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PALYNOLOGICAL EVALUATION OF THE HOLOSTRATOTYPE OF THE EGERIAN

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Abstract

The holostratotype of the Egerian Stage has been recovered in borehole and in the clay pit of the Wind's brick-yard at Eger (northern Hungary).

On the basis of palynological evaluation of the samples the following could be determined: In the borehole in the Middle Oligocene and conformably overlying Egerian layers marine planktonic organisms and a characteristic Oligocene paleotropical flora has been preserved.

From the lower samples of the brick-yard pit (lower flora) very scarce Late Oligocene plankton and flora elements were collected.

In the upper samples of the brick-yard pit (middle and upper flora) beside paleotropical elements the consistent presence of arcto-tertiary elements is also characteristic.

The Egerian Stage was established for the Central Paratethys area in 1968 by T. BÁLDI and J. SENEŠ, in order to iron out difficulties in defining the Upper Oligocene-Lower Miocene boundary (Chattian-Aquitanian) — a problem that had been heavily disputed for a long time (T. BÁLDI and J. SENEŠ 1975. p. 9). The clay pit of Wind's brick-yard at Eger and the borehole of 80 m depth spudded into it were designated as holostratotype (1. c. p. 99).

The section of the holostratotype was subjected to palynological analyses. In a brief paper with co-author I. PÁLFALVY, the present writer reported on the results of their sampling made together with him (NAGY—PÁLFALVY, 1963) and, in addition, she described some new species (NAGY, 1963).

The present report is the first evaluation ever published of the results of the combined examination of the borehole drilled in 1961 in the brick-yard and the samples recovered from the clay pit there.

Materials and Methods

Geological Review

The Egerian of the lithological log recovered from the borehole in the brick-yard shows a conformable development from the Middle Oligocene. The Middle Oligocene Kiscell Clay (80.3—36.2 m) is overlain, from 36.2 to 18.0 m by Egerian glauconitic, tuffitic sandstones, followed higher up, from 18.0 to 0.0 m, by molluscan clays. In the geological section of the clay pit, the afore-mentioned clays with molluscs continue, attaining a total of 48 m in thickness taken combined with their share in the lithological log (BÁLDI, 1975), being followed by a sequence of clays and sandstones (15 m). The final member is constituted by sands and brackish-water or limnic clays and pebble (40 m) (BÁLDI, 1975). According to I. PÁLFALVY (1963), rhyolite tuffs are at the top of the sequence.

In the course of her palynological studies, the author evaluated a total of 58 samples distributed, according to their origin, as follows:

lithological log:
Middle Oligocene Kiscell Clay — 6 samples
Egerian glauconitic-tuffitic sandstone — 2 samples
molluscan clays — 10 samples
clay pit:
molluscan clays, siltstone lenses,
Bed X_2 and Bed x_1 (lower flora) — 2 samples
sequence of clays and sandstones (middle flora) 1 sample
brackish-water to limnic formation
overlying the sands (upper flora) — 37 sample

Results

The samples involved in palynological analyses are evaluated in the order of succession of that lithological section, quite clear and illustrative, published by T. BÁLDI (1966). Numbered from 1 to 20, Báldi's stratigraphic units encompassing a total of about 160 m thickness may be characterized by the following palynological assemblages:

The sample of the 79.8–80.3 m interval of the log derives from Bed 1 of BÁLDI. Constituted by *Middle Oligocene* Kiscell Clay, it cannot contain too much palynological material. The palynological data are indicative of marine sediments (e. g. *Pleurozonaria stellulata* (COOKS. et MANUM 1960) MÄDLER 1968. The sedimentation seems to have taken place rather far off-shore, as evidenced by the scarcity and small size of Angiospermae and the occurrence of small-size wind-bladdered coniferous pollen grains.

