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Tracing Photosynthesis

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Abstract

The goal of our research was to investigate photosynthesis according to the equation

$$6\ CO_2 + 6\ H_2O \rightarrow C_6H_{12}O_6 + 6\ O_2$$

The following experiments have been executed:

The first investigation included setting up a beaker with water and an Elodea plant. The task was to count oxygen bubbles released by the plant. Red and gray filters have been used. The water temperature was changed from 18 °C to 30°C. This experiment proved that the production of oxygen was present, and that different coloured light decreases the amount of oxygen produced while warmer water increases oxygen production.

The second experiment incorporated observing the stomata in Ficus elastica. We counted the number of stomata by getting a print of the leaf structure with nail polish and a piece of tape. This proved that there are stomata only on the lower epidermis while the upper epidermis has none.

Afterwards we stored an Elodea plant in the dark to observe the moving chloroplasts in the light under a microscope. It could be seen that the chloroplasts started to move after illuminated by light.

In the third experiment we first tested the uptake of carbon dioxide from water by plants. Three bottles were filled with soda water, two contained the stems of Egeria densa, one was wrapped in aluminium foil. The water in the bottle filled with the stems standing in light became less acidic, the others stayed the same.
Afterwards we looked for starch granules in leaves. We removed the chlorophyll from the Gerbera hybrida leaves and tested the leaves for starch by using an iodine solution that turned the leaf into blueish black colour.

The last experiment showed the different pigments in a spinach leaf. We crushed spinach leaves, mixed them with acetone and put the solution on chromatography paper. Observation showed the presence of chlorophyll a and b, xanthophyll, and carotene.