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Report of a Fossil *Marsilea* Petiole from the Deccan Intertrappean Beds of Maraipatan, Chandrapur District (M.S.)

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Abstract

Present paper describes in details the petiole collected from the Deccan Intertrappean Beds of Maraipatan of Chandrapur district of Maharashtra state. The fossil specimen is exposed in transverse plane measuring 0.5 cm. in length and 1.45 X 1.78 mm in diameter. It shows many resemblances with *Marsilea*. Hence authors placed it with the genus *Marsilea* as an extinct species *Marsilea patnii* sp. nov.

KEY WORDS: Fossil, petiole, *Marsilea*, Deccan, Intertrappean, Maraipatan

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1. Introduction

The present paper deals with a report of new fossil *Marsilea* petiole from the Deccan Intertrappean beds of Maraipatan of Chandrapur District (M. S.), India. Maraipatan is new fossiliferous locality situated in Jiwati Taluka of Chandrapur district (M.S.). It is about 80 km. from Chandrapur in the south. So far many reproductive parts of pteridophytes have been reported from Deccan Intertrappean bed but reports of vegetative parts are very few. The present specimen is differ from reported *Rhizomites dakshini* (Paradkar, 1971) and *Rhodeites polycarpa* (Chitaley & Paradkar, 1973). It shows some similarities with *Marsilea intertrappea* (Upadhye and Patil, 1979) but differ in some respect. The specimen shows more similarities with modern living genus *Marsilea* L. than any other known fossil or living genus of pteridophytes. Hence the specimen is describe here in details.

2. Material and Methods

The fossiliferous cherts are collected from a new Intertrappean fossiliferous locality of Maraipatan (M.S.). The chert was black in color. While breaking the chert the material is exposed in transverse plane. The material is 0.5cm in length and 1.45 X 1.78 mm in diameter. After etching the chert with Hydrofluoric acid, serial peels are taken along its transverse plane with cellulose acetate peel solution. The peels are mounted in DPX mountant on slides and studied with the help of microphotographs and camera lucida sketches.

2.1 Description

The transversely exposed petiole measures 0.5cm in length and 1.45 X 1.78 mm in diameter. It is differentiated in epidermis, hypodermis, cortex and stele. It shows following anatomical details.

Epidermis is single uni-layered made up of rectangular to oval cells. Cells measuring 33µm x 56µm in size. Stomata are not found in the epidermis.
Hypodermis- is multilayered measuring 145 µm to 324 µm in thickness and made up of 5 to 7 layers of parenchymatous cells. The cells measures 23 µm to 54 µm in diameter.

Cortex: is differentiated into two zones i. e. outer cortex and inner cortex.

Outer cortex is comprises of large air spaces or lacunae (aerenchyma), separated from each other by septa. The total number of air spaces in present specimen is 33. The larger air space measures 89 µm in tangential diameter and 236 µm in radial diameter, while smaller measures 59 µm in tangential diameter and 67 µm in radial diameter. Septa made up of rectangular to oval parenchymatous cells.

Inner cortex multilayered measuring 132 µm to 276 µm in thickness. It is made up of compact parenchymatous cells.

Endodermis - is single layered and lie next to inner cortex, made up 24 µm x 42 µm elongated cells.

Pericycle - is lie next to endodermis. It is single layered surrounding the inner stele.

Stele - is present centrally in the petiole. It contains two arms of V shaped xylem in exarch condition surrounded by phloem. Xylem consist metaxylem and protoxylem tracheids. Metaxylem tracheids measures 28 µm to 35 µm in diameter while protoxylem tracheids measures 12 µm to 16 µm in diameter. The opening of V is towards the axis. Phloem consists of phloem parenchyma and sieve tubes. Stele is amphiphloic siphonostele.

3. Results and Discussion

With regard to the above description the transversely exposed specimen shows following anatomical details-

Epidermis is uni-layered.

Hypodermis is parenchymatous and multilayered.

Cortex is divided in to outer cortex and inner cortex.

