PLANT PHYSIOLOGY

# Water in Plants Ascends As Vapor, New Theory Holds

WATER flows uphill in plants through the many thousands of tiny tubes that make up the woody parts of the stems, but it does not flow as water does in the plumbing pipes of a house. It does not go up in solid streams, at least in times of water scarcity, but forms films that stick to the walls of the tubes and flow along them, with hollow spaces in the middle filled with water vapor.

This hypothesis of sap ascent in plants, radically differing from all doctrines accepted by botanists for many years, was laid before the Botanical Society of America at its meeting in Boston, by its retiring president, Prof. George J. Peirce of Stanford University.

### Present Theory

The theory of sap ascent most commonly held today is that the water in the microscopic tubules of the plant, because of the very small diameter of its columns, has a strength like that of fine wires, and that the pull exerted upon these columns by the evaporation taking place in the leaves literally drags the water upward through the stem as though the "wires" were made of some solid stuff instead of a thin liquid. This theory took its present form about twenty years ago, and has been accepted by practically all plant physiologists.

With all this Prof. Peirce disagrees. He has performed delicate physical and chemical experiments with plants near the wilting point which indicate that water in the liquid form exists only in contact with the cell walls. The hollow space within these water cylinders, he stated, is filled with water vapor, which in this form can move through the plant much faster than water molecules can travel when they are parts of a continuous water mass. Only at times of water surplus, said Prof. Peirce, are the tubes filled with continuous columns of liquid water.

Prof. Pierce's theory does not picture the water entering the plant in the simple mechanical way postulated by the "orthodox" doctrine of present-day botany. The living protoplasm in the roots, he said, "conditions," its entry, speeding it up under some circumstances and slowing it down under others. Thus, when the soil is warming up in the spring, the water vessels of trees will be gorged with sap; but when the soil is getting cold in autumn a dearth of water will take place in the tree even though the soil about its roots is not dried up.

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GENERAL SCIENCE

## A.A.A.S. Declares For Intellectual Freedom

A FIRM, outspoken protest upon such inroads upon intellectual independence as are being made in Germany and other parts of the world today was one of the most important results of the meeting of the American Association for the Advancement of Science at Boston.

The resolution adopted by this principal organization of the nation's scientists will also be read with significance in some parts of our country where with less openness and without a flying of banners of oppression damaging curtailments of intellectual freedom have been made.

Headed "A Declaration On Intellectual Freedom," the pronouncement reads:

"The American Association for the Advancement of Science feels grave concern over persistent and threatening inroads upon intellectual freedom which have been made in recent times in many parts of the world.

"Our existing liberties have been won through ages of struggle and at enormous costs. If these are lost or seriously impaired there can be no hope of continued progress in science, of justice in government, of international or domestic peace, or even of lasting material well-being.

"We regard the suppression of independent thought and of its free expression as a major crime against civilization itself. Yet oppression of this sort has been inflicted upon investigators, scholars, teachers and professional men in many ways, whether by governmental action, administrative coercion, or extra-legal violence. We feel it our duty to denounce all such actions as intolerable forms of tyranny.

"There can be no compromise on this issue for even the commonwealth of learning cannot endure 'half slave and half free.'

"By our life and training as scientists and by our heritage as Americans we must stand for freedom."

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PUBLIC HEALTH

# Health Experts Differ On Effects of Depression

THE POSSIBLE effects of the continued depression on the health of the country's population was closely watched during the past year. Reports and opinions of health experts were conflicting, however.

Metropolitan Life Insurance Co. statisticians found from a study of deathrates that wage earners of the United States and Canada remained remarkably healthy.

Surveys conducted jointly in large cities by the U. S. Public Health Service and the Milbank Memorial Fund showed that victims of the depression who have become impoverished since 1929 have had much more sickness than the "chronically poor" or than families whose heads were full-time wage earners.

Weights of American school children have not been materially affected by the depression, a U. S. Public Health Service survey indicated.

One-fifth of all the children in the country are showing the effects of the depression, the U. S. Children's Bureau estimated.

Depression diets do not lack vitamin A, as evidenced by no increase in cases of eye diseases resulting from this deficiency, the late Dr. Alfred F. Hess and Dr. Daniel B. Kirby of New York City found on formal inquiry among leading eye specialists of the country.

The deathrate from diabetes, despite the fact that it is associated with over-nutrition and obesity, has not declined as a result of the depression, Drs. Elliott P. Joslin, Boston, and Herbert H. Marks and Louis I. Dublin, Metropolitan Life Insurance Co. statisticians, found.

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