

## Occurrence of Fossilized Eucalyptus Wood from the Cuddalore Sandstone Series, Tamil Nadu



### Botany

**KEYWORDS :** Fossil wood, Tertiary, Cuddalore Sandstone Series, India, Eucalyptus

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### ABSTRACT

*Cuddalore Sandstone Series is one of the Tertiary sediments of India. The rock system contains many petrified woods of gymnosperms and angiosperms. In the present report, one piece of petrified wood having affinity with Eucalyptus wood was described. This is the first report of fossilized Eucalyptus wood from this sediment. Fossil wood having affinity with living Eucalyptus wood had already reported from the Deccan Intertrappean bed of India. But the authenticity of this report was questioned by Rozefeldes (1996). The present report confirm the occurrence of Eucalyptus wood from the Tertiary sediments of India.*

### INTRODUCTION

The Indian Tertiary system is broadly divided into two groups namely Palaeogene (Eocene) and Neogene (Miocene) based on the age (Prakash 1973). The Cuddalore series of South India is a Neogene deposit. Cuddalore series, named after the town Cuddalore, have widespread fossiliferous rocks with lateritised and ferruginous sandstones, exposed along the east coast of Peninsular India. Rocks of Cuddalore series extend from Pondicherry to Madura along the east coast and from Warkala to Ratnagiri on the west coast. Scattered patches of this series are also exposed in Rajamundry of Andhra Pradesh (Navale 1959). The Cuddalore series found on many Mesozoic coastal deposits and found below the alluvium of Cauvery river. The sandstones are arkosic, light pink and dirty white in colour, medium to coarse grained in texture and gritty and are fossiliferous in the Villupuram district of Tamil Nadu (Figure 1) near Pondicherry where they contain petrified woods (Krishnan 1982).

Petrified woods collected from the various localities of Cuddalore Sandstone Series were of gymnosperms and angiosperms. Woods of these two groups are found in isolated position, very rarely they are found in mixed state. Although many petrified woods are found, only a few woods show good preservation. These woods were extensively worked out by Ramanujam, Rao, Navale, Lakhanpal, Awasthi, Guleria, Bande, Prakash and Anil Agarwal (Jeyasingh and Devadoss 1996). Gymnospermic woods reported from this series were mostly of Mesembrioxylon sp. The petrified angiospermic woods reported from this series were 74 taxa belonging to 22 families (Table 1). The present work pertaining to a piece of petrified secondary wood collected from Murattandichavadi of Cuddalore Sandstone Series of India.

### SYSTEMATIC PALAEOBOTANY

Family: Myrtaceae

Genus: Eucalyptus L' Herit

Species: Eucalyptus dharmendrae Bande et al. (1986)

Material: CM. 50

Description: The species is represented by a single piece of secondary wood measuring 7.0 cm in length and 7.0 cm in width.

Growth rings: Absent. Woods: Diffuse porous. Vessels: Mainly solitary or in pairs. In cross section, vessels are thin-walled and generally circular to radially elliptic (Figure 2). The mean vessel tangential diameter is 151  $\mu$ m (range: 115-184  $\mu$ m), mean vessel radial diameter is 185  $\mu$ m (range: 123-253  $\mu$ m) and mean vessel element length is 523  $\mu$ m (range: 174-893  $\mu$ m). On average, there are 8 vessels per mm<sup>2</sup>. Perforation plates: Simple and oblique. Tyloses: Absent. Many vessels are plugged with dark coloured deposits. Intervessel pitting: Alternate and hexagonal

due to crowding. Fibres: Thin-walled, non-septate and organized into regular radial files in cross section, no fibre pitting was observed. Tracheids: Vascentric, associated with parenchyma forming a sheath of 2-5 cells around the vessels and also extend as short radial chains (Figure 3). Axial parenchyma: Paratracheal and apotracheal. Paratracheal parenchyma occurring as a few cells around the vessels, apotracheal parenchyma found as diffused cells. Rays: Uniseriate, 8 (range: 5-16 cells) cells high (Figure 4), homogeneous to weakly heterogeneous (Figure 5). There are 15-22 rays per square millimeter.

### COMPARISON

The characteristic features of present wood; the medium size vessel, arrangement of vessels in short oblique chains, presence of vascentric tracheids, presence of apotracheal and paratracheal parenchyma indicate its affinity with the genus Eucalyptus. The present petrified wood compares well with Eucalyptus sp. like E. alba, E. albus, E. amygdalina, E. baueriana, E. baxteri, E. bicolor, E. tetradonta, E. blakelyi, E. bosistoana, E. canpaspe, E. cypellocarpa, E. moluccana and E. planchoniana Dadswell (1972) and Ilic (2002).

