



A NEW GULATE MEGASPORE FROM THE SATPURA GONDWANA BASIN

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ABSTRACT

A new gulate megaspore *Satpuraspora* is described from the Barakar Formation (Lower Permian), Rawanwara Colliery, Pench Valley Coalfield, Satpura Gondwana Basin, Madhya Pradesh. The megaspore has been observed under light and scanning electron microscopes and its exosporium is characterised by the presence of elongate, furcate processes with pointed apices.

Key words : Gulate Megaspore, Barakar Formation, Rawanwara Colliery, Pench Valley Coalfield, Lower Gondwana.

INTRODUCTION

Well-preserved plant fossils represented by the species of *Glossopteris*, *Gangamopteris*, *Euryphyllum*, *Noeggerathiopsis*, *Cordaicarpus*, *Samaropsis* and *Vertebraria* are collected from the lower seams of Barakar Formation exposed in the Rawanwara Colliery, Pench Valley Coalfield, Chhindwara District, Madhya Pradesh (fig. 1). The chemical treatment of carbonaceous samples has yielded a variety of mega- and miospores. Mioflora is dominated by monosaccate and trilete genera e.g. *Parasaccites*, *Plicatipollenites*, *Caheniasaccites*, *Virkkipollenites*, *Callumispora*, *Brevitriletes*, *Leotriletes* and *Verrucosiporites*. The megaspores are represented by *Talchirella*, *Barakarella*, *Jhariatriletes*, *Banksisporites*, *Singhisporites*, *Bokarasporites*, *Duosporites* and a new gulate type with distinct exine ornamentation.

Gulate megaspores showing roundly conical elevation of trilete mark and contact area over a rounded body usually with lateral mode of flattening are rare in the Lower Gondwana successions of India. There are three genera separated on the basis of exine ornamentation. *Gulatriletes* Bharadwaj & Tiwari, 1970 shows spines and setae-like fleshy simple or furcate processes; *Shahdolia* Pant & Mishra, 1986 possesses verrucose ornamentation and *Lagenicula* (Bennie & Kidston) Potonié & Kremp, 1954 is known by simple spinose ornamentation. *Nidhitriletes* Pant & Basu, 1979 recorded from Triassic has been found to be similar with *Lagenicula* in having spines (Pant and Mishra, 1986).

The megaspores have been studied under dry and wet conditions after being sorted from the maceral treated with hydrofluoric acid for 6-7 days. External features of individual megaspores were examined under low power and high power microscopes in incident light. SEM study was carried out after treating the single megaspore in absolute alcohol for 4-5 times and with AgNO_3 to increase the conductivity and finally coated with gold palladium. To examine the structural features each megaspore was further treated with nitric acid for 3-4 days and finally with mild alkali (2-5%) for 5-10 minutes (for details, see Lele and Srivastava, 1983). The type slide and negative of megaspore are preserved in the museum of Birbal Sahni Institute of Palaeobotany, Lucknow.

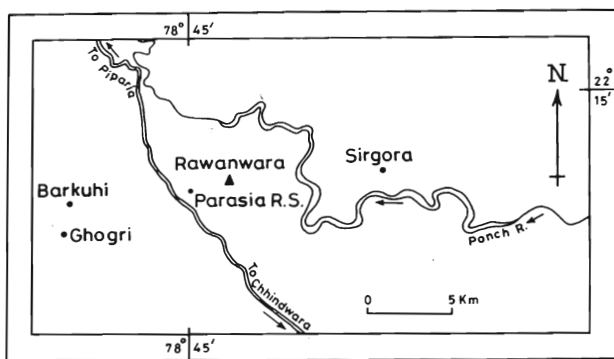


Fig. 1. Location map of the area showing the fossil locality indicated by a filled triangle.

SYSTEMATIC DESCRIPTION

Anteturma **Sporites** Potonié, 1893

Turma **Triletes** Reinsch, 1881

Subturma **Lagenotriletes** Potonié & Kremp,
1954

Infraturma **Gulati** Bharadwaj, 1957

Genus **Satpuraspora** n. gen.

