

MORRISIA, A NEW GENUS OF CYCADOPHYTIC FRONDS FROM THE RAJMAHAL HILLS, BIHAR

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ABSTRACT

Under the genus *Morrisia* are placed those pinnate leaves of *Taeniopteris mccllellandi* (OLDHAM & MORRIS), which were earlier described by Oldham and Morris (1863) as *Stangerites mccllellandi*. In addition to the old specimens of Oldham and Morris a few new specimens collected from Bindraban and Sakrigalighat in the Rajmahal Hills, Bihar, during the years 1954-1956 are also described.

INTRODUCTION

Compound leaves with pinnae having the form and venation of *Taeniopteris* Brongniart are extremely rare in the plant-bearing beds of the Rajmahal Hills, Bihar. Three such pinnate leaves were earlier described by Oldham & Morris (1863) as *Stangerites mccllellandi*. Later, Schimper (1869) referred these specimens under his new genus *Angiopteridium*. So in 1877 Feistmantel described *Stangerites mccllellandi* as *Angiopteridium mccllellandi*. Finally, Sahni (1922) and Sahni & Rao (1933) adopted the generic name *Taeniopteris* Brongniart for Oldham and Morris's specimens of *S. mccllellandi*. These pinnate leaves, however, should not be placed under the genus *Taeniopteris*, because according to Brongniart's (1928) diagnosis *Taeniopteris* is only a simple leaf. Therefore, I am, here, redescribing the Oldham and Morris's specimens of *S. mccllellandi* under a new genus *Morrisia* named after late Dr. John Morris. The rejection of the generic names *Stangerites* Bornemann, *Angiopteridium* Schimper and *Taeniopteris* Brongniart will be further dealt with under the 'discussion'.

During the years 1954-1956, in addition to the above three specimens, four more specimens were collected from Bindraban, about 2 miles south of Mirzachowki and Sakrigalighat, Rajmahal Hills, Bihar, by Dr. S. C. D. Sah, Mr. Gurdip Singh and myself. Diagnosis and description are based on the observations made on these specimens as well.

DIAGNOSIS

Morrisia gen. nov.

Leaf large, simply pinnate. Pinnae nearly opposite or alternate; midrib thick; secondary veins numerous, arising from the median vein nearly at right angle, parallel, straight or sometimes dichotomizing.

Type-species — *Morrisia mccllellandi* (Oldham & Morris) Bose.

Morrisia mccllellandi (Oldham & Morris),
n. comb

Pl. 1, Fig. 1; Pl. 2, Figs. 1-3 & Pl. 3, Figs. 1-2;
Text-figs. 1-2

1863 — *Stangerites mccllellandi* O. & M.,
p. 32, Pl. XXIII, Figs. 1-3.

1869 — *Angiopteridium mccllellandi* (Morris) Schimper, p. 605.

1877 — *Angiopteridium mccllellandi* (O. & M.) Feistmantel, p. 44.

1922 — *Taeniopteris mccllellandi* in Sahni,
Table II.

1933 — *Taeniopteris mccllellandi* (O. & M.)
Sahni & Rao, p. 197.

Large leaf of unknown length, width about 15-20 cm. in the middle. Rachis very thick (0.3-1 cm.), marked with number of longitudinal ridges (8?) with longitudinal striae between. Pinnae alternate, obliquely set, arising at an angle of about 52° over most of the leaf; mostly distant, sometimes touching each other near the apex, attached to the rachis with a very ill-defined petiole. Pinnae elongately oblong-linear, about 7-14 cm. long and 1.2-2 cm. broad, shape of apex not known, base tapering more or less quickly, margin entire. Midrib of pinnae thick and strong, 1-1.5 mm. wide; secondary veins numerous, parallel, mostly little less than a millimetre apart, arising from the midrib nearly at right angles, often dichotomizing near the base or little further out. Substance of lamina thick, leathery and brittle.

