

RE-EXAMINATION OF A WOODEN POST FROM KIRĀRI, MADHYA PRADESH

By S. S. GHOSH

In this article Mr. S. S. Ghosh, Assistant Wood Technologist, Forest Research Institute, Dehra Dun, re-examines an ancient wooden post found about thirty years back and shows that it is unlikely to have been a sacrificial pillar, as it is generally taken to be, as the wood is not mentioned as suitable for the purpose in Vedic and later literature.

1. INTRODUCTION

IN 1921, a wooden post measuring 13 feet 9 inches was accidentally discovered by the local people in the bed of an old tank near the village of Kirāri in District Bilāspur, Madhya Pradesh. The pillar was carelessly left in the sun till the signs of letters were noticed on it. The village pandit, though unable to decipher the letters, made an eye-copy of the inscription. The pillar then came to the notice of Sir John Marshall, who had it removed to the Government Museum, Nagpur, where it is still housed.

From an archaeological point of view this was an important find: Dr. Hirananda Sastri¹, who made a careful palaeographic study of the inscription, assigned the pillar to the second century A.D. He also gave the name of the wood of the post as *Pterocarpus marsupium* (*Leguminosae*), locally known as *bijāsāl*.

In 1947, Dr. N. P. Chakravarti, Director General of Archaeology, arranged to send a small portion of the pillar to Dr. K. A. Chowdhury, Wood Technologist, Forest Research Institute, Dehra Dun, for re-examination, with the view of finding out whether the timber was actually one of those specified in the Brāhmanical texts as suitable for sacrificial posts. The material was handed over to the author for investigation by Dr. Chowdhury.

2. RESULTS OF ANATOMICAL INVESTIGATION

The superficial appearance of the wood is rather dark, but there may have been discolouration due to its burial in mud for centuries. After cleaning the exposed surface has shown two fairly distinct zones—the outer dirty brown, and the inner dull red with a brownish tinge. This colour-differentiation gives the impression of sapwood and heartwood. But this has not been confirmed by microscopic examination. The entire wood-block has been found to be a true heartwood. The difference in colour appears to be due to the leaching out of the colouring substances from the outer portion. The wood is fairly close-grained and fine-textured. The outer surface is rough due to the peeling off of wood at places (pl. I, 1). The inner portion is sound and is very hard, weighing about 60 lb. per cubic foot at 12 per cent moisture-content. It is a true *diffuse-porous* wood. The *growth rings* are somewhat distinct to the naked eye (pl. I, 1), and the growth marks are characterized by dark bands of fibres. The rate of growth is about 9 rings per inch. *Pores or vessels* are visible to the eye, small to moderate-sized, usually in radial pairs of 2-5, the pore-pairs often forming radial to obliquely-radial pore-chains (pl. I, 2). *Tyloses* are present, filling up the pore cavities either partially or completely. *Tracheids*

¹ *Epigraphica Indica*, XVIII (1925-26), pp. 152-57.

are few and localized round the vessels. *Soft tissues* or parenchyma cells are clearly seen under a lens. They are usually diffuse, occasionally also in fine lines, forming an irregular reticulum with the rays and pores (pl. I, 2, 4 and 5). *Fibres* are very narrow, visible only under the microscope. They are frequently aligned in the radial direction (pl. I, 5) and appear to be distinctly smaller in cross-section than the parenchyma cells. *Rays* are fine, closely spaced and show as inconspicuous ray-flecks on the radial surface. They are 1-4 seriate and heterogeneous. Two types of rays are recognizable: (1) uniseriate with high cells and (2) multiseriate with horizontal cells in the centre and upright cells at both ends (pl. I, 3). Occasionally both types link up forming very deep rays. Gummy infiltrations are met with in the rays and parenchyma cells.

3. IDENTIFICATION

The outstanding anatomical features of the wood are that the vessels are arranged in radial to obliquely-radial chains, and the parenchyma cells form reticulum with the rays. Moreover, the fibres are very thick-walled and well-packed in radial rows, revealing a dense nature of the wood. All these anatomical characters indicate its affinity to the woods of the family *Sapotaceae* and *Ebenaceae*.¹ Among these two families, it shows more affinity with the former than with the latter. On checking up with all the timbers of the family *Sapotaceae*, it has been found that the wood under investigation resembles the wood of *Madhuca latifolia* (Syn. *Bassia latifolia*) in all the minute anatomical details. This timber is known to the trade as *mahuā*, locally known in Madhya Pradesh as *Mohwā*, *Moh*, *moho*. It will, therefore, be seen that the previous identification with *bījāsāl* (*Pterocarpus marsupium*) was wrong. It is quite possible that the main basis for the first identification was the colour, which is somewhat similar in *Pterocarpus marsupium* and *Madhuca latifolia*.