Outer cortex is aerenchymatous possessing 33 air spaces separated by septa.

Inner cortex is multilayered made up of compact parenchyma and is multilayered.
Endodermis and pericycle is single layered surrounding stele.

Stele consist of V shaped xylem tracheids surrounded by phloem.

Xylem consist metaxylem and exarch protoxylem.
Phloem consist phloem parenchyma and sieve tubes.
Stele is amphiphloic siphonostele.

From above characters the specimen is identified as *Marsilea* petiole exposed in transverse plane.

For further identification the specimen is compared with the petioles of modern pteriodophytes of family Marsileaceae and the reported fossil specimens.

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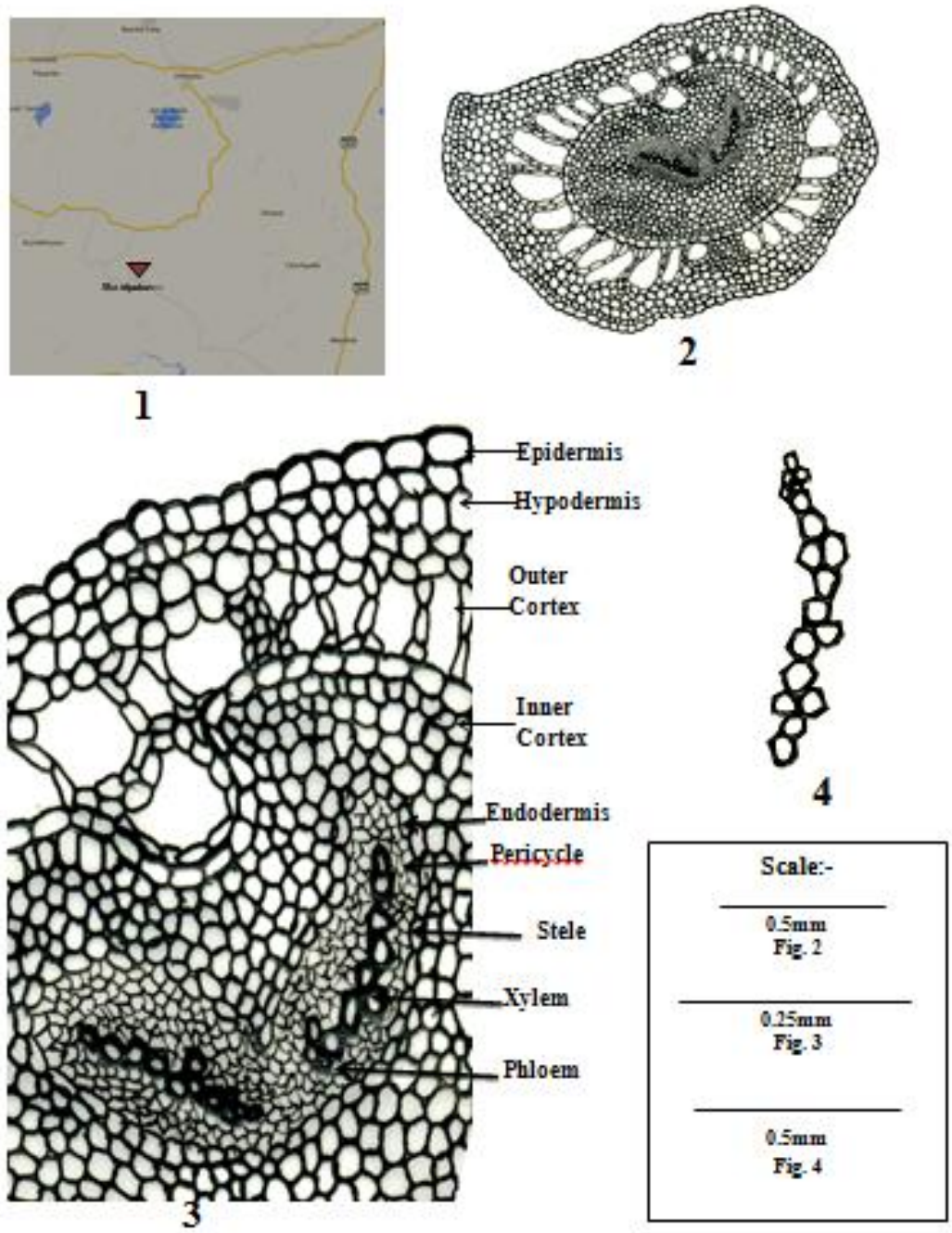

