TWO NEW SPORE GENERA FROM THE MIOCENE SEDIMENTS OF NORTH-EAST INDIA

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Abstract

Two new spore genera, viz., *Pilamonoletes* and *Operculosculptites* are described from the Miocene sediments of north-east India. *Pilamonoletes* is pilate and bean-shaped, whereas *Operculosculptites* is operculate and variously sculptured. *Pilamonoletes* seems to be a polypodiaceous spore and *Operculosculptites* a bryophytic one.

Introduction

Miocene rocks in north-east India are generally represented by Surma and Tipam groups. The Surma Group is divided into Lower Bhuban and Upper Bokabil formations whereas Tipam is subdivided into Tipam Sandstone and Girujan Clay formations. Dupi Tila Group stands for Mio-Pliocene sediments and is known as Lower Dupi Tila and Upper Dupi Tila in Surma valley and as Namsang beds in Upper Assam and Naga Hills. Under the two sponsored projects funded by the Oil Industry Development Board, New Delhi subsurface Miocene samples supplied by the Oil & Natural Gas Commission, Dehradun, from the Rokhia bore hole core no. 1, Gojalia 1 and Baramura 2 in Tripura and Oligocene and Miocene rocks exposed along Silchar-Haflong road in Assam were palynologically investigated. The samples yielded mostly pteridophytic spores and gymnospermous pollen, while angiospermic pollen are rare. In all, 115 genera comprising 165 species were recorded, out of which 25 genera and 34 species are reworked Palaeozoic and Mesozoic forms. Two new genera encountered in the samples are detailed below.

The slides are deposited at the repository of the Birbal Sahni Institute of Palaeobotany, Lucknow.

Description

Genus—*PILAMONOLETES* gen. nov.

Type species—*Pilamonoletes excellensus* sp. nov.

Generic diagnosis—Spores oval, bean-shaped, monolete, lete distinct-indistinct, extending half to two-thirds along the longitudinal axis. Exine pilate, pila with narrow base and swollen head, sculptural elements generally more on distal side, sparsely placed, evenly distributed, interpilar exine laevigate.

Comparison—*Polypodiisporites* Potonié 1934 is comparable to *Pilamonoletes* in shape but is distinguished by the presence of verrucae on both sides which are also closely placed to form pseudoreticulate pattern. *Polypodiidites* Ross (1949) is also bean-shaped, monolete but verrucae at the base are polygonal in shape and with pointed tip. *Verrucatosporites* Pflug (1952) has warts as ornamentation. *Polypodiaceaesporites* Thiergart (1938) is more or less laevigate to granulose, *Seniasporites* Sah & Kar (1969) is proximally laevigate and distally verrucose. *Pilamonoletes* proposed here is separated from all other monolete genera by its pilate ornamentation which are sparsely placed and bean-shaped overall form.

Remarks—The pila when adpressed on the spore look like ordinary verrucae, but

those situated on the margin clearly show the narrow rod-like body of pila and the swollen head. The verrucae are generally with swollen base and the tip may either be pointed or flat. Since the basic nature of ornamentation is different so a new genus has been instituted here to accommodate these forms.

Pilamonoletes excellensus sp. nov.
Pl. 1, figs. 1-4

Holotype—Pl. 1, fig. 1; size 90×50 μm; Slide no. B.S.I.P. 9665/4/3, V17/3.

Type locality—Rokhia bore hole core no. 1, depth 195-200 m, Miocene.

Description—Spore bean-shaped, 72-92 × 48-56 μm. Monolete distinct, extending up to two-thirds radius along longitudinal axis. Exine up to 2 μm thick, pilate, pila with narrow base and swollen head, sculptural elements generally more on distal side, sparsely placed, evenly distributed, interpilar exine laevigate.

Pilamonoletes moderatus sp. nov.
Pl. 1, figs. 5-6

Holotype—Pl. 1, fig. 5; size 54×40 μm; Slide no. B.S.I.P. 9667/1/3, L19/2.

Type locality—Rokhia bore hole core no. 1, depth 1450-1455 m, Miocene.

