PALYNOLOGY OF THE JAINTIA GROUP (PALAEOCENE-EOCENE) EXPOSED ALONG JOWAI-SONAPUR ROAD, MEGHALAYA, INDIA—PART I. SYSTEMATIC PALYNOLOGY

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Abstract

The paper deals with the systematic description of pteridophytic spores and angiospermic pollen grains recovered from the sediments of Jaintia Group (Palaeocene-Eocene), Meghalaya exposed along the Jowai-Sonapur Road. The pteridophytic spores are represented by 15 genera and 25 species, out of which 6 species are new. The angiospermic pollen grains are represented by 20 genera and 29 species, out of which 5 species are new.

Introduction

Recently a detailed palynostratigraphical work on the Jaintia Group (Palaeocene-Eocene) exposed between Jowai and Sonapur, Meghalaya was carried out by the authors. The area of study is located in the south-east of Shillong. The Jaintia Group is lithologically divided into three formations which in the ascending order are: Therria Formation, Sylhet Limestone and Kopili Formation. The sediments of these formations were observed along the National Highway 44 connecting Shillong (Meghalaya) and Badarpur (Assam). A geological map of this road section along with other field details has been published by Saxena and Tripathi (1982).

Sein and Sah (1974) palynologically demarcated the Eocene and Oligocene sediments exposed along a part of this road section between Lumshnong and Sonapur without dealing with the morphology of the recovered palynotaxa. Most of the referred taxa have been designated up to the generic level only. Thus, there exists a scope for their morphotaxonomic study. Later, Dutta and Jain (1980) described acritarch and dinoflagellate assemblages from the Sylhet Limestone and Kopili Formation in the Lumshnong area near this road section and pointed out their biostratigraphic potential. The palynostratigraphical information presented in the above mentioned two papers are meagre because these studies are based on a few samples only. Consequently, a more elaborate palynostratigraphical study was started in this area.

The present study is based on the field work carried out in the year 1978. During this field trip 318 rock samples were collected from well measured sections, out of which, 160 samples proved to be productive yielding a rich palynofloral assemblage constituted by algal, fungal, pteridophytic and angiospermic remains. The algae and fungi recovered from this area have been dealt with by Tripathi (in press). The present paper deals with the morphotaxonomic studies of the pteridophytic spores and angiospermic pollen grains recovered from the Palaeocene-Eocene sediments of the Jaintia Group of Meghalaya. The spores and pollen grains have been systematically arranged according to the classification scheme proposed by Potonié and Kremp (1954), subsequently enlarged by the same authors (1955, 1956) and Potonié (1956, 1958, 1960, 1966, 1970).

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Systematic Description

Anteturma	—	*Sporites* Potonié, 1893
Turma	—	*Triletes* Potonié & Kremp, 1954
Subturma	—	*Azonotriletes* Luber, 1935
Infraturma	—	*Laevigati* (Bennie & Kidston) Potonié, 1956

Genus—*CYATHIDITES* Couper, 1953.

Type Species—*Cyathidites australis* Couper, 1953

Cyathidites australis Couper, 1953
Pl. 1, Fig. 2

Previous record—Palaeocene of Matanomadh Formation, Kachchh (Saxena, 1978).

Occurrence—Lower part of Therria Formation (Palaeocene), Meghalaya.

Affinity—Couper (1953, 1958) suggested that the spores referred to *Cyathidites* have a possible affinity with the fern families Cyatheaceae or Dicksoniaceae.

Genus—*INTRAPUNCTISPORIS* Krutzsch, 1959

Type Species——*Intrapunctisporis intrapunctis* Krutzsch, 1959

Intrapunctisporis densipunctis sp. nov.
Pl. 1, Figs. 1, 3

Holotype—Pl. 1, Fig. 3; Slide no. 8764

Type horizon—Therria Formation

Type locality—At 79.5 km from Shillong on Shillong-Badarpur Road, Jainita Hills, Meghalaya.

Diagnosis—Miospores subtriangular to subcircular, 80-85μm in size, interapical margins straight to slightly convex, sometimes concave; trilete extending up to half of the spore radius; exine ± 1 μm thick, densely intrapunctate.

Description—Miospores usually subtriangular. Holotype 85 μm in size, apices broadly rounded, interapical margins straight or slightly concave or convex. Trilete mark distinct, extending up to half of the spore radius, ray-vertex raised, labra thick, tapering towards ray-ends. Exine ± 1 μm thick, intrapunctate, punctae closely packed and uniformly distributed. Proximal face of the spore convex, distal face slightly concave.

Comparison—*I. densipunctis* sp. nov. is distinguished from *I. intrapunctis* Krutzsch (1959) in having thinner exine, broadly rounded apices and more or less straight interapical margins. It differs from *I. apunctis* Krutzsch (1959) and *I. harudiensis* Kar (1978) in being larger in size and also in having densely placed intrapunctate exine ornamentation. The present species is distinct from *Intrapunctisporis* sp. Kar (1978) in having broadly rounded apices.

Occurrence—Lower part of Therria Formation (Palaeocene), Meghalaya.

Affinity—Morphologically *I. densipunctis* sp. nov. resembles the spores found in some members of the family Schizaeaceae.

Genus—*DANDOTIASPORA* (Sah, Kar & Singh) Singh, Singh & Sah, 1979

Type Species—*Dandotiaspora dilata* (Mathur) (Sah, Kar & Singh) Singh, Singh & Sah, 1979

Remarks—Sah, Kar and Singh (1971) established the genus *Dandotiaspora*, constituting five species viz., *Dandotiaspora dilata*, *D. plicata*. *D. telonata*. *D. pseudoauriculata* and *D. densicorpa* in this genus,. These species were constituted mainly on the basis of exinal thickenings present on the distal side of the spore. Subsequently, Singh, Singh and Sah (1979) re-studied the spores of *Dandotiaspora* recovered from Tura Formation, from where the original genus was described. Since the original slides were not available for re-examination they made observations on the specimens available to them from their own material collected from the same area. They rediagnosed the genus and observed that exinal thickening of the spore is present at the proximal side and not at the distal side of the spore as regarded by the original authors.

During the present study many specimens referable to the genus *Dandotiaspora* have been examined. They show exinal thickening on the proximal surface which is associated with the haptotypic characters. Thus, this confirms the observations made by Singh *et al.* (1979).

Dandotiaspora dilata Sah, Kar & Singh emend. Singh, Singh & Sah, 1979

Pl. 2, Figs. 20 & 25

Previous records—Palaeocene-Eocene of Pakistan (Vimal, 1952), Assam (Bose & Sah, 1964); Lower Eocene of Kachchh (Mathur, 1966) and Palaeocene of Cherra Formation, Meghalaya (Sah & Dutta, 1966).

Remarks—*Dandotiaspora dilata* is widely distributed in the Indian sub-continent and is generally regarded as an index fossil for identification of the Palaeocene and Lower Eocene sediments, particularly in Rajasthan, Kachchh and Meghalaya.

Occurrence—Therria Formation (Palaeocene) and Kopili Formation (Upper Eocene), Meghalaya.

Affinity—*Dandotiaspora dilata* resembles the spores found in some members of the family Matoniaceae.

Dandotiaspora telonata (Sah, Kar & Singh) Singh, Singh, & Sah, 1979

Pl. 1, Fig. 7

Previous record– Dandot Lignite, West Punjab, Pakistan (Vimal, 1952); Supratrappean beds, Kachchh (Mathur, 1966) and Tura Formation, Meghalaya (Singh, Singh & Sah, 1979).

