Araucarioxylon from the Sriperumbudur Formation, Upper Gondwana, Tamil Nadu, India

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Two new species of *Araucarioxylon* are described from the Sriperumbudur Formation (Upper Gondwana), Sriperumbudur, Tamil Nadu, India. They differ from the known species of *Araucarioxylon* and hence named as *A. rajivii* sp. nov. and *A. giftii* sp. nov.

Key-words – Fossil woods, *Araucarioxylon*, Gymnosperm, Sriperumbudur Formation, Early Cretaceous, Tamil Nadu.

INTRODUCTION

PLANT fossils from the Sriperumbudur Formation were first recorded by Feistmantel (1879). Subsequently, Seward and Sahni (1920), and Suryanarayana (1953, 1954, 1956) added more information on megaflora of this formation. Sahni (1928, 1931) also described a number of impressions, and two petrified woods, viz., *Cupressinoxylon coromandelinum* Sahni and *Mesembrioxylon* sp. Another fossil wood *Dadoxylon rajmahalense* Sahni was recorded by Suryanarayana (1953, 1956).

During several field trips over the last twenty five years, a large number of impressions and petrifactions of plant fossils were collected from Sriperumbudur Formation out of which two well preserved petrified woods referable to the form genus *Araucarioxylon* Kräusel are described here. The wood specimen 70/SPR/1 was collected near the lake in Sriperumbudur town in June 1970 and the specimen 89/SPR/GPR/3 from the margin of a small pond in the village Gunduperumbudur, about 3 km away from the former site, in September 1989. The former specimen is a small silicified decorticated wood measuring about 4 cm in length and about 2 cm in width, while the latter is about 14 cm in length and about 3 cm in width.

The specimens and slides are deposited in Palaeophytology Laboratory, Department of Botany, Madras Christian College, Madras.

DESCRIPTION

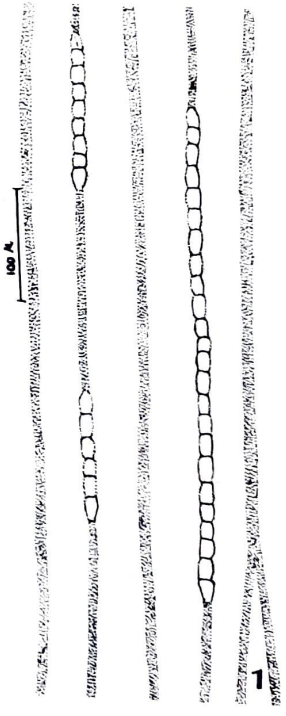
Araucarioxylon rajivii *sp. nov.*

Pl. 1, figs, 6-7; Text-figs 1-3

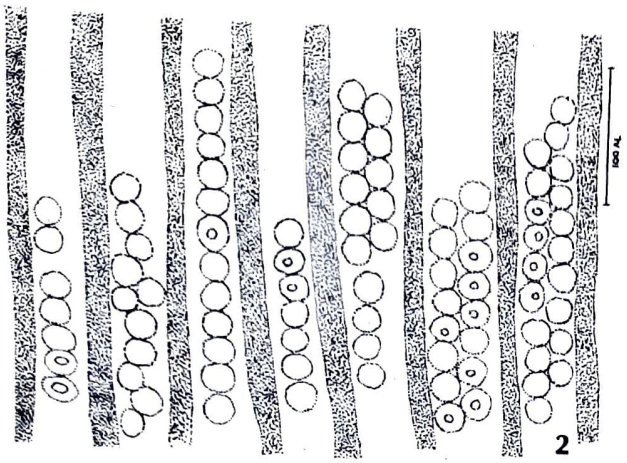
Diagnosis- Growth rings distinct, only radial walls of tracheids pitted, pits uni- to biseriate, alternate, contiguous, circular with circular aperture, cross-field pits 1-2 (rarely 3), circular to oval with rim-like border. Rays uniseriate, 2-26 cells high. Xylem parenchyma absent.

The specific name is after late Mr. Rajiv Gandhi, the former Prime Minister of India.

