

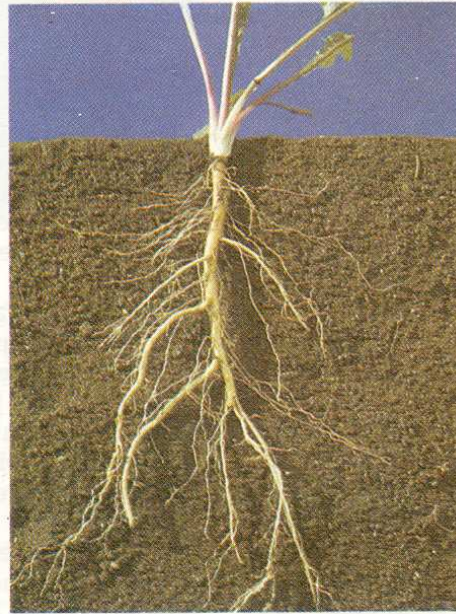
Tema 9: Estructura general de las plantas vasculares.

Bibliografía: ver temas anteriores.

La Raíz. Estructura primaria y desarrollo.

Funciones:

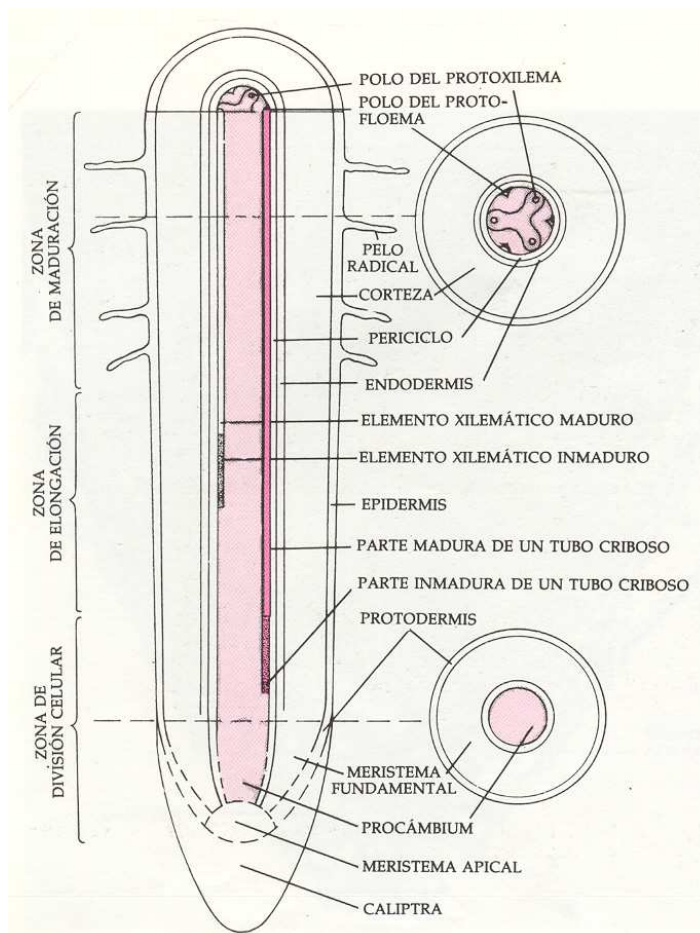
- Fijación
- Absorción
- Almacenamiento
- Conducción (transporte)



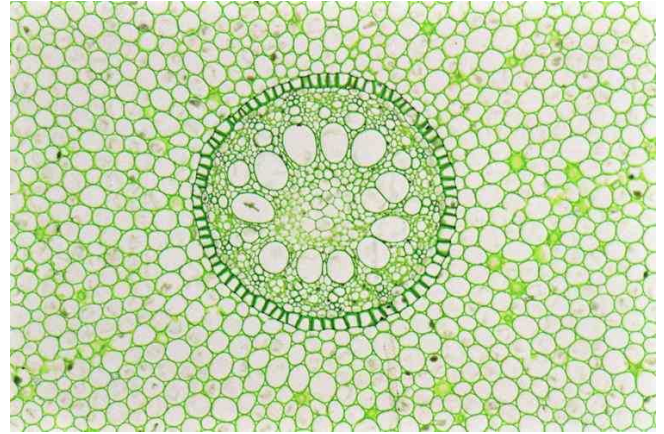
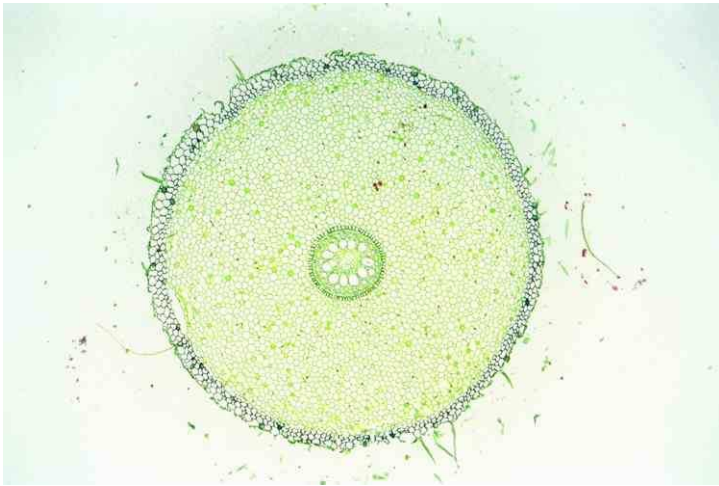
Raíz fasciculada

Sistemas de raíces:

Raíz axonomorfa



Origen y crecimiento de tejidos primarios.



