

## OCCURRENCE OF THE GENUS *YABEIELLA* ÔISHI IN THE JABALPUR FORMATION

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### ABSTRACT

Leaf fragments described earlier by Bose and Sukh-Dev (1960) as *Nipaniophyllum hirsutum* (Pentoxyleae) from Bansa (Lower Cretaceous) are now identified as leaves of the genus *Yabeiella* Ôishi on finding a better specimen with venation and cuticle. Thus, as had been reported, the Pentoxyleae is not yet found in the Jabalpur Formation.

The diagnosis of the genus *Yabeiella* is also emended here. The genus resembles most with the leaflets of *Stangeria paradoxa* (a living Cycad) in venation and some other characters. However, its systematic position is still open.

*Key-words* — *Yabeiella*, *Stangeria*, Jabalpur Formation (India).

### सारांश

जबलपुर शैल-समूह में याबियेला ओइशी को प्राप्त — सुखदेव

बांसा (अधर क्रीटेशियस) से शिरा-विन्यास तथा बाह्यचर्म युक्त एक पहले से अच्छा प्रादर्श मिल जाने पर बोस एवं सुखदेव (1960) द्वारा निपानियोफिलम हिरसूटम (पैन्टॉक्सिली) के अनुरूप वर्णित पर्ण-विखण्डों को अब याबियेला ओइशी प्रजाति की पत्तियाँ अभिनिर्धारित किया गया है। अतः पूर्व कथनानुसार पैन्टॉक्सिली अभी तक जबलपुर शैल-समूह में नहीं पाई गई है।

याबियेला प्रजाति का निदान भी यहाँ संशोधित किया गया है। शिरा-विन्यास तथा कुछ अन्य लक्षणों में यह प्रजाति स्टैनजोरिया पेराडोक्सा (एक वर्तमान साइकेड) से बहुत अधिक मिलती-जुलती है। तथापि, इसकी वास्तविक वर्गीकरण स्थिति अभी भी विचाराधीन है।

### INTRODUCTION

THE genus *Yabeiella* was instituted by Ôishi (1931) for the spatulate or oblong-lanceolate leaves in which the lateral veins show anastomosis and are joined near the margin of leaf with a distinct marginal vein. These leaves were first reported from the Triassic of Argentina (Geinitz, 1876; Kurtz, 1921; Wieland, 1929; Ôishi, 1931). Since then they have been found in the Triassic formations of Australia (Walkom, 1917; Jones & de Jersey, 1947; Andrews, 1961), South Africa (du Toit, 1927; Ôishi, 1931) and Japan (Ôishi, 1931a). Ôishi (1931) provisionally included the Indian Rajmahal specimens of Feistmantel (1877), *Macrotaeniopteris*

*crassinervis*, in his genus. But I express no opinion about this determination until I examine them.

I collected a fossil leaf in 1960 from the same Bansa beds (Lower Cretaceous) which agrees in venation pattern with the generic diagnosis of *Yabeiella*. However, it possesses the cuticular structure of *Nipaniophyllum hirsutum* Bose & Sukh-Dev (1960). In the genus *Nipaniophyllum* there is no marginal vein. Moreover, Bose and Sukh-Dev's specimens are very small fragments without the leaf margin and hence, do not show their characteristic venation. On finding the above specimen I have transferred their species to the genus *Yabeiella*.

Ôishi (1931) clearly described the venation of these leaves, but his diagnosis lacks

cuticular details which are added here. He mentioned minute pittings on the midrib in his diagnosis but I consider them only of specific value.

### DESCRIPTION

Genus — *Yabeiella* Ôishi, 1931

*Emended Diagnosis* — Leaf bifacial, spatulate or oblong-lanceolate. Base of leaf tapering to a very short stalk. Lamina arising from the sides of midrib. Midrib strong, persisting up to the apex; lateral veins simple or forked and occasionally two adjacent ones joining or connected with cross bars; at their outer extremities lateral veins joining to form a distinct marginal vein.

Stomata present over the whole of lower surface of lamina and both sides of midrib. Usually 4-6 subsidiary cells surrounding the sunken guard cells. Guard cells having most of their outer surface exposed and sharing a thick cuticular ridge between them and subsidiary cells.

*Type Species* — *Taeniopteris mareyesiac* Geinitz, 1876.

*Comparison & Discussion* — Among fossil plants *Doratophyllum* Harris (1932) and *Nipaniophyllum* Sahnî (emend. Vishnu-Mittre, 1958) of Mesozoic and *Rhabdotaenia* Pant (1958) of the Palaeozoic have haplocheilic stomata, similar leaf form and forked or unforked lateral veins. But the veins in these genera do not unite near the margin of leaf to form a marginal vein as they do in *Yabeiella*.

