

these remedies is re-investigated and shown to be of some therapeutic value, as, for example, valerian and raspberry leaves. Recently, renewed interest has been awakened in species of *Strophanthus* as a starting-point for cortisone synthesis, and *Strychnos* for curare. Similarly, the fungi have come into prominence in the search for antibiotics.

By virtue of his association with the revision of the British Pharmaceutical Codex and of the British Pharmacopœia, Mr. T. C. Denston is in close touch with developments in pharmacognosy, and as a former teacher he has the gift of clearly expounding this subject. This new edition of his text-book contains all the excellent features of the previous ones, and is up to date at the time of going to press. It includes not only new substances used in the practice of pharmacy, but also alludes to the application of new methods of cultivation, and to breeding experiments involving the artificial inducing of polyploidy and its effect on yield of active principles. Consideration is also given to insect infestation of drugs, insecticides, and to spices and flavouring agents.

The text-book is well planned and well produced. Mr. D. C. Harrod, himself a teacher of, and examiner in, pharmacognosy, has added some new illustrations, drawings which might well be emulated by students; but some of the old, unsatisfactory drawings have not been replaced. Unfortunately, the text-book is planned on the syllabus of the old Chemist and Druggist qualifying examination, which no longer exists, and it falls short of requirements for the Pharmaceutical Chemist qualifying examination and for the various degree examinations in pharmacy of the universities. The lack of descriptions of anatomical and histological characters of important, official plant drugs is a serious omission which will weigh with students, among whom the text-book has previously enjoyed deserved popularity. It is, of course, possible for students to find this additional information in the monographs of the British Pharmacopœia, and all students possess this latter work, so that there is no additional expense; but, even so, they have no illustrations of these characters, and, owing to their limited resources, they will tend to purchase text-books which provide all that they require. This is a pity, for Mr. Denston's text-book is otherwise excellent and highly commendable.

W. O. HOWARTH

FOUNDATIONS OF ANCIENT SCIENCE

The Exact Sciences in Antiquity

By O. Neugebauer. Pp. xiv+191+14 plates. (Copenhagen: Ejnar Munksgaard; London: Oxford University Press; Princeton, N.J.: Princeton University Press, 1951.) 42s. net.

THE study of ancient Egyptian and Babylonian science was formerly based upon the hearsay reports of classical writers. During the past hundred years it has been completely transformed through the decipherment of inscribed clay tablets and papyri recovered from the sites of the old civilizations. Among living scholars who have made fundamental contributions to the interpretation of these obscure documents, none is more distinguished than Dr. Otto

Neugebauer, of Brown University. His discoveries and theories, communicated over the years to the specialist journals, have been made more widely intelligible and accessible through a course of six lectures delivered in 1949 at Cornell University and now published, with much supplementary material, in the form of a book. The field surveyed is restricted to mathematics and astronomy, but the author's interest transcends the mere technical development of these sciences to embrace the historical significance of the Hellenistic period.

The numerals and astronomical symbols of a fifteenth-century "Book of Hours" serve to lead the reader back directly to the reckoning procedures of antiquity, and thence to the remarkable mathematical achievements of the Babylonians. As early as 1600 B.C. they were performing operations equivalent to the solution of quadratics and were even tackling equations of higher degree. In contrast, the arithmetic of the Egyptians is chiefly of interest as representing a primitive stage of development no longer available for study elsewhere. Both Babylonian and Egyptian geometry amount to little more than the application of arithmetical procedures to problems of practical life which happen to involve areas, etc. This species of geometry, contrasting with the essentially Greek 'axiomatic' geometry of the Euclidean tradition, later made its appearance in Alexandrian scientific literature, and it can be followed thence into medieval Islam and Christendom. In like manner, Dr. Neugebauer adduces evidence of a system of Alexandrian astronomy very different from the classical Ptolemaic synthesis. This system perpetuated the methods of Babylonian astronomy, to which the most considerable chapter of the book is devoted.

While the 'Old Babylonian' period (1800-1600 B.C.) corresponds to the highest level ever attained by Babylonian mathematics, the astronomical scripts of greatest interest belong to the 'Seleucid' period (covering the last three centuries before Christ). It is not yet possible to construct a coherent history of Babylonian astronomy, but Dr. Neugebauer suspects that one major incentive for its early development was the necessity for bringing the fundamental lunar calendar into a regular relation with the solar reckoning associated with agricultural processes. He has followed up the pioneer work of Epping and Kugler in unravelling the intricate tables which set forth, in successive columns, the discontinuously varying corrections which the Babylonian astronomers applied to the mean motion of moon or planet. This chapter destroys a number of cherished legends of the historians, and it reveals the startling gulf that has appeared between the generally accepted picture of ancient astronomy and the results which are slowly emerging from the analysis of the source material. The closing chapter, on the origin and transmission of Hellenistic science, is an elaborate application of Dr. Neugebauer's thesis that the transmission of mathematical and astronomical methods affords one of the surest means of establishing and dating contacts between contemporary or successive civilizations.

This authoritative and finely illustrated book, of the contents of which only the barest sketch has been given, is bound to stimulate interest in a peculiarly abstruse branch of the history of science. It may also attract recruits to the task of interpreting the abundant source material in our museums before the climate destroys it.

A. ARMITAGE