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SPORE-POLLEN DATA FROM THE MARL LAYERS OF MTE. BOLCA

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Introduction

The marl layers of Mte. Bolca has become renowned owing to its faunal remainders in an excellent state. On the basis of literary data, however, the opinions concerning its geological age are different.

On the comparative stratigraphical table of the spore-pollen types known from the locality types of the Paris basin, as well from the major European localities of the lower palaegenic age, the upper level of the Cuisian sub-stage is taking place with the data of the locality type (KEDVES, 1967). On the basis of the classic data of the upper level of the sub-stage Sparnacian, and of the data, from Cuise mentioned above, more layers in Hungary from the lower Eocene (Halimba, Iszkaszentgxörgy) belong probably to the lower level of the Cuisian sub-stage.

It is generally known that in the upper Cretaceous and Palaeogene periods the living world of Hungary was in a close connection with the Mediterranean region. It is, therefore, very considerable from the point of view of the pollen stratigraphy of the lower Eocene layers in Hungary, as well, to know the composition of the sporomorhae in the layers of Mte. Bolca.

About the sporomorphae of the Mediterranean Palaeogene sediments we have got so long but a few data. It is an open question so far, in which degree the pollen-stratigraphic regularities, recorded in Central, Western and Eastern Europe till now, are valid for this area. Thus the palaeogene pollen-stratigraphy of Europe, resp. its connections of general validity can be promoted with knowledge of these data.

Materials and Methods

The matter of our investigations has been made available for us by TIBOR KECSKEMÉTI who collected it with ENDRE DUDICH, JR. and GÁBOR KOPEK together. We wish to express our thanks in this way, as well, for their kind help.

The preparation of the rock samples took place with a treatement with HCl and fluorhydrogen.

Our preparations are relatively poor in spores and pollen grains; on the other hand, in remains of Hystrichosphaeridae they are extremely rich. For obtaining a sporomorpha ensemble that was suitable to be compared we had to investigate 55 preparations.

Problems of terminology

The taxonomy and the science of terminology of the sporomorhae of the lower Tertiary period have been advancing with rapid strides in recent times, although we are still far from a general unitary science of terms. The great number of papers published of late years have resulted in a lot of synonyms, as well.

Below we shall exclusively treat of some questions in connection with our data, in accordance with the degree of their importance.

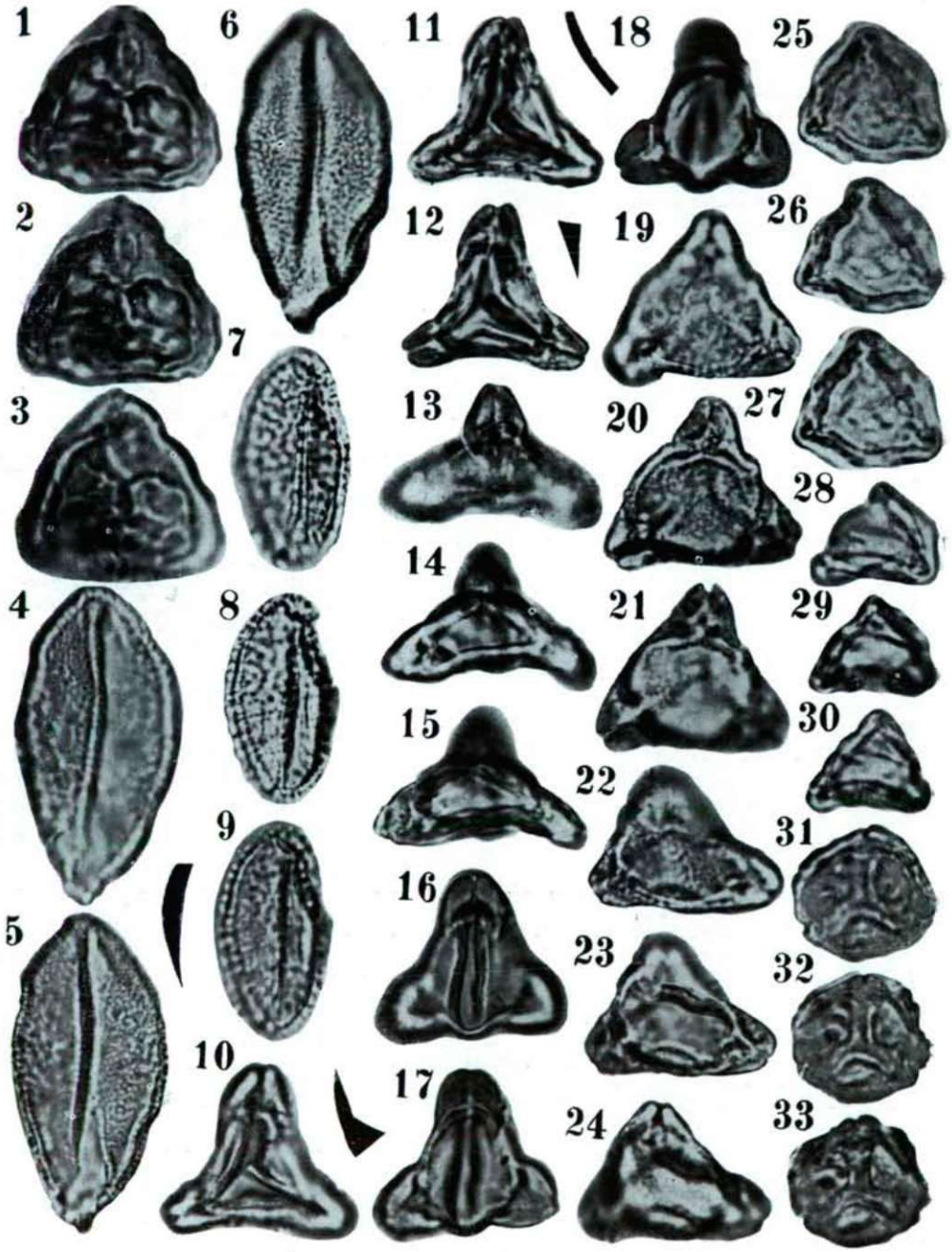
1. In the Hungarian special literature a pollen type Restionaceae, that is very important from palaeobotanical point of view, was described by the name *Monoporopollenites hungaricus* KDS. 1965. (Plate IV, 4—6). The fossil pollen grains of the type Restionaceae were classified by KRUTZSCH (1961) into genus *Milfordia* ERDTMAN 1960, and the *Inaperturopollenites incertus* PF. & TH. 1953 subfsp. *foveolatus* PF. & TH. 1953 published by THOMSON & PFLUG (1953), were published by him by the name *Milfordia incerta* (TH. & PF. 1953) W. KR. 1961. On the other hand, ERDTMAN's (1960) genus diagnosis is: "Generic diagnosis (genotype *Milfordia hypolaenoides*): Pollen grains monocolpate. Colpus with slightly jagged margin. Exine psilate, its outer layer (sexine) provided with small, densely spaced circular pits (scrobiculi)." Although there can be found doubtless a great similarity between the structures of *Milfordia hypolaenoides* ERDTMAN 1960 and *Monporopollenites hungaricus* KDS. 1965 exine, nevertheless, they cannot belong to an identical genus as genus *Milfordia Erdtman* 1960 is containing monocolpate forms, the mentioned pollen grains of the type *Restionaceae,* however, monoporate ones. The use of genus *Milfordia* ERDTMAN 1960 is reflected also by ROCHE's work (1968) where the terms *Milfordia incerta* KRUTZSCH 1960 and *Milfordia hungarica* (KEDVES, 1965) W. KRUTZSCH (manuscript) are used. After W. KRUTZSCH's personal information he wrote:

