species: *Platanipollis ipelensis* (PACLTOVÁ 1966) GRABOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994

(65) *Platanipollis ipelensis* (PACLTOVÁ 1966) GRABOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Pl. 7, Fig. 5, 6.

1966 *Tricolporopollenites ipelensis* n. sp. - PACLTOVÁ, p. 25, Pl. 19, Fig. 14-19.
1994b *Platanus orientalis* L. foss. - IVANOV, p. 41, Pl. II, Fig. 2, 3.
1994 *Platanipollis ipelensis* (PACLTOVÁ 1966) n. c. - GRABOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL., p. 26, Pl. 14, Fig. 21 a-c.

Description: after GRABOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. (1994) and IVANOV (1994b). Size range: E= 16.5-20.6 μm, P= 21.5-25.5 μm.
Botanical affinity: *Platanus orientalis* L. PALAMAREV & PETKOVA (1987) found in the sediments of Northwest Bulgaria the fossil species *Platanus lineariloba* KOLAKOVSKYI 1955 (leaf imprints) which recent analogue is also *Platanus orientalis.*
Stratigraphic range: Upper Paleocene - Middle Miocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Platanoidites* POTONIÉ, THOMSON & THIERGART 1950
Type species: *Platanoidites gertrudae* (POTONIÉ 1931) POTONIÉ, THOMSON & THIERGART 1950

(66) *Platanoidites gertrudae* (POTONIÉ 1931) POTONIÉ, THOMSON & THIERGART 1950
Pl. 7, Fig. 7, 8.

1931a *Pollenites gertrudae* n. sp. - POTONIÉ, p. 322, Pl. 2, Fig. 34.
1950 *Platanoidites gertrudae* (POTONIÉ 1931) n. c. - POTONIÉ, THOMSON & THIERGART, p. 57, Pl. B, Fig. 40.

1994b *Platanus occidentalis*-type - IVANOV, p. 41, Pl. II, Fig. 4, 5.
1996 *Platanoidites gertrudae* (POTONIÉ 1931) POTONIÉ, THOMSON & THIERGART - ASHRAF & MOSBRUGGER, p. 26.

Description: after IVANOV (1994b). Size range: E= 15.5-23.2 μm, P= 19.5-26.0 μm.
Botanical affinity: *Platanus occidentalis* type (after the type described by LIEUX 1980). In the fossil macroflora of Northwest Bulgaria (PALAMAREV & PETKOVA 1987) the fossil species *Platanus platanifolia* (ETT. 1851) KNOBLOCH 1964 is presented (recent analogue - *Platanus occidentalis*).
Stratigraphic range: Middle Eocene - Miocene/Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Eucommiaceae VAN TIEGHEM
Genus *Eucommioipollis* ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Type species: *Eucommioipollis eucommius* (PLANDEROVÁ 1990) ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL. 1994

(67) *Eucommioipollis parmularius* (POTONIÉ 1934) ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Pl. 7, Fig. 9.

1934 *Pollenites parmularius* n. sp. - POTONIÉ, p. 52, Pl. 2, Fig. 7.
1953 *Tricolpopollenites parmularius* (POTONIÉ) n. c. - THOMSON & FFLUG, p. 97, Pl. 11, Fig. 152-162.
1960 *Tricolporopollenites parmularius* (POTONIÉ) n. c. - KRUTZSCH IN KRUTZSCH, PCHALEK & SPIEGLER, p. 140, Pl. 2, Fig. 93.
1994b *Eucommia ulmoides* OLIV. foss. - IVANOV, p. 41-42, Pl. II, Fig. 6.
1994 *Eucommioipollis parmularius* (POTONIÉ 1934) n. c. - ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL., p. 24, Pl. 13, Fig. 7a, b.

Description: after IVANOV (1994b). Size range: E= 20.2-27.9 μm, P= 31.0-34.0 μm.
Botanical affinity: In its shape, size and structure of the apertures the fossil species is similar to the pollen of the extant species *Eucommia ulmoides* OLIV.
Stratigraphic range: Paleocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Ulmaceae MIRBEL
Genus *Ulmipollenites* WOLFF 1934
Type species: *Ulmipollenites undolosus* WOLFF 1934

(68) *Ulmipollenites undolosus* WOLFF 1934
Pl. 7, Fig. 10, 11.

1934 *Ulmipollenites undolosus* n. sp. - WOLFF, p. 75, Pl. 5, Fig. 25.
1953 *Polyporopollenites undolosus* (WOLFF) n. c. - THOMSON & FFLUG, p. 90, Pl. 10, Fig. 52-58.
1985 *Ulmipollenites undolosus* WOLFF 1934 - NAGY, p. 196, Pl. CXI, Fig. 15, 16.
1994b *Ulmus* sp. - IVANOV, p. 42, Pl. II, Fig. 7.

Description: after IVANOV (1994b). Size range: D= 30.0-35.0 μm.
Botanical affinity: genus *Ulmus* L.
Stratigraphic range: Eocene - Pleistocene.
Occurrence in NWBg: Badenian - Pontian.

(69) *Ulmipollenites planeraeformis* (ANDERSON 1960) KONZALOVA 1976
Pl. 7, Fig. 12

1960 *Ulmoideipites planeraeformis* n. sp. - ANDERSON, p. 20, Pl. 12, Fig. 25.

1976 *Ulmipollenites planeraeformis* (ANDERSON 1960) n. c. - KONZALOVA, p. 22-23.
1994b *Planera aquatica*-type - IVANOV, p. 42, Pl. II, Fig. 8.

Description: after IVANOV (1994b). Size range: D= 37.0-41.0 μm.
Botanical affinity: *Planera aquatica* type.
Stratigraphic range: Miocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Zelkovaepollenites* NAGY 1969
Type species: *Zelkovaepollenites potoniei* NAGY 1969

(70) *Zelkovaepollenites potoniei* NAGY 1969
Pl. 7, Fig. 13, 14.

1969 *Zelkovaepollenites potoniei* n. sp. - NAGY, p. 225, Pl. LI, Fig. 17,20.
1994b *Zelkova* sp. - IVANOV, p. 42, Pl. II, Fig. 9, 10.

Description: after IVANOV (1994b). Size range: D= 31.0-35.0 μm.
Botanical affinity: *Zelkova* sp., cf. *Zelkova serrata* (THUNB) MAKINO.
Stratigraphic range: Miocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Celtipollenites* NAGY 1969
Type species: *Celtipollenites komloënsis* NAGY 1969

(71) *Celtipollenites komloënsis* NAGY 1969
Pl. 7, Fig. 15.

1969 *Celtipollenites komloënsis* n. sp. - NAGY, p. 224, Pl. XLIII, Fig. 3, 7.
1994b *Celtis* sp. - IVANOV, p. 42, Pl. II, Fig. 9, 11.

Description: after NAGY (1969) and IVANOV (1994b). Size range: D= 28.0-34.0 μm.
Botanical affinity: genus *Celtis* L., *C. australis* L., *C. occidentalis* L.
Stratigraphic range: Middle and Upper Miocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Fagaceae DUMORTIER
Genus *Faguspollenites* RAATZ 1937
Type species: *Faguspollenites verus* RAATZ 1937

(72) *Faguspollenites verus* RAATZ 1937
Pl. 7, Fig. 16.

1937 *Fagus-pollenites verus* n. sp. - RAATZ, p. 23, Pl. 1, Fig. 17.
1994b *Fagus* sp. - IVANOV, p. 42, Pl. III, Fig. 1.
1996 *Faguspollenites verus* RAATZ 1937 - ASHRAF & MOSBRUGGER, p. 47, Pl. 7, Fig. 21, 22.

Description: after IVANOV (1994b). Size range: D= 39.0-45.8 μm.
Botanical affinity: *Fagus* sp.
Stratigraphic range: Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Tricolporopollenites* PFLUG & THOMSON IN THOMSON & PFLUG 1953
Type species: *Tricolporopollenites dolium* (POTONIÉ 1931) THOMSON & PFLUG 1953

(73) *Tricolporopollenites cingulum* (POTONIÉ 1931) THOMSON & PFLUG 1953
ssp. *pusillus* (POTONIÉ 1934) THOMSON & PFLUG 1953
Pl. 7, Fig. 17.

1934 *Pollenites quisqualis pusillus* n. f. - POTONIÉ, p. 71, Pl. 3, Fig. 21.
1953 *Tricolporopollenites cingulum* (POTONIÉ 1931) n. c. ssp. *pusillus* (POTONIÉ 1934) n. c. - THOMSON & PFLUG, p. 100, Pl.12, Fig. 28-41.
1994 *Castaneoideaepollis pusillus* (POTONIÉ 1934) n. c. - GRABOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL., p. 21, Pl.12, Fig. 8, 9.
1996 *Tricolporopollenites cingulum* (POTONIÉ 1931) THOMSON & PFLUG 1953 ssp. *pusillus* (POTONIÉ 1934) THOMSON & PFLUG 1953 - ASHRAF & MOSBRUGGER, p. 37-38, Pl. 6, Fig. 10, 11.

Description: after THOMSON & PFLUG (1953). Size range: E= 9.5 - 14.5 μm; P= 12.5 - 19.5 μm.
Botanical affinity: genera *Castanea* pp., *Passania* pp., *Castanopsis* pp. The fossil pollen grains resemble *Castanea americana* type described by KEDVES (1982).
Stratigraphic range: (Paleocene) Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(74) *Tricolporopollenites cingulum* (POTONIÉ 1931) THOMSON & PFLUG 1953
ssp. *oviformis* (POTONIÉ 1931) THOMSON & PFLUG 1953
Pl. 7, Fig. 18.

1931a *Pollenites oviformis* n. sp. - POTONIÉ, p. 328, Pl. 1, Fig. 20.
1953 *Tricolporopollenites cingulum* (POTONIE 1931) n. c. ssp. *oviformis* (POTONIÉ 1931) n. c. - THOMSON & PFLUG, p. 100, Pl.12, Fig. 42-49
1994b *Castanea sativa* type - IVANOV, p. 43, Pl. III, Fig. 2.
1994 *Castaneoideaepollis oviformis* (POTONIÉ 1934) n. c. - GRABOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL., p. 21, Pl.12, Fig. 10.
1996 *Tricolporopollenites cingulum* (POTONIÉ 1931) THOMSON & PFLUG 1953 ssp. *oviformis* (POTONIÉ 1931) THOMSON & PFLUG 1953 - ASHRAF & MOSBRUGGER, p. 37, Pl. 6, Fig. 8, 9.

Description: after IVANOV (1994b). Size range: E= 11.3 - 17.0 μm; P= 15.5 - 23.5 μm.
Botanical affinity: *Castanea sativa* type.
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(75) *Tricolporopollenites liblarensis* (THOMSON 1950) GRABOWSKA
IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Pl. 7, Fig. 19.

1953 pp. *Tricolporopollenites liblarensis* (THOMSON) (=*quisqualis* POTONIÉ) n. c. - THOMSON & PFLUG, p. 97, Pl.11, Fig. 111-132.
1994b cf. *Castanopsis* - IVANOV, p. 43, Pl. III, Fig. 3.
1994 *Tricolporopollenites liblarensis* (THOMSON 1950) n. c. - GRABOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL., p. 28, Pl.16, Fig. 13,14.

Description: after GRABOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. (1994) and IVANOV (1994b). Size range: E= 11.3 - 17.0 μm; P= 15.5 - 23.5 μm. GRABOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. (1994) transferred the pp. *Tricolpopollenites liblarensis* to the genus *Tricolporopollenites* on the base of the structure of the apertures - colporate.
Botanical affinity: The fossil species is closest to recent genera *Castanopsis* (D. DON.) SPACH. and *Lithocarpus* BLUME (=*Pasania* OERSTED). GRABOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. (1994) pointed out similarities with species belonging to the fam. Fabaceae, Combretaceae and Verbenaceae.

Stratigraphic range: Upper Paleocene - Miocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Quercoidites* POTONIÉ, THOMSON & THIERGART 1950 emend. SLODKOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Type species: *Quercoidites henrici* (POTONIÉ 1931) POTONIÉ, THOMSON & THIRGART 1950

(76) *Quercoidites asper* (PFLUG & THOMSON IN THOMSON & PFLUG 1953) SLODKOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Pl. 7, Fig. 20, 21.

1953 *Tricolpopollenites asper* n. sp. - PFLUG & THOMSOM IN THOMSON & PFLUG, p. 96, Pl. 11, Fig. 43-49.
1994b *Quercus* sp. - IVANOV, p. 43, Pl. III, Fig. 4.
1994 *Quercoidites asper* (PFLUG & THOMSON IN THOMSON & PFLUG 1953) n. c. - SLODKOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL., p.24, Pl. 15, Fig. 1.

Description: after SLODKOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. (1994) and IVANOV (1994b).
Size range: E= 18.6 - 23.3 μm; P= 24.8 - 35.6 μm.
Botanical affinity: *Quercus robur* type.
Stratigraphic range: Lower Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(77) *Quercoidites henrici* (POTONIÉ 1931) POTONIÉ, THOMSON & THIRGART 1950
Pl. 7, Fig. 22.

1931a *Pollenites henrici* n. sp. - POTONIÉ, p. 329, Pl. 2, Fig. 19.
1950 *Quercoidites henrici* (POTONIÉ 1931) n. c. - POTONIÉ, THOMSON & TIERGART, p.54, Pl. B, Fig. 22, 23.
1980 *Tricolpopollenites henrici* (POTONIE 1931) THOMSON & PFLUG 1953 - THIELE-PFEIFFER, p. 142, Pl. 11, Fig. 1, 2.
1996 *Quercoidites henrici* (POTONIÉ 1931) POTONIÉ, THOMSON & TIERGART 1950 - ASHRAF & MOSBRUGGER, p. 27, Pl. 5, Fig. 10.

Description: after THIELE-PFEIFFER (1980). Size range: E= 15.0 - 22.0 μm; P= 25.0 - 31.0 μm.
Botanical affinity: *Quercus* sp.
Stratigraphic range: Eocene?, Oligocene - Miocene.
Occurrence in NWBg: Sarmatian.

Fam. Betulaceae
Genus *Alnipollenites* POTONIÉ 1934
Type species: *Alnipollenites verus* (POTONIÉ 1931) POTONIÉ 1934

(78) *Alnipollenites verus* (POTONIÉ 1931) POTONIÉ 1934
Pl. 8, Fig. 1, 2.

1931a *Pollenites verus* n. sp. - POTONIÉ, p. 329, Pl. 2, Fig. 40.
1934 *Alnipollenites verus* (POTONIÉ 1931) n. c. - POTONIÉ, p. 58, Pl. 2, Fig. 17.
1953 *Polyvestibulopollenites* (*Alnipollenites*) *verus* (POTONIÉ 1931) n. c. - THOMSON & PFLUG, p. 90, Pl. 10, Fig. 69-76.
1994b *Alnus* sp. - IVANOV, p. 43, Pl. III, Fig. 5.

Description: after IVANOV (1994b). Size range: D= 19.5 - 27.0 μm.
Botanical affinity: genus *Alnus* MILLER, *Alnus serrulata* type.
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Betulaepollenites* POTONIÉ 1934
Type species: *Betulaepollenites microexelsus* POTONIÉ 1934

(79) *Betulaepollenites betuloides* (PFLUG IN THOMSON & PFLUG 1953) NAGY 1969
Pl. 8, Fig. 3.

1953 *Trivestibulopollenites betuloides* n. sp. - PFLUG IN THOMSON & PFLUG, p. 85, Pl. 9, Fig. 25-34.
1969 *Betulaepollenites betuloides* (PFLUG IN THOMSON & PFLUG 1953) n. c. - NAGY, p. 228, Pl. LII, Fig. 12.
1994b *Betula* subtype *costata* - IVANOV, p. 43, Pl. III, Fig. 6.

Description: after IVANOV (1994b). Size range: D= 19.0 - 25.5 µm.
Botanical affinity: genus *Betula* L., *Betula* subtype *costata* (sensu KUPRIANOVA 1965).
Stratigraphic range: Middle Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Carpinipites* SRIVASTAVA 1966
Type species: *Carpinipites ancipites* (WODEHOUSE 1933) SRIVASTAVA 1966

(80) *Carpinipites carpinoides* (PFLUG IN THOMSON & PFLUG 1953) NAGY 1985
Pl. 8, Fig. 4, 5.

1953 *Polyporopollenites carpinoides* n. sp. - PFLUG IN THOMSON & PFLUG, p. 92, Pl. 10, Fig. 79-83.
1969 *Carpinuspollenites carpinoides* (PFLUG IN THOMSON & PFLUG 1953) n. c. - NAGY, p. 228, Pl. LII, Fig. 8.
1985 *Carpinipites carpinoides* (PFLUG IN THOMSON & PFLUG 1953) n. c. - NAGY, p. 198, Pl. CXII, Fig. 9-14.
1994b *Carpinus* sp.- IVANOV, p. 43, Pl. III, Fig. 7, 8.
1996 *Carpinuspollenites carpinoides* (PFLUG IN THOMSON & PFLUG 1953) NAGY 1969 - ASHRAF & MOSBRUGGER, p. 58, 59, Pl. 9, Fig. 2, 3.

Description: after IVANOV (1994b). Size range: D= 29.5-37.8 µm.
Botanical affinity: genus *Carpinus* L.
Stratigraphic range: Middle Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Corylopollis* ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Type species: *Corylopollis coryloides* (PFLUG IN THOMSON & PFLUG 1953) ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL. 1994

(81) *Corylopollis coryloides* (PFLUG IN THOMSON & PFLUG 1953)
ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Pl. 8, Fig. 6.

1953 *Triporopollenites coryloides* n. sp. - PFLUG IN THOMSON & PFLUG, p. 84, Pl. 9, Fig. 20-24.
1994b *Corylus* subtype *ferox*- IVANOV, p. 43-44, Pl. III, Fig. 9, 10.
1994 *Corylopollis coryloides* (PFLUG IN THOMSON & PFLUG 1953) n. c. - ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL., p. 16, Pl. 8, Fig. 17, 18.

Description: after IVANOV (1994b). Size range: D= 29.0-33.5 µm.
Botanical affinity: genus *Corylus* L, *Corylus* subtype *ferox* (sensu KUPRIANOVA 1965).
Stratigraphic range: Middle Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Ostryapollenites* THOMSON 1950
Type species: *Ostryapollenites rhenanus* (THOMSON IN POTONIÉ, THOMSON & THIERGART 1950) NAGY 1969

(82) *Ostryapollenites rhenanus* (THOMSON IN POTONIÉ, THOMSON & THIERGART 1950) NAGY 1969
Pl. 8, Fig. 7.

1950 *Ostrya?-Pollenites granifer rhenanus* n. sp. - THOMSON IN POTONIÉ, THOMSON & THIERGART, p. 52, Pl. B, Fig. 9, 10.
1953 *Triporopollenites rhenanus* (THOMSON 1950) n. c. - THOMSON & PFLUG, p. 84, Pl. 8, Fig. 150.
1969 *Ostryapollenites rhenanus* (THOMSON 1950) n. c. - NAGY, p. 226-227, Pl. LII, Fig. 10.
1994b *Ostrya* sp. - IVANOV, p. 44, Pl. III, Fig. 11.

Description: after IVANOV (1994b). Size range: D= 25.0-28.0 µm.
Botanical affinity: genus *Ostrya* SCOPOLY, *Ostrya virginiana* type (after LIEUX 1980).
Stratigraphic range: Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Myricaceae BLUME IN DUMORTIER
Genus *Myricipites* WODEHOUSE 1933
Type species: *Myricipites dubius* WODEHOUSE 1933

(83) *Myricipites bituitus* (POTONIÉ 1931) NAGY 1969
Pl. 8, Fig. 8.

1931a *Pollenites bituitus* n. sp. - POTONIÉ, p. 332, Pl. 2, Fig. 17.
1953 *Triatriopollenites bituitus* (POTONIÉ 1931) n. c. - THOMSON & PFLUG, p. 79, Pl. 7, Fig. 116-134.
1969 *Myricipites bituitus* (POTONIÉ 1931) n. c. - NAGY, p. 245, Pl. LV, Fig. 1.
1994b *Myrica*-type. - IVANOV, p. 44, Pl. III, Fig. 12.

Description: after IVANOV (1994b). Size range: D= 23.0-28.0 µm.
Botanical affinity: genus *Myrica* L.
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(84) *Myricipites esculentiformis* (GLADKOVA 1956) n. c.
Pl. 8, Fig. 9, 10.

1956 *Myrica esculentiformis* n. sp. - GLADKOVA, p. 211, Fig. 1 v, g, d, e.
1966 *Myrica esculentiformis* GLADKOVA 1956 - BOITSOVA IN POKROVSKAYA (ED.), p. 249, Pl. 99, Fig. 10.

