

och vard, by Folke Skuncke, 1949. P. A. Norstedt and Soners, Forlag, Stockholm) and there are older works in English. Peterson's book, however, is the first about moose in North America with the modern and critical approach of the relatively new profession, Wildlife Management.

Members of this society who have seen the film "Expedition Moose", available from the film library, will be interested to learn that the film and the book under review here are two products of the same study.

Peterson studied moose in the Ontario wilderness for several years. On foot, in canoes and in aircraft he did much travelling to gather his data. The results are in his book. In addition, the volume presents in orderly fashion all reliable information on the species in North America, with frequent references to Scandinavian knowledge as well. There are over eighteen pages of references to published material which has been incorporated into the text. Here, then, in one book, is the accumulated knowledge of the past concerning moose, with the results of the author's own researches added.

That this moose book will be much used is evident from the current Canadian scene. Prolonged and detailed studies of moose are being undertaken in British Columbia and Newfoundland, while less intensive studies are continuing in Manitoba, Ontario, New Brunswick and Nova Scotia. Dr. Peterson indicates repeatedly that there is still much of importance to be learned about moose. His book is a solid foundation upon which the new students of moose can build.

Some have called the moose a living fossil. This may be so. Those concerned about the world's vanishing fauna can be assured, however, that Canada is using adequate funds and trained biologists to ensure that moose will remain *living* fossils.

R. Y. E.

BIRD NAVIGATION (1955). By G. V. T. MATTHEWS. (Cambridge Monographs in Experimental Biology No. 3. Cambridge University Press, 12s. 6d.). 141 pages, line illustrations.

Those of us who have been following, in the years since the war, the revival of bird navigation studies, and in particular the observational and experimental work of D. R. Griffin in North America, Gustav Kramer in Germany and G. V. T. Matthews in England, must have realized that lately all that has stood between the scientific world and a satisfactory theory of bird navigation was something which, in itself, was nothing

in the nature of a scientific discovery :—simply, the technical matter of presentation.

Matthews' *Bird Navigation* has done the trick. Seldom have I read a scientific book written with less fuss or with a greater facility in orderly arrangement. Dr. Matthews' ability extends, beyond a flair for the design of beautiful and satisfactory experiments, to a felicitous manner of presenting their results and comparing them with their predecessors, of drawing conclusions. In constructing his overwhelming case for the acceptance of the sun-arc hypothesis of complete navigation by birds, he scarcely ever breaks step : to mix a metaphor, his pyramid is built on massive foundations, steadily grading to its apex, with each block nicely balanced on those below and none askew or out of place.

The final hypothesis, which perches so securely on top, is one to which he has made major contributions from his own experiments.

If I praise the arrangement of Dr. Matthews' book as much as the design of his experiments, it is because I think he deserves more than a simple tribute for orderly-mindedness. Consider the immense literature of bird-homing and bird-navigation. It is a fantastic muddle, a scholar's nightmare. In it can be found triumphs of clear and critical thinking, and at the same time (even in the same journals) miasmas of muddle-headedness that must be read to be believed.

Believed, did I write? Yes, almost anything, including magic, has at one time or another been believed to be the master factor in bird navigation. Visual perception over immense distances (over the horizon!), infra-red sensitivity, heat sensitivity, scent-sensitivity, sensitivity to unspecified radiations, extra-sensory perception, telepathic sensitivity, radio-sensitivity, magnetism-sensitivity, sensitivity to Corioli's force, white magic, black magic, no doubt other colours of magic; everything, in fact, except the apparatus by which humans navigate. That is, by the perception of changes in the position of the sun and of the passage of time. Dr. Matthews' book should be read not only as a model of good research and good presentation, but also for the awful warnings it contains of the dangers of uneconomic hypothesis. It seems impossible that his sun-navigation theory (and when it say "his", I mean of course as presented by him; for it is a theory erected by simultaneous discoveries by several separate schools of workers in close touch with each other) can fail to be generally accepted.

Readers of *Bird Navigation* will be convinced of two things.

First, that Dr. Matthews and his fellow workers have established this as the most economical hypothesis to cover all avian navigation, including homing; namely, that birds can observe a portion of the arc described by the sun in its apparent travel through the sky, evaluate it and extrapolate it to the highest point of the arc; and that they have a time sense; and that this is enough to account for all the facts resulting from all observations and experiments that have ever been made. Secondly, that only one who is the possessor of a high faculty of scientific thinking and imagination, and at the same time a master of lucid exposition, could have compressed this thesis (together with an entirely satisfying and fair historical survey of all previous theories) into so economical a space. And if I may add a third matter for congratulation, Dr. Matthews has combined this clearness and fairness with a good measure of wit and humour. This book is not to be missed.

J. F.

EAGLES. By LESLIE BROWN. London, Michael Joseph, 1955. pp. 274, 38 photographs. 18s.

Eagles in Africa and the golden eagle in Scotland are the subjects of this very interesting book. The author has spent a great deal of time over a period of years studying these birds, and this record of his observations adds much to the knowledge of their lives, though, as he says, there is still a lot to learn and it will not easily be learnt. He devotes a chapter to "Unsolved Problems".

The photographs deserve a word of especial praise; they could only have been obtained by one of Mr. Brown's skill, enthusiasm—and agility!

J. J. Y.

RECORDS OF BIRDS OF PREY BRED IN CAPTIVITY. By ARTHUR A. PRESTWICH. London, 1955. Arthur A. Prestwich. 10s. 6d.

For some thirty years Mr. Prestwich has been collecting records of the breeding of birds of prey in captivity and his first compilation was published in book form in 1950.

This second edition (revised and enlarged) is no mere list of records, but contains a great deal of very interesting information about the nesting activities of the rather large number of birds of prey that have bred under captive conditions.

J. J. Y.