

Podocarpacean wood from the Cretaceous of Cauvery Basin

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ROCK formations of Cauvery Basin have been a subject of speculation and interest to palaeontologists and geologists since 19th Century. Abundant fossil occurrence, lithological variations and various depositional patterns attracted much attention (Blanford, 1865; Kossmat, 1897; Ramanathan, 1968; Banerji, 1972; Sundaram & Rao, 1979, 1986; Tiwari *et al.*, 1996; Ramasamy & Banerji, 1997; Hart *et al.*, 2000). Recent researches have demarcated precise formational limitations and categorised fossil contents with their stratigraphic zonation.

Petrified woods were known from the Cauvery Basin through the studies of Sahni 1931, Varma 1955, Agashe 1969,

Ramanujam 1953, 1978 and Kar *et al.* 1998. Though plant leaf fossils were of common occurrence in the upper Gondwana Early Cretaceous deposits of Terani plant beds (Sukh-Dev & Rajanikanth, 1989), petrified woods of Cretaceous are yet to be explored to full potential from the Cauvery Basin. A number of silicified woods were collected from near Sattanur Village and the present wood species belongs to the Kulakkalnattam Sandstone, Garudamangalam Formation, Cauvery Basin.

The Cauvery Basin constitutes the southern most basins, along the eastern coast of India and comprises a number of sub-basins. The marine Cretaceous rock formations of Tiruchirapalli District, Tamil Nadu are generally grouped into three litho groups namely Uttatur, Trichinopoly and Ariyalur. The Uttatur Group has recently been sub-divided into Dalmiapuram, Karai, Garudamangalam formations (Fig. 2). The Garudamangalam Formation is characterised by fine to coarse grained parallel laminated and bioturbated sandstone. This formation is further subdivided into Kulakkalnattam Sandstone Member and Anaipadi Sandstone. The present wood collected from a small mound about 2 km west of Sattanur Village. The lithology of area conforms with the Kulakkalnattam Sandstone Member characterised by fine to coarse calcareous sandstones with two distinct layers of carbonate concretions, shell rich sandstones, silty sandstones, ferruginous sands, argillaceous siltstones and pebbly sandstones (Tewari *et al.*, 1996) (see Fig. 1 after Hart *et al.*, 2000). The age of the Garudamangalam Formation is considered as Late Cretaceous (Turonian).

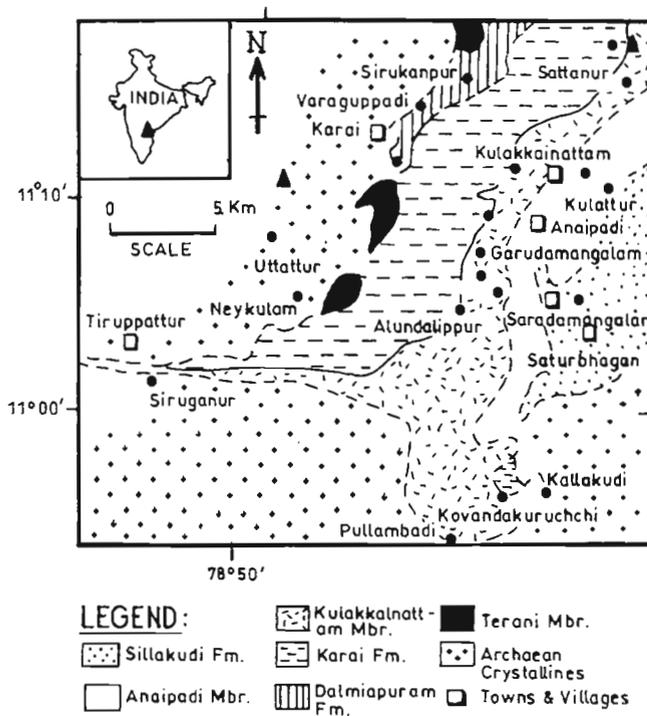


Fig. 1—Showing fossil locality (after Hart *et al.*, 2000).

SYSTEMATICS

Kingdom—PLANTAE

Class—GYMNOSPERMS

Order—CONIFERALES

Family—PODOCARPACEAE

Genus—**PODOCARPOXYLON****PODOCARPOXYLON KULAKKALNATTAMENSIS** sp.
nov.

The wood is dark brown in colour measuring 5"/3" in size. The wood was cut with a diamond blade and three sections-Transverse, tangential and radial sections were grounded using carborandum powder and mounted with the help of Canada Balsam. Thinly polished sections were studied using high power microscope (Olympus BH2).

Transverse section

Growth rings faint, early wood wide tracheidal cells polygonal, rectangular, squarish, vary in shape and size, 5-9 µm in size, walls 1.25-2 µm in thickness, resin cells scattered, late wood narrow, 2-3 cells wide, compactly arranged.

