zodiacal light. The second volume deals more fully with the magnetism of the earth—its origin, its variations, and its association with cosmic radiation—followed by two highly speculative chapters on magnetic phenomena associated with the moon and comets. In covering this wide field much of the material has been brought up to recent date, even including some of the current thinking on radio astronomy.

There are serious shortcomings in that the author has omitted much important research and has included much that is trivial and much that is not favorably regarded by outstanding investigators in the field. The interpretations that the author places on facts of observation and the conclusions that he draws regarding the nature and origin of the phenomena he describes are in many cases in disagreement with my opinions and those of others. For this reason, the reader is warned against accepting statements in these two volumes without critical examination.

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Sponsored Research Policy of Colleges and Universities. A report of the Committee on Institutional Research Policy. American Council on Education, Washington 6, 1954. vii + 95 pp. $1.50.

The academic world, if not the general public, has been made increasingly aware that research, especially scientific research, is getting to be expensive business. An ever-increasing share of this expense is being borne by nonuniversity funds directed to universities. Two years ago, recognizing the problems growing out of these trends, the committee authoring the present report was appointed. It is refreshing to find a committee reporting so promptly and concisely.

The document is short and, although somewhat repetitious, it is interesting reading. According to it, universities, colleges, and such institutions exist to extend, conserve, and disseminate knowledge. They ". . . have a heavy responsibility to encourage the free exercise of intellectual curiosity . . ." without worrying overmuch about distinctions between basic and applied research. "It is crucial to the National Welfare that research in Educational Institutions be continued and increased, and sponsored research is indispensable to this end." However, it should be recognized that even the best of men and institutions may be tempted by the glitter of gold, and the report laudably warns against the dangers of diverting scholars from their basic ends. The report offers various examples of ways in which outside funds may be dangerous, while noting the desire of all concerned to contribute the maximum to the public good, in normal or in emergency times.

I think that the average reader would agree with me that the over-all impact of the book would be more accurately portrayed by the title "Fiscal Policy Related to Sponsored Research of Colleges and Universities." This is understandable since the committee was composed of men with varying but appreciable degrees of interest in matters of administration as contrasted with meeting classes or working in the laboratory. According to standard bibliographic references available to me, the "administrative quotient" (man-years administration/man-years teaching-research) approximates 1, but since the average tenure of the members in administrative posts is near 10 years, the academic aspects are necessarily more remote. A plea, to which I heartily subscribe, is made for administration and faculty to get together to arrive at a mutual understanding of fiscal (that is, overhead) problems.

Much of the report appears to assume an equivalence of contract-type support and grants-in-aid. To the committee, the major differences, as is noted in Chapter 5, would appear to be with respect to overhead. Referring to grants-in-aid: "Normally indirect costs under this system have ranged up to 15%. These policies and the grant-in-aid method, when carried out on an extensive scale, are held to be harmful by institutional representatives." Perhaps so, but I suspect that the average recipient of a grant-in-aid from the U.S. Public Health Service would be a little appalled to learn that he is harmful to his institution. Private foundations are gently chided for not allowing overhead; ". . . the Foundation grant cannot escape the criticism that it is imposing an undue burden on the educational institution by requiring it to participate in the cost of conducting the research covered by the grant-in-aid."

When the contractual policies of the Armed Services Procurement Regulations are spoken of by the committee with fondness, they signify approval of a system derived by modifications of procedures devised to procure material for our military units. Administration of research funds by officials of the various agencies of the Department of Defense has been, by and large, very acceptable to scientists, as witness the effective program of the Office of Naval Research. However, the fact that research can be handled this way does not mean that universities have to accept schemes devised for completely nonacademic purposes, for buying units of research unless they wish to. A recent Congressional committee report (Riehlman report) is considerably more illuminating with regard to the impact of armed forces policies on scientists than is the present report of the committee of the American Council on Education.

The committee remarks: "Basic research is analogous to a checking account in a bank. If such funds are withdrawn and not replaced, the account will soon be overdrawn." Prosecuting basic research is not analogous to depositing money in the checking account (p. 5) and the "account" is never "overdrawn." I fear the analogy used by the committee illustrates a point of view not uncommon in universities, including the policy of operating research as a personal-type checking account where the depositor is charged a fee for each unit.

Perhaps modern academic institutions must, for some reason not known to faculty members, regard research as a commodity subject to depletion by use and withdrawal. For my part, I like to think that when I study a sodium pump in frog muscles I am providing a minor facet of light in our existing body of knowledge that will endure and illuminate other problems and will lose its impact, not by being "overdrawn," but by being superseded by better research.

The report speaks rather longingly of what it terms "institutional non-project type" grants. Federally sponsored research in agriculture is offered as a desirable example. Although it is true that funds to land-grant colleges under the Morrill Act of 1890 amount virtually to free endowment, others (such as Hatch, Adams, and Bankhead-Jones) have varying degrees of limitation, may provide no overhead, and may carry "matching fund" clauses. Bankhead-Jones projects are also closely audited on a yearly basis. Thus, from the example offered it is hard to tell what the committee is approving as policy.

Policies more basic than fiscal are touched upon primarily with reference to a quotation from President Dodd's delightful remarks about "projectitis."

A committee of the National Science Board is currently studying matters related to the impact of outside funds on universities and colleges and it is to be hoped that, building on the present report, they can delve into matters of basic policy. Certainly university policy is being formed willy-nilly or otherwise, in large part because of the almost explosive intermingling of university scholars and fund-granting agencies over the past decade. In the life sciences alone thousands of grants-in-aid are made to scienitsts, mostly by foundations and agencies, which, in turn, rely in large part on the advice of hundreds of university scientists. The scholars themselves are thus squarely in the middle of an expanding program, not just on the receiving end. Administrative officials should take great

pains to insure a high degree of mutual understanding among themselves and this potent body of advisor-research workers. The present report speaks briefly of the vexing fear that the existence of much money for a given area of scholarship may distort a university or college program. There is the even more vexing, because unspoken, fear that scholars may come to be measured in terms of their grant money rather than their intellectual abilities.

