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Research Paper

A NEW FOSSIL CONIFER WOOD FROM THE SRIPERUMBUDUR FORMATION, TAMIL NADU, INDIA

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Sriperumbudur Formation is one of the Upper Gondwana formations found along Palar Basin, Tamil Nadu, India. The present report is about a piece of petrified secondary wood of an conifer, having affinity with *Araucariaceae*, collected from this Formation and it is identified as species of *Agathoxylon* Hartig. The anatomy of this fossil wood indicates that during Tertiary period the *palaeo* climate of the Palar Basin was uniform and the environment was xeric with less availability of water.

Keywords: Agathoxylon, Sriperumbudur formation, Upper gondwana

INTRODUCTION

Sedimentary rocks of Upper Gondwana age are exposed in many places of Tamil Nadu and particularly along the Palar basin. The sedimentary rocks that are exposed in and around the Sriperumbudur (a town, 40 km from Chennai—the capital of Tamil Nadu). The rock Formation is known as Sriperumbudur Formation, which marked by the Palar river in the South, the Satyavedu hills of Andhra Pradesh in the North, Arakkonam town in the west and the Bay of Bengal in the East (See map in Kumarasamy, 2013). So far many publications came out on petrified gymnosperm woods of this Formation *viz., Cupressinoxylon coromandelianum* (Sahni, 1931), *Mesembrioxylon tirumangalense* (Suryanarayana, 1953), *Dadoxylon rajmahalense* (Suryanarayana, 1954), *Araucarioxylon rajivii* and *Araucarioxylon giftii* (Jeyasingh and Kumarasamy, 1994a), *Araucarioxylon mosurense* (Jeyasingh and Kumarasamy, 1995), *Cupressinoxylon gondwanensis* (Kumarasamy and Jeyasingh, 2004), *Sahnioxylon savitrii* (Kumarasamy and Jeyasingh, 2007) and *Agathoxylon gondwanensis* (Kumarasamy, 2013). Apart from these petrified woods, many impression fossils of petridophytes and gymnosperms were reported from this Formation (Jeyasingh and Kumarasamy, 1994b; and Kumarasamy and Jeyasingh, 1995). The plant fossils available in this region mainly of leaf impressions of petridophytes and gymnosperms and petrifield woods of gymnosperms. The present report is about a piece of petrified secondary wood of a conifer.

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MATERIALS AND METHODS

The present petrified wood (SPR/VK/152) was collected from Vallam, a place near to Sriperumbudur. Thin sections (TS, TLS and RLS) were prepared using rock cutting and polishing machine. The sections were observed under light microscope and photographs were taken using Olympus Digital Camera attached with Olympus-Trinocular Microscope.

Plate-1

Types of species: *Agathoxylon sriperumbudurensis* sp. nov.

Holotype : Specimen-SPR/VK/152

Slides : SPR/VK/152/1, 2, 3 and 4

Type locality : Vallam

Stratigraphic horizon : Sriperumbudur Formation, Early Cretaceous

Etymology : Named after the Formation where the wood was found

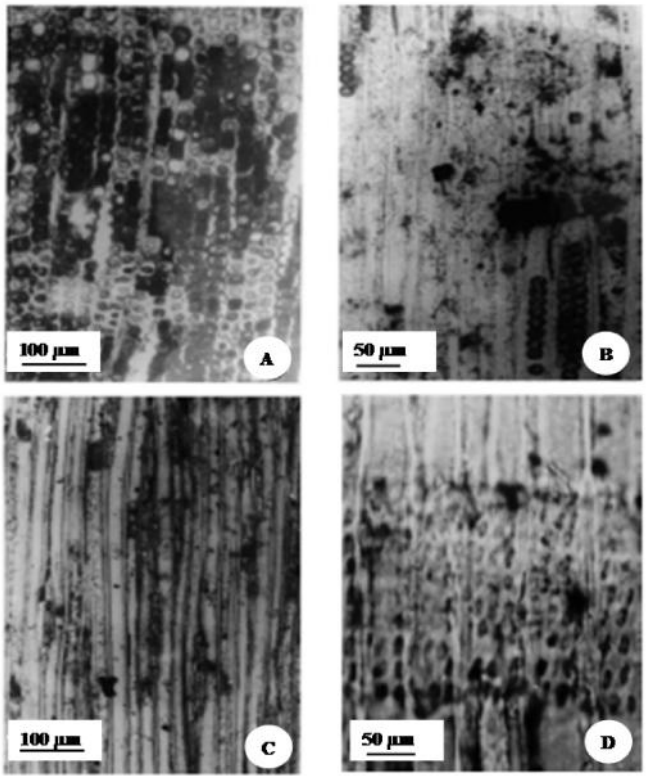
Diagnosis

Growth rings not distinct, tracheids circular with highly thickened walls. Only radial walls pitted; pits uni-seriate, alternate, contiguous, cirulcar with circular apertures. Cross field pits 3-6, cupressoid. Rays simple, uniseriate, 1-15 cells high, xylem parenchyma and resin tracheids absent.