Diagnosis—Spore bean-shaped, 54×40 μm. Monolete distinct, extending up to two-thirds radius along longitudinal axis. Exine up to 1.5 μm thick, pilate, pila with narrow base and swollen head, sculptural elements developed more on the distal side. Pila sparsely placed, uniformly distributed, interpilar exine ± laevigate.

Comparison—The present species closely resembles *Pilamonoletes excellensus* by its ornamentational pattern but is easily distinguished by its smaller size range. Since in extant pteridophytes, the size variation of spores in a particular species is not much so this species is maintained.

Genus—OPERCULOSCULPTITES gen. nov.

Type species—Operculosculptites globatus sp. nov.

Generic diagnosis—Spores subcircular, operculate, operculum subcircular, generally well-defined. Exine thick, laevigate or sparsely sculptured on operculum side but heavily ornamented with verrucae, pila and bacula opposite to operculum side.

Description—Spore with uneven margin due to projection of sculptural elements, 55-50×38-35 μm. Operculum generally distinct, sometimes indistinct because of sculptural elements, conforms with overall shape. Exine 2.5-6 μm thick, variously ornamented with bacula and verrucae, sculptural elements up to 8 μm long, closely placed on opposite side of operculum providing pseudoreticulate pattern in surface view.

Comparison—*Katrolites* Venkatachala & Kar (1967) is comparable to the present genus in presence of operculum and alete nature of the spores but the latter is readily separated by its verrucate, pilate, baculate ornamentational pattern. *Granuloperculatipollis* Venkatachala & Góczán (1964) is distally porate but has granulose ornamentation. *Distalanulisporites* Klaus (1960) has a circular annulus in the middle region but is subtriangular in shape and possesses a distinct trilete mark. *Exesipollenites* Balme (1957) is also operculate but is distinguished by having laevigate-granulose ornamentation and differential thickening of exine. *Cooksonites* Pocock (1962) approximates the present genus in sculptural elements but is differentiated by its well developed cingulum. *Coptospora* Dettmann (1963) is distinctly hilate and has asymmetrically thickened exine. *Operculosculptites* proposed here is distinguished from all the known genera by its subcircular shape, operculate nature and differentially ornamented exine.

Remarks—The general morphology of the present genus perhaps points towards the bryophytic affinity. It is, however, very difficult to tag with it any living form. The spores of *Calobryum dentatum* Kumar & Udar, *C. indicum* Udar & Chandra and *Haplomitrium hookeri* (Smith) Nees studied by Gupta & Udar (1986) broadly resemble *Operculosculptites* in the presence of differential ornamentation and presence of elevation (operculum) on one surface. The sculptural elements in none of the species studied by them are so robustly built and closely placed. Operculum like opening is also found in the spores of *Distichium montanum* (LAM.) (Boros & Jarai-Komlodi 1975, Pl. 38, figs. 1-6, P. 112, *Trematodon ambiguous* (HEDW) Hornsch (Boros & Jarai-Komlodi 1975, Pls. 42a,42b figs. 1-7, p. 118) and *Pollia heimii* (HEDW.) Furnr. (Boros & Jarai-Komlodi 1975, Pl. 83a, figs. 1-7, P. 194). Of them, the spores of *Trematodone ambiguous* are bedecked with strongly built verrucae and bacula.

Operculosculptites globatus sp. nov.
Pl. 1, figs. 7-11

Holotype—Pl. 1, fig. 7; size 38-54 μm; Slide no. B.S.I.P. 9644/2/2, R 31/2.

Type locality—Rokhia bore hole core no. 1, depth 2095-2100 m, Miocene, Tripura.

Diagnosis—Spores subcircular with uneven margin due to projection of sculptural elements, 38-35×54-49 μm. Operculate, operculum generally well-defined, subcircular. Exine 2-5 μm thick, heavily sculptured with verrucae and bacula on nonoperculate side, exine on operculum side more or less laevigate or sparsely ornamented with verrucae and bacula.

Operculosculptites rokhiaensis sp. nov.
Pl. 1, figs. 12-19

Holotype—Pl. 1, fig. 12; Size 46×45 μm; Slide no. B.S.I.P. 9635/1/2, L 15/1.

