

originates entirely in minds completely detached from mundane affairs and concerned solely with the pursuit of truth for its own sake. He offers instead a picture of the lives of Davy, Faraday, Joule, Kelvin and Clerk Maxwell, in which we see how their characters were moulded by early upbringing, and the way in which their work was determined by various social and industrial influences. In revealing the extent to which other incentives besides the desire to contribute to the advancement of knowledge affected their careers, Mr. Crowther gives us a highly stimulating series of studies which appear appropriately at a moment when scientific workers are considering much more seriously both the social consequences of their work and the social factors which determine its extent or direction.

The selection of four physicists and a physical chemist as the most representative men of science of the century is defended on grounds that there were few outstanding figures in the fields of medicine, geology, botany and zoology during the period, in itself an example of the way in which the sciences which promised the greatest direct contribution to the prosperity of industry were the most richly endowed, while the biological, sociological and psychological sciences, which could offer no such immediate return, were much less generously encouraged. Although the author's opposition to capitalism tends to obtrude at times, it scarcely detracts from the fascination and suggestiveness of what is not merely biography but also to some extent a study of the effect of social conditions on the general development of science during the period.

R. B.

#### A Text-Book of Physical Chemistry

Vol. 2: Principles involved in Chemical Reactivity. By Dr. J. Newton Friend. Pp. xii+483+3 plates. (London: Charles Griffin and Co., Ltd., 1935.) 24s. net.

There is a pleasantly classical flavour about the second volume of Dr. Friend's treatise. Most of our old acquaintances are there, and though the ultra-modern physicist, "trained in an atmosphere of rigid economy of mechanical concepts" (an economy, Heaven help him, which leads on occasion to glib outpourings concerning the uncertainty principle, and a discreet silence concerning the mode of action of a locking-nut), may find overmuch of ancients in the exposition, the student who has attacked the fundamentals of physical chemistry with the aid of Dr. Friend's two volumes will not have a great deal to unlearn. The principal topics to which the ten chapters of the second volume are devoted are thermochemistry, chemical equilibrium, reaction velocity and chemical change in homogeneous systems, combustion in gases, the phase rule, catalysis, electrochemistry, the structure of the atom and of the molecule, and chemical thermodynamics.

The treatment is throughout clear, concise and elementary. Broadly speaking, the treatise will serve to lay the foundations for an advanced honours course.

A. F.

#### The Biology of Bacteria: an Introduction to General Microbiology

By Prof. Arthur T. Henrici. Pp. xi+472. (Boston, New York and Chicago: D. C. Heath and Co.; London: George G. Harrap and Co., Ltd., 1934.) 12s. 6d. net.

This book, as explained in the preface, is intended as an introduction to microbiology in its scientific aspects as distinct from its practical applications in hygiene, agriculture and industry. The author, indeed, considers that the lower unicellular micro-organisms present problems sufficiently important to warrant microbiology being considered as a separate branch of biology, distinct from either botany or zoology. At the same time, when dealing with individual organisms, their rôle in the causation of disease, or their importance in agriculture and industry, are adequately described, and immunity, antibodies and antisera, agglutination and the like, are all considered.

After a brief history of bacteriology and some details respecting the microscope, the microbic life of the Protozoa, Algæ, Fungi, Bacteria and other unicellular groups is considered. In these chapters the structure, nutrition, reproduction and other functions of each group are surveyed. The 'ultra-microbes', the finer structure of Bacteria, and the subjects of heredity, variation and metabolism in this group form the subject of several chapters. In this connexion, the author has definite views on the meaning and importance of Gram-staining, holding that the Gram-positive species form a homogeneous group distinct from the Gram-negative species, and bringing them in relation to the Fungi. In the many instances where alternative hypotheses are possible, for example, as regards the nature of 'bacteriophage', these are clearly stated.

The book is well produced and illustrated, and gives an excellent account of the biology of the Bacteria.

R. T. H.

#### Zur Erforschung des Weltalls: acht Vorträge über Probleme der Astronomie und Astrophysik

Von P. ten Bruggencate, E. F. Freundlich, W. Grotrian, H. Kienle, A. Kopff. Herausgegeben von W. Grotrian und A. Kopff. Pp. x+286. (Berlin: Julius Springer, 1934.) 19.80 gold marks.

This is not in the strict sense a popular book. It is, however, an account by a group of well qualified German astronomers of some of the recent researches and outstanding problems in their subject, written for readers with a reasonable knowledge of mathematics and physics. The authors' names are a sufficient guarantee of the quality of the volume. The subjects discussed—methods of astrometry, the physical condition of the stars, their inner constitution and evolution, the structure of the stellar system, the sun—reflect a sound choice from the whole range of astronomical knowledge. The volume arose from a series of eight lectures given to a circle of engineers at Charlottenburg in 1933. It is freely and well illustrated and attractively set out. It fills what is probably a real need in astronomical literature.