## FIGURE 1

## How does a plant get energy?

Have you ever observed a plant's growth over time and wondered what is really happening? Your task is to use the information that scientists have gathered over several hundred years to determine how a plant gets energy.

Use the clues provided by other scientists to help you solve the mystery. Cut out the clues below and arrange them in groups that help you develop your answer. Use both words and scientific symbols when presenting your explanation.

The pigment (chlorophyll) is found in chloroplasts.

During the night, plants use ATP to assemble glucose (CeH<sub>12</sub>O<sub>6</sub>) using CO<sub>2</sub> and H<sub>2</sub>O.

combined with CO2, Experiments show that glucose can be made.

Animal cells do not have chloroplasts.

> In 1992, Marcus won a Nobel Prize for Physics describing the process of electron flow in plants.

Animal cells cannot make glucose (C6H,2O6).

Experiments in the 1950s using

radioactive oxygen showed that Oo

from the CO<sub>2</sub> combines with other

molecules to form CoH, Oo.

In 1779, Ingenhousz found that

aquatic plants produce 0, in the light

but not in the dark. He concluded that

plants need sunlight to produce O<sub>2</sub>.

Experiments show that H from water is later found as part of the C6H12O6 molecule.

In 1643, van

Helmont proved

empirically that

water, not soil, is

needed by plants.

light energy is used to split water into H and O.

> Glucose produced by leaves can be used to build starch, cellulose. or other organic compounds.

If H is

Glucose can be "stored" as a starch molecule in the leaves of plants.

Leaves from plants grown in the dark have a lower amount of starch than leaves from plants grown in light.

When water is split, the O2 diffuses away, but the electrons flow through a transfer chain to help form ATP.

Growth and division of plant cells requires chemical energy and organic molecules.

Air is a combination of many gases, including CO<sub>0</sub>.

Radiant energy from the Sun can be described in terms of its energy content.

Experiments in 1941 showed

that the oxygen (Oo) released

from plants comes from water.

Green plants cannot live without water and air.

Making glucose does not require light, but it does require ATP.

In 1771. Priestley proved that plants give off a gas (later called oxygen).

All cells

need

glucose

(C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) to

carry on

cellular

activity.

Pigments found in some cells are capable of absorbing various parts of the Sun's energy.

> Glucose can come to a cell already made or can be made in some cells.

Chlorophyll absorbs light energy and uses it in chemical reactions in the chloroplasts.

Chloroplasts are the cellular organelles found in leaves.

Energy is needed for chemical reactions to occur.