Group	Formation	Age
Recent – sub-recent	Alluvium Cuddalore	Mio-Pliocene
—Unconformity—		
Ariyalur	Niniyur Kallamedu Kallankurichchi	Danian Palaeocene
—Unconformity—		
Uttatur	Garudamangalam Anaipadi Member Kalakkalnattam Member Karai Dalmiapuram	Cretaceous
—Unconformity—		
Upper Gondwana	<i>Sivaganga</i>	Early Cretaceous
—Unconformity—		
Crystallines		Archaean

Fig. 2—Generalised Stratigraphy of Cauvery Basin (after Tewari *et al.*, 1996).

Taxa	Reference	Age	Horizon	Wood Characters
<i>Podocarpoxylon trichinopoliense</i>	Varma 1955	Cretaceous	Garudamangalam Tamil Nadu	Growth rings prominent, wood parenchyma rare, xylem rays uniseriate, 2-6-10 cells high, radial wall pits uniseriate, circular, separate, cross field pits fusiform 1-2, simple
<i>Podocarpoxylon speciosum</i>	Ramanujam 1955	Miocene Pliocene	Muttanqi Tamil Nadu Cuddalore Series	Growth rings distinct, xylem parenchyma abundant, resin present, xylem rays uni-biseriate, 1-18 cells high, radial wall pits uni-biseriate, opposite-sub-opposite, pore circular, cross field pits 2-4
<i>Podocarpoxylon mahabalei</i>	Agashe 1969	Miocene Pliocene	Tiruvakkarai Tamil Nadu Cuddalore Series	Growth rings prominent, resin cells present, xylem parenchyma scattered, Xylem rays 1-30 cells, radial wall pits uniseriate, circular, separate, contiguous, cross field pits single ovoid, taxodioid
<i>Podocarpoxylon sahnii</i>	Ramanujam 1963	Miocene Pliocene	Tiruvakkarai Tamil Nadu Cuddalore Series	Growth rings well defined, xylem rays uni-biseriate, rarely triseriate, 1-20 cells high, radial wall pits always uniseriate, circular separate, cross field pits one, rarely two, fusiform, borderless
<i>Podocarpoxylon sarmae</i>	Varma 1955	Cretaceous	Garudamangalam Tamil Nadu Cuddalore Series	Growth rings scarce, wood parenchyma rare, xylem rays uniseriate, 3-8 cells average in height, up to 18 cells, radial wall pits uniseriate, circular, separate, cross field pits 2-4, small, oval, oblong in one or two rows
<i>Podocarpoxylon schmidianum</i>	Sahni 1931	Miocene Pliocene	Tiruvakkarai Tamil Nadu Cuddalore Series	Growth rings faintly marked, resin parenchyma scanty, xylem rays uniseriate, rarely biseriate, numerous, 2-3 cells-100 cells in height, average 36 cells, radial pits circular or slightly elliptical, uni-biseriate, opposite, cross field pits one or two, large, pores slit like, obliquely vertical
<i>Podocarpoxylon tiruvakkarai anum</i>	Ramanujam 1953	Miocene Pliocene	Tiruvakkarai Tamil Nadu Cuddalore Series	Growth rings present, xylem rays exclusively uniseriate, 3-50 cells in height, with resin, pitting on tangential walls present, radial pits large, uni-biseriate, opposite, cross field pits one, oval, rounded, borderless.

Fig. 3—Distribution of fossil wood taxa in the Cauvery Basin.

