Selection of Materials: The following species of Bauhinia (Caesalpiniaceae) were selected for the study:

1. Bauhinia purpurea Willd.

A moderate sized ornamental evergreen tree, with pink flowers, distributed in sub-Himalayan tracts rising to 4,000 feet, also in Assam Khasi hills, Chittagong and the western peninsula. The bark is reported to contain tannin and is also used as astringent in diarrhoea. Flower buds are reported to be used as pot herbs.

The wood is greyish brown, moderately soft and light. It is used for agricultural implements and is suitable for scantling and rafters in inferior construction works.

2. Bauhinia variegata Willd.

A medium sized tree, flowering during the hot season, distributed in the sub-Himalayan tracts from the Indus east wards, also in dry forest over eastern, central and western India and in Burma. Flowers are deep pink in color.

The tree yields gum similar to cherry gum. Its bark is reported to be used in dyeing to obtain various shades of brown.
The leaves and buds are edible beside being useful in dysentery, diarrhoea and worms. The barks is described as astringent, alterative tonic and useful in scorfulla skin diseases and ulcers. The wood is greyish brown and moderately hard and is used for agricultural implements.

The main phenological features of both the selected species are presented in Table 1.

**Procedure and Techniques:** In order to study the cambium and its immediate derivatives a dozen fully grown, normal trees of comparable age and vigour (Table 2) were selected for each species and labelled. Trees growing under shade or in poor soil conditions were avoided as they were likely to have a relatively slackened growth or other physiological abnormalities.

**Collection:** Blocks of about 2 cm² size containing sap wood, cambium and bark were collected from main trunks of the selected trees at about the chest height (1.5 m from the ground) with the help of a chisel and a hammer. The collections were made at fortnightly intervals, usually in morning hours, and the blocks were taken from all the four sides (east, west, north and south) of the trunks of at least two trees per species on each turn. This practice was extended for three consecutive year viz. 1976, 77, 78. When the material was collected from the same tree repeatedly, care
was taken to obtain the blocks from a place about 20 cm apart the previous sampling spot. To study the ontogenetic changes in the structure of cambium and its derivative tissues, samples were collected in July and November 1977 from different positions (I-IV) of the main tree axis with varying circumference (Fig. 1).

**Fixation:** The samples were fixed on the spot in either F.A.A. or Crafts III solution and later aspirated for free access of the fixative into deeply situated tissues. They were allowed to remain in the fixative for 3-5 days and then transferred to a mixture of 50% glycerol and 50% ethanol (v:v) for softening. After a month the material was either used for sectioning or preserved in 70% ethanol.

**Sectioning and Staining:** Transverse and longitudinal (radial as well as tangential) sections were cut on a Reicherts sliding microtome usually at a thickness of 10-12 µm. Depending on the purpose of the study, the sections were stained with any of the following staining schedules and passed through ethanol series for dehydration:

A. For the study of cambium:

1) Heidenhains hematoxylin (Johansen 1940).

2) Tannic acid - Ferric chloride (Foster 1934).
SEMIDIAGRAMATIC SKETCH
SHOWING DIFFERENT SAMPLING
SPOTS ON TREE AXIS

FIG. 1
B. For the study of derivative tissues:

i) Heidenhains hematoxylin - Safranin/Bismarck brown (Johansen 1940).

ii) Tannic acid - Ferric chloride - Lacmoid (Cheadle et al. 1953).

Maceration: The cambium derived elements viz., vessel segments, xylem fibres, sieve-tube members and phloem fibres were macerated, when necessary, following the method described by Ghouse et al. (1974). For the phloem elements, the method included the slicing of the bark samples in tangential plane at an approximately 1 mm thickness. The slices were separately treated with 5% NaOH solution at 45-50°C for a number of days. The solution was replaced with a fresh one of the same concentration after each 72 hours. Under periodical checkings the treatment was extended till the cells of the treated slices became loose enough to be separated on glass slides when teased with a needle or tapped gently under cover glass. Having attained the desired stage, the slices were washed and stained with 1-2% aqueous solution of astra blue or lacmoid (for sieve elements) as well as with that of safranin or Bismarck brown (for fibres). The macerated elements were mounted in glycerol. In case of xylem, the slices obtained for different places were separately treated with concentrated HNO₃ and potassium chlorate, following the method of Ghouse and Yunus (1972) with slight modifications, and were stained with safranin or Bismarck brown.
Estimation of Tissue Proportion: The area occupied by the component initials in cambial zone and by the different phloic and xylary elements in derivative tissues was determined by the following method.

For each sample, 10-20 camera lucida drawings of the tissue under study were made from relevant sections on tracing papers of uniform thickness and the areas occupied by the desired elements were carefully marked. All the drawings were weighed in a sensitive microbalance. Of these drawings the portions containing the marked tissue elements were carefully cut and removed, and again weighed separately. Since the weight of the uniformly thick paper sheets was directly proportional to their surface area, the area occupied by the required elements was computable by comparing the above two weights. Relative proportion of various cell types was thus calculated per unit area and expressed in percentage following Ghouse and his co-workers (cf. Ghouse & Yunus 1974a,b,c; Ghouse & Iqbal 1975, 1978).

Cell Measurements: To determine the size of various cell types in the samples collected at a particular time or from a particular level of the tree axis, 100-250 elements per sample were usually measured on a random basis using micrometer scale under specific magnifications. The average as well as range of the cell dimension was then determined after pooling the readings obtained from all the relevant samples.
### TABLE 1

Phenology of *Bauhinia* spp. at Aligarh

<table>
<thead>
<tr>
<th>Species</th>
<th>Leaf emergence</th>
<th>Flowering</th>
<th>Leaf fall</th>
</tr>
</thead>
</table>

### TABLE 2

General features of the selected trees

<table>
<thead>
<tr>
<th>Species</th>
<th>Age (years)</th>
<th>Height (meters)</th>
<th>Circumference of trunk (cm)</th>
<th>Bark colour</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>B. purpurea</em></td>
<td>25–30</td>
<td>4–6</td>
<td>91–100</td>
<td>Dark brown</td>
</tr>
<tr>
<td><em>B. variegata</em></td>
<td>25–30</td>
<td>6–10</td>
<td>90–115</td>
<td>Black</td>
</tr>
</tbody>
</table>