Milfordia incerta (PF. & TH. 1953) W. KR. 1961 is synonymous with:
Inaperturopollenites incertus foveolatus PF. & TH. 1953,
Milfordia hypolaenoides ERDTMAN 1960, and *Milfordia hungarica* (KEDVES, 1965) W. KRUTZSCH (manuscript) with:
Inapeturopollenites incertus PF. & TH. 1953 subfsp. *fossulatus* PF. & TH. 1953,
Monoporopollenites hungaricus KEDVES 1965,
Monulcopollenites confossus, STOWER, ELSIK & FAIRCHILD, 1966 (recte: *Monulcipollenites confossus* FAIRCHILD 1966 — in STOWER, ELSIK & FAIRCHILD 1966).

Plate I

1—3. — *Polypodiaceoisporites* fsp., *Pteridaceae, Pteris;* prep. 0—33—46, 4,8/104,7.
4—6. — *Sabalpollenites* fsp., *Palmae,* cf. *Sabal;* prep. 0—33—40, 6,3/105,8.
7—9. — *Sabalpollenites areolatus* (R. POT. 1934b) R. POT. 1958. *Palmae,* cf. *Trachycarpus;* prep. 0—33—39, 16,2/108,8.
10—12. — Cf. *Pseudoplicapollis* fsp.,; prep. 0—33—45, 6,1/107,5.
13—15. — *Basopollis* fsp.$_1$; prep. 0—33—40, 15,0/109,8.
16—18. — *Cf. Basopollis* fsp.; prep. 0—33—41, 21,9/105,2.
19—21. — *Basopollis* fsp.$_2$; prep. 0—33—54, 12,6/103,5.
22—24. — *Basopollis* fsp.$_2$; prep. 0—33—53, 13,0/107,1.
25—27. — *Interpollis supplingensis* (PF. 1953a) W. KR. 1961; prep. 0—33—53, 19,1/112,2.
28—30. — *Interpollis microsupplingensis* W. KR. 1961; prep. 0—33—48, 15,1/111,8.
31—33. — Cf. *Pompeckjoidaepollenites* fsp.; prep. 0—33—38, 13,5/114,6.

Plate I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As for the pollen grains of *Gramineae* type the genus *Graminidites* COOKSON 1947, and for the monoporate forms of reticulate sculpture genus THIERGART (1937) *Sparganiaceaepollenites* are accepted, MEYER's (1956) *Monoporopollenites* genus is invalid. On the other hand, genus *Milfordia* ERDTMAN 1960 is to be reserved to the monocolpate forms, so much more because we don't know, so far, any publication concerning a repeated investigation of the original slides and an emendation of the diagnosis. Thus the genus ELSIK 1968, that is valid for the pollen grains of the "*Restionaceae* type" is as follows Fgen.: *Restioniidites* ELSIK 1968. Type Species: *Restioniidites hungaricus* (KEDVES, 1965) ELSIK (1968).

2. The so-called *Longaxones* pollen grains are extremely problematical from the point of view of a taxonomic and botanical affinity and from the nomenclature, as well. A considerable part of the names applied in the present work must be considered, therefore, to be of provisory character. The extremely great lot of form-species described so far is expecting to be systematized. That, however, cannot be a topic of this paper of ours.

3. In exceptional cases, we use also taxons not published in details, as yet. These names are distinguished by asterisks.

Results

1. *Pteridophyte* spores have occurred but in a minimal amount (*Polypodiaceoisporites* fsp., *Pteridaceae*, *Pteris* — Plate I, 1—3).

