Traité du Calcul des Probabilités et de ses Applications. Volume 3. Part 3, *Appli-cations de la Statistique à la Démographie et à la Biologie.* By R. Risser. Paris, Gauthier-Villars, 1932. x+255 pp.

In this comprehensive and superior *Traité* under the general editorship of Émile Borel, Risser's section follows two sections written by H. Galbrun deal-ing with the premiums and reserves for life insurance. Risser's section is in four parts, the first treating of sickness and disability. Here an integro-differential equation appears, the derivative expressing the rate of change from the active class to the inactive class, and the integral the return from inactivity. This equation is reduced to a Volterra equation of the second species, and solved by means of an infinite series of definite integrals. Relations among the various probabilities involved are deduced.

The second part takes up population statistics from the standpoint of Broggi, with the two survivor aggregates and the three death aggregates. Then, for the Makeham law, the determination of the parameters by the King-Hardy method is set forth. When applied to the Population Masculine mortality table, the Makeham graduation is shown to be unsatisfactory when tested by the normal probability law. A method for successive approximations is elucidated. Thiele's law for survival, based upon the square root of the age, is exhibited; and also Oltramare's, with its four exponential functions of the age.

The third part deals with the fluctuations which take place in the popula-tions of species in their struggle for existence. This follows closely the work of Vito Volterra, but mention is made of W. Thompson, R. Ross, and of A. J. Lotka's *Elements of Physical Biology.* The differential equation, giving rates of increase or decrease, is the natural starting-point in most problems; but the integro-differential equation also arises.

The fourth part deals with graduation by the methods of Cauchy, Carvallo, Gauss, Tchebycheff, Gram, Poincaré, Legendre, Woolhouse, Karup, Higham, Achard, Sprague, and Fourier.

Risser's book is in line with the other excellent monographs appearing in the *Traité.* Many helpful numerical illustrations are inserted as needed. There is a table of contents, but no index. A fairly large number of references can be found in the footnotes. Some typographical errors appear; but they are seldom troublesome. The book should be decidedly interesting not only to the actuary, but to the student of pure mathematics as furnishing a natural origin for some theoretical problems.

E. L. DODD

Determinanten. By Paul B. Fischer. Third Edition. Sammlung Goschen, No. 402. Berlin, Walter de Gruyter and Co., 1932. 136 pp.

This little volume gives an elementary introduction to the theory of deter-minants, their use in the solution of linear equations, some simple geometrical applications, and a brief treatment of determinants of special form. The ap-pearance of a third edition indicates that it has found favor with the public. For students in American colleges who have learned the elements of the the-ory, it will be useful as a means to get practice in reading German.

ARNOLD DRESDEN