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SPORE-POLLEN INVESTIGATION OF BORE-HOLE NO. 11 AT LŐKÖSHÁZA, WITH SPECIAL REGARD TO THE RECYCLED SPOROMORPHS

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Introduction

Several papers were published in recent years about the spore-pollen investigation of the recycled sediments. Palynology even as a method has proved suitable to ascertain by means of the presence of sporomorphs of older ages in the sedimentary rock investigated with more or less certainty not only the fact of recycling but also the age of the sediments recycled. In the literature of palynology nowadays several publications treat of the problem of denudation. Concerning method we may distinguish three main trends:

1. The classical method, the essence of which is the fundamental knowledge of the sporomorphs in various periods. On that basis, more types of denudation were separated from one another (GRICHUK, 1950; KRIVÁN and NAGY, 1963; WILSON, 1964; KEDVES, ENDRÉDI and SZELEY, 1966).
2. The separation of the recycled sporepollen grains by staining (STANLEY, 1966).
3. The separation of the recycled sporomorphs with fluorescence microscopy (VAN GIJZEL, 1966; 1967).

The materials of our investigation were the samples obtained from a depth of 0,00 to 8,20 m from the bore-hole No. 11 at Lőkösháza. The geological structure of the bore-hole is treated in the monograph of ANDÓ and MUCSI (1968). It is characteristic of the deep structure of the south-eastern territory beyond River Tisza that sea-torton and Miocene with Sarmatian sediments settled on the Palaeozoic and Mezozoic substrata. On which Panonian sediments have been stratified with transgression.

In the Pleistocene, the Hungarian Plain proceeded sinking. The site of river beds towards these sinking territories continually changed, their sediments were detrital cone-like. In the Holocene, the erosion of rivers, smaller and periodical. The character of sporadically standing water is marked by a clay-bearing, silty sediment.

Results

The bore-hole investigated by us falls on the area of a narrower ancient river valley. The underlayer of the Holocene valley bottom is silt, clayey silt between 4,3 to 8,2 m. The spore-pollen of Pleistocene in the two layers between

7,2 to 8,2 m is little, mainly as compared with the older sporomorphs of larger mass. The pollens of *Pinus silvestris* type are dominant, the mass of *Alnus*, *Betula* pollen is considerable, in a good condition characteristic of the quarter. In the layers between 6,0 to 7,2 m the dominance of conifers come to an end, there are more pollens of deciduous trees, from which the Quercus, Fagus, Carpinus, Juglans species can be determined; in the sample of 6,3 to 6,6 m we have found pollens of *Pinus cembra* type and *Ericaceae* (Plate IV, 11, 12), as well. It means the same as the *Trichia hispida* L. present alone here, marking a dry-cold climate in the *Mollusca* ensemble. The microfossils of the layer-line between 4,3 to 6,3 m from the Quaternary contain some species from standing water. The pollen of *Myriophyllum, Ceratophyllum* and the *Botryococcus* alga (Plate IV, 13, 14) show marsh conditions; *Cyperaceae, Typha, Equisetum, Alnus* and *Betula* are furnishing data about the combination of riparian vegetation.

The washing role of the ancient River-Maros entering the Hungarian Plain appears for the last time in the layers between 4,3 to 4,7 m in which, besides the uliginal genera coming from the inundation, a great many older sporomorphs can be found. The palynological results correspond to the malacological statements of ANDÓ and MUCSI (1968) who similarly determined a lacustrian, uliginal fauna.

