THE SPORAE DISPERSAE OF JABALPUR STAGE, UPPER GONDWANA, INDIA*

PRAMOD KUMAR
Birbal Sahni Institute of Palaeobotany, Lucknow

ABSTRACT

The present paper deals with a systematic description of the miospore assemblage recovered out of the Upper Gondwana coals and associated shales from Sehora, Hathnapur in district Narsinghpur and Lameta Ghat in district Jabalpur, belonging to the Jabalpur Stage of the Jabalpur Series, represented in the Satpura Coal Basin, Madhya Pradesh, India. The miofloral assemblage consists of 58 genera and 103 species, of which one genus and 44 species are new. Only the new species have been described in detail and have been compared with the comparable known species of the southern and Northern miofloras.

INTRODUCTION

A PRELIMINARY report, on the occurrence of miospores of Schizaeaceae, Gleicheniaceae, Osmundaceae, Bennettitales and a few angiospermic pollen grains (Magnoliaceae) from the Narsinghpur carbonaceous shales of the Jabalpur Series, was published by Srivastava (1954). Later on, Dev (1961) studied the miofloral contents of the Jabalpur Series and reported a few striated bisaccate pollen grains. Singh (1966) restudied the miospores from the coals of Sehora and Hathnapur of the Jabalpur Series, and also discussed its age. The presence of striated saccate and angiospermic pollen grains in the Jabalpur Stage, as stated above, has necessiated an exhaustive taxonomic study of the miospores assemblages of the coals of the Jabalpur Stage. A complete account of the *Sporae dispersae* has been given here. The recovered genera and species have been arranged according to the artificial system of classification proposed by Potonié (1956, 1958 & 1960) and Dettmann (1963).

Seven new and 6 emended miospore genera, occurring in the Jabalpur Stage, have already been published (*see* Singh & Kumar, 1971 and Bharadwaj & Kumar, 1972). The geology, sample data, palynological correlation and the age of the Jabalpur Stage have been discussed earlier (*see* Bharadwaj, Kumar & Singh, 1972). The material and the type slides are preserved at the Museum of the Birbal Sahni Institute of Palaeobotany, Lucknow.

SYSTEMATIC DESCRIPTION

The spore species described below have been recovered out of the coals and associated shales from Sehora, Hathnapur (Harad river) and Lameta Ghat of the Jabalpur Stage, Jabalpur Series, India. The taxa described here include a number of trilete, monolete, hilate, alete, monosaccate, bi- and poly-saccate, colpate and operculate miospore genera. The present miosporological investigation describes 58 genera and 103 species, of which one genus and 44 species are new. The new species, marked with an asterisk in the list given below, have been described in detail.

Cyathidites australis Coup.
C. minor Coup.
C. punctatus (Delc. & Sprum.) Delc. *et al.*
**C. densus* sp. nov.
**Alsophilidites psilatus* sp. nov.
Haradisporites mineri Singh & Kumar
**H. scabratus* sp. nov.
**H. undulatus* sp. nov.
**H. sinuosus* sp. nov.
H. sp.
Stereisporites sp.
cf. *Stereisporites* sp. A
cf. *Stereisporites* sp. B
Biretisporites sp.
**Dictyophyllidites haradensis* sp. nov.
D. sp.
**Concavisporites novicus* sp. nov.
C. sp.
Todisporites minor Coup.
Leptolepidites sp.
Lophotriletes sp.
Coniatisporites haradensis Singh & Kumar
Osmundacidites wellmanii Coup.
Baculatisporites comaumensis (Cooks.)Pot.

*Contributed to the Palaeobotanical Conference, Birbal Sahni Institute of Palaeobotany Silver Jubilee, December 1971

**B. rotundus* sp. nov.
Neoraistrickia neozealandica (Coup.) Bharad. & Kumar
**N. pallida* sp. nov.
Biformaesporites baculosus Singh & Kumar
B. sp.
Rugulatisporites sp.
Lycopodiacidites sp.
Foveosporites sp.
**Lycopodiumsporites sinuosus* sp. nov.
**L. pallidus* sp. nov.
**Klukisporites haradensis* sp. nov.
Cicatricosisporites ludbrooki Dettm.
C. sp.
**Matonisporites dubius* sp. nov.
**M. discoidalis* sp. nov.
**Lametatriletes indicus* Singh & Kumar
**L. tenuis* sp. nov.
**L. mesozoicus* sp. nov.
Venusteaesporites pallidus Singh & Kumar
Boseisporites praeclarus (Dev) Bharad. & Kumar
**B. indicus* sp. nov.
**B. jabalpurensis* sp. nov.
**B. sehoraensis* sp. nov.
Callispora potoniei (Dev) Bharad. & Kumar
**Trilites fusus* sp. nov.
**Ischyosporites haradensis* sp. nov.
**Gleicheniidites glaucus* sp. nov.
**G. apicus* sp. nov.
Sestrosporites irregulatus (Coup.) Dettm.
**Peregrinisporis indicus* sp. nov.
cf. *Murospora* sp.
Contignisporites glebulentus Dettm.
C. cooksonii (Balme) Dettm.
C. fornicatus Dettm.
C. dettmannii Singh & Kumar
C. psilatus Singh & Kumar
C. sp. Singh & Kumar
Densoisporites mesozoicus (Singh *et al.*) Bharad. & Kumar
**D. indicus* sp. nov.
**D. novicus* sp. nov.
Crybelosporites sp. cf. *C. stylosus* Dettm.
Laevigatosporites ovatus Wils. & Webs.
L. gracilis Wils. & Webs.
**Monolites indicus* sp. nov.
M. sp.
**Leschikisporis verrucosus* sp. nov.
Metamonoletes haradensis Singh & Kumar
Dettmannites attenuarus Singh & Kumar
Rouseisporites sehoraensis Singh
**R. densus* sp. nov.
**Coptospora mesozoica* sp. nov.
**C. pallida* sp. nov.
Callialasporites trilobatus (Balme) Bharad. & Kumar
C. dampieri (Balme) Bharad. & Kumar
C. segmentatus (Balme) Bharad. & Kumar
C. discoidalis (Döring) Bharad. & Kumar
C. indicus (Singh & Kumar) comb. nov.
C. primus (Singh & Kumar) comb. nov.
C. limbatus (Singh & Kumar) comb. nov.
C. sehoraensis (Singh & Kumar) comb. nov.
C. enigmaticus (Singh & Kumar) comb. nov.
C. fimbriatus (Singh & Kumar) comb. nov.
C. plicatus (Singh & Kumar) comb. nov.
**C. doringii* sp. nov.
**C. circumplectus* sp. nov.
**C. lametaensis* sp. nov.
C. sp.
Vitreisporites pallidus (Reiss.) Nils.
Alisporites similis (Balme) Dettm.
Alisporites sp. cf. *A. bilateralis* Rouse
**A. ovalis* sp. nov.
**A. mesozoicus* sp. nov.
**A. haradensis* sp. nov.
**A. sehoraensis* sp. nov.
**Abiespollenites triangularis* sp. nov.
Platysaccus densus (Venkata.) comb. nov.
Platysaccus sp. A. Sah & Jain
P. sp.
Podocarpidites ellipticus Cooks.
P. grandis Sah & Jain
P. multesimus (Bolkhov.) Poc.
P. cristiexinus Sah & Jain
**P. vermiculatus* sp. nov.
**Baculopollenites haradensis* sp. nov.
Phyllocladidites ruei Cooks.
P. florinii (Cooks. & Pike) Sah & Jain
Podosporites tripakshi Rao
P. microsaccatus (Coup.) Dettm.
P. sp.
Dacrycarpites australiensis Cooks. & Pike
Araucariacites australis Cooks.
A. ghuneriensis Singh *et al.*
A. indicus (Singh *et al.*) comb. nov.
**A. limbatus* sp. nov.
Reticulatasporites sp.
Cycadopites gracilis Sah & Jain
C. sp. cf. *C. sakrigaliensis* Sah & Jain
C. couperi (Dev) comb. nov.
**Monosulcites ellipticus* sp. nov.
Classopollis sp. cf. *C. torosus* (Reiss.) Coup.

C. sp.
**Gliscopollis pallidus* sp. nov.

Anteturma — *Sporites* H. Pot., 1893
Turma — *Triletes* (Reinsch.) Dettm. 1963
Suprasubturma — *Acavatitriletes* Dettm., 1963
Subturma — *Azonotriletes* (Lub.) Dettm., 1963
Infraturma — *Laevigati* Benn. & Kidst.) Pot., 1966

Genus — *Cyathidites* Coup., 1953

Genotype — Cyathidites australis Coup., 1953.

Cyathidites punctatus (Delc. & Sprum.) Delc., Dettm. & Hughes, 1963
Pl. 1, Figs. 1-2

Synonymy

1956 — *Cyathidites medicus* Sah & Jain; p. 265, Pl. 1, Fig. 4
1966 — *Deltoidospora* sp. Jain & Sah; p. 106, Pl. 2, Fig. 41

Remarks — The presently studied specimens of *C. punctatus* closely compare with *C. australis* Coup., in having similar shape and size range but differ by the presence of faintly intramicropunctate exine and thickened margins of the tapering Y-rays.

Cyathidites densus sp. nov.

Pl. 1, Figs. 3-4

Holotype — Pl. 1, Fig. 3; 56×55 μ, Regd. Sl. No. 3419/8.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 48-65 μ. Triangular. Trilete, ray-ends bifurcating. Exine 2·5-4μ thick and faintly intramicropunctate.

Description — Miospores are biconvex, triangular in equatorial view with straight to concave sides and rounded angles. Trilete mark is prominent and Y-rays reach 3/4 or more or the spore radius with thin and raised labra. Some specimens have bifurcating ray-ends. Exine is 2·5-4 μ thick in optical section, intramicropunctate, intrapuncta are faint and closely spaced. *Extrema lineamenta* is smooth.

Comparison — *Cyathidites densus* sp. nov. is distinct from *C. medicus* Sah & Jain in having slightly larger size, bifurcating ray-ends and thicker exine. *C. ghuneriensis* Singh *et al.* is comparable with the present species in having similar length of Y-rays and more or less same size but differs in having thicker intramicropunctate exine, dark brown colour and sharply rounded corners. *C. asper* (Bolkhov.) Dettm., is distinct by the presence of thickening along the Y-mark, slightly bigger size and thicker exine.

Genus — *Alsophilidites* (Cooks.) Pot., 1956

Genotype — Alsophilidites kerguelensis Cooks., 1947.

Remarks — The genus *Alsophilidites* was described by Cookson (1947) from the lignites of Kerguelen Archipelago. Later on, Potonié (1956) emended its diagnosis, stating that *Alsophilidites* shall include miospores with smooth exine, having rounded corners and slightly concave sides together with a prominent trilete mark, the rays of which reach the corners. Dettmann (1963) observed that both *Cyathidites* Coup., and *Alsophilidites* Cooks., have common morphographic characters and proposed to retain *Cyathidites* on the grounds of priority. Potonié (*l.c.*) distinguished *Alsophilidites* from *Cyathidites* by virtue of its longer trilete mark, a character which is constant and clearly observable in the present specimens from the Jabalpur Stage. The present author concurs with Potonié's (*l.c.*) view and has treated the genus *Alsophilidites* as an independent taxon.

Alsophilidites psilatus sp. nov.

Pl. 1, Figs. 5-6

Holotype — Pl. 1, Fig. 5; 29-31 μ; Regd. Sl. No. 3421/8.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 24-32 μ. Triangular, rounded angles. Trilete, Y-rays slightly sinuous with raised labra.

Description — Miospores are biconvex, generally small triangular in equatorial view with concave sides and rounded angles. Trilete mark is prominent and Y-rays reach the equator. They are slightly sinuous

with slightly raised labra. Some specimens have bifurcating ray-ends. Exine is 1-1·5 μ thick in optical section and light to dark brown in colour. *Extrema lineamenta* is smooth.

Comparison — *Alsophilidites psilatus* sp. nov. differs from *A. kerguelensis* Cooks., in having smaller size, concave sides and weakly sinuous Y-rays. This species differs from *A. densus* Singh *et al.* in having smaller size and is devoid of any ornamentation on the exine. *A. grandis* Sah & Jain is distinct from the present species in having larger size, thicker exine and intragranulate ornamentation along the Y-mark. *A. exilis* Sah & Jain distinguishes itself in having bigger spores and finely punctate ornamentation along the pyramic area.

Genus — *Haradisporites* Singh & Kumar, 1972

Genotype — *Haradisporites mineri* Singh & Kumar, 1972.

Haradisporites scabratus sp. nov.

Pl. 1, Figs. 7-9

Holotype — Pl. 1, Figs. 7-8; 30×30 μ; Regd. Sl. No. 3421/5.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 25-34 μ, subdeltoid in form. Y-rays slightly sinuous. Exine 1-1·5 *u* thick and faintly sculptured.

Description — Miospores are triangular in equatorial view with straight to ± convex sides and rounded angles. Trilete mark is prominent and Y-rays reach 3/4 of the spore radius. They are slightly sinuous with narrowly raised and crumpled labra. Exine is 1-1·5 μ thick in optical section and faintly sculptured. *Extrema lineamenta* is ± rough.

Comparison — *Haradisporites scabratus* sp. nov. closely compares *H. mineri* Singh & Kumar in having almost similar shape and size but differs from the latter by virtue of its faintly sculptured exine which is thicker.

Haradisporites undulatus sp. nov.

Pl. 1, Figs. 10-11

Holotype — Pl. 1, Fig. 10; 21×26 μ; Regd. Sl. No. 3417/7.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 17-44 μ. Subdeltoid with sharply rounded angles. Y-rays reaching near the periphery and characteristically undulating.

Description — Miospores are subdeltoid in equatorial view with straight to slightly convex sides and rounded angles. Trilete mark is prominent and Y-rays almost reach the equator; and are characteristically undulating with narrowly raised labra. Exine is 1-1·5 μ thick in optical section and dark brown in colour. *Extrema lineamenta* is smooth.

Comparison — Specimens assigned to *Haradisporites undulatus* sp. nov. are rarely represented in the assemblage. This species is distinguishable from *H. mineri* Singh & Kumar in having sharply rounded angles and characteristically undulated Y-mark. *H. scabratus* sp. nov. does not compare well with *H. undulatus* sp. nov. in having faintly sculptured exine, shorter Y-rays and slightly sinuous trilete mark.

Haradisporites sinuosus sp. nov.

Pl. 1, Figs. 12-14

Holotype — Pl. 1, Figs. 12-13; 46×41 μ; Regd. Sl. No. 3421/7.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 38-48 μ. Triangular with broadly rounded angles. Trilete, Y-rays sinuous. Exine thin.

Description — Miospores are triangular in equatorial view with straight to more or less convex sides and broadly rounded angles. Trilete mark is prominent and Y-rays reach ± 3/4 of the spore radius. They are sinuous with narrowly raised and slightly crumpled labra. Exine is less than 1 μ thick in optical section. *Extrema lineamenta* is smooth.

Comparison — *Haradisporites sinuosus* sp. nov. closely compares with *H. mineri* Singh & Kumar in possessing more or less similar type of Y-mark and similar exine thickness but varies in having larger size and well rounded angles. *H. undulatus* sp. nov. is distinct from the present species in having

sharply rounded angles and undulating Y-mark. *H. scabratus* sp. nov. can also be distinguished from *H. sinuosus* sp. nov. as the former species is smaller in size and possesses slightly thicker exine which is sculptured.

Haradisporites sp.

Pl. 1, Fig. 15

Description — Miospore is triangular with straight to more or less concave sides and rounded angles. Size of the spore is 20× 24·5 μ. Trilete mark is distinct and Y-rays reach 3/4 of the radius. They are straight to sinuous having 3-4 μ wide, slightly darker area along the Y-rays. A single row of puncta is arranged on the proximal exine near the Y-rays in a straight line which loops over the angles. It remains localized near the Y-mark area. Exine is less than 1 μ thick in optical section and distally folded, folds run parallel to the Y-rays. *Extrema lineamenta* is smooth.

Remarks — *H.* sp. is the only specimen of its kind which has been recovered from the Jabalpur Stage. It has peculiar characters like slightly darker area, a row of puncta near the Y-rays and distal folds, which are not shared by any other species.

Comparison — As compared to *Haradisporites mineri* Singh & Kumar, *H.* sp. is smaller in size and possesses a darker area together with a row of puncta near the Y-rays and distally folded exine. *H. scabratus* sp. nov. distinguishes itself in having thicker and faintly sculptured exine. *H. sinuosus* sp. nov. also varies in having broadly rounded angles, bigger size and smooth exine. *H. undulatus* sp. nov. possesses undulating Y-mark and sharply rounded angles.

Genus — *Stereisporites* Pflug, 1953

Genotype — *Stereisporites stereoides* (Pot. & Venitz.) Pf., 1953.

Synonymy — See Dettmann, 1963; p. 25.

Remarks — Manum (1962) observed that *Stereisporites* Pf. (in Thoms. & Pf., 1953) has priority over *Sphagnumsporites* (Raatz) ex Pot. (1956) and thus recognized the former genus. Cookson (1953) instituted a spore genus *Sphagnites* which has been treated as a synonym of *Stereisporites* by Dettmann (1963). De Jersey (1954) emended its diagnosis to include those spores which possess distal polar thickening. The possibility of having a new genus to accommodate such spores with exinal thickenings has not been ruled out by de Jersey (*l.c.*) and Dettmann (*l.c.*). In the present assemblage of the Jabalpur Stage, specimens of *Stereisporites* are not well represented, so a detailed taxonomic work on the genus was not possible. However, it is suggested that any spores which have polar thickening on the distal face of the exine should not be described in *Stereisporites*.

Stereisporites sp.

Pl. 1, Fig. 16

Description— Miospore is biconvex, rounded triangular in equatorial view with convex sides and broadly rounded angles. Size ranges from 45-48 μ. Trilete mark is distinct and Y-rays extend more or less 2/3 of the spore radius. They are simple and straight. Exine is 2-3 μ thick in optical section. *Extrema lineamenta* is smooth.

Comparison —*Stereisporites antiquasporites* (Wils. & Webs.) Dettm., differs in having distal polar thickening. *S. tenuis* (de Jersey) de Jersey has longer Y-rays, thinner exine and smaller size.

cf. *Stereisporites* sp. A

Pl. 1, Fig. 17

Description — Miospore is biconvex, triangular in equatorial view with convex sides and broadly rounded angles. Size measures 27×29·5 μ. Trilete mark is distinct and Y-rays extend 2/3 or more of the spore radius. They are straight, bordered by 2-3·5 μ wide thicker exine with raised labra. Exine is ±1 μ thick in optical section. *Extrema lineamenta* is smooth.

Comparison — The specimen assigned to cf. *Stereisporites* sp. A is different from *S. antiquasporites* (Wils. & Webs.) Dettm., in having distinct thickening along the Y-rays and in lacking the distal polar thickening. *Stereisporites stereoides* (Pot. & Venitz) Pflug has a thicker exine and longer Y-rays without thickenings. *S. megastereoides* Pflug is distinct in having thicker exine, longer and simple Y-rays. *S. australis* forma *parva* Cooks., possesses longer Y-rays and thicker exine. *S. australis* forma *crassa* Cooks., is larger in size and has thinner

exine. *S. tenuis* (de Jersey) de Jersey bears longer Y-rays but without any thickenings.

cf. *Stereisporites* sp. B

Pl. 1, Fig. 18

Description — Miospores are biconvex, mostly triangular in equatorial view with convex sides and rounded angles. Size measures 27-34·5 μ. Trilete mark is distinct and Y-rays extend almost 3/4 of the spore radius. Exine is 1·5-2 μ thick, intramicropunctate; intrapuncta shallow and sparsely spaced. *Extrema lineamenta* is smooth.

Remarks — Specimens of cf. *Stereisporites* sp. B are rarely present in the assemblage. This species differs from *Stereisporites* sp. in having longer Y-arms, raised labra and intrapunctate exine. As compared to cf. *Stereisporites* sp. A, it lacks the thickening along the labra and possesses structured exine.

Genus — *Biretisporites* (Delc. & Sprum.) Delc. Dettm. & Hughes, 1963

Genotype — Biretisporites potoniaei Delc. & Sprum., 1955.

Biretisporites sp.

Pl. 1, Fig. 19

Description — Miospores are biconvex, triangular in equatorial view with more or less convex sides and broadly rounded angles. Size measures 31·5-53 μ. Trilete mark is distinct and Y-rays reach 3/4 of the spore radius with fairly elevated labra (2-4 μ high), appearing as extensions of the proximal exine. Exine is ±1 μ thick in optical section, faintly pitted under oil immersion and possesses distal median folds. *Extrema lineamenta* is ± smooth.

Comparison— Biretisporites potoniaei Delc. & Sprum., is different from the present specimens of A. sp. in having more pronounced Y-mark, thinner and faintly structured exine. A. *spectabilis* Dettm., is distinct in having bigger size (77-122 μ), thicker exine and more elevated lips.

Genus — *Dictyophyllidites* Coup., 1958

Genotype— Dictyophyllidites harrisii Coup., 1958.