Description: Triporate pollen grains. Outlines: Triangular in pollar view. Size range: D= 21.5-24.2 µm. Apertures: pores, protrunded, diameter of pore chanel 0.5-0.7 µm. Exine: 1.0-1.2 µm thick, two layered, sexine thicker than nexine. Ornamentation: scabrate.
Botanical affinity: genus *Myrica* L., *Myrica esculenta* BUCH. according to GLADKOVA (1956).
Stratigraphic range: Paleogene and Neogene (GLADKOVA 1956).
Occurrence in NWBg: Badenian.

Fam. Juglandaceae A. RICHARD EX KUNTH
Genus *Pterocaryapollenites* THIERGARTH 1938
Type species: *Pterocaryapollenites stellatus* (POTONIÉ 1931) THIERGART 1938

(85) *Pterocaryapollenites stellatus* (POTONIÉ 1931) THIERGART 1938
Pl. 8, Fig. 11.

1931b *Pollenites stellatus* n. sp. - POTONIÉ, p. 28, Pl. 2, Fig. V 47b.
1938 *Pterocaryapollenites stellatus* (POTONIÉ 1931) - THIERGART, p. 311, Pl. 24, Fig. 19.

1994b *Pterocarya* cf. *insignis* RHED. ET WILS. - IVANOV, p. 44, Pl. III, Fig. 13.
1996 *Pterocaryapollenites stellatus* (POTONIÉ 1931) THIERGART 1938 - ASHRAF & MOSBRUGGER, p. 74, Pl. 11, Fig. 5, 6.

Description: after IVANOV (1994b). Size range: D= 37.0-42.0 µm.
Botanical affinity: genus *Pterocarya* KUNTH, cf. *Pterocarya insignis* RHED. & WILS.
Stratigraphic range: Middle Eocene - Pleistocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Juglandipollis* KOHLMAN-ADAMSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Type species: *Juglandipollis juglandoides* KOHLMAN-ADAMSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994

(86) *Juglandipollis maculosus* (POTONIÉ 1931) KOHLMAN-ADAMSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Pl. 8, Fig. 12, 13.

1931b *Pollenites maculosus* n. sp. - POTONIÉ, p. 28, Pl. 2, Fig. V 19d.
1953 *Multiporopollenites maculosus* (POTONIÉ 1931) n. c. - PFLUG IN THOMSON & PFLUG, p. 94-95, Pl. 10, Fig. 95.
1994b *Juglans* sp. - IVANOV, p. 44, Pl. IV, Fig. 1, 2.
1994 *Juglandipollis maculosus* (POTONIÉ 1931) n. c. - KOHLMAN-ADAMSKA IN ZIEMBINSKA-TWORZYDLO ET AL., p. 18, Pl. 9, Fig. 20, 21.

Description: after KOHLMAN-ADAMSKA IN ZIEMBINSKA-TWORZYDLO ET AL. (1994). Size range: D= 37.0-47.0 µm.
Botanical affinity: The fossil pollen is most like to recent *Juglans cinerea* type (sensu KUPRIANOVA 1965) including species from sect. *Trachicaryon* DODE and *Cardiocaryon* DODE. The pollen of the extant species *J. cathayensis* DODE is closest to the fossil one.
Stratigraphic range: Oligocene - Miocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Caryapollenites* RAATZ 1937
Type species: *Caryapollenites simplex* (POTONIÉ 1931) RAATZ 1937

(87) *Caryapollenites simplex* (POTONIÉ 1931) RAATZ 1937 ssp. *simplex*
Pl. 8, Fig. 14, 15.

1931d *Pollenites simplex* n. sp. - POTONIÉ, p. 2. Abb. 4.
1937 *Carya-pollenites simplex* POTONIÉ 1931 - RAATZ, p.19, Pl. 1, Fig. 6.
1953 *Subtriporopollenites simplex* (POTONIÉ & VENITZ) n. c. ssp. *simplex* (POTONIÉ & VENITZ) n. c. - THOMSON & PFLUG, p. 86, Pl. 9, Fig. 64-73.
1985 *Caryapollenites simplex* (POTONIÉ 1932) RAATZ 1937 ssp. *simplex* - NAGY, p. 206, Pl. CXV, Fig. 24, 25.
1994b *Carya ovata*-type - IVANOV, p. 45, Pl. IV, Fig. 3, 4.

Description: after IVANOV (1994b). Size range: D= 41.5-48.5 µm.
Botanical affinity: *Carya ovata* type (sensu KUPRIANOVA 1965).
Stratigraphic range: Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(88) *Caryapollenites simplex* (POTONIÉ 1931) RAATZ 1937 ssp. *triangulus* PFLUG IN THOMSON & PFLUG 1953
Pl. 8, Fig. 16.

1953 *Subtriporopollenites simplex* (POTONIÉ & VENITZ) n. c. ssp. *triangulus* n. f. - PFLUG IN THOMSON & PFLUG, p. 86, Pl. 9, Fig. 57-61.

1985 *Caryapollenites simplex* (POTONIÉ 1932) RAATZ 1937 ssp. *triangulus* PFLUG 1953 - NAGY, p. 206, Pl. CXV, Fig. 26, 27.
1994b *Carya pecan*-type - IVANOV, p. 45, Pl. IV, Fig. 5, 6.

Description: after IVANOV (1994b). Size range: D= 41.5-57.5 μm.
Botanical affinity: *Carya pecan* type (sensu KUPRIANOVA 1965).
Stratigraphic range: Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Momipites* WODEHOUSE 1933
Type species: *Momipites coryloides* WODEHOUSE 1933

(89) *Momipites punctatus* (POTONIÉ 1931) NAGY 1969
Pl. 8, Fig. 17, 18.

1931a *Pollenites coryphaeus punctatus* n. f. - POTONIÉ, p. 329, Pl. 2, Fig. 7.
1950 *Engelhardtioipollenites* (*al. Pollenites*) *punctatus* (*al. coryphaeus punctatus*) - POTONIÉ, THOMSON & THIERGART, p.51, Pl. B, Fig. 7.
1953 *Triatriopollenites coryphaeus* (POTONIÉ 1931) n. c. ssp. *punctatus* (POTONIÉ 1931) n. c. - THOMSON & PFLUG, p. 80, Pl. 8, Fig. 15-37.
1960 *Engelhardtioipollenites* (*al. Pollenites*) *punctatus* (*al. coryphaeus punctatus* POTONIÉ 1931) POTONIÉ 1951- POTONIÉ, Synopsis, p.117, Pl. 7, Fig. 147.
1969 *Momipites punctatus* (POTONIÉ 1931) n. c. - NAGY, p. 246, Pl. LIV, Fig. 9, 10.
1994b *Engelhardia acerifolia*-type - IVANOV, p. 45, Pl. V, Fig. 1, 2.

Description: after IVANOV (1994b). Size range: D= 24.5-31.0 μm.
Botanical affinity: fam. Juglandaceae, genera *Engelhardia* LOESCH., *Oreomunnea* OERSTED. and *Alfaroa* STANDLEY. The fossil pollen can be compared with the pollen type *Engelhardia acerifolia* (sensu KUPRIANOVA 1965) and with the pollen of the extant species *Oreomunnea* (*Engelhardia*) *pterocarpa* OERSTED. It should be noted that PALAMAREV & PETKOVA (1987) established in the Sarmatian sediments from NW Bulgaria two species belonging to genus *Engelhardia* - *E. orsbergensis* (WESSEL & WEBER 1856) JÄHNICHEN, MAI & WALTER 1977 (leaf imprints) and *E. macroptera* (BRONGNIART 1828) UNGER 1866 (seeds). The first one is similar to the extant species *Engelhardia* (*Oreomunnea*) *mexicana* STANDLEY and the second one - to *E. roxburgiana* LINDL. EX WALL.
Stratigraphic range: Middle Eocene - Miocene, Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(90) *Momipites quietus* (POTONIÉ 1931) NICHOLS 1973
Pl. 8, Fig. 19, 20.

1931c *Pollenites quietus* n. sp. - POTONIÉ, p. 556, Fig. B.
1951 *Engelhardtioipollenites quietus* POTONIÉ 1934 - POTONIÉ, Pl. 20, Fig. 36, 37.
1953 *Triatriopollenites quietus* (POTONIÉ 1931) n. c. - THOMSON & PFLUG, p. 81, Pl. 8, Fig. 80-82.
1973 *Momipites quietus* (POTONIÉ 1931) n. c. - NICHOLS, p. 107.
1994b *Engelhardia wallichiana*-type - IVANOV, p. 45, Pl. V, Fig. 4.

Description: after IVANOV (1994b). Size range: D= 18.0-22.0 μm.
Botanical affinity: fam. Juglandaceae, genus *Engelhardia* LOESCH., *Engelhardia wallichiana* type (sensu KUPRIANOVA 1965) incl. extant species *E. wallichiana* LINDL. and *E. chrisolepis* HANSE.
Stratigraphic range: Paleogene - Miocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Platycaryapollenites* NAGY 1969 emend. FREDERIKSEN and CHRISTOPHER 1978

Type species: *Platycaryapollenites miocaenicus* NAGY 1969

(91) *Platycaryapollenites miocaenicus* NAGY 1969
Pl. 8, Fig. 21, 22.

1969 *Platycaryapollenites miocaenicus* n. g. n. sp. - NAGY, p. 242, Pl. LIII, Fig. 25-26.
1994b *Platycarya strobilaceae* S. et Z. foss. - IVANOV, p. 45, Pl. V, Fig. 5.

Description: after IVANOV (1994b). Size range: D= 17.5-23.5 μm.
Botanical affinity: fam. Juglandaceae, genus *Platycarya* SIEB. & ZUCC., *P. strobilaceae* SIEB. & ZUCC.
Stratigraphic range: Miocene.
Occurrence in NWBg: Badenian - Sarmatian.

Fam. Caryophyllaceae JUSSIEU
Genus *Caryophyllidites* COUPER 1960
Type species: *Caryophyllidites polyoratus* COUPER 1960

(92) *Caryophyllidites rueterbergensis* KRUTZSCH 1966
Pl. 9, Fig. 1.

1966 *Caryophyllidites rueterbergensis* n. fsp. - KRUTZSCH, p. 40-41, Pl. 8, Fig. 9-14.
1994b *Silene italica*-type - IVANOV, p. 45, Pl. V, Fig. 3.

Description: after KRUTZSCH (1966) and IVANOV (1994b). Size range: D= 26.5-31.5 μm.
Botanical affinity: fam. Caryophyllaceae, *Silene italica* type. This type (acc. to PETROV ET AL. 1987) includes pollen of the species belonging to the genera *Silene* L. p.p., *Dianthus* L., *Arenaria* L., *Petrorhagia* (SER.) LINK., *Kohlrauschia* KUNTH and *Minnuartia* L.
Stratigraphic range: Miocene, Pliocene.
Occurrence in NWBg: Sarmatian (Volhynian) - Pontian.

Fam. Chenopodiaceae LESS.
Genus *Chenopodipollis* KRUTZSCH 1966
Type species: *Chenopodipollis multiplex* (WEYLAND & PFLUG 1957) KRUTZSCH 1966

(93) *Chenopodipollis multiplex* (WEYLAND & PFLUG 1957) KRUTZSCH 1966
Pl. 9, Fig. 2.

1957 *Periporopollenites multiplex* n. sp. - WEYLAND & PFLUG, p. 103, Pl. 22, Fig. 18, 19.
1966 *Chenopodipollis* (al. *Periporopollenites*) *multiplex* (WEYLAND & PFLUG 1957) n. c. - KRUTZSCH, p. 35, Pl. 7, Fig. 22-25.

Description: after KRUTZSCH (1966). Size range: D= 24.5-29.0 μm.
Botanical affinity: fam. Chenopodiaceae.
Stratigraphic range: Middle Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(94) *Chenopodipollis stellatus* (MAMCZAR 1960) KRUTZSCH 1966
Pl. 9, Fig. 3.

1960 *Pollenites stellatus* n. spm. - MAMCZAR, p. 56, Fig. 199 a, b.
1966 *Chenopodipollis* (al. *Pollenites*) *stellatus* (MAMCZAR 1960) n. c. - KRUTZSCH, p. 35.
1994b Chenopodiaceae gen. ind. - IVANOV, p. 46, Pl. V, Fig. 6.

Description: after KRUTZSCH (1966) and IVANOV (1994b). Size range: D= 22.0-24.0 μm.

Botanical affinity: fam. Chenopodiaceae.
Stratigraphic range: Middle Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Polygonaceae JUSSIEU
Genus *Persicarioipollis* KRUTZSCH 1962
Type species: *Persicarioipollis meuseli* KRUTZSCH 1962

(95) *Persicarioipollis meuseli* KRUTZSCH 1962
Pl. 9, Fig. 4.

1962b *Persicarioipollis meuseli* n. fsp. - KRUTZSCH, p. 282, Pl. 8, Fig. 9-16.

Description: after KRUTZSCH (1962b). Size range: D= 50.0-58.5 μm.
Botanical affinity: genus *Persicaria* MILL.
Stratigraphic range: Miocene - Pliocene.
Occurrence in NWBg: Maeotian - Pontian.

Fam. Polygalaceae JUSSIEU
Genus *Polygalacidites* SAH & DUTTA 1966
Type species: *Polygalacidites clarus* SAH & DUTTA 1966

(96) *Polygalacidites miocaenicus* (NAGY 1969) NAGY 1985
Pl. 9, Fig. 5.

1969 *Polygalacearumpollenites miocaenicus* n. sp. - NAGY, p. 180, Pl. XLIII, Fig. 14.
1985 *Polygalacidites miocaenicus* (NAGY 1969) n. c. - NAGY, p. 165, Pl. XCV, Fig. 21, 22.

Description: after NAGY (1969). Size range: E= 15.0-19.0 μm, P= 17.0-26.0 μm.
Botanical affinity: fam. Polygalaceae LINDL., cf. *Polygala* L.
Stratigraphic range: Miocene.
Occurrence in NWBg: Sarmatian - Pontian.

Fam. Theaceae D. DON.

(97) *Tricolporopollenites minor* TAKAHASHI 1961
Pl. 9, Fig. 6, 7, 8, 9.

1961 *Tricolporopollenites minor* n. sp. - TAKAHASHI, p. 320, Pl. 24, Fig. 18, 21, 28-31.
1969 *Tricolporopollenites minimus* n. sp. - NAGY, p. 236, Pl. LII, Fig. 22-24.
1976 Family ?*Theaceae* - KONZALOVA, p. 24, Pl. 13, Fig. 1-3.

Description: Tricolporate pollen grains. Outlines: broadly oval in equatorial view. Apertures: ectoaperture - colpus, long, narrow; endoaperure - pore, rounded, 1.0-1.5 μm in diameter. Size range: E= 8.5-12.5 μm, P= 12.0-17.0 μm. Exine: 0.9-1,2 μm thick, tectate, sexine:nexinE= 1:1. Ornamentation: psilate.
Comments: This species differs from *T. cingulum* and *T. liblarensis* by less elongated polar axis (P:E= 1.2), and displacement of colpi which ones are arranged in rhomboidal pattern. It differs from *T. megaexactus* ssp. *exactus* by the absence of colpus curving in the area of endoapertures.
Botanical affinity: fam. Theaceae, genus *Eurya* THUNB., cf. *E. japonica* THUNB. In the fossil macroflora of NW Bulgaria the genus *Eurya* is presented by two species (PALAMAREV & PETKOVA 1987) - *E. stigmosa* (LUDWIG 1860) MAI 1960 and *E. angularis* PALAMAREV IN PALAMAREV & PETKOVA 1987. The recent analogue of the first species is also *E. japonica*.

Stratigraphic range: Oligocene - Miocene.
Occurrence in NWBg: Badenian - Pontian.

(98) *Tricolporopollenites* sp. 1.
Pl. 9, Fig. 10, 11, 12.

Description: Tricolporate pollen grains. Outlines: broadly elliptic in equatorial view. Apertures: ectoaperture - colpus, long; endoaperure - pores, rounded, 3.0-4.0 μm in diameter. Size range: E= 24.5-26.5 μm, P= 31.0-34.5 μm. Exine: 1.7-1,9 μm thick, tectate-perforate, sexine:nexinE= 2:1. Ornamentation: scabrate.
Botanical affinity: The fossil pollen is very similar in its morphological features to the pollen of the extant genus *Camellia* L., and more exactly - *C. confusa* CRAIB. and *C. japonica*. As a macrofossils the genus *Camellia* was established in NW Bulgaria by PALAMAREV & PETKOVA (1987) with the species *C. abchasica* (KOLAKOVSKYI 1957) KOLAKOVSKYI 1959.
Occurrence in NWBg: Volhynian - Maeotian.

Fam. Salicaceae MIRBEL
Genus *Salixipollenites* SRIVASTAVA 1966
Type species: *Salixipollenites discoloripites* (WODEHOUSE 1933) SRIVASTAVA 1966

(99) *Salixipollenites* sp.
Pl. 9, Fig. 13.

1994b *Salix* sp. - IVANOV, p. 46, Pl. V, Fig. 8.

Description: after Ivanov (1994b). Size range: E= 18.5-21.5 μm, P= 24.0-28.5 μm.
Botanical affinity: genus *Salix* L. (SRIVASTAVA 1966).
Stratigraphic range: Miocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(100) *Inaperturopollenites incertus* PFLUG & THOMSON IN THOMSON & PFLUG 1953
ssp. *foveolatus* PFLUG & THOMSON IN THOMSON & PFLUG 1953
Pl. 9, Fig. 14.

1953 *Inaperturopollenites incertus* PFLUG & THOMSON IN THOMSON & PFLUG 1953 ssp. *foveolatus* n. ssp. - PFLUG & THOMSON IN THOMSON & PFLUG, p. 66, Pl. 5, Fig. 31-35.
1976 *Populus*-Habitus - MENKE, p. 54, Pl. 27, Fig. 19.
1994b *Populus* sp. - IVANOV, p. 46, Pl. V, Fig. 9, 10.

Description: after THOMSON & PFLUG (1953) and IVANOV (1994b). Size range: D= 37.5-45.0 μm.
Botanical affinity: genus *Populus* L.
Stratigraphic range: Paleogene, Miocene - Pliocene.
Occurrence in NWBg: Sarmatian - Maeotian.

Fam. Ericaceae JUSSIEU
Genus *Ericipites* WODEHOUSE 1933
Type species: *Ericipites longisulcatus* WODEHOUSE 1933

(101) *Ericipites baculatus* NAGY 1969
Pl. 9, Fig. 19, 20.

1969 *Ericipites baculatus* n. sp. - NAGY, p. 211-212, Pl. XLIX, Fig. 18-19.
1994b Ericaceae gen. ind. - IVANOV, p. 46, Pl. V, only Fig. 12.

Description: after NAGY (1969) and IVANOV (1994b). Size range: 24.0 -32.0 μm.
Botanical affinity: fam. Ericaceae, cf. genus *Erica* L.
Stratigraphic range: Upper Miocene - Lower Pliocene.
Occurrence in NWBg: Volhynian - Pontian.

(102) *Ericipites callidus* (POTONIÉ 1931) KRUTZSCH 1970
Pl. 9, Fig. 15, 16.

1931a *Pollenites callidus* n. sp. - POTONIÉ, p. 332, Pl. 2, Fig. 27.
1970b *Ericipites callidus* (POTONIÉ 1931) n. c. - KRUTZSCH, p. 122, Pl. 54, Fig. 7-10.
1994b Ericaceae gen. ind. - IVANOV, p. 46, Pl. V, only Fig. 11.

Description: after KRUTZSCH (1970). Size range: 25.0 - 32.0 μm.
Botanical affinity: fam. Ericaceae, *Erica arborea* type (sensu MATEUS 1989).
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(103) *Ericipites ericius* (POTONIÉ 1931) POTONIÉ 1960
Pl. 9, Fig. 17, 18.

1931a *Pollenites ericius* n. sp. - POTONIÉ, p. 329, Pl. 2, Fig. 25.
1960 *Ericipites* (al. Pollenites) *ericius* (POTONIÉ 1931) n. c. - POTONIÉ, Synopsis III, p. 138.

Description:Tetrads. Size range: 27.0 - 34.0 μm. Single pollen grains heteropollar, tricolporate, Exine: 1.5-2.0 μm thick. Ornamentation: psilate
Botanical affinity: fam. Ericaceae, genus *Andromeda* (acc. ASHRAF & MOSBRUGGER 1996).
Stratigraphic range: Middle Eocene - Pliocene.
Occurrence in NWBg: Badenian - Maeotian.

Fam. Clethraceae KLOTZSCH - Cyrillaceae ENDL.

(104) *Tricolporopollenites megaexactus* (POTONIÉ 1931) THOMSON & PFLUG 1953
ssp. *exactus* (POTONIÉ 1931) THOMSON & PFLUG 1953
Pl. 9, Fig. 21, 22, 23.

