

## REVIEWS

*Voles, Mice and Lemmings: Problems in Population Dynamics.* By CHARLES ELTON. Clarendon Press, Oxford, 1942. 496 pp., 64 tables, 22 figures, frontispiece. 30s.

This is a large book, dealing with a large subject which has hardly been documented at all before. The author is well known for his work upon population problems of wild animals and has paid special attention to fluctuations, which occur in many groups, e.g. rodents. Such fluctuations are often of remarkable amplitude and regularity, so much so that environmental rhythms or periodic onset of disease seem inadequate to explain the phenomena observed. In fact such changes appear to be more explicable by postulating an oscillation inherent in the population dynamics of the species concerned.

Such regular changes in numbers are noted particularly in Arctic and sub-Arctic animal populations, and are of the greatest importance when these animals form the livelihood of hunters and trappers. Scientific interest in the causes of these fluctuations is matched by the anxiety of responsible governments to palliate lean years for their native-inhabited territories.

The first part of the book deals with small rodent plagues in various parts of the world, but particularly Europe, and one perceives the immense task of documentation which the author set himself. The labour has been almost as much one of historical, as of biological, research. This is particularly true of the third and fourth parts, which are considered below. The second part contains the very interesting and instructive story of how research on wild rodent populations at Oxford has progressed from small beginnings in 1925 to the co-ordinated team work of 1939. The techniques adopted for studying fertility, mortality, age structures, annual turnover, etc. are discussed against the general background of ecological and population research that has developed in various parts of the world since the war of 1914-18.

The research, to which the third and fourth parts of the book are devoted, was only made possible by the preservation of a great body of data in the archives of some of the fur-trading companies of Arctic Canada, notably the Moravian Missions and the Hudson's Bay Company. It is remarkable that all the log books and fur returns, dating back sometimes to the eighteenth century, have not long ago disappeared. Not only must they have passed through many vicissitudes in the various forts at which they were kept, but there must have been great temptation at the headquarters of the companies concerned in later years to get rid of "old junk" each time that new brooms were introduced. It is to the credit of the companies that they have not only preserved these records, but have made them available for this research.

Only a small part of the territories under the management of the companies is dealt with, namely the Quebec peninsula including Labrador; but a glance at the bibliographies that follow each chapter and the copious quotations dispersed through the text will show how great a labour of reading journals and returns, digesting the contents and piecing together stories that were at

best disjointed and overlaid with ephemeral detail, the author has set himself; and how far we are indebted to him for the great task of collation and interpretation he has carried out.

Years of abundance and scarcity in fur-bearing animals of the Quebec peninsula had been noted a long time ago, but people were not so quick to deduce a definite attribute of wild populations in this region from such empirical observations. The author's presentation of the facts leaves us in no doubt that these fluctuations can be taken as self-perpetuating and to involve more or less all the animals of the community. Man is not so seriously affected now, but previously lean years inevitably exacted their toll through starvation and lowered resistance to disease.

Both in the third part, which deals principally with coloured fox cycles in northern Labrador (from Hamilton Inlet to the northern tip), and in the fourth part, which deals with Arctic fox cycles in the Ungava region, the author has been at pains to explain the type of country and the movements and customs of its native inhabitants and trappers. The result is that the reader starts with a clear idea of the environmental complex, which has been disentangled for him with simplicity resulting from great labour and careful phrasing. It might be objected that vivid writing is not a scientist's job, yet few, who read these chapters, will not be grateful for the descriptive powers of the author.

The rest of the third part, after a preliminary sketch of the Indians of this area, moves on to a consideration of coloured fox returns from stations along the northern coastline of the Labrador. These reflect best of all the general tides of change that sweep regularly over the whole animal population here. Every four years from 1834 to 1932, with slight variations, there occurred a peak in the number of fox skins returned; this is so clear-cut that it is taken as a starting-point for examining the evidence for a more general oscillation. The question as to what fraction of the total population of foxes these figures for catches represent is an important one: the author suggests on various lines of evidence (including the gradual shift in polymorphic balance, whereby red foxes are gaining at the expense of silver through selective killing), that the fraction is not minute, may in fact be above 10 %. This suggests that a close watch needs to be kept upon these precious resources, upon which the Indian and Eskimo peoples live.

From the predator one turns to the prey, and here there are no fur returns to depend on. Exhaustive search in archives and diaries, however, produce overwhelming evidence that fox peaks coincide with or just follow peaks in voles and lemmings, so that the latter really lie at the root of the great fluctuations observed. Concurrent effects on other predators are also noted.

In the fourth part the Arctic area round Ungava is considered. A preliminary sketch of the country, the bands and families of Indians and Eskimo and their hunting areas (including estimates of their population and changes), is included with a chapter on the ranges and decrease in numbers of the caribou. This drives home even more strongly the responsibilities devolving upon those who would open up a country's resources. Happily, as a result of protection, the caribou is again increasing in some areas.

Fur returns in this area are concerned mostly with Arctic fox, and a similar short-term fluctuation is demonstrated, which falls into step with the Labrador coloured foxes. In this case migration has to be taken into consideration as well, and the ice movements round the coasts, which are discussed at length, facilitate a southward movement by carrying down foxes that hunt out on the sea ice.

From the predators we again turn to the small rodents, and the findings in Labrador are exactly repeated. The mainstay of the four-year cycle is here the lemming, which ranges from extreme scarcity to overwhelming abundance, just as in Norway.

This vast body of research states very clearly a problem, which can only be finally resolved by intensive ecological and population research on the spot. The implications of its solution, not only for the furtherance of scientific knowledge, but for the well-being of the peoples concerned, are enormous. The author allows himself a small plea for this research to be done, but the whole book constitutes the strongest possible plea that could be advanced.

There are of course parts of the book which tend to dullness, especially the building up of the case for small rodent fluctuations from quotations from letters and journals. But the remarkable thing is how small, in such a sustained effort, the dull parts are. Perhaps the warmest recommendation is that the central principles and problems are never allowed to be obscured by the detail. One is always quite certain just what the author is talking about and his arguments gain cogency from their very lucidity. The incisiveness of the style is also of great assistance to this end, and the absence of technical jargon proves that a scientific book can be written in good English, intelligible and enjoyable to anybody.

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*Dog Team Transportation. Basic Field Manual F.M. 25-6.* War Department, U.S.A., United States Government Printing Office, Washington, 1941. 78 pp., 14 Figs. (For sale by the Superintendent of Documents, Washington, D.C., 15 cents.)

This comprehensive little book has much to recommend it to those interested in its subject. It covers most of the field including housing, driving, feeding and care of the dogs, but as the title implies it is intended as a manual and guide for men detailed to undertake the care and working of dogs. The authors have therefore decided on certain methods and principles, and the use of these is more or less stipulated, and although there are some alternatives mentioned it is far from complete as an authoritative book on Dog Team Transportation. If one, in reading it, remembers this primary object of the booklet, much can still be learnt from a study of its somewhat condensed contents. The beginner will be able to adopt the methods suggested without much further instruction, for trouble has been taken to work through the subject methodically, but the dog expert will miss many methods of driving, puppy training and feeding not included in its pages.