The Palaeobotanist, **27** (2): 221-225, 1981.

AESCHYNOMENOXYLON MALWAENSIS SP. NOV. FROM THE DECCAN INTERTRAPPEAN BEDS OF INDIA

M. B. BANDE

Birbal Sahni Institute of Palaeobotany, 53, University Road, Lucknow-226 007, India

ABSTRACT

A new species of *Aeschynomenoxylon*, *A. malwaensis*, has been described from the Deccan Intertrappean beds exposed near Barawaha in Madhya Pradesh. This is an additional evidence for the occurrence of fossiliferous Intertrappean beds in the Middle Traps which are usually considered to be poor in fossil contents.

Key-words — *Aeschynomenoxylon*, Leguminosae, Deccan Intertrappean Series, India.

सारांश

भारत की दक्खन अन्तर्ट्रेपी संस्तरों से प्राप्त एस्काइनोमीनॉक्सीलॉन मालवायेन्सिस न० जा०

– मोहन बलवंत बाँडे

मध्य प्रदेश में बड़वाह के निकट विगोपित दक्खन अन्तर्ट्रेपी संस्तरों से उपलब्ध **एस्काइनोमीनॉक्सीलॉन** की एक नवीन जाति, ए० **मालवायेन्सिस,** का वर्णन किया गया है। साधारणतः पादपाश्महीन समझे जाने वाले इन मध्य ट्रेपों में पादपाश्ममयी अन्तट्रपी संस्तरों की प्राप्ति का यह एक अतिरिक्त प्रमाण है।

INTRODUCTION

THE Deccan Traps are one of the major geological formations of the Peninsular India exposed mostly in Maharashtra and Madhya Pradesh extending into Gujarat and Rajasthan on one side and Bihar and Andhra Pradesh on the other. Outliers are found as far out as Rajahmundry at the head of the Godavari delta and in parts of the Ranchi plateau in Bihar (Krishnan, 1968b, p. 87). Recently their northern limit has been extended further up to Betwa in Jalaun District of Uttar Pradesh (Srivastava & Saha, 1975).

The Deccan Traps are stratigraphically divided into Upper Traps covering the areas of Bombay and Kathiawar, Middle Traps covering the areas of western Madhya Pradesh and the Malwa plateau and the Lower Traps covering the parts of eastern Madhya Pradesh and Maharashtra (Krishnan, 1968a, p. 405, 1968b, p. 88; Wadia, 1973, p. 281). While Wadia considers the Middle Traps as totally devoid of fossiliferous Intertrappean beds, Krishnan describes them as practically devoid of the Intertrappeans. Recent report of the Geological Survey of India (1976, p. 25) also mentions that the upper part of the Malwa plateau is almost free from Intertrappean beds. The only definite record of the occurrence of fossiliferous Intertrappean beds from Malwa is by Roy Chowdhury and Sastri (1958, p. 554) who mention the occurrence of some fossiliferous beds containing fragments of fossil woods alongwith *Physa* in the region of the Barwaha-Katkut area of Narbada Valley, Nimar District, Madhya Pradesh. It is thus clear that the Deccan Traps of Malwa region are usually considered to be poor in the occurrence of plant fossils. Contrary to these observations, recently the author came across a rich fossiliferous Deccan Intertrappean exposure near Barwaha in Madhya Pradesh. The locality is situated near the village Agarwara about 3 km north-west of Barwaha. Fossil woods, belonging to both dicotyledons and monocotyledons, were collected from this locality. However, the author is not sure whether

this is the same locality as mentioned by Roy Chowdhury and Sastri (1958). A preliminary study of this material resulted in the finding of fossil woods showing similarity with the already known species of *Ailanthoxylon* (Prakash, Verma & Dayal, 1967) and a new species of *Aeschynomenoxylon* Müller-Stoll & Mädel (1967) which is described below.

SYSTEMATIC DESCRIPTION

FAMILY—LEGUMINOSAE

Genus — *Aeschynomenoxylon* Müller-Stoll & Mädel 1967

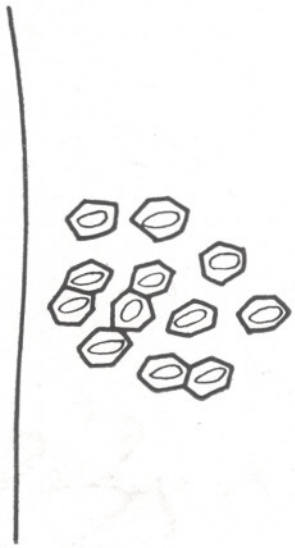
Aeschynomenoxylon malwaensis sp. nov.

