

SOME PLANT REMAINS FROM HOSHANGABAD DISTRICT, MADHYA PRADESH

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ABSTRACT

In this paper, *Taeniopteris spatulata* McClelland, *Ptilophyllum acutifolium* Morris, *P. cutchense* Morris, *P. instiaticallum* Bose and *Pagiophyllum marwarensis* Bose & Sukh-Dev are described from the Jurassic rocks (Gondwana) of Hoshangabad District. Except *Ptilophyllum instiaticallum* and *Pagiophyllum marwarensis* which are preserved as incrustations, the rest are in the form of impressions.

Key-words — Cycadales, Pteridophytes, Jurassic, Hoshangabad (India).

सारांश

होशंगाबाद जनपद, मध्य प्रदेश से कुछ पादप अवशेष -- सुखदेव एवं जेबा-बाना

इस शोध-पत्र में होशंगाबाद जनपद की जुरेसिक कालीन चट्टानों (गोंडवाना) से टीनियोप्टेरिस स्पेटुलेटा मैकक्लेलैंड, टाइलोफिलम एक्यूटोफोलियम मॉरिस, टा० कच्छेन्से मॉरिस, टा० इंस्टीटेकैलम बोस तथा पेजियोफिलम मारवारेन्सिस बोस एवं सुखदेव का वर्णन किया गया है। पर्पटाशम के रूप में परिरक्षित टाइलोफिलम इंस्टीटेकैलम तथा पेजियोफिलम मारवारेन्सिस के अतिरिक्त शेष सभी मुद्राशम के रूप में उपलब्ध हैं।

IN the Hoshangabad District the fossiliferous outcrops of the Jurassic age are found near Jhirnapur on the Morand River (22°19': 77°28'), Jatamao (22°23': 77°35'), Khatama (22°29': 77°44') and Parsapani (22°35': 78°3'). The plant remains in them are mostly preserved as impressions. Some incrustations are found in the carbonaceous shales near Parsapani. Our knowledge of the Jurassic flora of this district is based on Zeiller (1902), Seward and Sahni (1920), Crookshank (1935, 1936), Shah and Singh (1965a, b) and Zeba-Bano (1979). Most of the plant remains of this region have been listed. Only a small number of them have been described and illustrated: these are *Moranocladus oldhami* (Zeill.) Sahni from Morand Valley; *Hausmannia crookshanki* Shah & Singh, *H. dichotoma* Dunker, *H. buchii* Andreae, *Cladophlebis medlicottiana* (Oldh.) Pascoe, *Sphenopteris anderssonii* Halle, *Sphenopteris* sp. from Jatamao; and *Gleichenites* sp. from Parsapani.

Recently a large number of plant fossils from this district have been collected. Out of them the pteridophytes have already been described in detail by Zeba-Bano (1979) and this paper deals with the descriptive account of some gymnosperms.

