**Advanced Organic Chemistry**. G. W. Wheland. Wiley, New York, ed. 3, 1960. xi + 871 pp. Illus. $17.50.

This edition of a well-known textbook contains new material considered by most instructors to be necessary for the study of organic chemistry at the graduate level. Among the new topics introduced are electron and nuclear magnetic resonance, the Hammet equation, selected kinetic studies, and molecular orbital theory. The text is improved by the additions, but the brief treatments accorded the topics here could hardly give the student any proficiency with concepts and techniques considered by many to be essential for understanding current developments in the theory and practice of organic chemistry.

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**Soviet Statistics of Physical Output of Industrial Commodities**. Their compilation and quality. Gregory Grossman. Princeton University Press, Princeton, N.J., 1960. xvi + 150 pp. $4.50.

Gregory Grossman has a deservedly high reputation among those interested in the Soviet economy. His work is always interesting and stimulating, it avoids jargon, it shows scholarship and ingenuity in handling evidence. All these qualities are present in this volume. He delimits his area of inquiry quite clearly: *physical* output of industrial commodities. Therefore, he does not analyze output indices, or agricultural statistics, for example. Within his chosen area, he goes carefully into all available evidence, taking nothing for granted, never making unproved assertions. If his conclusions are sometimes tentative, this is because the evidence is often tenuous, or even contradictory. On the whole, he tends to the sensible view that the data on physical output, as reported, are usable, that there is probably no "double book-keeping" in the sense of a separate working set of "unfalsified" figures used by the planners. On the other hand, some false reporting from below undoubtedly occurs, while central statisticians sometimes endeavor to mislead by selection and suppression of data. Grossman warns us that these hypotheses rest on a not-very-sure foundation; however, the pure invention hypothesis, which he calls the "nihilistic position," is much less well founded.

There are some very interesting analyses of possible forms of distortion in reporting to the center and of the measures taken to combat it. It is true and important that some forms of falsification are much easier to practice than others. For instance, it is hardly possible to "invent" the production of nonexistent steel, because the factory concerned would be called upon to deliver it to somebody. The factory may, however, "borrow" production from the first week of the next plan period to enable it to claim plan fulfilment for the current period. It may alter the product mix, to the disadvantage of the users, for the same reason. The extent to which a factory can do such things depends on the degree of detail of the plan, the number of possible variants of the product, the importance attached to it by inspecting and checking agencies, and so on. The reporting agencies tend to be interested in presenting their statistics so as to show rapid growth, and they use the ambiguities of the regulations to this end. The chronic seller's market has often enabled the producer to foist inferior or defective products on the purchaser, and thereby to inflate output figures. All these and other factors are discussed fully and well. "Presentational" distortions in publication by the central statistical administration are also well covered, and the attentive reader will learn to be cautious in evaluating certain types of data, without jumping to the conclusion that outright falsification is practiced. Thus, an output series on footwear production may be affected by an unpublicized change of the definition of "leather shoes" or by the omission of the production figures for some small workshops during the base-year, but there is no evidence that the authorities simply announce that 250 million pairs have been produced when they know the correct figure to be 230 million. Again, "definitional" distortions depend on the commodity. What might be possible in the case of shoes, clothes, or canned foods is most unlikely to apply to other items—for example, electricity or flour —which are much more homogenous.

Possibly the author is a little hard on Soviet statistics and statisticians, at least by implication, when he compares them with our own. In my days at the British Board of Trade, I was struck by the reluctance of many firms to supply information, other than during infrequent (and much resented) censuses of production. The necessities of planning do provide a flow of regular data and the means of administrative cross-checking, which Western statistical agencies lack. Many of the statistical problems, notably those involved in physical output data of multivariant commodities, are common to all countries, and a perfectly "correct" answer is beyond the wit of man. But it is an important fact that the self-interest of Soviet enterprises and reporting agencies is involved in a way in which it is not in the West, and it would be surprising indeed if this self-interest did not affect the figures. In analyzing the various ways in which this would affect published data, Gregory Grossman has produced a most valuable survey of a very important and complex aspect of evaluating Soviet statistics.

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**Relativity: The General Theory**. J. L. Synge. North-Holland, Amsterdam; Interscience, New York, 1960. xvi + 506 pp. Illus. $16.50.

This book is the sequel of Synge's work *Relativity: The Special Theory*, which was published by the same publishers in 1956. The present book may be considered a text or a monograph; at any rate it is a very personal account of the subject matter, in the best sense of the word, and makes most enjoyable reading for the fellow investigator.

This work is distinguished from other books on general relativity by its geometric approach. Synge takes the Riemannian character of the space-time continuum for granted, but then makes a most searching inquiry into the possibility of invariant characterization of diverse four-dimensional manifolds, most but not all of which are presumed to possess some interest to the physicist. That much of the book is written in an informal, and occasionally episodal, style should not deceive the casual reader into believing that Synge has written a semipopular work. Quite on the contrary; Synge deals with a number of topics that are now subjects for research, and he goes to the bottom of many of them. If his presentation occasionally leaves one dissatisfied, it is because the subject has not yet been completely clarified.