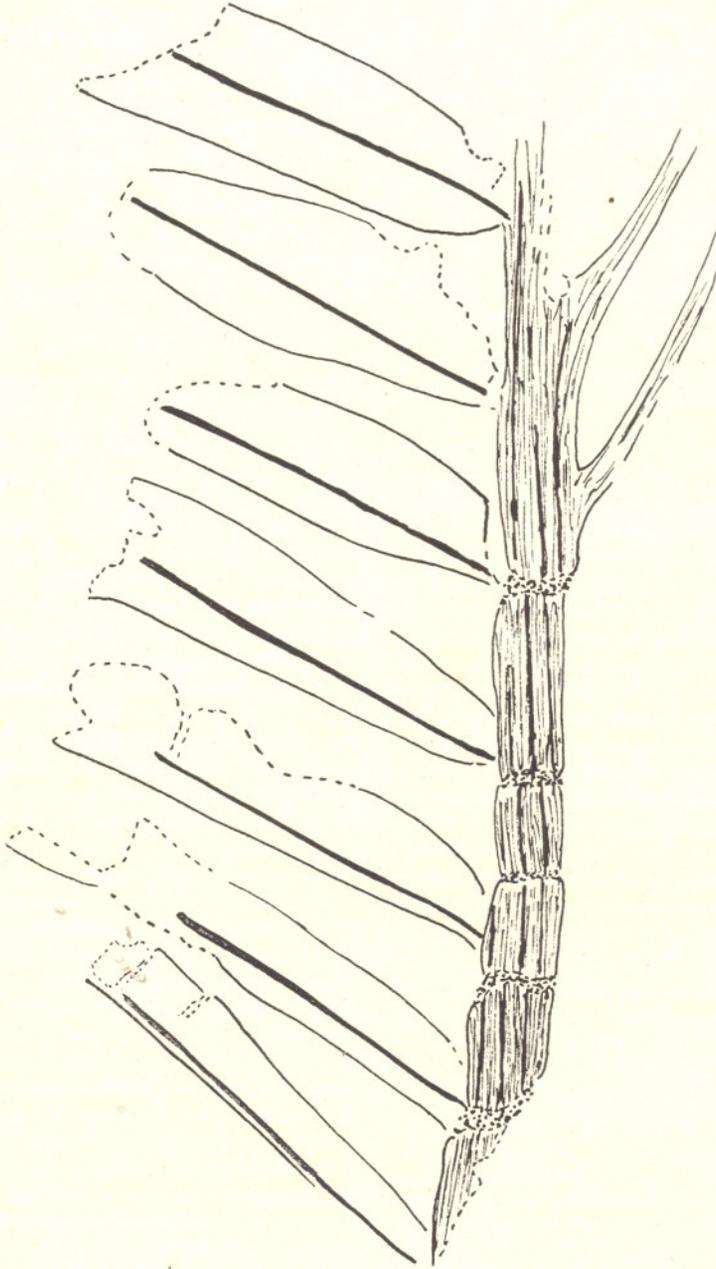
Locality — Bindraban, Amrapara and Sakrigalighat, Rajmahal Hills, Bihar.

Age — Jurassic.

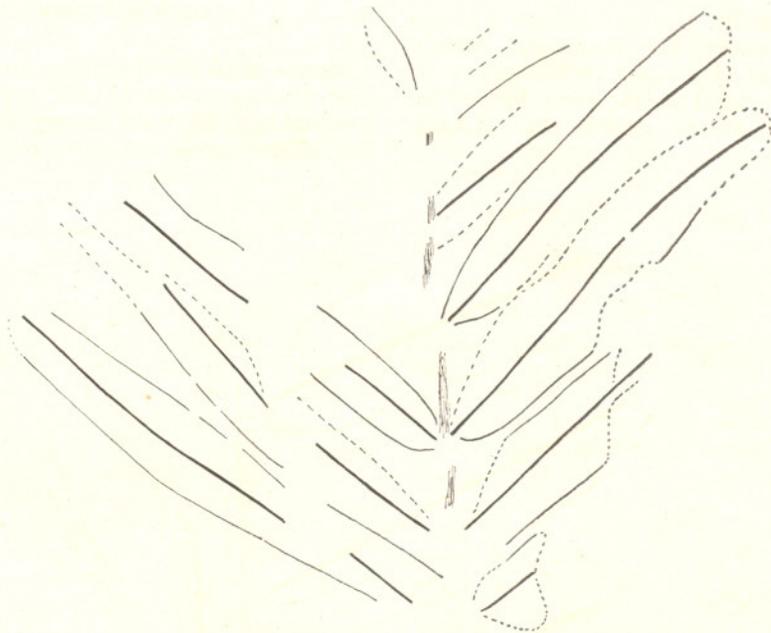
Type Specimen—The Geological Survey of India, Calcutta, No. 4/438 (PL. 1, FIG. 1; TEXT-FIG. 1). Formerly figured by Oldham and Morris (1863, PL. XXIII, FIG. 1).