DESCRIPTION

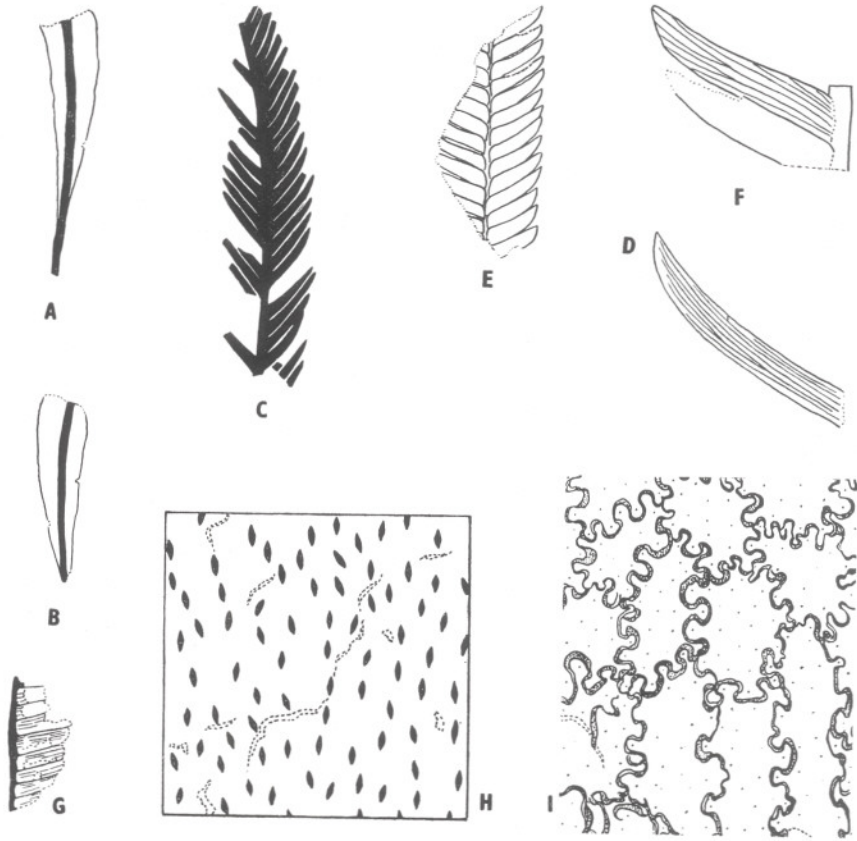
CYCADALES

Genus — *Taeniopteris* Brongniart

Taeniopteris spatulata McClelland

Pl. 2, fig. 11; Text-fig. 1A-B

Description — Incomplete leaf, simple, petiolate, 3.0 × 0.7 cm. Petiole short, 5 mm long and 1 mm wide. Lamina attached slightly above the lateral margin of midrib, gradually tapering towards base, at places



TEXT-FIG. 1 — A-B. *Taeniopteris spatulata* McClelland. A. Specimen no. 66/1438 \times 1. B. Specimen no. 57/1438 \times 1. C, D. *Ptilophyllum acutifolium* Morris. C. Specimen no. 40/1438 \times 1. D. A pinna from above specimen enlarged showing venation \times 2. E, F. *Ptilophyllum cutchense* Morris. E. Specimen no. 52/1434 \times 1. F. Few pinnae enlarged showing venation, specimen no. 62/1434 \times 2. G-I. *Ptilophyllum institacallum* Bose. G. Specimen no. PP-A \times 1. H. Showing distribution of stomata on lower cuticle in 1 sq mm, slide no. PP-B-(2) \times 40. I. Showing few marginal cells of lower surface, slide no. PP-B-(5) \times 500.

uneven in breadth, two longitudinal halves of lamina unequal in width. Margin entire to slightly undulate. Apex not preserved. Midrib thick, uniformly broad, having fine longitudinal striations. Majority of veins simple, sometimes bifurcating just after emergence, arising at an angle of about 65° - 75° , running parallel up to the margin.

Collection — Museum specimen no. 57/1438 (C.P. 66/1438), Birbal Sahni Institute of Palaeobotany, Lucknow.

Locality — Near Parsapani, Hoshangabad District.

Horizon & Age — Jabalpur Formation, Jurassic.

Comparison — The species is extremely rare at Parsapani. Only a single specimen in counter part has been collected. In gross features it closely resembles *Taeniopteris spatulata* McClelland described by Oldham and Morris (1863) from the Rajmahal Hills and by Feistmantel (1879, pl. 1, figs 8-10) from Madras Coast. The present specimen exactly matches with some of the specimens of *T. spatulata* described by Seward and Holtum (1922, pl. 12, figs 1, 2, 4, 6a) from Ceylon. *T. spatulata* shows some resemblance with *T. thomsoniana* described by Arber (1917, pl. 8, figs 4, 7) from New Zealand in shape, size and venation of the leaf.

BENNETTITALES

Genus — *Ptilophyllum* Morris*Ptilophyllum acutifolium* Morris

Pl. 1, figs 1-3; Text-fig. 1C-D

Description — Leaf pinnate, available length 2.5-7 cm and breadth 1.5-3 cm in the middle, narrowing gradually towards base and apex. Rachis mostly concealed by pinnae bases. Pinnae attached on the upper surface of rachis at an angle of 35°-56°, elongate to subulate, typically 1.6-2 cm long and 1.5-2 mm broad at the base, straight or falcate, alternate, rarely sub-opposite, acroscopic margin rounded and basiscopic margin slightly decurrent, mostly pinnae margin touching each other or slightly overlapping near base. Margin entire. Apex acute. Veins 5 to 7, arising from whole pinna base, majority unforked, when forked only once, parallel.