Fossil woods similar to living Eucalyptus wood placed under the same genera name Eucalyptus (Bande et al. 1986). In India, so far, only one report of fossil Eucalyptus wood. It is reported from Deccan Intertrappean bed (Bande et al. 1986) as E. dharmendrae. The present wood compares well with E. dharmendrae in having medium size vessels, arrangement of vessels in oblique pattern, presence of vascular tracheids, arrangement of apotracheal and paratracheal parenchyma, typically uniseriate rays which are usually heterogeneous, so the present wood assigned to the species E. dharmendrae. Conformity of this species was questioned by Rozefeldes (1996). Because, he couldn't find the vested pits and heterogeneous rays, typical characters of any wood of Myrtaceae in the specimen reported by Bande, so he questioned the authenticity of this specimen. In the present wood also because of poor preservation, the nature of intervessel pits were not clearly observed. But the presence of weakly heterogeneous rays, occurrence of exclusively solitary vessels, arranged in short oblique lines and the presence of vascular tracheids mixed with parenchyma indicate its affinity with modern Eucalyptus wood. This is the first report of a Myrtaceae wood from the Cuddalore sandstone series. This report confirm the presence of Eucalyptus wood from the Tertiary sediments of India.

### ACKNOWLEDGEMENT

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**Table 1**

List of reported angiospermous fossil woods from Cuddalore Sandstone series.

S. No.	Name of the fossil wood	Family	Reference
1.	<i>Xanthophyllum cuddaloreense</i> Awasthi	Polygalaceae	Awasthi (1987)
2.	<i>Calophylloxyton cuddaloreense</i> Lakhanpal and Awasthi	Clusiaceae	Lakhanpal and Awasthi (1965)

3.	<i>Calophylloxylon indicum</i> Lakhanpal and Awasthi	Clusiaceae	Lakhanpal and Awasthi (1965)
4.	<i>Anisopteroxylon coromandelense</i> Navale	Dipterocarpaceae	Navale (1963b)
5.	<i>Dipterocarpoxyton arcotense</i> Awasthi	Dipterocarpaceae	Awasthi (1980)
6.	<i>Dipterocarpoxyton pondicherriense</i> Awasthi	Dipterocarpaceae	Awasthi (1974)
7.	<i>Dryobalanoxylon holdeni</i> (Ramanujam) Awasthi	Dipterocarpaceae	Ramanujam (1956a)
8.	<i>Dryobalanoxylon indicum</i> (Ramanujam) Awasthi	Dipterocarpaceae	Ramanujam (1956a)
9.	<i>Hopenium neyveliense</i> Awasthi	Dipterocarpaceae	Awasthi (1984)
10.	<i>Hopenium pondicherriense</i> Awasthi	Dipterocarpaceae	Awasthi (1980)
11.	<i>Hopeoxylon indicum</i> (Navale) Awasthi	Dipterocarpaceae	Navale (1963b)
12.	<i>Shoreoxylon arcotense</i> Awasthi	Dipterocarpaceae	Awasthi (1974)
13.	<i>Shoreoxylon indicum</i> Awasthi	Dipterocarpaceae	Awasthi (1974)
14.	<i>Shoreoxylon krauseli</i> Ramanujam and Rao	Dipterocarpaceae	Ramanujam and Rao (1967)
15.	<i>Sterculinium pondicherriense</i> (Awasthi) Guleria	Sterculiaceae	Awasthi (1981b)
16.	<i>Ailanthoxylon indicum</i> Prakash	Simaroubaceae	Awasthi (1975b)
17.	<i>Euphorioxylon indicum</i> Awasthi <i>et al.</i>	Sapindaceae	Awasthi <i>et al.</i> (1984)
18.	<i>Sapindoxylon indicum</i> Navale	Sapindaceae	Navale (1957)
19.	<i>Anacardioxylon mangiferoides</i> Ramanujam	Anacardiaceae	Ramanujam (1960)
20.	<i>Glutoxylon burmense</i> (Holden) Chowdhury	Anacardiaceae	Awasthi (1966)
21.	<i>Glutoxylon cuddaloreense</i> Awasthi	Anacardiaceae	Awasthi (1966)
22.	<i>Holigarnoxylon assamicum</i> Prakash and Awasthi	Anacardiaceae	Jeyasingh and Devadoss (1996)
23.	<i>Mangiferoxylon scleroticum</i> Awasthi	Anacardiaceae	Awasthi (1966)
24.	<i>Albizinium pondicherriense</i> Awasthi	Fabaceae	Awasthi (1979)
25.	<i>Cynometroxylon dakshinense</i> Navale	Fabaceae	Navale (1959)
26.	<i>Cynometroxylon holdeni</i> (Gupta) Prakash and Bande	Fabaceae	Ramanujam and Rao (1966a)
27.	<i>Erythrophloeoxylon feistmantelli</i> (Ramanujam) Müller-Stoll and Mädél	Fabaceae	Ramanujam (1960)
28.	<i>Erythrophloeoxylon sitholeyi</i> (Ramanujam) Müller-Stoll and Mädél	Fabaceae	Ramanujam (1955)
29.	<i>Euacacioxylon bharadwajii</i> (Navale) Müller-Stoll and Mädél	Fabaceae	Navale (1963a)
30.	<i>Bauhinia</i> Ramanujam and Rao	Fabaceae	Ramanujam and Rao (1966b)
31.	<i>Cassinium arcotense</i> Awasthi	Fabaceae	Awasthi (1979)
32.	<i>Milletioxylon indicum</i> Awasthi	Fabaceae	Awasthi (1975a)
33.	<i>Pahudioxylon arcotense</i> Navale	Fabaceae	Navale (1963a)
34.	<i>Pahudioxylon sahnii</i> Ghosh and Kazmi	Fabaceae	Ramanujam (1960)

