wither away. Thus, man as we know him is to be regarded as only a transitional operative in the progression of life, but one that commands a critical turning of the road. For at this point the method of evolution may change from the unconscious to the conscious, from that of trial and error to that of long-range foresight.

Man in the shackles of authoritarianism is incapable of such advances. Should he attempt them, his efforts would be misdirected and corrupting. But, with the amplified opportunity to create that is his when he is free to see things as they are, he will find his greatest inspiration in the realization that he is by no means the final acme and end of existence, but that, through his own efforts, he may become the favored vehicle of life today. That is, he can be the means whereby life is conducted onward and outward, to forms in ever better harmony within themselves, with one another, and with outer nature, endowed with ever keener sentience, deeper wisdom, and further reaching powers.

Who can say how far this seed of self-awareness and self-transfiguration that is within us may in ages to come extend itself down the corridors of the cosmos, challenging in its progression those insensate forces and masses in relation to which it has seemed to be but a trivial infestation or rust? For the law of the gene is ever to increase and to evolve to such forms as will more effectively manipulate and control materials outside itself so as to safeguard and promote its own increase. And if the mindless gene has thereby generated mind and foresight and then advanced this product from the individual to the social mind, to what reaches may not we and our heirs, the incarnations of that social mind, be able, if we will, to carry consciously the conquests of life?

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* Prepared for the Columbia University Bicentennial Lecture Series and read in abbreviated form as the third lecture in ser. B, pt. I, *The Nature of Things*; broadcast on 17 Oct. 1954 by CBS.

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Herbert Osborn: Scientist, Teacher, Leader of Men

ONE of this country's greatest entomologists, Dr. Herbert Osborn, died 20 September 1954, in Columbus, Ohio, at the age of 98. His accomplishments as a scientist and teacher insure him a permanent place among America's men of science.

Today, the American people are among the healthiest and best fed of any on earth. This is due, in part, to the profound effect of research in the control of insect pests and to successful efforts on the part of our public to control its insect enemies.

Without the control of insect pests, our national annual agricultural production—crops and livestock—would be half or less than they are today. In addition, insect-borne diseases would cause thousands of deaths and hundreds of thousands of illnesses each year.

Economic and health benefits such as these stemmed from the pioneer efforts of far-seeing entomologists like Dr. Osborn. He, together with a tiny number of other dedicated persons, brought about the successes of economic entomology that are well known to everyone today.

Dr. Osborn was born in Wisconsin on 19 March 1856. Thus, his life span almost duplicated the first century of professional entomology—1854–1954. His first paying job concerned knocking Colorado potato beetles into a can for later destruction. By the time he was 15, he had lived through the greatest agricultural catastrophe this country has ever seen—the horrible grasshopper plagues of the 1870's. For three straight years grasshoppers destroyed almost all the agricultural production of the soils from Texas into Canada and from the Rocky Mountains into Illinois. In these boyhood days, he saw the Hessian fly destroy 50 to 90 percent of the wheat crops of early settlers almost every year. No one knew then how such pests could be controlled or how losses they caused could be prevented.

Young Osborn decided to take on that job. He dedicated himself not to the study of generalized entomology but to a search for ways to protect people and their crops, livestock, and possessions from insect depredation.

Osborn received his B.S. degree in 1879 and M.S. degree in 1880—both from Iowa State College. He taught at Iowa State College for the next 19 years.

He served Iowa as state entomologist and entomologist for the State Agricultural Experiment Station and, at the same time, was a special agent for the Bureau of Entomology, USDA.

During this period of research for the Federal Government, Dr. Osborn conducted the first comprehensive study of insects, ticks, and mites that affect and carry diseases to man and domestic animals. In a publication issued by the U.S. Department of Agriculture in 1896 following these studies, he described methods for the control of such pests. So far-reaching were these methods that many of them still were in general use in 1945. The appearance of hydrocarbon insecticides, such as DDT, in 1945 changed some of them, but basic control measures that he suggested remain almost the same now as when he first published them 58 years ago.

Osborn became head of the department of zoology and entomology at Ohio State University in 1898. He knew by that time that the dozen or so trained agricultural entomologists then in existence were incapable of doing all the work that needed to be done. He thereupon developed the idea of establishing a school for the sole purpose of training entomologists skilled in controlling insect pests and able to tell people how they could do the job themselves.

When he retired from active teaching in 1916, Osborn had seen a majority of this country's economic entomologists receive all or part of their technical education and training in his classes. E. O. Essig said, in his *A History of Entomology* (1931):

> He probably trained more entomologists in America than any other teacher. His students are now to be found in every State in this country and in most foreign countries. Many of them are in positions of great responsibility.

No less than 25 percent of the 4500 professional entomologists in the United States received all or part of their training in the department of zoology and entomology, Ohio State University, and many of them were in Dr. Osborn's classes.

Osborn received honorary degrees from Iowa State College in 1916, University of Pittsburgh in 1930, and Ohio State University in 1936. He was a member of numerous scientific organizations, both domestic and foreign and was president of five of them. He was a life member of several, including the California Academy of Sciences and Le Société Entomologique de France. He was editor of a number of scientific journals over the years.

Honors due a great scientist were given Osborn during his lifetime. Today we feel the force of the contribution that he made to our national economy through teaching. But this is only a beginning. We cannot even guess how much his services will mean to the future of the peoples of this earth.

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News and Notes

Electrolytes in Biological Systems

The annual meeting of the Society of General Physiologists was held at the Marine Biological Laboratory, Woods Hole, Mass., 8–9 Sept., with 90 registrants. The first day was devoted to a symposium on *Electrolytes in Biological Systems,* dedicated to W. J. V. Osterhout and M. H. Jacobs, which is summarized here by its organizer, A. M. Shanes.

Dean B. Cowie and Richard B. Roberts described careful and extensive radioisotope studies with *E. coli, T. utilis* and *N. crassa,* which revealed a high rate of entry into or exit from the cellular water by ions, glucose-1-phosphate, fructose-1:6-phosphate, cystine, glutamate, methionine, and glutathione. Proteins, however, are excluded. Penetration also was demonstrated by the competitive displacement, by exogenous labeled or unlabeled amino acids, of amino acids produced by the bacteria from glucose precursor. The authors concluded that the protoplasm of these microorganisms is in direct contact with the environment, the cell membrane being unable to affect appreciably the movement of small molecules; how the cells retain their metabolic intermediates under these circumstances was discussed.

"Sodium and potassium regulation in *Ulva lactuca* and *Valonia macrophysa*" was described by George T. Scott and Hugh R. Hayward. The dependence of normal ion distributions on metabolic processes was demonstrated by the effects of metabolic inhibitors and by the ability of substrates and of photosynthetic processes to counteract these inhibitors. Of particular importance, in the light of the recent tendency to emphasize the sodium ion, was the clear demonstration that the kinetics of sodium and potassium movement can be quite different or completely independent.

In his paper, "Relationship of cell surface enzymes to ion transport in yeast," Aser Rothstein described the biochemical and ionic interactions that experiments in his laboratory indicate to be restricted to the surface of the yeast cells, and their implications for ion transfer.

"Electrolyte transport in mitochondria" was discussed by Gilbert Mudge. The metabolic activity of the mitochondria partially determines the concentration and rate of exchange of potassium but not of sodium. These isolated organelles were found to contain 3 times as much potassium as sodium. The experimental conditions, that is, the manner of preparation and the concentrations of various components in the medium, were shown to be extremely important for the nature of the results.