

A PETRIFIED MATONIACEOUS RHIZOME FROM AMARJOLA IN THE RAJMAHAL HILLS, INDIA

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ABSTRACT

Anatomy is described of a petrified rhizome collected from the Jurassic of Rajmahal Hills, Bihar. There are present three cyclic amphiphloic solenosteles with well-developed traces and wide leaf gaps. Protoxylem points are mesarch. Comparison is made with both living as well as fossil representatives of the family Matoniaceae.

INTRODUCTION

THE Rajmahal Hills are quite rich in ferns (Surange, 1965; Bose & Sah, 1968; Sharma, 1974) and a number of petrified rhizomes belonging to the families Osmundaceae, Gleicheniaceae, Schizaeaceae and Cyatheaceae have been described from this area (Jacob, 1950; Mittre, 1955, 1959; Gupta, 1970; Sharma, 1973; Sharma & Bohra, 1976, 1977). However, matoniaceous fossil plants are not common in occurrence and only a few specimens of the frond genus *Phlebopteris* have been described so far (Rao, 1950; Surange, 1965; Bose & Sah, 1968). The present material forms the first record of a petrified rhizome of Matoniaceae from the Rajmahal Hills.

The material was collected from the fossiliferous locality of Amarjola in the Amarapara region. The material was boiled in Canada balsam prior to sectioning with the help of a wire bandsaw. Slides were prepared by the usual method of grinding and polishing processes and mounted in Canada balsam. Some of the photographs have been taken in reflected light.

DESCRIPTION

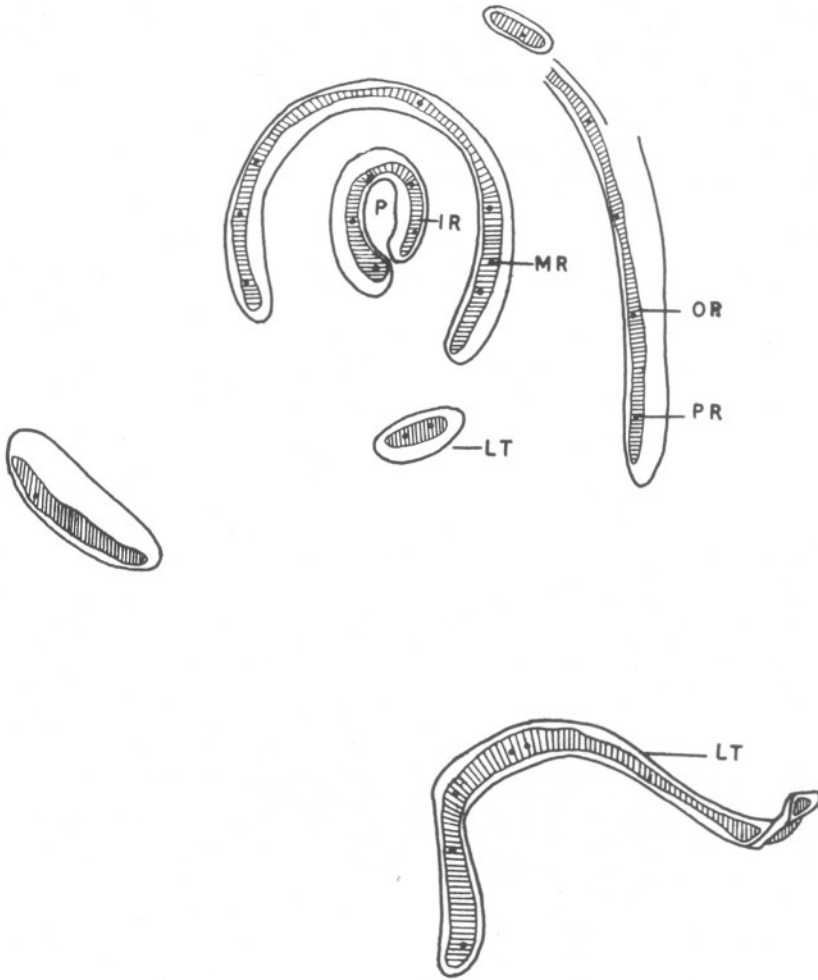
MATONIACEOUS RHIZOME

Rhizome dichotomously branched, 0.9-1.2 cm thick, length unknown, ground tissue well-developed made up of elongated thick-walled cells. Stele is polycyclic amphiphloic solenostele; xylem is 3-5 cells thick

made up of tracheids and xylem parenchyma. Protoxylem points many and mesarch. Metaxylem tracheids with spiral and scalariform thickenings. Phloem and pericycle distinct. Endodermis one cell thick. Leaf trace large and possesses a wide gap.

