

# *Araucarioxylon kumarpurensis*, a new gymnospermous wood from the Upper Permian of West Bengal

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The new species is identified after a study of ground thin sections and cellulose acetate paper peels prepared from a number of petrified wood pieces collected from Coal Seam IX, Raniganj Formation, West Raniganj Coalfield. The woods are mostly limonitic and usually very much crushed; however, at places they show good preservation. The secondary xylem shows distinct annual rings, mostly uniseriate xylem rays and 1-2 seriate araucaroid pits on the radial walls of tracheids and 2-8 cupressoid pits in its cross-fields. The new species closely compares with *Dadoxylon bengalense* Holden which however, is easily distinguished by "mixed" type of radial pitting.

**Key-words**—Fossil woods, Gymnosperms, Raniganj Formation, Upper Permian (India).

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## सारांश

अरोकेरॉक्सिलॉन कुमारपुरेन्सिस, पश्चिम बंगाल के उपरि परमी से एक नव अनावृतबीजी कव्छ

ऊषा बाजपेई एवं विनय कुमार सिंह

पश्चिमी रानीगंज कोयला-क्षेत्र में रानीगंज शैल-समूह की नवीं कोयला-सीम से एकत्रित अनेक अशमीभूत काष्ठ के टुकड़ों की सेल्यूलोज़ एसीटेट पील तथा पतली काटों के गहन अध्ययन के उपरान्त यह नव जाति अभिनिर्धारित की गई है। यद्यपि ये काष्ठ प्रायः लिमोनीटी तथा कचली हुई हैं तथापि, इनमें कहीं कहीं पर अभिलक्षण सुपरिरीक्षित हैं। द्वितीयक दारु स्पष्ट वार्षिक बलय, प्रायः एकपक्षिक किरणें एवं बाहिनीकीयों की अरीय भित्तियों पर 1-2 पक्षिक अरोकेरॉयड गर्त तथा इसके क्रास क्षेत्रों में क्यूप्रेसोसम गर्त प्रदर्शित करती है। यह नव जाति डेडॉक्सिलॉन बंगालेन्सिस होल्डन से तुलनीय है जो "मिश्रित" प्रकार के अरीय गर्तों द्वारा सरलता से पहचानी जा सकती है।

