

Tissues

```
graph TD; A[Tissues] --> B[Meristematic]; A --> C[Permanent];
```

The diagram is a simple hierarchy. At the top is a large orange rounded rectangle containing the word 'Tissues'. A vertical black line descends from the bottom center of this rectangle. This line meets a horizontal black line. From the left end of this horizontal line, a vertical black line descends to the top center of an orange rounded rectangle containing the word 'Meristematic'. From the right end of the horizontal line, a vertical black line descends to the top center of another orange rounded rectangle containing the word 'Permanent'. The entire diagram is set against a white background with a light orange border on the right side.

Meristematic

Permanent

```
graph TD; A[Meristematic Tissue] --> B[Apical]; A --> C[Lateral]; A --> D[Intercalary];
```

Meristematic Tissue

Apical

Lateral

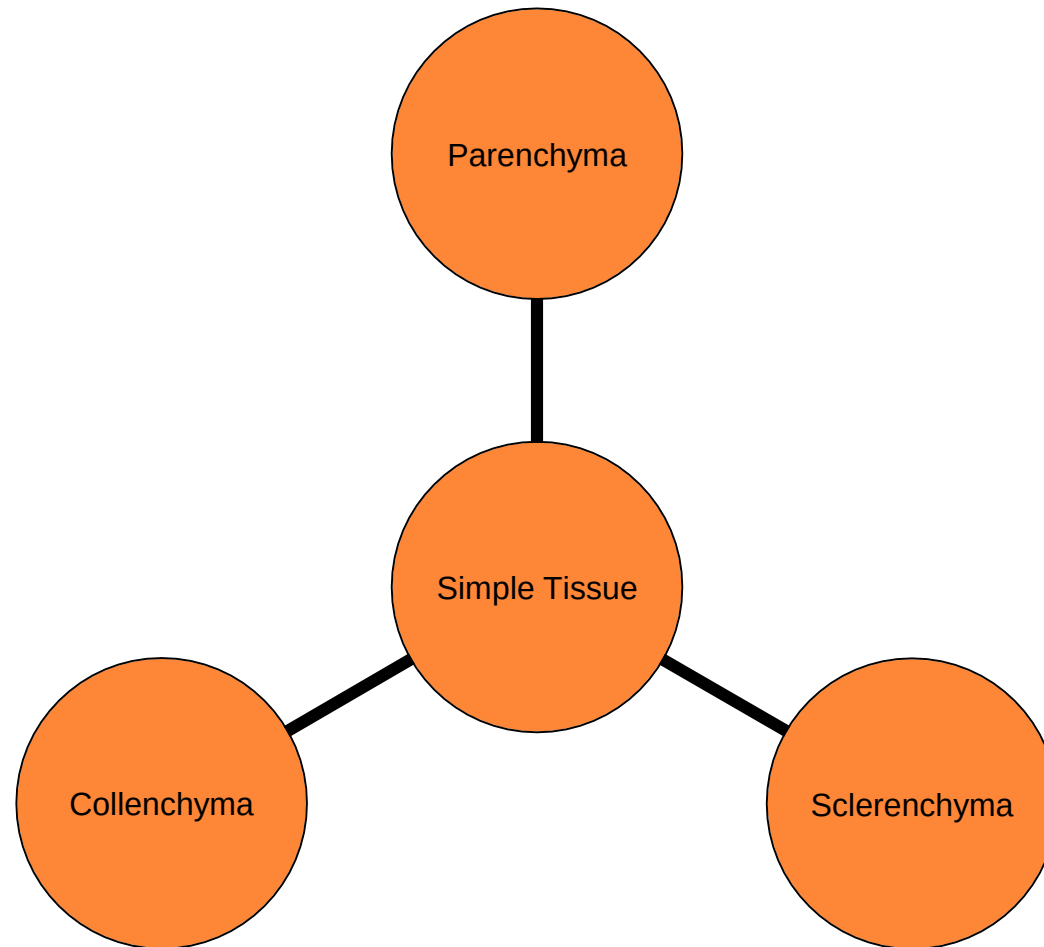
Intercalary

Permanent tissue

```
graph TD; A[Permanent tissue] --> B[Simple tissue]; A --> C[Complex tissue];
```

Simple tissue

Complex tissue



```
graph TD; A[Complex Tissue] --> B[Xylem]; A --> C[Phloem];
```

Complex Tissue

Xylem

Phloem

tracheids

**Xylem
parenchyma**

xylem

vessels

**Xylem
fibres**



Xylem

```
graph TD; Xylem --> Protoxylem; Xylem --> metaxylem;
```

A hierarchical diagram with 'Xylem' at the top in a large orange rounded rectangle. A vertical line descends from it, with two horizontal branches leading to 'Protoxylem' and 'metaxylem' in white rounded rectangles.

