from about 80 graduate deans, 1800 graduate faculty members, 2300 recent recipients of the doctorate, 600 college presidents, and 70 industrial representatives." Through all of this he brought the trained eye of a social scientist to bear upon "the state of graduate education by institution and by discipline, in terms of what goes in, what comes out, and what happens in between."

The book is written with uncommon clarity of organization, with a somewhat clinical detachment, and happily, with an ever-present and welcome twinkle of unmistakably urbane good humor. Falling into three primary parts, the text deals first with the past in a discussion of "what has happened in graduate education in this country"; in this section the author seeks "only to discern the limitations that the past imposes on the present and the lessons that it ought to teach." The second segment the present and the near future: "The present and the near future . . . is the body of the report and it is organized along the lines of the major problems now active." Section three carries the "conclusions, commentary, and recommendations: what should happen."

This final portion of the book, which is clearly founded upon the data presented earlier, carries some 21 formal suggestions. These range from recommendations pertaining to graduate programs, such as the creation of "more compact, more specified" designs of doctoral work and new approaches to the foreign language requirement, to plans for the creation of "a center for advanced studies in the humanities" and the establishment of a new standard-setting "Graduate University" in Washington, D.C. Berelson assumes such other positions as the following: financial support of doctoral students should be regularized but students certainly should not be completely subsidized; that industry should provide unencumbered block-grant support to graduate schools; that recruiting of candidates for doctoral work should be "conducted more systematically and more energetically"; that training for teaching should be given new thought and effective planning within doctoral programs; that "over the visible future the national load of doctoral study should be carried mainly by the presently established institutions of top and middle-level prestige"; and that there should be a strengthened national organization of graduate schools. As he makes abundantly clear, there is no shortage of basic issues to which graduate faculties around the nation should be addressing themselves, with a willingness to seek new solutions in a new era of responsibility.

Some readers may sense overtones here and there of excessive reverence for the "top prestige universities," and others may occasionally want to argue that impressive institutional size may not necessarily breed high quality in graduate work, but nonetheless this is a fine and enormously valuable summing up of the problems and challenges confronting a vital segment of American higher education. There will be many differences of opinion over the interpretation of portions of the data that Berelson has assembled, and many a prolonged argument over some of his recommendations. In providing a better lighted stage on which the debates can be held, however, the author has performed an invaluable service.

Berelson observes that "what American academic life needs is a sense of pride, of *esprit de corps*, of profession in the best sense. That is what the American graduate school must take the lead in supplying, to itself and its constituency." Berelson has surely served this high cause well, for in this book he asks the right questions. It is required reading for anyone seriously interested in the future of graduate study.

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Errors and Deception in Science. Essays on biological aspects of life. Jean Rostand. Translated from the French by A. J. Pomerans. Basic Books, New York, 1960. 196 pp. Illus. $4.

The six essays presented here have little unity and are best discussed separately. The title-essay, presented first, is the best of the lot. It includes a play-by-play account of the development of Blondlot's fictitious n-rays early in this century; curiously, the author does not tell about the role played by the American physicist Robert W. Wood in revealing the fraud. Details and references may be found in Martin Gardner's *Fads and Fallacies in the Name of Science* (Dover, 1957), an immensely more valuable source of this sort of *memorabilia* than Rostand's essay.

As with the first, so also for the remaining essays: for each of them a better version is already in print. The subject matter of "Biology and the law," treated by our biologist in a cramped and legalistic spirit, is handled by the jurist Glanville Williams in a most humane and biological way in *The Sanctity of Life* (Knopf, 1957). "The singularities of man" is less interesting than N. J. Berrill's *Sex and the Nature of Things* (Dodd, 1953). It is better to read Roger J. Williams' *Free and Unequal* (University of Texas Press, 1953) than Rostand's "Biology and maladjustment." The chapter "Biological unity and diversity" is a poor substitute for P. B. Medawar's graceful essay, *The Uniqueness of the Individual* (Methuen, 1957; Basic Books, 1958). And the final chapter, "Biology and the cinema" reads as though it had been cribbed from the *Encyclopaedia Britannica.*

Has this book any excuse for being? Perhaps, in its original form. Perhaps there is nothing better in French. But that is no good excuse for translating it into English; in this language it is second best throughout, as I have indicated above. It has not even the excuse for being that it constitutes a new synthesis. To me its publication seems no more than an attempt by the publisher to capitalize on the well-merited praise earned by Rostand's previous book, *Can Man Be Modified?* [reviewed in *Science* **129**, 1606 (1959)].

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Electrons and Phonons. The theory of transport phenomena in solids. J. M. Ziman. Oxford University Press, New York, 1960. xiv + 554 pp. Illus. $13.45.

