THE FOSSIL FLORA OF THE JABALPUR SERIES — 3. SPORES AND POLLEN GRAINS

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ABSTRACT

The present paper describes spores and pollen grains from the Jabalpur series exposed near Sehora on the Sher river, Narsinghpur district, Madhya Pradesh. For the classification of these spores and pollen grains the morphographic system of Potonié and Kremp (1955, 1956) and Potonié (1956, 1958) has been followed. For those forms which could not be accommodated in the already known genera, six new form-genera have been instituted. The microflora is rich in the Conifer pollen grains and the pollen grains of the Cycadophytes are poorly represented. Among the Pteridophyta, spores belonging to the Lycopodiales, Cyatheaceae and Schizaeaceae are fairly common.

INTRODUCTION

IN a party led by Dr. M. N. Bose, Mr. Suryanarayana and myself visited some of the Upper Gondwana localities in Madhya Pradesh in February 1957. Various carbonized shale samples for maceration were collected by Mr. Suryanarayana about 2-3 furlongs north-east of Sehora, on the Sher river. He very kindly handed me the collection for the study of microfossils.

A short note on the microfossil composition from this area has already been published by Shrivastava (1954). The present paper further describes in detail both mega- and microspores.

For the isolation of spores and pollen grains Harris' (1926) method was followed. They are classified here according to the system of Potonié and Kremp (1955, 1956) and Potonié (1956, 1958).

DESCRIPTION

Anteturma	***Sporites* H. Pot.**
Turma	***Triletes* (Reinsch) Pot. & Kr.**
Subturma	***Azonotriletes* Luber**
Infraturma	***Laevigati* (B. & K.) Pot. & Kr.**

CYATHIDITES COUPER

***Cyathidites australis* Couper**

Pl. 1, Fig. 1

Description — Trilete spores with concave sides and broadly rounded angles; 72-85 μ; Y-mark prominent, lips usually open, rays mostly not attaining the equator; exine nearly 1·6 μ thick (opt. cut) with fine infragranulation.

Comparison — The Sehora specimens resemble *Cyathidites australis* in all respects, except that they show clear infragranulation in the exine. *Cyathidites australis rimalis* Balme differs from the present spores in being smaller and in having a wide groove at the line of dehiscence.

Sl. No. 28724-13.

***Cyathidites* sp.**

Pl. 1, Fig. 2

Description — Trilete spore, equatorial outline triangular having broadly rounded corners and deeply concave sides; measuring 122 μ; Y-mark distinct, rays extending more than three-fourths of the radius, lips open in the centre; infragranulation of the exine rough and even sometimes projecting through the exolamella.

Comparison — Unlike *C. australis*, *Cyathidites* sp. possesses deeply concave sides and conspicuously infragranulate exine. The latter is also comparatively bigger in size.

Sl. No. 28736-1.

CALLISPORA N. GEN.

Diagnosis — Trilete miospores with good rounded angles and ± straight sides; grana or little pilae present in the exine; outline mostly smooth; exine thick, may be slightly thicker on the angles; Y-rays attaining equator.

Comparison — *Callispora* may be compared with *Alsophilidites* (Cookson) ex Potonié and *Gleicheniidites* (Ross) Delcourt & Sprumont. *Alsophilidites* shows a close similarity but is easily distinguished in having smooth exine. *Gleicheniidites* is also distinct from the present species as there too the exine is smooth and the triangle-edges are in the form of pointed arcs. *Concavisporites* (Pflug) Delcourt & Sprumont (R. POT. 1956, p. 15, PL. 1, FIG. 5) is mostly smooth and decorated with Kyrtome.

Remarks — In general shape, thick exine and long Y-rays, these spores appear to be cyatheaceous.

Genotype — *Callispora potoniei* n. sp.

Type Locality — Sehora, Narsinghpur dist.

***Callispora* potoniei n. sp.**

Pl. 1, Fig. 3

Diagnosis — Trilete spore, Holotype 90 μ; △-sides straight, angles rounded; exine thick (±3 μ thick), enriched with abundant small pilae or grana; outline may be smooth; Y-mark attains equator.

Description — Equatorial outline of the spores triangular with rounded angles. Exine possesses numerous small grana or pilae due to which the wall sometimes appears to be radially striated. Y-rays usually open and the lips extending up to the ends.

Comparison — *C. potoniei* resembles only in shape *Microreticulatisporites parviretis* Balme, but the latter is smaller in size and possesses a fine reticulum.

Remarks — Although only two spores were found, yet these show sufficient necessary details as to place them under a new species. This species is named after Professor R. Potonié.

Holotype — Pl. 1, Fig. 3; Sl. No. 28724-1.

***Callispora* sp.**

Pl. 1, Fig. 4

Description — Equator triangular, corners rounded with ± straight sides; Y-rays open up to the equator; 102 μ; rather larger grana present in the exine; exine thick, slightly thicker on the angles; outline smooth.

Comparison — *Callispora* sp. is distinguished from *C. potoniei* by its larger size, thicker exine and the grana or pilae are rather bigger and sparsely distributed.

Sl. No. 28723-13.

TODISPORITES COUPER

***Todisporites crassus* n. sp.**

Pl. 1, Figs. 5-7

Diagnosis — Globose spore, circular in equatorial outline, 80-122 μ diameter; Y-mark usually attaining equator; exine ± laevigate, thick (optical cut of wall 2-5·6 μ thick); infragranulate, granules conspicuous and abundant.

Comparison — *Todisporites crassus* resembles *Trilites fragilis* Couper (1953, PL. 2, FIG. 19) only in shape and ± in size. However, *Todisporites crassus* differs in possessing comparatively thicker exine.

Remarks — It is not possible to put these forms in any other genus except *Todisporites*, in spite of the fact that the exine is particularly much thicker.

Holotype — Pl. 1, Fig. 5; Sl. No. 28724-6.

Infraturma *Apiculati* (B. & K.) Pot.

CONCAVISSIMISPORITES DEL. & SPRU.

***Concavissimisporites verrucosus* Del. & Spru.**

Pl. 1, Fig. 8

Description — Triangular spore with deeply concave sides and broadly rounded ends; size 98 μ; exine ornamented with abundant verrucae, the bases of verrucae are polygonal and united with one another to form a negative reticulum; Y-mark sharply defined, arms as narrow lines, not reaching equator.

The verrucae are seen, at places, projecting out in the equatorial outline.

Comparison — The spore here described resembles to a great extent some of the spores described by Sah (1953) as *Acanthotriletes* (type 4) from Andigama, Ceylon (PL. 2, FIG. 46).

Sl. No. 28723-10.

INIQUIORNATISPORIS N. GEN.

Diagnosis — Miospores circular-triangular or subtriangular in equatorial outline; Y-rays reaching equator; proximal exine smooth, distal exine possessing larger verrucae.

Comparison — Among the verrucated genera reported so far there does not seem a type with ± a triangular shape and possessing a smooth proximal exine and verrucated distal one. *Iniquiornatisporis* resembles the Palaeozoic genus *Schopfites* Kosanke in the orientation of the verrucae, but differs from the latter because the genotype of *Schopfites* is absolutely rounded.

Remarks — Only two spores were found, but these are well preserved and give all the necessary details.

Genotype — *Iniquiornatisporis suryanarayanai* n. sp.

Type Locality — Sehora, Narsinghpur dist.

***Iniquiornatisporis suryanarayanai* n. sp.**

Pl. 2, Figs. 9, 10

Diagnosis — Spore subtriangular, size 138 μ; Y-mark attaining equator; proximal

exine infragranulate; distal exine verrucate, verrucae 6-7×6-11 — rarely 15 μ, more than 9 on one side of Y-mark, not so densely placed, intervening spaces corrugated.

Description — The verrucae are ± dark. These are not so closely placed, but sometimes they are seen fusing with one another.

Comparison — *I. suryanarayanai* shows only apparent resemblance to *Lygodioisporites perverrucatus* Couper (1958). But *L. perverrucatus* possesses verrucae on both the surfaces and is circular in the equatorial contour. *I. suryanarayanai* possesses verrucae only on the distal exine and is subtriangular in equatorial contour.

Holotype — Pl. 2, Figs. 9, 10; Sl. No. 28721-1.

BACULATISPORITES Thomson & Pflug

***Baculatisporites sehorensis* n. sp.**

Pl. 2, Figs. 11, 12

Diagnosis — Spore subcircular in equatorial view; size 114×96 μ; exine extrareticulate; muri composed of bacula of variable sizes; lumina usually 3-6 μ across, sometimes even smaller, usually tetra- or polygonal; extrema lineamenta not smooth.

Remarks — The muri of the reticulum in the present spore are composed of small bacula. No genus is known so far which possesses this type of reticulum. Because one spore was found, so I am placing it only provisionally under *Baculatisporites* in spite of the fact that the bacula are better arranged than in all the species of this genus.

Holotype — Pl. 2, Figs. 11, 12; Sl. No. 28732-1.

Infraturma *Murornati* Pot. & Kr.

LYCOPODIUMSPORITES Thiergart

***Lycopodiumsporites* sp.**

Pl. 2, Fig. 13

Description — Trilete spore, ± circular in equatorial contour; 85×79 μ; Y-rays not completely reaching equator; exine thick, proximal exine not so similarly ornamented with grana or pilae as the distal one; contact areas smooth; exine shows an extrareticulum, which is partly imperfect; lumina squarish or polygonal, 4-8 μ broad, and appears to have some grana; outline covered with muri (projecting 3 μ outward); optical cut of exine 3 μ thick and shows fine radial striations. Among the projecting muri, sometimes grana or pilae are seen which are not higher than the muri.