Among other topics, Synge has dealt with continuum mechanics, the Cauchy problem of general relativity, integral conservation laws and equations of motion, fields with special symmetries, gravitational waves, solutions of the Einstein-plus-Maxwell field equations, and geometrical optics in a curved universe.

For the record I should like to state that Synge's criticism of a statement of mine (see page 310, footnote 1) is fully justified.

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**North Arabian Desert Archaeological Survey, 1925–50**. Papers of the Peabody Museum of Archaeology and Ethnology, vol. 45, No. 2. Henry Field. Peabody Museum, Harvard University, Cambridge, Mass., 1960. x + 224 pp. Illus. $8.25.

In southwestern Asia few regions are so little known archeologically as the Arabian Peninsula, where serious lacunae remain in our knowledge of the cultural history of every area and of every period. Some of the gaps in the prehistory of northern Arabia are filled by this work, which contains the results of five ground surveys and one aerial crossing of the North Arabian (or Syrian) Desert, conducted by Field between 1925 and 1950.

While these surface surveys by no means covered the entire region, they yielded a sufficiently representative sampling of artifacts to permit the distinguished prehistorian Dorothy Garrod to frame tentative conclusions regarding the cultural history of the region in prehistoric times. The Paleolithic period is successively represented by Acheulean, Levalloisian, Levalloiso-Mousterian, and Aurignacian industries, with affinities to those of neighboring countries, especially Syro-Palestine. Thereafter the desert cultures apparently diverge from surrounding tradition, and Garrod typologically distinguishes three industries ranging in time from the late Paleolithic—early Mesolithic to the late Mesolithic–Neolithic. The exact nature and chronological order of these late industries must await the discovery and excavation of stratified sites. In Paleolithic times, this region seems to have enjoyed a more favorable climate, supported a larger population, and served as a route of migration between Africa and Asia. The absence of sickle blades from the latest industries suggests that desiccation was sufficiently advanced in Mesolithic times to make agriculture impossible.

Other essays deal with special features of the survey. The geology of the region is described by E. W. K. Andrau; the architecture of three Umayyad lodges is discussed by Eric Schroeder, supplemented with observations by Florence E. Day; and a Greek inscription from Qasr Burqu' is published by Sterling Dow. Appended to the report are two lists of plants from this region and a most useful list of the archeological sites visited, with a summary of the finds at each. Worthy also of special notice is the excellent three-color map showing Field's traverses, the sites and quarries discovered, and the surface features of this region. This book will be an extremely useful source for future archeological research in the region.

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**The Economics of Defense in the Nuclear Age** (A RAND Corporation research study). Charles J. Hitch and Roland N. McKean, Eds. Harvard University Press, Cambridge, Mass., 1960. vii + 422 pp. $9.50.

This book deals not primarily with economics, as it is ordinarily understood, but with the application of economic concepts to military decision-making at all levels. The authors "regard all military problems as, at least in one of their aspects, economic problems in the efficient allocation and use of resources." They feel that "the job of economizing, which some would leave to budgeteers and comptrollers, cannot be distinguished from the whole task of making military decisions."

Starting from this premise, the authors discuss first the general background of defense planning: the various military threats we face, the general economic-resource limitation of defense programs, the indirect effects of defense spending, and the economic strengths of the major powers.

The major portion of the book is devoted to describing and illustrating concepts and methodology for making quantitative analyses of cost versus effectiveness of alternative military programs, sometimes in dollar measures, often in physical measures, when time or other constraints require it. One excellent chapter discusses the problems of selecting appropriate criteria for evaluating the relative effectiveness of alternative programs, a particularly knotty problem in most large-scale systems analyses, particularly when various incommensurable costs or benefits are involved.

Also discussed are the difficult problems of handling uncertainty, both for the case of random variation and for uncertainty resulting from the future decisions of an enemy, who is likely to take advantage of any weakness in our defense posture. An appendix, written for readers with an elementary knowledge of differential calculus, "presents necessary and sufficient conditions for the maximum and minimum of a broad class of functions. It also includes a brief discussion of methods for finding the maximum."

Numerous examples to illustrate the concepts discussed are drawn from the Rand Corporation's 15 years of experience in analyzing, for the Air Force, problems at all levels, ranging from the broad strategy for deterring all-out war to the design of efficient logistic support procedures.

In part 2 the discussion covers a variety of special problems and applications: efficiency in military research and development; military logistics; the economics of military alliance; economic warfare and disarmament; mobilization, civil defense, and recuperation. The final chapter "Choosing policies for deterrence," is a reprint of Albert Wohlstetter's brilliant article, "The delicate balance of terror," which first appeared in the January 1959 issue of *Foreign Affairs*.

The book is well and simply written, and presupposes no special background in economics, mathematics, or operations research. The authors disclaim any intention of writing a text in "how to do" military operations research or systems analysis; but it is, in fact, one of the best general expositions of concepts in these fields which has appeared. It should be useful to military operations analysts, and invaluable to decision-makers who must use the results of military operations analysis and system analysis. It would make an excellent text for use in the service war colleges and in university courses in operations analysis.

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