Estructura primaria.

Plant Monocot Root

Transmitted light T.S. iris (*Iris sp.*) root. Stained with Safranin and light green

[1]

Magnification x 25

Even at this lower power you can see features which should help you to decide whether this section is of a root or stem section.

[2]

Hot spot 2. Magnification x 100

The stele and inner cortex. Note the thickened endodermis but also the arrangement of the large xylem vessels and the presence of a pith.

[3]

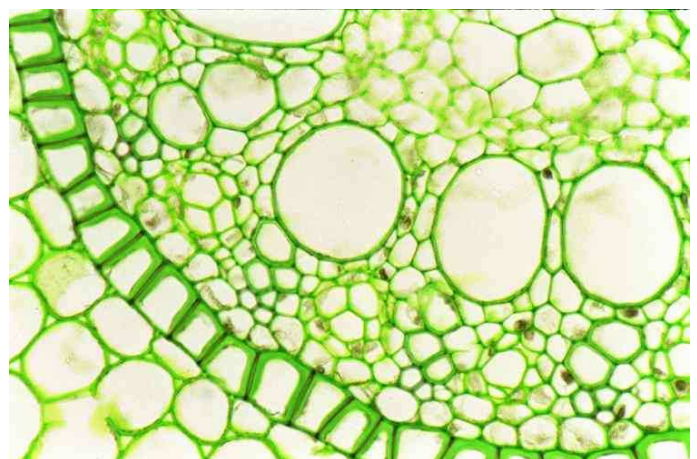
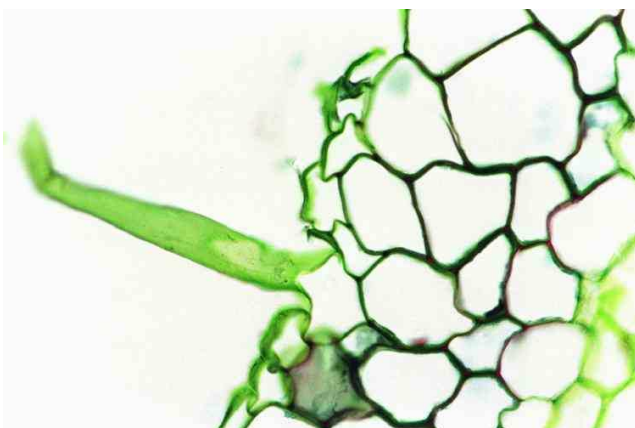
Hot spot 2a. Magnification x 400

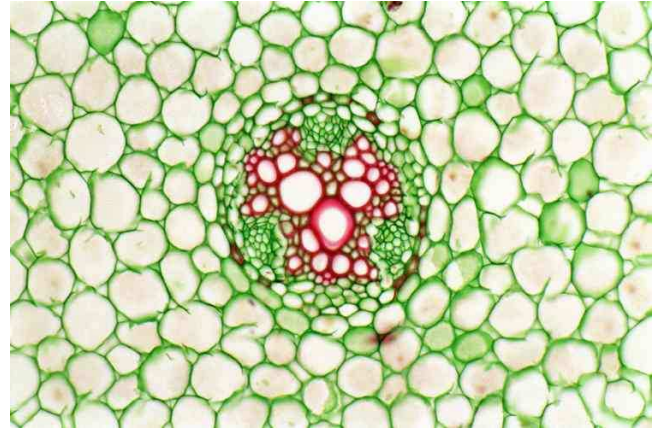
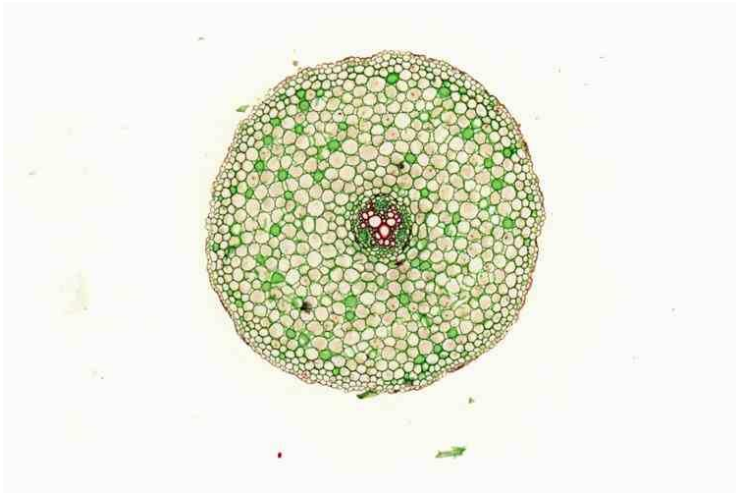
Endodermis, xylem and phloem of a monocotyledonous root. Can you locate the phloem cells?

[4]

Hot spot 1. Magnification x 400

A root hair, epidermal cells and the thickened outer cortex area. Note the dark, but not red, colouration of the outer cells indicating suberized parenchyma of the hypodermis.





Plant Herbaceous Dicot Roots

Transmitted light T.S. young buttercup (*Ranunculus sp.*) root. Stained with Safranin and light green.

[1] x 25. Living cells are stained green by the light green stain. The main constituents of the walls of living cells are cellulose, hemicellulose and pectin.

