

PLANT PHYSIOLOGY

\$1,000 A.A.A.S. Prize Given For Plant Research

**Drs. D. R. Hoagland and D. I. Arnon Honored
For Showing Plant Roots Actively Seek Nutrients**

DEMONSTRATION that plant roots actively go after needed mineral elements in the soil, actually working for what they get rather than just letting these nutrients drift into them, figured decisively in the winning of the annual \$1,000 prize of the American Association for the Advancement of Science by a paper read at the meetings by Dr. D. I. Arnon of the University of California. Dr. Arnon spoke on behalf of a seven-man laboratory team headed by Prof. D. R. Hoagland.

The classic theory of plants' absorption of mineral elements, still presented in all botany textbooks, holds that plant roots are quite passive, and that the mineral ions merely diffuse into them, very much as a drop of ink in a tumblerful of water slowly spreads to color the whole of it. This was shown to be in error by the researches of Prof. Hoagland and his associates, which proved that only roots which are actively ex-

pending energy can absorb the nutrient elements.

The researches were conducted on roots which had been cut away from the parent plants—usually barley. It was found that only roots giving off carbon dioxide—sure sign of active metabolism, or life processes—could absorb mineral salts. A high rate of growth or a high respiration rate always accompany rapid absorption. Cells that are not actively alive are poor absorbers of minerals.

In addition to its interest as "pure" science, this new concept of mineral absorption by plants has considerable potential practical importance, for its helps in getting a better understanding of such basic agricultural practises as irrigation and the use of fertilizers.

Also discussed in the prize paper were other phases of the work done at the Berkeley laboratory, particularly on the disposal of mineral elements by the plant after it has absorbed them through its

roots. Especial attention was given to some of the so-called micro-nutrients like manganese, zinc and boron, which are needed by plants in concentrations of only a few parts per million of water absorbed.

The research team working with Prof. Hoagland comprises, in addition to Dr. Arnon: T. C. Boyer, Dr. F. C. Steward, Dr. P. R. Stout, Dr. H. Jenny and Dr. R. Overstreet. One of the men, Dr. Steward, is at present conducting his work under severe handicaps—he is at the University of London, which is for the moment not in London but "somewhere in England."

Science News Letter, January 11, 1941

Chemists count at least 14 major types of *synthetic plastics* now used in human apparel.

PHYSIOLOGY

Vitamin A Blood Content Increases After Alcohol

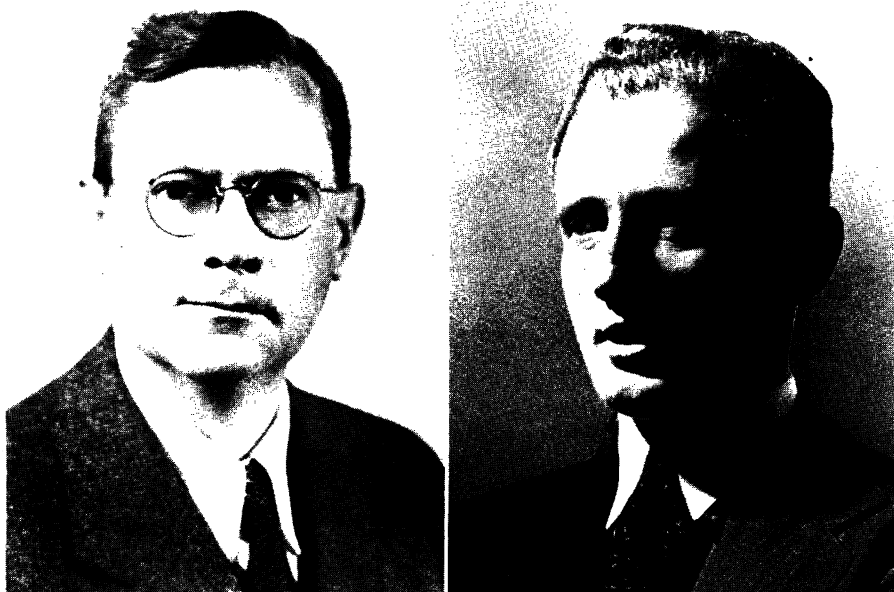
TAKING alcohol raises the vitamin A content of the blood in men as well as dogs, Dr. Samuel W. Clausen, Dr. Burtis B. Breese, Dr. William S. Baum, Dr. Augusta B. McCoord and Dr. John O. Rydeen, of the University of Rochester School of Medicine and Dentistry, announced (*Science*, Jan. 3).

Before-and-after tests were made on 10 persons taking alcohol in the form of mixed drinks as desired during the course of "the usual social evening drinking common in this country." In every case the amount of vitamin A in the blood was increased after the drinking. The increase was relatively slight in most cases but was remarkably large in one person who had a high level of vitamin A in his blood before the drinking.

Night blindness is one of the chief signs of lack of this vitamin, although it is required for health of other parts of the body besides the eyes and for normal growth of children.

Tests of ability to see in the dark, one method of determining whether a person is getting enough vitamin A, made after drinking, showed unaccountably short recovery time in dark adaptation. Dr. L. B. Pett, of the University of Alberta, who made this observation, suggested that the reason was the mobilization of vitamin A from its storage place in the body, presumably the liver, to the blood which would distribute it to other parts of the body including the eyes.

