Book Reviews

Microbial Processes and Disease: A Textbook

Microbiology. BERNARD D. DAVIS, RENATO DULBECCO, H. N. EISEN, HAROLD S. GINSBERG, and W. BARRY WOOD, JR. Hoeber (Harper and Row), New York, 1967. xii + 1464 pp., illus. $23.50.

This is a big book—1464 pages, $23.50, and six pounds big. It makes one wonder just how large and how expensive the combined demands of professors, students, and publishers are going to make the microbiology text of the future. This volume, by five eminent microbiologists, all of whom are M.D.'s, is the first completely new textbook designed specifically for medical school microbiology courses to appear in this country for a long time, and its publication has been awaited with more than ordinary interest. It is described on its title page as "a text emphasizing molecular and genetic aspects of microbiology and immunology, and the relations of bacteria, fungi, and viruses to human disease." To quote again, this time from the preface, the authors "have tried to identify the 'truly vital roots' of classical bacteriology, immunology, and virology, and to engraft them upon the recent molecular advances."

This objective is reflected in the amounts of space devoted to the topics usually covered in medical microbiology texts. Approximately equal portions of the book are concerned with bacterial physiology and genetics, immunology, bacterial and mycotic agents of disease, and viruses. This distribution represents a much heavier emphasis on basic microbiology and immunology than has been traditional. It is also unusual in that more pages are devoted to viruses than to bacteria and fungi.

The sections on bacterial physiology (broadly defined to include structure, metabolism, genetics, and chemotherapeutic agents) and immunology present highly readable accounts of these subjects in terms of modern biological concepts. They should be of value not only to medical students but also to graduate students in microbiology and other biological disciplines. Professors of microbiology might also learn something from these chapters.

The sections on bacterial and mycotic infections and virology are less successful in escaping the conventional mold of the medical microbiology text, but this is not really the authors' fault. The main trouble is that there is still no molecular biology of infection. Although molecular biology had its origin in Avery's search for an explanation for the pathogenicity of the pneumococcus, the lack of interest in infectious diseases on the part of molecular biologists has been matched only by the lack of interest in molecular biology on the part of medical microbiologists. However, the authors are to be commended for attempting to bring modern biological concepts to bear on host-parasite relationships and mechanisms of microbial pathogenicity, for this is the only way in which our understanding of infectious processes will be materially increased. In teaching microbiology to medical students, I have been somewhat surprised to find that it is easier to interest them in basic microbiology and immunology than in specific infectious agents and infectious diseases. The former, they say, represent coherent bodies of information, the latter "only facts." How to give coherence to these facts remains, even in this excellent text, a problem without a wholly satisfactory solution.

This is a handsome book, if a little unwieldy. The typography is good, and the illustrations are excellent and very numerous (1302 to be exact). There are 10 to 30 "selected references" at the end of each of the 57 chapters. A mild complaint might be that the references in some areas are a little too selected for a student with a broad range of interests. In some places, the enthusiasms and prejudices of the authors show through the printed page to a degree more appropriate to a critical review than to a textbook, but in general the treatment of controversial topics is fair and dispassionate. As is inevitable with a book of this length, there are errors, both factual and typographical. But anyone who has ever had any part in writing a textbook will be reluctant to cast the first stone of reproach.

In our department, we teach a two-quarter course in microbiology to medical students, graduate students, and undergraduate seniors that covers roughly the same topics presented in this text. A few copies were available for use in these courses last year. All these groups of students liked this text; the good students depended on it more heavily than the poor ones. I predict that Davis, Dulbecco, Eisen, Ginsberg, and Wood's *Microbiology* will be widely used in microbiology courses both within medical schools and without.

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Since the writing of this review Harper and Row has published a condensed version of *Microbiology*, under the title *Principles of Microbiology and Immunology* (863 pp., $14.95), for use as a textbook for general microbiology courses.—ED.

Botanical Center in Russia

The Komarov Botanical Institute. 250 Years of Russian Research. STANWYN G. SHETLER. Smithsonian Institution Press, Washington, D.C., 1967 (distributed by Random House, New York). xiv + 240 pp., illus. $5.95.

Stanwyn G. Shetler, an associate curator at the Smithsonian's Natural History Museum, visited the Komarov Botanical Institute in 1964, the year it celebrated its 250th anniversary, and apparently caught an infectious though fortunately mild and quite benevolent germ, for as an outcome of this visit, after a half-dozen years of gestation and extensive additional research, he has written this attractive account of the institute and its activities. This reviewer happened to visit the institute in 1963. He cannot claim to have made further studies on its history, but on the basis of what he did learn during his own visit he can testify to the author's great care and objectivity.

There are a few mistakes. The author, when speaking about the organization of the Russian Botanical Society in the year 1916, translates the term *tovarishch predsedatelya* as "comrade president."

But at least at that time it had no other meaning but vice-president, and these gentlemen might have been no less startled at being called "comrades" than Shetler, who in pre-Soviet Russia could have been a *tovarishch kuratora,* might be today if someone should address him as "comrade curator." The author also calls the Komarov, with no qualification, the leading Russian botanical institution in both the past and the present. However, this is true only if plant physiology is not considered part of botany. The leading Russian institution in that science is, and has been since its inception, the present Timiryazev Institute of Plant Physiology in Moscow, like the Komarov an institute of the Academy of Sciences of the U.S.S.R.

