the red perennial clover, and on page 109 a dried specimen of *Trifolium pratense* is presented. The undersigned has been unable to locate any other copy of the 1816 edition and wishes to do so in order to ascertain whether this error is found in all copies or is peculiar to this one copy and will appreciate any information as to libraries where other copies may be consulted.

A. J. PIETERS

BUREAU OF PLANT INDUSTRY

QUOTATIONS

THE WORLD POULTRY CONGRESS

ALTHOUGH from a spectacular standpoint the recent Poultry Congress at Ottawa was an unqualified success, in consequence of which the poultry industry in Canada will derive considerable benefit, it is difficult at present to form an estimate of the educational value of the proceedings and to assess the importance of the information derived from the numerous papers and discussions. There would appear to be some justification for critical comment upon the fact that papers were not printed in advance, so that, as five sections were in session at the same time in different halls, delegates experienced great difficulty in gaining more than a vague impression of the whole, while the general public must await the publication of the official proceedings before it will be possible to summarize the educational effect of the congress.

The general impression, which is confirmed by the evidence of delegates, is that insufficient time was available to do justice to the many papers presented by authorities in the numerous branches of the industry. Not only did the "five-ring circus," as an American delegate described it, create confusion among those who were desirous of getting full educational value, but the absence of printed papers and the short time allowed for each paper necessarily limited the scope and the value of such discussion as was permitted. In view of the fact that the next congress is to be held in England in 1930 it will be necessary to formulate a policy that will do justice to the educational side, though it may be impossible to emulate the generous manner in which the Canadian government gave the poultry industry the best publicity it has ever enjoyed. The fortunate circumstance which enabled the Prince of Wales and Mr. Baldwin to visit the congress set the seal upon the efforts of the Canadian authorities to make the event a thorough success in the spectacular sense.

It is the more regrettable, therefore, that doubt exists as to whether the original purpose of world's poultry congresses was sufficiently considered. The International Association of Poultry Investigators and Instructors inaugurated these triennial congresses with a view to enabling research workers and educationists to express their views and discuss experiences; and one suspects that interest in the Canadian congress spread so widely that the authorities found themselves with a plethora of good things which could only be embraced in the program by the quintuple-session plan. Even that would have been effective had the papers been printed in readiness for the proceedings, and it seems essential that that precaution should be taken at future congresses unless a drastic measure of compression is adopted by limiting the number of papers.

A further point which must be borne in mind for future congresses arises from apparent differences between investigators and practical poultrymen. It is conceivable that some of the former approach the task of research from the laboratory standpoint, whereas some practical men are so exacting as to demand that all investigation shall begin and end in the poultry yard. Doubtless there is a measure of reason on both sides, and a considerable amount of latitude must be allowed. It can not be denied, however, that research is a means to practical progress, and in connection with poultry-keeping its success must be measured by what it achieves in smoothing the path of the practical worker. That in turn depends upon close association and mutual confidence between the two classes, so that every effort should be made to interest scientific investigators in the every-day problems of the practical poultrymen at the same time as the latter are induced to take research workers into their confidence.—*The London Times.*

SCIENTIFIC BOOKS

Elements of Physical Biology. By ALFRED J. LOTKA. Baltimore, Williams and Wilkins Co., 1925. xxx + pp. 460.

ONCE in a while some one writes a really new book such as "The Fitness of the Environment," "Winnie the Pooh," "Die Ausdehnungslehre" or "Oedipus Tyrannus." Sometimes such works are immediately approved like the first two; sometimes, as was the case with the third, not even the brightest minds of the time seem to appreciate the significance of the book and a generation or two elapses before the author comes into his own. With respect to the last, it was crowned at once with approval but perhaps not understood until the advent of psychoanalysis millenniums later, although to one who knows his Greek drama not quite so poorly as his psychoanalysis it sometimes seems as though the complex that afflicted Oedipus was the opposite of the Oedipus complex! Lotka's "Physical Biology" is a new, not merely a

