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SPHENOPHYLLUM LOBIFOLIUM SP. NOV. FROM RANIGANJ FORMATION, INDIA.

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We have recently collected a large number of compressed shoots of a new *Sphenophyllum* Koenig (1925) from the Raniganj Formation (Lower Gondwana) of the Raniganj Coalfield, India. Their detailed study has enabled us to assign them hereunder to a new species.

Sphenophyllum libifolium sp. nov.

Diagnosis : Foliage shoots showing slender axes having continuous longitudinal ribs in internodes, nodes bearing symmetrical whorls of six leaves. Leaves cordate, subsessible to petiolate about 1.8-2.5 cm wide and 4-5.3 cm long inclusive of 0.3-0.8 cm long petiole, side margins of leaves lobed and distal ones showing a shallow to deep median notch, about 0.4-1.2 cm deep, veins repeatedly dichotomised, median veins proceeding straight to margin but lateral ones arched. Epidermis of leaves showing sinuous-walled cells with sinuosites having wave lengths about 19-36 μm and amplitudes about 5-13 μm. Stomata present in areas between veins, generally longitudinally oriented, 34-57 μm long and 16-23 μm wide, guard cells showing thickened lateral lamellae.

Holotype : No 14286

Isotypes : Nos. 14283a, 14283b, 14284a, 14284b, 14287, 14289a, 14289b of DIVYA DARSHAN PANT collection at present located in the Botany Department, Allahabad University.

The substance of the stems failed to yield remains of an epidermis or any soft or even resistant internal tissues like xylem and selerenchyma (cf. *S. speciosum*, as described by Pant & Mehra, 1963). However, the xylem of the petioles shows tracheids with scalariform thickenings (Fig. 4).

The details of epidermal structure and mesophyll of leaves were visible in brown coloured translucent celloidin pulls of their naturally macerated substance. As a rule the adaxial and abaxial layers of epidermis are squashed together in such a manner that the outlines of individual cells are never clear although the sinuous character of their walls can always be made out (Figs. 2, 8). However, in some small patches a single layer of epidermis is preserved and the wave-lengths and sinuosities are best seen at such points. There are also a few patches of epidermal pulls which show pairs of thickened bean-shaped guard cells but the epidermal cells around them are not preserved (Figs. 3, 9). Perhaps the thickened lamellae were responsible for the preservation of the guard cells while the surrounding

