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TWO NEW SPECIES, *ARAUCARIOXYLON SURANGEI* AND *A. LATHIENSE*, OF PETRIFIED WOODS FROM LOWER GONDWANA STRATA

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ABSTRACT

Two well-preserved petrified gymnospermous woods from Lathi locality of the Lower Gondwana (Lower Permian) have been described. The woods have been assigned to the genus *Araucarioxylon* Kraus. On account of their unique anatomical features, not found in other known species of *Araucarioxylon*, these have been described as new species, viz., *A. lathiense* and *A. Surangei*.

Key-words — *Araucarioxylon*, Petrified woods, Xylotomy, Permian, Lower Gondwana (India).

सारांश

अनावृतबीजी काष्ठाश्मों का अध्ययन-भाग 4. अधर गोंडवाना स्तर से अश्मीभूत काष्ठों की दो नई जातियाँ, ॲराकेरिऑक्सीलॉन सुरंगेयाई एवं ॲ० लाठीयेन्से – श्रीपद ऍन० अगाशे, के० आर० प्रसाद एवं ऍफ० सी० सुरेश

अधर गोंडवाना (अधर पर्मियन) के लाठी नामक स्थान से एकत्रित दो सुपरिरक्षित अश्मीभूत अनावृतबीजी काष्ठों का वर्णन किया गया है। इन काष्ठों को ॲराकेरिऑक्सीलॉन क्रॉस नामक वंश से नामांकित किया गया है। अराकेरिऑक्सीलॉन की अन्य विदित जातियों में न पाये जाने वाले इनके विशिष्ट लक्षणों के कारण इन्हें दो नई जातियों अर्थात् ॲ० लाठीयेन्से एवं ॲ० सुरंगेयाई के नाम से वर्णित किया गया है।

INTRODUCTION

THE investigation of Lower Gondwana strata of Maharashtra State was initiated by Agashe and Chitnis (1972, 1975, 1977, 1978) and this was confined to the miospore analysis of coal samples of Nagpur District. This work was further intensified by Agashe and Gowda (1978) who studied the petrified woods from the different Lower Gondwana localities in Maharashtra State.

In India, a number of workers like Holden (1917), Surange and Maithy (1961, 1962, 1963), Maheshwari (1965), Maithy (1965, 1967 1974), Kulkarni (1969), Kulkarni, Maithy and Surange (1969), Agashe and Chitnis (1971), Lakhanpal *et al.* (1975) and Agashe and Gowda (1978) have reported quite a number of petrified fossil woods from the different localities.

Reports of petrified woods from Maharashtra State include *Dadoxylon chandaensis* (Chitaley, 1949), *Planoxylon indicum*, (Vagyani & Mahabale, 1972), *Australoxylon kanhargaoense* (Prasad & Chandra, 1978), *Taxopitys indica* (Prasad & Chandra, 1978), *Araucarioxylon loharense* (Agashe & Gowda, 1978) and *Dadoxylon satnauriense* (Varadpande, 1978).

MATERIAL

The well-preserved wood is silicified type and measures 13 cm in length and 7 cm in diameter.

GENERIC DIAGNOSIS

Genus—*Araucarioxylon* Kraus, 1870

Wood homoxylic. *Growth rings* more or less distinct or absent. Polygonal or round tracheids, *pits* in uniseriate or multiseriate, araucaroid arrangement, spiral thickenings

absent, *crossfield pits* cupressoid, numerous. Wood parenchyma, ray tracheids and ducts absent. *Rays* uniseriate, rarely up to 5 seriate of various height from low (up to 10 cells high) to rather high (up to 50-60 cells high). Horizontal and tangential ray walls smooth and unpitted.

SPECIFIC DIAGNOSIS

1. *Araucarioxylon lathiense* sp. nov.

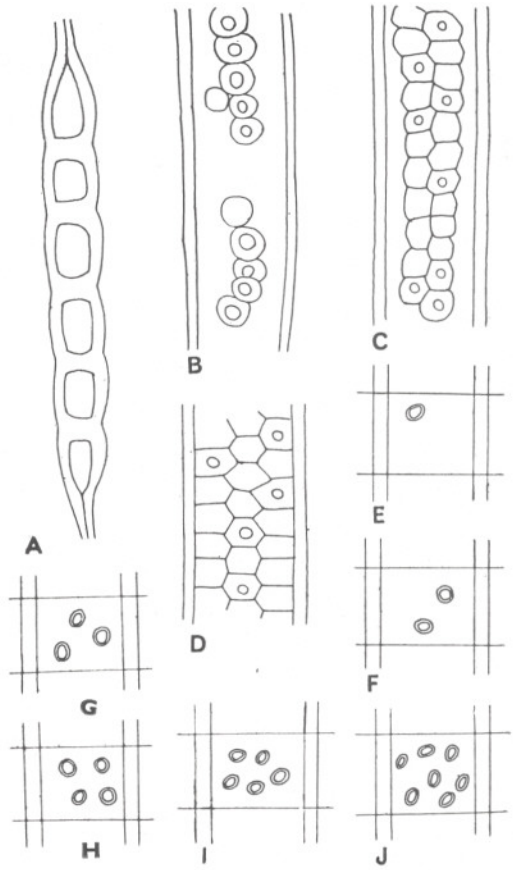
Growth rings distinct, ray uniseriate only, 1-27 cells in height with an average of 5 cells, *radial pits* 1-4 seriate, round, oval to hexagonal, crossfield pits 1-10 cupressoid with thin border. The name of the species has been given after the locality — Lathi — from where the specimen was collected.