Description- Wood-pycnoxylic. Growth rings distinct, almost equal in width, 30-40 tracheids wide, transition from early to late wood somewhat abrupt, the last few rows of late wood tracheids tangentially flattened. Early wood tracheids 35 µm x 45 µm to 65 µm x 95 µm in size with squarish, angular or rectangular outlines in cross section. Vertical parenchyma and resiniferous tracheids absent (Pl. 1, fig. 1). Pits present on radial wall of tracheids, uni-to biseriate; uniseriate pits circular, contiguous, line of contact straight, aperture wide, 8 µm x 10 µm in size, circular to oval; biseriate pits mostly contiguous, alternate in an irregular manner (Pl. 1, fig. 8; Text-fig.2), oval in shape, cross- field pits 1-2, rarely 3, al-

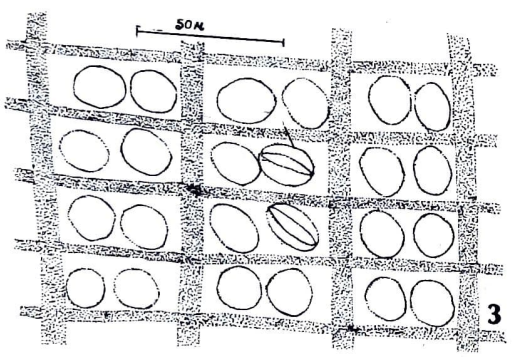


Text-fig. 1. *Araucarioxylon rajivii* sp. nov., Uniseriate rays in T.L.S.



Text-fig. 2. *A. rajivii* sp. nov., R.L.S. showing bordered pits.

ways adjacently placed, oval to circular, about 13 µm in diameter with a distinct rim-like border (Pl. 1, fig. 7; Text - fig. 3). Xylem rays uniseriate, 2-26 cells high, (average 12 cells), 15 per sq. mm, cells elongated, almost uniform in size, 10 µm x 19 µm without any inclusions (Pl.1, fig. 6; Text - fig. 1).



Text-fig. 3. *A. rajivii* sp. nov., Cross-field pitting.

Locality-Sriperumbudur, Chengai, M.G.R. District, Tamil Nadu, India.

Horizon -Sriperumbudur Formation.

Age -Early Cretaceous .

Holotype - Specimen no. 70/SPRI/1, Slides no. 70/SPR/1/, 2 & 3.

Araucarioxylon giftii *sp. nov.*

Pl. 1, figs 2-5; Text-figs 4-6

Diagnosis- Growth rings distinct, only radial wall of tracheids pitted, pits uni-to biseriate, alternate, contiguous or separate, circular with circular apertures. Cross-field pits 2-7, circular, varying in size. Rays simple, uniseriate, 2-29 cells high, cells varying in shape and size, xylem parenchyma and resiniferous tracheids absent.

The specific name of the wood is taken after late Prof. Gift Siromancy of Madras Christian College.

Description - Growth rings distinct, width unequal, varying from 5 to 30 tracheids, transition from early to late wood gradual. Early wood tracheids 45 µm x 60 µm and late wood tracheids 10 µm x 15 µm in cross section. Early wood tracheids rectangular, polygonal to squarish in outline with circular lumen. Late wood tracheids tangentially flattened. Vertical parenchyma and resin contents in tracheids absent. Ray cells often with some contents (Pl. 1, fig.2). Pits only on radial walls of tracheids, mostly uniseriate, occasionally biseriate; uniseriate pits circular, contiguous or separate, aperture circular, 6 µm in diameter; biseriate pits mostly contiguous, alternate in an irregular manner (Pl. 1, fig. 3; Text - fig. 5). Cross-field pits mostly 1 or 2, occasionally as many as 5-7, simple, circular, varying in size and occurring in clusters (Pl. 1, fig. 3; Text-fig. 6). Xylem rays uniseriate, 2-29 cells high (average 10 cells), 22 per sq. mm, cells elongated, varying in shape and size (Pl. 1, fig. 5; Text - fig. 4), average size of smaller and larger cells 22 µm x 14 µm and 32 µm x 24 µm, respectively.

Locality -Gunduperumbudur, Chengai, M.G.R. District, Tamil Nadu.

Horizon - Sriperumbudur Formation.