Remember that red staining indicates the presence of lignin as well as celluloses, hemicelluloses and pectins in the cell wall and this in its turn indicates that these cells are dead cells.

[2] Hot spot 3. x 200. The Stele.

Remember red stained cell walls are thickened with lignin and such cells are dead. They no longer have organelles. In a young tissue the overall layout of the vascular bundles is critical in deciding what organ (root or stem) you are looking at.

[3]. Hot spot 4. x 400. More detail of the cells of the stele: xylem, phloem, pericycle and cambium. With careful observation here you will be able to recognise cambium cells wherever they might occur in other sections. An advantage of being able to recognise cambial cells is that if you can find cambium in a vascular bundle

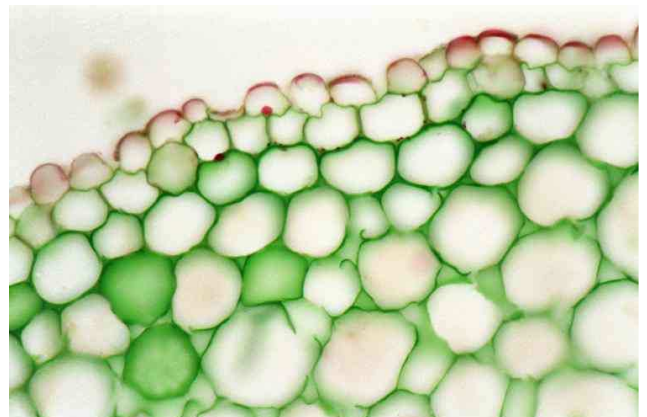
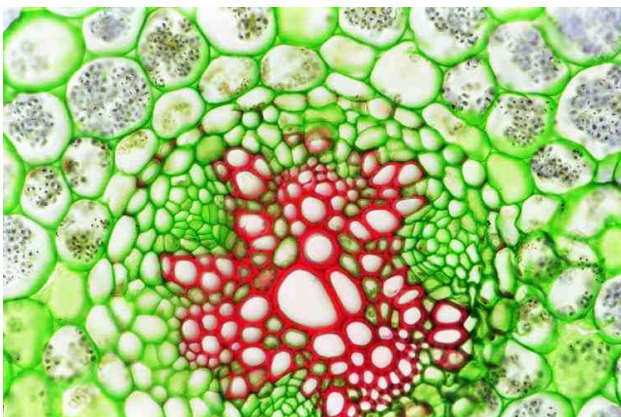
you know that phloem (which is sometimes difficult to recognise on positive features) must lie on the opposite side of the cambium to the more easily recognised xylem.

[4]. Hot spot 2. x 400. The endodermis; a boundary layer between the cortex and stele.

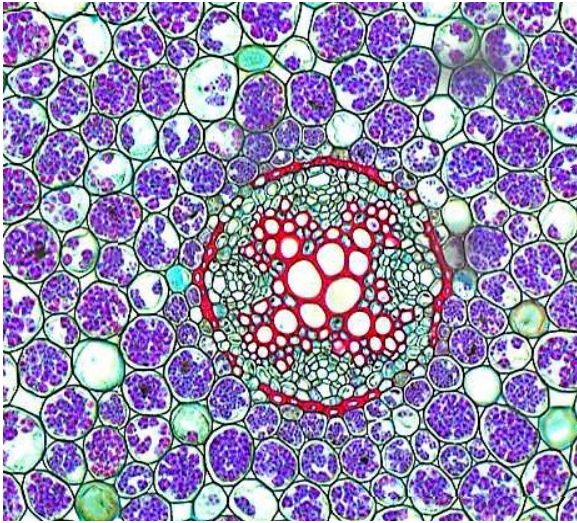
You will find there is a layer inside the cortex where many, but not all cells have lignin thickening in the radial walls. In some cells the thickening is u-shaped having progressed to the internal cell wall.

[5]. Hot spot 1. x 400. Epidermis and cortex.

