THE PALYNOLOGICAL CONTENT OF LOWER BASARABIAN (THE CLAYS WITH *CRYPTOMACTRA*) ON THE MOLDAVIAN PLATFORM

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KEY WORDS: Palynology, Sarmatian deposits, Miocene, Moldavian Platform.

The sarmatian deposits accumulated in the northern part of the Moldavian Platform bear the mark of the basinal evolution during Paratethys. This process was mainly controlled by the carpathian Orogene, which imposed the function of some foreland type basins. The paleogeographical configuration determined marine conditions of brackish type for the majority of the Paratethys basins, including the Euxinic and Dacian ones. As a result, both the micro and macrofauna assemblages revealed specific aspects.

The north and north-eastern part of the Moldavian Platform was marked by the pelitic rock accumulation even from the beginning of the Sarmatian. But these are not an exclusive presence: limestones were also found within the region, especially the recifal type, and even – although quite rarely – marls. The pelitic rocks are the consequence of the accumulation within the depozones specific to the foreland basins systems.

The Sarmatian evolution within this area is represented through some lithostratigraphical units: the accumulation of the Darabani-Mitoc clays for the Lower Sarmatian (Buglovian and Volhinian), while the Upper Sarmatian (Lower Basarabian and the first part of the Upper Basarabian) is represented by the clays with *Cryptomactra*. Below the last ones, the lithological sequence is characterized through uniformity, while above a lithological diversity can be distinguished, imposed by the paleogeographical configuration appeared during the Upper Basarabian.

Palynological study

The paynological study has been done based on the analysis of 11 siltic-argillous samples, taken from the Hlipiceni, Șipote, Bivolari and Comarna wells; these wells have a uniform distribution within the clays with *Cryptomactra* area. The sampling has been carefully planned, so that the targeted zone was situated at the same stratigraphical level in the Hlipiceni, Sipote and Bivolari wells. At Comarna well, the samples reflect the content of approximately 180 m from the clays with *Cryptomactra* thickness, below the relief line (Figure 1).

The quantitative – qualitative analysis of pollen and spores types establishes not only the polinical frequency of each sample, but also the list of identified taxa (Table 1).

The main botanical groups are identified within the analyzed samples as it follows:

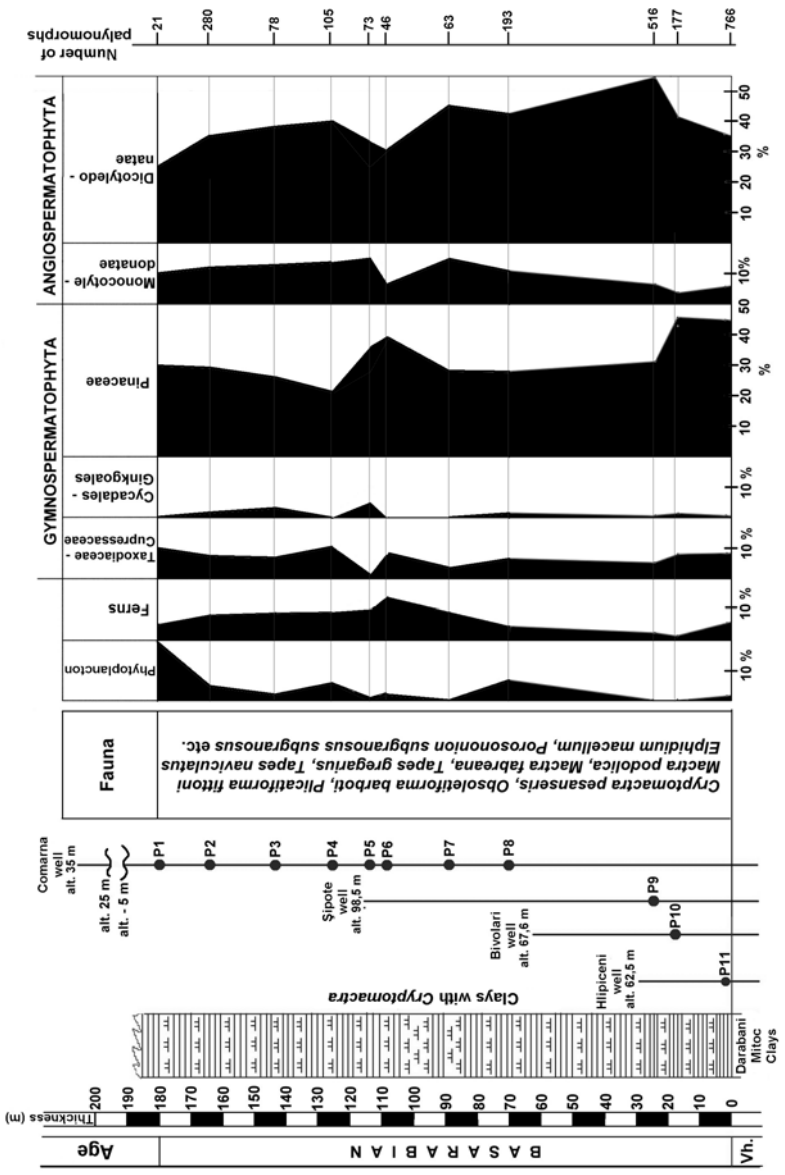

Figure 1. Percentage diagram for the major groups of palynomorphs from the Comarna, Bivolari, Şipote and Hlipiceni wells.