recent, book; whether it will go promptly with our effective scientific literature may be doubted; it is not easily read by most biologists who, rather than mathematicians or physicists, must make it effective. Like many really new works it contains a great deal of the author's thinking and writing for a good many years. The fundamental idea is simple, namely, that the rates of change of certain variables x_1, x_2, . . . x_n are functions of the variables themselves and of certain parameters P_1, P_2, . . . P_m, that there will be an equilibrium situation (with respect to the time) for those values of the variables which make the rates of change zero, albeit this equilibrium situation may change with changing values of the parameters, and that if the variables differ only slightly from their equilibrium values there will occur a variation of those variables in time. Primarily it is the study of this well-known system of equations that concerns the author and the interpretation of the results when the variables and parameters represent quantities of biological significance.

The simplest case is the law of population growth, $dX/dt = F(X)$, it being assumed that the rate of that growth depends solely on the population. Here there will be equilibrium for those values of X which make $F(X) = 0$, *i.e.*, the population can maintain itself at any value X_0 such that $F(X_0) = 0$ because then $dX/dt = 0$ and there is no rate of change of population. One solution is $X_0 = 0$. If X is near zero we may expand F(X) by Maclaurin's series to a single term and have $dX/dt = aX$, which gives the Malthusian law of growth. Evidently, too, the population may be saturated at a value X_0 different from zero. In the neighborhood of this value we may expand by Taylor's series to find $dX/dt = a(X-X_0)$, where for stability a is necessarily negative, and asymptotic approach to the equilibrium value from above or from below. If we consider the two roots 0 and X_0 we may write $dX/dt = aX(X_0 - X)\varphi(X)$, and by neglecting $\varphi(X)$, *i.e.*, by assuming it does not vary appreciably between 0 and X_0, we have the Verhulst-Pearl-Reed law of population growth—a law which the author shows does not hold for the growth of the rate in weight (Donaldson). By considering two variables in a similar manner one may discuss the interrelation of two populations, symbiosis, immunizing diseases, malaria-like diseases, parasitism, etc. Or by the further analysis of the growth function of a single variable one may derive certain demographic relations and conceptions which have been introduced by the author and used by him as a means of research on human populations.

From this brief discussion I intend to imply what I believe to be a characteristic of the book, namely, that it is fundamentally mathematical rather than physical biology, that it portrays the workings of a mind more mathematical than physical. Certainly physical biology should include a great deal about the theory of dimensions, about surface tension, etc., indeed much of the point of view and of the sort of material which may be found in d'Arcy Thompson's "Growth and Form." There seems to be in the book almost none of the sort of thinking that a physicist does. I do not particularly object to the author's choice of a name for his book; it is all right if you understand it; I am merely trying to point out that what some might expect to find under the name is conspicuous by its absence. Gibbs did not call his great work physical chemistry, and if he had, a contemporaneous reviewer might have made observations not dissimilar to mine above. And, by the way, although Lotka undoubtedly knows his Gibbs, even the "Statistical Mechanics," and often gives a type of reasoning very familiar to students of Gibbs, there happens to be no mention of that great name in the Index of Names which appears to list more than 400 persons as cited in the text. And again, by the way, if one will look at that list of names and examine the text to see how intimately ideas from very many of them are interwoven to carry forward the author's own thought, one can not but realize the long time and deep study and varied reading required to bring oneself to a position where he could contemplate writing such a book.

Although the main underlying thought may be mathematical, there is much general philosophy of science and much general descriptive material to be found in this work, much that is as easy to read as it is interesting and instructive, not a little perhaps which is of no great importance to the work as a whole. The author knows how to write, not only in detail but in a broad way, how to lighten heavy reading with description, to intersperse chapters weighty in mathematical formulas with those entirely free of them. And what a mass and variety of material he has thus put together! It would be quite out of the question for a single reviewer either to do it justice or to point out whatever defects of judgment it may contain.

EDWIN B. WILSON

SPECIAL ARTICLES

THE ANTI-COAGULATING ACTION OF THE SECRETION OF THE BUCCAL GLANDS OF THE LAMPREYS (PETROMYZON, LAMPETRA AND ENTOSPHENUS)

THE function of the paired buccal glands in the lampreys has for a long time been a puzzle to zoolo-