(Type species: *Satpuraspora gondwanensis* n. gen. and n. sp.)

Generic diagnosis: Gulate, trilete megaspore, arcuate ridges well marked, gula prominent, without ornamentation, exosporium covered with elongate, 2-7 times furcate, conical, flabellate processes showing pointed apices.

Comparison: *Satpuraspora* is distinct from all the known gulate megaspores in having different types of exine ornamentation. However, elongate flabellate, furcate processes are comparable with the genus *Setosisporites* (Ibrahim) Potonié & Kremp 1955 but its long spinose ornamentation showing 2-3 furcations are different from present genus. Moreover, bulk of contact area does not form gula in *Setosisporites*.

Satpuraspora gondwanensis n. sp.

(Pl. I, figs.1-8)

Holotype: B S I P Museum Slide No.12602

Locality & Horizon: Rawanwara Colliery, Pench Valley Coalfield, Satpura Gondwana Basin, Chhindwara district, Madhya Pradesh; Barakar Formation (Lower Permian), Lower Gondwana.

Specific diagnosis: Megaspore trilete, gulate, azonate, circular to semi circular, triradiate ridges and contact area extended into a neck-like projection,

i.e. gula, exosporium covered with elongate, flabellate furcate processes showing pointed apices, mesosporium indistinct, not detachable, sometimes shows faint impressions of cushions.

Dimensions:

Dry condition

Size of megaspore : 600 x 800 μ m

Tri-radiate ridges : 120 - 150 x 20 μ m

Width of arcuate ridges : 20 μ m

Appendages : 50 -70 x3-8 μ m

Gula : 30 -35 x40-50 μ m

Wet condition

Size of megaspore: 1450x1560 μ m

Appendages: 30-80 x 5-12 μ m

Branches: 35 x55 μ m

Gula: 180x220 μ m

Description: Circular to semicircular gulate megaspore bears elongate, flabellate processes which are apically furcated 2-7 times into spines with pointed apices. SEM observation of megaspore shows dense ornamentation only on one corner. However, under light microscope evenly distributed ornamentation is clearly demarcated in marginal areas. Gula is smooth, i. e. without ornamentation. An indistinct folded mesosporium is discernible with faint marks of irregularly distributed cushions after the treatment with mild alkali but the organisation and structural features of mesosporium are not clear.

Remarks: Dispersed megaspores are recorded from almost all the sequences of Indian Gondwana (Bhardwaj and Tiwari, 1970; Lele and Srivastava, 1983; Pant and Mishra, 1986; Tewari and Maheshwari, 1992). Although stratigraphic significance of megaspores is not apparent, Maheshwari and Tewari (1988) have identified broad-based cenozones and subzones of megaspores. The records of gulate megaspores, i.e. *Gulatriletes*,

