of the n^{th} country problems, much as, for example, Blackett neglects them in a recent article in *Scientific American* (April 1962).

Teller gives an outline of what he hopes is the political evolution of the free nations: Protected by technical superiority (derived in part from more freedom from secrecy), and helping the underdeveloped peoples through Project Plowshare and other research, we should develop through NATO to Atlantic Union and ultimately to a world government. These ideas are all on the side of the angels, but there is no serious discussion of the problems involved in their implementation.

The personal reminiscences in *The Legacy of Hiroshima* would perhaps be more exciting if the identities of the antagonists weren't revealed so early in the book. Of course, it would have been impossible to conceal the identity of the hero, but with some effort the various villains could have been disguised longer. A model for a more dramatic presentation of this kind of material may be found in "Tom Swift and His Giant Psychosis".

The popular science writing is excellent, especially the brief clear treatment of the Einstein time dilation. Teller and Brown are exceptionally good reporters where there is a simple, unambiguous answer.

Finally, the brief discussion of education contains such thoughts as: "A great battle has been won by the Soviet Union in the schoolroom"; Scientists in America "are, in fact, considered outside the society"; and, "But Strauss' appointment as Secretary of Commerce was not confirmed by Congress, and early adoption of the metric system in our country suffered another setback."

Linear Differential Operators. By Cornelius Lanczos. 564 pp. D. Van Nostrand Co., Inc., Princeton, N. J., 1961. $12.75. *Reviewed by J. Gillis, Weizmann Institute of Science.*

THE world of scientific books has been having its population explosion and the linear differential equations family has by no means been the least fertile. In the circumstances a reviewer may hope to be pardoned a tremor or two as he picks up a new book on linear differential operators. That this reviewer was able to do it this time without any tremor at all is due to the pleasure he has derived in the past from the earlier books of the same author.

The chief theme is linear differential equations, both ordinary and partial. What is novel about the book is that, without any sacrifice of accuracy or rigor, it really concentrates on how to solve the equations. The central method is that of the Green's function. Other methods are indeed introduced, but they are all based on a Green's-function approach. Indeed this exposition of the power of the Green method as a unifying principle in linear differential equations is a striking reminder of how much we owe to the Nottingham miller who found his own way in mathematics 130 years ago.

Lanczos' presentation is painstakingly careful. It may be criticized in places where the distinction between careful and excessive exposition seems slightly blurred. But such decisions must always be questions of personal taste. Certainly the meticulous presentation can be most valuable to anybody teaching the subject and anxious for some new idea to clarify his message. He is very likely to find here just what he wants. It is not quite so obvious that the style of exposition is the best for a student, who might possibly find himself so bewildered by the mass of details that he cannot discern among them the essential idea.

Apart from the usual material, one finds in Lanczos' book a wealth of ideas and applications of the sort not normally encountered in a work on this subject. To cite a few examples, almost at random, there is the application of Green's functions to estimating the Taylor-series remainder and Lagrange interpolation error, the interesting little note on the nature of high fidelity and of the relative importance in that connection of harmonics and of transients, and the short but lucid discussion of the conservation laws of mechanics. The Sturm-Liouville set of ideas is based most naturally on Green methods, and this leads us to WKB methods, expounded with great clarity. And there is then an extremely useful account of special functions, chiefly with the idea of applying WKB to the calculation of their asymptotic properties.

Most books on partial differential equations fall into one of two classes. There are those which tell us everything about the equations except how to solve them; and the others which limp through a few routines, once more separating the variables in equations which were separated by Fourier and Poisson and have been separated so many times since then that it is difficult to see them without wincing. And so we are grateful to the author for a book which transcends both classes and really has something to say which is both useful in substance and original in presentation.

Advances in Computers, Volume 2. Franz L. Alt, A. D. Booth, R. E. Meagher, eds. 434 pp. Academic Press Inc., New York, 1961. $14.00. *Reviewed by Peter L. Balise, University of Washington.*

SINCE rapid progress is being made in so many different directions that no one can be expert in all phases of computation, it is increasingly important to be able conveniently to draw upon the knowledge of specialists. *Advances in Computers* will inform its readers about developments outside their own fields by providing introductory but not elementary presentations of advances, which may be supplemented from its large reference lists. Continuing Volume 1 (which considered programming for business applications, weather prediction, language translation, game playing, recognition of spoken words, and binary arithmetic), Volume 2 lucidly presents five additional topics.

