

# FOSSIL WOOD OF *BAUHINIA* FROM THE SIWALIK BEDS OF KALAGARH, U.P.

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## Abstract

This paper deals with the fossil wood of *Bauhinium miocenicum* gen et sp. nov. of the family Leguminosae collected from the Siwalik beds of Kalagarh, Pauri Garhwal District in Uttar Pradesh.

## Introduction

The fossil wood described in the present paper was recovered from Kalagarh, which is situated at the foot hills of Siwalik in Pauri Garhwal District, U. P. Kalagarh through oversight had so far been placed in Bijnor District (Prakash, 1978, 1981; Trivedi & Ahuja, 1978ab, 1980; Trivedi & Misra, 1978, 1980). Recently, the critical study of toposheets shows that Kalagarh actually belongs to Pauri Garhwal District (29°35' N, 78°45' E).

The Siwalik range of Kalagarh is rich in fossil plants mostly preserved as petrified woods. This is the first authentic record of the petrified wood belonging to the genus *Bauhinia* Linn. of the family Leguminosae. The other leguminous taxa known from this region are *Cassinium borroahii* (Prakash) Prakash (Prakash, 1978), *Cynometroxylon holdeni* Prakash & Bande (1980), *Dialiumoxylon kalagarhense* Trivedi & Misra (1978) and *Hopeoxylon eosiamensis* Prakash (1981).

## Systematic Description

Family—Leguminosae

Genus—*BAUHINIUM* gen. nov.

*Bauhinium miocenicum* sp. nov.

(Pl. 1, Figs. A-E)

The investigation is based on a single silicified wood piece measuring 3 cm in diameter and 4 cm in length. The fossil wood is greyish brown in texture and well preserved.

*Topography*—Wood diffuse porous. *Growth rings* not seen. *Vessels* solitary and also in radial groups of 2-3 embedded in tangential bands of parenchyma or fibrous tissue or partly in each, occluded with resinous substance, 7-10 per sq mm. *Parenchyma* paratracheal and paratracheal zonate; paratracheal parenchyma vasicentric, relatively scanty forming 1-2 seriate interrupted sheath; paratracheal zonate parenchyma forming bands up to 6 cells wide which alternate with the fibrous bands of mostly equal width; parenchyma cells arranged in radial rows (Pl. 1, figs. A-B). *Rays* 1-3 seriate, mostly biseriate; ray tissue

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heterogeneous, rays composed of procumbent cells in the middle part and 1-3 rows of marginal upright cells at the ends, 9-16 cells (265-460  $\mu\text{m}$ ) high, 12-14 per mm; rays storied forming ripple marks (Pl. 1, Figs. C, D). *Fibres* libriform, not arranged in radial rows, in the form of regular tangential bands alternating the parenchyma bands of almost equal width.

*Elements*—*Vessels* oval in transverse section, t.d. 132-176  $\mu\text{m}$ , r.d. 220-270  $\mu\text{m}$ , segments storied vessel member 176-248  $\mu\text{m}$  long with truncate or slightly tailed end, perforation simple; intervessel pit pairs bordered, alternate, orbicular (Pl. 1, Fig. E). *Parenchyma cells* thin-walled and filled with some content. *Ray cells* filled with gummy infiltrations; upright cells with vertical height 22-35  $\mu\text{m}$ , radial length 12-18  $\mu\text{m}$ ; procumbent cells 12-16  $\mu\text{m}$  in vertical height and 24-40  $\mu\text{m}$  in radial length. *Fibres* non-septate.

*Affinities*—The noteworthy features of the present fossil wood in addition to banded parenchyma are 1-3(2) seriate, heterocellular, storied rays showing ripple marks and non-septate fibres. These anatomical features are shared by the fossil wood with those of extant *Bauhinia* Linn. of the family Leguminosae. *B. anguina* Roxb., *B. malabarica* Roxb., *B. purpurea* Linn., *B. recemosa* Linn., *B. retusa* Ham., *B. reticulata* D. C., *B. vahlii* W & A., were studied in detail with the help of thin sections available at the Xylarium of Birbal Sahni Institute of Palaeobotany and published descriptions and figures (Gamble, 1902; Pearson & Brown, 1932; Ramesh Rao & Purkayastha, 1972) in order to find out the living counterpart of the present fossil wood. The above study revealed that *B. retusa* shows close agreement in almost all the structural details with that of the present fossil wood. However, there is a slight difference in the frequency of vessels and rays of the two.

The fossil wood showing affinities with the modern wood of *Bauhinia* was reported by Rawat in 1965 from the Siwalik beds of Mohand, district Saharanpur, U. P. under the generic name *Bauhinioxylon*. As Rawat did not give any description and illustration of this fossil wood, the genus is not valid according to the International Code of Botanical Nomenclature; hence, it is proposed to institute a new name *Bauhinium* for the fossil woods *Bauhinia*. In view of the closest resemblance of the present fossil wood with the modern wood of *Bauhinia*, it is assigned to *Bauhinium* and named as *Bauhinium miocenicum* sp. nov.

