

jects with which they already have some acquaintance. As Richard Stevenson says in the foreword, "Surprisingly enough there are only scattered accounts of these [effective field] theories. . . . This gap has been filled admirably by Dr. Smart. . . . His book, written in his usual felicitous style . . . in particular will be welcomed by experimenters who struggle Laocoön-like with the paper serpents being emitted by the journals."

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*J. H. Van Vleck, who is Hollis Professor of Mathematics and Natural Philosophy at Harvard University, is well known for his work in the theory of magnetism.*

## International teaching survey

A SURVEY OF THE TEACHING OF PHYSICS AT UNIVERSITIES. 396 pp. Unesco, New York, 1966. Cloth \$6.50, paper \$4.50.

by Robert L. Weber

Surprisingly informative and lively, this international report surveys the teaching of physics in Czechoslovakia, the Federal Republic of Germany, France, the Union of Soviet Socialist Republics, and the United States of America. The authors of the report express the hope that "it will serve as a chart for some adventurous exploration into better ways of teaching physics." Addressed especially toward informing and helping the developing universities, the report should interest any teacher of physics, enabling him to view his own efforts in a perspective which is international and which extends from elementary grades to the university, and beyond.

Each chapter begins with an introduction to define the problems to be discussed. The main portion of the chapter displays the current procedures in the teaching of physics, and those parts of mathematics which are a part of the education of a physicist, in each of the countries participating in the survey. Each chapter concludes with a summary stating the extent to which there is agreement among the educational practices described.

The broad scope of this report is

indicated by the titles of its chapters: 2, Preparation for the study of physics in universities and related admission requirements of universities; 3, The education of professional physicists in universities to the first degree; 4, The role of physics in the education of school teachers, engineers, and others; 5, Advanced study toward higher degrees; 6, Academic research in physics: continuing education, evening schools, extramural education; 8, Teachers of physics in universities; 9, Material; 10, The improvement of physics teaching.

Valuable detailed information appears in 195 pages of appendixes: syllabuses, lists of experiments and books, sample examinations, etc. In describing the diversity in physics programs in the United States, the authors supplement general information with details about physics programs in four high-ranking institutions: Berkeley, Columbia, MIT, and Swarthmore.

One encounters on an international scale in this report some of the dilemmas painfully familiar to every physics teacher. On page 79 there is recognized the need to reduce the number of topics in the course so we can "uncover physics, not cover it." The opinion of the 1957 Carleton Conference that a satisfactory introductory physics course can be constructed around seven basic principles is quoted. Yet the report also faithfully records the proliferation of topics and the trend toward two-year basic courses. Again, while the reasonableness of the "new math" is welcomed, in more than one national report fear is expressed that the teaching of mathematics to physicists is in danger of becoming excessively formal and unrelated to physics (page 92).

It is unfortunate that in this comprehensive and elegant report it was not found feasible to give some student evaluation of introductory physics courses at the college level. Had this been done, I suspect that at least one other teaching dilemma would have been exposed. The physicists' conviction (displayed especially in the German report) that physics must be introduced through laboratory observation and manipulation is opposed by the view held by most students I have encountered that the

introductory laboratory makes low-yield use of their time.

Teachers of physics and administrators of academic programs are indebted to the contributors to this international report, to its coordinator William C. Kelly and to the American Institute of Physics for a remarkably well-organized book which can be very helpful to an institution starting a physics program or to a faculty replanning an existing program.

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*Robert L. Weber, who is professor of physics at The Pennsylvania State University, is the author of a number of textbooks.*

## Mainly for graduate students

THE THEORY OF TRANSFORMATIONS IN METALS AND ALLOYS. An Advanced Textbook in Physical Metallurgy. By J. W. Christian. 975 pp. Pergamon, New York, 1965. \$28.00.

by H. M. Otte

In spite of the specialized sounding title, the 23 chapters, consisting of nearly 100 sections, that go to make up the body of this work, cover a broad spectrum of solid-state physics and physical metallurgy. The underlying guiding theme throughout is the rearrangements of the atoms in metals and alloys as produced by suitable thermal and mechanical treatments. Atomic processes are discussed in terms of the associated kinetic and crystallographic features. "Transformations" is used in the broadest sense to include all those changes in the solid state that occur by the same atomic processes, irrespective of the nature of the driving forces. Thus the book is concerned mainly with the mechanisms of phase transformations and not the reasons for them. Plastic deformation by slip is virtually the only major subject excluded, but, by admission of the author, principally because of the vastness of the subject rather than lack of proper justification for inclusion! However, a whole chapter is devoted to dislocation theory.

The introductory chapters, which form an appreciable fraction of the whole book, contain discussions of