

Saksenasporites gen. nov. – A Permian megaspore from Birsinghpur Pali, Madhya Pradesh

R.P. TRIPATHI

Department of Botany, J.N. Vyas University, Jodhpur 342 001, India.

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ABSTRACT

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A new taxon of Permian megaspore, *Saksenasporites* gen. nov., is described from Birsinghpur Pali, Madhya Pradesh (India). The new megaspore is characterised by unequal trilete laesurae, one or two of them extending beyond arcuate ridges, mixed verrucose- baculose sexine sculpture, distinct contact areas delimited by arcuate ridges and unpitted nexine. A new suprainfraturma, *Verrucosi-baculati* nov., is proposed in the text. Taxonomic consideration of the new megaspore is based on SEM and LM studies.

Key-words—Megaspore, Permian, Lower Gondwana, India.

सारांश

मध्य प्रदेश के बीरसिंहपुर पाली क्षेत्र से प्राप्त एक परमियनयुगीन

गुरुबीजाणु : *सक्सेनास्पोराइटीज़* नव वंश

आर.पी. त्रिपाठी

मध्य प्रदेश के बीरसिंहपुर पाली क्षेत्र से *सक्सेनास्पोराइटीज़* नव वंश नामक परमियनयुगीन गुरुबीजाणु का एक नया वर्गक अंकित किया गया। यह नया गुरुबीजाणु असमरूप त्रिअरीय लीज्यूरी द्वारा अभिलक्षित है। इनमें से एक अथवा दो चापाकार कटक आगे तक बढ़े हुए हैं तथा ये मिश्रित किणमय-बाकुलामय सेक्साइन लक्षण (स्कल्पचर) हैं। इनके सुस्पष्ट सम्पर्क क्षेत्र चापाकार कटकों तथा अगर्तमय नेक्साइन तक असीमित हैं। शोध पत्र द्वारा *वेरुकोसी* - *बाकुलाटी* नामक एक नया महाअवुटर्मा (सुपराइन्क्राटुर्मा) प्रस्तावित किया जाता है। नवीनतम गुरुबीजाणु का वर्गकीय मूल्यांकन क्रमवीक्षण इलेक्ट्रॉन सूक्ष्मदर्शी तथा सरल सूक्ष्मदर्शी द्वारा किए गए अध्ययन पर आधारित है।

INTRODUCTION

PERMIAN rocks possess diversified assemblages of megaspores (Bharadwaj & Tiwari, 1970; Pant & Mishra, 1986; Maheshwari & Tewari, 1987). Megaspores from Birsinghpur Pali were first reported by Saksena (1971); since then, Lele and Chandra (1974), Pant and Mishra (1986), Mishra and Tripathi (1991), Maheshwari and Tewari (1991) and Tripathi (1997) have described a wide variety of

megaspores from the locality. The present investigation on *Saksenasporites* gen. nov. adds further to our knowledge of dispersed megaspores from the Permian rocks of India.

MATERIAL AND METHOD

Carbonaceous shales were collected from the North bank of Johilla river, about 150 m from its confluence with Ganjra nalla, in Birsinghpur Pali Coalfield, District Shahdol (Madhya

Pradesh). The shales are full of incrustations of leaves of *Noeggerathiopsis* sp., *Glossopteris* sp., *Gangamopteris* sp., equisetalean axes, coniferous shoots and cordaitalean seeds (Feistmantel, 1882; Saksena, 1955; Pant *et al.*, 1995). Coal samples were collected for the present purpose from the coal mines of the area and macerated by usual techniques (Tripathi & Mishra, 1997a).

The Holotype and figured slides are stored in Palaeobotany Laboratory, Botany Department, Govt. Autonomous Science College, Rewa, M.P., India. The descriptive terms used in the text are in accordance with Kremp (1965) and Pant and Mishra (1986).

