

A NEW MICROSPORANGIATE FRUCTIFICATION FROM THE TRIASSIC OF NIDPUR, INDIA

SHYAM C. SRIVASTAVA

Birbal Sahni Institute of Palaeobotany, Lucknow

ABSTRACT

A carbonized spore-bearing fructification under *Bosea indica* gen. et sp. nov. has been described here from Nidpur beds. It consists of an axis with microsporophylls arranged in opposite or sub-opposite order. The microsporophyll is flattened and elongated, along the margin of which sporangia are borne pendant on its under surface. Each sporangium contains *Weylandites*-type of spore.

Bosea indica, in its sporophyll cuticle, resembles *Lepidopteris indica* Bose & Srivastava. In its spore-type, it is distinct from all the so far known pteridospermic fructifications.

INTRODUCTION

RECENTLY, some male and female fructifications have been recorded from the Triassic sediments of Nidpur, namely, *Nidistrobis*, *Nidia*, *Satsangia* and *Pteruchus* (See, Bose and Srivastava, 1973a & b; Srivastava and Maheshwari, 1973; Pant and Basu, 1973 and Srivastava, 1974). Associated with these, a new microsporophyll, preserved in the form of compression has been collected by Dr. M. N. Bose to whom I am grateful for entrusting me the specimen for description. Though the specimen is imperfect from base and apex and also none of the microsporophylls is complete yet it provides sufficient data not to refer it to any of the existing form genera. In view of its importance as the only specimen from India and in having characteristic spore contents which were described in dispersed condition as *Weylandites* by Bharadwaj and Srivastava (1969), it is being designated here under a new generic name *Bosea*.

Bosea gen. nov

Diagnosis — Male fructification, microsporophylls attached on axis at an acute angle, opposite or sub-opposite; microsporophylls narrow, flattened, elongated and sporangia pendant along margin; cells of

axis elongated, rectangular; sporophyll cuticle amphistomatic, stomata longitudinally or obliquely orientated, subsidiary cells papillate, 5 or 6 in number, papillae overhanging stomatal pit, sporangial wall membranous with rectangular or rhomboidal cells, spores striate, non-saccate, circular or oval with transverse striations on proximal face and distally vertically striated.

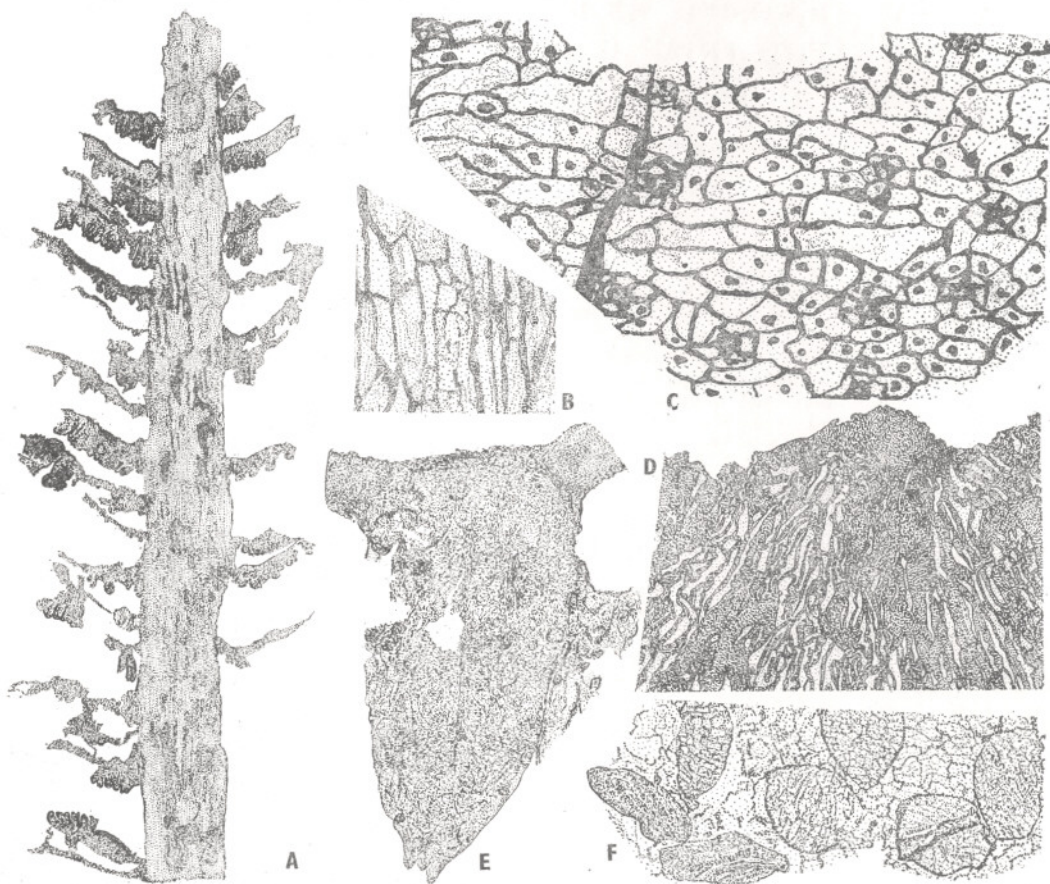
Type species — *Bosea indica* gen. et sp. nov.

