

ON A PETRIFIED SPECIMEN OF *DICTYOZAMITES* FROM THE RAJMAHAL HILLS, INDIA

M. N. BOSE

Birbal Sahni Institute of Palaeobotany, Lucknow

&

M. L. KASAT

University of Rajasthan, Jaipur

ABSTRACT

The anatomical details of rachis and surface features of pinnae of a petrified specimen of *Dictyozamites*, collected from Amarjola, Rajmahal Hills, form the subject of this paper. In anatomical details the present specimen resembles *Ptilophyllum amarjolense* Bose (1953) and *P. sahnii* Gupta & Sharma (1968a)

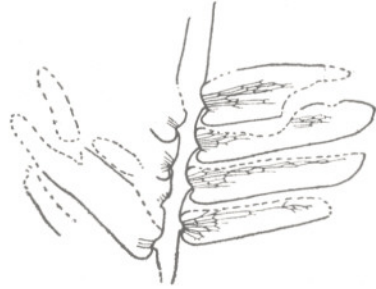
INTRODUCTION

FROM India, only five species of *Dictyozamites* are known, viz., *D. falcatus* (Morris) Medlicott & Blanford, *D. indicus* (Feistmantel) Sahnii & Rao, *D. hallei* Sahnii & Rao, *D. bagjoriensis* Jacob and *D. sahnii* Gupta & Sharma. All these species are based on external characters and nothing is known regarding their cuticular structure. Recently, a well preserved petrified specimen of *Dictyozamites* was collected from Amarjola, Rajmahal Hills, Bihar by one of us (M.N.B.). From this specimen it has been possible to study the anatomical details of the rachis and to some extent, surface features of the pinnae. The specimen is provisionally described here as *Dictyozamites* sp.

Dictyozamites sp.

Pls. 1, 2, Figs. 1-12; Text-figs. 1, 2A-D

Pinnate leaf measuring 4.5 cm. in length, 5 cm. in breadth. Rachis 3-5 mm. wide, on upper side partially concealed by pinnae bases. Pinnae alternate or sub-opposite, arising at an angle of about 70°, attached on upper surface of rachis by middle portion of bases. Pinna 2.5 cm. long, 0.9 cm. broad, slightly falcate. Margin entire, apex obtuse. Acroscopic and basisopic margins auriculated, basisopic margin concealed by acroscopic margin of pinna below. Veins many, radiating from base, anastomosing



TEXT-FIG. 1 — *Dictyozamites* sp. no. 33806. × 1.

and forming reticulation. Middle meshes long and nearly parallel, those towards apex and margin shorter and polygonal.

Upper surface of lamina devoid of stomata. Cells mostly polygonal, rarely rectangular, irregularly arranged; anticlinal walls sinuous, loops deep and prominent; periclinal wall without papillae or trichome bases. On lower surface, veins distinctly marked. Cells along veins elongated, rectangular, 2-5 cells wide; anticlinal walls slightly wavy; periclinal wall smooth. Cells between veins polygonal; anticlinal walls sinuous, periclinal wall smooth. Stomata numerous, occurring between vein meshes, crowded, irregularly scattered and transversely orientated, rarely oblique. Guard cells crescent shaped, well cutinized. Subsidiary cells broad with straight walls, more cutinized than ordinary epidermal cells. Aperture mostly oval.

Rachis, in transverse section, showing an upper layer of rectangular epidermal cells followed by 6-7 cells wide hypodermal layer. Hypodermal cells thick walled, each cell having a dark content inside. Ground tissue consisting of thin walled isodiametric or oval cells, having intercellular spaces in between. Sclereids visible in ground tissue and in between vascular bundles. An

incomplete layer of thick-walled mechanical tissue surrounding vascular bundles. Vascular bundles about 25-30, collateral, arranged in double (outer and inner) series in the form of "U". Opening of "U" facing upwards. Xylem pointing inwards; radial walls of tracheids showing scalariform thickening. Phloem badly preserved, cells polygonal.

Specimen — No. 33806 of the Birbal Sahni Institute of Palaeobotany, Lucknow.