Table 1. List of the palynomorphs taxa from the Comarna, Bivolari, Şipote and Hlipiceni wells.

Taxa	Frequence										
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
PHYTOPLANCTON											
Tytthodiscus sp.	x	x		+				x			x
Hystrichosphaera sp.		+	x	x				+			+
Deflandrea phosphoritica phosphoritica Cook. & Eisen. 1961	x	x				x		x			
Thalassiphora pelagica Eisen. 1954		x									
Mycrhystridium sp.		x						x			
PTERIDOPHYTA											
Laevigatosporites haardti crassicus Kr. 1967	x										
Laevigatosporites haardti (Pot. et Ven. 1934) Th et Pf., 1953 subsp. *haardti* Kr. 1967		+		x	x						+
Laevigatosporites gracilis Wilson – Webster 1946		+	x					x			+
Laevigatosporites bisulcatoides Kr. 1967							x				x
Laevigatosporites sp.		x		+	x		x	+	+	x	•
Echinatisporis longechinus Kr. 1959		x									
Baculatisporites gemmatus Kr. 1959		x									
Baculatisporites quintus rugulatoides Kr. 1967		x									x
Baculatisporites primarius (Wolff 1934) Th.– Pf. 1953											x
Hydrosporis azollaënsis Kr. 1962		x									
Neogenisporis neogenicus Kr. 1962		x		x							x
Triplanosporites microsinuosus Pflanzl 1955			x		x						
Triplanosporites sinuosus (Pf. 1952) Th. – Pf. 1953								x			
Toripunctisporis lusaticus Kr. 1962			x								
Extrapunctatosporis minimus Kr. 1967		x	x			x			+	x	x
Extrapunctatosporis miocaenicus Kr. 1967											x
Leiotriletes wolffi wolffi Kr. 1962						x		x			
Polypodiaceoisporites gracillimus Nagy 1963		x									
Verrucatosporites favus magnus Kr. 1967											x
Verrucatosporites cf. *bockwitzensis* Kr. 1967											x
Verrucatosporites arctotertiarius Kr. 1967									x		
Stereisporites (Distverrusporis) electoides electoides Kr. 1963					x		x				
Stereisporites sp.		x							x		x
Retitriletes sp.			x								
GYMNOSPERMATOPHYTA											
Pityosporites sp.	+	••	•	•	••	•	+	••	••	••	••
Pityosporites microalatus (Pot. 1931) Th. – Pf. 1953		•		x			x		+	+	•
Pityosporites alatus (Pot. 1931) Th. – Pf. 1953		x						x	+	+	•
Pityosporites minutus (Zakl. 1957) Kr. 1971		x	x	x		x		x	+	x	•
Pityosporites labdacus (Pot. 1931) Th. – Pf. 1953		+		x	x			x	+	x	•
Pityosporites pacltovae Kr. 1971		x									
Pityosporites macroinsignis Kr. 1971					x			+	x		
Pityosporites insignis (Naum. ex Bolch. 1953) Kr.1971			x						+		+
Pityosporites microinsignis Kr. 1971											x
Pityosporites scopulipites (Wodeh. 1933) Kr. 1971					x			x	+	x	+
Pityosporites cedrisacciformis Kr. 1971					x			+	+	x	x
Pityosporites pristinipollinius (Trav. 1955) Kr. 1971							x	x		x	
Pinuspollenites miocaenicus Nagy 1985		x							x		