1931d *Pollenites megaexactus* n. sp. - POTONIÉ, p. 26, Pl. 1, V 42b.
1931d *Pollenites exactus* n. sp. - POTONIÉ, p. 26, Pl. 1, V 46b.
1953 *Tricolporopollenites megaexactus* (POTONIÉ 1931) n. c. ssp. *exactus* (POTONIÉ 1931) n. c. - THOMSON & PFLUG, P. 101, Pl. 12, Fig. 87-92.
1996 *Tricolporopollenites megaexactus* (POTONIÉ 1931) THOMSON & PFLUG 1953 ssp. *exactus* (POTONIÉ 1931) THOMSON & PFLUG 1953 - ASHRAF & MOSBRUGGER, p. 41, Pl. 7, Fig. 1, 2.

Description: after THOMSON & PFLUG (1953). Size range: E= 10.0-15.5 μm, P= 15.0 - 21.0 μm.
Botanical affinity: fam. Cyrillaceae: genera *Cliftonia* BANKS, *Costaea* A. RICH. and *Cyrilla* GARD.; fam. Clethraceae: genus *Clethra* L., *C. arborea* AIT. (acc. THIELE-PFEIFFER 1980, MOHR 1984, ASHRAF & MOSBRUGGER 1996).
Stratigraphic range: Middle Eocene, Miocene - Pliocene.
Occurrence in NWBg: Badenian - Sarmatian.

Fam. Symplocaceae D. DON.

Genus *Symplocoipollenites* POTONIÉ 1951 emend. SLODKOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Type species: *Symplocoipollenites vestibulum* (POTONIÉ 1931) POTONIÉ 1951

(105) *Symplocoipollenites hidasensis* (NAGY 1963) n. c.
Pl. 9, Fig. 24, 25.

1963 *Porocolpopollenites hidasensis* n. sp. - NAGY, p.397-398, Pl. V, Fig. 39-41.
1995 *Symplocos* type A - IVANOV, p. 40, Pl. 1, Fig. 10.

Description: after NAGY (1963) and IVANOV (1995). Size range: 32.0-34.0 μm.
Botanical affinity: genus *Symplocos* JACQUIN.
Stratigraphic range: Middle Miocene.
Occurrence in NWBg: Sarmatian (Volhynian and Bessarabian).

(106) *Symplocoipollenites maturus* (DOKTOROWICZ-HREBNICKA 1960) ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Pl. 10, Fig. 1.

1960 *Symplocos-pollenites vestibulum* POTONIÉ forma *matura* - DOKTOROWICZ-HREBNICKA, p. 111, Pl. 43, Fig. 227.
1974 *Porocolpopollenites maturus* (DOKTOROWICZ-HREBNICKA 1960) n. c. - ZIEMBINSKA-TWORZYDLO , p. 382-383, Pl. 19, Fig. 5, 6.
1994 *Symplocoipollenites maturus* (DOKTOROWICZ-HREBNICKA 1960) n. c. - ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL., p. 30, Pl. 18, Fig. 3, 4.
1995 *Symplocos paniculata* type - IVANOV, p. 38, Pl. 1, Fig. 3, 4.

Description: after IVANOV (1995). Size range: 33.0-41.5 μm.
Botanical affinity: genus *Symplocos* JACQUIN, the species included in the *Symplocos paniculata* type (sensu VAN DER MEJDEN 1970).
Stratigraphic range: Miocene.
Occurrence in NWBg: Sarmatian (Volhynian and Bessarabian).

(107) *Symplocoipollenites rarobaculatus* (THIELE-PFEIFFER 1980) ASHRAF & MOSBRUGGER 1996
Pl. 10, Fig. 2.

1980 *Porocolpopollenites rarobaculatus* n. sp. - THIELE-PFEIFFER, p. 135, Pl. 9, Fig. 1, 2.
1995 *Symplocos cochinchinensis* type - IVANOV, p. 38, Pl. 1, Fig. 1, 2.
1996 *Symplocoipollenites rarobaculatus* (THIELE-PFEIFFER 1980) n. c. - ASHRAF & MOSBRUGGER, p. 51, Pl. 8, Fig. 15.

Description: after IVANOV (1995). Size range: 25.0-31.0 μm.
Botanical affinity: genus *Symplocos* JACQUIN, the species included in the *Symplocos cochinchinensis* type (sensu VAN DER MEJDEN 1970).
Stratigraphic range: Miocene.
Occurrence in NWBg: Sarmatian (Volhynian and Bessarabian).

(108) *Symplocoipollenites triangulus* (POTONIÉ 1931) POTONIÉ 1951
Pl. 10, Fig. 3, 4.

1931a *Pollenites triangulus* n. sp. - POTONIÉ, p. 332, Pl. 2, Fig. 9.
1951 *Symplocoipollenites triangulus* (POTONIÉ 1931) n. c. - POTONIÉ, p. 135, Pl. 21.
1953 *Porocolpopollenites triangulus* (POTONIÉ 1931) n. c. - THOMSON & PFLUG, p. 94, Pl. 11, Fig. 1, 2.
1985 *Porocolpopollenites triangulus* (POTONIÉ 1931) THOMSON & PFLUG 1953 - NAGY, p. 194, Pl. CX, Fig. 8.
1995 *Symplocos tinctoria* subtype - IVANOV, p. 39-40, Pl. 1, Fig. 7, 8.

Description: after IVANOV (1995). Size range: 25.0-31.0 μm.

Botanical affinity: genus *Symplocos* JACQUIN, *Symplocos tinctoria* subtype.
Stratigraphic range: Lower-Middle Miocene.
Occurrence in NWBg: Volhynian - Lower Pontian.

(109) *Symplocoipollenites vestibulum* (POTONIÉ 1931) POTONIÉ 1951 ssp. *vestibulum*
Pl. 10, Fig. 5, 6.

1931 *Pollenites vestibulum* n. sp. - POTONIÉ, p. 329, Pl. 2, Fig. 23.
1951 *Symplocoipollenites vestibulum* (POTONIÉ 1931) n. c. - POTONIÉ, p. 147, Pl. 21, Fig. 158, 159, and 162.
1995 *Symplocos alata* type - IVANOV, p. 38, Pl. 1, Fig. 5, 6.
1996 *Symplocoipollenites vestibulum* (POTONIÉ 1931) POTONIÉ 1951 ssp. *vestibulum* - ASHRAF & MOSBRUGGER, p. 52, Pl. 8, Fig. 11-13.

Description: after IVANOV (1995). Size range: 30.0-38.0 μm.
Botanical affinity: genus *Symplocos* JACQUIN, the species included in the *Symplocos alata* type (sensu VAN DER MEJDEN 1970).
Stratigraphic range: Middle Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Sapotaceae JUSSIEU
Genus *Tetracolporopollenites* PFLUG & THOMSON IN THOMSON & PFLUG 1953
Type species: *Tetracolporopollenites sapotoides* PFLUG & THOMSON IN THOMSON & PFLUG 1953

(110) *Tetracolporopollenites obscurus* PFLUG & THOMSON IN THOMSON & PFLUG 1953
Pl. 10, Fig. 7, 8.

1953 *Tetracolporopollenites obscurus* n. sp. - PFLUG & THOMSON IN THOMSON & PFLUG, p. 108, Pl. 14, Fig. 86-89, 102-108.
1994b *Bumelia lanuginosa*-type - IVANOV, p. 47, Pl. VI, Fig. 1, 2.

Description: after IVANOV (1994b). Size range: E= 16.0-18.0 μm, P= 20.0-26.0 μm.
Botanical affinity: fam. Sapotaceae.
Stratigraphic range: Middle Eocene - Lower Miocene.
Occurrence in NWBg: Badenian - Lower Pontian

(111) *Tetracolporopollenites sapotoides* PFLUG & THOMSON IN THOMSON & PFLUG 1953
Pl. 10, Fig. 9.

1953 *Tetracolporopollenites sapotoides* n. sp. - PFLUG & THOMSON IN THOMSON & PFLUG, p. 110, Pl. 15, Fig. 6-12.
1994b cf. *Manilkara* - IVANOV, p. 47, Pl. VI, Fig. 3-5.

Description: after IVANOV (1994b). Size range: E= 29.5-34.0 μm, P= 46.5-52.0 μm.
Botanical affinity: fam. Sapotaceae.
Stratigraphic range: Middle Eocene - Middle Miocene.
Occurrence in NWBg: Badenian - Sarmatian (Bessarabian).

Fam. Tiliaceae JUSSIEU
Genus *Intratriporopollenites* PFLUG & THOMSON IN THOMSON & PFLUG 1953 emend. MAI 1961
Type species: *Intratriporopollenites instructus* (POTONIÉ & VENITZ 1934) THOMSON & PFLUG 1953

(112) *Intratriporopollenites cordataeformis* (WOLFF 1934) MAI 1961
Pl. 10, Fig. 10. 11, 12.

1934 *Tiliae-pollenites instructus cordataeformis* n. f. - WOLFF, p. 73, Pl. 5, Fig. 22.

1961 *Intratriporopollenites cordataeformis* (WOLFF 1934) n. c. - MAI, p. 67, Pl. 67, Fig. 8-14.
1994b *Tilia* sp. - IVANOV, p. 47, Pl. VI, Fig. 6, 7.

Description: after MAI (1961) and IVANOV (1994b). Size range: E= 37.0-42.0 μm.
Botanical affinity: fam. Tiliaceae, *Tilia* L., *T. cordata* MILL. and *T. americana* L. (acc. ASHRAF & MOSBRUGGER 1996).
Stratigraphic range: Middle Miocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian

Fam. Sterculiaceae VENTENAT
Genus *Reevesiapollis* KRUTZSCH 1970
Type species: *Reevesiapollis triangulus* (MAMCZAR 1960) KRUTZSCH 1970

(113) *Reevesiapollis triangulus* (MAMCZAR 1960) KRUTZSCH 1970
Pl. 10, Fig. 13, 14.

1960 *Pollenites triangulus* n. sp. - MAMCZAR, p. 220, Pl. XIV, Fig. 202.
1970 *Reevesiapollis triangulus* (MAMCZAR 1960) n. c. - KRUTZSCH, p. 37, Pl. 5, Fig. 19-35; Pl. 6, Fig. 1-11, 19-41; Pl. 7, Fig. 1-44; Pl. 8, Fig. 1-21.
1994b *Reevesia* sp. - IVANOV, p. 47, Pl. VI, Fig. 12.

Description: after KRUTZSCH (1970), PETROV & DRAZHEVA-STAMATOVA (1972) and IVANOV (1994b). Size range: E= 22.0-27.0 μm.
Botanical affinity: genus *Reevesia* LINDL.
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Iteaceae J. G. AGARDH
Genus *Iteapollis* ZIEMBINSKA-TWORZYDLO 1974
Type species: *Iteapollis angustiporatus* (SCHNEIDER 1965) ZIEMBINSKA-TWORZYDLO 1974

(114) *Iteapollis angustiporatus* (SCHNEIDER 1965) ZIEMBINSKA-TWORZYDLO 1974
Pl. 10, Fig. 15.

1965 *Psilodiporites angustiporatus*n. sp. - SCHNEIDER, p. 205, Pl. 1, Fig. 10.
1974 *Iteapollis angustiporatus* (SCHNEIDER 1965) n. c. - ZIEMBINSKA-TWORZYDLO, p. 402-403, Pl. XXV, Fig. 2, 3.
1994b *Itea* sp. - IVANOV, p. 48, Pl. VI, Fig. 10, 11.

Description: after PETROV & DRAZHEVA-STAMATOVA (1973) and IVANOV (1994b). Size range: E= 23.0-28.0 µm, P= 15.0-18.0 µm.
Botanical affinity: genus *Itea* L., *Itea virginica* L.
Stratigraphic range: Miocene - Pliocene.
Occurrence in NWBg: Badenian - Maeotian.

Fam. Rosaceae JUSSIEU

(115) *Tricolporopollenites* sp. 2 (*Spiraea* sp.)
Pl. 10, Fig. 16, 17.

1993 *Spiraea* L. - type - KOHLMAN-ADAMSKA, p. 140, Pl. 22, Fig. 5.
1994b *Spiraea* sp. - IVANOV, p. 48, Pl. VI, Fig. 8,9.

Description: Tricolporate pollen grains. Outlines: elliptical in equatorial view, rounded in polar view. Size range: E= 18.0-21.0 μm, P= 22.0-25.0 μm. Apertures: ectoaperture - colpus, meridional,

long, broad; endoapertures - pore, rounded, 3.0-4.0 μm in diameter; apocolpium 5.0-7.0 μm in diameter. Exine: 1.1-1.3 μm thick, tectate, tectum thin. Ornamentation: finely striate.
Botanical affinity: genera *Spiraea* L. and *Pyracantha* M. J. ROEMER (acc. KOHLMAN-ADAMSKA 1993); the fossil pollen is similar to the pollen of the extant species *Spiraea crenata* L.
Stratigraphic range: Middle and Upper Miocene.
Occurrence in NWBg: Badenian - Maeotian.

Fam. Anacardiaceae LINDLEY
Genus *Pistacioidites* OSZAST 1960
Type species: without type species - OSZAST (1960)

(116) *Pistacioidites* sp.
Pl. 10, Fig. 18, 19.

1994b *Pistacia* sp. - IVANOV, p. 48, Pl. VI, Fig. 13, 14.

Description: after IVANOV (1994b). Size range: D= 27.0-37.5 μm.
Botanical affinity: genus *Pistacia* L.
Stratigraphic range: Miocene.
Occurrence in NWBg: Badenian - Pontian.

(117) *Tricolporopollenites pseudocingulum* (POTONIÉ 1931) THOMSON & PFLUG 1953
Pl. 10, Fig. 20, 21.

1931 *Pollenites pseudocingulum* n. sp. - POTONIÉ, p. 328, 332, Pl. 1, Fig. 2-4, 19, 24, 26, 27.
1953 *Tricolporopollenites pseudocingulum* (POTONIÉ 1931) n. c. - THOMSON & PFLUG, p. 99, Pl.12, Fig. 96-111.
1994b *Rhus* sp. - IVANOV, p. 48, Pl. VII, Fig. 1, 2.

Description: after IVANOV (1994b). Size range: D= 27.0-37.5 μm.
Botanical affinity: fam. Anacardiaceae LINDL., genera *Rhus* L., *Mangifera* L. and *Allospondias* STAFF. (= *Spondias* L.) (acc. THIELE-PFEIFFER 1980 and MULER 1981).
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Rhuspollenites* THIELE-PFEIFFER 1980
Type species: *Rhuspollenites ornatus* THIELE-PFEIFFER 1980

(118) *Rhuspollenites* cf. *ornatus* THIELE-PFEIFFER 1980
Pl. 10, Fig. 22, 23.

1980 *Rhuspollenites ornatus* n. sp. - THIELE-PFEIFFER, p. 23, 24, Pl. 16, Fig. 15-22.

Description: after THIELE-PFEIFFER (1980). Size range: E= 17.0-18.5 μm, P= 26.0-29.0 μm.
Botanical affinity: *Rhus* L.-type.
Stratigraphic range: Upper Oligocene - Miocene.
Occurrence in NWBg: Badenian - Sarmatian (Volhynian).

Fam. Staphyleaceae (D. C.) LINDLEY

(119) *Tricolporopollenites* sp. 3 (*Staphylea* sp.)
Pl. 10, Fig. 24, 25.

1990 *Tricolporopollenites* sp. type "*Staphylea*" - PLANDEROVÁ, p. 79, Pl. LXXVII, Fig. 5, 6.
1994b *Staphylea* sp. - IVANOV, p. 48, 49, Pl. VII, Fig. 4, 5.

Description: after IVANOV (1994b). Size range: E= 27.0-29.5 μm, P= 42.0-46.0 μm.
Botanical affinity: *Staphylea trifolia* L.-type.
Stratigraphic range: Middle and Upper Miocene.
Occurrence in NWBg: Badenian - Sarmatian (Bessarabian).

Fam. Aceracae JUSSIEU
Genus *Aceripollenites* NAGY 1969
Type species: *Aceripollenites reticulatus* NAGY 1969

(120) *Aceripollenites striatus* (PFLUG 1959) THIELE-PFEIFFER 1980
Pl. 10, Fig. 26, 27, 28.

1959 *Tricolpopollenites striatus* n. sp. - PFLUG, p. 155, Pl. 16, Fig. 13.
1980 *Aceripollenites striatus* (PFLUG 1959) n. c. - THIELE-PFEIFFER, p. 145, 146, Pl. 11, Fig. 22-25.
1994b *Acer* sp. - IVANOV, p. 49, Pl. VII, Fig. 3.

Description: after IVANOV (1994b). Size range: E= 25.0-27.0 μm, P= 29.0-31.5 μm.
Botanical affinity: *Acer campestre* L., *Acer rubrum* L.
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Sarmatian and Maeotian.

(121) *Aceripollenites* cf. *microrugulatus* THIELE-PFEIFFER 1980
Pl. 10, Fig. 29.

1980 *Aceripollenites microrugulatus* n. sp. - THIELE-PFEIFFER, p. 146, 147, Pl. 11, Fig. 26-31.
1984 *Aceripollenites microrugulatus* THIELE-PFEIFFER 1980 - MOHR, p. 82, Pl. 13, Fig. 9.1 and 9.2.

Description: after THIELE-PFEIFFER (1980) and MOHR (1984). Size range: E= 33.0-34.0 μm. THIELE-PFEIFFER (1980) and MOHR (1984) showed the species only in equatorial view. I found 3 exemplars but all of them are in polar view. They differ by a larger equatorial diameter, but are identical in its ornamentation with *Aceripollenites microrugularus.*
Botanical affinity: *Acer negundo* L., *Acer saccharinum* L. (THIELE-PFEIFFER 1980).
Stratigraphic range: Miocene - Pliocene.
Occurrence in NWBg: Sarmatian.

Fam. Nyssaceae DUMORTIER
Genus *Nyssapollenites* THIRGART 1938
Type species: *Nyssapollenites pseudocruciatus* (POTONIÉ 1931) THIREGART 1938

(122) *Nyssapollenites kruschi* (POTONIÉ 1931) POTONIÉ, THOMSON & THIREGART 1950
ssp. *accessorius* (POTONIÉ 1934) POTONIÉ,THOMSON & THIREGART 1950
Pl. 11, Fig. 1, 2, 3.

1934 *Pollenites kruschi* (POTONIÉ 1931) *accessorius* n. f. - POTONIÉ, p. 64, 65, Pl. 6, Fig. 9.
1950 *Nyssapollenites (kruschi) accessorius* POTONIÉ - POTONIÉ, THOMSON & THIREGART, p. 59, Pl. B, Fig. 48.
1994b *Nyssa* sp. - IVANOV, p. 49, Pl. VII, Fig. 7, 8.
1996 *Nyssapollenites kruschi* (POTONIÉ 1931) POTONIÉ, THOMSON & THIREGART 1950 ssp. *accessorius* (POTONIÉ 1934) POTONIÉ,THOMSON & THIREGART 1950 - ASHRAF & MOSBRUGGER, p. 48, 49, Pl. 8, Fig. 4-6.

Description: after IVANOV (1994b). Size range: E= 25.0-27.0 μm, P= 29.0-31.5 μm.

Botanical affinity: The fossil pollen is similar to the extant pollen type *Nyssa sylvatica* described by LIEUX (1983).
Stratigraphic range: Lower Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Alangiaceae DE CANDOLLE
Genus *Alangiopollis* KRUTZSCH 1962
Type species: *Alangiopollis barghoorniamum* (TRAVERSE 1955) KRUTZSCH 1962

(123) *Alangiopollis barghoornianum* (TRAVERSE 1955) KRUTZSCH 1962
Pl. 11, Fig. 4, 5.

1955 *Alangium barghoornianum* sp. n. - TRAVERSE, p. 65, Fig. 12: 102.
1962b *Alangiopollis barghoorniamum* (TRAVERSE 1955) n. c. - KRUTZSCH, p. 279, 290, Pl. VII, Fig. 1-9.
1994 *Alangiopollis barghoornianus* (TRAVERSE 1955) KRUTZSCH 1962 - TRAVERSE, p. 289, Pl. III, Fig. 1.

Description: after TRAVERSE (1955). Size range: E= 61.0-83.0 μm.
Botanical affinity: The fossil pollen is similar to the pollen of the extant species *Alangium kurzii* CRAIB (REITSMA 1970; SHATILOVA ET AL. 1988).
Stratigraphic range: Oligocene - Miocene.
Occurrence in NWBg: Sarmatian.