It is a little startling to me to find the statement: "Research Grants however, and particularly those sponsored by the Federal Government, seem to be concentrated in a relatively few institutions of higher learning." The implication of this statement is that other institutions are neglected. So far as life sciences are concerned at least, federal funds do turn out, in fact, to be distributed roughly in proportion to academic populations of states. What more could be asked?

Since "sponsored research" deals mainly with scientific research, it is natural that the present volume is biased in that direction. Working next door to this scientific mountain may have profound effects on the life of a nonscientific researcher, and this deserves most serious attention within the educational world. It is indeed important that studies such as the one under consideration be carried out, that the results be published and widely discussed. To survive, the academic institution needs to know thoroughly what its aims and ideals really are and develop policies to achieve them.

I commend to the attention of the committee an earlier report (1605) on university policies contained in a volume entitled *The Advancement of Learning*. In it, Francis Bacon quotes Diogenes who, upon being asked "How it happened that Philosophers followed the rich, and not the rich the Philosophers?" replied "Because the Philosophers know what they want, but the rich do not."

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Introduction to the Theory of Neutron Diffusion. vol. 1. K. M. Case, F. de Hoffmann, and G. Placzek. Los Alamos Scientific Lab., Los Alamos, N.M., 1953. viii + 174 pp. Illus. Paper, $1.25. (Order from Supt. of Documents, GPO, Washington 25.)

This slim volume is based on a series of lectures given by G. Placzek in 1949 on methods of treating the one-velocity diffusion problem in homogeneous, isotropic media. It includes "Streaming in vacuum," "Purely absorbing media," "The equations for a general medium," "Uniform infinite medium with isotropic scattering," and "Application of the results obtained for the uniform infinite medium to the solution of finite problems." This last chapter, unfortunately, is cut off after a single application (to the source-free half-space). The remaining applications are promised in the projected volume II.

Although the subject matter is limited, it is basic and well chosen. The treatment is clear, detailed, and thorough. Included are many extremely useful tables and curves (for example, on the escape probabilities for uniform sources in purely absorbing media). Especially noteworthy and impressive is the thorough discussion of the approach to the asymptotic (diffusion) density in strongly absorbing media.

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Structure of Molecules and Internal Rotation. San-Ichiro Mizushima. Physical chemistry, a series of monographs. Eric Hutchinson, Ed. Academic Press, New York, 1954. x + 244 pp. Illus. $6.

The work discussed in this book is closely related to that of Mizushima and his colleagues at the University of Tokyo during the past two decades. The book is organized into two parts, the first of which deals with a description of the development of the investigations on internal rotation. The second part presents a more detailed explanation of some of the theoretical aspects of the problem and a description of experimental methods.

Ethane and its derivatives are treated in considerable detail. A summary is given of the results of investigations using infrared absorption, Raman scattering, dipole moment data, electron diffraction, and heat-capacity measurements. The interpretation of these studies is developed to show support for the model that describes the liquid and gas phases as consisting of a mixture of *trans* and *gauche* rotational isomers. The *trans* form seems, in general, to be stabilized in the crystalline state. The influence of internal hydrogen bonding is briefly covered, and the nature of the potential barrier hindering internal rotation is discussed in connection with the treatment of thermal data.

A chapter is devoted to simple molecules, other than ethane derivatives, that may show internal rotation. Rotational, or orientational, isomerism in cyclic molecules is also treated. The remainder of part I is devoted to a discussion of more complicated systems, such as long-chain hydrocarbons, polypeptides, and related compounds. The various possibilities of extended, folded and helical peptide chain structures are discussed in terms of rotational orientation about appropriate bonds. Experimental evidence for one or another of these structures in specific proteins is cited.

Part II begins with a description of several experimental techniques used or developed by the group at the University of Tokyo. A brief introduction to the theory of normal vibrations is followed by application to special cases involving torsional oscillation, again with emphasis on ethane derivatives. One section is devoted to the vibrations of long-chain molecules, and one to sum and product rules applicable to rotational isomers. Finally, the analysis of the Raman and infrared spectra of dichloroethane is given as an example.

The book constitutes an interesting introductory account of the application of studies in infrared and Raman spectroscopy to simple molecules having internal rotational or torsional vibrational degrees of freedom. The possible extension of these results and/or techniques to the elucidation of structures for more complex molecules is discussed and illustrated by some examples.

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The Structural Chemistry of Proteins. H. D. Springall. Academic Press, New York; Butterworths, London, 1954. x + 376 pp. Illus. $6.80.

The author states that this book grew out of a course of lectures given to undergraduates in the final year of an "Honours School of Chemistry" and to postgraduate research workers. After an introduction defining the biological importance of the proteins and considering the amino acids derived by hydrolysis, Springall discusses successively the chemical methods of peptide synthesis, the fibrous proteins, the globular proteins, and finally the analytic chemistry of the proteins and amino acids. Each chapter has a self-contained biblography, and there are author and subject indexes as well as an index of "named" proteins and peptides. Each chapter has a reasonably detailed introductory summary of its subject, which should serve to orient the student in the subject and its literature.

The chapters on fibrous and globular proteins contain discussions of physicochemical methods applicable to proteins including x-ray and electron beam diffraction, infrared and ultraviolet absorption, electrophoresis and sedimentation. The relationship of these studies to molecular sizes and shapes and to the various detailed models of folded, pleated, and helical peptide chains is clearly stated.