Abiespollenites latisaccatus (Trevisan 1967) Kr. 1971		x									+
Abiespollenites dubius (Chlonova 1960) Kr. 1961											x
Abiespollenites cf. *sibiriciformis* (Zakl. 1957)Kr. 1971									x		+
Abiespollenites cedroides (Thomson 1953) Kr. 1971									x		x
Abiespollenites sp.		+		x		x		x	•	+	••
Piceapollis tobolicus (Panova 1966) Kr. 1971		x			x					x	+
Piceapollis cf. *praemarianus* Kr. 1971								x		x	
Piceapollis planoides Kr. 1971		x							x		
Podocarpidites podocarpoides (Thg. 1958) Kr. 1971	x										
Podocarpidites libellus (Pot. 1931) Kr. 1971		x		x			x			x	
Podocarpidites piniverrucatus Kr. 1971		x			x		x				x
Podocarpidites nageiaformis (Zakl. 1957) Kr. 1971									+	x	x
Cedripites miocaenicus Kr. 1971		+	x			x	x		x		x
Zonalapollenites rueterbergensis Kr. 1971		x									+
Zonalapollenites igniculus (Pot. 1931) Th. – Pf. 1953						x					
Zonalapollenites spinulosus Kr. 1971			x					x	x		+
Zonalapollenites gracilis Kr. 1971											x
Zonalapollenites verruspinus Kr. 1971											x
Zonalapollenites sp.		+					x	x	+	+	••
Sciadopityspollenites varius Kr. 1971	x	x							x		
Sciadopityspollenites serratus (Pot. – Ven. 1934) Thg. 1937		x		x							x
Sciadopityspollenites verticillatiformis (Zauer 1960) Kr. 1971		x		x				x		x	x
Sciadopityspollenites crassus Kr. 1971											x
Sciadopityspollenites sp.		+	x	x				x	+	x	+
Inaperturopollenites verrupapillatus Trev. 1967	x	x		x		x		x	x		x
Inaperturopollenites concedipites (Wodeh.1933) Kr. 1971		x		x				x	+	+	x
Inaperturopollenites hiatus (Pot.1931) Th. - Pf.1953		x					x	+	+	x	•
Inaperturopollenites microforatus Kr. 1971				x		x					
Inaperturopollenites radiatus Kr. 1971											+
Inaperturopollenites sp.		+	+	+		x	x	+	+	+	••
Cupressacites bockwitzensis Kr. 1971		x	x	x					x		+
Araucariacites cf. *europaeus* Kr. 1971		+	x								
Sequoiapollenites sp.		x		x							
Cycadopites sp.		+	x					x	x		x
Psophosphaera pseudotsugoides Kr. 1971											+
Ephedripites sp.		x						x	+	x	+
Ginkgo sp.		x	x		+			x		x	x
ANGIOSPERMATOPHYTA. MONOCOTYLEDONATAE											
Monocolpopollenites tranquillus (Pot.1934) Th. – Pf. 1953	x	+		x	x			x			+
Monocolpopollenites arcuatus Petrescu 2000								x	x		
Monocolpopollenites sp.		•	+	+	+	x	+	•	••	+	••
Arecipites trachycarpoides Nagy 1969									x		+
Dicolpopollis kockeli Pflanzl 1956									x	x	x
Graminidites media (Cookson 1947) Pot. 1960											x
Graminidites sp.	x	+	+	x	x		+	+	x		+
Typha angustifolia Les. 1956		+		x				+			x
Sparganiaceaepollenites polygonalis Thg. 1937		x	x								
Potamogeton sp.				x							
ANGIOSPERMATOPHYTA. DICOTYLEDONATAE											
Magnolipollis sp.		+		+		x		x	x		+
Gothanipollis gothani Kr. 1959					+						

Tricolpopollenites retiformis Th. – Pf. 1953		+	x	x			+	+	x	x	+
Tricolpopollenites asper Th. – Pf. 1953							x	x			
Tricolpopollenites librarensis (Th.1950) Th.– Pf. 1953		+	+	+		+	x	+	•	+	••
Tricolporopollenites cingulum (Pot. 1931) Th. et Pf. 1953 subsp. *pusillus* (Pot. 1934) Th. et Pf. 1953	x	x	x				x	x	+	+	•
Tricolporopollenites cingulum (Pot. 1931) Th. et Pf. 1953 subsp. *oviformis* (Pot. 1931) Th. et Pf. 1953									x	x	x
Tricolporopollenites henrici (Pot. 1931) Kr. 1960			x		x	x	x	+	••	+	•
Tricolporopollenites microhenrici (Pot.1930) Kr.1960		+	x	+	x		x		••	x	•
Tricolporopollenites marcodurensis Pf. - Th. 1953									+		x
Tricolporopollenites sp.	x		x		x			x	+	+	x
Quercopollenites robur Nagy 1969									+		x
Quercopollenites sp.		•	x	+	+		+	+	••	+	•
Sapotaceoidaepollenites obscurus (Pf. Et Th., 1953) Nagy 1969		x									
Engelhardtioidites microcoryphaeus (Pot. 1931) Th. - Thg. ex Pot. 1960		•	+	•			+	+	+	+	••
Araliaceoipollenites edmundi (Pot. 1931) Pot. 1951								x	x		
Momipites punctatus (Pot. 1931) Nagy 1969		x				x			x		+
Triatriopollenites rurensis Th. – Pf. 1953		+	x	x		+	x	x	•	x	+
Myricipites bituitus (Pot. 1931) Nagy 1969			x						+		+
Cyrillaceaepollenites megaexactus (Pot.1931) Pot.1960		x							x		
Cyrillaceaepollenites exactus (Pot. 1931) Pot. 1960		x	x		x				+		+
Alnipollenites verus (Pot. 1931) Pot. 1934	x	x	x	x	x		x	+	•	x	••
Caryapollenites simplex (Pot. 1931) Kr. 1960	x	+	x	x				x	x	x	+
Juglanspollenites verus Raatz 1937		x		x							
Juglanspollenites maculosus (Pot. 1931) Nagy 1985		+	x		x		x	+	+		x
Carpinipites carpinoides (Pf. 1953) Nagy 1985		x						x	+		+
Faguspollenites minor Nagy 1969		x									x
Faguspollenites sp.			x		x	x	x	x	•		•
Ilexpollenites iliacus (Pot. 1931) Pot. 1960		x									x
Chenopodipollis multiplex (Weyl.-Pf. 1957) Kr. 1966		+		x	+	x	+	••	+		x
Intratriporopollenites instructus (Pot.1931)Th.-Pf. 1953		+			x			x	x		x
Ulmipollenites undulosus Wolff 1934		x	x	x	x	x		+	•	+	+
Zelkovaepollenites sp.								x			x
Pterocaryapollenites stellatus (Pot. 1931) Thg. 1937		+							+		x
Nyssapollenites kruschi (Pot. 1931) Nagy 1969		x					x	+	x		
Salixipollenites densibaculatus Nagy 1969											x
Ericipites ericius (Pot. 1931) Pot. 1960							x	x	+	••	+
Ericipites callidus (Pot. 1931) Kr. 1970										x	
Reevesiapollis sp.				x							
Betulaepollenites betuloides (Pf. 1953) Nagy 1969						x			x		
Aceripollenites sp.		x									
Platycaryapollenites sp.		x						x	x		x
Nymphaeaepollenites minor Nagy 1985		x									
Eucommiapollis eucommi (Pland. 1990) Petr. 1999					x			x	+		x

