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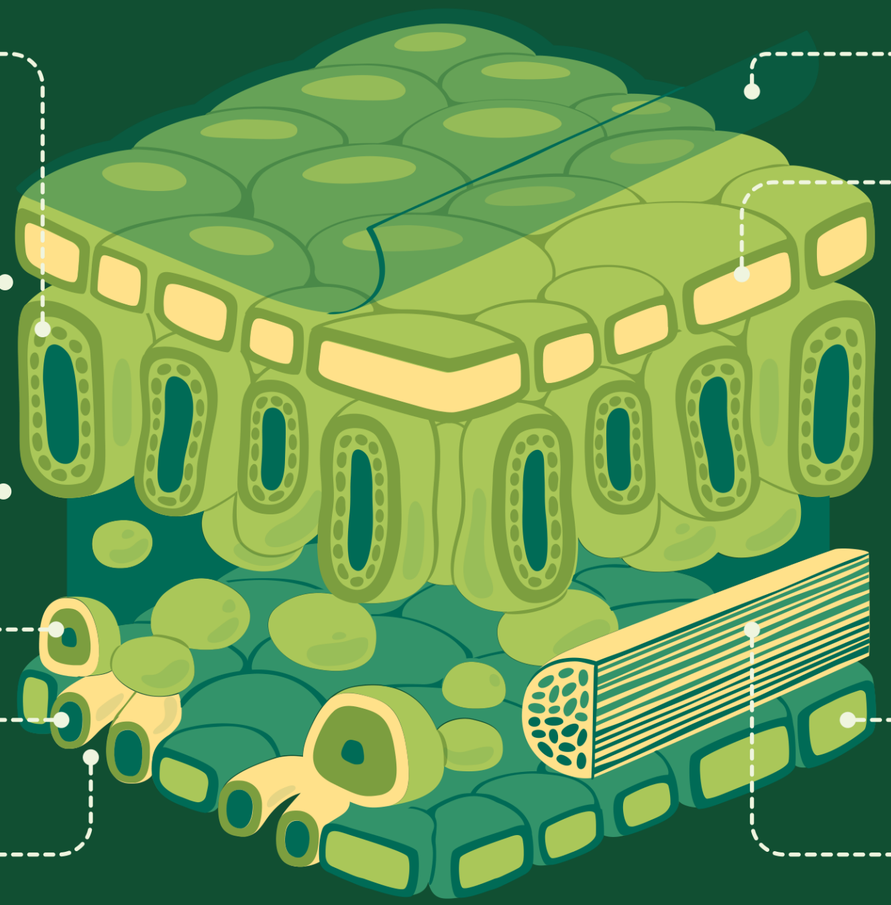
ANATOMY OF A LEAF

OVERVIEW OF LEAF'S ANATOMY



Chloroplast

Palisade Cells

Spongy Mesophyll

Guard Cells

Stoma

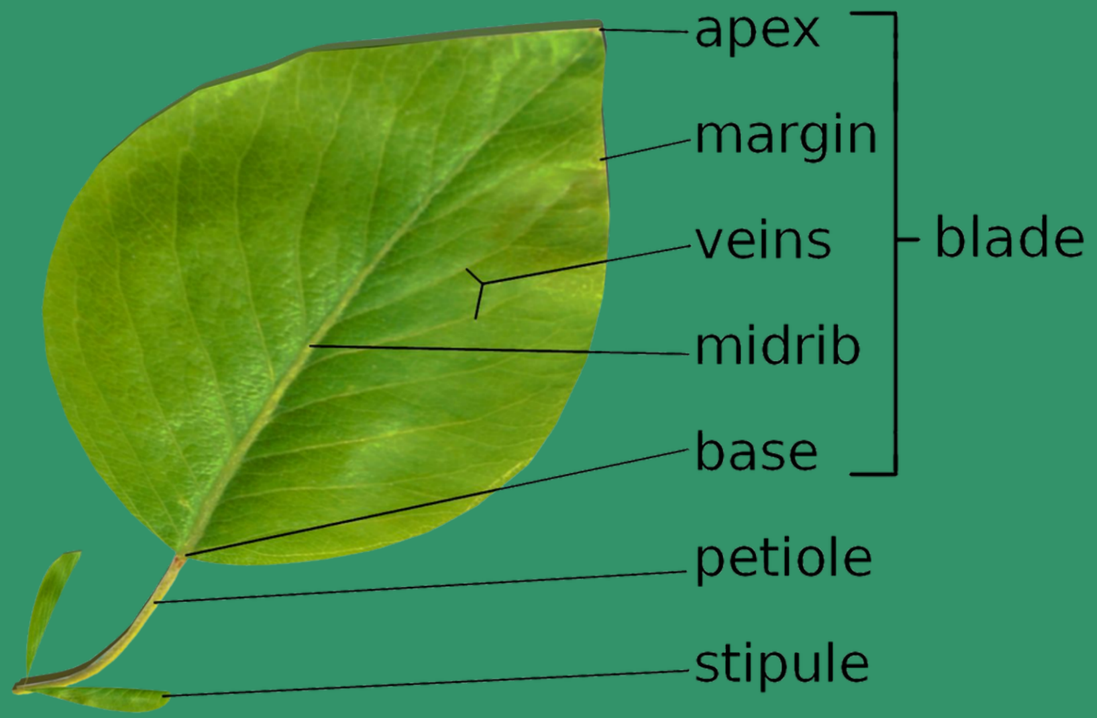
Cuticle

Upper Epidermis

Mesophyll

Lower Epidermis

Vascular Bundles



WHAT IS A LEAF?