The Pleistocene series of layer stops at 4,3 m. The spectrum rich in conifers of the layers between 7,3 to 8,2 may show the stadium of Würm while the pollen combination of layers above them marks an interstadial part. As a result of an intensive erosion in a warmer and more humid climate, the river spreading widely after entering the Plain had produced a flora and fauna of standing water in its inundations. This supposition is verified also by the sedimentary material as the silt clayey below ends at 5,7 m with a humous part of the layer. The humous sediment refers to a pause in reworking. Above it, at 4,3 m, is a blue clay-silt as closing layer, as a result of the reducing process of a state constantly under water. The Holocene valley formation begins at 4,3 m, with a new, weakened rhythm of the river activity the sediment of which between 1,4 to 4,3 m is micaceous, coarse-grained and rough sand mixed only with about 5 p. c. gravel of 1 to 7 mm in diameter. The pollen content of the sediment-proceeding upwards becoming finer — is very thin. The most of them are *Graminae* pollens that can mark between 1,2 to 1,4 m only the hazel phase of the ancient Holocene steppe period. For the phases of the ancient Holocene

Plate I

1,2. — *Toroisporis (Toroisporis) reissingeri* KEDVES & SIMONCSICS 1964, prep. Lökösháza, 4,9—5,3 m., 41,9/90,2.
3,4. — *Gleicheniidites (Triplexisporis) posttriplex* DÖRING 1965, prep. Lökösháza, 4,7—4,9 m., 32,2/94,8.
5,6. — *Gleicheniidites (Radiatisporis)* fsp., prep. Lökösháza, 4,7—4,9 m. 35,2/110,6.
7,8. — *Gleicheniidites (Triremisporites) minor* DÖRING 1965, prep. Lökösháza, 4,9—5,3 m., 44,6/94,2.
9,10. — *Gleicheniidites (Triremisporites)* cf. *minor* DÖRING 1965, prep. Lökösháza, 4,3—4,7 m., 41,3/109.
11,12. — *Gleicheniidites (Triremisporites) rasilis* (BOLCH. 1953) W. KR. 1959, prep. Lökösháza, 7,7—8,2 m., 45,1/105.
13,14. — *Gleicheniidites (Triremisporites)* fsp., prep. Lökösháza, 4,7—4,9 m., 30,3—90,1.

