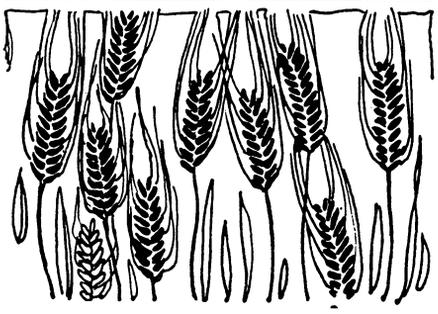
PLANT PHYSIOLOGY

NATURE RAMBLINGS by Frank Thone



Pinned With Magnesium

➤ A RECIPE for making life possible on an uninhabited planet might very well begin, "Use 55 parts carbon, 72 parts hydrogen, five parts oxygen, four parts nitrogen, and one part magnesium." The "parts" are atoms, and the life-enabling recipe is the formula for chlorophyll *a,* one of the two green, sunlight-capturing, food-making pigments in all green plants. Its opposite number, chlorophyll *b,* differs by two atoms of hydrogen and one of oxygen, but winds up with the same single atom of magnesium.

Although the numbers of atoms of constituent elements in a molecule of chlorophyll is known, biochemists have not yet found out exactly how they are put together. Some tentative diagrams of its structure have been drawn up, and in practically all of them the "Mg" that symbolizes magnesium is shown at the center, as if it were the kingpin of an intricate mechanism. So it is in a sense; although we do not know what its exact function is in the activity of chlorophyll, it is certain that if that one magnesium atom were withdrawn, the remainder of the complex could no longer be called a chlorophyll molecule.

Chlorophyll, using sun-power to weld water and carbon dioxide together to form sugar, seems to act as a catalyst. That is, its own substance is neither increased nor diminished, even momentarily, by the process which it promotes, although the greater part of its bulk is made up of carbon, hydrogen and oxygen atoms—the identical elements that are bound together in the foodstuff formed by its action.

There is not even complete agreement about what that first-formed foodstuff is. It is usually said to be some form of sugar, but there are also plant physiologists who believe that starch is made first, then changed into sugar for transportation to other parts of the plant in solution. Sugars and starches are always found in such intimate association with active chlorophyll that it is extremely difficult to tell which came first.

Of this much, however, we may be certain: that without chlorophyll there would be no trees, no grainfields, no pastures, not even any mosses or green pond-scums. And every molecule of chlorophyll seems to be held together by a single pin of magnesium.

Science News Letter, August 30, 1947

MINING

New Electric Cables Lessen Mine Hazards

➤ COAL MINE explosions will be fewer with a new non-sparking electric cable, and a new shock-proof cable will decrease danger from high-voltages in circuits leading to operating machinery.

Electric cables in mines that bring light and power from power lines to working faces usually are stretched along the floor where they are subjected to rough usage, being pulled about where needed. As a result, ordinary insulation wears away quickly and sparking often follows. These sparks, sufficient to ignite methane gas and coal dust, have caused many disastrous explosions. Leakage from high-voltage cable is exceedingly dangerous to men coming in contact with it. These trailing cables, as they are called, are used to power heavy moving machines.

The non-sparking cable, developed by the U. S. Rubber Company, New York City, and Leonard Wilson of Kenilworth Mines, Utah, has a fine strand of wire embedded between the inner and outer layers of insulation. If the insulation becomes damaged, this wire catches incipient current leakage before an arc can occur, and carries the leakage to a sensitive circuit breaker which cuts off the power.

The safe high-voltage cable, manufactured by the General Electric Company, is already in use in the Saddle Creek phosphate mine of the American Cyanamid Company. Each conductor of the three-wire cable is covered with a metal sheath woven around the outside of the individual insulation. Each sheath is in contact with those of the other two wires, and also with ground wires set in the spaces between them. The entire cable is covered with a tough rubber-like insulation.

In the event of a break or "fault" in any part of the cable, the high-voltage current would be carried immediately by the metal sheathing or the ground wires to a panel between the cable and the main power line and there activate a device to cut off the current.

Science News Letter, August 30, 1947

NUCLEAR PHYSICS

Betatron X-Rays Steel One Inch Thick in Second

➤ FLAWS in steel, for uses ranging from Navy guns to battleship armor, will be detected by a new 10,000,000-volt X-ray machine to be installed in the Naval Ordnance laboratory at White Oak, Md. It will take X-ray pictures of one-inch thick steel in one second.

The technical name of the machine is the betatron. It has now been completed by General Electric, Schenectady, N. Y., and is a small version of G.E's 100,000,000 electron-volt atom-smashing betatron. This new machine is the first of its size to be produced for industrial purposes. Its rays will penetrate a foot-thick piece of steel in minutes, as compared with hours needed previously.

Science News Letter, August 30, 1947