

LEAF ANATOMY

The leaf is the primary photosynthetic organ of the plant. It consists of a flattened portion, called the blade, that is attached to the plant by a structure called the petiole. Sometimes leaves are divided into two or more sections called leaflets. Leaves with a single undivided blade are called simple, those with two or more leaflets are called compound.

The outer surface of the leaf has a thin waxy covering called the **cuticle** (A), this layer's primary function is to prevent water loss within the leaf. (Plants that leave entirely within water do not have a cuticle). Directly underneath the cuticle is a layer of cells called the **epidermis** (B). The vascular tissue, xylem and phloem are found within the veins of the leaf. Veins are actually extensions that run from to tips of the roots all the way up to the edges of the leaves. The outer layer of the vein is made of cells called **bundle sheath cells** (E), and they create a circle around the xylem and the phloem. On the picture, **xylem** is the upper layer of cells (G) and is shaded a little lighter than the lower layer of cells - **phloem** (H). Recall that xylem transports water and phloem transports sugar (food).

- ☐ Cuticle (light blue)
- ☐ Epidermis (yellow)
- ☐ Guard cells (pink)
- ☐ Palisade Mesophyll (dark green)
- ☐ Phloem (purple)
- ☐ Xylem (orange)
- ☐ Spongy Mesophyll (light green)
- ☐ Bundle Sheath (dark blue)

Within the leaf, there is a layer of cells called the **mesophyll**. The word mesophyll is greek and means "middle" (meso) "leaf" (phyllon). Mesophyll can then be divided into two layers, the **palisade layer** (D) and the **spongy layer** (F). Palisade cells are more column-like, and lie just under the epidermis, the spongy cells are more loosely packed and lie between the palisade layer and the lower epidermis. The air spaces between the spongy cells allow for gas exchange. Mesophyll cells (both palisade and spongy) are packed with chloroplasts, and this is where photosynthesis actually occurs.

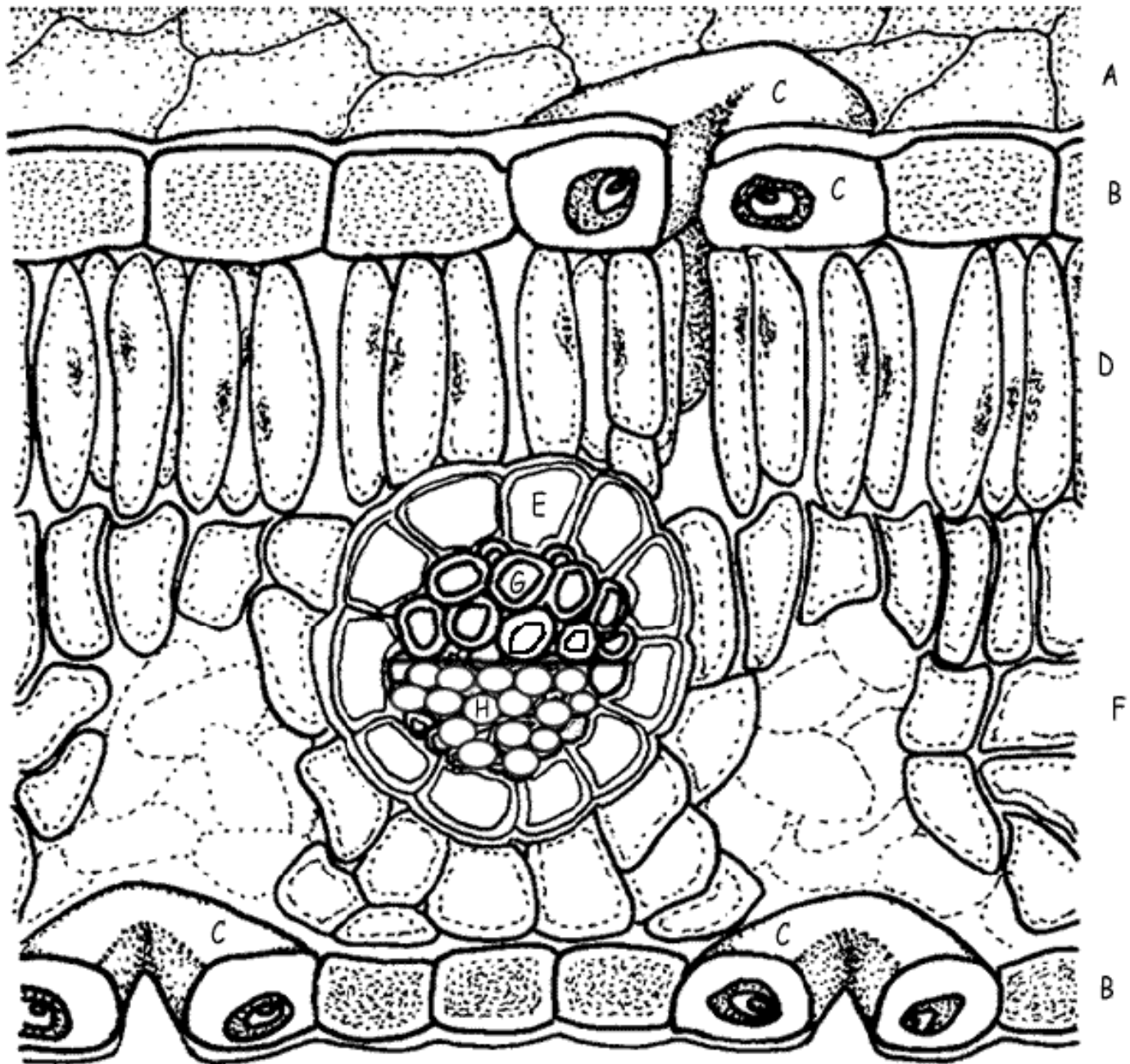
Epidermis also lines the lower area of the leaf (as does the cuticle). The leaf also has tiny holes within the epidermis called stomata. Specialized cells, called **guard cells** (C) surround the stomata and are shaped like two cupped hands. Changes within water pressure cause the stoma (singular of stomata) to open or close. If the guard cells are full of water, they swell up and bend away from each other which opens the stoma. During dry times, the guard cells close.

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Color the structures underlined above. Make sure that the entire picture is colored and that the color matches the words. For simplicity only part of the picture is labeled.



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Questions:

1. What two tissues are found within a vein?
2. What does the word "mesophyll" mean?
3. What two layers of the plant contain chloroplasts?
4. The outermost layer of cells: _____
5. The waxy covering of the leaf: _____
6. These cells function to open and close stomata - _____
7. Outer layer of the vein - _____
8. Column like cells that lie just under the epidermis - _____
9. Openings that allow for gas exchange - _____
10. The stalk that connects the leaf to the stem - _____