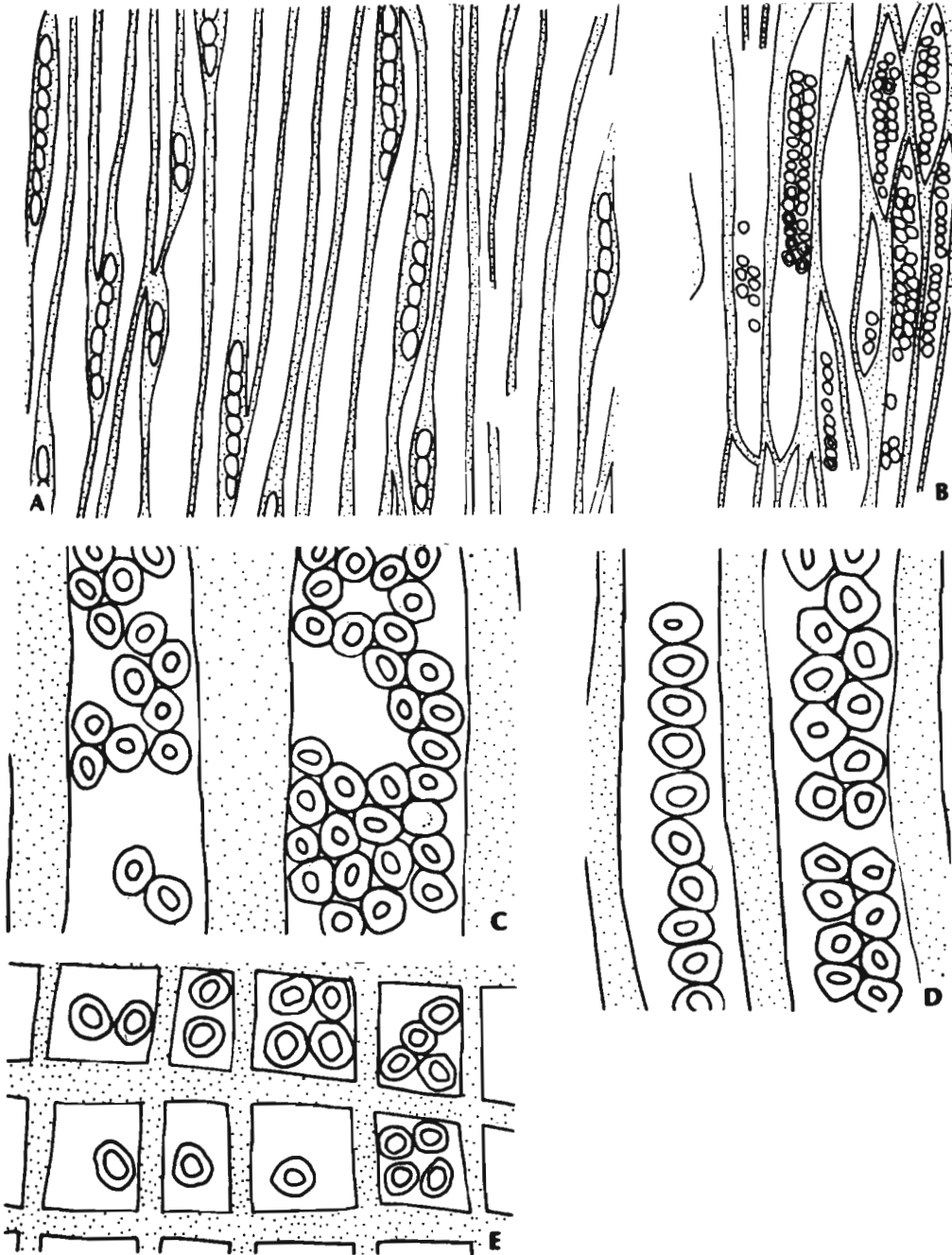
## INTRODUCTION

THE Raniganj Formation comprises four members, viz, Kumarpur Sandstone Member, Nituria Coal Member, Hijuli Sandstone Member and Sitarampur Coal member in descending order (Gee, 1932). The Raniganj Formation is very rich in plant megafossils, the upper part containing a number of fossil woods. Bradshaw and Sahni (1925) reported a fossil tree of about 22 meters length from the railway cutting about 3.2 kilometers west of Asansol, which however, did not have well-preserved structural details. Bradshaw (1925) considered the fossil tree trunk as belonging to the Panchet Series (Triassic) but according to Fox (1928) and Pascoe (1959) the fossil wood sandstone bed of Kumarpur, west of Asansol

should be considered as the uppermost horizon of the Raniganj Formation (Upper Permian) rather than the lowermost horizon of the Panchet Formation.

Sahni (1932) reported *Dadoxylon zaleskyi* from the same locality which showed a heterogeneous pith, endarch primary xylem and araucaroid secondary wood. This wood was later transferred to *Kaokoxydon* Kräusel (1956), as *K. zaleskyi* (Sahni, 1932) by Maheshwari (1967) due to the presence of sclerotic cells in the solid, heterogeneous pith.

Fox (1934) gave a list of fossil plants from the Raniganj Formation, Raniganj Coalfield in which he mentioned *Dadoxylon kumarpurensis* from the Kumarpur Sandstone Member but the wood was neither described and figured by Fox nor by others.



**Text-fig. 1**—**A**, Tangential longitudinal section showing uniseriate xylem rays, Slide no. BSIP 35718-4.  $\times 125$ ; **B**, Radial longitudinal section showing biseriate bordered pits, Slide no. BSIP 35717-2.  $\times 175$ ; **C**, Radial longitudinal section showing araucarioid arrangement of pits, Slide no. BSIP 35716-4.  $\times 575$ ; **D**, Uniseriate arrangement of pits, Slide no. BSIP 35716-12.  $\times 575$ ; and **E**, Cross-field areas showing bordered pits in the cross-fields, Slide no. BSIP 35716-13.  $\times 575$ .

