BRACHYPHYLLUM SEHORAENSIS, A NEW CONIFER FROM SEHORA, NARSINGHPUR DISTRICT, MADHYA PRADESH

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ABSTRACT

The new species, *Brachyphyllum sehoraensis* is represented by leafy twigs bearing spirally arranged and appressed leaves. Leaves are hypostomatic. Upper surface is nonstomatiferous. Stomata on the lower surface are numerous, irregularly scattered and orientated over the entire surface; guard cells are deeply sunken.

INTRODUCTION

The species described below have been obtained from the Upper Gondwana beds of the Jabalpur Formation in the Sher River at Sehora, about 9 km east of Bachai Forest Rest House. The beds are very rich in megafossils and contain *Cladophlebis*, *Todites*, *Onychiopsis*, *Pachypteris*, *Doratophyllum*, *Ptilophyllum*, *Williamsonia*, *Bucklandia*, *Coniferocaulon*, *Brachyphyllum*, *Pagiophyllum* and *Araucarites*. Bose (1960) has already described a few pteridophytic remains as *Onychiopsis psilotoides* and *Cladophlebis* sp. cf. *C. longipennis* and in 1966 he published a general account of the work published on Sehora fossils since 1954.

DESCRIPTION

Genus—**Brachyphyllum** Brongniart, 1828

Type species—*Brachyphyllum mamillare* Brongniart, 1828

Brachyphyllum sehoraensis sp. nov.

Pls. 1-2, figs. 1-9; Text-fig. 1 A-E

1877 *Brachyphyllum mamillare*, L. & H.: Feistmantel, p. 16 *partim*, pl. 13, figs. 6, 7

Diagnosis—Leafy twigs about 16-25 mm wide, mode of branching not known. Leaves spirally arranged, appressed, rhomboidal in shape, about 15-18 mm long and 9-12 mm broad; apex rounded or obtusely pointed; leaf-base cushion covered by leaves lying immediately below; leaf margin entire. Upper surface of leaf restricted to a more or less crescentic area along upper edge of leaf-base cushion. Veins not visible.

Leaves hypostomatic, cuticle of unequal thickness. Upper cuticle 3 μ thick, devoid of stomata; cells much longer than broad, polygonal; rarely rectangular, serially arranged in longitudinal direction. Cell walls thick, more or less straight; surface unspecialized. Lower cuticle 7 μ thick; cells square, rectangular or polygonal with their longer axis in longitudinal direction; cell walls thick and straight; surface mottled, devoid of papillae,

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or trichome. Stomata numerous, irregularly scattered and orientated over entire surface, mono- or dicyclic. Subsidiary cells 6-9 (mostly 8), surface wall thickly cutinized. Guard cells deeply sunken, thinly cutinized, mostly not preserved.

Holotype—No. 33855 of Birbal Sahni Institute of Palaeobotany, Lucknow.

Locality—Sehora, Narsinghpur District, Madhya Pradesh.

Age & Horizon—? Upper Jurassic; Jabalpur Formation.

Description—Brachyphyllum sehoraensis is represented by fragmentary twigs on two slabs of grey shale (Pl. 1, figs. 1-2; Text-fig. 1 A-B) from Sehora, Narsinghpur, Madhya Pradesh. The twigs are stout and 16-25 mm wide, bearing appressed and spirally arranged leaves. Branching habit of these twigs is not known. The leaf-base cushions are not seen as the leaves cover the bases of the leaves above. Somewhat similar twigs from Jabalpur were earlier figured by FEISTMANTEL (1877, pl. 13, figs. 6, 7) as *Brachyphyllum mamillare*. Because of their large size, he considered them to be the older branches or stems. Unfortunately, none of the two specimens have cuticle preserved in them. Moreover, out of the two specimens, at present, only a portion of the specimen in pl. 13, fig. 6 is available (here figured in Pl. 1, fig. 3). The other specimen is misplaced. The available portion in external features is very similar to the present specimens so we have placed it under the new species.