Occurrence—Therria Formation (Palaeocene) and Kopili Formation (Upper Eocene), Meghalaya.

Affinity—*Dandotiaspora telonata* resembles spores found in some members of the family Matoniaceae.

Dandotiaspora sp.

Pl. 1, Fig. 6; Pl. 4, Fig. 49

Description—Miospores subtriangular, 80-85 μm in size, apices rounded, interapical margins convex. Trilete thin, distinct. Exine thickened along the laesura, the thickening extending beyond the ray-ends, Y-mark extending up to more than 3/4 of spore radius. Exine 2-3 μm thick, intrapunctate, exine thicker at the three apices just above the ray-ends and often protruding out like auriculae.

Remarks—The present species of *Dandotiaspora* is distinct from other known species of the genus in having thicker apices appearing like auriculae.

Occurrence—Therria Formation (Palaeocene), Meghalaya.

Affinity—*Dandotiaspora* sp. resembles the spores found in some members of the family Matoniaceae.

Genus—*BIRETISPORITES* (Delcourt & Sprumont) Delcourt, Dettmann & Huges, 1963

Type species—*Biretisporites potoniae* Delcourt & Sprumont, 1955

Biretisporites sp.
Pl. 4, Fig. 57

Description—Miospore subtriangular, 75 μm in size, apices acutely rounded, interapical margins more or less straight to slightly convex. Trilete distinct, thin, extending up to almost equator of the spore, enclosed within the elevated lips of the upturned exine. Exine ±1 μm thick, scabrate.

Comparison—The present form is distinguished from *B. spectabilis* Dettmann (1963) in possessing slightly smaller size and in having acutely rounded apices, and thinner exine. *B. bellus* Sah & Kar (1969) and *B. convexus* Sah & Kar (1969) are smaller in size. *Biretisporites* sp. Singh (1977) is subcircular in shape and is smaller in size.

Occurrence—Lower part of Therria Formation (Palaeocene), Meghalaya.

Affinity—Morphologically this form is quite similar to the spores of *Hymenophyllum.*

Genus—*LYGODIUMSPORITES* (Potonié, Thomson & Thiergart) Potonié, 1956

Type Species—*Lygodiumsporites adriennis* (Potonié & Gelletich) Potonié, Thomson & Thiergart, 1950.

Lygodiumsporites eocenicus Dutta & Sah, 1970
Pl. 4, Fig. 50

Previous records—Lower Eocene of South Shillong Plateau, Meghalaya (Dutta & Sah, 1970); Palaeocene-Eocene of Tura Formation, Meghalaya (Singh, 1977) and Palaeocene of Matanomadh Formation, Kachchh, Gujarat (Saxena, 1978).

Occurrence—Therria Formation (Palaeocene) and Kopili Formation (Upper-Eocene), Meghalaya.

Affinity—Morphologically present miospores are comparable to the spores of *Lygodium.*

Lygodiumsporites meghalayaensis sp. nov.
Pl. 1, Figs. 5, 8

Holotype—Pl. 1, Fig. 5; Slide No. 8770.

Type Horizon—Therria Formation.

Type Locality—At 85 km from Shillong on Shillong-Badarpur Road, Meghalaya.

Diagnosis—Miospores roundly triangular; 90-100 μm in size; trilete usually distinct, extending up to more or less half of the spore radius; exine 1-2 μm thick, laevigate; proximal face flat, distal face deeply convex.

Description—Miospores mostly rounded triangular, sometimes subcircular. Holotype 94 μm in size, apices broadly rounded, interapical margins deeply convex. Trilete thin, usually distinct, extending up to more or less half of the spore radius. Exine 1-2 μm thick, laevigate. Proximal surface of the spore flat, distal surface deeply convex.

Comparison—*L. eocenicus* Dutta & Sah (1970) is different from *L. meghalayaensis* sp. nov. in its smaller size range, in having more or less triangular shape and a flat distal face. *L. meghalayaensis* sp. nov. is also different from other species of the genus in being larger in size.

Remarks—*L. meghalayaensis* sp. nov. is closely comparable to *Todisporites* sp. Sein & Sah (1974; pl. 2, Fig. 24-26). Sein and Sah (1974) have not given the description of the palynomorphs, but from the illustrations provided by them it appears that those forms possess a small trilete mark, hence do not come under the circumscription of the generic diagnosis of *Todisporites*.

Occurrence—Lower and Middle part of Therria Formation (Palaeocene), Meghalaya.

Affinity—*L. meghalayaensis* sp. nov. resembles the spores of *Lygodium*.

Lygodiumsporites khliehriatensis sp. nov.
Pl. 1, Fig. 4; Pl. 4, Fig. 53

Holotype—Pl. 1 Fig. 4; Slide no. 7033

Type Horizon—Therria Formation

Type locality—At 85 km from Shillong on Shillong Badarpur Road, Meghalaya.

Diagnosis—Miospores subtriangular to subcircular; 75-104 μm in size; trilete distinct, thin, sinuous, extending up to slightly less than half of the spore radius; exine 1-2 μm thick, finely intrastructured to scabrate.

Description—Miospores mostly subtriangular, rarely subcircular. Holotype 83 μm in size, apices broadly rounded, interapical margins slightly to deeply convex. Trilete distinct, thin, sinuous, sometimes with open lips, extending up to slightly less than half of the spore radius. Exine 1-2 μm thick, intrastructured, sometimes scabrate.

Comparison—*L. khliehriatensis* sp. nov. is distinguished from other species of the genus in having larger size range and also in possessing a sinuous trilete mark.

Remarks—*L. khliehriatensis* sp. nov. is closely comparable to *Todisporites* sp. Singh (1977; Pl. 1, Fig. 25) which possesses a short trilete mark hence it does not come under the circumscription of the generic diagnosis of *Todisporites*.

Occurrence—Lower and middle part of Therria Formation (Palaeocene), Meghalaya.

Affinity—This species also morphologically resembles the spores of *Lygodium*.

Lygodiumsporites marginiplicatus sp. nov.
Pl. 1, Fig. 9; Pl. 2, Fig. 15

Holotype—Pl. 2, Fig. 15; Slide no. 8776.

Type Horizon—Therria Formation

Type locality—At 87.5 km from Shillong on Shillong Badarpur Road, Meghalaya.

Diagnosis—Miospores roundly triangular; 75-90 μm in size; trilete distinct, extending up to ±half of the spore radius; exine 1-2 μm thick, laevigate to scabrate; margin of the spores marked with very fine, radially disposed ridges of fine reticulations.

Description-Miospores roundly triangular in shape. Holotype 90 μm in size, apices broadly rounded, interapical margins convex. Trilete distinct, thick, sometimes slightly raised, extending up to ±half of the spore radius. Exine 1-2 μm thick, laevigate to scabrate. Radially disposed fine ridges or fine reticulations present all along the margin of the spore. The marginal ridges or reticulations sometimes concentrating only at a part of the periphery. Proximal and distal faces apparently deeply convex.

Comparison—*L. marginiplicatus* sp. nov. is different from other species of the genus in having marginal fine ridges or reticulations. It is also distinct in possessing deeply convex proximal and distal faces.

Occurrence—Lower part of Therria Formation (Palaeocene), Meghalaya.

Affinity—These miospores may doubtfully be related to *Lygodium*.

