chemosynthetic assimilation of carbon and to autotrophic and heterotrophic assimilation of nutrients. Also considered are the end-products of metabolism and various aspects of growth.

Because of the very broad field covered in a limited space, this book is not an intensive monograph and has little to offer the specialist. To students and research workers who desire a brief survey of the biochemical literature of this heterogeneous group of plants, this book will offer much information of interest. The bibliography of some 300 items and the index add to the value of the book. It is well worth the price asked.

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Introduction to Tensors, Spinors, and Relativistic Wave-Equations (Relation Structure). E. M. Corson. Hafner, New York, 1953. xii + 221 pp. $10.

The phrase *relation structure* in the title is important to an understanding of the content of this valuable book and of the point of view from which it is written. The existence of half-integral spin fields in the description of the elementary particles is very deeply connected with the existence of an essentially two-valued representation of the basic group of physics. This purely mathematical fact that the proper (homogeneous) Lorentz group is rightly regarded as one of many homomorphic images of the more fundamental spin representation group leads to an extensive and intricate set of interrelationships among various transformation groups, their infinitesimal generators, and the spaces on which they operate. It is with these structural relationships that the author is concerned, and they give his book a permanence of value it could not otherwise achieve in view of the somewhat chaotic and incomplete state of the physical theory expounded.

The first two chapters form part I, "Mathematical introduction," and establish the basic mathematical framework of the tensor and spinor analysis, respectively. The selection of material here is explained in the preface:

> Our presentation is based on the view that the theoretical physicist is primarily interested in the intelligent application of the rules of the spinor calculus, rather than in the more abstruse geometrical theory of the pure mathematician (which is not intended to detract from the necessity and beauty of the latter development).

The result of this policy decision is that the spinor formalism is developed mercilessly and is used with casual ease. Since there is every indication that the author himself has understood the underlying geometry (not so abstruse, really), the loss of clarity is not as great as might be expected from dependence on the massive notational framework with its multiplicity of indices. (The only extended treatment of this geometry in the formalism of the present volume known to me is in the 1935–36 notes on lectures by O. Veblen and myself entitled "Geometry of complex domains." These have been long out of print and unavailable but are now being reprinted at The Institute for Advanced Study, Princeton, N.J.).

The second part, "Physical principles," treats the general field theory and relativistic wave-equations in their field and matrix-algebraic aspects. Beginning with a Lagrangian density, the variation principle is used to derive field equations. Other topics in Chapter 3 include conservation theorems, gauge invariance, interaction of electromagnetic and matter fields, and canonical Hamiltonian formulation of the field theory.

The Dirac-Fierz-Pauli theory is given major attention in Chapter 4, but the Chandra and Proca contributions are also considered, the 4-spinor formulation is developed, and there is a concluding section on spin and statistics.

The final and longest chapter (66 pp.) reconsiders and systematizes the theory from the point of view of the representations of the homogeneous and inhomogeneous Lorentz groups, as developed by Wigner, Bargmann, Gelfand, Neumark, and others. Here the powerful concepts of the structure of algebras are used to establish the essential identity of apparently different wave-equations.

The book is rich in its detail, is literate in style, and contains a valuable bibliography and index. The printing was done by Blackie and Son in Glasgow and fully sustains the high reputation of that firm. While the book is certainly very difficult to read, and a small part of this should be charged to the author, the contribution it makes to the foundations of theoretical physics is considerable.

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An Illustrated Catalogue of the Rothschild Collection of Fleas* (Siphonaptera) *in the British Museum, vol. I. ***Tungidae and Pulicidae.*** G. H. E. Hopkins and Miriam Rothschild. British Museum (Natural History), London, 1953. 361 pp. Illus. + plates. £4 4s.

G. H. E. Hopkins, assistant to Karl Jordan at Tring and recently retired from the British African Service as a medical entomologist, is a top authority on world fleas. Miriam Rothschild, daughter of the late N. C. Rothschild, founder, one might say, of world siphonaptery, is a specialist in bird fleas and underwriter of the cost of this elaborate catalogue.

The unexcelled art work is made up of line drawings, many comparative, mostly from the pen of Jordan's young assistant, F. G. A. M. Smit, who is an artist in his own right and an enthusiaste student of world fleas. Some are from the originals or are a modification of them. The photomicrographs, which make