modern techniques clearly recognizable as analysis such as activation analysis and electron-probe microanalysis, to methods that fit only a broad definition of the field of analysis, such as critical constant determinations. The articles are primarily aimed to show "*how* a method or technique works, not *why* it works." Nevertheless, many of the articles contain basic information on the principles underlying the methods and will serve as an immediate guide as to the applicability of the procedures.

Often a critical step in the efficient solution of an analytical problem is the choice of the best approach in view of the personnel and facilities available. This encyclopedia should perform an important function in alerting the industrial analytical chemist to a wide range of possible attacks on his problems. The editors and authors are to be commended for an important contribution to the literature of analytical chemistry.

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Sharks and Swimmers

The formation of the Shark Research Panel of the American Institute of Biological Sciences in June 1958 has stimulated research on elasmobranch biology and the shark hazard problem. Since then several books of varying quality on sharks and shark attacks have appeared which are intended to inform swimmers and divers about the dangers. David H. Davies, who was killed in an automobile accident late in 1965, authored one of the better of such books, **About Sharks and Shark Attack** (Hobbs, Dorman, New York, 1966. 237 pp., illus. $6.95). In six years of research on the sharks of South Africa, during which he gathered original information, he found only 83 instances of unprovoked attacks, an indication that, though they must be regarded as an ever-present hazard for swimmers, their frequency is not great.

The first of the 10 chapters gives general background information on sharks, discussing their anatomy, classification, evolution, reproduction, physiology, migration, and habits. The remainder of the book discusses the shark-attack problem in the waters of South Africa, where, among 24 kinds of sharks, only six are dangerous. They are the Zambezi shark, *Carcharinus leucas*; the ragged-tooth, *Carcharias taurus*; the tiger shark, *Galeocerdo cuvieri*; the blue pointer, *Carcharodon carcharias*; the mako, *Isurus glaucus*; the hammerhead, *Sphyrna*. Detailed documentation of 19 attacks, largely investigated by the author, is given, including color illustrations of massive wounds of the victims. (These gruesome photographs seem to me to be suitable for a medical journal but out of place in this book, which is written for the general public.) Anti-shark-attack measures used in South Africa to protect swimmers are discussed and illustrated. These include mechanical barriers, protective shark nets, meshing, beach patrols, and reduction of the shark population by fishing. A chapter is devoted to advice to swimmers and divers on the kind of action to take in the event of an attack or to help avoid attack. Mention is made of further research in progress on the biology of sharks and on anti-shark-attack measures, such as barriers and electric, sonic, and chemical repellents.

This book was written by a man with a broad scientific background and is quite dependable. I recommend it highly.

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Human Maladies

In **History and Geography of the Most Important Diseases** (Hafner, New York, 1965. 224 pp., illus. $5.50), Erwin H. Ackerknecht, formerly professor at the University of Wisconsin and now at the University of Zurich, provides an English version of his work published in German by Enke Verlag in 1963. The book was originally prepared because the pertinent literature was either partially outdated or out of reach; and, for the first time, it brings together this complex story in a highly condensed yet critical form. The presentation is clear and matter-of-fact in tone. No concessions are made to a "popular" audience; but the text should be very interesting reading to those who appreciate the importance of the subject. It will also be useful as a reference work, providing brief accounts of particular diseases. Laymen may need a medical dictionary or other aids at some points in the narrative, but such supplementary reading will do no harm. Typographical errors appear here and there, the most serious of which result in a garbling of parts of George Rosen's preface.

Despite brevity, the study is a comprehensive one covering some 38 diseases as now recognized. The author first sets up eight classes, such as acute communicable, deficiency, and "chronic diseases of unknown origin" —the latter a difficult category to handle. Under each heading, from three to 20 entities are discussed; and this is done, wherever possible, in terms of symptoms, history, geography, and the growth of understanding. The range of Ackerknecht's knowledge revealed here is remarkable. Historical statements are usually quite specific, and this is also true of the geographic, except for references to so vague a location as "South America."

Quite naturally, more space is given to diseases which have been widespread and often fatal—particularly those now subject to some control—than to less serious or less well-known ones. One may raise questions as to why some particular disease entity, or group of related entities, is or is not brought into the picture. The omission of heart and vascular ailments is striking, and no explanation for it is offered. But the author necessarily gives us his own judgment as to what types of illness were most "characteristic" of a given category in his nosology; and most readers will accept the classification and examples chosen as providing a meaningful panorama of diseases.

The author draws interesting conclusions from his sweeping survey, and it is in this connection that historians may differ at some points. He says, for example, that diseases "seem to be caused always by . . . infection, wear and tear, and new growth." True as this usually is, one wonders whether the statement can be applied, for example, to the food deficiencies (avitaminoses). Questions can be raised also about the view that the "predominance" of major diseases had little or no influence on a given society at a given time. Can it be proved one way or the other, for example, that combined malnutrition, malaria, and hookworm infection had nothing to do with the so-called "laziness" of workers in the southern states of the U.S.A.? On the other hand, this view offers a desirable correction to exaggerated claims that whole cultures declined

as a result of spreading diseases. Quite suggestive, also, is Ackerknecht's opinion that "history" is often the cause, rather than the consequence, of changes in morbidity—that malaria in Rome, for example, was the consequence rather than the cause of social dissolution. Likewise sound, I think, is the statement that medical history always shows "a combination of retreats and advances" rather than a growing "conquest" of diseases; though the recent increase in average life expectancy at birth may be viewed as a positive achievement. Certainly, as the author notes in closing, the contemplation of this vital theme "does not offer any cause for excessive optimism."