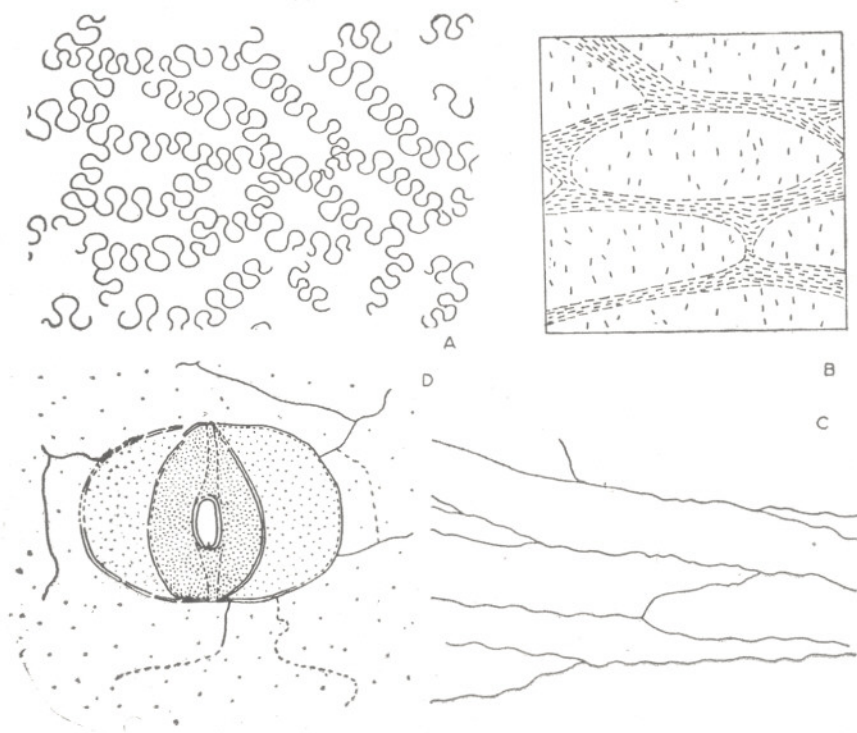
Locality — Amarjola, Rajmahal Hills, Bihar.

Age & Horizon — Upper Jurassic; Rajmahal Stage.

Comparison — In external features present specimen resembles some of the specimens of *Dictyozamites falcatus* (Morris) Medlicott & Blanford described by Feistmantel (1879, PL. 3, FIG. 2; PL. 4, FIGS. 1, 3, 8; PL. 5, FIGS. 2, 5, 9) from Vemavaram and Sriperumbudur and *D. sahnii* Gupta and Sharma (1968, PL. 1, FIGS. 1-4) from Onthea. In venation pattern *D. sp.* is more closer to *D. falcatus*

but in the absence of cuticular features and other details, in Feistmantel's (1879) and Gupta and Sharma's (1968) specimens, it is difficult to compare these with the present specimen.

In the nature of venation *Dictyozamites sp.* resembles *D. crassinervis* and *D. latifolium* described by Menéndez (1956) from Argentina. In all these species the middle meshes of pinnae are long, narrow and parallel but those towards apex and margin are short and polygonal. The present species can however, be readily distinguished from the Argentinian species in size and cuticular structure of the pinnae. In *D. crassinervis* and *D. latifolium* the pinnae are much broader than *D. sp.* and also unlike *D. sp.* the subsidiary cells are papillate. *D. sp.* can easily be distinguished from *D. hawelli* Seward described by Harris (1969) from Yorkshire, *D. johnstrupii* described by Nathorst (1907) from Scandinavia (see Florin, 1931) and *D. minusculus* described by Menéndez (1966) from Argentina,



TEXT-FIG. 2 — *Dictyozamites sp.*— A, cell on upper surface; slide no. 33806-3. $\times 250$. B, lower surface showing distribution of stomata; slide no. 33806-4. $\times 40$. C, lower surface showing cells along veins; slide no. 33806-7. $\times 250$. D, a stoma; slide no. 33806-7. $\times 500$.

in cuticular details. Unlike *D. sp.* in the latter three species the epidermal cells on lower side are papillate.

In anatomical details, the rachis of *D. sp.* resembles the rachis of *Ptilophyllum amarjolense* Bose (1953) and *P. sahnii* Gupta & Sharma (1968a) described by Bose & Kasat

(1971). In these, rachis in cross-section shows outermost layer of epidermis which is followed by 6-7 layered thick hypodermis and thin walled ground tissue. Also the vascular bundles in all the three species are arranged in the form of "U" in double series with xylem facing inwards.

