VIVEKANAND COLLEGE, KOLHAPUR

(AUTONOMOUS)

Department of Botany

B.Sc. II

TOPIC : VASCULAR BUNDLE

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M.Sc., Ph.D.

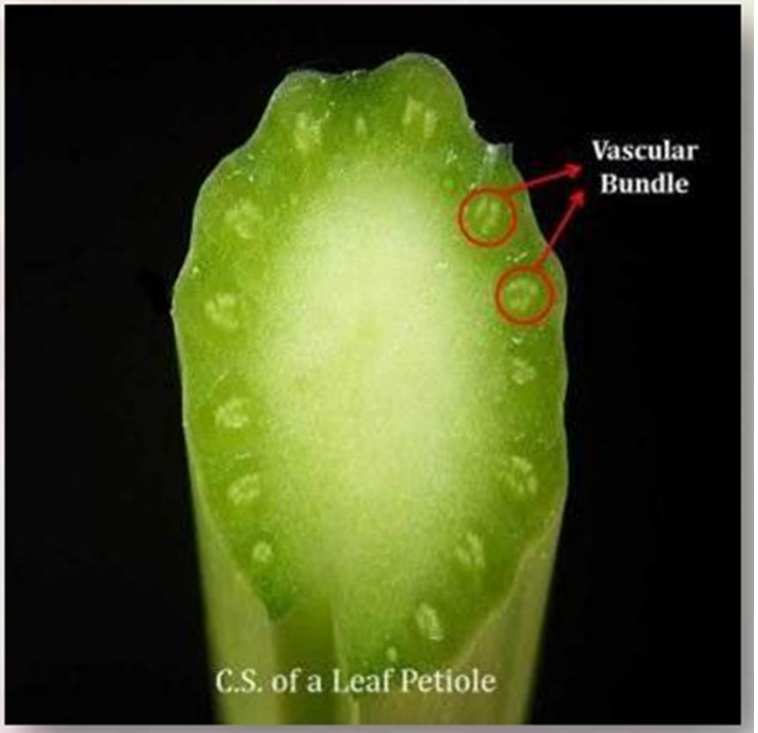
VASCULAR BUNDLES

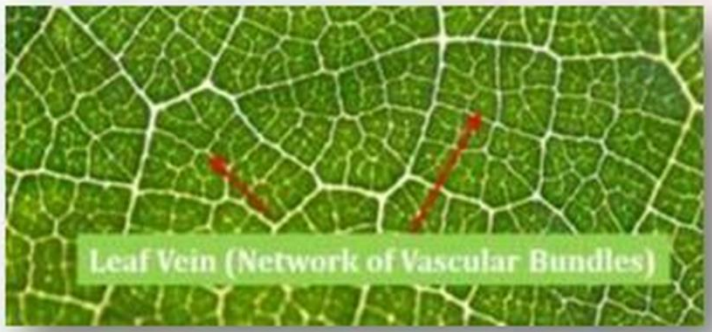
Structure & Classification

VASCULAR BUNDLES

What are vascular bundles? What are its components?

- Vascular bundles are components of Vascular Tissue System
- Also called as '*fascicle*'
- Part of **TRANSPORT** system in plants
- One of the **PRIMARY** tissue system in plants
- It is a **COMPLEX** tissue system in plants





- *Complex tissue = composed of MORE THAN ONE TYPE OF CELLS*

VASCULAR BUNDLES

What are vascular bundles? What are its components?

