BIOCHEMISTRY

Energy of Photosynthesis

Clue as to how the energy of the sun is channeled into the "blood stream" of plants is found in protogen molecules, recently discovered plant growth stimulant.

➤ AN UNDERSTANDING of the key question of photosynthesis, nature's process of manufacturing the world's energy foods in green plants, may have been found.

It was reported by Dr. Melvin Calvin, University of California chemist, in the annual Harrison Howe Lecture of the Rochester, N. Y., section of the American Chemical Society.

In photosynthesis, green plants capture light energy from the sun and, with carbon dioxide and water, form the energy substances basic to life on earth—proteins, carbohydrates, fats, sugars, etc.

While studies by Dr. Calvin and many others with radioactive carbon have yielded the answers to many of the secrets on the "synthesis" side of the process, the most important question of all, in the "photo" phase, has baffled generations of scientists.

The question is this: how is the sun's energy channeled into the chemical "blood stream" of plants?

Scientists have known that the chlorophyll, the green pigment of plants, initially captures the sun's energy. This happens when quanta, or packets, of energy from the sun set electrons of the chlorophyll into faster motion. Energy is stored temporarily in the increased motion of the electrons.

But this energy can remain in the chlorophyll for only a few thousandths of a second at most. The question is how the energy gets from the chlorophyll into the plant chemistry.

Dr. Calvin told the assembled chemists that he obtained a clue in a prosaic manner. He had received samples of protogen, a recently discovered growth stimulant found widely in plants.

One sample was the natural chemical found in plants. The other was a closely related synthetic material. Chemically they are essentially the same, with but slight differences in the arrangements of the atoms in the molecules.

Dr. Calvin's examination showed that the natural form of protogen was yellowish, while the synthetic product was colorless. This suggested to him a peculiar arrangement of the two sulfur atoms in the natural protogen, which is known as a disulfide.

In this arrangement the two sulfur atoms would be bound together in a small ring, and the bond could be easily split by quanta of energy from outside the molecule. Dr. Calvin synthesized the main section of the molecule and found his speculation was true.

Dr. Calvin's theory, then, is essentially this: The protogen molecules are in contact with the plastids, the plant units that contain chlorophyll. Energy packets emerging from chlorophyll strike the protogen molecule, breaking the susceptible bond tying the two sulfur atoms together. The energy is retained in the two resulting molecular fragments, which can easily combine with other molecules in the rapid transitions that build energy-bearing proteins and other substances. Thus the energy is stored in the plant.

Dr. Calvin was cautious in his report. He said his evidence, though strong, is not conclusive, and that further work will be required to prove it.

If this work justifies the theory, the greatest hurdle of all to man's understanding of the process which keeps him alive will have been cleared.

Science News Letter, December 6, 1952

GENETICS

Heredity Seen as Key To Fat-Use Disorders

➤ HEREDITY, RATHER than diet or occupation or housing, may be what determines whether or not a person is likely to develop disorders of fat utilization, including early fatty degeneration of the arteries leading to a serious form of hardening of the arteries and heart trouble.

If this is the case, the hereditary transmission seems to be through a dominant gene with incomplete penetrance.

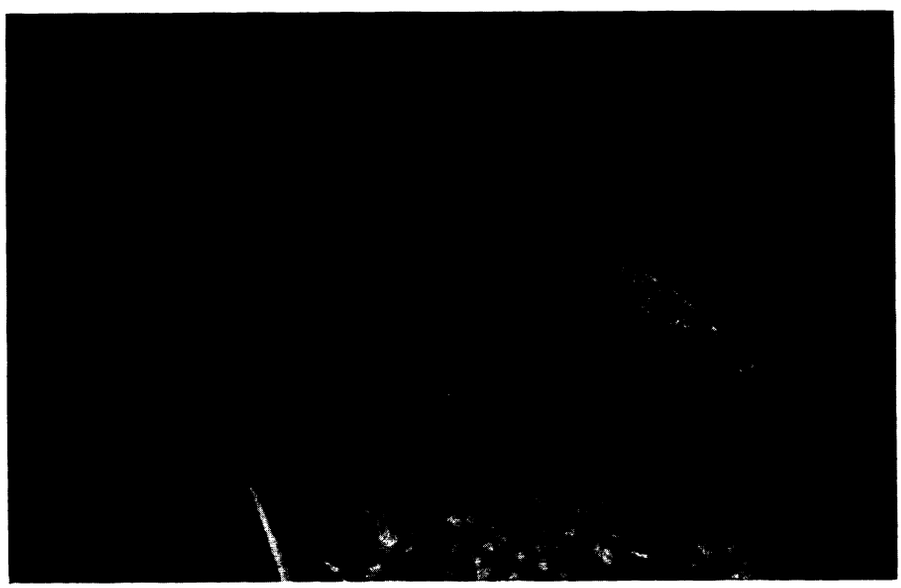
Studies showing this were reported by Drs. David Adlersberg, Louis E. Schaefer, Stanley R. Drachman and Arthur C. Steinberg of Mount Sinai Hospital, New York, to the American Institute of Biological Sciences.

Because of earlier research showing that faulty utilization of the fatty substance, cholesterol, might be "a common denominator" for most patients with early fatty degeneration of the heart's arteries, these scientists investigated patients who had a high level of cholesterol in their blood. Included in the investigation was a study of as many of the patients' relatives as possible, to determine the hereditary pattern of this condition.

Among other things, the scientists found that a high percentage of brothers, sisters and children of the patients also had high blood cholesterol levels, even though these sisters and brothers did not show any signs of sickness due to faulty fat utilization. This faulty fat utilization, showing up in too much cholesterol in the blood, occurs more often among Jews than non-Jews, but is as frequent among brothers, sisters and children of non-Jewish as of Jewish patients. This latter finding lends strength to the theory that the condition is genetically determined.

The conclusions are considered tentative and the study should, the scientists state, be extended to a larger and more representative population group.

Science News Letter, December 6, 1952



PINK FALSE KATYDID—This rare pink form of the false katydid, Amblycorypha oblongifolia, found near Wyandotte, Mich., by Walter P. Nickell, has milky-white eyes and white antennas. Normally, these insects are grass-green in color, with light brown eyes and antennas.