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Stephen H. Spotte: *Fish and invertebrate culture: water management in closed systems*. Wiley-Interscience, New York and London, 1970. 145 pp, £ 4.25.

The title "Fish and Invertebrate Culture" is misleading. The book omits many important aspects of cultivation, with regard to both ecological and economical aspects. Lower invertebrates, zooplankton, and farming of invertebrates and fishes for commercial ends receive no attention; terms such as "aquaculture", "mariculture", or "fish farming" are not even mentioned in the table of contents or in the index. No doubt, the subtitle "Water Management in Closed Systems" is more appropriate.

The book is subdivided into Part I: "Effects of Animals on Captive Water" and Part II: "Effects of Captive Water on Animals". These subdivisions, again, are misleading. Part I deals primarily with biological, mechanical and chemical filtration, the role of bacteria in closed systems, and carbon dioxide. Part II includes such topics as respiration, toxic metabolites, treatment of diseases, and laboratory tests.

The author is the director of an aquarium. If he had restricted himself to addressing the practitioner involved in running a public aquarium display, young scientists looking for advice on how to use a closed water system, and the advanced fish hobbyist, it would have been easier for the reviewer to praise this book. It is well written. The chapters devoted to practical aspects contain valuable information, obviously gained through many years of successful aquarium operation. Although it is apparent that microbiology and water chemistry are less the writer's domain than are mechanisms of filtration and troubleshooting keys for clogged filters, the information presented is well considered and informative.

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C. C. Lindsey and C. S. Woods. *Biology of Coregonid Fishes*. The University of Manitoba Press, Winnipeg, 1970. 560 pp. \$ 8.00.

This volume consists of a series of papers originally delivered at the International Symposium on Biology of Coregonid Fishes which was held in Winnipeg, Manitoba, Canada, 25–29 August 1969, to promote exchange of ideas among biologists interested in this group of fishes. Only two contributors to the symposium requested that their papers be omitted.

The work is composed of 29 separate papers each reporting on a particular aspect of coregonid biology. Contributors were from Canada (9), Finland (2), Italy (1), Sweden (2), United Kingdom (1), USA (10), USSR (4), and West Germany (1).

The contributions stress systematics, evolution, genetics and distribution. Life history and behavioural studies receive little attention (except for some long overdue studies on the early life history of *Coregonus clupeaformis*). Two papers deal with the parasites of coregonid fishes, and one of these, by G. H. Lawler, summarizes all known coregonid parasites. Commercial aspects are not considered except for a paper by Leopold et al. on Polish fisheries. Based on subject matter the papers may be assigned to the following categories: systematics (6), evolution and genetics (4), zoogeography and distribution (4), biology (14), populations (3), spawning and fecundity (5).

Of special interest perhaps to Eurasian biologists are the following papers: Cavender, T. M., "A comparison of coregonines and other salmonids with the earliest known Teleostean fishes:" Svårdson, G., "Significance of introgression in Coregonid evolution"; Maitland, P. S., "The origin and present distribution of *Coregonus* in the British Isles"; Shaposhnikova, G. K., "On the taxonomy of whitefishes from the USSR" (emphasis on skull osteology); Gasowska, M., "Osteological analyses of the forms of the species *Coregonus lavaretus* (L.) from Poland and their relationship to forms from other places"; Himberg, K. J. M., "A systematic and zoogeographic study of some North European coregonids"; Nikolsky, G. V., and Reshetnikov Yu. S., "Systematics of Coregonid fishes in the USSR"; Numann, W., "The 'Blaufelchen' of Lake Constance (*Coregonus wartmanni*) under negative and positive influences of man."

Dr. C. C. Lindsey is to be commended for conceiving and planning the symposium that produced the papers in this volume. An additional by-product of the symposium is "A Bibliography of Coregonid Fishes", published in 1971 and prepared by K. E. Marshall and C. S. Woods as Technical Report No. 151, 63 pp, Freshwater Institute, Fisheries Research Board of Canada, Winnipeg.