Fam. Cornaceae DUMORTIER
Genus *Cornaceaepollis* STUCHLIK IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Type species: *Cornaceaepollis major* (STUCHLIK 1964) STUCHLIK IN ZIEMBINSKA-TWORZYDLO ET AL. 1994

(124) *Cornaceaepollis major* (STUCHLIK 1964) STUCHLIK IN ZIEMBINSKA-TWORZYDLO ET AL. 1994
Pl. 11, Fig. 6, 7.

1964 *Cornoidites major* n. sp. - STUCHLIK, p. 62, Pl. 19, Fig. 1-4.
1994b *Cornus* sp. - IVANOV, p. 49, Pl. VII, Fig. 6, 9.
1994 *Cornaceaepollis major* (STUCHLIK 1964) n. c. - STUCHLIK IN ZIEMBINSKA-TWORZYDLO ET AL., p. 22, Pl. 13, Fig. 11a-c.

Description: after STUCHLIK (1964) and IVANOV (1994b). Size range: E= 32.5-46.5 μm, P= 48.0-59.0 μm; apocolpium diameter= 7.0-13.0 μm.
Botanical affinity: *Cornus* type.
Stratigraphic range: Middle Miocene.
Occurrence in NWBg: Badenian - Maeotian.

Fam. Cornaceae DUMORTIER - Mastixiaceae CALESTANI

(125) *Tricolporopollenites satzveyensis* PFLUG IN THOMSON & PFLUG 1953
Pl. 11, Fig. 8, 9.

1953 *Tricolporopollenites satzveyensis* n. sp. - PFLUG IN THOMSON & PFLUG, p. 103, Pl. 13, Fig. 10-13.
1994 *Cornaceaepollis satzveyensis* (PFLUG 1953) n. c. - ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL., p. 22, 23, Pl. 13, Fig. 8-10a, b.

Description: after THOMSON & PFLUG (1953) and THIELE-PFEIFFER (1980). Size range: E= 32.5-34.5 μm, P= 49.0-51.0 μm.
Botanical affinity: fam. Cornaceae or Mastixiaceae (after THIELE-PFEIFFER 1980).
Stratigraphic range: Paleocene - Miocene.

Occurrence in NWBg: Badenian.

(126) *Tricolporopollenites edmundii* (POTONIÉ 1931) THOMSON & PFLUG 1953
Pl. 11, Fig. 10, 11.

1931d *Pollenites edmundii* n. sp. - POTONIÉ, p. 26, Pl. 1, V 53e, V 52a, V 53a.
1953 *Tricolporopollenites edmundii* (POTONIÉ 1931) n. c. - THOMSON & PFLUG, p. 101, Pl. 12, Fig. 126-131.

Description: after THIELE-PFEIFFER (1980). Size range: E= 27.0-32.0 μm, P= 43.0-52.0 μm.
Botanical affinity: cf. fam. Mastixiaceae (acc. THIELE-PFEIFFER 1980).
Stratigraphic range: Middle Oligocene - Miocene.
Occurrence in NWBg: Badenian, Sarmatian.

Fam. Araliaceae JUSSIEU
Genus *Araliaceoipollenites* POTONIÉ 1951
Type species: *Araliaceoipollenites euphorii* (POTONIÉ 1931) POTONIÉ 1951

(127) *Araliaceoipollenites euphorii* (POTONIÉ 1931) POTONIÉ 1951
Pl. 11, Fig. 12, 13.

1931a *Pollenites euphorii* n. sp. - POTONIÉ, p. 332, Pl. 1, Fig. 12, 28.
1951 *Araliaceoipollenites euphorii* POTONIÉ 1931 - POTONIÉ, p. 151, Pl. 21, only Fig. 140, 141.
1994b Araliaceae gen. ind. - IVANOV, p. 49, Pl. VII, Fig. 10, 11.
1996 *Araliaceoipollenites euphorii* (POTONIÉ 1931) POTONIÉ 1951 - ASHRAF & MOSBRUGGER, p. 29.

Description: after IVANOV (1994b). Size range: E= 20.0-27.0 μm, P= 24.5-38.0 μm.
Botanical affinity: fam. Araliaceae.
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

(128) *Araliaceoipollenites reticuloides* THIELE-PFEIFFER 1980
Pl. 11, Fig. 14, 15.

1980 *Araliaceoipollenites reticuloides* n. sp. - THIELE-PFEIFFER, p. 164, Pl. 15, Fig. 26-34.

Description: after THIELE-PFEIFFER (1980). Size range: E= 20.5-25.0 μm, P= 23.0-31.0 μm.
Botanical affinity: *Hedera helix* type (acc. to the type described by VAN HELVOORT & PUNT 1984, see also NILSON ET AL. 1977).
Stratigraphic range: Miocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Aquifoliaceae BARTLING
Genus *Ilexpollenites* THIERGART EX RAATZ 1937
Type species: *Ilexpollenites iliacus* (POTONIÉ 1931) THIERGART EX RAATZ 1937

(129) *Ilexpollenites iliacus* (POTONIÉ 1931) THIERGART EX RAATZ 1937
Pl. 11, Fig. 16, 17, 18.

1931c *Pollenites iliacus* n. sp. - POTONIÉ, p. 556, Abb. 5.
1937 *Ilex-pollenites iliacus* POTONIÉ - RAATZ, p. 25.
1938 *Ilex-pollenites iliacus* POTONIÉ - THIERGART, p. 321, Pl. 25, Fig. 30.
1994b *Ilex* sp. - IVANOV, p. 49, 50, Pl. VII, Fig. 12, 13.
1996 *Ilexpollenites iliacus* (POTONIÉ 1931) THIERGART EX RAATZ 1937 - ASHRAF & MOSBRUGGER, p. 31, Pl. 5, Fig. 19-21.

Description: after IVANOV (1994b). Size range: E= 21.5-29.5 μm, P= 29.5-40.0 μm.
Botanical affinity: genus *Ilex* L.
Stratigraphic range: Eocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Vitaceae JUSSIEU

(130) *Tricolporopollenites macrodurensis* PFLUG & THOMSON IN THOMSON & PFLUG 1953
Pl. 11, Fig. 19.

1953 *Tricolporopollenites macrodurensis* n. sp. - PFLUG & THOMSON IN THOMSON & PFLUG, p. 103, Pl. 13, Fig. 5-9.
1994b *Parthenocissus* sp. - IVANOV, p. 49, Pl. VII, Fig. 10, 11.

Description: after THOMSON & PFLUG (1953) and IVANOV (1994b). Size range: E= 29.5-35.0 μm, P= 35.5-52.0 μm.
Botanical affinity: genera *Parthenocissus* PLANCH. and *Cissus* L.
Stratigraphic range: Middle Eocene, Upper Oligocene - Pliocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. cf. Proteaceae JUSSIEU
Genus *Proteacidites* (COOKSON 1950) COUPER 1953
Type species: *Proteacidites adenanthoides* COOKSON 1950

(131) *Proteacidites egerensis* NAGY 1963
Pl. 11, Fig. 21, 22.

1963 *Proteacidites egerensis* n. sp. - NAGY, p. 406, Pl. III, Fig. 9-11.
1990 *Proteacidites egerensis* NAGY 1963 - PLANDEROVÁ, p. 60, Pl. LX, Fig. 20.

Description: after NAGY (1963). Size range: E= 18.0-22.5 μm.
Botanical affinity: The fossil pollen is similar to the pollen of the extant species *Orites lancifolia* MUELL but the presence of the fam. Proteaceae in European Tertiary is still questionable.
Stratigraphic range: Egerian - Badenian.
Occurrence in NWBg: Badenian - Sarmatian (Volhynian).

Fam. Oleaceae HOFFMANNSEGG
Genus *Oleoidearumpollenites* NAGY 1969
Type species: *Oleoidearumpollenites reticulatus* NAGY 1969

(132) *Oleoidearumpollenites chinensis* NAGY 1969
Pl. 11, Fig. 22, 23, 24.

1969 *Oleoidearumpollenites chinensis* n. sp. - NAGY, p. 197, 198, Pl. XLVII, Fig. 7, 8.
1994b Oleaceae gen. ind. - IVANOV, p. 50, Pl. VIII, Fig. 3-6.

Description: after NAGY (1969) and IVANOV (1994b). Size range: E= 28.0-31.5 μm, P= 29.0-33.5 μm.
Botanical affinity: The fossil pollen is similar to the pollen of the extant genera *Ligustrum* L. and *Jasminum* L.
Stratigraphic range: Egerian - Sarmatian.
Occurrence in NWBg: Sarmatian - Maeotian.

(133) *Tricolpopollenites* cf. *sinuosimuratus* TREVISAN 1967
Pl. 11, Fig. 25.

1967 *Tricolporopollenites simuosimuratus* n. f.-sp. - TREVISAN, p. 38, Pl. 25, Fig. 4.
1984 *Tricolporopollenites* cf. *simuosimuratus* TREVISAN 1967 - MOHR, p. 78, Pl. 12, Fig. 10.1, 10.2, 13.1, 13.2.
1994b *Fraxinus* cf. *oxycarpa* WILLD.- IVANOV, p. 50, Pl. VIII, Fig. 2.

Description: after IVANOV (1994b). Tri- and tetracolpate pollen grains. Size range: D= 36.0-39.0 μm.
Botanical affinity: *Fraxinus oxycarpa* WILLD., *F. americana* L, and *F. pennsylvanica* MARSH. The pollen grains described by TREVISAN (1967) as *T. sinuosimuratus* are smaller than our pollen grains.
Stratigraphic range: Upper Miocene - Pliocene.
Occurrence in NWBg: Badenian - Maeotian.

Fam. Caprifoliaceae FRITSCH
Genus *Lonicerapollis* KRUTZSCH 1962
Type species: *Lonicerapollis gallwitzi* KRUTZSCH 1962

(134) *Lonicerapollis gallwitzi* KRUTZSCH 1962
Pl. 12, Fig. 1, 2.

1962a *Lonicerapollis gallwitzi* n. fsp. - KRUTZSCH, p. 275, Pl. 5, Fig. 1-6.

Description: after KRUTZSCH (1962). Tricolporate pollen grains, with short colpi and ore of 14.0-16.0 μm in diameter. Size range: E= 74.0-77.0 μm.
Botanical affinity: *Lonicera periclymenum* type (acc. to type described by PUNT ET AL. 1976).
Stratigraphic range: Oligocene/Miocene - Pliocene.
Occurrence in NWBg: Sarmatian.

(135) *Lonicerapollis* sp.
Pl. 12, Fig. 3, 4, 5.

Description: Tricolporate pollen grains. Outlines: 3-angular with convex sides in polar view. Size range: E= 78.0-83.5 μm. Apertures: ectoaperture - colpus, short, narrow, sunken; endoaperture - lalongate ora. Exine: 3.2-3.4 μm thick, sexine:nexine = 2:1, tectum 1.2 μm thick, collumelas straight. Ornamentation: scabrate and supra-echinate, echinae widely spaced.
Comments: Similar pollen was found by KONZALOVA (1976: p. 38, Pl. 7, fig. 16, 17.) in the Bohemian Miocene, but it is smaller - 36 μm in diameter.
Botanical affinity: The fossil pollen resembles to the pollen of the extant species *Simphoricarpus racemosus* MICHX.
Occurrence in NWBg: Sarmatian (Volhynian).

Genus *Caprifoliipites* WODEHOUSE 1933
Type species: *Caprifoliipites viridifluminis* WODEHOUSE 1933

(136) *Caprifoliipites sambucoides* NAGY 1969
Pl. 12, Fig. 6, 7.

1969 *Caprifoliipites sambucoides* n. sp. - NAGY, p. 190, 191, Pl. XLIV, Fig. 9, 14.

Description: after NAGY (1969). Size range: E= 16.0-18.0 μm, P= 22.0-26.0 μm.
Botanical affinity: *Sambucus ebulus* type (acc. ZIEMBINSKA-TWORZYDLO ET AL. 1994).
Stratigraphic range: Miocene.

Occurrence in NWBg: Sarmatian (Volhynian).

Fam. Lamiaceae LINDLEY
Genus *Polycolpopollenites* (COUPER 1953) NAKOMAN 1967
Type species: *Polycolpopollenites clavatus* (COUPER 1953) NAKOMAN 1967

(137) *Polycolpopollenites* cf. *hexaradiatus* NAKOMAN 1967
Pl. 12, Fig. 8, 9.

1967 *Polycolpopollenites hexaradiatus* n. sp. - NAKOMAN, p. 33, Pl. 1, Fig. 15, 15a.

Description: after NAKOMAN (1967). Hexacolpate pollen grains, with reticulate ornamentation. Size range: E= 83.0-85.5 μm, exine: 1.6 μm thick, sexine:nexinE= 2:1.
The species described by NAKOMAN (1967) is smaller (50.0-60.0 μm) than our pollen.
Botanical affinity: genera *Thymus* L. and *Salvia* L.
Stratigraphic range: Miocene.
Occurrence in NWBg: Sarmatian - Maeotian.

Fam. Asteraceae DUMORTIER
Genus *Cichoreacidites* SAH 1967
Type species: *Cichoreacidites spinosus* SAH 1967

(138) *Cichoreacidites gracilis* (NAGY 1969) NAGY1985
Pl. 12, Fig. 10, 11.

1969 *Cichoriaearumpollenites gracilis* n. sp. - NAGY, p. 208, Pl. XLVIII, Fig. 13, 14.
1985 *Cichoreacidites gracilis* (NAGY 1969) n. c. - NAGY, p. 185, Pl. CVII, Fig. 6-8.
1994b *Cichorium intibus*-type - IVANOV, p. 50, pl. VIII, Fig. 8, 9.

Description: after NAGY (1969, 1985) and IVANOV (1994b). Size range: D= 28.0-35.5 μm.
Botanical affinity: Subfam. Cichorioideae, *Cichorium intibus* type (acc. to the type described by BLACKEMORE 1984).
Stratigraphic range: Upper Oligocene - Miocene.
Occurrence in NWBg: Badenian - Pontian.

Genus *Artemisiaepollenites* NAGY 1969
Type species: *Artemisiaepollenites sellularis* NAGY 1969

(139) *Artemisiaepollenites sellularis* NAGY 1969
Pl. 12, Fig. 12, 13.

1969 *Artemisiaepollenites sellularis* n. sp. - NAGY, p. 208, Pl. XLIX, Fig. 16, 17; Pl. XLX, Fig. 18, 19.

Description: after NAGY (1969, 1985). Size range: E= 16.5-23.0 μm, P= 19.5-24.5 μm.
Botanical affinity: genus *Artemisia* L.
Stratigraphic range: Upper Oligocene - Miocene.
Occurrence in NWBg: Sarmatian (Chersonian) - Pontian.

Genus *Tubulifloridites* (COOKSON 1947) POTONIÉ 1960
Type species: *Tubulifloridites antipodica* COOKSON 1947

(140) *Tubulifloridites macroechinatus* (TREVISAN 1967) NAGY 1985
Pl. 12, Fig. 14.

1967 *Tricolporopollenites macroechinatus* n. f.-sp. - TREVISAN, p. 46, Pl. 30, Fig. 1, 2.
1985 *Tubulifloridites macroechinatus* (TREVISAN 1967) n. c. - NAGY, p. 184, Pl. CVI, Fig. 18-21.
1994b Asteroideae gen. ind.- IVANOV, p. 50, pl. VIII, Fig. 10-12.

Description: after NAGY (1985) and IVANOV (1994b). Size range: E= 25.5-29.0 μm, P= 27.0-31.0 μm.
Botanical affinity: Subfam. Asteroideae.
Stratigraphic range: Middle and Upper Miocene.
Occurrence in NWBg: Badenian - Pontian.

3.4.2. Class LILIOPSIDA

Fam. Potamogetonaceae DUMORTIER
Genus *Potamogetonacidites* SAH 1967
Type species: *Potamogetonacidites cenozoicus* SAH 1967

(141) *Potamogetonacidites paluster* (MANTEN 1958) MOHR 1984
Pl. 12, Fig. 15.

1984 *Potamogetonacidites paluster* (MANTEN 1958) n. c. - MOHR, p. 60, 61, Pl. 7, Fig. 12.1, 12.2.

Description: after MOHR (1984). Inaperturate pollen grains. Outlines: elliptical to rounded. Size range: D= 31.0-38.0 μm. Exine: 1.0-1.3 μm thick, collumelas of the type "clava". Ornamentation: finely reticulate.
Botanical affinity: genus *Potamogeton* L.: *P. natans* L., *P. pectinalis* L., *P. pusillus* L. and *P. lucens* L.
Stratigraphic range: Miocene - Pliocene.
Occurrence in NWBg: Sarmatian (Volhynian and Bessarabian).

Fam. Poaceae BARNHART
Genus *Graminidites* COOKSON 1947
Type species: *Graminidites media* COOKSON 1947

(142) *Graminidites media* COOKSON 1947
Pl. 12, Fig. 16.

1947 *Graminidites media* n. spm. - COOKSON, p. 134, Pl. 15, Fig. 41.
1985 *Graminidites media* COOKSON 1947 - NAGY, p. 212, Pl. CXVII, Fig. 20-22.
1994b Poaceae gen. ind.- IVANOV, p. 51, pl. VIII, Fig. 7.

Description: after IVANOV (1994b). Size range: D= 34.0-39.0 μm.
Botanical affinity: fam. Poaceae.
Stratigraphic range: Upper Oligocene - Miocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Arecaceae SCHULTZ-SCHULTZENSTEIN
Genus *Monocolpopollenites* PFLUG & THOMSON IN THOMSON & PFLUG 1953
Type species: *Monocolpopollenites tranquillus* THOMSON & PFLUG 1953

(143) *Monocolpopollenites tranquillus* (POTONIÉ 1934) THOMSON & PFLUG 1953
Pl. 12, Fig. 17.

1934 *Pollenites tranquillus* n. sp. - POTONIÉ, p. 51, Pl. 2, Fig. 3, 8.

1953 *Monocolpopollenites tranquillus* (POTONIÉ 1934) n. c. - THOMSON & PFLUG, p. 62, 63, Pl. 4, Fig. 27, 28, 35, 44, 45.

Description: after THOMSON & PFLUG (1953). Size range: 27.0-34.0 μm.
Botanical affinity: fam. Arecaceae.
Stratigraphic range: Oligocene - Middle Miocene.
Occurrence in NWBg: Badenian.

(144) *Monocolpopollenites* sp.
Pl. 12, Fig. 18.

Description: Monocolpate pollen grains. Outlines: eliptical. Size range: 24.5-26.5 μm. Exine: ca. 1.0 μm thick. Ornamentation: psilate.
Botanical affinity: fam. Arecaceae.
Occurrence in NWBg: Badenian.

Genus *Arecipites* WODEHOUSE 1933
Type species: *Arecipites punctatus* WODEHOUSE 1933

(145) *Arecipites* cf. *convexus* (THIERGART 1938) KRUTZSCH 1970
Pl. 12, Fig. 19.

1938 *Sabal-pollenites convexus* n. sp. - THIERGART, p. 308, Pl. 24, Fig. 15.
1970a *Arecipites convexus* (THIERGART 1938) n. c. - KRUTZSCH, p. 103, Pl. 21, Fig. 20-31.
1994b Arecaceae type 1 (cf. *Sabal*) - IVANOV, p. 51, pl. IX, Fig. 2, 3.

Description: after IVANOV (1994b). Size range: 27.0-38.0 μm.
Botanical affinity: fam. Arecaceae, cf. genus *Sabal* ADANSON and other genera (after THIELE-PFEIFFER 1980).
Stratigraphic range: Oligocene - Miocene.
Occurrence in NWBg: Badenian - Pontian.

Fam. Pandanaceae R. BR.
Genus *Pandaniidites* ELSIK 1968
Type species: *Pandaniidites texus* ELSIK 1968

(146) *Pandaniidites* sp.
Pl. 12, Fig. 20, 21.

1994b *Pandanus* sp. - IVANOV, p. 51, pl. IX, Fig. 8-11.

Description: after IVANOV (1994b). Monoporate or monocolpate pollen grains. Aperture: pore or "ulcus" (ERDTMAN 1966), usually unclearly visible. Size range: 19.0-25.0 μm. Our pollen differs from *Pandaniidites texus* ELSIK 1968 by its aperture, which one is not anulate.
Botanical affinity: fam. Pandanaceae, genus *Pandanus* L.
Occurrence in NWBg: Badenian - Maeotian.

Fam. Sparganiaceae SCHULTZ-SCHULTZENSTEIN
Genus *Sparganiaceaepollenites* THIERGART 1938
Type species: *Sparganiaceaepollenites polygonalis* THIERGART 1938

(147) *Sparganiaceaepollenites neogenicus* KRUTZSCH 1970
Pl. 12, Fig. 22.

1970 *Sparganiaceaepollenites neogenicus* n. sp. - KRUTZSCH, p. 82, Pl. 13, Fig. 1-13.
1994b *Sparganium erectum*-type - IVANOV, p. 51, pl. IX, Fig. 12, 13.

