

MAASTRICHTIAN PALEOCENE AND EOCENE POLLEN AND SPORES FROM NIGERIA

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INTRODUCTION

In order to continue the investigation of the Nigerian Maastrichtian pollenflora (van Hoeken-Klinkenberg, 1964) with Lower Tertiary material, a study has been made of some boreholesamples of the Maastrichtian, Paleocene and Eocene in Nigeria. A comparison is made with the South American pollen and spores of the same age.

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STRATIGRAPHY

Samples of the boreholes Owan-1 (Upper Cretaceous and Paleocene), Egoli-1 (Upper Cretaceous and Paleocene) and Gbekebo-1 (Upper Cretaceous, Paleocene and Eocene) have been examined. The age of the samples was given by Shell/BP. The Egoli samples are on the whole very poor in pollengrains. The Paleocene part of the Owan samples is also poor in pollengrains. The Gbekebo samples show some more pollenmaterial, but the Paleocene is again rather poor. It is impossible to make a reliable pollendiagram, because either the samples are too poor in pollengrains or the sample distance is too great.

All the Maastrichtian pollen and spores as described by van Hoeken-Klinkenberg (1964) were found again. Several new pollengrains of the Maastrichtian and the Paleocene and the Eocene are described in this article. Some grains were found to be identical to South American ones.

Of the Maastrichtian pollen and spores several species were still found in the Lower Paleocene (Fig. 1), such as:

Scabriporites annellus van Hoeken-Klinkenberg 1964
Gemmatricolpites scabrus van Hoeken-Klinkenberg 1964
Syncolporites minutus van Hoeken-Klinkenberg 1964
Ctenolophonidites costatus nov. comb.

Throughout the Paleocene were found:

Retidiporites magdalenensis van der Hammen & Garcia 1965.

Triporites iverseni (as mentioned in van H.-Kl. 1964)
Echitriporites trianguliformis van Hoeken-Klinkenberg 1964.

Crototricolpites crotonoïsculptus nov. comb.

Retitricolporites crassicostatus n. sp.

The species that were found in the Maastrichtian and the Paleocene and the Eocene were:

Longapertites marginatus van Hoeken-Klinkenberg 1964.

Filtrotriletes nigeriensis n. sp.

Just as in South America *Proxapertites operculatus* van der Hammen 1956 occurs for the first time just above the Maastrichtian-Paleocene boundary.

Mauritiidites crassibaculatus van H.-Kl. 1964 occurs for the first time just under this boundary. In the pollendiagram of the G.S.N. borehole nr 1108, Inyi (van H.-Kl. 1964) *Mauritiidites crassibaculatus* was found for the first time just under the sudden rise of the percentage of *Psilamonocolpites medius* which was then suggested to be the transition from Maastrichtian into Paleocene. This *Psilamonocolpites medius* maximum could not be reproduced in this investigation. There were no samples available of the last 27 feet of the Maastrichtian and the first 13 feet of the Paleocene. That a *Psilamonocolpites medius* maximum in this interval is not impossible is shown in the diagram of borehole nr. 1108. In this diagram a rise was observed from 15 % to 55 % *Psilamonocolpites medius* within the 26 feet above the first appearance of *Mauritiidites crassibaculatus*.

In the Paleocene samples 20 feet under what has been indicated as the Paleocene-Eocene boundary a few Eocene pollengrains appear already, though in small amounts.

In the Eocene a flora is found with a great variety in species and especially many small triporate and brevicolpate grains. *Verrumonoletes usmensis* van der Hammen 1956 appears, as in South America. Tricolporate striate grains were seen as mentioned by Boltenhagen (1965, p. 320, pl. 1, fig. 14) of the Tertiary of Gabon and Cameroun. Only a few Eocene grains are identical to South American Eocene pollengrains, such as:

Retibrevitricolpites triangulatus n. sp.

