

### A Critical Review of the Aerial and Ground Surveys of Breeding Waterfowl in North America

Graham W. Smith. 1995. Biological Science Report 5, National Biological Service, Washington, D.C. 251 pp., 1 map, 12 graphs. Free.

Each May, ducks are counted, by species, from morning aerial surveys of the same 77 waterfowl producing areas in central and northern North America, east of the Rockies, from Montana and the Dakotas north, and in Alaska. Fifty-seven of the 77 strata are in western and northern Canada. The pilot and the observer are both biologists trained to count birds. Ground studies by a two to four-person crew, who walk around or through the same transect strip, but at a different time (to allow for the ducks flushed by the aircraft to return), allow calculation of Visibility Correction Factors, which are calculated for each species and for each aerial crew. The aerial observer counts ponds as well as waterfowl, only on his side of the plane, but the pilot does not, so that the number of ponds the observer records is doubled. This survey is claimed to be the most extensive anywhere in the world.

### Proceedings of the 6th International Grouse Symposium

Edited by David Jenkins. 1995. World Pheasant Association, P.O. Box 5, Lower Basildon, Reading, Berks RG8 9PF, U.K. iv + 175 pp. £15.

The 6th International Grouse Symposium was held in Udine, Italy, 20–24 September 1993. These proceedings contain 27 papers and 12 abstracts of presentations from that symposium representing 14 countries. The predominance of papers are European with Germany (8) and Italy (5) dominating.

Topics covered during the symposium include all aspects of the ecology and management of grouse. Several important papers are included here such as J. F. Bendell and L. I. Bendell-Young "Populations and habitats of snowshoe hares, ruffed and spruce grouse in the southern boreal pine forest of Ontario." This paper should be of special interest to North American grouse workers.

The proceedings have been carefully edited. English usage is relatively uniform between papers. Some symposia volumes make no attempt to provide

### Leks

By Jacob Höglund and Rauno V. Alatalo. 1995. Princeton University Press, Princeton. xiii + 248 pp., illus. Cloth U.S. \$49.50; Paper U.S. \$24.95.

In the words of the authors, leks are "aggregated male displays that females attend primarily for the purpose of fertilization". The word "lek" is of

Each well-distributed species has 11 pages of tables showing changes in numbers recorded over 40 years, from 1955 to 1994. In addition to variable fluctuations over the years, Northern Pintail numbers have declined through 1991, low numbers of American Wigeon were associated with droughts in the mid-1960s and 1980s, and Gadwall increased through the late 1950s and 1960s. Changes in numbers of ponds are also graphed, and allow an understanding of some of the vacillations observed for certain species. Data are presented for the American Coot, but not for geese (though numbers were recorded!).

There is no better reference source for changes in numbers of western Canadian waterfowl; 1955–1994.

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such consistency of English usage. The papers in this volume read smoothly and are easily understood.

The International Grouse Symposia are an important contribution to grouse ecology and management. The World Pheasant Association is commended for sponsoring these meetings every three years. All scientists, naturalists, and sportspersons interested in grouse should attend one of these symposia. The 7th symposium was held in August 1996 in Ft. Collins, Colorado.

The Proceedings of the 6th are recommended for the breadth of valuable information on grouse that transcends species and continents. The coverage in this volume is decidedly Eurasian, but the topics are just as relevant in Canada and the U.S.

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Scandinavian origin and although leks are popular subjects of study all over the world, it is fitting that this book was written by two Scandinavian experts. Moreover, the popularity of the topic means that the timing is right for this, the first book devoted solely to leks.

The first part of the book (1 introduction to the phenomenon of leks, especially to the great diversity that organization throughout the world. Although leks are most often studied in all vertebrates and invertebrates, authors give descriptions of leks in various groups. They also discuss the evolution of aggregation, in the relative importance of aggregation and resources as the reason for the lek, and in the prerequisites for lekking (e.g., potential for female choice, absence of male parental investment). The second part (four chapters) looks at the evolution of lekking in lekking species from the view of the males (e.g., what attributes contribute to mating success, that of the females (do females benefit from leks, or are benefits more direct, such as reduced search costs, the possibility to choose, reduced risk of injury, or ease of transmission?). The detailed case studies of Black Grouse are given, as well as a detailed analysis of lekking birds.