The vitamin A tests reported by the Rochester scientists were made on the blood, not the eyes. These scientists also



HONORED

Prof. D. R. Hoagland (left) and Dr. D. I. Arnon, both of the University of California, were awarded the annual \$1,000 prize of the American Association for the Advancement of Science for research that upsets the classic theory of plants' absorption of minerals.

believe that the increase in blood vitamin A after alcohol is due to a mobilization of the vitamin from other tissues. They suggest that this might form the basis of a test for vitamin A storage in the body.

Science News Letter, January 11, 1941

GEOGRAPHY

Maps Show Changing World As Possible Aid to Peace

WITH the world changing so rapidly, present-day maps are not adequate to show its alterations, S. Whittemore Boggs, geographer of the U. S. Department of State, told the American Association for the Advancement of Science. New maps are needed, which may aid in establishing a peaceful society.

Speaking before the section on geography and geography, he said that "maps should be devised to portray more effectively the great changes that have taken place throughout the world in the last century, largely as a result of improvements in travel, transportation and communication facilities."

He showed examples of several new maps. One he called an "isotachic map," the name coming from a Greek word meaning "equal speed." This, he said, "is analogous to physical maps with shadings between contours, in which the higher elevations are depicted in darker shadings. The territory in which travel within a given range of speed prevails is shown in a single shading, the lighter the shading the greater the speed. A map of 1940, by comparison with one of 1800, represents a change as fundamental as if giant steam shovels and grading machines had leveled the mountains and made the surface of the United States almost as smooth as a billiard table."

Such maps, he said, might prove an aid to thinking in terms of the earth as a whole, which might aid in world peace. They may show, he declared, "that recent inventions and techniques, instead of making a 'shrinking world,' have greatly lengthened the outreach of nations and groups, multiplied impacts, and tended to intensify rivalries which may be manifested anywhere on the globe. Such maps may also stimulate thinking in world terms, which is important at a time when such thinking is partially paralyzed."

Science News Letter, January 11, 1941

To prevent snow glare on Canada's snow-covered aviation landing fields, corrugated pipe equipment is rolled over the snow to form ripples.

PHYSIOLOGY

Change in Nine Molecules Produces Sensation of Sight

Each Quantum of Light Able to Cause Necessary Change in Visual Purple; No Physical System Like It

A CHANGE in only eight or nine molecules of the "sight chemical," visual purple, in the retina of the human eye is sufficient to produce the sensation of sight, Prof. Selig Hecht of Columbia University told the American Association for the Advancement of Science at Philadelphia. Associated with Prof. Hecht in his experiments were Simon Shlaer, also of Columbia, and Dr. Maurice H. Pirenne of the Belgian-American Educational Foundation.

In the research, an observer would stay in a dark room for half an hour, until his eyes had become dark-adapted and reached a maximum of sensitivity to light. Then a flash of light, exactly a hundredth of a second in duration and of carefully measured radiant-energy content, was shot at his eyes. The amount of light actually reaching the retina, when the minimum sight-causing illumination was reached, was calculated at eight or nine quanta, each quantum being able to cause the necessary chemical change in one molecule of visual purple in the retina.

Prof. Hecht commented, "Judging by the structure of the retina, the structure of light, and the chemistry of visual purple, it is hard to conceive of a biological system which could be more sensitive than this. Certainly there are no physical systems which even approach it."

Science News Letter, January 11, 1941

Cicadas May Harm Trees

SEVENTEEN-YEAR cicadas, usually called "locusts" when their shrilling swarms appear, may do more harm to trees than is commonly supposed, Dr. Gregory Thoennes of St. Mary's College of Winona, Minn., suggested. Dr. Thoennes has kept track of trees affected by an outbreak of seventeen-year cicadas in Missouri six years ago, and is of the opinion that the consequences of the excessive egg-deposition in the rind of young twigs are being too lightly dismissed by biologists.

The cicada, emerging after seventeen years of subterranean life, sings, mates,

lays its eggs and dies. The eggs are shoved into the green bark of young twigs, frequently in such numbers that the twigs wither and fall off.

It has always been supposed that the trees recovered from these infrequent partial defoliations with little injury, but Dr. Thoennes declared that in the case of orchard trees especially, measurements made for the past six years indicate a marked decrease in the yearly growth of injured branches. This change in growth rate, he said, is more noticeable in older trees than in younger ones, and in neglected trees than in those that have been well cultivated. In either case, however, the growth of affected branches is less than that of uninjured ones.

Science News Letter, January 11, 1941

Plants With Roots in Air

"AEROCULTURE," a new method for growing plants with their roots suspended in air, never either touching soil or being kept immersed in water, was described before the plant physiologists attending the meeting by its inventor, Prof. M. A. Raines of Howard University. Water, with mineral nutrients dissolved in it, is supplied by spraying or frequent dipping. A promising feature of the method, said Prof. Raines, is that sugar or other carbohydrates may be supplied without the elaborate precautions necessary to prevent fermentation or bacterial and mold growth when other methods are employed.

Science News Letter, January 11, 1941

Growth-Chemical Spray

COTTON yields were boosted by a third in experimental plots sprayed daily for three weeks during July with a one-to-one-million solution of the growth-promoting chemical, indole acetic acid, Prof. J. C. Ireland of Oklahoma Agricultural and Mechanical College reported before the meeting of the American Society of Plant Physiologists.

"This would suggest that the use of a synthetic hormone causes the cotton plants to develop more bolls to maturity," said Prof. Ireland. "There is an apparent