Remarks — Couper (1958) studied the *in situ* spores of *Dictyophyllum rugosum* L. & H., *D. nilssoni* (Brongn.) Goeppert and *D. munsteri* (Goeppert) Nathorst. He found that the dispersed fossil spores exhibit the same morphographic characters as seen in the *in situ* spores. Thus, he instituted a new spore genus *Dictyophyllidites* to accommodate the forms which have smooth exine, triangular shape with distal side markedly convex and a simple, long trilete mark bordered by interradial thickening. Bharadwaj and Singh (1964) stated that *Dictyophyllidites harrisii* Coup., possesses inter-ray thickening of the spore exine which is placed a little far from the Y-rays as seen in the spores of *D. rugosum* L. & H. (*see* Couper 1958, Pl. 21, Fig. 4). This feature has been confirmed in the study of present specimens. Dettmann (1963) described spores referable to *Dictyophyllidites* Coup., from South Eastern Australia, on the basis of which she emended the generic diagnosis of the genus so as to include spores which have thicker and even faintly patterned exine, e.g. *D. pectinataeformis* (Bolkhov.) Dettm. In the opinion of the present author, Dettmann (*l.c.*) has unduly enlarged the circumscription of *Dictyophyllidites* by embracing forms with sculptured exine. Thus, in the present work, it is suggested that *Dictyophyllidites* should include only laevigate forms as originally proposed by Couper (*l.c.*).

Dictyophyllidites haradensis sp. nov.

Pl. 1, Fig. 20

Holotype — Pl. 1, Fig. 20; 36×40 μ; Regd. Sl. No. 3417/3.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 32-40 μ. Triangular. Trilete, Y-rays bordered with 2-6 μ wide inter-ray thickenings with thin labra. Exine ±1 μ thick.

Description — Miospores are biconvex, triangular in equatorial view with straight to more or less concave or convex sides and rounded angles. Trilete mark is prominent and Y-rays reach 3/4 of the spore radius with thin, open and slightly raised labra, having 2-6 μ wide, distinct to faint inter-ray thickening near and along the Y-rays.

Exine is ±1 μ thick in optical section. *Extrema lineamenta* is smooth.

Comparison — Dictyophyllidites haradensis sp. nov. closely compares with *D. austriensis* Singh but distinguishes itself from the latter in having shorter Y-rays. *D. enigmaticus* Singh is different in having bigger size, fainter thickening along the Y-mark and thicker exine.

Dictyophyllidites sp.

Pl. 1, Fig. 21

Description — Miospores are biconvex, triangular in equatorial view with concave sides and rounded angles. Size measures 30×28 μ. Trilete mark is prominent and Y-rays reach 3/4 of the spore radius. They are straight to slightly sinuous with thick labra and bordered by 3-3·5 μ wide thickening which narrows towards the ray-ends. Exine is ±1·5 μ thick in optical section and dense. *Extrema lineamenta* is smooth.

Comparison — Dictyophyllidites sp. is different from *D. harrisii* Coup., in having slightly sinuous and shorter Y-rays, smaller size and denser exine. *D. crenatus* Dettm., is different by virtue of its bigger size, thicker exine and elevated labra. *D. austriensis* Singh is closely comparable to *D.* sp. in having similar size range and arcuate inter-ray thickening along the Y-mark but differs from the latter by having convex sides, longer Y-rays and raised ray-vertex.

Genus — *Concavisporites* (Pf.) Delc. & Sprum., 1955

Genotype — Concavisporites rugulatus Pf. in Thoms. & Pf., 1953.

Remarks — Pflug (1953) instituted a spore genus *Concavisporites* from the tertiary deposits of West German Brown Coals. The genus accommodates those forms which are triangular with concave sides and have a 'Torus' running parallel to the Y-mark. Later on, Delcourt and Sprumont (1955) emended its diagnosis restricting *Concavisporites* (Pflug) to spores having concave sides and a cushion like pad around the Y-mark. In the present study, spores (Pl. 1, Figs. 24 & 25) though similar to *Conccvisporites* (sensu Pflug) have a continuous thickening on the distal face and this appears very much like a 'Torus', running parallel to the Y-mark as is the condition described for *Concavisporites*. It seems that the 'Torus' which is supposed to be located on proximal face along the Y-mark in reality, occurs distally. A support to this contention is offered by the distal position of 'Kyrtome' in *Ahrensisporites* Pot. & Kr. There is evidently a strong case for re-examination of the genotype of *Concavisporites* to ascertain the correct location of the inter-radial thickenings (Tori) in it. If these thickenings are found to be located distally as is contended here, the circumscription of *Conccvisporites* will have to be emended accordingly.

Concavisporites novicus sp. nov.

Pl. 1, Figs. 22-25

Holotype — Pl. 1, Fig. 22; 26×22 μ; Regd. Sl. No. 3421/6.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis— Size 20-30 μ. Triangular with acute, rounded angles. Trilete, reaching the equator. A thick, arcuate inter-radial band (3-5 μ wide, 'Torus or Kyrtome') joined with each other below the ray-ends present on distal side. Exine 1-1·5 μ thick.

Description — Miospores are small, triangular in equatorial view with more or less straight sides and narrowly rounded angles. Trilete mark is distinct and Y-rays reach the equator. They are more or less straight with slightly raised labra. Distally midway between the pole and the equator occurs a conspicuously thick, uninterrupted, arcuate interradial band (3-5 μ wide). Exine is 1-1·5 μ thick in optical section. *Extrema lineamenta* is smooth.

Comparison — Concavisporites novicus sp. nov. is distinguishable from *C. mortoni* (de Jersey) de Jersey in having sharply rounded angles and slightly elevated labra. *C. cutchensis* Singh *et al.* is bigger in size and possesses rounded angles. Couper (1958) described some species under *Concavisporites* like *C. punctatus, C. variverrucatus* and *C. subgranulosus* which have ornamented forms and hence they are not comparable with the present species. *C. rugulatus* Pf., closely compares with *C. novicus* sp. nov. in having similar shape and size range but

the former is supposed to have the ' Torus ' proximally.

Concavisporites sp.

Pl. 1, Fig. 26

Description — Miospore is triangular in equatorial view with fairly concave sides and rhombic angles. Size is 32×24 μ. Trilete mark is prominent and Y-rays almost extend to the equator with raised labra. Distally three arcuate interradial bands (thickening 2-3 μ wide) are present. Exine is ±1 μ thick in optical section. *Extrema lineamenta* is smooth.

Comparison — *Concavisporites cutchensis* Singh *et al.* is longer in size with more or less straight sides and ± uniformly broad ' Kyrtome '. *C. infirmus* Balme possesses finely rugose or faintly microreticulate exine and hence is not comparable. *C. juriensis* Balme is distinct in having arcuate thickening at the angles which appears to be looping over on the distal side. *C. novicus* sp. nov. has rounded angles, ± straight sides and the interradial thickenings are joined on ends.

Infraturma — *Apiculati* (Benn, & Kidst.) Pot., 1956

Genus — *Leptolepidites* Coup., 1953

Genotype — *Leptolepidites verrucatus* Coup., 1953.

Leptolepidites sp.

Pl. 1, Fig. 27

Description — Miospore is biconvex, subcircular in equatorial view. Size measures 33×38 μ (excluding sculpture) and 42×48 μ (including sculpture). Trilete mark is faintly observed and Y-rays reach more than 3/4 of the spore radius with simple and straight labra. Exine is thin, proximally finely granulose but distally and equatorially verrucose. Verrucae are hemispherical to subhemispherical, measuring 6-10 μ high and 9-12 μ in basal diameter. They are free and closely spaced. *Extrema lineamenta* is sculptured.

Comparison— The presently studied specimen closely compares with *Leptolepidites verrucatus* Coup., but is distinct in having proximally granulose exine, larger verrucae, subcircular shape of the spore and thinner exine. *Leptolepidites major* Coup., compares with the present species in having subcircular outline of the body but varies in possessing smaller size of verrucae on both the faces as reported by Couper (1958).

Genus — *Lophotriletes* (Naum.) Pot. & Kr., 1954

Genotype — *Lophotriletes gibbosus* (Ibr.) Pot. & Kr., 1955.

Lophotriletes sp.

Pl. 1, Figs. 28-29

Description — Miospores are biconvex, triangular in equatorial view with slightly concave sides and rounded angles. Size measures 28-32·5 μ. Trilete mark is distinct and Y-rays extend more than 2/3 of the spore radius with thin and open labra. Exine is thin and sculptured with small coni (1-2 μ high and 1·5-2 μ broad at the base). They are sparsely distributed over polar regions but appear slightly closely spaced in radially equatorial regions. *Extrema lineamenta* possesses coni.

Comparison — *Lygodium clavum* Ivan., (in Samoilov. *et al.*) closely resembles *Lophotriletes* sp. in having thinner exine and in the distribution of the elements but differs in having bigger sculptural elements. *Lophotriletes* sp. Singh *et al.* is from distinct *L.* sp. in having larger size and closely spaced elements with confluent bases.

Genus — *Baculatisporites* Pf. & Thoms. in Thoms. & Pf., 1953

Genotype — *Baculatisporites primarius* (Wolff) Pf. & Thoms. in Thoms. & Pf., 1953.

Baculatisporites rotundus sp. nov.

Pl. 1, Figs 30-33

Holotype — Pl. 1, Fig. 30; 33·5×37 μ; Regd. Sl. No. 3417/5.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 32-48 μ. Circular to subcircular. Exine thin, bacula 2-3 μ high,

mixed with coni bacula having knob-shaped to truncated apices and closely spaced.

Description — Miospores are circular to subcircular in equatorial view. Trilete mark is distinct and Y-rays reach 3/4 of the spore radius. They are slightly sinuous. Exine is more or less 2 μ thick, densely baculate (30-48 in number at the perimeter); bacula 2-3 μ high, having variably shaped apices which are either knob-shaped or truncated. The number of knob-shaped bacula along the perimeter is more than the conical and truncated processes. Ornamentation around the trilete mark is reduced. *Extrema lineamenta* is variously sculptured.

Comparison — *B. clavaeoides* Sah & Jain is slightly larger in size and has thicker exine. *B. emarginatus* Sah & Jain possesses shorter bacula and is slightly bigger in size. *B. comaumensis* (Cooks.) Pot., is distinct from *B. rotundus* sp. nov. in having smaller bacula which are sparsely distributed (12-30 in number at the perimeter).

Genus — *Neoraistrickia* (Pot.) Bharad. & Kumar, 1972

Genotype —*Neoraistrickia truncata* (Cooks.) Bharad. & Kumar, 1972

Neoraistrickia pallida sp. nov.

Pl. 2, Figs. 34-47

Holotype — Pl. 2, Figs. 34-35; 48·5 × 59·5 μ; Regd. Sl. No. 3421/7.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 35-59·5 μ. Roundly triangular. Trilete. Exine thin, baculate; bacula 3-5 μ high and 2·5-4 μ wide with rounded apices.

Description — Miospores are roundly triangular in equatorial view. Trilete mark is distinct when open otherwise faintly discernible and Y-rays usually reach 3/4 of the spore radius, rarely extending to the equator. They are simple, slightly sinuous together with thin, slightly open, raised and crumpled labra. Exine is less than 1 μ thick, decorated with stout, rounded processes on the distal face only, bacula are 3-5 μ high, 2·5-4 μ wide and set 2-7 μ apart, whereas proximal face is smooth. *Extrema lineamenta* has baculate ornamentation.

Comparison — *Neoraistrickia pallida* sp. nov. closely resembles *N. truncata* (Cooks.) Bharad. & Kumar in having similar size and shape but is distinct from the latter in having sinuous Y-rays and more stout processes with rounded apices which are wider at the base. *N. taylorii* Playford & Dettm., differs from *N. pallida* sp. nov. in having thinner processes. *Selaginella rotundiformis* Kara-Murza (in Samoilov. *et al.*) is subcircular or roundly subtriangular in polar view, and seemingly has often lipped Y-arms that are said to equal 1/2 to 2/3 of the spore radius. *N. neozealandica* (Coup.) Bharad. & Kumar is distinguishable from *N. pallida* sp. nov. in having longer, slightly curved and truncated processes.

Genus — *Biformaesporites* Singh & Kumar, 1971

Genotype — *Biformaesporites baculosus* Singh & Kumar, 1971.

Biformaesporites sp.

Pl. 2, Figs. 38-39

Description — Miospore is subcircular in equatorial view. Size measures 73 × 86 μ. Trilete mark is faintly visible and Y-rays extend 2/3 to 3/4 of the spore radius. They are simple, slightly wavy and are unequal in length. Exine is ± 2 μ thick in optical section and densely sculptured on both the surfaces, ornamentation consists of mostly stout coni which are intermixed with spines and truncated bacula. In equatorial view, sculptural processes are mostly partially confluent at their sides near the bases, coni are usually slightly broken at the apices and measure 3-5 μ in length and 3-6 μ in width at the bases, spines which are slightly curved at the tips, measure 6-7 μ in length and 2·5-4 μ in width at the bases, a few bacula which are truncated and slightly dentated at the flat margin of the apices are also visible. Bacula are far less in number in comparison to other elements. *Extrema lineamenta* is sculptured.

Comparison — *Biformaesporites* is distinguishable from A. *baculosus* Singh &

Kumar in having larger number of coni and spines in comparison to bacula.

Infraturma — *Murornati* Pot. & Kr., 1954

Genus — *Rugulatisporites* Pf. & Thoms. in Thoms. & Pf., 1953

Genotype — *Rugulatisporites quintus* Pf. & Thoms. in Thoms. & Pf., 1953.

Rugulatisporites sp.
Pl. 2, Figs. 40-41

Description — Miospore is biconvex and roundly triangular in equatorial view. Size measures 38×40·5 μ. Trilete mark is prominent and Y-rays extend 3/4 of the spore radius. They are straight but undulating at the polar region and bifurcating at the ends with slightly raised labra. Exine is 1-1·5 μ thick, decorated with faint muri or rugulae which are mostly low, small, free to anastomosing and are distributed closely on both the surfaces. Proximally, the ornamentation is prominent. *Extrema lineamenta* is wavy.

Comparison — *Rugulatisporites* sp. resembles *R. quintus* Pf. & Thoms., (in Thoms. & Pf.) in having ± similar shape whereas the latter is distinct in having bigger size, simple trilete mark and more prominent ornamentation. Singh (1964) described *R.* sp. from Alberta, which has slightly bigger size, shorter Y-arms and regular pattern of rugulae on both the faces and hence is different.

Genus — *Lycopodiacidites* (Coup.) Pot., 1956

Genotype — *Lycopodiacidites bullerensis* Coup., 1953.

Lycopodiacidites sp.
Pl. 2, Figs. 42-43

Description — Miospore is biconvex, triangular in equatorial view and straight to convex sides with slightly rounded angles. Size measures 47×51·5 μ. Trilete mark is distinct and Y-rays extending up to the angles. They are sinuous. Exine is ±1·5 μ thick, proximally smooth, distally sculptured with flat and anastomosing rugulae which are ±2 μ thick, appearing vermiculate, narrowly spaced, having ±0·75 μ broad lumina. A membraneous, hyaline, smooth layer of perispore covers the miospore which is 4-6 μ wide.

Comparison — *Lycopodiacidites bullerensis* Coup., is distinct from *L.* sp. in having smaller size and rugged distal surface. *L. cristatus* Coup., differs in possessing smaller size spinose distal exine. The spines are blunt and curved. *L. asperatus* Dettm., is distinguishable from *L.* sp. in having larger size and coarser rugulae which are present on both the faces.

Genus — *Foveosporites* Balme, 1957

Genotype — *Foveosporites canalis* Balme, 1957.

Foveosporites sp.
Pl. 2, Figs. 44-45

Description — Miospores are biconvex, convexly subtriangular in equatorial view with convex sides and broadly rounded angles. Size ranges from 38-66 μ. Trilete mark is perceptible and Y-rays reach 3/4 of the spore radius. They are straight to slightly wavy with thin and slightly raised labra. Exine is 2-3 μ thick, decorated with micropits on both the faces (excepting about the polar region which appears smooth proximally). Pits are circular to irregular in outline, ±0·5 μ in diameter and are separated from each other by smooth intervening areas. *Extrema lineamenta* is ± punctate.

Comparison — *Foveosporites canalis* Balme is different in having longer Y-rays and coalescing puncta which are slightly bigger in size. *F. mimosae* de Jersey & Hamilt., is distinct in having circular outline and shorter Y-rays. *F. moretonensis* de Jersey is reported to have shorter Y-rays and irregular ridges which separate the pits.

Genus — *Lycopodiumsporites* Thierg. ex Delc. & Sprum., 1955

Genotype — *Lycopodiumsporites agathoecus* (Pot.) Thierg., 1938.

Lycopodiumsporites sinuosus sp. nov.
Pl. 2, Figs 46-49

Holotype — Pl. 2, Figs. 46-47; 32·5×38·5 μ; Regd. Sl. No. 3421/10.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 30-44·5 μ. Roundly triangular. Trilete, Y-rays sinuous. Exine ±1 μ thick, distally reticulate. Lumina rectangular to hexagonal, 2-7·5 μ in diameter.

Description — Miospores are biconvex, generally roundly triangular in equatorial view. Trilete mark is distinct and Y-rays extend to the equator. They are sinuous, bordered by slightly elevated (±1 μ high) and membraneous labra which sometimes appear crumpled. Exine is more or less 1 μ thick, proximal surface is smooth but distal surface is reticulate. Reticulum is regular and composed of low, 2-3 μ high, anastomosing muri which are 1·5-2·5 μ wide. The sides are straight and flat-topped with crests projecting beyond the equatorial outline. Lumina are generally rectangular to hexagonal, rarely oval or subcircular in outline and 2-7·5 μ in diameter. *Extrema lineamenta* is wavy.

Comparison — *Lycopodiumsporites sinuosus* sp. nov. resembles *L. gristhorpensis* Coup., in size and shape but the latter differs in having simple Y-arms and truncated papillae as the distal ornamentation of the exine. *L. nodosus* Dettm., is distinct from the present species in having coarsely granulose ornamentation, thicker exine, widely spaced two to three free muri on the proximal surface and reticulate exine distally and equatorially. *L. facetus* Dettm., differs from *L. sinuosus* sp. nov. in having overall reticulate exine with wider lumina and larger size range of the spore. *L. eminulus* Dettm., closely resembles *L. sinuosus* sp. nov. in size, shape and in the diameter of lumina but is distinct from the latter in having thicker exine and straight Y-arms. *L. austroclavatidites tenuis* Balme is distinguishable from the present species in having thinner muri and straight Y-arms. *L. marginatus* Singh can be distinguished by its larger size (50-60 μ), shorter Y-arms and larger lumina (9-14 μ in diameter).

Lycopodiumsporites pallidus sp. nov.
Pl. 2, Figs. 50-51

Holotype — Pl. 2, Fig. 50; 41×45 μ; Regd. Sl. No. 3421/6.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 30·5-46 μ. Roundly triangular, Y-rays undulating. Exine +1·5 μ thick, distal reticulum encroaching equatorially at the proximal face, muri thin and flexible, lumina broadly polygonal and 4·5-12 μ in diameter.

Description — Miospores are biconvex, roundly triangular in equatorial view. Trilete mark is distinct and Y-rays reach 2/3-3/4 of the spore radius. They are undulating, having ±1 μ thick labra which are elevated, 1-1·5 μ high. Exine is ±1·5 μ thick. Proximal surface is smooth but reticulate distally, reticulum encroaches slightly on the proximal face at the equatorial outline, muri are ±1 μ thick and 2-3 μ high. The muri are with straight to concave sides which anastomose and project beyond the equatorial outline in optical section. Lumina are 4·5-12 μ in diameter and broadly polygonal in outline. *Extrema lineamenta* is wavy.

Comparison — *Lycopodiumsporites pallidus* sp. nov. is distinct from *L. austroclavatidites* (Cooks.) Pot., *L. circolumen* Cooks. & Dettm., *L. eminulus* Dettm., in having undulating Y-mark and elevated labra. *L. facetus* Dettm., is distinguishable from *L. pallidus* sp. nov. in having longer Y-rays, thicker exine and granulose to reticulate exoexine. *L. marginatus* Singh differs in having a few irregular ridges on the proximal face and straight Y-arms. *L. sinuosus* sp. nov. is distinct in having longer Y-rays, thicker muri, rectangular to hexagonal lumina and only distally reticulate exine.

Genus — *Klukisporites* Coup., 1958

Genotype — *Klukisporites variegatus* Coup., 1958.

Klukisporites haradensis sp. nov.
Pl. 2, Figs. 52-54

Holotype — Pl. 2, Figs. 52-53; 45×48 μ; Regd. Sl. No. 3421/4.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 45-62 μ. Triangular. Trilete, Y-rays bordered by arcuately thicker area. Exine 2-3 μ thicker, proximally having 1-2 row of small pits along the Y-mark, distally foveoreticulate, semilunar

shaped lumina together with small pits at the distal polar region.

Description — Miospores are biconvex, triangular with straight to convex sides and rounded angles. Trilete mark is distinct and Y-rays reach more than 3/4 of the spore radius with thin, slightly elevated and crumpled labra, bordered by arcuate darker area which is 2-6 μ wide. Exine is 2-3 μ thick in optical section, proximal surface is smooth but possesses 1-2 prominent rows of arcuately arranged pits along the Y-rays, pits are sparsely spaced, 1-2 μ in diameter and circular to oval in shape. The distal face is decorated with thick, anastomosing, low, flattened muri, 5-7 μ wide, 2-3 μ high and separated from each other by semilunar lumina which are 4-6 μ long, 1·5-3 μ wide and sparsely spaced. *Extrema lineamenta* is slightly wavy.

Comparison — *Klukisporites variegatus* Coup., is distinguishable from *K. haradensis* sp. nov. in having irregular and prominent pits distally, whereas proximal exine is sculptured with low verrucae or granules. *K. scaberis* (Cooks. & Dettm.) Dettm., also differs from *K. haradensis* sp. nov. in having grana over the exine and granulose to verrucose lips of the labra. *K. convolutus* Poc., is proximally smooth excepting at the apices. *K. verrucosus* Poc., is also smooth at the proximal face whereas distal face has irregular verrucae. *K. foveolatus* Poc., is distinguishable from *K. haradensis* sp. nov. in having proximally smooth exine and polygonal to circular fovea distally.