SYSTEMATICS

Remarks—Pant & Mishra (1986), while emending the genus *Jhariatriteles* Bharadwaj & Tiwari 1970, stated that the megaspores of type species *J. baculosus* Bharadwaj & Tiwari and *J. damudicus* (Srivastava) Bharadwaj & Tiwari have mixed verrucose-baculose ornamentations over the sexine. This feature is also seen in text-figures and photographs given by Bharadwaj and Tiwari (1970) and, further, the megaspores of the genus *Saksenasporites* gen. nov., in the present study, under SEM, confirm the presence of mixed verrucose-baculose ornamentations over sexine of megaspores. Hence, the new suprainfraturma *Verrucosi-baculati* nov. is proposed here for the trilete megaspores having mixed verrucose-baculose sexine sculpture.

Supraturma—SPORITES H. Potonié 1893

Anteturma—MEGASPORITES Pant 1962

Turma—TRILETES (Reinsch) Potonié & Kremp 1954

Suprasubturma—AZONOTRILETES Lubert 1935

Subturma—APICULATI (Bennie & Kidston) Potonié 1956

Suprainfraturma—VERRUCOSI-baculati nov.

SAKSENASPORITES gen. nov.

Diagnosis—Megaspores trilete, amb circular to subtriangular, trilete laesurae unequal, one or two of them extending beyond arcuate ridges but falling short of margin; contact areas distinct and bounded by arcuate ridges, sexine covered with mixed verrucose-baculose sculptures, nexine membranous and unpitted.

Type species—*Saksenasporites rewaensis* sp. nov.

Comparison—Genus *Saksenasporites* nov. is compara-

ble with *Jhariatriteles* (Bharadwaj & Tiwari) Pant & Mishra 1986 in having mixed verrucose-baculose sexine sculptures, nature of contact areas, arcuate ridges and nexine but differs in having unequal trilete laesurae, being one or two of them extending beyond arcuate ridges (trilete laesurae in *Jhariatriteles* reach only up to arcuate ridges and never extend beyond them). It is comparable with *Duosporites* (Høeg, Bose & Manum) Bharadwaj & Tiwari 1970 in extension of trilete laesurae beyond arcuate ridges but differs in having mixed verrucose-baculose sexine sculptures and unpitted nexine (sexine sculptures in *Duosporites* are granulose to finally verrucose and nexine is always pitted). *Saksenasporites* differs from *Neoraistrichia* potonié 1956 in having mixed verrucose-baculose sexine sculptures, distinct contact areas and arcuate ridges (Sexine sculptures in *Neoraistrichia* are exclusively baculose, contact areas indistinct and arcuate ridges are absent). It differs from *Rewatriteles* Pant & Mishra 1986 in having differentially distributed mixed verrucose-baculose sexine sculptures and extension of trilete laesurae beyond arcuate ridges (In *Rewatriteles* sexine sculpture is exclusively baculose showing uneven distribution).

SAKSENASPORITES REWAENSIS sp. nov.

Pl. 1, figs 1-6; Text-fig. 1A-I

Diagnosis—Megaspores trilete, amb circular to subtriangular, trilete laesurae prominent, straight to sinuous, gradually widening towards peripheral ends, widest and highest at trijunctions with arcuate ridges; contact areas well developed, circular to subcircular or subtriangular in shape, depressed, radius 1/2 to 2/3 or more of the spore, delimited by unevenly raised arcuate ridges; sexine covered with differentially distributed mixed verrucose-baculose sculpture, verrucae and beculae sparse and small in contact areas, dense and large elsewhere; nexine faintly preserved, thin, membranous, diameter about 2/3 of the spore, unpitted.

Dimensions :

		Dry megaspores	Macerated and mounted megaspores
Equatorial diameter		350-560 µm	400-680 µm
Trilete laesurae	Length	95-315 µm	100-480 µm
	Width	15-80 µm	15-115 µm
	Height	15-30 µm	
Contact area	Diameter	220-345 µm	235-480 µm
	Width	18-30 µm	15-50 µm
Arcuate ridges	Width	18-30 µm	
	Height	15-30 µm	
Verrucae			

PLATE 1

(*Saksenasporites rewaensis* sp. nov.)

