

Petrified conifer woods from Lathi Formation (Jurassic), Rajasthan

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Petrified woods of conifers collected from village Lathi in the Jaisalmer district of Rajasthan are described. Growth rings are indistinct, rays short and uniseriate, and the radial walls of tracheids have distinct uniseriate bordered pits with well preserved tori. In some of the woods numerous unicelled fungal spores are seen in the tracheids. Anatomy is compared with the members of Podocarpaceae and Cupressaceae.

Key-words – Fossil woods, Conifer, Lathi Formation, Jurassic, Rajasthan.

INTRODUCTION

THE occurrence of fossil woods in the Lathi Formation has been known since the middle of nineteenth century (Carter 1862). Blanford (1877) also reported distinct plant remains from the Lathi Formation. Das Gupta (1975) divided the Lathi Formation into two members, i.e. the Lower Odania Member and the Upper Thaiat Member. Das Gupta (1977) remarked that except for dicotyledonous wood fragments and fossilized tree trunks, no diagnostic fossil could be found in the outcrop of the Lathi Formation. Bhatia (1977) and Verma (1982) considered the fossil woods of Lathi as probable dicot angiosperms. Verma (1982) reported abundant silicified tree trunks, dicotyledonous wood fragments, gastropods and forminifers from this formation. Leaf impressions of *Pterophyllum*, *Ptilophyllum*, etc. are very rare.

Lukose (1972) reported pteridophytic spores and gymnospermous pollen grains and believed Lathi Formation to be older in age than the Salt Range Jurassics.

A number of petrified woods of conifers have been collected from the Lathi village and their anatomy is described in this paper.

MATERIAL AND METHOD

The fossil woods were collected from the stone mines in Lathi village and its surroundings (between Pokaran and Jaisalmer) in Jaisalmer District of Rajasthan. These are found as fossiliferous bands in the sandstones (Fig. 1A). The woods are hard, silicified and of variable sizes (Fig. 1B). Sections have been cut either with the help of a diamond edge wheel or small

chips were taken out with the help of chisel and hammer. Slides were prepared by the conventional techniques of grinding and polishing and mounted in canada balsam.

DESCRIPTION

The woods selected for the present study vary from 10-65 cm in length and 8-24 cm in diameter. Sections have been prepared in all the three plains, i.e. transverse, tangential and longitudinal.

Transverse Section : Growth rings are indistinct, tracheids are arranged in radial rows (Fig. 1C) separated by narrow rays. The tracheids are squarish to angular in cross section and each measure 45 x 36 μm to 60 x 54 μm in diameter. Some of the tracheids are filled with dark globular spore like bodies.

Tangential longitudinal section : Tracheids are long and smooth with tapering end walls. Pittings are not visible on this face of tracheids. Rays are 1-15 cells in length, homogeneous and uniseriate (Figs. 1D, 2A). The ray cells are rectangular, 75 x 24 μm to 180 x 36 μm in size with smooth tangential walls.

Radial longitudinal sections : The tracheids have nicely preserved uniseriate bordered pits (Fig. 2B). The pits are circular, 42 x 36 μm to 57 x 55 μm in diameter, separate or continuous, sometimes 2 or 3 pits unite together and form a large oblong bordered pit with 2 or 3 tori. The pits are comparatively larger in size and touch the lateral walls of tracheids (Fig. 2B). The border of pit is narrow, 6 to 9 μm thick while the pit pore is comparatively large, circular and 25 to 42 μm in diameter. Tori are well preserved in majority of



Fig. 1A. A view of a fossil locality at Lathi, arrow showing horizontal bands of fossiliferous sediments. **Fig.1B.** A collection of fossil woods lying at the site in Lathi village. **Fig. 1C.** T.S. wood with radial rows of angular trachieds. **Fig. 1D.** T.L.S. wood with small, uniseriate rays. **Fig. 1E,F.** R.L.S. wood with uncelled fungal spores in trachieds. (Figs. 1C, D x 40; 1E,F x 120).

pits and each measure $8 \times 6 \mu\text{m}$ to $15 \times 12 \mu\text{m}$. Crossfield pits not clearly visible in majority of slides, 1-4 or 5 pits faintly visible in a crossfield. These are much smaller than the tracheidal pits.

Unicelled fungal spores occur frequently in some of the woods and these are clearly visible in RLS (Figs. 1E, F). The spores are either globose or have an obtuse point of attachment and range from $25 \mu\text{m}$ to $65 \mu\text{m}$ in diameter. Associated mycelium is seen rarely and badly preserved.

Comparison - The present wood has been compared in anatomy with the extant conifer genera like *Juniperus communis* of Cupressaceae, *Dacrydium araucarioides* of Podocarpaceae and *Abies grandis*

of Pinaceae (Greguss 1955). In all the above three taxa, pits are uniseriate on the radial walls of tracheids and each pit has a large circular pit-pore and distinct torus. However, unlike *Abies grandis* the resin canals and multiseriate rays are absent in the present fossil wood. Comparison with *J. communis* and *D. araucarioides* remains incomplete for want of preservation of pits in crossfields.

