

changes in the types of samples encountered and in the nature of the analytical information demanded.

In general, I believe that volume 1 fulfills its objective of giving a group of tested procedures that, although they may not be the best methods available, will suffice for many cases in which certain relatively common determinations have to be made. While I would have liked to see more critical discussion of the sources of error in the methods given and of other available methods, these functions are not part of the primary objective of the work.

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Phycology in India

Proceedings of the Symposium on Algae. P. Kachroo, Ed. Indian Council of Agricultural Research, New Delhi, 1960 [1961]. 406 pp. Illus. Paper, \$3.

This symposium, which met in New Delhi 7–11 December 1959, was organized jointly by the Indian Council of Agricultural Research and UNESCO's South Asia Science Cooperation Office. The stated purpose was to create interest in algae, especially as a source of food and as a factor in public health problems. That the importance of algae to the rapidly developing Indian civilization has been recognized, but not sufficiently, is clearly shown by the proceedings. Fewer than half of the papers deal with economic aspects, and most of these were given by participants from Europe, Japan, and the United States. The foreign guests were well chosen, all being competent investigators with significant messages to bring to India.

The symposium apparently accomplished its purpose, but the value of publishing the proceedings, other than for prestige, may be questioned. The resulting volume is a mixture of two types of contributions, rather than a group of closely related papers. Primarily, it presents a cross section of phycology in India; secondarily, it presents a partial spectrum of investigations on economic aspects of algae. While the papers by the foreign guests (on such topics as nitrogen fixation and mass culture) cover material that, in large part, has been treated more exten-

sively elsewhere, those by Indian phycologists generally report fresh material and are of sufficiently high caliber to provide some justification for publishing the book, at least from the point of view of someone interested in the overall advance of phycology.

Because of her enormous human resources, India has a high potential for scientific productivity. In an effort to close the gap between actual and potential production, Indian governmental and academic authorities have chosen what appears to be, in my judgment, an unsound plan: the establishment of a series of national journals, covering the spectrum of science. The output of good work in India, now and in the foreseeable future, can easily be accommodated in the well-edited, internationally recognized journals already available. The mere existence of national journals does not increase the amount of good work; rather, it spreads production thin and thus encourages hasty, superficial, and trivial reports. For those, like myself, who have been depressed by this facet of Indian science, the high quality of the present symposium proceedings is reassuring.

The chairman of the organizing committee was M. S. Randhawa, whose lengthy address of welcome does not seem commensurate with his success in convening the symposium. After some entertaining remarks on the esthetic and emotional appeal of algae (an interesting subject rarely broached), Randhawa gives a biased, fragmentary, and often inaccurate history of phycology. Even when one bears in mind that Randhawa's main interest lies in the Zygnemataceae, the choice (and omission) of many items still seems curious. For example, he states, "Lately a good deal of interest has been taken in the U.S.A. in the study of algae. W. J. Hodgetts (1918–25) described conjugation in *Zygogonium ericetorum* and also a number of new species of algae." Hodgetts was British; moreover, there is no mention of such substantial American contributors as G. M. Smith, W. R. Taylor, G. F. Papenfuss, G. W. Prescott, and E. Y. Dawson. The British fare no better. The long list of references, inconsistently cited and riddled with errors, bears little relation to citations in the text. We find Svedelius (1906, 1906–07) in the text, but Svedelius (1939, 1945, 1946) in the bibliography; H. J. Carter (1858) and Nellie Carter (1926, 1932, 1933) are merged into one person; and the pur-

pose of listing 37 references by Randhawa is all too apparent.

The contributed papers underscore the traditional Indian strength in morphology and cytology and their relative weakness in physiology and biochemistry. In the field of ecology new strength is shown. Of several good papers on both marine and freshwater algal ecology, the one by K. S. Srinivasan, "Distributional patterns of marine algae in Indian seas," is especially informative and scholarly. Based on highly dispersed literature as well as on original work, this account is the first picture of the marine algal flora of India as a whole, and it should prove of particular interest to those who plan to participate in the International Indian Ocean Expedition.

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Guideposts to Outer Space

The Stars. A new way to see them. H. A. Rey. Houghton Mifflin, Boston, Mass., ed. 2, 1962. 160 pp. Illus. \$6.

Very frequently astronomers are asked to recommend a book that will help someone to learn the constellations. Most persons seem completely baffled by imagined intricacies of the celestial sphere and the way constellations come and go in the sky. This book can be recommended to such persons as a great aid to learning about the constellations.

What is meant by "knowing" a constellation may be a matter of debate. Most of us recognize them as geometrical patterns that bear no relation to their names. But the author, H. A. Rey, thinks that the star patterns should appear as the name of the constellation suggests, and because he has taken great pains to connect the stars in each constellation into appropriate figures, in this book Leo looks like a lion! This should make the identification much more appealing to the new generations just beginning to learn about the sky.