Comparison — *Lycopodiumsporites* sp. comes nearest to *L. austroclavatidites* Cookson (1953). But the spore here recorded is much larger in size than *L. austroclavatidites*. Moreover, the imperfect nature of the reticulum of *Lycopodiumsporites* sp. is not yet fully known, so its further comparison is not possible at present.

Sl. No. 28725-2.

ERLANSONISPORITES R. Pot.

***Erlansonisporites mineri* n. sp.**

Pl. 2, Fig. 14

Diagnosis — Trilete megaspores, measuring 252-500 μ; body circular, 224-400 μ; Y-rays sharp, extending beyond the body into the peripheral extension of the exine; tectum skinny, infragranulate, 116-200 μ long, 6-16 μ high; exine distinctly extrareticulate, infragranulate, extended sidewards into an equatorial extension (15-25 μ wide) which is little more broad towards the radii of the Y-mark; muri raised, 3-6 μ; lumina polygonal, 15-25 μ broad.

Description — Towards the periphery of the body, the angles of the muri are produced into fairly long and sharply pointed spines which are not longer than the peripheral extension of the exine and are fused with it.

Comparison — *E. erlansonii* (Miner) R. Pot. is much bigger in size than *E. mineri*. Unlike the present species, *E.* (al. *Triletes*) *sparassis* (Murray) R. Pot. lacks the arcuate ridges and the latter has comparatively much higher plates or ridges which are either free or occasionally form a loose network.

Remarks — This new species has been named after Mr. E. L. Miner.

Holotype — Pl. 2, Fig. 14; Sl. No. 28723-3.

Turma *Zonales* (B. & K.) R. Pot.
Subturma *Zonotriletes* Waltz
Infraturma *Cingulati* Pot. & Kl.

BOSEISPORITES n. gen.

Diagnosis — Triangular miospores with rounded angles, and straight or rarely concave sides; cingulum smooth, slightly thicker on the angles, but unlike *Trilobozonosporites* (Pant) Pot. perfectly rounded at the angles; Y-rays approaching the cingulum; tectum present; exine over the central body sculptured.

Comparison — *Boseisporites* comes nearest to *Simozonotriletes* (Naum.) Pot. & Kr., but is differentiated from the latter in the absence of sharply concave sides (Pot. 1958, Pl. 2, Fig. 14) and in possessing a tectum and clearly sculptured exine over the body. Unlike *Boseisporites*, *Murospora* Somers possesses comparatively a heavy cingulum. *Murospora* is also characterized by the absence of a tectum.

Remarks — This new genus is named after Dr. M. N. Bose.

Genotype — *Boseisporites praeclarus* n. sp.

Type Locality — Sehora, Narsinghpur dist.

***Boseisporites praeclarus* n. sp.**

Pl. 2, Fig. 15

Diagnosis — Spore triangular, 85-107 μ in size; sides straight with rounded ends; cingulum smooth, narrower (3-6 μ) on the sides, gradually thickening (4-9 μ) at angles; Y-mark approaching cingulum; tectum not high; exine laevigate, infragranulate.

Description — The tectum in most cases is quite distinct, but in some it is not so clear. But it is present in every specimen. The infragranules are closely placed and impart a microreticulate appearance to the spore coat. The cingulum sometimes appears radially striated, and somewhat darker.

Comparison — *Boseisporites praeclarus* comes nearest to *Cingulatisporites floridus* Balme (1957, Pl. 5, Figs. 60, 61), but the latter is a smaller form with a heavy cingulum and also differs in its ornamentation. *Cyathidites crassiangulatus* Balme (l.c., Pl. 3, Figs. 39-41) resembles *B. praeclarus* in shape, but only apparently. *B. praeclarus* also shows some resemblance to *Trilites gigantis* Cookson (1953, Pl. 1, Figs. 8, 9) in the nature of its cingulum. But *B. praeclarus* differs from *T. gigantis* in the thickness of the cingulum and the nature of the ornamentation of the exine.

Holotype — Pl. 2, Fig. 15; Sl. No. 28715-3.

Turma *Barbates* Mädler

DIJKSTRAISPORITES R. Pot.

***Dijkstraisporites* sp.**

Pl. 3, Fig. 16

Description — Trilete megaspore, measuring 390×330 μ; body 315×300 μ, subtriangular; exine infragranulate and characterized by having skinny infragranulated spines or scales which are not uncommonly bifurcated, or two partially united at the base, and usually larger towards the periphery; Y-mark reaches the equator and possesses infragranulated partitioned membrane (37 μ high); spines 18×6-31×13 μ, not densely distributed, lesser on the dorsal side; equatorial membrane seems to be completely encircling the body and appears to be slightly larger towards the arms of Y-rays.

Comparison — The present megaspore is more comparable to *Dijkstraisporites* (al. *Triletes*) *decorus* (Dijkst.) Pot. than *D.* (al. *Triletes*) *helios* (Dijkst.) Pot. However, *D. decorus* and *Dijkstraisporites* sp. can be easily differentiated in the sculpture of their spore coat. In *D. decorus* the spore body possesses granular objects whereas spines are present in *Dijkstraisporites* sp. My specimen appears to be a new species. However, as only one spore with partly preserved corona was recovered, it is described here only as *Dijkstraisporites* sp.

Remarks — Although *Dijkstraisporites* Pot. embraces only the reticulate, granulate to verrucate forms, yet I have placed my specimen under this genus because except for the ornamentation it resembles Potonié's genus in all other features.

Sl. No. 28723-2.

Turma *Monoletes* Ibrahim
Subturma *Azonomonoletes* Luber
Infraturma *Psilamonoleti* v.d. Hammen

MONOLITES (Erdt.) Pot.

***Monolites grandis* n. sp.**

Pl. 3, Figs. 17, 18

Diagnosis — Monolete spore, bilateral, elongate-oval in equatorial view, and bean-shaped from the side; 126-148×69-104 μ; monolete slit not reaching equator; exine ± laevigate, thick (optical cut 4-5·5 μ), infragranulate.

Comparison — The exine of these specimens is much more thicker as compared to the Palaeozoic genera and the spore wall is also striated probably due to the infragranules. However, it is quite reasonable to adopt Erdtman's Tertiary genus *Monolites* for these forms rather than to substitute a new genus as these forms are not of much stratigraphical value. *Punctatosporites ellipsoideus* Pflug (in Thomson & Pflug, 1953, p. 60, Pl. 3, Fig. 45) resembles our specimen in shape, but differs from it in being

comparatively much smaller in size. *Monolites* sp. described by Couper (1958, p. 149, PL. 25, FIGS. 17, 18) resembles *M. grandis* in shape and ± exine thickness, but they are much smaller in size.

Holotype — Pl. 3, Fig. 17; Sl. No. 28724-18.

Turma *Cystites* Pot. & Kr.

SACCARISPORITES N. GEN.

Diagnosis — Megaspore without Y-mark; ± circular in outline; exine infragranulate to slightly granulate.

Remarks — V. Lürzer (1956, p. 70, Photos 1-6) has reported similar sacs composed of sporopollenin of recent Cupressacean seeds (1-4 mm. in size). Our specimens also appear to be megaspores of Gymnospermic seeds which have separated out during maceration.

Turma *Cystites* according to Potonié and Kremp (1954) includes the 'seed-megaspores' of Lepidocarpaceae under the genus *Cystosporites*. I now propose that the divisional range of *Cystites* be extended to embrace other seed-like megaspores also.

Genotype — *Saccarisporites lurzeri* n. sp.

Type Locality — Sehora, Narsinghpur dist.

***Saccarisporites lurzeri* n. sp.**

Pl. 3, Figs. 19, 20

Diagnosis — Megaspore ± circular or oval in outline, and tapering to one of the sides; exine rather thick, ± laevigate, infragranulate; size 440×330 μ and 1233×1049 μ.

Remarks — Only 2 megaspores were found. The surface shows numerous secondary folds and irregularly distributed depressions which may be of secondary importance.

The specific name is after Mr. V. Lürzer.

Holotype — Pl. 3, Fig. 20; Sl. No. 28724-7.

***Saccarisporites* sp.**

Pl. 3, Fig. 21

Description — Megaspore ± circular in outline while somewhat flat on one side probably due to folds; 350×300 μ; exine rather thin with conspicuous infragranulations which may sometimes project out of the exolamella.

Comparison — This form resembles *S. lurzeri* in every respect except that here the exine is very thin and infragranulations are comparatively much more conspicuous. It is described as *Saccarisporites* sp. as only a single specimen was recovered.

Sl. No. 28723-1.

Anteturma	***Pollenites* R. Pot.**
Turma	***Saccites* Erdtman**
Subturma	***Monosaccites* (Chitaley) Pot. & Kr.**
Infraturma	***Aletesacciti* Leschik**

SEHORISPORITES N. GEN.

Diagnosis — Monosaccate grains without Y-mark, extrema lineamenta ± circular; body circular; saccus too much blown out distally so as to form numerous secondary radial folds on the distal side.

Genotype — *Sehorisporites indicus* n. sp.

Type Locality — Sehora, Narsinghpur dist.

***Sehorisporites indicus* n. sp.**

Pl. 3, Fig. 22

Diagnosis — Monowinged grain, 126-158 μ in diameter; body 62-76 μ, circular, without Y-mark; exine over the body finely infrareticulate; breadth of saccus a little more than half the radius of the entire grain; exine infrareticulate; lumina rather larger.