Lygodiumsporites psilatus sp. nov.
Pl. 2, Fig. 16; Pl. 4, Fig. 60

Holotype—Pl. 4, Fig. 60; Slide no. 8773.
Type Horizon—Therria Formation
Type Locality—At 87.5 km from Shillong on Shillong Badarpur Road, Meghalaya.

Diagnosis—Miospores roundly triangular to subcircular, 71.85 μm in size; trilete distinct to indistinct, extending up to ± half of the spore radius; exine 1.2 μm thick, laevigate, finely folded in the central part of the spore.

Description—Miospores mostly subcircular, sometimes roundly triangular. Holotype 75 μm in size, apices broadly rounded, interapical margins deeply convex. Trilete thin, distinct to indistinct, extending up to ± half of the spore radius. Exine 1±2 μm thick laevigate. Usually thin folds present over the exine close to the trilete mark.

Comparison—*L. psilatus* sp. nov. is comparable to *L. eocenicus* Dutta & Sah (1970) in the size range but differs from it and also from other known species of the genus in possessing exinal folds close to the trilete mark.

Occurrence—Lower part of Therria Formation (Palaeocene), Meghalaya.

Affinity—These miospores resemble the spores of *Lygodium*.

Genus—*TODISPORITES* Couper, 1958

Type species—*Todisporites major* Couper, 1958

Todisporites major Couper, 1958
Pl. 1, Fig. 12

Previous records—Lower Cretaceous of Kachchh (Venkatachala & Kar 1969); Upper Jurassic of Kachchh (Venkatachala, Kar & Raza, 1969) and Palaeocene of Kachchh (Saxena, 1978).

Occurrence—Therria Formation (Palaeocene) and Kopili Formation (Upper Eocene), Meghalaya.

Affinity—These miospores are comparable to the spores found in the family Osmundaceae.

Infraturma	—	*Apiculati* (Bennie & Kidston) Potonié, 1956
Subinfraturma	—	*Granulati* Dybova & Jachowitz, 1957
Genus	—	*OSMUNDACIDITES* Couper, 1953
Type species	—	*Osmundacidites wellmanii* Couper, 1953

Osmundacidites sp.
Pl. 2, Fig. 19

Description—Miospores almost circular, 76-80 μm in size, apices broadly rounded, interapical margins deeply convex. Trilete distinct, straight, open, extending up to more or less 3/4 of the spore radius. Exine 1-2 μm thick, finely granulose, grana closely packed

with pin-head endings. Ornamentation reduced proximally, particularly near the Y-ray area.

Comparison—*Osmundacidites* sp. described here is larger in size than *O. wellmanii* Couper (1953), *O. minutus* Sah & Kar (1969) and *O. cephalus* Saxena (1978). *Osmundacidites* sp. described here and *O. microgranifer* Sah & Jain (1965) have similar size range and exine ornamentation but the latter is distinguished in having wavy and shorter Y-mark. Specimens described here are comparable to *Osmundacidites* sp. Sein & Sah (1974) but the illustrations provided by them show the ill-preserved nature of their specimens.

Remarks—Only two specimens were recovered, hence no specific designation has been given.

Occurrence—Lower part of Kopili Formation (Upper Eocene), Meghalaya.

Affinity—Morphologically *Osmundacidites* sp. is comparable to the spores of *Osmunda*.

Infraturma—*Murornati* Potonié & Kremp, 1954

Genus—*CORRUGATISPORITES* Thomson & Pflug, 1953

Type species—*Corrugatisporites solidus* Thomson & Pflug, 1953

Corrugatisporites sp.

Pl. 2, Fig. 17

Description—Miospore subtriangular, 80 μm in size, apices broadly rounded, interapical margins convex. Trilete distinct, straight, extending up to 2/3 of the spore radius. Exine 1 μm thick, both proximal and distal surfaces rugulate forming variously shaped channels which become irregular due to presence of warty protrusions. Warts fused at the base to form cristae giving a rugulate pattern.

Comparison—*Corrugatisporites multivallatus* Thomson & Pflug (1953) and *C. paucivallatus* Thomson & Pflug (1953) have comparatively finer exinal ornamentation. The present form is distinguished from *C. toratus* Weyland & Greifeld (1953) in being larger in size and in having densely placed irregular ridges and in having densely placed irregular ridges. *C. terminalis* Sah & Dutta (1968) differs from the present from in having different exine ornamentation at proximal and distal faces. *C. formosus* Dutta & Sah (1970) differs from *Corrugatisporites* sp. in being smaller in size, in having indistinct and short trilete mark. *C. terpitus* Dutta & Sah (1970) is larger in size.

Remarks—Only one specimen has been recovered and it is quite similar to *Corrugatisporites* sp. Sein & Sah (1974, pl. 1, Fig. 2) reported from the Oligocene sediments of Jowai-Badarpur Road Section, Lower Assam.

Occurrence—Middle part of Kopili Formation (Upper Eocene), Meghalaya.

Affinity—Thomson and Pflug (1953) mentioned that their species closely resemble the spores of *Lygodium*. General characters of the spore suggest its affinity to those of *Lygodium* but spores having similar shapes size and ornamentation are also found in Lycopodiaceae.

Genus—*FOVEOTRILETES* (van der Hammen) Potonié, 1956

Type Species—*Foveotriletes scrobiculatus* (Ross) Potonié, 1956

Foveotriletes pachyexinous Dutta & Sah, 1970

Pl. 1, Fig. 11

Previous record—Palaeocene of Cherra Formation, Meghalaya (Dutta & Sah, 1970).

Occurrence—Lower part of Therria Formation (Palaeocene), Meghalaya.

Affinity—Morphologically *Foveotriletes pachyexinous* is comparable to the spores found in the family Lycopodiaceae.

Foveotriletes sp.
Pl. 2, Fig. 23

Description—Miospore subtriangular, 70 μm in size, apices broadly rounded, interapical margins slightly concave. Trilete distinct, straight, lips open, extending almost up to the margin of the spore. Exine 2.5 μm thick, foveolate, foveolae 2 μm across, semicircular, muri flat.

Comparison—*Foveotriletes* sp. is distinct from *F. pachyexinous* Dutta & Sah (1970) in being slightly larger in size and in having thicker and distinctly foveolate exine.

Occurrence—Lower part of Therria Formation (Palaeocene) Meghalaya.

Affinity—Morphologically this miospore is also comparable to the spores found in plants of Lycopodiaceae.

Genus—*STRIATRILETES* van der Hammen emend. Kar, 1979

Type species—*Striatriletes susannae* van der Hammen emend. Kar, 1979

Striatriletes susannae van der Hammen emend. Kar, 1979
Pl. 2, Fig. 13

Previous records—Eocene of Assam and Meghalaya (Gosh *et al.*, 1964; Salujha *et al.*, 1972, 1974), Oligocene of Kachchh (Kar, 1979) and Upper Eocene of Meghalaya (Singh & Tripathi, 1983).

Occurrence—Kopili Formation (Upper Eocene), Meghalaya.

Affinity—Morphologically *Striatriletes susannae* closely resembles the spores of a fern *Ceratopteris thalictroides*.

Striatriletes pseudocostatus Singh & Tripathi, 1983
Pl. 2, Fig. 22

Previous record—Upper Eocene of Meghalaya (Singh & Tripathi, 1983).

Occurrence—Lower part of Kopili Formation (Upper Eocene), Meghalaya.

