

Topic: Anomalous Secondary Growth in Boerhaavia

B.Sc. Botany (Hons.) II

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Boerhaavia diffusa is a highly medicinal plant belong to the family Nyctaginaceae. T.S. of *Boerhaavia* stem observe that its structure is like a typical dicotyledonous stem with the only difference that it has three ring of vascular bundles.

Epidermis

- Single layered epidermis consists of small, radially elongated cells.
- Multicellular epidermal hairs arise from some cells.
- A thick cuticle is present on the epidermis.
- Some stomata are also present.

Cortex

- It is well differentiated and consists of few layered collenchymatous hypodermis followed by chlorenchyma.
- Collenchyma is 3 to 4 cells deep, but generally near stomata it is only one layered.
- Chlorenchyma is present inner to collenchyma in the form of 3 to 7 layers.

- Chlorenchymatous cells are thin walled, oval, full of chloroplasts and enclose many intercellular spaces.
- Endodermis is clearly developed and made up of many, tubular, thick-walled cells.

Pericycle

- Inner to the endodermis is present parenchymatous pericycle but at some places it is represented by isolated patches of sclerenchyma.

Vascular System

- Vascular bundles are present in three rings. In the innermost ring are present two large bundles; in the middle ring the number ranges from 6 to 14 while the outermost ring consists of 15 to 20 vascular bundles.
- Vascular bundles of innermost and middle rings are medullary bundles.
- Vascular bundles are conjoint, collateral and endarch.

- Two vascular bundles of the innermost ring arc large, oval and lie opposite to each other with their xylem facing towards centre and phloem outwards.
- Middle ring consists of 6-14 small vascular bundles.
- Vascular bundles of inner and middle rings may show a little secondary growth.
- Phloem consists of sieve tubes, companion cells and phloem parenchyma while the xylem consists of vessels, tracheids and xylem parenchyma.
- Outermost ring of the vascular bundles contain inter-fascicular cambium which is absent in other two rings.
- Cambium develops secondarily from the pericycle and becomes active. It cuts secondary phloem towards outer side and secondary xylem towards inner side. Due to these changes the primary phloem becomes crushed and present next to pericycle. Primary xylem is situated near the pith.
- Interfascicular cambium also soon becomes active and cuts internally the row of cells which become thick walled and lignified and are known as conjunctive tissue.

Pith:

- It is well developed, parenchymatous and present in the centre.

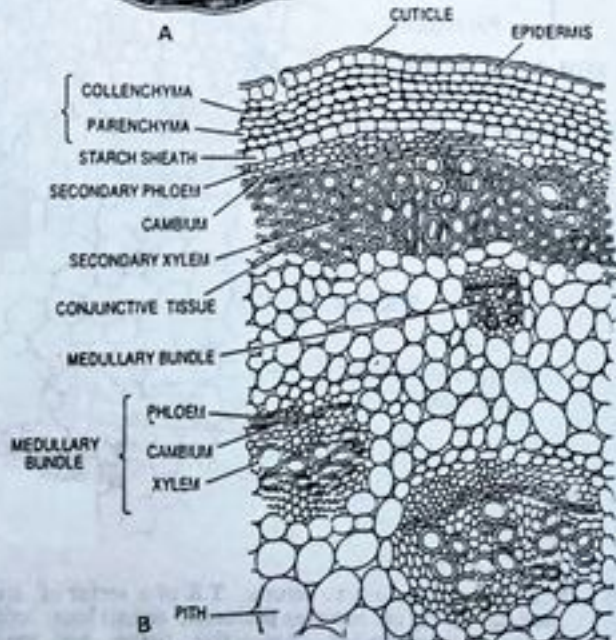
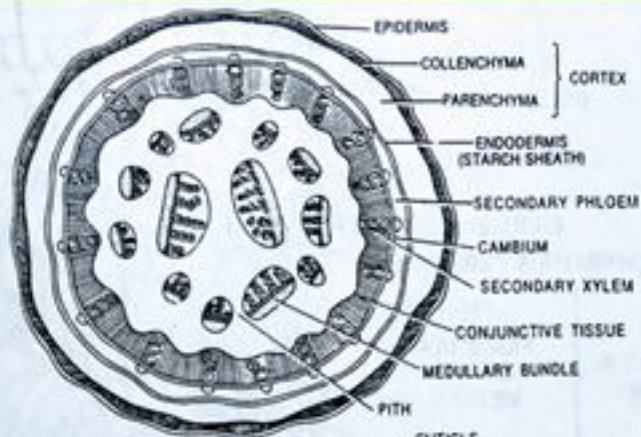