The present fossil wood was also compared with the fossil wood similar to *Bauhinia* described by Ramanujam and Rao (1966). In this case the rays are 1-2 seriate and 10-22 cells high, parenchyma bands are narrower than the fibrous bands, whereas in our specimen the xylem rays are 1-3 seriate (mostly biseriate), 9-16 cells high and parenchyma is in the form of regular tangential bands alternating the fibrous bands of almost equal width.

*Bauhinia* Linn. is a large genus having about 300 species widely scattered throughout the tropics of the world. The species *B. retusa*, with which the fossil wood resembles closely is a small to medium-sized tree, distributed in the sub-Himalayan tract and outer Himalayas from Bias to Nepal ascending up to 1300m and is also found in Chotanagpur and on the slopes of Eastern Ghats and in the parts of Madhya Pradesh and Mysore but rather scarce (Ramesh Rao & Purkayastha, 1972).

*Generic Diagnosis*—Wood diffuse-porous. *Growth rings* inconspicuous or absent. *Vessels* large to medium sized or small, solitary or in radial rows of 2-3 or more, open or tylosed or with gum deposits; vessel segment short, truncate, or abruptly tailed; perforation simple; intervessel pit-pairs alternate, bordered, orbicular. *Parenchyma* paratracheal sparse or relatively abundant, occurring as patches round the vessels, mostly forming broad tangential, straight or wavy bands which alternate with similar bands of fibrous tissue,

*Rays* 1-3 heterogeneous, storied or non-storied, when storied forming ripple marks. *Fibres* semilibriform to libriform; arranged in tangential bands, non-septate.

*Specific Diagnosis*—Wood diffuse-porous. *Growth rings* not seen. *Vessels* solitary and also in radial groups of 2-3, t.d. 132-176  $\mu\text{m}$ , r.d. 220-270  $\mu\text{m}$ , 7-10 per sq mm, occluded with resinous substance, vessel segment 176-248  $\mu\text{m}$  long with truncate or slightly tailed end; perforation simple; intervessel pit-pairs alternate, bordered, orbicular. *Parenchyma* paratracheal and paratracheal zonate; paratracheal parenchyma vascentric relatively scanty forming 1-2 seriate interrupted sheath; paratracheal zonate parenchyma forming bands of up to 6 cells wide which alternate with the fibrous bands of mostly equal width; parenchyma cells arranged in radial rows and filled with some substance. *Rays* 1-3 seriate, mostly biseriate, ray tissue heterogeneous, rays composed of procumbent cells in the middle portion and 1-3 rows of upright cells at the ends, 9-16 cells (265-460  $\mu\text{m}$ ) high, 12-14 per mm; rays storied, forming ripple marks, cells filled with gummy infiltrations. *Fibres* libriform, not arranged in radial rows, in the form of regular tangential bands alternating with the parenchyma bands of almost equal width, non-septate.

*Holotype*—B. S. Trivedi Collection No. S. 20, Botany Department, Lucknow University, Lucknow.

*Locality*—Sukhasot, a nalah in Kalagarh.

