PHYSIOLOGY

Scientist Tells How Chemistry Affects Color Vision

Harvard Researcher Has Isolated and Identified Three Color Pigments in Eye Which Act as Color Filters

THE FIRST explanation of the chemistry underlying color vision in an animal was reported to the Optical Society of America at Lake Placid by Dr. George Wald of the Harvard University Biological Laboratories.

Dr. Wald has isolated and identified three color pigments found in the cones of the chicken eye, the color-seeing receptors. These pigments, he said, probably act as color filters in much the same sort of arrangement used to take color photographs.

The pigments are astacene, which is responsible for the color of boiled lobsters; xanthophyll, the pigment of egg yolk, and a carotene, a pigment giving carrots their characteristic color.

The color "film" of the chicken eye, on which the filtered light falls to start the seeing process, contains a violet, light-sensitive pigment which Dr. Wald has named iodopsin. It is the first light-sensitive pigment ever found in the cones of the eye.

Dr. Wald, winner of this year's Eli Lilly prize of the American Chemical Society for his outstanding research on the chemistry of vision, gave his explanation of chickens' color vision during a paper in which he massed experimental evidence to prove that many of the complicated phenomena of seeing, a process involving man's highest mental powers, can be explained on a basis of relatively simple chemical and physical reactions which take place in the eye.

More and more, he said, scientists are learning that many of the properties of vision are derived directly from the properties of various substances located in the retina of the eye, the photographic plate on which images of the outside world are formed.

As an example Dr. Wald reported the direct chemical analysis of retinas which show that rhodopsin, a rose-colored, light-sensitive pigment found in the rods, is manufactured by the body from two different precursors, either retinene or vitamin A.

This discovery has afforded a physico-chemical explanation of varying rates of the adaptation of the eye to darkness, for the synthesis from retinene is much more than that from vitamin A and the speed of the adaptation depends entirely on which precursor is being used.

It also explains why a deficiency of vitamin A results in night-blindness, the inability to see in dim light, he reported. Without the vitamin there just isn't enough rhodopsin being formed.

In studies of experimentally induced night-blindness in human subjects, conducted by Dr. Selig Hecht and his colleagues at Columbia University and Dr. Wald, it was found that not only the rods but also the cones of the eye are affected by a faulty diet, a discovery which implies that vitamin A may be the precursor of the light-sensitive material of the cones as well as of rhodopsin.

Dr. Wald has found that visual sensitivity may decrease markedly within 24 hours on a vitamin-deficient diet. It can be cured, however, in as short a time as 20 minutes with a single dose of vitamin A or the provitamin, carotene.

Science News Letter, October 28, 1939

CHEMISTRY

U. S. Chemistry Ready But Sees Loss in War

AMERICAN chemical industry stands ready to go into chemical wartime production but will do so only with the greatest reluctance. This is the thought behind the leading editorial in the official journal of the American Chemical Society, *Industrial and Engineering Chemistry.*

In contrast to 1914, American chemistry has an abundance of plants and trained men to meet almost any conceivable expansion of the nation's chemical needs.

But the chemical industry is wary of going into a terrific wartime expansion. Having once gone through a fever of war orders, hasty over-building of plants, hurried research to develop unfamiliar methods and then the final collapse at the war's end, chemical manu-

Earth Trembles

Information collected by Science Service from seismological observatories and relayed to the U. S. Coast and Geodetic Survey and the Jesuit Seismological Association resulted in the location of the following preliminary epicenters:

Tuesday, Oct. 17, 1:22.2 a.m., EST

In the South Pacific, near the New Hebrides islands. Latitude 14 degrees south, longitude 167 degrees east (approximately). A strong shock.

Thursday, Oct. 19, 6:54.0 EST

Near point where Saguenay river flows into St. Lawrence. Latitude, 48 degrees north. Longitude, 70 degrees west, approximately. A sharp shock.

Stations cooperating with Science Service in reporting earthquakes recorded on their seismographs are:

University of Alaska, College, Alaska; Apia Observatory, Apia, Western Samoa; University of California, Berkeley, Calif.; Dominion Observatory, Ottawa; Dominion Meteorological Observatory, Victoria, B. C.; The Franklin Institute, Philadelphia; Harvard University Observatory, Harvard, Mass.; University of Hawaii, Honolulu; Hong Kong Observatory, Hong Kong, China; Magnetic Observatory of the Carnegie Institution of Washington, Huancayo, Peru; Massachusetts Institute of Technology, East Machias, Maine; University of Michigan, Ann Arbor, Mich.; Manila Observatory, Manila, P. I.; Montana School of Mines, Butte, Mont.; Montana State College, Bozeman, Mont.; Pennsylvania State College, State College, Pa.; Phu Lien Observatory, near Hanoi, French Indo-China; Seismological Observatory, Pasadena, Calif.; University of South Carolina, Columbia, S. C.; U. S. Weather Bureau, University of Chicago; Williams College, Williamstown, Mass.; University of Wisconsin, Madison, Wis.; Zikawei Observatory, near Shanghai, China; observatories of the Jesuit Seismological Association at Canisius College, Buffalo, N. Y., Fordham University, New York City, Georgetown University, Washington, D. C., St. Louis University, St. Louis, St. Xavier College, Cincinnati, and Weston College, Weston, Mass.; observatories of the U. S. Coast and Geodetic Survey at San Juan, P. R., Sitka, Alaska, Tucson, Ariz., and Ukiah, Calif.