

Cause whose laws it is attempting to unravel. We do not agree that the cause of science is opposed to that of morality or right conduct or true religion and it is unnecessary to make extravagant claims on behalf of the latter to establish its superiority. Any attempt to do so is apt to land one in an untenable position. For instance, when the author says that men must live (society based on conduct) before they can know, the dictum is true of a social order under the control of a governing authority, but not of primitive society. Primitive man sustained himself not through the mystical charms of the Ten Commandments but by his skill in hunting, and dissimulating by lying concealed near the water holes and imitating the calls of animals and in circumventing the pursuits of his antagonists. The exploded controversy of the nineteenth century which raged over the conflict of science and religion has no basis in fact if we define and delimit the connotation of the latter term and is unnecessary to be evoked as offering difficulties to the interpretation of the social progress and political achievements.

The object of history is defined as the discovery of the principles of human evolution and the whole book is devoted to defend this thesis. There is one point in the discussion on which we are inclined to be sceptical. The truth which the historian sets out to discover is not of the same order as the one which falls within the province of the scientific investigators. If the apparatus is arranged without initial error or defects in the parts, then the observed facts cannot be far from truth, unless the observer is careless or clumsy in his interpretation. The material on which the historian works is human document which at the time of preparation cannot but be coloured by the passions and prejudices of the times. The very source is vitiated. If in 2014 A.D. the future historian were to proceed to investigate the truth about the Great War, he has to rely on the evidence of despatches, bulletins and other documents which the belligerents and the allies have published from time to time and each presents his case from his standpoint, in defence of his actions. These evidences on which the historian has to work will not have the same value as the facts presented by an experiment.

For purposes of a scientific history which deals with the evolution of social and

political institutions, mankind will have to be treated as a single unit and obviously this is impossible, for the ethnological, cultural and social differences among the races are too wide and deep to be brought under one general theory. But nevertheless the great events of nations and the factors of their evolution must have a common substratum capable of a scientific treatment. Scientific history is possible and even metaphysical history. But we prefer, we confess, Macaulay, Green and Froude to Seely, Mahan and Lord Acton. The narrative history has always an irresistible interest to man who is deeply concerned with the personal triumphs of his ancestors, their tastes, manners, dress, social weaknesses and strength, public amusements, their pains and their graces, their joys and tragedies, their forms of government and their public finance and foreign relations.

We have read this book with great profit. It opens out new fields of investigation and invests history with a new and attractive garb. Frankly, historical works written on the lines suggested by the author, must be invaluable contributions to historical literature.

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RESPIRATION IN PLANTS. By W. Stiles and W. Leach. (Methuen & Co., Ltd., London, 1932. Price 3s. 6d.)

In this small monograph of 124 pages on respiration in plants, the authors have been able to compress a good deal of information which, as they themselves say, is readable and understandable by the elementary student in Botany, and is also of value to the advanced student. In the four chapters into which the book has been divided, the authors have endeavoured to marshal facts, quoting recent researches of a fundamental nature only, with a view to lead the student of the subject into estimating a correct picture, as far as possible, of the cell dynamics concerned with this fundamental property of the living matter, *viz.*, Respiration. Chapter I deals with the physiological importance of the process in the living mechanism of the plant, *viz.*, the release of energy by a process of dissimilation of substances of a higher energy content. Chapter II deals with respiration of normal plants under aerobic conditions where the variability of the respiratory intensity under various conditions of development, season, and other interval changes in the plants and plant organs, and also under

the influence of external factors, is discussed. Chapter III deals with anaerobic respiration where, without making an attempt to connect it with the aerobic respiration, the authors have presented significant facts to prove the general existence of respiration without oxygen, the production of alcohol, the similarity of effects of external agencies on the intensities of aerobic and anaerobic respirations and the variability of the ratio of the anaerobic to the aerobic respirations in different plant organs. Of particular interest is their discussion of the behaviour of ripening apples on transference to nitrogen from air investigated by Blackman and Parija, where a rise of respiration takes place under anaerobic conditions, a behaviour which, though exceptional, may, in the authors' opinion, be a common feature characteristic of senescent fruits. Chapter IV which deals with the Mechanism of Respiration in plants, is a digested summary of investigations on plant respiration. After discussing the general nature of fermentation in the yeast cells, the authors have given a concise account of oxidising systems in plant and animal cells, including the non-enzymatic oxidising systems, such as, the Glutathione of Prof. Hopkins. They next pass on to a sufficiently exhaustive discussion of the stages in the respiration process, where the latest views are quoted and summarised, holding respiration as a balanced reaction commencing from the reserve respirable material and ending in its complete oxidation to substances of least energy content, such as, CO_2 and H_2O . During this process many intermediate reactions occur, such as the hydrolysis of the reserve material, its activation prior to oxidation, the glycolysis of the activated material and finally the respiration of these substances under either aerobic or anaerobic conditions. The quantitative output of the end-result would depend upon the working of this series of balances in the reactions involved. The latest scheme which presents these balanced reactions in something like a conceivable picture of the actual events which may be taking place in the plant cell is that of Blackman based on Parija's observations. Of the greatest interest to the biologists is Blackman's conclusion that oxygen plays a double part in plants, *viz.*, direct oxidation in the final process of respiration and an earlier influence altering the rates of production of the substrates which are utilised in the final stage of

respiration. This substantiates in an experimental way the general idea that oxygen (the "vital air" of the biologists) has manifold effects in various directions in the life-reactions of the living cell.