35.	<i>Peltophoroxyton indicum</i> (Ramanujam) Müller-Stoll and Mädél	Fabaceae	Ramanujam (1955)
36.	<i>Peltophoroxyton variegatum</i> (Ramanujam) Müller-Stoll and Mädél	Fabaceae	Ramanujam (1960)
37.	<i>Pericopsoxyton indicum</i> Awasthi	Fabaceae	Awasthi (1979)
38.	<i>Pithecellobioxyton cuddaloreense</i> Jeyasingh and Devadass	Fabaceae	Jeyasingh and Devadoss (1996)
39.	<i>Pterocarpoxyton arcotense</i> Ramanujam	Fabaceae	Ramanujam (1960)
40.	<i>Pterogynoxyton felixii</i> (Navale) Müller-Stoll and Mädél	Fabaceae	Navale (1963a)
41.	<i>Tamarindoxylon antiquum</i> Ramanujam	Fabaceae	Ramanujam (1961)
42.	<i>Parinarioxylon cuddaloreense</i> Awasthi	Rosaceae	Awasthi (1969b)
43.	<i>Parinarioxylon neyveliense</i> Awasthi and Agarwal	Rosaceae	Awasthi and Agarwal (1986)
44.	<i>Carallioxylon indicum</i> Awasthi	Rhizophoraceae	Awasthi (1984)
45.	<i>Anogeissusoxylon indicum</i> Navale	Combretaceae	Navale (1964a)
46.	<i>Terminalioxylon coromandelinum</i> Ramanujam	Combretaceae	Ramanujam (1966)
47.	<i>Terminalioxylon felixii</i> Ramanujam	Combretaceae	Ramanujam (1956b)
48.	<i>Terminalioxylon grandiporosum</i> Ramanujam	Combretaceae	Ramanujam (1966)
49.	<i>Terminalioxylon mortandrense</i> Navale	Combretaceae	Navale (1956)
50.	<i>Terminalioxylon sahnii</i> Navale	Combretaceae	Navale (1956)
51.	<i>Terminalioxylon speciosum</i> Ramanujam	Combretaceae	Ramanujam (1956b)
52.	<i>Terminalioxylon traumaticum</i> Ramanujam	Combretaceae	Ramanujam (1966)
53.	<i>Barringtonioxylon arcotense</i> Awasthi	Lecythidaceae	Awasthi (1970a)
54.	<i>Careoxyton pondicherriense</i> Awasthi	Lecythidaceae	Awasthi (1970a)
55.	<i>Lagerstroemioxylon arcotense</i> Awasthi	Lythraceae	Awasthi (1981)
56.	<i>Duabangoxylon indicum</i> (Navale) Awasthi	Sonneratiaceae	Awasthi (1981a)
57.	<i>Sonneratioxylon dakshinense</i> Ramanujam	Sonneratiaceae	Ramanujam (1957)
58.	<i>Sonneratioxylon preapetala</i> Awasthi	Sonneratiaceae	Awasthi (1969a)
59.	<i>Alangioxylon scalariformae</i> Awasthi	Alangiaceae	Awasthi (1969c)

