

TWO SPECIES OF *AUSTRALOXYLON* FROM THE KAMTHI FORMATION OF CHANDRAPUR DISTRICT, MAHARASHTRA*

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ABSTRACT

Two species of *Australoxylon* viz., *A. kanhargaense* Prasad & Chandra and a new species *A. longicellularis* have been described. The form-genus *Australoxylon* is characterised by the presence of mixed type of tracheid pitting with clusters of 2, 3 and 4 pits disposed in groups. The crossfield pits are bordered.

INTRODUCTION

MARGUERIER (1971) instituted the form-genus *Australoxylon* to accommodate some pycnoxylic, decorticated secondary woods, characterised by the presence of araucaroid (alternate) and abietoid (opposite) type of tracheid pitting, collected from the African Lower Gondwana. In 1973, MARGUERIER described two new species of *Australoxylon*, viz., *A. teixeirae* from Karroo Formation of Mozambique and *A. natalense* from Ecca Formation of Natal. Both the species come from *Noeggerathiopsis*-bearing rocks and hence *Australoxylon* is presumed to be a cordaitalean member. In the present case the woods belong to Kamthi beds of Kanhargaon village, Chandrapur District, Maharashtra, from where we have identified several species of *Glossopteris* and a few pteridophytic remains.

Genus—***Australoxylon*** Marguerier (1971)

Australoxylon kanhargaense Prasad & Chandra (1978)

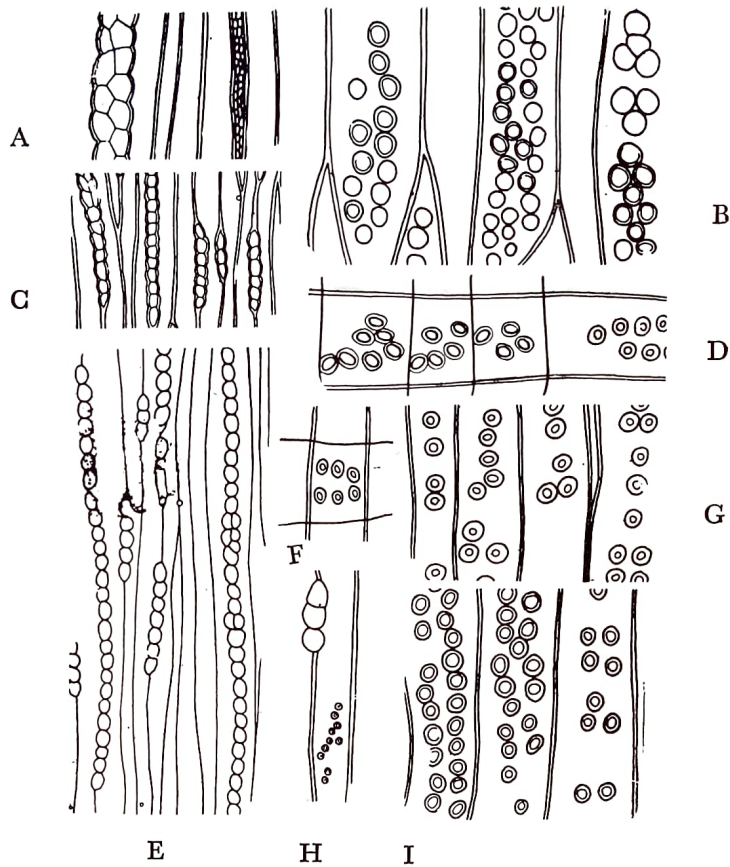
Pl. 1, Figs. 1-2 ; Text-figs. 1A—D

Description—The material consists of a single piece of decorticated secondary wood, measuring 25 cm in length and 19 cm in diameter. The secondary system shows distinct growth rings, demarcated by a narrow zone of crushed late-wood tracheids. Microscopically the growth rings are 5-7 mm wide. The medullary rays in cross section are placed at an interval of 3-6 tracheids. The rays are homogeneous, 1-2 seriate, 1-30 cells high, average height being 9-10 cells in 25 counts (Pl. 1, Fig. 1 ; Text-fig. 1C). The ray cells measure 15.3-35.7 μm in height and 11.9-32.3 μm in width. The tangential diameter of the tracheid is 25.5-42.5 μm . The tangential walls of the tracheids are pitted, pits 1-3 seriate, hexagonal, alternate and contiguous (Text-fig. 1A). The pits on the radial walls of tracheids are 1-3 seriate, circular, bordered, separate-contiguous and alternate-opposite. The radial diameter of the tracheids is 20.4-47 μm and that of pits is 5.1-12 μm . At many places the pits are arranged in clusters of 2, 3 and 4 (Pl. 1, Fig. 2). The pits in the crossfields vary from 1-7, circular, bordered (mostly 4 ; Text-fig. 1), measuring 3.5-8.5 μm in diameter.