Genus — *Cicatricosisporites* Pot. & Gel., 1933

Genotype — *Cicatricosisporites dorogensis* Pot. & Gel., 1933.

Remarks — Potonié and Gelletich (1933) circumscribed a spore genus *Cicatricosisporites* from the Tertiary deposits of doroger in Hungary. According to Potonié (1956) the genus is characterized by a sculpture consisting of muri or striations of equal width and height and running closely ± parallel to each other and partly to the equator meeting each other below the angles. The muri of both surfaces are seen crossing each other more or less. In the genotype designated by Potonié (*l.c.*) and as illustrated by Potonié & Gelletich (1933, Pl. 1, Fig. 1) the Y-mark is distinct. The rays are narrow near the apex but a little before the equator they widen and become denser before bifurcating at the equator. According to Dettmann (1963) the genus is "characterized by distal and equatorial sculpture of more or less parallel muri. In the type species three series of parallel muri are arranged about a centre on the distal hemisphere and at an angle to the equator; the equatorial muri terminate in the proximo-equatorial, radial regions where they coalesce with adjacent muri of the same series". Dettmann's (*l.c.*) species as described and illustrated by her amply support her observations. Some of the miospores in the present study correspond to Dettmann's *C. ludbrooki* and hence have been referred the same. However, the specimens described under cf. *Cicatricosisporites* sp. (figured in Pl. 2, Figs. 55-57) possess proximally small, low tubercles at the interradial regions and a series of ± parallel muri on distal face.

cf. *Cicatricosisporites* sp.
Pl. 2, Figs. 55-57

Description — Miospores are triangular in equatorial view with straight to weakly convex sides and more or less rounded corners. Size measures 44-62 μ. Trilete mark is distinct and Y-rays more or less reach the equator. They are ± straight with slightly elevated labra (1·5-2 μ high). Exine is ±1·5 μ thick, proximal face has 13-15 sparsely distributed tubercles which are irregular in shape. Distal face possesses a series of muri. Muri are 13-15 in numbers, each 1-2·5 μ wide, 1-2·5 μ high, hardly bifurcating and sharply crested. They are ± parallel to each other but appear to converge nearer the equator. The intervening furrow bases are 0·5-1 μ wide. *Extrema lineamenta* is crested.

Remarks— The specimens of cf. *Cicatricosisporites* sp. are usually obliquely flattened.

Comparison — *Cicatricosisporites dunrobinensis* Coup., is distinct from cf. *C.* sp. in having smooth proximal face, broader muri and margo. *C. typicus* Jain & Sah differs from it in having proximal and distal muri, two seris of muri at the distal face and lacking proximal tubercles. *C. hughesi* Dettm., and *C. australiensis* (Cookson) Dettm., are different from cf. *C.* sp. in exhibiting distal and equatorial exine possess

three series of muri as well as lacking tubercles in the proximal polar region.

Subturma — *Zonotriletes* Waltz 1935
Infraturma — *Auriculati* (Sch,) Dettm., 1963

Genus — *Matonisporites* (Coup.) Bharad. & Kumar, 1972

Genotype — *Matonisporites phlebopteroides* Coup., 1958.

Matonisporites dubius sp. nov.

Pl. 3, Figs. 58-59

Holotype — Pl. 3, Fig. 58; 58-60 μ; Regd. Sl. No. 3421/8.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis— Size 46-78 μ. Triangular with rounded angles. Trilete, Y-rays bordered by 6-9 μ wide thickening. Exine thicker at angles (4-7·5 μ).

Description — Miospores are triangular with straight or more or less concave sides and rounded angles. Trilete mark is distinct and Y-rays reaching 3/4 of the spore radius or to the equator with open and slightly raised labra, bordered by a distinct, broad thickening which is 6-9 μ wide. Exine is dark brown in colour, differentially thickened, 2-3·5 μ thick at the sides and 4-7·5 μ thick at the angles. *Extrema lineamenta* is smooth.

Comparison — *Matonisporites* dubius sp. nov. is distinguishable from *M. phlebopteroides* Coup., which has thicker angles. *M. crassiangulatus* (Balme) Dettm., possesses sharply rounded angles and grooved laesurae. Hence, both are different species. *M. kutchensis* Venkata., differs from *M. dubius* sp. nov. in having larger size and thicker exine.

Matonisporites discoidalis sp. nov.

Pl- 3, Figs. 60-61

Holotype — Pl. 3, Fig. 60; 74-80 μ; Regd. Sl. No. 3414/10.

Locus typicus — Sehora, Narsinghpur district, M.P., India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis— Size 68-89 μ. Triangular with flat angles. Trilete. Exine thicker at the angles (4-6·5 μ).

Description — Miospores are triangular in equatorial view with more or less concave sides and flat angles. Trilete mark is prominent and Y-rays reach 3/4 of the spore radius. They are straight to slightly sinuous with slightly raised labra. Exine is variably thickened, 2-3 μ thick at the sides and 4-6·5 μ thick at the angles. *Extrema lineamenta* is smooth.

Comparison — *Matonisporites discoidalis* sp. nov. varies from *M. dubius* sp. nov. in having flat angles and comparatively less developed thickening at the angles. *M. crassiangulatus* (Balme) Dettm., exhibits sharply rounded corners and grooved laesurae. *M. phlebopteroides* Coup., differentiates itself in having thicker, rounded angles and has a distinct margo. *M. kutchensis* Venkata., is larger in size, longer trilete mark, rounded corners and thicker exine as compared to *M. discoidalis* sp. nov.

Genus — *Lametatriletes* Singh & Kumar 1972

Genotype — *Lametatriletes indicus* Singh & Kumar, 1972.

Lametatriletes tenuis sp. nov.

Pl. 3, Figs. 62-63

Holotype — Pl. 3, Fig. 62; 66×76 μ; Regd. Sl. No. 3414/7.

Locus typicus — Sehora, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 60-83 μ. Triangular with slightly flat angles. Trilete, Y-rays sinuous. Exine thicker at angles (4-7·5 μ), puncta comparatively closely spaced on the distal face than on the proximal face but prominent 1-3 rows of puncta along the Y-rays.

Description — Miospores are triangular with concave sides and rounded to slightly flat angles. Trilete mark is distinct and Y-rays reaching 3/4 of the spore radius or run up to the inner margin of the thickened angles. They are sinuous, enclosed within the membraneous, slightly raised and crumpled labra. Sometimes Y-rays show bifurcating ray-ends. Exine is 2-3 μ thick at the sides and 4-7·5 μ thick at the angles.

Distally the exine is comparatively densely punctate but proximally puncta are sparsely placed excepting along the Y-rays where they are arranged in 1-3 rows. *Extrema lineamenta* is faintly punctate.

Comparison — *Lametatriletes tenius* sp. nov. closely compares with *L. cooksoni* (Dettm.) Singh & Kumar in having similar size range, nature of the trilete mark and exinal thickenings but the latter differs in lacking flat angles and sparsely punctate exine at the proximal face. *L. indicus* Singh & Kumar differs in having shallower and sparsely spaced puncta on the distal face, convex sides and are faintly thickened along the Y-mark with rounded corners.

Lametatriletes mesozoicus sp. nov.
Pl. 3, Figs. 64-65

Holotype — Pl. 3, Fig. 64; 58×52·5 μ; Regd. No. 3421/8.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 42-68 μ. Triangular. Trilete, Y-rays bordered by a thicknening (5-11 μ wide), having 2-5 rows of linearly arranged puncta along the Y-rays. Exine thicker at angles (4-6·5 μ).

Description — Miospores are triangular with concave sides and rounded angles in equatorial view. Trilete mark is prominent and Y-rays reaching 3/4 of the spore radius or ending just before the thicker angles. They are slightly sinuous with thick, slightly raised and crumpled labra. Exine along the Y-rays is arcuately thickened (5-11 μ wide). Exine is 2-3 μ thick at the sides and 4-6·5 μ thick at the angles. Distal face is faintly micropunctate. Proximal face beset with 2-5 rows of puncta which are prominently noticeable along the Y-rays over the arcuately thickened area, one row of puncta is more distinct than the others. Puncta are widely spaced and separated from each other by smooth intervening areas. *Extrema lineamenta* is faintly punctate.

Comparison — *Lametatriletes indicus* Singh & Kumar differentiates itself from *L. mesozoicus* sp. nov. in having convex sides, larger size ranges and faintly thicker labra. *L. tenuis* sp. nov. is distinguishable from *L. mesozoicus* sp. nov. in having bigger size range and flat angles but it lacks thickening along the Y-mark.

Genus — *Boseisporites* (Dev) Bharad. & Kumar, 1972

Genotype — *Boseisporites praeclarus* (Dev) Bharad. & Kumar, 1972.

Boseisporites indicus sp. nov.
Pl. 3, Figs. 66-67

Holotype — Pl. 3, Fig. 66; 74×76 μ; Regd. Sl. No. 3416/8.

Locus typicus — Sehora, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 62-86 μ. Triangular. Trilete. Exine two layered, thicker at the angles (2-4·5 μ thick), puncta distinct (±2 μ deep) and densely spaced (±0·75 μ apart).

Description — Miospores are biconvex, triangular with straight to concave sides and rounded angles. Trilete mark is distinct and Y-rays reach mostly 3/4 of the spore radius. They are straight to slightly undulate with thin and slightly raised labra. Exine is two layered, the outer is hyaline, differentially thickened, ±0·75 μ thick at the sides and 1·5-2·5 μ thick at the angles and punctate. Puncta are well pronounced, measuring ±0·75 μ in diameter and ±2 μ deep, closely distributed (±0·75 μ apart), sometimes appearing fused with each other simulating small and narrow canals which are separated by smooth intervening areas. Inner layer is dark and is ±1·5 μ thick on the side and ±2 μ at the angles. *Extrema lineamenta* appears radially striated in optical section.

Comparison — *Boseisporites praeclarus* (Dev) Bharad. & Kumar is distinguishable from *B. indicus* sp. nov. in having more thick exine at the angles, shallower pits as the ornamentation of the exine and shorter Y-rays. *B. insignitus* Venkata., *B. punctatus* Venkata., have thicker exine. *B. lobatus* Venkata., possesses bigger size range and lobed punctate exine.

Boseisporites jabalpurensis sp. nov.
Pl. 3, Figs. 66-68

Holotype — Pl. 3, Fig. 68; 82×86 μ; Regd. Sl. No. 3416/3.

Locus typicus — Sehora, Narsinghpur district, M.P., India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 60-86 μ. Triangular. Trilete. Exine thicker at the angles (±4 μ), proximal face faintly punctate, distally being prominent (0·5-1 μ deep) puncta slightly prominent near the Y-mark.

Description — Miospores are biconvex, triangular with straight to more or less concave sides and rounded angles. Trilete mark is prominent and Y-rays reach 3/4 of the spore radius. They are straight to slightly sinuous with thin, open and elevated labra. Exine is two layered, outer layer is hyaline, variably thickened, ±0·75 μ thick at the sides and 1·5-2 μ thick at the angles and punctate on both the surfaces. Puncta are distinctly visible at the distal surface, measuring 0·5-1 μ in diameter and 0·5-1 μ in depth, proximal surface is faintly punctate excepting near the Y-mark where puncta are slightly prominent. Inner layer is dark, ±1 μ thick at the sides and ±2 μ at the angles.

Comparison — *Boseisporites jabalpurensis* sp. nov. closely compares with *B. indicus* sp. nov. in having similar shape, size and exine thickness but the latter is distinct from the former in having deeper puncta all over and densely packed on both the faces. *B. praeclarus* (Dev) Bharad. & Kumar is distinguishable from *B. jabalpurensis* sp. nov. in having thicker angles and lacking variably punctate exine as well as prominent puncta along the Y-mark. *B. insignitus* Venkata., and *B. punctatus* Venkata., are distinct from the present species in having thicker angles and sides. *B. lobatus* Venkata., possesses lobed amb, bigger size range and longer Y-rays.

Boseisporites sehoraensis sp. nov.

Pl. 3, Fig. 70; Pl. 4, Figs. 79-80

Holotype — Pl. 3, Fig. 70; 100×113·5 μ; Regd. Sl. No. 3414/14.

Locus typicus — Sehora, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 80-124 μ. Triangular. Trilete. Exine thicker at the angles (6·5-8·5 μ), deeply (3-4·5 μ deep) and sparsely (2·5 μ apart) punctate.

Description — Miospores are biconvex, triangular with more or less straight sides and rounded angles. Trilete mark is distinct and Y-rays extend to the inner margin of the radial thickenings with simple, slightly elevated and crumpled labra. Exine is two layered, the outer is hyaline and the inner darker, and differentially thickened. The outer is 2-3 μ thick at the sides and 3·5-5 μ thick at the angles and punctate. Puncta are present on both the surfaces which are deep and sparsely distributed, usually 2-5 μ apart from each other, ±1 μ in diameter and 3-4·5 μ deep. The exine appears radially striated in optical section, possibly due to the radially oriented puncta. The inner layer is 1-2·5 μ thick on the sides and 3-3·5 μ thick at the angles. *Extrema lineamenta* is radially striated in optical section.

Comparison — The specimens assigned to *Boseisporites sehoraensis* sp. nov. are distinct from *B. indicus* sp. nov. which is smaller in size and has got thinner corners and closely punctate exine with shallower puncta. *B. jabalpurensis* sp. nov. is also smaller in size and possesses variably punctate exine with shallower puncta. *B. praeclarus* (Dev) Bharad. & Kumar is distinct in having shallower puncta, smaller size range and thinner inner layer. *B. lobatus* Venkata., distinguishes itself in possessing lobed amb and circular to vermiculate puncta.

Other species — 1961 *Callispora* sp. Dev.; p. 44, pl. 1, fig. 4.

Genus — *Trilites* (Erdtm., 1947 Cooks., 1947) Dettm., 1963

Genotype — *Trilites tuberculiformis* Cooks., 1947.

Trilites fusus sp. nov.

Pl. 3, Figs. 71-72

Holotype — Pl. 3, Fig. 71; 32×34·5 μ; Regd. Sl. No. 3421/6.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 23-42 μ. Rounded triangular. Y-rays slightly sinuous. Exine thicker at the angles (2-2·5 μ), distally verrucose, verrucae irregularly elongated.

Description — Miospores are biconvex, convexly triangular in equatorial view. Trilete mark is distinct and Y-rays extend 3/4 of the spore radius or to the inner margin of the radial thickenings. They are slightly sinuous and sometimes possess bifurcating ends with thin, slightly raised and crumpled labra. In few specimens labra are widely open near the pole but gradually tapering towards the ends. Exine is variably thick, 1-1·5 μ thick at the sides and 2-2·5 μ thick at the angles. Proximal surface is smooth and distally ornamented with verrucae which are irregular and elongated. Verrucae are generally free but may be anastomosing and simulating a thick reticulum at the distal polar region. Verrucae are 2-7 μ high and 1·5-3 μ wide at the apices and 3-5 μ wide at their bases. They are separated from each other by 2-4 μ wide spaces. *Extrema lineamenta* is corrugated.

Comparison — *Trilites fusus* sp. nov. resembles *Trilites tuberculiformis* Cooks., in shape but differs from the latter in having slightly variably thickened exine and smaller size with elevated labra which have bifurcated ends. *T. fusus* sp. nov. is distinct from *T. asolidus* Krutz., and *T. paravallatus* Krutz., in having smaller size, larger and thicker sculptural elevations. *Trilites* cf. *T. tuberculiformis* (Cooks.) Dettm., agrees with the description of *T. fusus* sp. nov. but it is distinct in having thicker exine at the sides and angles and having straight Y-rays. *Trilites bossus* Coup., is distinguishable from the present species in having shorter Y-mark and slightly smaller sculptural elevations.

Genus — *Ischyosporites* Balme, 1957

Genotype — *Ischyosporites crateris* Balme, 1957.

Remarks — Balme (1957) assigned such miospores to *Ischyosporites* which possess triangular outline with straight or convex sides having a distinct trilete mark as well as ornamented distal face having anastomosing ridges, simulating irregular reticulum with increased thickening at the angles. The type species *I. crateris* Balme is proximally smooth. Dettmann (1963) considers that the radial thickening is a diagnostic feature of infraturma *Auriculati*, thus she has transferred *Ischyosporites* Balme to *Auriculati* and this treatment has been followed here. The closest ally of *Ischyosporites* is *Klukisporites* Coup., which differs by not having auriculae. *Trilites* Erdtm. ex Coup., and *Trilobosporites* Pant ex Pot., have verruco-regulate sculpture, freely terminating muri and granulate-verrucate sculpture at the polar regions respectively.

Ischyosporites haradensis sp. nov.
Pl. 3, Figs. 73-74

Holotype — Pl. 3, Fig. 73; 38×44·5 μ; Regd. Sl. No. 3421/3.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 33-48·5 μ. Triangular. Trilete. Exine thicker at the angles (3-4·5 μ), proximally smooth, distal and equatorial faces foveo-reticulate, muri thick (2·5-5 μ), lumina polygonal in shape.

Description — Miospores are biconvex, convexly triangular with rounded angles. Trilete mark is distinct and Y-rays reach the inner margin of the radial equatorial thickenings with slightly raised and crumpled labra. Exine is variably thickened, 1-2 μ at the sides and 3-4·5 μ thick at the angles. Proximal surface is smooth. Distal and equatorial surfaces possess foveo-reticulate sculpture. The muroid processes are irregular, 2·5-5 μ thick, 2-5 μ high, deeply and widely cut at the corners. Lumina are polygonal in shape, measuring 5-8 μ wide and 3-5 μ deep in equatorial view. *Extrema lineamenta* is wavy.

Comparison — *Ischyosporites haradensis* sp. nov. differs from *I. crateris* Balme which has triangular equatorial outline, thicker exine, thicker muri and broader lumina. *I. punctatus* Cooks. & Dettm., is bigger in size, has straight sides with punctate exine near the tetrad mark at the proximal surface. *I. irregularis* Sah & Jain differs from *I. haradensis* sp. nov. in having intragranulose ornamentation on the proximal surface and fainter Y-mark. *I. inusilatus* Jain & Sah and *I. incompositus* Jain & Sah differ from *I. haradensis* sp. nov. in having slightly larger size, a central shield at the distal face and the absence of irregular arrangement of reticulum as well as delicate distal ridges that are poorly developed on the central region of the spore respectively. *I. marburgensis* de Jersey is distinct in

having slightly bigger size, slightly thicker exine and reduced ornamentation on the proximal face.

Infraturma — *Tricrassati* Dettm., 1963

Remarks — Potonié (1956 & 1960) included *Gleicheniidites* (Ross) Delc. & Sprum., (1955) under the infraturma *Laevigati* (Benn. & Kidst.) Pot. & Kr., (1954). Thereafter, Dettmann (1963) emended the generic diagnosis of *Gleicheniidites* in which she stated that the genus has interradial thickness (crassitudes) at the equator. For this reason she instituted a new infraturma *Tricrassati* Dettm., (1963) to include *Gleicheniidites* and other morphologically similar spores. This treatment has also been accepted and followed in this treatise.

Genus — *Gleicheniidites* (Ross ex Delc. & Sprum.) Dettm., 1963

Genotype — *Gleicheniidites senonicus* Ross, 1949.

Remarks — Ross (1949) instituted *Gleicheniidites* from the Scania Clay of Sweden and suggested that the spores possibly belong to Gleicheniaceae. Later on, Delcourt and Sprumont (1955) validated the genus by giving the generic diagnosis and designated *G. senonicus* Ross as its genotype. The illustrated specimens of this species possess a trilete mark with smooth exine which is equatorially thickened in the interapical regions. Thereafter, Delcourt and Sprumont (1957) instituted another genus *Triremisporites* which was later on merged with *Gleicheniidites* by the same authors in the years, 1959. Krutzsch (1959) emended the diagnosis of *Gleicheniidites* and incorporated miospores having laevigate to sculptured exine (punctate, granulate or verrucate etc.) besides equatorial thickenings in the interapical regions. In the same publication Krutzsch (*l.c.*) proposed six subgeneric categories under *Gleicheniidites*, of which five incorporate spores with smooth exine and together they conform to the generic diagnosis of *Gleicheniidites*. Dettmann (1963) emended the generic diagnosis of *Gleicheniidites* and disagreed with Krutzsch's treatment of the genus and excluded *Peregrinisporis* from the limits of *Gleicheniidites* because the former category includes sculptured miospores with punctate, granulate and verrucate exine. Sah & Jain (1965) have also described *G. microgranulosus* and *G.* sp. which show sculptured exine. The present author agrees with Dettmann (*l.c.*) that *Gleicheniidites* should not include sculptured miospores. Thus, miospores with sculptured exine but otherwise similar to *Gleicheniidites* have been treated here separately under *Peregrinisporis* Bolkhov., which is characterized by having ornamentated forms.

Gleicheniidites glaucus sp. nov.
Pl. 3, Figs. 75-76

Holotype — Pl. 3, Fig. 75; 26×29 μ; Regd. Sl. No. 3421/2.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 18-34 μ. Rounded acute angles. Exine ±2 μ thick, proximally thicker between the angles (3-4 μ), distally having 3 arcuate, interradial thickenings (2-5 μ).

