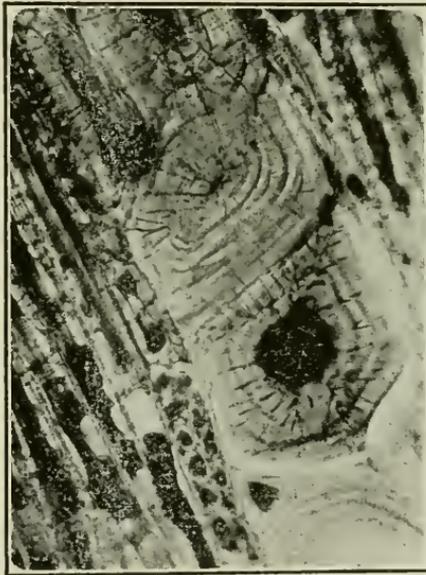


TYLOSES IN *BROSIMUM AUBLETII*.

KATHERINE E. GOLDEN.

The wood of *Brosimum Aubletii* has been given various common names, as leopard-wood, letter-wood, and snake-wood, on account of the mottled appearance of part of its heartwood. It is a very hard, compact wood, dark brown in color, and has part of the heartwood beautifully mottled with black. The mottling is due to the sclerenchymatous tyloses which fill its tracheæ.

The wood is composed of a mass of fine fibres, nearly round in transverse section, and arranged in fairly regular radial rows. The fibres are flattened tangentially when adjoining either parenchyma cells or

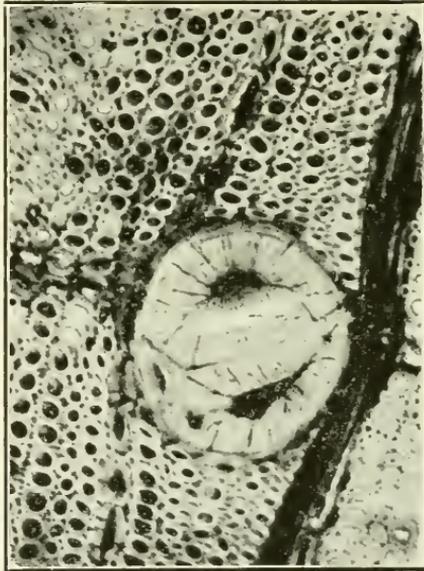


Leopard-wood. Tang. Sect. (x 300)

tracheæ. The tracheæ are scattered promiscuously throughout the fibres, either singly or in groups of two to four. They are finely pitted, and consist of vessels and tracheïdes. Parenchyma occurs around the tracheæ, sometimes in single rows, sometimes irregularly grouped, also in tangen-

tial lines, and in regular radial rows, having blind ends, as they seem to start and to stop anywhere. The tangential rows branch, the branches running into other rows or joining with the cells around tracheae. Sometimes the tangential and radial rows are so regular that they give the wood a cross-barred appearance.

The medullary rays consist of very narrow, long cells, the long diameter running in a radial direction. They are from one to four cells wide, the more common number being two. They are from about fifteen to fifty cells in height, though an accurate count could not be made, due to the presence in every ray of larger sclerenchymatous cells. One or more of these sclerenchymatous cells, having fairly thick walls, occur in



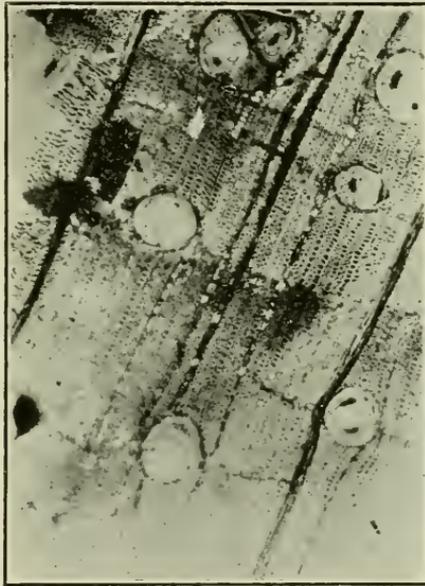
Leopard-wood. Trans. Sect. (x 300)

each ray, either at the end or throughout its height. In all cases a sclerenchyma cell occupies the place of two to four of the regular parenchyma cells and seems to be the result of the merging of a number of the parenchyma cells. They are seen to best advantage in the tangential section.

In a similar way the radial rows of parenchyma, though as regular in their formation as the rays, are easily distinguished from the rays by their greater size and sclerenchymatous walls.

All the elements of the wood, including even the wood fibres, have their lumina filled with a brown to black solid coloring matter. The walls of the elements are not impregnated with the color, and consequently stand out distinctly, so that their peculiarities are easily observed.