Collection — Museum specimen nos. 16/1434, 16"/1434, 22/1434, 24/1434, 47/1434, 53/1434, 23/1435, 40/1438, 48/1438, 64/1438 and 73/1438, Birbal Sahni Institute of Palaeobotany, Lucknow.

Localities — Morand River near Jhirnapur, near Jatamao and Parsapani, Hoshangabad District.

Horizon & Age — Jabalpur Formation, Jurassic.

Comparison — Majority of the specimens are preserved in the form of impressions. However, a few have a thin carbonized crust but no cuticular preparation could be made out of them. Some of the specimens in the present collection resemble very much *P. jabalpurens* Jacob & Jacob described by Bose and Kasat (1972, pl. 7, fig. 58; pl. 9, fig. 79). The gross features of the pinnae are exactly like those of the pinnae of *P. jabalpurens*. But in the absence of cuticle we have, at present, preferred to place our specimens under *P. acutifolium*.

Ptilophyllum cutchense Morris

Pl. 1, figs 4, 5; Text-fig. 1E-F

Description — Leaf pinnate, lamina as a whole narrow, linear, more or less uniformly broad, available length 4.5-5.2 cm and breadth 1.3-1.5 cm. Rachis partially

or completely covered by pinnae, 0.1-0.2 cm wide. Pinnae attached on upper surface of rachis at an angle of 63°-67°, alternate, ovate, typically 0.8-1.2 cm long and 0.2-0.3 cm broad at the base, margin straight or rarely slightly falcate, apex obtuse, basal acroscopic margin rounded, basiscopic margin slightly decurrent, pinnae bases touching each other or slightly overlapping. Veins arising from whole base of pinnae, 6-7, forked or unforked, when forked once, parallel.

Collection — Museum specimen nos. 27/1434, 37/1434, 49/1434, 52/1434, 62/1434, 27/1438, 44/1438 and 63/1438, Birbal Sahni Institute of Palaeobotany, Lucknow.

Localities — Near Jatamao and Parsapani, Hoshangabad District.

Horizon & Age — Jabalpur Formation, Jurassic.

Comparison — The present specimens resemble most some of the specimens of *P. institacallum* described by Bose and Kasat (1972, pl. 8, figs 68-73). But in the absence of cuticle we have described them here under *P. cutchense*. Some of the present specimens may be compared with *P. cutchense* described by Feistmantel (1877b, pl. 6, fig. 1) from Sher River, Feistmantel (1877a; Oldham & Morris, 1863, pl. 22, figs 2, 3, 6) from Rajmahal, Feistmantel (1879, pl. 8, fig. 4) from Vemavaram and Bose and Kasat (1972, pl. 1, figs 9, 10; pl. 2, figs 14, 17) from Vemavaram and Kakadbbhit.

Ptilophyllum institacallum Bose

Pl. 1, figs 6-10; Text-fig. 1G-I

Description — Leaves pinnate, incomplete, up to 1.9 cm in length and approximately 1.4 cm in width. Rachis thick, 2 mm wide, partly concealed by pinnae bases. Pinnae alternate or sub-opposite, 6.8 × 2.2.5 mm, closely set on upper surface of rachis at an angle of about 75°-80°. Pinnae bases asymmetrical, acroscopic basal margin rounded, basiscopic margin decurrent. Margin entire. Apex obtuse. Venation obscure.

Cells of rachis on both sides squarish to rectangular, sometimes polygonal. Anticlinal walls thick, straight or undulating, at places sinuous. Periclinal wall devoid of papillae.

Upper cuticle of lamina poorly preserved and devoid of stomata. Cells irregular in shape and size, squarish or polygonal. Anticlinal walls sinuous with prominent loops, periclinal wall unspecialized. Lower cuticle differentiated into non-stomatal, non-papillate marginal region and stomatiferous, papillate central region. Marginal region 8-11 cells broad, cells squarish, rectangular or polygonal; anticlinal walls sinuous, periclinal wall unspecialized. Cells of stomatiferous region squarish to polygonal, highly papillate. Papillae about 1-5, crescent-shaped or irregular in shape and size, thickly cutinized, joining to form a frill-like structure, obscuring outlines of cells and leaving hollow, more or less circular area in the middle of the cells. Cell outlines, when visible, wavy or sinuous. Stomata broadly oval or \pm circular, irregularly distributed, transversely orientated, sometimes obliquely placed, almost concealed by over-hanging papillae. Subsidiary cells more cutinized than ordinary epidermal cells, outer walls wavy. Guard cells sunken, crescent-shaped thickening well developed, pore slit-like.

