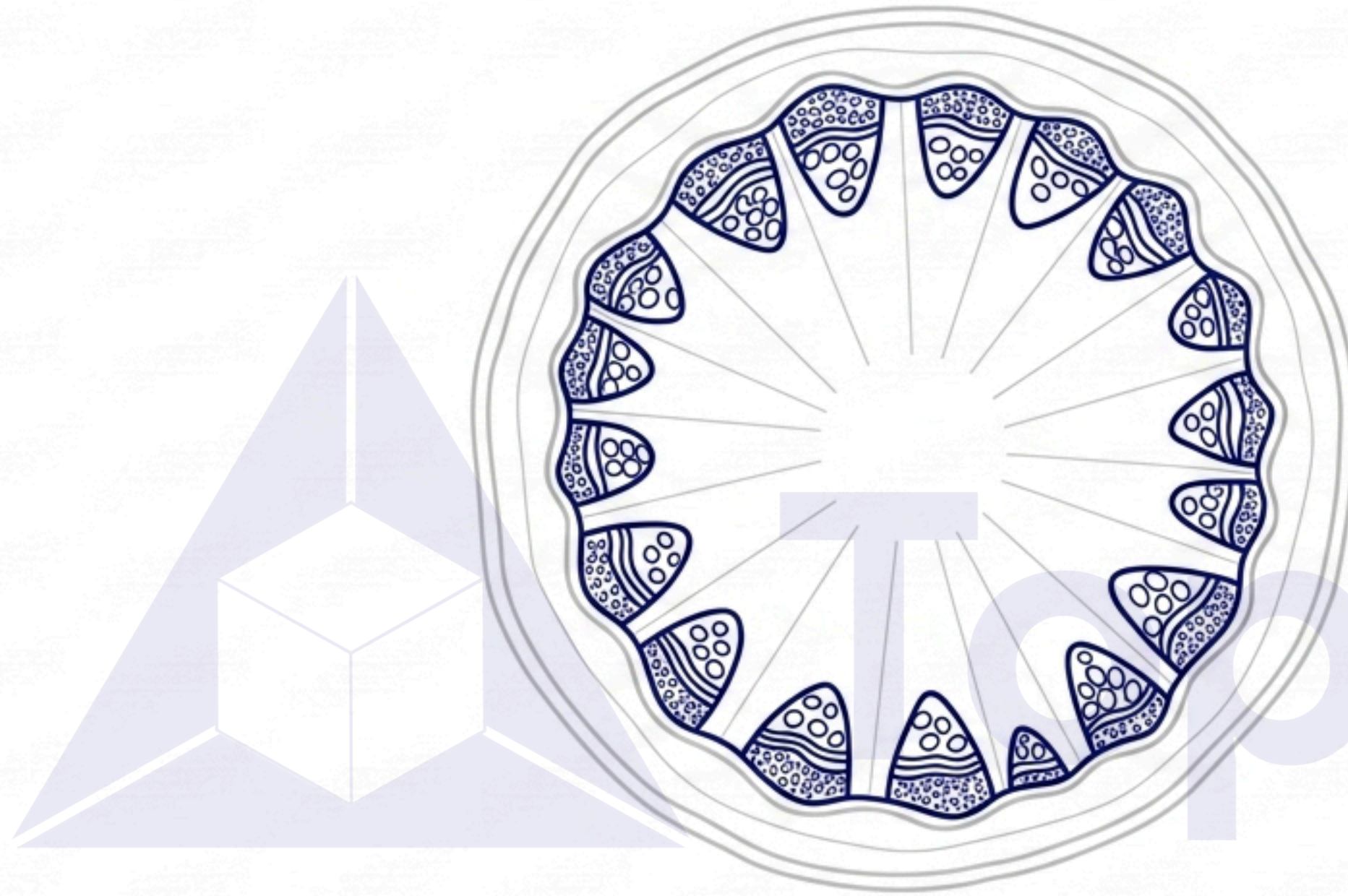