"The Biology of Coregonid Fishes" is well edited and surprisingly free from errors (the distribution of *Prosopium* in Ontario, Canada, is incorrect). Not since the publication of Koelz's monumental work on the coregonid fishes of the Great Lakes has so much information on coregonid fishes been made available in one volume. This book is a most valuable contribution to ichthyological literature and exceptionally good value for the price.

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V. R. Protasov: *Vision and near orientation of fish*. (Translation from Russian edition, Akad. Nauk. SSSR Inst. Evolyut. Morfol., 1968) Israel Program for Scientific Translation, Jerusalem 1970. 175 pp., \$ 15.00.

This monograph on the vision and orientation of fish is divided into an introduction and four chapters. The first of these is a short account of the distribution of light in water and the second a resumé of behavioural and physiological techniques of studying fish vision. The third chapter is a review of vision in fish, and the last an assessment of the role of vision in fish behaviour.

I have found this paper hard to judge fairly because it is clearly aimed at a Russian audience. I have, however, been helped by a Russian review (Il'ichev, 1969), which pointed out that this was the first attempt of its kind in the Russian literature. Il'ichev regarded the paper as well laid out with a careful selection of valuable material but felt that the first chapter was unnecessary and Chapter II contained too much detail. He pointed out that although the paper was written on the basis of literature up to 1963 its publication was delayed until 1968, for reasons probably beyond the author's control.

I find the paper disappointing. The first chapter is superficial and so short that it would have been better omitted. No mention is made of important advances in the measurement of underwater irradiance and radiance distribution made in the late 1950s and early 1960s. Jerlov's (1951) optical classification of water types goes unmentioned, as does the physics of underwater visibility. Contrary to Il'ichev, I find the second chapter also incomplete. There is a good summary of methods of studying vision based on the optomotor response, but the section on the

electrophysiology of the retina is sketchy. No reference is made to the important reviews by Svaetichin and Jonasson (1956), or Tamura (1963). The chapter on fish vision which comprises almost half of the rest of the monograph is largely drawn from Walls (1942), as indeed are most of the anatomical figures, whether acknowledged or not. The section on the resolution of the lens is based on Tamura's (1957) work and Tables 6 and 7 are direct copies of Tamura's Tables 7 and 3. The data in the unnumbered table on p. 80 are taken from Tamura's Table 6, but several of the values have been transposed. The statement on p. 30 that the pineal functions in only one species of lamprey is not true. There is however some useful original information in this chapter, which summarizes several of Protasov's earlier papers on spectral sensitivity (Table 4 and Figure 32), critical flicker fusion frequency (Table 5) and colour vision (Figures 42 and 43). The last chapter is really the basis of the monograph and is unsatisfactory in that it attempts to cover too many fields in too short a space. The subjects discussed include the effect of light intensity on fish activity, the role of sign stimuli in behaviour, the distance of recognition of objects, optomotor reactions and the reactions of fish to light. Because of this enormous scope the extent of each section is very limited and the subjects are not discussed in much depth. For example, the largest part – on the reactions of fish to light – is covered in 11 pages, and of these nearly 4 deal with aspects of visual physiology that have already been discussed in Chapter III. Better use could have been made of available space by expanding, for example, the short but important section on the distances at which fish react to objects. On the other hand, the review of optomotor reactions is reasonably good.

Probably for the Russian reader the wide scope of this review is useful in that it summarizes much foreign literature on fish vision and provides an introduction to the western schools of ethology, whose achievements are stressed by the author in his introduction. However, for the western reader such a review is of limited value because much of the subject matter has already been dealt with more fully in standard textbooks. The effort involved in translation could, I think, have been better employed in translating more of the Russian papers on which the review is based. There are a number of irritating editorial mistakes, some of which – like the lack of acknowledgements on several figures – stem from the Russian text. A number of others, in particular the rendering of various authors' names (e.g. Chasler and Shvassman for Hasler and Schwassman on p. 4) are the result of careless transcription by the translators.