Psilatricolpites minutus Gonzalez 1966

Retitricolpites polaris Gonzalez 1966

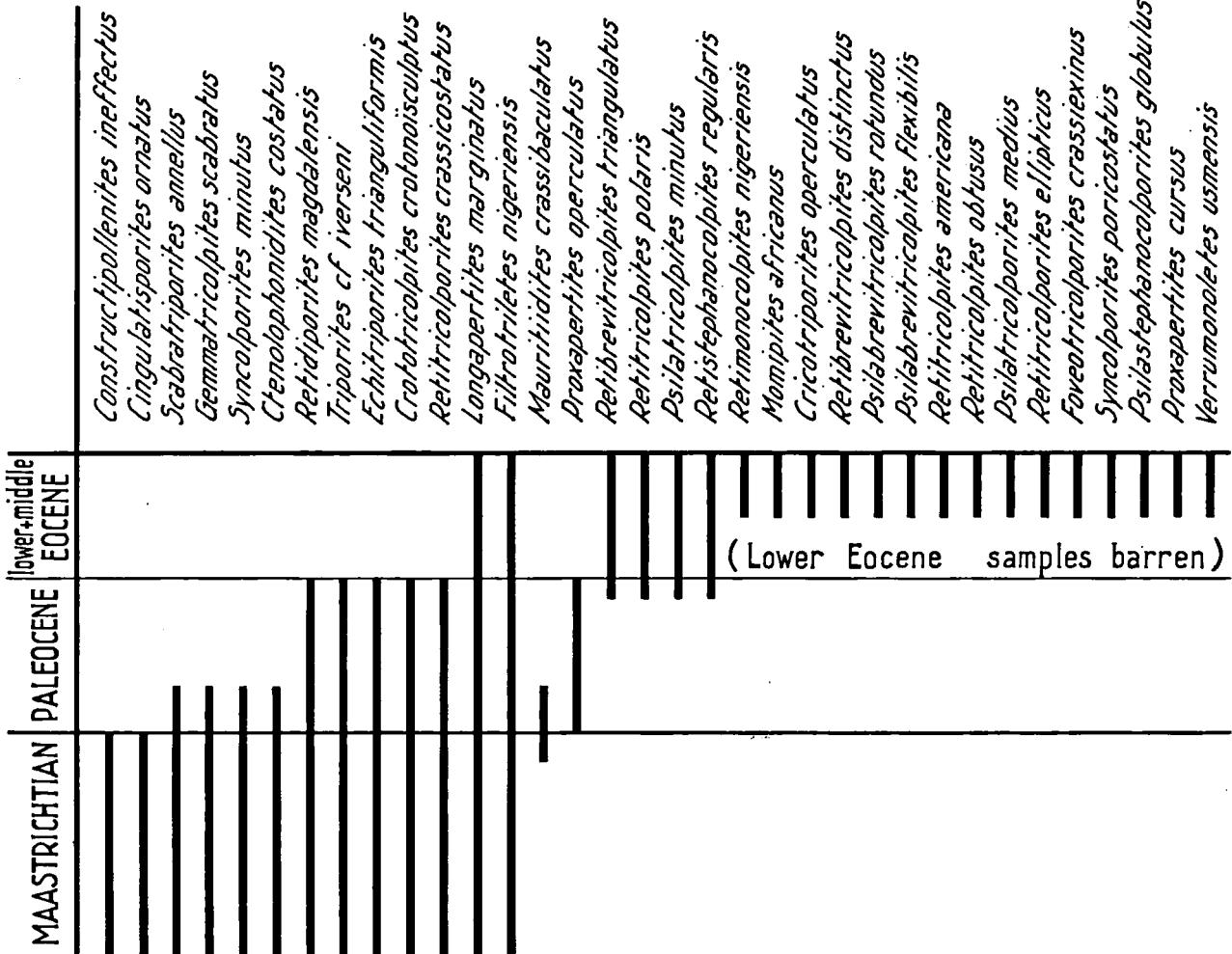


Fig. 1. The stratigraphical range of some pollentypes as was found in samples of the boreholes Owan-1, Egoli-1 and Gbekebo-1, Nigeria.

Retitricolpites americana Wymstra 1966

Psilatricolporites medius Gonzalez 1966

Verrumonoletes usmensis van der Hammen 1956b.

Other Eocene grains only resemble South American ones, but the greater part of the grains in the African Eocene are unknown in the South American samples that have been studied up to now.

SYSTEMATIC DESCRIPTIONS

The pollen and spores of the Maastrichtian, Paleocene and Eocene of Nigeria have been compared with South American and European pollengrains. Most of the grains have to be described, as they are not identical to already known species. The grains have been given names following the international rules of botanical nomenclature.

An error was made in using the name *Stephanocolpites costatus* in van H.-Kl. 1964 for grains of the Ctenolophon-type. A new genussname is given in this article for grains of this type. The genera *Gemmatricolpites* and *Clavatricolpites* should not have been mentioned as new genera in van H.-Kl. 1964, as these genera had already been validly described in a publication by Pierce (1961), that unfortunately arrived too late in Leiden to be consulted in time. A new genus is published by Leidelmeyer (1966) for tricolpate pollengrains with a Croton-pattern: *Crototricolpites*. *Clavatricolpites crotoneosculptus* van H.-Kl. 1964 is also included in this genus. *Diporites magdalenensis* as mentioned in van H.-Kl. 1964 has now been described as *Retidiporites magdalenensis* in van der Hammen & Garcia 1965. A better photo is published of *Rugulatisporites caperatus* van H.-Kl. 1964, clearly showing the tetradmark. For the description of the grains the symbols by Iversen & Troels-Smith (1950) are used. The locality of the type specimens in the slides is given for the Leitz binocular microscope PO 16, nr. 496231 of the Palynological Laboratory, Geological Institute, Leiden Netherlands.

MONOCOLPATES

RETIMONOCOLPITES Pierce 1961.

Retimonocolpites nigeriensis n. sp.

Plate I fig. 14.

Description: Intectate reticulate monocolpate pollengrain. Endocolpe only. The lumina of the reticulum are varying in size; the lumina are smaller in size on the two extremes of the grain.

Size of grain	:	46 × 25 μ
sculpt. H	:	1 μ
lumina D	:	1 — 2,5 μ
exine M	:	1,5 μ

Type: slide NG 15 rep 2; loc. 99,4 × 33,7.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria,

DIPORATES

RETIDIPORITES Varma & Rawat 1963.

Retidiporites magdalenensis v. d. Hammen & Garcia 1965.

These grains were mentioned already in van H.-Kl. 1964 as *Diporites magdalenensis*.

PROTRUDODIPORITES n. gen.

Diporate pollengrains with protruding pores. Because of their protruding pores together with the conspicuous reticulate sculpture the grains described below as *Protrudodiporites typicus* could not be included in the genus *Retidiporites* Varma & Rawat 1963.

Genotype: *Protrudodiporites typicus* n. sp.

Protrudodiporites typicus n. sp.