Type locality—Rokhia bore hole core no. 1, Depth 205-210 m, Miocene, Tripura.

Diagnosis—Spores subcircular, 40-60 × 38-58 μm, operculate, operculum generally well-defined, exine baculate, bacula more or less of same size, sculptural elements sparsely placed, more on distal side, interbacular exine laevigate.

Comparison—*Operculosculptites globatus* resembles the species described here in shape and size range but *O. rokhiaensis* is distinguished by its uniformly built bacula.

Operculosculptites baculatus sp. nov.
Pl. 1, figs. 20-24

Holotype—Pl. 1, fig. 20; size 60×57 μm; Slide no. B.S.I.P. 9652/3/4, Q 48/2.

Type locality—Rokhia bore hole core no. 1, depth 220-225 m, Miocene, Tripura.

Diagnosis—Spore subcircular, 46-64×44-62 μm, operculate, baculate, bacula long, strongly built, closely placed forming negative reticulum in surface view.

Comparison—*Operculosculptites rokhiaensis* comes close to this species in general organisation but in *O. baculatus* the bacula are very closely placed and robustly built. *G. globatus* is variously sculptured with verrucae and bacula.

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Explanation of Plate

(All photomicrographs are enlarged *ca.* ×500)

Plate 1

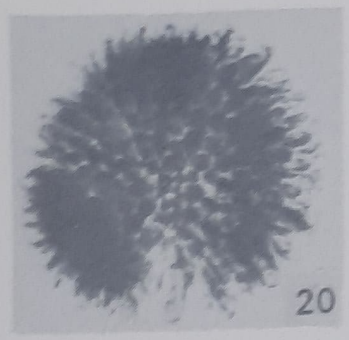
1—4. *Pilamonoletes excellensus* sp. nov., Slide nos. B.S.I.P. 9665/4/3, V17/3; B.S.I.P. 9663/2/6, N32/3; B.S.I.P. 9662/3/3, P42/2; B.S.I.P. 9664/3/1, V19/4.

5—6. *Pilamonoletes moderatus* sp. nov., Slide nos. B.S.I.P. 9667/1/3, L19/2; B.S.I.P. 9666/1/1, Y46/1.

7—11. *Operculosculptites globatus* sp. nov., Slide nos. B.S.I.P. 9644/2/2, R31/2; B.S.I.P. 9645/4/1, D12/1; B.S.I.P. 9643/1/1, P24/3; B.S.I.P. 9642/4/7, U24/2; B.S.I.P. 9645/4/1, D12/1.

12—19. *Operculosculptites rokhiaensis* sp. nov., Slide nos. B.S.I.P. 9635/1/2, L15/1; B.S.I.P. 9636/3/5, J 22/4; B.S.I.P. 9634/2/7, R36/4; P.S.I.P. 9638/1/6, W36/4; B.S.I.P. 9638/1/6, W36/4; B.S.I.P. 9633/4/4, M34/4; B.S.I.P. 9640/4/4, Q45/1; B.S.I.P. 9637/2/6, X30/4; B.S.I.P. 9641/3/3, J42/1.

