may have to consider similar changes elsewhere will find a singularly trustworthy aid to comparative study ; phytologists, archæologists, and historians alike will join in thanking the editorial committee for having placed at their disposal a document of such interest and importance to all of them as Prof. Trail's introductory essay.

Our Bookshelf.

(1) *Four-figure Mathematical Tables.* By Frank Castle. Pp. 48. (London : Macmillan and Co., Ltd., 1923.) 1s.

(2) *Mathematical Tables.* By Prof. G. H. Bryan. Pp. 27. (London : Macmillan and Co., Ltd., 1923.) 3s. 6d.

(3) *Tables logarithmiques à treize décimales.* Par Prof. H. Andoyer. Pp. x + 27. (Paris : J. Hermann, 1923.) 8 francs.

IT is refreshing to come across a set of mathematical tables that are original in construction and use. Thus all that need be said of Mr. Castle's tables (1) is that they seem to contain what the usual student requires, including hyperbolic logarithms, and exponential and hyperbolic functions. But Prof. Bryan's tables (2) afford us the pleasure of novelty. They are original in practically every possible way, and do not look like any other four-figure tables. In Prof. Bryan's tables the squares of numbers up to 1000 are given *accurately*, a really useful innovation. But it is as regards logarithms that Prof. Bryan achieves his most notable lapse from orthodoxy. Ordinary tables give logarithms and antilogarithms, with the tacit assumption that in reality logarithms are the quantities required, while the antilogarithms are a sop to the lazy student. Many of us who were brought up on seven-figure tables scarcely realised that antilogarithms were ever printed. Prof. Bryan now reverses the scales. He gives primarily only antilogarithms (five figures up to 0·6 and then four figures up to 1). By bordering the tables with the terms *antilogarithms* and *antilogarithms of reciprocals* in opposite senses, he produces a compact set of figures which give logarithms and cologarithms, *i.e.* logarithms of reciprocals.

The process is unfamiliar, and only continued practice can decide whether this innovation is one worthy of general acceptance. One advantage is that in carrying out a calculation involving multiplications and divisions, we need only *add* all the logarithms taken out of the tables. Ordinary logarithms are given, however, for numbers of two digits. The logarithms of the circular functions are given with considerable elaboration. The high price of the tables is no doubt due to the novel features, which necessitated entirely new setting. The tables are in the nature of an experiment, and it will be interesting to see whether they justify themselves.

(3) The use of logarithms with a large number of figures is, of course, quite a different problem from the use of four- or five-figure tables. The large differences that arise in the former necessitate subsidiary calculations, and the question arises as to the best means of carrying out these calculations. Prof. Andoyer claims that his thirteen-figure logarithmic tables can be used quite easily with the aid of Crelle's multiplication tables or a calculating machine. There are three tables. The first gives the logarithms to thirteen figures of numbers from 100 to 1000. The second table gives the logarithms of numbers from 100,000 to 101,000, with differences and second differences. The third table gives the antilogarithms for 00000 to 00432 with differences and second differences. The process is then as follows. To find log 314159265358979 we divide by 314, getting the quotient 100050721451904. The logarithms of 314 and of 100050 are taken from the tables, and we use the differences and second differences of Table II. for the 721451904. Again, to find the number the logarithm (mantissa) of which is 497498726941, we look up in Table I. the number the logarithm of which is nearest this : thus log 314 is 4969296480732, leaving 0002202246209. Table III. with the differences and second differences then gives the antilogarithm of this remainder, which when multiplied by 314 gives the number required. The process is simple in theory and quite easy in practice.

S. B.

The Nature and Properties of Soils : a College Text of Edaphology. By Prof. T. Lyttleton Lyon and Prof. Harry O. Buckman. (Agricultural Science Series.) Pp. v + 588. (New York : The Macmillan Co. ; London : Macmillan and Co., Ltd., 1922.) 15s. net.

THE various text-books on soil science that have been produced by Prof. Lyon and his associates at Cornell University overlap one another to a certain extent. Much of the present volume will also be found within the pages of " Soils : their Properties and Management," by Profs. Lyon, Fippen, and Buckman, but the book as a whole marks a definite advance on the earlier ones, and further establishes the prominent position occupied by the Cornell school in soil investigations.

The arrangement of the book follows the usual conventions : the geological factors are first considered, as a preliminary to a discussion of the physical and the closely related physico-chemical properties of soils and soil moisture ; the chemical and biochemical properties are taken next, and the concluding chapters deal with manures and manurial practice. The discussion of these sections has, with few exceptions, been set out with due regard to modern research. The chapters on soil colloids and the tilth of the soil compare very favourably with the treatment given in the average American text-book, and one's dislike of the relegation of much important matter in these and other chapters to small-print footnotes must be tempered by approval that it has at any rate been included in the book. The section on mechanical analysis of soils would be improved if modern methods, such as those due to Oden and Wiegner, were included ; and the discussion of humus and organic matter is incomplete without some reference to Odén's work.

Now that so many branches of science have converged to form the composite that, for want of a better name, is called soil science, the task of writing a college text-book on the subject is no easy one, especially if the volume is to be kept within a reasonable compass. Profs. Lyon and Buckman have provided in this book a very satisfactory working solution of the problem