Plate I

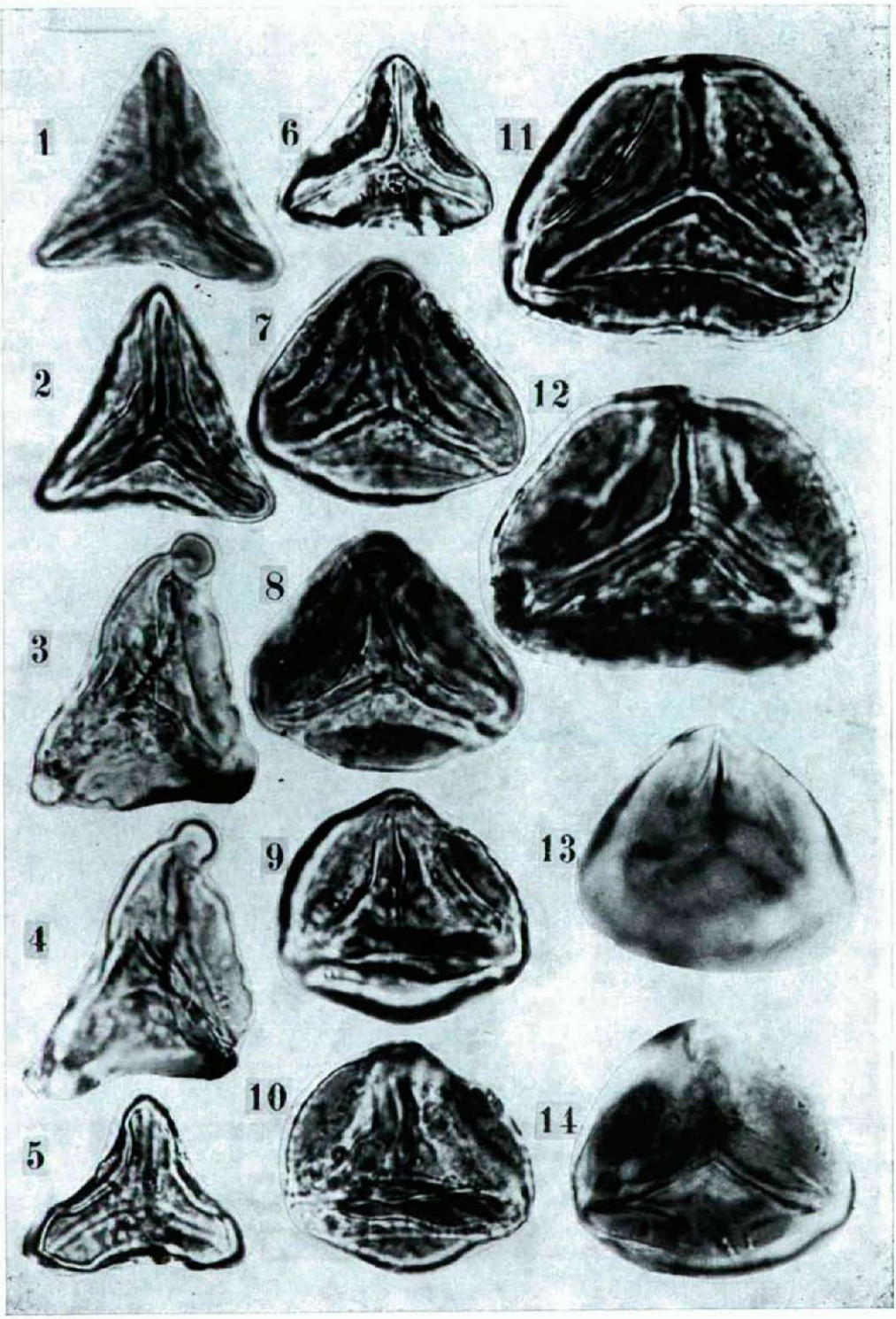
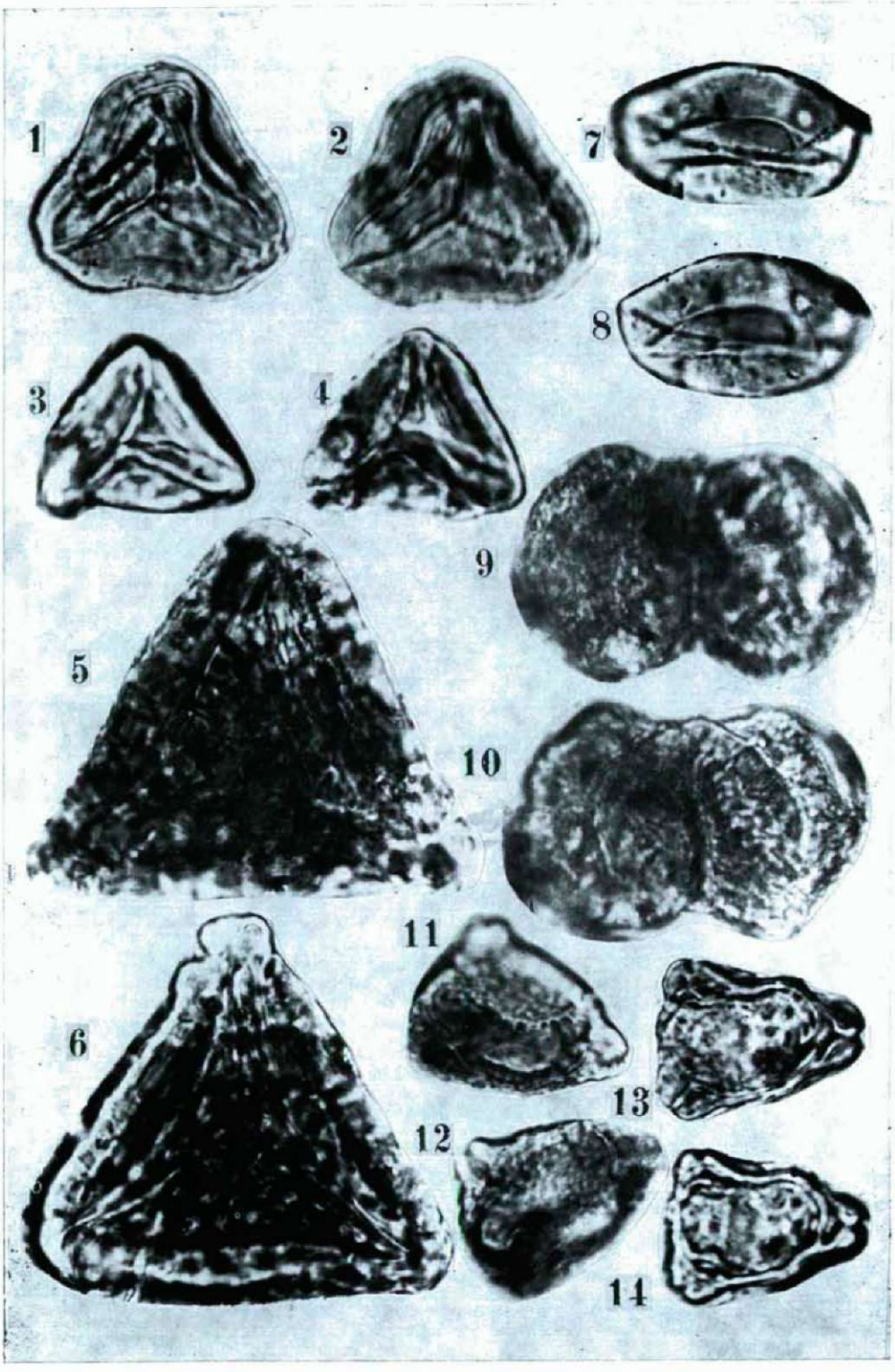