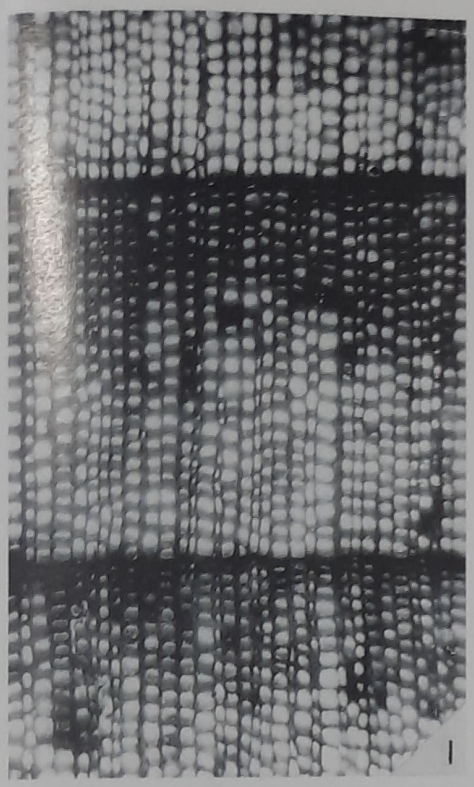
Age - Early Cretaceous.

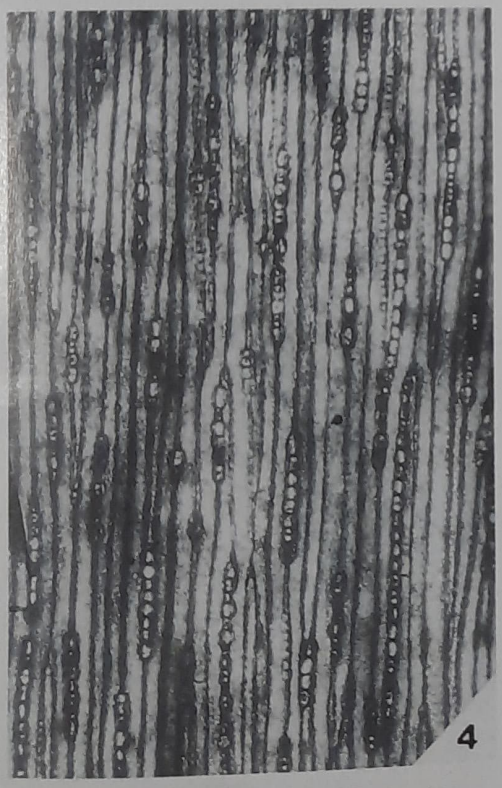
Holotype - Specimen 89/SPR/GPR/3; Slides no 89/SPR/GPR/3/ 1,2 & 3.

Comparison–Six species of *Araucarioxylon* with exclusively uniseriate rays are so far known from the Upper Gondwanas (Early Cretaceous) of India. They are *Araucarioxylon rajmahalense* (Sahni) Bose & Maheshwari (1974); *A. agathioides* (Kräusel & Jain) Bose & Maheshwari (1974); *A. amraparense* (Sah & Jain) Bose & Maheshwari (1974); *A. bindrabunense* (Sah & Jain) Bose & Maheshwari (1974), *A. mandroense* (Sah & Jain) Bose & Maheshwari (1974) and *A. santalense* Bose & Maheshwari (1974).

Plate 1

1. *Araucarioxylon rajivii* sp. nov., Cross section showing growth rings and tracheids. 70/SPR/1/1, x 50.
2. *A. giftii* sp. nov., Cross section showing growth rings and tracheids. 89/SPR/3/1, x 30.
3. *A. giftii* sp. nov., R.L.S. showing radial pitting and cross-field pitting. 89/SPR/3/3. x 200.
4. *A. giftii* sp. nov., T.L.S. 89/SPR/3/2, x 60.
5. *A. giftii* sp. nov., A part of figure 4 magnified to show the variation in the size of the ray cells. 89/SPR/3/2, x 150.
6. *A. rajivii* sp. nov., T.L.S. 70/SPR/1/2, x 80.
7. *A. rajivii* sp. nov., R.L.S. showing cross-field pits. 70/SPR/1/3, x 200.
8. *A. rajivii* sp. nov., R.L.S. showing radial pits. 70/SPR/1/3, x 175.