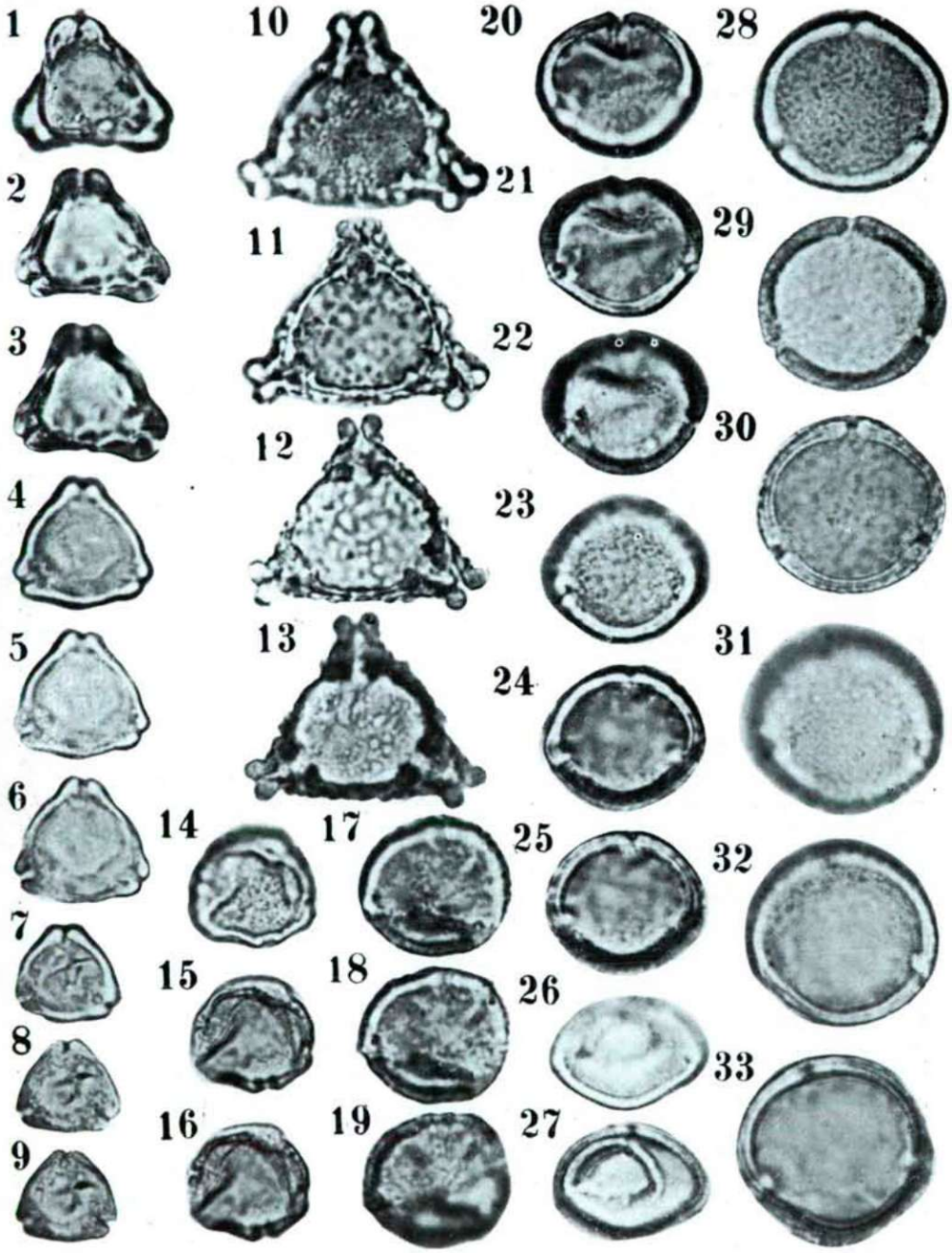
2. *Gymnospermatophyte* pollen grains could not be observed.

3. From the point of view of the geological age, the presence of representatives of the *Normapolles* stemma is particularly important (Cf. *Pseudoplicapollis* fsp. — Plate I, 10—12; *Basopollis* fsp.$_1$ — Plate I, 13—15; *Basopollis* fsp.$_2$ — Plate I, 19—24; Cf. Basopollis fsp. — Plate I, 16—18; *Interpollis supplingensis* (Pf. 1953a) W. KR. 1961 — Plate I, 25—67; *Interpollis microsupplingensis* W. KR. 1961— Plate I, 28—30; cf. *Pompeckjoidaepollenites* fsp. — Plate I, 31—33; *Plicapollis pseudoexcelsus* (W. KR. 1958) W. KR. 1961 subfsp. *luteticus* KDS. 1968 — Plate II, 4—6; *Plicapollis pseudoexcelsus* (W. KR. 1958) W. KR. 1961 subfsp. *minor* PF. 1953a — Plate II, 7—9. Also a new genus that is interesting in view of its morphology has

Plate II

1—3. — *Plicapollis pseudoexcelsus* (W. KR. 1958) W. KR. 1961 subfsp. *turgidus* PF. 1953a; prep. 0—33—39, 20,8/116,8.
4—6. —* *Plicapollis pseudoexcelsus* (W. KR. 1958) W. KR. 1961 subfsp. *luteticus* KDS. 1968; prep. 0—33—48, 11,9/106,7.
7—9. — *Plicapollis pseudoexcelsus* (W. KR. 1958) W. KR. 1961 subfsp. *minor* PF. 1953a; prep. 0—33—19, 16,5/110,9.
10—13. — *Normapolles* fgen. et fsp. indet.; prep. 0—33—45, 21,4/104,3.
14—16. — *Triporopollenites* fsp., cf. *Betulaceae;* prep. 0—33—40, 16,3/110,8.
17—19. — *Subtriporopollenites constans* PF. 1953a subsfp. *constans, Juglandaceae*, cf. *Carya;* prep 0—33—40, 10,0/110,6.
20—22. — *Subtriporopollenites anulatus* TH. et PF. 1953 subfsp. *nanus* Th. et Pf. 1953, *Juglandaceae*, cf. *Carya;* prep. 0—33—41, 20,3/111,5.
23—25. — *Subtriporopollenites* cf. *anulatus* TH. et PF. 1953 subfsp. *nanus* TH. et PF. 1953, *Juglandaceae*, cf. *Carya;* prep. 0—33—20, 17,1/111,3.
26—27. — *Subtriporopollenites anulatus* TH. et PF. 1953 subfsp. *nanus* TH. et PF. 1953, *Juglandaceae*, cf. *Carya;* prep. 0—33—43, 11,5/109,1.
28—30. — *Subtriporopollenites* fsp., cf. *Juglandaceae, Carya;* prep. 0—33—42, 6,0/105,9.
31—33. — *Subtriporopollenites magnoporatus* (TH. et PF. 1953) W. KR. 1961, cf. *Juglandaceae, Carya;* prep. 0—33—42, 8,9/107,9.

Plate II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been found (Plate II, 10—13) occuring, however, only in one specimen; its description will therefore be possible only after getting new data.