Frequency: x – very scarce (1–2 grains); + - scarce (3-9 grains); • – frequent (10-20 grains); •• - very frequent (> 21 grains).

- The **phytoplancton** is missing in the samples from the Sipote, P9 (drilling depth 91 m) and the Bivolari wells, P10 (drilling depth 42 – 45 m). But it has a maximum frequency in P1 sample from the Comarna well, arising 20 % from the total of identified palynomorphs (Figure1). There has been found the following genres: *Tytthodiscus, Hystrichosphaera, Deflandrea, Thalassiphora.*
- The **ferns** are relatively diversified, but have a low frequency (1,7 – 13%). The spores of *Polypodiaceae* are predominant: *Leavigatosporites haardti, L. gracilis, L. bisulcatoides*. There also has been identified *Osmundaceae: Baculatisporites quintus, B. gemmatus* ; *Schizaeaceae: Leiotriletes trianguloides,* and *Neogenisporis neogenicus, Extrapunctatosporis minimus, Triplanosporites microsinuosus, Hydrosporis azollaënsis* etc.
- The **conifers** prevail the associations (31,5 – 53,1%), being represented through members of the *Pinaceae* family. The *Pinus* genre is the most well represented through the following forms: *Pityosporites microalatus, P. alatus, P. labdacus, P. minutus, P. macroinsignis, P. scopulipites, P. cedrisacciformis* etc. Also within the *Pinaceae* there were identified the genres:

- *Abies* with the species *Abiespollenites latisaccatus, A.* cf. *sibiriciformis, A. cedroides, A. dubius*;
- *Cedrus* with *Cedripites miocaenicus*;
- *Tsuga* with the species *Zonalapollenites rueterbergensis, Z. igniculus, Z. spinulosus*;
- *Picea* with the species *Piceapollis tobolicus, P. planoides.*

The *Podocarpaceae* family appears only sporadically.
The *Taxodiaceae – Cupressaceae* pollen (1,4 – 10,4%) has been identified through the species *Inaperturopollenites hiatus, I. concedipites, I. microforatus, Sciadopityspollenites varius, S. serratus, S. verticillatiformis, S. crassus, Cupressacites bockwitzensis* etc.
The *Cycadales* pollen can also be found, but with a low frequency.

- The monocotyledonous **angiosperms** (most well represented in the P5 and P7 samples, at a 15 % frequency) are mainly exemplified by monocolpate and dycolpate palm pollen – *Monocolpopollenites tranquillus, M. arcuatus, Arecipites trachycarpoides, Dicolpopollis kockeli* – which indicates a warm climate. The monoporeus pollen are attributed to the genres *Graminidites, Sparganiaceaepollenites, Typha*.

On the contrary, the dicotylodonous pollen (25 – 55 %) is frequent and diversified, being represented through the following families:
- The *Fagaceae* family, represented by *Fagus* and *Quercus* (oaks) pollen – *Tricolporopollenites microhenrici, T. henrici*, *Quercopollenites robur* etc. It must be mentioned the fact that this oak group reaches a percentage of 21 %, especially in the Şipote well, P9 sample;

