

ON BARAKAROXYLON JHARIENSE

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ABSTRACT

In the present paper the wood genera *Barakaroxylon* Surange & Maithy (1962) and *Indoxylon* Surange and Maithy (1963) are merged on the basis that the central and the peripheral secretory canals, which distinguish these two genera, have been found in one and the same specimen. On the basis of priority the genus *Barakaroxylon* has been retained.

INTRODUCTION

IN 1961 Surange and Maithy proposed a new generic name *Barakaroxylon* to the petrified wood described earlier as *Dadoxylon jhariense* Surange & Sah, (1957). The wood was characterized by longitudinally running secretory canals scattered in the peripheral region of the pith. In 1962 the same authors instituted another genus *Indoxylon* on the basis that in this genus a solitary central canal is also present in the pith, in addition to the peripheral canals; the central and the peripheral canals are also connected by transversely running canals. Recently some fresh collections from the same locality, 18th coal seam of the Kharkhari colliery, Jharia coalfield, Bihar, were brought by Dr. P.K. Maithy and studied in detail by one of us (S.K.). Earlier authors also re-examined the type material and the combined observations of the investigations are set out below.

Barakaroxylon Surange & Maithy emend.

Synonymy 1963 — *Indoxylon* Surange & Maithy.

Emended diagnosis — Pith solid, heterogenous, composed of parenchymatous cells, secretory cells, sclerotic cells and canals; primary xylem endarch; secondary xylem with araucaroid and mixed type of pitting.

Genotype — *Barakaroxylon jhariense* Surange & Maithy

Barakaroxylon jhariense Surange & Maithy emend.

Pl. 1, Figs. 1-5

Synonymy 1956 — *Dadoxylon jhariense* Surange & Sah

1962 — *Barakaroxylon jhariense* Surange & Maithy

1962 — *Barakaroxylon krauseli* Surange & Maithy

1963 — *Indoxylon canalosum* Surange & Maithy

Emended diagnosis — Solid heterogenous pith, composed of parenchymatous cells, secretory and sclerotic cells, vertical running canals distributed in the peripheral region of pith, sometimes a distinct central canal and transverse connecting canals also present; primary xylem endarch with annular, spiral, scalariform and reticulate elements; growth rings distinct, radial and tangential walls of tracheids pitted, 1-4 seriate, alternate, sub-opposite to opposite, contiguous or separate, sometimes pits in groups of 2 or 3, cross-field pits 1-7, bordered and simple; medullary rays uniseriate, biseriate, and rarely triseriate, 1-22 cell high.

Holotype — 21733, Birbal Sahni Institute of Palaeobotany, Lucknow.

Horizon — Barakar.

Age — Lower Permian.

Locality — 18th Coal seam of Kharkhari colliery, Jharia coalfield, Bihar.

DESCRIPTION

PITH

Pith is heterogenous, lobed and 2-3 cm. in diameter. It is composed of parenchymatous cells, sclerotic cells, secretory cells and canals. The details of the parenchyma cells are same as described earlier.

Sclerotic cells — The sclerotic cells have not been reported by earlier authors. The sclerotic cells are either single or grouped in nests. The cells vary in size, usually circular in transverse section and rectangular in longitudinal section; their cell walls show several layers of thickenings. (Pl. 1, FIG. 3).

Secretory cells — These are distributed all over the pith but more abundant in the central region. The secretory cells are bigger than the surrounding pith cells, circular, with slightly thickened walls and

filled with dark contents. In longitudinal sections the secretory cells are elongated. (PL. 1, FIG. 5).

Secretory canals — The canals run longitudinally in the pith, of which one is in the centre and the rest are distributed in the peripheral region; some of these canals are joined by narrow transverse connections.

To study the course of the canals, eight serial transverse sections were cut from a fossil wood 28551/317, measuring 30 cm. in length and 15 cm. in diameter.

The first section of the pith is illustrated in (TEXT-FIG. a). Here the pith is lobed and there is no central secretory canal. Along the periphery of the pith there are twenty canals of unequal size, some of them filled with iron pyrites. Two centimeters above this region (TEXT-FIG. b) the number of peripheral canals is reduced from twenty to nineteen, and four centimeters further up, this number is reduced to eighteen (TEXT-FIG. c). For the first time here there is an indication of the beginning of the central canal, almost in the centre of the pith. The central canal is as big as a pith cell, only that it's cell wall is somewhat thickened. At about 4.5 cm. above this region the number of the peripheral canals is reduced to seventeen and the central canal becomes more prominent (TEXT-FIG. d). Nine centimeters further up the number of peripheral canals are reduced to sixteen and some of them become larger in size (TEXT-FIG. e). For the next ten centimeters there is no change, except that the peripheral canals are reduced to fifteen in number (TEXT-FIG. f). Throughout the length of the stem, transverse connections between the peripheral canals, and the peripheral canals with the central canals are observed (PL. 1, FIG. 5).