Among the living gymnosperm *Yabeiella*, especially *Y. hirsuta*, greatly resembles the leaflets of *Stangeria paradoxa* in their form and venation. Both show similar distribution of variably orientated haplocheilic stomata, with rather exposed guard cells and sinuous epidermal walls on the upper side. But in *Stangeria* the leaves are pinnate and the leaflets do not abscise from the leaf, whereas in *Yabeiella* the leaves are probably simple. Stomatal structure similar to *Yabeiella* is also seen in certain conifers, cycads and Ginkgoales but their leaves are altogether different in form and venation.

The systematic position of *Yabeiella* is entirely open.

*Yabeiella hirsuta* (Bose & Sukh-Dev)  
n. comb.

Text-fig. 1A-K

1960 *Nipaniophyllum hirsutum* Bose & Sukh-Dev, p. 150, pl. 3, figs 16-21; text-figs 5, 6A-D.

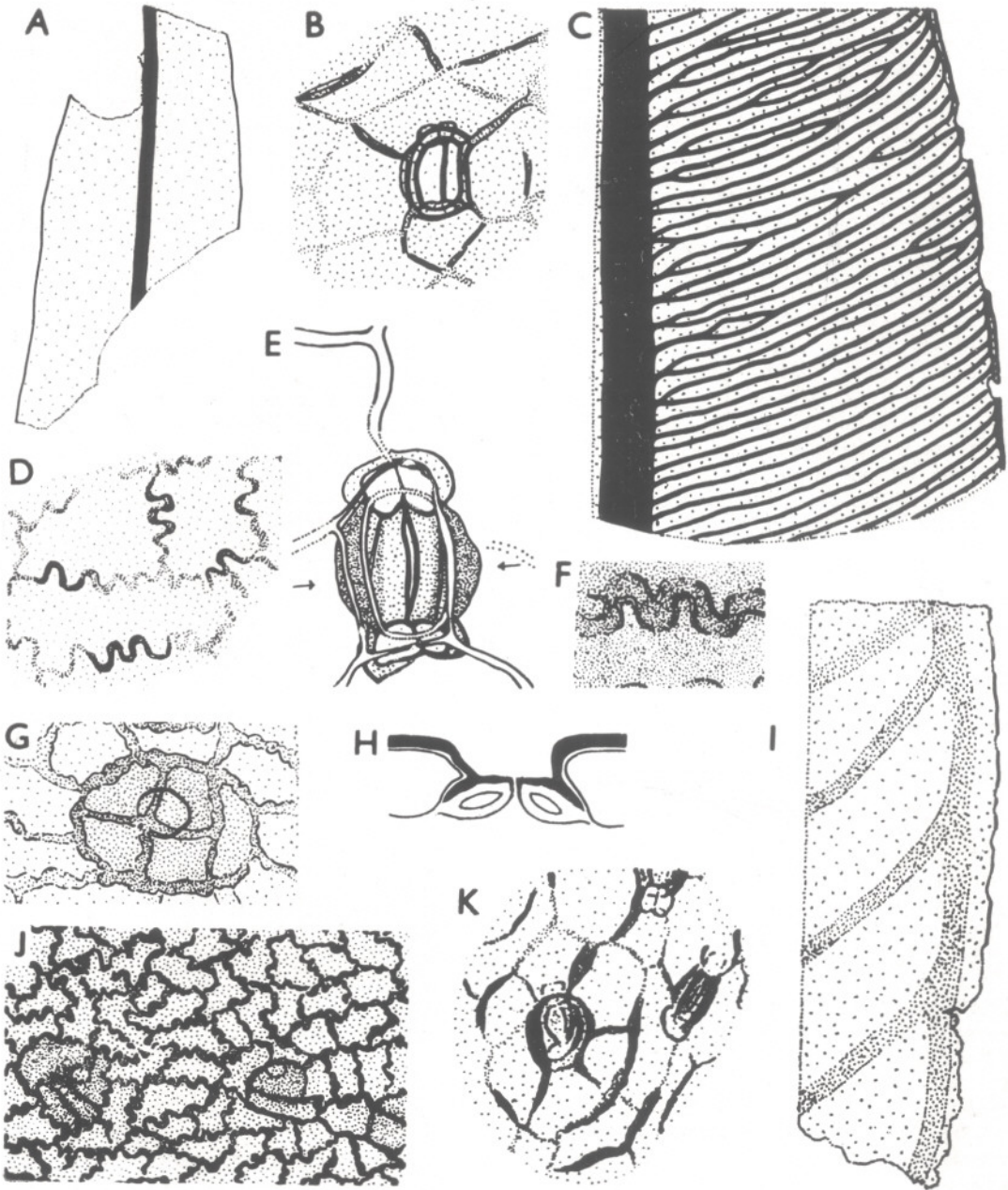
*Diagnosis* — Leaf oblong-lanceolate, typically nearly 3 cm broad. Substance of lamina thick with a fairly broad midrib, measuring about 2 mm. Lateral veins prominent, arising about 13-17 per cm (about 17 veins/cm at the margin) and at an angle of about 60°-85°. Veins simple or once forked at varying levels, sometimes anastomosing. Veins uniting close to the leaf margin to form a marginal vein. Margin slightly undulate, entire.