- 1, 2. Megaspores showing sinuous trilete laesurae, one of them extending beyond arcuate ridges and depressed contact areas delimited by arcuate ridges. Fig. 1. Slide no. 358, x 200; fig. 2. Slide no. 352, x 200.
- 3, 4. Megaspores showing swollen peripheral trijunctions and extension of one laesurae beyond arcuate ridge. Sculptured sexine is clear in fig.

3., Slide no. 359, x 300; fig. 4, Holotype, Slide no. 374, x 300.

5. Megaspore with central opening. Slide no. 354, x 200.

6. Macerated megaspore. Note extension of two laesurae beyond arcuate ridges (arrows), Slide no. 360, x 200.

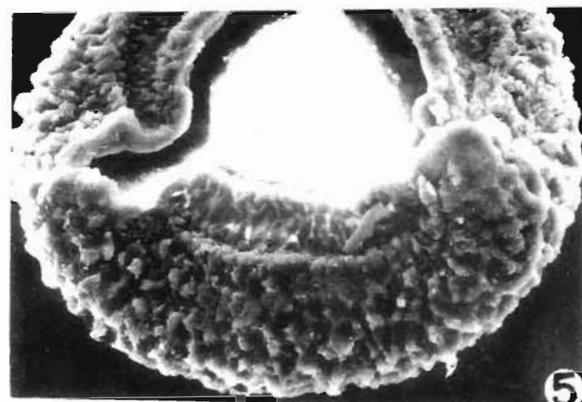
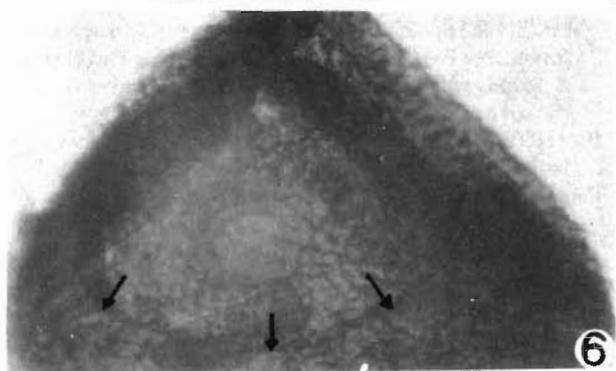
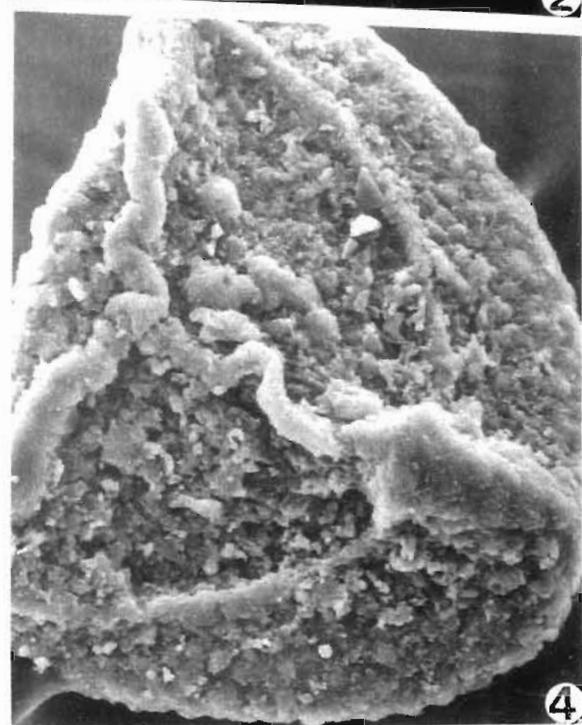
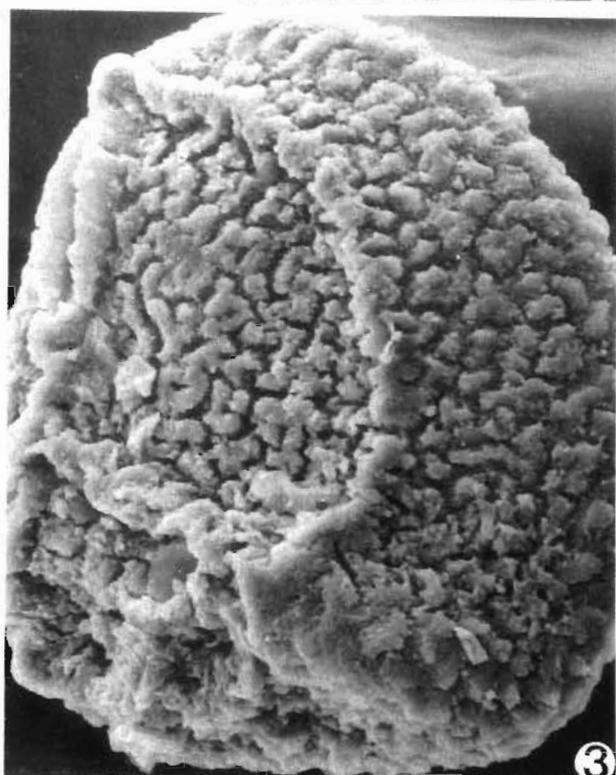
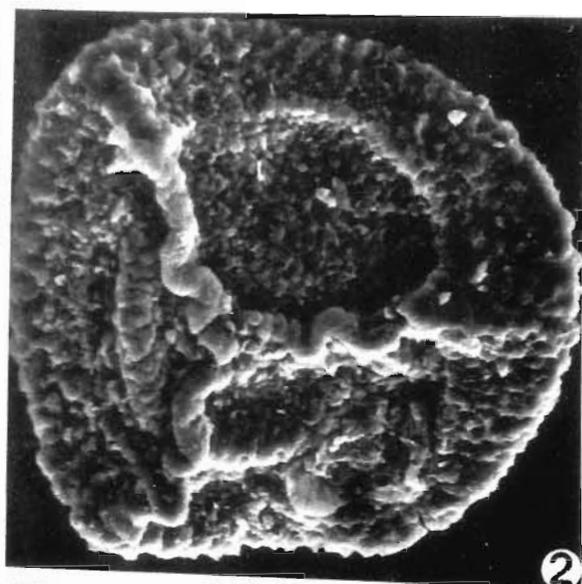
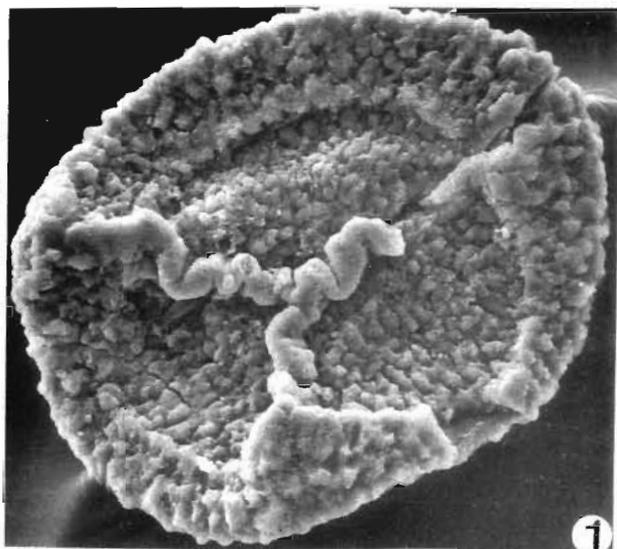