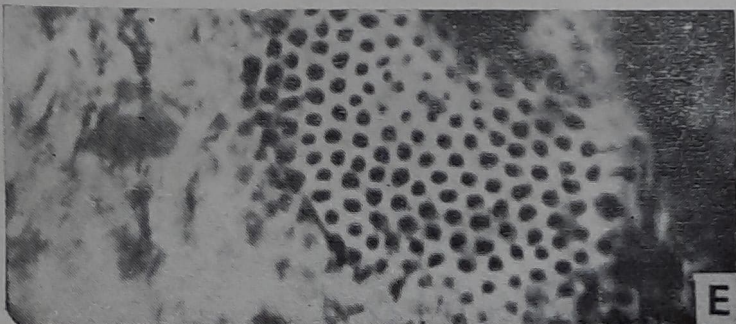
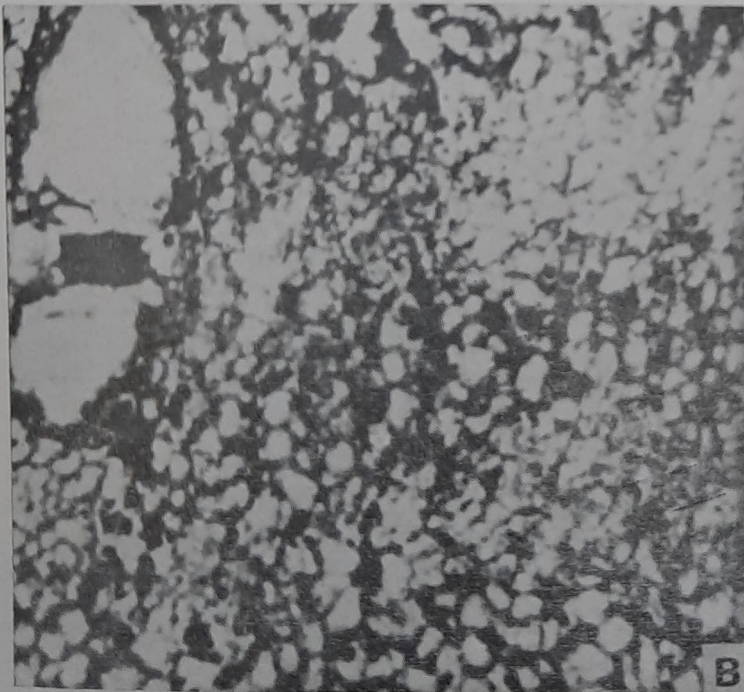
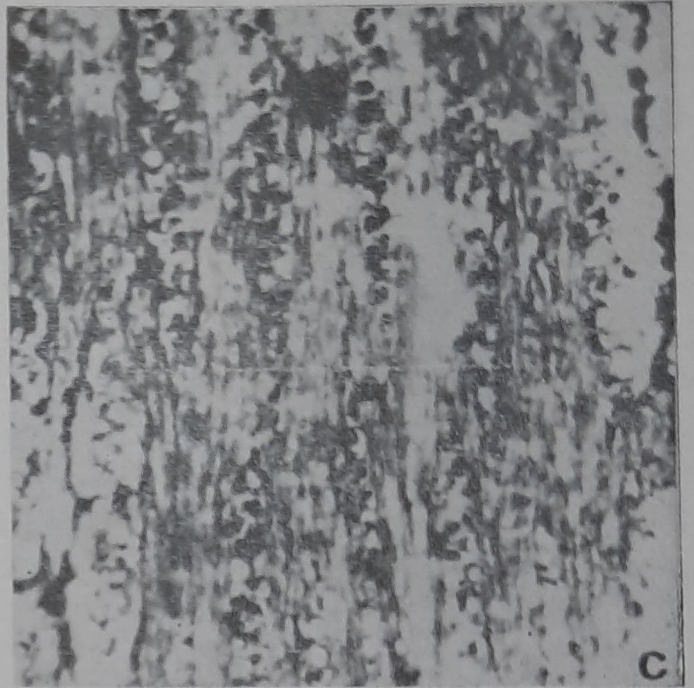
*Age*—Mio-Pliocene (Middle Siwalik).

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### References

- GAMBLE, J. S. (1962). *A Manual of Indian timbers*. London.
- PEARSON, R. S. & BROWN, H. P. (1932). *Commercial Timbers of India*. 1. Calcutta.
- PRAKASH, U. (1978). Fossil woods from the Lower Siwalik beds of Uttar Pradesh, India. *Palaeobotanist*, **25** : 376-392.
- PRAKASH, U. (1981). Further occurrence of fossil woods from the Lower Siwalik beds of Uttar Pradesh, India. *Palaeobotanist*, **28-29** : 374-388.
- PRAKASH, U. & BANDE, M. B. (1980). Some more fossil woods from the Tertiary of Burma. *Palaeobotanist*, **26**(3) : 261-278.
- RAMANUJAM, C. G. K. & RAO, M. R. (1966). A fossil wood resembling *Bauhinia* from the Cuddalore Series of South India. *Curr. Sci.*, **35** (22) : 575-577.
- RAMESH RAO, K. & PURKAYASTHA, S. K. (1972). *Indian Woods*. 3. Dehradun.
- RAWAT, M. S. (1955). *Blechnoxylon indicum* gen. et sp. nov., a new dicotyledonous fossil wood from India. *Proc. 51st and 52nd Indian Science Congr., Calcutta*, **3** : (Abst.) : 425.
- TRIVEDI, B.S. & AHUJA, M. (1978a). *Sterculioxylon kalagarhense* sp. nov. from Kalagarh (Bijour Distt.), U. P., India. *Curr. Sci.*, **47**(1) : 24-25.
- TRIVEDI, B.S. & AHUJA, M. (1978b). *Glutoxylon kalagarhense* sp. nov. from Kalagarh. *Curr. Sci.*, **47**(4) : 135.
- TRIVEDI, B. S. & AHUJA, M. (1980). *Dipterocarpaceoxylon nungarhense* n. sp. from Kalagarh (Bijour Distt.), India. *Palaeobotanist*, **26** (3) : 221-225.
- TRIVEDI, B. S. & MISRA, J. P. (1978). *Dialiumoxylon kalagarhense* n. sp. from Mio-Pliocene of Kalagarh, U. P., India. *Indian Jour. Bot.*, **1** : (1&2) : 57-6.
- TRIVEDI, B. S. & MISRA, J. P. (1980). Two new dipterocarpaceous woods from the Middle Siwalik of Kalagarh, Bijour Distt., India. *Palaeobotanist*, **26** (3) : 314-321.



## Explanation of Plate

*Bauhinium miocenicum* gen. et sp. nov.

- A. Cross section showing nature and distribution of vessels and parenchyma, (X50).
- B. A portion of cross section magnified to show alternate bands of parenchyma and fibres, ( $\times 110$ ).
- C. Tangential longitudinal section showing storied arrangement of xylem rays, ( $\times 50$ ).
- D. A portion of tangential longitudinal section magnified, ( $\times 100$ ).
- E. Bordered pits with orbicular aperture, (X600).