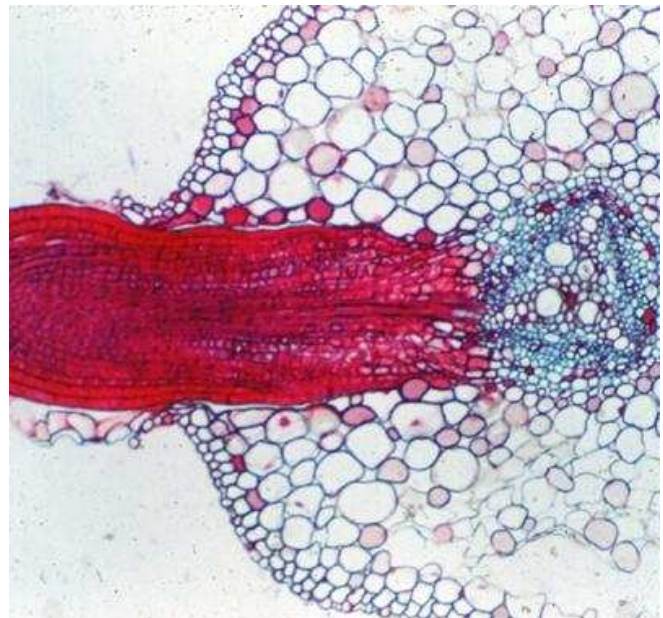
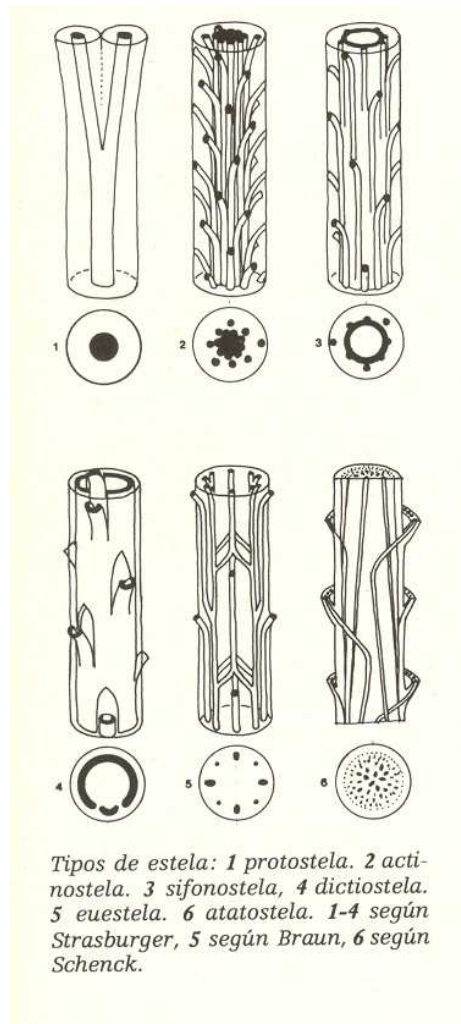
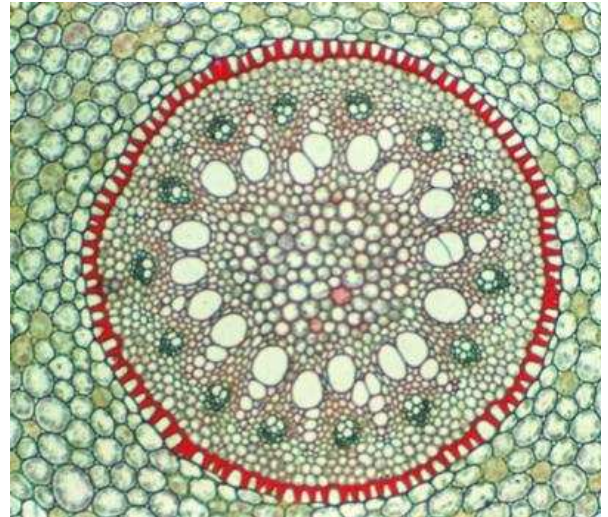
The critical characteristics are location, cell shape, how the cells fit together and the thickness of the cell walls.



