

from *H. uninervis*, in which the leaf-blades are generally wider (0.025–0.35 cm) and the leaf-tips always have two linear lateral teeth and a broad, obtuse median tooth. Flowers and fruits of the two species have been studied too infrequently to be of use in the species delineation. The labels did not indicate the environment where *H. pinifolia* was found in India. General experience, however, has shown that the species is not bound to any particular habitat. In fact, it has been found in all kinds of disturbed places and in sites apparently unsuitable for other seagrasses. In such places it may be dominant, with few or no companion species¹.

A distribution map of the species has been published earlier by den Hartog in the series *Pacific Plant Areas*⁶. This map was based on material seen by the author^{1,7} and on other reliable observations^{8,9}. However, since the publication of this map, new records of the species became known from Palau¹⁰, the Philippines¹¹, New Guinea and the Bismarck Archipelago¹² and north-west Australia¹³. Therefore a new, updated map of the area of distribution of *H. pinifolia* has been prepared (figure 1).

25 January 1988

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OCCURRENCE OF MULTINUCLEATE CAMBIAL INITIALS IN SOME TROPICAL TREES

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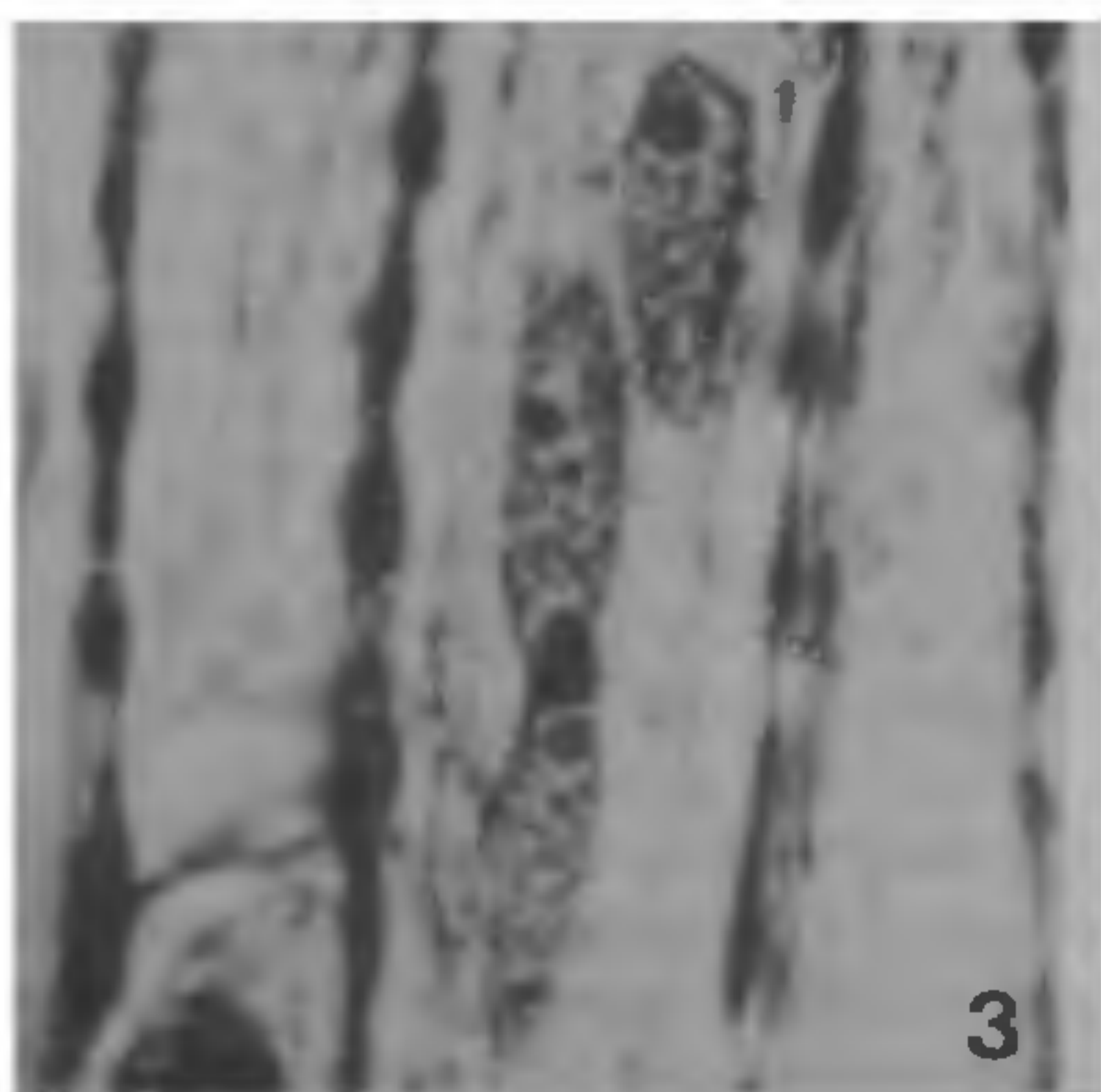
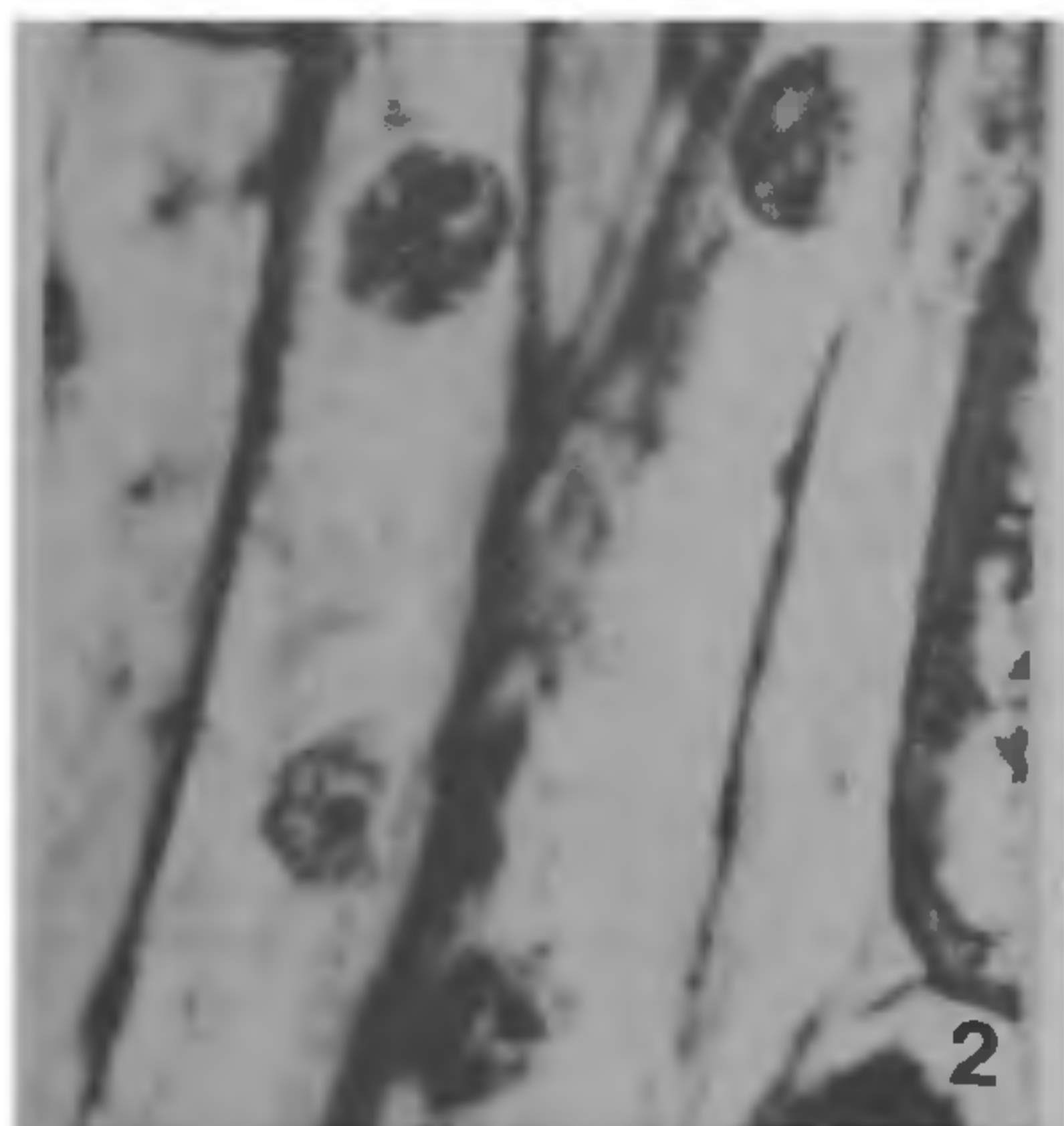
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STUDIES on the cambial cytology are few in tropical trees¹⁻⁵. The present paper describes the nuclear behaviour in the cambial initials in four deciduous and two evergreen trees: *Albizia lebbek* Benth., *Dalbergia sissoo* Roxb., *Tectona grandis* L.f., *Terminalia crenulata* Roth (deciduous); *Mangifera indica* L. and *Morinda tinctoria* Roxb. (evergreen). The vascular cambium is semi-storied in *Dalbergia* and non-storied in others. In *Albizia*, *Dalbergia* and *Terminalia* the vascular cambium showed two peak periods of activity intermittent with two periods of dormancy^{6,7}, the maximum number of nuclei being recorded during the active period.

