helpful. Elton stresses additional coordinating principles which ought to be useful not only in animal assemblages but also with biotic communities. The animal community, he says, can be best understood on a food-chain, food-cycle basis. Each animal can ingest food of a certain range of size only. This results in a gradation of eaten and eater from small, even microscopic, forms at one end of the food chain through larger and larger species to the largest at the other end of the chain—usually a carnivore. Elton emphasizes the significance of the study of *niches,* too, meaning by the term the status of the animal in the community, principally in relation to food, enemies and activities. The importance of "ecologic niches" has long been recognized in this country, especially by Grinnell[1] and certain of his coworkers, though not cited in this connection by Elton.

Elton believes that in the future at least half of all work in animal ecology will be concerned with the numbers of animals. As he points out, the numbers of animals, their fluctuations and regulation, are all-important in economic considerations. Closely linked with the food-chain, food-cycle, size of food, and niche, is what Elton calls the pyramid of numbers. By this rather telling figure he stresses the fact that the small "key-industry" animals at the base of the food-chain are exceedingly abundant, while the successively larger animals become less and less numerous. Variations in numbers with season, climate and cycle come in for discussion, and reference is made to plagues of mice and lemmings. If the accounts of and references to mouse plagues in the literature generally are as much exaggerated as is Julian Huxley's allusion to the California mouse plague of January–February, 1927, in the introduction to Elton's book (p. xvi), one should discount them considerably if he wishes to view them in proper perspective. This is probably not Huxley's fault, except as he used the lurid pseudo-scientific accounts of the occurrence that apparently went all over this country and crossed the ocean. In this same introduction Huxley attributes the subsidence of rodent plagues to the outbreak of some epidemic, and suggests that the killing of the rodents by man either has no effect on the natural course of events or even delays the crisis and maintains the rodent plague longer than would otherwise be the case. But it seems clear that natural epidemics can not possibly and should not be relied on to regulate the numbers of noxious rodents. Wherever a disease transmissible to live-stock and human beings is involved (as in the California mouse plague cited) such a course would often be dangerous to the public health. Omission to provide for effective control, as in the case of rabbits in the southwestern United States, in England, Australia and elsewhere, has apparently not resulted in effective natural control. Admittedly our regulation of animal populations is, at this stage, highly empiric and faltering; but Huxley's suggestion does not help much. On the other hand Elton and Huxley are probably correct in stating (p. xiv) that the existence of enemies is in a majority of cases a biological necessity to a species, "which without them would commit suicide by eating out its food-supply."

The scope of Elton's book is indicated by the chapter headings, which include "The Distribution of Animal Communities," "Ecological Succession," "Environmental Factors," "The Animal Community," "Parasites," "Time and Animal Communities," "The Numbers of Animals," "Variations in the Numbers of Animals," "Dispersal," "Ecological Methods," "Ecology and Evolution."

In spite of Elton's assertion that "plant ecologists can not afford to ignore animals, while a knowledge of plant succession is essential for animal ecologists" (page 18) he seems to miss the essential unity of the plant-animal community. While it is true that special methods must be developed and applied in animal ecology, nevertheless, an adequate solution of ecological problems can only be attained through attention to the biotic community and not animals or plants alone.

In his assertion that " . . . habits and habitats of animals may form systematic characters quite as important as structural features. . . ." the author strikes a sympathetic chord in the reviewer, who made a similar suggestion in a paper published thirteen years ago.[2]

With Elton's contention that "Ecology is a branch of zoology which is perhaps more able to offer immediate practical help to mankind than any of the others" the reviewer is also in complete agreement.

Elton's work is suggestive and stimulating. The author is to be congratulated on it.

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Les Bases Physiologiques de la Fécondation et de la Parthénogénès. By ALBERT DALCQ, Chargé de Cours at the University of Brussels, with a preface by Professor A. Brachet. Volume XI of the collection, "Les Problemes Biologiques," Les Presses Universitaires de France, 1928. 274 pages.

