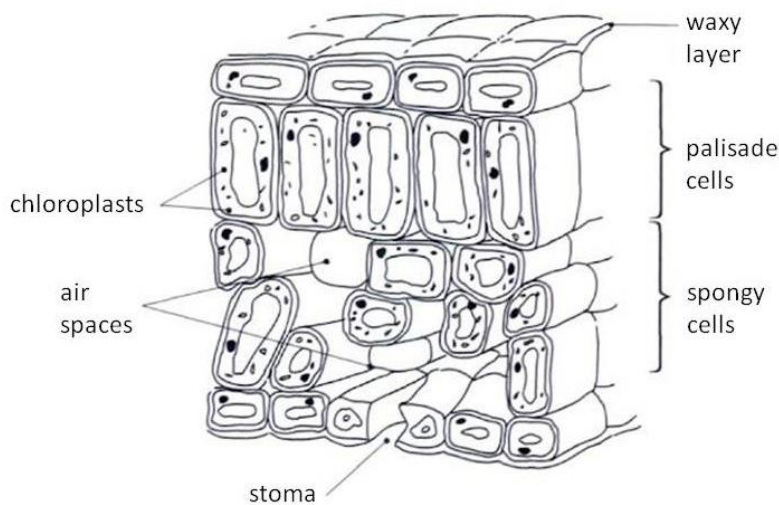
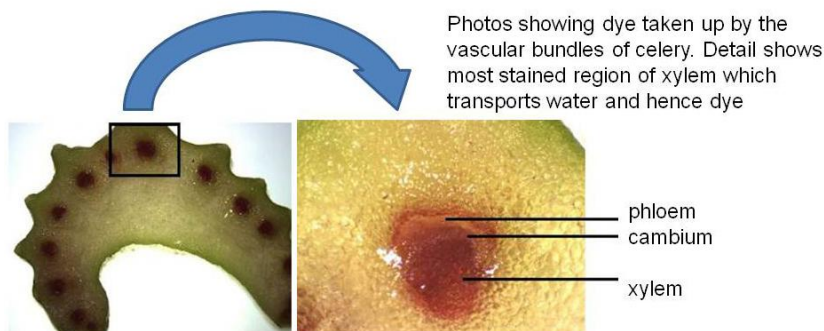


Structure and Function of a Plant

Plants are special organisms since they can make their food by using carbon dioxide and water and light energy. Write down the equation for this $\text{CO}_2 + \text{H}_2\text{O} + \text{light} = \text{CH}_2\text{O} + \text{O}_2$. Plants do this in their leaves in organelles called chloroplasts using chlorophyll which makes most leaves green. In the leaf, there are different cells which do different jobs. The outer layer of cells is called the epidermis. The upper surface is covered by a waxy layer or cuticle to prevent water loss. Inside there are two types of mesophyll cells palisade cells in the upper part of the leaf and spongy cells in the lower half. The spongy cells have air spaces in between the cells whilst the palisade cells are packed close together. The epidermis (often mainly the lower part) contains small holes or stomata (singular - stoma) which allows gases to pass into and out of the leaf. The opening and closing of the stomata are controlled by a pair of guard cells. Complete the labels on the diagram below (of a section through a leaf):



During the day carbon dioxide gas diffuses into the leaf and is used for photosynthesis but at night photosynthesis stops. On the other hand, respiration which requires carbohydrates and oxygen occurs day and night. Although plants use some water during photosynthesis, they lose water vapour through their stomata in a process called transpiration. As water vapour is lost, the cell surfaces inside the leaf would become dry but instead water is drawn through the rest of the plant. Water enters the plant through its root hairs. The stem contains vascular bundles consisting of xylem and phloem. It is the xylem formed of small pipes of dead cells which allows water to move from the roots to the leaves. Capillary action is important for this process. Water is also needed by the plants for support and to bring in minerals from the soil. The other component of each bundle is called phloem. It is important for moving the carbohydrate products of photosynthesis from the leaf to the other parts of the plant. The xylem and phloem are separated by the vascular cambium which can form both. Complete the labels below:



Transpiration can be measured with a potometer but it can be affected by a number of factors including temperature, humidity and movement of air.