From the above study, it can be concluded that the central canal is not present throughout the length of the stem, it has at least one tapering end, which ends blindly. It is likely that the central canal appears and disappears at various levels in the stem. The peripheral canals are of different lengths and both the ends of the canals taper gradually to a point. The cells lining the canals are not well developed at the two ends.

PRIMARY XYLEM

The pith is surrounded by endarch, contiguous, 10-12 celled primary xylem. Protoxylem is 2-3 celled. Xylem elements

show annular, spiral, scalariform to reticulate type of thickening (PL. 1; FIG. 2).

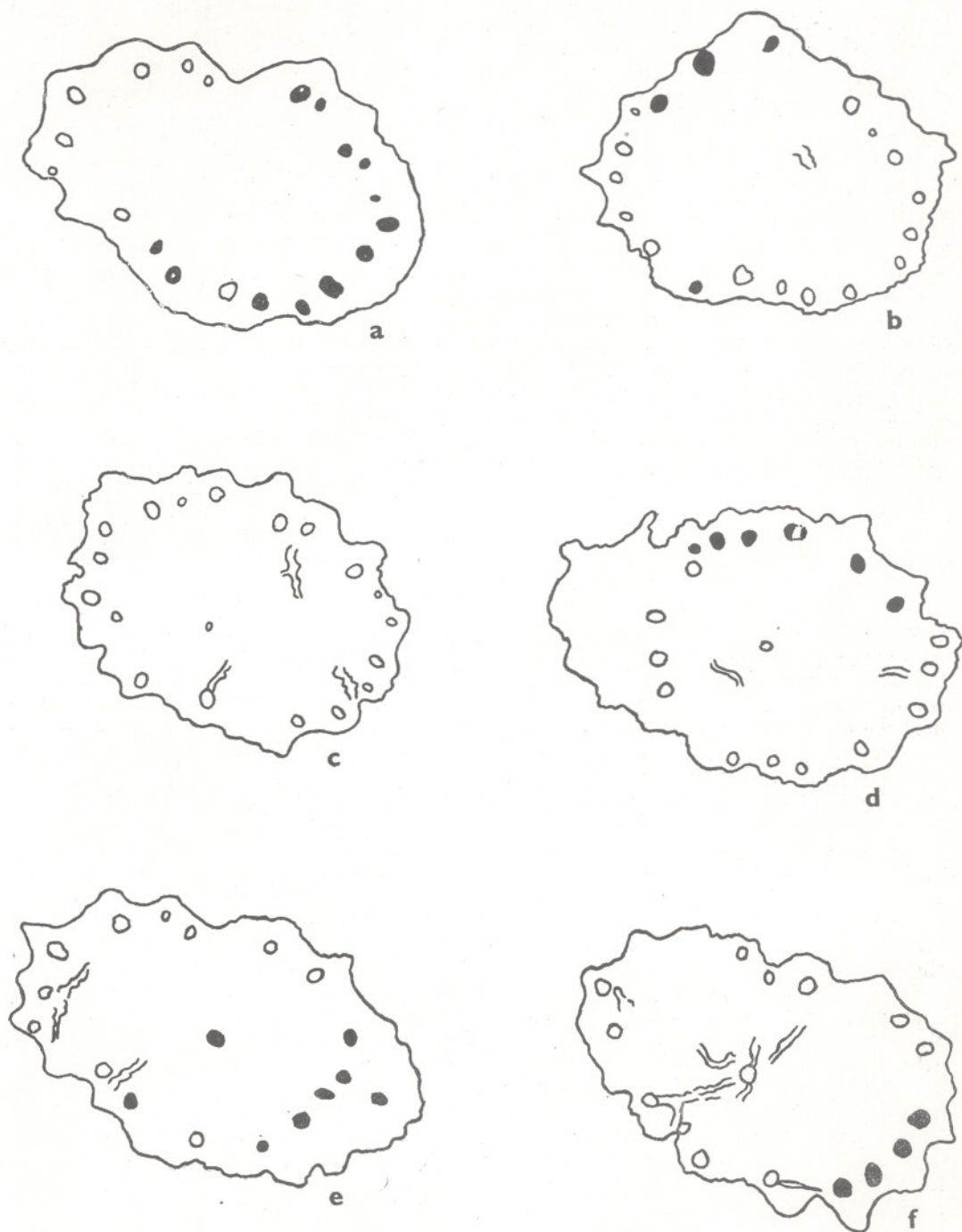
SECONDARY XYLEM

The secondary xylem has late and early wood elements. The pits are present on radial as well as tangential walls of the tracheids. The radial pits are 1-4 seriate, usually biseriate (PL. 1; FIG. 4). Sometimes pits are arranged in groups (PL. 1, FIG. 1), each group contains 2, 3 or 5 pits; when 2 they are opposite, when three they form a triangle and when five they form a stellate structure. Other details of pits are same as described earlier. An interesting feature is that in the early wood the seriation of pits near the primary xylem is commonly uniseriate or biseriate, but away from the pith it is always uni- to tri-seriate. In late woods, however, the seriation is always uniseriate. Tangential pitting is rare; the pits are simple, contiguous or separate. The cross field pits are 1-7; frequently one or two big pits occupy the whole area. The two pits are placed either side by side, or one above the other; when more than two they are contiguous or separate, sometimes forming a stellate structure (PL. 1, FIG. 4). The medullary rays are 1-20 cells high, usually they are 6-8 celled. The rays are mostly uniseriate, rarely biseriate or partially triseriate.

DISCUSSION

Barakaroxylon represents a *Dadoxylon* type of wood but having secretory canals in a solid pith, and these characters separate from the other southern hemisphere woods, such as *Solenopitys*, *Solenoxylon* and *Polysolenoxylon*.