Plate I fig. 4.

Description: Diporate pollengrain. Intectate. Sculpture reticulate with a short bacula standing in the middle of each lumen. Pores large and protruding. Grain with convex sides.

Size of grain	:	49 × 33 μ
pore D	:	14,5 μ
lumina D	:	1,5 — 2 μ
lumina H	:	< 1 μ
exine M	:	ca 1 μ

Type slide: NO 7 rep 1; loc. 101,3 × 45,5.

Age and locality: Maastrichtian, borehole Owan-1, Nigeria.

TRIPORATES

MOMIPITES Wodehouse 1932.

Momipites africanus n. sp.

Plate I fig. 15.

Description: Triangular pollengrain with convex sides. Triporate. Psilate.

Size of grain	:	17 μ
pore D	:	2 μ
exine M	:	1,2 μ

Type: slide NG 15 rep 1; loc. 99,2 × 30,5.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

Affinity: Resembling grains occur in recent Moraceae (*Ficus*) and Betulaceae (*Corylus*).

CRICOTRIPORITES Leidelmeyer 1966.

Cricotriporites operculatus n. sp.

Plate I fig. 16.

Description: Triporate pollengrain. Psilate, tectate. Pores provided with an operculum, an annulus and strongly developed costae pori.

Size of grain	:	22 μ
pore D	:	3,5 μ
operc. D	:	2 μ
thickness costae	:	2 μ
exine M	:	1,5 μ

Type: slide NG 15 rep 1; loc. 108,2 × 35,1.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

Affinity: Grains resembling *Cricotriporites operculatus* are described as *Cricotriporites guianensis* by Leidelmeyer (1966) of the Eocene of British Guiana.

Cricotriporites fragilis n. sp.

Plate II fig. 1.

Description: Pollengrain triporate. Round pores with costae pori. Sculpture psilate-vaguely foveolate. Grains were always found with folds.

Size of grain	: 20 μ
pore D	: 2,5 μ
thickness costae	: 1,5 μ
exine M	: 1 μ

Type: slide NG 15 rep 2; loc. 103,6 \times 37,9.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

SCABRATRIPORITES van der Hammen 1956a.*Scabratriporites simpliformis* n. sp.

Plate I fig. 11.

Description: Triporate pollengrain, triangular with convex sides. Round pores sunken and with costae. Surface with sparse scabrae.

Size of grain	: 21 μ
pore D	: 2,5 μ
sculpt. D	: < 1 μ
thickness costae	: ca 1,2 μ
exine M	: < 1 μ

Type: slide NG 12 rep 1; loc. 104,5 \times 44,4.

Age and locality: Paleocene, borehole Gbekebo-1, Nigeria.

Affinity: A similar grain is the „Triporites species” in Jardiné & Magloire 1965, pl. VIII fig. 13.

PROTEACIDITES Cookson 1950.*Proteacidites miniporatus* n. sp.

Plate I fig. 8.

Description: Pollengrain triporate. Triangular with straight sides. Small sunken pores. Surface with sparse scabrae.

Size of grain	: 32 μ
pore D	: 1,5 μ
sculpt. D	: 1 μ
exine M	: 1,2 μ

Type: slide NO 11 rep 2; loc. 100,3 \times 36,8.

Age and locality: Paleocene, borehole Owan-1, Nigeria.

MICROFOVEOTRIPORITES n. gen.

Triporate pollengrains with a microfoveolate sculpture. Different from other foveolate triporate genera because of the fine sculpture.

Genotype: *Microfoveotriporites cretaceus* n. sp.

Microfoveotriporites cretaceus n. sp.

Plate I fig. 3.

Description: Nearly circular triporate pollengrain with round sunken pores. Intectate. Sculpture foveolate, with unsculptured areas on the middle of the sides between the pores. Exine thickening in the unsculptured areas.

Size of grain	: 22,5 μ
pore D	: 2,5 μ
sculpt. D	: < 1 μ
sculpt. H	: << 1 μ
exine M	: 1 — 1,5 μ

Type: slide NO 7 rep 1; loc. 98,8 \times 42,7.

Age and locality: Maastrichtian, borehole Owan-1, Nigeria.

STRIATRIPORITES n. gen.

Striate triporate pollengrains. Grains resembling the grains described below were not encountered in the existing genera of triporate grains.

Genotype: *Striatrporites nigeriensis* n. sp.

Striatrporites nigeriensis n. sp.

Plate I fig. 1.

Description: Striate triporate pollengrains. Around each of the pores is an unsculptured area. Pores with protruding borders.

Size of grain	: 22 μ
pore D	: 4 μ
sculpt. D	: ca 1 μ
sculpt. H	: < 1 μ

Type: slide NO 2 rep 1; loc. 100,4 \times 36,7.

Age and locality: Maastrichtian, borehole Owan-1, Nigeria.

*TRICOLPATES**RETIBREVITRICOLPITES* n. gen.

As there are various characteristic brevicolpate pollengrains in the Eocene deposits of Africa and South America, which seem to form a unit from the morphological point of view, it seems appropriate to establish a new genus for this type of grain.

Description: tricolpate pollengrains with a very great polar area; polar index $\geq 0,75$, „brevicolpate”. Sculpture reticulate.

Genotype: *Retibrevitricolpites triangulatus* n. sp.

Retibrevitricolpites triangulatus n. sp.

Plate II fig. 2.