Comparison — *Sehorisporites indicus* resembles the monosaccate grain figured by Sah (1955, PL. 1, FIG. 17) from the Jurassic of the Salt Range in having the radial secondary folds of the bladder on the distal side and in the body lacking Y-mark. Monosaccate grain from the Salt Range is, however, quite different as it is much smaller in size and also the bladder possesses indistinct reticulations as compared to *S. indicus*. Sah's specimen represents another distinct type under the form-genus *Sehorisporites*.

Holotype — Pl. 3, Fig. 22; Sl. No. 28724-6.

cf. *ZONALASPORITES* IBRAHIM

cf. *Zonalasporites* sp.

Pl. 3, Fig. 23

Description — Monowinged grain; 95×79 μ; somewhat oval or subcircular; body 72×47 μ, encircled by an equatorial velum (nearly 13 μ broad); exine infragranulate to infrareticulate (infragranules more clear on body); muri sinuous, particularly clear on the velum where forming radial striations; velum sharply demarcated, outline wavy.

Comparison — Only a single specimen was obtained; therefore, it is described here as cf. *Zonalasporites* sp.

Zonalasporites sp. is larger in size than *Z. ulughbeki* Ibrahim and it also lacks the extrarugulations seen in the latter (R. POT., 1958, PL. 5, FIG. 49).

Sl. No. 28736-7.

CIRCELLA LUBER

***Circella splendidus* n. sp.**

Pl. 4, Fig. 24

Diagnosis — Monowinged grain; equatorial outline circular to subcircular (or ± polygonal), 132-136×113-124 μ; central body ± circular, 85-95×69-90 μ; exine over the body shows finer infrareticulation; lumina narrow, as broad as muri while little broader on the saccus; extrema lineamenta wavy; bladder with radial striations.

Comparison — It is not possible to place these specimens in *Tsugaepollenites* Pot. & Ven, where the muri are overwhelmed by irregular rugae (warts). Moreover, it also does not agree with the diagnosis of *Zonalasporites* Ibrahim and *Enzonalasporites* Leschik wherein the striations in the velum are formed due to sinuous muri and also in their granulate exine.

Remarks — *Circella* Luber is not clearly defined. Yet for the present these specimens are placed here because of the radial striations on the velum.

Holotype — Pl. 4, Fig. 24; Sl. No. 28725-1.

CALLIALASPORITES N. GEN.

Diagnosis — Equator ± circular to oval; body ± circular, subcircular to triangular; grain complex, body encircled by an equatorial bladder, which may be incomplete to appear 3 separate bladders or a position in between; bladders smaller and ± of same breadth unlike *Alatisporites*; Y-mark absent (or a very vestigial Y-fold present); exine over the body and bladders infra- to extragranulate.

Discussion — Balme (1957) described three new species under the genus *Zonalapollenites*, as *Z. dampieri*, *Z. trilobatus* and *Z. segmentatis*. Similar grains were also recovered from Sehora, and for all these a new form genus *Callialasporites* is proposed here. Because *Zonalapollenites* Pflug (in THOMS. & PFL., 1953) is equivalent or synonymous to *Tsugaepollenites* Pot. & Ven (*see* R. POT., 1958, p. 48). And the type of velum found in *Tsugaepollenites* is missing in the grains described under *Callialasporites*. Moreover, *Callialasporites* includes forms with a good many variations in the form of body and the number of bladders, but having the same type of wings. All the different species of *Callialasporites* show just a transition from one form to the other.

Callialasporites is also differentiated from *Alatisporites* by its smaller wings which are usually as broad in the middle as at the ends and are with a faint sculpture. Moreover, *Alatisporites* possesses a distinct Y-mark.

Genotype — *Callialasporites* (al. *Zonalapollenites*) *trilobatus* (BALME, 1957, PL. 8, FIG. 91) comb. nov.

Type Locality — W. Australia, Broome No. 3 Water Bore, Canning Basin, Jarlemai Siltstone, Oxfordian.

***Callialasporites monoalasporus* n. sp.**

Pl. 4, Fig. 25

Diagnosis — Grain monowinged; equatorial contour oval; 94-107×88-98 μ; body oval in equatorial outline (size 72-86×56-72 μ), distinctly separated from an equatorial 9-19 μ broad and minutely granulate bladder by a conspicuous fold (which is usually incomplete), exine minutely infra- to extragranulate; Y-mark absent; radial folds on the bladder absent (rarely seen).

Remarks — Sometimes there are little incisions on the bladder so as to give a trilobed appearance.

Comparison — *Callialasporites monoalasporus* is differentiated from *C.* (al. *Zonalapollenites*) *dampieri* (Balme) by the lack of frilled nature of the bladder and the body being demarcated from the bladder by a thick band.

Holotype — Pl. 4, Fig. 25; Sl. No. 28723-9.

***Callialasporites* (al. *Zonalapollenites*) *dampieri* (Balme) comb. nov.**

Pl. 4, Figs. 26, 27

1953; *Euryzonotriletes* (type second) Sah, Pl. 1, Photo 14.

Description — Equatorial outline ± circular; 70-85 μ; body ± circular or roundly subtriangular (53-70 μ), possessing an equatorial narrow bladder which is rarely slightly 3-lobed; exine infragranulate; no Y-mark seen; bladder infragranulate, 9-12 μ wide, possessing a good number of radial folds which give it a frilled appearance.

Sl. Nos. 28724-14, 28736-9.

***Callialasporites* (al. *Zonalapollenites*) *trilobatus* (Balme) comb. nov.**

Pl. 4, Figs. 28, 29

Description — 85-101 μ; subtriangular; body triangular to subtriangular (56-75 μ), possessing 3 equatorially attached bladders which sometimes are narrowly attached at

the body angles and give a trilobed appearance; Y-mark absent, sometimes a fold may be seen like the Y-mark (PL. 4, FIG. 29); exine of central body infragranular and rugose; bladders 19-25-31 μ broad, infragranulate to indistinctly granulate, sometimes showing radial folds.

Sl. Nos. 28723-11, 28736-11.

***cf. Callialasporites* sp.**

Pl. 4, Figs. 30, 31

Description — Triwinged grain, subcircular in outline; size 95×76 μ; body large, spherico-triangular, 75×60 μ, exine subgranular; Y-mark prominent, rays with thick and wavy margins, reaching to the periphery; bladders three, equatorially placed, touching each other at one or two ends, 22 μ broad, and possessing radial convolutions; exine finely extragranulate.

Remarks — This spore possesses a distinct Y-mark unlike the previous three species described above. Somewhat similar Y-mark is also observed by Hughes and Couper (1958, FIG. 1, c & d) in their specimens described by them as *Zonalapollenites* cf. *dampieri*.

Sl. No. 28723-4.

Subturma *Disaccites* Cookson
Infraturma *Striatiti* Pant

STRIATITES PANT

***Striatites indicus* n. sp.**

Pl. 4, Fig. 32

Diagnosis — Biwinged grain; 66-82×100-117 μ; body usually circular or sometimes quadrangular, 41-54 μ across; cap with rather coarse infrareticulation and possessing an equatorial rim and 5-8 stripes (usually 6 μ broad) placed parallel to the breadth of the body; wings longer than body, 63-81×41-57 μ, with coarser infrareticulation and leaving 6-12 μ broad space in between.

Remarks — Usually the central body is rounded, but ± flattened forms have also been seen. This is probably due to preservation. The wings are attached ventrally by a thick rim.

Comparison — Both *Striatites sewardi* (Virkki) Pant and *S. cancellatus* (Balme & Henn.) Pot. are smaller forms, while *S. richteri* (Klaus) Pot. is comparatively larger in size. *S. indicus* resembles closely in size and shape the grain (PL. 3, FIG. 4) figured by Ghosh and Sen (1948). But in Ghosh and Sen's specimen the striations are divergent and not parallel as in *S. indicus*. The grain (PL. 3, FIG. 1) figured by them is comparatively larger in size and possesses larger number of striations.

Holotype — Pl. 4, Fig. 32; Sl. No. 28724-12.

***Striatites* sp.**

Pl. 4, Fig. 33

Description — Bisaccate grain; 80×120 μ; body globose, 60 μ across; cap possesses nearly 9 stripes (3-6 μ broad); exine with fine infrareticulum; bladders 80×54 μ, symmetrically placed, leaving 26 μ space in between, and having coarser infrareticulum.

Comparison — *Striatites* sp. is quite distinct from *S. indicus* in its possessing much larger body and greatly spaced wings. Only a single grain was found.

Sl. No. 28724-14.

PROTOSACCULINA MALAWKINA

***Protosacculina* sp.**

Pl. 5, Fig. 34

Description — Pollen grains with very reduced bladders; size 90×114 μ; body oval, longer than broad, 90×60 μ; proximal surface having 13, ± parallel stripes (4-6 μ broad); exine faintly sculptured; bladders 62×52 μ, with narrow distinct infrareticulum.

Remarks — Only a single grain was found.

Sl. No. 28724-10.

***Protosacculina* sp.**

Pl. 5, Figs. 35, 36

Description — Body ± spherical with 9-10 stripes placed parallel to the breadth of the body, leaving very narrow spaces in between; striations broad in the middle while narrowing and converging at the two ends; exine with fine infragranulation; bladders reduced and placed symmetrically on the sides; exine with bigger infragranules which are closely placed and united, giving an appearance of a reticulum.

Remarks — Only two grains were found, but in both one of the wings is folded over the body. The sizes of the two specimens are given below in their folded condition.

Pl. 5, Fig. 35: Whole size — 186×142 μ (being folded laterally). Body — diameter 148 μ (?). Wings — 182×36 μ.

Pl. 5, Fig. 36: Whole size — 100×95 μ (being folded laterally). Body — diameter 86 μ. Wings — 94×14 μ.

