ARAUCARIAN ROOTS FROM THE JURASSIC OF RAJMAHAL HILLS, INDIA

The Rajmahal Hills have yielded the largest variety of fossil plants known from the Jurassic rocks of India\(^1\). The major plant groups occurring in this area are ferns, cycads, Bennettitales, Pentoxylege and conifers which are represented by stems, petioles, leaves, sporangia and seeds. No gymnospermous roots are known and the only roots described from the beds are those found in association with some of the sphenocalyx like T. spinosa Jacob\(^3\), Osmunda caylae sahnii (Mitter)\(^4\) and O. rajmahalensis (Gupta)\(^2\). However, in some material collected by the senior author (BDS) from a newly discovered locality of Pakur in the Santhal Pargana District of Bihar, petrifications of isolated roots of ferns and conifers are frequently found. The locality is situated 4 km North West of the railway station Pakur. The fossiliferous rock is yellowish-white and rests on a thick layer of trap which is made up of black, hexagonal pillars.

The roots are 3–12 mm in diameter with two exarch protoxylen points (Fig. 1). The primary xylem is made up of hexagonal tracheids while those of the secondary xylem are narrower and rectangular in shape. Even a thin root (4–5 mm diameter) may show well developed secondary growth (Fig. 2). Xylem parenchyma and resin canals are absent. In older roots the secondary xylem on the two sides of the primary xylem plate may be equally or unequally developed and the primary xylem may become obscure (Fig. 2).

Wood rays are 1–3 cells high, uniseriate and homogeneous. Tangential walls of tracheids are smooth while the radial walls are provided with uni to triseriate, contiguous bordered pits. Pits in cross fields are not visible.

Phloem is radial and made up of thin walled cells filled with some dark staining matter (Fig. 1). The secondary phloem in the majority of the roots is represented by an unscreened narrow zone outside the secondary xylem. Cortex is 0.6-0.9 mm wide, parenchymatous and provided with numerous, hexagonal sclereids. In the outer portion of cortex a thick layer of periderm is seen in older roots which is made up of radially arranged, thin walled, narrow cells in 6–10 lines.

In the nature of secondary xylem the present material shows the typical characters of Araucariaceae, i.e., compact wood without resin ducts, tracheids having continuous bordered pits on their radial walls and presence of uniseriate, small wood rays. The occurrence of araucarian stems and megastrobili in the new locality may lend some support to the araucarian affinities of these roots.

Figs. 1–2. Fig. 1. A young root, showing diarch xylem, × 36. Fig. 2. An old root showing compact secondary xylem on two sides, the primary xylem is not seen, × 12.

Comparison was also made with the cupressoid roots described from the Jurassic of Arctic\(^5\) and other known coniferous roots, but did not find fruitful.

The present study is interesting as it is the first description of a gymnospermous root from the Rajmahal Hills, India.

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