Surange and Maithy instituted two genera *Barakaroxylon* and *Indoxylon* for stems collected from Kharkhari colliery, the same locality from where the woods described above have been collected. *Barakaroxylon* was based on the presence of secretory canals only on the periphery of the pith, while *Indoxylon* was based on the presence of not only the peripheral canals but also one central canal. Further more, these vertical canals were joined by narrow transverse canals. Both the characters are found in one and the same wood specimen described in foregoing pages. It appears that the peripheral pith canals are perma-



TEXT-FIG. 1 (i-vi) — Pith in transverse sections at different levels in wood 28551/3 17, showing distribution of canals. $\times 2.5$. Dark canals depict filling of iron pyrites. (i) showing twenty peripheral canals and no central canal; (ii) showing nineteen peripheral canals and no central canals; (iii) showing eighteen peripheral canals and beginning of the central canal; (iv) showing seventeen peripheral canals, slightly bigger than the previous section; (v) showing sixteen peripheral canals and a prominent central canal; (vi) showing fifteen peripheral canals and a prominent central canal with transverse connections.

nent features in the stem, while the central canal and the transverse connecting canals appear and disappear in the stem. It is, therefore, no longer necessary to have two generic names for these woods, *Barakaroxylon* being the older name, is retained.

Surange & Maithy described another species viz. *B. krauseli* on the basis that the pits are absent on the tangential walls of

the tracheids. As regards the tangential pitting, according to Bailey (1933), the development of pits on the tangential walls of a tracheid is a physiological feature. Moreover, the tangential pits, being rare, can easily be missed. It is, therefore, not necessary to keep *B. krauseli* as a distinct species. It has, therefore, been merged in *B. jhariense*.

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EXPLANATION OF PLATE 1

Fig. 1 — Radial longitudinal section of the secondary xylem to show grouped pitting. $\times 300$.

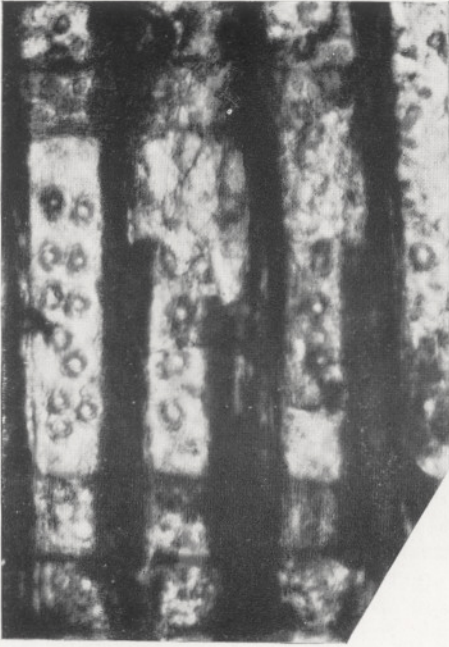
Fig. 2 — Radial longitudinal section of the primary xylem to show spiral, scalariform and reticulate elements. $\times 100$.