Comparison — In striated body and reduced bladders *Protosacculina* sp. resembles

well with the description of Malawkina's Rhaetic genus *Protosacculina*. It is not possible to place the present spores in the genus *Vittatina* Luber (1940), because in this genus the sacci are absolutely shrunken. These Sehora grains appear to be a new species, but because of lack of more specimens, these are for the present described as *Protosacculina* sp.

Sl. Nos. 28724-20, 28724-14.

STRIATOPODOCARPITES (Soritschewa & Sedowa) ex R. Pot.

***Striatopodocarpites balmei* n. sp.**

Pl. 5, Fig. 37

Diagnosis — Biwinged pollen grains, 88-100×129-158 μ in size; body ± circular to oval, 75-90×70 μ; cap possesses 6-8 stripes (9-15 μ broad) placed nearly parallel to the longer axis; bladders larger than body, 88-100×57-76 μ, having coarse infrareticulum.

Remarks — The specific name has been given after Mr. B. E. Balme.

Holotype — Pl. 5, Fig. 37; Sl. No. 28736-1.

***Striatopodocarpites* sp.**

Pl. 5, Fig. 38

Description — Bisaccate, 90×140 μ; body 81×50 μ (perhaps laterally shrunken?), possessing nearly 7 narrow stripes placed obliquely in the middle of the proximal surface; exine infragranulate; bladder 92×62 μ, highly convex with coarser infrareticulation and leaving 22 μ space in between.

Comparison — *Striatopodocarpites* sp. differs from *S. balmei* in possessing much narrower and oblique stripes, and from *S.* (al. *Taeniaesporites*) *antiquus* (Leschik, 1956, Pl. 22, Fig. 4) Pot. in having a longer spore body and thinner striations.

Sl. No. 28723-6.

Infraturma *Disacciatrileti* (Leschik) R. Pot.

PITYOSPORITES (Seward) R. Pot.

***Pityosporites* sp.**

Pl. 5, Figs. 39-41

Description — Bisaccate grains, 72-95×95-141 μ; body circular in equatorial view; usually somewhat longer, sometimes broader while triangular to subtriangular in lateral view, 60-95×62-85 μ; proximal exine thicker with narrow infrareticulum; rarely appearing slightly granular; distal exine thin with faint sculpture; bladders ventro-laterally placed, shorter than or sometimes as long as the body, occasionally both body and wing of ± equal size, 66-91×41-63 μ; exine with narrow and rather coarser infrareticulum.

Sl. Nos. 28715-2, 28736-9, 28736-10.

***Pityosporites* sp.**

Pl. 6, Fig. 42

Description — Bisaccate grains of diploxylonoide type; 92-107×80-88 μ; body oval, longer than broad, 80-100×58-63 μ; exine with narrow infrareticulum which also appears to be infragranulate; bladders longer than body, narrow, 92-107×44-54 μ, with narrow infrareticulum.

Sl. No. 28723-15.

***Pityosporites* sp. cf. *P. grandis* (Cookson) Balme**

Pl. 6, Fig. 43

Description — Bisaccate grain, equatorial outline oval; 79×101 μ in size; body indistinct (72×44? μ), finely infrareticulate; bladders symmetrically placed and leaving a fairly spaced furrow in between; exine thick, infrareticulate; lumina as broad as muri.

Remarks — Only a single grain was found.

Sl. No. 28724-11.

***Pityosporites* sp.**

Pl. 6, Figs. 44, 45

Description — Bisaccate pollen grains; equatorial outline oval; 92-110×119-126 μ; body distinct with clearly demarcated outline, longer than broad, 91-110×53-68 μ; distal exine thin, ± smooth, proximal exine faintly sculptured; bladders placed symmetrically on either side, 92-104×50-55 μ, with thicker and distinctly infrareticulate exine, and leaving a fairly broad furrow in between.

Comparison — *Pityosporites* sp. is distinguished from *Pityosporites* sp. cf. *P. grandis* (Cookson) Balme by its larger size and well-demarcated body.

Remarks — *Pityosporites* sp. shows a few folds on the distal exine of the spore body. Only a few grains are found, and they too do not furnish constant characters regarding the folds.

Sl. Nos. 28723-14, 28724-13.

***Pityosporites* sp.**

Pl. 6, Fig. 46

Description — Size 85×142 μ; body 85×82 μ, subcircular with greatly convex

longitudinal walls; proximal exine thicker, infragranulate and showing a biconvex rupture parallel to the breadth of the body, distal exine thin showing fine infrasculpture; bladders smaller than body, 79×57 μ; exine finely infragranular.

Sl. No. 28724-17.

PROTOPINUS Bolchowitina

***Protopinus angustisulcus* n. sp.**

Pl. 6, Figs. 47, 48

Diagnosis — Bisaccate grains with very narrow furrow; size 90-118×124-154 μ; outline oval; body usually indistinct, ± oval, much smaller than bladders, 54-80×51-54 μ; bladders larger, covering body symmetrically on both sides and leaving a very narrow streak-like furrow in between; exine with faint and narrow infrareticulum.

Comparison — *Protopinus subluteus* Bolk. (1956, p. 91; Pl. 14, Fig. 160) and *P. latebrosa* Bolk. (l.c., p. 91; Pl. 14, Fig. 161) are comparable to *P. angustisulcus*. *P. angustisulcus* differs from *P. subluteus* and *P. latebrosa* essentially in being larger in size and possessing a very narrow furrow in between the wings. *P. angustisulcus* shows apparent resemblance in shape to some of the pollen grains (Pl. 11, Figs. 33, 37, 38) described by Ramanujam (1957) from Vemavaram. All these grains figured by Ramanujam are smaller in size and possess a much wider furrow in between the wings as compared to *P. angustisulcus*.

Remarks — The genus *Protopinus* is not well diagnosed. But at present I am describing these grains under this genus only provisionally.

Holotype — Pl. 6, Fig. 47; Sl. No. 28724-17.

Infraturma *Pinosacciti* (Erdt.) R. Pot.

ALISPORITES Daugherty

***Alisporites* sp.**

Pl. 6, Fig. 49

Description — Bisaccate, 126×152 μ; body ± tetragonal, 116×102 μ exine thin, very faintly infrareticulate and laevigate; bladders 126×85 μ, broadly convex, leaving a narrow furrow in between, infrareticulate.

Comparison — *Podocarpus tricocca* (Mal.) Bolk. (1956, Pl. 23, Fig. 232) resembles closely *Alisporites* sp. in the shape of the body and the orientation of the bladders. But in *P. tricocca* the spore body is comparatively much smaller in size in proportion to the wings as compared with *Alisporites* sp. Only a single grain was found.

Sl. No. 28724-16.

PROTOCONIFERUS Bolch.

***Protoconiferus grandis* Bolk.**

Pl. 7, Figs. 50, 51

Description — Bisaccate grains; outline ± circular; diameter 104-132 μ; bladders covering the body on both the sides and leaving a very narrow streak-like slit in between; body difficult to make out, sometimes its outline shines through the sac and is ± circular, 97-126×95-116 μ; exine of bladder conspicuously infrareticulate; lumina usually pentagonal (broader in the middle while narrowing towards the slit and edges), 2-5 μ broad; muri slightly thick.

Comparison — These specimens resemble *Protoconiferus grandis* Bolkhovitina (1956, Pl. 13, Fig. 153) in every respect except that the size range of Bolkhovitina's specimens is much larger (162-170-178 μ).

Sl. Nos. 28736-3, 28736-4.

Infraturma *Podocarpoiditi* Pot., Thoms. & Thierg.

PLATYSACCUS (Naum.) Pot. & Kl.

***Platysaccus* sp.**

Pl. 7, Fig. 52

Description — Biwinged, 78×104-110 μ; body ± circular to oval, diameter 47 μ; exine thin, finely sculptured, infragranulate or infrareticulate and possessing a ring around the periphery of the body; bladders 75×53 μ, longer than the body, placed symmetrically on either side and leaving 9 μ furrow in between; exine with fine infrareticulation.

Comparison — The present species appears to be distinct from *Platysaccus papilionis* Pot. & Kl. in their much thinner exine of the body.

Remarks — Only a single grain of *Platysaccus* sp. was found.

Sl. No. 28724-17.

PODOCARPIDITES (Cookson) R. Pot.

***Podocarpidites* sp.**

Pl. 7, Fig. 53

Description — Bisaccate grain, 88×135 μ; body circular, 70 μ in diameter, with a rim-like structure around its periphery; upper coat roughly granulate, lower thin; bladders 88×58 μ, projecting beyond the body, leaving

27 μ furrow in between; exine coarsely infrareticulate; lumina narrow.

Comparison — *Podocarpidites* sp. resembles in shape *Podocarpus multiformis* Bolk. (1956, Pl. 25, Fig. 239). But the former differs from *P. multiformis* in possessing absolutely rounded body. In *P. multiformis* the body is oblong.

Sl. No. 28715-3.

***Podocarpidites* sp.**

Pl. 7, Fig. 54

Description — Bisaccate grain measuring 35×57 μ; body broad (25×31 μ), proximal exine thick, infragranulate, granules somewhat larger and at some places even projecting outwards; bladders larger than the body, 35×25 μ, with coarse and narrow infrareticulum.

Comparison — In the smaller size and ± in shape the present grain is comparable to *Podocarpus multesima* Bolk. (1956, Pl. 24, Fig. 235). But both these can be easily diffrentiated as the body of the grain in *P. multesima* is ± circular but flattened in *Podocarpidites* sp. Moreover, the exine of the body in the former (as it appears from the illustration) is much less granulate as compared to the latter.