20—24. *Operculosculptites baculatus* sp. nov., Slide nos. B.S.I.P. 9652/3/4, Q48/2; B.S.I.P. 9650/3/8, L 48/4; B.S.I.P. 9652/3/4, Q48/2; B.S.I.P. 9649/3/5, J28/2; B.S.I.P. 9651/1/6, X44/2.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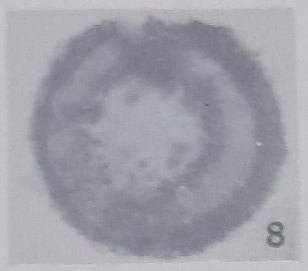
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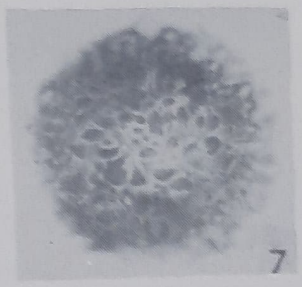
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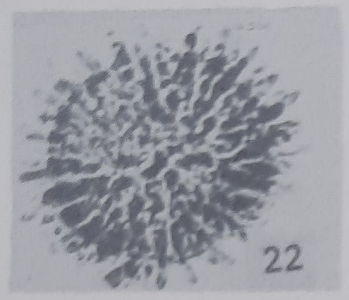
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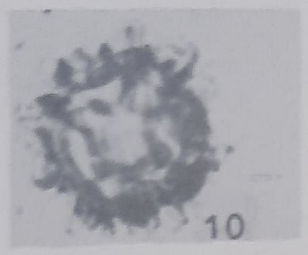
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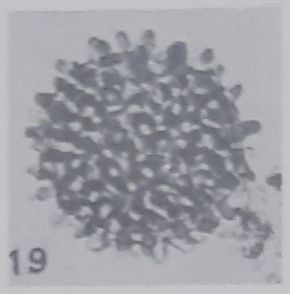
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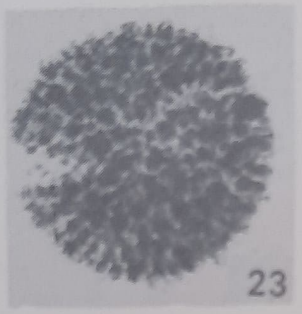
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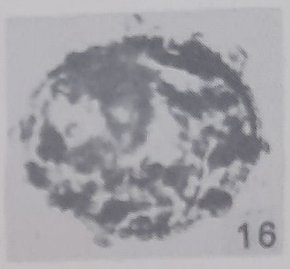
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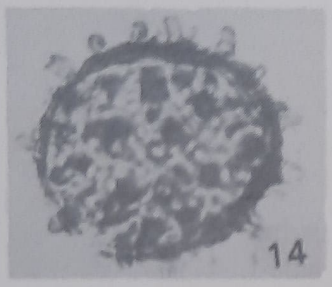
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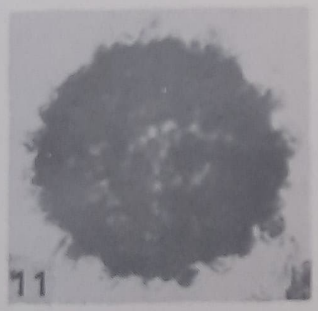
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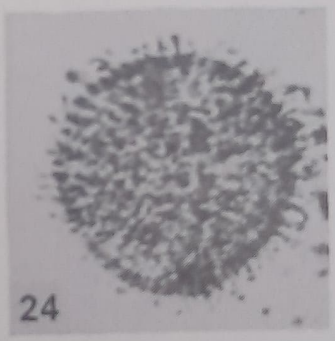
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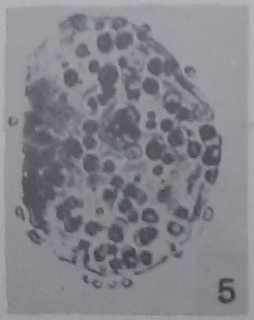
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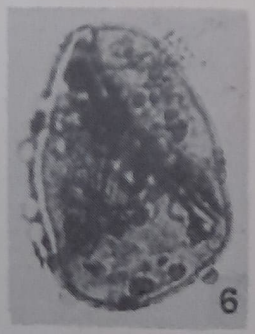
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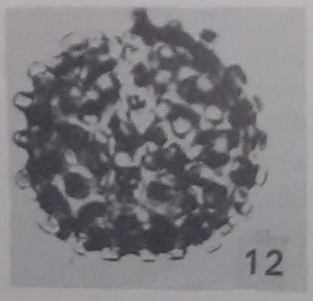
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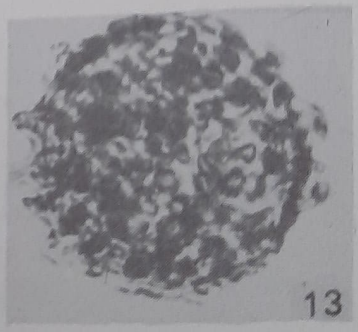
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