Collection — Museum specimen nos. PP-A, PP-B, PP-C and PP-D, Birbal Sahni Institute of Palaeobotany, Lucknow.

Locality — Near Parsapani, Hoshangabad District.

Horizon & Age — Jabalpur Formation, Jurassic.

Comparison — The specimens from Parsapani are few and extremely fragmentary. They have yielded minute cuticular pieces and from them it is difficult to make out the exact distributional pattern of stomata. The largest piece gives an impression as if they are forming a central stomatic region.

In cuticular features the Parsapani specimens match with *P. institacallum* Bose described by Bose and Kasat (1972).

CONIFERALES

Genus — *Pagiophyllum* Heer

Pagiophyllum marwarensis Bose & Sukh-Dev

Pl. 2, figs 12-18; Text-fig. 2A-E

Description — Leafy shoots straight or slightly curved, about 5 mm broad. Leaves

small, lanceolate, spirally arranged, arising from a rhomboidal leaf-base cushion, directed forward or spreading laterally, falcate, keeled. Margin entire. Apex acute.

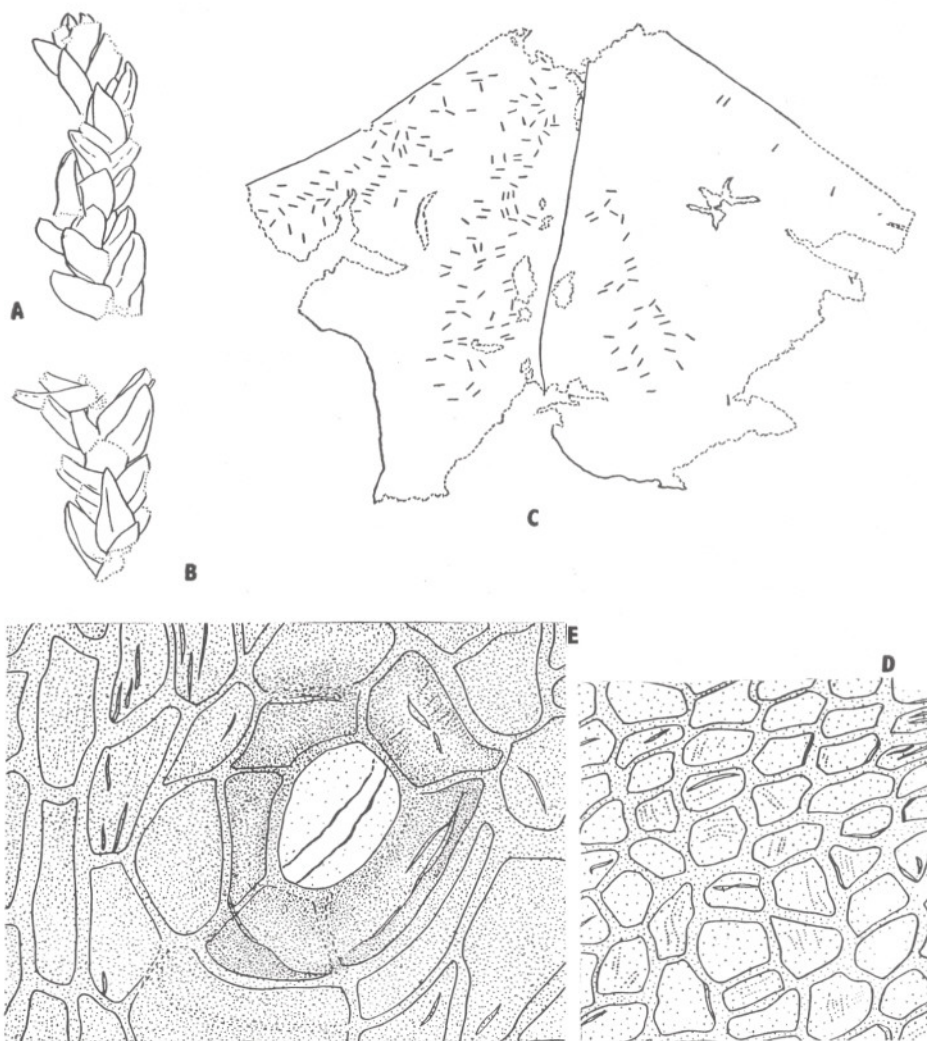
Cuticle almost of same thickness on both sides, amphistomatic. Stomata more on upper surface than lower, arranged in two longitudinal zones, stomatal zones lying close to margin and meeting towards apex, leaving a central non-stomatic zone. Stomata within each zone arranged in short, discontinuous files, usually transversely placed, sometimes obliquely or less commonly longitudinally placed, sometime sharing a common subsidiary cell. Stomata more or less oval or circular, sunken. Subsidiary cells 4-7, mostly 4 or 5, more cutinized than the ordinary epidermal cells and with a narrow slit in middle, inner walls of subsidiary cells joining the pit more cutinized, sometimes finely striated. Guard cells thinly cutinized, sunken. Epidermal cells variable in shape and size, triangular, squarish, rectangular, or polygonal, within the stomatal files more broader than their length. Anticlinal walls 5-9 μ (mostly 7.5 μ) thick, almost straight or at times slightly curved, sometimes pitted. Periclinal wall non-papillate, some showing a thin area or longitudinal slits or striations. Hypodermis present under both sides, walls thin. On lower side stomata few, mostly confined towards base in ill-defined short files and rarely one or two near the apex. Stomatal and epidermal structure same as on upper side.