- Vascular bundles consists of **TWO** main parts

1. **Xylem**: water conducting tissue
2. **Phloem**: food conducting tissue

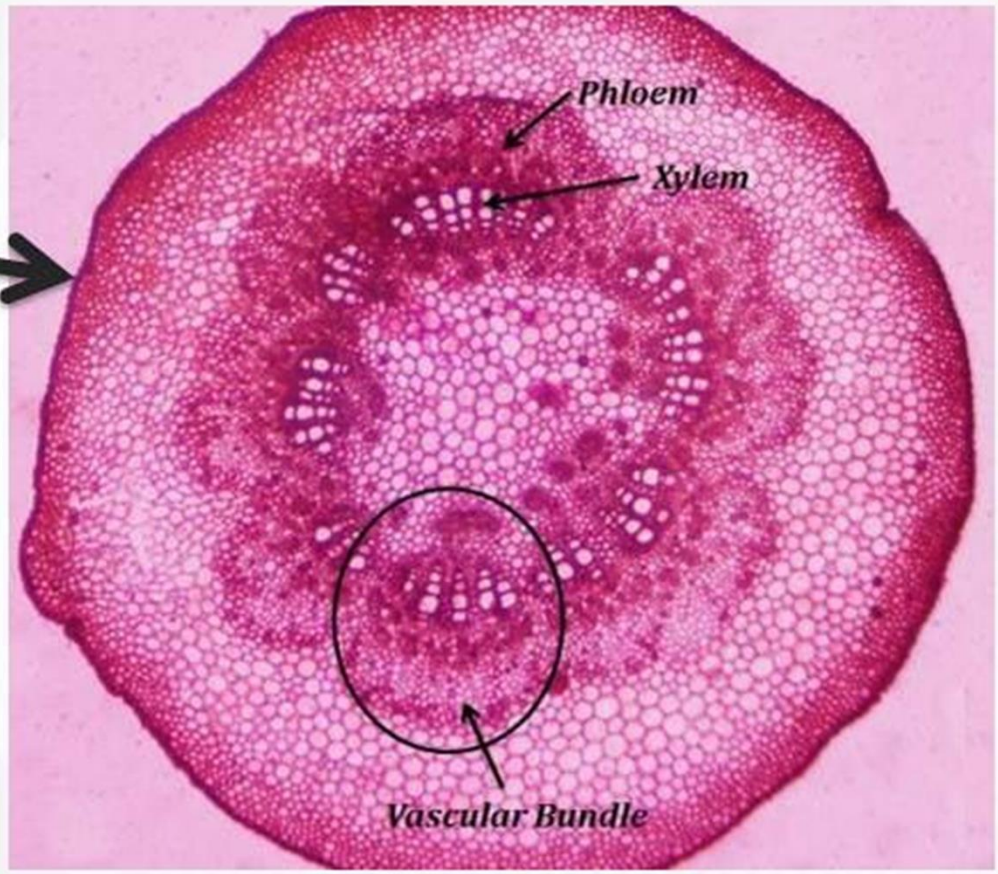
Typical Vascular Bundle

- Xylem and phloem are complex tissues
- **Components of xylem:** Tracheids, Vessels, Xylem fibres & Xylem parenchyma
- **Components of phloem:** Sieve cells, Sieve tube elements, companion cells, Phloem parenchyma, Phloem fibres (bast fibres)

VASCULAR BUNDLES

How vascular bundles originate in plants?

- *The elements of xylem and phloem are always organized in groups called* ***VASCULAR BUNDLES***



Vascular bundles

VASCULAR BUNDLES

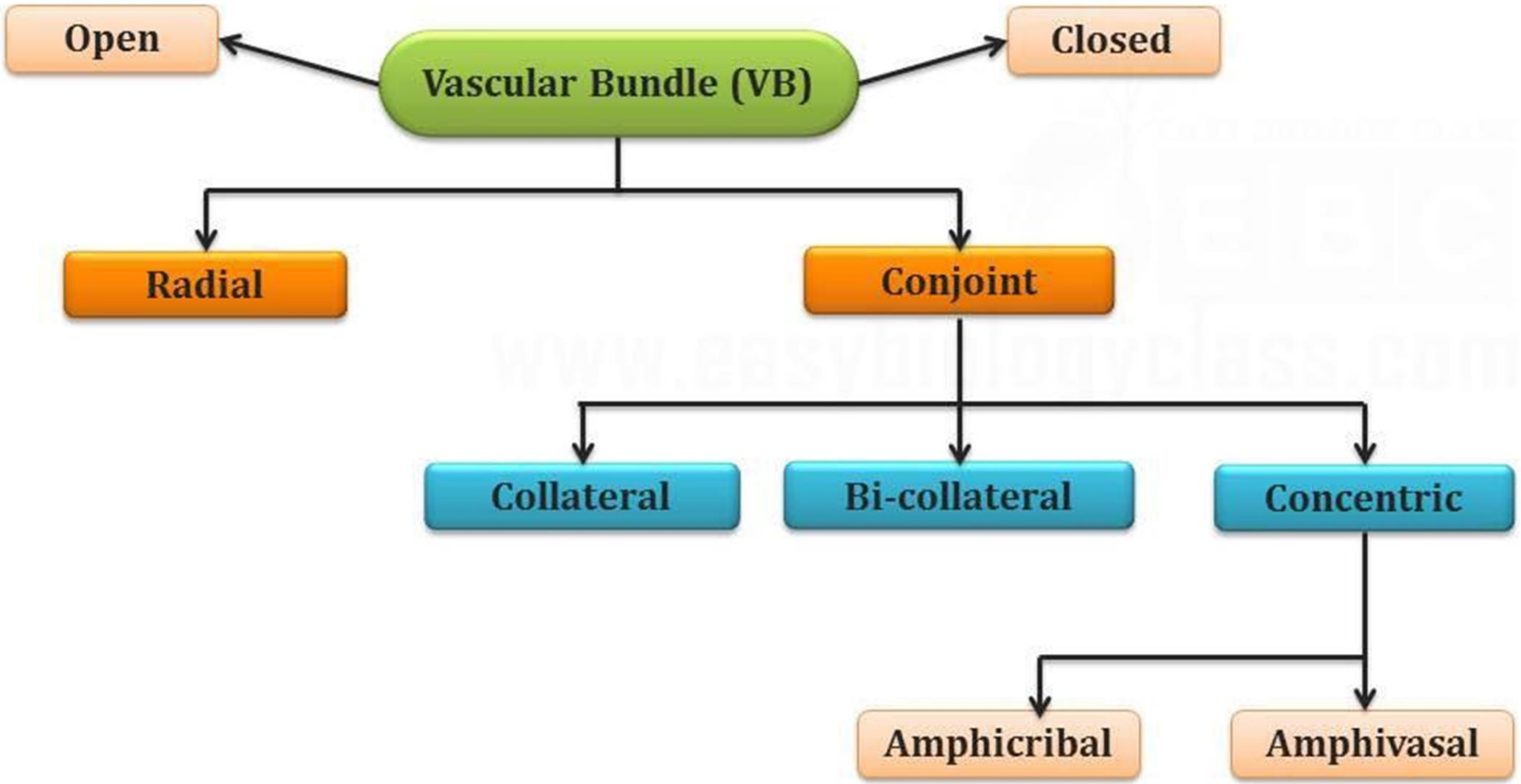
Different types of vascular bundles:

