

**FRESHWATER FISHES OF CANADA.**  
 BY W. B. SCOTT AND E. J. CROSSMAN. *Ottawa, 1973. 7 x 10 inches, 966 pages, illustrated. (Canada, Fisheries Research Board, Bulletin 184). \$9.75 Canada, \$11.70 abroad.*

This book represents a milestone in Canadian ichthyology. There is no doubt that it is, and will remain for many years, the most important reference book on Canadian freshwater fishes. It is of such high calibre that it is of more than regional value. It will be useful for Alaska and the northern United States, and of interest to workers in all north circumpolar freshwaters.

The book resulted from a contract that was drawn up between the authors and the Fisheries Research Board of Canada. It was fortunate that two such highly qualified and talented people were given the opportunity to undertake this task. Although work on this book was only formally begun in 1966, the contents are based upon research and experience accumulated by the authors during several decades. They have travelled widely in Canada and beyond, collecting and studying fish. Their research has made significant contributions to our knowledge of fish. Their work as Curators of Ichthyology at the Royal Ontario Museum has given them a perspective that is somewhat unique, as they had to meet and provide information to, the general public. The need to synthesize and make accessible information that was available only in scientific literature was very apparent to them. *Freshwater Fishes of Canada* is an admirable attempt to do just that.

The first section of the book includes an introduction, which gives the background to the production of the book; a list of Canadian freshwater fish by major oceanic drainage basins, *i.e.* Pacific, Arctic, Hudson Bay, etc; an historical list of important publications on the Canadian fish fauna; instructions for preserving specimens; an outline of the sequence followed for the species accounts, and a section of anatomical drawings followed by a key to the families of Canadian freshwater fishes.

The major part of the book consists of species accounts, arranged systematically with keys for all families, where species identification necessitates. These accounts are exceptionally well done. The authors have gone to great pains to try to include whatever relevant data were available on Canadian populations, but have not hesitated to use published data on populations in the United States where this clarified the presentation or provided essential details. The keys for identification are

clear and concise, with two or more characters or points of distinction with each couplet. They should enable anyone, who is prepared to make the effort, to identify Canadian species with confidence. The only difficulties that might arise would be with juveniles, and with mutilated or single specimens of species that were difficult to diagnose. These are always problems in taxonomy. Identifications are reinforced by the detailed descriptions of each species which include many characters, measurements and colour notes. In preparing these descriptions the authors have rechecked much published material, or made original measurements and counts where no published data were available. Illustrative material includes a line drawing and distribution maps for almost all species, and anatomical sketches of key features where appropriate. The drawings are superb and, in this reviewer's opinion, far superior to photographs for a book of this nature. The majority are original and were prepared especially for the book by two artists of the Royal Ontario Museum, Anker Odum and Peter Buerschaper. The black and white reproductions are complemented by a series of coloured plates. It is a pleasure to see such fine work. The illustrations alone are worth the price of the book. Systematic notes provide an insight into the taxonomic history, species variability and subspecific divisions of a species, and an outline of any controversy or discussion concerning the validity of the specific or subspecific designations. Biological notes on each species are as complete as the published information and space permit. Data on reproduction include spawning dates, sites, behaviour, egg numbers and characteristics. This is followed by information on development, fry behaviour, growth and longevity. Where information was available, comparative growth rates for different regions are provided. Habitat characteristics, diet and ecological interactions with other species, including predators and parasites, are recorded. Finally, there is a section on relation to man which may involve a brief history of commercial exploitation or be merely a comment on the possible role of the species in the aquatic ecosystem.

The bibliographic parts of the book are of considerable value. Following the text on each family is a section entitled 'Suggested Reading' which provides the reader with a selection of references providing further information on the group. At the end of the book the reference section, which is over 50 pages long, provides a very complete coverage of works relevant to the ecology and system-

atics of Canadian freshwater fish, although some of the environmental physiologists may feel they have been overlooked.