Description — Miospores are biconvex, triangular with concave or straight sides and rounded acute angles. Trilete mark is prominent and Y-rays reaching the equator. They are straight to weakly sinuous with thin and slightly elevated labra (1-1·5 μ high). Exine is more or less 2 μ thick, the distal face possesses three arcuate, interradial thickenings which are 2-5 μ wide, equatorial thickenings have been observed between the angles, measuring 3-4 μ thick. *Extrema lineamenta* is smooth.

Comparison — *Gleicheniidites glaucus* sp. nov. closely compares with *G. indicus* Singh *et al.* in having more or less similar size and nature of the Y-mark but differs in having thicker exine and fainter equatorial interradial thickenings on the proximal face. *Gleicheniidites* cf. *G. cercinidites* (Cooks.) Dettm., possess more prominent interradial thickenings and thinner exine.

Gleicheniidites apicus sp. nov.
Pl. 3, Figs. 77-78

Holotype — Pl. 3; Fig. 77; 24·5×26 μ; Regd. Sl. No. 3421/3.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 18-28 μ. Triangular, angles appearing ± rhombic in shape. Y-rays characteristically undulating at the polar area. Exine equatorially having narrow interradial thickenings (2-3 μ) and arcuate or straight folds intersecting the Y-rays in the interapical region.

Description — Miospores are triangular with concave sides and rounded angles with pointed radial extremities appearing more or less rhombic in shape. Trilete mark is prominent and Y-rays undulating more at the pole and later running more or less straight to the equator with slightly elevated labra, 1-2 μ thick. Exine is more or less 1 μ thick, distally often possessing arcuate or straight folds in the interapical region usually intersecting the Y-rays. Exine possesses faint, equatorial, interradial thickenings (2-3 μ). *Extrema lineamenta* is smooth.

Comparison — *Gleicheniidites apicus* sp. nov. appears similar to *Gleicheniidites* sp. cf. *G. circinidites* (Cooks.) Singh in the shape of angles but differs from the latter in having undulating trilete mark, fairly concave sides and intersecting fold present in the interapical region. *G. senonicus* Ross is distinct from *G. apicus* sp. nov. in possessing folds parallel to the outer margin whereas the present species shows folds in the interapical region and undulating Y-mark. *G. apicus* sp. nov. is differentiated from *G. mundus* Sah & Jain, *G. microgranulosus* Sah & Jain and *G.* sp. Sah & Jain by having smaller size and undulating Y-mark.

Genus — *Sestrosporites* Dettm., 1963

Genotype — *Sestrosporites* (*Foveotriletes*) *irregulatus* (Coup.) Dettm., 1963.

Sestrosporites irregulatus (Coup.) Dettm., 1963

Pl. 4. Fig. 81

Holotype — Couper 1958; Pl. 22, Fig. 9.

Remarks — *Sestrosporites irregulatus* (Coup.) Dettm., (1963) is represented by a single specimen in the present assemblage. The present specimen varies from those figured by Dettmann (1963, Pl. 27, Fig. 1-3) in having rounded triangular outline and slightly smaller size (38×41 μ).

Genus — *Peregrinisporis* Bolkhov., 1953

Genotype — *Peregrinisporis peregrinus* Bolkhov., 1953.

Peregrenisporis indicus sp. nov.

Pl. 4, Figs. 82-83

Holotype — Pl. 4, Figs. 82-83; 38×43·5 μ; Regd. Sl. No. 3420/9.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 28·5-43·5 μ. Convexly triangular. Trilete, Y-rays sinuous at the apex. Exine sculptured with coni and small verrucae. Distally one arcuate fold or thickening present in each interradial region (2-5 μ wide).

Description — Miospores are biconvex, convexly triangular in equatorial view. Trilete mark is prominent and Y-rays extend up to the equator. They are slightly sinuous at the apex with raised labra (±1 μ high). Exine is equatorially differentially thickened, 2-5 μ thick between the apices and gradually narrowing (1-2 μ wide) at the angles. Proximally it is smooth about the polar region only but small coni, measuring 1-2·5 μ in height, mixed with a few verrucae and are distributed on the distal and equatorial regions. They are closely spaced and are 0·5-1·5 μ apart from each other, their bases being often confluent. In surface view the ornamentation is densely packed but may be free to anastomosing. Interradially three arcuate folds or thickenings are present on the distal surface as well as weakly developed equatorially. *Extrema lineamenta* is sculptured with coni and verrucae.

Comparison — *Peregrinisporis indicus* sp. nov. is distinct from *Peregrinisporis peregrinus* Bolkhov., which has granulose exine and broader crassitudes. *P. echinatus*

Bolkhov., is distinguishable from *P. indicus* sp. nov. in having echinate exine.

Infraturma — *Cingulati* Pot. & Kl., 1964

Genus — *Murospora* Somers, 1952

Genotype — Murospora kosankei Somers, 1952.

cf. *Murospora* sp.
Pl. 4, Fig. 84

Description — Miospore is triangular with very broadly rounded angles and slightly concave sides. Size measures 50·5 × 60 μ. Central body is roundly triangular and surrounded by a thick, equatorial, 5-7 μ wide cingulum which is smooth and dark in colour. Trilete mark is distinct and Y-rays extend to more or less half of the radius. Exine is distally densely tuberculate and proximally smooth.

Remarks — The specimen figured here approaches *Murospora* to some extent though not fully. The distal tuberculate ornamentation, short Y-rays and the very broadly rounded angles distinguish it from *Murospora*. In view of the fact that this is the only specimen available for study, detailed observations have not been possible and it is tentatively included in *Murospora* till some more information is gathered about it.

Suprasubturma — *Perinotriletes* (Erdtm.) Dettm., 1963

Genus — *Densoisporites* (Weyl. & Krieg.) Bharad. & Kumar, 1972

Genotype — Densoisporites velatus Weyl. & Krieg., 1953.

Densoisporites indicus sp. nov.

Pl. 4, Figs. 85-86

Holotype — Pl. 4, Fig. 85; 49 × 57 μ; Regd. Sl. No. 3417/8.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 46-60 μ. Roundly triangular. Trilete. Exoexine closely sculptured with fine grana, 2·5-6 μ wide at sides and 6-8·5 μ wide at angles. Inner layer 38-46 μ.

Description — Miospores are biconvex and roundly triangular to subcircular in equatorial view. Trilete mark is distinct to faintly represented, Y-rays reaching equator of the inner body and their impression extending over the outer layer. They are straight to slightly sinuous, membraneous with low labra. Spore wall is two layered and cavate. The inner layer is thin, homogeneous, subcircular and 38-46 μ in diameter. Exoexine is loosely enveloping and sculptured. It is variably thickened, slightly more in the radial regions, measuring 2·5-6 μ at the sides and 6-8·5 μ at the angles, consisting or randomly arranged sculptured elements (grana) which are low and forming scabrate pattern in surface view, closely patterned near the equatorial region, grana are fine, low and anastomosing to simulate microreticulate sculpture appearing as wrinkles on the surface. *Extrema lineamenta* is closely uneven.

Comparison — The studied specimens of *Densoisporites indicus* sp. nov. agree with *Densoisporites velatus* (Weyl. & Krieg.) Dettm., in their shape and the sculpture but differ from the latter in having slightly wide exoexine and bigger size. *Densoisporites triradiatus* (Delc. & Sprum.) Delc. *et al.* distinguishes itself in being much bigger size and having wider exoexinal layer. *D. fissus* Reinh., is distinct in having exoexine with denser basal region and thicker inner layer. In *D. caretteae* Vissch., the inner layer is thicker. *D. mesozoicus* (Singh *et al.*) Bharad. & Kumar differs in having larger size and wider inner layer as well as exoexine which is coarsely sculptured.

Densoisporites novicus sp. nov.

Pl. 4, Figs. 87-88

Holotype — Pl. 4, Fig. 88; 56 × 62 μ; Regd. Sl. No. 3418/7.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 50-63 μ. Trilete. Inner layer convexly triangular, 34-38 μ in size. Exoexine finely sculptured, 8-11 μ wide at sides and 11-12·5 μ wide at angles.

Description — Miospores are biconvex and convexly triangular in equatorial view. Trilete mark is distinct and Y-rays reach 3/4 or ending near the equator. They are straight to slightly undulating and membraneous with low labra. Spore wall is two layered and cavate. The inner layer is less than 0·5 μ thick, homogeneous, convexly triangular, measuring 34-38 μ in diameter and has a loosely enveloping, outer sculptured exoexine which is closely attached to the proximal face right upto the contact area. Exoexine is variably thickened, slightly thicker at the angles, measuring 8-11 μ thick at the sides and 11-12·5 μ thick at the angles. It has closely arranged sculptural elements (grana), low and fine which lend it a scabrate pattern. One specimen has interradial folds on the proximal face in the inner layer. *Extrema lineamenta* is finely sculptured.

Comparison — *Densoisporites indicus* sp. nov. is different from *D. novicus* sp. nov. in having bigger inner layer and narrower exoexine. *D. fissus* Reinh., differs from *D. novicus* sp. nov. in having thicker inner layer and basal region of exoexine is smaller in size. *D. caretteae* Vissch., differs in having smaller width of exoexine and thicker inner layer. *D. mesozoicus* (Singh *et al.*) Bharad. & Kumar possesses larger size and coarser sculptural elements on the exoexine. *D. poatinaensis* Playford bears conspicuous and elevated lips and has a bigger average range. *D. corrugatus* Archeng. & Gammerro possesses corrugated exine on the proximal face and at the equatorial zona and hence is distinctly different.

Genus — *Crybelosporites* Dettm., 1963

Genotype — *Crybelosporites striatus* (Cooks. & Dettm.) Dettm., 1963.

Crybelosporites sp. cf. *C. stylosus* Dettm., 1963

Pl. 4, Fig. 89

Holotype — Dettmann 1963; Pl. 18, Figs. 12, 13.

Description of specimen studied — Miospore is plano-convex, subcircular in equatorial outline. Size measures 50×58 μ. Central body is dark brown in colour, rounded triangular in shape. Size of the central body measures 37×37·5 μ. Trilete mark is faintly visible and Y-rays extend upto the spore body outline. They are slightly sinuous. Spore wall is stratified, cavate, 9-12 μ wide, consisting of an inner, sculptured layer, ±1·5 μ thick. Sculpture is faint, low, small, free to anastomosing, simulating sinuous ridges over the spore body and a thicker structured, proximally cavate enveloping two layered exoexine. Inner layer of exoexine is ±2 μ thick and spongy in nature. Outer layer of the exoexine is thin, membraneous, composed of radially arranged fibrous elements forming a surface reticulum. Muri are narrow, thin, leaving polygonal to circular lumina, 1-2 μ in diameter. Exoexinal layers are adherent distally and they are separated from each other by a small cavity.

Remarks — *Crybelosporites* sp. cf. *C. stylosus* closely resembles *C. stylosus* Dettm., but the present specimen possesses low and small ridges on the inner layer.

Turma — *Monoletes* Ibr., 1933
Suprasubturma — Acavatomonoletes Dettm., 1963
Subturma — *Azonomonoletes* Lub., 1935
Infraturma — *Laevigatomonoleti* Dyb. & Jachow., 1957

Genus — *Laevigatosporites* Ibr., 1933

Laevigatosporites ovatus Wils. & Webs., 1946

Pl. 4, Fig. 90

Holotype — Wilson & Webster 1946; Fig. 5.

Remarks — The present specimens of *Laevigatosporites ovatus* are larger in size (64-78 μ long and 48-62 μ broad) as compared to those figured by Wilson and Webster (1946).

Laevigatosporites gracilis Wils. & Webs., 1946
Pl. 4, Fig. 91

Holotype — Wilson & Webster 1946; Fig. 4.

Remarks — *L. gracilis* Wils. & Webs., possesses smaller size range (27-30 μ long and 16-19 μ broad) as compared to the present specimens (44-66·5 μ long and 27-43·5 μ broad) of Jabalpur Stage, India.

Genus — *Monolites* (Erdtm., 1947. Cooks., 1947, Chit., 1951) ex Pot., 1956

Genotype — *Monolites major* Cooks., 1947.

Monolites indicus sp. nov.
Pl. 4, Figs. 92-93

Holotype — Pl. 4, Fig. 92; 112×78 μ; Regd. Sl. No. 3421/6.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 105-120 μ long×63-92·5 μ broad. Broadly oval to bean-shaped, concavo-convex. Monolete mark medianly deeply curved. Exine 2·5-6 μ thick and intrapunctate.

Description — Miospores are bilateral, concavo-convex, distal side is deeply convex, broadly oval in polar view but appearing bean-shaped in lateral view. Monolete mark is distinct, 65-90 μ long, medianly deeply curved. Labrum is 2-4 μ thick, raised and crumpled. Exine is dark brown in colour, 2·5-5 μ thick and intrapunctate. Puncta are small, shallow, closely to sparsely set. *Extrema lineamenta* is smooth.

Comparison — *Monolites indicus* sp. nov. closely compares with *M. intragranulosus* Singh *et al.* in having more or less similar shape and size while the latter possesses thinner exine, straight and shorter monolete mark and finely intragranulose exine. *M. grandis* Dev is distinct in having intragranulose, transluscent exine, straight and shorter monolete mark. *Monolites* sp. Coup. is smaller in size with thinner and smooth exine and has straight monolete mark.

? *Monolites* sp.
Pl. 4, Fig. 94

Description — Miospores are bilateral, oval in equatorial view. Size ranges from 72-96 μ long and 47-61 μ broad. Monolete mark is distinct on the proximal (concave) side, 34-36 μ long. Exine is 2-4 μ thick, light brown in colour, intragranulose, grana are coarse, closely packed on both the surfaces. *Extrema lineamenta* is ±smooth.

Infraturma — *Sculptatomonoleti* Dyb. & Jachow., 1957

Genus — *Leschikisporis* (Pot.) Bharad. & Singh, 1964

Genotype — *Leschikisporis aduncus* (Lesch.) Pot., 1958.

Leschikisporis verrucosus sp. nov.
Pt. 4, Figs. 95-96

Holotype — Pl. 4, Fig. 95; 38×34 μ; Regd. Sl. No. 3421/3.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 36-50 μ long and 28-38 μ broad. Rounded triangular or broadly elliptical. Monolete mark asymmetric appearing as trilete. Exine 1-2 μ thick, verrucae low, small, appearing vermiform. Proximal verrucae faint around the mark.

Description — Miospores are rounded triangular or broadly elliptical in polar view but oval in lateral view, distal surface is deeply convex. Monolete or asymmetric trilete mark is distinct, slit reaches 3/4 of the spore radius or to the periphery with simple, straight and thin labra. Exine is 1-2 μ thick, ornamented with small verrucae. Verrucae are low, closely spaced, anastomosing and forming a vermiform pattern. *Extrema lineamenta* is slightly wavy.

Comparison — *Leschikisporis verrucosus* sp. nov. closely compares with *L. aduncus* Bharad. & Singh in size and shape but the latter has finely granulose exine. *L. indicus* Singh *et al.* is distinguishable in having smaller size and finally granulose exine. *Marattisporites scabratus* Coup., possesses a coarser and granulose exine.

Infraturma — *Hilates* (Dettm.) Singh, 1970

Genus — *Rouseisporites* Pocock, 1962

Genotype — *Rouseisporites reticulatus* Pocock, 1962.

Rouseisporites densus sp. nov.
Pl. 4, Figs. 97-98

Holotype — Pl. 4, Fig. 97; 54×60·5 μ; Regd. Sl. No. 3421/6.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 34-66 μ. Exine two layered, inner layer thin, enveloping outer layer loose, membraneous forming an equatorial zona invaginated near the three ridge-

amb. Distal muroid ridges like a triradiate mark having 3 meshes. Exine along ridges and elsewhere finely granulose ornamented.

Description — Miospores are biconvex, subcircular to convexly triangular in equatorial view. Nonaperturate and zonate. Exine is two layered, inner layer thin, rigid and smooth, outer layer appears loose, membraneous and granulose. Zona invaginates like a funnel at each radial region. Distally 3 muroid ridges are prominent and are 2-5 μ wide. Meshes are three in number, each is 24-32·5×44-52 μ in size. Exine is granulose. Grana are fine and closely distributed along the triradiate ridges as well as elsewhere. *Extrema lineamenta* is more or less rough.

Comparison — The specimens assigned to *Rouseisporites densus* sp. nov. are different from *R. reticulatus* Poc., which possesses low ridges that radiate out from the distal pole, and a hole at each equatorial radial region. *R. triangulatus* Poc., is different in having low reticulate ridges. *R. simplex* (Cooks. & Dettm.) Dettm., is distinguishable from *R. densus* sp. nov. in having slightly larger size, thicker exine and more conspicuous distal muroid ridges. *R. granospeciosus* (Delc. & Sprum.) Delc. *et al.* possesses a thicker inner layer and radially oriented, bifurcating muroid ridges at the equator. *R. radiatus* Dettm., also possesses an inner layer which is thick, scabrate and has 4-6 radially disposed muroid ridges at the distal face. *R. sehoraensis* Singh is distinguishable in having outer smooth layer and thinner muroid ridges. *R. pallidus* Singh and *R. pseudosulcatus* Singh are different in having sculptured inner layer and proximally smooth exine in the former whereas, the latter has granulose inner layer, two oval shaped muroid ridges and smooth proximal face.

Genus — *Coptospora* Dettm., 1963

Genotype — Coptospora striata Dettm., 1963

Coptospora mesozoica sp. nov.
Pl. 4, Figs. 99-100

Holotype — Pl. 4, Fig. 99; 62·5×72 μ; Regd. Sl. No. 3406/1.

Locus typicus — Lameta Ghat, Jabalpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 36·5-90 μ. Nonaperturate or hilate. Exine 2-4·5 μ thick, granulose, grana coarse and closely set. An outer thick exoexinal layer loosely enveloping the specimens.

Description — Miospores are biconvex and circular to subcircular in equatorial view. Nonaperturate or hilate. Probably, the distal face has a thinner, ruptured area (hilum) which is more or less subcircular in outline and measures 18-40 μ in diameter at or about the polar region. Exine is 2-4·5 μ thick in optical section, coarsely granulose and ruffled. Exoexinal layer loosely envelopes the miospores. *Extrema lineamenta* is granulose and slightly wavy.

Comparison — *Coptospora striata* Dettm., is different from *C. mesozoica* sp. nov. in having radially striated, distal exine near the equator together with radially elongated elements directed towards the periphery. *C. paradoxa* (Cooks. & Dettm.) Dettm., is distinct in having subtriangular outline, 3-9 hexagonal, fractured areas and a thinner outer layer. *Coptospora* sp. A. Dettm., and *C.* sp. B. Dettm., do not compare by having different ornamentation of the exine. *Katrolaites kutchensis* Venkata. & Kar is closely comparable to *C. mesozoica* sp. nov. in having similar shape, size range and exinal pattern but distinguishes itself in having a distally operculate and intrapunctate exine.

Coptospora pallida sp. nov.
Pl. 4, Fig. 101; Pl. 5, Fig. 102

Holotype — Pl. 4, Fig. 101; 56×62·5 μ; Regd. Sl. No. 3421/7.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 32-62·5 μ. Subcircular. Nonaperturate or hilate. Exine ±2 μ thick, granulose, grana fine and closely set. An outer intact exoexinal layer enveloping the specimens evident.

Description — Miospores are biconvex and subtriangular to subcircular in equatorial view. Nonaperturate or hilate. Probably, the distal face possesses a thinner fractured or darker area (hilum) which is irregular in outline and measures 18-33 μ

in diameter at/or about the polar region. Exine is ±2 μ thick in optical section, finely granulose, intact exoexinal layer envelops the miospores. *Extrema lineamenta* is granulose.

Comparison — *Coptospora pallida* sp. nov. closely compares with *C. mesozoica* sp. nov. in having more or less similar qualitative characters but the latter species differs in having coarsely granulose thicker exine and loose exoexinal layer. *C. striata* Dettm., and *C. paradoxa* (Cooks. & Dettm.) Dettm., are different in having radially striated exine together with other morphological differences.

Anteturma — *Pollenites* Pot., 1931
Turma — *Saccites* Erdtm., 1947
Subturma — *Monosaccites* (Chit). Pot. & Kr., 1954
Infraturma — *Aletesacciti* Lesch., 1955

Genus — *Callialasporites* (Dev.) Bharad. & Kumar, 1972

Genotype — *Callialasporites trilobatus* (Balme) Bharad. & Kumar, 1972.

Callialasporites indicus (Singh & Kumar) comb. nov.

Synonymy

1969 — *Tsugaepollenites indicus* Singh & Kumar; Pl. 1, Figs. 3-5.

Holotype — Singh & Kumar, 1969; Pl. 1, Fig. 4; Text-fig. 2.

Emended specific diagnosis — Pollen grains 52-76 μ. Oval to subglobose. Central body oval to subglobose. Exine irregularly folded. Saccus 4-7 μ wide, frilled and limboid margin 3·5-5 μ thick and microverrucose.

Remarks — On re-examination, the specimens of *C. indicus* Singh & Kumar (1969, Pl. 1, Figs. 3-5) reveal that exine is microsculptured. Saccus is distally inclined and limboid margin is present.

Callialasporites primus (Singh & Kumar) comb. nov.

Synonymy

1969 — *Tsugaepollenites primus* Singh & Kumar; Pl. 1, Figs. 6-8.

Holotype — Singh & Kumar, 1969; Pl. 1, Fig. 6; Text-fig. 3.

Emended specific diagnosis — Pollen grains 88-120 μ. Central body circular, faintly perceptible. Saccus 10-20 μ broad, microverrucose, nonvesiculate, frills absent, slightly notched and 2-2·5 μ thick limboid margin present.