Pl. 1, figs 1-6; Text-fig. 1

The description of the species is based on a well-preserved piece of silicified wood, about 8 cm in length and 3 cm in diameter. The fossil is black inside and brown on its outer surface.

Topography — Wood diffuse-porous. *Growth rings* absent (Pl. 1, fig. 1). *Vessels* small to medium in size, mostly solitary, also in radial multiples of 2-3, rarely in clusters, evenly distributed, 2-3 per sq mm (Pl. 1, figs 1, 2). *Parenchyma* paratracheal, in the form of 1-2 seriate sheath and extending laterally to form 2-3 seriate extensions of aliform to aliform-confluent parenchyma (Pl. 1, figs 1, 2). *Xylem rays* fine, visible on the transverse surface as straight, black lines running radially, evenly distributed, 6-8 per mm (Pl. 1, figs 1, 2), 1-4 (mostly 2-3) seriate or 20-60 μm in width and 5-30 cells or 90-825 μm in height; ray tissue homogeneous, rays made up of procumbent cells only (Pl. 1, fig. 4). *Fibres* forming the ground mass of the wood, angular in cross-section, aligned in radial rows in between the rays (Pl. 1, figs 1, 2).

Elements — Vessels thin-walled, circular to oval when solitary, with flat contact walls when in groups, t.d. 75-150 μm, r.d. 30-150 μm; vessel members 100-225 μm in length with oblique ends; perforations simple; intervessel pit-pairs bordered, alternate to opposite, 4-6 μm in diameter, oval to polygonal in shape with lenticular apertures (Pl. 1, fig. 3; Text-fig. 1). *Parenchyma cells* thin-walled, 20-30 μm in diameter and 40-120 μm in length. *Fibres* fusiform, 20-75 μm in diameter and 250-325 μm in length, partly storied (Pl. 1, figs 5, 6); inter-fibre pits simple, 1-2 seriate, mostly on the radial walls, 8-10 μm in diameter (Pl. 1, fig. 5).



TEXT-FIG. 1 — *Aeschynomenoxylon malwaensis* — Intervessel pit-pairs showing polygonal borders and lenticular apertures × 580.

DISCUSSION

Important anatomical characters of the fossil wood such as small to medium-sized vessels, vasicentric and aliform to aliform-confluent parenchyma, fine, homogeneous rays and the characteristic fusiform fibres with simple pits on their radial walls clearly indicate the affinities of the present fossil to the extant genus *Aeschynomene* Linn. of the family Leguminosae (Metcalfe & Chalk, 1950, pp. 519-525; Prakash, 1961, 1962).

Slides of only one species of *Aeschynomene*, *A. hispida* Willd., were available for comparison besides description and photographs of one more species, *A. sensitiva* Sw. (*Prakash*, 1961, pl. 1, figs 2-7). Both the species, although resembling the fossil in most of the anatomical characters, differ from it in the structure of xylem rays. The xylem rays, which are only 1-2 seriate in both the living species, are broader, 1-4 seriate in the fossil wood from Barwaha. Moreover, the rays are storied in *A. sensi-*

tiva, a condition not found in the fossil wood. The fossil was also compared with the only known species of *Aeschynomenoxylon*, *A. tertiarum* (Prakash) Müller-Stoll & Mädel (1967) described from the Deccan Intertrappean beds of Mohgaon Kalan. *A. tertiarum* differs markedly from the present fossil in a number of anatomical characters. Thus the vessels in *A. tertiarum* are smaller in size (t.d. 45-110 μm; r.d. 52-90 μm) as compared to those of the fossil (t.d. 75-150 μm; r.d. 30-150 μm); their frequency is also less than in the present fossil. Parenchyma in *A. tertiarum* is diffuse and in the form of 1-4 seriate, continuous tangential parallel running bands while in the fossil under discussion the parenchyma is vasicentric and aliform to aliform-confluent. The xylem rays in *A. tertiarum* are mostly uniseriate, rarely partially biseriate and up to 11 cells high, but in the fossil wood the rays are 1-4 (mostly 2-3) seriate and up to 30 cells in height. Lastly, the fibres, although quite similar in both the species, are non-storied in *A. tertiarum* as against partly storied fibres in the fossil wood from near Barwaha. Under the circumstances the present fossil wood has been described as a new species of *Aeschynomenoxylon*, *A. malwaensis*, the specific name indicating its occurrence in the region of Malwa.