Affinity—In size, shape and exine ornamentational pattern these miospores are like the spores of *Ceratopteris thalictroides* but the present spores possess a very thick trilete mark and ill developed flat costae. However, a relationship of these miospores with the family Parkeriaceae can not be ruled out.

Striatriletes attenuatus Singh & Tripathi, 1983
Pl. 2, Fig. 14

Previous record—Upper Eocene of Meghalaya (Singh & Tripathi, 1983).

Occurrence—Lower part of Kopili Formation (Upper Eocene), Meghalaya.

Affinity—Morphological features of this species suggest its affinity with the family Parkeriaceae.

Turma — *Monoletes* Ibrahim, 1933
Subturma — *Azonomonoletes* Luber, 1955
Infraturma — *Laevigatomonoleti* Dyboa & Jachowitz, 1957

Genus — *MONOLITES* (Cookson) Potonié, 1956

Type Species—*Monolites major* (Cookson) Potonié, 1956

Monolites mawkmaensis Sah & Dutta, 1966
Pl. 2, Fig. 24

Previous records—Lower Eocene of Cherra Formation, Meghalaya (Sah & Dutta, 1966); Palaeocene of Shillong Plateau, Meghalaya (Dutta & Sah, 1970) and Upper Eocene of Jowai-Badarpur Road Section, Lower Assam (Sein & Sah, 1974).

Occurrence—Middle part of Therria Formation (Palaeocene), Meghalaya.

Affinity—Morphologically these miospores are comparable to the spores of the family Polypodiaceae.

Monolites (*Laevigatosporites*) *discordatus* (Pflug in Thomson & Pflug) Potonié, 1956
Pl. 4, Fig. 52

Previous record—Eocene of Shillong Plateau, Meghalaya (Dutta & Sah, 1970).

Occurrence—Lower part of Therria Formation (Palaeocene), Meghalaya.

Affinity—Morphologically these forms are comparable to the spores of the family Polypodiaceae.

Infraturma — *Sculptatomonoleti* Dybova & Jachowitz, 1957

Genus — *POLYPODIISPORITES* Potonié, 1934

Type Species — *Polypodiisporites favus* Potonié, 1934

Polypodiisporites mawkmaensis Dutta & Sah, 1970
Pl. 3, Fig. 43

Previous record—Lower Eocene of South Shillong Plateau, Meghalaya (Dutta & Sah, 1970).

Occurrence—Middle part of Therria Formation (Palaeocene), Meghalaya.

Affinity—Morphologically these miospores resemble the spores of the family Polypodiaceae.

Genus—*VERRUCATOSPORITES* Pflug ex Potonié, 1956

Type Species—*Verrucatosporites alienus* (Potonié) Thomson & Pflug, 1953

Verrucatosporites sp.
Pl. 4, Fig. 54

Description—Miospore bean-shaped, 98 × 65 μm in size, proximal side slightly concave, distal side deeply convex, monolete. Lete mark indistinct, thin, extending up to ±half of the longer axis of the spore. Exine less than 1 μm thick, verrucose. Verrucae having a broad base, rounded top, 5-7 μm across and 2-3 μm high. Exine between the verrucae finely intrastructured.

Remarks—Very few forms referable to the genus *Verrucatosporites* have been reported from the Tertiary sediments of India. Deb (1970, Pl. 1, Figs 2,5) described *Verrucatosporites* sp. from the Tertiary sediments of Bengal Basin, South Calcutta. Specimens described by her are smaller in size and possess thicker exine. Illustrations provided by her are very indistinct.

Occurrence—Lower part of the Kopili Formation (Upper Eocene), Meghalaya.

Affinity—Morphologically *Verrucatosporites* sp. is comparable to the spores of some members of the family Polypodiaceae.

Genus—*SCHIZAEOISPORITES* (Potonié) Potonié, 1960

Type Species—*Schizaeoisporites eocenicus* (Selling) Potonié, 1956

Schizaeoisporites sp.
Pl. 3, Fig. 44

Description—Miospores oval, 45-48 ×30 μm in size, sometimes lateral ends unequally broad, monolete. Lete mark mostly indistinct, thin, sometimes lips open, extending up to more than 3/4 of the longer axis of the spore. Exine ±1 μm thick, striate. Striations 1-1.5 μm wide and less than 1 μm apart, parallel to the longer axis of the spore. The striations and space between them finely pitted.

Comparison—*Schizaeoisporites* sp. differs from *S. eocenicus* (Selling) Potonié (1956) and *S. phaseolus* Delcourt & Sprumont (1955) in being smaller in size. *S. crassimurus* Dutta & Sah (1970) has got obliquely placed striations. *Schizaeoisporites* sp. Sah & Dutta (1966) differs from the present form in having anastomosing striations. *S. multistriatus* Rao & Ramanujam (1978) is comparable to the present form in possessing the similar size range but former has got thickened spore margin.

Occurrence—Middle part of Therria Formation (Palaeocene), Meghalaya.

Affinity—Morphologically these miospores are comparable to the spores found in *Schizaea* of the family Schizaeaceae (Selling, 1946; Bolkhovitina, 1961).

Turma	—	*Aletes* Ibrahim, 1933
Subturma	—	*Azonaletes* (Luber, 1935) Potonié & Kremp, 1954
Infraturma	—	Subpilonapiti (Erdtman, 1947) Vimal, 1952
Genus	—	*SCIADOPITYSPOLLENITES* Raatz, 1937
Type species	—	*Sciadopityspollenites serratus* Raatz, 1937

Sciadopityspollenites sp.
Pl. 3, Fig. 28

Description—Pollen grain oval in shape, 94 ×78 μm in size, bilateral, lateral ends broadly rounded, inaperturate. Exine ±1 μm thick, appearing undifferentiated, covered with very low verrucae, verrucae 3-4 μm wide at the base, 2-3 μm apart. Exine variously folded.

Remarks—The genus *Sciadopityspollenites* is reported from Palaeocene sediments of Meghalaya (Biswas, 1962; Dutta & Sah, 1970). These pollen grains are smaller in size and possess verrucae which are much high in comparison to those found in the present form. Only a few specimens of this type were recovered.

Occurrence—Lower part of Kopili Formation (Upper Eocene), Meghalaya.

Affinity—In some plants of the family Aristolochiaceae, this type of pollen grains are found.

Anteturma	—	*Pollenites* Potonié, 1931
Turma	—	*Plicates* (Naumova) Potonié, 1960
Infraturma	—	*Rectectines* (Malawkina) Potonié, 1958
Genus	—	*COUPERIPOLLIS* Venkatachala & Kar, 1969
Type Species	—	*Couperipollis perspinosus* (Couper) Venkatachala & Kar, 1969

Couperipollis brevispinosus (Biswas) Venkatachala & Kar, 1969
Pl. 3, Figs. 33, 42

Remarks—Biswas (1962, pl.8, fig. 43) described *Colocasioideaepites brevispina* from the Eocene sediments of the Tura Formation, Meghalaya. Sah and Dutta (1966, p. 77) proposed a new combination for the same species and transferred it to the genus *Monosulcites* viz., *Monosulcites* (*Colocasioideaepites*) *brevispinosus*. Venkatachala and Kar (1969) instituted a new genus *Couperipollis* and included *Monosulcites brevispinosus* under it as *Couperipollis* (*Monosulcites*) *brevispinosus* (Biswas), which, in fact, should have been referred to Sah and Dutta (1966), as Biswas (1962) never used the prefix *Monosulcites* for his species which is now named as *Couperipollis brevispinosus*. Obviously, the reference should have been made to *Colocasioideaepites* Biswas instead of *Monosulcites brevispinosus* Sah & Dutta.