Sl. No. 28724-21.

Subturma *Polysaccites* Cookson

PODOSPORITES Rao

***Podosporites variabilis* n. sp.**

Pl. 7, Figs. 55-58

Diagnosis — Grains with 3-4 bladders; body ± circular in equatorial contour while the dorsal surface bulging out as a hemisphere in the lateral view, 41-63 μ (sometimes 69 μ) ×31-57 μ (sometimes 60 μ); proximal exine much thicker (1·5-2·5 μ) and infra to finely extragranulate; distal exine thin, faintly sculptured; bladders distally attached, samller than the body, 18×15-36 μ (sometimes 52×37 μ), infrareticulate.

Comparison — *P. variabilis* with its large size, coupled with variable wings, appears to be quite distinct. The smallest grain (Pl. 7, Fig. 55) of *P. variabilis* resembles in shape *P. tripakshi* Rao, but differs from the latter in being still bigger in size. The present specimens are classified under *Podosporites* Rao (1943), mainly it is a Jurassic genus.

Holotype — Pl. 7, Fig. 55; Sl. No. 28736-1.

Turma *Aletes* Ibr.
Subturma *Azonaletes* (Luber) Pot. & Kr.
Infraturma *Granulonapiti* Cookson

ARAUCARIACITES Cookson

***Araucariacites indicus* n. sp.**

Pl. 7, Fig. 59

Diagnosis — Diameter 82-117 μ (mean 94 μ); equatorial contour circular, usually flattened and showing numerous folds; exine thin (optical cut of wall 1-1·5 μ thick) and subgranular; granules very small and closely placed.

Remarks — *Araucariacites indicus* resembles *A. australis* Cookson (1947, p. 130, Pl. 13, Figs. 1-4) to a great extent, but these Sher river forms are usually larger in dimension.

Holotype — Pl. 7, Fig 59; Sl. No. 28723-4.

Infraturma *Subpilonapiti* (Erdt.) Vimal

DUPLICISPORITES (Leschik) R. Pot.

***Duplicisporites serenus* n.sp.**

Pl. 7, Fig. 60

Diagnosis — Equatorial outline subtriangular or subcircular, 63-79×72-85 μ; exine wholly set with numerous verrucae (3-4·5 μ wide), which are usually irregularly contiguous and form long and irregular spirals; Y-mark doubtful.

Comparison — *D. serenus* is much larger in size and its verrucae are also more developed than all the reported species of *Duplicisporites* (Leschik) Pot.

Holotype — Pl. 7, Fig. 60; Sl. No. 28736-7.

Turma *Monocolpates* Iversen & Troels-Smith
Subturma *Intortes* (Naumova) R. Pot.

GINKGOCYCADOPHYTUS Samoilowitz

***Ginkgocycadophytus* (al. *Entylissa*) *deterius* (Balme) comb. nov., var. *majus* n. var.**

Pl. 7, Fig. 61

Diagnosis — Monocolpate grains, 122-148 ×47-63 μ; elongate with a long furrow joining the two ends; folds run parallel to the furrow and disappear at the ends where the furrow opens broadly; exine very faintly infragranulate.

Comparison and Discussion — Balme (1957) described some grains as *Entylissa deterius* (Pl. 6, Figs. 75-77). But the genus *Entylissa* Naum. is synonymous of *Ginkgocycadophytus* Samoil (*see* R. Potonié, 1958, p. 93).

So Balme's specimens should be described under the latter genus. The present grains resemble in shape Balme's specimens, but differ in their being comparatively much larger in size.

Holotype — Pl. 7, Fig. 61; Sl. No. 28723-6.

Subturma *Retectines* (Malawkina) R. Pot.

GINKGORETECTINA Malawkina

***Ginkgoretectina vastus* n. sp.**

Pl. 8, Figs. 62, 63

Diagnosis — Grains monocolpate, 150-216 × 69-96 μ; outline boat-shaped with usually pointed ends (sometimes slightly rounded); colpus extends from one end to the other; exine very faintly infragranulate or infrareticulate, and slightly thick.

Remarks — These pollen grains are usually distorted and are much broader in the middle while narrowing sharply towards the ends. All these have been placed under the genus *Ginkgoretectina*. I very much doubt it whether they have anything to do with modern *Ginkgo*.

Holotype — Pl. 8, Fig. 62; Sl. No. 28724-17.

MONOSULCITES (Erdt.) Couper

***Monosulcites couperi* n. sp.**

Pl. 8, Fig. 64

Diagnosis — Elliptical in lateral view, 103-139 × 47-69 μ; broader in the middle and narrowing abruptly towards the rounded ends; colpus extends from one end to the other; exine thick, infragranulate, at some places grana coming out of exolamella.

Remarks — These grains are usually preserved in the lateral position and the ends of most of the specimens appear pointed. But those grains which are not preserved in lateral view show rounded ends.

Comparison — *M. couperi* is comparable to *M. subgranulosus* Couper (1958) in its thick and subgranular exine and ± in shape. But Couper's specimens are considerably smaller in size than *M. couperi*.

Holotype — Pl. 8, Fig. 64; Sl. No. 28723-10.

INCERTAE SEDIS

Specimen — A (*Pl.* 8, *Fig.* 65)

Description — Megaspore 510 μ in size. Body (460 μ in diameter) spherical, but shows numerous folds due to bad preservation. The folds apparently appear to form a broad reticulum. There appears to be a Y-mark with tectum, but it is very difficult to say so with certainty because of the numerous folds and bad preservation. The body appears to be surrounded by a broad equatorial flange which is perhaps slightly broader and pointed at radii of the Y-rays (breadth at radii of Y-rays= 60-100 μ). Exine richly and conspicuously infragranular, both on the body and on the flange.

Sl. No. 28724-4.

Specimen — B (*Pl.* 8, *Fig.* 66)

Description — Megaspore 250 × 230 μ; subcircular in equatorial outline; exine conspicuously infragranulate and extrareticulate; muri of reticulum slightly raised; lumina 3-9 μ broad, irregular and 4-6-angled; Y-mark very doubtful.

Sl. No. 28724-8.

Specimen — C (*Pl.* 8, *Fig.* 67)

Description — Trilete spore, 98 × 82 μ; equatorial contour oval or subcircular; body 93 × 72 μ; exine infragranulate, but at several places grana are seen projecting out; Y-rays prominent, thick, slightly raised, arms reaching equator where the ends of Y-mark are seen to be joined by a curvatura which has nearly the same breadth as the Y-rays and encircles the spore body equatorially.

Sl. No. 28724-14.

Specimen — D (*Pl.* 8, *Fig.* 68)

Description — Monosaccate, 168 × 222 μ; equatorial contour subtriangular, with 2 longer sides, sides convex with rounded ends; body 110 × 145 μ, of similar outline, and possesses three internal folds parallel and close to the three sides (the folds are broader in the middle, while narrowing towards the ends); an open triangular rupture is seen on the distal side; exine thin with faint sculpture; body is engulfed by infrareticulately marked bladder which leaves a narrow triangular space (63 × 22 μ) on the distal side; bladder broader on the sides of the body than at angles.

Sl. No. 28724-3.

Specimen — E (*Pl.* 8, *Fig.* 69)

Description — Monosaccate, 82 × 136 μ; equatorial outline elongate - oval; body oval, 53 × 76 μ, possessing on the proximal side 4-5, 6-12 μ broad, stripes; exine finely infrareticulate; bladder encircling the body equatorially and more developed

along the long axis of the grain; exine with prominent but narrow infrareticulum; lumina as broad as muri.

Sl. No. 28723-4.

DISCUSSION

In the Narsinghpur district the outcrops of the Upper Gondwana rocks are exposed at various places near Sehora. Out of twenty-five different shale samples collected from them, only eight carbonaceous samples yielded microfossils. The lowermost black carbonaceous bed (sample Nos. 28724 and 28736) was found to be the richest in spore contents.

The present study supports the observation made by Shrivastava (1954) so far as the occurrence of schizaeaceous spores are concerned, but differs in other respects. Spores belonging to Lycopodiales and Cyatheaceae are also fairly well represented in my preparations. Shrivastava found in his shale samples the predominance of bennettitalean pollen grains; I found them to be extremely rare in my slides. Whereas my samples are rich in conifer pollen grains, Shrivastava failed to notice any. Unlike Shrivastava, the angiospermic pollen grains belonging to the Magnoliaceae have so far not been observed by me in any of my slides.

As compared to the other Mesozoic microflora, the Andigama shales which show a closer affinity with the Rajmahal series (Sah, 1955) have a few spores similar to the Jabalpurs, such as *Callialasporites dampieri* and *Concavissimisporites verrucosus*. The cycadophytic and triwinged conifer grains which are quite abundant in the Rajmahal Hills (Vishnu-Mittre, 1954) are comparatively poorly represented here. In the fewer number of the cycadophytic pollen grains the Jurassic microflora of the Salt Range (Sah, 1955) may be compared to the present microflora. But in the Salt Range such a richness of winged grains, as is found here, is lacking. The spore assemblage described by Ramanujam (1957) from Vemavaram possesses some winged grains comparable to that of the present winged grains. But the winged grains are relatively more abundant in the latter.

The beds of the Jabalpur series exposed near Sehora, as compared to the above-mentioned Mesozoic deposits in India, show a great diversity and richness of winged pollen grains with relatively poor cycadophytic grains and thus appear to be younger than the Rajmahal series and the other localities cited above. This observation is further supported by the occurrence of *Weichselia* and *Onychiopsis* (Bose & Sukh Dev, 1959). So far these two pteridophytic genera are not known from the Rajmahal series and not even from Mesozoic of Cutch which is supposed to be Wealden in age.