PLATE 1

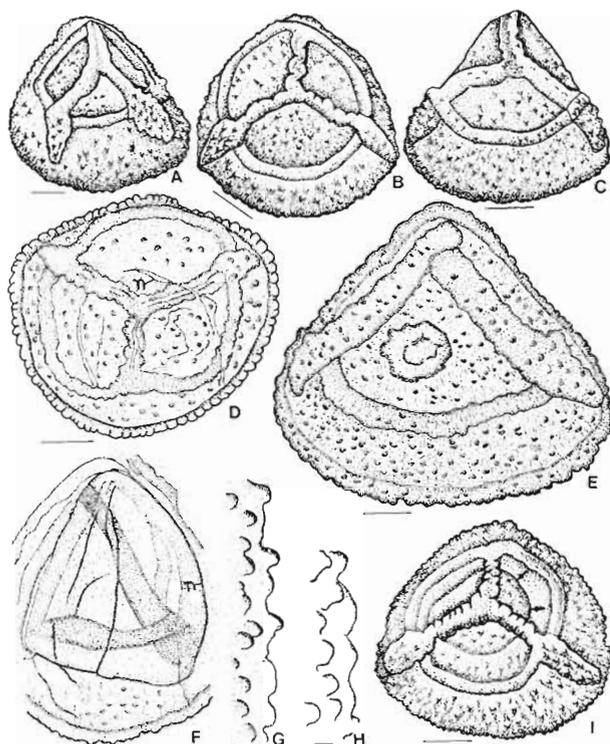
(a) In contact areas	Length	4-8 μm	4-10 μm
	Width	6-12 μm	6-15 μm
(b) Outside contact area	Length	4-20 μm	4-25 μm
	Width	6-25 μm	10-37 μm
Baculae	Length	5-20 μm	6-30 μm
	Width	4-10 μm	4-20 μm
Sexine	Thickness	20-30 μm	
Nexine	Diameter	200-400 μm	

Holotype—Plate 1, figure 4; slide no. 374.

Locality & Horizon—Birsinghpur Pali Coalfield, Madhya Pradesh, Lower Gondwana (Lower Permian), India.

Derivation of name—After Professor S.D. Saksena who contributed a lot to the Gondwana Palaeobotany.

Description and discussion—Fifty six specimens of megaspores are assigned to *Saksenasporites rewaensis* sp. nov. Forty six of them are subtriangular in shape and compressed in various planes suggesting that their polar as well as equatorial axes were more or less equal. Seven spores, subcircular in shape, are preserved in dorsi-ventral orientation while only three of them show a little deviation of proximal trijunctions



Text-figure 1A-I—*Saksenasporites rewaensis* sp. nov. A-C, I. Dry megaspores showing laesurae extending beyond arcuate ridges and forming lip-like structures. Central portion of contact area in fig. I is slightly raised (arrows); D-F. Macerated megaspores showing faintly preserved circular (Fig. D) and subtriangular (Fig. F) nexine (n) and extension of two laesurae beyond arcuate ridges (Fig. E). G, H. Marginal portions of megaspores, enlarged, showing mixed verrucose-baculose sexine sculpture (Scale bar = A-F, I=100 μm . G, H =10 μm).

from the centre of the spores. Under SEM, these spores show prominent trilete laesurae which are widest and highest at their peripheral ends and join the inwardly curved arcuate ridges (Pl. 1, figs 1, 2, 4). Distal ends of one or two laesurae may extend beyond the arcuate ridges but never touch the margins. The peripheral ends of trilete laesurae are lip-like in appearance (Pl. 1, figs 4, 6; Text-figure 1A-C, E). Laesurae are straight to sinuous. In a megaspore an opening is observed due to splitting of trilete sutures on proximal face. This opening extends beyond arcuate ridged (Pl. 1, fig. 5). In few specimens central portions of the contact areas are seen slightly raised (Text-figure 1 I). Sexine of the spores is covered with mixed verrucose and baculose ornamentations. Verrucae are wider than the height whereas reverse is found in case of baculae (Pl. 1, fig. 3; Text-figure 1G, H.).

On treatment with alkali spores of *S. rewaensis* sp. nov. increase slightly in size and the sexine cracks into a number of segments and the membranous nexine is seen through these cracks (Text-figure 1D, F.). Nexine could be observed only in 20 percent of the macerated megaspores. It is circular or subtriangular in shape, membranous, unpitted and fills nearly 2/3 portions of inner spore cavity.

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