Previous records—Palaeocene and Eocene of Tura Formation, Meghalaya (Biswas, 1962; Sah and Singh, 1974; Singh, 1977); Lower Tertiary sediments of South Shillong Front, Meghalaya (Baksi, 1972) and Palaeocene and Eocene of Shillong Plateau, Meghalaya (Sah & Dutta, 1968; Dutta & Sah, 1970).

Occurrence---Therria Formation (Palaeocene), Meghalaya.

Affinity—Biswas (1962, p. 42) surmised Araceaeous affinity to the pollen grains of *C. brevispinosus*. Pollen grains of similar morphology are also produced by some members of the family Palmae and Nymphaeaceae. On the basis of exine ornamentation and monosulcate nature of *C. brevispinosus* it seems very likely that they may have a botanical affinity with the family Palmae.

Couperipollis meghalayaensis sp. nov.
Pl. 3, Fig. 29; Pl. 4, Fig. 51

Holotype—Pl. 4, Fig. 51; Slide no. 8769.

Type Horizon—Therria Formation.

Type locality—At 87.5 km from Shillong on Shillong-Badarpur Road, Meghalaya.

Diagnosis—Pollen grains oval to elliptical; 60-98 $\times$44-60 μm in size; monosulcate, sulcus usually indistinct, long; exine 1-3 μm thick, spinose, spines long, sparsely placed, interspinal area punctate.

Description—Pollen grains mostly oval in shape, rarely elliptical, Holotype 64 $\times$60 μm in size, monosulcate. Sulcus mostly indistinct, widely open, extending from Pole to Pole. Exine 1-3 μm thick, sexine and nexine equally thick, exine of the proximal face thicker than that of the distal face, spinose, spines 8-12 μm long and 3-5 μm wide at the base, sparsely placed, sometimes having a bulbous base and usually with a roundly

pointed tips. Interspinal space punctate, puncta channel-like, simulating negative reticulum in surface view.

Comparison—The indistinct nature of the sulcus of *Couperipollis meghalayaensis* sp. nov. is also exhibited by *C. brevispinosus* (Biswas) Venkatachala & Kar (1969) and *C. kutchensis* Venkatachala & Kar (1969) but the latter two species differ in having shorter and closely placed spines. *C. wodehousei* (Biswas) Venkatachala & Kar (1969) possesses densely packed, long spines with rounded tips and hence, is not comparable to the present species. *C. microreticulata* Kar (1979) has short and sparsely placed spines, widely open sulcus and a finely reticulate interspinal area, thus is different from *C. meghalayansis* sp. nov. *C. longispinosus* Salujha & Kindra (1981) possesses microreticulate exine in between the spines and has a broad sulcus.

Occurrence—Therria Formation (Palaeocene), Meghalaya.

Affinity—Morphological features of these pollen grains suggest its affinity with those of the family Palmae and Nymphaeaceae.

Couperipollis wodehousei (Biswas) Venkatachala & Kar, 1969

Pl. 3, Fig. 38

Remarks—*Araceaepites wodehousei* Biswas (1962) was transferred to *Monosulcites* as *Monosulcites* (*Araceaepites*) *wodehousei* by Sah and Dutta (1966). Subsequently, Venkatachala and Kar (1969) instituted a new combination as *Couperipollis* (*Monosulcites*) *Wodehousei* (Biswas). In fact, Biswas (1962) described *Araceaepites wodehousei* and did not refer it to *Monosulcites* as given by Venkatachala and Kar (1969).

Previous records—Lower to Middle Eocene of Sylhet Limestone Formation, Meghalaya (Biswas, 1962); Palaeocene of Cherra Formation, Meghalaya (Sah and Dutta, 1966); Palaeocene of Jaintia Series, Meghalaya (Dutta and Sah, 1970); Palaeocene of Tura Formation, Meghalaya (Singh, 1977) and Palaeocene of Matanomadh Formation, Kachchh (Saxena, 1979).

Occurrence—Lower part of Therria Formation (Palaeocene), Meghalaya.

Affinity—Morphologically these forms are comparable to the pollen grains of the family Palmae but Biswas (1962; p. 47) suggested its affinity to the family Araceae.

Couperipollis rarispinosus (Sah & Dutta) Venkatachala & Kar, 1969

Pl. 3, Fig. 41

Previous records—Lower Eocene of Cherra Formation, Meghalaya (Sah and Dutta, 1966) ; Palaeocene of Jaintia Series, Meghalaya (Dutta and Sah, 1970); Palaeocene of Tura Formation (Singh, 1977) and Palaeocene of Matanomadh Formation Kachchh (Saxena, 1979).

Occurrence—Middle part of Therria Formation (Palaeocene), Meghalaya.

Affinity—Morphologically this form shows similarity with the pollen grains of the family Palmae and Nymphaeaceae.

Genus—LILIACIDITES Couper, 1953

Type Species—*Liliacidites kaitangataensis* Couper, 1953

Liliacidites microreticulatus Dutta & Sah, 1970

Pl. 3, Fig. 27

Previous record—Palaeocene of Cherra Formation, Meghalaya (Dutta and Sah, 1970).
Occurrence—Lower part of Therria Formation (Palaeocene), Meghalaya.
Affinity—*L. microreticulatus* Dutta & Sah (1970) is closely comparable to the pollen grains of *Aletris aurea* (Liliaceae).

Liliacidites giganticus Singh, 1977
Pl. 4, Fig. 58

Previous record—Palaeocene of Tura Formation, Meghalaya (Singh, 1977).
Occurrence—Therria Formation (Palaeocene), Meghalaya.
Affinity—Morphological features of *L. giganticus* Singh (1977) resemble with pollen grains found in the family Liliaceae.

Liliacidites major Singh, 1977
Pl. 4, Fig. 61

Previous record—Palaeocene of Tura Formation, Meghalaya (Singh 1977).
Occurrence—Therria Formation (Palaeocene), Meghalaya.
Affinity—Morphological features of *L. major* Singh (1977) suggest its affinity with the family Liliaceae.

Genus—*COLLOSPERMUMPOLLIS* Tripathi & Singh, 1984

Type Species—*Collospermumpollis laevigatus* Tripathi & Singh, 1984

Collospermumpollis laevigatus Tripathi & Singh, 1984
Pl. 2, Fig. 18

Occurrence—Lower-Middle part of Therria Formation (Palaeocene), Meghalaya.
Affinity—monosulcate pollen grains are mostly met within the families Amaryllidaceae, Iridaceae, Liliaceae and Palmae, where the sulcus is generally not very wide. However, *Collospermumpollis laevigatus* Tripathi & Singh, 1984 can be compared with the pollen grains of extant plant *Collospermum microspermum* (Liliaceae), which measure up to 48 μm in size and have a widely open colpus with distinctly smooth exine (Cranwell, 1953; fig. 51).

Infraturma—*Monoptyches* (Naumova) Potonié, 1958

Genus—*PALMIDITES* Couper, 1953

Type Species—*Palmidites maximus* Couper, 1953

Remarks—The genus *Palmidites* established by Couper (1953) is based on a very insufficient diagnosis. Later, Potonié (1958, Synopsis II) slightly altered its diagnosis as follows: "Outline more or less oval, anisopolar; over 50 μ; exine smooth to roughened; colpus about the same length of grain, not widening towards the ends".