The genus *Aeschynomene* Linn. consists of about 150 species (Willis, 1973) distributed both in the Old and the New World. It is chiefly a tropical genus with a few species occurring in warm temperate areas. About one half of the species are hydrophytes, found in marshes, mud holes, rice paddies, along the stream banks. The others are more xeric, found in dry, waste places, pine barrens, oak woods, or on the rocky hillsides and sandy beaches (Rudd, 1955).

In India two species *Aeschynomene indica* Linn. and *A. aspera* Linn. have been recorded by Hooker (1879, pp. 151, 152). *A. indica* is a suffruticose annual, 30-91 cm in height occurring from Himalaya to Ceylon and Siam ascending to 1524 m in Kashmir and 1219·2 m in Kumaon. The other species, *A. aspera*, is a tall erect swamp species growing wildly in Bengal and Sylhet to Malacca and Ceylon.

SPECIFIC DIAGNOSIS

Aeschynomenoxylon malwaensis sp. nov.

Wood diffuse-porous. *Growth rings* absent. *Vessels* small to medium in size, t.d. 75-150 μm; r.d. 30-150 μm, mostly solitary, also in radial multiples of 2-3, rarely in clusters, 2-3 per sq mm; vessel members 100-225 μm in length with oblique ends; perforations simple; inter-vessel pit-pairs bordered, alternate to opposite, 4-6 μm in diameter, oval to polygonal in shape with lenticular apertures. *Parenchyma* vasicentric forming 1-2 seriate sheath around the vessels and extending laterally to form aliform to aliform-confluent parenchyma. *Xylem rays* 1-4 (mostly 2-3) seriate, up to 30 cells in height, 6-8 per mm, homogeneous, made up of procumbent cells only. *Fibres* polygonal in cross-section, fusiform in shape, partly storied, 20-75 μm in diameter and 250-325 μm in length; interfibre pits simple, numerous, 1-2 seriate, mostly on the radial walls.

Holotype — B.S.I.P. Museum no. 35335.

Locality — Agarwara near Barwaha, Madhya Pradesh.

Horizon — Deccan Intertrappean Series.

REFERENCES

GEOLOGICAL Survey of India (1976). Geology and mineral resources of the states of India. Part XI—Madhya Pradesh. *Geol. Surv. India Misc. Publ.*, **30** (11): 1-48.

HOOKER, J. D. (1879). *The Flora of British India*. Vol. **II**. Kent, England.

KRISHNAN, M. S. (1968a). *Geology of India and Burma*. Madras.

KRISHNAN, M. S. (1968b). The age of the Deccan Traps, pp. 87-94 in *Symposium on Deccan Trap Country*. Indian National Science Academy, New Delhi.

METCALFE, C. R. & CHALK, L. (1950). *Anatomy of the Dicotyledons*. Vol. **1**. Oxford.

MÜLLER-STOLL & MÄDEL (1967). Die Fossilen Leguminosen-Hölzer Eine Revision der mit Leguminosen verglichenen fossilen Hölzer und Beschreibungen alterer und neuer Arten. *Palaeontographica*, **119B**: 95-174.

PRAKASH, U. (1961). Fibres in the secondary xylem of *Aeschynomene*. *J. Arnold Arboret.*, **92** (4): 442-445.

PRAKASH, U. (1962). *Aeschynomene tertiara*, a new fossil wood from the Deccan Intertrappean beds

at Mahurzari near Nagpur, India. *Palaeobotanist*, **11** (1-2): 1-6.

PRAKASH, U., VERMA, J. K. & DAYAL, R. (1967). Revision of the genus *Gondwanoxylon* Saksena with critical remarks on the fossil woods of *Ailanthoxylon* Prakash. *Palaeobotanist*, **15** (3): 294-307.

ROY CHOWDHURY, M. K. & SASTRI, U. U. (1958). On the geology of the Barwaha-Katkut area of the Narbada Valley, Nimar District, Madhya Bharat. *Rec. geol. Surv. India*, **85** (4): 523-556.

RUDD, V. E. (1955). The American species of *Aeschynomene*. *Contr. United St. Nat. Herb.*, **32** (1): 1-172.

SRIVASTAVA, K. K. & SAHA, H. L. (1975). A recent find of Deccan Traps near Sala, Jalaun District, Uttar Pradesh. *Rec. geol. Surv. India*, **106** (2): 102-109.

WADIA, D. N. (1975). *Geology of India*. New Delhi.

WILLIS (1973). *A Dictionary of Flowering Plants and Ferns*. Cambridge.

