their mode of working, and the principles underlying the construction, but he gives the actual construction by working drawings and excellent pictures and detailed instruction required in the workshop.

The space available for this review does not permit of an enumeration of the contents in detail; it must therefore suffice merely to mention the main headings. The first three chapters deal with continuous current. We find here measuring instruments, switchgear, rheostats, accumulators, D.C. machines, special types of motors as used on railways and for winding engines, speed control, and the use of D.C. apparatus generally. The rest of the book is taken up with A.C. work. Here, again, we start with measurement and the construction of measuring instruments, then follow switchgear and safety appliances, the construction and testing of generators, parallel working, converters, transformers, synchronous and asynchronous motors, starting and regulating devices, and finally commutator motors. It is an excellent book and will be found useful by all practical men who work on scientific principles. GISBERT KAPP.

PRINCIPIA MATHEMATICA.

Principia Mathematica. By Dr. A. N. Whitehead, F.R.S., and Bertrand Russell, F.R.S. Volume ii. Pp. xxxiv+772. (Cambridge: The University Press, 1912.) Price 30*s.* net.

THE main features of this important work have been described in a previous notice (August 31, 1911, p. 273). In the present volume the authors come more directly into contact with what may be called traditional arithmetic and algebra, the three parts being devoted to cardinal arithmetic, relation-arithmetic, and series respectively. Our old familiar friend, the family of natural numbers, appears under the head of "inductive cardinals"; besides this, and preceding it, we have a discussion of various types of cardinals, definitions of addition, multiplication, and exponentiation valid for transfinite, as well as finite, numbers; thence we proceed to the study of intervals, progressions, the first transfinite cardinal, and the axiom of infinity.

The section on relational arithmetic almost brings us back to formal logic again; it is a sort of analogue to ordinal arithmetic, and, as the authors point out, it is in the present context mainly important as a preparation for the doctrine of series, which immediately follows. The mathematical reader will be struck by the fact that a relation which generates a series is analysed into one which possesses three separate and independent properties. Important technical terms here are "section" and "segment" (pp. 624 *et seq.*), and in all this connection the contributions of Dedekind and Cantor make themselves felt. The final section brings us to the general problems of convergence, limit, and continuity; and the reader who has the courage to learn the new symbolism will now find that there has been a real philosophical advance in the period between Cauchy and Cantor; or perhaps it would be better to say that Cantor has initiated a new era of research, so far as any one man is truly an initiator.

Analogies are always dangerous, and in nothing more so than in pure mathematics; but one cannot help feeling that all this recent investigation of the elements of mathematics has some affinity to the chemical analysis of molecules into their atoms. Perhaps it may not be absurd to carry the metaphor a little further. Electricians have proved that the atom of the chemist is a much more complicated entity than he imagined; it is possible that the present irreducibles of the mathematician may dissociate, if subjected to still severer tests. If this be so, the resolver will be either a mathematician or a metaphysician, or a combination of both; and even he may not (indeed, probably will not) arrive at ultimate conclusions with which the human spirit will rest content.

It would be very unfair not to point out that the authors, by immense and ungrudging work, have fused together the discoveries of many searchers (including themselves) into as near a homogeneous whole as present circumstances permit. G. B. M.

DISEASE-DISSEMINATING ARTHROPODS.

Entomology for Medical Officers. By A. Alcock, C.I.E., F.R.S. Pp. xx+347+136 text-illustrations. (London: Gurney and Jackson, 1911.) Price 9*s.* net.

IT has well been said that tropical medicine is nowadays largely a matter of entomology, and it is to the recognition of this fact that the volume before us owes not only its appearance, but also much of the knowledge epitomised in its pages. The term "entomology" is interpreted by the author in the "old inclusive Latreillian sense," and we consequently find ourselves concerned not merely with insects, but with the Arthropoda as a whole, or rather with those groups of this enormous phylum with which the medical officer in the tropics at the present day must needs have a nodding acquaintance or something more.

In view of the transcendent importance of the Diptera in connection with disease, it is not surprising to find that nearly half of the volume is