

# A NEW SPECIES OF *PTILOPHYLLUM* FROM BANSA, SOUTH REWA GONDWANA BASIN

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## ABSTRACT

Cuticular structure of a new species of *Ptilophyllum* (*P. gladiatum*) from Bansa, South Rewa, has been described.

## INTRODUCTION

**B**ENNETTITALEAN fronds are extremely rare in the Upper Gondwanas (Jabalpur series) of South Rewa Gondwana basin. From there, so far only a single species, *Ptilophyllum cutchense* Morr., is known. One specimen each of *P. cutchense* was collected by Hackett (1872) from Baragaon and Hughes (1880) from Bansa. Both these specimens were reported by Feistmantel (1882); he, however, did not describe or figure any one of them. He had only mentioned (p. 40), "This species has been already several times described and figured in the various papers on Upper Gondwana fossils, so there is no necessity of mentioning it any further here. I would only remark that it was met with but rarely, only one specimen having been found at one locality. I have not figured it, it being of the ordinary type of this species."

The present species is based on a specimen collected by us in March 1957 from Machrar river cutting near the village Bansa<sup>1</sup>, about 6 miles south-west of Chandia, South Rewa. The specimen was collected along with hundreds of other specimens, mostly belonging to the conifers. All of them are carbonized and preserved in dark carbonaceous shales.

## DESCRIPTION

*Ptilophyllum gladiatum* n. sp.

Pl. 1; Text-fig. 1, A-F

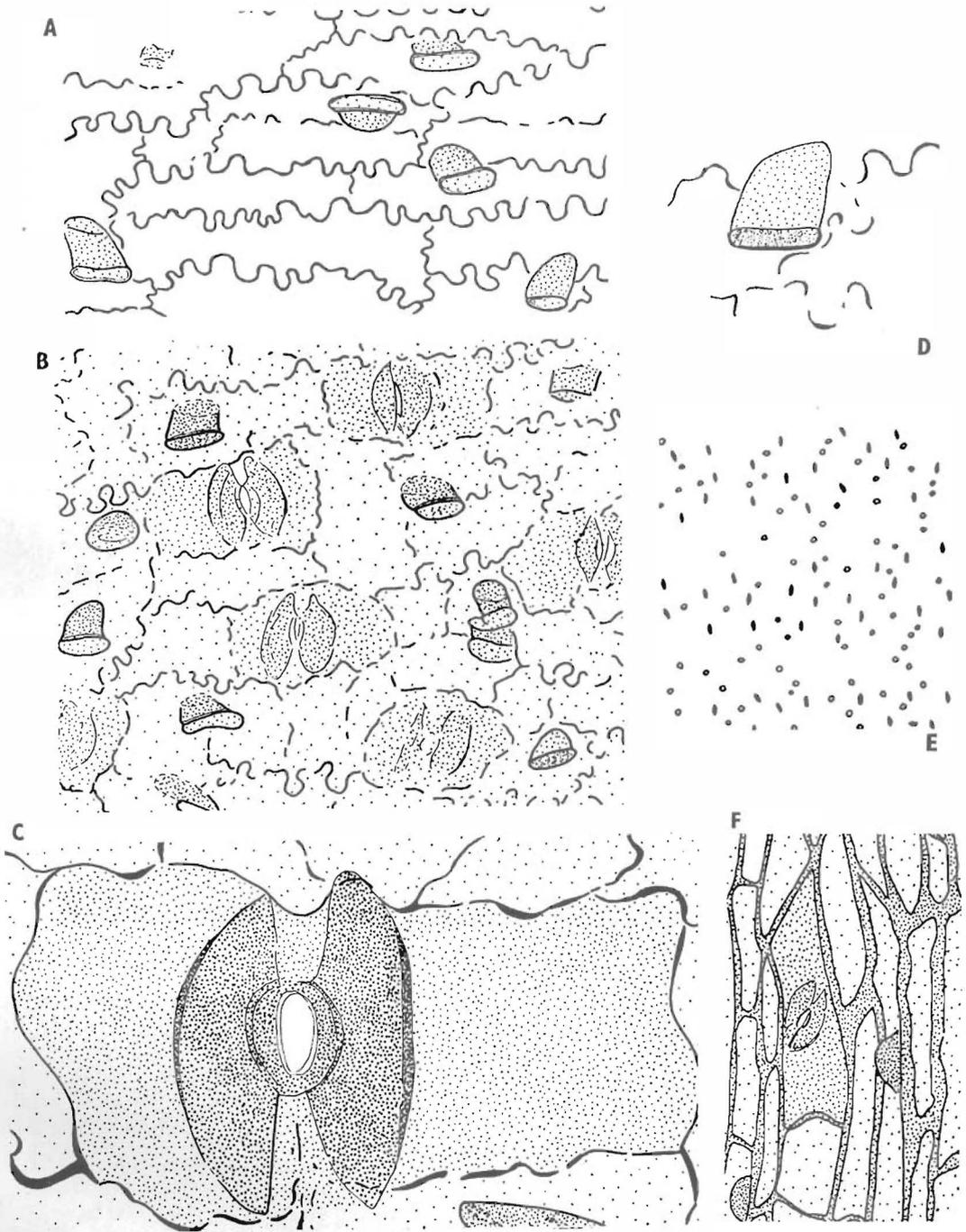
**Gross Features**—Leaf incomplete, available length 9.6 cm., width over the middle 1.9 cm., tapering gradually to the base, apex not preserved. Pinnae placed over the rachis, almost concealing it; obliquely placed,