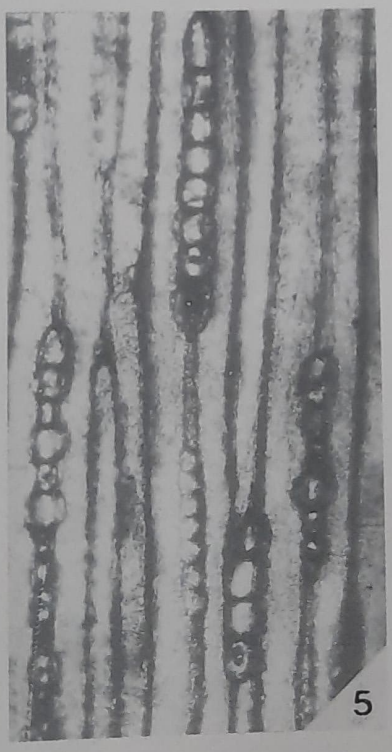
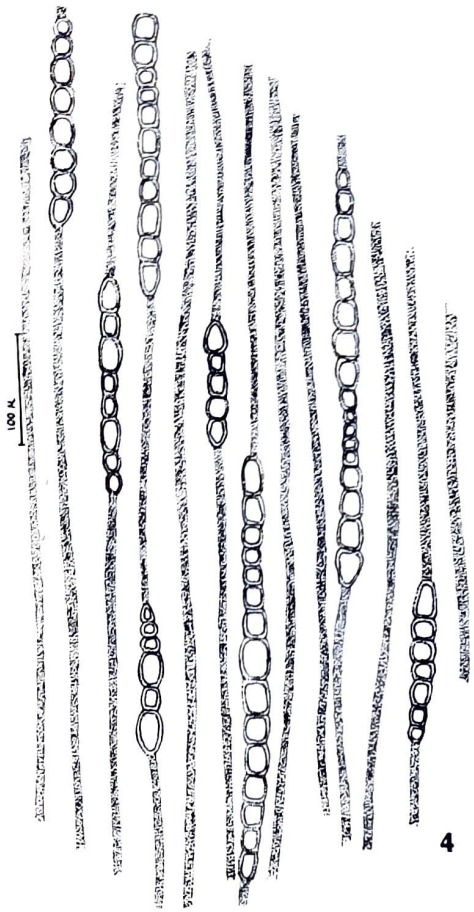


