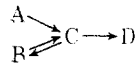
Book Reviews

Analogcomputer in Chemie und Biologie. By H. Röepke and J. Riemann. Springer-Verlag, Berlin. 1969. vii + 184 pp. 16.5 × 23.5 cm. $9.50.

This book is, in the opinion of the reviewer, a successful attempt to reintroduce chemists and biologists to the use of analog computers as tools for the investigation of reaction kinetics. The necessity of such a reintroduction becomes apparent if one considers that it has recently become customary in the chemical literature to equate the word "computer" with "digital computer," and thus excluding analog computers (see K. B. Wiberg, "Computer Programming for Chemists," W. A. Benjamin, Inc., New York, N. Y., 1965). On the other hand, investigations of the kinetics of chemical and biological processes have been limited to processes which consist of only a few individual steps, since the mathematical solution of the sets of simultaneous differential equations which describe complex processes is extremely difficult, if not impossible. The obvious way to approach such a problem would therefore be to eliminate the necessity for a mathematical solution. This is possible with analog computers, since their primary function is the simulation of time-dependent processes. This identity of the computer's primary function with the problem results in a very close similarity between the *problem language* and the *machine language*. It is therefore very easy to learn to program analog computers directly from the set of differential equations which specify the different steps of a process. It is a merit of this book by Röepke and Riemann that it impresses the reader with the ease with which even extremely complex processes can be programmed; for example, on p 168 the programming is discussed for a process which consists of three interconnected parallel reaction sequences, with two of them being of the following type.



The first three chapters of the book (20 pp) consist of a general discussion of the difference between analog and digital computers and of a listing of potential applications of analog computers in chemistry and biology. This section was meant to be, and is, quite superficial and should therefore not be considered to be more than background information. This introduction is followed by a 17-page review of the laws of reaction kinetics which includes mathematical solutions of sets of simultaneous differential equations for some simple processes. (These examples are included to show in a later chapter how much easier even these simple cases can be solved with analog computers.) Chapter 6 consists of an abbreviated (7 pp) listing of the usual components of analog computers, and this is followed by a 12-page introduction to the technique of programming analog computers for the simulation of chemical and biological processes. This introduction is brief and is really limited only to this specific type of problem, which makes it quite simple but also gives enough information that even novices in the use of analog computers can understand the last two chapters of the book.

The second half of the book consists of 50 examples in which processes of all degrees of complexity have been programmed. In most of these examples programming starts with an assumed kinetic model and relates only the amounts of starting materials, intermediates, and products which are found in the reaction mixture as a function of time. Only two examples deviate from this pattern by including additional dependent variables (p 142, absorbance; p 152, temperature of the reaction mixture). This second half is the most important part of the book, and it should therefore be mentioned that it consists mostly of differential equations and drawings of the corresponding computer programs. It can therefore even be useful to readers who are not fluent in German, provided that they already have a certain knowledge of programming of analog computers.

Minor blemishes can be found in this book although misprints are few (example: p 23 has $\ln a/a_0 = -\frac{1}{k}$ instead of $-\frac{1}{k} \times t$). In certain instances the reviewer would have preferred a more usual nomenclature (log instead of lg), the use of equations in more familiar forms (such as the Arrhenius equation on p 28), and in a few instances maybe a clearer notation (on p 155 the use of an input signal "XY" on the multiplier M_2, which has input posts marked +x, −x, +y, −y, can create confusion). But these blemishes are minor compared to the value of this book in impressing the reader with the ease of application of analog computers to investigations of reaction kinetics. It is for this didactic reason that this book is strongly recommended to chemists and biologists interested in this aspect of their fields.

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Biochemie des Sauerstoffes. 19th Colloquium der Gesellschaft für Biologische Chemie, Mosbach, Baden, 1968. Edited by B. Hess and Hj. Staudinger. Springer-Verlag, New York, N. Y. 1968. viii + 360 pp. 21.5 × 13.5 cm. Paperback, $17.00.

The discovery of cytochrome oxidase by Warburg and that of cytochromes by Keilin occurred 45 years ago, but the enzymatic function of cytochrome P-450, a microsomal complex of CO with hemoproteins which plays a role in microsomal oxidations and hydroxylations was described only in 1958. It appeared appropriate to review and summarize in the present symposium the observations and conclusions which have accumulated in this field during the last decade. They have greatly enriched biochemical knowledge of respiratory processes, and the oxidative metabolic variation of many drugs.

The topics of the symposium run the gamut of biochemical oxidations, with emphasis on mechanisms throughout. Introduced by a review of theoretical aspects of the physical chemistry of oxygen, which could be useful to any type of chemist, and of intercapillary oxygen transport and intracellular oxygen concentration, the following subjects are covered thoroughly: oxygenated and deoxygenated myoglobin; design of the respiratory chain; cytochrome P-450 and its functions; oxygenases; model systems for oxygen activation; oxygen-induced synthesis of respiratory enzymes; and electron transfer, field changes, proton translocation, and phosphorylation in photosynthesis. Each chapter is followed by a discussion paper and a section of verbatim, but carefully edited, remarks by participants in the symposium. These portions of the presentation may well serve as models for many other symposia which are printed in book form but often not adapted to the readers' needs.

Over two-thirds of the papers are in English. There are 188 figures which may account for the relatively high price of this little paperback volume.

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Frontiers of Biology. Volume 10. Antagonists and Nucleic Acids. By M. Earl Balis. John Wiley and Sons, Inc., New York, N. Y. 1968. xi + 293 pp. 17.5 × 24.5 cm.

In the last 25 years so much information on antagonists to nucleic acid biosynthesis and utilization has accumulated that reviews of the literature are welcomed by workers in this multidisciplinary field. Mechanisms of irreversible antagonism have been surveyed aptly by B. R. Baker [see *J. Med. Chem.*, **10,** 1195 (1967)], and numerous books on nucleic acid biosynthesis have been published. But a review especially of competitive inhibitors is a timely addition to this area.

The present book considers five biosynthetic aspects, *i.e.*, purine and pyrimidine biosynthesis and interconversion, and transcription and replication in nucleic acids. However, these chapters do not sway from the intended topic of the book; inhibitory processes and substances of these biochemical pathways are emphasized at every point. The chapter on alkylating agents is adequate but not comprehensive. The section on inhibitors of protein synthesis is very good. George B. Brown has furnished a special and well-conceived chapter on purine N-oxides as antimetabolites and oncogens.