be applied to unstable entities that persist for as little as 10^{-23} second and whose mass spread, related to lifetime via the uncertainty principle, is an appreciable fraction of the nominal mass itself.

Thus, the building blocks of matter do not appear as the immutable, indivisible objects of ancient thought. Correspondingly, the distinction between "elementary" and "composite" particles has become increasingly blurred. In the opening essay of this volume, G. F. Chew presents the case for the view that all of the subatomic particles have equal claim to being fundamental and that in some sense they should all be regarded as composites of one another. These notions of "nuclear democracy" can be given more precise expression in the framework of detailed mathematical hypotheses, which are at the core of one active line of present-day theoretical research. In any case, so tightly connected are all aspects of particle physics that progress in any one branch of the subject illuminates all of the branches. It is not surprising, therefore, that this collection of papers—there are 70 in all—ranges over a broad spectrum of particle physics, both experimental and theoretical. The papers were presented at the international conference on nucleon structure held at Stanford, California, in June 1963.

At the center of attention is the problem of the electromagnetic structure of the nucleons, as revealed by the beautiful and difficult experiments on electron-nucleon scattering carried out at Stanford, Cornell, Cambridge (Mass.), and Orsay. Roughly speaking, what is measured here is the spatial distribution of electric charge and current densities in the quantum mechanical cloud that constitutes a nucleon. With increasing electron momentum transfer to the nucleon, one explores structure at increasingly small distances. According to present evidence this structure extends smoothly out to distances of order 10^{-13} cm, without any noticeable point-like concentration toward the center. The experimental papers, though short, represent masterful summaries that are still current. On the theoretical side, nucleon electromagnetic structure is, kinematically, one of the simplest of the deep questions of particle physics. It is reviewed in the papers presented by Yennie, Wong, and Durand. Recent progress has been slightly retrograde. The electromagnetic structure is not so completely dominated, as was once hoped, by a few vector meson states; and departures from the standard Rosenbluth constraint on structure, which might have heralded certain bizarre properties of the electromagnetic field suggested by Regge-pole ideas, have failed to materialize experimentally.

A second group of papers deals with high energy elastic scattering experiments and their theoretical interpretation. Especially noteworthy is the excellent review by Lindenbaum of the precision small-angle scattering results obtained at Brookhaven. Special mention must also be made of the paper in which Hughes reviews current sources of knowledge of the electromagnetic fine structure constant and of the paper in which Wu reviews certain critical evidence bearing on theories of nucleon beta decay. In other articles, Rosenfeld, Miller, and Ne'eman discuss the quantum numbers of the subatomic particles and attempt to classify them according to conjectured symmetry schemes.

Altogether, this collection of papers portrays a lively conference on a lively frontier of physics. It concludes with a concise summing up by A. Salam, who also records his judgment of particle physics for 1963 with an appropriate cartoon on the last page of the volume.

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Radioactive Elements

Radiation, Isotopes, and Bone. Franklin C. McLean and Ann M. Budy. Academic Press, New York, 1964. xiv + 216 pp. Illus. Paper, $3.45; cloth, $5.95.

The importance of the skeleton as the site of deposition of certain radioactive elements has been so popularized that the problems created by the "bone seekers" are almost commonplace. McLean and Budy's compact (216 pages) text gives the facts, hypotheses, theories, and conclusions that form the scientific background for these problems in readable, well-illustrated summaries of the pertinent areas of science. This monograph is not an encyclopedia, not for members of the "bone club" only, and not a manual for physicians treating bone diseases. It does provide an orientation on the role of the skeleton in certain health hazards of the atomic age. Definitions are fully stated so that a physicist can appreciate the biological aspects, and a physician the radiation aspects. Informative pictures and tabulations are woven into presentations of concepts. References to papers, reviews, and books are appended to each chapter.

The subject matter of the 14 chapters falls into three categories: (i) The nature of the bone-isotope-radiation problem (chapters 1 to 5). In these chapters discussions couched in understandable language carefully present the pertinent concepts in such diverse fields as atomic structure, radiation physics (for example, the techniques of measuring radioactivity), bones and teeth as tissues, and the nature of the mineral of the hard tissues. (ii) Bone metabolism (chapters 6 to 11 and chapter 14). The important bone-seeking elements and the kinetics of their distribution in the body are described individually in these chapters. Only when one appreciates the homeostatic mechanisms in the normal metabolic processes do the superficial differences fall into a coherent unified pattern. Some isotopes have been used as tracers to reveal the intricate processes of bone metabolism. Clinical applications of isotope techniques can improve the diagnosis of certain pathological states of the skeleton. Metabolic events in the organic part of bone are briefly reviewed. (iii) The effects of radiation on the skeleton (chapters 12 and 13). In this part two matters are considered—the effects of natural radioisotopes, and the effects of nuclear debris, especially the fallout from nuclear bomb testing.

"The properties that lead radioisotopes to seek bone, and to remain deposited therein, have increased both the hazards of radiation and the opportunities to study its effects. This book deals with both topics." College and advanced students in biology, chemistry, and physics, as well as those trained in the health sciences, will find that the complex, interrelated problems discussed in *Radiation, Isotopes, and Bone* are revealed in clarifying perspective.

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