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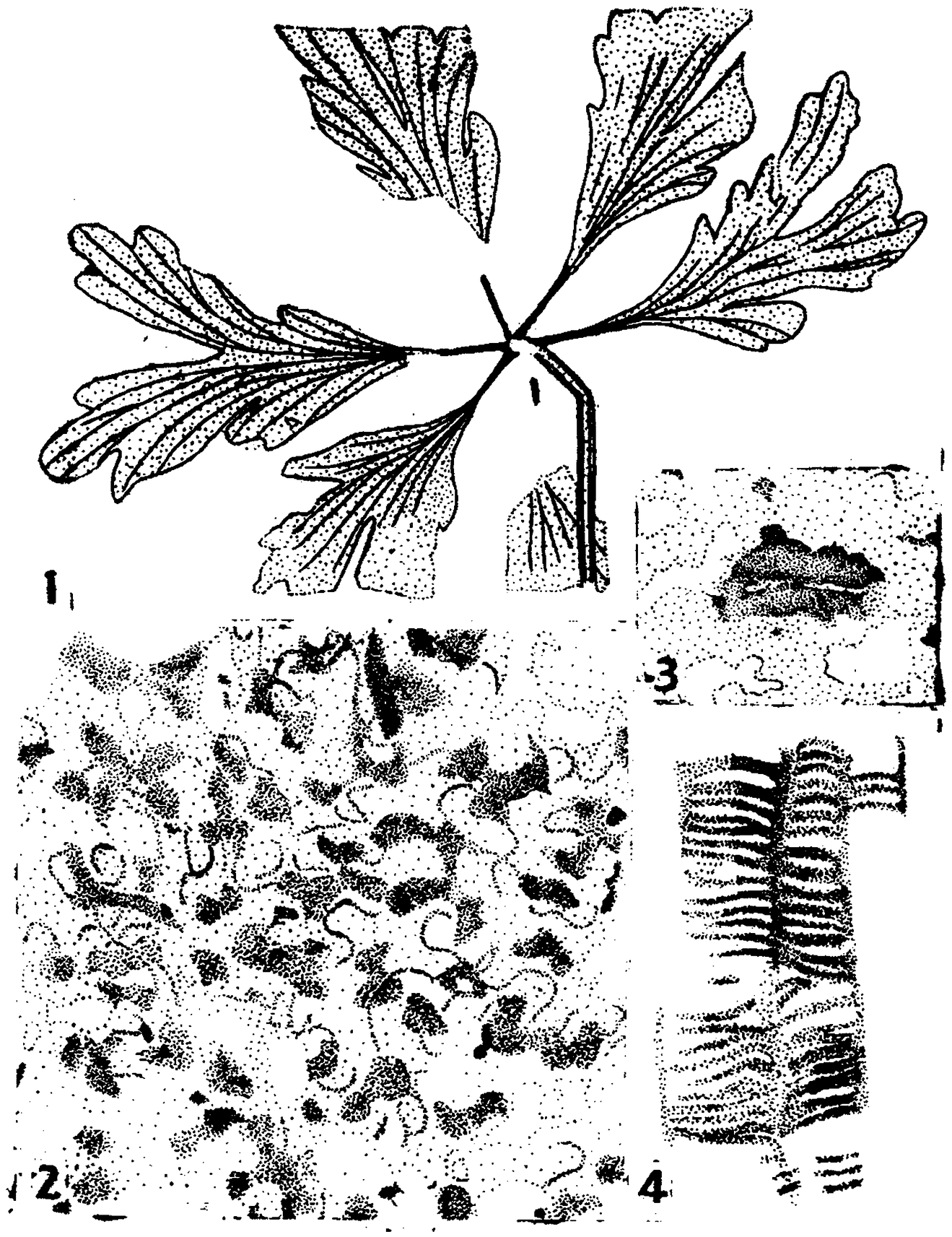
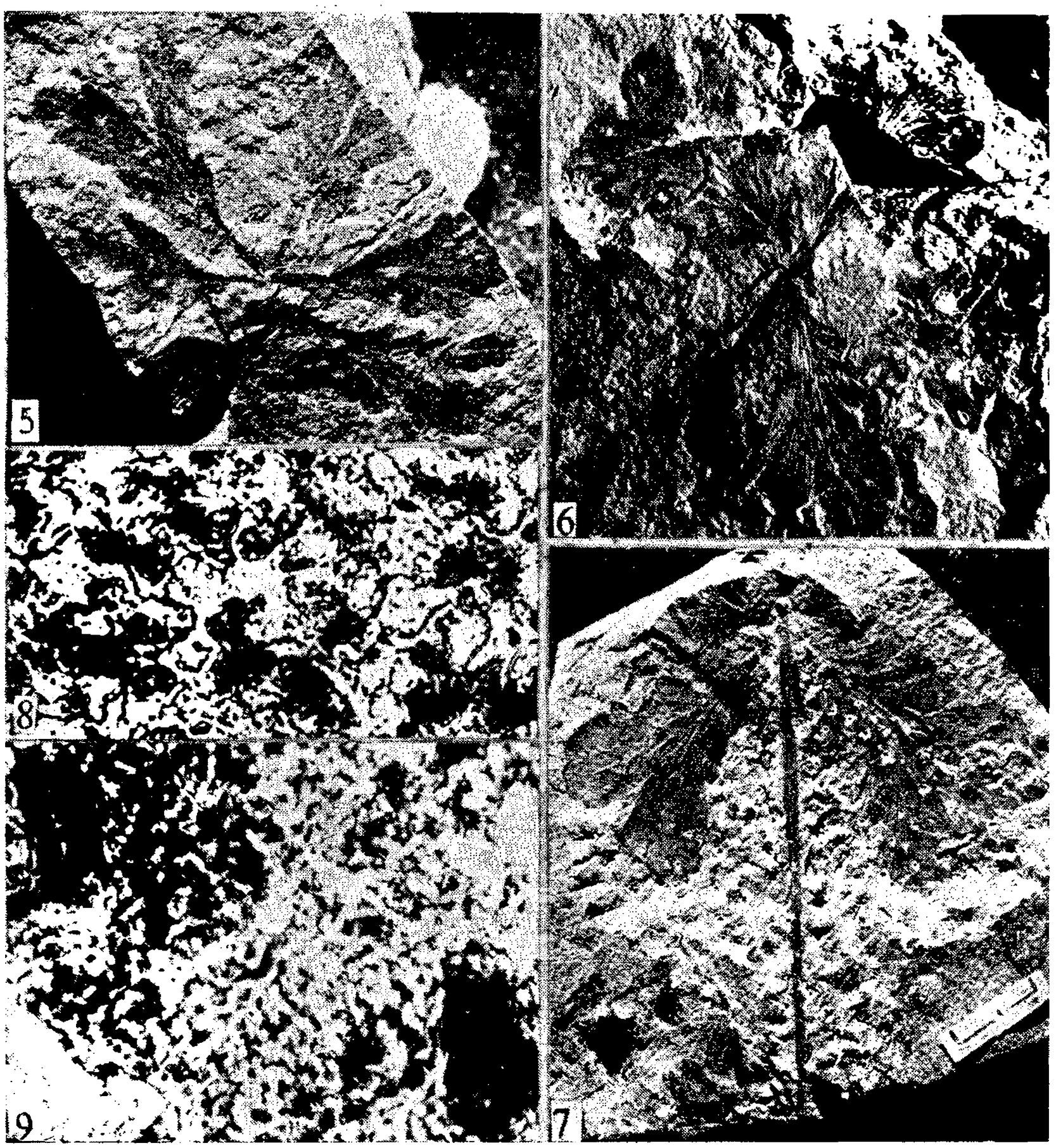