Also the species of genus *Subtriporopollenites* occurring in a great quantity are important from this point of view (*Subtriporopollenites constans* PF. 1953a subfsp. *constans* — Plate II, 17—19, *Juglandaceae* cf. *Carya*; *Subtriporopollenites anulatus* TH. & PF. 1953 subfsp. *nanus* Th. & PF. 1953, *Juglandaceae*, cf. *Carya* — Plate II, 20—22, 26, 27; *Subtriporopollenites* cf. *anulatus* TH. & PF. 1953 subfsp. *nanus* TH. & PF. 1953, *Juglandaceae*, cf. *Carya* — Plate II, 23—25; *Subtriporopollenites magnoporatus* (TH. & PF. 1953) W. KR. 1961, cf. *Juglandaceae, Carya* — Plate II, 31—33; *Subtriporopollenites facilis* (BOTSCHARNIKOVA 1960) KDS. 1968, cf. *Juglandaceae* — Plate III, 1—3; *Subtriporopollenites* fsp., cf. *Juglandaceae, Carya* — Plata II, 28—30), further on the *Boehlensipollis* fsp. (Plate III, 28—30), the *Gallopollis minimus* GRUAS—CAVAGNETTO 1967 subfsp. *concaviformis* GRUAS—CAVAGNETTO (Plate IV, 1—3), *Tricolporopollenites parmularius* (R. POT. 1934) W. KR. 1960 (Plate IV, 7—9), *Tetracolporopollenites halimbaense* KDS. 1961, *Sapotaceae* (Plate VI, 19—21 *Tetracolporopollenites ellipsus* KDS. 1965, *Sapotaceae* (Plate VI, 22—27), *Tetracolporopollenites ellipsus* KDS. 1965, *Sapotaceae* (Plate VI, 22—67), *Tetracolporopollenites hungaricus* KDS. 1965, *Sapotaceae* (Plate VI, 28—33).

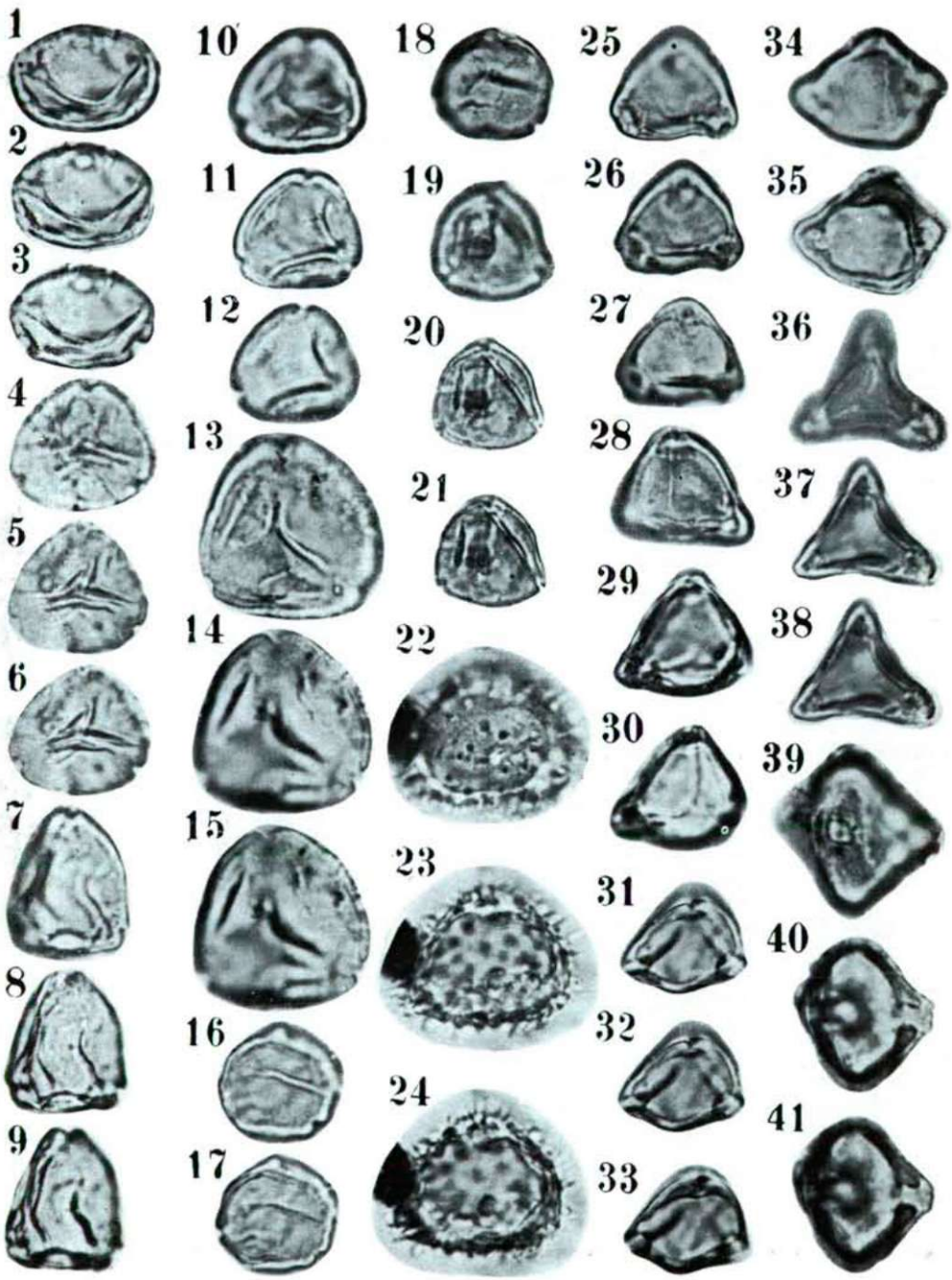
Types occurring first of all in palaeogene sediments are: *Plicatopollis* fsp.$_{1-4}$, *Juglandaceae* (Plate III, 4—15), *Compositoipollenites rhizophorus* (R. POT. 1934) R. POT. 1960 subfsp. *rhizophorus, Icacinaceae* (Plate III, 22—24), *Pentapollenites regulatius* W. KR. 1962 subfsp. *concavus* W. KR. 1962 (Plate III, 39—41, cf. 34—38), *Restioniidites hungaricus* (KEDVES 1965) ELSIK 1968, *Restionaceae* (Plate IV, 4—6).