- The *Betulaceae* family is represented through *Alnus* pollen (3,2 – 3,4 %, identified within the Hlipiceni and Şipote wells), *Carpinus* (*Carpinipites carpinoides*) and *Betula* pollen (*Betulaepollenites betuloides*);
- The *Juglandaceae* family comprises especially *Engelhardtia* pollen – *Engelhardtioidites microcoryphaeus*. Aside this taxon, there has been also isolated *Carya* pollen – *Caryapollenites simplex, Juglans – Juglanspollenites verus, J. maculosus, Pterocarya – Pterocaryapollenites stellatus, Platycarya*;
- The *Myricaceae* family is represented by *Triatriopollenites rurensis* and *Myricipites bituitus*;
- The *Ulmaceae* family mainly comprises *Ulmus* pollen (3,7 % in the P9 sample), *Zelkova* having a sporadic presence;
- The *Ericaceae* family, represented by several species, has the higher frequency (15,8 %) in P10, from the Bivolari well. This percentage increase suggests a fluvial contribution from the continent.
- The *Chenopodiaceae* pollen, represented by several species, is almost absent in the inferior part of the analyzed column (the Hlipiceni, Şipote and Bivolari wells), but reaches a maximum value (12,9 %) in the Comarna well, P8 sample (the middle zone).

The leguminous plants pollen is also quite well represented, while the *Salicaceae* pollen is found in almost constant values (the last one is exemplified by *Tricolpopollenites retiformis* and *Salixipollenites densibaculatus*).

Palynomorphs, belonging to *Tilia, Acer, Cyrilla, Reevesia, Eucommia, Nyssa, Magnolia* have been also identified, but their frequency is low.

General Considerations

The microfloristic data obtained from the analysis of the samples taken from Hlipiceni, Şipote, Bivolari and Comarna wells allow the reconstruction of the following vegetal communities :

- forest community of recurrently floodable swampy area. This aspect is prooven by the presence of the *Alnus, Pterocarya, Taxodium, Salix, Myrica* and *Cyrilla* pollen. This kind of community is better represented in the lower part (the beginning of the Basarabian) of the analyzed column from the Hlipiceni well. In areas with water depth between 2 – 3 m and associated to this high-hydric level vegetation, the *Typha* genre evolves along other aquatic plants, like *Potamogeton* sp. (the latest taxon has been identified only within the Comarna well, P4 sample);
- low areas habitats, but less humid than the former, were occupied by mesophytic broad-leaved plants like *Quercus, Fagus, Castanea, Ulmus, Carpinus*. From all these taxa, the most well represented and diversified is the *Quercus* genre;
- the presence of the xerophytic bushes, which evolved on dry areas, is certified through the existence at certain levels of numerous leguminous plants;

- forest of high altitude, consisting in *Pinus, Abies, Tsuga, Picea* genres, is well outlined at the lower part of the Basarabian. While the *Pinus, Tsuga* and *Picea* genres have almost constant values within all the analyzed samples, the *Abies* genre is well represented only in the P11 (7 %) and P10 (4,5 %) ones. This abundance in *Pinaceae* at the lower part of the analyzed column (Figure 1) may be explained in two ways: either through a short cooling period, or the existence of several higher zones, covered with *Pinaceae* (probably some Oriental Carpathians areas) which were beginning to form at that time.

Analyzing the frequency curve of the *Chenopodiaceae,* one can notice an interesting aspect: they are almost absent at the lower part of the analyzed column, while in the middle zone of the P8 sample reach a maximum value. According to Slamková (1999), this pollen originates in a halophytic, grassy vegetation, characteristic to interfluvial areas, probably indicating a local salty swamp medium which appeared after a marine regression. Petrescu and Meseşan (1993) believe that this vegetation type presents drying features towards the interior of the continent. Although their ecology is not equivalent, according to Slamková and Petrescu, these *Chenopodiaceae* were either developing within the seaside area, or behind the swamp, in a dry zone. This aspect prooves the presence of some open areas, which could not appear but due to a marine regression. Probably the phenomenon appeared in the first half of the Basarabian. This statement can be sustained by the variation of the *Gramineae* pollen which is almost missing in the first half of the analyzed column, but reaching a maximum value in the P2 sample (3,2 %).

Considering both the quantitative-qualitative taxon analysis and the climatic conditions within which the nowadays closer descendants of the identified fossil species evolves , several aspects can be outlined:

- the beginning of a continentalization phase, within a paleogeographical change;
- the outlining of several high zones (mountain heights) which favoured the proliferation of temperate elements, with an important forest multi-staging;
- the demonstration of the regression of the sarmatic basin, sustained by the quantitative variation of the *Chenopodiaceae* and *Gramineae* pollen;
- during the accumulation of the lower part of the clays with *Cryptomactra*, the climate was generally a wet-warm-temperate one, with a possible important cooling during the inferior part of the Basarabian and the middle part of the analyzed column.

