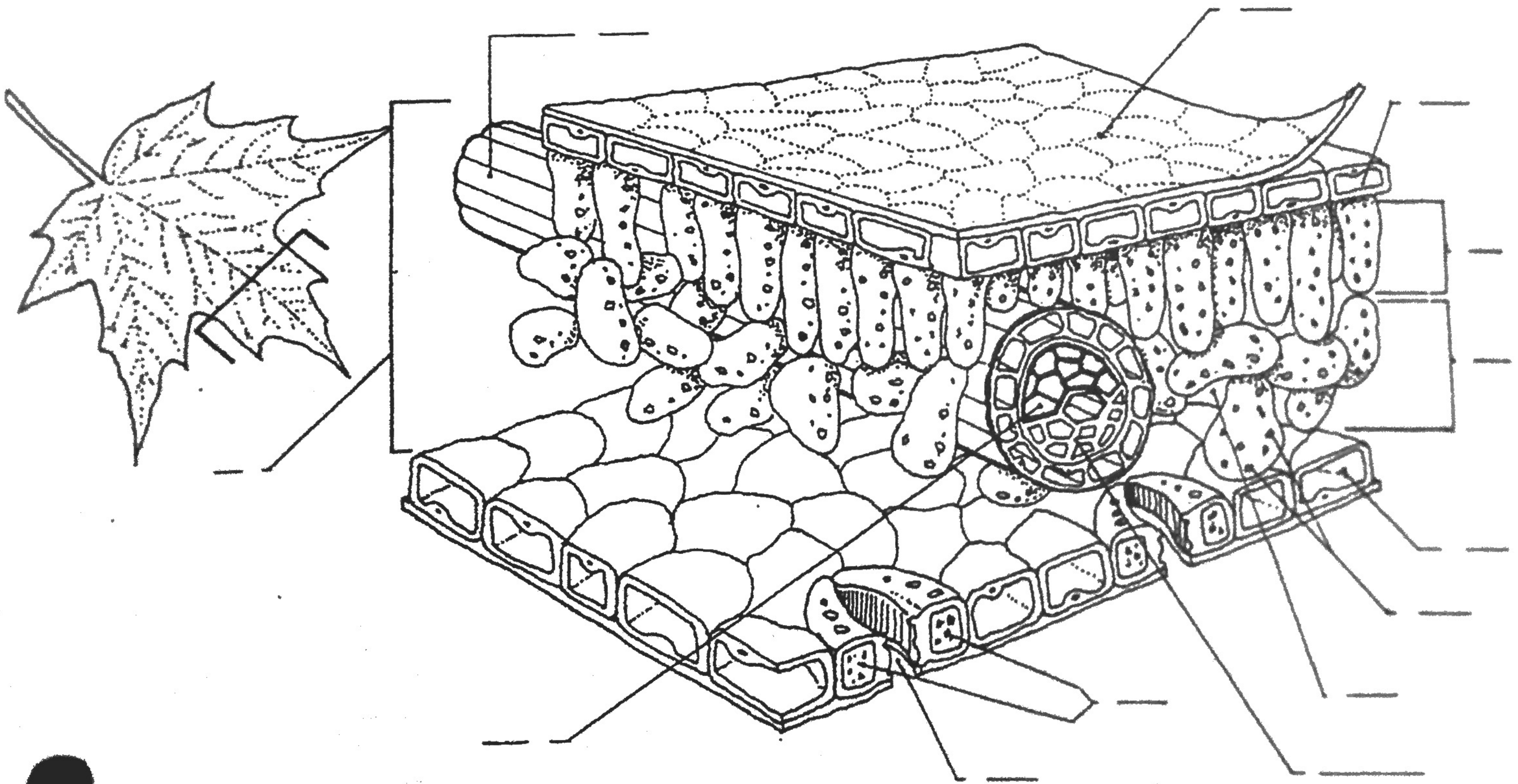


CROSS SECTION OF A LEAF

Name _____

Label the following parts of the leaf in the diagram below. Give the purpose/function of each part.