Plate 1

Table 1

Sl No	Name of the Species	Growth rings	Tracheids Radial Pitting	Medullary Rays Seriation	Medullary Rays Height	Cross-field Pits	Pith	Xylem parenchyma	Resin Tracheids	Horizon	Locality
1.	Dadoxylon jurassicum Bhardwaj 1953	Faint	1-2 rows, contiguous, alternate, hexagonal	Uniseriate	1-11 cells	4-8, pore oblique, border not preserved	Present with stone cells	Absent	Present	Early Cretaceous	Amarjola, Rajmahal hills, Bihar
2.	Araucarioxylon rajmahalense(Sahni) Bose & Maheshwari 1974	Well marked	2-3 rows, alternate, hexagonal, rarely circular in early wood, 1 row flattened pits, sometimes circular in late wood	Uniseriate	1-20 cells	Not preserved	Absent	Absent	Present	Early Cretaceous	Banchapa, Rajmahal hills, Bihar; Vellum Sriperumbudur, Tamil Nadu
3.	A. agathioides (Krausel & Jain) Bose & Maheshwari 1974	Indistinct	1-3 rows, contiguous, alternate, hexagonal	1-2 seriate	2-20 cells	2-8, sometimes in groups of 5-6, circular to angular, separate or contiguous	Absent	Absent	Present	Early Jurassic	Mandro, Rajmahal hills, Bihar
4.	A. amraparense (Sah & Jain) Bose & Maheshwari 1974	Distinct	1-3 rows, alternate to opposite contiguous or separate, hexagonal to circular	Uniseriate	1-15 cells	4-8 contiguous, rounded	Absent	Absent	Present	Late Jurassic	Amrapara, Rajmahal hills, Bihar
5.	A. bindrabunense (Sah & Jain) Bose & Maheshwari 1974	Indistinct	Mostly only 2-3 rows, rarely one row, contiguous, alternate, hexagonal	Uniseriate	1-45 cells	4-12 bordered, aperture as big as the border	Absent	Absent	Absent	Late Jurassic	Bindraban, Rajmahal hills, Bihar
6.	A. santalense (Sah & Jain) Bose & Maheshwari 1974	Distinct or indistinct	Mostly one row, sometimes 2 rows, flattened, contiguous, alternate	Uniseriate	1-10 cells	2-6 bordered, circular, separate	Absent	Absent	Present	Late Jurassic	Mandro, Rajmahal hills, Bihar
7.	A. mandroense (Sah & Jain) Bose & Maheshwari 1974	Distinct	1-3 rows, contiguous, alternate, hexagonal in early wood, 1-2 rows, circular opposite in pairs in late wood	Uniseriate	1-15 cells	4-12 in early wood, 2-6 in late wood (usually 3-4 rounded)	Absent	Absent	Absent	Late Jurassic	Mandro, Rajmahal hills, Bihar
8.	A. keriense Trivedi & Srivastava	Distinct	1-2 seriate, alternate, hexagonal, bordered	Uniseriate	2-12 cells	One in each field, bordered, circular or oval	Absent	Absent	Absent	Early Tertiary	Keria, Chhindwara District, M.P.
9.	A. giftii sp. nov.	Distinct	1-2 rows, contiguous, alternate, circular	Uniseriate	1-29 cells	Mostly 1 or 2, occasionally as many as 5 to 7, bordered, circular	Absent	Absent	Absent	Early Cretaceous	Gunduperumbudur, Sriperumbudur Formation, Tamil Nadu
10.	A. rajivii sp. nov.	Distinct	1-2 rows, contiguous, alternate, circular	Uniseriate	1-26 cells	1-2 rarely 3, oval to circular with a distinct rim-like border	Absent	Absent	Absent	Early Cretaceous	Sriperumbudur, Tamil Nadu

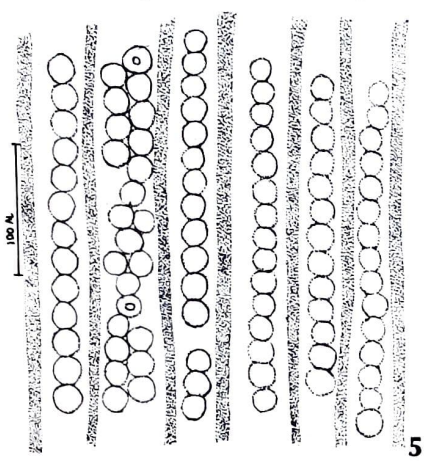


Text-fig. 4. *Araucarioxylon giftii* sp. nov., Uniseriate rays in T.L.S. (Note size difference in cells)

The only report of *Araucarioxylon* from the Sriperumbudur beds is by Suryanarayana (1956), who identified the wood as *Dadoxylon rajmahalense* and compared it with the wood described by Sahni (1930) from the Rajmahal hills under the same name. However, Bose and Maheshwari (1974) renamed it as *Araucarioxylon rajmahalense*.

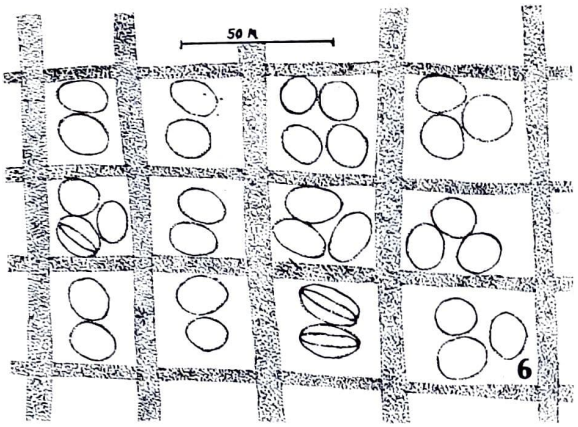
Araucarioxylon rajmahalense shows distinct growth rings with uniseriate xylem rays 1-20 cells high, radial bordered pits and no details of the cross-field pitting.