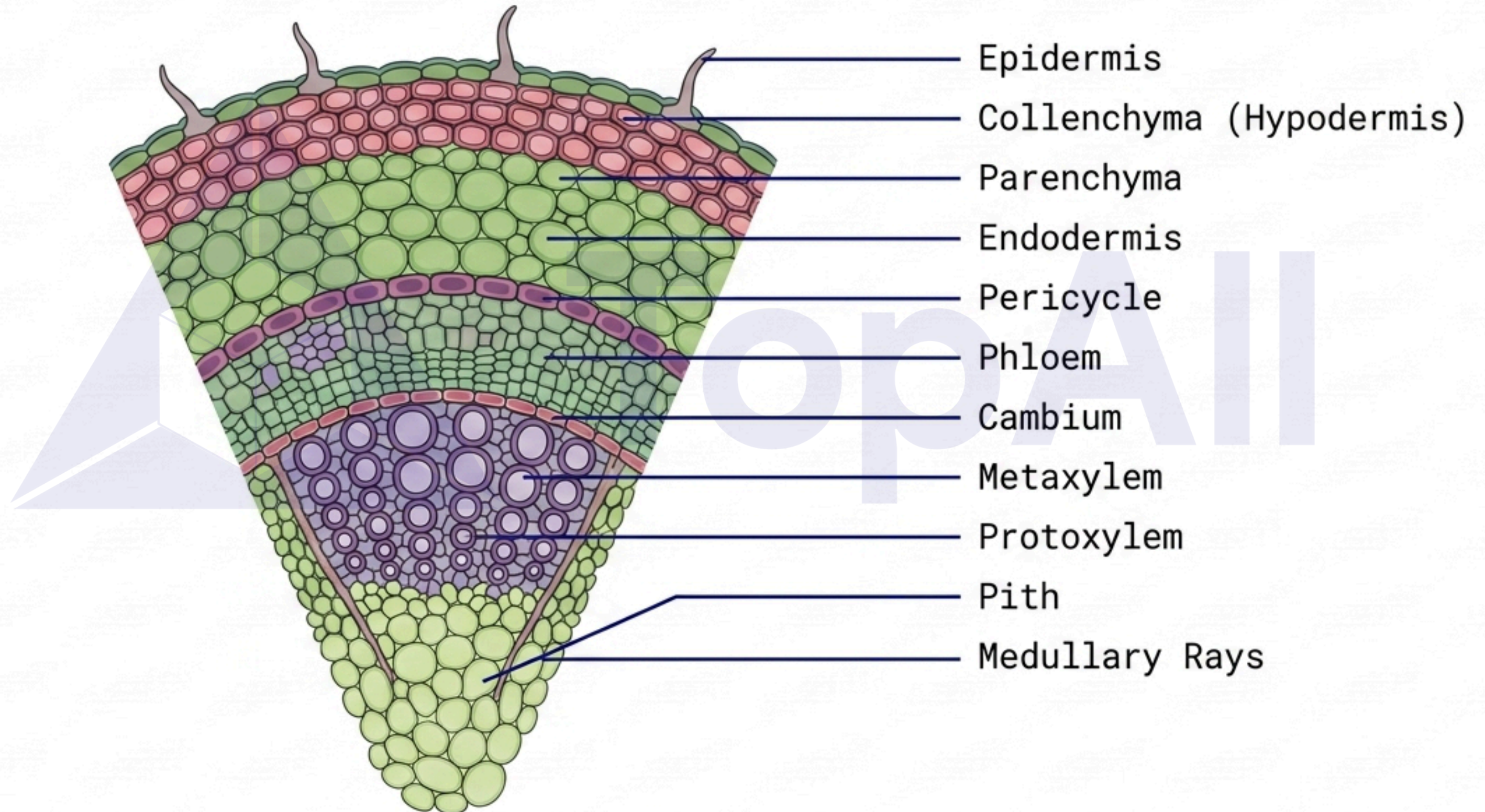