Description: „Brevitricolpate” pollengrain. Intectate, reticulate. There is a certain variability in sculpture coarseness, exine thickness, costae colpi thickness and grain size. Furrows provided with costae.

Size of grain	: 16 μ var 14 — 20 μ
lumina D	: ca 1 μ var < 1 μ — 1 μ
exine M	: 1,5 μ var < 1 μ — 1,5 μ
polar index	: 12,5/16

Type: slide NG 15 rep 1; fig. 2a: loc. 102,1 \times 42,8.Paratypes: slide NG 15 rep 1; fig. 2b: loc. 95,8 \times 38,0; fig. 2c: loc. 95,9 \times 29,1.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

Affinity: Identical grains are found in the Eocene of Colombia by Gonzalez, 1966.

Retibrevitricolpites distinctus n. sp.

Plate II fig. 3.

Description: „Brevitricolpate” pollengrain with a very distinct reticulate pattern. Columellae only under the muri of the reticulum: semitectate. Furrows with costae. The grain is covered with a coarse reticulum on the intercolpia; the polar area is covered with a much finer reticulum.

Size of grain	:	13 μ
Lumina D polar area	:	< 1 μ
Lumina D intercolp.	:	2 μ
exine M	:	1,2 μ
polar index	:	10/13

Type: slide NG 15 rep 2; loc. 100,9 \times 43,9.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

PSILABREVITRICOLPITES n. gen.

Brevitricolpate pollengrains, sculpture psilate. Polar index $\geq 0,75$.

Genotype: *Psilabrevitricolpites rotundus* n. sp.*Psilabrevitricolpites rotundus* n. sp.

Plate II fig. 4.

Description: Brevitricolpate pollengrains. Tectate psilate. Furrows with costae. Polar view circular.

Size of grain	:	19,5 μ
exine M	:	1,2 μ
polar index	:	13,5/19,5.

Type: slide NG 15 rep 2; loc. 103,5 \times 39,8.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

Psilabrevitricolpites flexibilis n. sp.

Plate II fig. 5.

Description: Psilate tectate brevitricolpate pollengrains. Folds in the grain are the cause of a doubling of the exine, that is seen often.

Size of grain	:	18 μ
polar index	:	14,5/18
exine M	:	1,2 μ

Type: slide NG 15 rep 1; loc. 101,7 \times 27,8.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

PSILATRICOLPITES van der Hammen & Wymstra 1964.*Psilatricolpites colpiconstrictus* n. sp.

Plate I fig. 13.

Description: Psilate tectate pollengrain with clearly visible columellae. Tricolpate, constricticolpate. Constriction indistinct and short.

Size of grain	:	25 \times 21 μ
exine M	:	1,5 μ
polar area	:	small

Type: slide NG 12 rep 2; loc. 97,3 \times 38,3.

Age and locality: Paleocene, borehole Gbekebo-1, Nigeria.

Affinity: This grain resembles *Psilatricolpites clarissimus*

van der Hammen & Wymstra 1964, but the Nigerian grains are constricticolpate.

Psilatricolpites minutus Gonzalez 1966.

Plate II fig. 6.

Grains identical to those found by Gonzalez in the Colombian Eocene and described as *Psilatricolpites minutus*, also constricticolpate with an S-shaped constriction were found in the Nigerian Eocene.

Nigerian example: slide NG 15 rep 2; loc. 105,1 \times 36,2.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

RETITRICOLPITES van der Hammen 1956a.*Retitricolpites clarensis* Gonzalez 1966.

Plate I fig. 12.

Grains identical to those described by Gonzalez, 1966, of the Eocene of Colombia were found in the Nigerian Paleocene.

Nigerian example: slide NG 8 rep 2; loc. 103,5 \times 25,8.

Age and locality: Paleocene, borehole Gbekebo-1, Nigeria.

Retitricolpites marginatus n. sp.

Plate II fig. 8.

Description: Tricolpate pollengrains. Semitectate. Circular in polar view. Sculpture reticulate with rather large lumina; lumina smaller in a margin along the furrows.

Size of grain	:	32,5 μ
lumina D	:	1,2 — 3,5 μ
muri D	:	< 1 μ
exine M	:	2,5 μ

Type: slide NG 15 rep 1; loc. 94,3 \times 32,8.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

Retitricolpites americana Wymstra 1966.

Plate II fig. 11.

Pollengrains that are described as *Retitricolpites americana* by Wymstra, 1966, found in the Eocene of British Guiana were also found in the Nigerian Eocene.

Nigerian example: slide NG 15 rep 2; loc. 103,8 \times 39,9.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

Retitricolpites polaris Gonzalez 1966.

Plate II fig. 9.

Grains identical to those described as *Retitricolpites polaris* by Gonzalez, 1966, of the Eocene of Colombia have been found in the Nigerian Eocene.

Nigerian example: slide NG 15 rep 2; loc. 100,9 \times 43,9.

Age and locality: Middle Eocene, borehole Gbekebo-1 Nigeria.

Retitricolpites obtusus n. sp.

Plate II fig. 13.

Description: Reticulate tricolpate pollengrains. Prolate with flattened poles.

Exine thickening in the polar area. Polar area small.

Size of grain : $32 \times 21 \mu$
 lumina D : 1μ
 exine M : 1μ ; at the poles: $2,5 \mu$

Type: slide NG 15 rep 1; loc. $95,8 \times 35,6$.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

CROTOTRICOLPITES Leidelmeyer 1966.

Crototricolpites crotonoisculptus nov. comb.