Cuticle moderately thick, upper being thicker than the lower (upper about 3-6  $\mu$  and lower about 3  $\mu$  thick at the folds, at the margins about 9-18  $\mu$  thick). Stomata present only on the lower surface. Trichome-bases present on both surfaces in almost equal number, arising on a group of 2-7 small and thickened cells.

Cells of upper cuticle mostly with a long axis, but axis variably orientated. Shape variable. Anticlinal walls always sinuous and thickened at the curves. Periclinal walls mostly flat, of uneven thickness particularly on the lower surface. Thin slits present on both surfaces usually close to the anticlinal walls.

Lower cuticle divided into two zones, the vein zones with few or no stomata, the broader interveinal zones with numerous stomata. Cells along veins elongated with distinctly sinuous anticlinal walls, sometimes walls nearly straight, cells of interveinal zones polygonal, walls nearly straight, faintly marked (often almost invisible). The common outer anticlinal wall of a group of cells bearing a trichome nearly straight or sinuous. Stomata close to one another, but irregularly distributed and orientated in the interveinal zones. Sometimes two stomata even sharing a common subsidiary cell. Stomatal apparatus (subsidiary cells + guard cells) variable in size and shape, circular to elongated. Subsidiary cells 4-6, variable in size and shape, but resembling the epidermal cells. Guard cells sunken, poles at a higher level than the area around the aperture. Guard cells with a large exposed moderately cutinized





TEXT-FIG. 1A-K — *Yabeiella hirsuta* (Bose & Sukh-Dev) n. comb. A. Part of leaf, specimen no. 33759  $\times 1$ . B. Stoma and adjacent cells, slide no. 2807  $\times 400$ . C. Venation, specimen no. 33759  $\times 8$ . D. Cells of lower surface over lateral veins, slide no. 2809  $\times 400$ . E. Stoma and epidermal cells, slide no. 2807  $\times 800$ . F. Part of a cell of upper surface between the lateral veins, slide no. 2806  $\times 800$ . G. Trichome-base on a group of 4 thickly cutinised cells of lower surface, slide no. 2807  $\times 400$ . H. Reconstructed transverse section of stoma of the fig. E along the line denoted by arrows. I. Part of leaf magnified showing a marginal vein on the right hand side, slide no. 2806  $\times 30$ . J. Cuticle from upper surface between the veins, slide no. 2806  $\times 200$ . K. Stoma and epidermal cells, slide no. 2806  $\times 400$  (all slides prepared from specimen no. 33759 from the Marwar Ghat, Bansa).

outer surface. A thick cutinized ridge present between the guard cells and lateral subsidiary cells.

Stomata common on upper surface of midrib, but a few present on the lower surface, irregularly distributed but longitudinally orientated. Epidermal cells on both surfaces elongated, narrow, rectangular or irregular in shape, mostly in series. Anticlinal walls sinuous.

*Holotype* — Specimen no. 30156, figured by Bose and Sukh-Dev (1960, pl. 3, fig. 16).

*Locality* — Marwar Ghat about 3/4 km north-east of Bansa, Shahdol District, Madhya Pradesh.

*Horizon & Age* — Jabalpur Formation, Lower Cretaceous.

*Comparison & Discussion* — The present species was compared with *Nipaniophyllum raoi* by Bose and Sukh-Dev (1960). On the strength of similarities in the then known venation characters, distribution of

stomata, sunken guard cells and sinuosity in the walls of the upper surface, they included the present species in the organ-genus *Nipaniophyllum*. The present species, as is now known, differs in venation pattern generically from *Nipaniophyllum* but agrees with *Yabeiella* due to the presence of marginal vein.

*Y. hirsuta* closely resembles *Y. mareyesiaca* (Geinitz) Ôishi in the size of the leaf and in venation, but *Y. mareyesiaca* is not fully known.

#### ACKNOWLEDGEMENT

It is a great pleasure to record my indebtedness to Professor T. M. Harris under whose kind guidance I carried out this and other research work on fossil plants at the Botany Department of the University of Reading, England.

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