Description: after IVANOV (1994b). Size range: 21.5-27.0 μm.
Botanical affinity: fam. Sparganiaceae. The fossil pollen is similar to the recent pollen type *Sparganium erectum* described by PUNT (1976).
Stratigraphic range: Oligocene - Miocene.
Occurrence in NWBg: Badenian - Pontian.

(148) *Sparganiaceaepollenites polygonalis* THIERGART 1938
Pl. 12, Fig. 23.

1938 *Sparganiaceae-pollenites polygonalis* n. sp. - THIERGART, p. 307, 308, Pl. 24, Fig. 11, 12.
1985 *Sparganiaceaepollenites polygonalis* THIERGART 1938 - NAGY, p. 214, Pl. CXVIII, Fig. 13-16.

Description: Monoporate pollen grains. Outlines: rounded-polygonal. Size range: 25.0-31.0 μm. Aperture: pore, ca. 4.0 μm in diameter. Exine: 1.5-1.7 μm thick. Ornamentation: reticulate.
Botanical affinity: fam. Sparganiaceae.
Stratigraphic range: Oligocene - Miocene.
Occurrence in NWBg: Badenian - Pontian.

4. Remarks on the systematic composition of the fossil flora

The fossil flora composition determined in the course of palynological studies comprises total 148 taxa. The moses are presented by 4 species, pteridophytes by 32 species/subspecies, and gymnosperms by 19 species/subspecies. The angiosperms are most diverse and they are presented by 93 species/subspecies, belonging to 46 extant plant families. As a whole in the composition of the fossil flora the tree and shrub species are dominants and they are the main components of paleoflora, which is an evidence about the predominance of forest paleocoenosis. The herbaceous taxa are poor presented.

From paleoecological point of view the established microflora represents a complex of floristic elements, including different ecological components (Table 1.). The paleofloristic composition is an evidence of the development of a relatively rich polylayered and polydominant forest vegetation, where several types of paleocommunities can be recognised: 1) associations of aquatic plants (*Nuphar*, *Nelumbo*, *Potamogeton*); 2) swamp forests (Taxodiaceae, *Myrica*, Cyrillaceae, *Nyssa*); 3) riparian forests (*Platanus*, *Alnus*, *Ostrya*, *Ulmus*, *Salix*, *Populus*, *Staphylea*); 4) hemixerophytic shrubs and trees (*Celtis*, *Pistacia*, *Ephedra*, *Spiraea*); hygromesophytic to mesophytic forests (polydominant and multispecies paleocoenosis of Magnoliaceae, Fagaceae, Juglandaceae, Sapotaceae, Theaceae, Araliaceae, Symplocaceae, Arecaceae). The detailed paleoecological analysis of the fossil flora and its development will be a subject of separate paper.

Table 1a. Alphabetic list of taxa find out in the Miocene sediments of NW Bulgaria.

TAXON	No in text	Recent analogue	Geoflo-ristic element	Occurrence in Northwest Bulgaria Badenian I Sarmatian I Maeotian I Pontian Mid. Up. I Vol.Bes.Ch. I Low. Upp. I Low.
Abiespollenites latisaccatus	39	*Abies* type, *Abies* MILL.	A2	----------
Aceripollenites cf. *microrugulatus*	121	*Acer negundo* L., *A. saccharinum* L.	A	-----
Aceripollenites striatus	120	*Acer campestre* L., *A. rubrum* L.	A1	----- ---------
Alangiopollis barghoornianum	123	*Alangium kurzii* CRAIB	P1	-------
Alnipollenites verus	78	*Alnus* MILLER, *Alnus serrulata* type	A1	----------
Araliaceoipollenites euphorii	127	Araliaceae	P2	----------
Araliaceoipollenites reticuloides	128	*Hedera helix* type	P2	----------
Arecipites cf. *convexus*	145	Arecaceae, cf. *Sabal* ADAN.	P	----------
Artemisiaepollenites sellularis	139	*Artemisia* L.	A1	----------
Betulaepollenites betuloides	79	*Betula* L., *Betula* subtype *costata*	A1	----------
Camarozonosporites hamulatis	25	Lycopodiaceae	?	------
Caprifoliipites sambucoides	136	*Sambucus ebulus* type	A1	---
Carpinipites carpinoides	80	*Carpinus* L.	A1	----------
Caryapollenites simplex ssp. *simplex*	87	*Carya ovata* type	A1	----------
Caryapollenites simplex ssp. *triangulus*	88	*Carya pecan* type	A1	----------
Caryophyllidites rueterbergensis	92	Caryophyllaceae	A	----------
Cedripites deodaraesimilis	46	*Cedrus deodara* LOUD.	A1	----------
Celtipollenites komloënsis	71	*Celtis australis* L., *C. occidentalis* L.	A1	----------
Chenopodipollis multiplex	93	Chenopodiaceae	A1	----------
Chenopodipollis stellatus	94	Chenopodiaceae	A1	----------
Chloranthacearumpollenites dubius	58	Chloranthaceae, *Chloranthus* spp.	P	---------- ------
Cicatricosisporites chattensis ssp. *chattensis*	5	*Anemia* SW., *A. tomentosa* (SAV.) SW.	P	----------
Cichoreacidites gracilis	138	Cichorioideae, *Cichorium intibus* type	A1	----------
Cornaceaepollis major	124	*Cornus* type	P2	----------
Corrugatisporites graphicus	11	*Lygodium* SWARTZ.	P	---------
Corrugatisporites cf. *pseudovallatus*	12	Pteridaceae, cf. *Pteris* L.	P2	----------
Corylopollis coryloides	81	*Corylus* L, *Corylus* subtype *ferox*	A2	----------
Criptogrammasporis crispiformis	22	*Criptogramma crispa* (L.) R. BR.	A1	----
Cupressacites bockwitzensis	54	Cupressaceae, cf. *Thuja* (L.) TOURN.	A	----------
Echinatisporis cycloides	31	Selaginellaceae, *Selaginella* BEAUV.	P2/A1	------
Echinatisporis echinoides ssp. *echinoides*	32	Selaginellaceae	P2/A1	----------
Ephedripites (Distachyapites) tertiarius	38	*Ephedra distachya* type	A	----------
Ericipites baculatus	101	Ericaceae, cf. *Erica* L.	A	----------
Ericipites callidus	102	Ericaceae, *Erica arborea* type	A	----------
Ericipites ericius	103	Ericaceae, *Andromeda*	A	----------
Eucommiolpollis parmularius	67	*Eucommia ulmoides* OLIV.	A1	----------
Faguspollenites verus	72	*Fagus* sp.	A2	----------
Ginkgorectina neogenica	37	*Ginkgo* L.	A1	----------

Table 1b.

TAXON	No in text	Recent analogue	Geoflo-ristic element	Occurrence in Northwest Bulgaria Badenian I Sarmatian I Maeotian I Pontian Mid. Up. I Vol.Bes.Ch. I Low. Upp. I Low.
Gleicheniidites microstellatus	10	Gleicheniacee	P2	----------
Graminidites media	142	Poaceae	A	----------
Ilexpollenites iliacus	129	*Ilex* L.	P2	---------- ----------
Inaperturopollenites hiatus	53	Taxodiaceae.	A1	----------
Inaperturopollenites incertus ssp. *foveolatus*	100	*Populus* L.	A	----------
Intratriporopollenites cordataeformis	112	*Tilia* L., *T. cordata* MILL. and *T. americana* L.	A1	----------
Iteapollis angustiporatus	114	*Itea* L., *Itea virginica* L.	P2	---------- ----------
Keteleeriapollenites komloënsis	40	*Keteleeria* CARR.	A1	----------
Laevigatosporites nutidus ssp. *nutidus*	36	Thelypteridaceae, Polypodiaceae	?	----------
Larixidites gerceënsis	45	*Larix* L.	A2	----------
Leiotriletes maxoides ssp. *maximus*	7	*Lygodium* SWARTZ.	P	----------
Leiotriletes maxoides ssp. *maxoides*	6	*Lygodium* SWARTZ.	P	----------
Leiotriletes maxoides ssp. *minoris*	8	*Lygodium* SWARTZ.	P	----------
Leiotriletes triangulatoides	9	*Dicksonia* L'HÉRIT.	P	---------- ----------
Liquidambarpollenites formosanaeformis	62	*Liquidambar formosana* HANCE	A1	----------
Liquidambarpollenites orientaliformis	63	*Liquidambar orientalis* MILL.	A1	----------
Lonicerapollis gallwitzi	134	*Lonicera periclymenum* type	A1	----------
Lonicerapollis sp.	135	*Simphoricarpos racemosus* MICHX.	A1	----
Lusatisporis perinatus	30	*Selaginella* BEAUV.(*S. sibirica*-group)	A	----------
Lusatisporis punctatus	29	*Selaginella* BEAUV.(*S. sibirica*-group)	A	-----
Magnolipollis neogenicus ssp. *minor*	57	*Magnolia* L.	P1	--------
Magnolipollis neogenicus ssp. *neogenicus*	56	*Magnolia pyramidata* PURSH., *M. virginiana* L.	P1	---------- ----------
Mecsekisporites zengoevarconyensis	21	Pteridaceae, *Anogramma* Link.	A1	----------
Momipites punctatus	89	*Engelhardia* LOESCH., *Oreomunnea* OERSTED.	P2	----------
Momipites quietus	90	*Engelhardia wallichiana* type	P1	---------- ----------
Monocolpopollenites sp.	144	Arecaceae	P	----------
Monocolpopollenites tranquillus	143	Arecaceae	P1	----------
Monoleiotriletes gracilis	23	unknown	?	----
Juglandipollis maculosus	86	*Juglans cinerea* type	A1	----------
Myricipites bituitus	83	*Myrica* L.	A1	----------
Myricipites esculentiformis	84	*Myrica* L., *Myrica esculenta* BUCH.	A1	-------
Nelumbopollenites sp.	60	*Nelumbo* cf. *caspicum* (D.C.) FISH.	P	---------- ----------
Nupharipollis echinatus	59	*Nuphar lutea* type	A	----------
Nyssapollenites kruschi ssp. *accessorius*	122	*Nyssa sylvatica* type	A1	----------
Oleoidearumpollenites chinensis	132	*Ligustrum* L. and *Jasminum* L.	A1	----------
Ostryapollenites rhenanus	82	*Ostrya* SCOPOLY, *Ostrya virginiana* type	A1	---------- ----------
Pandaniidites sp.	146	*Pandanus* L.	P2	---------- ----------
Periporopollenites sp.	64	*Altingia* NOR.	A1	----------

Table 1c.

TAXON	No in text	Recent analogue	Geoflo-ristic element	Occurrence in Northwest Bulgaria Badenian I Sarmatian I Maeotian I Pontian Mid. Up. I Vol.Bes.Ch. I Low. Upp. I Low.
Persicarioipollis meuselI	95	*Persicaria* MILL.	A	----------
Phaeocerosporites transversus	2	*Phaeoceros* PROSK.	A1	---------
Piceapollis planoides	44	*Picea* L.	A	----------
Pistacioidites sp.	116	*Pistacia* L.	P2/A1	----------
Pityosporites labdacus	48	*Pinus sylvestris* (*diploxylon*) type	A1	----------
Pityosporites microalatus	47	*Pinus haploxylon* type incl. *Cathaya* C. & K.	A	----------
Platanipollis ipelensis	65	*Platanus orientalis* L.	A1	----------
Platanoidites gertrudae	66	*Platanus occidentalis* type	A	----------
Platycaryapollenites miocaenicus	91	*Platycarya* S. & Z., *P. strobilaceae* S. & Z.	P2	----------
Podocarpidites cf. *libellus*	55	*Podocarpus* L'HERIT.	P	----------
Polycolpopollenites cf. *hexaradiatus*	137	*Thymus* L. and *Salvia* L.	A	----------
Polygalacidites miocaenicus	96	Polygalaceae	A	----------
Polypodiaceoisporites corruratus	13	cf. Pteridaceae	P	----------
Polypodiaceoispor. gracillimus ssp. *semiverrucatus*	14	Pteridaceae	P	----------
Polypodiaceoisporites paucirugosus	15	cf. Gleicheniaceae, cf. *Dicranopteris* BERNH.	P	----
Polypodiaceoisporites snopkovae	16	unknown	?	-----
Polypodiaceoisporites sp.	20	cf. Pteridaceae, cf. Schizaeaceae	P	----
Polypodiaceoisporites spiniverrucatus	17	Pteridaceae, *Pteris pelucida* BL., *P. amoena* BL.	P	----------
Polypodiaceoisporites torosus	18	Pteridaceae	P	----------
Polypodiaceoisporites triangulus ssp. *trianguloides*	19	cf. Pteridaceae	P	----------
Potamogetonacidites paluster	141	*Potamogeton* L.	A	---------
Proteacidites egerensis	131	cf. Proteaceae	P	----------
Pterocaryapollenites stellatus	85	*Pterocarya* cf. *insignis* RHED. & WILS.	A1	----------
Quercoidites asper	76	*Quercus robur* type	A1	----------
Quercoidites henrici	77	*Quercus* sp.	P2	----------
Reevesiapollis triangulus	113	*Reevesia* LINDL.	P2	---------- ----------
Retitricolpites vulgaris	61	*Corylopsis* S. & Z.	P2	----------
Retitriletes pseudoclavatus	26	*Lycopodiella inundata* type	A1	------
Retitriletes reticuloides ssp. *reductoides*	27	*Lycopodium clavatum* type	A1	----------
Rhuspollenites cf. *ornatus*	118	*Rhus* L.-type.	A1	----------
Salixipollenites sp.	99	*Salix* L.	A2	----------
Saxosporis duebenensis	1	*Phaeoceros* PROSK.	A1	--
Sciadopityspollenites serratus	49	*Sciadopitys verticillata* (THBG.) S. & Z.	A1	------ -----
Selagosporis sp. A.	28	*Huperzia selago* type	A1	----------
Sequoiapollenites cf. *megallgulus*	52	*Taiwania* HAYATA	A1	----------
Sequoiapollenites cf. *rotundus*	51	*Taxodium* RICHARD	A1	----------
Sequoiapollenites polyformosus	50	*Sequoia* ENDL. and *Cryptomeria* D. DON	A1	----------
Sparganiaceaepollenites neogenicus	147	*Sparganium erectum* type	A	----------

Table 1d.

TAXON	No in text	Recent analogue	Geoflo-ristic element	Occurrence in Northwest Bulgaria Badenian I Sarmatian I Maeotian I Pontian Mid. Up. I Vol.Bes.Ch. I Low. Upp. I Low.
Sparganiaceaepollenites polygonalis	148	Sparganiaceae	A	----------
Stereisporites minor ssp. *minor*	3	*Sphagnum* L.	A	----------
Stereisporites stictus ssp. *stictus*	4	*Sphagnum* L.	A	----
Symplocoipollenites hidasensis	105	*Symplocos* JACQUIN	P	---------
Symplocoipollenites maturus	106	*Symplocos* JACQUIN	P2	---------
Symplocoipollenites rarobaculatus	107	*Symplocos* JACQUIN	P2	----------
Symplocoipollenites triangulus	108	*Symplocos* JACQUIN	P2	---------- ----------
Symplocoipollenites vestibulum ssp. *vestibulum*	109	*Symplocos* JACQUIN	P2	---------- ----------
Tetracolporopollenites obscurus	110	Sapotaceae	P	---------- ----------
Tetracolporopollenites sapotoides	111	Sapotaceae	P	----------
Tricolpopollenites cf. *sinuosimuratus*	133	*Fraxinus oxycarpa* WILLD., *F. americana* L.	A	----------
Tricolporopollenites cingulum ssp. *oviformis*	74	*Castanea sativa* type	P2	----------
Tricolporopollenites cingulum ssp. *pusillus*	73	*Castanea* pp., *Passania* pp., *Castanopsis* pp.	P2	----------
Tricolporopollenites edmundii	126	cf. Mastixiaceae	P	----------
Tricolporopollenites liblarensis	75	*Castanopsis* (D. DON.) SPACH., *Lithocarpus* BL.	P2	----------
Tricolporopollenites macrodurensis	130	*Parthenocissus* PLANCH. and *Cissus* L.	P1	----------
Tricolporopollenites megaexactus ssp. *exactus*	104	Cyrillaceae, Clethraceae	P2	----------
Tricolporopollenites minor	97	*Eurya* THUNB.	P2	----------
Tricolporopollenites pseudocingulum	117	*Rhus* L., *Mangifera* L. and *Allospondias* STAFF.	P2	----------
Tricolporopollenites satzveyensis	125	Cornaceae or Mastixiaceae	P1	----------
Tricolporopollenites sp. 1.	98	Theaceae, cf. *Camellia* L.	P2	----------
Tricolporopollenites sp. 2 (*Spiraea* sp.)	115	*Spiraea* L., cf. *Spiraea crenata* L.	A	----------
Tricolporopollenites sp. 3 (*Staphylea* sp.)	119	*Staphylea trifolia* L.-type	A1	----------
Tsugaepollenites maximus	41	*Tsuga canadensis* (L.) CARR.	A1	----------
Tsugaepollenites minimus	43	*Tsuga* sp.	A1	----------
Tsugaepollenites spinulosus	42	*Tsuga heterophylla* (RAFIN) SARGENT	A1	----------
Tubulifloridites macroechinatus	140	Asteraceae, Asteroideae	A	----------
Ulmipollenites planeraeformis	69	*Planera aquatica* type	A1	----------
Ulmipollenites undolosus	68	*Ulmus* L.	A2	----------
Verrucatisporites tekeresensis	24	unknown	?	----------
Verrucatospotites clatriformis	35	Davaliaceae, *Davalia canariensis* (L.) SM.	P2	--
Verrucatospotites favus ssp. *favus*	33	Polypodiaceae, *Polypodium* type	A	----------
Verrucatospotites favus ssp. *pseudosecundus*	34	cf. Polypodiaceae	P2	----------
Zelkovaepollenites potoniei	70	*Zelkova* sp., cf. *Z. serrata* (THUNB) MAKINO.	A1	----------

Geofloristic elements: **A**- generally arctotertiary element; **A1**- warm-temperate; **A2**- cool-temperate; **P**- generally paleotropical element; **P1**- tropical; **P2**- subtropical (after ZIEMBINSKA-TWORZYDLO ET AL. 1994).

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6. Explanations of plates

Plate 1.
(All figures x 1000, except where otherwise stated)

Fig. 1. (1) *Saxosporis duebenensis* KRUTZSCH 1963 - C-37 Makresh, Sarmatian (Volhynian).

Figs. 2, 3. (2) *Phaeocerosporites transversus* NAGY 1968 - C-1 Slavotin, Sarmatian (Volhynian). Fig. 2. Optical cross-section; Fig. 3. Ornamentation of distal side.

Fig. 4. (3) *Stereisporites minor* (RAATZ 1937) KRUTZSCH 1959 ssp. *minor* - C-1 Slavotin, Sarmatian (Volhynian).

Fig. 5. (4) *Stereisporites stictus* (WOLFF 1934) KRUTZSCH 1959 ssp. *stictus* - C-37 Makresh, Sarmatian (Volhynian).

Fig. 6. (5) *Cicatricosisporites chattensis* KRUTZSCH 1961 ssp. *chattensis* - C-1 Slavotin, Sarmatian (Volhynian).

Figs. 7 - 9. (6) *Leiotriletes maxoides* KRUTZSCH 1962 ssp. *maxoides* - C-1 Slavotin, Sarmatian (Volhynian). Spore in different optical levels. x 500.

Fig. 10. (7) *Leiotriletes maxoides* KRUTZSCH 1962 ssp. *maximus* (PFLUG IN THOMSON & PFLUG 1953) KRUTZSCH 1962 - C-1 Slavotin, Sarmatian (Volhynian). x 500.

Fig. 11. (8) *Leiotriletes maxoides* KRUTZSCH 1962 ssp. *minoris* KRUTZSCH 1962 - C-1 Slavotin, Sarmatian (Volhynian).

Fig. 12. (9) *Leiotriletes triangulatoides* KRUTZSCH 1962 - C-1 Slavotin, Sarmatian (Volhynian). x 750.

Fig. 13. (10) *Gleicheniidites microstellatus* NAGY 1963 - C-1 Slavotin, Sarmatian (Volhynian).