4. DISCUSSION

A. Effect of submersion of the wood in mud

The specimen is no doubt of considerable interest to the archaeologist, but not less so to the wood technologist, for it gives an opportunity of seeing the results of long submersion of wood in mud.

It may be recalled that the outer portion of the pillar flaked off when it was removed from the tank and left in the sun. The specimen received in this laboratory shows only the heartwood. It is, therefore, not possible to say whether the peeled-off portion was sapwood or heartwood. Again, the specimen shows light colour on the periphery and deep colour in the centre. This naturally gives an impression that the outer portion has been attacked by some fungus. But this is not true. No fungal hyphae has been observed in any portion of the wood. Further, the microscopic examination shows that in the outer portion of the specimen the fibres have undergone considerable changes. The secondary walls, which are normally thick-walled and lignified, have dissolved away, and the fibres have collapsed and shrunk into an irregular mass (pl. I, 6 and 7). On the other hand, the thin-walled parenchyma cells and the rays have somehow retained their original shape and are easily recognizable. Furthermore, the inner portion of the specimen has not shown any change in cell-structure, and this observation has been confirmed by determining the weight of the wood which was found to be about 60 lb. per cubic foot at 12 per cent

¹ J. S. Gamble, *A Manual of Indian Timbers* (London, 1922); R. S. Pearson and H. P. Brown, *Commercial Timbers of India*, II (Calcutta, 1932).

moisture-content. It may be noted that in the majority of cases examined in our laboratory¹ where specimens were submerged in mud for a long time, the parenchyma cells and the rays have been noticed to be better preserved than the fibres. Chemists² working on ancient woods have reported an apparent increase in the total lignin-content in these timbers. Moreover, an analysis³ of different tissues in a wood has revealed a high lignin content in rays and parenchyma cells in comparison with the fibres and vessels. It is, therefore, quite probable that a high lignin content of rays and parenchyma cells is responsible for the better preservation of these tissues in a submerged piece of wood. However, it is not very clear at present whether there exists any relation between the minute anatomical structure (pits and wall-thickness) of the rays and parenchyma cells and their better preservation in a submerged timber. Further research work on this line may throw some light on this problem.

B. Mention of *Madhuca latifolia* in ancient literature

References to this tree are not wanting in ancient Indian literature. Many virtues have been attributed to *madhūka* tree and its products. In the *Upavana-vinoda*,⁴ under the section *Tarumahimā* ('glory of trees'), it is said that 'he who plants a *madhūka* tree becomes free from all diseases, and by him all the gods, especially the goddess Pārvatī, is pleased and gratified'. Again, in the section *Vichitra-karaṇa* ('botanical marvels') it is stated that if *yashṭimadhu*, sugar, *kushṭha* and flowers of *madhūka* are pasted together and applied to the root of a tree, it produces fruits without seeds within. Furthermore, according to the *Bṛihatsamhitā*,⁵ *madhūka* tree near an anthill is an indicator of underground water in a dry region, and in the *Matsya Purāṇa*⁶ it is mentioned as one of the auspicious timber trees. Use of *madhūka* flowers for the preparation of liquors is also frequently met with. *Suśruta*,⁷ in his list of wines which are appetizing and acid in taste, mentions *śidhu*—a kind of wine prepared from *madhūka* flowers. And Charaka,⁸ in his nine sources of wine, mentions flower-wine (*pushpāsava*) prepared from the flowers of *madhūka* trees. In the *Śabdakalpadruma*⁹ mention is made of *madhūka* (honey-liquor) as one of the twelve different kinds of liquor, apart from the *soma* drink. It also appears that use of perfume and scent was not unknown in ancient times. In the *Mahābhārata*¹⁰ the use of a perfume called *madhura* prepared from *madhūka* and other flowers is referred to. A remarkable effect of using tooth-brush of *madhūka* tree is given in the *Bṛihatsamhitā*:¹¹ one is supposed to get a large number of children if he cleanses the teeth with a twig of a *madhūka* tree.

¹ K. A. Chowdhury, 'Studies on ancient woods', *Report of Seventh International Botanical Congress* (Stockholm, 1950).

² L. E. Wise, *Wood Chemistry* (New York, 1946).

³ W. M. Harlow and L. E. Wise, 'Analysis of wood rays in two hard woods', *Industrial and Engineering Chemistry*, XX, no. 7, p. 720.

⁴ *Upavana-vinoda*, English translation by G. P. Majumdar (Calcutta, 1936).

⁵ G. P. Majumdar, *Vanaspati* (Calcutta, 1927).

⁶ G. P. Majumdar, *Some aspects of Indian Civilization* (Calcutta, 1938).