Plate II



vegetation we cannot give any palynological support. The pollen combination may have perished owing to frequent water coverage and desiccat ion.

Recycled sporomorphs. The investigation of these sporomorphs was performed with the mentioned classical method. The washing is complicated because more sediments of various ages were perishing in identical or nearly identical ages. The spores and pollens washed through are marking the denudation of the following layers:

1. Lower Cretaceous

We have observed first of all a large mass of Pteridophyte spores in very good condition. The morphology of these is referring to the Gleicheniaceae family of tropical character. We have determined the following taxa of the morphological system: *Toroisporis (Toroisporis) reissingeri* KEDVES et SIMONCSICS 1964 (Plate I, 1, 2), *Gleicheniidites (Triplexisporis) postriplex* DÖRING 1965 (Plata I. 3. 4), *Gleicheniidites (Radiatisporis)* fsp. (Plate I, 5, 6), *Gleicheniidites (Triremisporites) minor* DÖRING 1965 (Plate I, 7, 8; cf. 9, 10), *Gleicheniidites (Triremisporites) rasilis* (BOLCH. 1953) W. KR. 1959 (Plate I, 11, 12), *Gleicheniidites (Triremisporites)* fsp. (Plate I, 13, 14), *Gleicheniidites (Laticrassisporis* fsp.$_1$ (Plate II, 1, 2), *Gleicheniidites (Laticrassisporis)* fsp.$_2$ (Plate II, 3, 4), *Trubasporis* fsp. (Plate II, 5, 6).

Gymnospermatophyte pollen grains: cf. *Monosulcites* fsp. (Plate II, 7, 8), *Podocarpidites* fsp. (Plate II, 9, 10).

2. Upper Cretaceous

Only genus *Trudopollis* occurred, in our samples (Plate II, 11, 12). This age or the Lower Tertiarc period is referred to by cf. *Plicapollis pseudoexcelsus* (W. KR. 1958) W. KR. 1961 subfsp. *turgidus* PF. 1953 (Plate II, 13, 14).