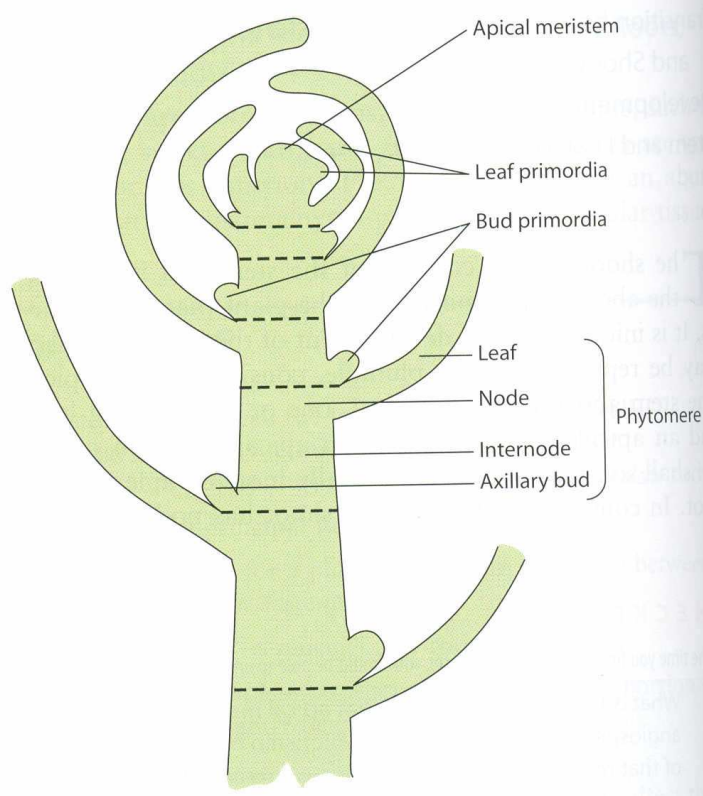
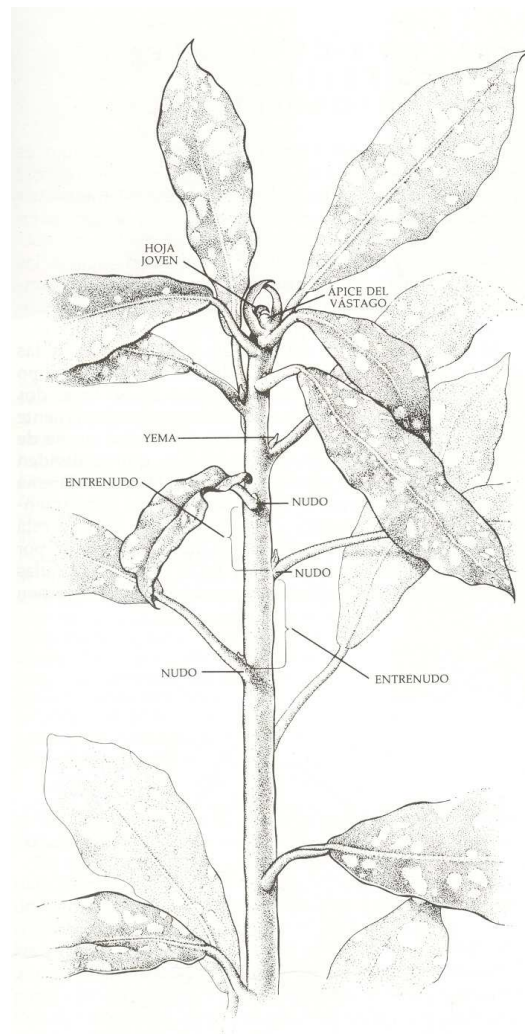
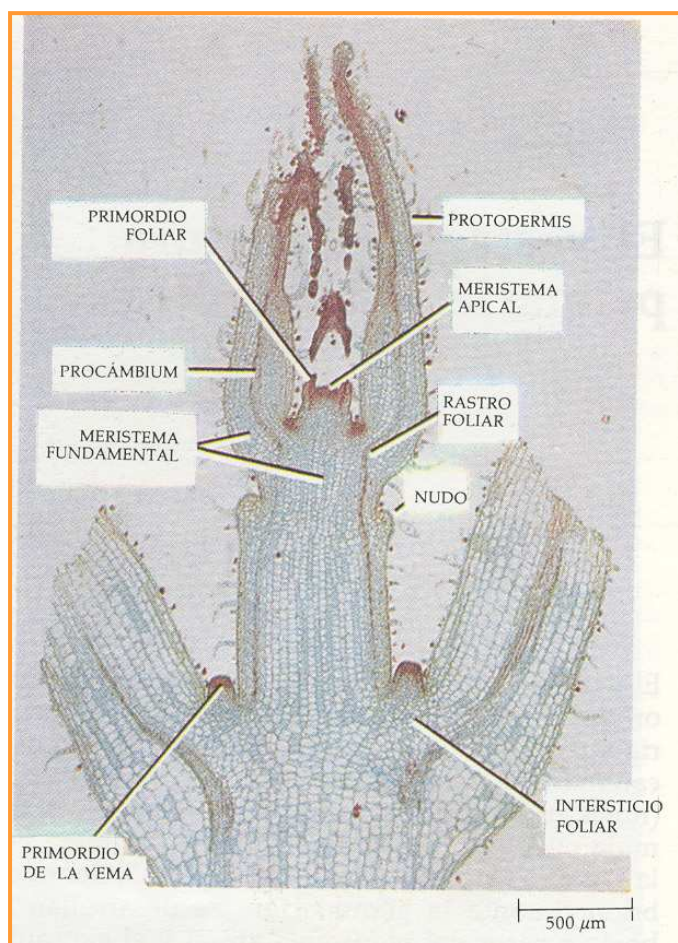
Raiz dicot



Raiz monocot



El vástago. Estructura primaria y desarrollo.



Ramificación del tallo.

Ramificación monopodial (monopodio)

Eje principal continuo con prolongación longitudinal a través de la yema terminal con el ápice; las yemas laterales y los tallos laterales están subordinados (abeto y roble, por ejemplo).

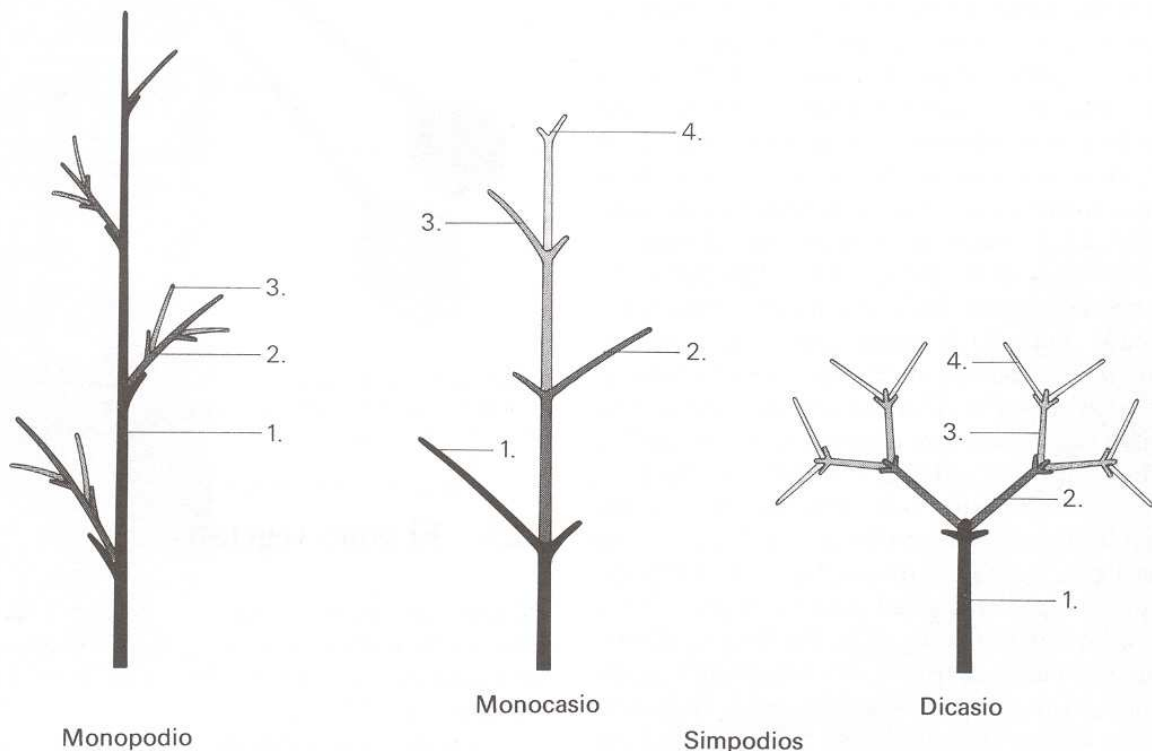
Ramificación simpodial (simpodium)