The sample deriving from the marl layer, Bed 2, (51.2–51.5 m) has yielded, similarly to the former, few palynological data, indicating the presence, beside a few Coniferae, of *Alangiopollis sibirica* (LUBOMIROVA 1972) and Sapotaceae species. Taken from these same marls, the samples of the 50.3–50.9 m interval show extremely rich pollen spectra and contain a good deal of organic matter. Of the planktonic organisms, *Deflandrea spinulosa* ALBERTI 1959 shares 0.9%, *Cordospaeridium inodes* (KLUMPP, 1953) EIS. ssp. *minus* MORG. 1966 — 0.9%, *Achomosphaera* cf. *grallaeformis* (BROSIUS 1963) DAVEY et WILLIAMS 1966 — 1.8%, *Hystrichokolpoma cinctum* KLUMPP 1953 — 0.9%, *Pleurozonaria concinna* (COOKS. et MAN. 1960) MÄDLER 1968 — 4.5%, microforaminifera — 3.6%. The share of marine planktonic organisms sum total is 20.7%. Out of fern spores, it is *Cicatricosisporites chattensis* W. KR. 1961 *minor* W. KR. 1967, *Cicatricosisporites cicatricisoides* W. KR. 1959, of the Angiospermae pollen grains it is *Moncolpopollenites dorogensis* KEDVES 1961 that rise up into the Egerian. The 25% figure of Coniferae is suggestive of the proximity of a highland range, the same holds true for the 44% figure of predominant angiospermous pollen grains. Among these there are relatively few tropical elements (Sapotaceae) which seem to have been ferns corresponding to the level of herbaceous plants (*Corrugatisporites multivallatus* (PFLUG 1933) NAGY, *Verrucingulatisporites* cf. *verrucatus* KEDVES 1961, *Polypodiisporites favus* (R. POT. 1931) R. POT. 1933). The 3rd Bed, the fine-sandy, galuconitic marls, were held by BÁLDI for a transitional Kiscellian-Egerian layer (1966).

The pollen spectrum of the sample from 46.0–46.6 m does not show any substantial change compared to the former. The preservation state of the fossils is not so good, as implied by the lithologic composition of the sediments enclosing them

The presence of an Oligocene sea is indicated by *Deflandrea spinulosa*, larger *Pleurozonaria concinna*, a few fragments of Hystrichosphaeridae. The proximity of land is suggested by the subequal amount of coniferous and deciduous pollen grains. The occurrence of a species of transition between *Cedripites oligocaenicus* and *C. lusaticus*, in terms of morphology at least, and that of *Momipites quietus* (R. Pot. 1934) Nichols is worth mentioning. The presence of *Tricolporopollenites cingulum* (R. Pot. 1931) Th. et Pf. 1953 ssp. *oviformis* (R. Pot. 1931) Th. et Pf. 1953 massula, *Corrugatisporites multivallatus*, *Gleichenia* and *Polypodiaceoisporites* refers to an environment not too far off-shore.

The glauconitic sandstones constituting the 4th Bed (44.8–36.2 m) is barren (sterile). It is from the 5th Bed up, i. e. from 32.2 m on, that T. Báldi considers the sequence to be Egerian in age.

The first of the two samples recovered from the 5th Bed (31.9–32.5 m) is constituted by glauconitic, tuffitic sandstone. Its planktonic species are suggestive of a marine Oligocene, too: *Cordosphaeridium cantharellum* (Bros. 1935) Davey and Will. 1966 and microforaminiferal remains. *Sapotaceoidaepollenites microellipticus* (Pf. 1953) n.c. is that which might be quoted as a paleotropical element. The terrestrial vegetation is represented by a pollen spectrum similar, in composition and proportions, to the former. (21.5–21.9 m): marine planktonic organisms like *Deflandrea spinulosa*, fragments of Hystrichosphaeridae, *Pleurozonaria concinna* and microforaminiferal remains. Coniferae constitute 60% of the spectrum suggesting an environment farther off-shore. Among the representatives of Angiospermae, *Plicatopollis plicatus* (R. Pot. 1934) W. Kr. 1962, *Cyrillaceaepollenites megaexactus* (R. Pot. 1931) R. Pot. 1960, *Sapotaceoidaepollenites* sp., *Polypodiisporites alienus* (R. Pot. 1934) Nagy 1973 and *Osmundacidites primarius* (Wollf, 1934) Nagy ssp. *oligocaenicus* W. Kr. 1967 are thermophile plants of Oligocene character. Such characteristic forms as *Caryapollenites simplex* (R. Pot. 1931) R. Pot. 1960, *Pterocaryapollenites* sp., *Tricolporopollenites cingulum* ssp. *oviformis* are suggestive of warm-to-temperate riparian vegetation.