Fig. The stem-anomalous structure—T.S. of *Boerhaavia* stem (of Nyctaginaceae)—A, diagrammatic; B, detailed structure. Description in the text.

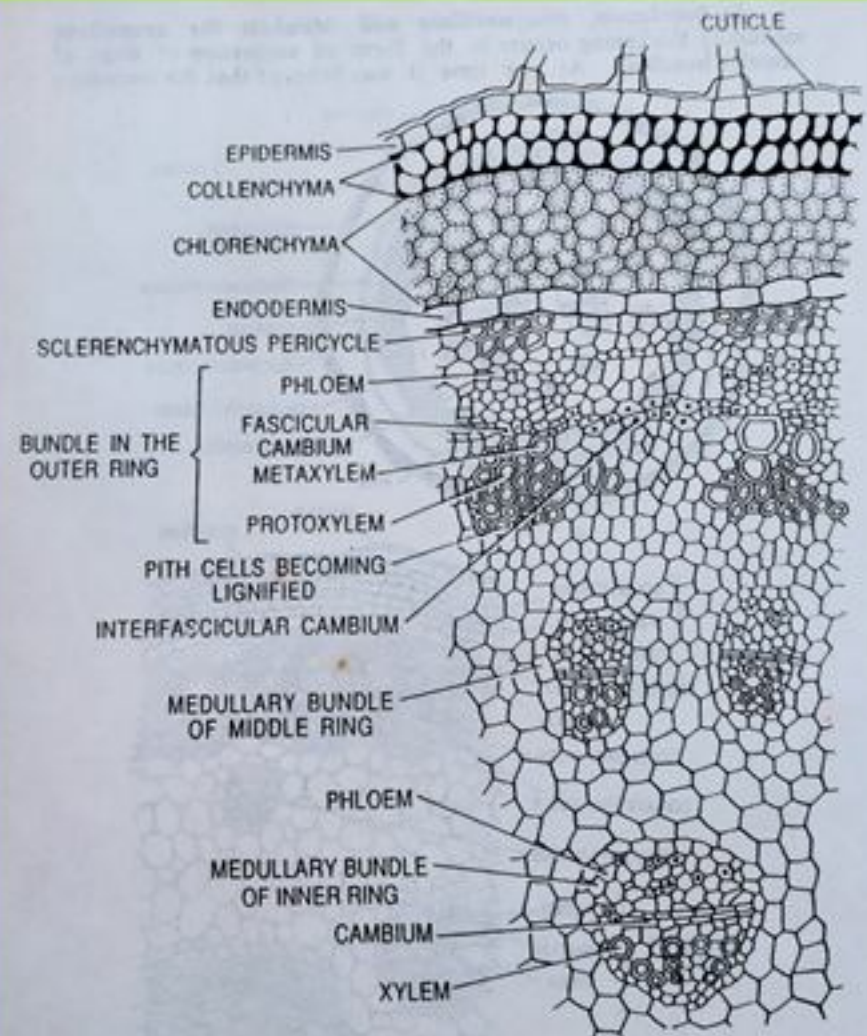


Fig. The stem-anomalous structure. T.S. of a sector of stem of *Boerhaavia diffusa* showing periderm, anomalous secondary growth, thick-walled conjunctive tissue, and medullary bundles.