penetration and stopping power is given as an appendix; actually it is the introduction, since most of the reports use his notation and expand on his topics.

The title is a bit misleading: "charged particle" means one heavier than the proton, and "penetration" is concerned only with range and stopping power. Considerable stress is given to the passage of heavy ions. As a result, one is concerned with shell corrections, small-angle multiple scattering, and similar topics that are germane to massive-particle problems but not so much to electron scattering. Electron penetration, in fact, is represented only in the extensive range-energy tables of Berger and Seltzer. They contribute also range-energy tables for mesons, and a tabulation of the Vavilov distribution.

Fano, the subcommittee chairman, contributes several good things besides his appendix/introduction. He and Turner treat inner-shell corrections to the stopping-power formula, ending with some remarks toward a generalized equipartition theorem such as obtains in the electron gas. His other paper is a short discussion of open problems in the field.

State-of-the-art reports are by nature rather strictly circumscribed by the interests of the reporters. Hence one is usually annoyed not to find a treatment of a pet problem. Here I would say more weight could be given to electron problems, especially plural-scattering effects, spin transport, and the like.

Studies in Statistical Mechanics, Volume 3. By J. de Boer and G. E. Uhlenbeck. 388 pp. (North-Holland, Amsterdam) Interscience, New York, 1965. $14.75.
Reviewed by Kurt E. Shuler, National Bureau of Standards.

Probably the most concise and precise way to describe this volume is to quote here in toto the Editors' Preface to Volume 3.

> This third volume of the Studies contains in the first place a monograph by Dr. Bloch on the diagram or "graphological" techniques in quantum statistical mechanics. It complements the article of Dr. Huang in Volume II which was written more from the physical point of view, while Dr. Bloch emphasizes and treats in detail the formal methods which were developed in the last ten years, mainly inspired by the quantum field theory. It is well known that the application of field theoretical ideas and methods has produced a whole flood of articles in which all kinds of diagram expansions were used. We are grateful to Dr. Bloch for having given a systematic treatment of this difficult subject and it seems to us that a student can learn from this chapter what has been accomplished. And although the ratio of the amount of physical insight to the amount of formal machinery is perhaps smaller than one hoped for, there is no doubt that any serious student of statistical mechanics should learn these methods. It seems to us also very valuable that Dr. Bloch always shows carefully how the classical theory is contained in the quantum theoretical formalism, so that his article also complements the article on graphological methods in classical statistical mechanics which appeared in Volume I.
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> The second article by one of the editors on the so called second quantization method is mainly intended as a preparation for the modern quantum mechanical treatment of systems of a large number of interacting identical particles. The student should perhaps be advised to study this article before starting with the articles of Dr. Bloch and Dr. Huang.
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> The third article is a reprint of the dissertation of Dr. Boris Kahn on the theory of condensation. It follows our policy to make available older monographs for which there is still demand. We refer to the foreword written by one of us for further comments.

There is no question that the articles by Bloch and de Boer are clear, authoritative, and well written and that they serve a most useful didactical purpose. In particular, the paper by Bloch on "Diagram Expansions in Quantum Statistical Mechanics" which is some 200-odd pages is a most valuable broad review and commentary on "graphology" as applied to equilibrium quantum statistical mechanics. Professor de Boer's paper on "Construction Operator Formalisms in Many Particle Systems" is rather specialized and concerned primarily with the use of annihilation and creation operators in the construction of eigenvectors in many-particle systems of identical particles. B. Kahn's 1938 dissertation "On the Theory of the Equation of State", to which Professor Uhlenbeck has written a very moving personal foreword, still forms, as indicated in Uhlenbeck's foreword, a good introduction to the modern statistical theory of the nonideal gas. When read in conjunction with Bloch's and de Boer's papers it also forms an interesting commentary on the difference of approach to problems in statistical mechanics then and now.

It is to this last point that the reviewer wishes to address himself briefly even at the danger of being considered a reactionary prehistoric fossil. There is no question that new and powerful mathematical techniques need to be developed for the solution of some of the complex modern problems in statistical mechanics, particularly in the fields of many-particle problems (both classical and quantal) and in nonequilibrium statistical mechanics. The history of science is replete with examples where the development of new mathematical techniques or the extension and application of hitherto esoteric and "pure" mathematics has led to decisive advances in physics and chemistry. The proof of the pudding is, however, in the eating. To those of us interested in statistical mechanics as a discipline which describes, interprets, and predicts chemical and physical phenomena, a mathematical technique is a tool and not an end in itself. The development and refinement of such tools are necessary; it is undoubtedly lots of fun and great mental stimulation for its practitioners, but is it *statistical mechanics?*

The Habitable Earth. By Ronald Fraser. 155 pp. Basic Books, New York, 1965. $4.50.
Reviewed by Alan G. Henney, Naval Ordnance Laboratory.