From Bed 6, the author has examined 10 samples recovered from molluscan clays. The microforaminifera of the sample from the 17.6–18.3 m interval still refer to a sea environment, but the coastline must have been closer in this case compared to the previous sample, as Angiospermae are present in much greater proportion than Coniferae. Among these both Sapotaceae and *Engelhardtia* can be found, though *T. cingulum* ssp. *oviformis* and Juglandaceae are also represented. A few ferns can also be observed *(Gleichenia, Selaginella)*.

The sample of the 16.8–17.2 m interval, from the same complex, is of similar composition, though it contains a poorer flora.

The sample recovered from the 13.1–13.4 m with *Pleurozonaria concinna* is typically marine, the ratio of Coniferae and Angiospermae pollen grains being similar to the case of the former 2 samples. Among the representatives of Coniferae, *Podocarpidites* sp., among those of Angiospermae *Tricolporopollenites spinus* W. Kr. 1962, *Sapotaceoidaepollenites* sp., *Cyrillaceaepollenites exactus* (R. Pot. 1931) R. Pot. 1960 and *Subpolycolporites minor* Rákosi 1973 are worthy of mention. The few fern spores and coal fragments and detritus of vegetal tissue are suggestive of a near-shore environment. The presence of *Pleurozonaria concinna* and a broken specimen of Hystrichosphaeridae in the 10.9–11.10 m interval are indicative of seawater. In the thermophile littoral forest close to the water's edge it is elements suggestive of Fagaceae — in addition to Sapotaceae, *Araliaceoipollenites edmundi* (R. POT. 1931) R. POT. 1960, *Engelhardtioidites microcoryphaeus* (R. POT 1931) R. POT. 1930 — that are predominant. Of the fern species it is *Leiotriletes triangulatoides* W. KR. 1962, *L. wolffi* W. KR. 1962 wolffi, *Gleicheniidites, Polypodiisporites alienus, Verrucingulatisporites undulatus* NAGY 1963 that prove the presence of a near-shore environment.

The material of 9.2–9.7 m is very rich, typical of the Upper Oligocene, 78% being constituted by Angiospermae of which the share of *Pentapollenites regulatius* W. KR. 1962 is 2.8%, that of *Plicatopollis plicatus* being again 2.8%, that of *Rhoipites pseudocingulum* (R. POT. 1934) R. POT. 1960 2.1%, *Cyrillaceaepollenites exactus* 1.4%, *Sapotaceoidaepollenites* sp. 2.8%, *Engelhardtioidites* 1.4%, *Intratriporopollenites insculptus* MAI 1961 0.7%, *Tricolporopollenites cingulum* (R. POT. 1931) TH. and PF. 1953 ssp. *fusus* TH. and PF. 1953 attaining almost 30%, *T. microhenrici* (R. POT. 1931) W. KR. 1964 almost 7%, *T. cingulum* ssp. *oviformis* 3.6%. The presence of a swamp forest is corroborated by the occurrence in 4.9% of *Taxodiaceaepollenites*, in addition to *Nyssapollenites* present in 2.8%, *Myricapollenites* in 0.7% and *Alnipollenites* in the same percentage. Fagaceae and quercoid forms are frequent. The share of *Fagus* is 0.7%, that of *Tricolporopollenites dolium* (R. POT. 1931) TH. et PF. 1953 and *T. villensis* (THOMS. 1950) TH. and PF. 1953 as well as Betulaepollenites and *Carpinus* being 1.4%. Underwoods are represented by *Artemisia*, Ericaceae, spores by *Cicatricosisporites cicatricosoides, Leiotriletes maxoides* W. KR. 1962 ssp. *maximus* (PF. 1953) W. KR. 1959, *Polypodiisporites favus, Polypodiaceaeoisporites miocaenicus* NAGY 1969, *Laevigatosporites haardtii* (R. POT. et VEND. 1934, TH. et PF. 1953, in valuable quantities. Paleotropical *Dicolpopollenites calamoides* NAGY 1963 is also present (0.7%). Beside *Sparganiaceaepollenites*, forms suggestive of freshwater (0.7%), the presence of marine sediments is suggested by *Cordosphaeridium inodes* (KLUMPP 1953) EIS. 1962 and *Pleurozonaria concinna*. The sample contain hosts of allochtonous elements, in addition to a great deal of Normapolles there occur a few Triassic Corollina specimens, possibly undergone redeposition even secondaryly, as well.

