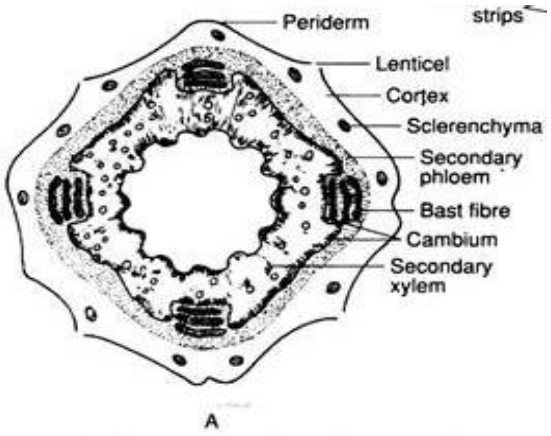
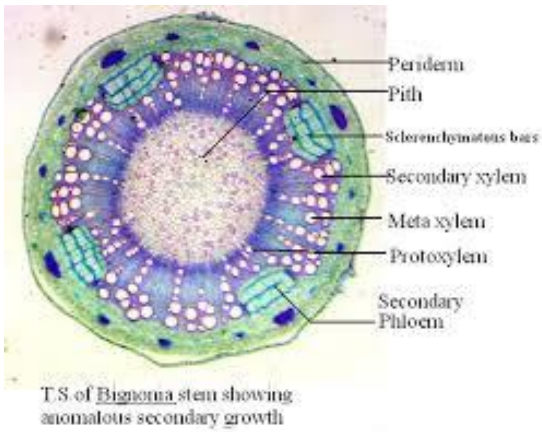
Anomalous secondary growth in *Bignonia* Stem





T.S of Bignonia stem showing anomalous secondary growth

- Secondary growth in ***Bignonia*** **stem** is not typical of that found in **dicotyledonous** stem. In this plant the **cambium** is **normal in position** but **abnormal in activity.**
- In some plants like *Bignonia* and other members of the family Bignoniaceae, the cambium is normal in position and activity for the first time, but immediately it cuts off different proportions of xylem and phloem at four alternative points in form of a cross.
- The cambium produces secondary xylem and secondary phloem in **variable quantities**; in some segments much greater amount of xylem than of phloem and in others more phloem than xylem.
- As a result, a characteristic structure is formed with ridged and furrowed xylem cylinder.
- The ridges are wider than the grooves.
- In the secondary phloem formed in the grooves, parallel strips of bast fibres are formed.
- The cambium breaks up into a number of strips, the wider ones remain on top of the ridges and narrower ones remain at the base of the grooves.
- The number of wedges formed is usually four in number, symmetrically arranged corresponding in position to the larger primary vascular bundle.

This is a kind of adaptive anomaly, as *Bignonia* is a woody climber.

