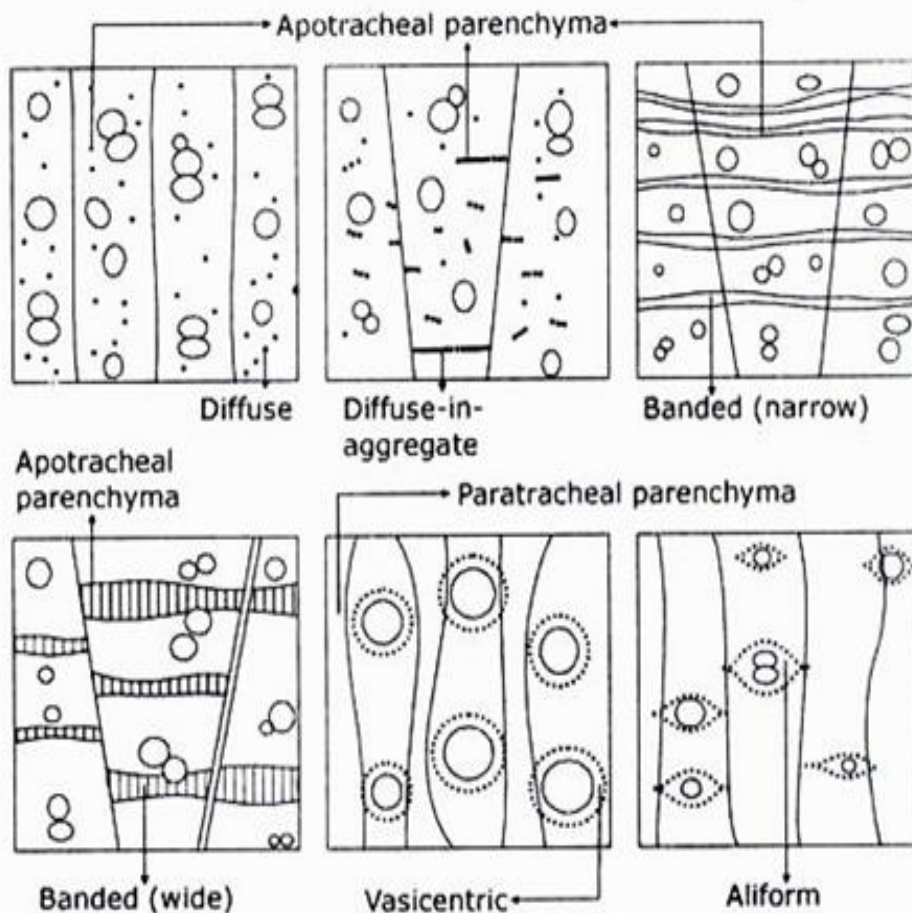


## Wood Parenchyma

The parenchyma associated with the secondary xylem can be differentiated into axial parenchyma initiating from the fusiform initials from ray initials. The cells of the axial parenchyma are usually as long as the fusiform initials from where they are derived. Sometimes the fusiform initials may divide transversely and then shorter axial parenchyma cells may develop secondary thickenings in their walls. Many times a small part of ray/axial parenchyma adjoining the pits of the cell penetrates into the vessels on the form of a blunt and short protrubance. The nucleus and the part of cytoplasm of the parent cell migrate into the peg like outgrowth. It gradually expands and forms a bladder in to the vessel lumen. This is known as tyloses. When the tyloses grow further it is detached from the parenchyma cell from which it has been originated. The separating wall is led down at the point of its entrance and enters into the vessel. Sometimes the tyloses undergo repeated division to form a multicellular structure which completely fills the lumen of the vessel.



## **Reaction Wood**

It is special kind of wood and sometimes produced on the lower side of branches of gymnosperms (compression wood) and on the upper side of branches of dicotyledons (tension wood). They are known as reaction wood and these are believed to be developed as a reaction to counteract the forces which induce the inclined position of the branches. It is shown that the stimulus of gravity and distinguishing of auxin play an important part in the formation of reaction wood. In reaction of the dicots, the vessels are reduced and are characterized by gelatinous fibers with thick highly refractive gelatinous layer in the wall. The phloem fibres of reaction wood are less lignified but their walls are thicker than the normal phloem fibres. In reaction wood of conifers the tracheids are rounded and shorter than normal wood, with intercellular spaces. The cell is heavily lignified. In addition to the above two major patterns, there are some other patterns of pore distribution:

**1. Tangential clusters**- When most of the pores tend to form tangentially aligned groups which may be either curved or arched. e.g., *Ulmus wallichiana*

**2. Exclusively solitary**- When pores occurs singly without any association with other pores. e.g., *Xanthophyllum, D*

## **Structure of xylem rays**

Rays vary in their width and cellular composition. They may be uniseriate (when only one cell wide) or multiseriate (when several cells wide). Usually both uniseriate and multiseriate medullary rays are present in a wood though one or the other type maybe quite infrequent. The medullary rays consist of erect and/or procumbent cells. The rays which are made up of only one type of cells are known as homocellular cells and the ones consisting both the types of cells are called heterocellular rays. In primitive woods both uniseriate and multiseriate heterocellular rays of considerable vertical length are present, whereas in advanced woods they are multiseriate and tend to become homocellular with marked reduction in their vertical length.