From the 8.3–9.2 m interval the author studied 2 samples, of which sample "b" taken from the deeper part (more calcareous) contains few pollen grains and spores, while sample "a" is again very rich in sporomorphs. Out of the marine planktonic organisms there are few Hystrichosphaeridae and more *Pleurozonaria* species such as *P. concinna, P. manumi* (KRIVÁN—HUTTER 1963) n. c. (*Crassosphaera manumi* KR.-H. 1963) and *P. minor* (KRIVÁN—HUTTER 1963) n. c. (*Crassosphaera minor* KR.-H. 1963). Angiospermae constitute 82% of the pollen spectrum, of which nearly 50% are *Tricolporopollenites cingulum* ssp. *fusus*, and with *T. cing.* ssp. *oviformis* added to, it accounts for 74% of the spectrum. Most of the species reach up to the Miocene: *Intratriporopollenites insculptus, Pentapollenites regulatius* (6.7%), *Cyrillaceaepollenites exactus, C. megaexactus, Tricolpopollenites liblarensis* (THOMS. 1950) TH. and PF. 1953 ssp. *liblarensis* and *T. liblarensis* (TH. 1950) TH. and PF. 1953 ssp. *fallax* (R. POT. 1934) TH. and PF. 1953 and *Tricolporopollenites microhenrici*. Sapotaceae pollen are present in more than 5%, being admixed to by *Monocolpopollenites tranquillus* (R. POT. 1934) TH. and PF. 1953, thus determining the Late Oligocene character of the flora. Arcto-Tertiary elements do also occur: quercoid forms, *Fagus, Salix* and Chenopodiaceae pollen grains.

Coniferae are insignificant (7.8%). Most of the spores are present in the Miocene sediments as well *(Polypodiisporites alienus, P. favus, Leiotriletes maxoides maximus)* and some *Verrucingulatisporites* and *Polypodiaceaepollenites* species. Redeposition in the case of this sample must have taken place in Snonian times. The climate in this case cannot be said to have been cooler than subtropical, as the botanical implications of *Tricolporopollenites cingulum* occurring in great quantity are quite obscure.

The sample from the 7.8–8.3 m interval is extremely rich in fossil floral remains. Fragments of cf. Lingulodinium sp. and *Pleurozonaria concinna* represent the marine plankton. The proportions of Coniferae, Angiospermae and spores are similar to the case of the previous samples. *Microfoveolatosporites sellingi* W. Kr. 1967 occurs here as a new element (1.8%). The great quantity of coal and organic plant detritus and remnants of vegetal tissue are suggestive of a near-shore environment. On occount of the more calcareous lithology of the samples recovered from the 6.1–6.4 m and 4.0–4.4 m intervals the quantity of spores and pollen grains is more reduced in them, though these do not differ from the spores, pollen grains and planktonic organisms of the former samples. Not even the presence of allochtonous forms does suggest a change in environment, and it is rather to the upper rich pollen spectra of the borehole that they resemble to in this respect.