A leaf is a flattened, lateral (meaning growing from the side) outgrowth from the stem of a vascular plant. In most cases, leaves are green and contain chlorophyll, which makes them the primary site of photosynthesis.

FUNCTION?

Beyond photosynthesis, leaves also play other roles in the plant's life, such as transpiration (releasing water vapor), gas exchange, and protection from sunlight and herbivores.

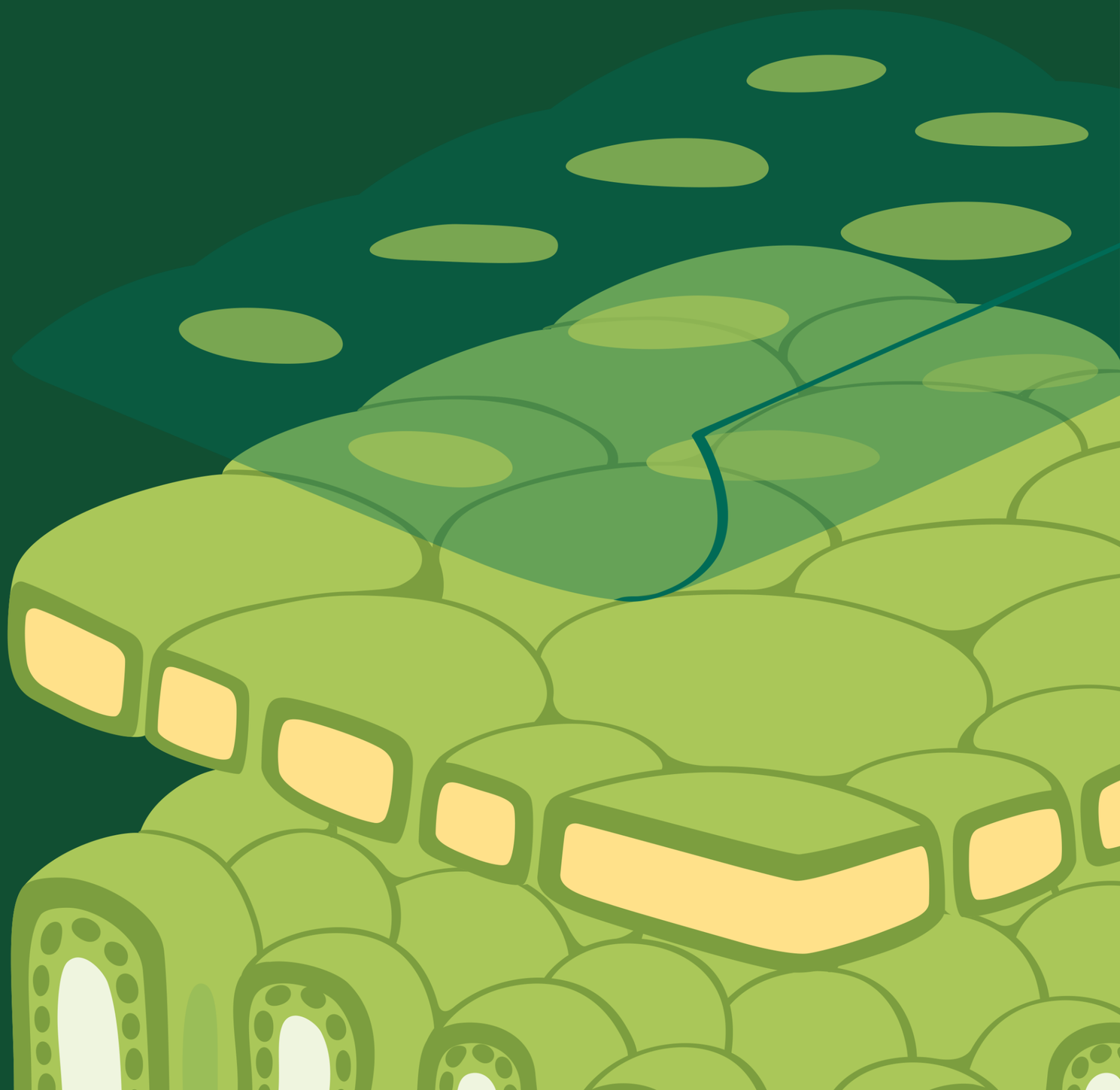
CUTICLE

WHAT IS IT?

A waxy layer covering the upper epidermis of the leaf, made of a substance called cutin.

WHAT'S ITS FUNCTION?

The cuticle acts as a waterproof barrier, reducing water loss from the leaf's surface.



UPPER EPIDERMIS

WHAT IS IT?

The single layer of cells covering the top surface of the leaf.

WHAT'S ITS FUNCTION?

Provides protection from water loss, UV radiation, and pathogens. It also secretes a waxy cuticle.