Description (Plate-1, Figures 1a-1d)

The study is based on a single piece of decorticated pycnoxylic wood, measuring 5.0 cm

Figur 1: Agathoxylon sriperumbudurensis



Note: A. Transverse section, B. Radial longitudinal section, C. Tangential longitudinal section, D. Cross-field pits.

long and 2.8 cm wide. The specimen is impregnated with silica. Growth rings not distinct, almost straight, width almost equal, 1.3-1.5 mm (34-44 cells) wide. All growth rings have more of early wood than late wood. In each growth ring all the tracheids are of uniform shape and size, except one layer of tracheids at the end of each growth ring which forms the late wood. Tracheids are not regularly arranged. Many intercellular spaces are seen between the tracheids. Transition from early wood to late wood is abrupt. There is no false ring. Early wood tracheids 0.73-1.05 mm long, radially 31.25-52.5 mm (average 38.7 mm) wide, circular, wall thick (upto 15 mm), the secondary wall itself is 10.00 mm thick and the tangential wall smooth. Radial wall pits mostly unseriate, on some places they are biseraite, alternate. Pits bordered, circular, contiguous, 15.0 mm in diameter. Aperture circular, 5.0 mm wide. Rims of sanio absent. Tracheids per mm^2 is 850. Late wood tracheids 25.0-28.7 mm (average 26.4 mm) wide in radial diameter.

Rays exclusively uniseraite, 1-21 (average 7.7) cells high, homocellular, cells 26.25 mm long and 18.75 mm wide. Both tangential and horizontal walls are smooth. Radial wall pits 3-6 (usually 5-6), cupressoid, elliptical, bordered, 6.25 mm wide, inclined at an angle of 45°, aperture wide, elliptical, 2.5 mm in diameter. Ray cells spanning 2-2½ tracheides, end wall vertical; vertical parenchyma, resin tracheides or resin canals are completely absent.

DISCUSSION

Fossil conifers woods having araucarian affinity were placed under 15 genera. Among these names, *Agathoxylon* Hartig, is the oldest valid name having araucarian affinity (Philipp, 2010), so the present wood assigned to species of *Agathoxylon*.

So, far there are five species of petrified woods of araucarian affinities *viz., Dadoxylon rajmahalense, Araucarioxylon rajivii, A. giftii, A. mosurense, Agathoxylon gondwanensis* reported from this Formation (Kumarasamy, 2013).

The present wood differ from *Dadoxylon rajmahalense* in having uniseviate radial pits and 1-5 cross food pits, whereas in *Dadoxylon rajmahalense* the radial wall pits are distinctly biseriate and there is no cross field pits observed in the wood. The present wood also differ from *A. rajivii* in having 3-6 cross field pits perfield, as where in *A. rajiviii* the cross field pits are 1-2 in numbers, similarly in *A. giftii*, the cross field pits are 1-3. In *A. mosurenase* the rays are 1-3 seriate where as in the present wood the rays are exclusively uniseriate. *Agathoxylon gondwanensis* differ from the present specimen in having 3-9 cross field pits per field.

The present petrified wood compared with fossil woods of other Upper Gondwana localities of India and abroad. The present specimen superficially resembles *Araucarioxylon bikanerense* reported by Harsh and Sharma (1988) from the Tertiary deposits of Rajasthan and *A. agathioides* reported by Krausel and Jain (1964) from the Rajmahal hills. But the present specimen differs from *A. bikanerense* in having uni-biseriate pits on the radial walls of the tracheids, whereas in *A. bikanerense* the radial wall pits upto triseriate.

The present specimen also compare well with *A. nepalensis*. Barale *et al.* (1978) of Nepal in having 1-2 seriate radial wall pits on the tracheids and uniseriate rays, but the latter differs from the present specimen in having 1-5 cross field

pits, which are mostly circular, whereas in the present specimen, it is 3-6 and elliptical. In the presence of thick walled tracheids; 3-6 elliptical, bordered, cross field pits in combination with other characters and in the complete absence of xylem parenchyma and resin canals, the present specimen stands apart from all other species. So, the present specimen assigned to a new species of *Agathoxylon* viz., *Agathoxylon aptiana*.

The gross anatomical structure of the present wood compare well that of the conifer woods reported earlier from this Formation, so an attempt had been made to deduce the palaeoenvironment of this area using the anatomical characters found in these petrified gymnosperm wood (Jeyasingh, 2008). This study also support the above mentioned view that the palaeoclimate of this area are during early Cretaceous times was more or less uniform without much climatic fluctuation, year after year and the plants were thriving in a xeric environment.

The present specimen as well as the petrified woods already reported from this formation indicate 'C' type growth-rings (as per Creber and Chaloner, 1984) in which the early wood is more than the late wood and the transition from the early wood to late wood is gradual there feature indicate that the climate of the palar basin during Lower Cretaceous time was almost uniform throughout the growing season except at its close.

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