relation to auxin, gibberellins, and antimetabolites; and cell division and differentiation related to induction and the morphology of transformation.

There is a short, selected bibliography, and three indexes—author, organism, and subject. The type, illustrations, and format are good.

The physiologist may feel that more time and emphasis should have been placed on the time relations in which light and darkness succeed each other than on such secondary considerations as the duration of the light and dark period, or to such modifying factors as temperature. Emphasis on modifying factors tends to stress the differences between various plants with respect to flowering, whereas an understanding of the fundamentals of flowering physiology must come from recognizing similarities. The author freely admits that the cocklebur is somewhat atypical, but uses this classical example to unify his presentation. Others may prefer a more critical survey of the literature and reference to already published work, rather than to unpublished data of experiments by the author and his students. Despite these inevitable exceptions, the author has accomplished exactly what he set out to do, in a most effective manner. The book should be well received, particularly by ecologists.

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Latin American Politics

The Military and Society in Latin America. John J. Johnson. Stanford University Press, Stanford, Calif., 1964. xii + 308 pp. $7.

This is the second important book published in English on the role of the military in Latin American politics. Its point of view differs substantially from that of the earlier work by Edwin Lieuwen. Both are essential reading if one wishes to understand the importance of the armed forces in the contemporary Latin American scene.

Johnson takes a substantially less-dismal view of the activities of the military in politics than did Lieuwen. In some countries, notably Brazil, he thinks that, on balance, their behavior has been positive and constructive. In general, he seems to think that the military are no less subject (albeit there is some time lag involved) than the civilians to the forces of change which are prevalent today in Latin American society. He sees the fact that the service academies are reaching further and further down the social scale for their students as indicating that, in the future, there is likely to be more and more sympathy among the officers for drastic social change.

On another point, too, Johnson differs from the earlier writing on the subject. He is a good deal less sanguine than Liewen about the effect that the so-called "professionalization" of the armed forces has on their tendency to engage in politics. He indicates that it may well induce them to intervene more rather than less. This is particularly true in the less well developed nations, where the technology possessed by the officer class is of greater relative importance and leads the officers to feel that they have capacity for dealing with technical problems which the civilians lack. He buttresses this argument with information on the number of government dependencies which are headed by military men, even in civilian-controlled administrations.

Fundamentally, Johnson starts with the proposition that, whatever the civilians might like, the military are not going to disappear and they are not going to cease being active politically. Therefore, the basic problem, as he sees it, is what direction this political activity is going to take. He says of the Latin American civilians that ". . . faced with such a situation, they could throw up their hands in despair and say to the officers, 'Do what you will not let us do.' That would be dramatic, and conceivably effective in certain instances. Or, knowing that they are moving rapidly into an era of profound social disorder and that Western representative democracy no longer has a monopoly in this Hemisphere, the public can maintain their armies as deterrents against extremist-provoked violence but at the same time work to convert them into more socially constructive institutions. That would not be so heroic but it would certainly be realistic, and Latin Americans will probably have to be more realistic than they ordinarily have been if they are to survive the onslaught of extremists from both the right and the left."

Several sections of this book are worthy of particular mention. One is that devoted to a historical account of the evolution of the military and its political role in Latin America, from the heroes of independence, to the ruffian armies of the "caudillos" of the later 19th century, to the comparatively well educated and technically capable officers of most present-day Latin American military forces.

Another particularly interesting aspect of the book is its more or less sociological analysis of the officer class. Johnson insists that in most countries there has been a shift in recent decades from the upper middle class of the smaller towns and cities to the lower middle and even the working classes of the cities as the principal source of officer candidates.

Finally, Johnson's analysis of the behavior of the Brazilian military as a special case is worthy of particular attention, especially in the light of Brazilian events since this book was published. Johnson's prediction that the Brazilian officers might be on the verge of changing their role from that of a grey eminence behind the political scenes to chief actors on the governmental stage seems to have been borne out by the revolution of 1 April and its aftermath.

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Computer Technology

Automatic Data Processing. Frederick P. Brooks, Jr., and Kenneth E. Iverson. Wiley, New York, 1963. xxvi + 494 pp. Illus. $10.75.

This book evolved from and with the lecture notes used in a two-semester graduate course given at Harvard University from 1954 to the present. It has been written in a form that is intended to be suitable for a two-semester course for college seniors, and, in addition, the authors have taken particular pains to make the book suitable for self-study. A set of exercises, usually well chosen, is given at the end of each chapter, as well as an extensive list of references to sources where a more detailed discussion of various topics treated in the chapter may be found. Twenty-two of the exercises are considered exceptionally difficult and their solutions are given in an appendix. The authors assert that the mathematical maturity attained from a course in college algebra should enable the reader to deal with the only occasional use of elementary mathematical concepts. However, the authors do use

the notions of the domain and range of functions and operators in discussing programs and metaprograms.

Chapter 1, which deals with number systems, congruences, symbolic logic, and encoding, is followed by three chapters that treat manual, semiautomatic (punched card), and automatic equipment. It is clear that some knowledge of such devices is important to the computer user. It is, however, equally clear that a substantial portion of a college senior's two-semester course should not be devoted to these topics. For such a course, I would much prefer to use a textbook in which the space devoted to these topics is considerably decreased and the savings assigned instead to an elaboration of the topics treated in chapters 5, 6, 7, and 8.