Figs. 1-4. *Sphenophyllum lobifolium* Sp. nov. Fig. 1. Axis with a longitudinally ridged internode and a node with an isophyllous whorl of six deeply notched leaves. (Specimen no. 14286 ×2). Fig. 2. Epidermal pull showing sinuous cell walls and dark patches of mesophyll cells. (×250). Fig. 3. Stoma showing guard cells with thickened lamellae and stomatal pore. (×400). Fig. 4. Scalariform petiolar tracheids. (×700).

thin-walled epidermal cells were lost during fossilization. The partially disintegrated mesophyll cells are represented by overlapping brown patches of irregular shape (figs. 2, 8).

To the best of our knowledge there are only ten species of *Sphenophyllum*, hitherto described from the Lower Gondwanas of different countries. Of these there are only two species which have been described from the Raniganj Formation. A comparison with these shows that *S. lobifolium* comes closest to *Parasphenophyllum crenulatum* Maithy (1978) in having apically notched cordate leaves but the leaves in *S. lobifolium*, though generally petiolate are occasionally subsessile, their side margins are lobed and distal margins show shallow lobes while leaves in *F. crenulatum*, are always petio-



Figs. 5-9. *Sphenophyllum lobifolium* sp. nov.Fig. 5. A node with an isophyllous whorl of six deeply notched leaves. (Specimen no. 14283 ×1 Fig. 6. A whorl of four leaves with shallow apical notches (Specimen no. 14284a ×1). Fig. 7. Counterpart of specimen in Fig. 6. showing a node above and an internode below. A fragment of a leaf of lower whorl is also seen. (Specimen no. 14284 b×1). Fig. 8. Epidermal pull showing sinuous walls of cells and dark patches of mesophyll cells. (×300). Fig. 9. Stomata showing lamellae of guard cells and stomatal pores. (×346).

late, their side margins are smooth and distal ones are crenulate (Maithy, 1978). Further *S. lobifolium* has a characteristic epidermal structure but the fine structure of *P. crenulatum*, is unknown. Recently Srivastava and Rigby (1983) have renamed *P. crenulatum* Maithy (1978) as *Sphenophyllum crenulatum* although this name has been used earlier by Knight (1975, see also Wagner, 1978) for a northern species which is quite different.