REFERENCES

- BOSE, M. N. (1953). *Ptilophyllum amarjolense*, sp. nov. from the Rajmahal Hills, Bihar. *Proc. natn. Inst. Sci. India*, **19**(5): 605-612.
- BOSE, M. N. & KASAT, M. L. (1971). The genus *Ptilophyllum* in India. *Palaeobotanist*, **19**(2): 115-145.
- FEISTMANTEL, O. (1879). Outliers on the Madras Coast. In "Fossil flora of the Upper Gondwanas." *Mem. geol. Surv. India, Palaeont. indica, Ser. 2*, **1**(4): 1-34.
- FLORIN, R. (1931). Untersuchungen zur Stammesgeschichte der Coniferlaes und Cordaitales. *K. svenska Ventensk Akad. Handl.*, **10**(1): 1-588.
- GUPTA, K. M. & SHARMA, B. D. (1968). Investigation of the Jurassic flora of the Rajmahal Hills, India: 1—On the Bennettitalean genus *Dictyozamites*, with description of *D. sahnii* sp. nov. *J. palaeont. Soc. India*, **5-9**: 21-28.
- GUPTA, K. M. & SHARMA, B. D. (1968a). Investigations on the Jurassic flora of the Rajmahal Hills, India: 2—On a new species of *Ptilophyllum* from Amarjola in Amarapara region. *J. palaeont. Soc. India* **11**: 1-7 (1966).
- HARRIS, T. M. (1969). The Yorkshire Jurassic flora III. Bennettitales. *Br. Mus. (nat. Hist.) London*.
- MENÉNDEZ, C. A. (1966). Fossil Bennettitales from the Tico flora, Santa Cruz Province, Argentina. *Bull. Br. Mus. (nat. Hist.) Geol.*, **12**(1): 1-42.
- NATHORST, A. G. (1907). Die Kutikula der Blätter von *Dictyozamites johnstrupii* Nath. *K. svenska Ventensk Akad. Handl.*, **42**(5): 12-14.

EXPLANATION OF PLATES

PLATE 1

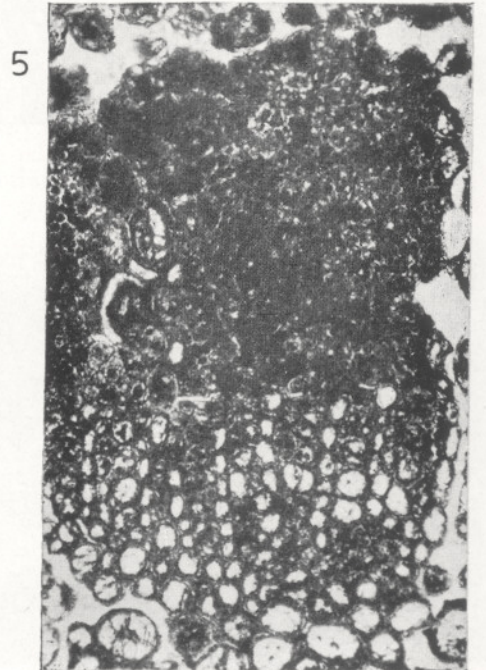
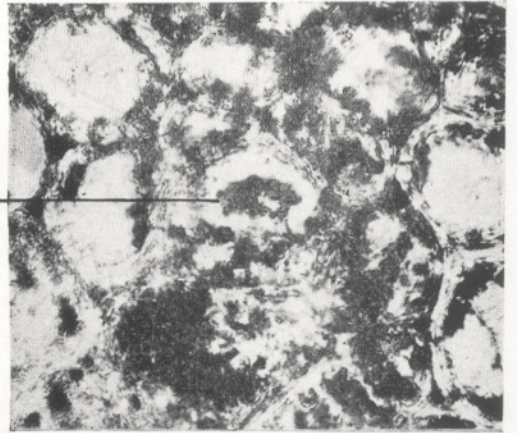
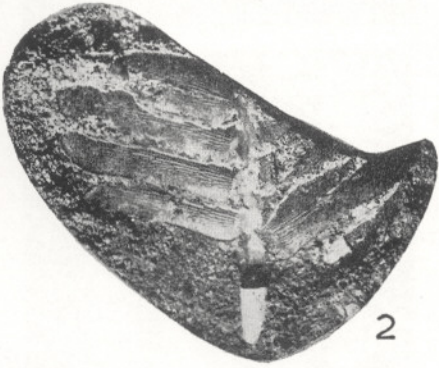
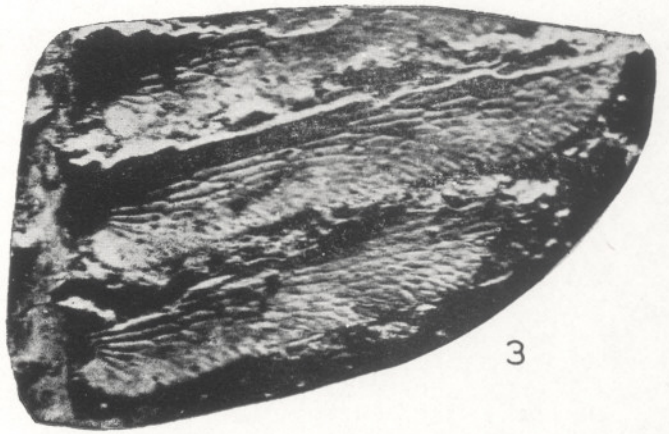
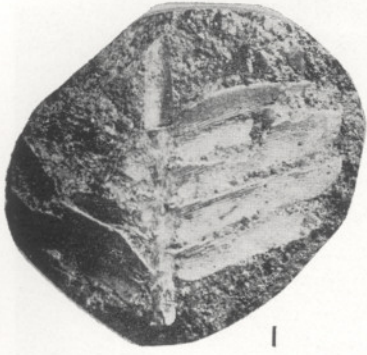
Dictyozamites sp.