The lower samples of the *clay pit of the brick-yard* have been recovered, according to the instructions of F. Legányi and I. Pálfalvy, from siltstones interbedded with molluscan clays on the northern margin of that part of the clay pit exposed in 1960 (Bed 6 of Báldi). In this part that was referred to as "lower flora" by Legányi leaf remnants are rather few. The lower sample, x_2, contains an extremely rich pollen spectrum. In contrast to the samples recovered from the borehole, it is Coniferae that are predominant, with 74.1%. In addition to hosts of *Pityosporites labdacus* (R. Pot. 1931) Th. et Pf. 1953 and *Abietinaepollenites microalatus* (R. Pot. 1931) Th. et Pf. 1953, the almost 5% share of *Podocarpidites* and the occurrence of some age-diagnostic forms such as Cedripites cf. verruculatus (*Trevisan* 1967) W. Kr. 1971 and *C. miocaenicus* W. Kr. 1971 that are worthy of mention. In addition to thermophile species (Sapotaceae, Cyrillaceae, Engelhardtia), Angiospermae (17.2%) include arcto-Tertiary elements *(Betula, Fagus)* as well. The mother plants of the spores in this case seem to have been rather thermophile elements (*Leiotriletes maxoides maximus, Mecsekisporites cerebralis* Nagy 1969, Osmundacidites, *Polypodiaceoisporites magdalenae* Nagy 1969).

The upper sample, x_1, too is extremely rich, though different from x_2. Angiospermae constitute 83.6%, Coniferae and Pteridophyta 8% each, in it. *Podocarpus* is represented with 2.1%, *Podocarpidites libellus* (R. Pot. 1931) W. Kr. 1971 is even age-diagnostic.

Among Angiospermae *Tricolporopollenites cingulum* ssp. *fusus* (10%) is predominant. The spectrum is rendered more varied by the presence of subtropical and tropical elements: *Cyrillaceaepollenites exactus* (3.5%), *C. megaexactus* (2.8%), *Engelhardtioidites* (2.8%), *Sapotaceoidaepollenites* (2.1%), *Plicatopollis plicatus, Araliaceoipollenites euphorii* (R. Pot. 1931) R. Pot. 1951, *Arecipites, Magnoliaepollenites* and *Ilexpollenites margaritatus* (R. Pot. 1931) R. Pot. 1960.

Juglans, Carya, Tricolporopollenites asper (Th. et Pf. 1953) W. Kr. 1961, *T. microhenrici* and *Tricolporopollenites liblarensis* are arcto-Tertiary elements, and *Zelkovaepollenites* also appears. Characteristic spores are: *Corrugatisporites multivallatus multivallatus, Favoisporites hungaricus* Nagy 1963, *Verrucatosporites saalensis* W. Kr., 1959, *Concavisporites discites* Pf. 1953.

The fine molluscan sands of the 7[th] Bed are palynologically sterile. It is the clays of the 8[th] Bed that contain the so-called "middle flora" whose macrofloral elements are rather poorly preserved. The microflora is very abundant. Coniferae are predominant with 54.4%, Angiospermae account for 36% of the spectrum, spores contribute 10% to it. More than 15% of Coniferae are represented by *Pityosporites labdacus*, 9% by *Abietinaepollenites microalatus*, 3.2 by *Podocarpidites*, 2% by *Cedripites*, 1% by *Dacrydiumites*. Characteristic forms occurring here are *Pityosporites cedrisacciformis* W. KR. 1971 and *Pityosporites minutus* (ZAKL. 1957) W. KR. 1971, too. Angiospermae are represented by many species, but the single species include few specimens. Of the paleotropical species we might mention *Engelhardtia*, *Plicatopollis plicatus* (2.4%), *Myricipites* (4%), Palmae (0.8%). Arcto-Tertiary elements are: *Tricolpopollenites liblarensis* ssp. *fallax*, *Tricolporopollenites cingulum* (4%), *Ulmipollenites* (1.6%), *Zelkova* (1.6%), *Alnus* (0.8%). Among the spores, *Echinatisporites*, *Cicactricosisporites*, *Leiotriletes* sp., *Polypodiisporites cerebriformis* NAGY 1963, *P. alienus*, *Polypodaceoisporites*, *Laevigatosporites haardti* are most significant. The spectrum suggests a mountainous region close to the coasts with mixed piedmont subtropical deciduous forests and thermophile fern spores.

The 9[th] Bed is constituted by micaceous sands, the 10[th] Bed by sandstones, the 11[th] Bed by limonitic sandstones, the 12[th] by limonitic concretional clay-marls, the 13[th] by unconsolidated sandstones. All these are palynologically sterile. Beginning with the top of the 20-m-thick sand complex, the 14[th] Bed comprises the so-called "upper flora" — a rich macroflora. This 15–16 m interval has been sampled in great detail. A total of 37 samples were analyzed. They were taken at any change in lithology and examined from fine-stratigraphic considerations. 8 samples out of these could be evaluated in percentage terms.