Australoxylon longicellularis sp. nov.

Pl. 1, Figs. 3-7 ; Text-figs. 1 E—I

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Australoxylon kanhargaense Prasad & Chandra, 1978. Text-fig. 1 ; A. Pits on tangential tracheidal walls in T. L. S. $\times 60$, B. Clusters of 2, 3 and 4 pits on radial tracheidal walls in R. L. S. $\times 120$, C. Height and seriation of medullary rays in T. L. S. $\times 25$, D. Crossfield pits in R. L. S. $\times 120$, *Australoxylon longicellularis* sp. nov., E. Height and seriation of medullary rays in T. L. S. $\times 25$, F. Crossfield pits in R. L. S. $\times 120$, G. & I Mixed type of pitting and clusters of 2, 3 and 4 pits on radial tracheidal walls in R. L. S. $\times 120$, H. Pits on tangential tracheidal wall in T. L. S. $\times 60$.

Diagnosis—Pycnoxylic decorticated secondary wood ; growth rings distinct ; late wood zone 5-6 tracheids wide, rectangular in shape ; early wood tracheids squarish-polygonal ; medullary rays homogeneous, 1-2 seriate, 1-64 cells high, average height being 6-7 cells in 25 counts ; tangential walls of the tracheids show 1-2 seriate, circular, bordered, alternate-opposite (mixed type of pitting) ; pits often arranged in clusters of 2, 3 and 4 ; crossfield pits 3-7 (mostly 4), circular, bordered with subcircular-oval pit pores.

Holotype—B.S.I.P. Museum specimen no. 35367.

Locality—Kanhargaon Village, Chandrapur District, Maharashtra, India.

Horizon & Age—Kamthi Formation (Lower Gondwana), Upper Permian.

Description—The species is based on a single piece of decorticated wood, measuring 28 cm in length and 37 cm in diameter. The secondary wood is pycnoxylic with distinct growth rings. In cross section early wood tracheids are rectangular-squarish in shape, measuring 25-42.4 μm . The late wood zone comprises of 5-6 tracheids in width, tracheids are compressed with thick walls and reduced lumen, measuring 15.3-17 μm . In cross-section the medullary rays are placed at an interval of 2-6 tracheids. The rays are homogeneous, 1-2 seriate. The ray cells are circular-subcircular in shape, measuring 17-35.7 μm in height and 13.6-23.8 μm in width. The tangential diameter of the tracheids is 17-40 μm . The tangential walls of the tracheids show 1-2 seriate, circular, bordered, isolated pits, measuring 3.4-6.8 μm in diameter (Pl. 1, Fig. 4 ; Text-fig. 1 E, H). There is a great deal of variation in seriation and height of the medullary rays with in the same specimen. The medullary rays near the branch trace are 1-10 cells high and mostly bi-

Table A

Name of Species	Horizon & Locality	Radial trachied wall pits	Tangential tracheid wall pits	Medullary rays	Crossfield pits
1. <i>Australoxylon teixeirae</i> Marguerier (1973)	Karoo Formation, Mozambique	1—3 seriate, mixed type, groups of 3,4 and 5	Occasionally pitted	1-2 seriate, 1-36 cells high, average height 2-16 cells	1-10 (mostly 4-6) lumen large, elliptical, oblique
2. <i>A. natalense</i> Marguerier (1973)	Ecce Formation, Natal	1-3 seriate with bars of sanio	Absent	1-2 seriate, 1-40 cells high, average height 2-15 cells	1-70 (mostly 3-4), lumen circular, elliptic
3. <i>A. kanhargoaense</i> Prasad & Chandra (1978)	Kamthi Formation, Chandrapur District, India	1-3 seriate, mixed type, separate-contiguous pits arranged in clusters of 2, 3 and 4	1-3 seriate, hexagonal alternate and contiguous	1-2seriate, 1-30 cells high, average height 9-10 cells 25 counts	1-7cells (mostly 4) bordered, circular, oval
4. <i>A. longicellularis</i> sp. nov.	—do—	—do—		1-2 seriate, 1-64 cells high, average height 6-7 cells in 25 counts	3-7 cells (mostly 4) circular and bordered
5. <i>A. bengalense</i> (= <i>Dadoxylon bengalense</i>) Holden, 1917 Marguerier (1973)	Barakar Stage, Jharia Coalfield, Bihar, India	1-4 seriate, mixed type with groups of 2 to 5 pits	Absent	Uniseriate, 1-20 cells high 2-7	
6. <i>A. barakarensis</i> (= <i>Dadoxylon barakarensis</i>) Surange & Saxena, 1958 Marguerier (1973)	Barakar Stage, Kharkhari Colliery, Jharia Coalfield, Bihar, India	1-3 seriate, mixed type. Parenchyma present.	Uniseriate, contiguous	Uniseriate, 1-22 cells high 2—5	
7. <i>A. kharkhariensis</i> (= <i>Dadoxylon kharkhariensis</i>) Maithy, 1965 Marguerier (1973)	—do—	1-3 seriate mixed type, separate-contiguous. Pits arranged in groups of 2 and 3.	Uniseriate, contiguous oval with circular pit pores.	1-2 seriate, 1-29 cells, high, average height 6-7 cells	2-5 (sometimes 7), contiguous, elliptic with elliptic pit pores
8. <i>A. nicoli</i> (= <i>Dadoxylon nicoli</i>) Seward, Walton, 1956 Marguerier (1973)	Lower Beaufort, Malawi	1-4 seriate	Absent	1-20 cells high	1—6
9. <i>A. nicoli</i> (= <i>D. nicoli</i>) Seward, Henriques et al., 1967 Marguerier (1973)	Karoo Formation, Mozambique	1-4 seriate	Absent	1-2 seriate, 1-22 cells high	1—8
10. <i>A. duartei</i> (= <i>Dadoxylon duartei</i>) Japiassu, 1970 Marguerier (1973)	Morro Pelado Formation, Brazil	2-3 seriate	Absent	1-2 seriate, 2-20 cells high	4—6

