

thesis, is speaking before chapters and clubs of the Society of the Sigma Xi, the Scientific Research Society of America.

Modern plants, with their green chlorophyll, utilize the energy of the light from the sun to break down molecules of water. They build the hydrogen thus obtained, along with the carbon dioxide they take from the air, into their plant structures. The oxygen they discard in this process maintains the balance of nature and the constitution of the air.

The earliest plants, Dr. van Niel is telling his scientific audiences, could not have made use of this complicated process which combines two radically different mechanisms: First, the photochemical reaction; second, the liberation of molecular oxygen.

Evidence has been found, Dr. van Niel reports, that certain purple bacteria make use of a simpler kind of photosynthesis. This method may have preceded that which takes place in the green chlorophyll. It is accomplished by a photochemical decomposition of water as in green plants. In both types of photosynthesis the hydrogen is transferred to carbon dioxide. But only in green-plant photosynthesis is oxygen evolved. In bacterial photosynthesis an oxidation product other than oxygen takes its place, and this must be continuously reduced. That requires the simultaneous oxidation of a reducing substance, for example a secondary alcohol. All these re-

actions take place under the influence of various enzymes.

It is reasonable, Dr. van Niel found, to regard the evolution of photosynthesis as proceeding from organisms with highly developed synthetic mechanisms but not yet endowed with photochemically functional pigment systems.

The pathway of development would then lead in the direction shown by the mechanisms in use by the purple bacteria. Their pigment systems were present in their colorless ancestors, but they were not yet independent of extraneous reducing chemicals.

"The next step in the evolutionary sequence," Dr. van Niel reports, "would then be concerned with changes whereby the 'oxidation product' of the photochemical reaction becomes capable of self-regeneration through the elimination of molecular oxygen. This is the mechanism operative in green plants."

"Interpreted in this manner, green plant photosynthesis appears as the ultimate result of that line of physiological evolution which represents the gradual development of synthetic mechanisms, and in which the organisms become progressively more independent of an external supply of reducing substances. Only with green plant photosynthesis has complete independence been acquired."

Science News Letter, November 6, 1948

green pigment, chlorophyll. As autumn advances, the chlorophyll dies and loses its color, while the xanthenes remain. Formation of the anthocyanins is promoted by the clear, sunny weather of the "Indian summer" type, cool but not frosty. Frost, if it comes too early in autumn, actually prevents the development of good autumn coloration.

The outside influences that set the leaves on the way towards their autumnal glory are complex, hence not well understood. They are not unlike the complex of causes that produce the ripening of fruit; indeed, an autumn-colored leaf might well be regarded as a RIFE leaf rather than as a dead one.

SCIENCE NEWS LETTER

Vol. 54 NOVEMBER 6, 1948 No. 19

56,700 copies of this issue printed

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N. W., Washington 6, D. C., North 2255. Edited by WATSON DAVIS.

Subscription rates: 1 yr., \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

Change of address: Three weeks notice is required. When ordering a change, please state exactly how magazine is now addressed. Your new address should include postal zone number if you have one.

Copyright, 1948, by Science Service, Inc. Reproduction of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service. Science Service also publishes CHEMISTRY (monthly) and THINGS of Science (monthly).

Printed in U. S. A. Entered as second class matter at the post office at Washington, D. C. under the act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to periodical Literature, Abridged Guide, and the Engineering Index.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., Pennsylvania 6-5566 and 360 N. Michigan Ave., Chicago, STAt 4439.

SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation.

Board of Trustees—Nominated by the American Association for the Advancement of Science: Edwin G. Conklin, Princeton University; Karl Lark-Horowitz, Purdue University; Kirtley F. Mather, Harvard University. Nominated by the National Academy of Sciences: Harlow Shapley, Harvard College Observatory; Warren H. Lewis, Wistar Institute; R. A. Millikan, California Institute of Technology. Nominated by the National Research Council: Hugh S. Taylor, Princeton University; Ross G. Harrison, Yale University; Alexander Wetmore, Secretary, Smithsonian Institution. Nominated by the Journalistic Profession: A. H. Kirchofer, Buffalo Evening News; Neil H. Swanson, Baltimore Sun Papers; O. W. Riegel, Washington and Lee School of Journalism. Nominated by the E. W. Scripps Estate; H. L. Smithton, E. W. Scripps Trust; Frank R. Ford, Evansville Press; Charles E. Scripps, Scripps Howard Newspapers.

Officers—President: Harlow Shapley, Vice President and chairman of Executive Committee: Alexander Wetmore, Treasurer: O. W. Riegel, Secretary: Watson Davis.

Staff—Director: Watson Davis. Writers: Frank Thone, Jane Stafford, A. C. Monahan, Marjorie Van de Water, Martha G. Morrow, Ron Ross, Lydia Schweiger. Science Clubs of America: Joseph H. Kraus, Margaret E. Patterson. Photography: Fremont Davis. Sales and Advertising: Hallie Jenkins. Production: Priscilla Howe.

Letters To The Editor

Autumn's Colors

If many readers of the SCIENCE NEWS LETTER are like myself they are curious to know what are the causes and contributing factors resulting in "Golden, crimson, purple, russet, scarlet—autumn's brave banners . . ."—J. Edward Johns, Columbus, Ohio.

The yellows and orange-reds in autumn leaves are due to the presence of a group

of pigments known collectively as the xanthenes. Carotene, which gives carrots, rutabagas, squashes, etc., their characteristic color, is one of the xanthenes. The purples and deep crimsons are due to another group of pigments, the anthocyanins, which are also responsible for the colors of such things as purple cabbage, beets, and red-foliaged ornamental plants.

The xanthenes are present all the time, but are covered up by the more abundant

Question Box

BIOCHEMISTRY

What relationship has been discovered between fat and a special sugar in the body? p. 294

BOTANY

What are the steps in the evolution of green plants? p. 291

CHEMISTRY

What new uses have been predicted for silicones? p. 296

MEDICINE

How are "sound-conditioned" animals aiding in the treatment of a disease? p. 302

Photographs: Cover, General Electric Co.; p. 291, Consolidated Vultee Aircraft Corp.; p. 293, Westinghouse Electric Corp.; p. 295, U. S. Navy; p. 298, Prof. James A. Reyniers.

What new method brings relief to asthma sufferers? p. 296

METEOROLOGY

What new agent may be used for artificial weather making? p. 301

PALEONTOLOGY

What weird beasts have been reconstructed? p. 295

PSYCHOLOGY

How can science help to promote peace in the world? p. 293

What is the physiological difference found between normal persons and those with schizophrenia? p. 291