The other Raniganj form, *Sphenophyllum speciosum* Zeiller (see Pant & Mehra, 1963) may be compared with *S. lobifolium* only because its fine structure is known although its asymmetrical whorls of

smooth margined sessile leaves and short internodes are rather different from those of *S. lobifolium* (Figs. 1, 5, 6, 7). Both species are similar in showing sinuous walled epidermal cells but the wavelengths and amplitudes of sinuosities of of the cell walls in *S. lobifolium* are 19-36 μm and 5-13 μm respectively whereas they are 31-49 μm and 13-29 μm in *S. speciosum*. The epidermal cells at the base of leaves or near veins in *S. speciosum* are elongated but no such cells could be seen in the epidermal pulls of *S. lobifolium*. The stomata of *S. lobifolium* are generally placed parallel to the veins while those of *S. speciosum* are irregularly oriented and their frequency is lower in *S. lobifolium* than in *S. speciosum*. Again the stomata in *S. lobifolium* are 34-47 μm long and 16-23 μm wide while in *S. speciosum* they are 20-34 μm long and 10-16 μm wide.

The rest of the species of *Sphenophyllum* described from Lower Gondwana rocks are so different from *S. lobifolium* that we do not need to compare them. However, *S. lobifolium* may be compared with some northern species having apically notched leaves like *S. longifolium*, *S. majus*, *S. oblongifolium*, *S. orbicularis*, *S. sarrensis*, *S. saxonicum* and *S. sewardii* (see Boureau, 1964) but they are all clearly different in having variously toothed apical margins and smooth sides.

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PODOSORDARIA MEXICANA ELL. & HOLW.—XYLARIACEAE: A NEW GENERIC RECORD FROM INDIA

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Podosordaria Ell. & Holw. is intermediate between *Xylaria* Hill. ex Grev. and *Poronia* Willd, ex. Fr., with less number of protuberant perthecia clustered in the subglobose tip of a small stalked stroma arising from Dung (Dennis 1956, 1957). This interesting fungus was encountered during fungal forays of East Himalayan hills (Darjeeling and Bhutan) from 1977-80. After thorough check up of the literature (Bilgrami *et al.*, 1979, 1981), it is found that no species of this genus has been recorded earlier from India. The cited collections have been deposited at PAN (Harbarium Botany Depatrment, Panjab University, Chandigarh, India) and a part with Prof. J. D. Roger's personal herbarium (Department of Plant Pathology, Washington State University, Pullman, Washington, U.S.A.)

Podosordaria mexicana Ell. & Holw., Bot. Gaz **24** : 37, 1897.

—*Poronia chardoniana* Toro, New York Acad. Sci. Survey Porto Rico **8**(1) : 68.1926.

—*Xylaria chardoniana* (Toro) Mill., Mong. Univ. Peurto Rico, Ser. 13, **2** : 214, 1934.

Stromata erect small, short-stalked, 2-10 perthecia per stroma clustered in the subglobose apex ; fertile clava up to 2mm across, subglobose, uneven and mammiform due to protrdued perithecia; ectostroma brown, membraneous; entostroma black, carbonaceous above & brown, non-corbonaceous below ; stalk short, cylindric, smooth, brown not rooting deeply in the dung; perithecia subglobose to globose, up to 1 mm diam; ostioles black, papillate. Asci 176-216 × 32-36 μm, 8-spored, cylindric, with obtuse apex; ascal plug staining deep blue with Melzer's reagent (J+). Ascospores 32-38 × 18-21.5 μm, each surrounded by a gelatinous sheath, dark-brown, ellipsoid to broadly ellipsoid, with longitudinal germ slit. Paraphyses thin, hyaline, many.

Collections examined : 16265 (PAN), on horse dung. Palamjoua (Darjeeling), August 30, 1980; 16265 (PAN, RH), on horse dung, Nawephu (Bhutan), September 26, 1980.

