NAVALESPORITES GEN. NOV.—A NEW MONOLETE MIOSPORE FROM SATPURA GONDWANA BASIN, INDIA

The *sporae dispersae* of the Lower Gondwana sediments of India consists of a number of miospore genera including monoletes, which are, however, limited in number. The monolete proximal aperture is known to have evolved during early Carboniferous time and since then miospores with bilateral symmetry have been described in Sphenospids and also Pterospides, the former being mostly laevigate while the latter possess sculptures. In the Lower Gondwana sediments of India the known monolete miospores have been usually referred to *Laevigatosporties*, *Latosporites*, *Thymospora*, *Spinosporites*, etc. During the palynological investigation of the Lower Gondwana sediments of Satpura and South-Rewa Gondwana Basins some miospores have been observed which bears a distinct combination of morphographic characters and are being described here as a new taxon-*Navalesporites* gen. nov.

Genus—**Navalesporites** gen. nov.

Type species—*Navalesporite spinosus* gen. *et* sp. nov.

Generic diagnosis—Broadly been-shaped, longitudinally oval, monolete miospore. Exine sculptured on distal face by mammoid spines, rarely short coni., Proximally ornamentation reduced and almost absent from the well-defined contact area.

General description—Miospores mostly oval in longitudinal symmetry with broadly rounded ends; distal side deeply convex. Proximal surface slightly convex in lateral view. Monolete mark distinct, extending more than $\frac{3}{4}$ of the body length, arcuate at both ends (Pl. 1, Fig. 9) delimiting the contact area. Sutures closed, labra thick, slightly raised. Exine 1.5 to 2.0 μm thick, brown to dark brown in colour, distally spinose, spines closely to sparsely set, sharply pointed. Majority of the spines bear bulbous base and beak-shaped tip which being (Pl. 1, Figs. 8, 9, 10) thin hyaline, and sharply pointed, some of the spines curved at the tip. Ornamentation almost uniformly distributed distally, Ornamentation much reduced proximally and almost absent in the contact area. Mode of flattening variable along the longer axis.

Comparison—The genus *Navalesporites* gen. nov. proposed here has a distinct monolete mark with reduced proximal ornamentation which is almost absent in the contact area. It resembles with the genus *Polypodiidites* Ross ex. Couper (1953) in view of having a markedly reduced proximal sculpture but differs in having spinose ornamentation which in the latter is distinctly verrucose. *Reticuloidosporites* Pflug (1953) can be compared with the new genus due to its oval shape, and spinose-verrucose-conate ornament. However, these processess do not possess the dome-shaped bases with beak-like tips, and are present on both the surfaces hence different from the present genus. *Polypodiisporites* Potonié (1934) and *Thymospora* Wilson & Venkatachala (1963) also possess verrucae all over the exine and thus differ from the present genus. *Crookshankites* Jana & Maheshwari (1984) is another monolete miospore in which the exine is verrucose and thus differs from the present taxon. *Spinosporites* Alpern (1958) has a weaker monolete mark and no contact area. However, as observed by Potonie (1960) and also Bharadwaj and Salujha (1965; P. 35) *Spinosporites* possesses small coni and not mammoid spines and hence it is distinctly a different taxon. *Scabramo-*

noletes Ramanujam (1966) has hillock-like sculptural elements hence it cannot be compared with the present genus.

Derivation Of The Name—The name *Navalesporites* has been derived after the name of Dr. G. K. B. Navale, a well known petro-palynologist, Asstt. Director and Head of the Department of Biodiagenesis, Birbal Sahni Institute of Palaeobotany, Lucknow.

Navalesporites spinosus sp. nov.

Pl. 1, Figs. 1—10

Holotype—Pl. 1, Fig. 1; Size 59 × 77 μm.

Locus Typicus—Sukh-Tawa River Section, Satpura Basin, M.P., India.

Horizon & age—Sukh-Tawa Formation, Satpura Gondwana Basin; Upper Permian-Lower Triassic, India.

Diagnosis—Oval, monolete miospores, holotype 59 × 77 μm. Exine sculptured distally spines mostly mammoid. Proximally ornamentation reduced and almost absent in the well-difined contact area. Exine 1 μm thick.

Description—Miospores longitudinally oval in shape with rounded ends. Size 45-75 × 62-81 μm. Monolete mark distinct and extending more than $\frac{3}{4}$ of body length, arcuate rims prominent at both ends delimiting the contact area. Sutures closed, labra slightly raised and thickened. Exine spinose sculptured, 2.0-3.5 μm in height. Majority of the spines bear bulbous base with a thin, hyaline sharply pointed apex (Pl. 1, Fig. 1). Some spines curved at the tip. Ornamentation reduced proximally, almost absent in the contact area (Pl. 1, Fig. 7).

Remarks—The samples from Parsora Formation and Suk-Tawa Formation have yielded spores and pollen grains. However, this assemblage has suggested an Permo-Triassic affinity for these sediments. The occurrence of *Navalesporites* gen. nov. in the Parsora Formation and Sukh-Tawa Formation and its absence in older horizons indicate the stratigraphic significance of this taxon. The pteriodophytic affinities of this genus and the complexity of assemblage on the whole, suggests a diversification and richness of vegetation during these times.

