

PHILOSOPHY

Evolution Extended to Include Intelligence as Prime Factor

DARWINIAN evolution was extended to include the action of human intelligence, and science was called upon to cooperate with education and religion to apply ethics to the solution of the world's current problems, in the retiring presidential address before the American Association for the Advancement of Science delivered by Dr. Edwin Grant Conklin, professor emeritus of biology at Princeton, executive officer of the American Philosophical Society, and president of Science Service.

Terming "dull and fruitless" attempts to make science the handmaiden of religion, Dr. Conklin emphasized that science was vitally concerned with ethics, the religion of science."

Like Religious Teachings

The words expressing the ethics of the great scientists, among them Pavlov, Pasteur, and Tyndall, were shown by Dr. Conklin to contain ideals of conduct and character similar to those taught by great religious leaders. Often the substitution of the word "Truth" for "God" will bring them into agreement.

Militarists and dictators have no right to seize upon Darwin's principle of natural selection as justification of their philosophy that might makes right, Dr. Conklin warned.

"Darwin himself repudiated this extension of his principle to the struggle between races and nations of men," Dr. Conklin said. "Those who attempt to extend it into the field of intellectual, social and moral qualities should remember that the standards of fitness are wholly different in these fields. Physically the fittest is the most viable and most capable of leaving offspring; intellectually the fittest is the most rational; socially the fittest is the most ethical. To attempt to measure intellectual or social fitness by standards of physical fitness is hopelessly to confuse the whole question, for human evolution has progressed in these three distinct paths. Man owes his unique position in nature to this three-fold evolution, and although the factors of physical, intellectual and social progress are always balanced one against another, they are not mutually exclusive."

Intelligence has become a prime factor in evolution. Human selection, as

practiced either by the hit or miss process of "trial and error" or the vastly more rapid and less wasteful method of remembered experience, is just as natural as the "natural" variety to which Darwin devoted most attention. We are continually improving on nature, as shown in agriculture, industry, medicine and education.

Dr. Conklin, urging this naturalness of intelligence, also upheld "free will," the freedom to choose between alternatives that are offered, without which there can be no responsibility, no duty, no ethics. But he emphasized that the will is not undetermined, uncaused, absolutely free, but is the result of the organization and experience of the organism, and in turn is a factor in determining behavior.

Biologists do not have to go within the atom and espouse Heisenberg's principle of indeterminacy to explain free will. "The fact that man can control to a certain extent his own acts as well as phenomena outside himself requires neither a little daemon in the electron nor a big one in man."

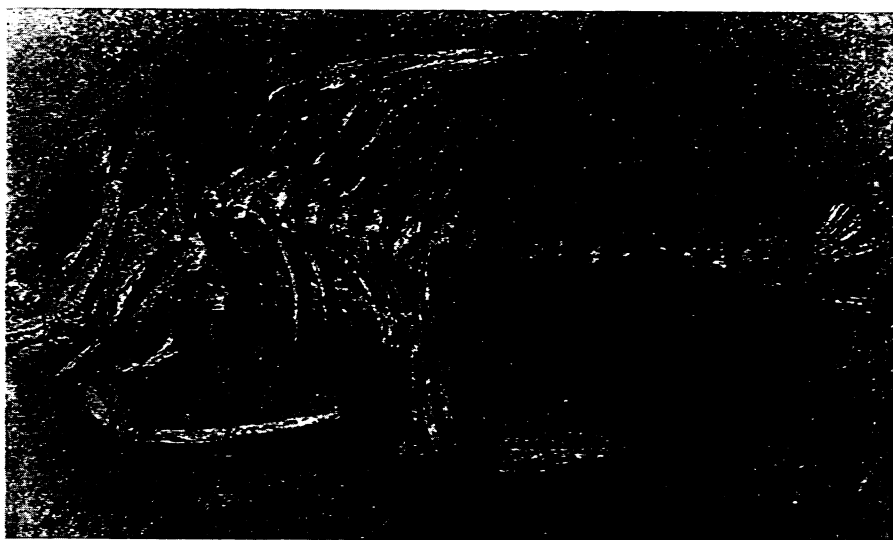
Admitting that neither in human nature nor in social relations has progress kept pace with science, Dr. Conklin de-

clared this the fault of man and society rather than science. Human nature lags behind scientific progress. How to remedy this? Dr. Conklin discards heredity and eugenics as too slow a process. Education, he concludes, based on a knowledge of the principles of development and aimed at the cultivation of better relations among all classes, races and nations, is the chief hope of social progress.

To the recent attack by Dr. Robert Maynard Hutchins, University of Chicago president, that science is a failure in the educational process, Dr. Conklin replied:

"Those who have never experienced the discipline and ennobling effects of scientific studies fear that science will destroy our civilization and are calling upon educators to repent and to return to the good old subjects of classical learning. It was not science that caused the decay of former civilizations, nor was it in the power of classic art, literature and philosophy to save those civilizations. Certainly there are no other studies than science that distinguish so sharply truth from error, evidence from opinion, reason from emotion; none that teach a greater reverence for truth or inspire more laborious and persistent search for it. Great is philosophy, for it is an attempt at a synthesis of all knowledge, but if it is true philosophy it must be built upon science which is tested knowledge."

All who believe freedom and responsibility are essential to all progress were called upon by Dr. Conklin to use their



15,000,000 YEARS OLD

During amber mining operations in East Prussia, a seabass skeleton was found in a layer of earth which geologists estimate to be 15,000,000 years old. It was discovered in the "green wall" above the "blue earth" of the Palmnicken Amber Mines.

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 Carrel. 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-