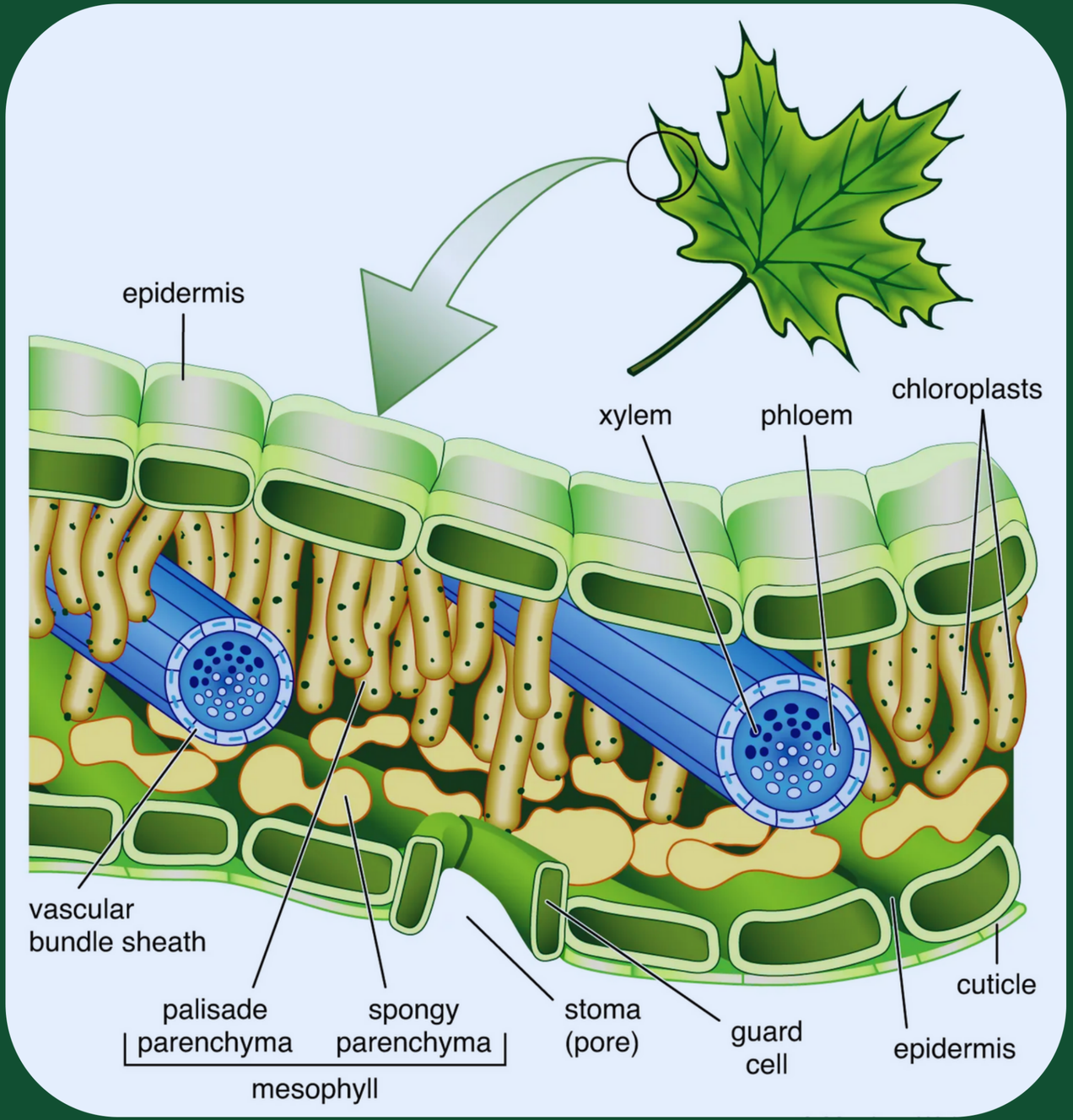
MESOPHYLL

WHAT IS IT?

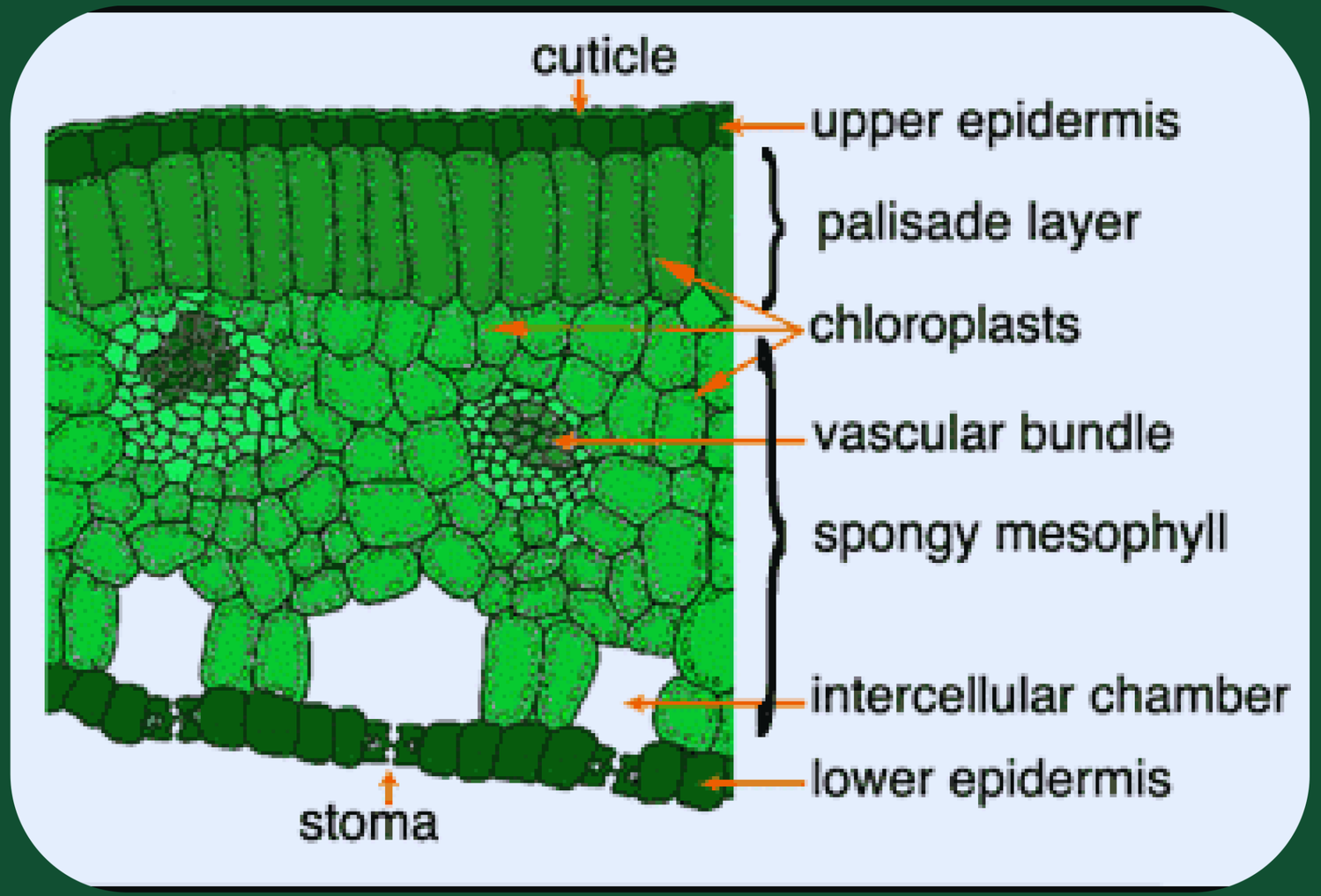
The tissue between the upper and lower epidermis of the leaf, responsible for photosynthesis.

