

result, because neither of these scholars was able to devote sufficient time to the study of original texts in the British Museum. Great impetus was given to the study when the late Sir Henry Rawlinson published the third part of the "Cuneiform Inscriptions," and Prof. Sayce found therein material for his paper on the "Astronomy and Astrology of the Babylonians," which appeared in 1873. During the last twenty-five years the astronomy of the Babylonians has been discussed by Strassmaier, Jensen and others, but little has been done for the older, sister subject of astrology. In the two volumes before us Mr. Campbell Thompson gives us the cuneiform text of what is, practically, the complete series of the Astrological Reports of the Royal Library at Nineveh—that is to say, copies of about two hundred and eighty tablets, and transliterations of about two hundred and twenty duplicates, without reckoning the transliterations of the texts of the original series. In addition, we find a translation of the tablets in English, and a vocabulary, with references, and a subject index. The work in each of these sections has been carefully done, and we welcome Mr. Thompson in the little band of English Assyriologists, because his pages, somehow, suggest that he intends to try to justify his position as assistant in the British Museum. The study of Biblical parallels and the making of Biblical comparisons are interesting and useful enough in their way, but it is useless to dogmatise about any branch of Assyriology as long as the literature relating to it remains unpublished. Mr. Thompson's book is a good proof of this contention. Many have talked glibly and written vaguely about Chaldean astrologers, but now that we have before us the actual texts of the documents which they drew up, we shall find that most of what has been written on the subject before is incorrect.

The study of astrological astronomy in Western Asia is very ancient, and an old tradition, referred to by Pliny, states that the Babylonians possessed records of calculations which covered a period of 490,000 years; there is no doubt that we now possess texts of this class which are as old as the reign of Sargon of Agadhe (about B.C. 3800); but nothing older than this date has yet been unearthed. The principal astronomical schools in Assyria in the seventh century B.C. were at Ashur, Nineveh and Arbela, and at a later period Sippar, Borsippa and Orchoe, in Babylonia, were famous for their schools. The chief duty of the astrologer in Assyria was to calculate times and seasons, which he did either by observation or by the help of an instrument called *abkallu shikla*—i.e. "master of measure" (or reckoning). This instrument may be the clepsydra, which Sextus Empiricus says was known to the Chaldeans. The time measure was called *kasbu*, and contained two hours; the month was one of thirty days, and the year contained twelve months. The Assyrians employed one intercalary month (second Adar), and the Babylonians two (Elul and Adar). Both nations had a year of lunar months, and much of the time of the Chaldean star-gazer was spent in observing the sun and moon, with the view of determining when the months began and ended. The seven planets were called Sin (moon), Shamash (sun), Umunpauddu (Jupiter), Dilbat (Venus), Kaimânu (Saturn), Gudud (Mercury), and Mushtabarrû-mûtânû (Mars). From these, and the Signs of the Zodiac, and indeed most heavenly bodies,

omens were deduced, and from the horns of the moon many portents were derived. Another source of omens were the halos, two of which were known; the one was of 22°, and the other of 46°. Dark halos always portended rain, and were well known, and Mr. Thompson suspects that the astrologers were acquainted with mock suns also. That they were good weather prophets is tolerably clear from many indications; indeed, it would be surprising if they were not. The omens derived from eclipses are very interesting, but the train of reasoning which guided the composition of birth portents cannot always be followed. Thus, in text No. 277, it is related that a certain butcher, called Uddanu, reported to an astrologer that when his sow littered, one of the young pigs had eight legs and two tails, and that he had preserved the animal in brine; from this birth the astrologer deduced the omen that the Crown Prince of the day would "grasp power." But why? Many of the reports sent to the king are interesting, chiefly because of the variety of their contents. When the astrologer had reported the astrological fact asked for, he added any little detail concerning mundane affairs which he might have room for on the tablet, or which he thought it would amuse the king to have knowledge of. Sometimes there is nothing of special astrological importance in the report at all—e.g. No. 22, whereon the writer wishes the king power and riches, and says that as the gods Ashur, Shamash, Nebo and Merodach have delivered Kush and Egypt into his hands, even so will they deliver the Cimmerians and the Mannai. Again, in No. 124, more than one-third of the report is occupied with the discussion of some private affair, in which the writer says, "Now the king knows I hold no land in Assyria." From the literal translations which Mr. Thompson gives in the second volume of his book, it is clear that the writers of these reports wilfully obscured their meaning by using obscure and difficult words, and that they intended to make it necessary for their recipients, royal or otherwise, to call in the professional astrologer. If the Assyrians found it difficult to get out a meaning from such documents, there is small wonder that we, in these days, have a difficulty in understanding them also, and as many of the allusions must necessarily be unknown to us, we may have to wait for new texts which will help us to clear them up. Meanwhile, Mr. Thompson has dealt carefully with his texts, and has erred rather on the side of being too literal than too paraphrastic in his translations. It is to be hoped that he will find time to continue his investigations, and to give us accurate editions of original documents, which may serve as the foundation of a superstructure of facts rather than theories.

THE SCIENCE OF NUMBER.

Éléments de la Théorie des Nombres. Par E. Cahen.
Pp. viii + 404. (Paris: Gauthier-Villars et Fils, 1900.)

TO the contemplative mind the science of arithmetic offers irresistible, if tantalising, attractions. The abstract notion of number underlies all scientific knowledge and theory whatever; and it is in terms of it alone that we are compelled to seek for the ultimate statement of the facts of the sensible world. It is most unfortunate

that arithmetic should be so often confounded with the vulgar art of logistic—the necessary, but ignoble, reckonings of the exchange and the market-place. Even those who are aware of the distinction often fall into another error, which is almost equally pernicious. To most of them scientific arithmetic means the “Theory of Numbers,” a term which they vaguely associate with an unknown, mysterious branch of mathematics with which only a few eccentric specialists have any concern.