[1] See Grinnell, *Univ. Calif. Publ. Zool.,* 12(4): 91, March 20, 1914, and Taylor, *Univ. Calif. Publ. Zool.,* 12(15): 473–482, March 20, 1916.

[2] *Proc. Calif. Acad. Sci.,* 4th ser., 5(5): 116–117, December 30, 1915.

THIS book, while professing by title to deal with the general question of fertilization and parthenogenesis, is concerned with a greater field. It might better perhaps be spoken of as a critique of the elementary phenomena of development, notably the events of fertilization and first cleavage. The author is personally familiar with this subject, having done a great deal of original work in the field himself. In spite of this the presentation of the material and the interpretation given by the various investigators is to a large degree unprejudiced by the author's own researches.

While one might expect that the early chapters would be devoted primarily to the interpretation of the phenomena of the fertilization, the physiology of the gametes, et cetera, the author considers first what he terms the physiology of segmentation. A clear presentation follows not only of the numerous theories of cell division but also of the initial period in cell division which precedes first cleavage and follows fertilization itself. In this part of the book, as in the chapters which follow, the author deals with not only the evidence derived from physical and chemical methods of investigation, but also that from cytology. Here, as has been mentioned above, the author's first-hand knowledge of the material makes the review decidedly valuable.

A special chapter is devoted to the events which take place between the time of activation and segmentation. Here Dalcq considers not only the events of normal fertilization, viz., the cortical and internal changes in the egg, the migration of the pronuclei, etc., but also the questions of polyspermy and parthenogenesis. The author seems to distinguish between fertilization and activation, a consideration of which follows.

One can not but feel that the chapter on activation is too brief, though some of the discussions which might be looked for here appear in the final chapter of the book. The author presents here a table which contains a summary of the agents and forms used in experiments on artificial parthenogenesis, which is very useful. The cytological pictures presented accompanying and following activation are treated in a separate chapter, as are also what the author terms the purely physiological results of activation. In one of the later chapters of the book which is devoted to the maturation of the gametes, Professor Dalcq has attempted the correlation of the cytological data with the evidence obtained by other methods. The author concludes the book with a chapter on the meaning of activation, in which he gives briefly the various theories which have been presented to explain the phenomena of fertilization.

Not since the publication of "The Problems of Fertilization" by F. R. Lillie has there appeared a book devoted to this subject. The actual space in the present volume concerned with the fertilization question is not as great as the title would lead one to expect. This fault is, I believe, a fortunate one, for while a great deal has been done on the fertilization reaction in the interim, the phenomena involved are so intimately connected with the events preparatory to the first cleavage that the two are difficult to separate and find themselves easily associated in the same book. The analysis of the material is fairly complete, though some aspects have been treated in a rather brief manner.

Unfortunately, a few errors in the names of scientific investigators (which it is to be hoped will be eliminated in the next edition), have crept into both text and bibliography.

The book has a great many figures and tables, some of the latter being taken from original works while others have been compiled in a most useful way by the author. The book has appended a bibliographical list of some thousand titles. Unfortunately, as is the case with other volumes of this series, there is no index.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

THE DETERMINATION OF NITRATES AND NITROGEN

IN determining nitrates in highly organic soils by the ordinary method of shaking with some material such as cupric hydroxide, which takes out the color by absorption and occlusion, considerable variation occurred in checks, probably due to interfering substances and the occlusion of nitrates. In determining total nitrogen a fresh sample was required. It was also found that the regular Kjeldahl method was burdensome where the digestion was excessively long, as is the case on most samples high in organic matter. This is especially true of samples of plant tissues.

The idea of distilling off the nitrate nitrogen from a concentrated sulfuric acid solution into an oxidizing solution and catching the other nitrogen as ammonium sulfate, which then could be oxidized to nitric acid and distilled off suggested itself. In order to do this it is necessary to destroy the organic matter and keep the nitrogen oxidized to the high valency state without decomposition during distillation. Chloric acid