Bosea indica gen. et sp. nov.

Pl. 1, Figs. 1-12, Text-figs. 1A-F

Diagnosis — Male fructification 3.6 cm. long, consisting of axis with elongate, flat, opposite or sub-opposite microsporophylls showing distinct parallel veins, sporangia all along the margin on the under surface of microsporophyll, sporangia near the basiscopic side 1.5-2 mm. long and 1 mm. broad, sporangia usually conical or oblong, sometimes more or less lanceolate with orbicular, blunt or pointed apex, sporangia perhaps partially fused in basal portions; sporophyll cuticle 2.5 μ thick, epidermal cells rectangular or polygonal, lateral- and end-walls straight, at places undulated, papillate, papillae oval or round; stomata lesser on one surface than the other, irregularly distributed, stomatal apparatus more or less circular with papillae overhanging stomatal pit, guard cells sunken, thickly cutinized all round, aperture slit-like; sporangium wall cells polygonal in basal region; sporangia unilocular, apical dehiscence; spores 25.5-60 $\mu \times$ 12.5-35.5 μ , distally vertical striations present on each side of biconvex sulcus, on proximal face exine microverrucose with numerous horizontal striations, striations on both the faces continuous with each other, sometimes irregularly distributed curving in oblique direction.

Holotype — No. 35154 of the Birbal Sahni Institute of Palaeobotany, Lucknow.



TEXT-FIG. 1 — *Bosesia indica* gen. et sp. nov. A, a branched fructification, showing arrangement of microsporophylls and longitudinally ribbed surface, of axis. Holotype No. 35154. $\times 3$. B, showing epidermal cells of axis in between minor folds. Slide No. 35154-1. $\times 250$. C, sporophyll cuticle showing stomata on both the surfaces. Slide No. 35154-6. $\times 100$. D, cells along the fringe of head. Slide No. 35154-1. $\times 100$. E, a macerated pendant sporangium with its membranous wall through which spores are visible. Slide No. 35154-8. $\times 70$. F, a piece of sporangium wall associated with a few spores. Slide No. 35154-1. $\times 500$.

Locality — Near Nidpur, Gopad river Valley, Sidhi District, Madhya Pradesh.

Age — Triassic

Remarks — So far only one specimen of *Bosesia indica* gen. et sp. nov. has been discovered. It is a male organ built on the pattern of a frond. It consists of an axis bearing branches right and left which are really the sporangia bearing microsporophylls. A detached, flattened young microsporophyll was lying very close to the type specimen which showed sporangia projecting out from its under side along the periphery. The sporangia were, therefore, pendant on the margin of the micro-

sporophyll. In one case partial fusion of two sporangia in the basal region was noticed. Either all sporangia were fused with each other in their basal parts or some were fused and the rest were free.

Inside a sporangium, spores are not uniform in size because some are appreciably smaller in size having minor folds on the proximal face. These spores are elliptical in shape. Sometimes folds are irregular and overlapping. On distal side vertical area is present. These spores have been marked mostly confined to the marginal region of a sporangium and on the middle part they surround the mature spores giving

somewhat mesh-like appearance to an under macerated sporangium.

Generally a sporangium contains *Weylandites*-type of spores described by Bharadwaj and Srivastava (1969) but associated with these some oval spores which show branched transverse striations with vertical partitions have also been isolated from the same sporangium. In these types, striations converge towards both the ends and all the striations are united by a continuous and sub-equatorial striation. On their distal face longish area is distinct. Such spores were put under the genus *Aumancisporites* by Bharadwaj and Srivastava (1969) in dispersed condition from Nidpur shale. But their association in one sporangium indicates that these would have been the variable forms of *Weylandites*-type of spore. Simultaneously, it may also be speculated that such forms must have emerged during the successive stages of development of the genus *Weylandites*.