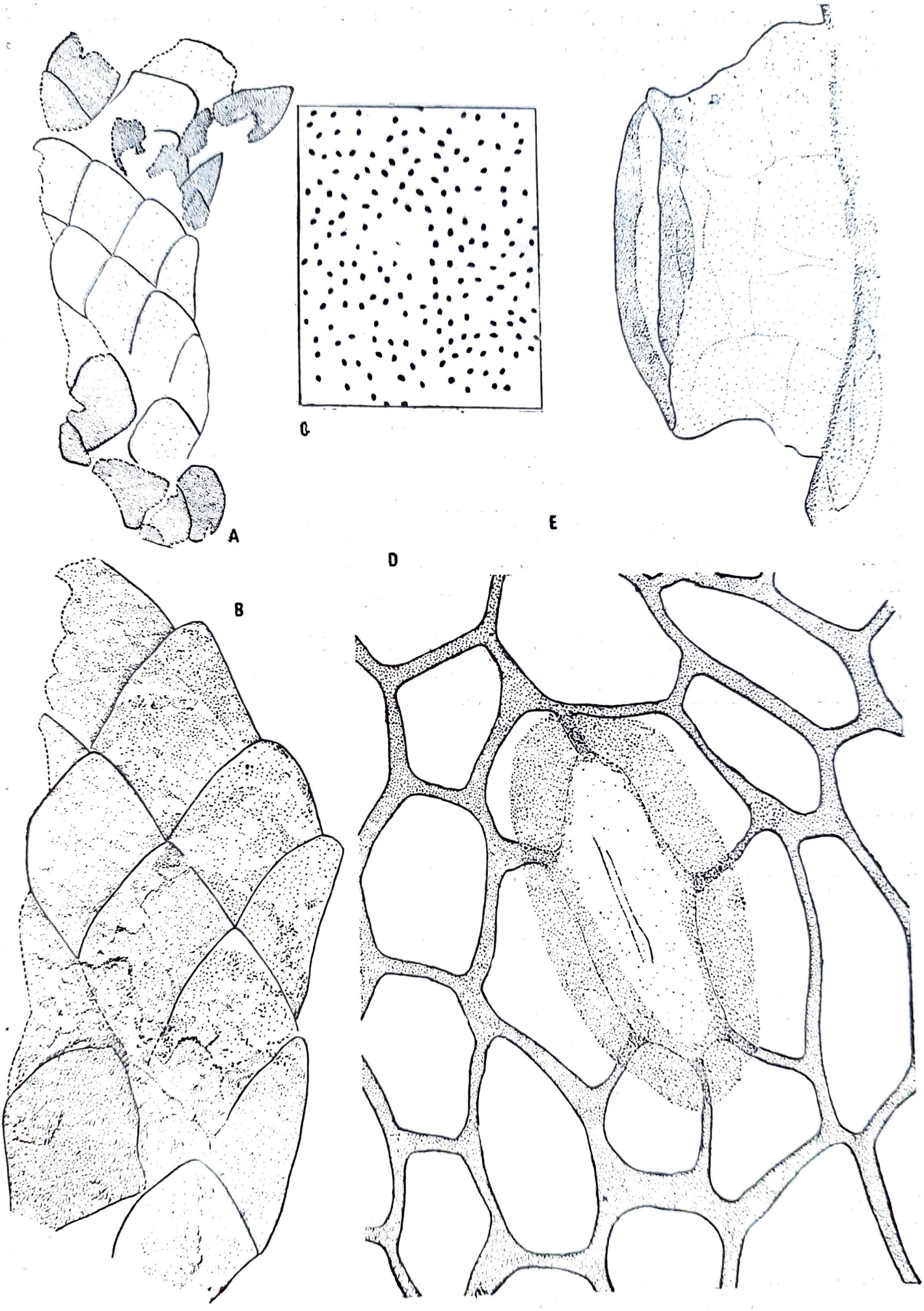
B. sehoraensis is characterized in having deeply sunken guard cells. Here, the subsidiary cells are forming a sort of pit which becomes very prominent when the leaf gets folded (Pl. 2, fig. 9).

COMPARISON

The present species on the basis of gross morphology can be placed either under *Brachyphyllum* or *Allocladus*. However, *Allocladus* is epistomatic and thus can be ruled out. It is difficult to choose between *Brachyphyllum* and *Pagiophyllum* as morphological distinction between the two genera is purely arbitrary and based upon leaf form, there being a close agreement in cuticle characters (KENDALL, 1947, p. 227; 1948, p. 76). Because of the appressed nature of the leaves we have, here, preferred to place our specimens under *Brachyphyllum*. As we do not have a sufficient number of specimens, for the present, we are not suggesting a new generic name for our specimens.