seriate and rarely partially triseriate (Pl. 1, Fig. 5) and the rays from the outermost region of the wood are upto 64 cells high and are uni- partly biseriate (Pl. 1. Fig. 4 ; Text-fig. 1E). The average height of the medullary rays in the mature secondary wood are 6-7 cells high in 25 counts. The pits on the radial walls of the tracheids are 1-3 seriate (mostly biseriate), circular, bordered, alternate-opposite, separate-contiguous 8.5-10.2 μm in diameter. The pits are often arranged in clusters of 2, 3 and 4. The crossfield pits are 3-7 (mostly 4), circular-oval, bordered, measuring 5.1-8.5 μm in diameter (Pl. 1, Figs. 6, 7, Text-fig. 1 F).

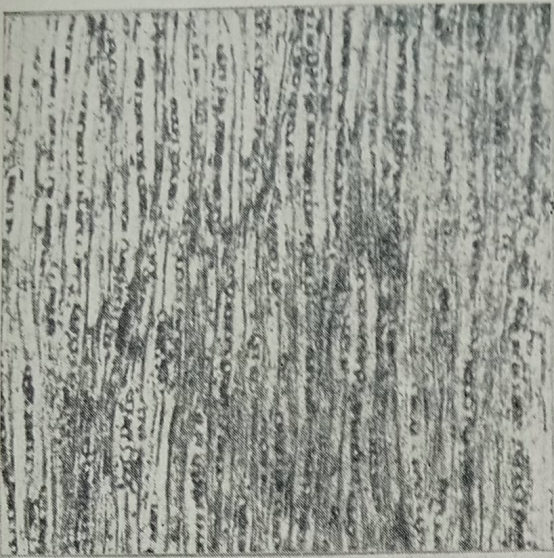
COMPARISON AND DISCUSSION

As the described woods show mixed type of tracheidal wall pitting with clusters of 2, 3 and 4 pits, they have been referred to the form genus *Australoxylon* Marguerier (1971). KRAEUSEL (1949) named such type of pitting as "Mischtypus" (mixed type). LEPEKHINA (1972) opined that the presence of mixed type pitting in Palaeozoic woods suggests primitive condition. Most of the woods described from Indian Lower Gondwana and Angaraland show mixed type of pitting. Also, several species of *Araucarioxylon* described by LEPEKHINA (1972) from Kuznetsk Basin show mixed type of tracheidal wall-pitting. However, the form genus *Australoxylon* shows pits arranged in clusters of 2-6, sometimes even more with bordered pits in the crossfields. MARGUERIER (1973) mentioned that three species of *Dadoxylon*, viz., *D. kharkhariense* Maithy (1965), *D. barakarensis* Surange & Saxena (1957), and *D. bengalense* Holden (1917), described from India show the typical characters of *Australoxylon*. Hence, the described woods are compared with the above species as well as with species from other Gondwana countries in Table-A.