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Strategists' Guide

The natural appeal of rational conflict lends an aura of excitement to the theory of games. Since the appearance in 1944 of von Neumann and Morgenstern's monumental treatise *Theory of Games and Economic Behavior*, the glamorous opportunity to solve a wide variety of decision-making problems has attracted numerous adherents. The businessman, the social scientist, the military strategist, the diplomat have heeded the call of a lustrous future filled with optimum strategies. In order to provide a clearer perspective to the nonmathematician and the potential user (or misuser) of game theory, Anatol Rapoport has written **Two-Person Game Theory: The Essential Ideas** (University of Michigan Press, Ann Arbor, 1966. 229 pp., illus. Paper, $1.95; cloth, $5).

Rapoport discusses the nature of the theory—what it is and what it is not, what it could become and what it cannot become. In order to lessen the notational worry, he confines his attention to the treatment of two-person games. After an opening chapter on the essential features of game theory, he tackles the difficult questions of what utility is and what relationship holds between utilities of different players. Next are presented highlights of the zero-sum theory: game matrix, saddlepoint, minimax, mixed strategy. Turning to the nonzero-sum theory, Rapoport uses the Battle of the Sexes as an example to summarize and contrast varied methods of solution offered respectively by Shapley, by Nash, by Raiffa, and by Braithwaite. The treatment of nonnegotiable games analyzes such conflicts as the Prisoner's Dilemma and Chicken. A chapter on the inductive theory is followed by a detailed example discussing a diplomatic conflict concerning international inspection to control treaty evasions.

The final chapter, entitled "Opportunities and limitations," is vital reading for all players in game theory. Here the author identifies the usefulness of game theory—and it is not a sort of usefulness that readily appeals to strong advocates of practical application, but it is a type that must not be dismissed. In summary I quote the book's penultimate sentence: "The great philosophical value of game theory is in its power to reveal its own incompleteness."

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Gauss on Number Theory

Carl Friederich Gauss is one of the handful of mathematical giants who tower above the merely great mathematicians. Although he flourished over a century ago, his work has a very modern flavor. Moreover, he is a masterly expositor, with the virtues of simplicity, clarity, and care for historical detail. It is therefore scandalous that virtually none of his works have been available in English. Now at last we have his **Disquisitiones Arithmeticae** [Translated from the second German edition (Göttingen, 1860) by Arthur A. Clarke. Yale University Press, New Haven, Conn., 1966. 492 pp., illus. Paper, $2.95; cloth, $12.50]. Perhaps the greatest single treatise on number theory (the study of the properties of whole numbers), it presupposes no more than a knowledge of arithmetic and elementary algebra, and a willingness to construct and work out numerous arithmetical examples to illustrate the argument. The principal topics are elementary theory of congruences, the law of quadratic reciprocity, forms, and the division of the circle (a little trigonometry is required for this last topic). Both mathematical specialists and amateurs will find much of interest in this book. Admirers of Gauss will not be surprised to find, in sections 267 through 270, that he used matrices to represent linear transformations and the row-column product to represent their composition almost half a century before Caley's "invention" of matrices. Section VIII, referred to several times by Gauss and not included in this book, may be found in volume 2, pages 510-14, of the collected works. The only significant weakness in the translation is the absence of an alphabetical index. Congratulations to Clarke! Let us hope that he will make more classics available in English.

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New Books

Mathematics, Physical Sciences, and Engineering

Advances in Machine Tool Design and Research. Proceedings of the Sixth International Machine Tool Design and Research Conference (Manchester, England), September 1965. S. A. Tobias and F. Koenigsberger, Eds. Pergamon, New York, 1966. 807 pp. Illus. $36. There are 48 papers.

Advances in Structure Research by Diffraction Methods. vol. 2. R. Brill and R. Mason, Eds. Vieweg, Braunschweig; Interscience (Wiley), New York, 1966. 170 pp. Illus. $9.75. Four papers.

Bioluminescence in Progress. Proceedings of the Luminescence Conference sponsored by the Japan Society for the Promotion of Science and by the National Science Foundation, under the United States–Japan Cooperative Science Program (Kanagawa-ken, Japan), September 1965. Frank H. Johnson and Yata Haneda, Eds. Princeton Univ. Press, Princeton, N.J., 1966. 664 pp. Illus. $15. There are 35 papers.

Chebyshev Methods in Numerical Approximation. Martin Avery Snyder. Prentice-Hall, Englewood Cliffs, N.J., 1966. 126 pp. Illus. $7.50.

Contamination Analysis and Control. James L. Dwyer. Reinhold, New York, 1966. 349 pp. Illus. $15.

Effects of High-Energy Radiation on Inorganic Substances. A symposium (Seattle, Wash.), October–November 1965. American Soc. for Testing and Materials, Philadelphia, 1966. 176 pp. Illus. Paper, $5.25; members, $3.70. Eight papers.

Electrical Methods in Geophysical Prospecting. George V. Keller and Frank C. Frischknecht. Pergamon, New York, 1966. 527 pp. Illus. $18.50. International Series of Monographs in Electromagnetic Waves, vol. 10.

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