During the past 15 years remarkable advances have been made in understanding the behavior of semiconductors and metals. This text on the theory of transport phenomena offers a unified presentation of much of this progress. The author starts with a discussion of lattice vibrations and the one-electron theory of the electronic structure of crystals. Chapters on electron-electron

and electron-phonon interactions precede a discussion of the formal theory of conduction. Detailed discussions of electrical conductivity, thermal conductivity, and thermoelectric and galvanomagnetic effects are presented, with specific substances used for illustration. This is a book of theory rather than materials.

Many recent advances and new techniques, previously available only in the literature, are incorporated—for example, variational methods for the solution of the Boltzmann equation are applied throughout; the Onsager relations receive constant attention; and the Bohm-Pines collective electron theory is included, probably for the first time in a textbook. Where full details could not be given, a clear statement of the essence is given, along with references for the interested reader. One unfortunate omission is the theory of hopping-type conductivity of localized electrons appropriate to certain oxide semiconductors. This book is limited to study based on band theory.

Although the text is written "from the ground up," it is my belief that it will be of greatest benefit to the reader with a working knowledge of quantum theory and some background in solid-state physics. For the theoretical and experimental research worker in the field, it will be a most valuable possession. No reviewer could fail to mention the quotations given just beneath the chapter headings. These gems and the author's vivid and sometimes humorous similitudes add to the enjoyable experience of reading this book.

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Education and Manpower. Henry David, Ed. Columbia University Press, New York, 1960. xvi + 326 pp. $5.

The National Manpower Council, which was established at Columbia University in 1951 during the presidency of Dwight D. Eisenhower, is bringing its program of research to a close. The book that has just appeared, *Education and Manpower,* is a by-product of the work that has been in progress during the past nine years. Basically it consists of a series of staff papers prepared as the program progressed, but it also contains papers by Clarence Faust, "Our secondary schools and national manpower needs," and by Charles E. Odell, "Vocational guidance and the skills of the work force." In essence, the book is a summary of conclusions reached by the National Manpower Council in the course of its investigations.

Henry David, the Council's executive director, has written the introductory and concluding selections, and Eli Ginzberg, director of staff studies, has contributed a chapter on "Education and national efficiency." Substantial sections of the volume are devoted to secondary and higher education, with a somewhat shorter section on vocational guidance.

With the book's general thesis, the reader will find himself in complete accord. This thesis is stated in the opening sentence of Henry David's introduction: "Formal education is the foundation upon which the development of the nation's manpower resources is built." On the other hand, those who have been equally active in the fields of manpower and education may question the claim made on the jacket: "The selections which comprise *Education and Manpower* reflect a distinctive approach to some of the critical issues in education today." The value of this contribution to the subject is less in its distinctive approach than in its effective synthesis of the solid and constructive thinking that has been done on this vital subject.

It is unfortunate that the volume has not been brought more nearly up to date. Most of the selections appeared between the years 1954 and 1958, and more has happened since than can be covered in eight pages of supplementary notes. I do not wish, however, to detract from the soundness of the Council's thesis. Readers certainly will say "Amen!" to Henry David's warning that "the big danger . . . lies . . . in the possibility that the supply of highly trained men and women will not be adequate to the nation's future requirements. And this danger is enhanced if we fail . . . to increase the supply of young people of ability reaching the colleges; to strengthen the institutions of higher education; and, finally, to reduce the present degree of wastage of potential ability in the population. It certainly does not lie within the power of higher education alone to realize these objectives. Unless there is early identification of ability, a drastic improvement in the quality of secondary education, a more effective program of educational and vocational guidance . . . the stream of young people reaching college will remain too small."

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The Physical Universe. Konrad Krauskopf and Arthur Beiser. McGraw-Hill, New York, 1960. 536 pp. Illus. $8.95.

The authors of this new elementary text covering the basic principles of physical science, but written for students who are not planning to specialize in science, undertook their task with a unique advantage: They set themselves the goal of condensing Krauskopf's *Fundamentals of Physical Science,* a text which has been employed on a large scale for well-nigh 20 years and which is still regarded by many as one of the best in the field. But simplification of an elementary text would, on the surface, seem to be either risky, impossible, or ruinous. Fortunately for the cause of education, the outcome proves successful beyond expectation, and the volume as it stands is a triumph of clarity, simplicity, and selectivity. It is the latter quality that often induces reviewers of textbooks to be petty and unfair because, do what you will from now until doomsday, the problem of choosing the items for inclusion in a text for a broad field must remain a personal one. All one can say in this instance is that the omissions made from the tested precursor are not fundamental. As for my own preference, I would have found it more useful had the authors left undisturbed the derivations of the equations for free fall and kinetic energy and omitted the page defining slugs and newtons, since the clarification of the distinction between mass and weight is well stated by them in prose anyway. It seems a little unfair to permit students to squeeze through a basic science course without sweating just a bit over the source, meaning, and practical value of an equation. But there is no reason why a conscientious teacher may not make an addition here and there, just as he often omits a section he finds expendable.

It would be redundant to go into details concerning the superior achievement of textbook authorship displayed