PLATE 1

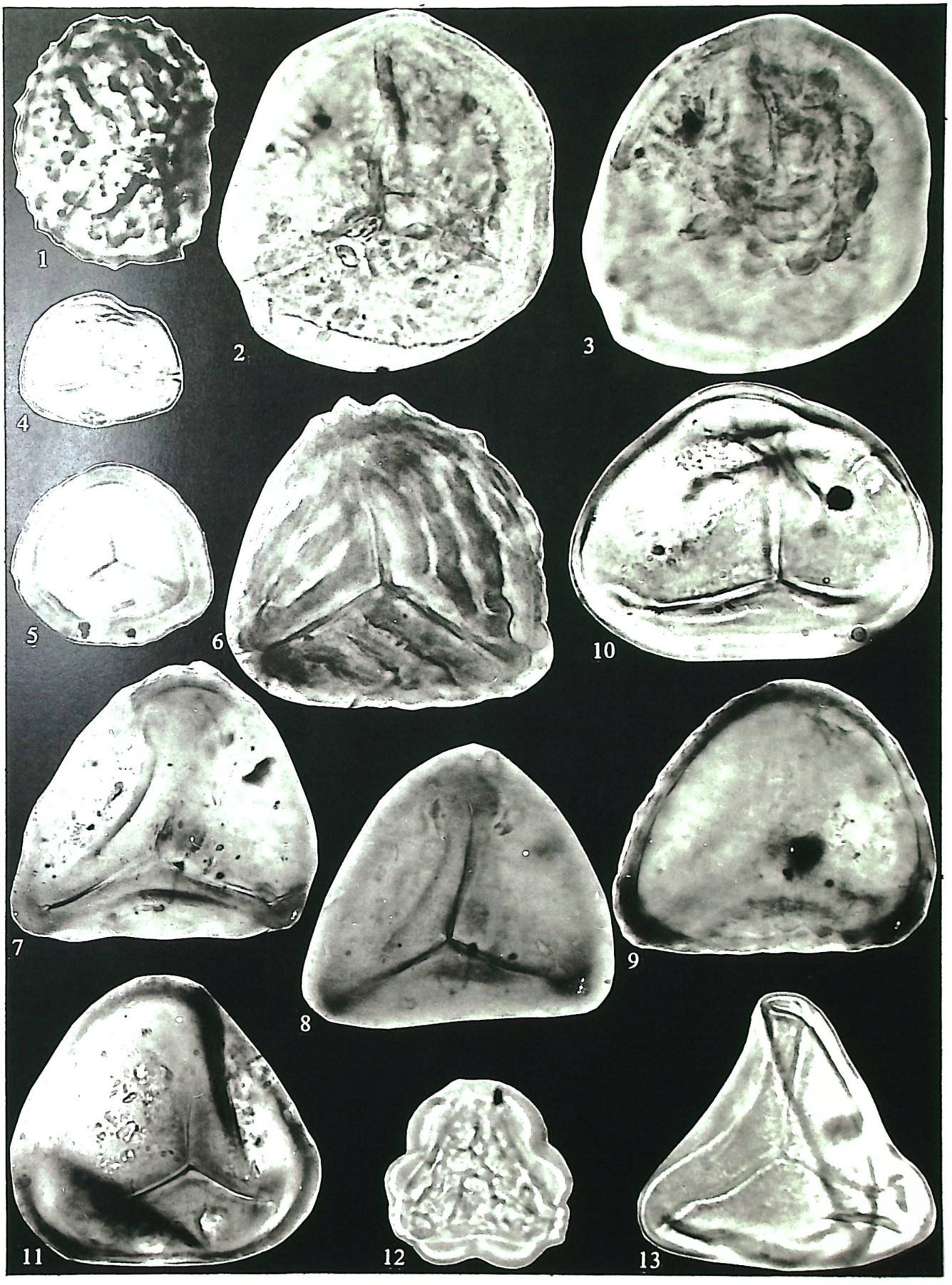

Plate 2.
(All figures x 1000, except where otherwise stated)

Fig. 1. (11) *Corrugatisporites graphicus* NAGY 1985 - C-1 Slavotin, Sarmatian (Volhynian).
Figs. 2, 3. (12) *Corrugatisporites* cf. *pseudovallatus* NAGY 1985 - C-1 Slavotin, Sarmatian (Volhynian).
Figs. 4, 5. (13) *Polypodiaceoisporites corruratus* NAGY 1985 - C-37 Makresh, Badenian.
Fig. 6. (14) *Polypodiaceoisporites gracillimus* NAGY 1963 ssp. *semiverrucatus* KRUTZSCH 1967 - C-1 Slavotin, Sarmatian (Volhynian).
Fig. 7. (15) *Polypodiaceoisporites paucirugosus* NAGY 1985 - C-37 Makresh, Sarmatian (Volhynian).
Figs. 8 - 10. (17) *Polypodiaceoisporites spiniverrucatus* TREVISAN 1967 - Fig. 8. C-12 Deleina, Sarmatian (Volhynian), SEM x 1800; Figs. 9, 10. Spore in different focus levels, C-37 Makresh, Sarmatian (Volhynian).
Fig. 11. (16) *Polypodiaceoisporites snopkovae* KEDVES 1973 - C-12 Deleina, Middle Badenian.
Figs. 12, 13. (18) *Polypodiaceoisporites torosus* NAGY 1969 - C-12 Deleina, Sarmatian (Volhynian), Spore in different focus levels.
Fig. 14. (19) *Polypodiaceoisporites triangulus* KRUTZSCH 1967 ssp. *trianguloides* KRUTZSCH 1967 - C-1 Slavotin, Badenian.
Fig. 15. (20) *Polypodiaceoisporites* sp. - C-37 Makresh, Sarmatian (Volhynian).
Figs. 16, 17. (21) *Mecsekisporites zengoevarconyensis* NAGY 1968 - C-37 Makresh, Badenian.

PLATE 2

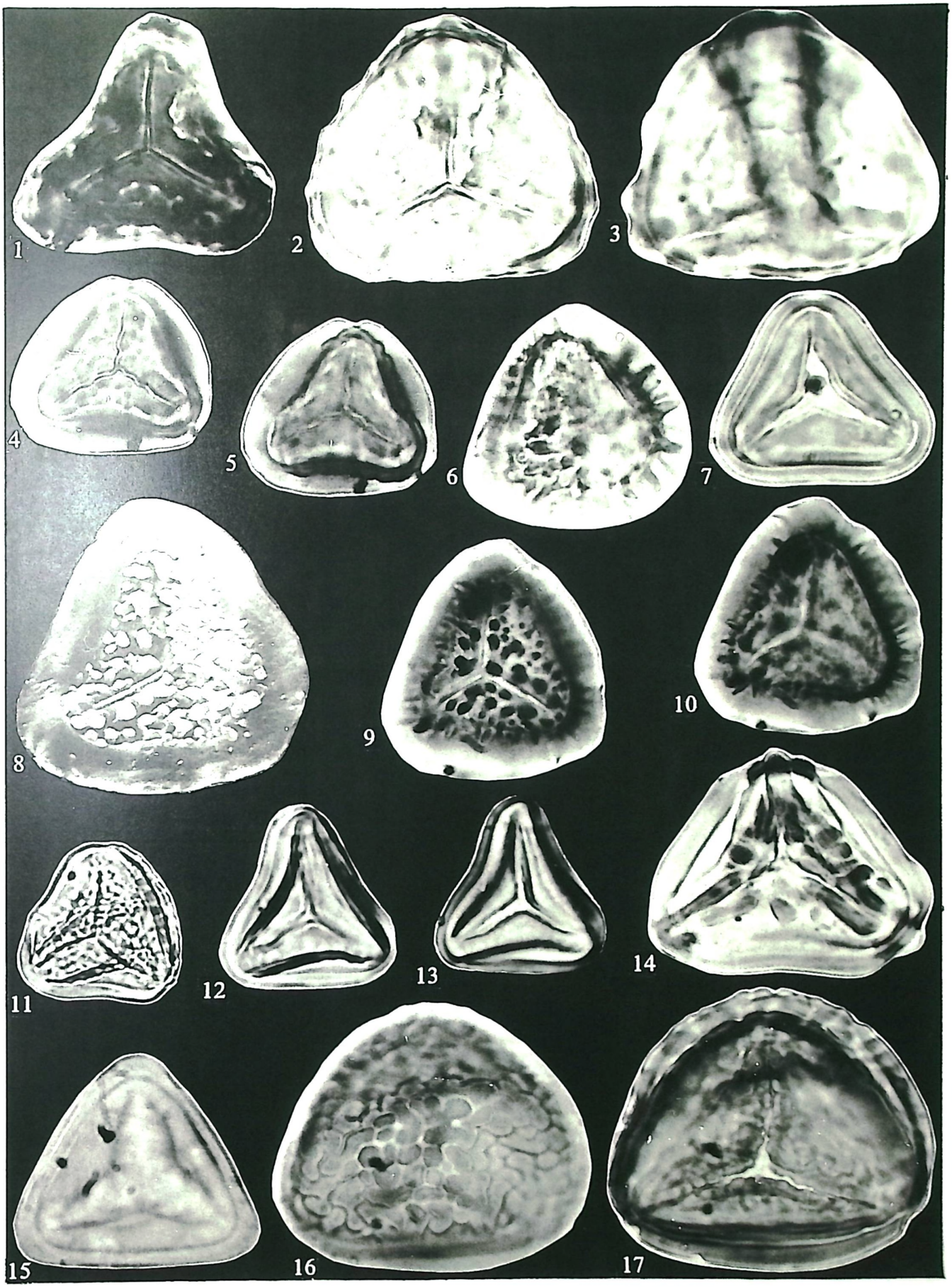

Plate 3.
(All figures x 1000, except where otherwise stated)

Figs. 1 - 4. (22) *Criptogrammasporis crispiformis* sp. n. - C-37 Makresh, Sarmatian (Volhynian); Figs. 1, 2. - Holotypus; Figs. 3, 4. - Isotypus x 500.

Fig. 5. (23) *Monoleiotriletes gracilis* KRUTZSCH 1959 - C-1 Drenovets, Sarmatian (Bessarabian).

Fig. 6. (24) *Verrucatisporites tekeresensis* NAGY 1985 - C-37 Makresh, Badenian.

Figs. 7, 8. (25) *Camarozonosporites hamulatis* (KRUTZSCH 1959) KRUTZSCH 1963 - C-37 Makresh, Badenian; 2 spores at different focus levels.

Figs. 9, 10. (26) *Retitriletes pseudoclavatus* KRUTZSCH 1963 - C-37 Makresh, Sarmatian (Volhynian).

Figs. 11, 12. (27) *Retitriletes reticuloides* KRUTZSCH 1963 ssp. *reductoides* KRUTZSCH 1963 - C-37 Makresh, Badenian.

Fig. 13. (28) *Selagosporis* sp. A. - C-37 Makresh, Badenian.

Fig. 14. (29) *Lusatisporis punctatus* KRUTZSCH 1963 - C-37 Makresh, Sarmatian (Volhynian); x 500.

PLATE 3

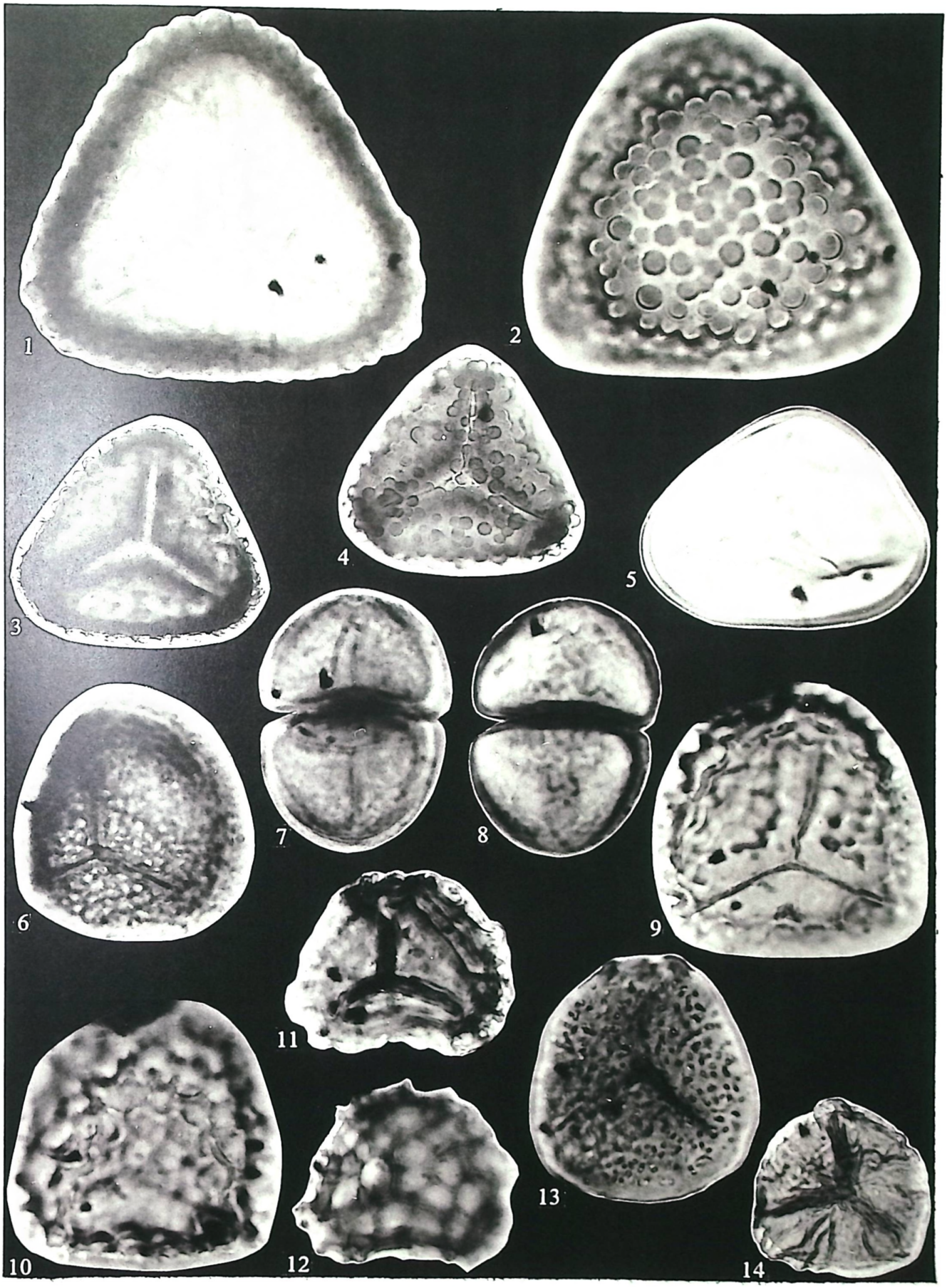

Plate 4.
(All figures x 1000, except where otherwise stated)

Figs. 1, 2. (30) *Lusatisporis perinatus* KRUTZSCH 1963 - C-37 Makresh, Sarmatian (Volhynian).

Fig. 3. (31) *Echinatisporis cycloides* KRUTZSCH 1963 - C-37 Makresh, Sarmatian (Volhynian).

Fig. 4. (32) *Echinatisporis echinoides* KRUTZSCH & PACLTOVÁ IN KRUTZSCH 1963 ssp. *echinoides* - C-37 Makresh, Sarmatian (Volhynian).

Figs. 5, 6. (33) *Verrucatosporites favus* (POTONIÉ 1931) THOMSON & PFLUG 1953 ssp. *favus* - Fig. 5. C-12 Deleina, Sarmatian (Volhynian), SEM x 780; Fig. 6. C-1 Slavotin, Sarmatian (Bessarabian).

Fig. 7. (34) *Verrucatosporites favus* (POTONIÉ 1931) THOMSON & PFLUG 1953 ssp. *pseudosecundus* (KRUTZSCH 1959) KRUTZSCH 1967 - C-1 Slavotin, Sarmatian (Volhynian).

Fig. 8. (35) *Verrucatosporites clatriformis* (MÜRRIGER & PFLUG 1952 ex THOMSON & PFLUG 1953) KRUTZSCH 1967 - C-12 Deleina, Badenian, SEM x 1200.

Fig. 9. (36) *Laevigatosporites nutidus* (MAMCZAR 1960) KRUTZSCH 1967 ssp. *nutidus* - C-37 Makresh, Sarmatian (Volhynian).

Figs. 10, 11. (37) *Ginkgorectina neogenica* NAGY 1969 - C-1 Slavotin, Sarmatian (Volhynian); Fig. 10. equatorial view; Fig. 11. polar view.

Fig. 12. (38) *Ephedripites* (*Distachyapites*) *tertiarius* KRUTZSCH 1970 - C-1 Slavotin, Sarmatian (Volhynian).

Fig. 13. (39) *Abiespollenites latisaccatus* (TREVISAN 1967) KRUTZSCH 1971 - C-1 Slavotin, Sarmatian (Volhynian).

Fig. 14. (40) *Keteleeriapollenites komloënsis* NAGY 1969 - C-12 Deleina, Sarmatian (Volhynian).

PLATE 4

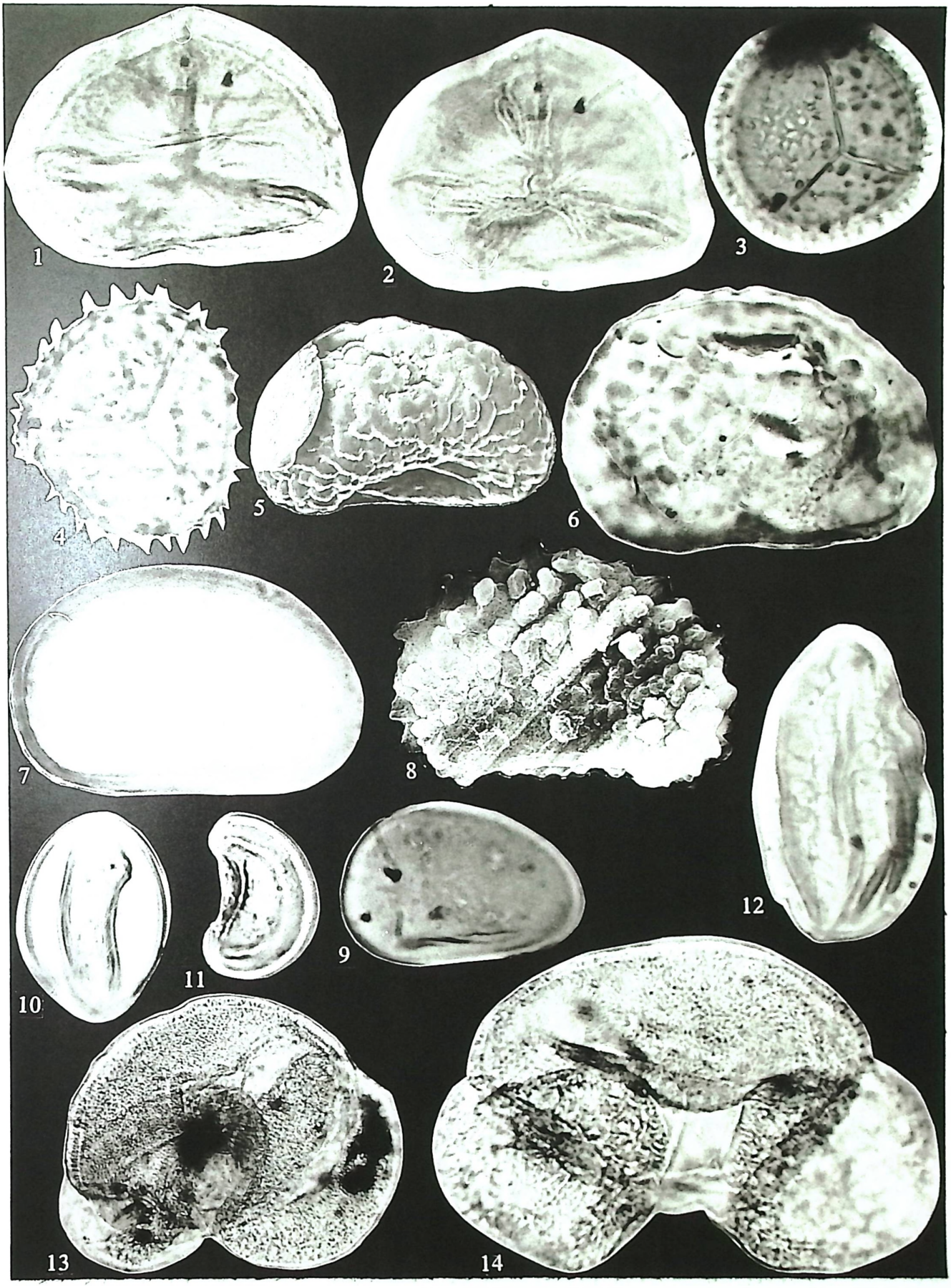

Plate 5.
(All figures x 500, except where otherwise stated)

Fig. 1, 4. (41) *Tsugaepollenites maximus* (RAATZ 1937) NAGY 1985 - Fig. 1. C-1 Drenovets, Sarmatian (Volhynian), SEM x 1600; Fig. 4. C-37 Makresh, Sarmatian (Volhynian), x 750, lateral view.