The samples belonging to the 14[th] Bed (Sample 1–6) were palynologically barren, with single spores or fragments of Coniferae.

The first sample taken from the 15[th] Bed (Sample 7) was recovered from a greyish, sandy clay layer. The rich spectrum contains 55% Angiospermae, 33.5% Coniferae and 6.3% spores and a few planktonic organisms as well. Among the coniferous pollen grains there can be found even *Abiespollenites absolutum* THIERGART 1937, *Piceapollenites tobolicus* (PAN. 1966) W. KR. 1971, *Cedripites szaszvarensis* NAGY 1969, *Dacrydium* and *Glyptostrobus* species, suggesting partly a higher mountainous topography and partly a marshy environment. This latter is supported by the rather great number of *Myrica* (14%) as well. Paleotropical forms are: *Calamus* (3%), Sapotaceae and *Engelhardtia*, the relevant spores are *Cicatrisporites chattensis minor*, *Faviosporites hungaricus* NAGY 1963, *F. concavus* NAGY 1963, *Polypodiisporites favus*, *Laevigatosporites haardti*. In addition to these there are arcto-Tertiary species as well: *Alnus* (2.8%), *Betula*, *Acer*, *Zelkova*, *Carpinus*, *Carya*.

In the next clayey sample (Sample 8) the representatives of Coniferae are predominant: *Abietinaepollenites microalatus* (18%), but in the lower samples *Podocarpidites libellus* and a few *Cedripites* species can also be found. A paleotropical environment is suggested by *Araliaceoipollenites megaexactus* and a few spores: *Verrucingulatisporites undulatus*, *Leiotriletes*, *Polypodiisporites alienus*, *Polypodiaceoisporites gracillimus* NAGY 1963 and by *Gleichenia* species. The presence of *Sphagnum* spores still in massulae in a considerable number is suggestive of a marhsy-boggy environment. Arto-Tertiary forms: *Alnus*, *Zelkova*, *Ulmus*, are also present.

The so-called "upper flora" occurring in the sandy clays of the 16[th] Bed is that which contains the nicest plant macrofossils. Only one of the 9 to 15 samples analyzed palynologically did not yield percentage results. These samples contain a very rich sporomorphous assemblage. Coniferae constitute in all samples more than 20% of the spectrum: *Pityosporites labdacus* and *Abietinaepollenites microalatus, Podocarpidites, Cedripites, Gingko, Sciadopitys* and *Tsugaepollenites igniculus* (R. POT. 1931) R. POT and VEN. 1934, *Piceapollenites tobolicus* are accompanied by *P. neogenicus* NAGY 1969 and *Abiespollenites absolutus.*

Among the representatives of Angiospermae the species *Dicolpopollenites calamoides* constitutes more than 13% of the spectrum, in other places it is *Myrica* that attains the same percentage, in Sample 12 even 20%. Additional paleotropical elements: Sapotaceae, *Monocolpollenites tranquillus, Plicatopollis plicatus, Engelhardtia, Cyrillaceaepollenites, Araliaceoipollenites edmundi.*

Of the spores it is *Osmunda* that attains 5–6% in the first samples, being complemented with *Gleichenia* and *Polypodiisporites favus.* The arcto-Tertiary elements are stabilized, though present in low percentage only (*Alnus, Zelkova, Ulmus, Carpinus, Acer,* quercoid forms and *Carya*).

Among the recent representatives of these genera there are still forms living under subtropical and warm-to-temperate climates. Also on account of the paleogeographic situation here, the local climate of this lagoonal, shallow-water littoral environment protected by higher mountain ranges could not have been colder than subtropical. The sandy and sandstone samples (Samples 16–19) of the 17th Bed are palynologically poor. It is in single, rather argillaceous, sand samples that a few pollen grains occur, just reminding of the rich floral spectrum of the previous samples.