EXPLANATION OF PLATE

PLATE 1

1. *Aeschynomenoxylon malwaensis* — Cross section to show the shape, size and distribution of vessels, paratracheal confluent parenchyma and the xylem rays. × 32. Slide no. 5989/35335.
2. *A. malwaensis* — Cross section enlarged to show non-libriform fibres. × 65. Slide no. 5989/35335.
3. *A. malwaensis* — Intervessel pit-pairs. × 200. Slide no. 5990/35335.
4. *A. malwaensis* — Tangential longitudinal section showing homogeneous xylem rays and fusiform fibres. × 95. Slide no. 5990/35335.
5. *A. malwaensis* — Radial longitudinal section showing simple pits on the radial walls of the fibres. × 160. Slide no. 5991/35335.
6. *A. malwaensis* — Radial longitudinal section showing storied fibres. × 65. Slide no. 5991/35335.

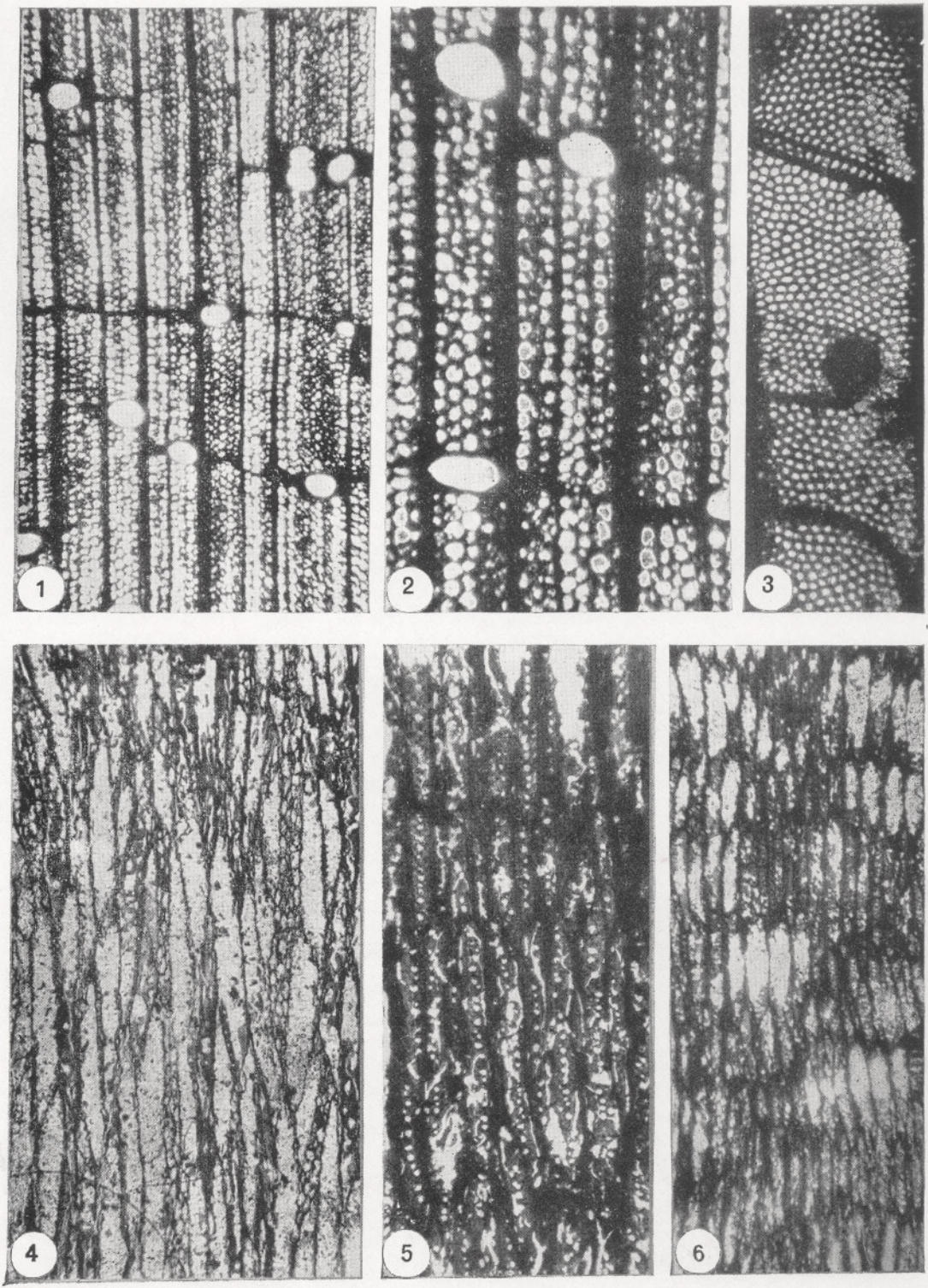


PLATE 1