Holotype — Specimen no. BUPW 735 and the slides prepared from it are deposited in the Department of Botany, Bangalore University, Bangalore.

Locality — Lathi, Chandrapur District, Maharashtra State.

Age — Permian (Lower Gondwana).

Growth rings distinct. In some places the tracheids appear to be very much crushed. Spring wood 150-160 cells wide, commonly rectangular measuring 50×35 μm. Autumn wood tracheids 20-25 cells wide, lumen narrow, rectangular and measure 30×15 μm. Transition from spring wood to autumn wood gradual (Pl. 1, fig. 1). *Medullary rays* uniseriate and range from 1-27 cells in height. Most common numbers of cells in medullary rays 3, 4 and 10. *Ray cells* 18 μm in height. *Radial pits* of araucaroid type range from uniseriate to tetraseriate, most commonly of biseriate and triseriate type (about 60%), separate or contiguous in uniseriate and biseriate types (Pl. 1, fig. 3; Text-fig. 1B, C). In biseriate to triseriate condition the pits are alternate and commonly form mesh-like appearance (Pl. 1, figs 3, 4; Text-fig. 1C, D), pits circular or slightly compressed and oblique in shape provided with circular to oval pore. Average diameter of each radial pit 6.2 μm. Crossfield pits 1-10, cupressoid, circular to oval with thin border (cupressoid-type). Generally field pits are 2-4 with an average diameter of 4 μm (Pl. 1, figs 5-7; Text-fig. 1E, J).



TEXT-FIG. 1 — *Araucarioxylon athiense* sp. nov.: **A.** Uniseriate medullary ray. **B-D.** Uniseriate to triseriate radial pits. **E-J.** Crossfield pits from 1 to 7.

Comparison — The wood is different from all the hitherto known species of *Araucarioxylon* and comes very close to *A. arberi* with regard to a number of field pits. Field pits in both the species range from 1-10, but our fossil differs from *A. arberi* with regard to the nature of medullary rays. *Medullary rays* range from 1-21 cells in *A. arberi*, while in our fossil wood they range from 1-27 cells. Hence, a new species, *A. lathiense* sp. nov., has been created and named after the locality from where the specimen was collected.

2. *Araucarioxylon surangei* sp. nov.

The fossil wood is well-preserved and of silicified type.

Diagnosis — Growth rings distinct. *Rays* uniseriate to biseriate, commonly uniseriate, 1-35 cells in height with an average of 4 cells. *Radial pits* 1-4 seriate, round to hexagonal, crossfield pits 1-11, cupressoid with thin border.

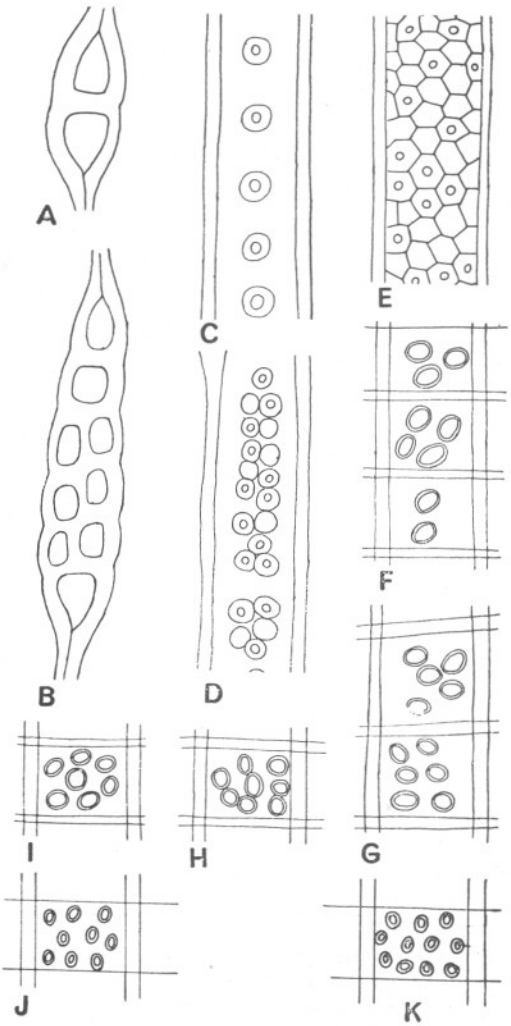
Holotype — Specimen no. BUPW 737 and the slides prepared are deposited in the Department of Botany, Bangalore University, Bangalore.