Remarks — The presently studied specimens of *C. primus* (Singh & Kumar) comb. nov. are slightly bigger in size range as described by Singh & Kumar (1969, 88-100 μ).

Callialasporites limbatus (Singh & Kumar) comb. nov.

Synonymy

1969 — *Tsugaepollenites limbatus* Singh & Kumar; Pl. 1, Figs. 9-11.

Holotype — Singh & Kumar, 1969; Pl. 1, Fig. 9; Text-fig. 4.

Emended specific diagnosis — Pollen grains 50-80 μ. Central body subcircular. Saccus trilobed, variably attached saccus to the body, microverrucose or microbaculose and 2-4 μ thick limboid margin.

Callialasporites sehoraensis (Singh & Kumar) comb. nov.

Synonymy

1969 — *Tsugaepollenites sehorensis* Singh & Kumar; Pl. 1, Figs. 12-13.

Holotype — Singh & Kumar, 1969; Pl. 1, Fig. 12; Text-fig. 5.

Emended specific diagnosis — Pollen grains 76-86 μ. Polar vesiculate absent. Saccus 4-6 μ wide, limboid margin 2-2·5 μ thick, microverrucose, and lacking radial folds.

Callialasporites enigmaticus (Singh & Kumar) comb. nov.

Synonymy

1969 — *Tsugaepollenites enigmaticus* Singh & Kumar; Pl. 2, Figs. 19-20.
1969 — *Cerebropollenites nilssonii* Singh & Kumar; Pl. 2, Figs. 24-26.

Holotype — Singh & Kumar, 1969; Pl. 2, Fig. 20.

Emended specific diagnosis — Pollen grains 60-80 μ. Central body incipient. Vesiculae vermiculate on both the faces. Saccus 2-2·5 μ thick limboid margin, microverrucose, intensely indented and twisted.

Remarks — *Callialasporites enigmaticus* (Singh & Kumar) comb. nov. and *Cerebropollenites nilssonii* Singh & Kumar have similar size range, shape and the same pattern of vesiculae as well as incipient central body. However, the latter has been transferred to *Callialasporites enigmaticus* (Singh & Kumar) comb. nov.

Callialasporites fimbriatus (Singh & Kumar) comb. nov.

Synonymy

1969 — *Tsugaepollenites fimbriatus* Singh & Kumar; Pl. 2, Figs. 21-23.

Holotype — Singh & Kumar, 1969; Pl. 2, Fig. 21; Text-fig. 8.

Emended specific diagnosis — Pollen grains 70-90 μ. Central body faintly perceptible. Saccus microverrucose with sparsely spaced low vesiculae.

Callialasporites plicatus (Singh & Kumar) comb. nov.

Synonymy

1969 — *Triangulopsis plicatus* Singh & Kumar; Pl. 2, Figs. 28-30.
1969 — *Triangulopsis varians* Singh & Kumar; Pl. 2, Figs. 31-34.

Holotype — Singh & Kumar, 1969; Pl. 2, Fig. 28.

Emended specific diagnosis — Pollen grains 50-94 μ. Central body triangular with a thick fold at each side. Saccus trilobate, microsculptured and 2-3·5 μ thick limboid margin.

Remarks — The specimens of *C. varians* Singh & Kumar (1969) are very much identical with *C. plicatus* (Singh & Kumar) comb. nov. in having similar type of ornamentation of the exine, shape of the central body and in lacking radial folds.

Callialasporites doringii sp. nov.

Pl. 5, Figs. 103-104

Holotype — Singh & Kumar, 1969; Pl. 1, Fig. 15.

Locus typicus — Sehora, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 55-68 μ. Central body faintly visible. Intexine thick and dark. Saccus narrow, frilled, 2-2·5 μ thick limboid margin, vesiculate excepting proximal and distal polar area and microverrucose.

Description — Pollen grains are monosaccate, circular to subcircular in flattened condition. Central body is subcircular and faintly perceptible measuring 48-54 μ in diameter. Tetrad mark is absent. Exine is two-layered. Intexine is thick and dark in colour and possesses low polar vesiculae which are limited to the body outline and leaving an oval to broadly oval depressed area at the polar region, measuring 20-34 μ in diameter. Distal polar area is thin and measuring 14-25 μ wide. Saccus is variably subequatorially attached, from one face 5-8 μ broad and the other face 10-14 μ broad, frilled in appearance, limboid thickening is 2-2·5 μ, microverrucose, verrucae are fine and closely packed and slightly constricted at three corners. *Extrema lineamenta* is undulated.

Remarks — The specimens of *C. doringii* sp. nov. as illustrated here were previously assigned to *C. lenticularis* (Dor.) Dettm., by Singh & Kumar (1969, Pl. 1, Figs. 15-17). In the light of re-examination of these specimens it is observed that they are different from *C. lenticularis* Dor., and hence, now they have been described under *C. doringii* sp. nov.

Comparison — *Callialasporites doringii* sp. nov. closely compares with *C. segmentatus* (Balme) Bharad. & Kumar in having similar size range, more or less similar width of saccus and similar distribution of vesiculae but the latter differs in lacking polar depression at one face and thick intexine. *C. lenticularis* (Dor.) comb. nov. is comparable with *C. doringii* sp. nov. in having thick intexine and nonvesiculate polar areas but the former is different from the latter in having smooth exine. *C. enigmaticus* (Singh & Kumar) comb. nov. is different in having twisted vesiculae and narrower saccus.

Other species — 1969 *Tsugaepollenites lenticularis* (Dor.) Dettm., in Singh & Kumar; Pl. 1, Figs. 15-17.

Callialasporites circumplectus sp. nov.

Pl. 5, Figs. 105-106

Holotype — Pl. 5, Fig. 105; 53×63 μ; Regd. Sl. No. 3419/7.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis— Size 46-68·5 μ. Saccus 3-4·5 μ wide, appressed to the body exine, microsculptured, vesiculate, polar vesiculae small, low and equatorially twisted.

Description — Pollen grains are monosaccate, subcircular in equatorial outline. Central body is also subcircular measuring 46×57·5 μ in diameter. Tetrad mark is absent. Exine is two-layered intexine thin. Distally thinner polar area is present, 24-25 μ in diameter, vesiculate, vesiculae are small and low which are present on both the faces of the body and directed towards the periphery. Saccus is appressed to the body exine, variably subequatorially attached, 3-4·5 μ wide, lowly frilled, microverrucose and corrugated at the equator measuring 2-3·5 μ wide. *Extrema lineamenta* is twisted.

Remarks — It is difficult to measure the variable attachment of the saccus to the body, because it is almost equatorially appressed but in some places the faint demarcation of loose exoexine is perceptible.

Comparison — *Callialasporites dampieri* (Balme) Bharad. & Kumar is distinct from *C. circumplectus* sp. nov. in having bigger size, broader saccus which is radially folded and is slightly constricted at the equatorial region. *C. segmentatus* (Balme) Bharad. & Kumar has broader saccus with radial folds, prominent polar vesiculae and Y-mark like ridges. *C. enigmaticus* (Singh & Kumar) comb. nov. possesses broader, intensely indented and twisted equatorial saccus and vermiculate pattern of vesiculae. *C. fimbriatus* (Singh & Kumar) comb. nov. also differs from *C. circumplectus* sp. nov. in having larger size, fainter central body, broader saccus with small and numerous vesiculae.

Callialasporites lametaensis sp. nov.
Pl. 5 Figs. 107-108

Holotype — Pl. 5, Fig. 107; 80×96 μ; Regd. Sl. No. 3402/10B.

Locus typicus — Lameta Ghat, Jabalpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis— Size 59-123·5 μ. Central body distinct. Saccus covering larger portion on the proximal face as compared to the distal side, ±2·5 μ thick limboid margin and microbaculate.

Description— Pollen grains are subcircular in equatorial view. Central body is distinct, measuring 48-88 μ in diameter, subcircular or convexly triangular in flattened condition. Alete. Exine is two-layered, consisting of intexine and exoexine. The inner layer is thinner and smooth. Saccus is 15-36 μ at one face and on the other face it is 8-28 μ wide and microbaculate, microbacula are closely packed. Distal polar exine is usually thinner than the proximal one, measuring 25-50 μ in diameter and ±2·5 μ thick limboid margin is present. *Extrema lineamenta* is microbaculate.

Comparison — *Callialasporites lametaensis* sp. nov. closely compares with *C. limbatus* (Singh & Kumar) comb. nov. in having equatorially thickened saccus but the latter differs in having narrower saccus, smaller size and trilobate saccus. *C. primus* (Singh & Kumar) comb. nov. has indistinct body. *C. enigmaticus* (Singh & Kumar) comb. nov., *C. fimbriatus* (Singh & Kumar) comb. nov. and *C. segmentatus* (Balme) Bharad. & Kumar are different from *C. lametaensis* sp. nov. in having vasiculate body as well as frilled saccus. *C. trilobatus* (Balme) Bharad. & Kumar, *C. plicatus* (Singh & Kumar) comb. nov. and *C. discoidalis* (Dev) Bharad. & Kumar possess triangular body and hence, are different from *C. lametaensis* sp. nov. *C. circumplectus* sp. nov. is different from *C. lametaensis* sp. nov. in having smaller size, narrower saccus and vesiculate body exine.

Callialasporites sp.
Pl. 5, Fig. 109

Description — Pollen grain is monosaccate, broadly elliptical in flattened specimen, size measures 126×96 μ. Central body outline is faint, elliptical, measuring 122×95 μ. Alete. Exine is thick and granulose. Distal polar thinner area, is matt, more or less oval in shape, measuring about 95×75 μ. The remaining peripheral surface is densely covered with numerous intensely twisted vesiculae near the distal polar thinner area are smaller, low and closely set but abruptly enlarging and aggregating towards the periphery, appearing closely frilled. Proximal

exine is decorated with vesiculae of similar pattern as in the distal surface but in a more rugged manner.

Comparison — *Callialasporites enigmaticus* (Singh & Kumar) comb. nov. is very small in size and possesses smaller vesiculae, hence it is different from *C.* sp.

Subturma — *Disaccites* Cooks., 1947
Infraturma — *Pinosacciti* (Erdtm.) Pot., 1958

Genus — *Alisporites* Daugh., 1941

Genotype — *Alisporites opii* Daugh., 1941.

Remarks — Daugherty (1941) instituted a form genus *Alisporites* from the Upper Triassic beds of Arizona. According to him "the spores are large, averaging 100-110 microns in length and having two large membraneous wings with reticulate markings. They are spherical to ovate in dorsal view, having a rather thick exine and a single fusiform furrow". The genus has been discussed by various workers like Nilsson (1958), Rouse (1959) and Pocock (1962). Nilsson (1958) emended the generic diagnosis of *Alisporites* Daugherty, and stated that the pollen grains are bisaccate, without Y-mark and with the equatorial outline more or less oval, and that a strong distal inclination of the sacci is not present; the zone of saccus attachment in the middle is hump-like, thickened and dark coloured. Soon after this, Rouse (1959) emended *Alisporites* restricting it for bisaccate pollen grains with the sacci diametrically opposed and with the central furrow flanked by two flaps with well developed margins. He meant to include thereby in it a number of abietinean spore genera of various workers. However, Pocock (1962) suggested that in *Alisporites* the bladders are somewhat distally pendant, that the distal groove is not covered by the bladders and that the central body is ill-defined. It is apparent that the various workers have tended to understand *Alisporites* slightly differently from each other. As apparent to me, the diplotype of *Alisporites* is a bisaccate pollen grain in polar view, with a vertically oval central body, ± equal in height to the two sacci which are distally inclined and their distal zones of attachment form a biconvex sulcus with thin exines. In the flattened central body secondary folds in the wall seem to lie along the equator adding to this conspicuity and the width. Specimens answering to the above description in general, have been referred to *Alisporites* by Nilsson (1958, Pl. 8, Figs. 2, 3), by Rouse (1959, Pl. 1, Figs. 10-16) and by Pocock (1962, Pl. 9, Figs. 140, 141, 142) yet they have worded the diagnosis of the genus differently. It is the contention of the present author to refer only such forms to *Allisporites* as a approximate to the general features of the diplotype described above.

Alisporites sp. cf. *A. bilateralis* Rouse, 1959

Pl. 5, Fig. 110

Holotype — Rouse, 1959; Pl. 1, Fig. 10.

Description of specimens studied — Pollen grains are bisaccate. Size measures 68-76 ×42·5-47 μ. Central body is broadly oval, measuring 21-39×41-51 μ. Exine is 1-1·5 μ thick, proximally intramicroreticulate, distally smooth. Sacci are haploxylonoid, measuring 23-39×36-51·5 μ, bilaterally symmetrically opposed and intramicroreticulate. Distal sulcus is 9-22 μ.

Remarks — *A. bilateralis* Rouse shows two crescentic flaps at the margin of the sulcus. Otherwise *A.* sp. cf. *A. bilateralis* is similar to the specimens of *A. bilateralis* figured by Rouse.

Alisporites ovalis sp. nov.

Pl. 5, Figs, 111-112

Holotype — Pl. 5, Fig. 112; 89×61·5 μ; Regd. Sl. No. 3421/2.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 60-112×52·5-65 μ. Central body broadly oval. Exine ± 1·5 μ thick. Sacci hemispherical and intramicroreticulate with bigger meshes.

Description — Pollen grains are bisaccate. Central body is broadly oval, measuring 34-56×53-62·5 μ. Exine is more or less 1·5 μ thick. Proximal cap is intramicroreticulate with fine meshes. Distal face is smooth. Sacci are haploxylonoid, hemispherical, diametrically opposed, measuring 28-53×49-61 μ in size and ornamented with intramicroreticulate exine. Muri are coarse

with bigger meshes which are irregular in shape. Distal sulcus is 15-20 μ wide.

Remarks— The present specimens assigned to *A. ovalis* sp. nov. closely resemble the specimens of *A. grandis* (Cooks.) Dettm., illustrated by Dettmann (1963) though minor quantitative variations within the two have been noticed. However, the specimen of *A. grandis* as illustrated by Cookson (1953, Pl. 2, Fig. 41) is different from Dettmann's specimens of *A. grandis* in having subspherical outline (106×91 μ) while the latter is horizontally oval (104×72 μ). Hence, specimens of *A. grandis* illustrated by Dettmann (1963) have been transferred to *A. ovalis* sp. nov.

Comparison — *A. ovalis* sp. nov. closely compares with *A. grandis* (Cooks.) Dettm., in having more or less similar ornamentation of exine but the latter differs in having subspherical equatorial outline. *A. indicus* Bharad. & Srivasta., is different in having smaller size range, thickened saccus attachment and slightly distally pendent sacci.

Alisporites mesozoicus sp. nov.
Pl. 5, Figs. 113-114

Holotype — Pl. 5, Fig. 113; 62×45 μ; Regd. Sl. No. 3418/1.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 62-98 × 37·5—62 μ. Central body subcircular. Exine 1-2 μ thick. Sacci intramicroreticulate, reticulum irregular with fine lumina. Distal sulcus broadly biconvex.

Description — Pollen grains bisaccate. Central body is subcircular, measuring 36-60 × 37·5-60·5 μ. Exine is 1-2 μ thick. Proximal cap is intramicroreticulate, lumina less than 0·75 μ in diameter. Distal face is smooth. Sacci are ± equal to the central body, measuring 24-47·5×35-57·5 μ, symmetrically opposed on either side of the central body with slightly pendant and ornamented with irregular intramicroreticulations. Distal sulcus is 15-27 μ wide.

Comparison — *A. similis* (Balme) Dettm., is different from *A. mesozoicus* sp. nov. in having oval central body, smaller size and thinner exine. *A. ovalis* sp. nov. closely compares with *A. mesozoicus* sp. nov. in having similar orientation of sacci but the former is bigger in size range and has broadly oval body outline. *A. baskoensis* Sah & Jain has elliptical central body which is more in width.

Alisporites haradensis sp. nov.
Pl. 5, Figs. 115-116

Holotype — Pl. 5, Fig. 115; 74×70 μ; Regd. Sl. No. 3420/3.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 74-140 × 68-114 μ. Central body oval in polar view. Exine ±1 μ thick, proximally intramicroreticulate. Sacci bean-shaped, intramicroreticulate meshes fine. Distal sulcus fusiform.

Description — Pollen grains are bisaccate, oval in equatorial view including sacci. Central body is oval in polar view, measuring 45×70 μ. Exine is ±1 μ thick, proximally intramicroreticulate with fine meshes, distally smooth or faintly granulose. Sacci are bean-shaped, haploxylonoid, measuring 31·5-55×51-97·5 μ and sometimes unequal in size. Saccus ornamentations are intramicroreticulate having fine meshes with 1-3 μ wide lumina. Distal sulcus is fusiform and 4-11 μ wide.

Comparison — *Alisporites haradensis* sp. nov. closely resembles *A. opii* Daugh., in having similar shape and the nature of the sulcus but the latter differs in having a thicker exine and simple reticulate markings on the saccus. *A. indicus* Bharad. & Srivasta., is smaller in size having uniformly broad sulcus with thick edges and distally microverrucose exine. *A. rajmahalensis* Sah & Jain has smaller size, thicker and granulose body exine. *A. jurassicus* Rao is distinct in having a subspherical central body. *A.* sp. Dev (1961; Pl. 6, Fig. 49) possesses broadly oval body, with faintly intrareticulate exine. *A. mesozoicus* sp. nov. is distinguishable from *A. haradensis* sp. nov. in possessing subcircular central body which is lesser in width.

Alisporites sehoraensis sp. nov.
Pl. 5, Fig. 117; Pl. 6, Fig. 118

Holotype — Pl. 5, Fig. 117; 90×76 μ; Regd. Sl. No. 3410/2.

Locus typicus — Sehora, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 62-102·5 × 51-74·5 μ. Central body markedly spindle-shaped. Exine 1-2 μ thick, proximally intramicroreticulate, distally faint muri, fine, excepting at the sulcus region. Sacci broadly bean-shaped. Distal sulcus shorter than the vertical length of the central body.

Description — The pollen grains are bisaccate. Central body is markedly spindle-shaped with broad vertical edges, measuring 61×68 μ. Exine is 1-2 μ thick proximally, intramicroreticulate with fine meshes, distally thin and has faint muri except at the region of the sulcus. Sacci are haploxylonoid, broadly bean-shaped, measuring 32-47×50-75 μ and ornamented with fine intramicroreticulum. Muri are fine. Distal sulcus is distinct, 7-25 μ broad but falls short of the vertical length of the body.

Comparison — *A. sehoraensis* sp. nov. is distinct from *A. haradensis* sp. nov. which is larger in size, oval in outline and possesses a longer and a narrower sulcus. *A. hemiglobosaccatus* Sah & Jain is different in possessing cristate exine at the proximal face and semiglobose sacci. *A. baskoensis* Sah & Jain possesses a thicker body rim and an indistinct furrow. *A. sehoraensis* sp. nov. is distinct from *A. ovalis* sp. nov. and *A. similis* (Balme) Dettm., in having markedly spindle-shaped central body and fainter muri distally. *A. mesozoicus* sp. nov. possesses subcircular central body and is smaller in size range hence, it is different from *A. sehoraensis* sp. nov.

Infraturma — *Abietosacciti* (Erdtman) Pot., 1958

Genus — *Abiespollenites* Thierg., in Raatz, 1937

Genotype—Abiespollenites absolutus Thierg., in Raatz, 1937.

Abiespollenites triangularis sp. nov.
Pl. 6, Figs. 119-120

Holotype — Pl. 6, Fig. 119; 92×68 μ; Regd. Sl. No. 3416/7.

Locus typicus — Sehora, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 72·5-100 × 51-68 μ. Central body subtriangular. Exine proximally 1-2 μ thick, intramicroreticulate, distally thin and ± smooth. Sacci hemispherical, unequal in size and intramicroreticulate.

Description — The pollen grains are bisaccate. Central body is subtriangular in polar view, measuring 71×63 μ. Exine is 1-2 μ thick. Proximal cap is intramicroreticulate with fine lumina. Distal exine is thin, more or less smooth. Sacci are haploxylonoid and are unequal in size. They are distally pendant and intramicroreticulate. Muri are coarse with small lumina. Distal sulcus is 10-37·5 μ wide.

Comparison — *Abiespollenites triangularis* sp. nov. is distinct from *A. absolutus* Thierg., in having subtriangular central body, smaller size and unequal sacci.

Other species — 1961 *Pityosporites* sp. Dev; Pl. 5, Figs. 39-41.

Infraturma — *Podocarpoiditi* Pot., Thoms. & Thierg., 1950

Genus — *Platysaccus* (Naum.) Pot. & Kl., 1954

Genotype — *Platysaccus papilionis* Pot. & Kl., 1954.

Platysaccus densus (Venkata.) comb. nov
Pl. 6, Fig. 121

Synonymy — *Podocarpidites densus* Venkata., 1969; Pl. 5, Fig. 17.

Description of specimen studied — Pollen grain is bisaccate. Size measures 76×66·5 μ. Central body is spindle to oval in shape, measuring 25×32·5 μ. Exine is thick, dark brown in colour and proximally verrucose. Sacci are diploxylonoid, hemispherical. Distal sulcus is 2·5-3 μ wide.

Remarks— *P. densus* (Venkat.) comb. nov. is represented here by a single specimen and one bladder of it is not well represented. The present specimen of *P. densus* is smaller in size as compared to the specimens illustrated by Venkatachala (1969; Pl. 5, Figs. 16-17, 21), measuring 95-110 μ.