Fig. 3 — Transverse section of the pith to show

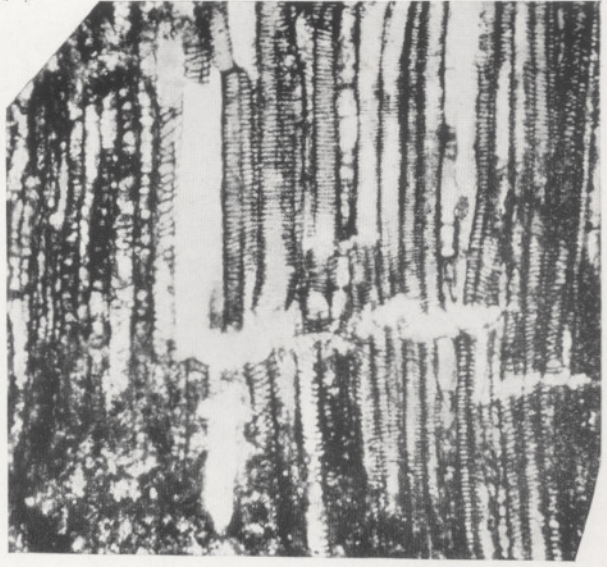
a nest of sclerotic cells. $\times 100$.

Fig. 4 — Radial longitudinal section of the secondary xylem to show the simple and bordered cross field pits; and biseriate radial pitting. $\times 300$.

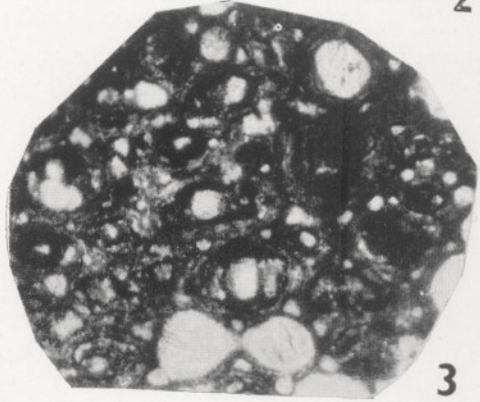
Fig. 5 — Longitudinal section of the pith to show secretory cells and transverse connections. $\times 100$.



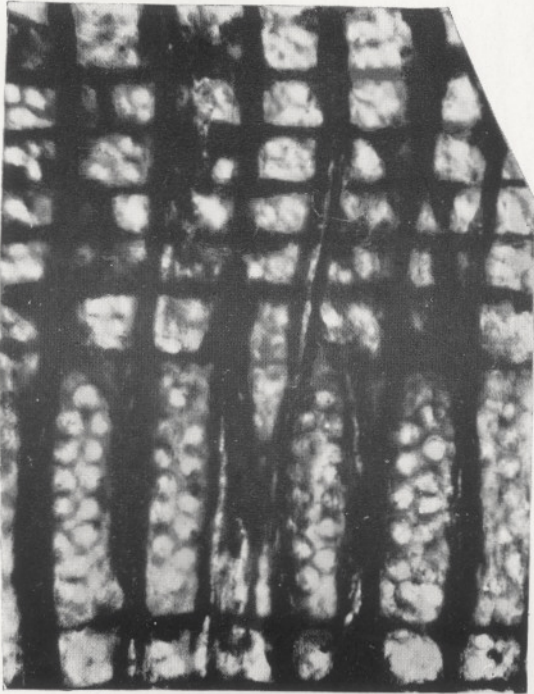
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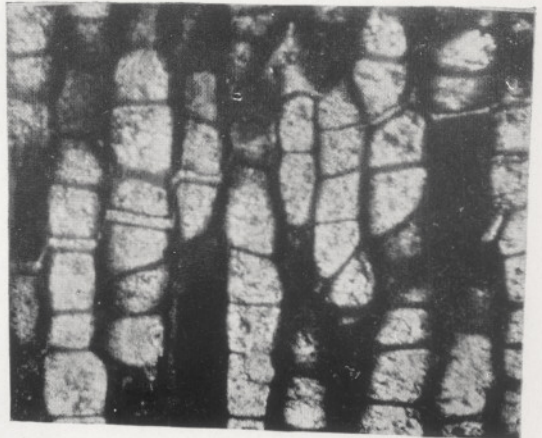
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