3. Lower Tertiary

In contradistinction to the recycled sporomorphs of Lower Cretaceous, the following sporomorphs are less characteristic but in their totality they refer to the denudation of the sediments from the Lower Tertiary: *Stereisporites (Stereisporites)* fsp. (Plate III, 1, 2), *Toroisporis (Toroisporis) eocaenicus* KEDVES 1966 (Plate III, 3, 4), *Concavisporites (Concavisporites) arugulatus* PF. 1953 (Plate III, 5, 6), *Toroisporis (Toroisporis)* cf. *torus* (PF. 1953) W. KR. 1959 subsp. *major* PF. 1953 (Plate III, 7, 8), cf *Gleicheniidites (Toridistalisporis) toriconcavus* W. KR. 1959 (Plate III, 9, 10), *Polypodiaceoisporites* fsp. (Plate III, 11, 12), *Ephedripites (Ephedripites)* fsp. (Plate III, 13, 14), *Taxodiaceaepollenites*

Plate II

1,2. — *Gleicheniidites (Laticrassisporis)* fsp.$_1$, prep. Lőkösháza, 4,9—5,3 m., 29,6/98,3.
3,4. — *Gleicheniidites (Laticrassisporis)* fsp.$_2$, prep. Lőkösháza, 7,7/8,2 m., 37,6/114.
5,6. — *Trubasporis* fsp., prep. Lőkösháza, 4,3—4,7 m., 34,2/96,4.
7,8. — Cf. *Monosulcites* fsp., prep. Lőkösháza, 4,3—4,7 m., 30,5/103,1.
9,10. — *Podocarpidites* fsp., prep. Lőkösháza, 4,7—4,9 m., 30,9/90.
11,12. — *Trudopollis* fsp., prep. Lőkösháza, 4,9—5,3 m., 35,8/107,1.
13,14. — Cf. *Plicapollis pseudoexcelsus* (W. KR. 1958) W. KR. 1961 subfsp. *turgidus* PF. 1953, prep. Lőkösháza 7,2—7,7 m., 36/99.

biatus (R. POT. 1931) KREMP 1949 (Plate III, 15, 16), *Triatriopollenites* fsp.$_1$ (Plate III, 17, 18), *Triatriopollenites* fsp.$_2$ (III, 19, 20), cf. *Nipa* (Plate IV, 1, 2), *Intratriporopollenites microreticulatus* Mai 1961 (Plate IV, 3, 4), *Tricolporopollenites* ex gr. *cingulum* (Plate IV, 7, 8), *Tricolporopollenites* fsp. (Plate IV, 9, 10).

The stratigraphy of *Crassosphaera concina* COOKSON et MANUM 1960 (Plate IV, 15) is only imperfectly, as yet, it is without doubt that it derives from older Mezozoic or Lower Tetriary sediments. According to the data obtained so far, it marks a facies of mixed water.

Summary

The area investigated by us belonged to the territory carried down by the ancient River Maros. The erosion came mostly from the Transylvanian Erzgebirge and in smaller parts from basins farther away. In this area, along River Maros, since the Cretaceous a strong erosion has taken place (PÁVAI-VAJNA, 1914). According to our palynological data, in 4,3 to 5,3 m depth of the borehole we can denote first of all the denudation of sediments from the Lower Cretaceous, verified by the relative frequency of the forms of family Gleicheniaceae coming characteristically from the Lower Cretaceous. In a depth of 7,2 to 8,2 m rather the types of Tertiary (older than the Miocene) are in majority (e. g., *Intratriporopollenites microreticulatus* Mai 1961, cf. *Nipa*, etc.), accompanied by one or two pollens from the Upper Cretaceous.

References

ANDÓ M.—MUCSI, M. (1968): Angaben zur Entwicklungsgeschicht eder Sedimente des ausklingenden Pleistozäns und Holozänen Alters im Lande südöstlich der Theiß (Ungarn). — Acta Geogr. Szeged *8*, 17—38.

DÖRING, H. (1965): Stratigraphische Verbreitung der Sporengattungen *Gleicheniidites* und *Trubasporites* im Jura-Kreide-Grenzbereich. — Mitteilungen ZGI. *1*, 191—209.

GRICHUK, V. P. (1950): The vegetation of the Russian Plain during Lower and Middle-Quaternary. — Trudy Geogr. In-ta Akad. Nauk. SSSR *46*.