Explanation of figures :- 1. Map of the locality of Maraipatan, 2. A complete view of Petiole in T.S., 3. A portion enlarged showing cellular details, 4. Xylem tracheids showing metaxylem and protoxylem

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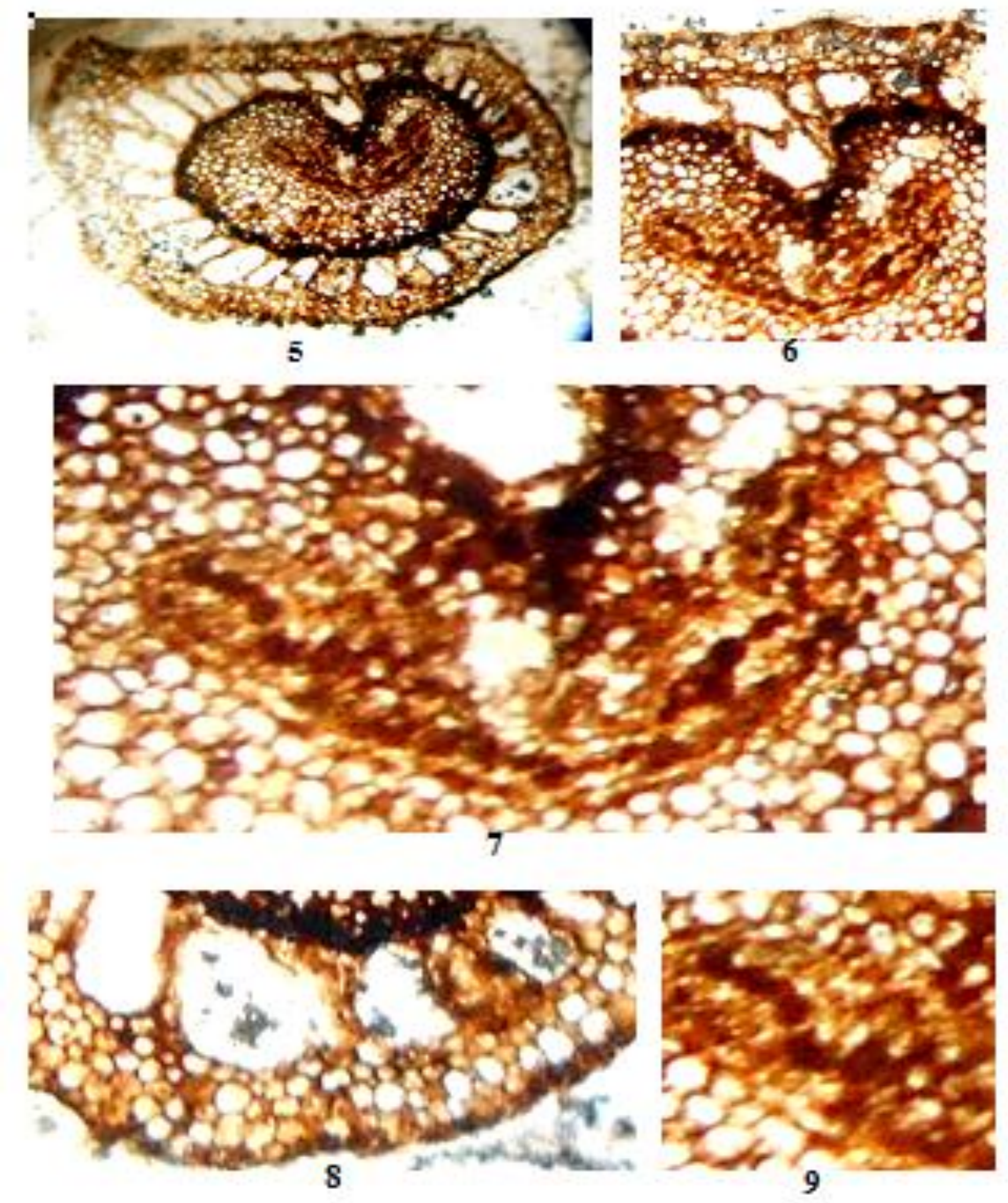

