

DUABANGOXYLON PAKISTANICUM SP. NOV., A NEW TAXON OF SONNERATIACEAE FROM RANIKOT FORT AREA

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Abstract

Duabangoxylon pakistanicum sp. nov., a new silicified stem is described from Tertiary deposits of Dada formation exposed near Ranikot fort area, district Dadu Sindh, Pakistan. The xylotomical feature of the present fossil wood shows close affinities to the genus *Duabanga* of family Sonneratiaceae.

Introduction

The presence of the fossil woods in the Tertiary deposits of Sindh was indicated by Blanford (1876) and Pascoe (1963). Nine fossil woods which have hitherto been described and identified from Sindh, Pakistan are: *Araucarioxylon* sp. Rajput & Khan (1984), *Sapindoxylon petaroensis* Khan & Rehmatullah (1968), *Albizzioxylon dhapriense* Khan & Rehmatullah. (1971), *Palmoxylon amriense* Khan *et al.*, (1972), *Laurinoxylon surangei* Lakhapal (1955) Rehmatullah *et al.*, (1984), *Cynometroxylon ranikotensis* Rajput & Khan (1982), *Pterocarioxylon ranikotensis* Rajput & Khan (1982), *Cynometroxylon indicum* Chowdhari & Ghosh (1946), Saeed *et al.*, (1984).

The present paper deals with the anatomical description and the affinities of a fossil wood collected from Dada formation exposed near Ranikot fort area, district Dadu, Sindh, Pakistan.

Material and Methods

Specimen No. RK.42 a single piece of brown silicified stem fossil measuring ca. 9x4 cm (Fig.1A) was collected from Ranikot fort area district Dadu (Lat. 25° 45' - 26° 00. N. Long. 67° 45' - 68° 00. E.).

Three dimensional sections of the petrified wood (Weatherhead, 1938) were prepared by the conventional Rock grinding method. Staining of the sections was not necessary due to the presence of hydrated iron oxides. Most of the preliminary investigation were made with simple light microscope and photographs were taken with Urtholux German Microscope.

ANATOMICAL DESCRIPTION

Topography: Wood diffuse porous. (Fig.1 B, Fig.2). Growth rings absent. Vessels small to large; unevenly distributed in ground mass, solitary as well as in radial multiples of 2-3; distribution of vessels 4-7 /sq. mm., lumen of vessels mostly empty, rarely filled with brown deposits; tylosis present in most of the vessels. (Fig.1 BCD of

