SIR RICKMAN GODLEE, the well-known surgeon, who died on April 20 at the age of seventy-six years, left subject to a life interest for his wife the residue of his estate to University College, London, and to University College Hospital. The gross value of the estate is £94,148. Among special bequests is £10,000 to endow scholarships for students of the University College Hospital Medical School.

PROFESSOR HENRY T. MOORE, professor of psychology at Dartmouth College, who recently was elected to a professorship in the University of Michigan, has been elected president of Skidmore College, vacant through the death of the late Charles H. Keyes.

ALBERT BRITT, of the Frank A. Munsey Publishing Company of New York City, previously for fourteen years editor of *Outing*, has been elected to the presidency of Knox College, of which he is an alumnus, to succeed Dr. James L. McConaughy, who was recently inaugurated as president of Wesleyan University.

THE American University, at Washington, D. C., which has long existed as only a graduate school, and which during the war gave over its campus and buildings to government use, has again resumed control of the campus and will this autumn open a college of liberal arts, with Dr. Geo. B. Woods as dean; Dr. J. W. Hornbeck, recently of Carleton College, has been appointed professor of physics; Mr. F. A. Varrelman, recently biologist to the National Research Council Marine Investigations and special assistant of the Bureau of Fisheries, as assistant professor of biology, and Dr. E. W. Gurnsey, of the Fixed Nitrogen Laboratories of the Department of Agriculture, instructor of chemistry.

DR. ERNEST C. LEVY, formerly director of public welfare for the city of Richmond, Va., has been appointed professor of preventive medicine in the medical college of the University of Virginia.

DR. ARCHIE GARFIELD WORTHING, of the Nela Research Laboratory, Cleveland, Ohio, has been appointed professor and head of the department of physics of the University of Pittsburgh, succeeding Dr. Lee Paul Sieg, who has been made dean of the college and graduate school.

DR. ELMER O. KRAEMER, national research fellow in colloid chemistry, has been appointed assistant professor to conduct research and give instruction in colloid chemistry at the University of Wisconsin.

DR. VICTOR F. HESS, associate professor of experimental physics in the University of Graz (Austria), has been promoted to a full professorship. Professor Hess was director of the research laboratory of the U. S. Radium Corporation, New York, 1921 to 1923 and also consulting physicist to the U. S. Bureau of Mines.

J. S. HUXLEY, fellow of New College, Oxford, and senior demonstrator in the department of comparative anatomy, has been appointed to the university chair of zoology tenable at King's College.

DISCUSSION AND CORRESPONDENCE

EVOLUTION IN THE PHYSICAL WORLD

IN a recent number of SCIENCE (July 17) Professor Henry Fairfield Osborn states that "in chemistry and physics the evolution of the chemical elements has recently been demonstrated." What does Professor Osborn mean? Probably this, that we have rather recently learned that there are units or entities called electrons which help to form the atoms of all elements, and perhaps that there are other units or entities which some scientists have called protons which may also be constituents of all atoms so that we now picture the atoms of different elements as differing only in the number and arrangement and motions of these two kinds of entities. Probably also Professor Osborn has in mind the phenomenon of radioactivity which is exemplified chiefly by radium in which we see transformations going on and by means of which a complex atom breaks down and changes over into a simpler one. But are we justified in saying that we have *demonstrated* the *evolution* of the chemical elements? Certainly not in the sense in which that word is ordinarily used. Some of the changes taking place in radioactivity occur in minute fractions of time, others require ages, but all are associated with degeneration or changing from complex to simpler forms of matter. We have no evidence whatever for the opposite process, the building up from simple to complex and we have no evidence whatever that the atoms of chemical elements have by slow accretions acquired their present structure and characteristics. Does any physicist hold the view that electrons have come into existence only in recent times or that they gradually have selected partners and with these partners arranged themselves in groups to form our atoms of to-day? Perhaps so, but no physicist is giving much time to such speculation, for the vastly more important matter is to find out what is happening in the physical universe to-day. We can have no knowledge of the past except as we obtain it from our knowledge of the universe of the present.