Podosordaria mexicana is a new reord for India and Bhutan. It differs from *P. pedunculata* (S. F. Gray) Denn. in its smaller stromata without rooting bases

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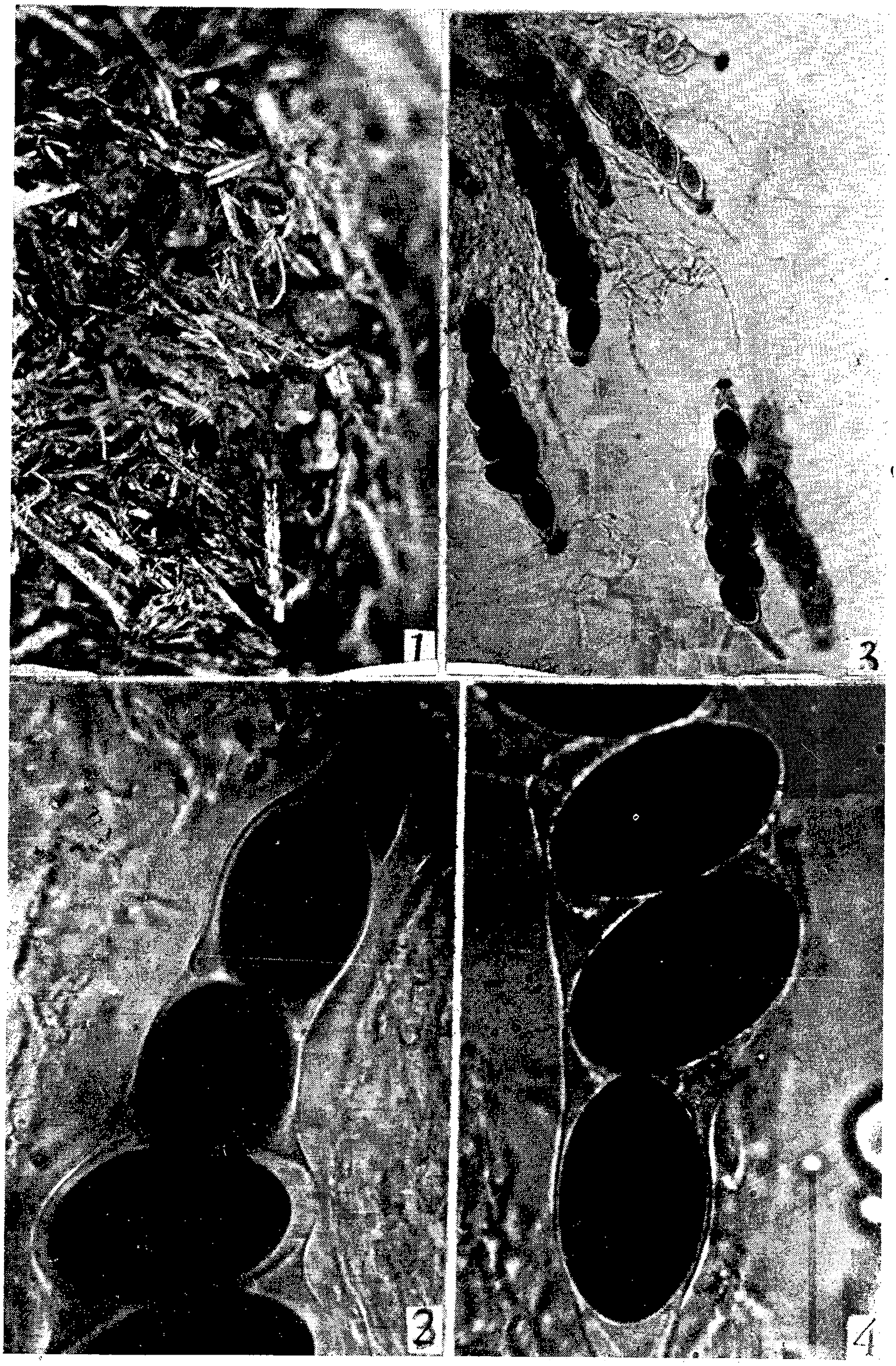

Fig. 1. 1. Stromata general habit (×5). 2. Asci and paraphyses (×550). 3 Ascus showing ascal apex (×1200). 4. Ascospores (×1200).

and in its rather smaller ascospores, those of *P. pedunculata* measure 40-58 ×19-24 μm.

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