KEDVES, M.—SIMONCSICS, P. (1964): Microstratigraphy of the carbonate manganese ore layers of the Shaft III. of Úrkút on the basis of palynological investigations. — Acta Miner. — Petr. Szeged *16*, 3—48.

Plate III

1,2. — *Stereisporites (Stereisporites)* fsp prep. Lökösháza, 4,7—4,9, 37,5/106,5.
3,4. — *Toroisporis (Toroisporis) eocaenicus* KEDVES 1966, prep. Lökösháza, 4,7—4,9 m., 33/95.
5,6. — *Concavisporites (Concavisporites) arugulatus* PF. 1953, prep. Lökösháza, 4,7—4,9 m., 38,9/94,5.
7,8. — *Toroisporis (Toroisporis)* cf. *torus* (PF. 1953) W. KR. 1959 subfsp. *major* PF. 1953, prep. Lökösháza, 4,3—4,7 m., 44/97.
9,10. — Cf. *Gleicheniidites (Toridistalisporis) toriconcavus* W. KR. 1959, prep. Lökösháza, 4,7—4,9 m., 37,5/88,6.
11,12. — *Polypodiaceoisporites* fsp., prep. Lökösháza, 4,3—4,7 m., 37,2/106,7.
13,14. — *Ephedripites (Ephedripites)* fsp., prep. Lökösháza, 4,9—5,3, 44,5/94.
15,18. — *Taxodiaceaepollenites hiatus* (R. POT. (1931) KREMP 1949, prep. Lökösháza, 4,3—4,7 m. 38,3/110,4.
17,18. — *Triatriopollenites* fsp.$_1$, prep. Lökösháza, 5,3—5,7 38/105,1.
19,20. — *Triatriopollenites* fsp.$_2$, prep. Lökösháza, 7,2—7,7 m, 43,5/109,7.