The authors have chosen to devote a good portion of chapters 4 and 5 to the obsolescent IBM-650 computer and to use this as a hypothetical machine in the subsequent discussions. I concur with the authors in their advocacy of the use of an actual computer in discussing computer coding and computer organization. I cannot, however, agree that the IBM-650 is a "not atypical" computer nor do I feel that the existence of programs which simulate the IBM-650 on many modern computers is a justification for discussing the organization of the IBM-650.

The discussions of programming, searching and sorting, and metaprograms, in chapters 6, 7, and 8, respectively, constitute the best part of the book. These chapters contain many actual programs and are well written. The authors stress the fundamental ideas and illustrate them by cogent examples. Some of the material in these chapters is a selection and a simplification of the treatment given in Iverson's excellent research monograph *A Programming Language*, also published by Wiley.

It is most unfortunate that the authors did not replace the material on the IBM-650 by corresponding material on a nonobsolescent computer and that they devoted so much space to manual and punched card equipment. If these lapses had been corrected, the authors' goal would have been better achieved and they would have written an excellent, comprehensive introduction to the use of automatic computers in all aspects of data processing.

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Mathematics

Nonlinear Mathematics. Thomas L. Saaty and Joseph Bram. McGraw-Hill, New York, 1964. xvi + 381 pp. Illus. $12.50.

Four brief quotations from the preface will suggest the spirit and the flavor of this fine new book by Saaty and Bram.

"Nonlinear mathematics is the mathematics of the day. Modern science demands it. . . . This volume is intended for the teacher who feels a need to unify the prolific subject matter of nonlinear mathematics. . . . Besides mathematicians we have written this book with scientists, engineers, economists, operational analysts, and other interested readers in mind. . . . We have tried to give more than a compilation of known techniques, to convey a spirit. In this spirit we integrate different topics of mathematics to show their interactions, to stimulate inventiveness through variety and to emphasize their origins from interaction with natural phenomena in physics, engineering and economics."

The first two chapters recapitulate the well-established theory of linear and nonlinear transformations and develop basic methods for solving systems of nonlinear algebraic and transcendental equations. Then a beginning discussion of linear programming theory precedes an 80-page treatment of nonlinear optimization and nonlinear programming. The better-known algorithms available for the construction of solutions of linear and nonlinear optimization problems are treated extensively.

The latter half of the book deals with nonlinear ordinary differential equations, automatic control theory, and linear and nonlinear prediction theory. Perturbation methods, stability theory, periodic solutions, and, especially, Lyapunov's stability theory are presented. A brief summary of useful techniques for solving nonlinear equations is noteworthy. Problems of random disturbances in control and communication are treated on the basis of the rather recent successes in the field of random processes.

Omitted, by choice, are topics in nonlinear partial differential equations, nonlinear integral and difference equations, and the subject of numerical methods. The style is informally pedagogic and conversational. Proofs are minimized to allow more extensive interpretation, motivating illustrations, and discussion of background and rationale. The presentation of ideas follows an effective sequential pattern: uniqueness and existence results, characterization, construction of solutions, convergence, approximation, and errors.

Readers of *Science*, and many others, will find this book of special interest. It provides an orderly, motivated treatment of these important topics, aimed at the senior or early graduate level. The authors have succeeded admirably in presenting this material in a form suitable for reading or for use in teaching. Insight, applications, and interrelationships have been developed. The extensive bibliography will be especially helpful to nonspecialists.

Here, then, is a book that should appeal to mathematicians in academic departments and to mathematics practitioners.

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New Books

Biological and Medical Sciences

Actualités de Phytochimie Fondamentale. Charles Mentzer and Olga Fatianoff. Masson, Paris, 1964. 270 pp. Illus. F.85.

Ageing. The biology of senescence. Alex Comfort. Holt, Rinehart, and Winston, New York, ed. 2, 1964. 379 pp. Illus.

Biostatistics. An introductory text. Avram Goldstein. Macmillan, New York, 1964. 284 pp. Illus. $9.50.

British Ecological Society Jubilee Symposium Supplement. A symposium held at London in March 1963. A. MacFadyen and P. J. Newbould, Eds. Blackwell, Oxford, England, 1964. 248 pp. Illus. Paper, 50s. Nineteen papers on the history of ecology in Britain, ecology and conservation, Quaternary ecology, production ecology, experimental and autecological studies, and the community concept. The volume is published as a supplement to the *Journal of Ecology* (vol. 25) and the *Journal of Animal Ecology* (vol. 33).

The Cell. Biochemistry, physiology, morphology. vol. 6, *Supplementary Volume*. Jean Brachet and Alfred E. Mirsky, Eds. Academic Press, New York, 1964. 578 pp. Illus. $18. Six papers: "The protozoan nucleus," Karl G. Grell; "The cytoplasm of Protozoa," William Trager; "The fungi," John B. Raper and Karl Esser; "The plant cell: Aspects of its form and function," Bruce R. Voeller (with electron micrographs by Myron C. Ledbetter and Keith R. Porter); "Sensory cells," R. Cordier; and "Connective tissue cells," Sylvia Fitton Jackson.

Cell Differentiation. vol. 17, Symposium of the Society for Experimental Biology.

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