- Vascular bundles are classified based **MANY** criterions

1. **Based on presence of cambium/secondary growth**
   - Open VB & Closed VB
2. **Based on arrangement in the plant body**
   - Radial & Conjoint
3. **Based on arrangement of individual VB components**
   - Collateral, Bi-collateral & Concentric (amphicribal & amphivasal)

VASCULAR BUNDLES

Different Types of Vascular Bundles



VASCULAR BUNDLES

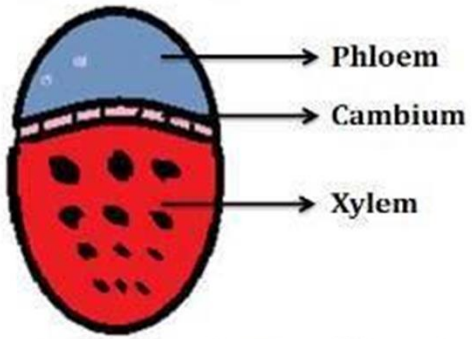
Open & Closed Vascular Bundles:

- A classification of VB based on presence of cambium
- **Cambium**: *a meristematic tissue responsible for secondary growth*

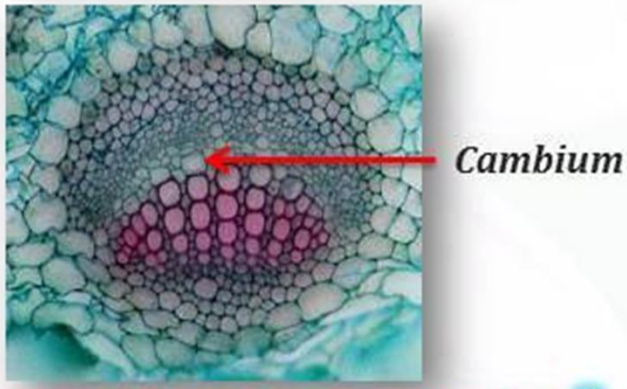
(1). Open vascular bundle

- Cambium present between xylem & phloem
- Secondary growth present
- Characteristic of dicotyledons (dicots)
- *Open for secondary growth*
- Cambium present between xylem & phloem