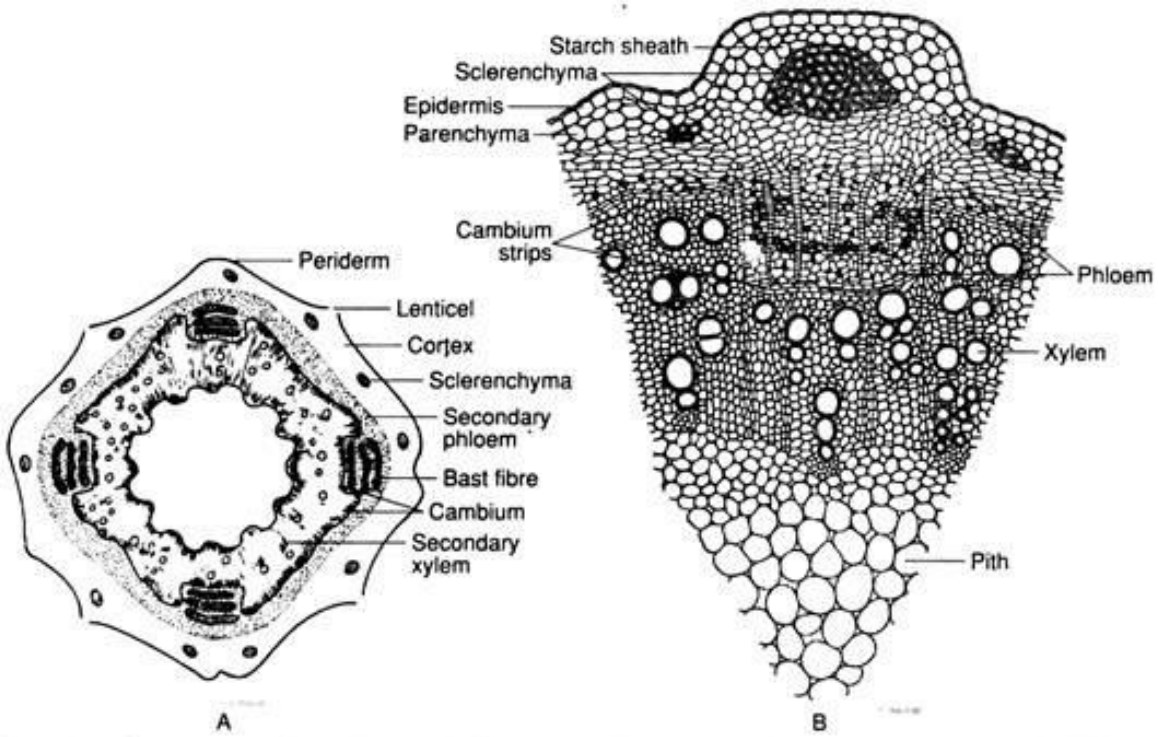


Fig. 5.147 : Transverse section of stem of *Bignonia* showing the anomalous secondary growth in thickness. A. Diagrammatic view of the whole transverse section of the same. B. Cellular drawing of a portion of the same

T. S. shows many ridges and furrows and reveals the following tissues from outside within:

Epidermis:

1. Single-layered epidermis consists of rectangular cells.
2. A thick cuticle is present.
3. A few multicellular hairs are also arising from some cells.

Cortex:

4. It is well-differentiated into collenchyma and parenchyma.
5. Collenchyma is present below the epidermis in the ridges in young stem but at maturity there develops sclerenchyma.
6. Parenchyma is present below the sclerenchyma or collenchyma in the ridges and directly below the epidermis in the grooves.
7. In old stem cortex consists of cork, cork cambium and cortex.
8. Endodermis is undistinguishable from cortical cells. The cells lack casparian strips.

Pericycle:

9. It is in sclerenchymatous patches.

Vascular system:

10. Phloem, secondary phloem, xylem and primary xylem constitute the vascular bundles along with the cambium.
11. Four longitudinal furrows of secondary phloem arc present which are wedged in between the secondary xylem cylinder.
12. Vascular bundles are conjoint, collateral, open and endarch.

13. Primary phloem is crushed and present in small patches.
14. Secondary phloem is in the form of a ring which remains intruded into the secondary xylem at four places.
15. Intruded furrows (four) of secondary phloem are arranged in the form of a cross.
16. In *Bignonia*, bars of sclerenchyma are present in the furrows of secondary phloem.
17. Cambium is single layered, present in between xylem and phloem and bent towards inner side along the furrows of secondary phloem.
18. Secondary xylem consists of vessels, tracheids, fibres and xylem parenchyma.
19. Due to the intrusion of the phloem at four places, secondary xylem is ridged and furrowed at four places.
20. Primary xylem is present close to the pith facing its protoxylem towards the centre. It's location is just opposite to the patches of primary phloem.

Pith:

21. It is thin walled and parenchymatous.

Secondary Growth:

Formation of four furrows of secondary phloem in the secondary xylem is due to the abnormal functioning of cambium which was behaving normally sometimes earlier.

At four or more places cambium produces less amount of secondary xylem towards inter side and large amount of secondary phloem towards outer side. Thus four wedges of secondary phloem are formed. They intrude into the secondary xylem and so xylem cylinder appears ridged and furrowed.

Identification:

(a) Presence of vessels in the xylem.....Angiosperms
(b) Multicellular epidermal hairs
Conjoint, collateral, open and endarch vascular bundles..... Stem
(c) Vascular bundles in a ring.
Presence of cambium..... Dicot Stem

Reference

- STUDIES IN BOTANY (Vol-I) (J.N.Mitra, Debabrata Mitra & Salil Chowdhury)
- Ganguli,H.C., Das, K.S.K. & Dutta, C.T. College Botany, Vol. I, latest Ed., New Central Book Agency
- Roy, P. Plant Anatomy, Latest Ed., New Central Book Agency

Thing to do

Write the answer of the following questions (pen, pencil and paper), scan with cam scanner and Submit by e-mail within Friday 3.4.2020, 12noon (Next scheduled online class via zoom cloud meeting).

Q1. Define secondary growth. Draw and describe the secondary growth in stem of *Bignonia*. *2+8 marks*