Sporomorphous types occurring generally in Tertiary sediments are: *Polypodiaceoisporites* fsp., *Pteridaceae, Pteris* (Plate I, 1—3), *Sabalpollenites areolatus* (R. POT. 1934) R. POT. 1958, *Palmae* cf. *Trachycarpus* (Plate I, 7—9), *Sabalpollenites* fsp., *Palmae*, cf. *Sabal* (Plate I, 4—6), Cf. *Platycaryapollenites* fsp.$_{1-2}$, *Juglandaceae, Platycarya* (Plate III, 16—21), *Tricolporopollenites megaexactus* (R. POT. 1931) TH. & P:. 1953, *Cyrillaceae, Clethraceae* v. *Theaceae* (Plate IV, 10—12), *Tricolporopollenites cingulum* (R. POT. 1934) TH. & PF. 1953, subfsp. *oviformis* (R. POT. 1931a) TH. & PF. 1953, *Fagaceae, Castanea* v. *Castanopsis* (Plate IV, 13—15), *Tricolporopol-*

Plate III

1—3. —* *Subtriporopollenites facilis* (BOTCHARNIKOVA 1960) KDS. 1968, cf. *Juglandaceae;* prep. 0—33—40, 19,2/106,6.
4—6. — *Plicatopollis* fsp.$_1$, *Juglandaceae;* prep. 0—33—43, 4,4/116,9.
7—9. — *Plicatopollis* fsp.$_2$, *Juglandaceae;* prep. 0—33—39, 9,6/118,8.
10—12. — *Plicatopollis* fsp.$_3$, *Juglandaceae;* prep. 0—33—39, 5,6/111,2.
13—15. — *Plicatopollis* fsp.$_4$, *Juglandaceae;* prep. 0—33—16, 13,0/111,2.
16—18. —* *Platycaryapollenites* fsp.$_1$, *Juglandaceae, Platycarya;* prep. 0—33—42, 12,0/104,9.
19—21. —* *Platycaryapollenites* fsp.$_2$, *Juglandaceae, Platycarya,* prep. 0—33—38, 10,2/113,8.
22—24. — *Compositoipollenites rhizophorus* (R. POT. 1934) R. POT. 1960 subfsp. *rhizophorus ,Icacinaceae;* prep. 0—33—38, 18,2/109,7.
25—27. — *Incertae sedis, Dicotyledonopsida;* prep. 0—33—38, 18,1/109,7.
28—30. — *Boehlensipollis* fsp.; prep. 0—33—53, 8,9/118,2.
31—33. — *Incertae sedis, Dicotyledonopsida;* prep. 0—33—27, 20,9/106,0.
34—35. — *Pentapollenites* cf. *regulatius* W. KR. 1962 subfsp. *concavus* W. KR. 1962; prep. 0—33—1, 15,3/108,7.
36—38. — *Pentapollenites* cf. *regulatius* W. KR- 1962 subfsp. *concavus* W. KR. 1962; prep. 0—33—41, 7,8/107,7.
39—41. — *Pentapollenites regulatius* W. KR. 1962 subfsp. *concavus* W. KR. 1962, prep. 0—33—45, 21,4/113,1.

Plate III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lenites cingulum (R. POT. 1934) TH. & PF. 1953 subfsp. *pusillus* (R. POT. 1934) TH. & PF. 1953, *Fagaceae, Castanopsis* v. *Lithocarpus* (Plate IV, 19—21), *Tricolporopollenites cingulum* (R. POT. 1934) TH. & PF. 1953 subfsp. *fusus* (R. POT. 1931a) TH. & PF. 1953 (Plate IV, 22—24), *Tricolporopollenites krutzschi* (R. POT. 1931b) TH. & PF. 1953 subfsp. *analepticus* (R. POT. 1934) TH. & PF. 1953, *Nyssaceae* v. *Mastixiaceae* (Plate IV, 25—27), *Tricolporopollenites iliacus* (R. POT. 1931b) TH. & PF. 1953 f. *medius* PF. &TH. 1953, *Aquifoliaceae, Ilex* (Plate VI, 1—6), *Tricolporopollenites margaritatus* (R. POT. 1931a) TH. & PF. 1953 f. *medius* PF. & TH. 1953, *Aquifoliaceae, Ilex* (Plate VI, 7—9), *Tricolporopollenites margaritatus* (R. POT. 1931a) TH. & PF. 1953 f. *minor* PF. & TH. 1953, *Aquifoliaceae, Ilex* (Plate VI, 10—18).

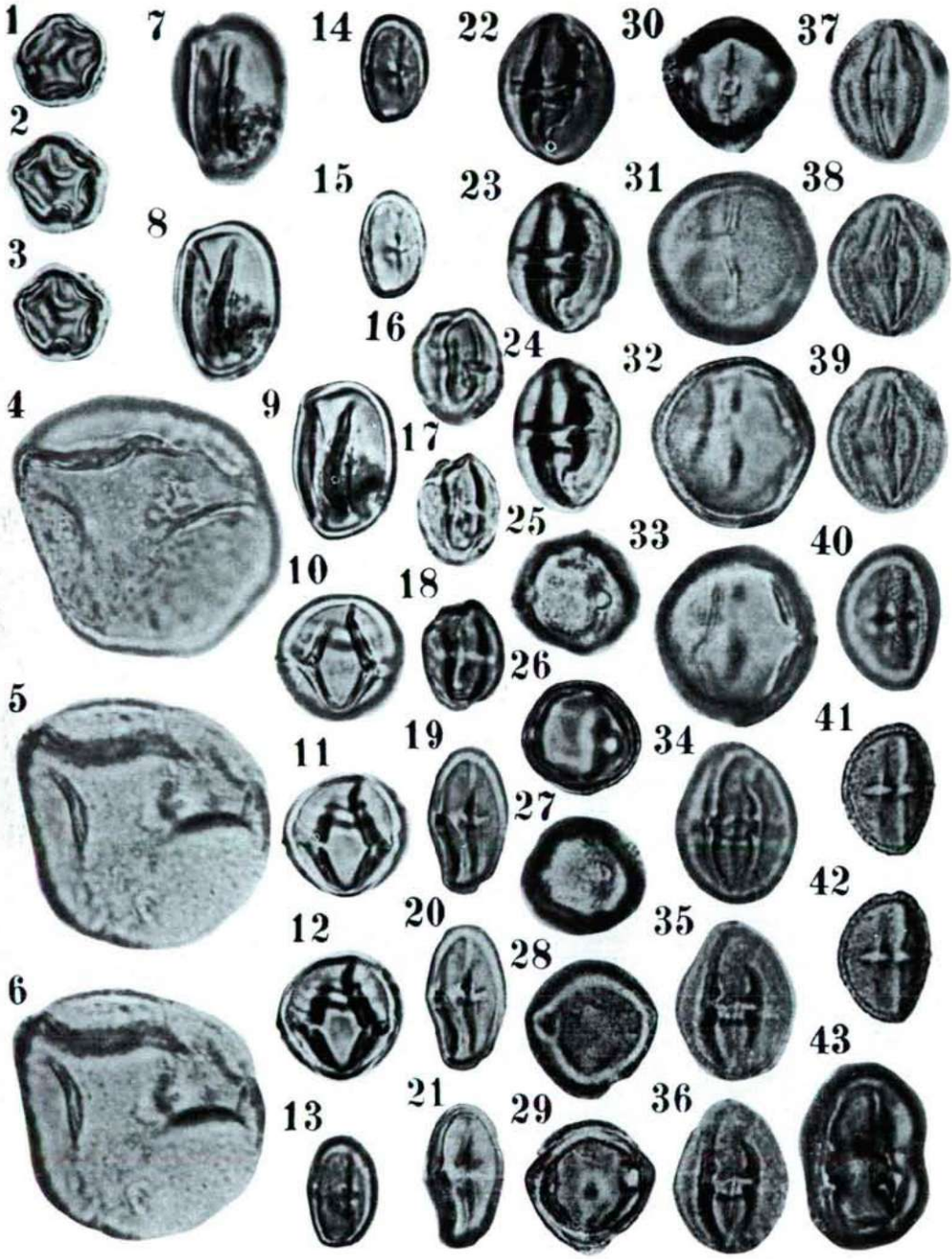
In view of their stratigraphic significance, there are unknown sporomorphae, for the time being: *Triporopollenites* fsp., cf. *Betulaceae* (Plate II, 14—16), *Incertae sedis, Dicotyledonopsida* (Plate III, 25—27, 31—33) *Tricolporopollenites* fsp.$_{1-11}$ (Plate IV, 16—18, 28—43, Plate V, 1—14), *Tricolporopollenites* cf. *striatoreticulatus* W. KR. 1962, *Simarubaceae, Picrasma* (Plate V, 15—17), *Tricolporopollenites aceroides* W. KR. 1961, *Rosaceae,* cf. *Pistacia* (Plate V, 18—20).