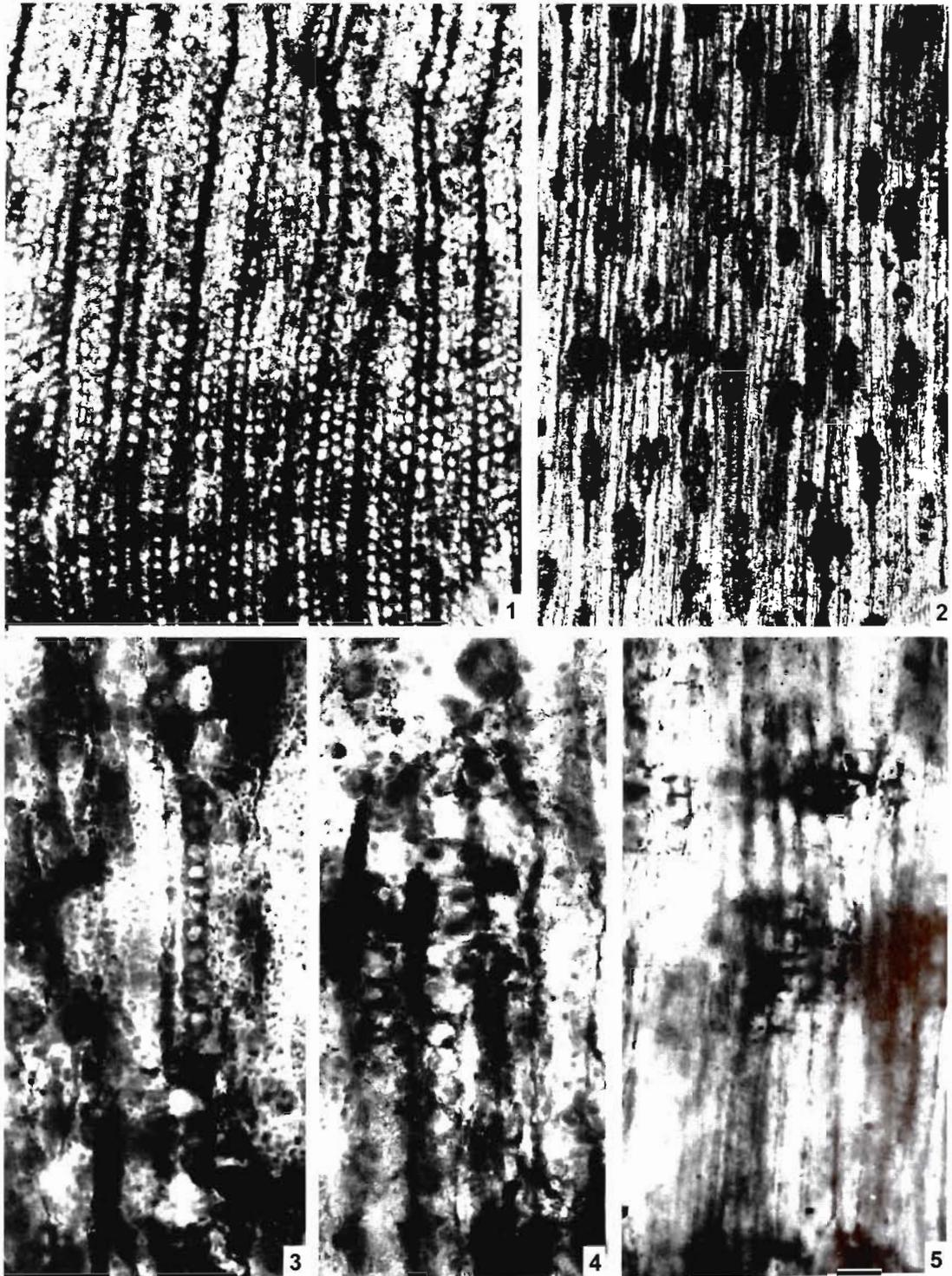


PLATE 1

(All photographs are enlarged (ca. x 1000))

- | | |
|---|---|
| <p>1. Transverse section showing tracheidal cells, Slide No. BSIP 39170 x 30.</p> <p>2. Transverse longitudinal section showing uniseriate xylem rays, Slide No. BSIP 39170. x 40.</p> <p>3. Radial longitudinal section showing uniseriate radial wall pits,</p> | <p>4. Radial longitudinal section showing circular radial wall pits, Slide No. BSIP 39170 x 300.</p> <p>5. Radial longitudinal section showing 1-2 podocarpoid cross field pits, Slide No. BSIP 39170. x 200.</p> |
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Tangential longitudinal section

Xylem rays mostly uniseriate, rarely biseriate, length varies, 2-16 cells, 60-460 µm in length, mostly 25-45 µm, cells oval, round, cells 20-35 µm, mostly small rays scattered all over.

Radial longitudinal section

Radial pits uni-to biseriate, round, 6-8 µm, solitary, contiguous, opposite, border thick, 2-4 µm in thickness, cross field pits 1-2, podocarpoid, 4-6 µm.

Collection—Sattanur, Tiruchirapalli District, Tamil Nadu.

Holotype—BSIP Slide No. 39107 A, B, C.

Horizon and Age—Garudamangalam Formation, Cauvery Basin, Upper Cretaceous (Turonian).

Remarks

The present wood with distinct radial pits has been assigned under *Podocarpoxylon kulakkalnattamensis* named after the Sandstone unit under the Garudamangalam Formation, Cauvery Basin. The wood is different from the earlier reported forms known from the Cauvery Basin (Fig. 3). Though occurrence of podocarpacean taxa in the Cauvery Basin was known through leaf fossils (Sukh-Dev & Rajanikanth, 1989), pollen (Venkatachala & Sharma, 1974) and wood (Varma, 1955) during the Cretaceous times, however, no serious efforts have been undertaken to study petrified woods. Xylotomy of fossil woods has also shown to be an excellent tool to unravel past environmental changes (Creber, 1977; Creber & Chaloner, 1984). Concerted efforts are suggested to collect more fossil woods for such studies.

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