⁷ *Ibid.*, pp. 48.

⁸ *Ibid.*, pp. 50.

⁹ *Ibid.*, pp. 55-56.

¹⁰ *Ibid.*, pp. 92.

¹¹ *Ibid.*, pp. 232.

Ancient literature also gives some information on the uses of *madhūka* wood. In Kautilya's *Arthaśāstra*,¹ *madhūka* is considered to be an imperishable wood and cultivated in the state forests.² The *Śilparatna*³ includes a specific direction on the collection and selection of timber for building purposes. It says that 'one should better use trees that are straight, hard-wooded, strong and perennial such as *śāka*, *asaṇa*, *madhūka*, *sāla*.....' It specially mentions *madhūka* as suitable for posts for buildings.

At present this timber is used for many purposes. It is suitable for posts and is said to be exceptionally durable in water. Besides, it is used for heavy plankings, beams, scantlings, bridge-construction, oil- and sugar-presses and hubs of wheels and axles of carts. In the light of the present uses to which *madhūka* wood is put, it is difficult to say for what specific purpose the Kirāri post was actually used at that time. Sastri suggested various possibilities; (1) a sacrificial *yūpa*; (2) a pillar of *vājapeya* rites; (3) a tank-pillar; (4) a *jaya-stambha*; and (5) a *dhvaja-stambha*. The Brāhmaṇas and Smṛitis specify *Aegle marmelos*, *Acacia catechu*, *Butea frondosa*, *Cordia myxa* and *Cedrus deodara* as suitable for sacrificial posts. As *madhūka* does not figure in the list, the pillar is not likely to be a sacrificial post. Whatever may have been its actual purpose it may be reasonably assumed that in its selection three main points were taken into consideration; in the first place, durability in constant contact with soil and water; secondly, strength as a post; and thirdly, suitable grain and texture for writing letters on it. That the wood of *Madhuca latifolia* meets all these conditions there cannot be any doubt.

I thank Dr. N. P. Chakravarti, the Director General of Archaeology in India, for giving me an opportunity to examine this interesting specimen. Grateful acknowledgement is due to Dr. K. A. Chowdhury, Wood Technologist, Forest Research Institute, for valuable discussions and for extending to me the benefit of his extensive knowledge on ancient woods. My thanks are also due to Mr. Damar Singh of the Wood Technology Branch for his help in the laboratory.

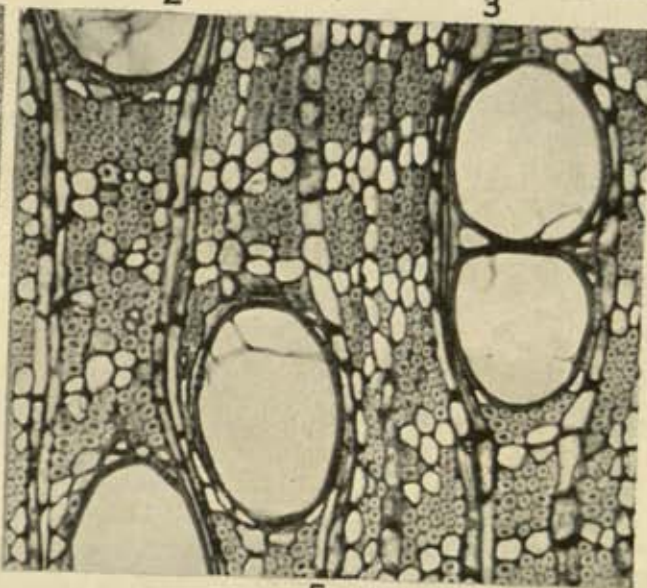
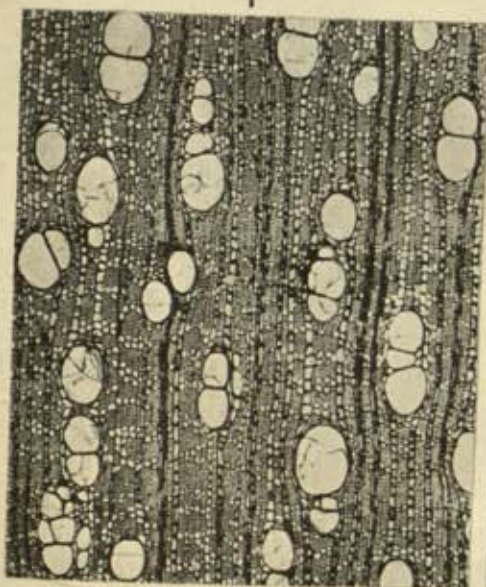
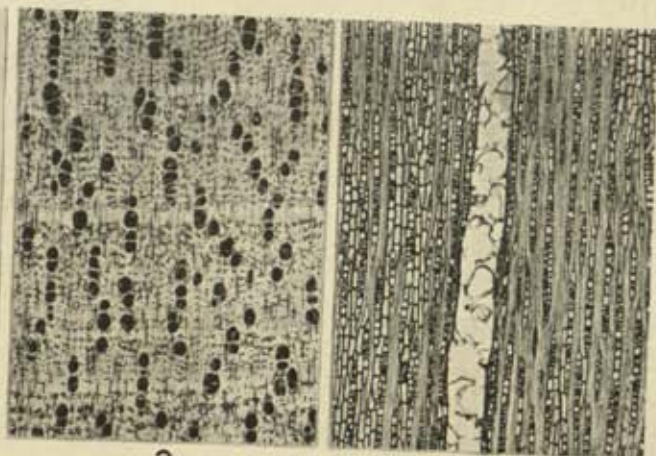
EXPLANATION OF PHOTOMICROGRAPHS (PL. 1)