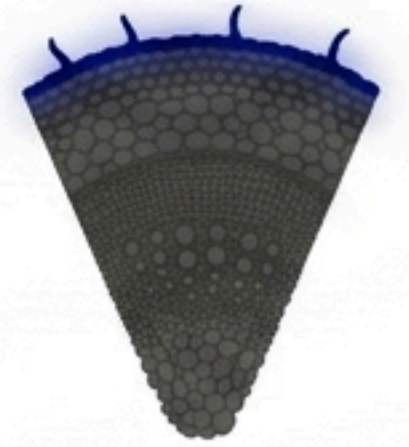
The Ring of Vascular Bundles

Anatomical Architecture of the Dicotyledonous Stem

Mapping the Transverse Section



The First Line of Defense



[CUTICLE]

A thin, waxy outer layer covering the stem to prevent water loss.

[TRICHOMES]

Multicellular epidermal hairs emerging from the surface, providing protection.

[STOMATA]

Regulatory pores interspersed along the epidermis to facilitate gas exchange.



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The Three-Tiered Cortex



Collenchymatous Hypodermis

Consists of a few layers of collenchyma cells just below the epidermis. Provides mechanical strength to the young stem.

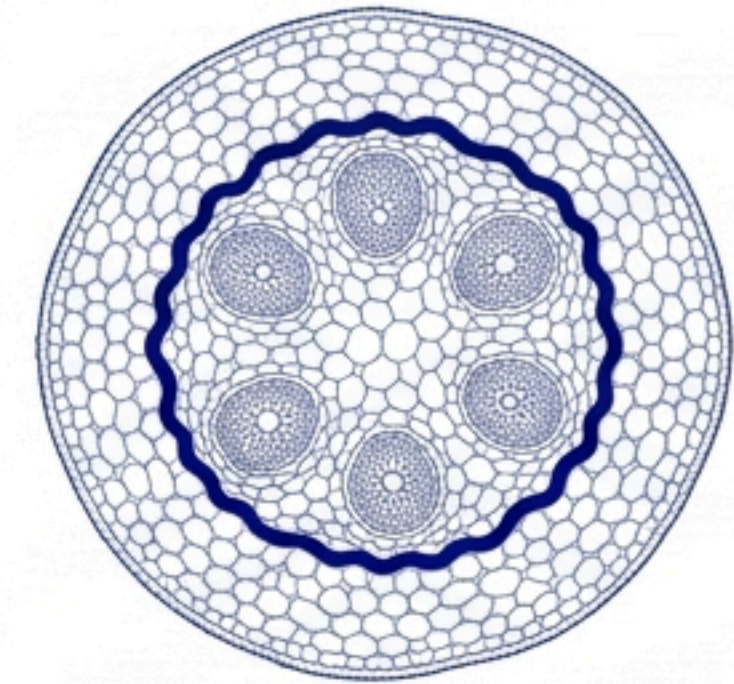
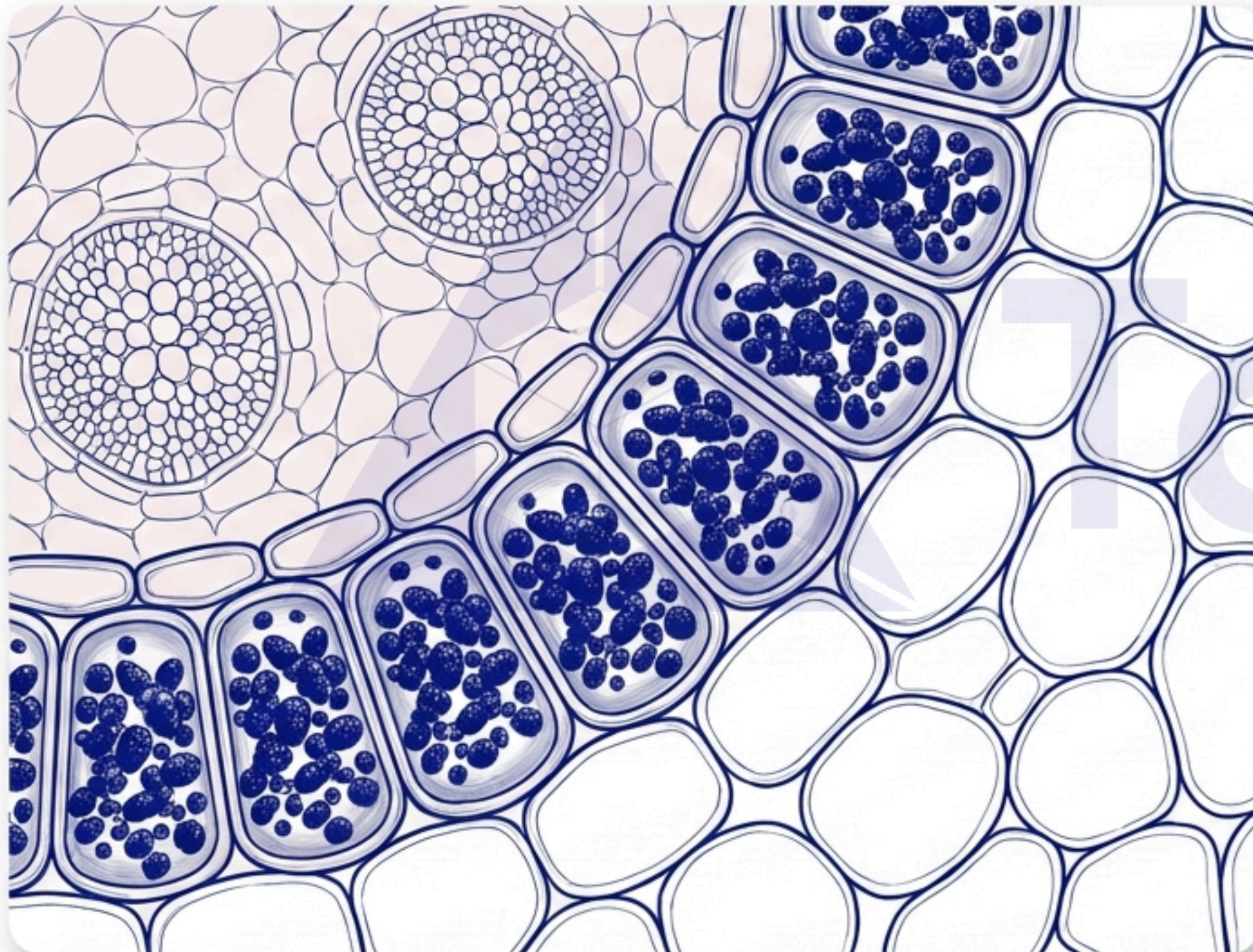
Cortical Parenchyma

