now being published in this field are evidence of the change that has occurred as the result of vastly improved modern methods of separation and purification of these elements, and new subjects have been created for investigation by both the old standard techniques and the most recently developed research methods.

The 30 papers, which follow the introduction, range from the highly practical one entitled "Fabrication of yttrium metal" to the theoretical one entitled "The electronic structure of the rare-earth metals." Many metallurgical grams are established, and lattice spacings are determined with great precision.

The reader will find much good inorganic and physical chemistry and solid-state physics. Some papers review a considerable amount of background information in covering their subject. The book will bring inorganic chemists up-to-date on some very interesting problems, such as the nonstoichiometric hydrides of the rare earths, but it is intended primarily for specialists in the field of rare earth research—to them it will bring new and valuable contributions in their field.

CHARLES P. SMYTH
Department of Chemistry,
Princeton University

Components of Matter

Theory of Elementary Particles. Paul Roman. North-Holland, Amsterdam; Interscience, New York, ed. 2, 1962. xvi + 580 pp. Illus. $12.75.

This book is described on its title page as a "second improved and revised edition" of a work first published in 1960 [reviewed in *Science* **132**, 1391 (1960)].

In his preface to this edition, Roman states that he has "endeavored to keep intact the structure and character of the book." On perusal, I find that this is a very accurate statement. No extensive revisions have been made in either the subject matter or its treatment. Apart from a little up-dating of the material at the end of the book and correction of errors, the present edition is essentially the same as the first, with its good and bad points.

The reader who is familiar with the first edition will know that the book is divided into three roughly equal parts of approximately 200 pages each. The first covers the four-dimensional orthogonal group, field equations, and field quantization. The second deals with symmetries, conservation laws, and selection rules, while the last, somewhat shorter, section treats isospin and classification schemes for the fundamental particles.

I find no real fault with the first two-thirds of the book. The author's treatment of the group-theoretic and algebraic structure of relativistic fields is clear and elegant. His discussion of invariances and selection rules is generally good, with many examples drawn from particle-antiparticle systems and weak interactions.

The last section is the least useful. The dangers of an extensive presentation of the "geometry" of quantum numbers, as it existed three or more years ago, are evident when one considers current concepts in this area. The existence of multiboson resonances (ρ, ω, η, K*, and the like) and meson-baryon resonances of various sorts has stimulated many new and evolving theories of symmetries based on SU_3 and other groups. At the present time the situation is so fluid that it seems unwise to devote a large amount of space in a self-styled introductory book to a discussion which is so readily outmoded. Even the few pages of new material at the end of the book are now superseded.

What the author chose to cover in the first parts of the book, he treated extremely well. But I object to the book's title, for it does not present an accurate description of the contents. The study of elementary particles, whether theoretically or experimentally, involves intimate consideration of transitions of quantum-mechanical systems from one state to another. Consequently, when the author states in his preface, "I never attempted in the book to actually calculate a transition probability or a lifetime. I did not even mention the 'classical' tool of the S-matrix method," I can but reply that he is not presenting the theory of elementary particles, but only a very restricted part of that theory. The student who seeks to learn about the theory of elementary particles will find much of value in this book, but he will be forced to go elsewhere to complete, even partially, his education in the field.

J. D. JACKSON
Department of Physics,
University of Illinois

Notes

Commercial Alloys

This fourth edition of the well-known **Engineering Alloys** by Norman E. Woldman (Reinhold, New York; Chapman and Hall, London, 1962. 1363 pp. $29.50) lists 35,000 commercial alloys together with their composition, their uses, and the names of the companies that manufacture them. The new edition contains information on 15,000 more alloys than its predecessor (1952) and represents a major revision. Woldman is to be congratulated for his careful effort to list alloys manufactured throughout the world. An alphabetical index of engineering alloys together with an alphabetical list of manufacturers (totalling 1536) provides ready identification of most important engineering alloys. The book should be very useful to those who deal extensively with commercial alloys. A minor deficiency is that to find the manufacturer of a pure metal one must know the trade name of the specific pure metal desired. The descriptions of foreign alloys are not as accurate as those of domestic alloys (for example, S.A.P., Hiduminium 100, and Sendust are incorrectly described for composition).

O. D. SHERBY
Department of Materials Science,
Stanford University

Recent Research

Parts 1 and 2 of volume 15 of **Fortschritte der Zoologie** (Fischer, Stuttgart, 1962. 164 pp. and 172 pp.), which is edited by Hans Bauer, contain the same sort of excellent reviews as the earlier volumes in the series. W. Hasselbach (Heidelberg) gives an extensive summary, including a substantial bibliography, of recent work concerned with the coupling of chemical and mechanical reactions during contraction and relaxation of skeletal, heart, and smooth muscles; he places special emphasis on the various reactions of the isolated contractile proteins and on the role of the physiological relaxation factor. H. Lüttgau (Bern) summarizes, under the somewhat misleading title "Physiology of nerves," the most recent findings about ion movements on the excitable membranes of vertebrates and invertebrates, their electrical characteristics