Bharadwaj (1953) described the anatomy of fossil woods collected from the Jurassic of Rajmahal Hills, Jharkhand. The present wood resembles *Podocarpoxylon (Mesembrioxylon)* Bose & Maheshwari in uniseriate arrangement of pits and in fusion of 2-3 pits forming a large oblong pit with 2-3

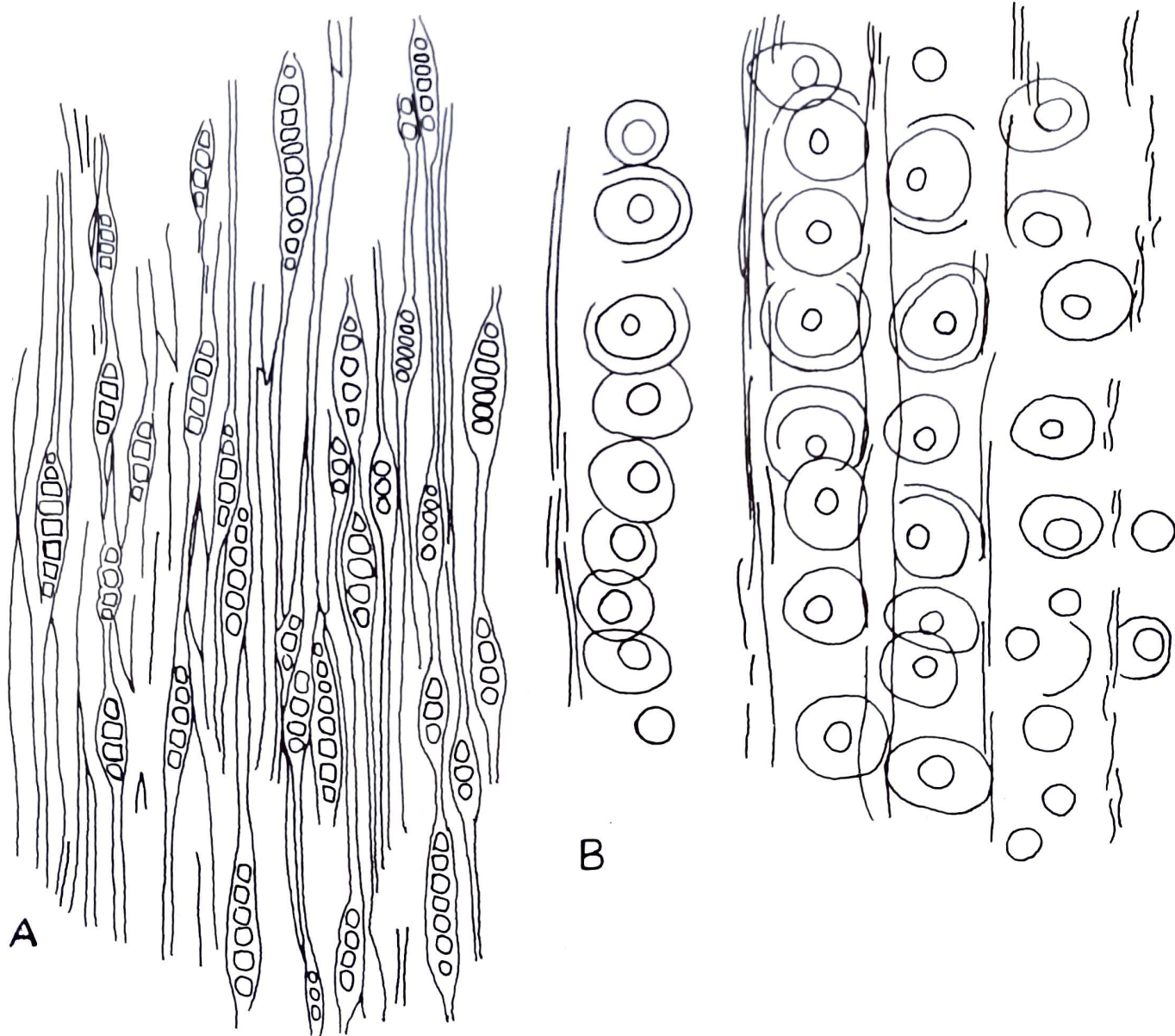


Fig. 2A. T.L.S. showing uniseriate rays and tracheids, x 160, Fig. 2B. R.L.S. showing tracheids with uniseriate bordered pits with tori, x 400.

tori (Bharadwaj 1953, Text Fig. 1) but the details of pits in crossfield remain unknown in the present fossil wood. Similarly, for want of preservation of mycelium the identification and comparison of fungal spores present in the wood remain uncertain.

DISCUSSION

On the basis of geological investigations earlier workers (Carter 1862, Blandford 1877, Das Gupta 1975, 1977, Bhatia 1977, Verma 1982) have assigned Lower Jurassic age to the Lathi Formation of Rajasthan. They have reported (without investigation of anatomy) the existence of dicotyledonous fossil wood fragments in this formation. There are no records in palaeobotanical literature of the occurrence of the dicotyledonous angiosperms from the Lower Jurassic rocks. There are, however, reports of fragmentary fossils of leaves, flowers and pollen grains from the Upper Jurassic and Early Cretaceous rocks (Andrews 1980, Crane & Dilcher 1985, Dilcher & Crane 1985) but not of petrified dicot woods. On the basis of preliminary investigation of the fossil wood fragments from the Lathi Formation, it is suggested that majority of the fossil woods belong to the conifer families, viz. Podocarpaceae, Cupressaceae and Araucariaceae.

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