

personal opportunity, distribution of wealth and income, education, knowledge, foreign policy, esthetics, and recreation—must all be made on broad judgmental grounds relating to the ultimate values and meanings of human life. Few specific criteria or objective standards are available. Where quantitative standards can be applied, as in the case of costs and prices within the private economy or tests within the educational system, these quantitative standards often tend to dominate decision-making to the exclusion of non-measurable and usually more important considerations. The allocation of resources to scientific investigation is partly an economic matter in which there are some quasi-objective standards, but it is largely an esthetic and educational matter relating to fundamental values and meanings of human life. As the seminar so clearly showed, the allocation of resources to science, including the determination of the role of universities in scientific investigation, is one of those important matters that call upon human beings to use their broad judgment (expressed in part through the political process) and not merely to resort to simple and automatic quantitative analysis.

The importance of the book is not lessened by the paucity of clear-cut answers and formulas. It is the best available discussion of a subject vital to our society and should be read and pondered by all those concerned with science policy.

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Colloque Ampère

Magnetic Resonance and Relaxation. Proceedings of the 14th Colloque Ampère, Ljubljana, Yugoslavia, Sept. 1966. R. BLINC, D. HADŽI, and M. OSREDKAR, Eds. North-Holland, Amsterdam, 1967. xvi + 1241 pp., illus. \$50.

The advent of magnetic resonance methods, in the early 1950's, has been recognized by some as the latest major contribution to the study of physical chemistry, where "physical chemistry" can be defined in the words of the late G. N. Lewis as "all those things in which I am interested." Certainly, the interest has grown from a physicist's laboratory curiosity (albeit, a Nobel-prizewinning observation) through a period of exciting, almost romantic, discovery of the inner secrets of mole-

cules and on to its present stages as an essentially routine exploratory or analytical tool.

This rapid maturation of a technique which was in many ways mechanically complex and even awesome to the chemist can to no small extent be attributed to the efficient, rapid communication systems developed by the early practitioners. Publications in the conventional literature serve their useful purpose, but are too slow and too restricted for the serious student. The solution was found in the formation of specialized colloquia, of which the Colloque Ampère is a prime example. This continuing series of colloquia has provided the international latticework for the interchange of results and ideas at the current state-of-the-art.

This compendium of the 14th session is illustrative of the range and intensity of activities of a cross section of the world's contributors. The emphasis of the conference was on the basic physics of magnetic resonance and on its applications in physics, chemistry, and biology. The almost 200 papers can be, somewhat artificially, sorted into about 60 on the fundamentals of the magnetic resonance phenomenon, 60 on applications to solid state physics including metals and semiconductors, 40 on the physical chemistry of molecules and aggregate systems, and the remainder on a variety of topics in dielectrics, radiation damage studies, deuteron resonance, and the computerization of magnetic resonance experiments. The rigor of the condensations printed here is highly varied, ranging from a few excellent general review articles of 30 pages or so down to abbreviated abstracts of less than 50 words. It is an admittedly arbitrary reflection of one's own interests to select individual articles for comment, but the several which I found particularly informative included R. L. Mössbauer's general discussion of recoil absorption of gamma rays and nuclear hyperfine interactions, the historical survey of the impact of NMR on the knowledge of hydrogen bonding by G. L. Hofacker and A. H. Hofacker, three descriptive articles on nuclear dynamic polarization by A. Abragam, E. L. Hahn, and K. H. Hauser, and the entire session on new techniques, which includes a particularly good survey on the superconducting magnet by F. A. Nelson and H. E. Weaver. Other readers would undoubtedly select a differing list.

In general, however, this compendium should not be viewed as a source

book or even as a general review. The coverage is too extensive and, in consequence, too abbreviated—even considering the 1241 pages. Unfortunately, it becomes a moot question even as to justification for hard-cover publication of a volume of such a relatively high price and predictable short-term utility.

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Successful Theorists

The Atomists (1805–1933). BASIL SCHONLAND. Oxford University Press, New York, 1968. x + 198 pp., illus. \$5.60.

Sir Basil Schonland has written an engaging semipopular account of an extremely interesting and complex aspect of the history of modern science. *The Atomists (1805–1933)* discusses the major post-1800 antecedents of the quantum mechanical atom, what Sir Basil calls "the final mathematical model of the atom." The story begins with Dalton and reviews very briefly the development of the ideas of the ion, electromagnetic waves, the electron, the early atomic models of the atom of Rutherford and of Bohr, and finally the changes wrought by quantum mechanics. The ideas and the relevant experiments pertaining to each are described clearly and economically; the illustrations are skillfully selected and helpful.

This account of historical landmarks in science raises some interesting questions. Without a doubt, Sir Basil's story of atomism is an example of "Whig" history; that is, the author has sought to illuminate only those aspects of history which have contributed positively to the development of present-day "text-book" versions of atomic structure. Consequently, armed with hindsight, the book systematically slights the concerns of the past. There is no discussion, for instance, of the vortex atom of William Thomson, which played so interesting and important a role in Victorian physics. There is bare mention of the influential Boscovichian atom and scarcely a reference to the opponents of atomism, the ranks of which included a fair number of distinguished scientists.

Yet there are uses even of Whig history, and Sir Basil's book amply illustrates them. As a concise source for clear discussions of important and well-known scientific events, *The Atomists (1805–1933)* succeeds admirably. More-