ventor of the instrument he must necessarily be entitled to object to having any name attached to it which, in his opinion, is liable to lead to misunderstanding. I can, therefore, assure him that should a further edition of my book be called for, the alteration will certainly be made. In the meantime I feel sure Mr. Priest will agree that the description of the instrument which I have given in the text of my book is in no way misleading.

JOHN W. T. WALSH

QUOTATIONS

RESEARCH IN MEDICAL PRACTICE

RATHER more than a year ago the Ministry of Health submitted to the British Medical Association a scheme for cooperative research by panel doctors. This scheme has now been considered by the Insurance Acts Committee of the association in consultation with representatives of the Ministry of Health, and certain conclusions have been arrived at which are likely to exercise an important influence on the future of research work in general practice. Research work by general practitioners, it is felt, should not be restricted either to panel doctors or to panel patients, but should be open to all medical men who may desire to undertake it. It should be voluntary and it should be unpaid. Moreover, the subject or subjects "should be capable of being dealt with by the individual practitioner in a simple manner." This last recommendation is likely to meet with the approval of all who understand the difficulties attending any research work in general practice; it is, moreover, justified fully by the nature of the information of which the profession stands at present in need. The late Sir James Mackenzie, who was the first man in this country to recognize the necessity of continuous research work in general practice, emphasized again and again the fact that knowledge is still lacking about the most simple of human ailments. He was wont, for example, to insist that the nature of pain and the mechanism of its production are unknown, and to ask how, in these circumstances, physicians could hope to deal successfully with this commonplace symptom. His challenge still stands; but the new proposals suggest that it is about to be taken up in the spirit in which it was delivered.

The British Medical Association takes the view that the organization of the investigations to be carried out should be entrusted to itself, and proposes to make use of its machinery of divisions and branches to facilitate the work. There can be no reasonable objection to that plan provided that care is exercised to prevent research work being reduced to the level of a mere *questionnaire*. True research, as Sir Ronald Ross has so often pointed out, springs from the spirit of curiosity and the spirit of wonder and is, consequently, difficult to organize. Research workers are born, not appointed. Thus it may be hoped that there is room in the new scheme for the encouragement and assistance of individuals or groups of individuals who have, in the vast field of general practice, begun to cultivate plots of their own. Such workers have, in all periods, been the real architects of progress. They submit, as a rule impatiently, to the restrictions of "inquiries" which are addressed to them by others, but they possess always great funds of patience and of self-denial for use in their chosen labors. To discover such workers and to help them is a task of no little difficulty and delicacy, but it is a task well worth carrying out. There is room, indeed, in any liberal scheme of medical research for the individual as well as for the group or team. Information which can be obtained in the form of answers to set questions ranks by common consent lower in point of value than that kind of knowledge which inspiration and devotion are able to win.—*The London Times.*

SCIENTIFIC BOOKS

Introduction to the History of Science. Volume I, from Homer to Omar Khayyam. By GEORGE SARTON, Associate in the History of Science, Carnegie Institution of Washington. Published for the Carnegie Institution of Washington by The Williams and Wilkins Company, Baltimore, 1927. p. i–xi, 1–839.

THIS large volume is the first of several volumes in preparation which mark the most comprehensive synthesis in the history of science thus far conceived. It registers an epoch in the writing of history. Sarton defines science as "systematized positive knowledge" and to this definition gives a broad interpretation to include not only physical science, mathematics and medicine, but also the early history of philology, for "the discovery of the logical structure of language was as much a scientific discovery as, for example, the discovery of the anatomical structure of the body," also the history of religion, for "until relatively modern times, theology was an intrinsic part of science, and not only that, but, in the opinion of most men, all other sciences were subordinated to it." The clash between Greek ideals and the oriental religions (chiefly Judaism and Christianity) is "one of the greatest intellectual conflicts of history." The author includes also parts of the history of music—"indeed the theory of music was considered a part of mathematics almost until modern times." Some attention is

paid to pseudo-science—astrology, alchemy, physiognomy, oneirology—for "it is not always easy to distinguish a pseudo-science from one which is sound but imperfect." Very little space is allowed to the work of magicians because "their purpose was but too often of a sordid nature," and quite different from the ideals of theologians and scientists. The author says: "Theologians were trying to reach the same goal as the men of science; they generalized prematurely; they were walking along the same road, but much too fast. Magicians did not follow that road at all; they were sidetracked or turned in hopeless circles." There is nothing in Sarton's study to support the doctrine that magic stimulated experimental science. "Magic is essentially unprogressive and conservative; science is essentially progressive; the former goes backward; the latter, forward."