EXPLANATION OF PLATE I

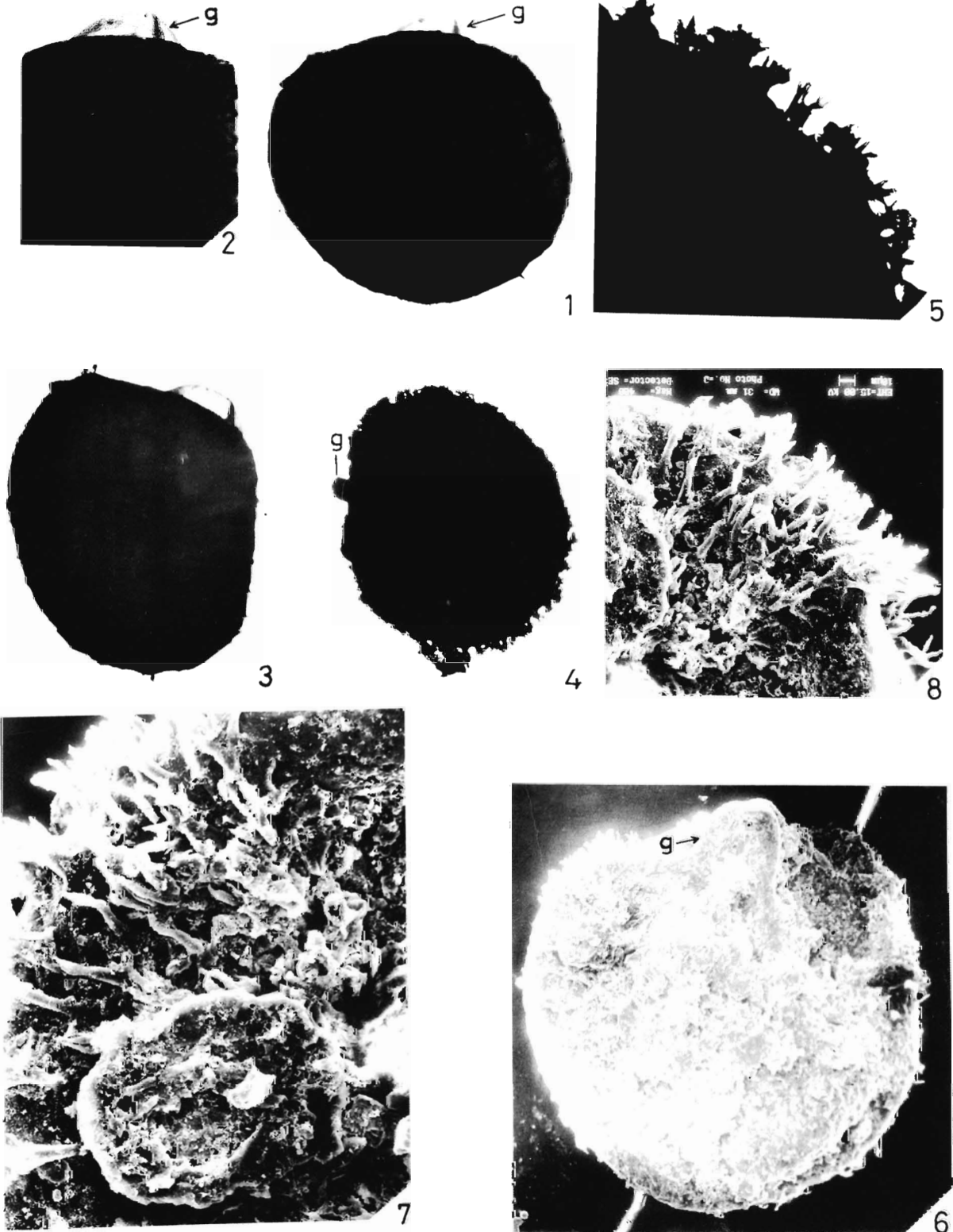


1-8. *Satpuraspora gondwanensis* n. sp.

- 1 Moistened megaspore as seen under transmitted light with faint gula (g) X90
- 2 Part of megaspore enlarged to show gula (g) X200
- 3 Megaspore after differential maceration in transmitted light showing gula (g) X90
- 4 Differentially macerated megaspore in incident light showing exine

ornamentation and gula (g) X60

- 5 Margin of megaspore enlarged to show furcate - flabellate ornamentation in incident light X140
- 6 SEM micrograph of dry megaspore showing gula (g) and surface feature X125.
- 7 SEM micrograph of dry megaspore showing furcate exine ornamentations X300
- 8 Part of dry megaspore in SEM is enlarged to show the nature of exine ornamentation X180



Shahdolia, *Lagenicula* and *Satpurasporea* in the Barakar Formation and *Nidhitriteles* in the Lower Triassic beds further demonstrate the inconsistent distribution pattern of megaspores in the Gondwana.

Megaspores have not yet been discovered in association with Gondwana plant fossils; therefore it is difficult to ascertain their botanical relationship. However, Pant and Mishra (1986) have assigned a near certain affinity of gulate megaspores with lycopsid group of plants on the basis of structural features of megaspores.

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