Multiple layers of rounded, thin-walled parenchymatous cells characterized by conspicuous intercellular spaces.

Endodermis

The innermost boundary layer of the cortex, acting as the strict dividing line before the vascular tissue.

The Starch Sheath

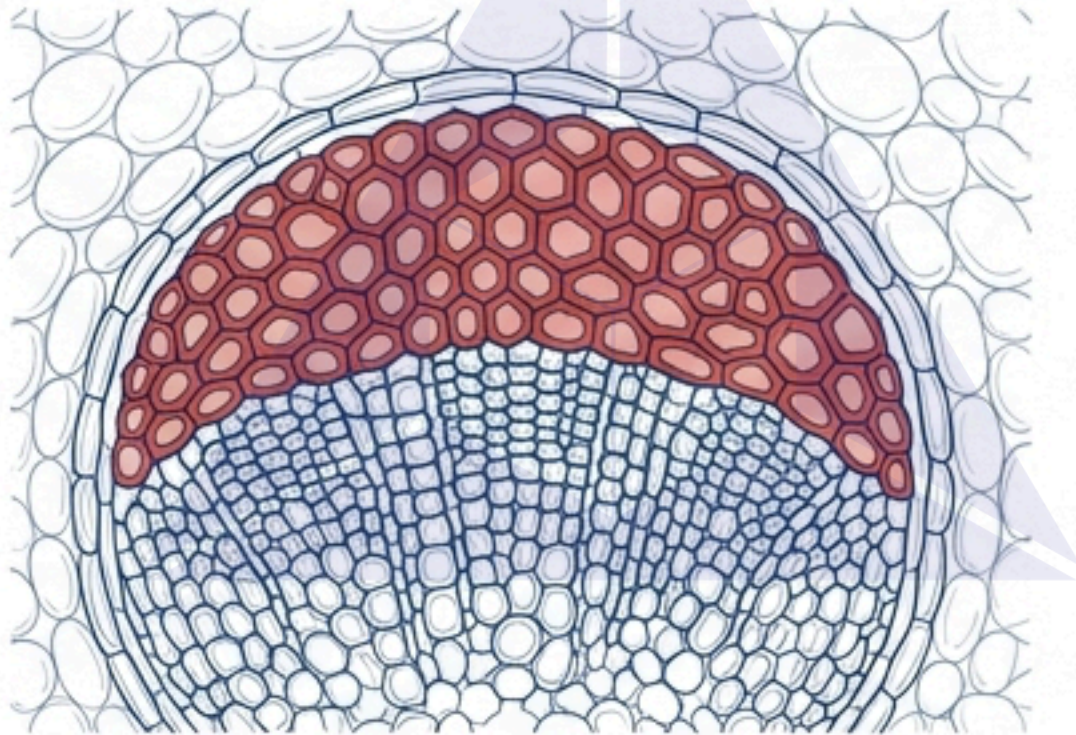


The cells of the dicot stem endodermis are uniquely rich in starch grains. Because of this dense accumulation, the entire endodermal layer is frequently referred to as the **Starch Sheath**.