Syn. *Clavatricolpites crotonoisculptus* van Hoeken-Klinkenberg 1964.

TRICOLPORATES

PSILATRICOLPORITES van der Hammen 1956a.

Psilatricolporites medius Gonzalez 1966.

Plate II fig. 7.

Grains identical to those described as *Psilatricolporites medius* by Gonzalez, 1966, of the Colombian Eocene were found in the Nigerian Eocene.

Nigerian example: slide NG 15 rep 2; loc. $99,6 \times 37,9$.

Age and locality: borehole Gbekebo-1, Nigeria.

STRIATRICOLPORITES van der Hammen 1956a.

Striatricolporites pimulus Leidelmeyer 1966.

Plate I fig. 2.

Grains identical to those described by Leidelmeyer, 1966, of the Paleocene of British Guiana are found in the Upper Maastrichtian in Nigeria.

Nigerian example: slide NG 5 rep 2; loc. $107,2 \times 33,4$.

Age and locality: Maastrichtian, borehole Gbekebo-1, Nigeria.

RETITRICOLPORITES van der Hammen 1956, van der Hammen & Wymstra 1964.

Retitricolporites crassicostatus n. sp.

Plate I fig. 9.

Description: Tricolporate pollengrains with conspicuous dark endexinous thickenings along the furrows: costae colpi. Tectate pollengrains with reticulate sculpture. Exocolpe with exopore.

Size of grain : 26μ
 lumina D : $< 1 \mu$
 thickness costae : $2,5 \mu$
 pore D : $2,5 \mu$
 exine M : 1μ

Type: slide NO 11 rep 2; loc. $99,8 \times 41,4$.

Age and locality: Paleocene, borehole Owan-1, Nigeria.

Retitricolporites ellipticus n. sp.

Plate II fig. 10.

Description: Tricolporate pollengrains. Intectate reticulate. Equatorial view prolate elliptical. Polar area small. Pores are endopores, furrows with costae that are thickening near the pores. The other pore limitation is diffuse. Pores transversally elongated.

Size of grain : $27 \times 14,5 \mu$
 pore D : $2,5 \mu$

lumina D : ca 1μ
 exine M : 1μ

Type: slide NG 15 rep 1; loc. $102,7 \times 39,5$.

Age and locality: Middle Eocene, borehole Gbekebo-1 Nigeria.

FOVEOTRICOLPORITES Pierce 1961.

Foveotricolporites crassiexinus n. sp.

Plate III fig. 1.

Description: Tricolporate pollengrains. Circular endopores with costae pori. Thick exine, foveolate. Under the muri between the foveolae are columellae, but they are absent in the foveolae: semitestate. Polar area small.

Size of grain : $31,5 \times 26,5 \mu$
 pore D : $3,5 \mu$
 sculpt. H : $< 1 \mu$
 sculpt. D : ca $1,5 \mu$
 exine M : 3μ

Type: slide NG 15 rep 2; loc. $103,6 \times 33,0$.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

SYNCOLPORATES

SYNCOLPORITES van der Hammen 1954.

Syncolporites poricostatus n. sp.

Plate II fig. 14.

Description: Syncolporate pollengrains, triangular in polar view: Pores with a vestibulum and costae pori. Sculpture psilate.

Size of grain : $14,5 \mu$
 pore D : 1μ
 exine M : $1,2 \mu$

Type: slide NG 15 rep 1; loc. $106,5 \times 41,8$.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

STEPHANOCOLPATES

CTENOLOPHONIDITES n. gen.

Stephanocolpate pollengrains with endexinous thickenings between the furrows. Thickenings fusing at the poles, forming an irregular ringlike pattern, as in recent Ctenolophonaceae.

Genotype: *Ctenolophonidites costatus* n. comb., originally described as *Stephanocolpites costatus* van Hoeken-Klinkenberg 1964.

RETISTEPHANOCOLPITES Leidelmeyer 1966.

Retistephanocolpites regularis n. sp.

Plate II fig. 15.

Description: Reticulate tectate stephanocolpate pollengrains.

Size of grain : $24,5 \mu$
 lumina D : 1μ
 exine M : $1,5 \mu$
 polar index : $7,5/24,5$.

Type: slide NG 15 rep 1; loc. $100,1 \times 30,8$.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

Affinity: These grains resemble the recent genus *Catostemma*.

STEPHANOCOLPORATES

PSILASTEPHANOCOLPORITES Leidelmeyer 1966.

Psilastephanocolporites globulus n. sp.

Plate II fig. 12.

Description: Stephanocolporate pollengrains. Psilate, intectate. Pores with costae. Globular grains.

Size of grain	:	16 μ
pore D	:	1,2 μ
exine M	:	1,5 μ
polar index	:	7,5/16

Type: slide NG 15 rep 1; loc. 105,3 \times 44,6.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

PROXAPERTURATES

PROXAPERTITES van der Hammen 1956b.

Proxapertites operculatus van der Hammen 1956b.

Plate I fig. 10.

Grains identical to those described as *Proxapertites operculatus* by van der Hammen of the Paleocene of Colombia were found in the Paleocene of Nigeria.

Nigerian example: slide NG 7 rep 4; loc. 105,2 \times 36,2. Age and locality: Paleocene, borehole Gbekebo-1, Nigeria.

Proxapertites cursus n. sp.

Plate III fig. 2.