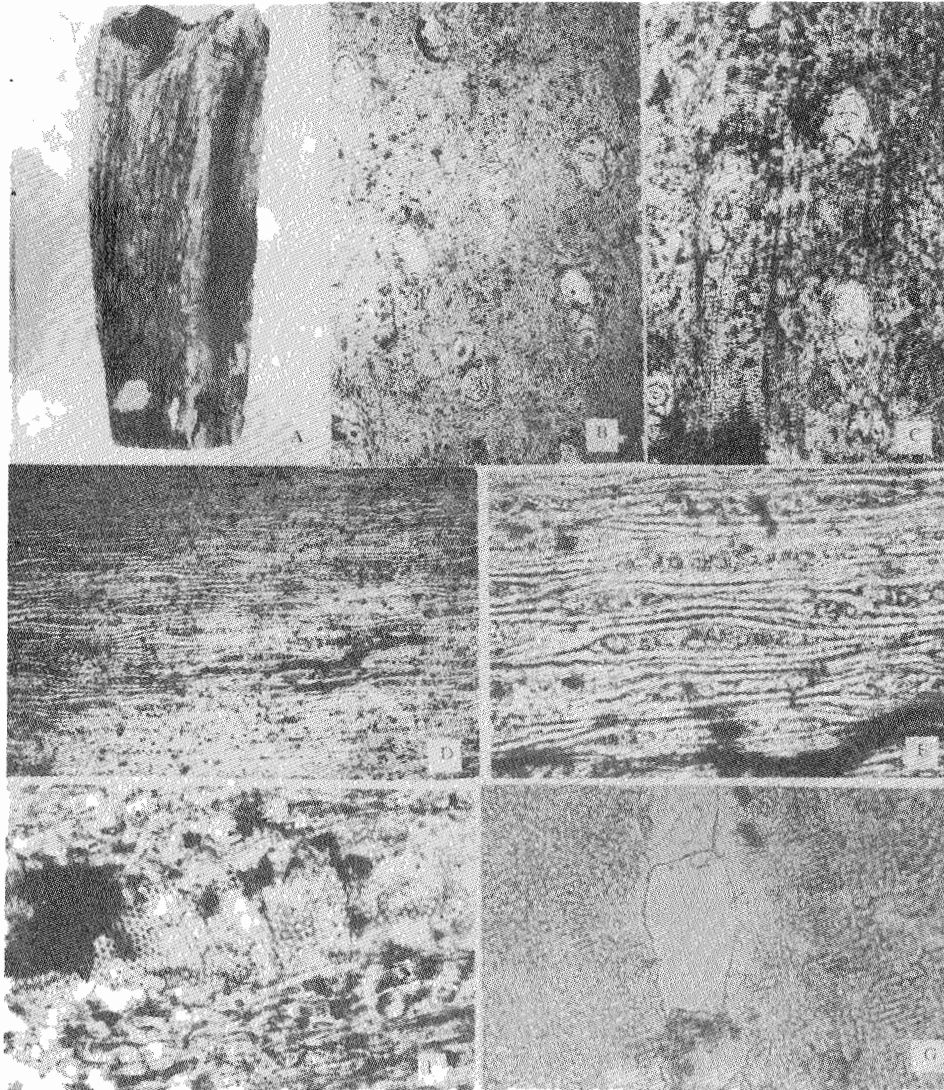


Fig.1 A. *Duabangoxylon pakistanicum* sp. nov. Macrophotograph of the fossil wood.
 B. Cross section showing distribution and type of the vessels and parenchyma x 350.
 C. Cross section showing type and distribution of vessels, tylosis and parenchyma. x 350.
 D. Tangential longitudinal section showing distribution of uniseriate xylem rays. x 350.
 E. Tangential longitudinal section showing enlarged xylem rays x 877.
 F. Tangential longitudinal showing pits on the wall of the vessels x 3500.
 G. Radial longitudinal section showing fibre-ray cutting and perforation plate of vessels x 877.

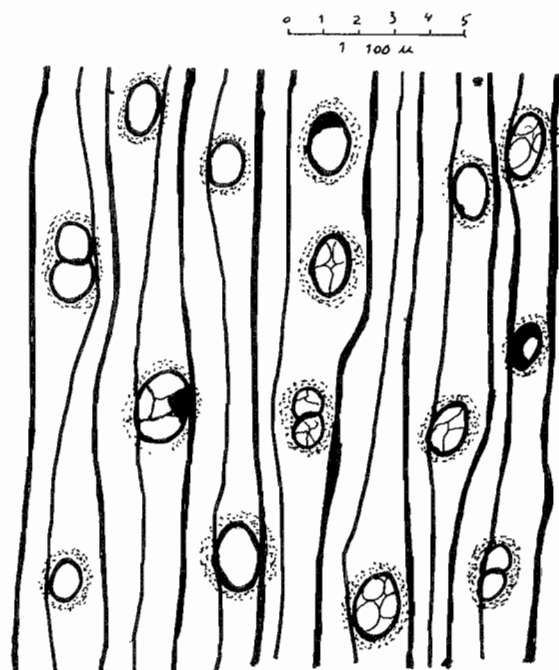


Fig.2. Cross section showing distribution of the vessels, parenchyma and xylem rays.

Fig.2). Parenchyma paratracheal, scanty vasicentric forming 2-4 seriate sheath around the vessels, occasionally with lateral extension. (Fig. 1. BCD, Fig.2). Xylem rays uniseriate, occasionally biseriata, forming canal like structure on either side of the vessels and diffused in ground mass each separated by 2-5 tangential rows of fibres; (Fig.1 B,C). Rays 6-22 cells or 80-420 μm high, 13-22/mm; ray tissue heterogeneous, ray homocellular to heterocellular; homocellular rays consisting of wholly of procumbent cells, while heterocellular rays consisting of procumbent cells and a few upright cells present one or both ends (Fig.1 EF, Fig.2,3); crystals occasionally present. Fibres aligned in radial rows between two consecutive xylem rays.

Elements: Vessels oval to elliptical in shape, those in radial multiples flattened at the place of contact (Fig.1 B C); tangential diameter of the vessel from 60-150 μm ., radial diameter from 90-250 μm length of the radial multiple of 2 is 170-330 μm , length of radial multiple of 3 is 320-420 μm ; vessel member 200-750 μm in length with truncate ends; perforation simple, vessel ends transverse and oblique Fig.1 E; Fig. 3 & 4) intervessel pits 8-10 μm in diameter, vestured, alternate with linear or lenticular orifice (Fig.1G), vessel ray and vessel parenchyma pits not preserved. Parenchyma cells 38 μm in length and 28 μm in diameter. Ray cells rectangular, procumbent cells 40-60 μm long and 15-25 μm broad; upright cells 60-75 μm long and 40-55 μm broad. Crystals occasionally present. Fibres elongated, nonseptate thin walled diameter ranges from 10-22 μm , length of the fibres 420-850 μm , inter fibre pits not seen.