Brachyphyllum sehoraensis differs from most species of the genus *Brachyphyllum* in having irregularly distributed stomata. Scattered stomata are, however, known in *B. crucis* (KENDALL, 1947, p. 240; 1952, p. 592), *B. expansum* (KENDALL, 1949, p. 310), *B. appropinquatum* and *B. praetermissum* (WESLEY, 1956, p. 25, 28), *B. irregulare* and *B. mirandae* (ARCHANGELSKY, 1963, p. 76). *B. crucis* and *B. expansum* both have comparatively small leaves. In *B. expansum* though scattered stomata occur, they do tend to form longitudinal rows. The stomatal pit is shallow and the subsidiary cells are papillate. *B. appropinquatum* differs in having smaller carinate leaves and in this species the subsidiary cells are distinctly papillate; the peg-like papillae projecting over the guard cells (WESLEY, 1956, p. 25, text-fig. 8 C, E, F, G). In *B. praetermissum* also, the leaves are smaller and each subsidiary cell has a papilla overhanging the guard cell (WESLEY, 1956, p. 29; Text-fig. 9 G, H). The

TEXT-FIG. 1.—*Brachyphyllum sehoraensis* sp. nov.: A, a part of the type specimen, ×*ca* nat. Size; B, enlarged drawing of a part of the twig from the type specimen, showing shape and arrangement of the leaves, ×*ca* 2; C, line drawing showing distribution and orientation of stomata on the lower side, ×*ca* 15; D, a stoma in surface view showing the ring formed by the subsidiary cells, ×*ca* 600; E, lateral view of a stoma showing the subsidiary cells, ×*ca* 600.


A
B
C
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E

leaves of *B. mirandae* are smaller in size, sometimes having a carina. The leaves further differ in being amphistomatic, and the leaf margin shows elongated cells. In *B. irregulare*, too, the leaves are smaller and amphistomatic. *B. expansum* var. *indica* (SAHNI, 1928) also shows scattered stomata but has much smaller leaves.

AFFINITIES

KENDALL (1947, p. 228) suggests the affinities of the genus *Brachyphyllum* with the Araucariaceae. In leaf form, *Brachyphyllum* is nearest to species of *Araucaria* section Eutacta [Eutacta Endlicher as defined by WILDE and EAMES (1952, p. 43)—"Leaves reduced, thick and often keeled, imbricate and usually erect."], while in epidermal characters *Brachyphyllum* comes close to the genus *Agathis* (KENDALL, 1947, p. 229). According to her (KENDALL, 1947, p. 229) "In *Agathis* the epidermal cell walls are always straight. The cells are usually rather short. The stomata occur over the lower side only, and are distributed in evenly-spaced files. The subsidiary cells have moderately or well-developed papillae." We studied three species of the genus *Agathis*. In *A. alba* and *A. australis* besides numerous stomata on lower cuticle several stomata are seen on the upper cuticle also. The stomata tend to occur in longitudinal rows but scattered stomata are not uncommon. Slightly wavy epidermal cell walls were found in *A. australis* and in *A. ovata*. Similarly, straight-walled epidermal cells were seen by us in *Araucaria bidwilii*, *A. excelsa* and *A. biramulata*. However, in all species of *Araucaria* observed by us the stomata occur in longitudinal rows or bands. Scattered stomata are, however, reported in *Podocarpus ustus* (FLORIN, 1931, p.270). We also observed scattered stomata in a leaf of *P. montanus*.

Therefore, our specimens do have some similarity with *Araucaria* and *Agathis* in leaf characters and in the cuticular structure. It is hence probable that *Brachyphyllum sehoraensis* has affinities with the family Araucariaceae.