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EXPLANATION OF PLATES

Plate I

1. *Thalassiphora pelagica* Eisen. 1954
2. *Deflandrea phosphoritica phosphoritica* Cook. & Eisen 1961
3. *Hystrichosphaera* sp.
4. *Mycrhystridium* sp.
5. *Laevigatosporites haardti crassicus* Kr. 1967
6. *Laevigatosporites haardti haardti* Kr. 1967
7. *Laevigatosporites gracilis* Wilson-Webster 1946
8. *Extrapunctatosporis minimus* Kr. 1967
9. *Laevigatosporites bisulcatoides* Kr. 1967
10. *Echinatisporis longechinus* Kr. 1959
11. *Verrucatosporites favus magnus* Kr. 1967
12. *Baculatisporites quintus rugulatoides* Kr. 1967
13. *Toripunctisporis lusaticus* Kr. 1962
14. *Triplanosporites sinuosus* (Pf. 1952) Th. – Pf. 1953
15. *Triplanosporites microsinuosus* Pflanzl 1955
16. *Hydrosporis azollaënsis* Kr. 1962
17. *Neogenisporis* sp.
18. *Neogenisporis neogenicus* Kr. 1962
19. *Leiotriletes wolffi wolffi* Kr. 1962
20. *Stereisporites (Distverrusporis) electoides electoides* Kr. 1963
21. *Retitriletes* sp.
22. *Baculatisporites gemmatus* Kr. 1959

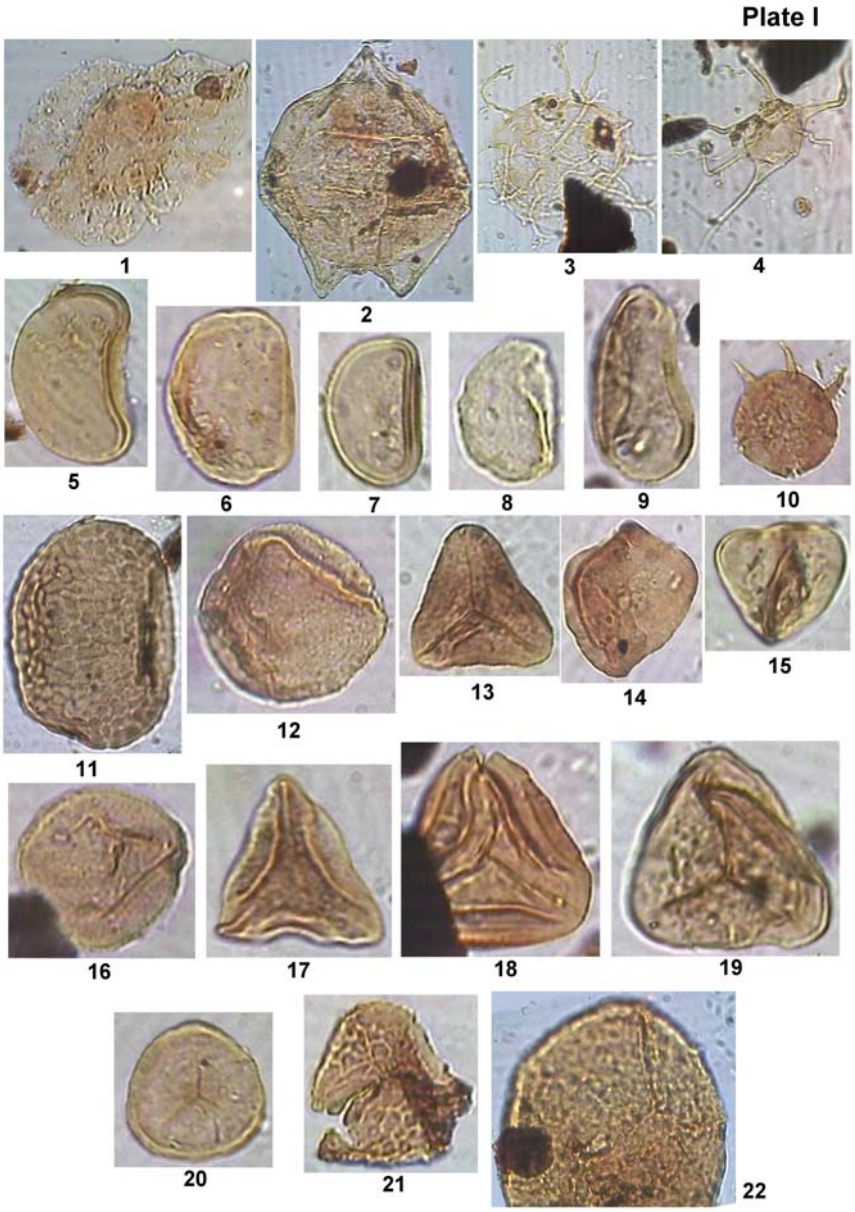
Plate II

1. *Pityosporites microalatus* (Pot. 1931) Th. et Pf. 1953
2. *Pityosporites alatus* (Pot. 1931) Th. et Pf. 1953
3. *Pityosporites scopulipites* (Wod. 1933) Kr. 1971
4. *Pityosporites minutus* (Zakl. 1957) Kr. 1971
5. *Pityosporites insignis* (Naum. ex Bolch. 1953) Kr. 1971
6. *Pityosporites cedrisacciformis* Kr. 1971
7. *Piceapollis tobolicus* (Pan. 1966) Kr. 1971
8. *Ephedripites* sp.
9. *Podocarpidites piniverrucatus* Kr. 1971
10. *Podocarpidites nageiaformis* (Zakl. 1957) Kr. 1971
11. *Cedripites miocaenicus* Kr. 1971
12. *Cupressacites bockwitzensis* Kr. 1971
13. *Araucariacites* cf. *europaeus* Kr. 1971
14. *Psophosphaera pseudotsugoides* Kr. 1971
15. *Piceapollis planoides* Kr. 1971