Platysaccus sp. A Sah & Jain, 1965
Pl. 6, Fig. 122

Remarks — Only three specimens have been observed in the Hathnapur assemblage and are assigned to *Platysaccus* sp. A Sah & Jain. The pollen grains are 59-88×48-65 μ

in size, central body is 30-46 μ in diameter, having marginal rim, ±2 μ thick. Sacci are 25-51×48-65 μ in size. These specimens are slightly smaller in size as compared to that figured by Sah and Jain.

Platysaccus sp.

Pl. 6, Fig. 123

Description — Size measures 56·5×64 μ. Central body is circular to oval, measuring 39×36 μ. Exine is 1-2 μ thick and proximally verrucose. Sacci measure 45×67 μ, semicircular in shape and are finely intrareticulate. Distal sulcus is ±5 μ broad.

Remarks — *Platysaccus* sp. is represented by a single specimen in the Hathnapur assemblages. The specimen has similar morphographic characters as in the case of *P.* sp. described by Dev (1961). However, the present specimen is smaller in size and has thicker and darker body exine.

Genus — *Podocarpidites* (Cooks.) Pot., 1958

Genotype— *Podocarpidites ellipticus* Cooks., 1947.

Podocarpidites ellipticus Cooks., 1947

Pl. 6, Fig. 124

Lectotype — Cookson, 1947; Pl. 13, Fig. 6.

Remarks — The studied specimens of *P. ellipticus* Cookson (1947) from the Jabalpur Stage measure 61-97·5×53-71 μ. Central body is broadly elliptical, measuring 35-55×50-65 μ. Exine is 1-2 μ thick and coarsely granulose. Sacci measure 25-57·5×55-78 μ. However, these specimens are slightly bigger in size and have thinner proximal exine as compared to those figured by Cookson (*l.c.*).

Podocarpidites multesimus (Bolkhov.) Poc., 1962

Pl. 6, Fig. 125

Holotype — Bolkhovitina, 1956; Pl. 24, Fig. 235.

Remarks — The presently studied specimens of *Podocarpidites multesimus* have verrucose body cap which in polar view appears like a thick rim as in the case of Bolkhovitina's specimens (Bolkhovitina 1956; Pl. 24, Fig. 235). Pocock (1962) has figured the specimens which possess granular body cap, pendant bladders and have no rim around the body.

Podocarpidites vermiculatus sp. nov.

Pl. 6, Figs. 126-127

Holotype — Pl. 6, Fig. 126; 65×36 μ; Regd. Sl. No. 3421/2.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 44-82·5 × 30-53 μ. Central body roundly oval to subcircular. Exine thin, proximally verrucose, verrucae low and vermiculate.

Description — Pollen grains are bisaccate. Central body is roundly oval to subcircular, slightly longer in horizontal axis and measuring 33-50×28-46·5 μ. Exine is more or less 1 μ thick. Proximal cap is verrucose, verrucae are low, vermiculate in pattern and ±1 μ thick. Sacci are thin, diploxylonoid, semicircular to broadly bean-shaped measuring 16-35×29-53 μ and intramicroreticulate. Muri are coarse. Distal sulcus is 10-24 μ wide.

Comparison — *Podocarpidites vermiculatus* sp. nov. is distinct from *P. cristiexinus* Sah & Jain which possesses cristate ornamentation on the body exine. *P. ellipticus* Cooks. is also distinct from the present species in having finely granulose exine. *P. alareticulosus* Sah & Jain possesses a thin marginal rim around the central body and has smaller bladders than the body *P. canadensis* Poc., compares with *P. vermiculatus* sp. nov. by the similar shape of the central body but possesses larger size and granulose cap. *Podocarpidites* sp. Venkata. *et al.* is different in having larger, horizontally oval and ill-developed central body together with leathery sacci. *P. densus* Venkat., is distinguishable from *P. vermiculatus* sp. nov. in having 3 times larger sacci as compared to the central body together with proximally thicker body exine.

Genus — *Baculopollenites* gen. nov.

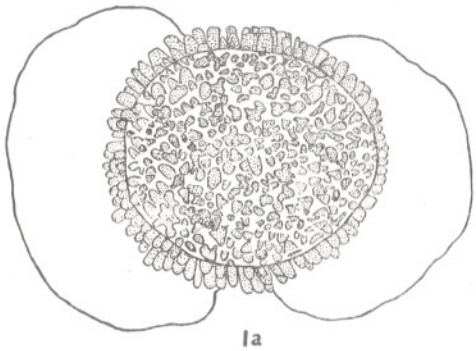
Generic diagnosis— Pollen grains bisaccate. Central body circular to subcircular proximally having ornamentation of verrucae mixed with bacula, ornaments closely packed, denser equatorially, forming a marginal,

thick rim in flattened condition. Alete. Exine distally smooth. Sacci broadly bean-shaped, intramicroreticulate and distally slightly inclined.

Dimensions — Equatorial diameter 39-84 ×30-58 μ.

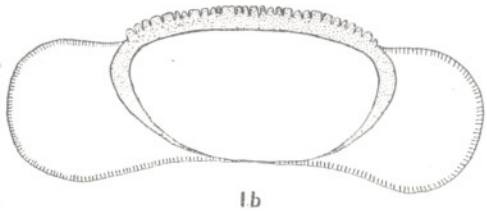
Genotype — *Baculopollenites haradensis* sp. nov.

Reconstruction — See Text-fig. 1a-b.



1a

TEXT-FIG. 1a — Proximal view showing ornaments of the exine of the central body.



1b

TEXT-FIG. 1b — Meridional section.

Comparison— *Podocarpidites* Cooks., (1947) is different from *Baculopollenites* gen. nov. in having proximally granulose exine and oval central body. *Alisporites* Daugh., (1941) is distinct from the present new genus in having distally a fusiform furrow and an oval central body which lacks prominent sculptural elements viz., verrucae or bacula on the proximal face. *Platysaccus* Pot. & Kl., (1954) possesses a central body having smooth to verrucose exine proximally, hence, it is different from *Baculopollenites* gen. nov. *Tumoripollenites* Bharad., (1962) has proximally tuberculate exine.

Derivation of name — On the basis of sculptural element (Bacula).

Baculopollenites haradensis sp. nov.

Pl. 6, Figs. 128-129

Holotype — Pl. 6, Fig. 129; 64×45 μ; Regd. Sl. No. 3421/6.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Bisaccate. Size 39-84×30-58 μ. Central body circular. Exine proximally ornamented with verrucae mixed with bacula, making a thick marginal rim. Sacci diploxylonoid and intramicroreticulate.

Description — Pollen grains are bisaccate. Central body is circular to subcircular in flattened condition, measuring 30-40×28-38 μ. Exine is proximally ornamented with mostly verrucae and also mixed with bacula. Sculptural elements are closely packed and coalescing. Verrucae are 1·5-3·5 μ long having broad rounded or may be flattened tips. Bacula are ±2 μ long and blunt, smooth to uneven tips. In the flattened condition 2-3·5 μ thick rim is present at the periphery of the central body. Distally exine is smooth. Sacci are diploxylonoid, broadly bean-shaped, distally inclined measuring 20-40·5×29-58 μ, and intramicroreticulate. Sometimes one or more horizontal folds are present arising from the saccus attachment area to the central body. Distal sulcus is 10-14 μ wide.

Subturma — *Polysaccites* Cooks., 1947

Genus — *Podosporites* Rao, 1943

Genotype — *Podosporites tripakshi* Rao, 1943.

Podosoprites sp.

Pl. 6, Fig. 130

Description — Pollen grain is trisaccate, triangular in polar view. Size measures 46-52·5 μ. Central body is triangular in equatorial view, measuring 42×52 μ. Exine is 2-4 μ thick and granulose. Sacci are rudimentary, frilled, infolded on the central body outline, much smaller than on the central body, measuring 8-10×18-42 μ,

reticulum obscure. Distally a broad triangular gap is apparent.

Comparison — *Podosporites* sp. is distinct from *P. microsaccatus* (Coup.) Dettm., as the latter is smaller in size and has intramicroreticulate sacci. *P. raoi* Singh *et al.* is distinguishable from *P.* sp. in having smaller size, intrareticulate exine with infolded sacci which seem to cover a wide area of the central body.

Turma — *Aletes* Ibr., 1933
Subturma — *Azonaletes* (Lub.) Pot. & Kr., 1954
Infraturma — *Granulonapiti* Cooks., 1947

Genus — *Araucariacites* (Cooks.) Coup., 1953

Genotype — *Araucariacites australis* Cooks., 1947.

Araucariacites indicus (Singh, Srivasta. & Roy) comb. nov.

Pl. 6, Figs. 131-132

Synonymy

1964 — *Laricoidites indicus* Singh, Srivastava & Roy; Pl. 3, Figs. 111-112.
1965 — *Laricoidites communis* Sah & Jain; Pl. 7, Figs. 139, 140, 154.

Holotype — Singh, Srivastava & Roy, 1969; Pl. 8, Fig. 112.

Description — Pollen grains are subcircular in equatorial view. Size range varies from 88-121 μ. Alete. Exine is 1-1·5 μ thick in optical section and granulose. Grana are fine, closely spaced. Secondary folds are irregular in distribution, thin and numerous. *Extrema lineamenta* is ± rough.

Remarks — The specimens of *Araucariacites indicus* as illustrated by Singh *et al.* (1964, Pl. 8, Figs. 111-112) appear granulose and not intrapunctate. Sah & Jain (1965) have also described *A. communis* which is reported to have microgranulose exine. However, both the species have been made a new combination *Araucariacites indicus* (Singh *et al.*) comb. nov.

Araucariacites limbatus sp. nov.

Pl. 7, Figs. 140-141

Holotype — Pl. 7, Fig. 133; 77×93 μ; Regd. Sl. No. 3406/1.

Locus typicus — Lameta Ghat, Jabalpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 67-105 μ. Exine 2·5-4 μ thick, grana coarse, and crowdedly packed. Secondary folds leathery.

Description — Pollen grains are subcircular to broadly oval in equatorial view. Alete. Exine is 2·5-4 μ thick in optical section and granulose. Grana are coarse, crowdedly packed all over the surface, a few specimens have a thinner polar area, measuring 35-46 μ. Secondary folds are leathery in appearance and irregularly distributed. *Extrema lineamenta* is rough.

Comparison — *Araucariacites limbatus* sp. nov. is distinct from *A. australis* Cooks. which has thinner and uniformly finely granulose exine. *A. ghuneriensis* Singh *et al.* possesses thinner exine and variable size of grana, being differentially distributed over the exine. *A. cooksonii* Singh *et al.* has thinner and finely granulose exine.

Other species — 1957 *Inaperturopollenites limbatus* Balme; Pl. 7, Figs. 83-84.

Infraturma — *Reticulonapiti* (Erdtm.) Vimal., 1952

Genus — *Reticulatasporites* Lesch., 1955

Genotype — *Reticulatasporites densus* Lesch., 1955.

Reticulatasporites sp.

Pl. 7, Figs. 136-137

Description — Miospores are subcircular in equatorial view. Size measures 48-98 μ. Alete. Exine is thin and broadly reticulate on both the surfaces. Muri are 3-6 μ thick, sometimes projecting beyond the equatorial outline. Their sides are straight forming hexagonal to polygonal lumina, measuring 12-22 μ wide.

Comparison — *Reticulatasporites aduncus* Leschik is distinct from *R.* sp. in having small size and smaller lumina together with thinner muri. *R. densus* possesses smaller size and punctate exine.

Turma — *Plicates* (Naum.) Pot., 1960
Subturma — *Monocolpates* Iversen & Troels-Smith. 1950

Genus — *Cycadopites* (Wodeh.) ex Wils. & Webs., 1946

Genotype — *Cycadopites follicularis* Wils. & Webs., 1946.

Cycadopites sp. cf. *C. sakrigaliensis* Sah & Jain, 1965
Pl. 7, Figs. 138-139

Holotype—Sah & Jain, 1965; Pl. 7, Fig. 144.

Description — Pollen grains are monosulcate, elliptical to oval in equatorial outline. Size range is 44-63 μ long and 26·5-34·5 μ broad. They are twice long as broad. Ends are narrow or roundly pointed. Furrow extends full length at the distal side of the pollen grain, broader at the polar region and gradually narrowing towards the ends. Exine is more or less 1 μ thick, ornamented with grana which are coarse and closely packed. *Extrema lineamenta* is granulose.

Remarks — The specimens of *Cycadopites* sp. cf. *C. sakrigaliensis* Sah & Jain figured here slightly differ from *Cycadopites sakrigaliensis* Sah & Jain in having densely ornamented and thinner exine.

Cycadopites couperi (Dev) comb. nov.
Pl. 7, Figs. 140-141

Synonymy — 1961 *Monosulcites couperi* Dev; Pl. 8, Fig. 64.

Holotype — Dev, 1961; Pl. 8, Fig. 64.

Description — Pollen grains are monosulcate, elongated oval to broadly elliptical or boat-shaped in equatorial view. Size is 80-153·5 μ long and 44-77 μ broad. Ends are roundly pointed. Furrow extends from one end to the other, narrower in the polar region and gapping towards the ends. Exine is ±1·5 μ thick, granulose. Grana are fine and closely packed. *Extrema lineamenta* is granulose.

Remarks — The specimens assigned to *C. couperi* (Dev) comb. nov. are abundantly noticed in the assemblage from Sehora. The present specimens of C. couperi are granulose and ranging from 80-153·5×44-77 μ in size. The known size range of the species as reported by Dev (*l.c.*) is 103-139 ×47-69 μ and on the re-examination of the holotype, it is observed that exine of the holotype is finely granulose not intragranulose. Thereby, the species has been transferred to *Cycadopites* as the nature of the sulcus is closer to this genus than *Monosulcites*.

Genus — *Monosulcites* (Erdtm. 1947, Cooks., 1947) ex Coup., 1953

Lectotype — *Monosulcites minimus* Cooks., 1947.

Monosulcites ellipticus sp. nov.
Pl. 7 Figs. 142-144

Holotype — Pl. 7, Fig. 142; 116·5×69 μ; Regd. Sl. No. 3407/8.

Locus typicus — Sehora, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 79-121·5 μ long and 46-97·5 μ broad. Broadly oval to elliptical. Ends broadly rounded. Distal furrow broader at one end and gradually narrowing towards the other end. Exine ±2 μ thick and finely granulose with irregular folds.

Description — Pollen grains are broadly oval to elliptical in equatorial view. Ends are broadly rounded. Distal furrow joins the ends, broadly open at one end from where it gradually tapers towards the opposite end. Sometimes longitudinal folds are present at or about the sulcus margins. Exine is ±2 μ thick, granulose and irregularly folded. Grana are fine and closely distributed. *Extrema lineamenta* is ± smooth but sometimes grana have been noticed projecting out of the margin.

Comparison — *Monosulcites parvus* Pot. & Sah differs from *M. ellipticus* sp. nov. in having smaller size and ± tapering ends. *M. maximus* Cooks., and *M. minimus* Cooks., are smaller in size range and lacking folds, hence, they are different from *M. ellipticus* sp. nov.

Turma — *Poroses* (Naum.) Pot. 1960
Subturma — *Operculati* Venkata. & Gocz., 1964

Genus — *Classopollis* ((Pf.) Venkata., 1966

Genotype — *Classopollis classoides* Pflug, 1953.

Remarks — The genus *Classopollis* was instituted by Pflug (1953). Pocock and Jansonius (1961) emended its diagnosis and also designated the type species. Venkatachala and Goczan (1964) supported Pocock and Jansonius's view on this genus. Later, Venkatachala (1966) opined that *Classopollis* has got an operculum and emended its diagnosis accordingly. This interpretation has been supported by the present study. This genus is widely distributed in Mesozoic rocks. Chaloner and Clarke (1962) have recorded its presence in the Rhaetic strata as well.

Classopollis sp. cf. *C. torosus* (Reiss.) Coup., 1958

Pl. 7, Figs. 145-146

Lectotype—Reissinger, 1950; Pl. 14, Fig. 20.

Description — Pollen grains are mostly, subcircular, oval or convexly triangular in equatorial outline. Size range is 23-48 μ. Pollen grains are monoporate having distally a distinct circular or subcircular pore. Exine is operculate, operculum is 17-32 μ, delimited and bordered by an equatorial exoexinal thickening which is 2-3 μ thick and scabrate with small inwardly projected rod like bacula appearing as radially disposed pits in polar view, measuring ±0·75 μ long and ±0·5 μ broad. Polar exine has irregular puncta which are arranged in 5-8 annular bands of intexinal thickening and forming ±8 μ wide zone, noticeable in some specimens. Proximally a weak vestigial and poorly developed tetrad scar or triangular thinner polar area, ±9 μ, is present. *Extrema lineamenta* is smooth.

Remarks — The specimens of *Classopollis* sp. cf. *C. torosus* have slightly smaller bacula.

Classopollis sp.

Pl. 7, Fig. 147

Description — Pollen grain is circular or subcircular in equatorial view. Size measures 84×76 μ. Pollen grain is operculate and distinctly monoporate. Exine is ±3 μ thick, forming a rim at the perimeter, intrapunctate having equatorially inwardly directed rod-like bacula which are radially oriented in polar view, bacula are 3-5 μ long. Irregularly demarcated puncta are visible in surface view. Distal exine has a weak, ill-defined pore, measuring 40-50 μ. *Extrema lineamenta* is smooth.

Comparison — Only one specimen of *Classopollis* sp. has been recovered from the Sehora assemblage. *C. calssoides* Pf., and *C. torosus* Coup., are fairly smaller in size and have smaller bacula as the ornamentation of the exine.

Genus — *Gliscopollis* Venkata., 1966

Genotype — *Gliscopollis* (al. *circulina*) *meyeriana* (Kl.) Venkata., 1966.

Gliscopollis pallidus sp. nov.

Pl. 7, Figs. 148-150

Holotype — Pl. 7, Fig. 148; 26×28 μ; Regd. Sl. No. 3418/1.

Locus typicus — Harad river near Hathnapur, Narsinghpur district, Madhya Pradesh, India.

Stratum typicum — Jabalpur Stage, Jabalpur Series, Upper Gondwana, India.

Diagnosis — Size 23-33·5 μ. Triradiate or triangular scar present at the proximal pole. Exoexine 2-3·5 μ thick, smooth, intexine thin and faintly intrapunctate.

Description — Pollen grains are circular or subcircular in polar view, lenticular in oblique compressions. Pollen grains are distally operculate and distinctly monoporate, measuring 8-9 μ in diameter. Proximal face has vestigial triangular or triradiate scar. Exine consists of two layers, exoexine is smooth, 2-3·5 μ thick and darker in colour, intexine is faintly intrapunctate, distally thinning out in the form of a ring, ±0·5 μ thick, demarcating the operculum which is 17-24 μ in diameter. *Extrema lineamenta* is smooth.

Comparison — *Gliscopollis meyeriana* (Kl.) Venkata., differs from *G. pallidus* sp. nov. in having larger size and thicker exoexinal band. *G. nammalensis* Jain & Sah is distinct in having thinner exine and prominent radial striations along the margin.

ACKNOWLEDGEMET

My sincere appreciation is expressed to Dr. D. C. Bharadwaj, Asstt. Director, Birbal Sahni Institute of Palaeobotany, Lucknow, for the constant encouragement during the progress of this work and critically going through the manuscript. The author is also highly thankful to Dr. H. P. Singh, Birbal Sahni Institute of Palaeobotany, Lucknow, for supplying the material for the present taxonomical study and his helpful advice.

REFERENCES

BALME, B. E. (1957). Spores and pollen grains from the mesozoic of western Australia. *C.S.I.R.O.*, **25**: 1-48.

BHARADWAJ, D. C. (1962). The miospore genera in the coals of Raniganj Stage (Upper Permian), India. *Palaeobotanist.* **9**(1 & 2): 68-106.

BHARADWAJ, D. C. & KUMAR, P. (1972). On the status of some miospore genera from the Mesozoic Era. *Ibid.* **19**(3). :214-224.

BHARADWAJ, D. C. & SINGH, H. P. (1964). An upper Triassic Miospore assemblage from the coals of Lunz, Austria. *Ibid.* **12**(1): 28-44.

BHARADWAJ, D. C. & SRIVASTAVA, SHYAM C. (1969). A triassic mioflora from India. *Palaeontolographica.* **125B**: 119-149.

BOLKHOVITINA, N. A. (1953). Spores and pollen characteristic of Cretaceous deposits of central regions of U.S.S.R. *Tr. Inst. Geol., Akad. Nauk. S.S.S.R.* **145** (*Geol. Ser.* 61): 1-184 (In Russian).

Idem (1956). Atlas of spores and pollen from Jurassic and lower Chalk layer of Veliuiskoi Basin. *Acad. Sci. Rep. geol. Inst. Publ.,* **2**: 1-132 (Russian).

COOKSON, I. C. (1947). Plant microfossils from the Lignites of Kerguelen Archipelago. *Rep. B.I.S.R.A.,* **2**: 127-142.

Idem (1953). Difference in miospore composition of some samples from a bore at Comaum, South Australia. *Aust. J. Bot.* **1**(3): 462-473.

COOKSON, I. C. & DETTMANN, M. E. (1959). Microfloras in bore cores from Alberton West, Victoria. *Proc. R. Soc. Vict.,* **71**: 31-38.

COUPER, R. A. (1953). Upper Mesozoic and Cainozoic spores and pollen grains from New Zealand. *N.F. Palaeont. Bull., Wellington.* **22**: 1-77.

Idem (1958). British Mesozoic Microspores and pollen grains, systematic and stratigraphic study. *Palaeontographica.* **103B**: 75-179.

Idem (1960). New Zealand Mesozoic and Cainozoic plant microfossils. *N.F. Palaeont. Bull. Wellington.* **32**: 1-88.