DESCRIPTION

Pinnae in all the specimens are incomplete near the apex and in the type specimen (No. 4/438). They are preserved only on one side of the rachis and there too their lower



TEXT-FIG. 1 — *Morrisia mclellandi*, Oldham and Morris coll., No. 4/438. × 1.



TEXT-FIG. 2 — *Morrisia mccllelandi*, from Bindraban, No. 25759. $\times \frac{1}{2}$.

margins are partly embedded inside the matrix, appearing as if they are divided into two unequal halves by the midrib. The other side of the type specimen shows only a few median veins of the pinnae. Pinnae in all the specimens are distantly placed. Venation in all the specimens is similar, the midrib, which is uniformly thick throughout its course, divides the pinnae into two equal halves. Only in the type specimen (No. 4/438) the rachis shows both the longitudinal ridges as well as the striations, in others only the striations are visible. The specimen in Pl. 2, Fig. 1, has a comparatively slender rachis but the other specimens have a fairly thick rachis.

COMPARISON*

Morrisia mccllelandi can be readily distinguished from *Taeniopteris spatulata* Mc-

*After this paper was sent to the press, I received a paper by Rao & Jacob (1957) describing a new species of *Taeniopteris* (*T. dentata*) from Mandro Hill, Rajmahal Hills. In being pinnate *T. dentata* resembles *Morrisia mccllelandi*, but it differs from the latter in having pinnae with dentate margin. Moreover, the secondary veins in *T. dentata* are given off from the midrib at an acute angle. In my opinion *T. dentata* is only another species of *Morrisia*.

Clelland, *Taeniopteris ensis* Oldham and *Nipaniophyllum raoi* Sahni (1948) by its pinnate character alone. The pinna of *M. mccllelandi* resembles to a great extent the leaves of *T. spatulata* and *N. raoi* in its shape and venation. In *T. ensis*, unlike *M. mccllelandi*, the secondary veins arise at an oblique angle. In this aspect our specimen also differs from *T. ensis* described by Ganju (1946) from Onthea. Ganju considered his specimens to be simple leaves attached in an alternate manner to a thick stem, but from his figures (Pl. 5, Fig. 27; TEXT-FIG. 7) it seems that one of his leaves (No. O/170) was compound. If it is really so, the leaf should be placed under the genus *Morrisia*.

Taeniopteris mccllelandi(?) Oldham & Morris, described by Chang (1936) from the coal pit of Keng Kou, is different from *M. mccllelandi* as the secondary veins in the former are oblique, arising at an angle of 70° . *M. mccllelandi* may be compared with *Taeniopteris auriculatum* (Fontaine) described by Berry (1910) from Patuxent formation in its pinnate habit but the secondary veins in the latter are distantly placed and are obliquely attached to the midrib. *T. nervosum* (Fontaine), also described by Berry (1910), is different from *M. mccllelandi* as its pinnae (or fronds) are much broader and

the secondary veins are closely packed and their angle of divergence is much varied. *Taeniopteris*(?) sp. cf. *T. auriculata* (FONTAINE) Berry, described by Ôishi (1946) from Tôtôri, Tyôsen, resembles *M. mccllellandi* in having pinnate leaves. It differs from the present species in having a comparatively thinner rachis and narrower pinnae.

DISCUSSION

The genus *Morrisia* has been created for the reception of those leaf impression of *Taeniopteris* Brongniart which are pinnate and belong to the Cycadophyta. They have been separated from *Stangerites* Bornemann, *Angiopteridium* Schimper and *Taeniopteris* Brongniart because of the following reasons:

Bornemann's (1856) new genus *Strangerites* (not *Stangerites*, for Bornemann also made the mistake of referring to the recent cycad as *Strangeria*) was founded on Brongniart's species of *Taeniopteris vittata* (1828). Bornemann did not give any figure. Although there was no evidence, Bornemann considered that *T. vittata* Brongn. might be the pinna of a pinnate cycadean frond. Later studies have shown that the cuticular structure of *T. vittata* approaches very closely to *Anomozamites nilssonii* (PHILLIPS) Seward, having the Bennettitalean type of stoma (THOMAS & BANCROFT, 1913; HARRIS, 1946). HARRIS (1932) gave a new generic name *Taeniozamites* for species of the form genus *Taeniopteris* having the Bennettitalean type of stoma. Florin (1933) re-established the generic name *Nilssoniopteris* Nathorst as a substitute for the *Taeniozamites* Harris. In 1946 Harris redescribed the cuticle of *Nilssoniopteris vittata* (Brongn.) Florin in detail. From these studies it is obvious that the generic name *Strangerites* of Bornemann is no longer valid.

In India Oldham and Morris (1863) described certain pinnate and simple leaves under *Stangerites* Bornemann, correcting Bornemann's spelling *Strangerites*. They gave the diagnosis of *Stangerites* (p. 32) as "Frond pinnate, pinnae with a thick median nerve, and numerous secondary veins, parallel, straight, or oblique and dichotomous". Under this genus they described 3 species, *S. mccllellandi* Oldham & Morris, *S. spatulata* McClelland, and *S. ensis* Oldham. Out of

these only *S. mccllellandi* was described as pinnate leaf. Both *S. spatulata* and *S. ensis* were described as "pinna simple (?)".

Schimper (1864) while instituting the genus *Angiopteridium* placed *S. mccllellandi* Oldham & Morris under his genus. The specimens on which the genus *Angiopteridium* was created was later found by Schimper (1874) to belong to *Marattiaceae* and he established the generic name *Marattiopsis* for them. However, Feistmantel (1877), probably in ignorance of the change made by Schimper, referred Oldham and Morris's specimens of *Stangerites* from Rajmahal to *Angiopteridium*. He also described specimens of *Angiopteridium* from Golapili and Madras Coast (1877a, 1879). None of these specimens were pinnate. Sahni (1922) adopted the generic name *Taeniopteris* Brongniart for all the Indian species of *Angiopteridium*, and Sahni & Rao (1933) described a specimen having several pinnae in relation to a thick rachis as *Taeniopteris mccllellandi* (OLDHAM & MORRIS). Now I have separated from *Taeniopteris* only those leaves of *T. mccllellandi* which are pinnate, because they do not fit into Brongniart's (1828, p. 262) diagnosis of the genus, "Folia simplicia integerrima, nervo medio crasso rigido, nervulis perpendicularibus simplicibus vel basi furcatis". Although there is a possibility of some of the leaves of Madras Coast described by Feistmantel (1879) as *Taeniopteris mccllellandi* being parts of a pinnate leaf, yet due to lack of evidence, at present I am keeping them separate from *Morrisia*. Associated with the leaves of *M. mccllellandi* a large number of detached and incomplete leaves resembling the pinnae of *M. mccllellandi* have been collected. I am keeping them separate, till we know the cuticular structure of these leaves. At Sakrigalighat *M. mccllellandi* has been collected in association with a large number of *Carnoconites laxum* Srivastava (1946) type of cones (PL. 3, FIGS. 4, 5).

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EXPLANATION OF PLATES

PLATE 1

1. *Morrisia maclellandi* (O. & M.), n. comb. Type specimen No. 4/438 from Bindraban; Amrapara. × 1.

PLATE 2

1. *M. maclellandi* (O. & M.), n. comb. Specimen No. 25759 collected by Mr. Gurdip Singh from Bindraban. × 1.
- 2-3. Portions of pinnae from the above specimen, showing venation. × 1.

PLATE 3

1. *M. maclellandi* (O. & M.), n. comb. Specimen No. 4919 collected by Dr. S. C. D. Sah from Sakrigalighat. × 1.
2. *M. maclellandi* (O. & M.), n. comb. Specimen No. 30671 collected by M. N. Bose from Sakrigalighat. × 1.
3. Associated leaves of *Taeniopteris* sp. Specimen No. 25473. × 1.
- 4-5. Counter-parts of a specimen of *Carnocoonites laxum* Sriv. type of cone found in association with the leaves of *M. maclellandi* from Sakrigalighat. Specimen No. 4892. × $\frac{1}{2}$.