WHAT'S ITS FUNCTION?

Contains chloroplasts for capturing sunlight and carrying out photosynthesis. It's further divided into two types of cells.



PALISADE CELLS



WHAT ARE THEY?

Tightly packed cells that contain a high number of chloroplasts.

WHAT'S THEIR FUNCTION?

They specialized in photosynthesis due to their abundance of chloroplasts for capturing sunlight.

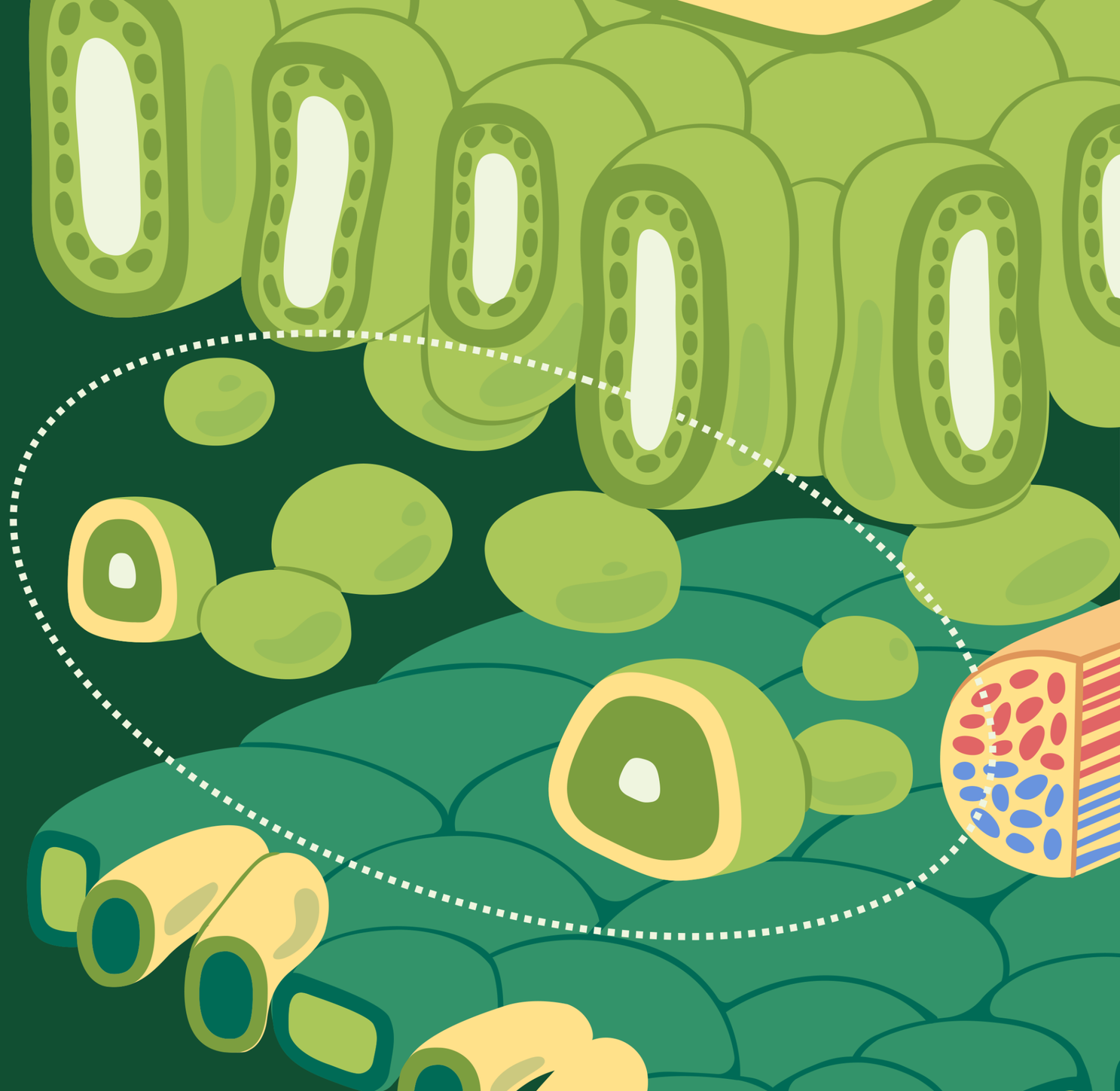
SPONGY MESOPHYLL

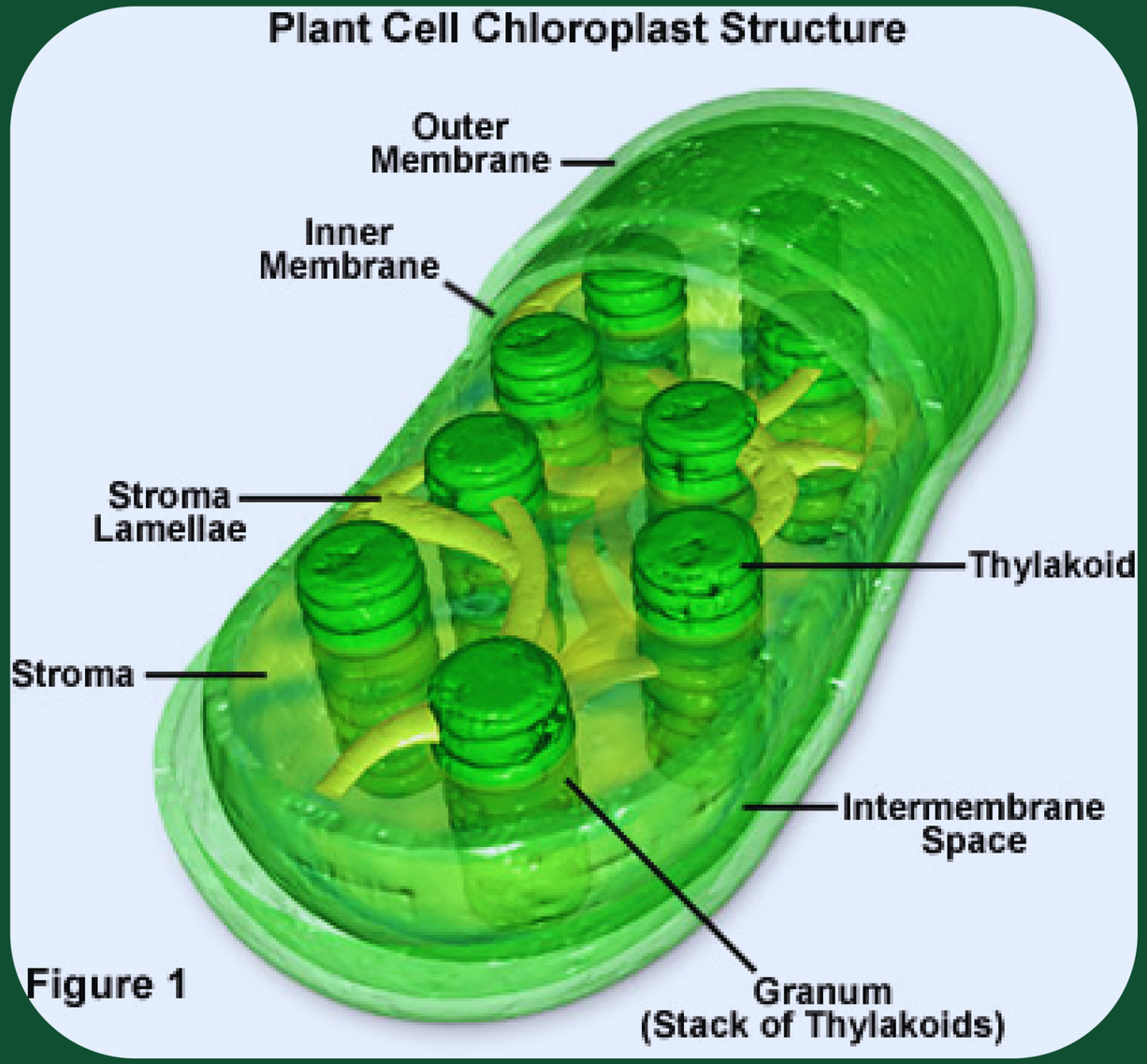
WHAT ARE THEY?

Irregularly shaped cells in the lower region of the mesophyll, containing air spaces between them.

WHAT'S THEIR FUNCTION?

Allow for gas exchange within the leaf due to the air spaces.





CHLOROPLASTS

WHAT ARE THEY?

These are specialized organelles within plant cells containing chlorophyll, the green pigment responsible for capturing sunlight during photosynthesis.

WHAT'S THEIR FUNCTION?

Chloroplasts convert sunlight energy into chemical energy (glucose) through photosynthesis.