The chief peculiarity of Leopard-wood is the presence of sclerenchymatous tyloses. Tyloses or tyioses, as they are more commonly called, are ingrowths of parenchymatous cells into the cavity of the tracheæ. When a trachea is adjoined by parenchyma, the parenchyma retains its protoplasm after the trachea becomes empty; as the parenchyma exerts pressure on the non-resistant walls of the trachea, the parenchyma pushes into the cavity of the trachea through a pit or weak spot, forming a short



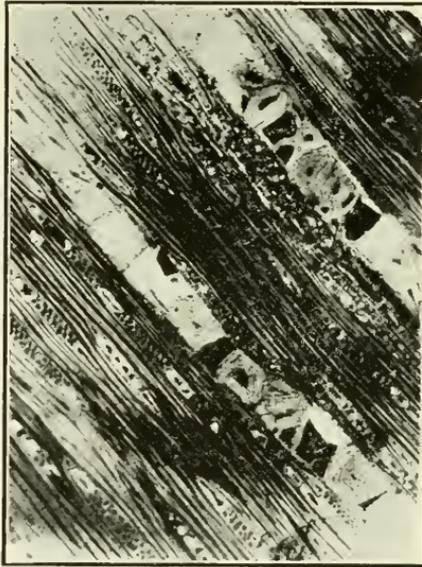
Leopard-wood. Trans. Sect. ( $\times 80$ )

tube. The tube may be the only one at that part of the trachea, or there may be so many that there is a series of tubes lining the entire cavity. These ingrowths may make no further progress, but the more common method of development is the formation of a wall at the junction of the tracheal wall, cutting off the ingrowths. These ingrowths may then carry on cell division, forming a mass of parenchyma filling the lumen of the trachea. Tyloses form in many Dicotyledons as a regular phenom-

enon, and without the occurrence of any injury to stimulate growth. They form in pitted tracheæ usually, though in some one-year old stems they form in fibrously thickened tracheæ without any perforations.

The walls of the tyloses are delicate at first, but they afterwards thicken somewhat, and their cellulose walls become lignified like the rest of the wood parenchyma.

In Leopard-wood the tyloses have their walls so strongly thickened that the cells resemble the stone cells in pears. Nearly all the tracheæ are filled with them, rarely is there found a portion of a trachea without

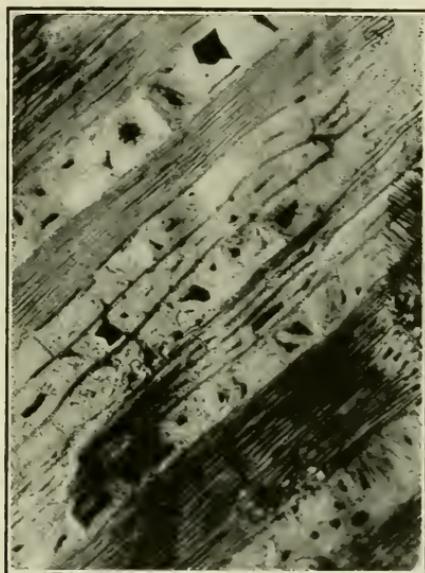


Leopard-wood. Tang. Sect. (x 80)

them. The stone cells are irregular in shape, and are packed closely together, usually one being sufficient to fill the lumen transversely, though sometimes two and three are wedged together across the lumen. The walls vary considerably in thickness, some having their lumina entirely obliterated, while in close proximity to them may be others with fairly large lumina. In all of them the thickening of the walls is in well-defined layers, the layers sometimes separating from each other. All the walls are provided with fine canals, radiating from the central lumen, sometimes branched, and in all, the canals of adjoining cells corresponding.

The tyloses give the wood a characteristic appearance under the microscope. This can be seen in the photographs, though much of the beauty is lost with the loss of color.

Boulger (1) in his valuable work on wood mentions the sclerenchymatous tyloses of the Leopard-wood, and in describing the gross structure of the wood, states that the sapwood is yellow, and that the tree has heartwood squaring twenty inches, though only six inches show the characteristic mottling. This would seem to indicate that even if all the heartwood had tyloses form, not all become sclerenchymatous.



Leopard-wood. Rad. Sect. (x 80)

The wood is used in this country in the manufacture of musical instruments, and only the mottled wood is prized. Pieces of the mottled were all that I was able to obtain, so I had no way of determining anything in regard to the tyloses in the sapwood or unmottled heartwood.

The formation of tyloses through the activity of the parenchyma, can be readily understood, but nothing is known as to the cause of this activity in some woods, while in other woods tyloses are never formed. Then again in most woods investigated nothing definite as to time of formation is known. DeBary (2) states that in *Robinia pseudacacia* tyloses form in

the autumn in the wood formed the previous spring, and that this is true, also, of other woods, but nothing definite as to their occurrence or absence is known. Further investigation is necessary to determine the facts relative to tyloses other than their structure and seemingly haphazard occurrence.

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1. Boulger, G. S. Wood, 1902.
  2. DeBary, A. Comparative Anatomy, 1884.