Protoxylem

metaxylem

xylem

```
graph TD; xylem --> exarch; xylem --> endarch;
```

A hierarchical diagram with 'xylem' at the top in a large orange rounded rectangle. A vertical line descends from it, with two horizontal branches leading to 'exarch' and 'endarch' in white rounded rectangles. An orange circle is located at the bottom right of the 'endarch' box.

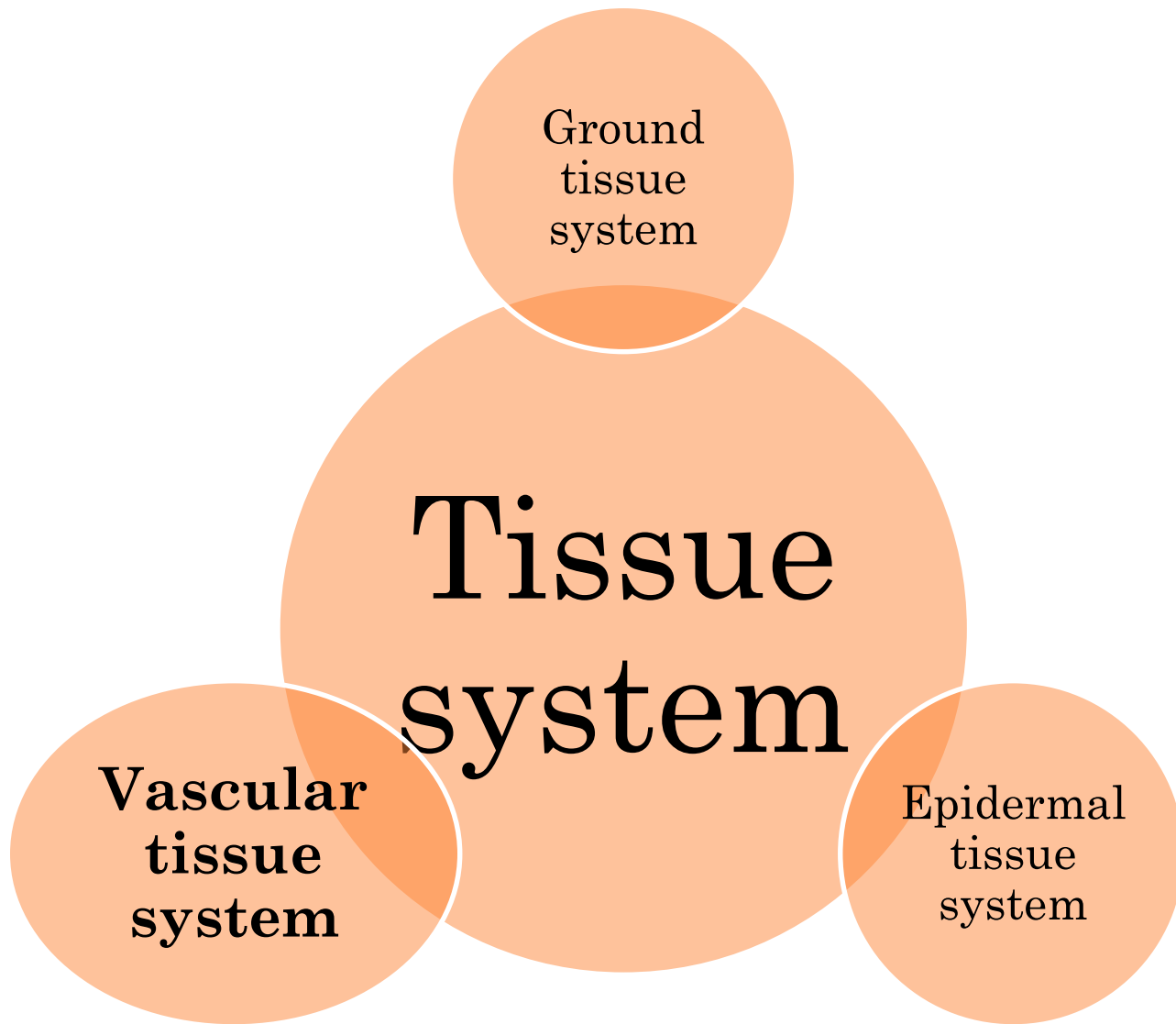
exarch

endarch

PHLOEM

- Sieve tube elements
- Companion cells
- Phloem parenchyma
- Phloem fibres





EPIDERMAL TISSUE SYSTEM

Epidermis

Cuticle

Stomatal apparatus

Hairs



GROUND TISSUE SYSTEM

- All tissue except epidermis and vascular bundles
- It includes parenchyma, collenchyma and sclerenchyma.
- In leaves it is called mesophyll.