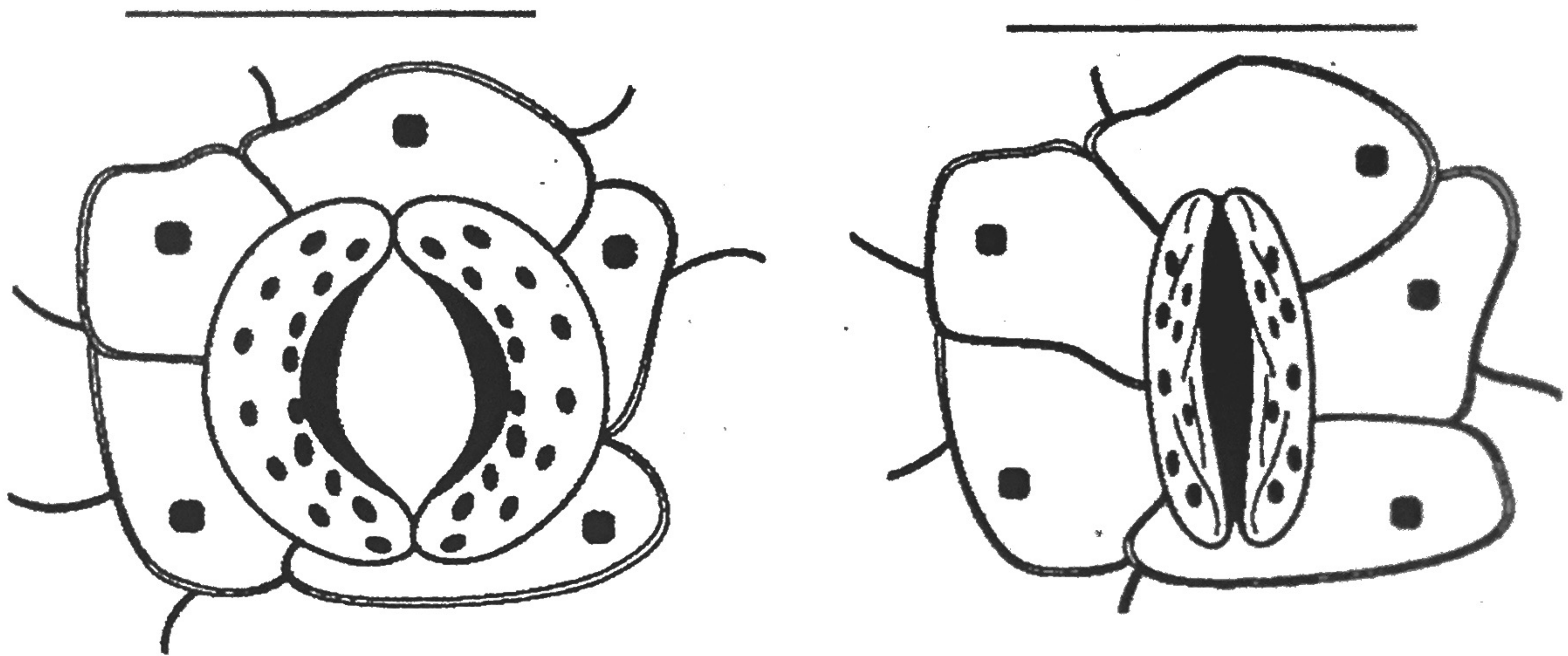
- a. lower epidermis _____
- b. upper epidermis _____
- c. palisade layer _____
- d. cuticle _____
- e. stomate _____
- f. guard cells _____
- g. vein (fibrovascular bundle) _____
- h. spongy layer _____
- i. air space _____
- j. xylem _____
- k. phloem _____
- l. chloroplasts _____
- m. mesophyll _____



Stomata

The stomata of a plant open and close to control the flow of gases to and from the leaves. Specialized cells in the epidermis, called guard cells, control whether a stoma is open or closed.

Label each diagram as an open or closed stoma. Draw a blue arrow showing the movement of carbon dioxide through the open stoma. Draw a yellow arrow showing the movement of oxygen through the open stoma.



Answer the questions:

1. Describe how oxygen and carbon dioxide move through stomata.

2. At what time of day are stomata generally open? Circle the correct answer.

day night

3. What causes stomata to open and close?

4. Why are stomata important to a plant?

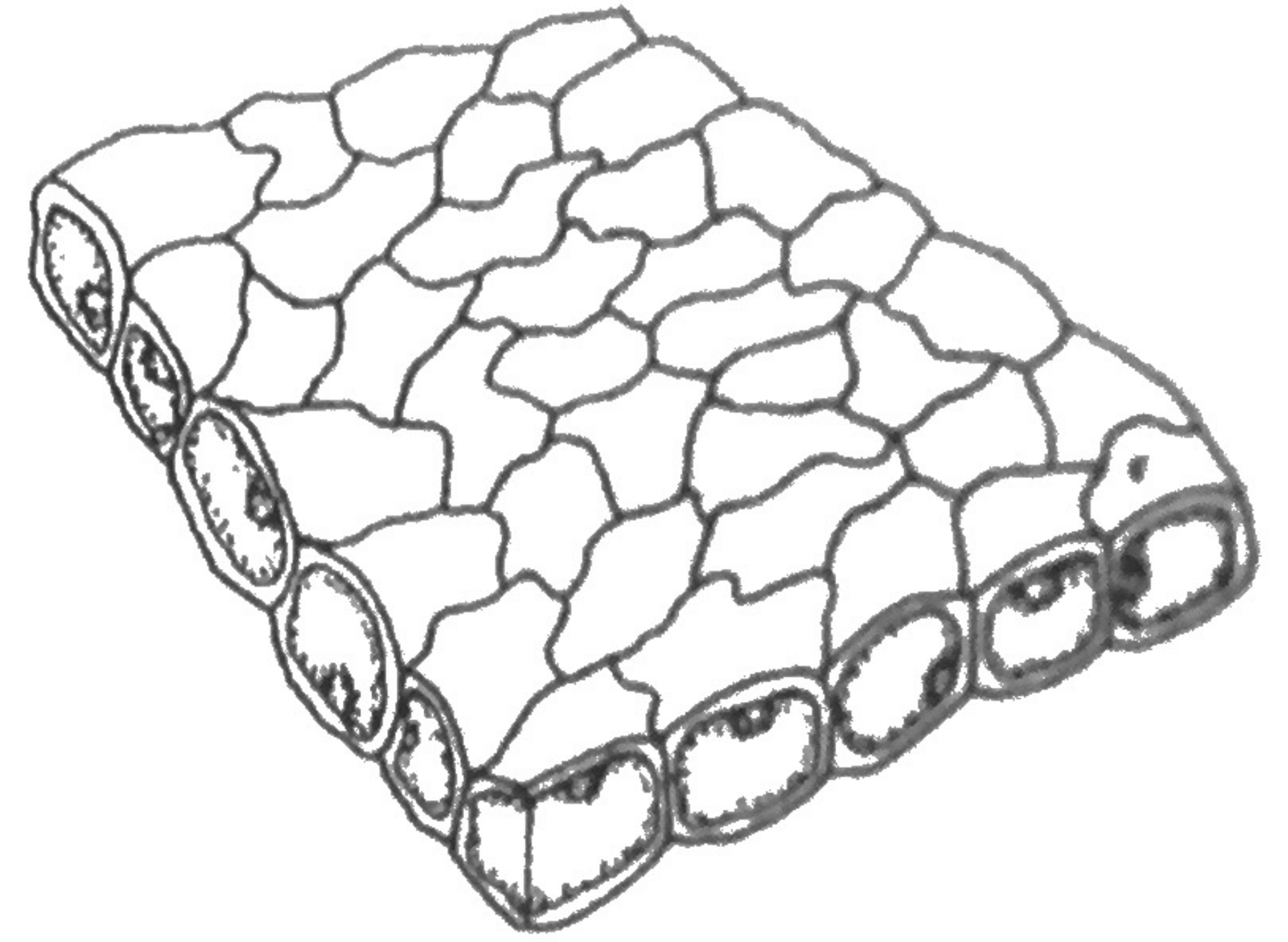
Plant organs are made of three tissue systems.

tissue is a group of cells working together to perform a certain task. Plants have three tissue systems: dermal, ground, and vascular tissue systems. The cells are often connected by plasmodesmata (PLAZ-muh-DEHZ-muh-tuh). These are strands of cytoplasm that pass through openings in cell walls. The cells of a plant tissue can share water, nutrients, and chemical signals through the plasmodesmata.