is called **FASCICULAR CAMBIUM**



Open Vascular Bundle



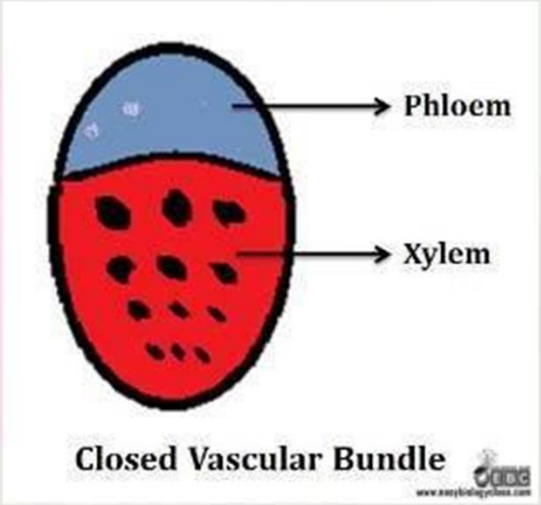
Open Vascular Bundle (Dicot Stem)

VASCULAR BUNDLES

Open & Closed Vascular Bundles:

(2). Closed vascular bundles:

- Cambium absent within vascular bundle
- Secondary growth absent
- Characteristic of monocotyledons (monocots)
- *Closed for secondary growth*
- Fascicular cambium absent

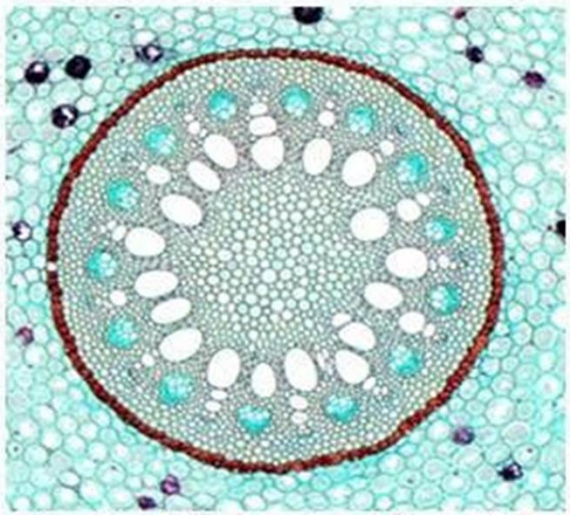


Closed Vascular Bundle (Monocot Stem)

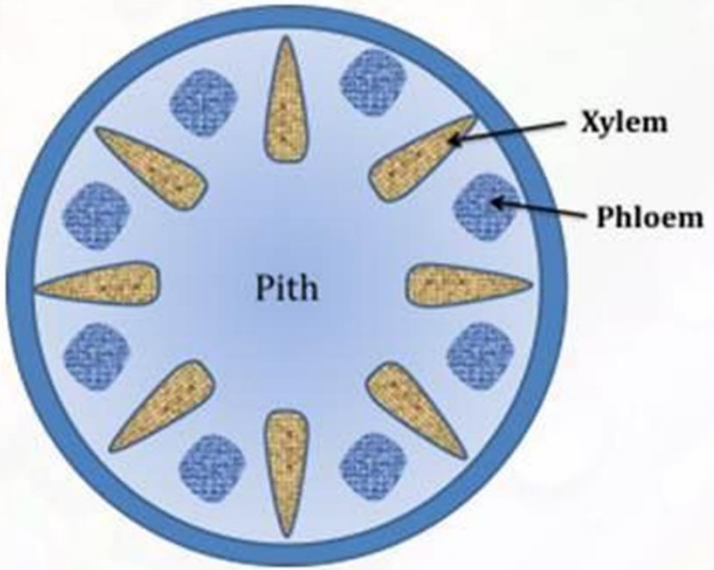
VASCULAR BUNDLES

Radial Vascular bundle

- Based on the arrangement of VB components
- Xylem and phloem are arranged separately
- Arranged alternatively in different radii
- Radial vascular bundles are found in ROOTS



Radial Vascular Bundles



Radial Vascular Bundles

VASCULAR BUNDLES

Conjoint vascular bundles

- Xylem and phloem are **arranged together**
- Xylem and phloem in same radius
- Conjoint VB are found in **STEM** and **LEAVES**
- Three types:

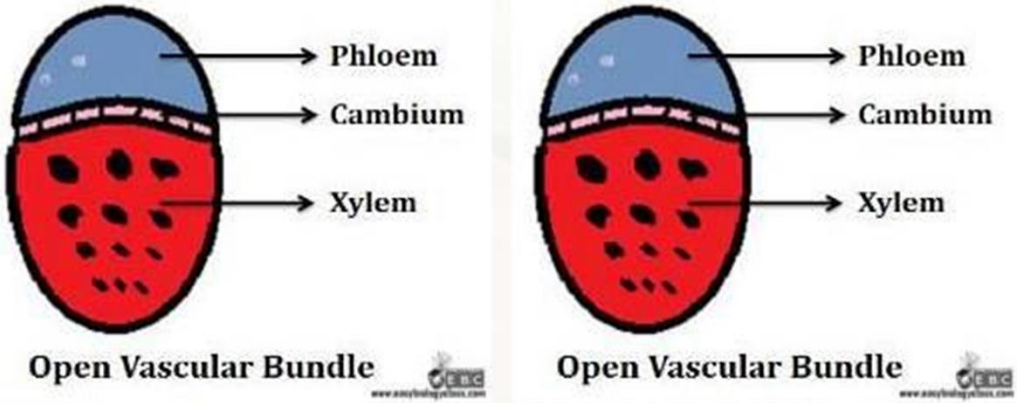
1. **COLLATERAL**
2. **BI-COLLATERAL**
3. **CONCENTRIC**

VASCULAR BUNDLES

(1). Collateral vascular bundles:

- A type of conjoint VB
- Phloem located **ONLY OUTSIDE** of the xylem
- Xylem towards interior, phloem towards exterior
- Most common type
- Collateral VB may be **Open** or **Closed**

Collateral Vascular Bundles

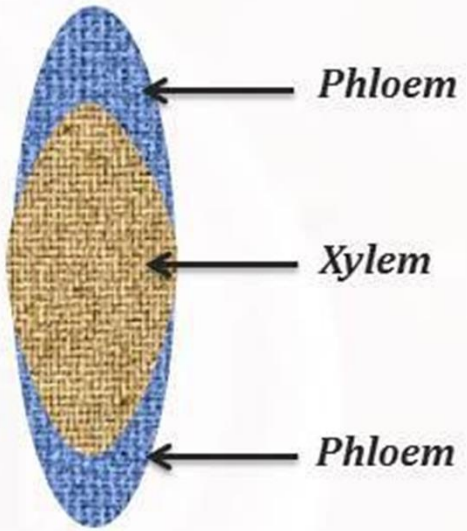


Collateral Vascular Bundles

VASCULAR BUNDLES

(2). Bi-collateral Vascular Bundles

- A type of conjoint VB
- Phloem present in two groups
- One outside the xylem, other inside the xylem
- (xylem in the middle, phloem both sides)
- Characteristic of some Angiosperms
- Example: members of Cucurbitaceae (*Cephalandra*, *Cucurbita*)
- Bi-collateral vascular bundles are always **OPEN**



Bi-collateral Vascular Bundle

VASCULAR BUNDLES

(3). Concentric Vascular Bundles:

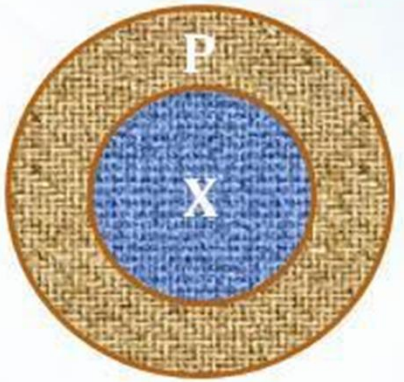
- A type of conjoint vascular bundle
- One VB element completely surrounds the other
- Either phloem surrounds xylem or xylem surrounds the phloem
- Two types:

    a) Amphicribal:

    b) Amphivasal:

VASCULAR BUNDLES

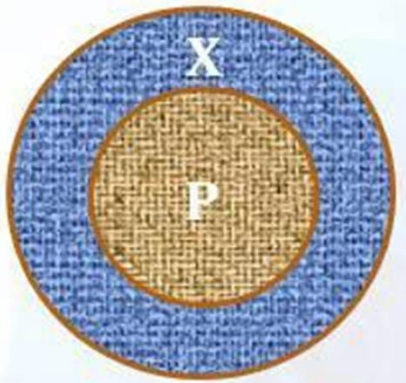
(3). Concentric Vascular Bundles:



Amphicribal

A). Amphicribal:

- A type of concentric vascular bundle
- Xylem lies at the centre, surrounded by a ring of phloem
- Example: Meristeles of ferns, small vascular traces of flowers, fruits and ovules



Amphivasal

B). Amphivasal:

- A type of concentric vascular bundle
- Phloem lies at the centre, surrounded by a ring of xylem
- Example: *Dracaena* stem, *Rumex*, *Begonia*

THANK YOU.....