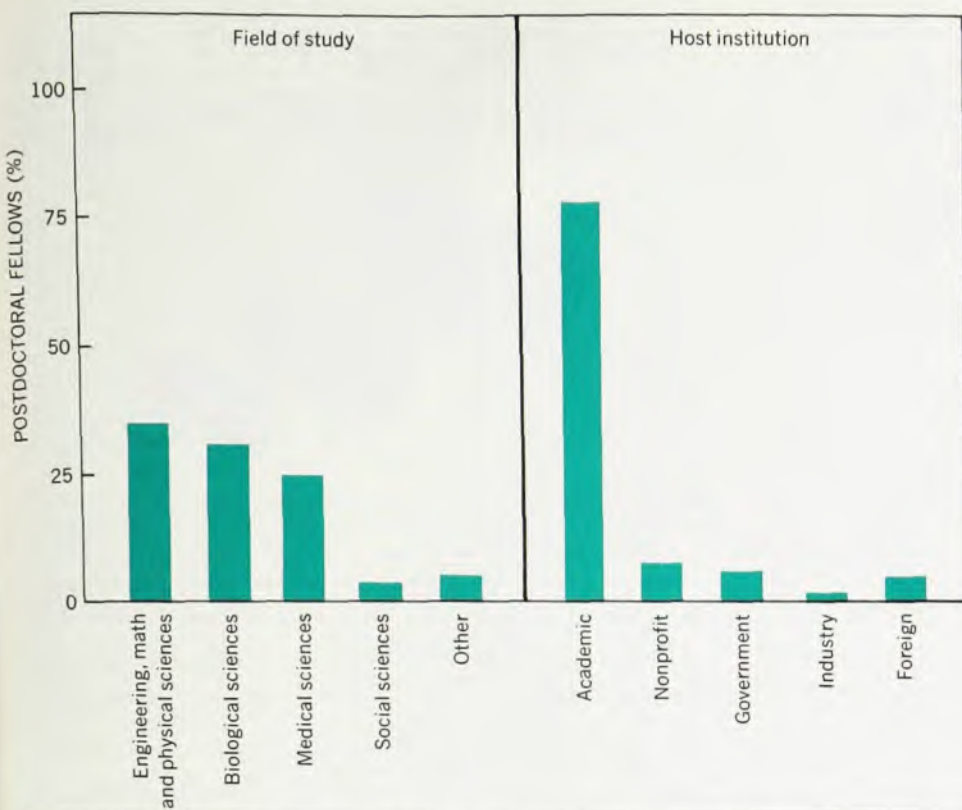




Distribution of US postdoctoral fellows. (From the book reviewed on this page.)

in those chapters is the large fraction of postdoctorals who are foreigners. Adding the postdoctorals in engineering, mathematics and the physical sciences together, we find that foreigners make up 56% of that group. For the postdoctorals in the life sciences this fraction is 41%, and it is only 22% in the social sciences. The distribution of fellowships by postdoctoral field is 35% for engineering, mathematics and the physical sciences, 56% for the life sciences, 4% for the social sciences and only 2% for the arts and humanities.

The third major aspect of this book is the effects of postdoctoral education on the host institution. The discussions naturally center around the university, because that institution not only produces all postdoctorals, but also employs the great majority of them. Tables and diagrams offer detailed information on the interaction between scholars and mentors and their influence on students, faculty and administration of a university. Academic institutions are divided into groups labeled "leading," "major," "established" and "developing," and tables show for selected graduate departments the activities, background, space requirements, and ratios among faculty, postdoctorals and students. But universities are not the only host institutions; nonacademic hosts such as industry and nonprofit organizations make their contributions and receive attention in this book.

Since the purpose of the book is to explain and evaluate postdoctoral educa-

tion, it has conclusions and recommendations. The fundamental conclusion is that postdoctoral education is a sound development which resulted from expansion of graduate education. In view of how crucially important the relationship is between the postdoctoral appointee and his mentor, more freedom in choosing a mentor is one of the recommendations. Another recommendation is that the duration of appointment should be determined by the fellow's progress toward independence and excellence in research. A difficulty that should be corrected is that of indirect support; it prevents patrons and administrators from recognizing the contributions of postdoctorals. However, better manpower planning can alleviate most of the difficulties, and this book can supply the necessary data needed for better planning.

The Invisible University is well written; it takes a narrow topic and explores all major aspects of it. Unlike many education and manpower books, *The Invisible University* singles out physics in many of its tables and graphs instead of just showing physical sciences as a group. All comparisons are pertinent, and the author is careful to discuss all sides of a given situation. Because a special study was conducted to obtain most of the material for this book, it should be said that the author is always careful not to read too much into the results of a survey.

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Elementary Radiation Physics

By G. S. Hurst, J. E. Turner

166 pp. Wiley, New York, 1970. \$7.95

This book contains five chapters of very elementary introductory material on the interaction between x rays, gamma rays and neutrons with matter. These are followed by two chapters on measuring absorbed energy and dosimetry with three final chapters on biological effects, x-ray technology and a small selection of applications.

It is the result of experience with the health-physics group at Oak Ridge, and it has the strengths and limitations of that experience. The illustrative material tends to come from the AEC laboratories, and much of the revolution in biology of the past ten years is not mentioned, even though a significant quotation from D. E. Lea clearly suggests that the relation between radiation and molecular biology is basic and exciting.

As a teacher of the effect of radiation on living systems I welcome the book. Inevitably biologists work in this field and it is almost impossible to induce them to read the standard works on radiation. This material can be used by them, and the book, therefore, should be on the shelves of every biology department library. My guess is that, in fact, it will be found (and not read) in physics departments. However, that is life.

I regret that the chapter on the interactions of charged particles with matter is so sketchy. Ferrin has treated this subject so beautifully and simply that one would think it would be standard material everywhere. It is not, and it is not here.

I was startled to find no references for more advanced reading and, as this is not in keeping with the authors' approach, I wondered why. There are, however, a great many problems.

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Nonlocal Variations and Local Invariance of Fields

By Dominic G. B. Edelen

197 pp. American Elsevier, New York, 1969. \$14.50

Dominic Edelen's book is intended to provide a "graduate text" also of interest to field-theoretic physicists, engineers in theoretical mechanics, control engineers, and so on, dealing with "techniques and methods in the field of nonlocal variational mechanics." This is indeed an accurate assessment of the potential audience. Despite the advanced level of the material the treatment is essentially *applied* in character.

The monograph deals with variational problems in which the Lagrangian