

utmost influence to see that intellectual freedom shall not perish from the earth. Science, he said, should stand for freedom especially in those countries where force, war and unutterable ferocity are used to compel acceptance of political, social or scientific creeds.

"In its practical aspects," said Dr. Conklin, "the ethics of science includes everything that concerns human welfare and social relations; it includes eugenics and all possible means of improving human heredity through the discovery and

application of the principles of genetics; it is concerned with the best means of attaining and maintaining an optimum population; it includes all those agencies such as experimental biology and medicine, endocrinology, nutrition and child study, which promise to improve bodies and minds. It includes the many scientific aspects of economics, politics and government; it is concerned especially with education of a kind that establishes habits of rational thinking, generous feeling and courageous doing."

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BIOLOGY

Tomato Roots Without a Plant Develop Tremendous Pressures

PRESSURE enough to send sap to the top of a California Big Tree, equivalent to more than 100 pounds per square inch, was developed in humble tomato roots. And the roots had never been attached to tomato plants.

Genuinely sensational experiments, which overturn one of the most widely accepted theories in the whole field of plant science, were reported by Dr. Philip R. White of the Rockefeller Institute for Medical Research, at the meeting of the American Association for the Advancement of Science in Indianapolis. The research was conducted in the Institute's laboratories at Princeton, N. J.

Root Tissue Cultures

Some time ago, Dr. White discovered how to keep roots growing after they had been detached from the parent plant, somewhat after the manner of the famous chick-heart tissue cultures kept going for many years by Dr. Alexis Carrell. He used tomato roots.

He noticed, as his "orphan" roots continued to grow in their culture fluid, that they contained the same kind of sap-conducting vessels possessed by normal roots, though there was apparently no work for them to do.

It occurred to him that here was a chance to test out one of the most disputed points in botany, the old theory of root pressure. Once favored, this theory had been abandoned during the past sixty years in favor of the idea that the sap was pulled upward through the plant by suction from the leaves, where evaporation was going on.

The earliest root-pressure experiments, performed by Stephen Hales early in the

eighteenth century, showed pressures of only 1.4 atmospheres. Nobody had ever been able to equal that record since. And this pressure was nowhere nearly enough to account for the rise of sap in tall trees and long vines. So after a time the theory was given up.

But Dr. White had roots that had never supplied sap to any stem. With these he decided to make a new and critical test.

He attached them strongly to narrow tubes in which the sap pressure could be balanced against the pressure of a column of mercury. With no apparent difficulty at all, the roots balanced 90, then 100, then 125 pounds per square inch of pressure. The apparatus failed at the higher pressures, but the roots seemed to be quite ready to go on to still higher figures.

Dr. White stated that he is now redesigning his apparatus, to give his tomato roots a chance to show what they really can do.

He offered no explanation of the great root pressures he has been able to demonstrate. He added, however, that he and his colleagues are making a start, at least, at trying to find out.

Life In Extreme Cold

Life can survive at the almost unimaginably low temperature of liquid air, Dr. Basile J. Luyet of St. Louis University told a zoological group at the meeting.

Some experiments have succeeded in the past, using bacterial spores and other low life forms with very low water content. However, Dr. Luyet has been able to obtain survival of living cells of nor-

mal "juiciness," and has further experiments now in progress.

Possibility of bringing ordinary cells alive through the intense freezing experience apparently depends, he said, on absence of actual ice crystals in them.

X-Ray "Candling"

Oranges, apples, potatoes, other fruits and vegetables can be "candled" like eggs, through the application of X-rays, Dr. R. B. Harvey of Minnesota University Farm, St. Paul, reported. X-ray shadows cast on the screen of a fluoroscope show clearly when the fair exterior of fruit or vegetable conceals a serious inner fault.

Application of the method in the fruit-packing industry has already been started. In the Florida citrus fruit belt, operators watching the X-ray shadows of fruit carried past them on a conveyor have been able to sort from 75 to 150 boxes an hour, eliminating internally imperfect specimens that would otherwise have gone into the market.

Worms' Eggs Are Tough

If the eggs of *Ascaris*, a common parasitic worm, were transported to a planet nearly a million times larger than the earth, they would remain alive in spite of the crushing pull of gravity. This is indicated by the results of experiments performed at the State University of Iowa by Dr. H. W. Beams.

Among the various kinds of cells he whirled in an ultra-centrifuge until they were subjected to forces thousands of times that of gravity were some of these eggs. Subjection to a force 150,000 times gravity for ten days did not kill them, and they lived through half an hour of whirling at 800,000 times gravity.

The research is being conducted with the aim of finding out more about the physical properties of protoplasm.