Inner Boundaries & Radial Transport

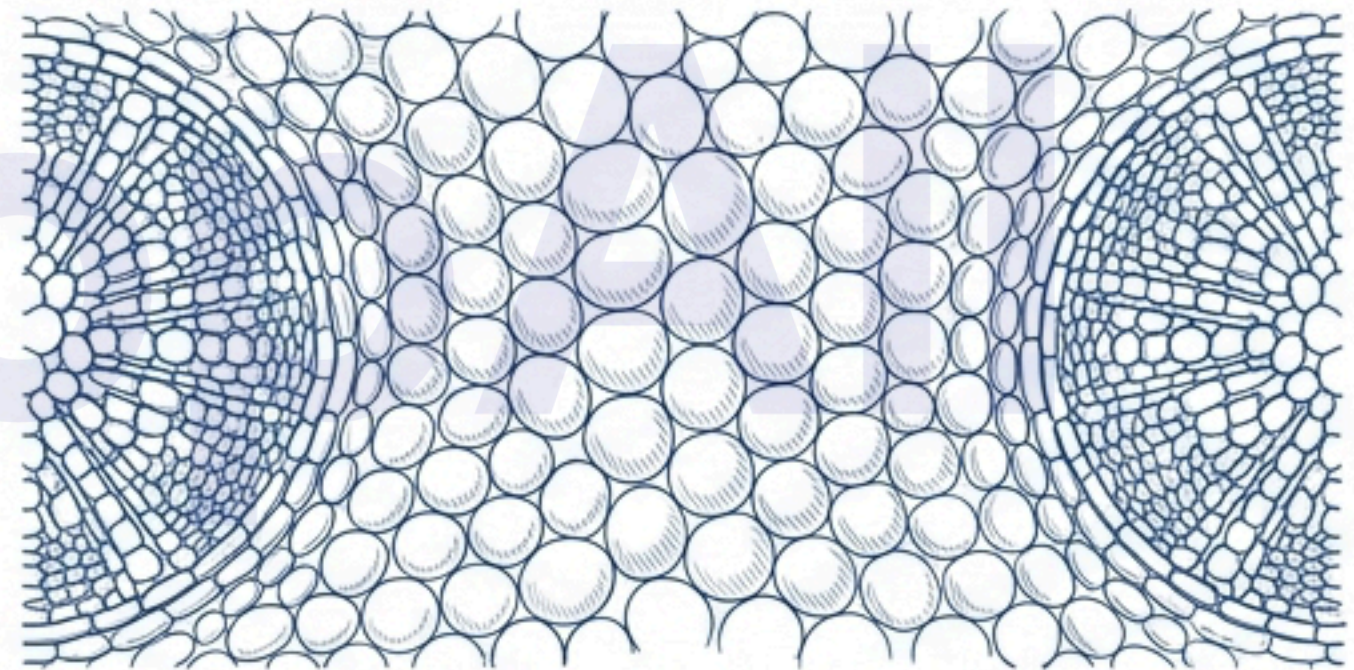


Pericycle



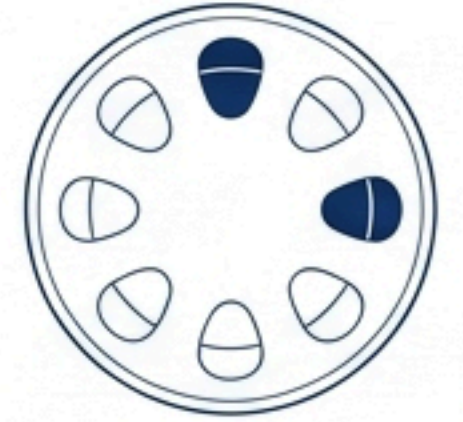
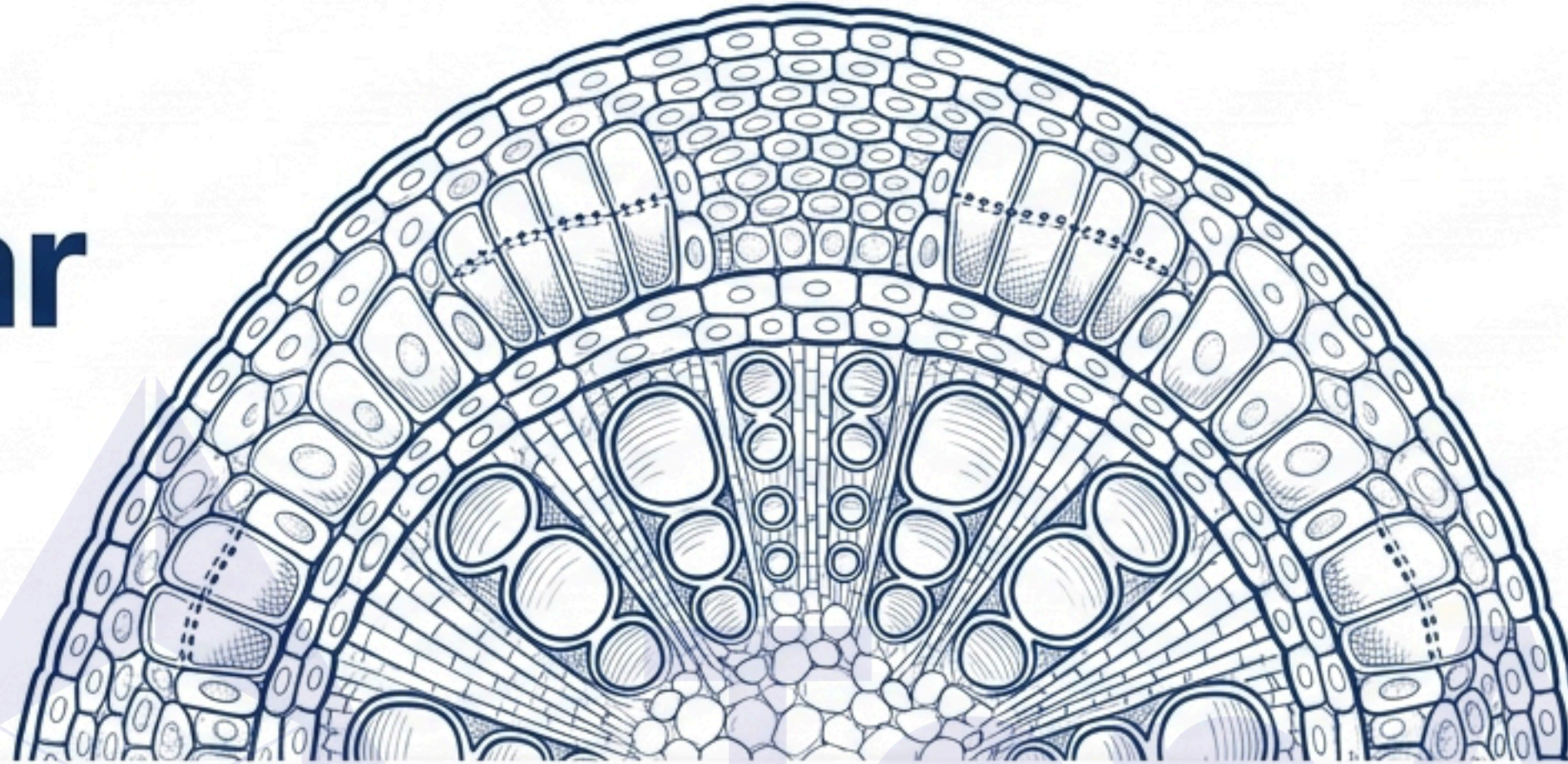
Situated on the inner side of the endodermis. In dicot stems, it appears as distinct **semi-lunar patches of sclerenchyma** sitting directly above the phloem.

