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FOREWORD

The Symposium on The Nucleus of the Atom and its Structure is the second symposium held by the Ohio State Chapter of the Society of the Sigma Xi, the first one having been on Metabolism. It is the aim of the chapter to present, from time to time as circumstances warrant, a series of lectures on some topic in science where the outposts of knowledge are being rapidly advanced, thus making new scientific material of great importance available to the general scientific reader.

This series on the nucleus is very timely because within the last three years numerous new fundamental entities and concepts have definitely evidenced themselves in nearly all experiments where the nucleus of the atom plays the major role.

The positive electron (or positron) was one of the first of the new entities to be discovered. The positron is similar, except for sign, to the commonly known electron; it was discovered late in 1932 in connection with experimental studies on the origin and nature of cosmic rays. Experiments on cosmic rays have been performed at a multitude of places on the earth, including the stratosphere. Professors W. F. G. Swann, Director of the Bartol Research Foundation and first speaker on this symposium, has with his colleagues contributed much to our present knowledge of cosmic rays.

Deuterium (heavy hydrogen) since its discovery has given to the physical, biological and medical sciences an ever increasingly useful and powerful tool. Many of the experiments performed recently owe their successful results to the larger quantities of deuterium made available by the few heavy water plants now in full operation. Professor H. L. Johnston has developed one of the very best plants in the country and has carried out many original experiments on this new isotope in its various compounds.

Artificial radioactivity, discovered last year by the Joliots, promises to be one of the really big steps in nuclear physics.

Already some 70 new nuclei have been synthesized and identified. A considerable development in the use of these radioactive nuclei as indicators for studying the behavior of their inactive isotopes is anticipated in the near future in the chemical, biological and medical fields. Professor E. O. Lawrence and colleagues at the Radiation Laboratory of the University of California have developed a four million volt cyclotron which has been notably successful in synthesizing a large number of these new nuclei.

Theoretical relations and new general principles are bound to follow in the wake of new discoveries. The beginning and development of the theory of nuclear transmutation processes owes much to Professor G. Gamow's contributions. The role of nuclear physics in astro-physical problems and in the theoretical origination of the chemical elements has also been given serious consideration by Professor Gamow.

The building blocks of matter, as we now know them, may change or be added to from time to time, but already our knowledge is quite extensive, although deficient in many respects. Undoubtedly then, it behooves all scientists to acquaint themselves with the essence of this knowledge so that they themselves may perhaps see an application of the new nuclear discoveries in their own special lines of endeavor.

F. C. BLAKE,
Chairman, Program Committee.

EDITOR'S NOTE

Once again the JOURNAL is pleased to be able to publish a series of Sigma Xi lectures on a timely and interesting topic. The prompt publication of these lectures in symposium form is made possible by the financial assistance and the editorial co-operation of the Society of the Sigma Xi.

L. H. S.