Transverse as well as longitudinal sections were cut of the specimen no. BD. 1M/Raj. A. to study the internal structure of the rhizome. It measures 3.2 × 1.2 cm in size and outer surface is provided with longitudinal striations representing the markings of the outer vascular cylinder. The ground tissue is made up of comparatively thick-walled (Pl. 1, fig. 4) elongated cells with pointed end walls (Pl. 1, fig. 6). They are provided with intercellular spaces and are filled with starch grain-like bodies. Pith is small, 0.7 × 0.9 cm in size consists of cortex like cells.

There are three vascular rings in cyclic succession (Pl. 1, fig. 1; Text-fig. 1); the inner most is present surrounding the pith and is 0.3-0.4 mm thick. It is provided with a narrow leaf gap. The middle vascular ring is provided with a wide gap. The trace is elliptical, 0.3 × 0.18 mm in size provided with mesarch protoxylem points. The outermost ring is incomplete and covers the inner two rings (Text-fig. 1). It is more or less U-shaped structure with a wide opening. Its detached part is also seen (Pl. 1, fig. 2; Text-fig. 1). In all the rings the xylem is 3-5 cells thick and consists of angular tracheids intermingled with xylem parenchyma (Pl. 1, fig. 5). The former are elongated cells with oblique end walls. In longitudinal section the vascular strand is seen dichotomized (Pl. 1, fig. 6) and in it, at certain places the tracheids are curved with irregular thicken-



TEXT-FIG. 1 — Matoniaceous rhizome. T.S. Rhizome showing three, cyclic vascular rings and detached leaf traces. $\times 20$. (LT — Leaf trace, OR — Outer ring, MR — Middle ring, IR — Inner ring, P — Pith, PR — Protoxylem point).

ings (Pl. 1, fig. 7). They are provided with spiral or scalariform thickenings on their lateral walls (Pl. 1, fig. 8).

The phloem surrounds the xylem on all the sides. It is made up of thin-walled angular sieve cells (Pl. 1, fig. 3). Similarly, the pericycle surrounds the phloem and is also made up of thin-walled cells, but its cells are distinct in appearance than those of the phloem. They are arranged more or less in regular rows. The endodermis is only one cell thick and made up of thick-walled cells.

COMPARISON

Schenk (1871) proposed the generic name *Matonidium* for the fossil plants exhibited the characters of the living fern *Matonia pectinata* R. Br. However, not many petrified rhizomes are known and majority of the species of *Matonidium* include fossil fronds. Seward (1910) figured a transverse section of the rhizome of *Matonidium* sp. (fig. 237D, p. 310) collected from the Wealden of Belgium and which was not different from the living material. The

present specimen also shows resemblances in anatomy with *Matonia pectinata*. Like the latter, there are three rings of amphiphloic solenosteles forming the vascular system of the rhizome. Leaf trace origin is complicated and produces a wide gap.

Protoxylem points are mesarch. However, in the material described above, there is present a distinct pith, while in the living fern the pith may be absent and the innermost vascular cylinder forms a solid proto-stele.

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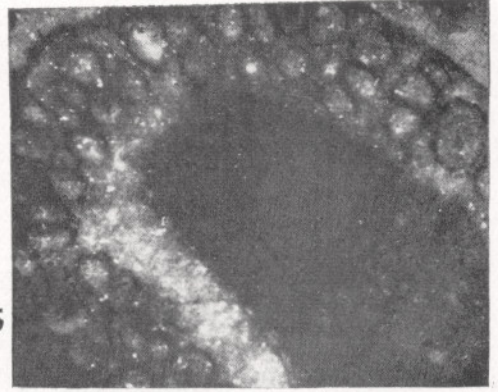
EXPLANATION OF PLATE

(Specimen no. BD IM/Raj. A.)

