even wrong symbols (e.g., p. 74, 4th line from bottom, U^{o}_{ss}) appear, and the language becomes too involved in explaining mathematical results (e.g., the supermultiplet theory), but such occasions are few and far between. On the whole, however, the book makes extremely fascinating and informative reading.

What is more, this small book (127 pages) covers in broad sweeps a surprisingly large portion of nuclear physics. Special emphasis is placed on the description and relation of various nuclear models and on nuclear reactions involving "close collisions" as well as "surface reactions". There are chapters on theories of β decay and electromagnetic transitions in nuclei. The book also contains an excellent bibliography which, instead of just being a list of references, is punctuated with remarks outlining the importance, and sometimes even critically commenting on the results, of these works. This one feature of the book, one hopes, will become increasingly popular.

While this book is not intended to be a text book, it is, in the reviewers opinion, indispensible to the student who seeks to know the problems of nuclear physics and not just its achievements, to the teacher who wishes to have a definitive summary of what should constitute an excellent program of teaching, and to the research worker, who likes sometimes to read an authoritative, yet simplified description of apparently complicated things.

Frontiers in Science: A Survey. Edited by Edward Hutchings, Jr. 362 pp. Basic Books, Inc., New York, 1958. $6.00. *Reviewed by Sidney D. Warshaw, Argonne National Laboratory.*

This volume of about 350 pages consists of 32 articles, split into three main sections: The Biological Sciences (with an introduction by G. W. Beadle), the Physical Sciences (introduced by Harrison Brown), and Science and Society (*not* the Social Sciences—introduced by Hunter Mead). Many of the contributors are eminent in their fields. Probably none of them was aware, at the time of writing, that his contribution would one day be put into a book intended to convey to the "thoughtful layman" an idea about methods of attack on the advanced outputs of science.

Most of the articles have evidently been taken from the magazine *Engineering and Science;* some are from speeches. All of the authors are somehow associated with the California Institute of Technology either because they are members of the staff, or a recent graduate, or a student at present, or because the substance of their article was in a speech given in some Caltech group.

The biological section has an article, "The Origin of Life", which does not once mention Oparin's now classic work of the same name, and is largely concerned with the ancient history (van Helmont, Leewenhoek, Pasteur). A paragraph or two is devoted to the virus work at Berkeley. (There is a promise of a Plate 1 after a line about the splitting off of nucleic acid from a pro-

tein, but the only Plate 1 seems to be a picture of Andromeda nebula 175 pages later.) Another paragraph mentions Stanley Miller's experiment on amino acid synthesis from the raw materials.

An article on chlorophyll was written apparently during the craze some years ago for chlorophyll deodorizers and is mostly concerned with exposing the uselessness of the material for that function. Articles on Protein Structure (Corey and Pauling), Brain Mechanisms in Behavior (Sperry), and Plant Hormones (Bonner) are well written and informative.

Several of the articles in the physical science section (Earthquakes, Volcanoes, Hypersonic Research at Caltech) while individually interesting perhaps are more properly engineering (i.e., second or third echelon) than frontier. There is a short article on cosmic rays at the North Pole but no mention at all of nuclear physics (except a discussion on cosmic abundance of the elements), or low-temperature physics, or fundamental particles, or solid-state problems, frontiers to which even a thoughtful layman could, and should, be introduced.

The section on science and society has a number of thoughtful short pieces on the philosophy of science and the relation of science to society (by DuBridge, Feynman, Oppenheimer, and others). There is also a piece called Why Do We Laugh and Cry?; the author has decided that ". . . laughter is . . . (a punishment used) . . . to degrade any competing system of values".

In conclusion one feels that the book is neither a clear nor unified description of the most advanced problems of science, as implied in its introduction, although a number of isolated articles are certainly worth reading.

The Physics of Clouds. By B. J. Mason. 481 pp. Oxford U. Press, New York, 1957. $11.20. *Reviewed by Ferguson Hall, US Weather Bureau.*

This carefully prepared treatise on the physics of clouds and related subjects could hardly be more welcome in this age of expanding meteorological knowledge. The widespread interest in the possibilities of weather control and artificial precipitation has given tremendous impetus to cloud and precipitation research during the past decade. In rather encyclopedic fashion Mason (Imperial College, London) has accomplished a seemingly impossible task in gathering together a vast assortment of individual research contributions, carefully placing them in perspective, skillfully evaluating their significance, and even adding no small measure of his own important findings.

Many readers will turn immediately to the chapter on the artificial stimulation of precipitation, and will be rewarded with as sound an appraisal as is possible in our present state of knowledge. Further perusal will be just as rewarding, however, and will lay before the reader the whole broad field of the microphysics of clouds (much of which needs further exploration). Also to be found are chapters on the larger-scale aspects of cloud growth and dissipation (contributed by Frank Ludlam, also of Imperial College), the use of radar in "x-raying" clouds and in storm detection, the generation of atmospheric electricity and the thunderstorm, and the growth and forms of snow crystals—in short, practically every aspect of this branch of meteorology.

This is a book for the specialist and nonspecialist alike, as well as for the school library, the science teacher, and the student. May the latter be thus encouraged to enter this new and exciting field of research! The book deserves wide distribution.

The Relativistic Gas. By J. L. Synge. 108 pp. (North-Holland, Holland) Interscience Publishers, Inc., New York, 1957. $4.50. *Reviewed by Philip M. Morse, Massachusetts Institute of Technology.*

This short monograph is an extended postscript to the author's earlier work, *Relativity, the Special Theory.* Kinetic theory turns out to be a rather prickly subject to rephrase in terms of special relativity. Many of the basic constructs—mean-free-path, momentum transfer, and so on—are not Lorentz covariant and it is not clear how they should be extended to fit the relativistic pattern. Professor Synge examines these problems, suggests possible solutions, and works out some of the consequences. He discusses distribution functions, the relativistic definitions of pressure, temperature, and the equipartition of energy, and ends with a discussion of shock waves in a relativistic gas. An understanding of the whole subject of relativistic kinetic theory is needed to make progress in investigating the origins of cosmic rays and of interstellar radiation in general. This volume represents some progress in the subject, though more work yet needs to be done, as Professor Synge would readily agree.

Quantum Mechanics, Non-Relativistic Theory. Vol. 3 of Course of Theoretical Physics. By L. D. Landau and E. M. Lifshitz. Translated from Russian by J. B. Sykes and J. S. Bell. 515 pp. (Pergamon Press Ltd., England) For US and Canada only, Addison-Wesley Publishing Co., Inc., Reading, Mass., 1958. $12.50. *Reviewed by M. E. Rose, Oak Ridge National Laboratory.*

To come immediately to the heart of the matter, it is this reviewer's opinion that this book on nonrelativistic quantum mechanics by Landau and Lifshitz represents a magnificent contribution to the pedagogy of physics. Perhaps this description will be regarded as an extreme one; in any event it deserves a word of explanation.

To begin with, the book is one of a series on theoretical physics which is to comprise nine volumes. Of these, all but two (Relativistic Quantum Theory and Physical Kinetics) have been written. One of the remaining seven is the well-known *Classical Theory of Fields* which has already appeared in an English edition, although a second edition is promised by the pub-