Fig.3. Tangential longitudinal section showing distribution of the xylem rays and vessel ends.



Fig.4. Tangential longitudinal section showing enlarged xylem rays and the fibres.

Discussion

COMPARISON WITH THE MODERN FAMILIES

Anatomical characters found in the wood were compared with members of the families Combretaceae, Lythraceae, and Sonneratiaceae. In the family Combretaceae the wood of *Terminalia* show some significant similarities with the fossil wood. In the genus *Terminalia* the xylem parenchyma are aliform, and aliform to confluent (Metcalf & Chalk, 1950), whereas in fossil wood xylem parenchyma is vasicentric, moreover in *Terminalia* xylem rays are homogeneous and fibres are septate (Brown, 1932) but in fossil under investigation the xylem rays are heterogeneous and fibres are non-septate.

In the family Lythraceae the genus *Lagerstroemia* shows close resemblance with fossil wood under investigation in the nature of vessels, parenchyma and xylem rays, but fossil specimen has diffuse-porous wood in which the growth rings are absent, whereas the wood of *Lagerstroemia* is semiring porous, has distinct growth rings, parenchyma aliform confluent and xylem rays homogeneous. These characters are different from the fossil wood which possess vasicentric parenchyma and heterogeneous xylem rays (Metcalf & Chalk, 1950).

Fossil wood was compared with the genera *Sonneratia* and *Duabanga* in the family Sonneratiaceae. The *Sonneratia* is different from the fossil wood in having small to medium sized vessels, septate fibres and in the absence of wood parenchyma.

The important anatomical features of the fossil wood like vessels small to medium, solitary as well as in radial multiples of 2-3, xylem rays 1-2 seriate, heterogeneous and fibres non-septate and thin walled are found in the genus *Duabanga* of the family Sonneratiaceae (Metcalf & Chalk, 1950), and hence the present fossil wood has been named as *Duabangoxylon*.

The genus *Duabanga* Buch-Ham, comprises of species of large trees. *D. sonneratioides* ascending to 900 meter grows in Eastern Himalayas, Assam and Burma (Gamble, 1902). Prakash & Awasthi (1970) reported *Duabangoxylon tertiarum* from tertiary deposits of Eastern India but that species differs from the present fossil wood in the size of vessels and the amount of wood parenchyma (Table 1).

The attributes like vessels, wood parenchyma and rays, indicates that the fossil wood under investigation is different from *D. tertiarum*. Therefore it is assigned as a new species, and named as *Duabangoxylon pakisticum* sp. nov. The specific epithet refers to the country from where the fossil wood was collected.

Duabangoxylon pakisticum sp. nov.

Wood diffuse porous. Growth rings absent. Vessels small to large, solitary as well as radial multiples of 2-3; oval to elliptical; t.d. 60-150 μ m r.d. 90-250 μ m, thin walled; vessel member length ranges 200-750 μ m, 4-7 vessels per sq. mm; perforation simple; tylosis present; intervessel pits large 8-10 μ m, circular, vestured. Parenchyma

Table 1. Comparison of the fossil wood with already reported species of the genus *Duanbangoxylon*.

Characters	<i>Duanbangoxylon tertiarum</i> Prakash, U. 1969.	<i>Duanbangoxylon pakistanicum</i> sp. nov.
Wood	Diffuse porous	Diffuse porous
Vessel	Medium to large or very large, solitary as well in radial multiples of 2-8, t.d. & r.d. 160-432 um. 2-6 per sq. mm.	Small to large, solitary as well as in radial multiples of 2-4, t.d. & r.d. 60-250 um. 4-7 per sq. mm.
Parenchyma	Scanty vasicentric, forming 1-2 seriate sheath.	Scanty vasicentric, forming 2-4 seriate sheath.
Xylem rays	1-2 seriate (mostly 1), heterogenous, 3-22 cells high.	1-2 seriate (mostly 1) homogenous and, heterogenous, 6-22 cells high.

scanty vasicentric, forming 2-4 seriate sheath around the vessels, occasionally extending sideways. *Xylem rays* 1-2 (mostly 1) seriate, homogeneous and heterogeneous, homogeneous rays consisting wholly of procumbent cells, heterogeneous rays consisting of procumbent cells and 1-2 marginal row of upright cells at one or both ends; crystals present, rays 6-22 or 80-420 um in height, 13-22 per mm. Fibres aligned in radial rows, angular, nonseptate, thin walled.

Holotype: PK 42/1987, Ranikot Fort Area. district Dadu, Sindh, Pakistan.
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Horizon: Dada Formation.

Age: Subrecent.

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