Connecticut's "Sand Bowl"

Wind erosion is no monopoly of the West's "dust bowl." In pre-Revolutionary times, the staid Eastern colony of Connecticut had a "sand bowl," Dr. Charles E. Olmstead of the University of Chicago reported.

It was caused by the same cycle of events that set up the present "dust bowl" of the West, he stated. A sandy region in central Connecticut was cultivated not wisely but too well, then abandoned. Wind erosion set in, aggravating the mischief.

During the generations since then, natural vegetation has healed the ancient scars. But it is not the plant society that once lived there. Even yet, said Dr. Olm-

stead, it constitutes a "secondary" stage: a community of lower order than the original terrain supported.

Fighting malaria by timing mosquito-control activities with peaks in the malaria mosquito's breeding schedule was suggested by Dr. E. Harold Hinman of the Tennessee Valley Authority. These peaks, marking the time when broods or crops of mosquito larvae are produced, seem to come at about ten-day intervals in the region Dr. Hinman studied. Climate and other factors may change the schedule in other regions. If the larvae are produced at regular intervals, however, Dr. Hinman believes that larva-destroying measures should be timed to fit the peaks of larva production.

Buckwheat may be a serious enemy of pine trees, through harboring a fungus that causes a serious root rot, E. J. Eliason of the New York State Conservation Department stated. In a New York tree nursery, young trees sickened and died on land where buckwheat had been grown as a cover crop. Even four years after the last planting of buckwheat, the fungus was still in the soil, virulently ready to attack pine roots.

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PERILOUS TREASURE

Getting these sorcerers' masks out of their ancient tribal home territory was rather risky: it is "verboten" for strangers to possess them.

ETHNOLOGY

Mystic Rites of West Africa Revealed to Harvard Scientist

Men and Women Have Secret Societies for Teaching Youths and Girls During Long Seclusion in "Bush"

MYSTIC religious rites of West African savages, with their emphasis on spirit worship and human sacrifice, many of them kept secret for many centuries by a merciless death penalty for their revelation, have been pieced together by a Harvard scientist.

According to Dr. George W. Harley of Harvard's Peabody Museum, who has just returned from 12 years in the bush, more than 2,000,000 natives of Liberia, Sierra Leone and French Ivory Coast, virtually the entire population of the area, were members of the Poro, a secret religious society fostering these strange rites, at the height of its power only a generation ago.

Today, due to the government's vigorous efforts to modify it, the Poro is only half its one-time size and its more barbarous practices have been stamped out. While the Poro is best known in Liberia, it represents the culmination of many similar societies which once spread across the continent.

300 Ceremonial Masks

Dr. Harley has brought back more than 300 wooden ceremonial masks used by the Poro, the most complete collection of its type ever assembled, as well as numerous other sacred relics.

How sacredly these are held by the natives is shown by the fact that a simple stone axe he has obtained was so revered that it could never be bought or sold. Instead, through the centuries of its existence, it was handed down from one high priest to another with the transference traditionally solemnized by the sacrifice of the recipient's eldest son.

"This is not all cruelty and savage blood-thirstiness," Dr. Harley explains. "It's just that the people take their religion so seriously they hold human life cheap rather than neglect its demands."

In addition to its religious significance, the Poro was very powerful politically, so powerful indeed that officials of the society have been known to stop bitter tribal wars merely by walking between the fighters. The Poro also served,

and still does, to a large extent, as a tribal educational institution.

Boy candidates for the society were taken into the bush by their elders for a rigorous educational program. First the boys went through a ceremony symbolizing their death; theoretically they were swallowed by an enormous sacred crocodile. Relatives and friends not members of the society, including all the women of the tribe, were told the boys were dead. This pretense was kept up for from three to seven years while they were isolated deep in the sacred forest, learning trades, tribal traditions, history and culture and the secret sign language of the society.

Living in Spirit World

During this period the boys were supposed to be living in an invisible spirit world and no one was allowed to see them on pain of death. Even those who might accidentally stumble on the Poro meeting place were killed and then eaten so that no human traces would be left in the supposedly spirit world. Even those members of the Poro who died accidentally in the bush were eaten in sacred ritual feasts.

Concerning these rituals the initiates swear to secrecy on the mask of the great "devil," the big man of the Poro. They hear his voice but do not see his face unmasked until the day of graduation, a grand occasion. At this graduation the boys are supposedly reborn from the belly of the great crocodile and they return to their village with great celebration.

They are entirely new beings now—men instead of boys—and they do not recognize any of their old friends or any past events. Indeed they must be introduced as strangers to their own mothers.

The masks, an integral part of the Poro, are worn in conjunction with flowing robes and "hula" skirts which completely cover the body. Lest his voice be recognized, the wearer speaks with a throaty, rolling falsetto. Thus mask and voice effectively conceal his identity, as well as serving as a badge of office. The