16. *Zonalapollenites rueterbergensis* Kr. 1971
17. *Inaperturopollenites hiatus* (Pot. 1931) Th. et Pf. 1953
18. *Sciadopityspollenites varius* Kr. 1971
19. *Abiespollenites latisaccatus* (Trev. 1967) Kr. 1971

Plate III

1. *Monocolpopollenites tranquillus* (Pot. 1934) Th. et Pf. 1953
2. *Monocolpopollenites arcuatus* Petrescu 2000
3. *Arecipites trachycarpoides* Nagy 1969
4. *Potamogeton* sp.
5. *Typha angustifolia* Lesch. 1956
6. *Faguspollenites minor* Nagy 1969
7. *Quercopollenites* sp.
8. *Quercopollenites robur* Nagy 1969
9. *Tricolporopollenites microhenrici* (Pot. 1930) Kr. 1960
10. *Dicolpopollis kockeli* Pflanzl 1956
11. *Graminidites media* (Cook. 1947) Pot. 1960
12. *Tricolporopollenites henrici* (Pot. 1931) Kr. 1960
13. *Tricolporopollenites cingulum pusillus* (Pot. 1934) Th. et Pf. 1953
14. *Carpinipites carpinoides* (Pf. 1953) Nagy 1985
15. *Caryapollenites simplex* (Pot. 1931) Kr. 1960
16. *Chenopodipollis multiplex* (Wey. et Pf. 1957) Kr. 1966
17. *Tricolporopollenites marcodurensis* Pf. et Th. 1953
18. *Ulmipollenites undulosus* Wolff 1934