Figs. 2, 3, 5. (42) *Tsugaepollenites spinulosus* (KRUTZSCH 1971) NAGY 1985 - Figs. 2, 3. C-37 Makresh, Sarmatian (Volhynian), distal view; Fig. 5. C-12 Deleina, Sarmatian (Chersonian), lateral view, x 750.

Figs. 6, 7. (43) *Tsugaepollenites minimus* (KRUTZSCH 1971) NAGY 1985 - Fig. 6. C-37 Makresh, Sarmatian (Volhynian), x 1200; Fig. 7. C-1 Drenovets, Sarmatian (Volhynian), SEM x 1400.

Figs. 8, 9. (44) *Piceapollis planoides* KRUTZSCH 1971 - Fig. 8. C-1 Slavotin, Sarmatian (Volhynian); Fig. 9. C-12 Deleina, Badenian, SEM x 720.

Fig. 10. (45) *Larixidites gerceënsis* (NAGY 1985) NAGY 1992 - C-1 Slavotin, Sarmatian (Volhynian).

Fig. 11. (46) *Cedripites deodaraesimilis* (NAGY 1969) NAGY 1985 - C-1 Slavotin, Sarmatian (Bessarabian).

Figs. 12, 13. (47) *Pityosporites microalatus* (POTONIÉ 1931) THOMSON & PFLUG 1953 - Fig. 12. C-12 Deleina, Badenian, SEM x 720; Fig. 13. C-1 Slavotin, Sarmatian (Volhynian).

Fig. 14. (48) *Pityosporites labdacus* (POTONIÉ 1931) THOMSON & PFLUG 1953 - Fig. 9. C-12 Deleina, Sarmatian, SEM x 800.

PLATE 5

Plate 6.
(All figures x 1000, except where otherwise stated)

Figs. 1-3. (49) *Sciadopityspollenites serratus* (POTONIÉ & VENITZ 1934) RAATZ 1937 - Fig. 1. C-12 Deleina, Badenian, SEM x 2000; Figs. 2, 3. C-1 Drenovets, Maeotian.

Figs. 4, 5. (50) *Sequoiapollenites polyformosus* THIERGART 1938 - C-1 Slavotin, Sarmatian (Volhynian).

Figs. 6-8. (51) *Sequoiapollenites* cf. *rotundus* KRUTZSCH 1971 - Figs. 6, 7. C-1 Slavotin, Sarmatian (Volhynian); Fig. 8. - C-37 Makresh, Badenian.

Fig. 9. (52) *Sequoiapollenites* cf. *megaligulus* KRUTZSCH 1971 - C-1 Slavotin, Badenian.

Figs. 10, 11. (53) *Inaperturopollenites hiatus* (POTONIÉ 1931) THOMSON & PFLUG 1953 - Fig. 10. C-1 Slavotin, Sarmatian (Volhynian); Fig. 11. C-12 Deleina, Badenian, SEM x 1300.

Fig. 12. (54) *Cupressacites bockwitzensis* KRUTZSCH 1971 - C-1 Slavotin, Sarmatian (Volhynian).

Fig. 13. (55) *Podocarpidites* cf. *libellus* (POTONIÉ 1932) KRUTZSCH 1971 - C-1 Slavotin, Badenian.

Figs. 14, 15. (57) *Magnolipollis neogenicus* KRUTZSCH 1970 ssp. *minor* KRUTZSCH 1970 - C-37 Makresh, Sarmatian (Volhynian).

Fig. 16. (56) *Magnolipollis neogenicus* KRUTZSCH 1970 ssp. *neogenicus* - C-1 Slavotin, Sarmatian (Volhynian).

Figs. 17, 18. (58) *Chloranthacearumpollenites dubius* NAGY 1969 - C-37 Slavotin, Sarmatian (Volhynian).

Figs. 19, 20. (59) *Nupharipollis echinatus* KRUTZSCH 1970 - C-1 Makresh, Sarmatian (Volhynian)

Fig. 21. (60) *Nelumbopollenites* sp. - C-1 Slavotin, Sarmatian (Volhynian).

Figs. 22, 23. (61) *Retitricolpites vulgaris* PIERCE 1961 - C-12 Deleina, Sarmatian (Volhynian).

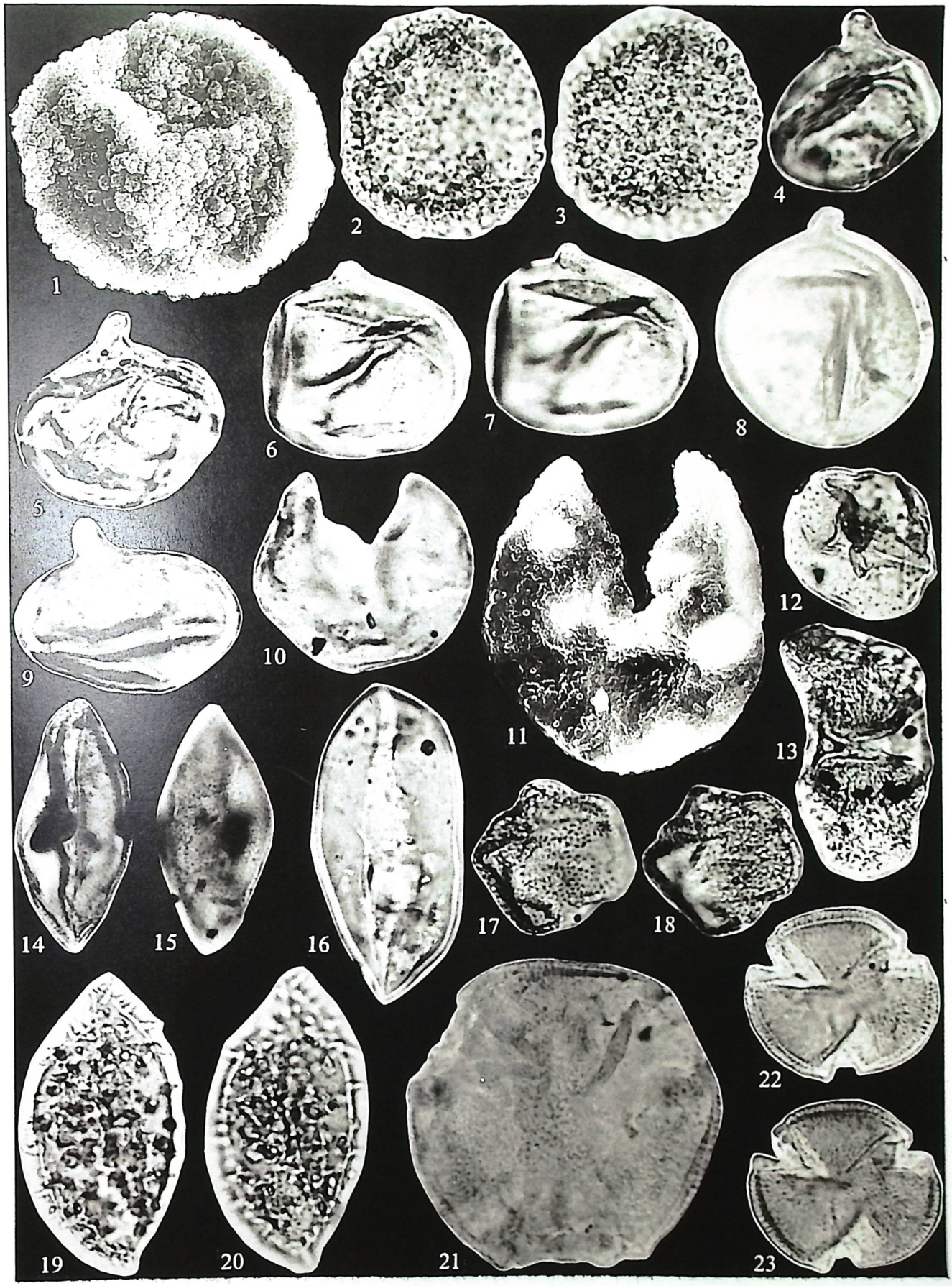
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Plate 7.
(All figures x 1000, except where otherwise stated)

Fig. 1. (62) *Liquidambarpollenites formosanaeformis* NAGY 1969 - C-37 Makresh, Sarmatian (Volhynian).

Figs. 2, 3. (63) *Liquidambarpollenites orientaliformis* NAGY 1969 - C-37 Makresh, Sarmatian (Volhynian).

Fig. 4. (64) *Periporopollenites* sp. - C-37 Makresh, Sarmatian (Volhynian).

Figs. 5, 6. (65) *Platanipollis ipelensis* (PACLTOVÁ 1966) GRABOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994 - C-1 Slavotin, Sarmatian (Volhynian); Fig. 5. equatorial view; Fig. 6. polar view.

Figs. 7, 8. (66) *Platanoidites gertrudae* (POTONIÉ 1931) POTONIÉ, THOMSON & THIERGART 1950 - C-1 Slavotin, Sarmatian (Volhynian); Fig. 7. ornamentation; Fig. 8. optical cross-section.

Fig. 9. (67) *Eucommioipollis parmularius* (POTONIÉ 1934) ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL. 1994 - C-1 Slavotin, Sarmatian (Volhynian).

Figs. 10, 11. (68) *Ulmipollenites undolosus* WOLFF 1934 - Fig. 10. C-1 Slavotin, Sarmatian (Volhynian); Fig. 11. C-12 Deleina, Sarmatian (Volhynian), SEM x 2200.

Fig. 12. (69) *Ulmipollenites planeraeformis* (ANDERSON 1960) KONZALOVA 1976 - C-1 Slavotin, Sarmatian (Volhynian).

Fig. 13, 14. (70) *Zelkovaepollenites potoniei* NAGY 1969 - C-1 Slavotin, Sarmatian (Volhynian).

Fig. 15. (71) *Celtipollenites komloënsis* NAGY 1969 - C-1 Slavotin, Sarmatian (Bessarabian).

Fig. 16. (72) *Faguspollenites verus* RAATZ 1937 - C-1 Slavotin, Sarmatian (Volhynian).

Fig. 17. (73) *Tricolporopollenites cingulum* (POTONIÉ 1931) THOMSON & PFLUG 1953 ssp. *pusillus* (POTONIÉ 1934) THOMSON & PFLUG 1953 - C-12 Deleina, Badenian, SEM x 3800.

Fig. 18. (74) *Tricolporopollenites cingulum* (POTONIÉ 1931) THOMSON & PFLUG 1953 ssp. *oviformis* (POTONIÉ 1931) THOMSON & PFLUG 1953 - C-12 Deleina, Badenian, SEM x 3300.

Fig. 19. (75) *Tricolporopollenites liblarensis* (THOMSON 1950) GRABOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994 - C-12 Deleina, Badenian, SEM x 4500.

Fig. 20, 21. (76) *Quercoidites asper* (PFLUG & THOMSON IN THOMSON & PFLUG 1953) SLODKOWSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994 - FIG. 20. C-1 Slavotin, Sarmatian (Volhynian), x 1250; Fig. 21. C-12 Deleina, Sarmatian (Volhynian), SEM x 2400.

Fig. 22. (77) *Quercoidites henrici* (POTONIÉ 1931) POTONIÉ, THOMSON & THIRGART 1950 - C-1 Drenovets, Sarmatian (Volhynian), SEM x 2300.

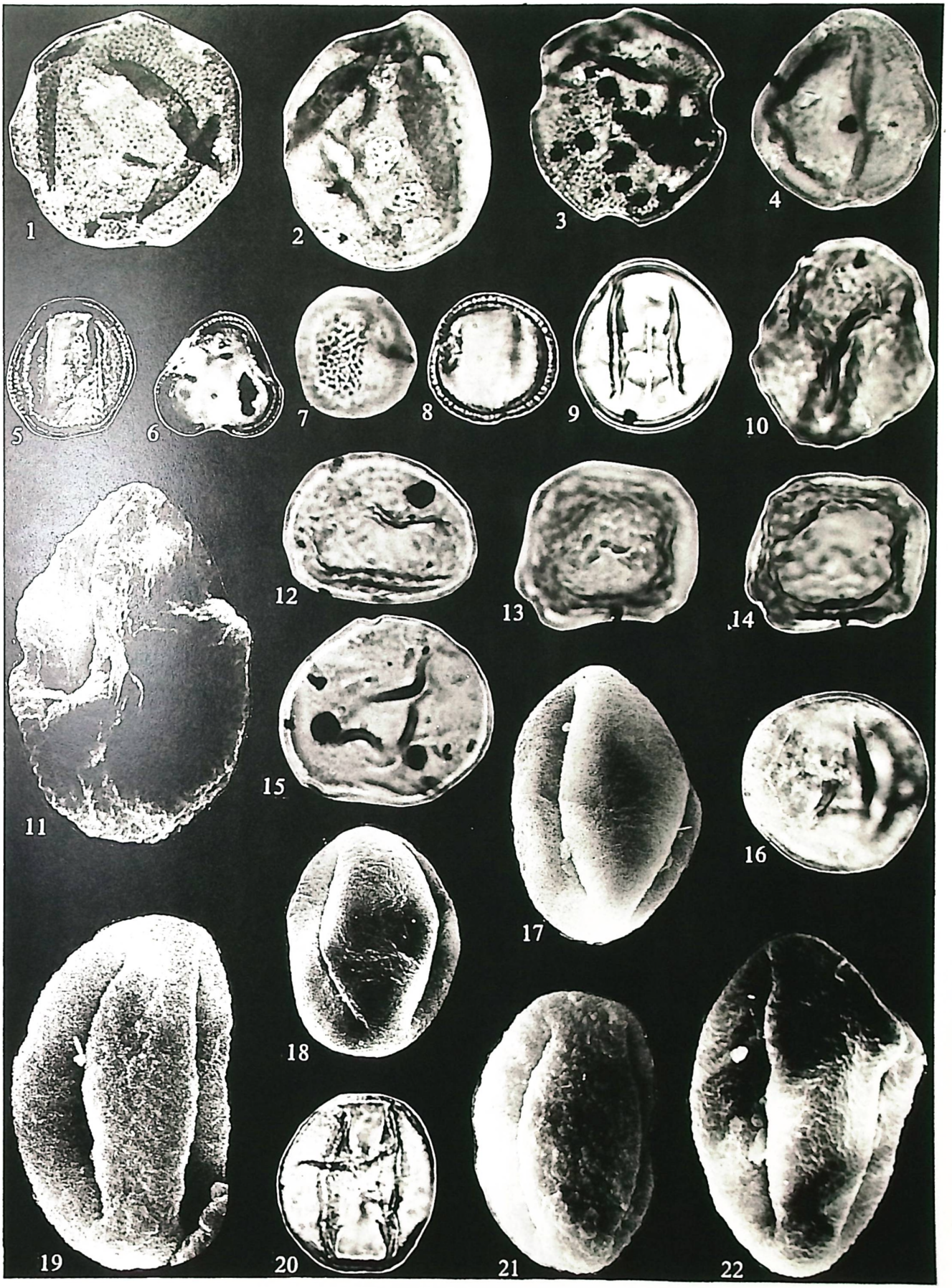
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Plate 8.
(All figures x 1000, except where otherwise stated)

Figs. 1, 2. (78) *Alnipollenites verus* (POTONIÉ 1931) POTONIÉ 1934 - Fig. 1. C-12 Deleina, Sarmatian (Volhynian), SEM x 3000; Fig. 2. C-1 Slavotin, Sarmatian (Volhynian).

Fig. 3. (79) *Betulaepollenites betuloides* (PFLUG IN THOMSON & PFLUG 1953) NAGY 1969 - C-1 Slavotin, Sarmatian (Volhynian).

Figs. 4, 5. (80) *Carpinipites carpinoides* (PFLUG IN THOMSON & PFLUG 1953) NAGY 1985 - Fig. 4. C-12 Deleina, Badenian, SEM x 2500; Fig. 5. C-1 Slavotin, Sarmatian (Volhynian).

Fig. 6. (81) *Corylopollis coryloides* (PFLUG IN THOMSON & PFLUG 1953) ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL. 1994 - C-37 Makresh, Sarmatian (Volhynian).

Fig. 7. (82) *Ostryapollenites rhenanus* (THOMSON IN POTONIÉ, THOMSON & THIERGART 1950) NAGY 1969 - C-1 Slavotin, Sarmatian (Volhynian).

Fig. 8. (83) *Myricipites bituitus* (POTONIÉ 1931) NAGY 1969 - C-1 Slavotin, Sarmatian (Volhynian).

Figs. 9, 10. (84) *Myricipites esculentiformis* (GLADKOVA 1956) n. c. - C-37 Makresh, Badenian.

Fig. 11. (85) *Pterocaryapollenites stellatus* (POTONIÉ 1931) THIERGART 1938 - C-1 Slavotin, Sarmatian (Volhynian).

Figs. 12, 13. (86) *Juglandipollis maculosus* (POTONIÉ 1931) KOHLMAN-ADAMSKA IN ZIEMBINSKA-TWORZYDLO ET AL. 1994 - Fig. 12. C-1 Slavotin, Sarmatian (Volhynian); Fig. 13. C-37 Makresh, Sarmatian (Volhynian).

Figs. 14, 15. (87) *Caryapollenites simplex* (POTONIÉ 1931) RAATZ 1937 ssp. *simplex* - Fig. 14. C-1 Slavotin, Sarmatian (Volhynian); C-12 Deleina, Sarmatian (Volhynian) SEM x 2000.

Fig. 16. (88) *Caryapollenites simplex* (POTONIÉ 1931) RAATZ 1937 ssp. *triangulus* PFLUG IN THOMSON & PFLUG 1953 - C-1 Slavotin, Sarmatian (Volhynian).

Figs. 17, 18. (89) *Momipites punctatus* (POTONIÉ 1931) NAGY 1969 - Fig. 17. C-12 Deleina, Badenian, SEM x 2900; Fig. 18. C-1 Slavotin, Sarmatian (Volhynian).

Figs. 19, 20. (90) *Momipites quietus* (POTONIÉ 1931) NICHOLS 1973 - Fig. 19. C-1 Slavotin, Badenian; Fig. 20. C-12 Deleina, Badenian, SEM x 1200.

Figs. 21, 22. (91) *Platycaryapollenites miocaenicus* NAGY 1969 - Fig. 19. C-37 Makresh, Sarmatian (Volhynian); Fig. 20. C-12 Deleina, Sarmatian (Volhynian), SEM x 2400.

PLATE 8

Plate 9.
(All figures x 1000, except where otherwise stated)

Fig. 1. (92) *Caryophyllidites rueterbergensis* KRUTZSCH 1966 - C-1 Drenovets, Maeotian.
Fig. 2. (93) *Chenopodipollis multiplex* (WEYLAND & PFLUG 1957) KRUTZSCH 1966 - C-12 Deleina, Sarmatian (Chersonian).
Fig. 3. (94) *Chenopodipollis stellatus* (MAMCZAR 1960) KRUTZSCH 1966 - C-1 Slavotin, Sarmatian (Bessarabian).
Fig. 4. (95) *Persicarioipollis meuseli* KRUTZSCH 1962 - C-1 Drenovets, Pontian.
Fig. 5. (96) *Polygalacidites miocaenicus* (NAGY 1969) NAGY 1985 - C-37 Makresh, Sarmatian (Volhynian).
Figs. 6-9. (97) *Tricolporopollenites minor* TAKAHASHI 1961 - Fig. 6. C-12 Deleina, Badenian, SEM x 3400; Figs. 7-9. C-37 Makresh, Badenian.
Figs. 10-12. (98) *Tricolporopollenites* sp. 1. - C-12 Deleina, Sarmatian (Volhynian), Fig. 10. polar view, x1250; Figs. 11, 12. equatorial view.
Fig. 13. (99) *Salixipollenites* sp. - C-1 Slavotin, Sarmatian (Bessarabian), polar view.
Fig. 14. (100) *Inaperturopollenites incertus* PFLUG & THOMSON IN THOMSON & PFLUG 1953 ssp. *foveolatus* PFLUG & THOMSON IN THOMSON & PFLUG 1953 - C-12 Deleina, Sarmatian (Volhynian).
Figs. 15, 16. (102) *Ericipites callidus* (POTONIÉ 1931) KRUTZSCH 1970 - Fig. 15. C-1 Slavotin, Sarmatian (Volhynian); Fig. 16. C-12 Deleina, Sarmatian (Volhynian), SEM x 2600.
Figs. 17, 18. (103) *Ericipites ericius* (POTONIÉ 1931) POTONIÉ 1960 - Fig. 17. C-12 Deleina, Sarmatian (Volhynian); Fig. 18. C-1 Drenovets, Sarmatian (Chersonian).
Figs. 19, 20. (101) *Ericipites baculatus* NAGY 1969 - Fig. 19. C-1 Slavotin, Sarmatian (Volhynian); Fig. 20. C-12 Deleina, Badenian, SEM x 2600.
Figs. 21-23. (104) *Tricolporopollenites megaexactus* (POTONIÉ 1931) THOMSON & PFLUG 1953 ssp. *exactus* (POTONIÉ 1931) THOMSON & PFLUG 1953 - Fig. 21, 22. C-37 Makresh, Badenian; Fig. 23. C-12 Deleina, Badenian, SEM x 3000.
Figs. 24, 25. (105) *Symplocoipollenites hidasensis* (NAGY 1963) n. c. - C-12 Deleina, Sarmatian (Bessarabian).