VASCULAR TISSUE SYSTEM

Open and closed

Radial and conjoint





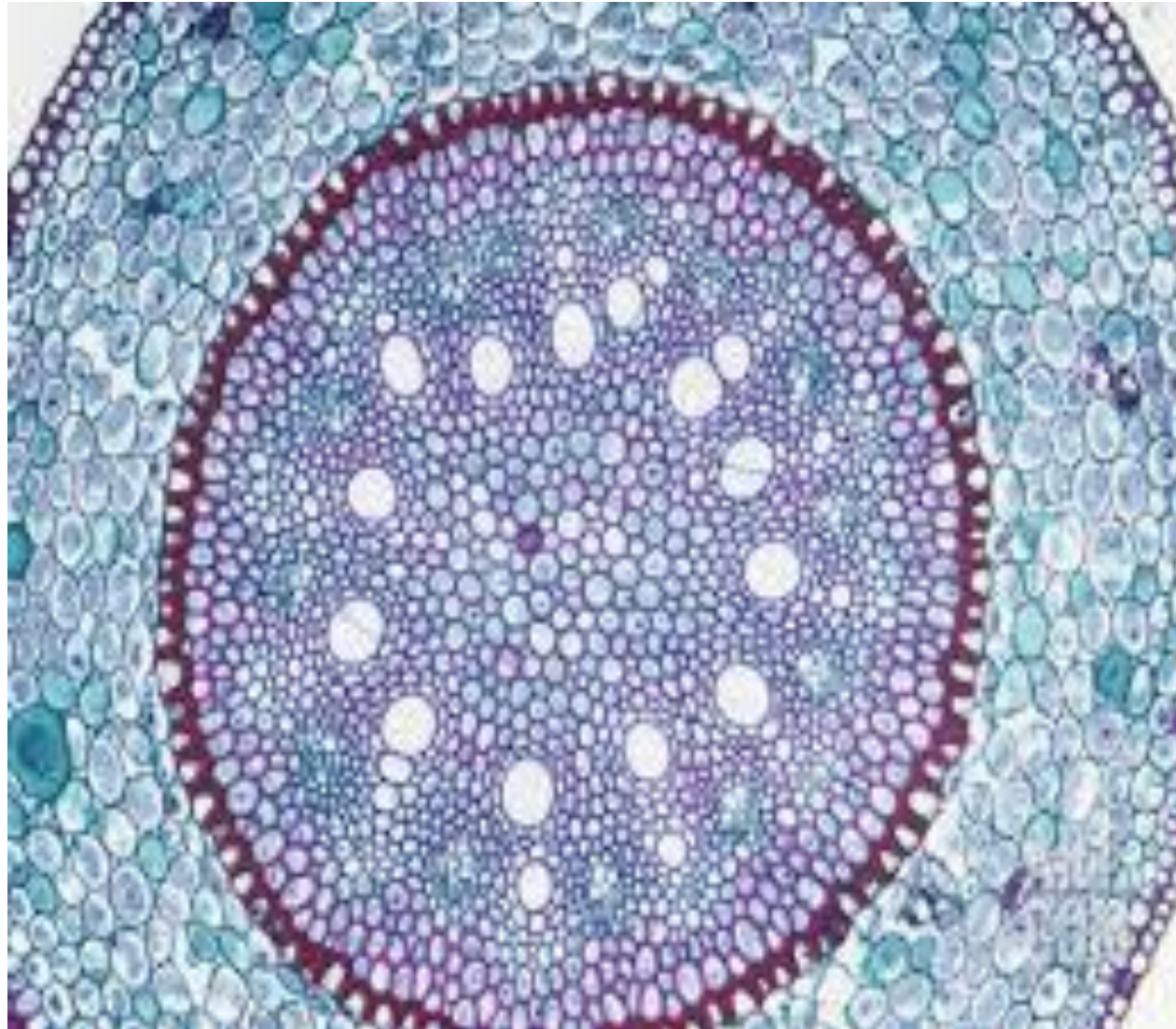
Pericycle

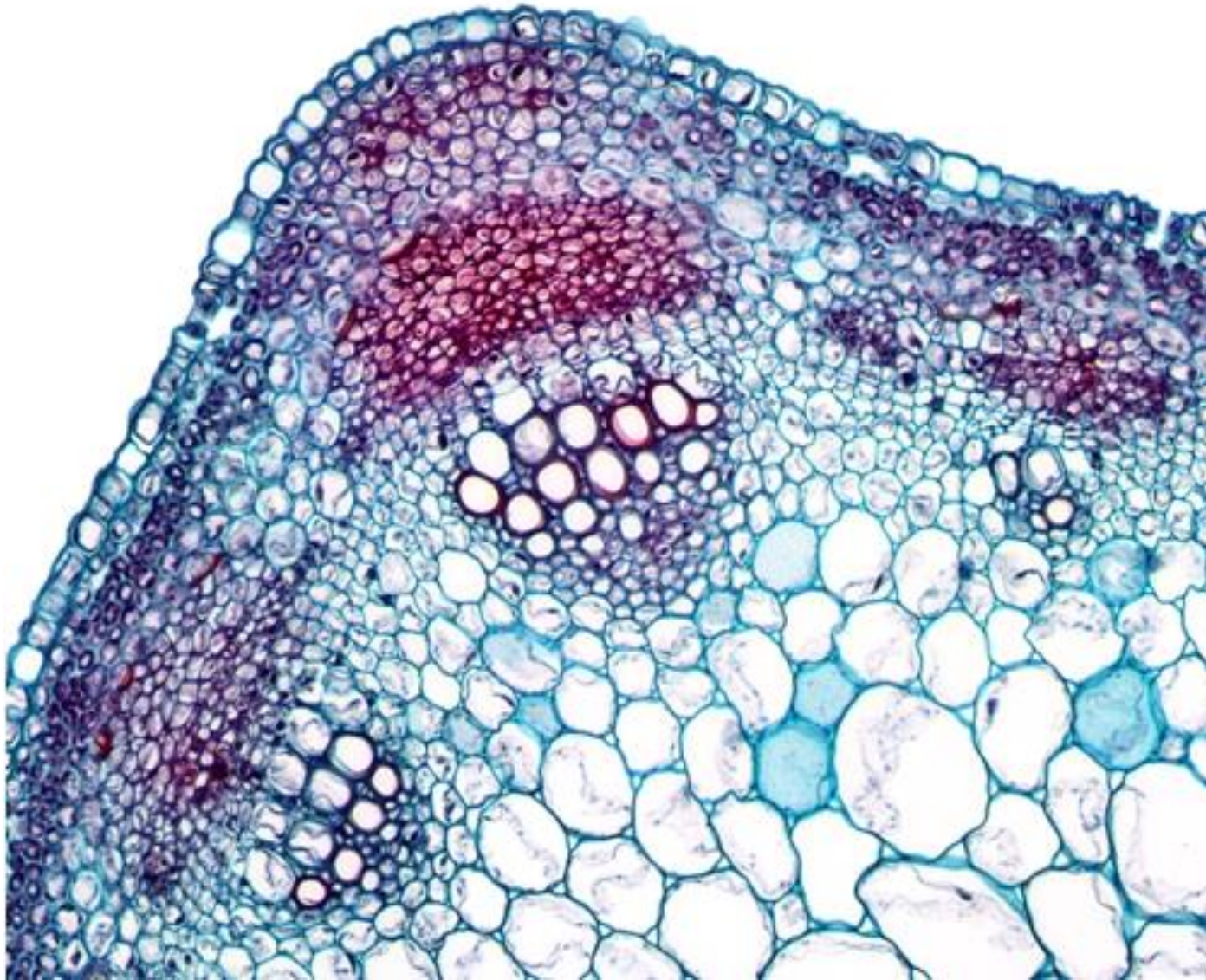
Primary phloem