The book is long and detailed and the authors must have been faced with many difficult decisions as to content when writing it. In reading the book I wondered if some sections could not have been shortened. The 'Distribution' section, giving the North American distribution followed by the Canadian, seemed in part redundant and slightly repetitive, and I wondered if the maps alone might not have been sufficient for the North American range with details in the text on Canadian localities only. I would not have too much confidence about some of the egg numbers reported, but this is a fault of the literature. Reliable estimates of how many eggs a species produces at spawning are not always available. Reporting on the diet of fish is a similar problem, as stomach contents are influenced by so many factors — including locality, season, method of capture, rate of digestion — that providing a generalized account of the food is almost impossible. I am sure the authors are more than aware of these problems. The parasite section is another difficult one, and perhaps the solution adopted in most descriptions is the only one, namely to list the numbers of various groups of parasites reported by Hoffman<sup>1</sup>. These are minor, almost insignificant, comments compared to the academic achievement of the authors in producing this work.

Throughout the text the authors have shown a keen historical perspective. They were wise in their choice to include descriptions of a number of species that might now be extinct, or nearly so, in Canada. I was pleased that they reported so well on the numerous depressing trends in commercial catch statistics, and that they were willing to point the finger at environmental deterioration as being responsible for the rarity and shrinking ranges of some species. The other thing that they highlighted very successfully was the limited state of our knowledge of many of the smaller species of fish. As a source of inspiration for research topics I think the book should more than fulfill the hopes expressed by the authors in their introduction.

This book should find its way onto the shelves of everybody who has more than a mere passing interest in fish.

G. Power

#### REFERENCE

- <sup>1</sup>Hoffman, G. L. 1967. *Parasites of North American Freshwater Fishes*. Berkeley: University of California Press.

EASTWARD TO EMPIRE: EXPLORATION AND CONQUEST ON THE RUSSIAN OPEN FRONTIER, TO 1750. BY GEORGE V. LANTZEFF AND RICHARD A. PIERCE. *Montreal: McGill-Queen's University Press, 1973. 6½ x 9¼ inches, 276 pages, 15 maps. \$15.50.*

Though the Slavic principalities which from the 9th century on grew up along the trade route from the Baltic to the Black Sea were vexed by internal strife and raids from the nomads of the steppes, the Russian urge for eastward expansion was even then evident. The traders of Novgorod pushed northeast into the Dvina basin and Kiev thrust southeast into the gap between the Ural mountains and the Caspian Sea. For more than two centuries (1237-1480) territories in eastern Russia were subjected to the rule of the Tatar Horde and paid tribute to their Asiatic masters. As the Tatar power waned and receded the Princes of Moscow emerged as the most powerful of the native potentates and consolidated their position by adding Novgorod to their dominions and appropriating the title Tsar (Caesar) from the defunct empire of Constantinople. Intermittent warfare to the south and southeast bred a set of footloose and lawless adventurers, the Cossacks. In 1581 a band of these, backed by the great trading firm of the Stroganovs and led by the outlaw Ermak, crossed the Urals, overthrew the Tatar Khanate to the east and penetrated as far as the Irtysh, a tributary of the Ob. Like his contemporary, Sir Francis Drake, Ermak was pardoned and rewarded by his Prince for successful brigandage. Though he later fell in battle, he had demonstrated Tatar impotence. Private adventurers, with the countenance and support of the Tsars, drove on. Barely half a century after Ermak's death the Russians reached the Pacific on the Gulf of Okhotsk, and a few years later were fighting and levying plunder, thinly disguised as tribute, in the valley of the Amur.

This conquest, extraordinary in its extent and the speed with which it was accomplished, was made possible by the river pattern of Siberia. The expanded and almost interlocking headwaters of the great northward-flowing rivers, Ob, Enisei and Lena, furnish a water route, broken only by infrequent portages, virtually all the way from the Ural mountains to the Pacific shore. Availing themselves of this, the Cossacks established successively the posts of Tobolsk, Eniseisk and Yakutsk, and went down the Lena by boat, levying tribute of furs from the natives and hunting for ivory along the frozen shores of the Arctic. In the