Explanation of figures:- 5. A complete view of petiole in T.S., 6. A portion enlarged showing cellular details, 7. Stele, 8. A portion enlarged showing epidermis, hypodermis & outer aerenchymatous cortex, 9. A portion of stele showing xylem and phloem

Comparison with modern pteridophytes

The present specimen is compared with the petiole of various genus of family Marsileaceae of modern pteridophytes.

Marsileaceae is represented by three living genera i.e. *Pilularia, Regnellidium* and *Marsilea.* Petioles of *Pilularia* and *Regnellidium* differs from present specimen in having less number of air spaces in outer cortex and structure of xylem in stele, as in *Pilularia* performs the function of photosynthesis and leaflet is almost lost, while in *Regnellidium* there are two leaflets (Johnse and Chrysler, 1938). Petiole of *Marsilea* resembles more with the present specimen in various characters like number of air spaces, V shaped exarch xylem, opening of V toward axis. It shows more resemblances with *Marsilea quadrifolia*.

Comparison with reported fossil pteridophytes

The present specimen is also compared with the reported fossil specimens of pteridophytes.

Rhizomites dakshini (Paradkar, 1971) could not be compared with the present specimen as it is rhizomes. *Rhodeites polycarpa* (Chitaley and Paradkar, 1973) is comparable with present specimen as it is pteridophytic petiole but differ in having longitudinal groove and nature of air chambers. *Marsilea intertrappea* (Upadhye and Patil, 1979) shows similarities with present specimen in nature of aerenchymatous cortex and stele but differ from specimen in absence of hypodermis, narrow zone of inner cortex.

Hence, it is clear that the present fossil specimen does not show more resemblance with any of the living genera and reported fossil pteridophytic specimen except genus *Marsilea* L., whatever differences found between fossil specimen and *Marsilea* L. may be due to growing stages or due to ecological conditions of that period. So author inclined to place this fossil specimen under living genus *Marsilea* L. as an extinct species, *Marsilea patnii* sp. nov.

Diagnosis

Marsilea patnii sp. nov.

The transversely exposed petiole measures 0.5cm in length and 1.45 X 1.78 mm in diameter. Epidermis is single uni-layered made up of rectangular to oval cells. Hypodermis is multilayered measuring 145 µm to 324 µm in thickness. Cortex is differentiated into two zones i. e. outer cortex and inner cortex. Outer cortex is constitute of large air spaces or lacunae (aerenchyma), separated from each other by septa. Septa made up of rectangular to oval parenchymatous cells. Inner cortex multilayered measuring 132 µm to 276 µm in thickness, made up of compact parenchymatous cells.Endodermis is single layered. Percycle is single layered surrounding the inner stele.Stele is present centrally in the petiole. It contains two arms of V shaped xylem in exarch condition surrounded by phloem. Xylem consist metaxylem and protoxylem tracheids. Metaxylem tracheids measures 28 µm to 35 µm in diameter while protoxylem tracheids measures 12 µm to 16 µm in diameter. The opening of V is towards the axis. Phloem consists of phloem parenchyma and sieve tubes. Stele is amphiphloic siphonostele.

Holotype: Ptr/SKZ/MRPTN. Dept. of Botany, Bhagwantrao Arts & Sci. College, Etapalli.

Locality :- Deccan Intertrappean Beds of Maraipatan, M. S., India.

Horizon :- Intertrappean Series of India.

Age :- Upper Cretaceous

4. Acknowledgement

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