sions of bioassay techniques and biological significance of the phenomena described could have been more thorough and critical; and it is perhaps to be regretted that the author did not allow himself more liberties in generalization that would have added interest to the review without subtracting from its precision. But he will easily achieve his main goal, which is to "provide an incentive for greater discoveries in this fascinating field."

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Ornithology

The Giant Canada Goose. Harold C. Hanson. Southern Illinois University Press, Carbondale, 1965. xxiv + 226 pp. Illus. $9.75.

The giant Canada goose, *Branta canadensis maxima*, was first described formally by Jean Delacour in 1951; the description was based on an unpublished manuscript by James Moffitt. Many years before, sportsmen, particularly William B. Mershon and Ray P. Holland, had called attention to a very large variety of Canada goose in the northern prairies. By the time it was described and named, the race was considered to be extinct. The author of this book discovered that the race still exists when he identified examples in a wintering flock at Rochester, Minnesota, in January 1962.

Breeding and wintering ranges of the giant Canada goose are extended considerably beyond those previously recognized, and more characters that distinguish it from other races are noted. Clines in morphological characters toward those of adjoining races are recognized. The breeding range is defined as the northeastern portion of the grassland biome lying east of the Rocky Mountains. The heavy coniferous forest and rocky Canadian Shield limit its range northward. Adaptations of the giant Canada goose to prairie habitat include a bill modification suited for stripping grass seeds from their stalks.

Breeding Canada geese, which have become reestablished in the former range of *maxima*, are of that race, despite the fact that stocks of other races also have been introduced into the same area. This emphasizes the importance of using representatives of a race already adapted by natural selection to environments where introductions are attempted.

Extensive movements by nonbreeding giant Canada geese were noted, for the geese travel far from their own breeding range and into the ranges of other races to molt. This tendency in geese frequently has complicated study of their taxonomy.

The giant Canada geese that nest in the middle and southern portions of their range have always been relatively sedentary, migrating southward only when forced to do so by lack of open water. The more northern nesters migrate the farthest south, leapfrogging the more southern nesters. A tendency to remain segregated during the winter in small flocks, presumably family units, is characteristic of this race. Wintering grounds are scattered widely in suitable areas where open water occurs in the Great Plains, the Great Basin, and the interior valleys of California.

Most birds return to the breeding grounds in spring before the breakup of ice and start to nest as soon as the thaws begin. Pairing takes place on the breeding grounds when the geese are a year old, but nesting does not occur until their second year. Remating of broken pairs often takes place during the next nesting season. Nesting territories required by *maxima* seem to be larger (not more than two pairs per acre) than those established by some other subspecies.

This book brings together much information on the biology and population dynamics not only of the giant Canada goose, but of all the larger races in such a way that it is a valuable guide to the conservation and management of this popular species.

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Radioactive Isotopes

Radiotracer Methodology in Biological Science. C. H. Wang and David L. Willis. Prentice-Hall, Englewood Cliffs, N.J., 1965. xviii + 382 pp. Illus. $16.

Radiotracer Methodology in Biological Science, by C. H. Wang and David L. Willis, merits high recommendation as a general textbook on the use of radioactive isotopes in biological research. It is written in a style too infrequently found in textbooks; it is very informative without being pedantic; difficult concepts are expressed simply but definitively—in short, it is a pleasure to read.

In content, it is a modern treatise that covers at relative length the principles and practice of scintillation counting with both solid and liquid scintillators. The section on the rapidly advancing field of liquid scintillation counting is particularly valuable because the authors' extensive experience in this important area allows them to speak with authority and to present a balanced appraisal. Ionization chambers and proportional and Geiger-Mueller counters, topics that have been treated at length in other texts, are dealt with briefly but adequately. These sections are supplemented by a series of simple experiments that illustrate the characteristics of radioactivity and the operation of the counting instruments.

The comprehensive section on the preparation of samples for counting also provides 240 references to the original literature. I consider the chapter on the proper design and execution of radiotracer experiments essential reading for beginners in radioisotope methodology. The final section describes six representative experiments that illustrate the application of the principles of radiotracer methodology to the solution of specific problems.

No attempt is made to detail the vast contributions of radiotracer methodology to the advancement of science. This task is properly relegated to textbooks in the appropriate scientific discipline. Nor is this a general reference text with extensive tabulation of physical constants. It is a teaching text in which a real attempt is made to distill the essence of the subject and to express it with brevity, and with clarity. It will be of particular practical assistance to those who are beginning to use radioactive isotopes, but it should also be on the bookshelf of investigators who are already using radioactive tracers but who feel that their understanding of the underlying principles is inadequate. The stated intention was to write "a brief but up-to-date introduction to the field of radiotracer methodology." This—and much more—has been accomplished.

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