The author starts with a few simple ideas necessary for finding one's way among the stars, and he wisely leaves the complications until late in the book. The reader can learn to identify constellations without worrying about such terms as *declination* or *hour circle*. Only in the last part of the book does the author give what he calls the "hows

and whys." Here, with many easily understood diagrams, he explains the circles of the celestial sphere and the seasonal changes of the constellations, as well as the ecliptic and how to find the planets. There are also brief descriptions of the moon and planets, of the nature of stars and the galaxy. A table for locating the planets and a brief "index-glossary" complete this excellent introduction to the sky.

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Engineering Data

Elements of Infrared Technology. Generation, transmission, and detection. Paul W. Kruse, Laurence D. McGlauchlin, and Richmond B. McQuistan. Wiley, New York, 1962. xxi + 448 pp. Illus. \$10.75.

This book, with a title descriptive of its content, provides a useful discussion for college seniors or first year graduate students whose interest is primarily academic and for engineers and scientists engaged in research on infrared devices.

Mainly because of its military applications, infrared technology has developed into a complex of many arts and sciences and, within the last two decades, has produced extremely sophisticated systems. The purpose of this volume is to explain the principles, operation, and limitations of the elemental components in infrared systems. A subsequent volume will cover systems and applications.

In the preparation of such a work, a major problem arises from the broad scientific scope underlying infrared technology. The authors' solution comprises careful organization and judicious editing. This is primarily an engineering book; it is an excellent compilation of engineering data. Much information is presented in graphic or in tabular form.

Most sources of infrared radiation are mentioned in the discussion of its generation, but thermal sources are covered in more detail than other methods. This seems justified because of their importance as practical thermal sources. A subject often neglected, photon fluctuation phenomena, is discussed in this section. The treatment of lasers and irasers is disappointingly short, considering their potential as coherent in-

frared sources. However, an excellent coverage of their use as detectors is given in another section.

The discussion of transmission follows the general pattern: a competent treatment of classical theory and its application to optical elements, then a summary of the optical properties of various media. The presentation of optical data is convenient and quite complete. For the more important materials, the coverage also includes pertinent mechanical properties, types of usable seals, and chemical stability. A discussion of the optical properties of the atmosphere completes the section.

The third subject, detection, which occupies about half the book, begins with a short introduction to solid state physics and noise theory. The authors then develop a complete quantitative engineering analysis of photoconductive, photoelectromagnetic, photovoltaic, and bolometer detectors; in this process they manage to discuss qualitatively the operating principles of all elemental detectors. They conclude with a comparison of various elemental detectors.

The Elements of Infrared Technology presents a great amount of information in a concise, clear fashion. The discussion of noise and its application to the analysis of elemental detectors will be useful to any experimentalist making low level measurements.

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Hazards of Nuclear Energy

Diagnosis and Treatment of Acute Radiation Injury. Proceedings of a scientific meeting, jointly sponsored by the International Atomic Energy Agency and the World Health Organization, Geneva, 17-21 October 1960. Columbia University Press, New York, 1961, 425 pp. Illus. \$8.

The publication of these proceedings represents an important event in our attempts to evaluate and deal with accidental serious exposures to external ionizing radiations. Practically all of the material in the first ten papers is concerned with six accidents that have taken place since the end of World War II. Excluding the experience of the U.S.S.R., the exposure to fallout of the Marshall Islands, and the two more

recent criticality incidents (in Nevada and at Hanford, Washington), these six incidents comprise most of the data on which our knowledge of accidental external exposure is based.

The "Lockport incident," which was discussed at the symposium, differs from the others in that the exposures were produced by x-radiation from an unshielded klystron tube in a radar station. The other five incidents all involved accidental criticality reactions, in experimental nuclear reactors in the case of the two old accidents at Los Alamos and also in the more recent one at Vinča, and in salvage operations involving uranium or plutonium, in the case of both the Y-12 accident and the recent one at Los Alamos.

One of the major contributions of this scientific meeting was to bring together the physicians, the physicists, and the radiobiologists who had to cope with the medical care of the exposed individuals. The papers and discussions brought out the very difficult problem of evaluating the degree of injury immediately after an accident in which there were mixed sources of irradiation and of recognizing unique regional injury, such as the heart damage experienced by the chemical operator in the most recent salvage accident (involving plutonium) at Los Alamos. Treatment was also extensively dealt with at the symposium; this ranged from allowing the patients to recover spontaneously, without therapy, to massive supportive measures and bone marrow transplantation.

Diagnosis and treatment of radiation injury were further considered in the next group of five papers, which were concerned with whole-body radiation therapy used to treat leukemia and other cancers and to suppress kidney homograft rejection. Procurement and preservation of human fetal blood-forming tissues, as well as adult bone marrow, were also discussed in detail.

The remaining six papers and discussion emphasized the special problems concerned with bone marrow transplantation. Human autologous marrow transplants have been used as an adjunctive measure to promote recovery from large port radiotherapy for advanced cancer. Particular attention was devoted to autologous and foreign marrow transplants in rabbits and monkeys, and this brought out the well-known problem of secondary disease in irradiated subjects treated with foreign bone marrow. Chemical protection against