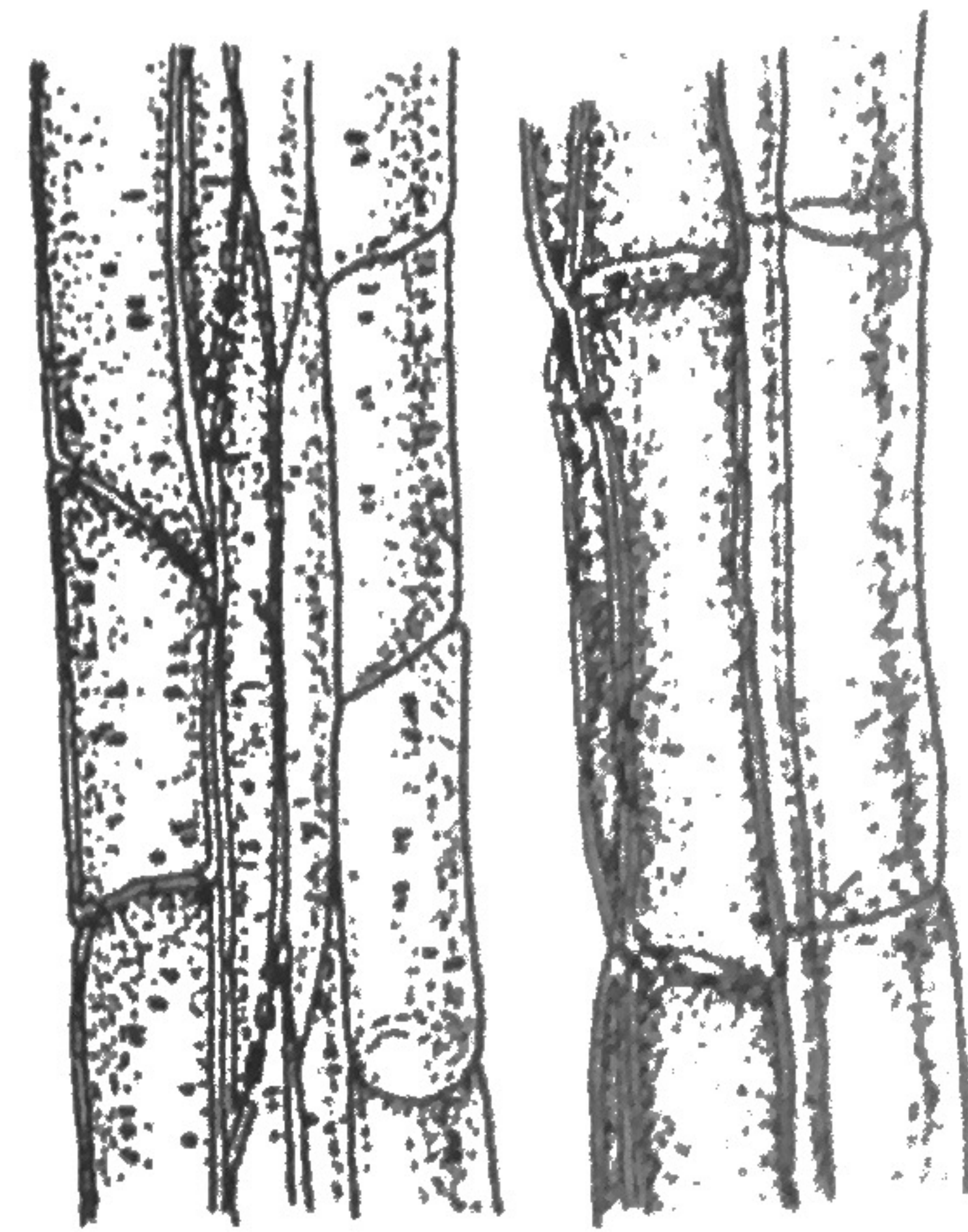
Dermal tissue system **Dermal tissue** covers the outside of a plant and protects it. Epidermis is dermal tissue made of live parenchyma cells. Epidermal cells may secrete* a waxy material that becomes the cuticle on leaves and some stems. Dermal tissue made of dead parenchyma makes up the outer bark of woody plants.

Ground tissue system Under the dermal tissue is the system of **ground tissue**, which makes up much of the inside of a plant. Ground tissue provides support and stores materials in roots and stems. In leaves, ground tissue contains chloroplasts for photosynthesis.

Vascular Tissue System The ground tissue surrounds the system of vascular tissue, which transports water, mineral nutrients, and organic compounds to all parts of the plant. The vascular system is made of hollow tubes. **Xylem** (ZY-luhm) is vascular tissue that carries water and nutrients up from the roots to the rest of the plant. **Phloem** (FLOH-EHM) is vascular tissue that carries sugars produced by photosynthesis from the leaves to the rest of the plant.



Epidermis is dermal tissue made of live parenchyma cells.



Xylem

Phloem



Underline three functions of ground tissue in plants.

Other traits of leaves used to identify plants include the pattern of veins and the leaf edge, or margin.



Name three leaf characteristics used to identify a plant.