Collection — Museum specimen nos. PP-6, 7, 8, 9, 10, 11 and 15, Birbal Sahni Institute of Palaeobotany, Lucknow.

Locality — Near Parsapani, Hoshangabad District.

Horizon & Age — Jabalpur Formation, Jurassic.

Remarks — Description is based on a large number of specimens obtained by bulk maceration. The specimens are similar to *Pagiophyllum marwarensis* Bose & Sukh-Dev (1972) described from the Lower Cretaceous of Bansa in gross morphology and cuticular structure. These specimens are also comparable to *P. rewaensis* Bose & Sukh-Dev (1972) and *P. sherensis* Maheshwari & Kumaran (1976) in having more stomata on the upper side and in their general arrangements, but they differ from



TEXT-FIG. 2—*Pagiophyllum marwarensis* Bose & Sukh-Dev. A. Specimen no. PP-11 \times 4. B. Specimen no. PP-6 \times 4. C. Showing distribution and orientation of stomata on upper and lower sides of leaf, slide no. PP-4 \times 20. D. Showing epidermal cells of lower cuticle, slide no. PP-(4) \times 250. E. Single stoma enlarged, slide no. PP-5 \times 500.

these two species in the details of the stomatal distribution and their structure.

P. marwarensis Bose & Sukh-Dev resembles *P. insigne* Kendall (1948) described from Yorkshire, in general morphology of leaf, twigs and shape of stomatal apparatus. The two species, however, differ in the nature of stomatal distribution. In *P. insigne* stomata are present on both the sides in almost equal numbers, sometimes on lower side may be

absent over the keel region. In *P. marwarensis* the stomata are more on upper surface than lower and arranged in two longitudinal zones.

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EXPLANATION OF PLATES

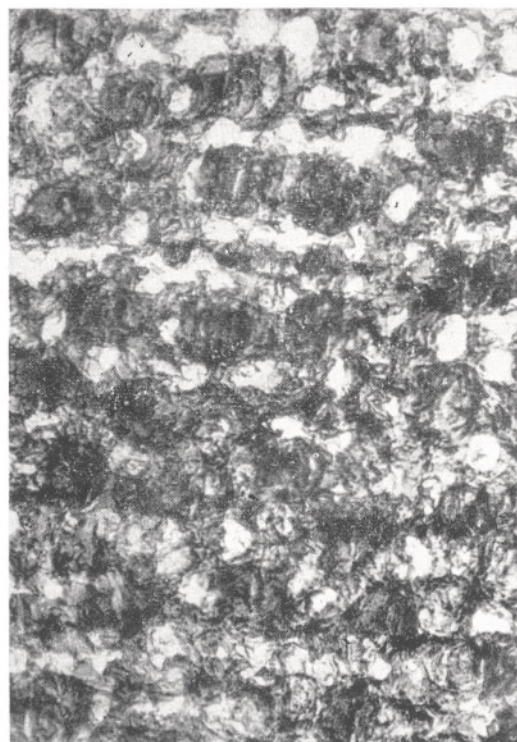
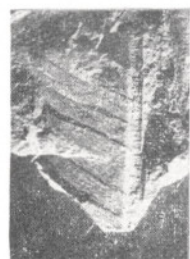
PLATE 1