**PLATE 1**

1. Transverse section through the secondary wood, slide no. BSIP 35716-1.  $\times 90$ .
2. Tangential longitudinal section showing uniseriate xylem rays, slide no. BSIP 35718-4.  $\times 90$ .
3. Radial longitudinal section showing 1-2 seriate bordered pits, slide no. BSIP 35717-2.  $\times 250$ .
4. Radial longitudinal section showing araucarioid arrangement of pits, slide no. 35717-2.  $\times 550$ .
5. Radial longitudinal section showing uniseriate arrangement of pits, slide no. 35716-12.  $\times 575$ .

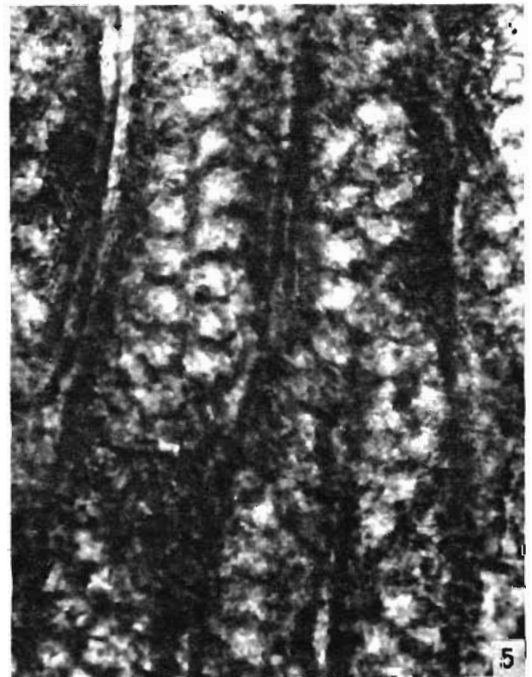
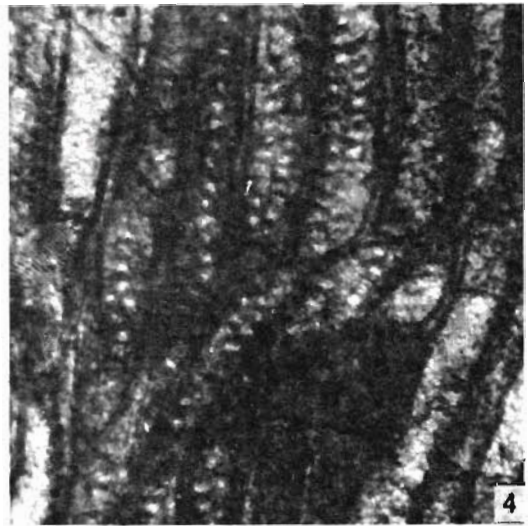