La yema terminal muere, crecimiento longitudinal por retoño de las yemas laterales (haya y tilo, por ejemplo).

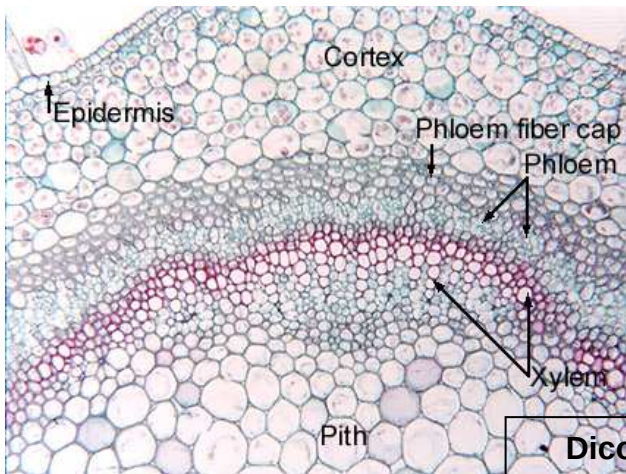
Cuando un retoño lateral se desplaza y toma la dirección del eje principal, continuando el crecimiento longitudinal, se produce un *monocasio* (ejemplo: tilo).

Cuando retoñan simultáneamente dos yemas opuestas entre sí, y sus brotes continúan ambos el crecimiento en la dirección principal del tallo, se produce un *dicasio* (ejemplos: saúco y muérdago).

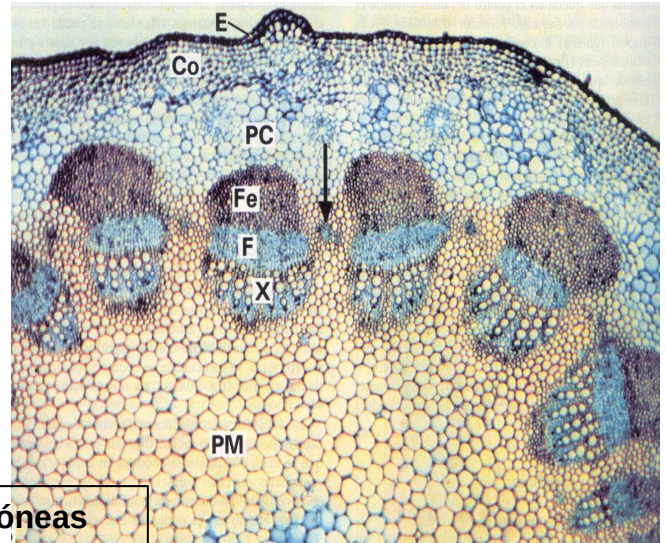
Externamente un dicasio se asemeja a una ramificación dicotómica. Pero esta última tiene un origen completamente distinto, como ya se explicó (cf. cap. 16.1.6.5).



Estructura primaria del tallo.

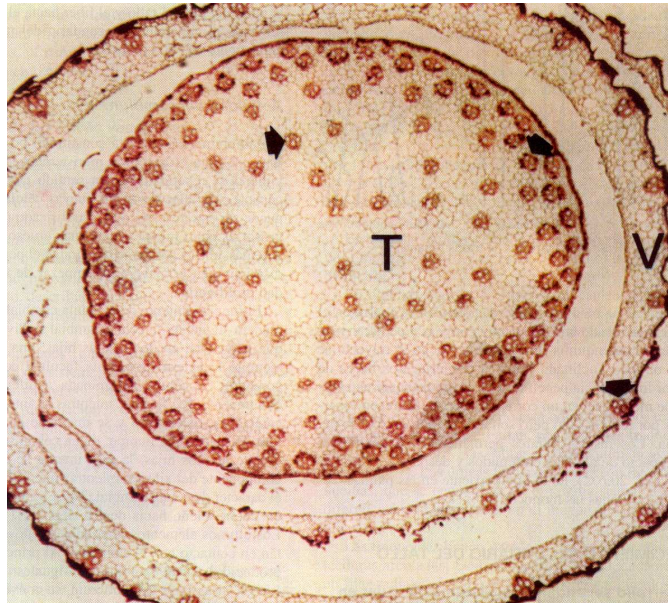


Tallo de dedalera (*Digitalis*), haz vascular en cilindro.



Tallo de girasol. Tejidos vasculares en haces separados.