1. End-surface of the post showing (a) deteriorated and (b) sound portions. Note the growth rings and developing cracks. Scale: $\frac{1}{4}$.
2. Transverse section showing the general view. Vessels are in radial pairs and these are again arranged in radial chains. Minute black dots are parenchyma cells. Note their arrangement and distribution. Scale: $\times 15$.
3. Tangential section showing distinctly heterogeneous type of rays. Scale: $\times 30$.
4. Transverse section showing tyloses inside the vessels, uniseriate and multiseriate rays and net-like arrangement of parenchyma. Scale: $\times 30$.
5. Same, under high magnification showing the radial arrangement of fibres. The fibres are very thick-walled and closely packed in groups. Scale: $\times 110$.
6. Transverse section through the deteriorated portion. Compare the structure with sound portion (dense) as shown in no. 4. Scale: $\times 30$.
7. Same under high magnification to be compared with 5. Most of the fibres have disintegrated, a few remaining ones are visible here and there. The black portions indicate the position of the collapsed fibres. Scale: $\times 110$.

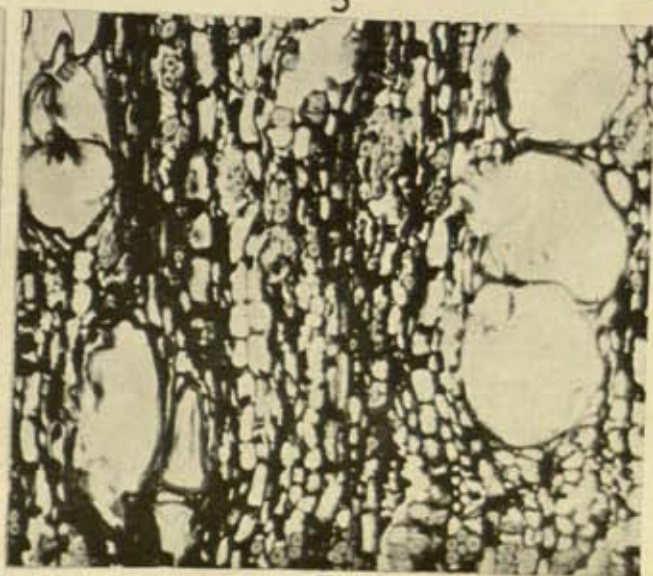
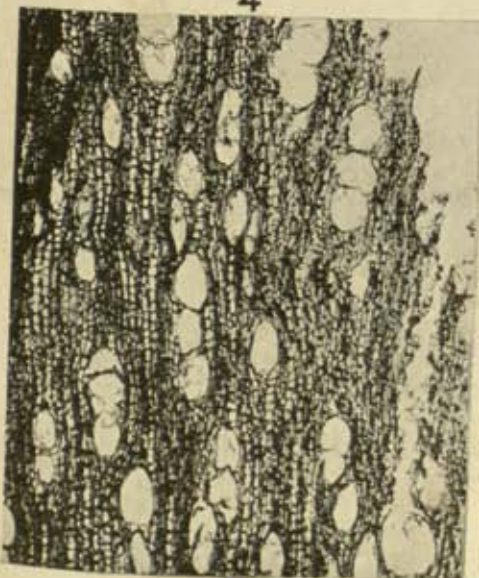
¹ Kautilya's *Arthaśāstra*, English translation by R. Shamasastri, second edition (Bangalore, 1928), p. 117.

² *Madhūka* is also mentioned among the *āraṇyaka* trees both in the *Charaka-saṃhitā* and in the *Śukranīti*, *Sacred Books of the Hindus*, XVI (Allahabad, 1914).

³ *Some Aspects of Indian Civilization*, p. 257.



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Sections of the wooden post from Kirāri (p. 20)