alternating, closely set or slightly imbricate towards the apical region; upper margin almost straight, lower slightly convex, apex acute; upper basal angle of pinnae rounded, lower basal angle less rounded, sometimes concealed by the pinna below. Shape of the pinnae on the whole 'gladius-like'. Substance of lamina thick, veins indistinct.

**Cuticular Structure of Rachis**—Cuticle thick on both the sides. Epidermal cells on the upper side much elongated, rectangular or rarely pointed. Lateral and end-walls straight, surface unspecialized. Lower cuticle of rachis with both stomata and papillae, epidermal cells slightly broader than the upper cuticle. Lateral and end-walls straight or slightly undulated at places. Surface-wall in majority smooth, few papillate. Papillae conical or dome-shaped, sometimes flattened to form an oval ring. Stomata rare, guard cells mostly orientated transversely, subsidiary cells much thickly cutinized than the rest of the epidermis.

**Cuticular Structure of the Lamina**—Stomata present only on lower side. Upper cuticle slightly thicker than the lower. Cells of the upper cuticle usually rectangular, sometimes squarish; lateral and end-walls thick, sinuously folded; the end-walls comparatively thinner with close and smaller loops; surface-wall smooth. Veins not indicated. Lower cuticle showing stomata forming bands between the veins and also a specialized marginal region with no stomata. The marginal non-stomatal band consists of 6-11 rows of rectangular or squarish cells. Lateral and end-walls slightly thicker than the lateral and end-walls of the epidermal cells in the stomatal bands; surface-wall without papillae. Stomatal bands broader than vein bands; usually there is differentiation of stomatal and non-stomatal bands, but at places stomata may be seen over the vein region. The stomatal bands have 3-5 rows of stomata, mostly transversely orientated, rarely slightly oblique, not forming definite files but scattered in the stomatal bands. The cells have thinner lateral and end-walls, often not even distinct. The cells

1. Since 1 November 1956, this village is in Madhya Pradesh.



TEXT-FIG. 1 — A, lower cuticle, showing the cells of non-stomatal region over the veins, No. 28576-2,  $\times 250$ . B, lower cuticle, No. 28576-2,  $\times 250$ . C, one enlarged stoma, No. 28576-1,  $\times 800$ . D, single papilla enlarged, showing the striations at the base, No. 28576-2,  $\times 500$ . E, distribution of stomata (black lines) and papillae (rings) in 1 sq. mm. area, No. 28576-2,  $\times 40$ . F, epidermal cells over the rachis, showing a stoma and two papillae, No. 28576-4,  $\times 250$ .

over the veins 2-3 rows, more like marginal cells, lateral and end-walls mostly clear. Surface-wall of the cells of stomatal and vein region more commonly papillate. Papillae thickly cutinized, hollow, conical or dome-shaped, sometimes mushroom-shaped, even flattened to form oval rings; tip mostly rounded, sometimes broken, then giving an appearance of a hollow cylinder; base showing peculiar striations.

Guard-cells sunk, with well-developed curved crescent-shaped thickenings, subsidiary cells broad, outer walls looped, inner wall without papillae.

*Locality* — Bansa, about 6 miles southwest of Chandia, Madhya Pradesh.

*Horizon* — Jabalpur series, South Rewa Gondwana basin.