On the onset of mitosis the nucleus enlarged considerably and chromosomal organization was evident even when the nuclear membrane was still intact (figure 1). The fusiform initials showed 2–10 nuclei, the maximum in *Terminalia*. During peak activity and differentiation of derivative elements, all the population of fusiform and ray initials had polynucleate condition. When the cambium approached dormancy in two periods within a year in *Albizia*, *Dalbergia* and *Terminalia* and only one period of dormancy in *Tectona*, *Mangifera* and *Morinda* showed uninnucleate condition; however, about 10–15% of fusiform initials in *Terminalia* and *Albizia* retained the multinucleate condition for some time during dormancy.

The nuclei of fusiform initials were not often alike with respect to their structure, size, shape, location, and stainability (figures 2 and 3). Like fusiform initials, ray cell initials also showed variation in nuclear number from 2 to 5, the maximum being recorded in *Terminalia*. Unlike fusiform initials, all the nuclei were spherical or oval throughout the seasons in all the ray cell initials and their degeneration towards dormancy was preceded by a change in their shape like nuclei of fusiform initials.

Bailey⁸ contended that appearance of multinucleate condition was due to the superimposed cells which lie close to the same focal plane. However, multinucleate condition of fusiform initials in a single focal plane has ruled out Bailey's observations. The presence of multinucleate fusiform



Figures 1–3. 1. Chromosomal organization of dividing nucleus. Note the nuclear membrane is still intact in *Terminalia* (nm, Nuclear membrane) ($\times 1400$); 2 and 3. Multinucleate fusiform initials of *Mangifera* and *Albizzia* respectively. Note the globular nuclei in the former and spindle-shaped nuclei in the latter (2. $\times 900$; 3. $\times 350$).

initials in *T. grandis* is confirmed and its presence in *Albizzia*, *Dalbergia*, *Mangifera*, *Morinda* and *Terminalia* is recorded for the first time.

The multinucleate condition is perpetuated even in the differentiation of vessel elements of *D. sissoo*⁹ while Patel³ observed the uninucleate xylem and phloem of *Solanum melongena*. This needs further studies. Occurrence of multinucleate condition in the ray cell initials is recorded for the first time here in *Albizzia*, *Dalbergia*, *Tectona*, *Terminalia*, *Mangifera* and *Morinda*.

9 September 1987; Revised 1 December 1987

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CHARACTERIZATION OF SHEATH FROM PHOTOHETEROTROPHICALLY GROWING STRAIN OF *CALOTHRIX MARCHICA* LEMM.

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THE filamentous cyanobacterium *Calothrix marchica* grew photo- and chemoheterotrophically in the presence of sucrose and fructose in the medium. A distinct sheath layer was developed around the trichome of photoheterotrophically grown strain of *C. marchica*¹. It was thought that considerable proportions of the sugars were assimilated by *C. marchica* in certain specific biosynthetic process, (for example, in the synthesis of sheath layer around the trichome). The present work was undertaken to isolate and characterize the sheath from the heterotrophically growing strain of *Calothrix*.

Calothrix marchica Lemm. var. *intermedia* Rao strain Sahu 1978/3² was used as the experimental