DAUGHERTY, L. H. (1941). The Upper Triassic flora of Arizona. *Carnegie. Inst. Wash. Publ.* **526**: 1-108.

DE JERSEY, N. J. (1959). Jurassic spores and pollen grains from the Rose-wood Coalfield. *Qd. Govt. Min. J.* **60**: 346-366.

Idem (1960). Jurassic spores and pollen grains from the Rosewood Coalfield. *Geol. Surv. Qd. Publ.* (294): 1-14.

Idem (1962). Triassic spores and pollen grains from the Ipswich Coalfield. *Ibid.,* (307): 1-18.

Idem (1963). Jurassic spores and pollen grains from the Marburg sandstone. *Ibid.,* 313.

Idem (1964). Jurassic spores and pollen grains from the Surat Basin. *Ibid.,* (322): 1-18.

Idem (1965). Plant microfossils in some Queensland Crude oil samples. *Ibid.,* (329): 1-9.

Idem (1968). Triassic spores and pollen grains from the Clematis Sandstone. *Ibid.,* 338(14): 1-44.

DE JERSEY, N. J. & HAMILTON, M. (1967). Triassic spores and pollen grains from the Moolayember formation. *Ibid.,* (336): 1-61.

DELCOURT, A. & SPRUMONT, G. (1955). Les spores et grains de pollen du Wealdien du Hainaut. *Mem. Soc. belge. Geol.* **4**(5): 1-73.

Idem (1957). Quelques microfossils du Wealdien de Fé ron-Glageon. *Extraits Bull. Soc. belge. Geol. Paléont. Hydrol.* **66**: 57-67.

DELCOURT, A. F., DETTMANN, M. E. & HUGHES, N. F. (1963). Revision of some Lower Cretaceous microspores from Belgium. *Palaeontology* **6**(2): 282-292.

DETTMANN, M. E. (1963). Upper Mesozoic microfloras from South-eastern Australia. Proc. *R. Soc. Vict.* **77**(1): 1-148.

DEV, S. (1961). The fossil flora of the Jabalpur Series-3. Spores and pollen grains. *Palaeobotanist.* **8**(1, 2): 43-56.

DÖRING, H. (1962). Planktonartige fossilien des Jura/Kreide-Grenzbereichs der Bohrungen Werle (Mecklenburg). *Geologie.* **10**(32): 110-121.

JAIN, K. P. & SAH, S. C. D. (1966). Revision of Jurassic spores and pollen grains from Andigama, Ceylon. *Palaeobotanist.* **14**(1-3): 106-115.

KRUTZSCH, W. (1959). Mikropaläontologische (sporenpaläontologische) untersuchungen in der Braunkohle des Geiseltales. *Geologie.* **8**(21/22): 1-425.

Idem (1962). Atlas der mittel-und jungtertiaren dispersen sporen-und pöllen-sowie der microplankton formen des nordlichen mitteleuropas. I. Laevigate und toriate trilete sporenformen. *Mitt. Zent. geol. Inst. Berlin*: 1-108.

LESCHIK, G. (1955). Die Keuperflora von Neuewelt bei Basel. II. Iso-und Mikrosporen. *Schweiz. palaeont. Abh.,* **72**: 9-70.

MANUM, S. (1962). Studies in the Tertiary flora of Spitsbergen with notes on Tertiary floras of Ellesmere Island, Greenland and Iceland. *Norsk. Polarinst. Skr.* **125**: 1-127.

NILSSON, T. (1958). Uber das vorkommen Eines Mesozoischen sapropelgesteins in Schonen. *Acta Univ. lund.* **54**(10): 6-111.

POCOCK, S. A. J. (1962). Microfloral analysis and age determination of strata at the Jurassic-Cretaceous boundary in the Western Canada Plains. *Palaeontographica.* **111B**: 1-95.

Idem (1964). Pollen and spores of the Chlamydo spermidae and Schizaeaceae from Upper Mann ville Strata of the Saskatoon area of Saskatchewan. *Grana Palynol.* **5**(2): 129-209.

POCOCK, S. A. J. & JANSONIUS, J. (1961). The pollen genus *Classopollis* Pflug, 1953. *Micropalaeontology.* **7**(4): 439-449.

PFLUG, H. D. (1953). Zur entstehung und entwicklung des angiospermiden pollen in der Erdgeschicte. *Palaeontographica.* **95B**: 60-171.

PLAYFORD, G. & DETTMANN, M. E. (1965). Rhaeto-Liassic plant microfossils from the Leigh Creek Coal measures, South Australia. *Senckenberg. leth.* **46**(2/3): 127-181.

POTONIÉ, R. (1956). Synopsis der Gattungen der *Sporae dispersae.* I. Teil. Sporites. *Geol. Jber.* **23**: 1-103.

Idem (1958). Synopsis der Gattungen der *Sporae dispersae.* II. *Ibid.,* **31**: 1-174.

Idem (1960). Synopsis der Gattungen der *Sporae dispersae.* III. *Ibid.,* **39**: 1-189.

POTONIÉ, R. & GELLETICH, J. (1933). Über die Pteridophytensporen einer eözanen Braunkohle aus Dorog, Ungarn. *Sber. berl. nat.* **33**: 517-528.

POTONIÉ, R. & KLAUS, W. (1953). Einige Sporengattungen detalpinen salzgebirages. *Geol. Jber,* **68**: 517-546.

POTONIÈ, R. & KREMP, G. (1954). Die Gattungen der palaeozoischen *Sporae dispersae* und ihre stratigraphie. *Ibid.,* **69**: 111-193.

Idem (1955). Die *Sporae dispersae* des Ruhrkarbons usw. Pt. I. *Palaeontographica.* **98B**: 1-136.

POTONIÉ, R. & SAH, S. C. D. (1958). *Sporae dispersae* of the Lignites from Cannanore Beach on the Malabar Coast of India. *Palaeobotanist.* **7**(2): 121-135.

RAATZ, G. V. (1937). Mikrobotanisch-stratigraphische untersuchung der Braunkohle des Muskauer Bogens. *Abh. preuss. geol. Landesanst.* **183**: 1-43.

RAO, A. R. (1943). Jurassic spores and Sporangia from the Rajmahal Hills, Bihar. *Proc. natn. Acad. Sci. India.* **13**(3): 181-197.

REINHARDT, P. (1954). Über die Sporae dispersae der Thüringer Trias. *Mber. dt. Akad. Wiss. Berl.* **6**(1): 45-56.

ROSE, N. (1949). On a Cretaceous Pollen and spore bearing clay deposit of Scania. *Bull. geol. Instn. Univ. Upsala.*, **34**: 25-43.

ROUSE, G. E. (1959). Plant microfossils from Kootenay Coal-measures strata of British Columbia. *Micropalaeontology.* **5**(3): 303-324.

SAH, S. C. D. & JAIN, K. P. (1965). Jurassic spores and pollen grains from the Rajmahal Hills, Bihar, India: with a discussion on the age of the Rajmahal Intertrappean Beds. *Palaeobotanist.* **13**(3): 264-290.

SAMOILOVITCH, S. R. *et al.* (1961). Pollen and spores of the western Siberia: Jurassic-Pliocene. *J. Soviet union Petrol. Sci. Res. Geol. Expl. Inst.* (VNIGRI) *Issue.* **177**: 1-657.

SINGH, C. (1964). Microflora of the Lower Cretaceous Mannville group, East-Central Alberta. *Bull. Res. Coun. Alberta.* **15**: 1-238.

SINGH, H. P. (1965). Saccate pollen grains from the Lower Triassic of Hallstatt, Austria. *Palaeobotanist.* **13**(1): 74-81.

Idem (1970). On some species of *Rouseisporites* Pocock occuring in the Jabalpur Series (Lower Cretaceous) of India. *Ibid.* **18**(1): 8-11.

SINGH, H. P. & KUMAR, P. (1969). Reappraisal of some subsaccate fossil pollen genera. *Palaeobotanist.* **17**(1): 80-92.

Idem (1972). Some new miospore genera from Upper Gondwana Coals of India. *Ibid.* **19**(2). :164-174

SINGH, H. P., SRIVASTAVA, S. K. & ROY, S. K. (1964). Studies on the Upper Gondwana of Cutch-1. Mio- and Macrospores. *Ibid.* **12**(3): 282-306.

THOMSON, P. W. & PFLUG, H. (1953). Pollen und sporen des mitteleuropäischen tertiärs. *Palaeontographica.* **94B**: 1-138.

VENKATACHALA, B. S. (1966). Mesozoic operculate pollen and their morphology. *Palaebotanist.* **15**(1-2): 98-101.

Idem (1969). Palynology of the mesozoic sediments of Kutch. 4. Spores and pollen from the Bhuj Exposures near Bhuj, Gujarat District. *Ibid.*, **17**(2): 208-219.

VENKATACHALA, B. S. & GÓCZAN, F. (1964). The spore-pollen flora of the Hungarian "Kossen Facies". *Acta geol. Bpest.*, **8**(1-4): 203-228.

VENKATACHALA, B. S. & KAR, R. K. (1967). *Katrolaites* gen. nov., A new fossil from the Jurassic rocks of Kutch, India. *Curr. Sci.*, **36**(22): 613-614.

VENKATACHALA, B. S., KAR, R. K. & RAZA, S. (1969). Palynology of the Mesozoic sediments of Kutch, W. India-5. Spores and pollen from Katrol Exposures near Bhuj, Kutch District, Gujarat State. *Palaeobotanist.* **17**(2): 184-207.

VISCSHER, H. (1966). Palaeobotany of the Mesophytic III plant microfossils from the Upper Bunter of Hengelo, The Netherlands. *Acta bot. Neelr.*, **15**: 316-375.

WEYLAND, H. & KRIEGER, W. (1953). Die sporen und pollen der Aachener Kreide und ihre Bedeutung für die charakterisierung des mittleren senons. *Palaeontographica.* **95B**: 6-29.

WILSON, L. R. & WEBSTER, R. M. (1946). Plant microfossils from a fort unian coal of Montana. *Am. J. Bot.*, **33**(4): 271-278.

EXPLANATION OF PLATES

(All photomicrographs are from unretouched negatives and magnified Ca. 500×)

PLATE 1

1-2. *Cyathidites punctatus* (Delc. & Sprum.) Delc. *et al.*, Regd. Sl. Nos. 3409/10, 3414/14.

3-4. *C. densus* sp. nov., Regd. Sl. Nos. 3419/8 (Holotype), 3421/2.

5-6. *Alsophilidites psilatus* sp. nov., Regd. Sl. Nos. 3421/8 (Holotype), 3417/7.

7-9. *Haradisporites scabratus* sp. nov., Regd. Sl. Nos. 3421/5, 3421/5–3421/5 (Holotype), 3417/10.

10-11. *Haradisporites undulatus* sp. nov., Regd. Sl. Nos. 3417/7 (Holotype), 3421/3.

12-14. *Haradisporites sinuosus* sp. nov., Regd., Sl. Nos. 3421/7, 3421/7 (Holotype), 3421/2.

15. *Haradisporites* sp., Regd. Sl. No. 3421/1.

16. *Stereisporites* sp., Regd. Sl. No. 3417/9.

17. Cf. *Stereisporites* sp. A., Regd. Sl. No. 3421/2.

18. Cf. *Stereisporites* sp. B., Regd. Sl. No. 3421/5.

19. *Biretisporites* sp., Regd. Sl. No. 3421/5.

20. *Dictyophyllieites haradensis* Sp. nov., Regd. Sl. No. 3417/3.

21. *Dictyophyllidites* sp., Regd. Sl. No. 3421/2.

22-25. *Concavisporites novicus* sp. nov., Regd. Sl. Nos. 3421/6 (Holotype), 3421/2, 3421/5, 3421/2.

26. *Concavisporites* sp., Regd. Sl. No. 3417/9.

27. *Leptolepidites* sp., Regd. Sl. No. 3421/8.

28-29. *Lophotriletes* sp., Regd. Sl. Nos. 3421/10, 3421/2.

30-33. *Baculatisporites rotundus* sp. nov., Regd. Sl. Nos. 3417/5 (Holotype), 3417/6, 3421/3, 3417/6.

PLATE 2

34-37. *Neoraistrickia pallida* sp. nov., Regd. Sl. Nos. 3421/7-3421/7 (Holotype), 3421/6, 3421/1.

38-39. *Biformaesporites* sp., Regd. Sl. Nos. 3414/1, 3414/1.

40-41. *Rugulatisporites* sp., Regd. Sl. Nos. 3417/6, 3417/6.

42-43. *Lycopodiacidites* sp., Regd. Sl. Nos. 3417/10, 3417/10.

44-45. *Foveosporites* sp., Regd. Sl. Nos. 3421/8, 3420/5.

45-49. *Lycopodiumsporites sinuosus* sp. nov., Regd. Sl. Nos. 3421/10-3421/10 (Holotype), 3417/3, 3417/5.

50-51. *Lycopodiumsporites pallidus* sp. nov., Regd. Sl. Nos. 3421/6 (Holotype), 3417/9.

52-54. *Klukisporites haradensis* sp. nov., Regd.

Sl. Nos. 3421/4-3421/4 (Holotype), 3421/10.

55-57. *Cicatricosisporites* sp., Regd. Sl. Nos. 3421/9, 3421/9, 3421/9.

PLATE 3

58-59. *Matonisporites dubius* sp. nov., Regd. Sl. Nos. 3421/8 (Holotype), 3421/7.

60-61. *Matonisporites discoidalis* sp. nov., Regd. Sl. Nos. 3414/10 (Holotype), 3414/6.

62-63. *Lametatriletes tenuis* sp. nov., Regd. Sl. Nos. 3414/7 (Holotype), 3416/7.

64-65. *Lametatriletes mesozoicus* sp. nov., Regd. Sl. Nos. 3421/8 (Holotype), 3417/5.

66-67. *Boseisporites indicus* sp. nov., Regd. Sl. Nos. 3416/8 (Holotype), 3416/7.

68-69. *Boseisporites jabalpurensis* sp. nov., Regd. Sl. Nos. 3416/3 (Holotype), 3416/7.

70. *Boseisporites sehoraensis* sp. nov., Regd. Sl. Nos. 3414/14 (Holotype).

71-72. *Trilites fusus* sp. nov., Regd. Sl. Nos. 3421/6 (Holotype), 3421/9.

73-74. *Ischyosporites haradensis* sp. nov., Regd. Sl. Nos.. 3421/3 (Holotype), 3421/9.

75-76. *Gleicheniidites glaucus* sp. nov., Regd. Sl. Nos. 3421/2 (Holotype), 3421/10.

77-78. *Gleicheniidites apicus* sp. nov., Regd. Sl. Nos. 3421/3 (Holotype), 3419/10.

PLATE 4

79a, b-80. *Boseisporites sehoraensis* sp. nov., Regd. Sl. Nos. 3414/14, 3414/14, 3410/2.

81. *Sestrosporites irregulatus* (Coup.) Dettm., Regd. Sl. No. 3421/8.

82-83. *Peregrinisporis indicus* sp. nov., Regd. Sl. Nos. 3420/9 (Holotype), 3421/9.

84. Cf. *Murospora* sp., Regd. Sl. No. 3401/11.

85-86. *Densoisporites indicus* sp. nov., Regd. Sl. Nos. 3417/8 (Holotype), 3421/8.

87-88. *Densoisporites novicus* sp. nov., Regd. Sl. Nos. 3418/7 (Holotype), 3421/4.

89. *Crybelosporites* sp. cf. *C. stylosus* Dettm., Regd. Sl. No. 3421/4.

90. *Laevigatosporites ovatus* Wils. & Webs., Regd. Sl. No. 3409/4.

91. *Laevigatosporites gracilis* Wils. & Webs., Regd. Sl. No. 3421/6.

92-93. *Monolites indicus* sp. nov., Regd. Sl. Nos. 3421/6 (Holotype), 3417/8.

94. ? *Monolites* sp., Regd. Sl. No. 3402/1.

95-96. *Leschikisporis verrucosus* sp. nov., Regd. Sl. Nos. 3421/3 (Holotype), 3417/7.

97-98. *Rouseisporites densus* sp. nov., Regd. Sl. Nos. 3421/6 (Holotype), 3417/1.

99-100. *Coptospora mesozoica* sp. nov., Regd. Sl. Nos. 3406/1 (Holotype), 3421/6.

101. *Coptospora pallida* sp. nov., Regd. Sl. No. 3421/7 (Holotype).

PLATE 5

102. *Coptospora pallida* sp. nov., Regd. Sl. No. 3419/6.

103-104. *Callialasporites doringii* sp. nov., Regd. Sl. Nos. 3231 (Holotype), 3236.

105-106. *Callialasporites circumplectus* sp. nov., Regd. Sl. Nos. 3419/7 (Holotype), 3419/6.

107-108. *Callialasporites lametaensis* sp. nov., Regd. Sl. Nos. 3402/10B (Holotype), 3402/3.

109. *Callialasporites* sp., Regd. Sl. No. 3407/12.

110. *Alisporites* sp. cf. *A. bilateralis* Rouse, Regd. Sl. No. 3421/1.

111-112. *Alisporites ovalis* sp. nov., Regd. Sl. Nos. 3421/2, 3421/2 (Holotype).

113-114. *Alisporites mesozoicus* sp. nov., Regd. Sl. Nos. 3418/1 (Holotype), 3416/4.

115-116. *Alisporites haradensis* sp. nov., Regd. Sl. Nos. 3420/3 (Holotype), 3416/9.

117. *Alisporites sehoraensis* sp. nov., Regd. Sl. No. 3410/2 (Holotype).

PLATE 6

118. *Alisporites sehoraensis* sp. nov., Regd. Sl. No. 3416/1.

119-120. *Abiespollenites triangularis* sp. nov., Regd. Sl. Nos. 3416/7 (Holotype), 3414/3.

121. *Platysaccus densus* (Venkata.) comb. nov., Regd. Sl. No. 3421/8.

122. *Platysaccus* sp. A Sah & Jain, Regd. Sl. No. 3421/9.

123. *Platysaccus* sp., Regd. Sl. No. 3420/4.

124. *Podocarpidites ellipticus* Cookson, Regd. Sl. No. 3410/2.

125. *Podocarpidites multesimus* (Bolkohv.) Poc., Regd. Sl. No. 3419/8.

126-127. *Podocarpidites vermiculatus* sp. nov., Regd. Sl. Nos. 3421/2 (Holotype), 3420/3.

128-129. *Baculopollenites haradensis* sp. nov., Regd. Sl. Nos. 3421/6 (Holotype), 3421/6.

130. *Podosporites* sp., Regd. Sl. No. 3421/2.

131-132. *Araucariacites indicus* (Singh *et al.*) comb. nov., Regd. Sl. Nos. 3417/2, 3409/10.

PLATE 7

133-135. *Araucariacites limbatus* sp. nov., Regd. Sl. Nos. 3406/1 (Holotype), 3407/3, 3407/3.

136-137. *Reticulatasporites* sp., Regd. Sl. Nos. 3413/12, 3417/9.

138-139. *Cycadopites* sp. cf. *C. sakrigaliensis* Sah & Jain, Regd. Sl. Nos. 3421/3, 3420/4.

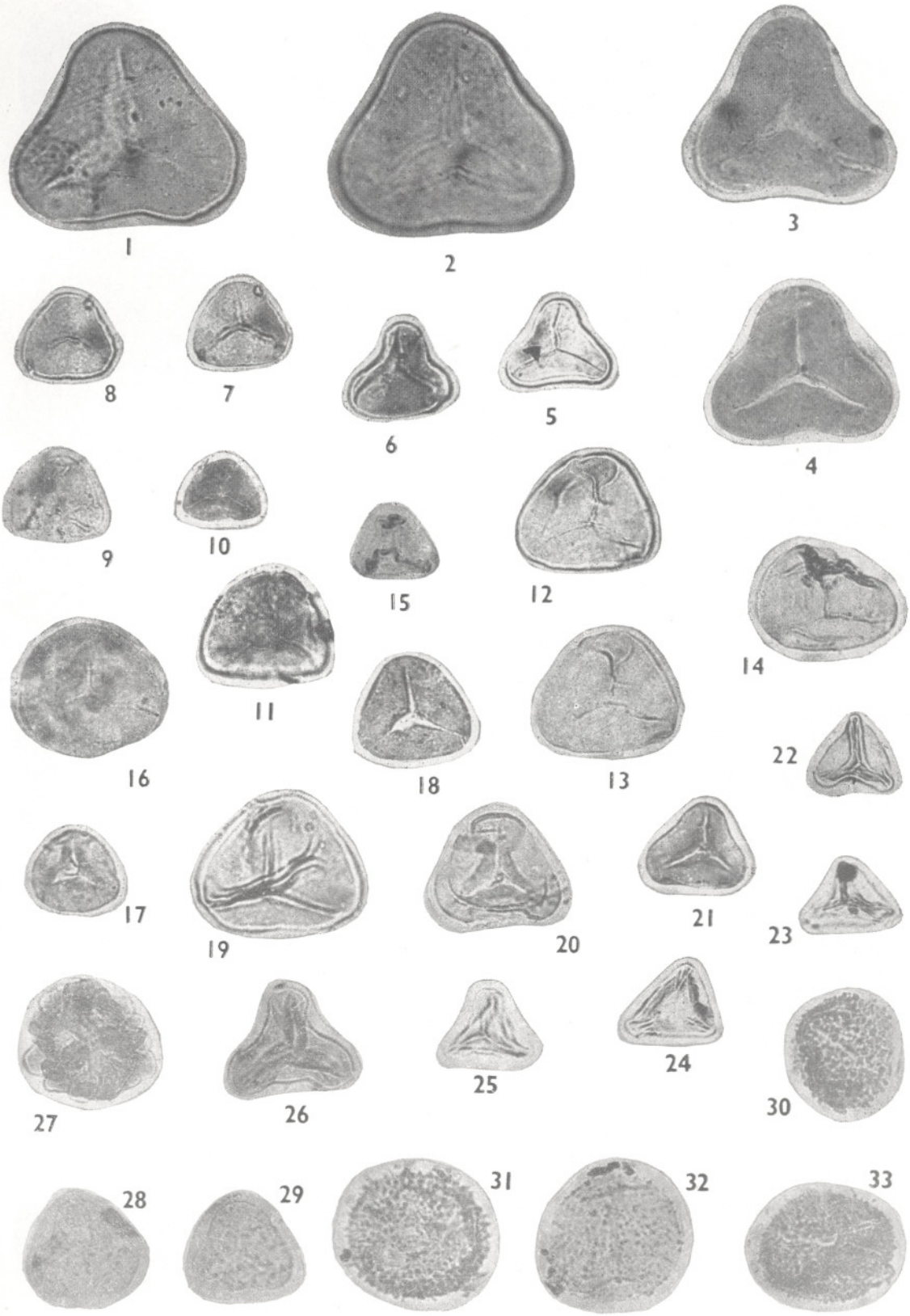
140-141. *Cycadopites couperi* (Dev) comb. nov., Regd. Sl. Nos. 3252, 3414/8.