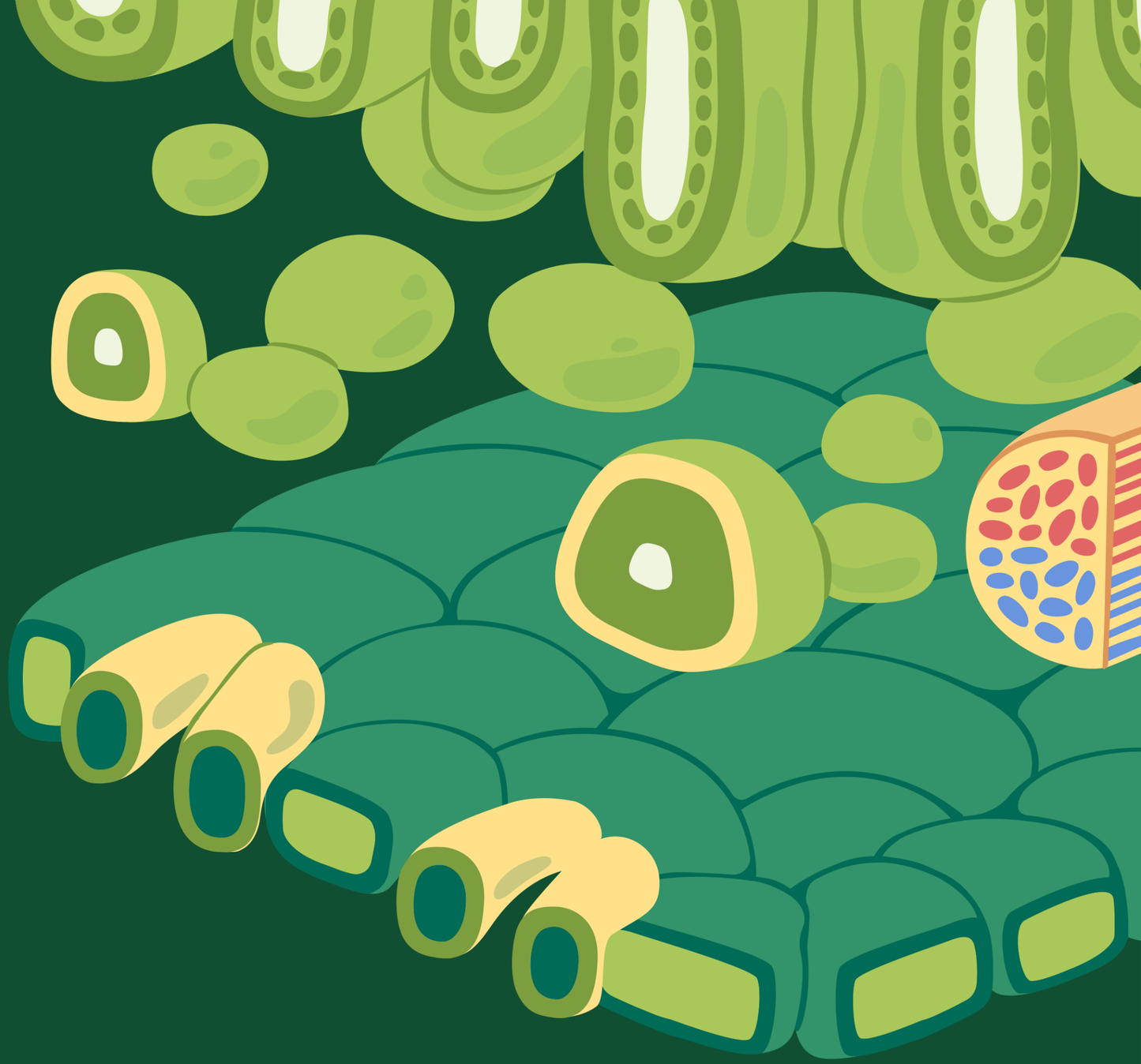
GUARD CELLS

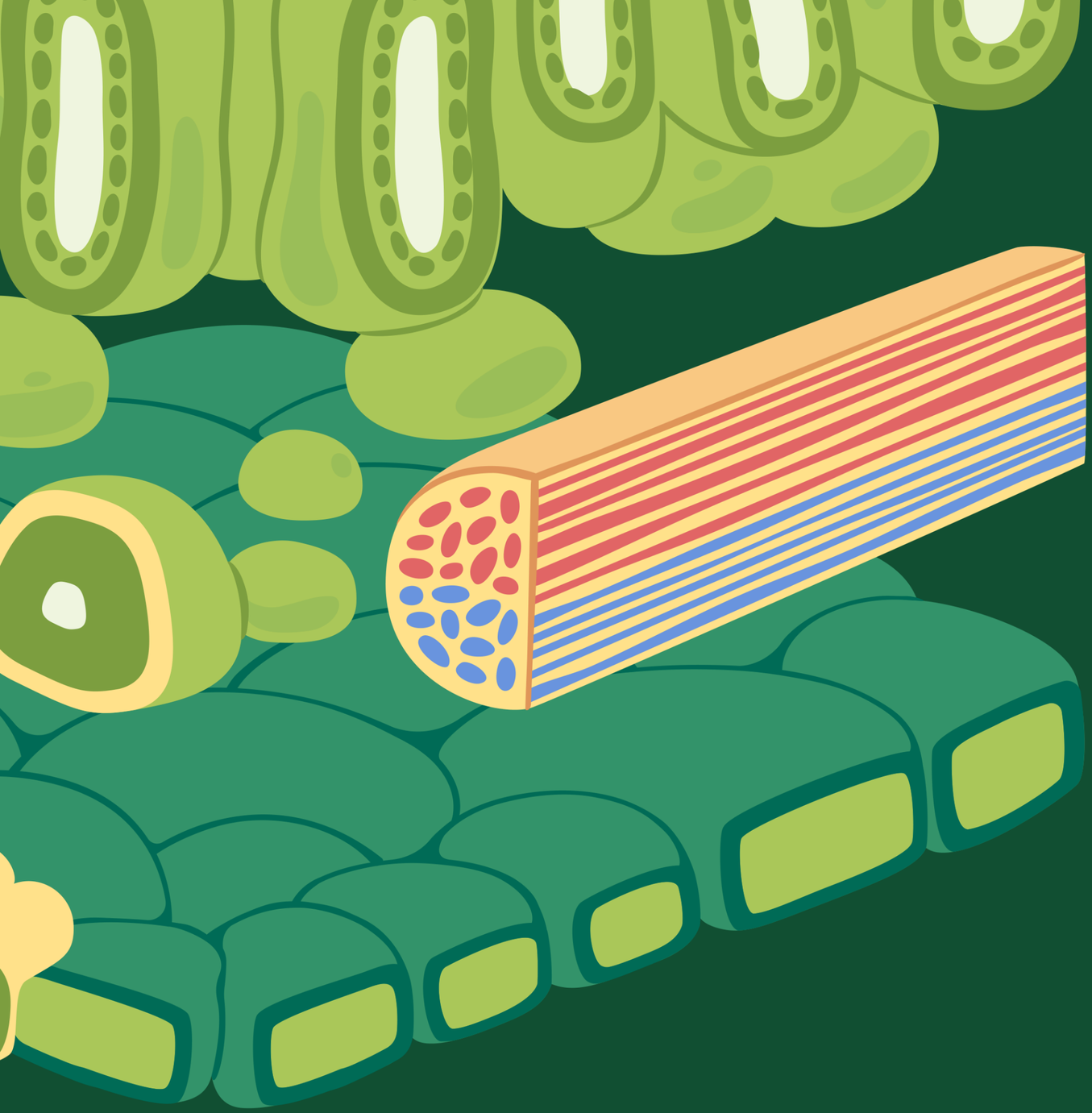
WHAT ARE THEY?