Though the authors cannot claim to have a thorough knowledge of the chemical aspects of the problem, they have been able to present a clear and concise discussion of all the chemical reactions which are known to be concerned in the process of respiration. The book, being a good summary of the more important recent work on this physiological process, should prove very useful to the teacher, the student and also the investigator. This is perhaps the first monograph in English by English authors of the recent work on respiration which, though concise, is sufficiently comprehensive.

R. S. I.

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FIRST PRINCIPLES OF TELEVISION. By A. Dinsdale, pp. xv + 234. (London. Chapman & Hall, Ltd., 1933. Price 12s. 6d.)

Progress in Television has been so rapid in the past few years that it is difficult for an author to bring the various practical methods and systems that are in vogue, and arrange them in the proper sequence so as to be easily understood by the general public. The author of this book has very wisely sifted the whole field and presented in an interesting manner what is necessary, to serve as a good background to a proper understanding of the subject.

A few pages have been deservedly devoted to the elucidation of some elementary principles in optics without which it is difficult for the layman to comprehend the various operations involved. The chapters discussing the various systems are well laid. It is particularly interesting to note that the author has taken considerable pains to review the present state of Television in various countries without forgetting even the most recent private demonstration which he saw in America.

The book is eminently suited for all those who want to have a general idea of the principles involved in Television, though the author would have catered for a wider circle had he included a few chapters for the serious experimenter. However the non-technicality of the language and the interesting way in which it is written render the book well worth the attention of all those interested in the progress of Television.

C. CHANDRASEKHARIAH.

GENERAL MECHANICS. By Prof. Max Planck. Translated by H. L. Brose. (London: Macmillan & Co., Ltd., 1933. Price 12s.)

Prof. Max Planck's book on "General Mechanics" is an elementary book on the subject which is divided into two parts, *viz.*, "Mechanics of a Material Point" and "Mechanics of a System of Material Points" including mechanics of a rigid body. Part I is divided into six chapters which deal with motion in a straight line and in space, central force, potential, integration of the equations of motions, relative motion, and constraints. Part II is divided into four chapters which deal with Statics and Dynamics of a rigid body; and Statics and Dynamics of an arbitrary system of points.

The beginner, who tries to learn mechanics, feels the difficulty in understanding the physical ideas underlying the different systems in mechanics. It has been the aim of the author to explain in an elementary way the physical motions involved in mechanics. He has also endeavoured to present the structure of mechanics as something evolved step by step. He has therefore departed from the traditionally prescribed method of presenting the subject as a finished product. The traditional method may be effective from the practical point of view, but is open to criticism not only on logical grounds, but also to the fact that it is likely to confuse the beginner who wants to grasp the physical principles underlying the Science of Mechanics. In several cases, the author sacrificed conciseness and elegance, and the proofs he has given are not necessarily short and elegant ones, but they are generally very lucid and suggestive. Instead of placing "ultimate definitions" at the beginning of ready products, the author, by discussing definite problems, has tried to show how these definitions became necessary and useful.

It is doubtful whether many scientists will agree with the author that "the enunciation of Newton's Law of Gravitation is not *au fond* an expedient invention, but rather it is to be regarded as an epistemological discovery". In this book "Vis Viva" and "Kinetic Energy" have been used synonymously whereas English Mathematicians usually define "Vis Viva" as twice "Kinetic Energy". By introducing an interesting little dialogue the author has explained quite effectively that a couple can be transported to any position in its own plane without altering its physical

meaning. Every student of Physics and Mathematics should read this book.

A. C. B.

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A TEXT-BOOK OF CHEMISTRY. By H. A. Wootton and C. W. R. Hooker. (Pp. 488. Cambridge: The University Press. Price 6s.)

The portion of the book dealing with theory is well written and most of the chemical terms are explained in detail as they occur. The descriptive portion of the book is ill-balanced; while the non-metallic elements and their compounds have been dealt with in some detail the treatment of the metals is meagre. The metallurgy of even technically important metals like aluminium, lead and copper is disposed of in a few sentences. The periodic classification is not dealt with at all. Further a few advanced ideas are introduced at too early a stage for the young beginner in Chemistry to appreciate or understand. The second part of the book contains instructions for practical work in fairly good detail; there are chapters dealing with practical work like preparation of substances, volumetric analysis, etc. The authors of the book have attempted to bring forth a volume which is ambitious in its scope. Naturally it has not been possible to do adequate justice to all branches of Chemistry.

The book can only be recommended to Libraries as a volume for general reference but it is not suitable as a text-book.

M. SESHAIYENGAR.

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FOUNDATIONS AND METHODS OF CHEMICAL ANALYSIS BY THE EMISSION SPECTRUM. Being the authorised translation of "Die Chemische Emissions spektralanalyse". By Dr. Walther Gerlach and Dr. Eugen Schweitzer. (Adam Hilger Limited, London, 1933.)

Although it is only three years since "Die Chemische Emissions spektralanalyse" was published it has proved so valuable to workers in the field that an English translation of it should be welcome to many.

The English edition has departed from the original only in two small sections. Table VIII on page 80 provides additional data for the quantitative estimation of iridium in platinum. The section on spectrophotometry is somewhat amplified by a description of Twyman and Simeon's arrangement and a short description of