Locality — Lathi, Chandrapur District, Maharashtra State.

Age — Permian (Lower Gondwana).

Description & Comparison — Growth rings are distinct. Spring wood tracheids rectangular with broad lumen and 100-130 cells wide. Average size of tracheid is 52×42 μm. Autumn wood 5-15 cells wide and its tracheids narrow-lumened, 32×20.5 μm in size. Autumn wood tracheids are also rectangular in shape. Transition from spring wood to autumn wood is gradual (Pl. 1, fig. 8). *Medullary rays* range from 1-35 cells in height. Maximum number of rays 2 cells in height followed by 3, 10 and 4. *Rays* uniseriate and biseriate-type (Pl. 1, fig. 9; Text-fig. 2A, B). *Ray cells* oblong in shape and the average height of each medullary ray 25 μm. *Radial pits* araucaroid type, range from uniseriate to tetraseriate. When uniseriate the radial pits are either contiguous or separate. Biseriate pits mostly contiguous and arranged in either alternate or opposite manner (Pl. 1, fig. 10). Generally the pits are arranged in groups of 2, 3 or more (Text-fig. 2D). Triseriate and tetraseriate pits are of alternate type and form net-like structure (Pl. 1, fig. 11; Text-fig. 2E). *Pits* circular or slightly oblique in shape; when contiguous they are provided with a circular to oval pore. Average diameter of each radial pit 6·5 μm and that of lumen 5·5 μm. *Crossfield pits* cupressoid type and range from 1-11, most commonly 2-4 pits occur. *Field pits* round to oval in shape and measure 4·5 μm in average diameter (Pl. 1, figs 12-14).

The fossil wood shows distinct *growth rings*. *Medullary rays* range from 1-35 cells and *crossfield pits* range from 1-11. These characters except the presence of distinct growth rings are different in all the other known *Araucarioxylon* species. Hence, a new species, *A. surangei*, is created in the honour of Dr K. R. Surange.



TEXT-FIG. 2 — *Araucarioxylon surangei* sp. nov.: **A.** Uniseriate medullary ray. **B.** Biseriate medullary ray. **C.** Uniseriate radial pits. **D.** Radial pits in groups. **E.** Tetraseriate hexagonal radial pits. **F-K.** Crossfield pits from 1 to 11.

Discussion — Palaeobotanical explorations of Maharashtra carried during the past 7-8 years have brought to light several new fossil bearing localities, suggesting strongly the existence of a highly diversified flora during the Lower Gondwana period. The real picture of any past vegetation may be obtained only by studying the organic remains of the plants in various forms. Petrified plant material forms the best evidence of the past plant life because of the

varied anatomical characters which can be studied from it.

In the present woods pith, primary xylem or cortical tissues are not preserved. The secondary xylem is well-preserved in both the woods. The xylotomical studies of woods from Zaran Forest and Lathi areas exhibit remarkable resemblance. These were characterized by distinct growth rings, uniseriate to biseriate nature of rays (uniseriate being most common). Uniseriate to multiseriate radial border pits which are mostly typically araucaroid type in nature, i.e. horizontally compressed and hexagonal, arranged in groups and cupressoid crossfield pits with thin borders. On account of the presence of these characters, both the fossil woods have been assigned to the genus *Araucarioxylon* Kraus. However, these two woods differ from each other in characters such as thickness and height of medullary rays and number of crossfield pits and, therefore, differ from all the species of *Araucarioxylon* described hitherto.

The occurrence of these two species and *A. loharense* Agashe & Gowda (1978) from the Lower Gondwana horizons of Chandrapur District suggests that *Araucarioxylon* belonging to the family Araucariaceae was rather well-established conifer in Chandrapur District during the Lower Gondwana period.

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EXPLANATION OF PLATE

PLATE 1

1-7. *Araucarioxylon lathiense* sp. nov. BUPW No. 735
1. Transverse section showing growth rings; Slide no. TS. 1.
2. Tangential longitudinal section showing medullary rays; Slide no. T.L.S. 1.
3. Radial longitudinal section showing biseriate, alternate contiguous radial pits; Slide no. RLS. 1.
4. Radial longitudinal section showing triseriate alternate radial pits; Slide no. RLS 1.
5. Crossfield with 4 field pits; Slide no. RLS 1.
6. Crossfield with 9 field pits; Slide no. RLS 1.
7. Crossfield with 10 field pits; Slide no. RLS 1.