The present volume is an introduction to the history of science from Homer to Omar Khayyam. The marking of the initial and end periods by these great literary names may seem strange to one who does not remember that in Homer there are matters of interest on geography, astronomy, anatomy, medicine, surgery and metallurgy, and that Omar Khayyam was a distinguished writer on mathematics and astronomy. Early Babylonian, Egyptian and Chinese science is not given in this volume because "it is not yet possible to give a continuous account"; this early science will be presented in separate chapters later when it is expected that "our knowledge of these difficult subjects will be materially improved."

The treatment is chronological. From the ninth century B. C. down through the eleventh century, the subject matter is presented in thirty-four periods varying in length from two centuries to half a century. The comprehensiveness of Sarton's scheme appears from his consideration in each period of the contemporaneous science of all the countries of the old world which were scientifically active at that time. The broadened viewpoint thus gained may be illustrated by the seventeenth century which Henry Hallam, with a vision confined to Europe, had called the nadir of the human mind; Sarton, in a more comprehensive view, finds the first half of that century "a golden age in at least four countries—Arabia, Tibet, China and Japan." The heading of each period after the first two bears the names of one or two outstanding scientists; thus we have "the time of Thales and Pythagoras," "the time of Hsüan Tsang," etc. It is of interest to notice that of the thirty-four names, sixteen are Greek or rather Hellenistic, five are Roman, three are Chinese, two are Byzantine, one is Persian, three are Muslim, one is Western European.

The treatment of the different periods is according to a uniform plan. First comes a survey of science in the period considered, then a presentation of the individual scientists classified by the subjects (religion, philosophy, mathematics, astronomy, geography, alchemy, medicine, historiography, law, or philology) in the cultivation of which they were respectively most conspicuous. A very compressed outline of the life and work of each writer is given, followed by a bibliography which in the case of prominent men like Galen covers several pages. Sarton says: "The best way of using this work is to read the introductory chapter and the first section of succeeding chapters, and to consult the other sections only as far as may be necessary to satisfy one's curiosity or to find an answer to a definite question."

Sarton's work is written under the dominance of his conviction that the proper procedure is not to pursue first the history of some one science and then take the history of other sciences, one at the time. This tandem arrangement is repugnant to his ideals. One should study, not the history of the sciences, but the history of science. Moreover, one should not confine one's attention to any one country like Greece or India, but should take a world view of scientific achievement. Such a synthetic process alone will afford a full picture, free of distortion, of the intellectual progress of mankind.

The work is prepared with freedom from national bias and with painstaking care. If the great discovery of the precession of the equinoxes is attributed to the Greek Hipparchos, rather than to the earlier Babylonian astronomer Kidinnu, it is because the positive proof of Kidinnu's achievement has been published only recently, while Sarton's volume was going through the press.

The endeavor of the author, we take it, has been not to produce a book which would rank among the "best sellers," but a book which would be a real *vade mecum* to all serious students of the history of science. It ought to be in every college library. Readers having already a modicum of knowledge of the history of science, at least in one field, are the ones who will profit most by this publication. Dr. Sarton has the scientific and keen philosophic insight which are necessary for successful historical research in this field. He and many other modern lovers of systematized positive knowledge, when contemplating the achievements of science since the time of Homer in lifting man to higher intellectual endeavor, would hardly hesitate to invoke the scientific spirit in the words which Lucretius addressed to Epicuros: "Thou, father, art discoverer of things, thou furnishest us with fatherly precepts, and like as bees sip of all things in the flowery lawns, we, O glorious being, in like manner feed from out thy pages upon all the golden maxims, golden I say, most worthy ever of

endless life. . . . At all this a kind of godlike delight mixed with shuddering awe comes over me to think that nature by thy power is laid thus visibly open, is thus unveiled on every side."

