

***SIDERINIUM PITENSIS* SP. NOV., A NEW SPECIES OF
SILICIFIED FOSSIL DICOT WOOD FROM TERTIARY
DEPOSITS OF SINDH, PAKISTAN.**

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Abstract

Siderinium pitensis sp. nov., a new silicified stem fossil is described from Tertiary rocks of Dada formation exposed near Ranikot fort area, district Dadu, Pakistan. The xylotomical features of the present fossil wood show close affinities with the genus *Sideroxylon* of the family Sapotaceae.

Introduction

The present paper deals with the new species of silicified dicot stem fossil belonging to the family Sapotaceae, which was collected from Ranikot fort area in 1976 by Rajput and Khan. The fossiliferous locality is 22 Km in west of Sunn railway station in the district Dadu of Sindh, Pakistan (Lat. 25^o.45 - 26^o.00. N. Long. 67^o.45. - 68^o.00. E.).

The stratigraphy of the Cenozoic of the region has been dealt with by William (1958), Jone (1960), Shah (1977) and Iqbal & Shah (1980). The general stratigraphical succession is as under:-

Subrecent
to ----- Dada Formation.
Pleistocene
Upper Miocene
to ----- Manchhar Formation.
Pleistocene
Lower Miocene
to ----- Gaj Formation.
Middle Miocene
Discontinuity
Oligocene ----- Nari Formation.
Discontinuity
Eocene ----- Khirthar Formation.
----- Tiyon Formation.
----- Laki Formation.
----- Lakhara Formation.
Paleocene ----- Ranikot Group ----- Bara Formation.
----- Khadro Formation.

The presence of the fossil woods in the Tertiary deposits of Sindh was indicated by Blanford (1876), also Pascoe's report of 1934, published as Manual in 1962. The fossil woods so far described from Sindh are as follows:

Araucarioxylon sp. Rajput & Khan (1984).

Sapindoxylon petarensis Khan & Rehmatullah (1968).

Albizioxylon dhaproense Khan & Rehmatullah (1971).

Pamoxylon amriense Khan *et al.*, (1972).

Laurinoxylon rehmanense Khan & Rajput (1976).

Palmoxylon surangei Lakhanpal (1955) Rehmatullah *et al.*, (1984).

Cynometroxylon ranikotensis Rajput & Khan (1982).

Pterocarioxylon ranikotensis Rajput & Khan (1982).

Cynometroxylon indicum Chowdhari & Ghosh (1946), Saeed *et al.*, (1984).

Material and Methods

Specimen No. RK.20: The material consists of a single piece of brown silicified stem fossil measuring ca. 12 X 8 cm (Fig. 1).

The anatomical sections were prepared by the conventional method of cutting, grinding and embedding in balsam, as described by Rajput & Khan (1976). Staining of these sections was not needed due to the presence of Hydrated Iron Oxide. 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. *Growth rings* absent. *Vessel* medium to large sized, solitary as well as in radial multiples of 2-3 and more, unevenly distributed in ground mass and 3-7 per sq. mm., vessel are mostly empty, in some vessels tylosis are present (Fig.1 B, Fig.2 A). *Parenchyma* apotracheal which are arranged in uniseriate lines, mostly regular, but sometime, forming thin bands due to the aggregation of cells (Fig.1 A, Fig.2). *Xylem rays* are numerous, mostly biseriate rarely uniseriate, 15-30 μ m in width, 10-18/mm., ray tissue heterogeneous, ray heterocellular consisting of procumbent cells in the middle portion and 1-5 tangential row of upright cells at the one or the both ends, 9-34 cell and 180-700 μ m high (Fig.1 E, Fig.2 BC). *Fibres* aligned in more or less distinct radial rows between the two consecutive xylem rays.