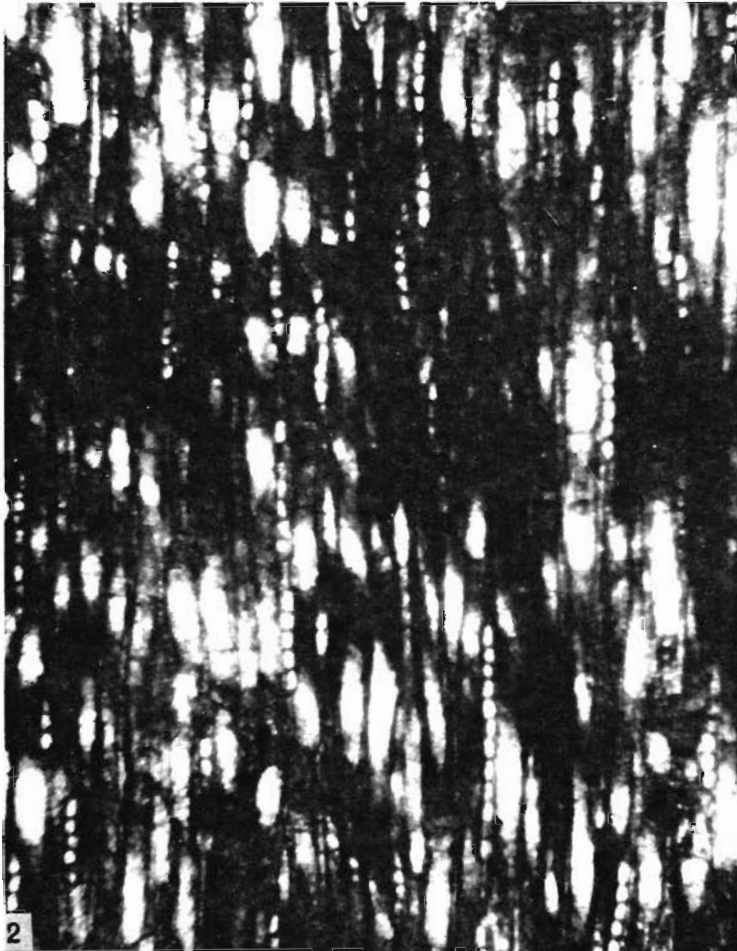
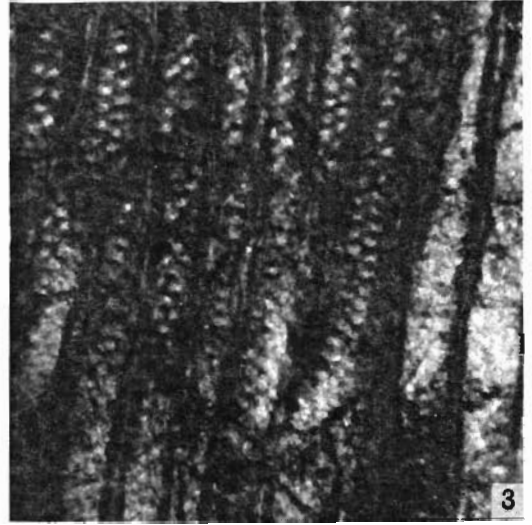
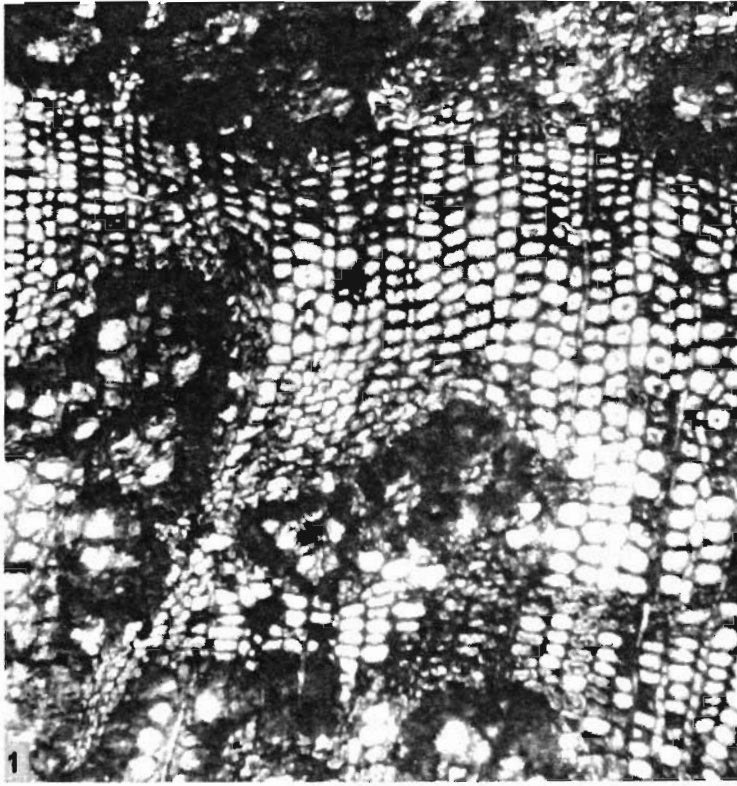


PLATE 1

## MATERIAL AND METHOD

The material for the present study was collected from the Kumarpur Sandstone exposed in Nonia Khal, Raniganj Coalfield. The fossil woods are limonitic. Both, ground thin sections and acetate paper peels were prepared. Out of the 30 woods, only 3 specimens gave useful information. The present observations are based on the three better preserved woods all of which exhibit similar characters and therefore have been assigned to the same species.