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EXPLANATION OF PLATES

(*All photomicrographs magnified* × 500, *unless otherwise stated*)

PLATE 1

1. *Cyathidites australis* Couper; Sl. No. 28724-13.
2. *Cyathidites* sp.; Sl. No. 28736-1.
3. *Callispora potoniei* n. gen.; n. sp.; Holotype, 90 μ, Sl. No. 28724-1.
4. *Callispora* sp.; Sl. No. 28723-13.
5-7. *Todisporites crassus* n. sp.; Fig. 5, Holotype, 96 μ, Sl. No. 28724-6; Fig. 6, Lateral view, Sl. No. 28724-21; Fig. 7, Spore showing short Y-rays, Sl. No. 28721-2.
8. *Concavissimisporites verrucosus* Del. & Spr.; Sl. No. 28723-10.

PLATE 2

9, 10. *Iniquiornatisporis suryanarayanai* n. gen.; n. sp.; Fig. 9, Holotype, showing smooth proximal exine, 138 μ, Sl. No. 28721-1; Fig. 10, Same spore, distal exine at focus, showing numerous verrucae.
11, 12. *Baculatisporites sehorensis* n. sp.; Fig. 11, Holotype, 114×96 μ, Sl. No. 28732-1; Fig. 12, Same spore.
13. *Lycopodiumsporites* sp.; Sl. No. 28725-2.
14. *Erlansonisporites mineri* n. sp.; Holotype, 340 μ, Sl. No. 28723-3 (× 100).
15. *Boseisporites praeclarus* n. gen.; n. sp.; Holotype, 100 μ; Sl. No. 28715-3.

PLATE 3

16. *Dijkstraisporites* sp.; Sl. No. 28723-2 (× 100).
17, 18. *Monolites grandis* n. sp.; Fig. 17, Holotype, 154×94 μ, Sl. No, 28724-18; Fig. 18, Lateral view, Sl. No. 28724-21.
19, 20. *Saccarisporites lurzeri* n. gen.; n. sp.; Fig. 19, Showing numerous secondary folds, Sl. No. 28724-5 (× 100); Fig. 20, Holotype, 1233 × 1049 μ, Sl. No. 28724-7 (× 50).
21. *Saccarisporites* sp.; Sl. No. 28723-1 (× 100).
22. *Sehorisporites indicus* n. gen.; n. sp.; Holotype, 158 μ diameter, Sl. No. 28724-6.
23. cf. *Zonalasporites* sp.; Sl. No. 28736-7.

PLATE 4

24. *Circella splendidus* n. sp.; Holotype, 136 μ, Sl. No. 28725-1.
25. *Callialasporites monoalasporus* n. sp.; Holotype. 106×90 μ, Sl. No. 28723-9.
26, 27. *Callialasporites dampieri* (Balme) comb. nov.; Fig. 26, Sl. No. 28724-14; Fig. 27, Sl. No. 28736-9.
28, 29. *Callialasporites trilobatus* (Balme) comb. nov.; Fig. 28, Sl. No. 28723-11; Fig. 29, Exine showing folds which may be mistaken for the Y-mark; Sl. No. 28736-11.
30, 31. cf. *Callialasporites* sp.; Fig. 30, Sl. No. 28723-4; Fig. 31, Y-mark at focus, same grain.
32. *Striatites indicus* n. sp.; Holotype, 68×110 μ, Sl. No. 28724-12.
33. *Striatites* sp.; Sl. No. 28724-14.

PLATE 5

34. *Protosacculina* sp.; Sl. No. 28724-10.
35, 36. *Protosacculina* sp.; Fig. 35, Sl. No. 28724-20; Fig. 36, Sl No. 28724-14.
37. *Striatopodocarpites balmei* n. sp.; Holotype, 102×160 μ, Sl. No. 28736-1.
38. *Striatopodocarpites* sp.; Sl. No. 28723-6.
39-41. *Pityosporites* sp.; Fig. 39, Sl. No. 28715-2; Fig. 40, Sl. No. 28736-9; Fig. 41, Sl. No. 28736-10.

PLATE 6

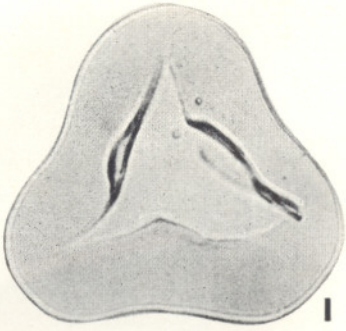
42. *Pityosporites* sp.; Sl. No. 28723-15.
43. *Pityosporites* sp. cf. *P. grandis* (Cookson) Balme; Sl. No. 28724-11.
44, 45. *Pityosporites* sp.; Fig. 44, Sl. No. 28723-14; Fig. 45, Sl. No. 28724-13.
46. *Pityosporites* sp.; Sl. No. 28724-17.
47, 48. *Protopinus angustisulcus* n. sp.; Fig. 47, showing the smaller body faintly; Holotype, 118× 154 μ, Sl. No. 28724-17; Fig. 48, Sl. No. 28724-17.
49. *Alisporites* sp.; Sl. No. 28724-16.

PLATE 7

50, 51. *Protoconiferus grandis* Bolk.; Fig. 50, Sl. No. 28736-3; Fig. 51, Sl. No. 28736-4.
52. *Platysaccus* sp.; Sl. No. 28724-17.
53. *Podocarpidites* sp.; Sl. No. 28715-3.
54. *Podocarpidites* sp.; Sl. No. 28724-21.
55-58. *Podosporites variabilis* n. sp.; Fig. 55, Holotype, 36×42 μ, Sl. No. 28736-1; Fig. 56, Sl. No. 28724-17; Fig. 57, Sl. No, 28736-7; Fig. 58, Sl. No. 28724-19.
59. *Araucariacites indicus* n. sp.; Holotype, 112 μ, Sl. No. 28723-4.
60. *Duplicisporites serenus* n. sp.; Holotype, 90 μ, Sl. No. 28736-7.
61. *Ginkgocycadophytus deterius* (Balme) comb. nov., var. *majus* n. var.; Holotype, 122×50 μ, Sl. No. 28723-6.

PLATE 8

62, 63. *Ginkgoretectina vastus* n. sp.; Fig. 62, Holotype, 216×96 μ; Sl. No. 28724-17; Fig. 63, Sl. No. 28736-7.
64. *Monosulcites couperi* n. sp.; Holotype, 136× 70 μ, Sl. No. 28723-10.
65. *Specimen A*; Sl. No. 28724-4 (× 100).
66. *Specimen B*; Sl. No. 28724-8 (× 100).
67. *Specimen C*; Sl. No. 28724-14.
68. *Specimen D*; Sl. No. 28724-3.
69. *Specimen E*; Sl. No. 28723-4.



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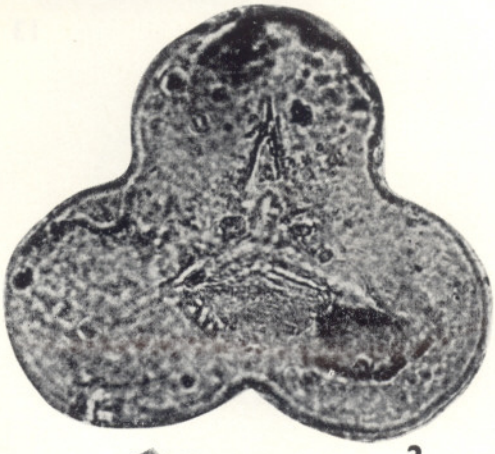

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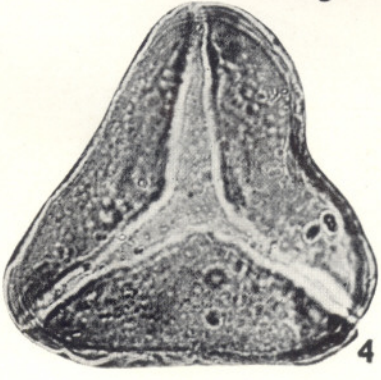

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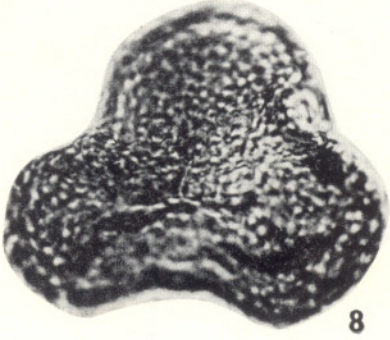

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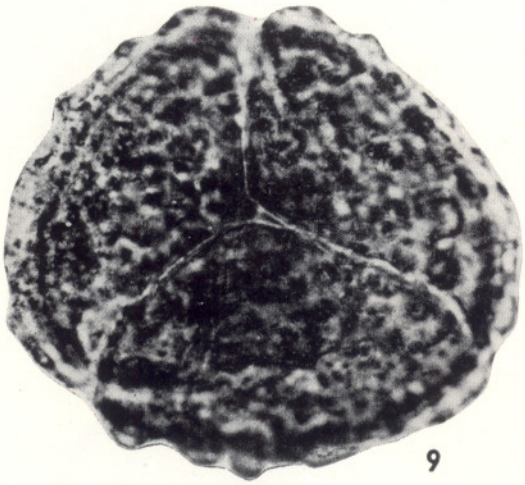