Secondary xylem has two systems of tissues which show different orientation in the longitudinal axis of the plant.

### **1. Axial System:**

It consists of vertical files of tracheary elements, fibres and wood parenchyma. The elements of this system can be studied in transverse and radial longitudinal sections (R.L.S). This system is also known as vertical or longitudinal system.

## **2. Radial System:**

It consists of rows of parenchymatous cells oriented at right angles to the longitudinal axis of the plant and forms xylem rays or wood rays. The height and thickness of xylem rays is revealed best in radial and tangential longitudinal sections respectively.

### **Rays and Axial Parenchyma:**

The parenchyma associated with the secondary xylem can be differentiated into

- (i) axial parenchyma, initiating from the fusiform initials, and
- (ii) ray parenchyma, which initiates from the ray initials.

The cells of the axial parenchyma are usually as long as the fusiform initials from which they are derived. But sometimes the fusiform initials may divide transversely and then shorter axial parenchyma cells are differentiated. The Ray parenchyma cells which are usually shorter than the axial parenchyma cells may sometimes develop secondary thickenings in their walls.

### **Distribution of the Axial Parenchyma**

The amount and distribution of axial parenchyma shows considerable variation in different woods and much taxonomic importance is attached to the type of distribution. Kariba (1937), who described the phylogenetic distribution of axial parenchyma, considers the absence of axial parenchyma as primitive feature and the presence of terminal parenchyma as advanced feature. With the increased specialization of the secondary xylem, the parenchyma cells become shorter and broader. The axial parenchyma may be categorized into two groups:

- (i) Apotracheal, when the distribution of parenchyma is independent of the vessels, and
- (ii) Paratracheal, when distribution of parenchyma is associated with vessels.

In addition to the above two types, a third type of parenchyma distribution, called boundary parenchyma, has been recognized (Jane, 1962). In this type, the parenchyma occurs as a fine continuous line or a narrow band either at the beginning or end of the growth rings. Such initial or terminal bands of parenchyma sharply delimit the growth rings. Apotracheal parenchyma may be divided into following types:

(1) **Diffuse or scattered**- When the apotracheal parenchyma occurs as isolated cells or short tangential aggregates, the distribution is described as diffuse or scattered. e.g., *Adina cordifolia*, *Dillenia illenia*

(2) **Diffuse-in-aggregates**- Here, the apotracheal parenchyma occurs in the form of fine and evenly spaced broken or tangential lines. This type of distribution is also referred to as fine line distribution. e.g., *Dipterocarpus*, *Hopea parviflora*

(3) **Banded**- In this type the parenchyma forms relatively conspicuous tangential bands, occurring at frequent intervals throughout the growth rings. When the band is broad and conspicuous, it is termed as banded-broad (e.g., *Pterygota*) and when fine and narrow, it is called banded-narrow. (e.g., *Lophopetalum*)

The Paratracheal parenchyma shows following variations:

**1. Vasicentric** - When parenchyma is closely associated with the pores, forming a fairly uniform light coloured sheath around the vessels, it is known as vasicentric. (e.g., *Acacia catechu*)

**2. Aliform** - In this type of parenchyma surrounds the vessels in such a way that wing like lateral projections are formed. It is also known as eyelet type. (e.g., *Albizia lebbek* , *Holoptelea integrifolia*).

**3. Aliform confluent** - It is a modification of aliform type. Here the wing like extensions of adjacent pores becomes connected laterally. Such distribution may either be found independently or in association with aliform type. (e.g., *Ongelnia cojeinensis*). When adjacent connecting pores are thin and narrow, it is called confluent narrow and when relatively broad then confluent broad.

**4. Long radial multiples**- When the pores are arranged so as to form long, radial rows of 3 to 6 or more. e.g., *Chloroxylon swietenia*

**5. Oblique groups**- When the pores are arranged in long or short, radially oblique groups to form a somewhat oblique pattern. e.g., *Quercus*

**6. Flame-like** - When the pores are usually small and arrange