The facts of the case are very different. It is true, of course, that the exact and logical foundation of the very rudiments of arithmetic has required the efforts of a series of the greatest intellects; that in order to follow its numerous ramifications, and appreciate its relation to other parts of analysis, demands a large amount of ability and perseverance; and that many of its truths have, as yet, only been proved by elaborate, one may even say artificial, methods; while other theorems, almost certainly true, still baffle all attempts at demonstration. But, in spite of all this, it may be asserted that arithmetic requires less apparatus and less preliminary training than any other branch of mathematics; and that, whether as a recreation or as a field for research, it amply rewards a very moderate degree of application.

It is not without reason, therefore, that Prof. Cahen addresses himself deliberately to amateur mathematicians; and, in fact, any one gifted with common sense, unspoiled by a vicious course of school instruction, ought to profit by his lucid and entertaining pages. In six chapters he deals in sufficient detail, and with appropriate numerical illustration (a most important point), with the elementary definitions and laws of operation, with linear and quadratic congruences, and with the elementary theory of binary quadratic forms. After this come a series of notes, ranging from scales of notation to an outline of the properties of Gauss's complex integers and their nearest allies; and, finally, a very useful set of tables, which afford the reader material for those applications to particular cases, without which the general theory cannot possibly be mastered.

The appearance of this work, as well as of others with a similar object in view (for instance, M. J. Tannery's excellent “*Leçons d'Arithmétique*”), encourages the hope that some improvement may be effected in the teaching of arithmetic in schools, and that a sound knowledge of its first principles may cease to be the monopoly of a very small minority of University graduates. It is, unfortunately, true that a very large proportion of class-books, both in arithmetic and in algebra, contain half-informed, misleading attempts at expounding theory which are really worse than the old-fashioned bundles of “Rules”; and unless these are replaced by something better, the efforts of reformers will have the lamentable result of producing a state of things worse than the old routine: a mere jargon of pseudo science, a barbarous patchwork of sham “Principles.”

M. Cahen's work will be found of interest, not only by the amateur in search of recreation, but by intelligent teachers and arithmeticians of every degree of proficiency; while the professed devotees of the science will look with pleased anticipation for the more extended work on the same subject which the author appears to be preparing.

G. B. M.

OUR BOOK SHELF.

Atlas of Urinary Sediments, with special reference to their Clinical Significance. By Dr. Hermann Riedel. Translated by F. C. Moore, M.Sc., M.D. Victoria. Edited and Annotated by Sheridan Delépine, M.B., C.M. Edinburgh, B.Sc. Pp. viii + 111, and 36 plates. (London: C. Griffin and Co., Ltd., 1899.)

THE work before us, as is evident from its title, is an atlas, and will be of interest rather on account of its plates, which are very beautiful, than of its letterpress; this latter, however, which is situated at the end of the book, covers more than a hundred pages, and is provided with a bibliography and an index of authors and subjects. The text is sub-divided into an introduction and two parts. The introduction deals with methods of collection and examination, &c. Part i. is devoted to unorganised, Part ii. to organised sediments. The editor has added considerably to the original text, his remarks being indicated by parentheses: he occasionally differs with Dr. Riedel concerning fact. The large additions to the text made by the editor have rather altered the character of the work, and have probably increased the sphere of its usefulness.

Under organised sediments bacteria are considered. A useful chapter is to be found at the end concerning the making of permanent specimens of urinary sediments.

The book should be of value to urologists, and the plates certainly to physicians in general. The thanks of the profession are due to the translator and the editor for making the work available to English readers, and amplifying its contents.

Dante. By Edmund G. Gardner, M.A. “The Temple Primers.” Pp. vi + 159. (Dent, 1900.)

A VERY admirable book, by the author of Dante's “Ten Heavens.” Dante was a master of the science of his time, and Mr. Gardner has shown that he has not only carefully studied the “*Divina Commedia*” from the point of view of literature, but has taken pains to carefully annotate all the references to the then *systema mundi* on which so much of the action of the poem depends. Diagrams and explanations are given at the end of the book, which will be found most useful by the student.

The Farmstead. By Prof. J. P. Roberts, Director of the College of Agriculture, Cornell University. Pp. vi + 350. (New York: The Macmillan Company. London: Macmillan and Co., Ltd., 1900.)

THIS is a very readable compendium of suggestions in regard to providing a beautiful, economical, and healthy rural home. Although written for American farmers, it contains much that is of interest to all who are concerned with a country life, and few will peruse the book without gleaning some useful hints. There are special chapters on house-furnishing, decoration, and sanitation by Prof. Mary Roberts Smith, who writes pleasantly on the lighter sides of a farmer's life. A strong case is made out for the educational opportunities of the farm, which are shown to be ample enough to satisfy the most exacting advocate of Nature Study. W. S.

Object Lessons in Botany from Forest, Field, Wayside and Garden. Book ii., for Standards iii., iv. and v. By Edward Snelgrove, B.A. Pp. xviii + 297. (London: Jarrold and Sons.)

THIS is a meritorious little book, and ought to well serve its purpose of inculcating habits of accurate and precise observation in the young pupils for whom it is designed. Although we notice a few slips here and there, they are not serious ones, and are quite eclipsed by the excellent character of the book as a whole. The author is convinced, as he says in the preface, of the value of elementary botany in the education of children, and we think his book justifies his contention.