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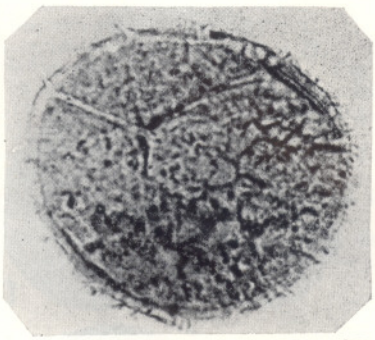

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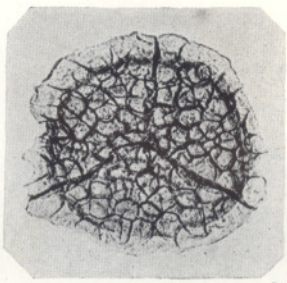

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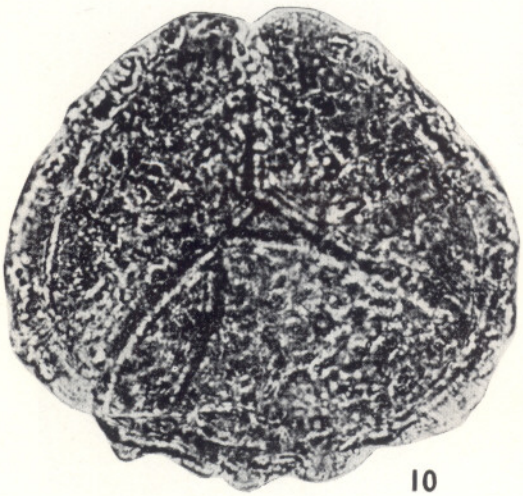

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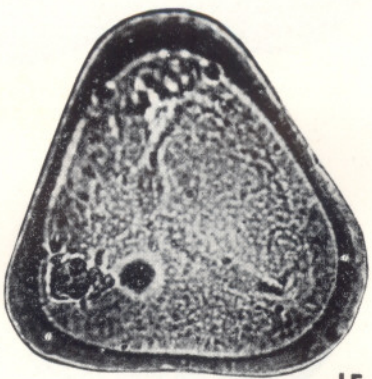

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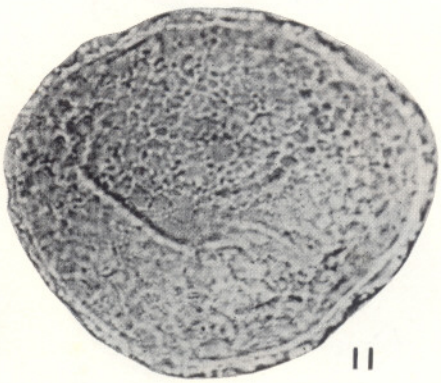

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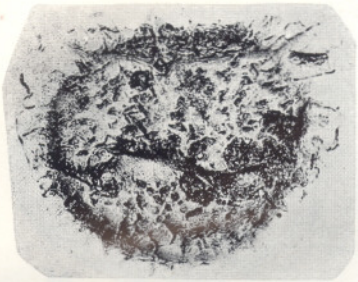

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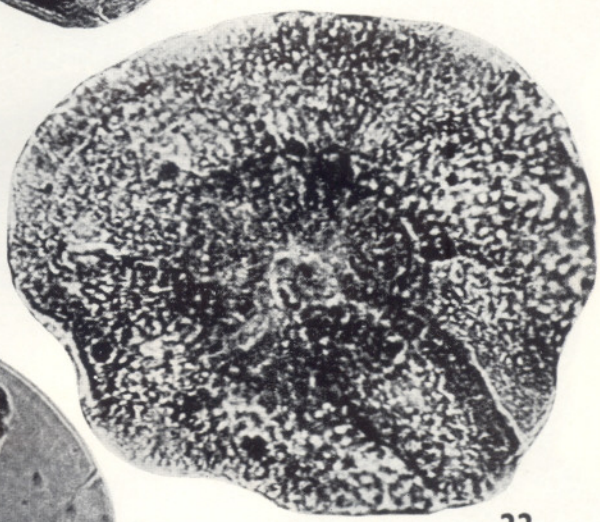

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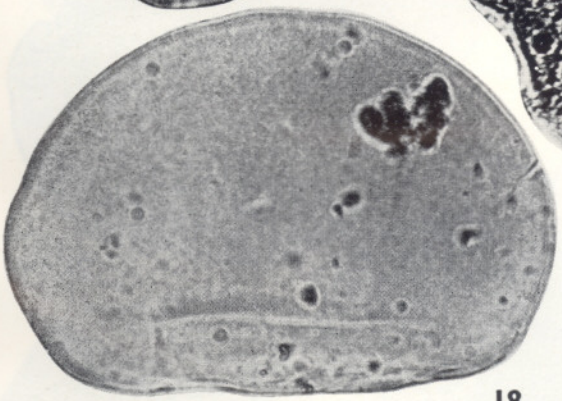

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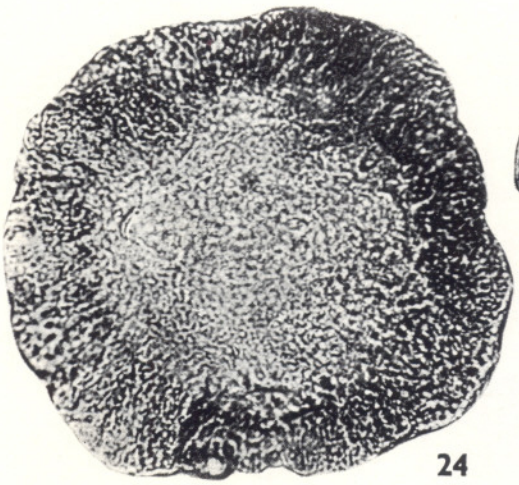

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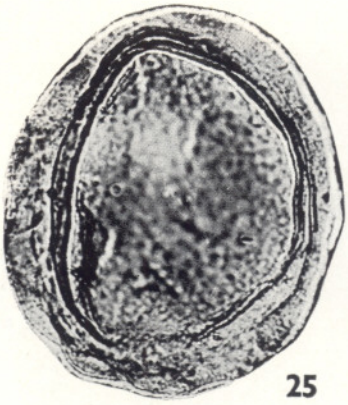

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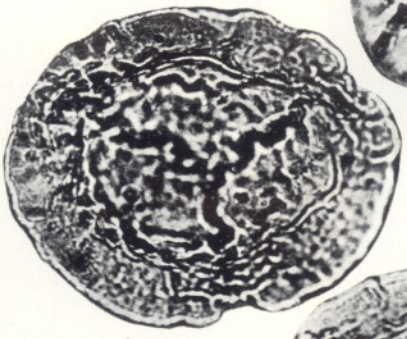

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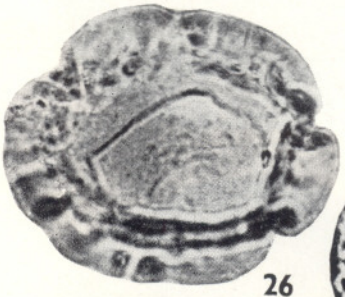

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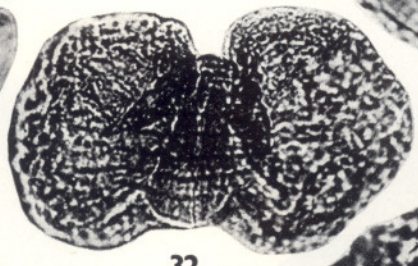

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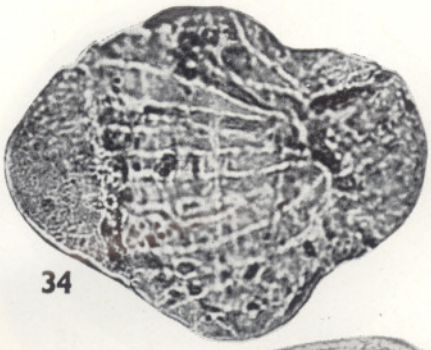

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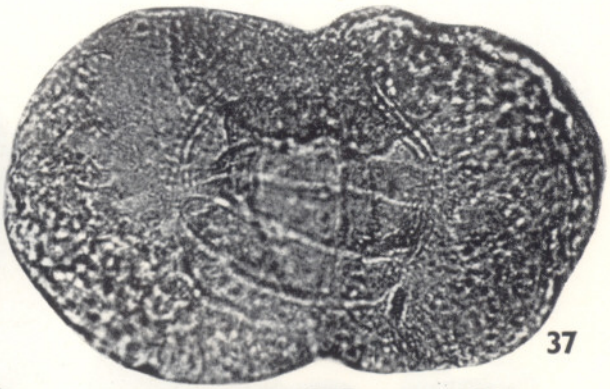

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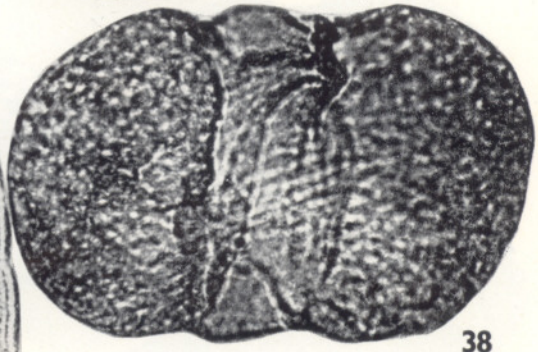

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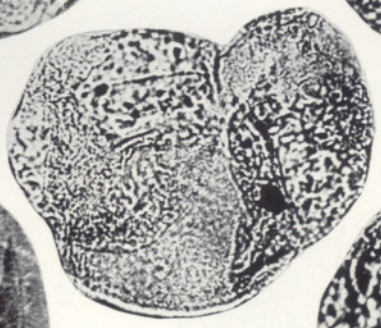