The Samples 20–22, containing coalified plant fragments, of the 18th Bed are devoid of pollen grains. The argillaceous sand samples (No. 23–24–25), even though not evaluable in percentage terms, did provide some interpretable information. The presence of swamps is suggested by Taxodiaceaepollenites sp. and by *Nyssa* and *Sphagnum* spores (*Stereisporites stereoides*). *Engelhardtia,* Myrtaceae, *Symplocos,* first appearing here, and *Monocolpopollenites tranquillus* are paleotropical elements. The spectrum is complemented by *Tricolporopollenites microhenrici,* a few quercoid forms and some spores (*Leiotriletes adriensis, Polypodiisporites multiverrucosus* NAGY 1969, *P. alienus, Microreticulatisporites* sp., *Corrugatosporites multivallatus, Laevigatosporites haardti*). The assemblage is characterized by the fact that the material affected by selective fossilization in the sandy sediments enclosing it is suggestive of a quite near-shore environment: it includes the representatives of Taxodiaceae and massulae of *Carpinus* pollen.

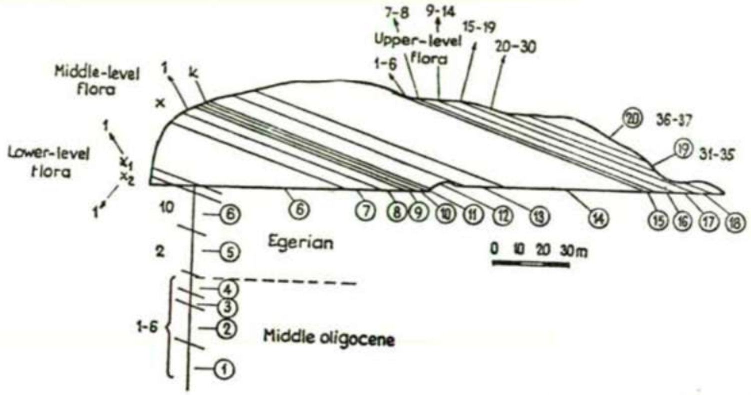
The sandy samples that follow, SAMPLES 26–27–28–29, are almost barren, only single specimens of freshwater Ovoidites ligneolus R. Pot. are present in them.

Sample 30 is a material of greenish colour, in which a few Coniferae (*Abies, Sciadopytis,* and 1–2 Angiospermae), *Myrica, Tricolporopollenites cingulum* and some spores, *Gleicheniidites microstellatus* NAGY 1963, *Gl. elegans* NAGY 1963, *Polypodiisporites alienus, Polypodiaceoidaesporites gracillimus,* have been preserved.

After a barren variegated clay sample (Sample 31), probably belonging to the 19th Bed, the clay sample (Sample 32) below the Mytilusbearing layer is that which has yielded the last rich pollen spectrum represented by Coniferae in 71.2% proportion of which 20% are *Abietinaepollenites microalatus* and 10.8% *Pityosporites* *labdacus*. In addition to them, species of *Podocarpus, Tsuga* and *Cedrus* and 12% Taxodiaceae can be found.

Among Angiospermae, the share of *Engelhardtia* is more than 4%; besides it is *Monocolpopollenites tranquillus* and *Dicolpopollenites calamoides* that represent paleotropical elements. They are complemented by spores *Osmunda, Cicatricosisporites, Trilites hungaricus* NAGY 1963, *Polypodiaceoisporites gracillimus, Polypodiisporites favus, P. alienus*, etc. *Alnus, Juglans*, minor quercoid pollen grains, etc. may by regarded as representatives of arcto-Tertiary elements.

The three additional samples (No. 33, 34, 35) are barren, just as it is the case with the sand samples (Samples 36–37) which already seem to belong to Báldi's 20[th] Bed.



The holostratotype of the Egerian rests conformably on the Middle Oligocene. The Egerian material of the Middle Oligocene exposures and boreholes is characterized by marine planktonic organisms and a typically Oligocene paleotropical flora, including very few arto-Tertiary elements. The basal samples of the brickyard exposure (lower flora) already contain very few planktonic organisms and a latest Oligocene flora. The upper samples (middle and upper flora) are characterized by the consistent presence of arcto-Tertiary elements added to the paleotropical ones.