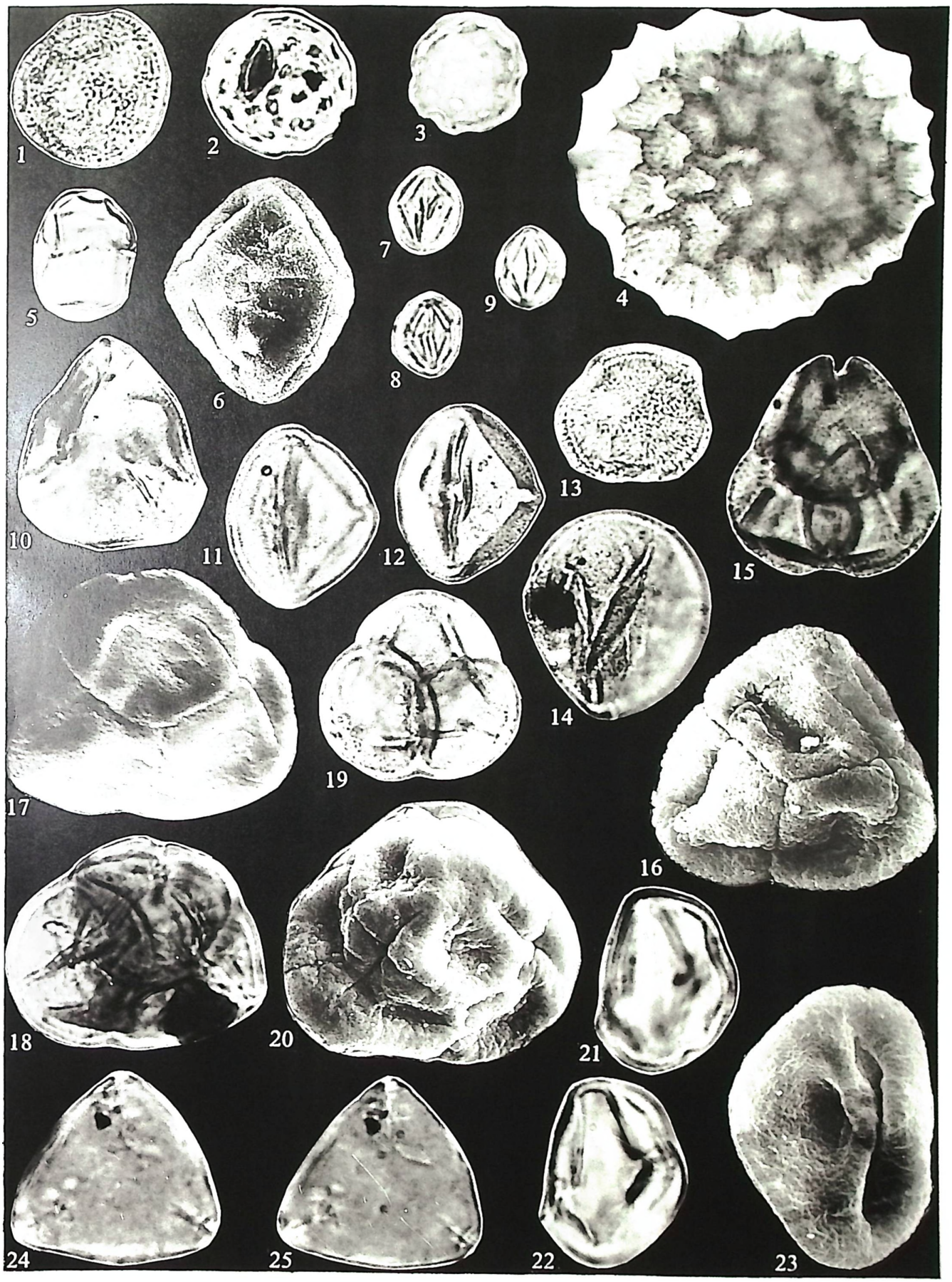
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Plate 10.
(All figures x 1000, except where otherwise stated)

Fig. 1. (106) *Symplocoipollenites maturus* (DOKTOROWICZ-HREBNICKA 1960) ZIEMBINSKA-TWORZYDLO IN ZIEMBINSKA-TWORZYDLO ET AL. 1994 - C-12 Deleina, Sarmatian (Bessarabian).

Fig. 2. (107) *Symplocoipollenites rarobaculatus* (THIELE-PFEIFFER 1980) ASHRAF & MOSBRUGGER 1996 - C-12 Deleina, Sarmatian (Bessarabian).

Figs. 3, 4. (108) *Symplocoipollenites triangulus* (POTONIÉ 1931) POTONIÉ 1951 - Fig. 3. C-37 Makresh, Sarmatian (Volhynian); Fig. 4. C-1 Slavotin, Sarmatian (Volhynian).

Figs. 5, 6. (109) *Symplocoipollenites vestibulum* (POTONIÉ 1931) POTONIÉ 1951 ssp. *vestibulum* - Fig. 5. C-12 Deleina, Sarmatian (Volhynian); Fig. 6. C-1 Slavotin, Sarmatian (Volhynian).

Figs. 7, 8. (110) *Tetracolporopollenites obscurus* PFLUG & THOMSON IN THOMSON & PFLUG 1953 - C-1 Slavotin, Sarmatian (Volhynian): Fig. 7. equatorial view; Fig. 8. polar view.

Fig. 9. (111) *Tetracolporopollenites sapotoides* PFLUG & THOMSON IN THOMSON & PFLUG 1953 - C-37 Makresh, Badenian.

Figs. 10-12. (112) *Intratriporopollenites cordataeformis* (WOLFF 1934) MAI 1961 - Fig. 10. C-1 Slavotin, Sarmatian (Volhynian); Fig. 11. C-12 Deleina, Sarmatian (Volhynian); Fig. 12. C-12 Deleina, Badenian, SEM x 1700.

Figs. 13, 14. (113) *Reevesiapollis triangulus* (MAMCZAR 1960) KRUTZSCH 1970 - C-12 Deleina, Badenian.

Fig. 15. (114) *Iteapollis angustiporatus* (SCHNEIDER 1965) ZIEMBINSKA-TWORZYDLO 1974 - C-37 Makresh, Sarmatian (Volhynian).

Figs. 16, 17. (115) *Tricolporopollenites* sp. 2 (*Spiraea* sp.) - C-1 Slavotin, Sarmatian (Bessarabian).

Figs. 18, 19. (116) *Pistacioidites* sp. - C-12 Deleina, Sarmatian (Bessarabian).

Figs. 20, 21. (117) *Tricolporopollenites pseudocingulum* (POTONIÉ 1931) THOMSON & PFLUG 1953 - C-1 Slavotin, Sarmatian (Volhynian).

Figs. 22, 23. (118) *Rhuspollenites* cf. *ornatus* THIELE-PFEIFFER 1980 - C-37 Makresh, Sarmatian (Volhynian).

Figs. 24, 25. (119) *Tricolporopollenites* sp. 3 (*Staphylea* sp.) - C-1 Slavotin, Sarmatian (Volhynian).

Figs. 26-28. (120) *Aceripollenites striatus* (PFLUG 1959) THIELE-PFEIFFER 1980 - Fig. 26. C-12 Deleina, Sarmatian (Volhynian) SEM x 2000; Figs. 27, 28. C-1 Slavotin, Sarmatian (Volhynian).

Fig. 29. (121) *Aceripollenites* cf. *microrugulatus* THIELE-PFEIFFER 1980 - C-37 Makresh, Sarmatian (Volhynian).


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Plate 11.
(All figures x 1000, except where otherwise stated)

Figs. 1-3. (122) *Nyssapollenites kruschi* (POTONIÉ 1931) POTONIÉ, THOMSON & THIREGART 1950 ssp. *accessorius* (POTONIÉ 1934) POTONIÉ,THOMSON & THIREGART 1950 - Figs. 1, 2. C-1 Slavotin, Sarmatian (Volhynian); Fig. 3. C-12 Deleina, Badenian, SEM x 2400.

Figs. 4, 5. (123) *Alangiopollis barghoornianum* (TRAVERSE 1955) KRUTZSCH 1962 - C-37 Makresh, Sarmatian (Volhynian) x 500.

Figs. 6, 7. (124) *Cornaceaepollis major* (STUCHLIK 1964) STUCHLIK IN ZIEMBINSKA-TWORZYDLO ET AL. 1994 - Fig.6. C-1 Slavotin, Sarmatian (Bessarabian), polar view; Fig. 7. C-37 Makresh, Sarmatian (Volhynian), equatorial view.

Figs. 8, 9. (125) *Tricolporopollenites satzveyensis* PFLUG IN THOMSON & PFLUG 1953 - C-12 Deleina, Badenian.

Figs. 10, 11. (126) *Tricolporopollenites edmundii* (POTONIÉ 1931) THOMSON & PFLUG 1953 - C-37 Makresh, Badenian.

Figs. 12, 13. (127) *Araliaceoipollenites euphorii* (POTONIÉ 1931) POTONIÉ 1951 - C-1 Slavotin, Sarmatian (Volhynian).

Figs. 14, 15. (128) *Araliaceoipollenites reticuloides* THIELE-PFEIFFER 1980 - C-1 Drenovets, Maeotian.

Figs. 16-18. (129) *Ilexpollenites iliacus* (POTONIÉ 1931) THIERGART EX RAATZ 1937 - C-1 Slavotin, Sarmatian (Volhynian), Fig. 16. polar view; Figs. 17, 18. equatorial view.

Fig. 19. (130) *Tricolporopollenites macrodurensis* PFLUG & THOMSON IN THOMSON & PFLUG 1953 - C-1 Slavotin, Sarmatian (Volhynian).

Figs. 20, 21. (131) *Proteacidites egerensis* NAGY 1963 - C-12 Deleina, Badenian.

Figs. 22-24. (132) *Oleoidearumpollenites chinensis* NAGY 1969 - C-1 Slavotin, Sarmatian (Volhynian), Fig. 22. equatorial view; Figs. 23, 24. polar view.

Fig. 25. (133) *Tricolpopollenites* cf. *sinuosimuratus* TREVISAN 1967 - C-1 Slavotin, Sarmatian (Volhynian).

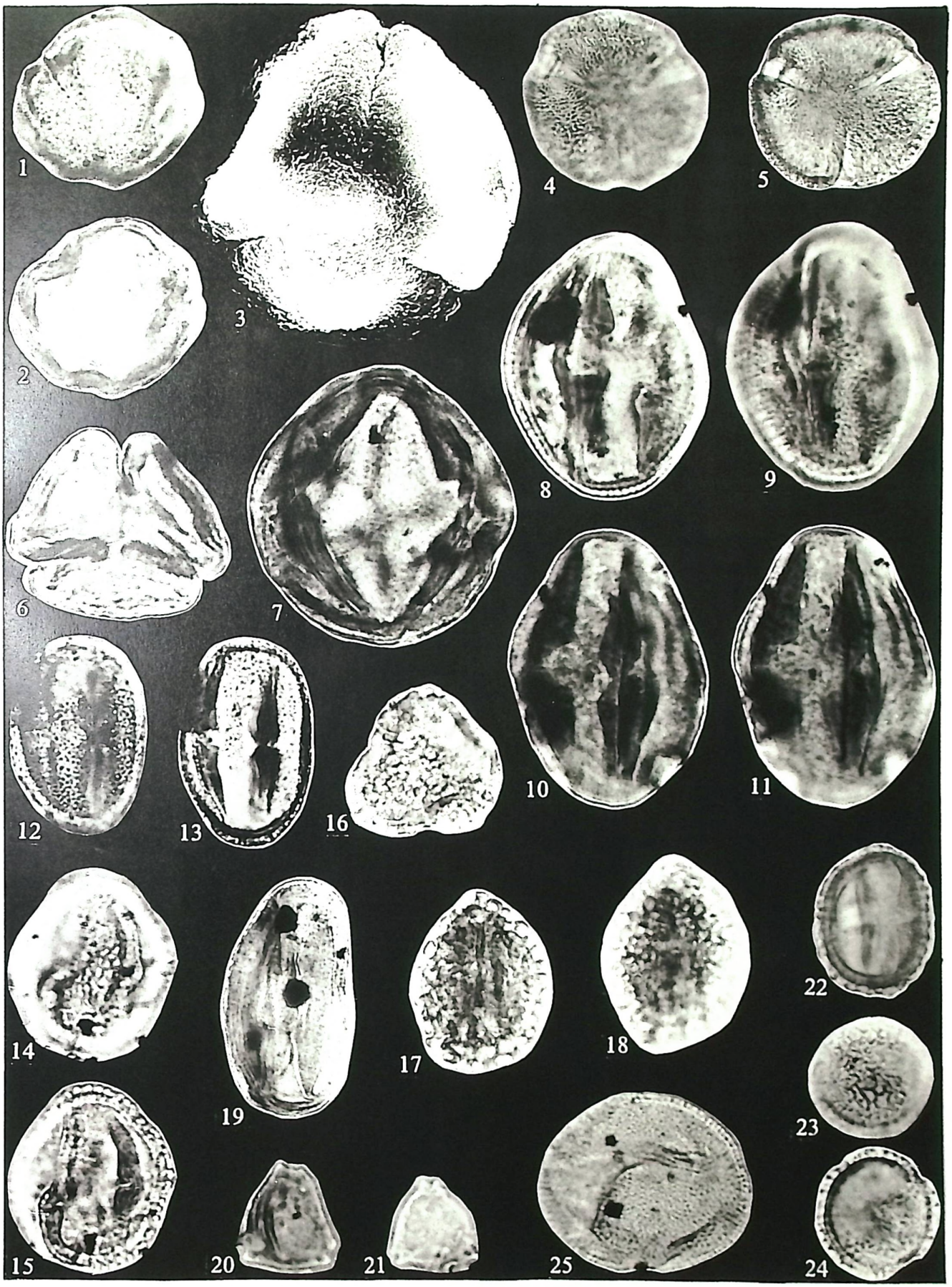
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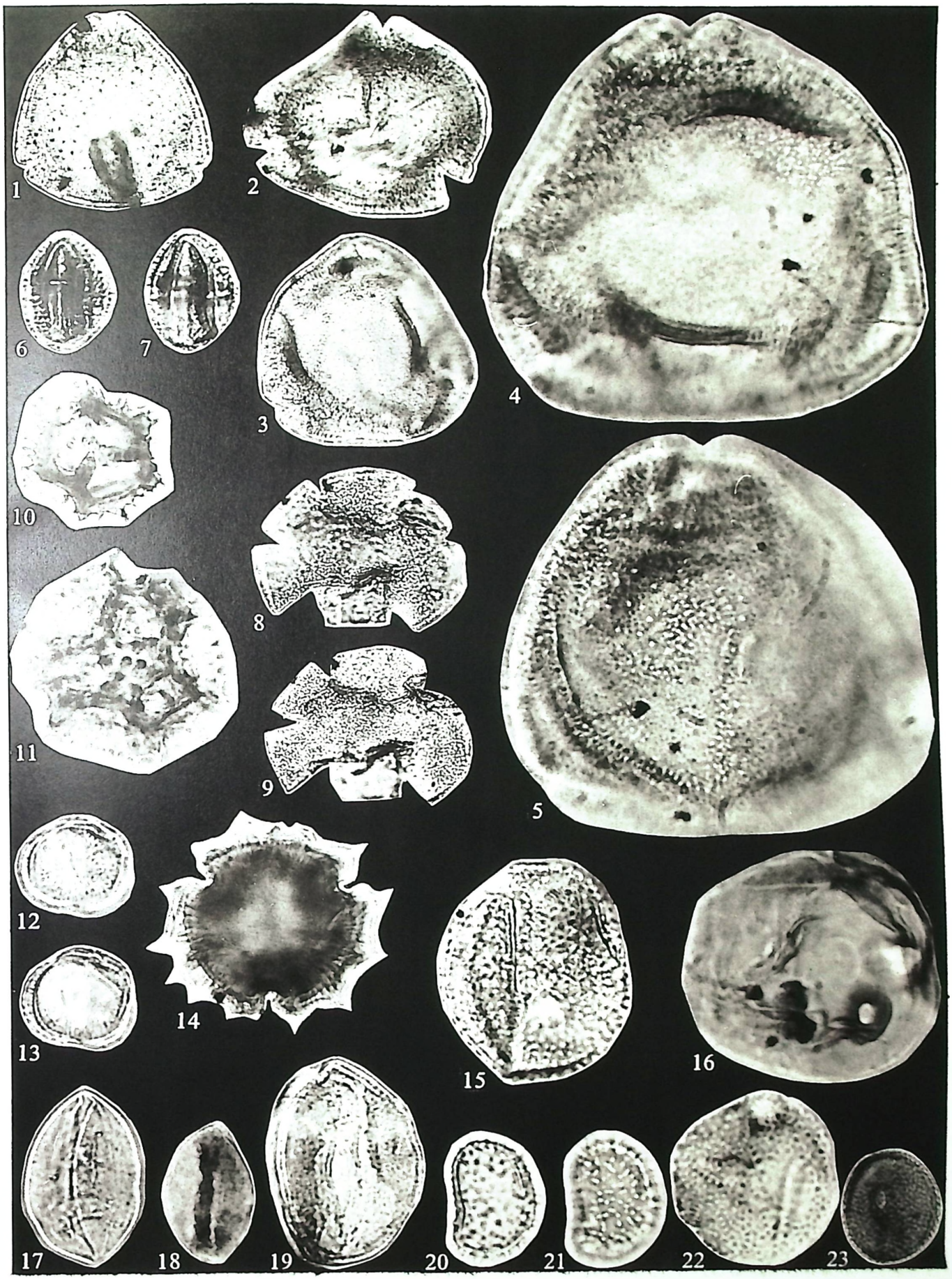
Plate 12.
(All figures x 1000, except where otherwise stated)

Figs. 1, 2. (134) *Lonicerapollis gallwitzi* KRUTZSCH 1962 - C-37 Makresh, Sarmatian (Volhynian) x 500.
Figs. 3-5. (135) *Lonicerapollis* sp. - C-12 Deleina, Sarmatian (Bessarabian); Fig. 3. x 500.
Figs. 6, 7. (136) *Caprifoliipites sambucoides* NAGY 1969 - C-37 Makresh, Sarmatian (Volhynian).
Figs. 8, 9. (137) *Polycolpopollenites* cf. *hexaradiatus* NAKOMAN 1967 - C-37 Makresh, Sarmatian (Volhynian) x 500.
Figs. 10, 11. (138) *Cichoreacidites gracilis* (NAGY 1969) NAGY1985 - C-1 Slavotin, Sarmatian (Volhynian).
Figs. 12, 13. (139) *Artemisiaepollenites sellularis* NAGY 1969 - C-1 Drenovets, Maeotian.
Fig. 14. (140) *Tubulifloridites macroechinatus* (TREVISAN 1967) NAGY 1985 - C-1 Slavotin, Sarmatian (Bessarabian).
Fig. 15. (141) *Potamogetonacidites paluster* (MANTEN 1958) MOHR 1984 - C-37 Makresh, Sarmatian (Volhynian).
Fig. 16. (142) *Graminidites media* COOKSON 1947 - C-1 Slavotin, Sarmatian (Volhynian).
Fig. 17. (143) *Monocolpopollenites tranquillus* (POTONIÉ 1934) THOMSON & PFLUG 1953 - C-37 Makresh, Badenian.
Fig. 18. (144) *Monocolpopollenites* sp. - C-12 Deleina, Badenian.
Fig. 19. (145) *Arecipites* cf. *convexus* (THIERGART 1938) KRUTZSCH 1970 - C-1 Slavotin, Sarmatian (Volhynian).
Figs. 20, 21. (146) *Pandaniidites* sp. - C-37 Makresh, Badenian.
Fig. 22. (147) *Sparganiaceaepollenites neogenicus* KRUTZSCH 1970 - C-1 Slavotin, Sarmatian (Volhynian).
Fig. 23. (148) *Sparganiaceaepollenites polygonalis* THIERGART 1938 - C-1 Slavotin, Sarmatian (Volhynian).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