

now they are starving in their small tent hidden in the vast northern woods.

Into this basic pattern of a love story, Fred Bodsworth has woven the ecology of the forest — caribou and wolves and the raven. Skillfully the author guides Jacob and the reader to a deeper understanding of the significance of nature's harsh law — the survival of the fittest.

This is an exciting story, skillfully written. The cold bleakness of the Arctic tundra is numbing. Fred Bodsworth shows a deep understanding of the relationships between the northern animals and their environment. I have only one plaintive query — a caribou fawn born in March?

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Radar Ornithology

By ERIC EASTWOOD. Methuen & Co. Ltd., London. 1967. xii + 278 pp. Liberally illustrated. 75 shillings. (Distributed in the United States by Barnes & Noble, Inc.)

Since 1964, the National Research Council of Canada's Associate Committee on Bird Hazards to Aircraft has taken films of radar displays at civil and military radar stations from coast to coast across Canada. The enormous quantities of film taken constitute an unique source of information on bird movements over the northern half of this continent. Members of the Canadian Wildlife Service, the Royal Canadian Air Force and the Meteorological Branch of the Department of Transport are engaged in the primary analysis of the film record — the relating of bird movements to weather conditions. Smaller scale analyses, e.g. of particular movements of such species as geese and Whistling Swans, have been carried out by faculty members of the University of Calgary and University of Toronto, and students at McMaster University.

The interpretation of bird movements on radar films, and their identification with particular species populations, requires considerable ornithological skill. Few North American ornithologists have watched migration actually in progress "live" on a console at a radar station. Dr. Eastwood's *Radar Ornithology* has, therefore, been published at a very opportune moment, and it should do much to encourage additional students to take part in the full utilization of the wealth of ornithological information available in the films taken in Canada.

Dr. Eastwood is a radar engineer at the Marconi Company in England, who became involved with birds when these were identified as being responsible for much of the "clutter" found on the plan position indicators of the increasingly powerful defence radars developed during the last ten years. Because of his technical background, Dr. Eastwood's book will be of particular value to ornithologists whose knowledge of physics is slight.

Of the fourteen chapters, two are devoted to the principles of radar and the electronics involved; two are devoted to why birds produce radar echoes, and how (bird-produced) "angels" are identified; two are devoted to study of the echo by electronic means (signature analysis) in order to determine what species of bird is causing an echo, how many birds compose an echo, and the number of birds involved in a roosting or migratory movement; two are devoted to the patterns of spring and fall migration which have been observed with radar in Europe and North America; and the remaining chapters discuss such topics as reversed migration, migratory orientation, drift by the wind and the altitude at which migrants fly — the recorded ceiling is 21,000 feet.

There are numerous line-drawings in the text — essential in any account of bird movements observed by radar. There are 24 pages of photographs

which, among other things, illustrate aerals, consoles, "angels" on p.p.i.'s, "wing-beat patterns" and radar signatures, the different appearances of migratory movements of warblers, thrushes and shorebirds, and "ring-angels" produced by starlings leaving their roosts. It is unfortunate that the photographs have a flat grey quality (the publishers could surely have done better) and I do not like their cardboard-cutout appearance. There are five pages of references but it is unfortunate that many bird-radar studies have not been listed e.g. only one paper by Bellrose is included. I found more than a few inaccurate and incomplete citations.

This book is an indispensable introduction to radar-migration studies. It will be useful to anyone wishing really to understand the background of regional or species studies, based on radar observations, that have appeared in *Ibis*, *British Birds*, *Bird-banding* and other journals in recent years. It will be essential first reading for anyone preparing to conduct a radar study. By providing them with an explanation of the physical basis of radar as it applies to studies of birds with such sophisticated machinery, Dr. Eastwood has done ornithologists a great service, and he has done a good job also of making a bird-radar literature that is often excessively tedious, interesting for the general reader. Thank you Dr. Eastwood!

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Rocky Mountain Flora

By WILLIAM A. WEBER. University of Colorado Press, Boulder. 1967. viii + 437 pp. \$9.40 U.S.

This is an excellent book, which I recommend with only one reservation. The scope is not as wide as the title

suggests, for, as explained on the title page, it covers the southern Rocky Mountains from Pike's Peak to Rocky Mountain National Park and from the plains to the continental divide. Nevertheless it will simplify field identification in most of Colorado and will be a useful supplement in adjoining areas.

In order to include the 1500 species of vascular plants of the Front Range it was necessary to omit full descriptions. Instead the final division of the key often gives supplementary information, allowing the user to confirm his identification. The book is essentially what in Europe is generally termed an excursion flora. Many of the widespread species are illustrated with excellent line drawings by C. F. Yokum.

The keys are frankly artificial, but are based on abundant experience and seem to be thoroughly practical. (I was impressed by the warning in a preliminary key that poison ivy occurs in the group in question.) In strongly represented families there may be separate keys to each genus; but, where few species occur, space is saved by treating the whole family in a single key.

All too often condensed floras, aimed principally at the amateur naturalist, are of very little use to more serious workers. In contrast, Weber's book shows how well a skillful author can combine simplicity with completeness and accuracy. There are no species citations and only minimal synonyms; but, to judge from examination of sample genera the taxonomy and nomenclature is extremely up to date. In fact one species is included that was published in December 1966. Thus, for those requiring modern nomenclature and species concepts for the region, this book will be extremely valuable.

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