Jim Douglas, Jr. outlines the more efficient finite-difference methods for partial differential equations of parabolic type and their convergence. The discussion is largely related specifically to the heat equation, with extensions to other equations noted. Philip Davis and Philip Rabinowitz survey selected aspects of least-square approximation and give some numerical results. Among the topics considered, necessarily briefly, are basic orthogonalization theory and methods, approximation of functions, solving differential equations, and convergence. Kenneth Shoulders gives a detailed, largely qualitative presentation of microelectronics, including material deposition, micromachining, component interconnection, and electron optics. It is noted that computer-controlled electronic construction processes will be necessary to produce the tiny but complex computing machines of the future. Saul Gass outlines several areas of recent progress in the increasingly important field of linear programming. Topics included are integer linear programming, the multiplex method, gradient method, and computing codes. Robert McNaughton discusses automata, defined rather broadly to include any finite system whose outputs are determined by its inputs. Many types of automata are mentioned, such as Turing machines and less well-known concepts.

The microelectronics chapter is descriptive, the automata chapter is philosophical, and the others are mathematical; all are interesting and well written.

The Quantum Mechanics of Many-Body Systems. By D. J. Thouless. Vol. 11 of Pure and Applied Physics, edited by H. S. W. Massey. 175 pp. Academic Press Inc., New York, 1961. $5.50. *Reviewed by R. W. Hellwarth, Hughes Research Laboratories.*

TO derive from first principles the properties of many-body systems whose behavior can only be understood in terms of quantum mechanics is a large undertaking. It is no surprise that the remarkable, if only partial, successes in understanding many-body systems have come mainly through physical insight gained from experiment and coupled with mathematical ingenuity, rather than from any organized body of theory. Nevertheless, formalisms for the systematic calculation of many-body problems have been developed (spurred perhaps by the successes of quantum-electrodynamic theory) which have served to clarify and unify (and occasionally confuse) many-body problems. In *The Quantum Mechanics of Many-Body Systems*, D. J. Thouless surveys the formalisms and physics of systems of many identical particles, rederiving old and new results and discussing the approximations required by the various methods. The development of each subject is traced from first principles, but with rigor and detail generally sacrificed for clarity. Qualitative and classical results are often rederived to illuminate the implications of the quantum mechanics and establish a physical feeling for the problem. The book therefore serves as an excellent bridge from "elementary" statistical mechanics to the current sophisticated methods of diagram summation, Green's functions, etc. Moreover, Thouless dwells at most length on subjects that have not been treated in review elsewhere, referring the reader to other more complete discussions when duplication would involve lengthy digression. All but a few pages are devoted to systems of many identical fermions, although the alteration of formulae required to treat bosons is indicated in a general way whenever it is convenient. Exposition of the mathematical framework for treating such subjects as low-lying excited states, collective motion, and finite temperature effects is everywhere interspersed with the actual calculation of results for electron gases, superconductivity, nuclear models, etc. It is gratifying to find difficulties, unclear points, and unsolved questions constantly pointed out. The result is a volume which is a clear review of and a useful guide through a fast moving field of considerable theoretical complexity.

Dispersion Relations and the Abstract Approach to Field Theory. Lewis Klein, ed. Vol. 1 of Internat'l Science Review Series. 273 pp. Gordon & Breach, Publishers, Inc., New York, 1961. $4.95. *Reviewed by Freeman J. Dyson, Institute for Advanced Study.*

THIS book is an anthology of recent original papers in the more mathematical and axiomatic parts of quantum field theory. The papers are well chosen, and together they lay out a logical path to be followed by anybody trying to work his way into the voluminous current literature of field-theoretical research. However, the book is spoilt by several serious faults which I will now discuss.

It is natural to compare this book with the "Series of Selected Papers in Physics," a series of volumes published by the Physical Society of Japan for the use of its members. Unfortunately, because of the protectionist policies of the American publishing industry, the Japanese series is not for sale in the United States. The volume under review is very similar to the volume *Theory of Elementary Particles, I,* in the Japanese series. The two collections have five papers in common.

Comparing the American with the Japanese volume, I find the American to be inferior in three major respects. (1) The American book is printed on a smaller page and on fuzzier paper. This makes the text, especially when it is reduced from the large page size of *The Physical Review,* aesthetically unattractive and difficult to read without eye strain. (2) The American publishers include no note of thanks or acknowledgment to the authors and journals from which they have taken their material. They did not in fact ask permission or even notify the authors that a reprinting was intended. The Physical Society of Japan has always been scrupulously courteous in asking and acknowledging such permission. (3) The American editor decided to have translated into English three papers which were originally published in German. The translations are so bad that they make these excellent papers almost unintelligible. The translators evidently know nothing of the