8-14. *Araucarioxylon surangei* sp. nov. BUPW No. 737.
8. Transverse section showing growth rings; Slide no. TS 1.
9. Tangential longitudinal section showing medullary rays; Slide no. TLS 1.
10. Radial longitudinal section showing biseriate, alternate and opposite radial pits; Slide nos. RLS 1, 2.
11. Radial longitudinal section showing triseriate alternate contiguous radial pits; Slide nos. RLS 1,2.
12. Crossfield with 5 field pits; Slide nos. 1-3.
13. Crossfield with 6 field pits; Slide nos. 1-3.
14. Crossfield with 11 field pits; Slide nos. 1-3.

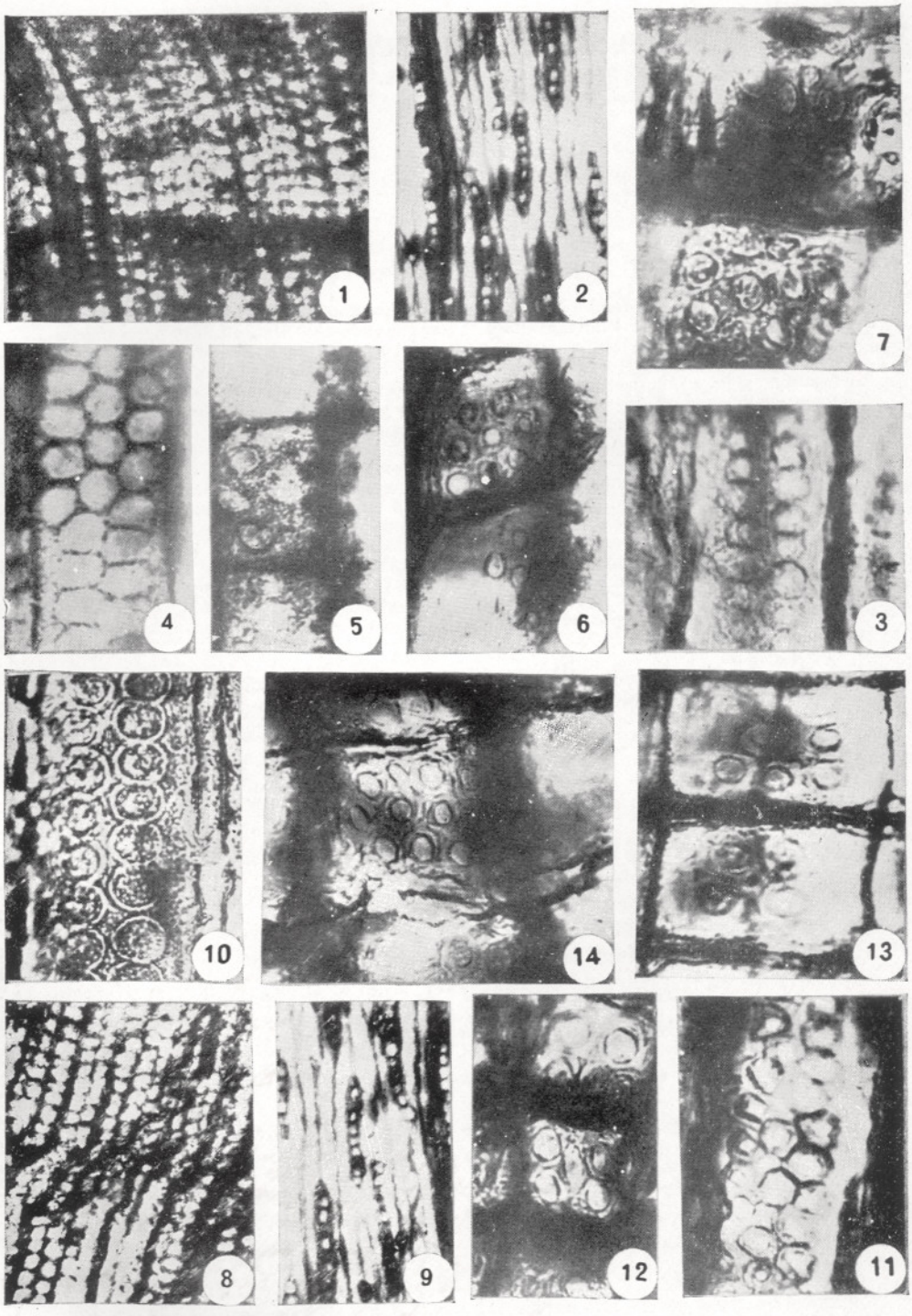

PLATE 1