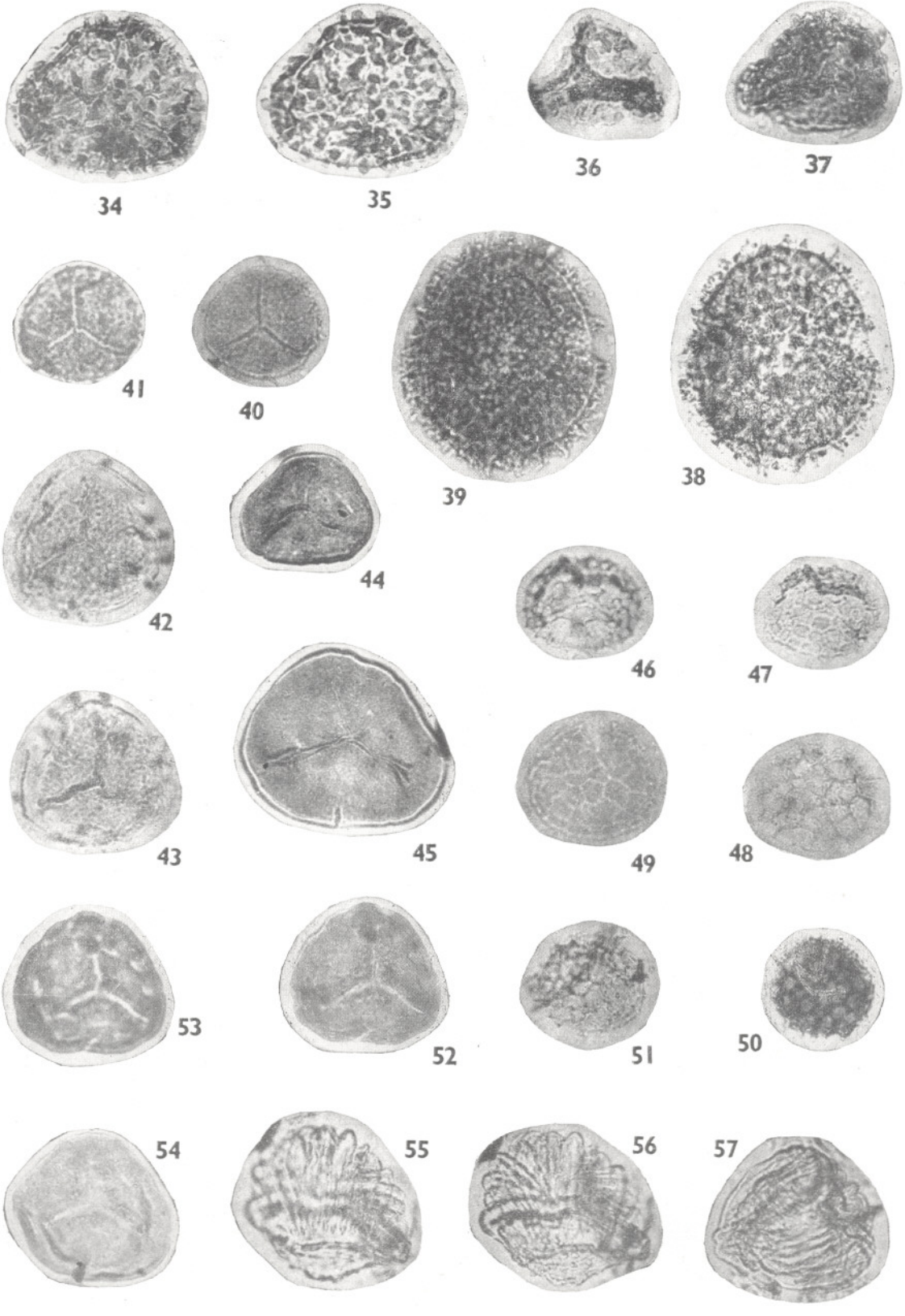
142-144. *Monosulcites ellipticus* sp. nov., Regd. Sl. Nos. 3407/8 (Holotype), 3410/1, 3416/6.

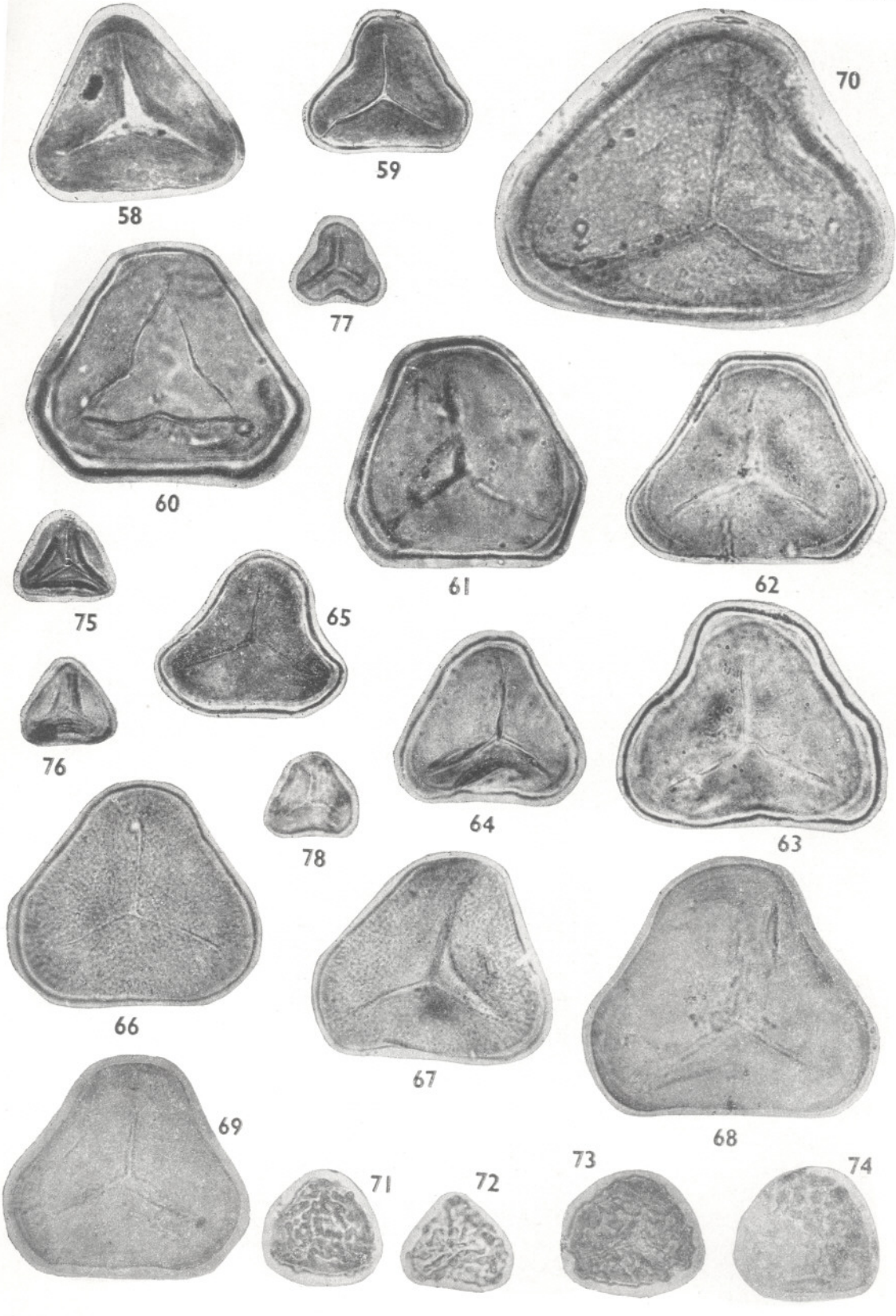
145-146. *Classopollis* sp. cf. *C. torosus* (Reiss.) Coup., Regd. Sl. Nos. 3421/8, 3417/1.

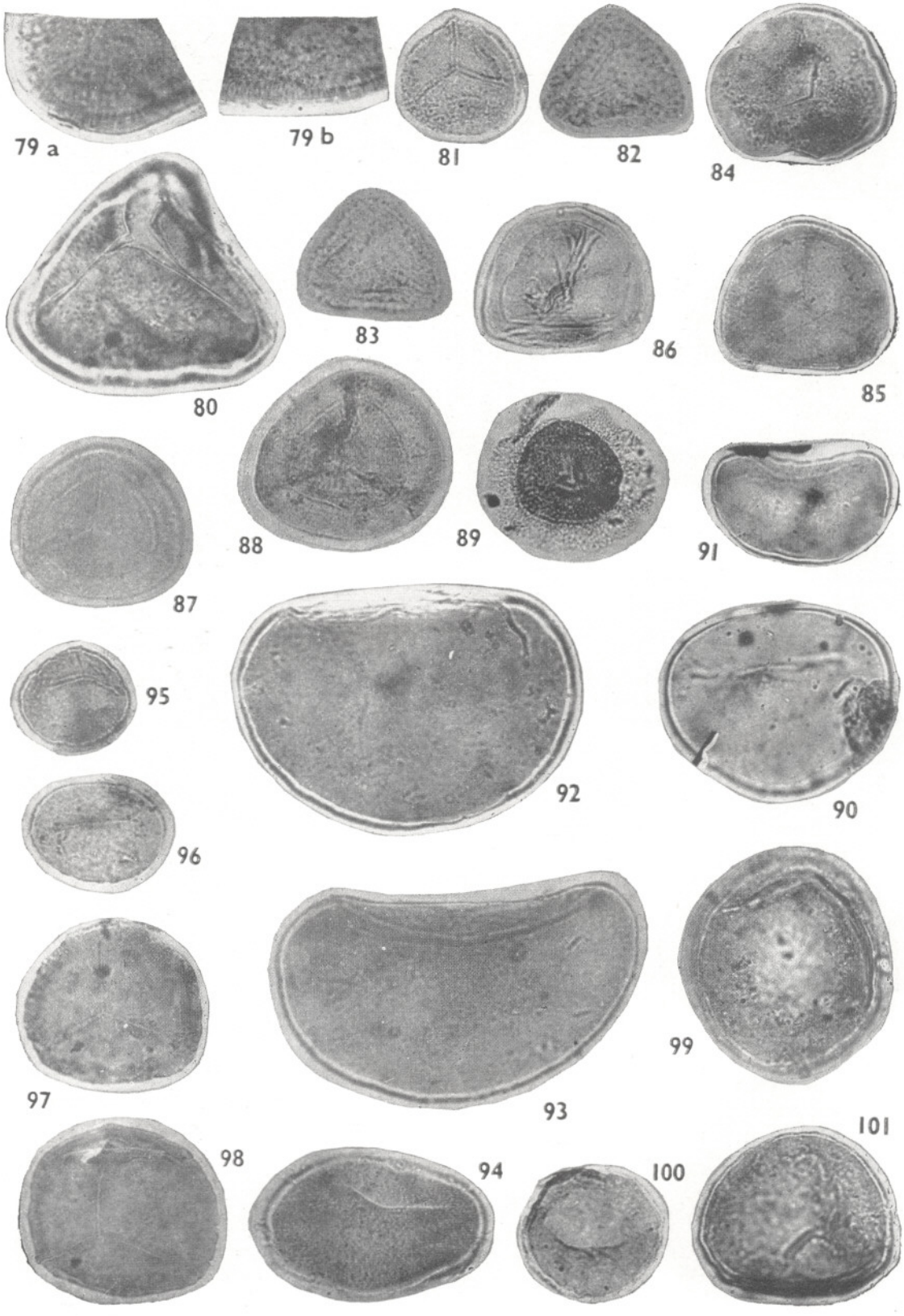
147. *Classopollis* sp., Regd. Sl. No. 3409/7.

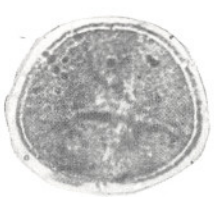
148-150. *Gliscopollis pallidus* sp. nov., Regd. Sl. Nos. 3418/1 (Holotype), 3417/6, 3417/3.

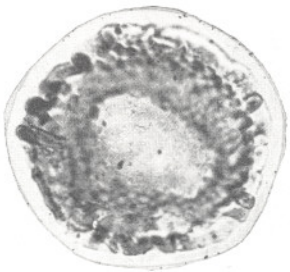

1
2
3
8
7
6
5
4
9
10
15
12
11
14
16
18
13
22
17
19
20
21
23
27
26
25
24
30
28
29
31
32
33

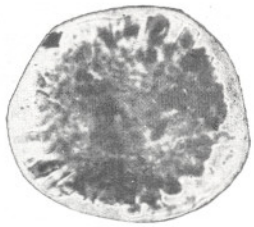

34
35
36
37
41
40
39
38
42
44
46
47
43
45
49
48
53
52
51
50
54
55
56
57

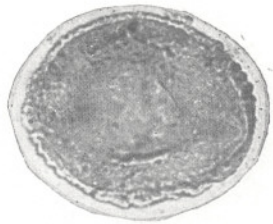

58
59
70
77
60
61
62
75
65
76
64
63
78
66
67
68
69
71
72
73
74


79 a
79 b
81
82
84
80
83
86
85
88
89
91
87
95
92
90
96
97
93
99
98
94
100
101


102

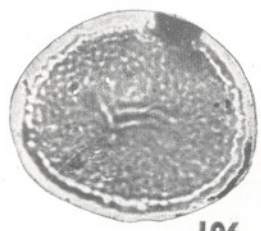

103

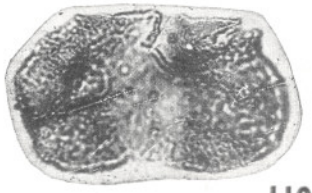

104


105

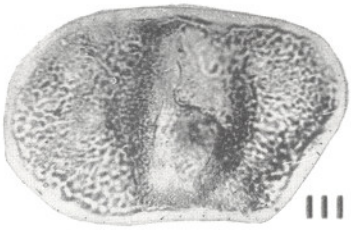

109


108

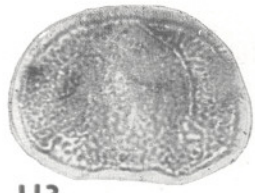

106


110

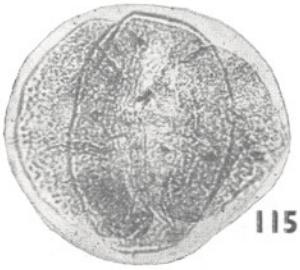

107

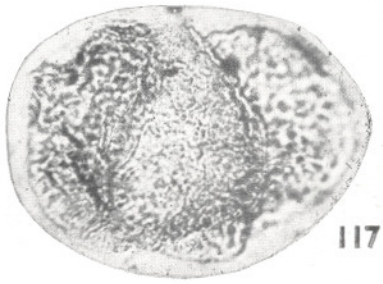

111


112


113

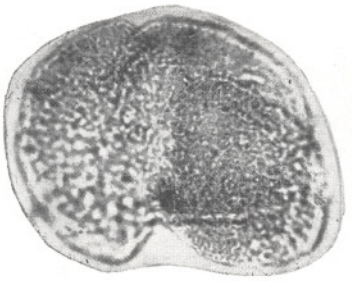

114


115


117


116

118



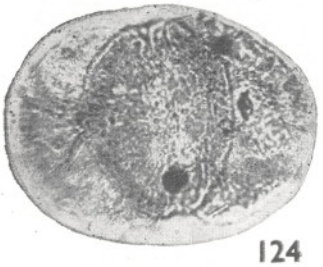
119

120

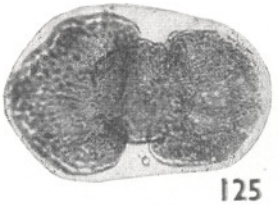
123

122

121

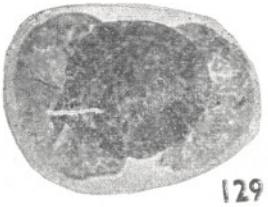


124

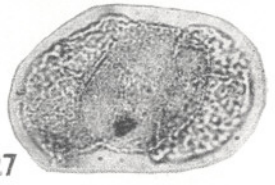


125

126

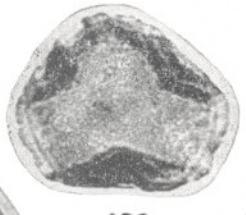


129



127

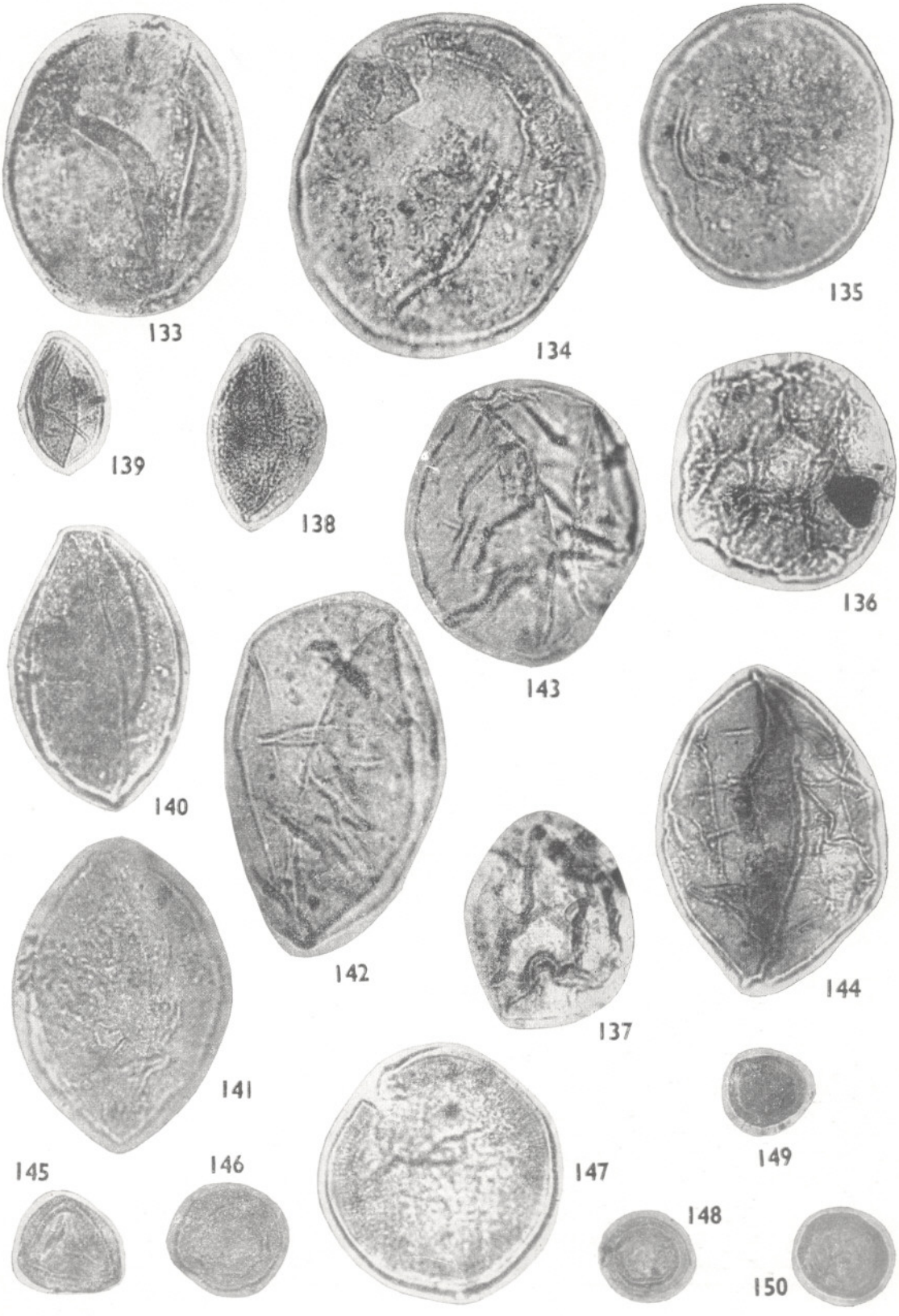
128



130

131

132


133
134
135
139
138
143
136
140
142
137
144
141
145
146
147
149
148
150