Comparison & Discussion — *Bosea indica* gen. et sp. nov. is a male reproductive organ. The epidermal features of its sporophyll closely agrees with the epidermal features of a vegetative leaf described under *Lepidopteris indica* Bose & Srivastava (1972). In both, general shape and arrangement of epidermal cells, stomatal distribution and structure of stomatal apparatus are quite similar to each other but there exist minor differences between the two,

e.g., in *L. indica*, upper surface is non-papillate and subsidiary cells are usually 5 in number whereas in *Bosea indica* both the surfaces are papillate and the subsidiary cells are usually 6. However, these differences are minor and could be expected in two distinct morphological organs of one plant such as a vegetative leaf and a microsporophyll. There is, therefore, a strong possibility of *Bosea indica* being the spore-producing male organ of *Lepidopteris indica*.

L. indica and *B. indica* belong to the Triassic in age whereas *L. Stormbergensis* and *L. ottonis* are known to occur from Middle Triassic (Africa, Australia, Argentina) and Upper Triassic (Green Land and Rhaetic of Scania, Sweden) respectively. Another type of male organ *Antevsia* is ascribed to *Lepidopteris* by Harris (1937) and Townrow (1960). *Antevsia* is characterized by having pinnately branched microsporophyll with groups of sessile pollen sacs, attached on the apex of ultimate branches, bearing monosulcate pollen grains. In *Bosea indica* the microsporophyll is directly attached on the axis with pendant sporangia along the margin, having vertically and horizontally striated spores.

Hence, in view of these facts, it can be safely inferred that both the male organs, namely, *Bosea* and *Antevsia* were borne on different kinds of plants which bore *Lepidopteris*-type of leaf.

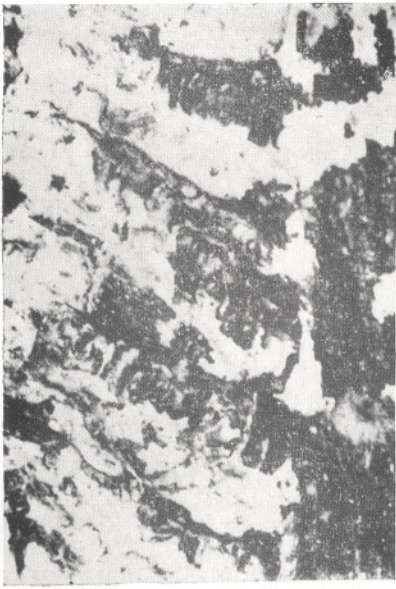
REFERENCES

- BHARADWAJ, D. C. & SRIVASTAVA, SHYAM C. (1969). A Triassic mioflora from India. *Palaeontographica*. **125**: 119-149.
- BOSE, M. N. & SRIVASTAVA, SHYAM C. (1972). *Lepidopteris indica* sp. nov. from the Lower Triassic of Nidpur, Madhya Pradesh, India. *J. palaeont. Soc. India*. **15**: 64-68.
- Idem (1973a). *Nidistrobos* gen. nov., a pollen-bearing fructification from the Lower Triassic of Gopad river valley, Nidpur. *Geophytology*. **2**(2): 211-212.
- Idem (1973b). Some micro- and megastrobili from the Lower Triassic of Gopad River Valley, Nidpur. *Ibid.* **3**(1): 69-80.
- HARRIS, T. M. (1937). The fossil flora of Scoresby Sound East Greenland. Pt. 5. *Meddr. Grønland*. **112**(2): 5-114.
- PANT, D. D. & BASU, N. (1973). *Pteruchus indicus* sp. nov. from the Triassic of Nidpur, India. *Palaeontographica*. **143**.
- SRIVASTAVA, SHYAM C. (1974). Pteridospermic remains from the Triassic of Nidpur, Madhya Pradesh, India. *Geophytology*. **4**(1): 54-59
- SRIVASTAVA, SHYAM C. & MAHESHWARI, H. K. (1973). *Satsangia*, a new plant organ from the Triassic of Nidpur, Madhya Pradesh. *Ibid.* **3**(2): 222-227.
- TOWNROW, J. A. (1960). The Peltaspermeaceae, a pteridosperm family of Permian and Triassic age. *Palaeontology*. **3**(3): 333-361.

