FERNS FROM THE CRETACEOUS OF MADHYA PRADESH - 3

[Dipteridaceae — *Hausmannia pachyderma* n. sp.]

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ABSTRACT

One more fern, *Hausmannia pachyderma* n. sp., is described from the Lower Cretaceous (Jabalpur Stage) of Madhya Pradesh which forms a part of the studies on the fossil ferns of this region undertaken by me (Sukh-Dev, 1970,7 1). The preceding numbers of this series include the following:

1. *Gleichenia nordenskiöldii* Heer (Gleicheniaceae), *Phlebopteris polypodioides* Brongn. (Matoniaceae), *Weichselia reticulata* (Stokes & Webb) Ward.
2. *Cladophlebis medlicottiana* (Oldham) Pascoe, *Sphenopteris* sp.

The specimens and slides are deposited in the Museum of the Birbal Sahni Institute of Palaeobotany, Lucknow.

DESCRIPTION

Family DIPTERIDACEAE

Genus *Hausmannia* Dunker 1846:12

Hausmannia pachyderma n. sp.

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

1961 — *Hausmannia pachyderma* n. sp., Sukh-Dev, p. 375 (Brief diagnosis. L. Cretaceous, Bansa and adjoining area, Shahdol district).

Diagnosis — Frond petiolate (?). Lamina broadly reniform in outline with a short basal sinus, size 1×1·6-3·2×4·2 cm. Margin almost entire to moderately undulate to crenate. About 3 primary veins arising from the summit of the petiole at the bottom of the sinus, branching dichotomously 2 to 5 times and radiating through the lamina. Secondary veins arise from these dichotomous veins on each side almost at right angle and, on further forking and uniting with the other ones, form squarish, rectangular or polygonal areolae; which in turn form progressively smaller areolae. Finer branches from these areolae unite or end freely in the mesophyll. Margin of the lamina marked with a slender marginal vein.

Stomata present only on the lower surface, closely packed, irregularly distributed and orientated, absent over the veins. Subsidiary cells like the ordinary epidermal cells, 4 or 5 (rarely 3, 6 or 7); commonly a stoma sharing 1-5 of its subsidiary cells with the adjacent stomata. Stomatal pit irregular in outline owing to the undulate end walls of subsidiary cells. Guard cells much overlapped in some stomata, while in others degree of overlapping less and in still others guard cells exposed. Guard cells commonly marked with projections looking like small papillae; projections almost to entirely lacking in others.

Epidermal cells on both sides thick walled, usually rectangular or polygonal. Anticlinal walls 3-5 μ thick and sinuous. Anticlinal walls lining the stomatal pit thinner, mostly about 2 μ or less thick. Trichomes absent on both sides. Epidermal cells over the veins narrow, elongate, rectangular or polygonal. Anticlinal walls much less sinuous or even almost straight.

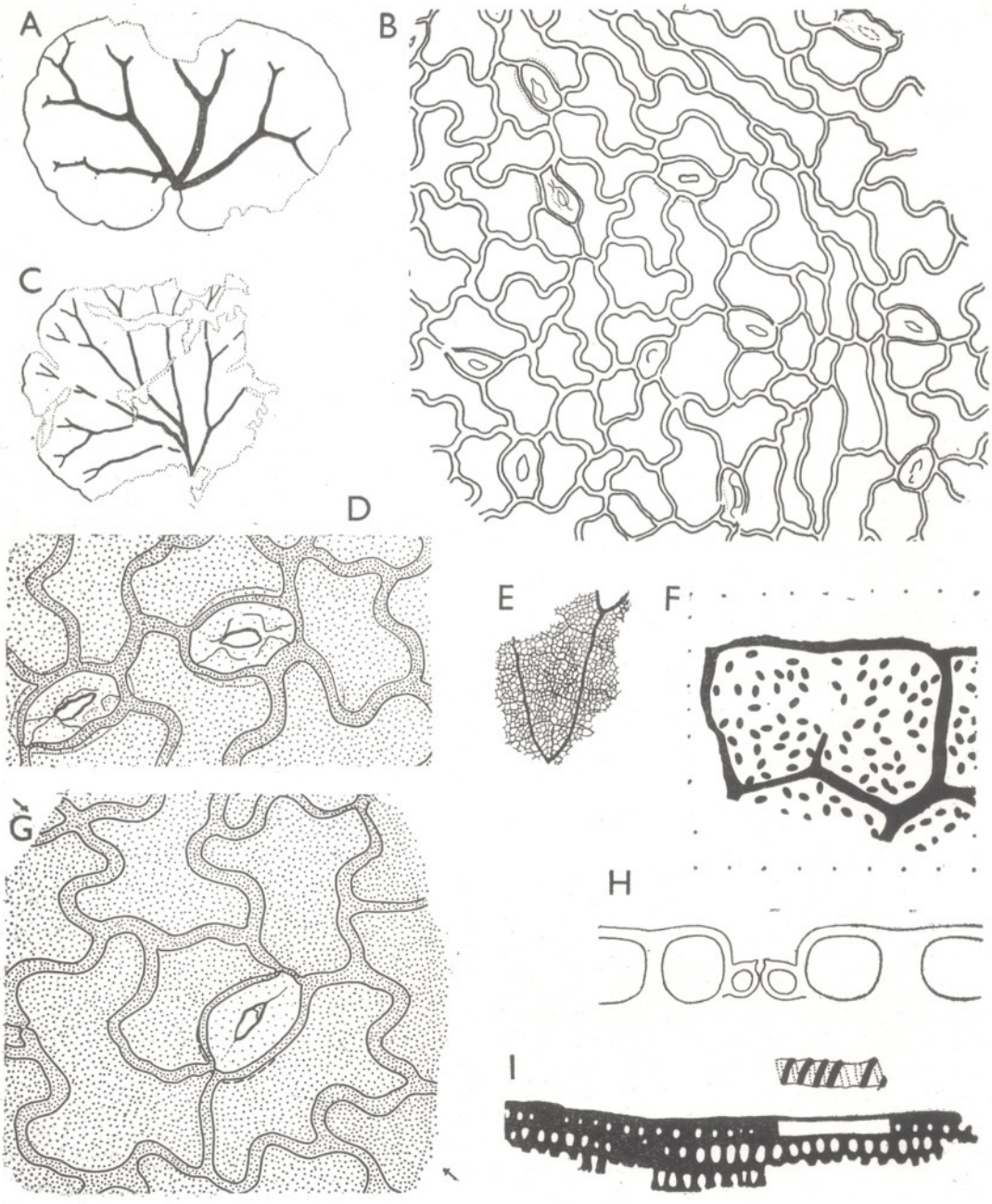
Holotype — Specimen no. 31683.