Description: Proxaperturate pollengrains. Reticulate. Under the muri of the reticulum are columellae, but most of the lumina are without columellae: semitecate. Only a few lumina have a columella in their centre.

Size of grain	:	44 \times 33 μ
lum. D	:	ca 1,5 μ
muri D	:	ca 1,5 μ
exine M	:	2,5 μ

Type: slide NG 15 rep 1; loc. 99,2 \times 30,5.

Age and locality: Middle Eocene, borehole Gbekebo-1, Nigeria.

MONOLETES

VERRUMONOLETES van der Hammen 1956b.

Verrumonletes usmensis van der Hammen 1956b.

Grains identical to those described by van der Hammen of the Eocene of Colombia are found in the Eocene of Nigeria.

TRILETES

FILTROTRILETES n. gen.

Foveolate trilete spores with a thick exine with pits. The genus *Foveotrilletes* was used for reticulate spores by Potonié (1956). *Foveosporites* Balme 1957 is different in having pits that are coalescing to form short channels and in having a thinner exine.

Genotype: *Filtrotrilletes nigeriensis* n. sp.

Filtrotrilletes nigeriensis n. sp.

Plate I fig. 7.

Description: Trilete spores, rounded triangular to oval shaped. Sculpture: distally and proximally foveolate, with irregularly disposed pits. Dark grains with a thick exine. Tetradmark reaching or nearly reaching the equator. The type specimen is a bit damaged (corner left Plate I fig. 7.).

Size of spore	:	34 — 54 μ
sculpt. D	:	1 — 1,5 μ
sculpt. H	:	1 μ

Distance between pits : 1,5 — 2,5 μ
exine M : 2,5 — 3,6 μ

Type: slide NG 6 rep 1; loc. 96,2 \times 41,4.

Age and locality: Maastrichtian, borehole Gbekebo-1, Nigeria.

DISTAVERRUSPORITES

Muller 1966.
Distaverrusporites simplex Muller 1966.

Plate I fig. 6.

Verrucate trilete spores, with a distal sculpturing only, were found in the Nigerian Maastrichtian. These grains certainly belong to the species *Distaverrusporites simplex* of the Upper Cretaceous of Borneo, which will be described by Muller (1966).

Nigerian example: slide NG 2 rep 1; loc. 100,0 \times 34,4.

Age and locality: Maastrichtian, borehole Gbekebo-1, Nigeria.

RUGULATISPORITES

Pflug 1953.
Rugulatisporites caperatus van Hoeken-Klinkenberg 1964.
Plate I fig. 5.

A new photo is given of a paratype where the tetradmark is showing clearly.

Paratype: slide NG 3 rep 2; loc. 102,6 \times 44,3.

Age and locality: Maastrichtian, borehole Gbekebo-1, Nigeria.

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PLATES

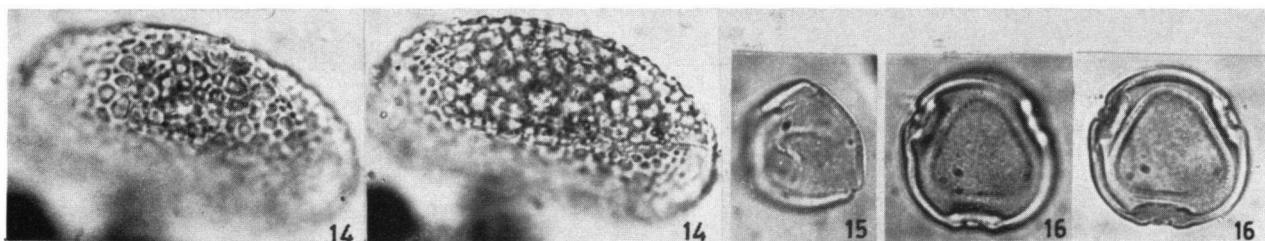
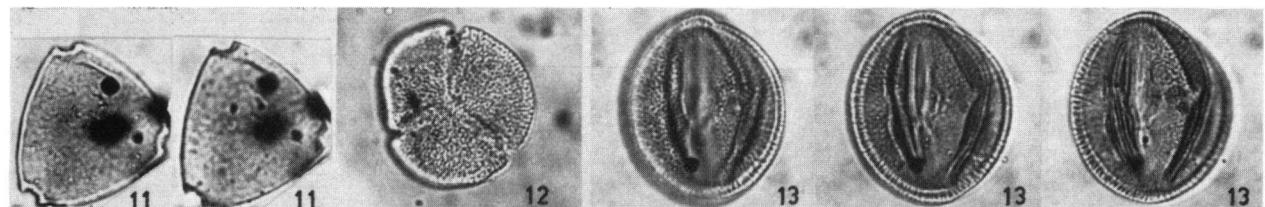
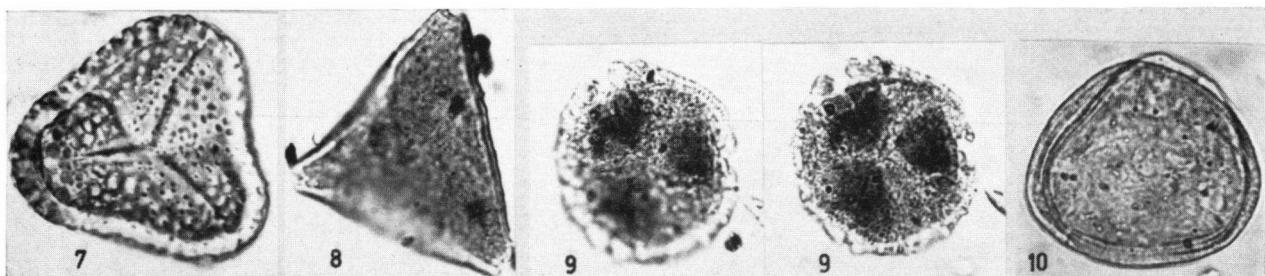
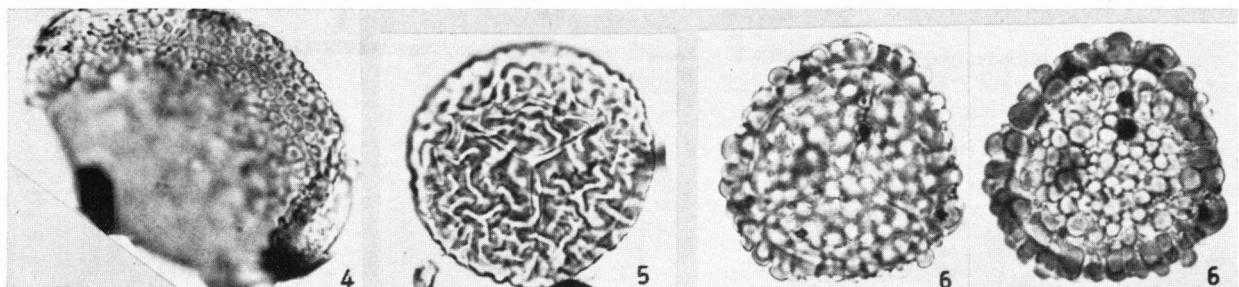
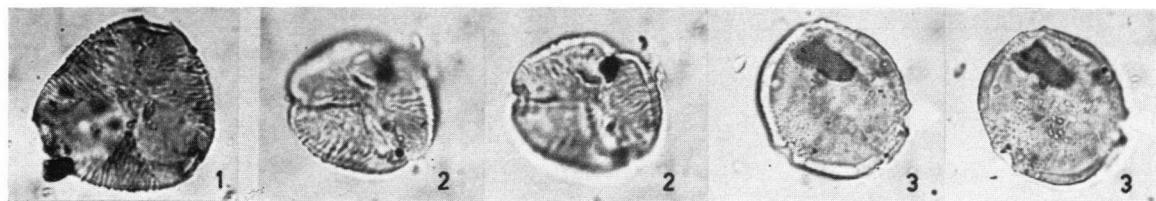