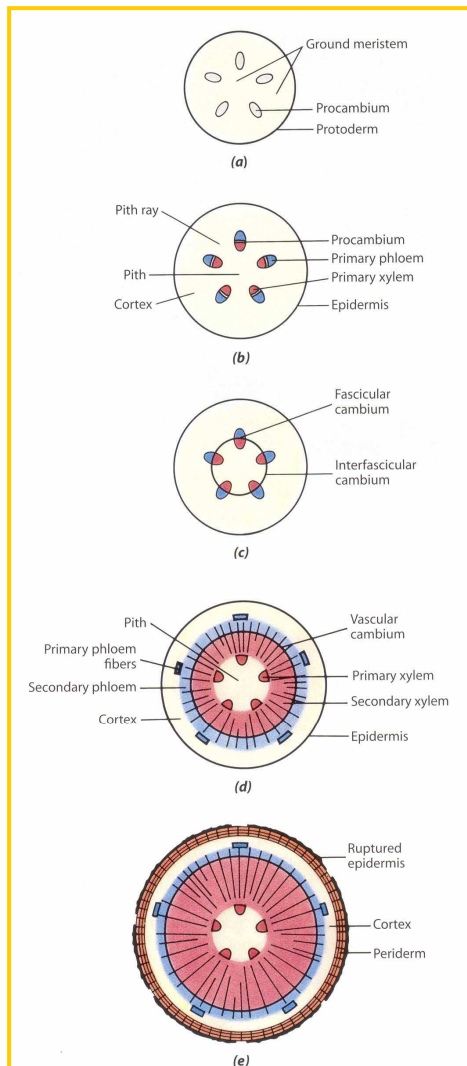
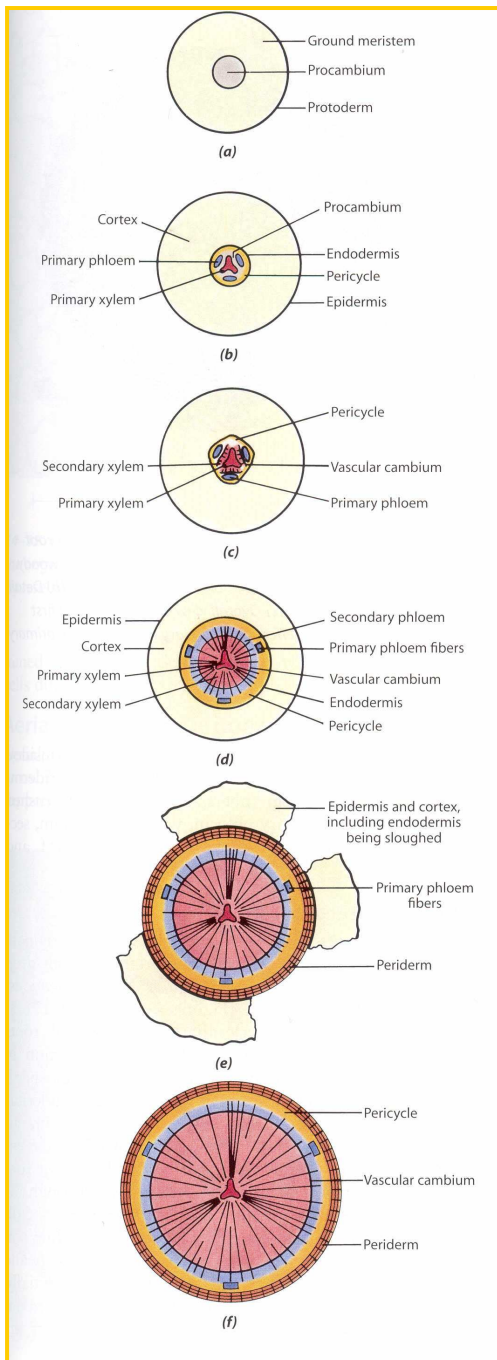
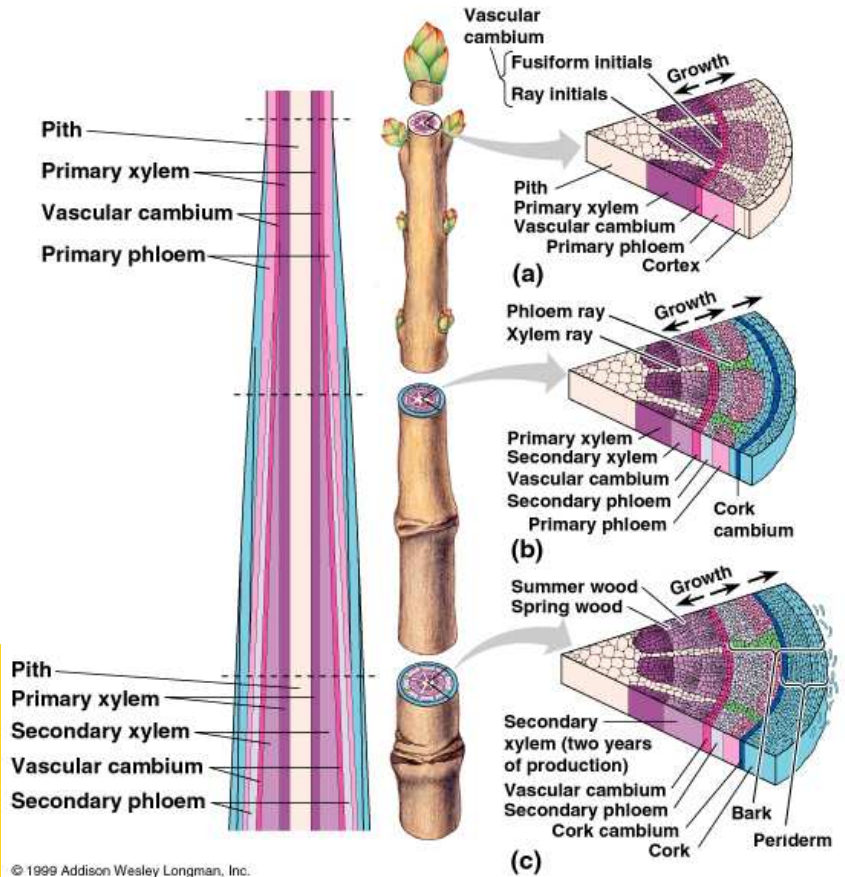
Dicotiledóneas