And this brings me to emphasize one point which is not stressed in texts or courses on evolution. There are evidences everywhere that changes have taken place in the organic world, but to account for those

changes we assume that the modes in which nature operates now have not changed—that the laws of nature by which these changes have been brought about are unchanging. If we do not make this assumption, if we assume on the other hand that the laws of nature or the modes in which we see nature now operating are themselves subject to change or are themselves undergoing evolution, then we must know the manner of change or the law of change of the laws—either that or we must be free to postulate any law of change that we please, in which case we can build up any theory of evolution that suits us.

For example, has matter recently acquired the property of attracting to itself other matter, has an electric charge gradually taken on the power of attracting or repelling other charges, has energy recently acquired its characteristics? Or did Newton when he stated the law of gravitation state a property of matter, which, so far as this little mind of ours can picture the universe of time and space, holds forever and forever? We may find that Newton's statement was incomplete, but such a discovery, if made, will not point to evolution in gravitation but to evolution in our comprehension of the phenomenon. So we come to view our universe as one of constant change subject to unchanging law. In physics we are dealing with the eternal verities.

Another view which is ordinarily not presented in discussions on evolution is that our universe is like a clock which having been wound up is now running down. For it is a clearly established law in physics that when transformations of energy take place—and they are always taking place—energy, though conserved, becomes unavailable. Thus in accounting for our universe we must start with it already wound up—filled with a vast quantity of high-grade energy—then with a suitable hypothesis, we may acquiesce in the nebular theory according to Laplace or the planetesimal according to Chamberlain or the spirally nebular according to Jeans and thus we may account for the so-called growth of worlds. It is true that going back only a few hundred million years we can joggle along comfortably, flinging off spiral nebulae here and there, on the way down. But we don't care to be questioned too closely regarding events before that time. I think that the opponents of evolution are justified in saying that we do not know what happened long ago, but while they would mean by that term a few thousand we would mean many million years.

The idea that there has been evolution in the physical world is not new. Many philosophers have proposed it. The clearest enunciation probably was given by Descartes three hundred years ago—"the physical world and all things in it whether living or dead have originated out of primitive formless matter by a process of evolution due to the continuous operation of physical laws." But at that time practically nothing was known about physical laws. Not even the law of gravitation was known; nothing was known about electricity or light. Yet vast ignorance of all nature's operations did not prevent Descartes from propounding his broad philosophy. Philosophers are not disturbed by ignorance of facts, but scientists have no other basis for their generalizations.

The teachers of evolution are, I am afraid, apt to extend the meaning of the word beyond the original and to see *evolution* in the illumination produced by the striking of a match. This phenomenon is not unlike that associated with the so-called birth of a star. But if we want to know what happens when a match is struck or a star is born we must study physics and chemistry not evolution.

G. F. HULL

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NOTE ON THE SEPARATION OF THE DEPRESSOR PRINCIPLE FROM HEPATIC TISSUE

THE action of water soluble substances prepared from hepatic tissue in lowering the blood pressure of normal animals has been noted in the literature many years previous. Investigations as to the chemical nature of this principle which were initiated in this laboratory and the department of physiology eighteen months ago by Drs. James and Laughton have yielded the following results.

The active principle is non-protein in character and is found in the abiuret fraction. It is soluble in water alcohol solutions up to 80 per cent. strength. It is precipitated from aqueous solutions by phosphotungstic acid along with the diamino acid fraction, and the material recovered in aqueous solution can be further purified by extraction with ether, which has the capacity for dissolving out a very active principle which depresses the arterial tension and maintains it at sub-normal levels for long periods.

The depressor substance is associated with a pressor principle in the abiuret fraction. These two are separated during the treatment with phosphotungstic acid, since practically all the pressor element remains in solution.

Not only is the normal pressure reduced to subnormal levels, but artificial hypertension induced by various well-known pressor substances is similarly reduced to any desired level depending on the dose employed.

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