Plate III

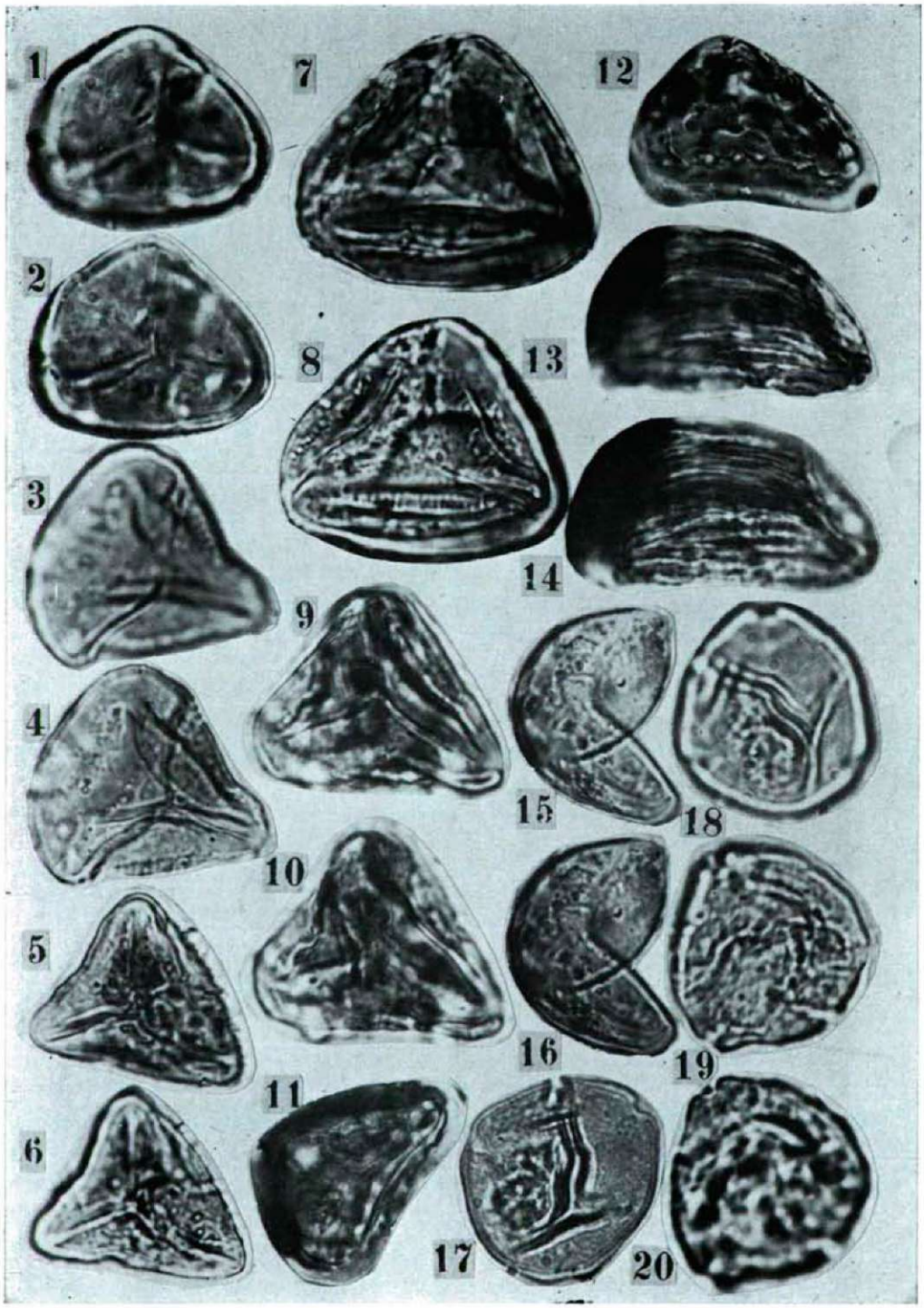
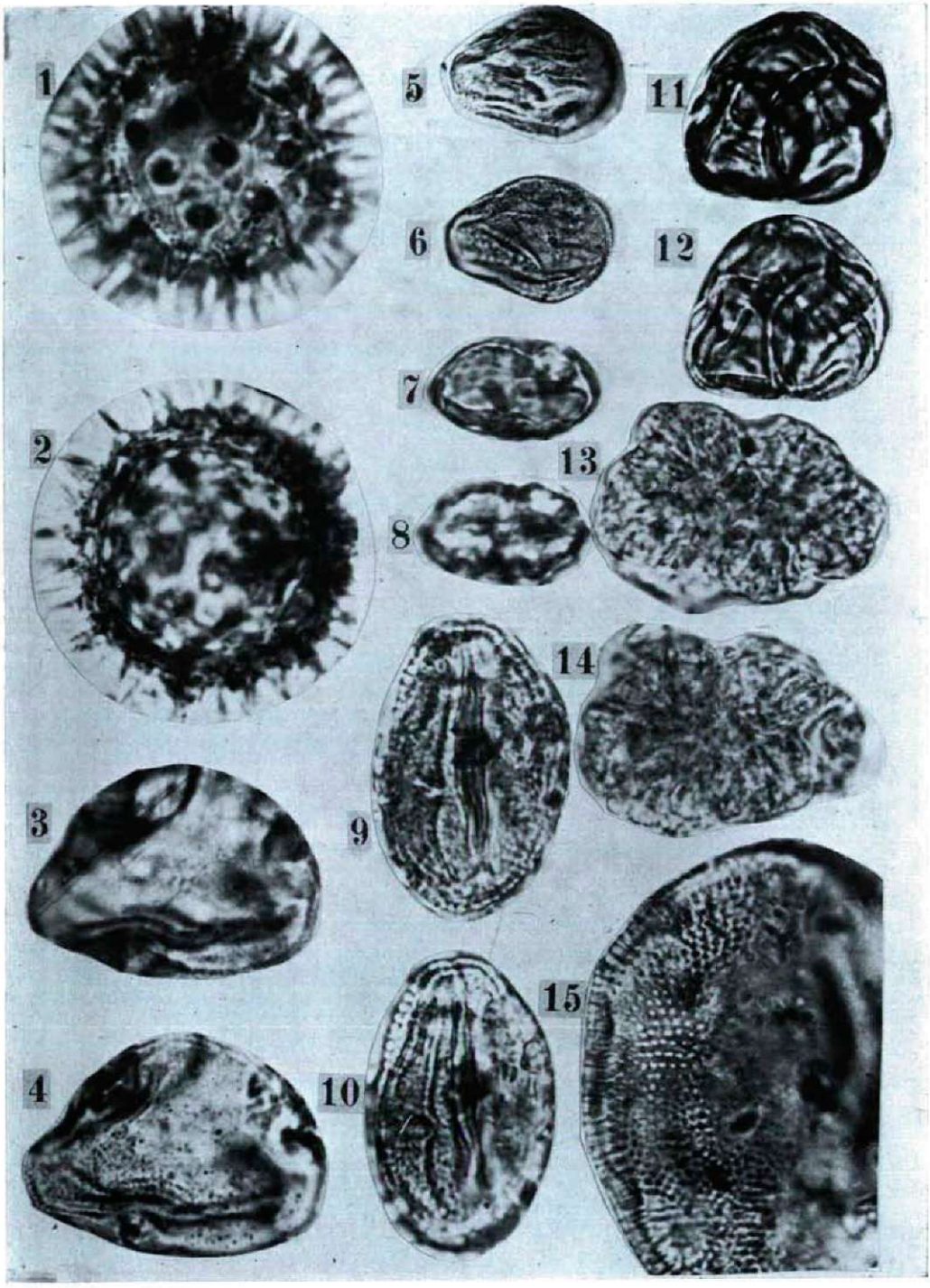