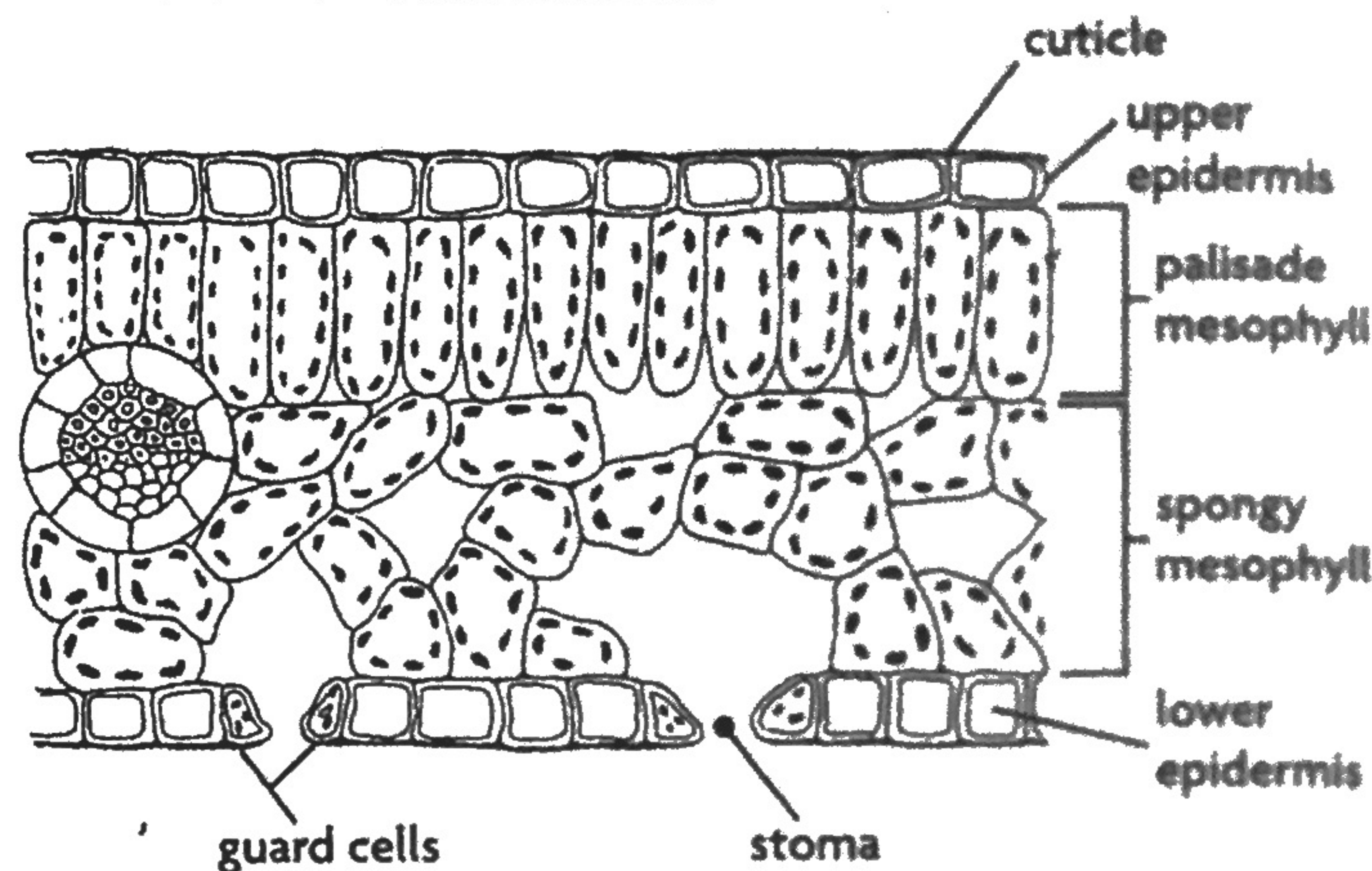
Most leaves are specialized systems for photosynthesis.

Photosynthesis occurs mainly in the leaves of a plant. You will recall that the process requires carbon dioxide, water, and light. Leaves have structures and adaptations that allow photosynthesis to occur, even in very different environments.

Photosynthetic structures Photosynthesis occurs in the mesophyll tissue of a leaf.

There are two kinds of mesophyll. Palisade mesophyll is a layer of tall, rectangular cells that absorb light that enters the leaf. Beneath this layer is the spongy mesophyll, which is a layer of loosely packed cells with many air spaces between them. The air spaces connect to the outside of the plant through the stomata, allowing for gas exchange.

Leaf adaptations Leaves are adapted for photosynthesis in the plant's particular environment. For example, in the desert, it is important to prevent water loss. Cacti leaves are the sharp spines that protect them and reduce water loss. Plants that live in water have plenty of water but need a way to exchange gas with the environment. A water lily has stomata on the upper surface of its leaves, instead of on the bottom, which is under the water's surface.



This cross section of a leaf shows structures for photosynthesis.



Circle the two types of mesophyll cells.