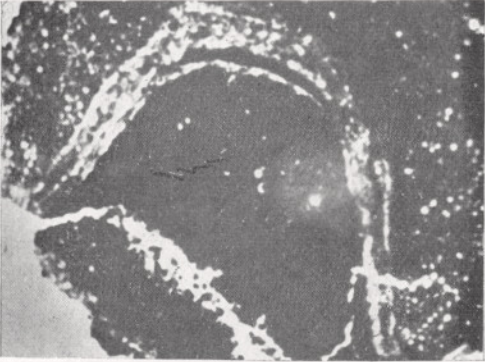
1. T.S. of rhizome showing polycyclic, amphiphloic solenostele. $\times 15$. Slide no. BDM/Raj. A.
2. T.S. of detached leaf trace from the outermost ring. $\times 15$. Slide no. BDM/Raj. A.
3. T.S. A portion of trace enlarged showing amphiphloic nature. $\times 120$. Slide no. BDM₁/Raj. A.
4. T.S. A portion of cortex showing comparatively thick-walled cells with intercellular spaces. $\times 90$. Slide no. BDM₂/Raj. A.
5. T.S. A portion of inner vascular ring enlarged. $\times 120$. Slide no. BDM₁/Raj. A.
6. L.S. A dichotomy of vascular strand. $\times 15$. Slide no. BDM₃/Raj. A.
7. L.S. A portion of vascular strand showing wavy tracheids. $\times 48$. Slide no. BDM₃/Raj. A.
8. L.S. A tracheid with scalariform thickenings. $\times 600$. Slide no. BDM₃/Raj. A.



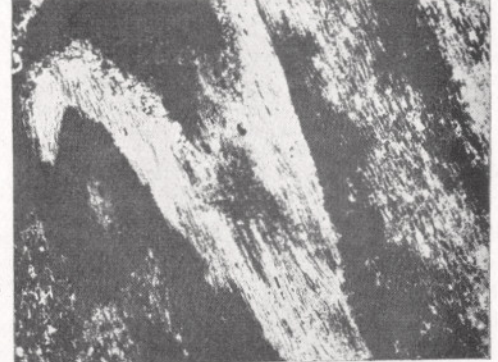
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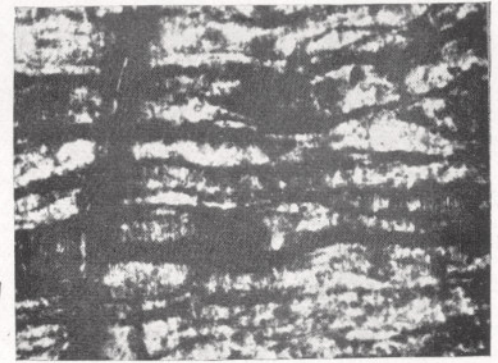
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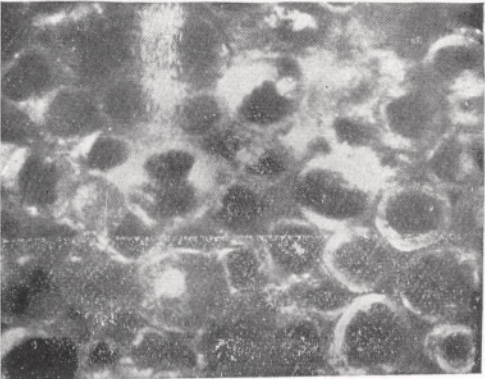
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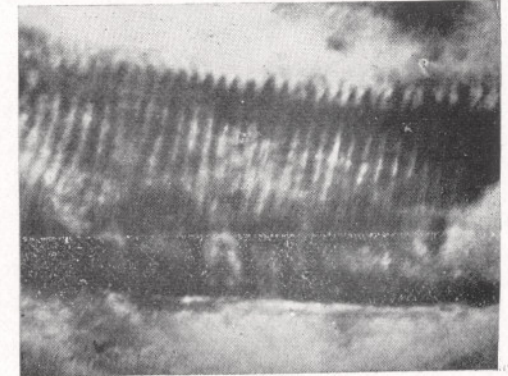
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