19. *Pterocaryapollenites stellatus* (Pot. 1931) Thierg. 1937
20. *Triatriopollenites rurensis* Pf. et Th. 1953
21. *Intratriporopollenites instructus* (Pot. 1931) Th. et Pf. 1953
22. *Faguspollenites crassus* Nagy 1969
23. *Engelhardtioidites microcoryphaeus* (Pot. 1931) Th. et Thierg. ex Pot. 1960
24. *Momipites punctatus* (Pot. 1931) Nagy 1969
25. *Cyrillaceaepollenites exactus* (Pot. 1931) Pot. 1960
26. *Alnipollenites verus* (Pot. 1931) Pot. 1934
27. *Tricolpopollenites retiformis* Th. et Pf. 1953
28. *Compositoipollenites* sp.
29. *Ericipites ericius* (Pot. 1931) Pot. 1960
30. *Tricolpopollenites liblarensis* (Th. 1950) Th. et Pf. 1953
31. *Betulaepollenites betuloides* (Pf. 1953) Nagy 1969
32. *Eucommiapollis eucommi* (Planderova 1990) Petrescu 1999
33. *Magnolipollis* sp.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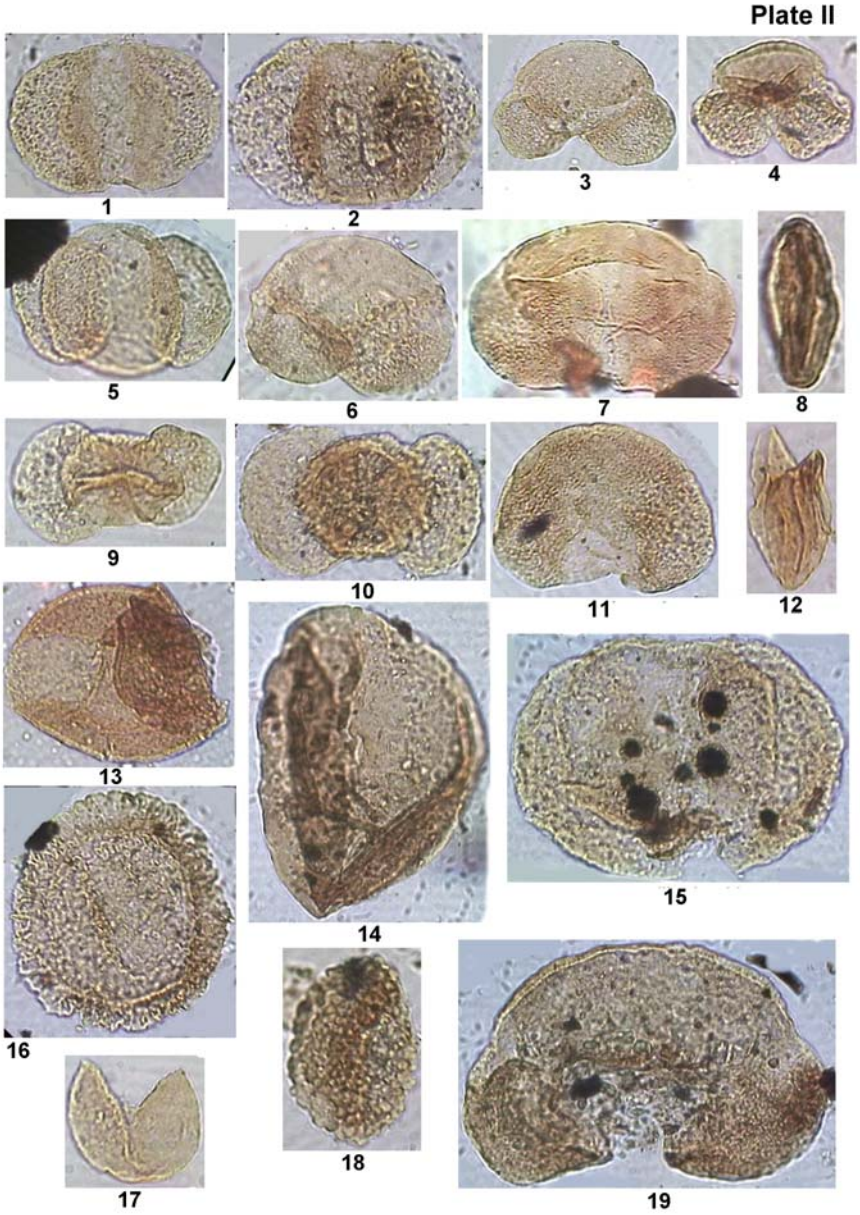
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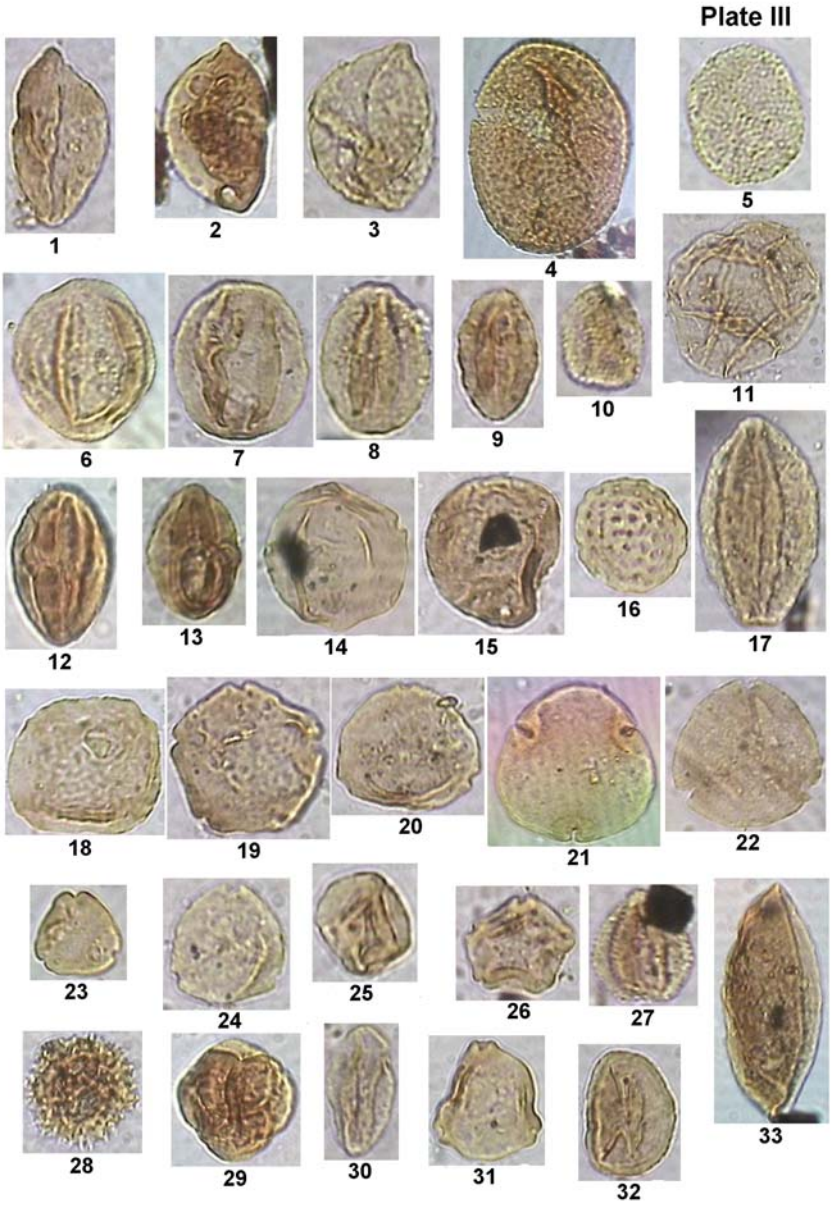
Plate III
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