Plate IV



KEDVES, M.—ENDRÉDI L., and SZELEY, Zs. (1966): Problémes palynologiques concernant le remaniement des sédiments Paléo- et Mésozoiques dans des bassins du Pannonien supérieur de Hongrie. — Pollen et Spores *8*, 315—336.

KRIVÁN, P.—NAGY L.-NÉ (1963): Harmadidőszaki és negyedkori spóra-pollen bemosást tartalmazó palynológiai spektrumok felbontása a lehordási terület megismerésére és a rétegtani felhasználás érdekében. — Földt. Közl. *93*. 82—96.

PÁVAI—VAJNA, F. (1914): Über die Ausgestaltung des Marostales. — Földt. Közl. *44*, 256—280.

STANLEY, E. A. (1966): The problem of reworked pollen and spores in marine sediments. — Marine Geol. *4*, 397—408.

VAN GIJZEL, P. (1967): Palynology and fluorescence microscopy. — Rev. Palaeobotan. Palynol. *2*, 49—79.

WILSON, L. R. (1964): Recycling, stratigraphic leakage and faulty techniques in palynology. — Grana Palynologica *5*, 425—436.

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Plate IV

1,2. — Cf. *Nipa*, prep. Lőkösháza, 7,7—8,2, 29,5/113.
3,4. — *Intratriporopollenites microreticulatus* Mai 1960, prep. Lőkösháza 4,3—4,7 m, 30,4/111.
5,6. — *Tricolporopollenites* ex gr. *microhenrici*, prep. Lőkösháza 4,9—5,3 m, 31/96,5.
7,8. — *Tricolporopollenites* ex gr. *cingulum* Lőkösháza, 4,9—5,3 m, 39,3/114,8.
9,10. — *Tricolporopollenites* fsp., prep. Lőkösháza 4,7—4,9 m, 35,5/98.
11,12. — cf. *Ericaceae*, prep. Lőkösháza 4,3—4,7 m, 35,5/108,1.
13,14. — *Botryococcus* fsp. prep. Lőkösháza, 4,7—4,9 m, 30,7/87,7.
15. — *Crassophaera concina* COOKSON et MANUM 1960 prep. Lőkösháza, 4,7—4,9, 36,9/103.