During the present study some large monocolpate pollen grains have been observed. These pollen grains are more than 50 μm in size, ovoidal-elliptical in shape, possess long and narrow colpus which is not wide at the two lateral ends. Exine ornamentation in these forms varies from laevigate to granulate. The lateral ends in majority of these pollen grains are obtusely pointed. On the basis of similarity between different species of *Palmidites* and those studied during the course of present study it is proposed to accommodate even such monocolpate pollen grains into the genus Palmidites.

Palmidites plicatus Singh, 1977
Pl. 4, Fig. 62

Previous record—Palaeocene of Tura Formation Garo Hills, Meghalaya (Singh, 1977).
Occurrence—Therria Formation (Palaeocene), and Lower part of Kopili Formation (Upper Eocene), Meghalaya.
Affinity—*P. plicatus* Singh (1977) is comparable to the pollen grains found in the family Palmae.

Palmidites obtusus sp. nov.
Pl. 2, Figs. 21, 26

Holotype—Pl. 2, Fig. 21; Slide no. 8786.
Type Horizon—Therria Formation
Type Locality—At 96.75 km from Shillong on Shillong-Badarpur Road, Meghalaya.
Diagnosis—Pollen grains ovoidal; 115-130 × 75—95 μm in size; bilateral, lateral ends obtusely pointed; monocolpate, colpus distinct, long, narrowly open; exine 1-2 μm thick, laevigate to granulose.
Description—Pollen grains ovoidal in shape, Holotype 130 × 81 μm in size, bilateral, lateral ends pointed and slightly protruding, monocolpate. Colpus, distinct, extending all along the length of the pollen, narrowly open, generally one lip of the colpus upturned giving an apperance of a wide colpus. Exine 1-2 μm thick, sexine and nexine appearing undifferentiated, laevigate to granulose.
Occurrence—Middle-Upper part of Therria Formation (Palaeocene), Meghalaya.
Affinity—*P. obtuses* sp. nov. is comparable to pollen grains of the family Palmae.

Palmidites maximus Couper, 1953
Pl. 3, Fig. 47

Previous records—Palaeocene of Garo Hills, Meghalaya, (Singh, 1977) and Matanomadh Formation, Gujarat, (Saxena, 1979).
Occurrence—Middle part of Therria Formation (Palaeocene), Meghalaya.
Affinity—These pollen grains are comparable to those found in the family Palmae.

Genus — *PALMAEPOLLENITES* Potonié, 1951

Type Species — *Palmaepollenites anguilus* (Potonié) Potonié, 1951.

Palmaepollenites communis Sah & Dutta, 1966
Pl. 3, Fig. 32

Previous record—Palaeocene of Cherra Formation, Shillong Plateau, Meghalaya (Sah & Dutta, 1966).
Occurrence—Middle part of Therria Formation (Palaeocene), Meghalaya.
Affinity—*P. communis* resembles the pollen grains found in some members of the family Palmae.

Genus—*PINJORIAPOLLIS* Saxena & Singh, 1981

Type Species—*Pinjoriapollis magnus* Saxena & Singh, 1981

Pinjoriapollis lanceolatus Saxena & Singh, 1981
Pl. 1, Fig. 10

Remarks—The pollen grain recovered during the present study is larger in size in comparison to *P. lanceolatus* Saxena & Singh (1981).

Previous record—Pliocene of Upper Siwalik (Pinjor Formation), Chandigarh, India (Saxena & Singh, 1981).

Occurrence—Lower part of Therria Formation (Palaeocene), Meghalaya.

Affinity—Saxena and Singh (1981) have correctly surmised its affinity with the family Magnoliaceae.

Infraturma—*Sphaerozonisulcates* Venkatachala & Kar, 1969

Genus—*PROXAPERTITES* van der Hammen emend. Singh, 1975

Type Species—*Proxapertites operculatus* van der Hammen, 1956

Proxapertites assamicus (Sah & Dutta) Singh, 1975
Pl. 3, Figs. 48

Previous records—Palaeocene of Cherra Formation, Meghalaya (Sah & Dutta, 1966), Lower Eocene of Tura Formation, Meghalaya (Sah & Singh 1974) and Palaeocene of Mikir Formation, Assam (Mehrotra, 1981).

Occurrence—Lower-Middle part of Therria Formation (Palaeocene), Meghalaya.

Affinity—Zonisulcate pollen grains are found in some members of the family Liliaceae and Nymphaeaceae.

Genus—*ASSAMIALETES* Singh emend. Singh & Tripathi (in press)

Type species—*Assamialetes emendatus* (Sah & Dutta) Singh emend. Singh & Tripathi (in press)

Assamialetes Crassimurus (Sah & Dutta) Singh & Tripathi, (in press)
Pl. 4, Fig. 59

Previous records—Palaeocene-Lower Eocene of Cherra Formation, Meghalaya (Sah & Dutta, 1966), Palaeocene of Tura Formation (Sah & Singh, 1974) and Palaeocene of Mikir Formation, Assam (Mehrotra, 1981).

Occurrence—Lower and Upper part of Therria Formation (Palaeocene), Meghalaya.

Affinity—Morphologically *A. emendatus* is comparable to the pollen grains found in some members of the family Nelumboniaceae, viz., *Nelumbo nucifera*. In the living pollen grains of *Nelumbo nucifera* exine is not very coarsely reticulate.

Subturma—*Triplyches* (Naumova, 1939) Potonié, 1960

Genus—*LADAKHIAPOLLENITES* Mathur & Jain, 1980

Type Species—*Ladakhiapollenites* (*Tricolpites*) *levis* (Sah & Dutta, 1966), Mathur & Jain, 1980

Ladakhiapollenites elongatus sp. nov.
Pl. 3, figs. 36 & 37

Holotype—Pl. 3, Fig. 36; Slide no. 8768

Type Horizon—Therria Formation.

Type Locality—At 85 km from Shillong on Shillong-Badarpur Road, Meghalaya.

Diagnosis—Pollen grains prolate to perprolate in equatorial view; tricolpate, colpus narrow, long; exine 1-1.5 μm thick, tectate, indistinctly sculptured, exine thickened at the two poles.

Description—Pollen grains prolate to perprolate in shape in equatorial view, 35-40× 22-30 μm in size (holotype 36×28 μm) in size, bilateral, tricolpate. Colpi long, narrow, extending up to more than 3/4 of the length of the pollen. The median colpus slightly shorter than the two lateral ones. Exine 1-1.5 μm thick, tectate, indistinctly sculptured.

Comparison—*L. levis* (Sah & Dutta) Mathur & Jain (1980) and *L. longicolpus* (Sah & Dutta) Mathur & Jain (1980) are spheroidal to subspheroidal in shape, possess intectate exine which is not thickened at the poles. *L. pachyexinous* (Couper) Mathur & Jain (1980) exhibits very thick and psilate exine. *L. brevis* (Sah & Kar) Mathur & Jain (1980) has shorter colpi. *L. minutus* (Sah & Kar) Mathur & Jain (1980) is smaller in size, possesses thin and laevigate to scrobiculate exine.

It is apparent that *L. elongatus* can be distinguished from other species of the genus in being oval-elongate in shape and in possessing indistinctly sculptured, tectate exine which is thickened at the two poles.

Occurrence—Lower part of Therria Formation (Palaeocene), Meghalaya.

Affinity—The present form is comparable to the pollen grains of some members of the family Cruciferae.