Present knowledge of the physical properties of and forces acting on the earth are discussed in a clear and concise manner. Liberal use is made of diagrams and photographs. The composition and influence of the earth's core and mantle on the surface features and magnetic field are treated. Periods of mountain formation are analyzed.

A separate chapter is devoted to the ocean floor. The theory of continental drift is strongly supported with evidence obtained from a number of independent sources. Finally, the ocean and air currents are considered.

Throughout the discussion, recent evidence is introduced (as late as 1963) in support of the theories, and the reader is left with an appreciation of the wealth of experimental evidence gained in recent years.

The Scientific Age. The Impact of Science on Society. By L. V. Berkner. 137 pp. Yale University Press, New Haven, Connecticut, 1964. $4.00.
Reviewed by R. B. Lindsay, Brown University.

We are continually being told that this is the age of science, which is remaking our world. We are also informed that countless people do not realize what is happening, and that as a result frustration, dissatisfaction, and anxiety abound in affluent and non-affluent countries alike. It is therefore not surprising that there is a large and growing body of literature discussing the various aspects of the impact of science on society. The volume under review is based on the Trumbull Lectures given at Yale University in 1964 by a distinguished scientist, who has long been gravely concerned over public misunderstanding of the role of science, and whose educational efforts to mitigate this situation are well known.

From its origin, the reader will hardly expect Dr. Berkner's book to to be a coherent and well-organized treatise on the interaction of science and society. Rather it is a series of vignettes, tied together to be sure by a common thread, but emphasizing separate aspects of the whole problem. Thus the author in his opening chapter stresses the contribution which science through technology has made in certain countries of the world, notably in Western Europe and the United States, in bringing about an "economy of plenty". The availability of very large energy sources not merely to the wealthy and leisure class but to a large fraction of the whole population, with rapidly multiplying modes of energy transformation, has introduced the need for new attitudes toward social organization. This in turn is placing a great strain on the educational system, from the standpoint both of the production of the trained personnel needed to make the organization work and of the development in the literate population as a whole of an adequate appreciation of the over-all meaning of science and technology.

The author is far from satisfied with our present educational system and presents a plea for a decided increase in the number of doctorates awarded by our graduate schools. His views here will be received with respect, even if they will not be regarded always as realistic. His own contribution in the establishment of the Graduate Research Center of the Southwest has been noteworthy and might well be emulated elsewhere.

The third chapter is concerned with the problems involved in the vast government support of science, particularly in the universities. Though he recognizes the usual difficulties that have been pointed out so many times, the author expresses a definite spirit of optimism with respect to their solution within the framework of the present system. Not all in the universities will share this optimism in the face of the wide diversity of procedures prevailing among the various modes of support available from different government agencies. However, these problems must be solved if scientific research is to flourish, since no one questions that its support must come in ever-increasing measure from government sources.

The reviewer has been happy to note the author's concern with that aspect of the impact of science which is not solely due to technology but rather to the influence of the *ideas* of science. He pays due attention to this matter in his chapter on science and philosophy, where he reviews the "two cultures" dichotomy made famous by C. P. Snow. While his plea to the humanist to try to understand science is reasonable, he probably places too little emphasis on the corollary obligations of the professional scientist to explain a little more clearly and agreeably to the humanist what science is all about.

In his final chapter the author stresses the need for what he calls a "strategy of maturity" in order to guarantee the continued maintenance and extension of an economy of plenty. This strategy in brief implies the application of science to all the manifold problems of society. There is considerable emphasis on the role of free enterprise in the exploitation of this strategy. Even the most ardent advocate of this system must occasionally feel like expressing the hope that in the midst of our determination to press forward vigorously with the investigation of the secrets of the constitution of matter and with plans for putting a man on the moon as soon as possible, we should not overlook such significant practical applications of science as those to problems of water and air pollution, whose solution is so vital for human survival in a highly industrialized civilization.

Statistical Mechanics. An Advanced Course with Problems and Solutions. By Ryogo Kubo. 425 pp. (North-Holland, Amsterdam) Wiley, New York, 1965. $19.00.
Reviewed by Donald A. McQuarrie, North American Aviation Science Center.

Statistical mechanics is an area which both physicists and chemists use and develop equally, and textbooks in the field should recognize this. Contrary to most previous statistical mechanics books written by physicists, this one contains many topics peculiar to chemistry or at least not usually studied by physicists, such as the lattice theory of solutions, chemical equilibria, polymers, absorption processes, and others. Each chapter starts with several pages of text, then has a number of worked examples amplifying the text, and then has a sizeable number of problems of increasing difficulty which are followed by their solutions worked out and discussed in detail. More than half the book is devoted to the problems and solutions.

Although the author states in the preface that the book is meant to be read without reference to other textbooks, the average or even above average student would be hard-pressed to go through the book alone. It should not be thought of as a beginning text, but as a problem supplement to existing texts or as an excellent text for an advanced course. Several factors make this an appealing book, one of them being the great diversity of subjects discussed, such as Doppler broadening, Drude theory, the Heisenberg model, defect solid state, dielectric re-