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Fig. 1. Localities of sampling in the Egerian sequence (After BÁLDI 1966).

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Plate 1

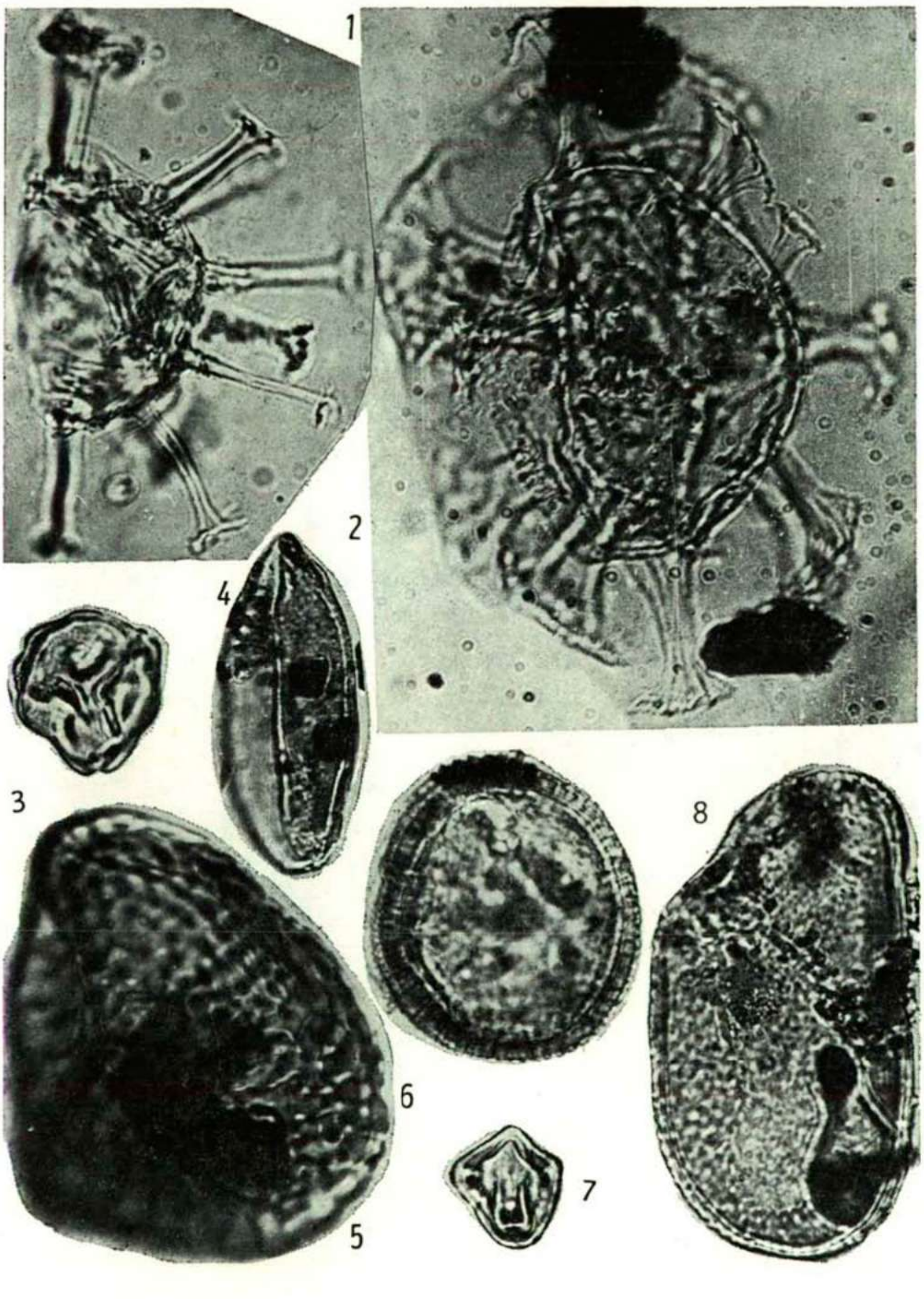

Plate 2