Genus—*TRICOLPITES* Cookson ex Couper, 1953 emend. Potonié, 1960

Type Species—*Tricolpites reticulatus* Cookson, 1947

Tricolpites alveolatus Couper, 1953
Pl. 3, Figs. 45, 46

Previous record—Lower Eocene-Miocene of New Zealand (Couper, 1953).
Occurrence—Middle part of Therria Formation (Palaeocene), Meghalaya.
Affinity—Uncertain.

Genus—*RETISYNCOLPORITES* Guzman, 1967

Type Species—*Retisyncolporites aureus* Guzman, 1967

Retisyncolporites angularis Guzman, 1967
Pl. 3, Fig. 30

Remarks—*R. angularis* Guzman (1967) is smaller in size but resembles the present form in other characters.

Previous record—Middle Eocene of Colombia (Guzman, 1967).
Occurrence—Middle part of Therria Formation (Palaeocene), Meghalaya.
Affinity—Uncertain.

Genus—*RETITRESCOLPITES* Sah, 1967

Type Species—*Retitrescolpites typicus* Sah, 1967

Retitrescolpites sp.
Pl. 3, Fig. 40

Description—Pollen grain spheroidal in polar view, 75 μm in size, tricolporoidate, Colpi indistinct, brevicolpate, pore indistinct, simple, equatorial, lalongate, 7-8 ×4-5 μm in size. Exine ±1 μm thick, undifferentiated, reticulate. Lumina 1-2 μm across muri 1-1.5 μm thick,lumina slightly smaller at the poles.

Comparison—*R. minor* Dutta & Sah (1970) is smaller in size, tricolpate and retipilariate in exine ornamentation. The present form is comparable to *R. assamicus* Dutta & Sah (1970) in size and tricolporoidate condition but the later has got longer colpi and coarsely reticulate ornamentation.

Occurrence—Upper Part of Kopili Formation (Upper Eocene), Meghalaya.

Affinity—Morphologically this form is comparable to the pollen grains found in some members of the family Leguminosae and Oleaceae.

Infraturma—*Prolati* Erdtman, 1943

Genus—*TRICOLPOROPOLLIS* Dutta & Sah, 1970

Type Species—*Tricolporopollis decoris* Dutta & Sah, 1970

Tricolporopollis rubra Dutta & Sah, 1970
Pl. 4, Fig. 63

Previous record—Palaeocene of Cherra Formation, Meghalaya (Dutta & Sah, 1970).

Occurrence—Middle part of Therria Formation, Middle part of Sylhet Limestone and Upper part of Kopili Formation, Meghalaya.

Affinity—Dutta and Sah (1970, p. 43) indicated its affinity with pollen grains found in some plants of the families, Euphorbiaceae, Rutaceae and Araliaceae.

Tricolporopollis (Venkatachala & Kar, 1969) *matanamadhensis* comb. nov.
1969 *Lakiapollis matanamadhensis* Venkatachala & Kar, Pl. 3, fig. 79

Holotype—Venkatachala and Kar 1969, Pl. 3, Fig. 79.

Type locality—Matanamadh, Lower Eocene, Kachchh, India.

Diagnosis—As stated by Venkatachala and Kar, 1969.

Remarks—*Lakiapollis matanamadhensis* has got foveolate exine, a character which is not diagnostic of the genus *Lakiapollis*. Therefore, it is emphasized here that the tricolporate (brevicolpate) pollen grains having laevigate to indistinctly structured exine should be kept under *Lakiapollis* whereas, those with reticulate and foveolate exine, conforming to the diagnosis of *Tricolporopollis*, should be included in it.

Genus—*LAKIAPOLLIS* Venkatachala & Kar, 1969

Type Species—*Lakiapollis ovatus* Venkatachala & Kar, 1969

Lakiapollis assamicus sp. nov.
Pl. 3, Fig. 35; Pl. 4, Fig. 55

Holotype—Pl. 4, Fig. 55; Slide No. 6958
Type Horizon—Therria Formation

Type locality—At 133 km from Shillong on Shillong-Badarpur Road, Meghalaya.

Diagnosis—Pollen grains spheroidal, rarely subtriangular in shape; Tribrevicolporate, apertures irregularly placed, pore margin thickened, colpi thin and short; exine thin, laevigate, folded.

Description—Pollen grains mostly spheroidal in shape, sometimes subtringular 90-95 × 80-85 μm in size (Holotype 85 μm), tribrevicolporate, apertures irregularly placed, colpus indistinct, mostly lalongate, slightly longer and narrower than pores. Pores distinct, circular to lalongate. up to 18 μm long and 10 μm wide, pore margin thickened. Exine ±1 μm thick, sexine and nexine undifferentiated, laevigate.

Comparison—L. ovatus Venkatachala & Kar (1969) is much smaller in size (up to 50 μm) and possesses subequatorial apertures, whereas, they are irregularly placed in the present species.

Occurrence—Kopili Formation (Upper Eocene), Meghalaya.

Affinity—L. assamicus sp. nov. compares with the pollen grains of some members of the families Euphorbiaceae and Araliaceae.

Previous record—Lower Eocene of Cherra Formation, Meghalaya (Dutta and Sah, 1970).

Occurrence—Lower part of Therria Formation (Palaeocene), Meghalaya.

Affinity—The present form is comparable to the pollen grains of *Myrica* (Myricaceae) and *Casurina* (Casurinaceae).

Turma—*Poroses* (Naumova) Potonié, 1960
Subturma—*Monoporines* (Naumova) Potonié, 1960

Genus—*GRAMINIDITES* Cookson, 1947

Type Species—*Graminidites media* Cookson, 1947

Graminidites maximums sp. nov.
Pl. 3, Fig. 34; Pl. 4, Fig. 56

Holotype—Pl. 4, Fig. 56; Slide no. 8791

Type Horizon—Therria Formation

Type locality At 107.5 km from Shillong on Shillong-Badarpur Road, Meghalaya.

Diagnosis—Pollen grains semicircular to ovoidal; monoporate, pore annulate; exine ±1 μm thick, undifferentiated, laevigate.

Description—Pollen grains semicircular to ovoidal in shape 82-105 ×75-80 μm in size (holotype 102 ×80 μm) monoporate. Pore ±circular in outline, annulate and 12-15 μm across (including the annulus). Exine ±1 μm thick, undifferentiated, laevigate, associated with a few irregular folds.

Comparison—G. media Cookson (1947) is smaller in size and is granulate. *G. subreticulata* Cookson (1947) is reticulate. *G. annulatus* (van der Hammen) Potonié 1960 is smaller in size. *G. assamicus* Sah & Dutta (1968) possesses psilate exine and is smaller in size.

Occurrence—Upper part of Therria Formation (Palaeocene), Meghalaya.

Affinity Morphologically these pollen grains are comparable to those found in the family Poaceae.

Subturma—*Polyporines* (Naumova) Potonié, 1960
Infraturma—*Periporiti* (van der Hammen), Potonié, 1960

Genus—*POLYPORINA* (Naumova) Potonié, 1960

Type Species—*Polyporina multistigmosa* Potonié, 1934

Polyporina sp.
Pl. 3, Fig. 31

Description—Pollen grain subcircular in shape, 78 μm in size, panporate. Pores ± circular in outline, more than 10 in number, 4-5 μm across, 10-12 μm apart. Exine ±1 μm thick, undifferentiated into sexine and nexein, granulose.