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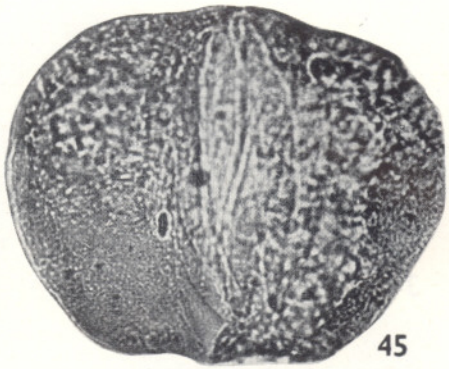
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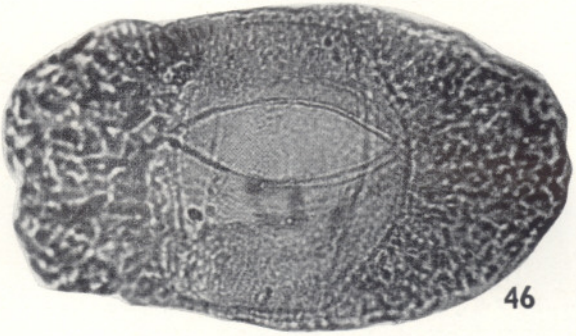
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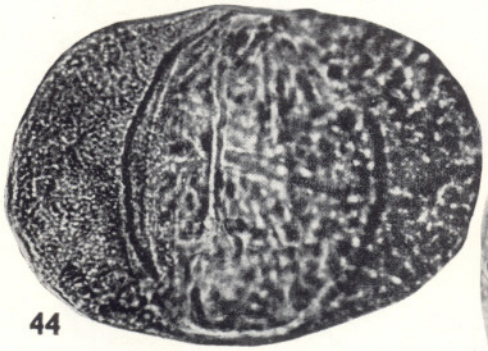
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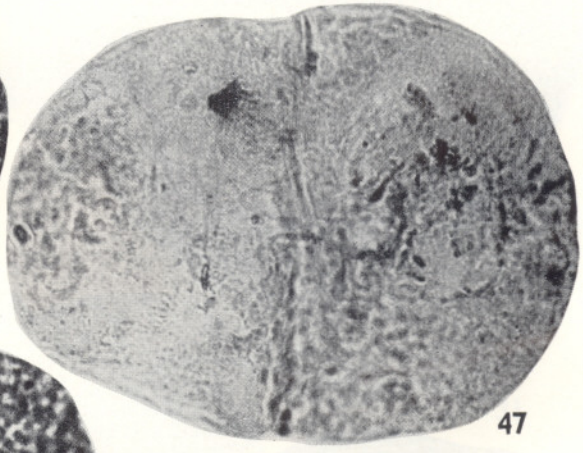
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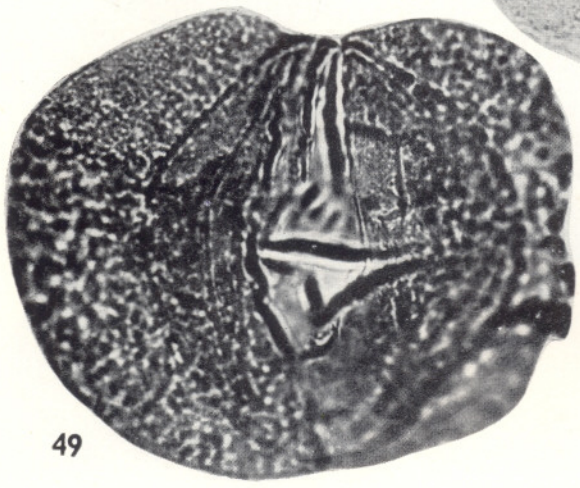
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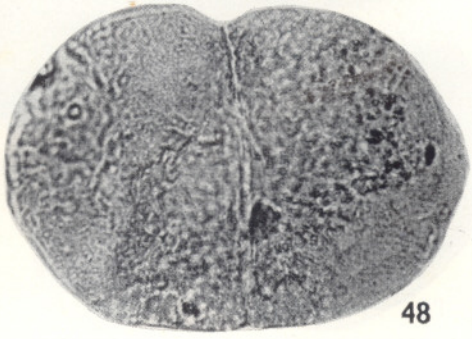
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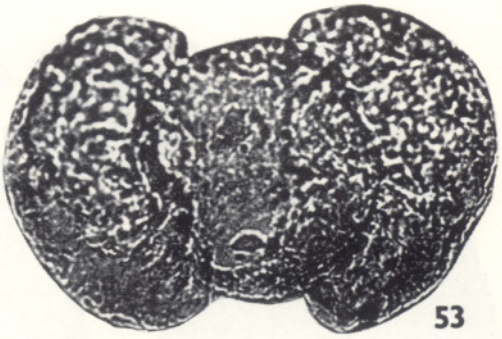
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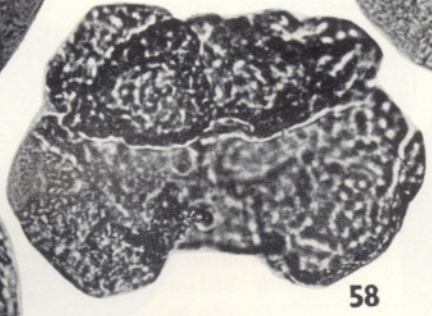
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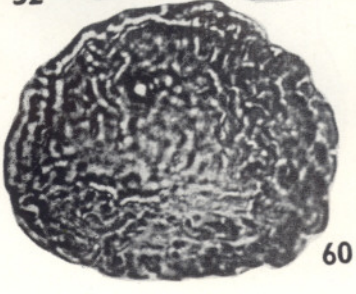
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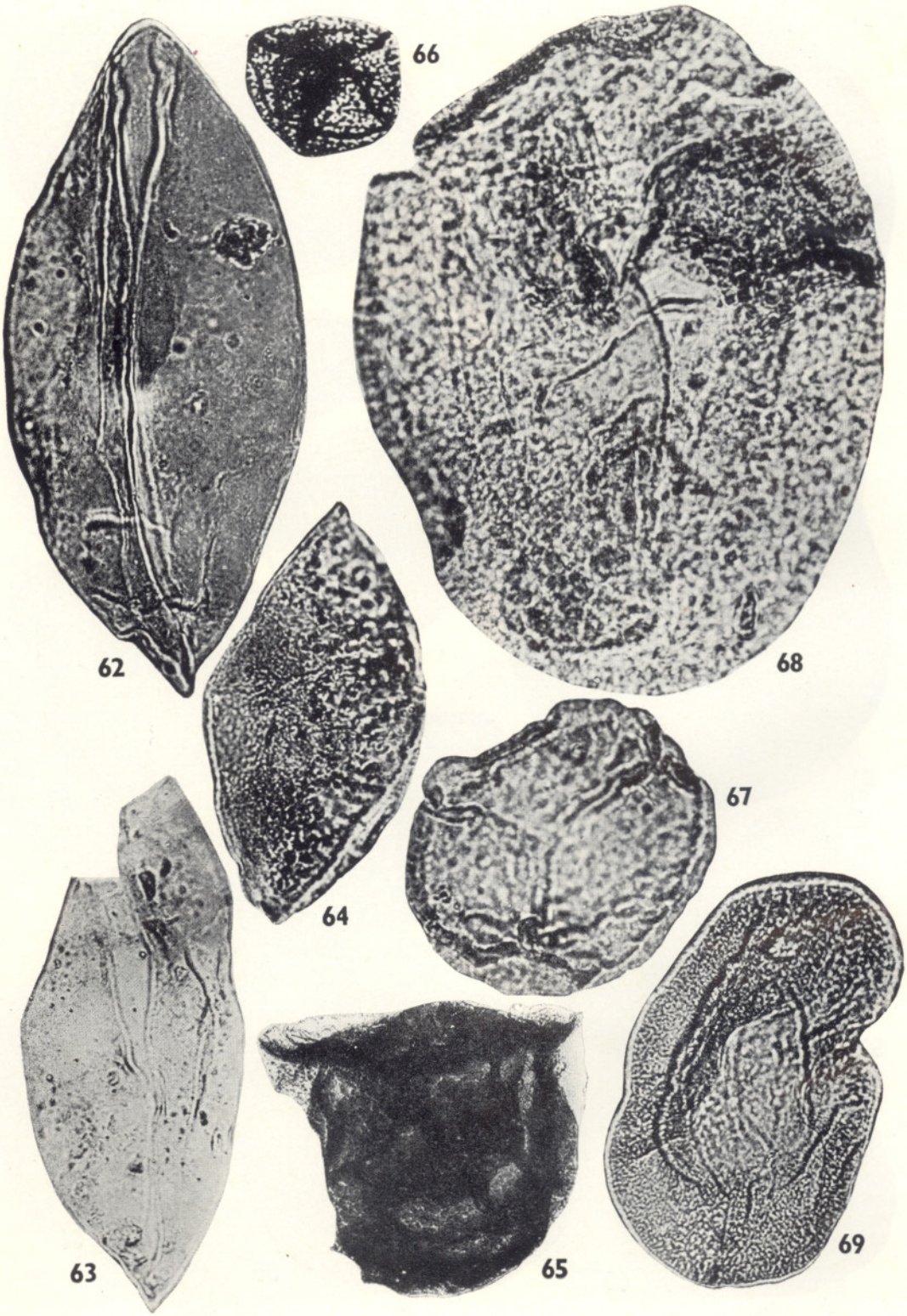
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