general properties of errors are treated, the distinction between errors and mistakes is carefully explained, and the reader will derive from these few pages a very clear idea of the kind of errors with which it is the mission of least squares to deal. This is followed by a chapter on the general theory of probability treated algebraically, and containing a brief explanation of the application of the theory to practical problems, such as life insurance, together with some examples from mortality tables.

We then reach the most important part of the book, chaps. iv. and v., comprising an exposition of the theory of errors and least squares on very elementary, but quite orthodox, lines. The great variety in the problems introduced to illustrate the text is very noteworthy: statistical tables, electrical resistance, balance constants, volumetric solutions, specific gravity bottles, surveying, transits of stars, the resolution of apparent parallax into actual parallax and proper motion, the solubility of salts, are all made to serve. The problems on chemical work are particularly suggestive, while the one on locating a distant station in surveying is of interest in employing rectangular co-ordinates instead of angles. There is an unfortunate mistake in the first numerical example of a normal equation (p. 75); the right-hand side of the equation should read 3·676, and the results of the problem as given in the text are appreciably inaccurate.

Chap. vi. is on empirical formulæ, and includes some useful hints as to the choice of mathematical expressions to represent the unknown relations between variables. A problem on the "reduction of pendulum to zero arc," on pp. 107 to 110, in which time is measured to the millionth of a second and arcs are recorded in whole degrees only, looks rather uncanny, but may be unexceptionable. The next chapter is on weighted observations, and follows the usual lines. In the final chapter, on the general theory of precision, an elementary knowledge of integration is assumed. The appendix, to which, as already mentioned, the more difficult analysis is relegated, contains also a very complete table of formulæ, all of which have been deduced in the text. On the whole, this is a good book, and being far less mathematical than most other works on the subject, it is likely to appeal to a wider class of readers.

NOXIOUS INSECTS.

Medical and Veterinary Entomology. By W. B. Herms. Pp. xii + 393. (New York: The Macmillan Company; London: Macmillan and Co. Ltd., 1915.) Price 17*s*. net.

THIS excellent text-book is based on manuscript used in teaching in the University of California and in the San Francisco Veterinary College. It is not intended to be a very comprehensive treatise, but an attempt to systematise the subject. It, however, goes beyond this, as new matter is here and there incorporated, thus making the volume of greater value. It is mainly adapted to the American continent, but will be found of general usefulness elsewhere. For instance, there is only a key of the North American genera of Tabanidæ. The first chapter is an introduction. The second deals with parasites and parasitism in general; the third with insect anatomy and classification, with a useful working key to the orders of insects. The mouth-parts are shortly but very concisely treated in chap. iv.; this portion might well have been amplified.

Cockroaches, beetles, and thrips are dealt with, and the small yet important part played by cockchafers in the spread of *Echinorhynchus gigas* and the uses of Spanish fly, etc., are concisely detailed. There is an interesting chapter on lice (pp. 52–68); we notice here that the human clothes louse is still called *Pediculus vestimenti* instead of *P. humanus*; the figures given here are not good. Bed-bugs and cone-nose bugs form the theme of chap. viii. An excellent précis on mosquitoes or Culicidæ is found in chap ix. (pp. 80–100), the classification used being that of Theobald and others, and not of the American dipterologists. Mosquito-carried diseases and control are also explained, and a full key of classification given under the Theobaldian system.

Other blood-sucking flies are dealt with, such as the buffalo-gnats, or Simulidæ, and horse-flies, or Tabanidæ, and notes on their control and relation to diseases are given. Naturally, the house-fly is fully described, twenty pages being devoted to its life-history, habits, and its relation to diseases, and another twenty-two pages to its control. The African tsetse-flies, or Glossinæ, and the horn- and stable-flies, are also fairly fully dealt with in chap. xv. (pp. 207–232).

An interesting account of Myiasis is given, including attacks of flesh-flies and bot-flies, or Œstridæ, and others, such as the Congo floor-maggot and the West Indian and American screw-worm. The portion dealing with the ox warble-flies, pp. 251–254, is not quite up to date; for instance, it is said that the larvæ are licked off by the tongue, and so pass into the œsophagus, Carpenter's researches in Ireland evidently being unknown to the author; these clearly prove that the larvæ enter by the skin, especially of the legs, and it is unlikely that any enter as described in this work. Nothing is said of their attack on human beings, the so-called "creeping disease," which is frequent in some countries. The remainder of the work is taken up with chapters on fleas and louse-flies, ticks, mites, including scab in sheep, scaly leg in fowls, and itch, and also an account of venomous insects and arachnoids. The section on louse-flies (Pupipara) might well have been extended; the account of the sheep "ked" is very brief, whilst all that is said of the Hippoboscidæ is contained in five lines, dealing with *H. equina*. Fuller information on *Pediculoides ventricosus* might also have been given, and the recent work of Willcocks in Egypt and others included.

The work ends with a four-page appendix dealing with general classification of bacteria and protozoa. F. V. T.