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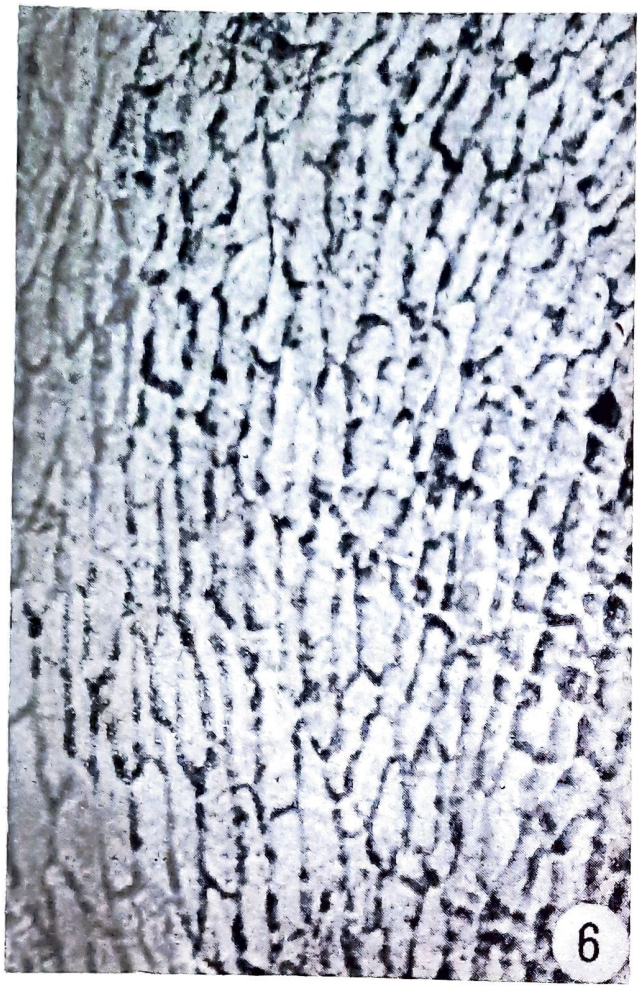
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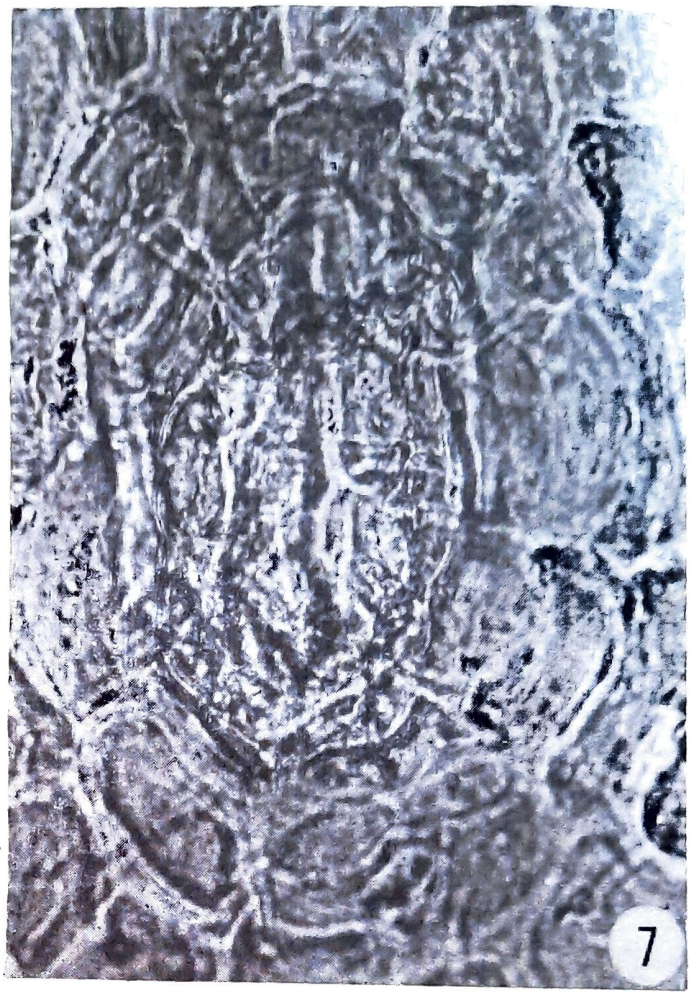
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EXPLANATION OF PLATES

Plate 1

Brachyphyllum sehoraensis sp. nov.

1. Type specimen showing incomplete twigs. Specimen no. B.S.I.P. 33855. × nat. Size.
2. A part from the type specimen enlarged to show shape and arrangement of leaves. Specimen no. B.S.I.P. 33855. × 2.
3. The available portion of the specimen earlier figured by Feistmantel (1877, pl. 13, fig. 6) and here referred to the new species. Specimen no. G.S.I. 4956. × nat. Size.
4. Lower cuticle, showing distribution of stomata. Slide no. 33855-1. × 30.
5. Lower cuticle, showing a few stomata and other cells. Slide no. 33855-1. × 150.

Plate 2

Brachyphyllum sehoraensis sp. nov.

6. Upper cuticle, showing shape and arrangement of cells. Slide no. 33855-6. × 100.
7. A stoma enlarged. Slide no. 33855-1. × 500.
8. A stoma enlarged, showing the sunken nature of the guard cells. Slide no. 33855-1. × 500.
9. A stoma is side view, showing the subsidiary cells. Slide no. 33855-1. × 500.