Medullary Rays



Layers of radially placed parenchymatous cells located in between the vascular bundles, facilitating radial transport.

The Vascular Engine



[CONJOINT]

Xylem and phloem are jointly situated along the same radius.

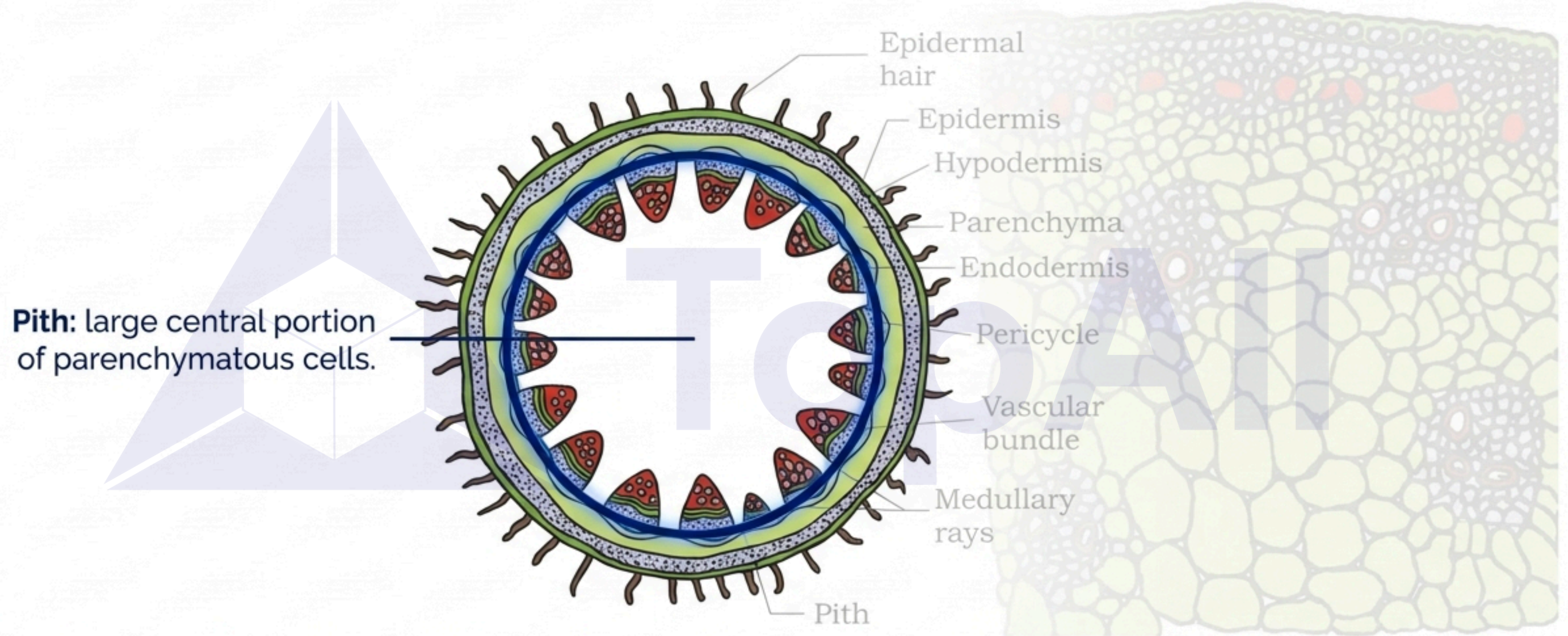
[OPEN]

A strip of cambium is present between the phloem and xylem, granting the ability to form secondary tissues (secondary growth).

[ENDARCH]

The protoxylem (first-formed xylem) faces **inward** toward the center (pith), while the metaxylem faces outward.

The Defining Characteristic



The defining characteristic of a dicotyledonous stem is the distinct '**Ring**' arrangement of its vascular bundles, completely separating the cortex from the central pith.



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