## DESCRIPTION

**Genus—*Araucarioxylon* Kraus, 1870**

*Araucarioxylon kumarpurensis* sp. nov.

Pl. 1, figs 1-5; Text-fig. 1A-E

**Diagnosis**—Secondary wood with distinct growth rings. Xylem rays homogeneous, uniseriate or sometimes partly biseriate, 1-19 cells high. Radial tracheidal walls usually with 1-2 seriate (rarely up to tetraseriate), contiguous, usually alternate, rarely sub-opposite and flattened or polygonal (araucarioid), bordered pits. Cross-field pits bordered, 2-8 (usually 4-6) in number and more or less cupressoid.

**Holotype**—Specimen no. BSIP 35717; Nonia Nala near Kumarpur, West Raniganj Coalfield, West Bengal; Raniganj Formation, Upper Permian.

**Description**—Most of the specimens being ill-preserved the information is derived from specimen nos. 35716, 35717 and 35718 which are identical anatomically. Pith, primary xylem and extraxylary elements are not preserved in any of the woods. Even the secondary xylem is satisfactorily preserved only in patches. Because of this reason, it has not been possible to decipher the width of a single growth ring. In cross-sections, the spring wood tracheids are polygonal or rectanguloid, about 44-79  $\mu\text{m}$  wide radially and 31-63  $\mu\text{m}$  wide tangentially. The width of spring wood zone is unknown due to partial disorganization of the growth rings. Autumn wood zones are narrow and the tracheids are about 11-32  $\mu\text{m}$  wide radially and about 31-48  $\mu\text{m}$  wide tangentially. The double walls between the spring wood tracheids are about 9-24  $\mu\text{m}$  thick and those between autumn wood tracheids about 7-17  $\mu\text{m}$  thick. Xylem parenchyma is absent.

The height of rays is 1-19 cells, averaging at 3-11 cells. The ray-cells are ovoid or rectanguloid in shape, about 23-40  $\mu\text{m}$  high and about 8-20  $\mu\text{m}$  wide at widest. Tangential and horizontal walls of ray cells and tangential walls of tracheids are unpitted.

Tracheidal pits are about 9-13  $\mu\text{m} \times 7-13 \mu\text{m}$  in size, pit pores oval or circular, about 4-6  $\mu\text{m} \times 3-6 \mu\text{m}$  in size. Cross-field pits are about 3-8  $\mu\text{m} \times 3-6 \mu\text{m}$  in size.

**Comparison**—In showing 1-3 seriate radial

tracheidal pits, 2-8 cupressoid cross-field pits and 1-19 cells high rays, the Kumarpur woods are comparable with *Dadoxylon bengalense* Holden, 1917; but at the same time the latter species differs in showing grouped or mixed pits on the radial tracheidal walls (*A. kumarpurensis* invariably shows araucarioid pits).

The investigated woods are also comparable to *A. ningabense* Maheshwari (1965) 1972 and *A. lobarense* Agashe & Gowda, 1978 in having 1-4 seriate radial pits and 2-8 cupressoid cross-field pits but differ in smooth tangential tracheidal walls. Further, *A. kumarpurensis* shows predominantly 1-2 seriate pits on tracheids; 3 or 4 seriate pits are extremely rare (*A. ningabense* and *A. lobarense* show pits on their tangential tracheidal walls besides having frequently up to 4 seriate radial tracheidal pits).

Likewise, the woods are also comparable in one or other characters with all the known species of *Araucarioxylon* but differ in most other characters.

For these woods a new species *Araucarioxylon kumarpurensis* has been erected, the species epithet signifies the occurrence of the species in the Kumarpur Sandstone Member of the Raniganj Formation.

## ACKNOWLEDGEMENT

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