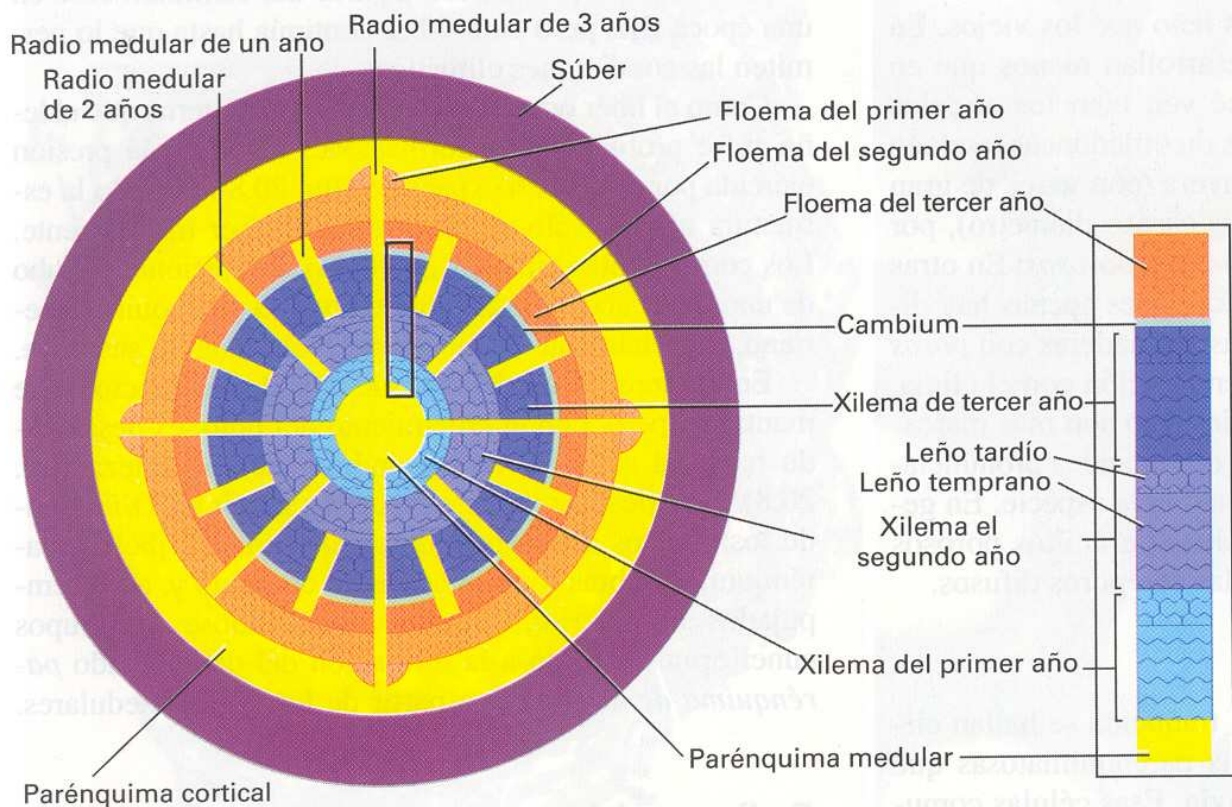


Monocotiledóneas

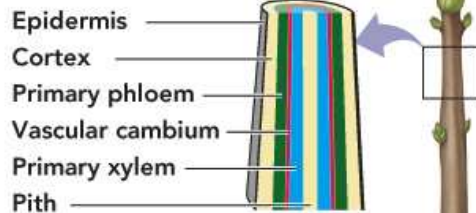
Tallo de maíz. Tejidos vasculares en cordones dispersos.

Crecimiento secundario.

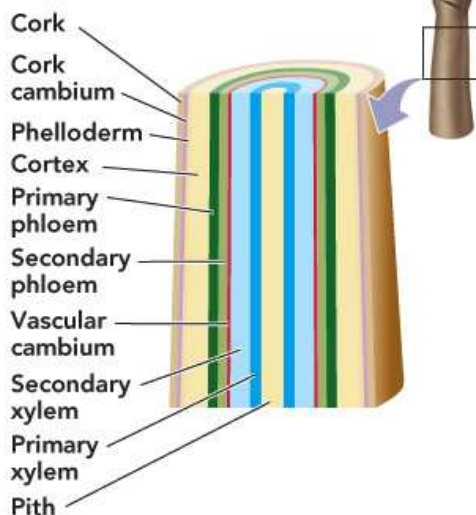




Primary growth in a woody stem



Primary and secondary growth in a woody stem



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