In comparison with *A. rajmahalense*, both the present specimens stand in contrast owing to the presence of predominantly uni- to biseriate radial pits, mostly circular to oval in outline and distinct cross-field pitting. The same features also distinguish these two new woods from *A. agathioides*, *A. amraparense*, *A. bindrabunense* and *A. mandroense*.



Text-fig. 5. *A. giftii* sp. nov., R.L.S showing bordered pits.

The distinct demarcation of growth rings distinguishes the present species from *A. santalense*. This is also true for the wood reported by Bhardwaj (1953) as *Dadoxylon jurassicum* which also shows the pith and primary xylem. The presence of resin tracheids in the latter two woods and their absence in the present new species is a further point of distinction between these woods.



Text-fig. 6. *A. giftti* sp. nov., cross-field pitting.

Thus it is apparent that the present fossils from Sriperumbudur do not match in all characters with the known species (See Table 1 for detailed comparison).

Also, these two woods do not compare with any of the woods with araucarioid pitting reported from the Intertrappean beds. Most of the Early Tertiary araucarioid wood possess resiniferous tracheids which are absent in the present fossil woods. Moreover, the radial pitting is often 2-3 seriate in the Early Tertiary woods. However, *Araucarioxylon rajivii* sp. nov. compares closely with *A. keriense* Trivedi & Srivastava (1989) from the Early Tertiary of Madhya Pradesh except for the cross-field pitting, which is consistently solitary in the latter while it is mostly 2-3 in the former (See Table 1).

The present new species of *Araucarioxylon* reported here can easily be distinguished from each other because of their differentiating characters with respect to the rays, i.e., ray density and size variation in cells, and the cross-field pitting. The occurrence of smaller and larger cells in the same ray of *A. giftii* sp. nov. is a distinct character not known in any other species of *Araucarioxylon*.

REFERENCES

Bhardwaj, D.C. 1953. Jurassic woods from the Rajmahal hills, Bihar. *Palaeobotanist* 2: 59-70.

Bose, M.N. & Maheshwari, H.K. 1974. Mesozoic conifers. pp. 212-233 in: Surange, K.R. *et al.* (eds)- *Aspects and Appraisal of Indian Palaeobotany*, Birbal Sahni Institute of Palaeobotany, Lucknow.

Feistmantel, O. 1879. The fossil flora of the Upper Gondwanas. Outliers on the Madras Coast. *Mem. geol. Surv. India, Plaeont. Indica Ser*, **1**(4) 191-224.

Krausel, R. & Jain, K.P. 1964. New fossil coniferous woods from the Rajmahal hills, Bihar, India. *Palaeobotanist* **12**: 169-180.

Sahni, B. 1928. Revision of Indian fossil plants. Part I. Coniferales (a. impressions and incrustations). *Mem. geol. Surv. India, Palaeont. Indica n. ser.* **11**: 1-49.

Sahni, B. 1931. Revision of Indian fossil plants. Part II. Coniferales (b. petrifactions). *Mem. geol. Surv. India, Palaeont. Indica n. ser.* **11**: 51-124.

Seward, A.C. & Sahni, B. 1920. Indian Gondwana Plants: A Revision. *Mem. geol. Surv. India, Palaeont. Indica n. ser.* 7:(1): 1-41.

Suryanarayana, K. 1953. *Mesembrioxylon tirumangalense*, a new species from Sriperumbudur group near Madras. *J. Indian bot. Soc.* 32(4): 159-164.

Suryanarayana, K. 1954. Fossil plants from the Jurassic rocks of the Madras Coast, India. *Palaeobotanist* 3: 87-90.

Suryanarayana, K. 1956. *Dadoxylon rajmahalense* Sahni from the coastal Gondwanas of India. *Palaeobotanist* 4: 89-90.

Trivedi, B.S & Srivastava, R. 1989. Gymnospermous woods from Early Tertiary of Chhindwara District of Madhya Pradesh. *Phytomorphology* **39**(1): 61-68.