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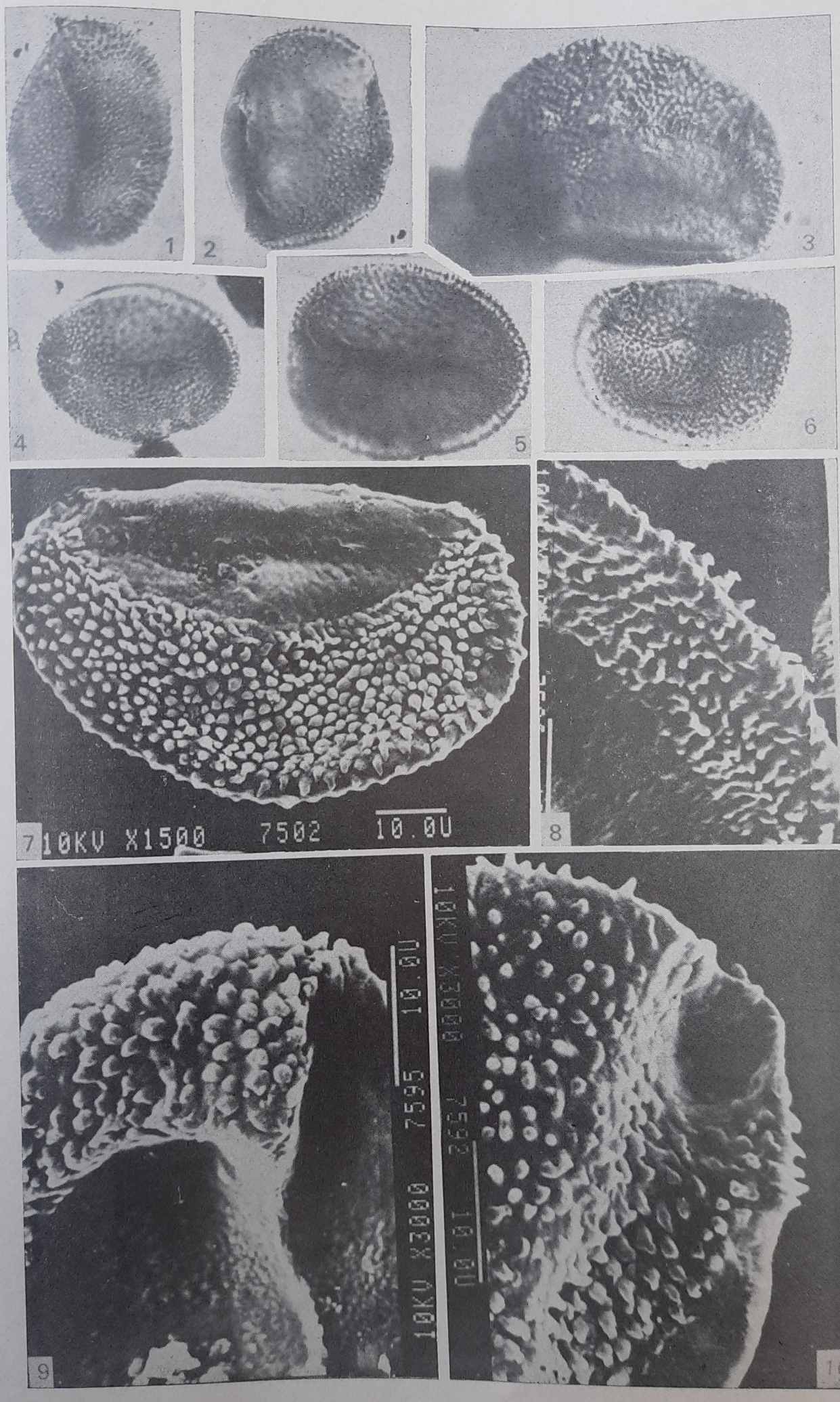
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EXPLANATION OF PLATE 1

1. *Navalesporites spinosus* sp. nov., Holotype; Reg. no. 9065, distal view, incident light, x 500.
2. *N. spinosus* sp. nov., Reg. no. 9066, proximal view, incident light, ×500.
3. *N. spinosus*, Reg. no. 9050; A specimen under differential interference showing the nature of the contact area, nature of ornamentation and the monolete mark, ×750.
4. *N. spinosus* sp. nov., Reg. no. 9068; distal view, incident light, ×500.
5. *N. spinosus*, Reg. no. 9051; Another specimen in top focus showing the smooth nature of contact area, incident light, ×500.
6. *N. spinosus* sp. nov. Reg. no. 9054; A specimen slightly in oblique orientation, incident light, × 500.
7. *N. spinosus* sp. nov., Lateral view, SEM ×916.
8. *N. spinosus* sp. nov., A specimen showing the nature of ornamentation; SEM ×2175.
9. *N. spinosus* sp. nov., a part of the proximal view showing arcuate nature of monolete; SEM, × 2127.
10. *N. spinosus* sp. nov., a portion of distal view showing nature of spines, SEM, ×2088.

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