60.	Chrysophylloxyton pondicherriense Awasthi	Sapotaceae	Awasthi (1977)
61.	Ebenoxyton arcotense Awasthi	Ebenaceae	Awasthi (1970b)
62.	Cordioxyton multiseriatum Awasthi	Boraginaceae	Awasthi (1984)
63.	Bridelioxyton cuddaloreense Ramanujam	Euphorbiaceae	Ramanujam (1956c)
64.	Bridelioxyton miocenicum (Ramanujam) Mädel	Euphorbiaceae	Ramanujam (1960)
65.	Paraphyllanthoxyton bangalamodense (Navale) Lakhanpal	Euphorbiaceae	Navale (1962)
66.	Paraphyllanthoxyton tertiarum (Ramanujam) Mädel	Euphorbiaceae	Ramanujam (1956c)
67.	Castanoxyton indicum Navale	Fagaceae	Navale (1964b)
68.	Castanoxyton tertiarum Navale	Fagaceae	Navale (1964b)
69.	Holopteleoxyton indicum Awasthi	Ulmaceae	Awasthi (1977)
70.	Palmoxyton arcotense Ramanujam	Areaceae	Ramanujam (1953a)
71.	Palmoxyton pondicherriense Sahni	Areaceae	Sahni (1931)
72.	Palmoxyton puratanum Ramanujam	Areaceae	Ramanujam (1958)

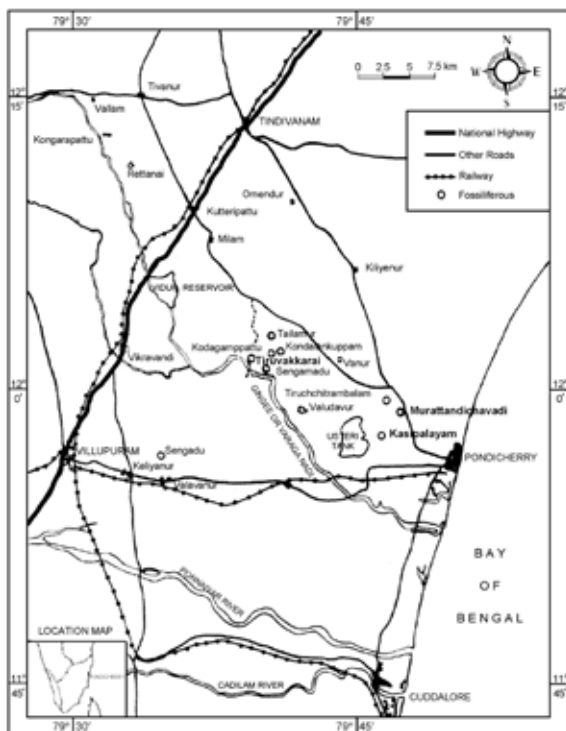


Figure 1

Figure 1. Map showing fossiliferous localities of Cuddalore Sandstones.

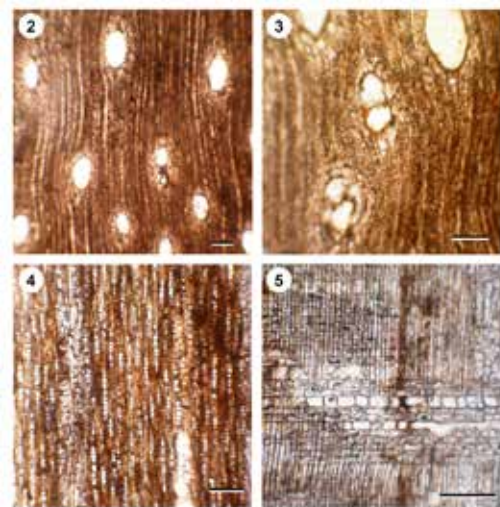


Figure 2. Transverse section of fossil Eucalyptus wood showing oblique arrangement of vessels; scale bar = 200 mm.

Figure 3. Transverse section of fossil Eucalyptus wood showing tracheids around the vessels; scale bar = 200 mm.

Figure 4. Tangential longitudinal section of fossil Eucalyptus wood showing uniseriate rays; scale bar = 200 mm.

Figure 5. Radial longitudinal section of fossil Eucalyptus wood showing weakly heterogeneous nature of the rays; scale bar = 200 mm.

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