Elements: *Vessels* thick walled, wall about 5-7 μ m thick, round to oval in shape, tangential diameter 90-260 μ m., radial diameter 110-360 μ m.; vessel members 350-800 μ m in length; perforation simple, perforation plate transverse (Fig.1 G, Fig.2); intervessel pit pairs are medium to large sized, 8-12 μ m in diameter, alternate, circular in shape and crowded (Fig.1 H); vessel-parenchyma and vessel-ray pits not observed. *Parenchyma cells* thin walled, round to oval in shape, diameter 10-25 μ m. *Ray cells* thin walled, round to oval in shape, tangential diameter 8-18 μ m and radial length 20-35 μ m. *Fibre cells* are polygonal in shape, thick walled, nonseptate, 5-12 in diameter.

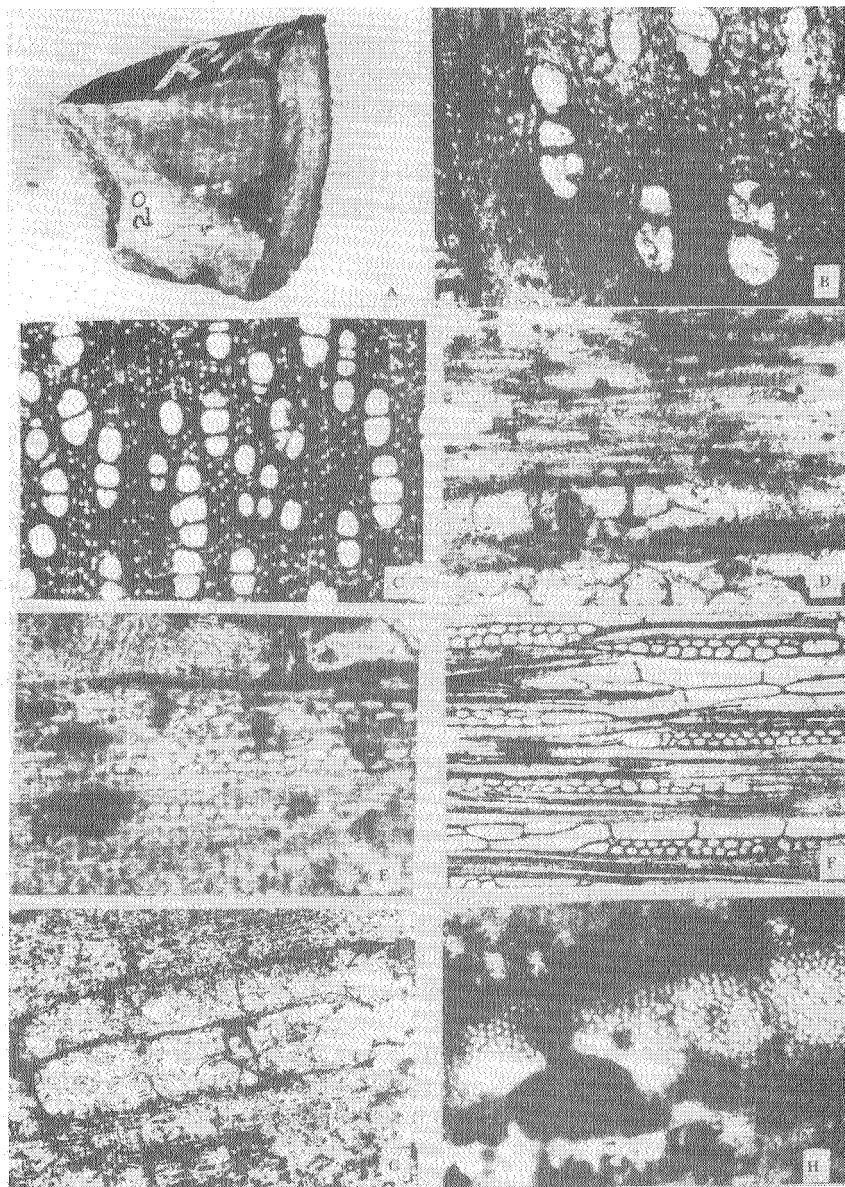


Fig.1. A. *Siderinium pitensis* sp. nov., Macrophotograph of the fossil wood, B. *Siderinium pitensis* sp. nov. Cross section showing distribution and type of the vessels and parenchyma. X 150, C. *Sideroxylon