1. *Ptilophyllum acutifolium* Morris, specimen no. 40/1438. × 1. Parsapani.
2. *P. acutifolium*, specimen no. 25/1438. × 1. Parsapani.
3. *P. acutifolium*, specimen no. 64/1438. × 1. Parsapani.
4. *Ptilophyllum cutchense* Morris, specimen no. 52/1434. × 1. Jatamao.
5. *P. cutchense*, specimen no. 62/1434. × 1. Jatamao.
6. *Ptilophyllum institacallum* Bose, specimen no. PP-A. × 1. Parsapani.
7. *P. institacallum*, specimen no. PP-8. × 1. Parsapani.
8. Showing cells of rachis, slide no. PP-B-(14). × 250.
9. Part of lower cuticle of lamina showing stomata, slide no. PP-D-(1). × 150.

10. A stoma enlarged, slide no. PP-D-(9). × 500.

PLATE 2

11. *Taeniopteris spatulata* McClelland, specimen no. 66/1438. × 1. Parsapani.
12. *Pagiophyllum marwarensis* Bose & Sukh Dev, specimen no. PP-7. × 4. Parsapani.
13. *P. marwarensis*, specimen no. PP-11. × 4.
14. *P. marwarensis*, specimen no. PP-6. × 4.
15. Showing distribution of stomata on upper and lower surface, slide no. PP-(4). × 20.
16. Part of cuticle showing stomata and epidermal cells, slide no. PP-8-(3). × 150.
17. A stoma magnified, slide no. PP-11-(5A). × 500.
18. A stoma magnified, slide no. PP-11-(2). × 500.

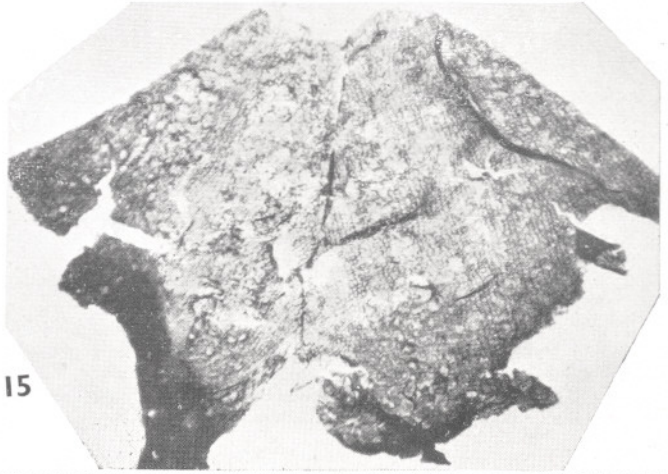




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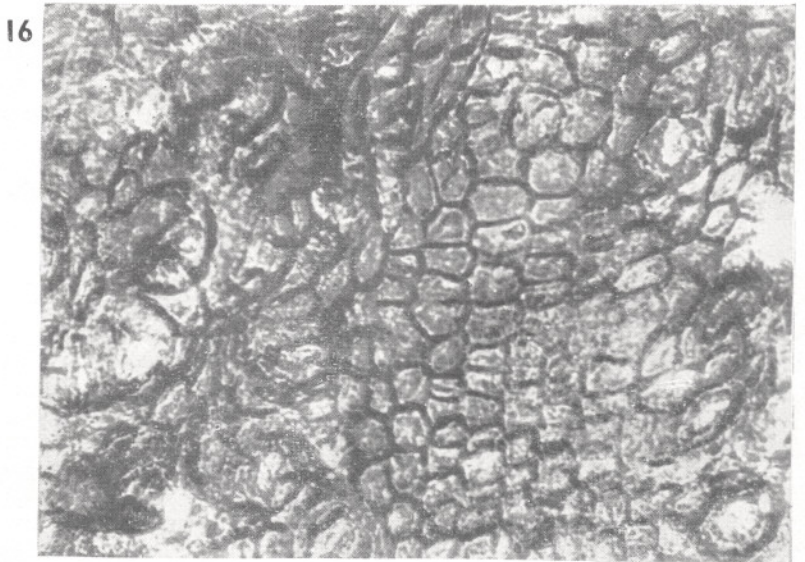
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