Occurrence:

Jabalpur stage — South Rewa, about ½ km. (B) and 3/4 km. NNW (A) of Bansa and Patparha (F), Shahdol district, Madhya Pradesh.

Comparison and discussion — One of my specimens is broadly reniform in outline with a short sinus at its base. The other specimens, though incomplete, appear to conform to the same form. The margin of all the specimens is similar and venation dipteroid.

In the form of the lamina *Hausmannia pachyderma* resembles *H.* (?) *reniformis* (Heer) Richter (1906, USSR). But the latter is quite distinct in possessing an entire margin and moreover it is also not fully known. In *H.* (?) *asarifolia* (Zigno) Richter (1906, Italy), *H. ussuriensis* Kryshtofovich (1923, USSR) and *H. nariwaensis* Ôishi (1930, 1932, Japan), which show some



TEXT-FIG. 1 — *Hausmannia pachyderma* n. sp. A, lamina, 31683, × 3. B, lower epidermis, vein region represented by narrow and elongated cells on the right hand side, slide no. 4247, × 250. C, part of lamina, 30619, × 1. D, two stomata and epidermal cells, slide no. 4247, × 500. E, a part of lamina magnified showing venation, 30619, × 2½. F, lower surface, showing veins and distribution of irregularly orientated stomata, the square represented by small dots is 1 sq. mm., slide no. 4246. G, a stoma and epidermal cells, slide no. 30288-2, × 500. H, reconstructed transverse section of stoma of the Fig. G along the line denoted by arrows. I, spiral and scalariform tracheids from the veins, white rectangular area in the scalariform tracheids represents the region overlapped by the spiral tracheid, slide no. 30288-4, × 1000. A, Bansa (Loc. A); B, D, F, G, I, all slides prepared from specimen no. 30288, Bansa (Loc. B); C, Bansa (Loc. A).

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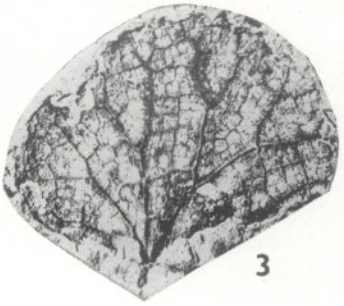

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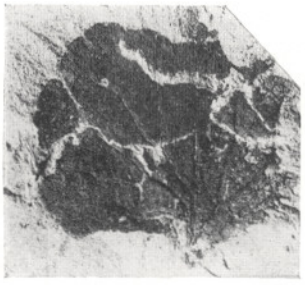

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similarities in the outline of the lamina, the basal sinus is much deeper as compared to *H. pachyderma*.

Hausmannia crookshanki Shah and Singh (1964) described from Jatamao differs from *H. pachyderma* in possessing a large number of primary veins and a deep apical incision of the lamina as seen from its illustration. Moreover, *H. crookshanki* is not fully known. Four of the present leaves are preserved in a carbonized state and have given considerable information about the fine anatomy of the leaf. This is the second record of the study of epidermal structure in this genus (first studied by CARPENTIER, 1938). Some of the features shown, for instance, the scalariform and spiral tracheids accompanied by what may be sieve tubes and also by various types of thick walled cells are merely those of ferns in general. But the epidermis shows features of more interest. The distinctly sunken stomata are more xeromorphic than in many ferns, and the lamina was evidently rather thick with a well developed palisade mesophyll.

In the epidermal cell structure comparison was made with *Hausmannia* sp. described by Carpentier (1938). This French specimen is only a fragment of a dissected leaf, probably of *H. dichotoma*. In both the species stomata are alike in their distribution and orientation. But in Carpentier's specimen the stomata lack projections over the guard cells and the end walls of the epidermal cells are merely undulate but not thrown into strong loops as in my specimen.

Hausmannia pachyderma also resembles *Polypodium aureum* in the epidermal structure. But in *P. aureum* the number of subsidiary cells varies from 2-4, the guard cells are much more deeply sunken and lack projections over them.

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EXPLANATION OF PLATE

PLATE 1

1. *Hausmannia pachyderma* n. sp., Holotype; Specimen No. 31683, × 1. Bansa (Loc. A).
2. *H. pachyderma* No. 30288, × 1. Bansa (Loc. B).
3. *H. pachyderma* No. 31695, × 1. Patparha (Loc. F).
4. *H. pachyderma* No. 30619, × 1. Bansa (Loc. A).
5. *H. pachyderma*. Stoma and adjacent epidermal cells. Sl. No. 4247, × 500. (prepared from specimen No. 30288, above Fig. 2).
6. *H. pachyderma*. Lower epidermis. Sl. No. 4247, × 250. (slide and specimen same as mentioned in Fig. 5).