Plate I
(1000 \times)

- Fig. 1. *Striatriporites nigeriensis* n. sp.
- Fig. 2. *Striaticolporites pimulus*
- Fig. 3. *Microfoveotriporites cretaceus* n. sp.
- Fig. 4. *Protrudodiporites typicus* n. sp.
- Fig. 5. *Rugulatisporites caperatus*
- Fig. 6. *Distaverrusporites simplex*
- Fig. 7. *Filtrotriletes nigeriensis* n. sp.
- Fig. 8. *Proteacidites miniporatus* n. sp.

- Fig. 9. *Retitricolporites crassicostatus* n. sp.
- Fig. 10. *Proxapertites operculatus*
- Fig. 11. *Scabratriporites simpliformis* n. sp.
- Fig. 12. *Retitricolrites clarensis*
- Fig. 13. *Psilatricolpites colpiconstrictus* n. sp.
- Fig. 14. *Retimonocolpites nigeriensis* n. sp.
- Fig. 15. *Momipites africanus* n. sp.
- Fig. 16. *Cricotriporites operculatus* n. sp.

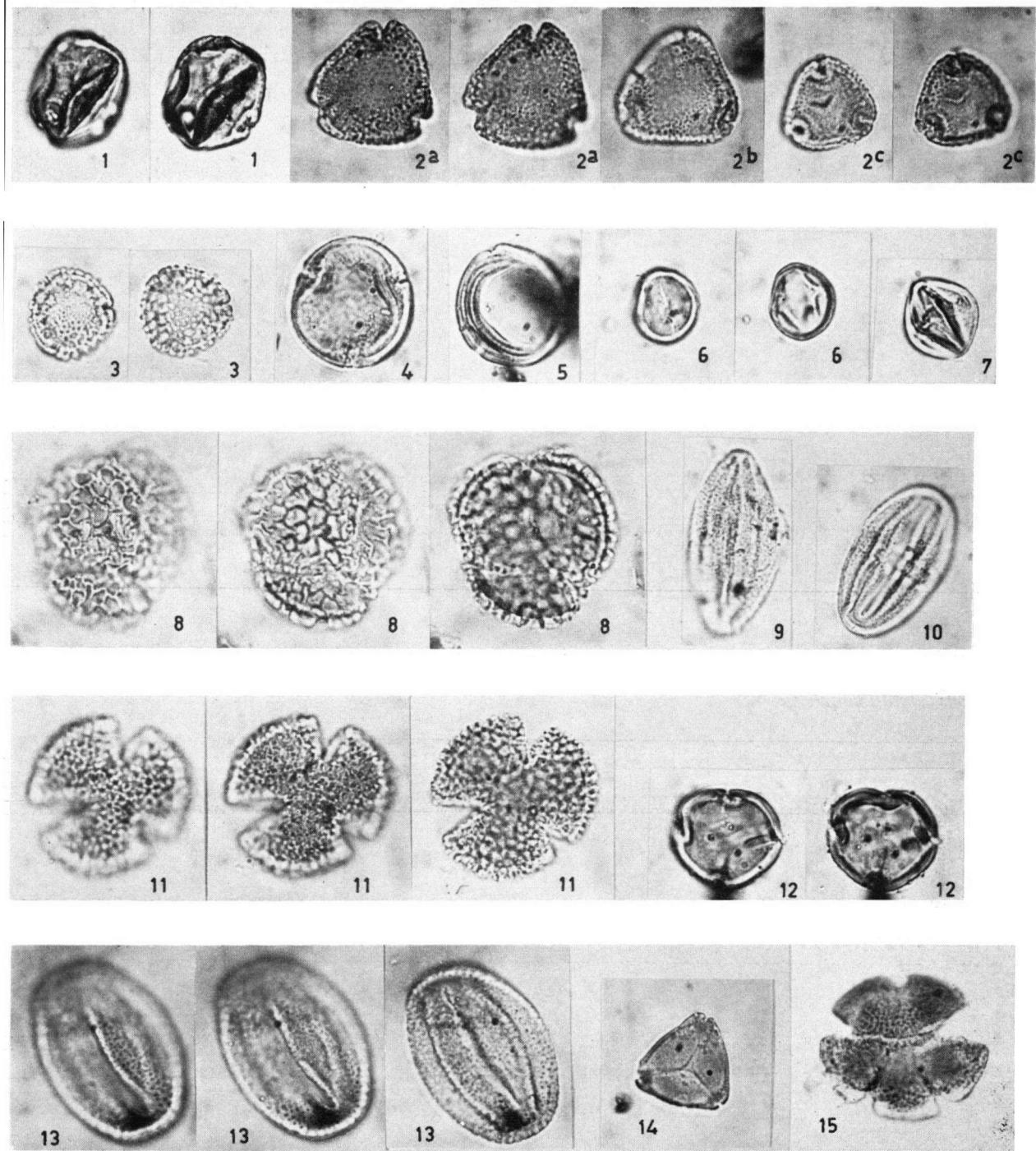


Plate II
(1000 \times)

- Fig. 1. *Cricotriporites fragilis* n. sp.