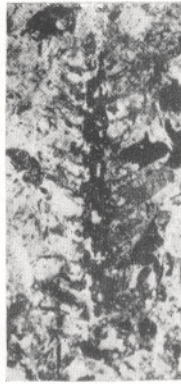
EXPLANATION OF PLATE

Bosea indica gen. et sp. nov.

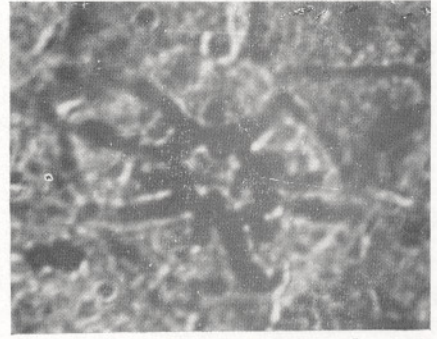
1. Holotype No. 35154. $\times 1$.
2. A portion of fertile axis enlarged under liquid paraffin, to show emergence of microsporophylls from longitudinally ribbed axis and pendant sporangia from the lower fringe of head. No. 35154. $\times 7$.
3. A broken sporangium magnified from apical region to show distinct spores. Slide No. 35154-10. $\times 500$.
4. Epidermal cells from the fringe region of elongated head associated with prominent folds. Slide No. 35154-1. $\times 100$.
5. A stoma from basal region of sporangial wall. Slide No. 35154-9. $\times 500$.
- 6-9. Spores showing variation in shape and size. (Figs. 6, 7; proximal and distal views). Slide No. 35154-10. $\times 1000$; (Figs. 8, 9). Slide Nos. 35154-2 & -1 respectively. $\times 1000$.
10. A partly broken sporangium, showing distinct epidermal cells towards its basal part. Slide No. 35154-8. $\times 100$.
11. An under macerated sporangium, showing apical dehiscence. Slide No. 35154-2. $\times 500$.
12. A stoma magnified from sporophyll cuticle. Slide No. 35154-1. $\times 500$.



2



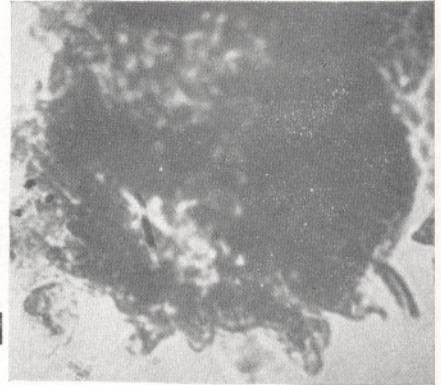
1



12



8



11



9



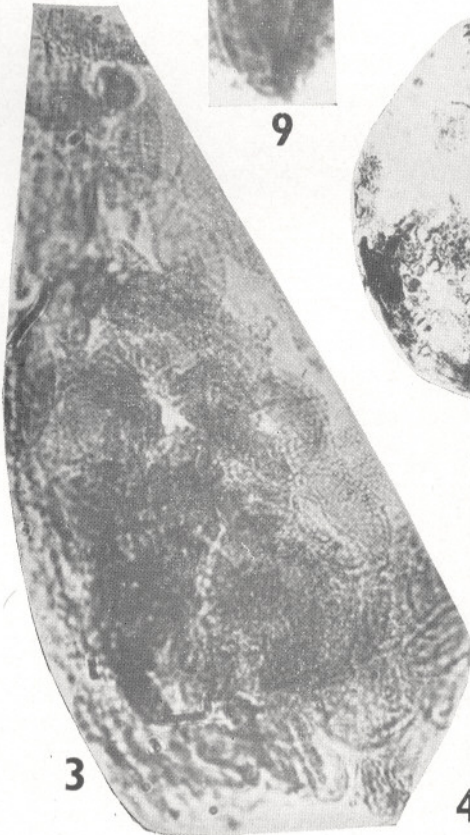
10



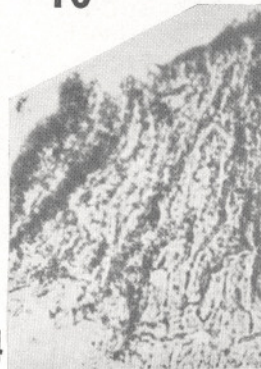
7



6



3



4



5