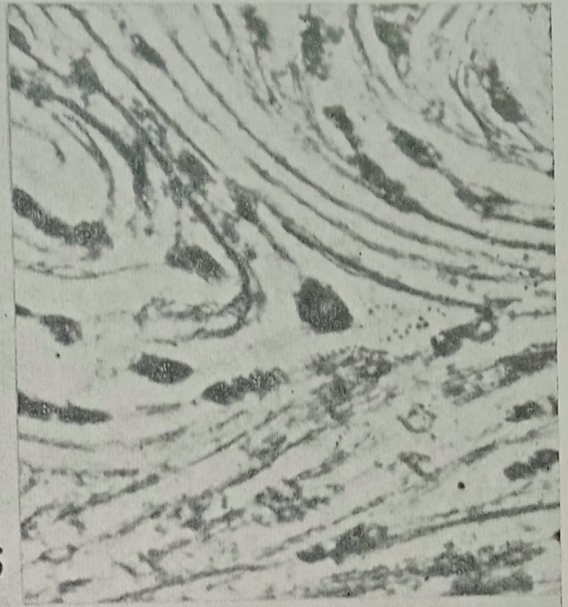
MUSSA (1978) described *Tordoxylon sanpaulense*, *Myelontordoxylon vittii*, *M. brazilense*, *Paratordoxylon compositi* from Irati Formation of Sao Paulo, Brazil which resemble *Australoxylon* in having groups of pits (rosette form pits) but they are different from *Australoxylon* in possessing incipient pith-core and also they are all supposed to be *Vertebraria*- type of complex axes.

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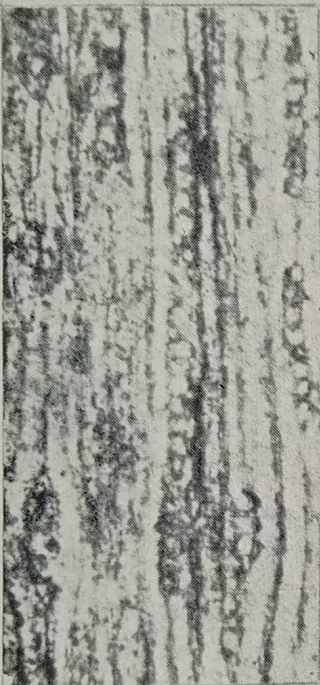
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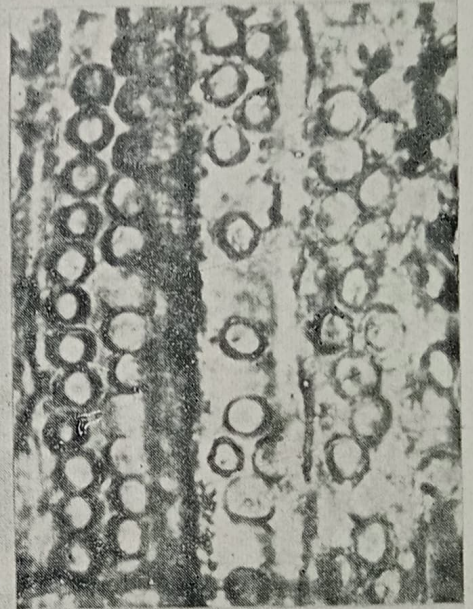
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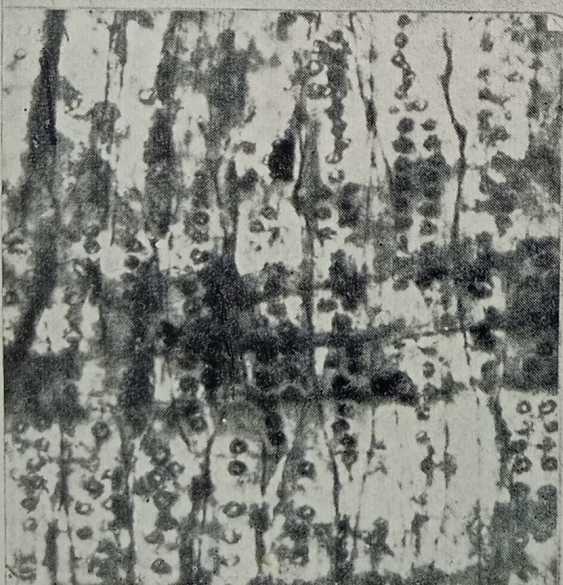
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EXPLANATION OF PLATE 1

Australoxylon kanhargaoense Prasad & Chandra, 1978.

1. Height and seriation of medullary rays in T. L. S. $\times 75$.
2. Biseriate mixed type of pits on the radial walls of the tracheids in R. L. S. $\times 500$.
Australoxylon longicellularis sp. nov.
3. Circular, bordered, isolated pits on tangential walls of tracheids at branch trace region in T. L. S. $\times 150$.
4. Height and seriation of medullary rays in T. L. S. $\times 75$.
5. Height and seriation of medullary rays at the branch trace region in T. L. S. $\times 75$.
- 6,7. Biseriate mixed type of pits with clusters of 2, 3, 4 pits in groups in R. L. S. $\times 100$.