A pair of specialized cells surrounding each stomata, responsible for opening and closing the pore.

WHAT'S THEIR FUNCTION?

By changing their shape (inflating or deflating), guard cells control the size of the stomata opening, regulating gas exchange and water loss.





LOWER EPIDERMIS

WHAT IS IT?

The single layer of cells covering the underside of the leaf.

WHAT'S ITS FUNCTION?

Similar to the upper epidermis, it provides protection and contains more stomata for gas exchange.

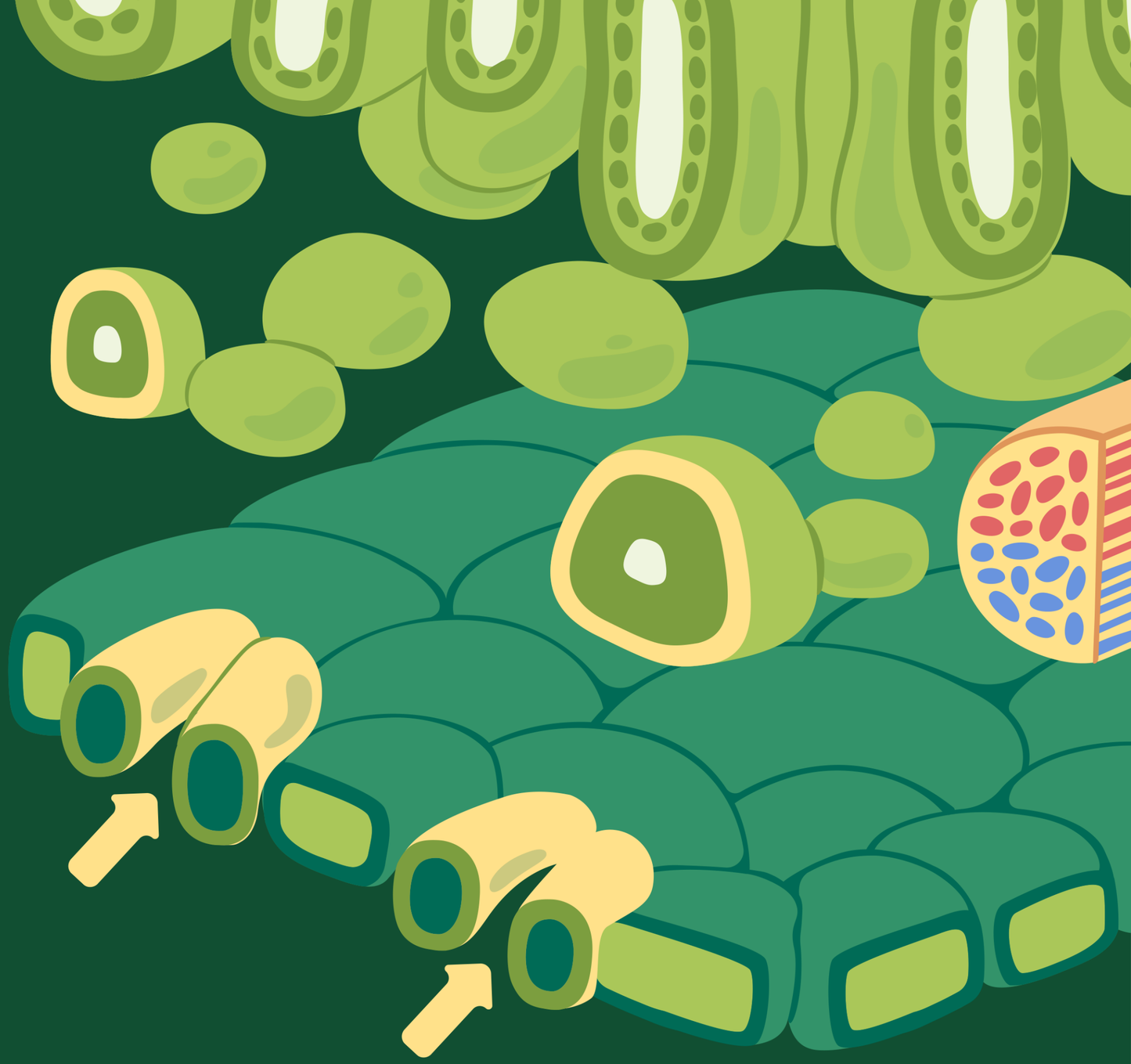
STOMATA

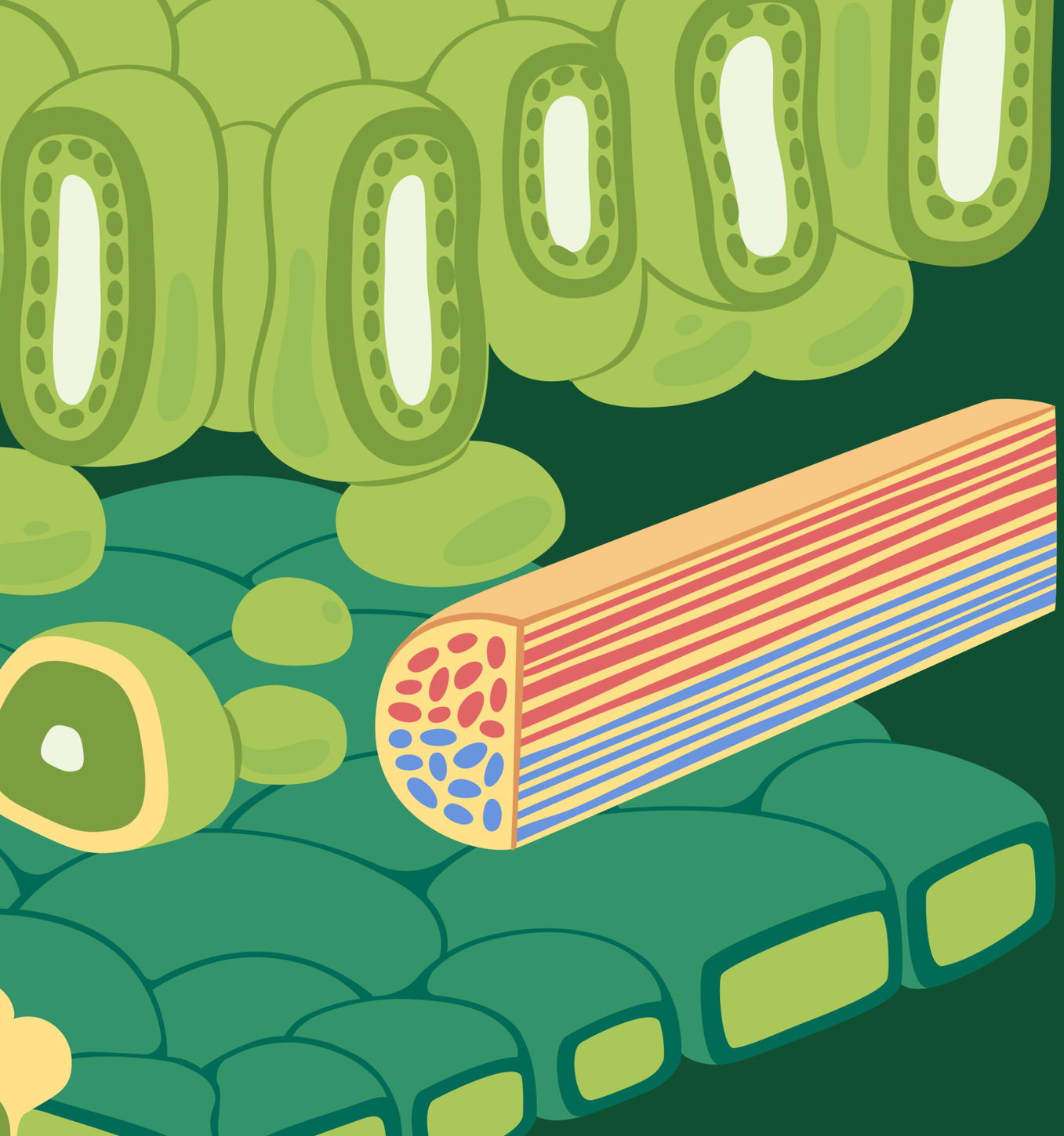
WHAT ARE THEY?

Microscopic pores on the leaf surface, allow for gas exchange (carbon dioxide intake and oxygen release).

WHAT'S THEIR FUNCTION?

Controlled by guard cells, stomata open and close to regulate gas exchange and water loss.





VASCULAR BUNDLES

WHAT ARE THEY?

A network of tubes within the leaf, transporting water, nutrients, and sugar throughout the plant.

WHAT'S THEIR FUNCTION?

Xylem vessels transport water and minerals from the roots to the leaves. Phloem vessels transport sugar.

A leaf, the primary site of photosynthesis in plants, has a complex anatomy designed for maximizing sunlight absorption and efficient gas exchange. Key components include the epidermis, mesophyll, and vascular tissue, all working together to support the leaf's functions.

External Anatomy:

Blade (Lamina): The broad, flat part of the leaf where most photosynthesis occurs.

Petiole: The stalk that attaches the leaf to the stem.

Stipules: Small, leaf-like appendages located at the base of the petiole in some plants.

Margin: The edge of the leaf, which can be smooth, toothed, lobed, or have other variations.

Internal Anatomy:

Epidermis:

The outer protective layer, consisting of both upper and lower epidermis. It contains stomata, pores that regulate gas exchange (CO_2 intake and O_2 release) and transpiration (water loss).

Cuticle:

A waxy, waterproof layer covering the epidermis, preventing excessive water loss.

Mesophyll:

The internal tissue between the upper and lower epidermis. It contains two main layers:

Palisade Mesophyll: Elongated cells containing many chloroplasts, the site of most photosynthesis.

Spongy Mesophyll: Loosely packed cells with air spaces, facilitating gas exchange and the movement of photosynthetic products.

Functions of Leaf Anatomy:

Photosynthesis: The primary function of leaves, where sunlight is converted into energy (sugars).

Gas Exchange: Stomata allow for the intake of CO_2 and release of O_2, necessary for photosynthesis.

Water Regulation: The cuticle and stomata help control water loss through transpiration.

Support: Veins provide structural support to the leaf.

Protection: The epidermis and cuticle protect the leaf from damage and desiccation.


CO_2
O_2
H_2O