1. 2. The counterparts of the specimen no. 33806. × 1.
3. A few pinnae enlarged. × 3.
4. Transverse section of rachis; slide no. 33806-1. × 30.
5. Transverse section of rachis showing vascular bundles; slide no. 33806-5. × 150.
6. Transverse section of rachis showing sclereid(s); slide no. 33806-5. × 500.

PLATE 2

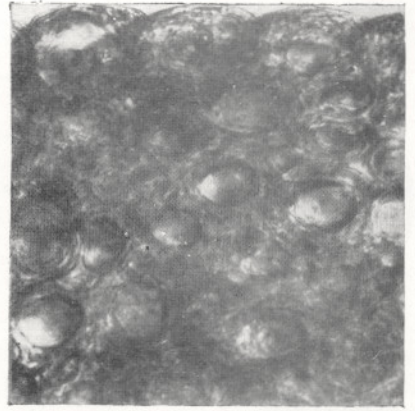
Dictyozamites sp.

7. Transverse section of rachis showing epidermal and hypodermal cells; slide no. 33806-1. × 500.
8. Radial longitudinal section of rachis showing scalariform thickening on radial walls of tracheids; slide no. 33806-2. × 500.
9. Upper surface of pinna showing surface cells; slide no. 33806-3. × 250.
10. Lower surface of pinna showing distribution of stomata; slide no. 33806-4. × 40.
11. The above magnified. × 150.
12. Two stomata; slide no. 33806-4. × 500.





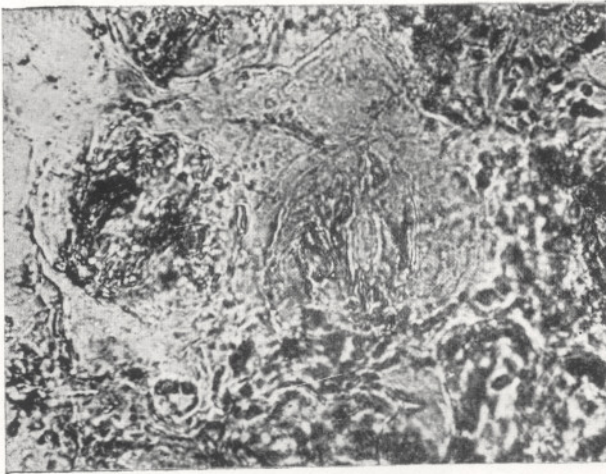
9



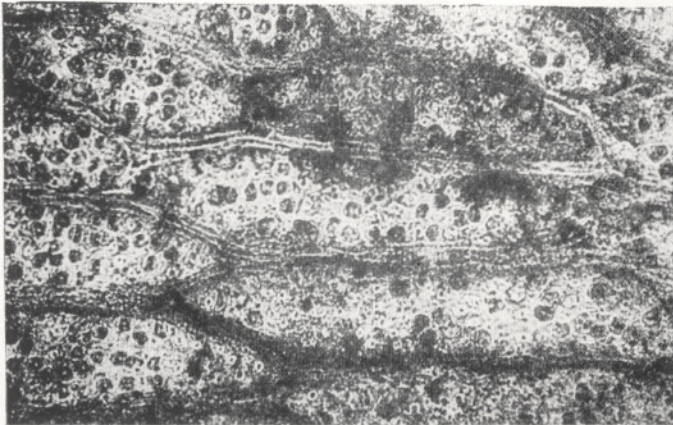
7



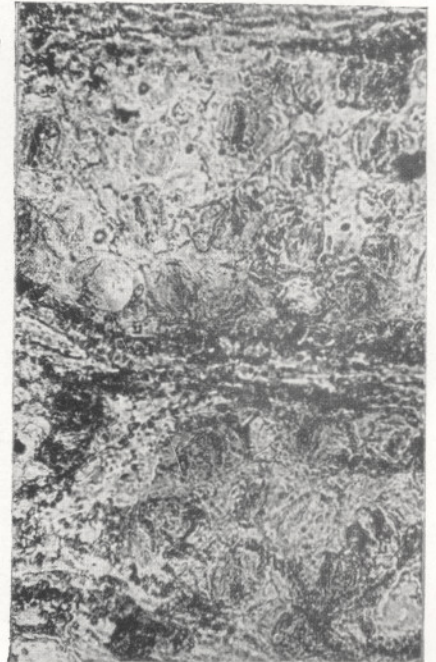
8



12



10



11