FLORIAN CAJORI

UNIVERSITY OF CALIFORNIA

AWARDS FOR RESEARCH AT THE UNIVERSITY OF CALIFORNIA

MANY members of the University of California faculty have received awards from the research fund of the university to carry on scientific and scholarly research next year. The research fund was created by the Board of Regents in 1917–18 with an initial appropriation of $2,000. For the academic year 1927–28 the regents have appropriated $85,000 in support of specific research projects. This sum is considerably supplemented by balances available on June 30, 1927, and by liberal donations from individuals and foundations. Grants in support of research are made by the president with the advice of the Board of Research, a committee of the Academic Senate, to individual members of the university or to departments on the basis of the merits of their projects and estimates of the cost. These grants are supplementary to provisions for research in regular departmental budgets, particularly such as those of the Lick Observatory, Scripps Institution of Oceanography, Hooper Foundation for Medical Research and the Agricultural Experiment Station.

The Board of Research is composed of the following members of the faculty: A. O. Leuschner, *chairman,* E. C. Hills, C. A. Kofoid, G. N. Lewis, C. B. Lipman, K. F. Meyer, F. J. Teggart, L. B. Loeb, *secretary.*

The awards to date for research for 1927–28 are as follows:

Professor E. B. Babcock and Professor J. L. Collins, for a taxonomic study of the genus Crepis and genetic and cytological studies of Crepis hybrids.

Professor A. R. Davis and Professor D. R. Hoagland, for the study of plant growth under controlled environment.

Professor C. B. Lipman for two assistants in research on tree injection and on the essential chemical elements essential to plant growth.

Professor H. M. Evans, three awards, supplementary to donations already made to assist in research on the relations between nutrition and fertility, on the effect of the endocrines, especially the hypophysis on the gonads and in a study of the sex cycle of the cat.

Professor R. O. Moody, for a radiographic study of the abdominal viscera.

The Department of Anthropology, Professor R. H. Lowie, *chairman,* for an assistant in research in connection with ethnological and archeological survey of California.

Professor A. L. Kroeber, for an assistant in determining the successive stages of development of the textile arts in prehistoric Peru.

The Department of Bacteriology, Professor K. F. Meyer, *chairman,* for an assistant, for a study on hypersensitiveness with bacterial protein fractions.

Professor G. L. Foster, for a study of carbohydrate metabolism of muscle.

Professor D. M. Greenberg, for research in electrochemistry of protein solutions.

Professor C. L. A. Schmidt, an award supplementary to a grant already made, for an assistant in research on the dissociation constants of amino acids.

Professor E. S. Sundstroem, for a study of acclimatization to low pressures of temperature and effect of low oxygenation on cancerous rats.

Professors T. H. Goodspeed and R. E. Clausen, for genetic and cytological investigations on *Nicotiana.*

The Department of Chemistry, Professor G. N. Lewis, *chairman,* for chemical research by members of the staff as follows:

Professor W. C. Bray, for researches on the mechanism of inorganic reactions, involving the mechanism of catalytic agents in homogeneous and heterogeneous systems.

Professor W. C. Blasdale, for a study of phase relations involved in sea water or marine deposits with special reference to the extraction of valuable constituents from such deposits.

Professor G. E. K. Branch, for a study of polarization in organic molecules and their effects on the rates and methods of reactions.

Professor E. D. Eastman, for a study of high temperature equilibria of metal oxides with special reference to the reduction of the oxides of free metals, the study of the third law of thermodynamics applied to solid solutions, and the free energy of water from the study of the oxygen electrode.

Mr. W. F. Giauque, for a study of problems involving the third law of thermodynamics, and the production of extremely low temperatures by means of high paramagnetic substances.

Professor G. E. Gibson and Professor H. C. Ramsperger, for a study of the absorption spectrum of iodine bromide and related substances.

Professor G. E. Gibson and students, for (1) isotherms of gas mixtures at high pressures with a view to determination of free energy and entropy of mixing, and (2) determination of straggling of alpha particles from radium rays in various gases by the Wilson track method.

Professor T. R. Hogness, for a study of positive ray analysis with special reference to this work as a means of studying molecular reactions.

Professor J. H. Hildebrand, for (1) solubility relations in terms of Raoult's law and internal pressures, and (2) problems related to phenomena of surface tension and colloidal chemistry.

Professor W. M. Latimer, for (1) studies of the distribution of thermal energy in solids at low tempera-