grandifolium*. Cross section showing similar type and distribution of vessels and parenchyma. X 150, D. *Siderinium pitensis* sp. nov. Tangential longitudinal section showing distribution of xylem rays and vessels with tylosis. X 150, E. *Siderinium pitensis* sp. nov. Tangential longitudinal section enlarged terminal portion of the xylem rays. X 300, F. *Sideroxylon grandifolium* sp. nov. Tangential longitudinal showing xylem rays. X 300, G. *Siderinium pitensis* sp. nov. Radial longitudinal section showing fibre-ray cutting and perforation plate of vessels. X 300, H. *Siderinium pitensis* sp. nov. Radial longitudinal section showing pits on the wall of the vessels. X 600.

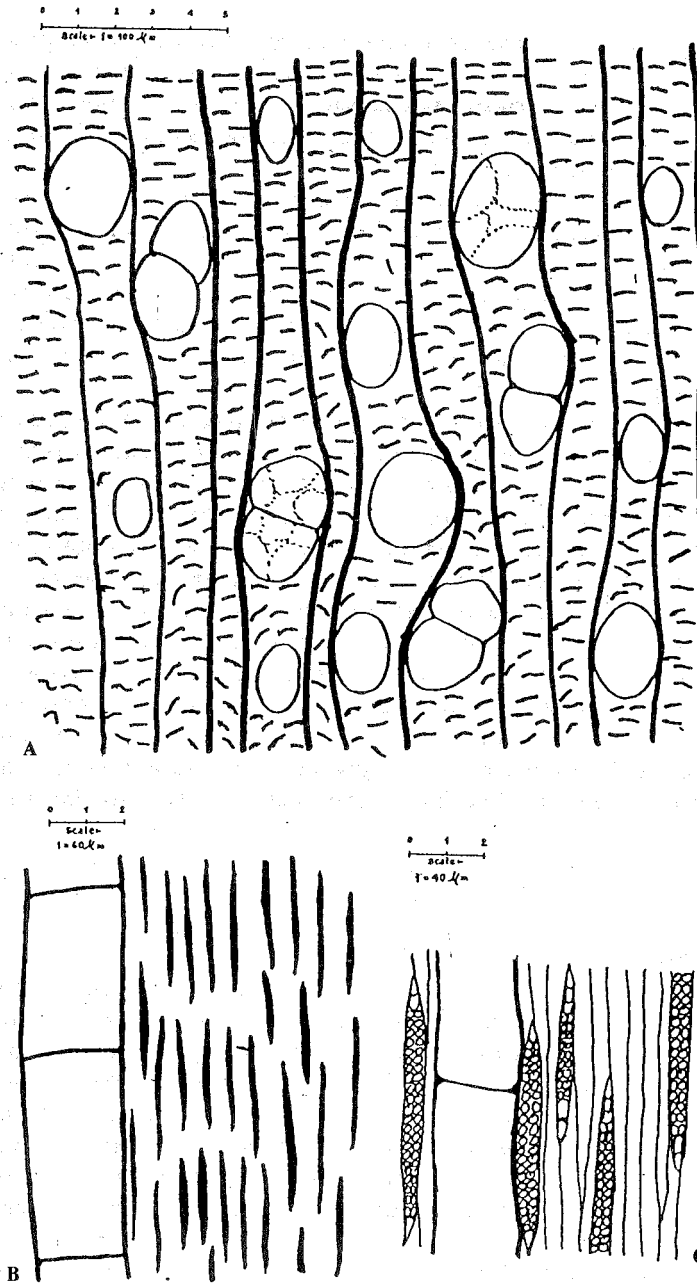


Fig.2. *Siderinium pitensis* sp. nov. A. C.S. showing nature and distribution of vessels and parenchyma, B. T.S. showing perforation plate of vessels and distribution of xylem rays, C. T.S. showing enlarged xylem rays and fibres.