4. In connection with the plant ensemble reconstructed on the basis of the remains assemblage, we have agein to refer to the sediment investigated being of marine character, owing to the *Hystrichosphaeridae* remains mentioned above, and other ones, as well. Therefore, we can make an attempt at the littoral vegetation only largely. There are considerable the "ancient *Angiospermatophytae*" among that the genera of *Myricaceae* can occur, as well. In the greatest amount the pollen grains *Juglandaceae* occurred, the most important ones of them being the "caryoid" forms of ancient type; apart from them also the *Platycarya* and other forms that are unknown concerning their nearer botanical connections are frequent. Further on, the amount of *Fagaceae (Castanea, Castanopsis, Lithocarpus) Aquifoliaceae (Ilex)* and *Sapotaceae* remains are noteworthy. The occurrence of *Palmae* (cf. *Sabal,* cf. *Trachycarpus*), cf. *Betulaceae, Icacinaceae, Cyrillaceae, Clethraceae* v. *Theaceae,*

Plate IV

1—3. — *Gallopollis minimus* GRUAS-CAVAGNETTO 1967 subfsp. *concaviformis* GRUAS-CAVAGNETTO 1967; prep. 0—33—39, 4,8/103,7.
4—6. — *Restioniidites hungaricus* (KEDVES 1965) ELSIK 1968, *Restionaceae;* prep. 0—33—43, 13,4/115,0.
7—9. — *Tricolporopollenites parmularius* (R. POT. 1934) W. KR. 1960; prep. 0—33—38, 8,4/108,6.
10—12. — *Tricolporopollenites megaexactus* (R. POT. 1931) TH. et PF. 1953, *Cyrillaceae, Clethraceae* v. *Theaceae;* prep. 0—33—40, 19,6/106,8.
13—15. — *Tricolporopollenites cingulum* (R. POT. 1934) TH. et PF. 1953 subfsp. *oviformis* (R. POT-1931a) TH. et PF. 1953, *Fagaceae, Castanea* v. *Castanopsis;* prep. 0—33—38, 5,8/113,6.
16—18. — *Tricolporopollenites* fsp. , cf. *Sapindaceae, Eurycorymbus;* prep. 0—33—39, 7,3/103,8.
19—21. — *Tricolporopollenites cingulum* (R. POT. 1934) TH. et PF. 1953 subfsp. *pusillus* (R. POT. 1934) TH. et PF. 1953, *Fagaceae, Castanopsis* v. *Lithocarpus;* prep. 0—33—42, 11,0/104,1.
22—24. — *Tricolporopollenites cingulum* (R. POT. 1934) TH. et PF. 1953 subfsp. *fusus* (R. POT. 1931a) TH. et PF. 1953, *Fagaceae;* prep. 0—33—41, 20,5/116,6.
25—27. — *Tricolporopollenites krutzschi* (R. POT. 1931b) TH. et PF. 1953 subfsp. *analepticus* (R. POT. 1934) TH. et PF. 1953, *Nyssaceae v. Mactixiaceae;* prep. —033—39, 21,3/117,7.
28—30. — *Tricolporopollenites* fsp.$_2$; prep. 0—33—18, 17'8/107,0.
31—33. — *Tricolporopollenites* fsp.$_3$; prep. 0—33—42, 7,7/120,4.
34—36. — *Tricolporopollenites* fsp.$_4$; prep. 0—33—41, 7,1/113,5.
37—39. — *Tricolporopollenites* fsp.$_5$; prep. 0—33—42, 20,8/117,6.
40—42. — *Tricolporopollenites* fsp.$_6$; prep. 0—33—22, 10,5/103,1.
43. — *Tricolporopollenites* fsp.$_7$; prep. 0—33—40, 5,5/113,4.

Plate IV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Nyssaceae v. *Mastixiaceae*, *Simarubaceae (Picrasma)*, *Rosaceae* (cf. *Pistacia)*, *Sapindaceae (Eurycorymbus)* is minimal.

The mentioned plants of *Angiosperms* are of ligneous stem and first of all staeminated by wind. Those of soft stems are referred to partly by the unique *Pteridaceae* type resp. a tropical sort of grass: *Restionaceae* pollen.