A third part (three chapters) asks how did leks come to evolve? The chapters are given, with supporting evidence, and some of which relate to intraspecific ecological correlates. The last

### Animal Evolution: Interrelationships

By Claus Nielsen. 1995. Oxford University Press, New York. ix + 467 pp. Cloth U.S. \$54.00.

Claus Nielsen has compiled a comprehensive review of the major features of animal evolution and within a phylogenetic framework integrates both developmental and functional characteristics into a synthesis that will serve as a mental reference for the evolution of animals for at least the next decade. This work is a major accomplishment. This work is a complete phylogenetic analysis of animal evolution. It contains new hypotheses of relationships and rearrangements are supported by synapomorphies. Each chapter contains a summary of hypothesized relationships and the shared derived characters that support the phylogenetic tree. There can be no doubt about the hypotheses. Where genealogical relationships are unclear, such as in the relationships between Oligochaeta and Polychaeta

The first part of the book (two chapters) is an introduction to the phenomenon of lekking and especially to the great diversity that can be found in lek organization throughout the animal kingdom. Although leks are most often studied in birds, they can be found in all vertebrates and in insects, and the authors give descriptions of leks in these various groups. They also discuss the variation in the extent of aggregation, in the relative importance of fertilization and resources as the reason for females to visit the lek, and in the prerequisites for leks to evolve (e.g., potential for female choice, external fertilization, absence of male parental care). A second part (four chapters) looks at the occurrence of sexual selection in lekking species first from the point of view of the males (e.g., what are the male attributes that contribute to mating success?) and then from that of the females (do females visit leks because it allows them to choose the "best genes" for their offspring, or are benefits more direct, such as reduced search costs, the possibility to copy other females' choice, reduced risk of injury, or reduced risk of disease transmission?). The details of a case study on Black Grouse are given, as well as a comparative analysis of lekking birds.

A third part (three chapters) asks the question: How did leks come to evolve? Many hypotheses are given, with supporting evidence when available, some of which relate to intraspecific variation and its ecological correlates. The last part of the book is a

short conclusion that recapitulates the important points, and presents the best prospects for future studies, with emphasis on the need for experimentation rather than description or the search for correlations.

The book is very well researched: an impressive 603 references are listed. Many facts are conveniently summarized in the form of tables that refer to previous work. But do not think that this book is a mere collection of empirical findings. Theories are expounded, and the authors do not shy away from conceptual and mathematical models to explain the evolution of leks or some of their characteristics. They also do not hesitate to admit to the existence of debate around many questions. Indeed, I got the impression that most questions about sexual selection in lekking species and the evolution of leks have not yet been satisfactorily answered.

This is the latest in a series of 13 monographs in behavior and ecology edited by John R. Krebs and Tim Clutton-Brock. The high standards of the previous books are maintained, in terms of both contents and presentation, and I think that people who appreciated these previous monographs will also like this one.

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### Animal Evolution: Interrelationships of the Living Phyla

By Claus Nielsen. 1995. Oxford University Press, New York. ix + 467 pp. Cloth U.S. \$137.50; Paper U.S. \$54.00.

Claus Nielsen has compiled an extremely impressive review of the major features of animal phyla, and within a phylogenetic framework. This masterpiece integrates both developmental and adult characteristics into a synthesis that will form THE fundamental reference for the evolution of animal phyla for at least the next decade – a truly impressive accomplishment. This work not only offers a complete phylogenetic analysis of all animal phyla, it contains new hypotheses of relationships where such rearrangements are supported by clear, unambiguous synapomorphies. Each chapter of the book illustrates a summary of hypothesized relationships by noting the shared derived character states on the phylogenetic tree. There can be no misunderstanding about hypotheses. Where genealogical relationships are unclear, such as in the relationships of the Oligochaeta and Polychaeta relative to one another

and to other Annelida, the tree branching sequences are left unresolved. Five taxa are simply considered as "enigmatic". The analysis is sound, and not at all speculative. Each chapter has a list of critical references from which the character states were derived.

This book has great potential as a university classroom text. Although this does not appear to be the intention of the text, learning about the progression of animal complexities could not be presented in a more lucid manner for students. For the first time, this exceptional work integrates phylogenetic theory into describing the main features of all animal groups. I would highly recommend this book for anyone with an interest in the evolution of animal phyla; you will not be disappointed.

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