- Fig. 2a. *Retibrevitricolpites triangulatus* n. sp.
- Fig. 2b., 2 c. Idem, paratypes
- Fig. 3. *Retibrevitricolpites distinctus* n. sp.
- Fig. 4. *Psilabrevitricolpites rotundus* n. sp.
- Fig. 5. *Psilabrevitricolpites flexibilis* n. sp.
- Fig. 6. *Psilatricolpites minutus*
- Fig. 7. *Psilatricolporites mediuss*

- Fig. 8. *Retitricolpites marginatus* n. sp.
- Fig. 9. *Retitricolpites polaris*
- Fig. 10. *Retitricolpites ellipticus* n. sp.
- Fig. 11. *Retitricolpites americana*
- Fig. 12. *Psilastephano-colporites globulus* n. sp.
- Fig. 13. *Retitricolpites obtusus* n. sp.
- Fig. 14. *Syncolporites poricostatus* n. sp.
- Fig. 15. *Retistephano-colpites regularis* n. sp.

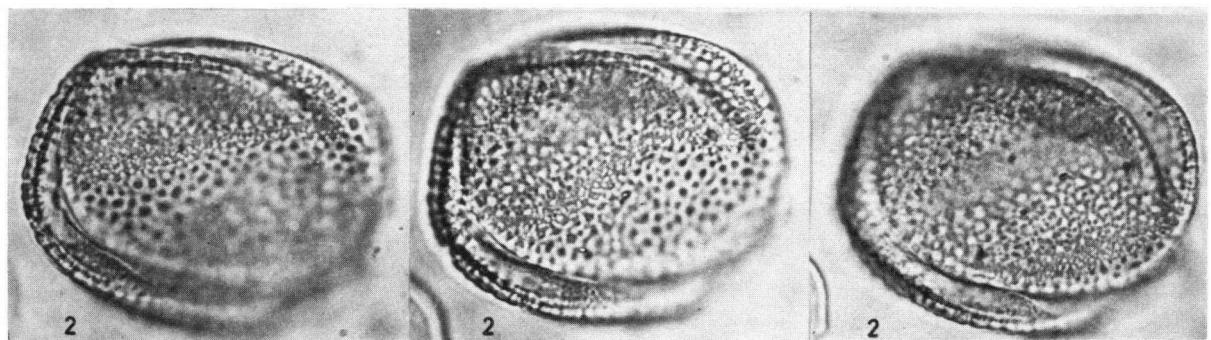
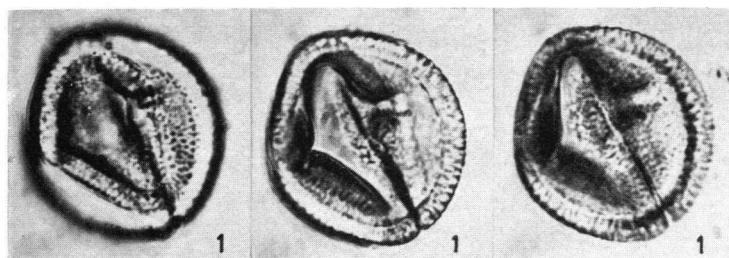


Plate III
(1000 \times)

Fig. 1. *Foveotricolporites crassiexinus* n. sp.

Fig. 2. *Proxapertites cursus* n. sp.