Discussion of results

1. The general composition of the spore-pollen assemblage is referring to the lower Tertiary period. The geological age of the sediment investigated on the basis of the *Normapolles* stemma being rich in genera, of the great number of the "ancient caryoid" pollen grains, of the palaeogene types, *Gallopollis minimus concaviformis* described from the Sparnacian sub-stage, *Tricolporopollenites parmularius*, *Sapotaceae* found in our material, and as well those enumerated in the other previous places, was described as lower Eocene. Compared with the pollenstratigraphic tables made so far concerning Europe, the Cuisian sub-stage in the low level of the most probable nearer period, but the upper part of the Sparnacian sub-stage isn't excluded, either. Against the latter possibility speaks the occurrence of *Boehlensipollis* fgen. that was, so far, found in younger palaeogene layers. Thus our results concerning the geologic age are essentially identical with SCHAUB's conception (1960).

2. Our data are referring to that the types of the spore-pollen assemblage which are important from the point of view of geological period, can be identified with the forms recognized from other territories of Europe, first of all from the classic sediments of the Paris basin.

3. Owing to the maritime character of the sediments and their being relatively rich in sporomorphs, further investigations are needed for a more perfect knowledge of the vegetation.

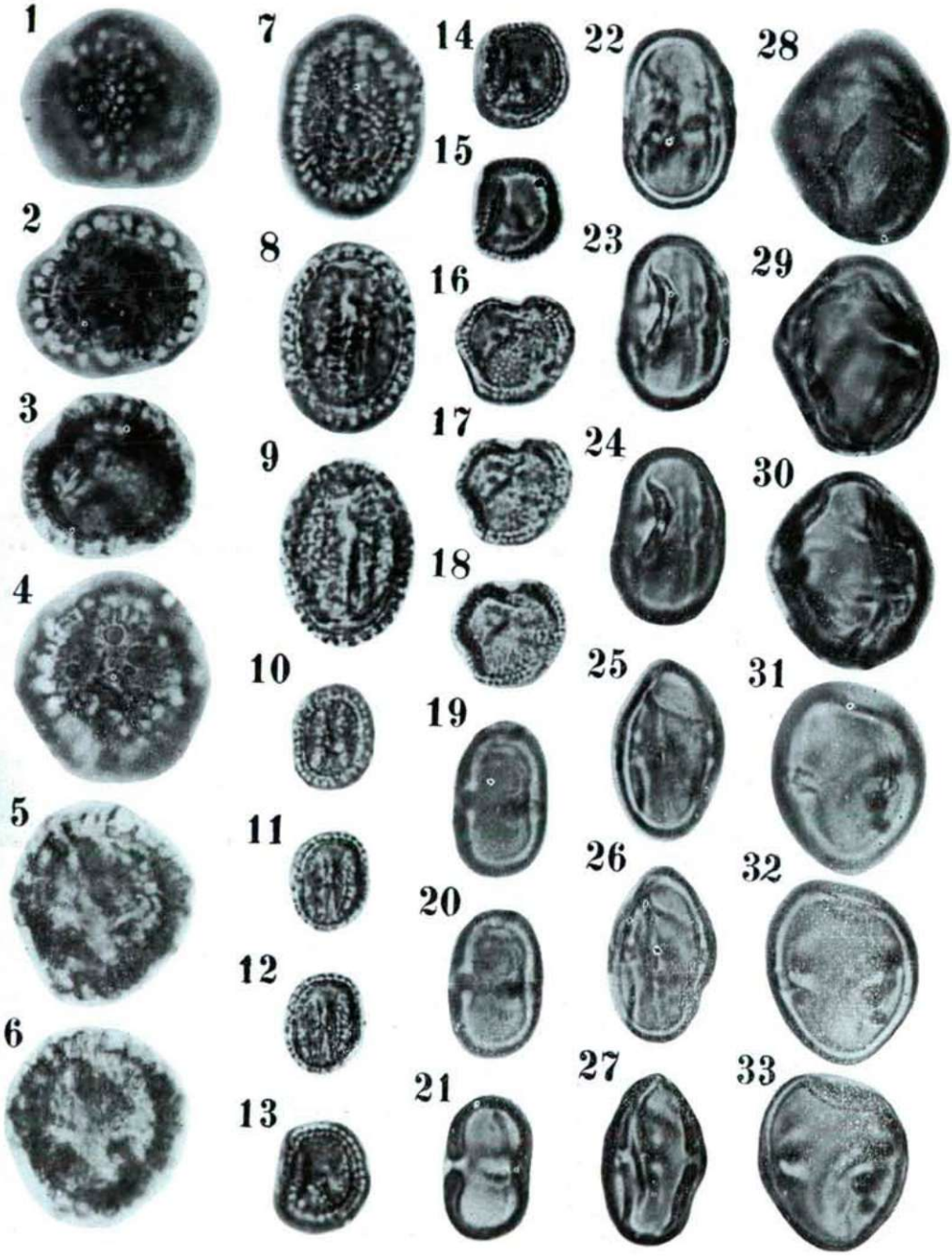
Summary

1. The examinated marl layers of Mte. Bolca, are extremely rich in *Hystrichosphaeridae* remains; on the other hand, they are relatively poor in sporomorphs. The remainder ensemble demonstrated is first of all denoting the lower level of the