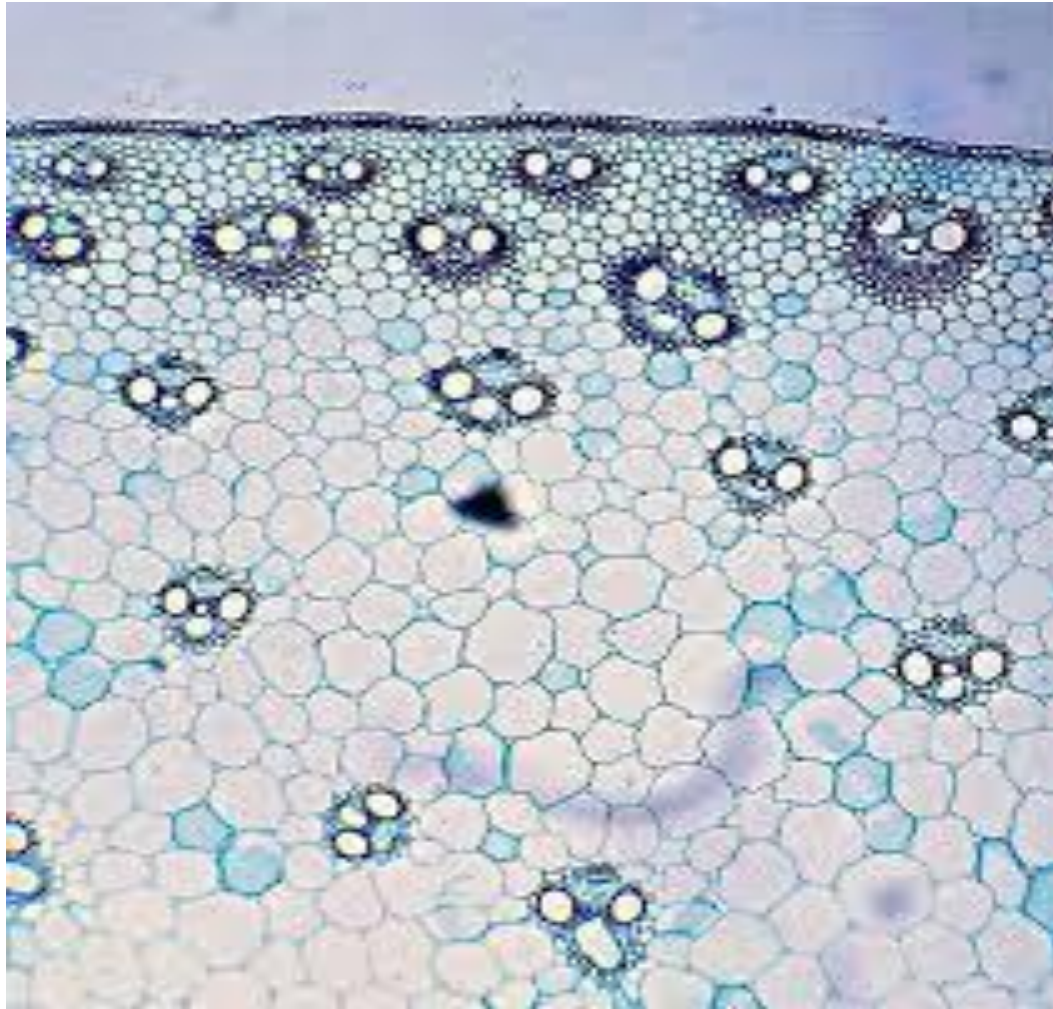
Endodermis

Metaxylem

Protoxylem
pole







SECONDARY GROWTH

Vascular cambium

Cork cambium



ACTIVITY OF VASCULAR CAMBIUM

Spring wood or early wood

Autumn wood or late wood



Heart wood

Sap wood

Periderm

phellogen

phellem

phelloderm

BARK : ALL TISSUES EXTERIOR TO THE
VASCULAR CAMBIUM

Early bark

Late bark