Comparison and Discussion: The important diagnostic features of the present fossil wood are: Vessel medium to large, mostly arranged in radial multiples of 2-3 and more, perforation simple, intervessel pits alternate, circular and crowded; parenchyma apotracheal in close regular uniseriate lines, xylem rays uni or biseriate heterogeneous and fibres thick walled nonseptate.

The combination of the above characters are found in the modern wood of some members of Euphorbiaceae, Rubiaceae, Ebenaceae and Sapotaceae (Metcalf & Chalk 1950). However the present fossil wood resembles more closely to the genus *Sideroxylon* of the family Sapotaceae. This relationship has been closely worked out by Prakash & Awasthi (1970), who for the first time reported fossil wood from the Tertiary deposits of Eastern India, resembling to the genus *Sideroxylon* and assigned the fossil to a new genus the *Siderinium*.

Sideroxylon of the family Sapotaceae comprises of about 100 species, mostly evergreen, laticiferous trees, sometime found as shrubs. This genus is widely distributed throughout the tropics of both hemispheres and also extends into Australia, New Zealand, North Folk Island, Southern Africa and Medeira (Willis, 1966). In Pakistan, *Sideroxylon inerme* L., a cultivated species is reported by Malik (1984).

Comparison with fossil record: Owing to its close resemblance, the present fossil wood is being compared with the *Siderinium deomaliense* of the family Sapotaceae (Prakash & Awasthi 1970). The present fossil wood shows some differences from *Siderinium deomaliense*, such as having medium to large sized vessels and smaller rays (Table 1). Hence, *Siderinium deomaliense* and the presently described wood may not be considered as perfect match. On the basis of xylotomical feature which are significant enough to separate it as a new taxa, the present wood is named as *Siderinium pitensis* sp. nov. The specific epithet indicates the prominent pits in the vessels of this species.

Diagnosis

Siderinium pitensis sp. nov.

Wood diffuse porous. *Growth rings* absent. *Vessel* medium to large sized, mostly in radial multiples 2-3 or more, rarely solitary, round to oval, t.d. 90-260 μm r.d. 110-360 μm , 3-7 per sq. mm., perforation simple; intervessel pit medium to large sized, simple, alternate, circular and crowded. Tylosis rarely present. *Parenchyma* apotracheal, mostly regular in uniseriate lines. *Xylem rays* mostly biseriate 12-18 per mm, 9-34 cells high; ray tissue heterogeneous, ray heterocellular, consisting of procumbent cells in the middle portion and 1-5 marginal row of upright cells present on one or both ends of the rays. *Fibres* cells small, polygonal, 5-12 μm in diameter, nonseptate, thick walled.

Holotype: RK.20/76, Ranikot Fort Area, District Dadu, Sindh, Pakistan. M. T. M. Rajput & K. M. KHan, (1976) Palaeobotany Museum Department of Botany, University of Sindh, Jamshoro, Sindh, Pakistan.

Horizon: Dada Formation.

Age: Subrecent.

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

Species	Wood	Vessels	Parenchyma	Xylem Rays	Fibres
<i>Siderinium deomaliense</i> Prakash & Awasthi, 1970	Diffuse porous	Solitary, mostly in radial multiples of 2-8, t.d. 32-176 μm . r.d. 20-192 μm . 15-50 per sq. mm. Pits simple 2.4 μm . in diameter.	Apotracheal, mostly regular, arranged in uniseriate lines.	Mostly 2, rarely 1-3 seriate, 11-77 cells high, 10-15/sq. mm. Ray heterogeneous, consisting of procumbant cells in middle portion, with 1-3 tangential upright cells.	Libriform, nonseptate.
<i>Siderinium pitensis</i> sp. nov.	Diffuse porous	Solitary, mostly in radial multiples of 2-3 and more, t.d. 90-260 μm . r.d. 110-360 μm . 3-7 per sq. mm. Pits large, 8-12 μm . in diameter.	Apotracheal, mostly regular, arranged in uniseriate lines.	Mostly 2, rarely 1 seriate, 9-34 cells high, 12-18/sq. mm. Ray heterogeneous, consisting of procumbant cells in middle portion, with 1-5 tangential upright cells.	Libriform, nonseptate.

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