

BIOLOGY

Chloroplasts Investigated

Scientists have found that nature's factory for converting sunlight into food energy controls its own reproduction within the living cell. The chloroplast contains genetic material.

► **THE CHLOROPLAST**, nature's tiny green "factory" for converting sunlight into food energy, may deserve a place along with the gene and the virus as one of the basic bits of life.

University of California scientists have discovered that the chloroplast, like the gene and the virus, contains genetic material and controls its own reproduction within the living cell. The new findings may point to the possibility that the chloroplast once existed on its own in an earlier phase of evolution.

Later, chloroplasts and certain living cells in green plants may have joined in their present mutually beneficial relationship, the chloroplasts supplying the cell with energy and nutrients and the cell insuring protection and orderly distribution of genes during the reproduction process.

Dr. Stanley Scher, associate research microbiologist with the University of California's Space Sciences Laboratory, Berkeley, Calif., and Mrs. Lynn Sagan, graduate student in genetics, used radioactive "tracer" techniques to investigate the formation of the genetic code-bearing chemical DNA (deoxyribonucleic acid) in a species of green algae known as *Euglena gracilis*.

Previous studies had shown that the DNA, which controls basic cellular processes, is located in the chromosomes of the cell's nucleus.

Research had also shown that the energy-converting chloroplasts within each algal cell are located outside the nucleus in the surrounding substance called cytoplasm.

Still unknown was whether the chloroplasts depend on the DNA in the cell's

nucleus to regulate their own duplication when the cell divides. To find the answer, the scientists fed growing cells a DNA-component chemical called thymidine which had been "labeled" with tritium, the radioactive isotope of hydrogen.

Exposed later on special photographic film, the cells showed clearly that some of the "labeled" thymidine had been taken up in the cytoplasm. From this, the scientists reasoned that some DNA must be located outside the cell nucleus.

In other experiments, the process was repeated on cells deprived of their chloroplasts through growth at above normal temperatures and through treatment with streptomycin. Here the scientists found no evidence of "labeled" DNA in the cells' cytoplasm.

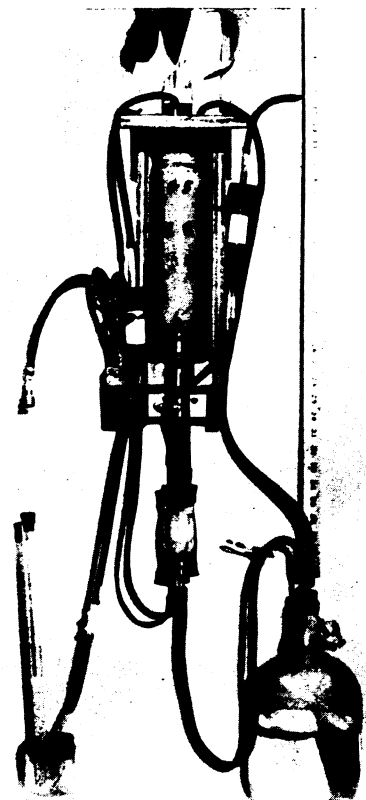
Clearly, the experiments showed, the chloroplasts were capable of synthesizing their own DNA, and with it they demonstrated a "genetic autonomy" which marks them as complete reproducing units.

Besides the genetic material, chloroplasts are known to contain energy-converting chlorophyll and enzymes needed to synthesize proteins.

Viruses and genes, by contrast, contain only protein and genetic material; they must depend on their cellular "homes" to fill their nutritional needs.

Later research may show whether chloroplasts can actually be made to grow and reproduce outside the living cell, a feat not yet accomplished by scientists on any sub-cellular biological unit.

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CUSTOM-MADE "CORK"—Silicone rubber, RTV-11, developed by General Electric, Waterford, Conn., is used in a custom-made "cork" separating sterile roots from the atmosphere surrounding the non-sterile upper plant.

TECHNOLOGY

Sound Helps Frogmen "See" Under the Sea

► **SCUBA** (self-contained underwater breathing apparatus) swimmers now can "see" submerged objects within a range of 120 yards by means of a portable underwater sonar.

Previously they had been handicapped in their operations by limited underwater visibility.

The underwater object locator that helps the frogmen "see" with their ears is a continuous-transmission, frequency modulated sonar that produces a sharp, narrow acoustic beam. It is worn strapped to the body, and the signals from echoes bouncing off underwater objects are received through a water-tight headset. The pitch of the tone indicates the distance to the target.

Only in a few geographic areas is the water clear enough to see, even on bright days, to about 50 feet below the ocean surface. In muddy rivers and bays, the frogmen see very little beyond a foot.

The portable sonar was developed by I. R. Colldewei, E. L. Walls and R. D. Lee, of Textron, Inc., Dalmo-Victor division, Belmont, Calif., and is reported in *Electronics*, 34:37, 1961.

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MEDICINE

Polio Strikes Chile

► **AT LEAST 420** persons came down with paralytic polio in Santiago, Chile, between Sept. 1 and Dec. 16, Dr. Luther L. Terry, Surgeon General of the Public Health Service, reported.

Dr. Terry's estimate was based on a report from two officials of the Service's Communicable Disease Center who spent several weeks in Santiago to observe the use of Type 1 oral polio vaccine in combatting an epidemic.

The Service provided, from the epidemic reserve maintained by the Service, 300,000 doses of the vaccine to the National Health Service of Chile in mid-October in response to a request for aid transmitted to the Service by the Department of State.

The National Foundation provided a substantial amount of equipment, including chest respirators, rocking beds and hot packs.

Dr. Alfonso H. Holguin and Leo Morris, the two Service officials who undertook the study, reported that nearly 400,000 doses of oral vaccine, including some vaccine provided by the Belgian Government, were administered during a two-week period. The vaccine was given to children between the ages of three months and six years since most of the cases had occurred in that age bracket.

The total population of Santiago province is 2,500,000. Forty percent of the cases occurred in the southern area of the city, which numbers 500,000.

The epidemic, according to the report, was limited almost entirely to Type 1 polio, although a few Type 3 cases were identified early in the epidemic.

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