Plate V

1—3. — *Tricolporopollenites iliacus* (R. POT. 1931b) TH. et PF. 1953 f. medius PF. et TH. 1953, *Aquifoliaceae, Ilex;* prep, 0—33—36, 5,6/114,4.
4—6. — *Tricolporopollenites iliacus* (R. POT. 1931b) TH. et PF. 1953 f. *medius* PF. et TH. 1953, *Aquifoliaceae, Ilex;* prep. 0—33—44, 22,0/115,9.
7—9. — *Tricolporopollenites margaritatus* (R. POT. 1931) TH. et PF. 1953 f. *medius* PF. et TH. 1953, *Aquifoliaceae, Ilex;* prep. 0—33—40, 6,4/102,1.
10—12. — *Tricolporopollenites margaritatus* (R. POT. 1931a) TH. et PF. 1953 f. *minor* PF. et TH. 1953, *Aquifoliaceae, Ilex;* prep. 0—33—38, 7,9/111,8.
13—15. — *Tricolporopollenites margaritatus* (R. PTO. 1931a) TH. et PF. 1953 f. *minor* PF. et TH. 1953, *Aquifoliaceae, Ilex;* prep. 0—33—41, 18,9/115,0.
16—18. — *Tricolporopollenites margaritatus* (R. POT. 1931a) TH. et PF. 1953 f. *minor* PF. et TH. 1953, *Aquifoliaceae, Ilex;* prep. 0—33—39, 7,6/114,5.
19—21. — *Tetracolporopollenites halimbaense* KDS. 1961, *Sapotaceae;* prep. 0—33—41, 7,1/103,9.
22—24. — *Tetracolporopollenites ellipsus* KDS. 1965, *Sapotaceae;* prep. 0—33—39, 10,3/106,2.
25—27. — *Tetracolporopollenites ellipsus* KDS. 1965, *Sapotaceae;* prep. 0—33—38, 15,5/108,1.
28—30. — *Tetracolporopollenites hungaricus* KDS. 1965, *Sapotaceae;* prep. 0—33—38, 21,6/112,9
31—33. — *Tetracolporopollenites hungaricus* KDS. 1965, *Sapotaceae;* prep. 0—33—42, 18,5/111,9.

Plate V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Cuisian sub-stage in view of the geological age of the sediment but the upper level of the Sparnacian sub-stage is possible, as well.

2. On the basis of our results, the Mediterranean region and the sporomorphae assemblages in Central and Western Europe don't differ from each other in their essential types and can be compared well from the point of view of stratigraphy.

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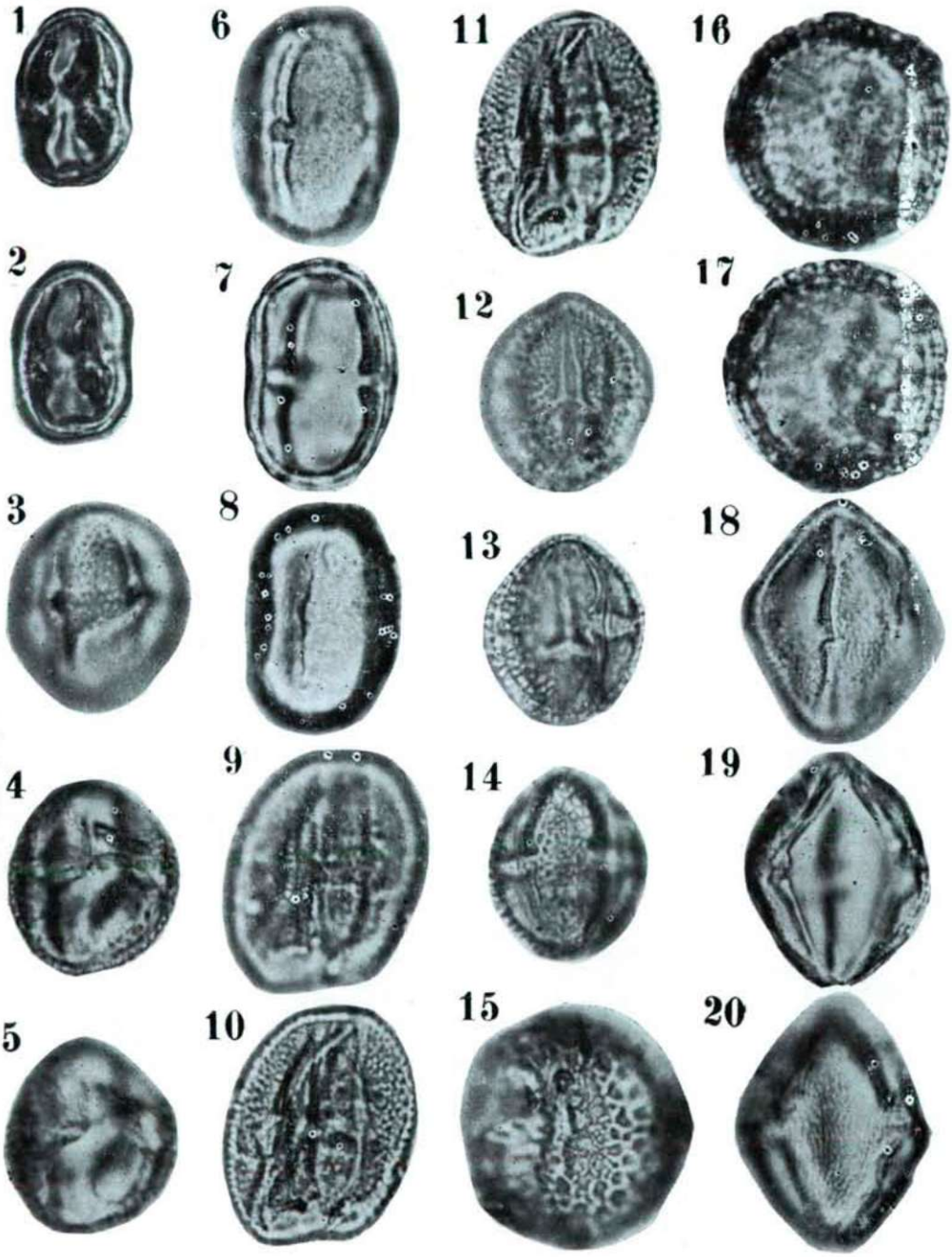
Plate VI

1—2. — *Tricolporopollenites* fsp.$_{.7}$; prep. 0—33—40, 5,5/113,4.
3—5. — *Tricolporopollenites* fsp.$_{.8}$; prep. 0—33—24, 6,0/118,4.
6—8. — *Tricolporopollenites* fsp.$_{.9}$; prep. 0—33—17, 11,6/111,2.
9—11. — *Tricolporopollenites* fsp.$_{.10}$; prep. 0—33—45, 19,8/105,1.
12—14. — *Tricolporopollenites* fsp.$_{.11}$; prep. 0—33—42, 22,6/110,1.
15—17. — *Tricolporopollenites* cf. *striatoreticulatus* W. KR. 1962, *Simarubaceae, Picrasma;* prep. 0—33—21, 21,2/108,4.
18—20. — *Tricolporopollenites aceroides* W. KR. 1961, *Rosaceae*, cf. *Pistacia;* prep. 0—33—30, 15,9/116,0.

Plate VI



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