Occurrence—Upper part of Therria Formation (Palaeocene) and Middle part of Sylhet Limestone (Middle Eocene), Meghalaya.

Affinity—Morphologically *Polyporina* sp. is comparable to the pollen grains of the families Chenopodiaceae and Amaranthaceae.

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Explanation of Plates

(All photomicrographs ca. × 500)

Plate 1

1 & 3. *Intrapunctisporis densipunctis* sp. nov; Slide nos. 8763 and 8764 ; Coordinates : 87.3x20.7 and 76.5 x 17.5 respectively.

2. *Cyathidites australis* Couper; Slide no. 8759 ; Coordinate : 92.8 ×22.3.

4. *Lygodiumsporites khliehriatensis* sp. nov.; Slide no. 7033; Coordinate : 104.8 ×6.0.

5 & 8. *Lygodiumsporites meghalayaensis* sp. nov.; Slide nos. 8770 and 8772; Coordinates : 99.9 ×24.6 and 83.3 ×7.1 respectively.

6. *Dandotiaspora* sp.; Slide no. 8783 ; Coordinate : 105.5 ×5.2.

7. *Dandotiaspora telonata* Sah, Kar & Singh emend. Singh, Singh & Sah; Slide no. 8774; Coordinate: 92.9 ×20.3.

9. *Lygodiumsporites marginiplicatus* sp. nov.; Slide no. 8770 ; Coordinate : 90.7 ×10.7.

10. *Pinjoriapollis lanceolatus* Saxena & Singh ; Slide no. 8762; Coordinate : 112.10 ×10.6.

11. *Foveotriletes pachyexinous* Dutta & Sah ; Slide no. 8770 ; Coordinate : 88.4 ×14.6

12. *Todisporites major* Couper ; Slide no. 8779 ; Coordinate : 105.10 ×15.7.

Plate 2

13. *Striatriletes susannae* van der Hammen emend. Kar ; Slide no. 6951 ; Coordinate : 85.7 ×23.3.
14. *Striatriletes attenuatus* Singh & Tripathi; Slide no. 6955 ; Coordinate : 75.2 ×30.8.
15. *Lygodiumsporites marginiplicatus* sp. nov. ; Slide no. 8776 ; Coordinate : 96.4 ×22.7.
16. *Lygodiumsporites psilatus* sp. nov. ; Slide no. 8774 ; Coordinate : 91.5 ×4.0.
17. *Corrugatisporites* sp.; Slide no. 8795 ; Coordinate : 92.8 ×13.7.
18. *Collospermumpollis laevigatus* Tripathi & Singh ; Slide no. 6949 ; Coordinate : 71.2 ×25.9.
19. *Osmundacidites* sp.; Slide no. 8793 ; Coordinate : 102.3 ×11.6.

20 & 25. *Dandotiaspora dilata* Sah, Kar & Singh emend. Singh, Singh & Sah ; Slide nos. 8779 and 8780 ; Coordinates : 102.9 ×13.4 and 91.3 ×9.4 respectively.

21 & 26. *Palmidites obtusus* sp. nov. ; Slide nos. 8786 and 8775 ; Coordinate : 73.1 ×22.10 and 93.2 ×12.3 respectively.

22. *Striatriletes pseudocostatus* Singh & Tripathi ; Slide no. 6952 ; Coordinate : 87.8 ×23.9.
23. *Foveotriletes* sp. ; Slide no. 8762 ; Coordinate : 106.1 ×8.7.
24. *Monolites mawkmaensis* Sah & Dutta ; Slide no. 8780 ; Coordinate : 83.3 ×12.2.

Plate 3

27. *Liliacidites microreticulatus* Dutta & Sah ; Slide no. 8776 ; Coordinate : 108.5 ×21.10.
28. *Sciadopityspollenites* sp. ; Slide no. 8796 ; Coordinate : 76.1 ×24.8.
29. *Couperipollis meghalayaensis* sp. nov. ; Slide no : 8771 ; Coordinate : 73.3 ×23.3.
30. *Retisyncolporites angularis* Guzman ; Slide no. 8781 ; Coordinate : 90.9 ×5.1.
31. *Polyporina* sp. : Slide no. 8359 ; Coordinate : 83.1 ×9.4.
32. *Palmaepollenites communis* Sah & Dutta; Slide no. 6949 ; Coordinate : 74.6 ×12.0.

33 & 42. *Couperipollis brevispinosus* (Biswas) Venkatachala & Kar ; Slide nos. 8789 and 8787 ; Coordinates : 119.2 ×18.6 and 83.6 ×22.1 respectively.

34. *Graminidites maximus* sp. nov. ; Slide no. 8790 ; Coordinate : 106.8 ×23.6.
35. *Lakiapollis assamicus* sp. nov. ; Slide no. 6943 ; Coordinate : 100.2 ×106.7.

36 & 37. *Ladakhipollenites elongatus* sp. nov. ; Slide no. 8768 ; Coordinates : 81.0 ×15.8 and 90.8 ×15.6 respectively

38. *Couperipollis wodehousei* (Biswas) Venkatachala & Kar ; Slide no. 8767 ; Coordinate : 114.9 ×12.7.
39. *Dicolpopollenites eocenicus* Tripathi & Singh ; Slide no. 6944 ; Coordinate 99.8 ×12.4.
40. *Retitrescolpites* sp.; Slide no. 8797 ; Coordinate : 78.1 ×13.7.
41. *Couperipollis rarispinosus* (Sah & Dutta) Venkatachala & Kar ; Slide no. 8783 ; Coordinate : 115.9 ×10.6.
43. *Polypodiisporites mawkmaensis* Dutta & Sah; Slide no. 8778 ; Coordinate : 86.2 ×10.1.
44. *Schizaeoisporites* sp. ; Slide no. 8782 ; Coordinate : 107.4 ×10.5.

45 & 46. *Tricolpites alveolatus* Couper ; Slide nos. 8785 and 8784 ; Coordinates : 85.5 ×8.6 and 73.1 × 25.7 respectively.

47. *Palmidites maximus* Couper ; Slide no. 8765 ; Coordinate : 112.4 ×18.1.
48. *Proxapertites assamicus* (Sah & Dutta) Singh ; Slide no. 7031 ; Coordinate : 101.1 ×18.1.

Plate 4

49. *Dandotiaspora* sp. ; Slide no. 8770 ; Coordinate : 107.10 ×14.7.
50. *Lygodiumsporites eocenicus* Dutta & Sah ; Slide no. 8760 ; Coordinate : 99.7 ×22.2.
51. *Couperipollis meghalayaensis* sp. nov. ; Slide no. 8769 ; Coordinate : 79.10 ×17.1.
52. *Monolites discordatus* (Pflug in Thomson & Pflug) Potonié ; Slide no. 8774 ; Coordinate : 97.5 × 16.3.
53. *Lygodiumsporites khliehriatensis* sp. nov.; Slide no. 8774 ; Coordinate : 83.7 ×14.4.
54. *Verrucatosporites* sp. ; Slide no. 8794 ; Coordinate : 80.4 ×19.6.
55. *Lakiapollis assamicus* sp. nov. ; Slide no. 6958 ; Coordinate : 92.0 ×5.2.
56. *Graminidites maximus* sp. nov. ; Slide no. 8791 ; Coordinate : 108.5 ×12.8.
57. *Biretisporites* sp. ; Slide no. 7035 ; Coordinate : 85.7 ×10.10.