*Collection* — Holotype, specimen No. 28576 of the Birbal Sahni Institute of Palaeobotany.

#### COMPARISON

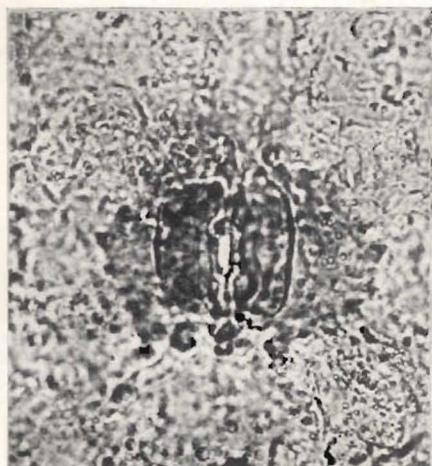
We have failed to compare our specimen with *Ptilophyllum cutchense* Morris, reported by Feistmantel (1882) from Bansa, as no figure or description is available. However, a comparison with *P. cutchense* described by Sahni & Rao (1933) and Jacob & Jacob (1954) shows *P. gladiatum* is distinct from the former. The shape of the pinnae in the two is different. Unlike *P. gladiatum* rachis of *P. cutchense* is without stomata and papillae. In *P. cutchense*, on the lower side, surface of each cell of the stomatal and non-stomatal bands is papillate, sometimes a cell may have 2-3 papillae, whereas in *P. gladiatum* quite a good many cells are without papillae and none of the cells have more than one papilla, their shape is also different. *P. cutchense* resembles *P. gladiatum* in having stomata sometimes over the veins as well and also in lacking papillate subsidiary cells. *P. gladiatum*, to some extent, may be compared with *P. acutifolium* Morris described by Seward & Sahni (1920) and Jacob & Jacob (1954). In both pinnae have acute tips, lower cuticle is differentiated into

stomatal, non-stomatal and marginal regions, and outer walls of the subsidiary cells are looped. But *P. acutifolium* is different in many ways — its rachis has no stomata or papillae, lower cuticle is extremely delicate, papillae are sessile and 8-10 papillae overhang the outer walls of the subsidiary cells of each stoma. Some of the pinnae of *P. amarjolense* Bose with acute tips show slight resemblance with *P. gladiatum* but the surface structure of the former is different. *P. indicum* Jacob & Jacob which has been compared with *P. acutifolium* and some European forms of *P. pecten* is quite distinct from our species in its general form of the pinnae, rachis with no stomata or papillae, subsidiary cells with thin and straight outer walls and inner walls each with a papilla. *P. distanse* (Feist.) Jacob & Jacob resembles *P. gladiatum* in having stomata on the undersurface of the rachis, but differs from the latter in the same way as *P. acutifolium*; in addition pinnae here are attached to the rachis at some distance. In *P. jabalpurensis* Jacob & Jacob pinnae are long, very narrow and straight, whereas in *P. gladiatum* pinnae are broad and straight. Round each stoma of *P. jabalpurensis* 8-12 papillae are present, but no such papillae are seen in *P. gladiatum*.

In general form of the pinnae, *P. gladiatum* is somewhat comparable to *P. pecten* Thomas & Bancroft (1913) and some of the forms of *P. pecten* described by Oisli (1940) from Japan and Walkom (1917) from Queensland. However, lower cuticle and details of the stomata are different in *P. pecten* of Thomas & Bancroft. The cuticular structure of the other two forms is not known. *P. gladiatum* also resembles to some extent *P. pectinoides* (Phil.) Morris and *P. hirsutum* Thomas & Bancroft, both described in detail by Harris (1946, 1949), in the form of its pinnae. Unlike *P. gladiatum* cells of *P. pectinoides* are almost devoid of papillae, but each subsidiary cell has a papilla. In *P. hirsutum* lower epidermis is densely papillose and each subsidiary cell bears a papilla.

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## EXPLANATION OF PLATE 1

*Ptilophyllum gladiatum* n. sp.

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| 1. <i>Ptilophyllum gladiatum</i> n. sp. No. 28576.<br>× 1/1. | 4. Lower cuticle, showing three stomatal bands and the distribution of stomata and papillae. No. 28576-2. × 100/1. |
| 2. Epidermal cells of the rachis No. 28576-4.<br>× 200/1.    | 5. Stoma and adjacent cells. No. 28576-1.<br>× 500/1.  |
| 3. Upper cuticle. No. 28576-3. × 200/1.                      |  |