On a few occasions one may feel that the author's objectivity is carried too far. It might have been worthwhile to explain why the fortunes of the Russian Botanical Society reached such a low point as they did in 1932, since this is an interesting illustration of the situation of science in a totalitarian system. It may have been no less interesting to know that the Komarov Institute and its leaders had enough courage to offer a haven—perhaps a modest one—to at least one of the few Russian biologists who refused to bow to Lysenko even after 1948, when Lysenko was all-powerful, his doctrines having been endorsed by Stalin himself.

But although perhaps interesting these are points of relatively small significance. The rather complicated history of the present Komarov Institute—what was founded on Saint Petersburg's Pharmaceutical Island 250 years ago was really quite different from what is standing in the same place in Leningrad today—is described concisely, accurately, and with a sympathy which is attractive and entirely legitimate. The contributions of the institute and its predecessors in descriptive botany, which are indeed outstanding, are discussed clearly and with profound understanding. And since in this area of botany the institute has indeed always maintained the leading position in Russia, Shetler's book mirrors the history of much of Russian botany as a whole.

Furthermore, if read carefully it mirrors a good deal more, namely, certain features that seem quite typical of Soviet Russian biological sciences in general. There is a predilection for organizational matters. The structure of the Komarov Institute, with its departments, laboratories, and secondary laboratories or "groups," may well be the most complex one of any botanical institution on the globe, and moreover does not strike one as perfectly logical; for example, there is no department or laboratory of plant physiology, but there are independent laboratories of photosynthesis and of microelements, while the Laboratory of Physiology of Growth and Development is, rather surprisingly, part of the Department "Botanic Garden." Fortunately, it seems that these rather artificial boundaries are no serious obstacles to the scientific work and that they can be torn down (and replaced by others) with no or very little advance notice. Another and more serious feature of Russian biology which is also reflected in Shetler's account is the love—or is it an outcome of the methods of training?—of eminent Russian biologists for sweeping theories (the Russians themselves like to call them *ucheniya,* teachings, probably oblivious of the religious implications of the word), which are often followed and defended with little regard for new facts, whether coming from new observations or from new technical advances. Komarov was undoubtedly an outstanding systematist, and the 30-volume *Flora of the U.S.S.R.,* which is his accomplishment even though his direct contributions were quite small, is, as Shetler rightly says, an epitome of everything that is good about programmed research; it is the most outstanding contribution of Russian botany, and is, one may add, outstanding by any standards. But Komarov was an extreme "splitter" and moreover rather dogmatic in this attitude, and it is today clear that, to say the least, his concepts cannot be applied to any and all taxonomic groups. The *Flora,* however, has followed these concepts rather faithfully, and the resulting ambiguity of what it calls a "species" is the one fundamental weakness of which it can and must be accused. Even now, after the *Flora* has been completed, and although Komarov left the institute 30 years ago and has been dead for almost 25 years, his "teachings" seem to influence, one way or another, much of the work in the institute that bears his name; one cannot help the feeling that they are becoming more of a liability than an asset, standing in the way of the development and even the adoption of newer, promising methods in systematic research which are already widely accepted elsewhere.

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High-Powered Observation

Radar Astronomy. JOHN V. EVANS and TOR HAGFORS, Eds. McGraw-Hill, New York, 1968. xx + 620 pp., illus. $19.50.

Although radar astronomers are rather few in number, an interesting claim is made on their behalf that some of the most important recent advances in radar in general, notably in signal processing, have come from radar astronomy. If one thinks of radar astronomy as a field of basic research aimed at exploration of our environment, it is interesting to recall that the original development of radar for civil and military purposes stemmed from earlier endeavors in the scientific exploration of our physical environment. In fact, two basic kinds of radar, the frequency-swept continuous-wave radar and the pulsed radar, were both introduced in the same year (1925) by Appleton and Barnett in England and by Breit and Tuve in the United States with their successful demonstrations of the presence of the ionosphere. Evidence for the existence of an electrically conducting layer had been clearly developed by Heaviside and Kennelly from observations of radio propagation, and by Balfour Stewart from observations of the terrestrial magnetic field, but not everyone believed it; whereas the introduction of the radar technique immediately revealed the presence of two layers and gave their heights.

Application of radar to the exploration of the solar system has been just as impressive. Astronomical accuracy is famous, and in the hands of radio astronomers is becoming even more astounding. The accuracy with which the astronomical unit is known has been improved by three orders of magnitude by measuring the range to Venus, and is now limited by knowledge of the speed of light, the elements of the planetary orbits, and the radii of the planets. Further work in the field of echo delays will thus lead to improvement of planetary data.

Surprises were in store over the planets Mercury and Venus as regards their rotation rates, which can be studied from Doppler broadening of the echo and by a special "delay-Doppler" technique that makes use of returns from discrete surface features. Mercury had been thought, from visual observations of surface markings extending over many years, to have a rotation period of 88 days, which is the same as its orbital period. It now turns out that Mercury makes three rotations in