

F. Moravec: Parasitic Nematodes of Freshwater Fishes of Europe. Published in coedition by Academia, Prague and Kluwer Academic Publishers, Dordrecht, The Netherlands, Boston and London, ISBN 80-200-0482-3 (Academia), ISBN 0-7923-2172-3 (Kluwer Academic Publishers), 1994, 473 pp. Price 184.- US\$.

There is increasing interest in the parasites and diseases of fish. Stocks of many freshwater and marine species are threatened and declining, or have disappeared as commercial sources of protein. This has led to much interest in aquaculture in which fish are grown to marketable size in captivity. However, hatchery fish are often susceptible to diseases because of confinement and high population densities. Human impact on ecosystems can upset host-parasite relationships in lakes and streams and this can have detrimental effects on fish populations. Also, the introduction of foreign parasites into new localities during translocation of fish can have adverse consequences. These are a few of the more practical reasons why we should know something about fish parasites and diseases.

There are more fundamental reasons for the study of fish parasites. Fish are excellent models to study host-parasite relationships and their evolution and epizootiology. They are especially suitable because they can usually be captured in numbers and aged and sexed with ease. Some species are valuable experimental animals and can be reared parasite-free and in uniform sizes and of known genetic history. There are also fewer ethical restrictions in experimenting with fish than mammals or birds.

In this excellent book Dr. Moravec has brought together the literature on the 58 species of nematodes that occur in the adult form in freshwater fish in Europe. Some of these nematodes are significant pathogens. In addition he has reviewed the literature on about 26 additional species of nematodes found as adults in piscivorous birds and mammals but which have larval stages in fish intermediate or paratenic hosts. Some of these larvae, especially the ascaridoids, make the flesh unsightly and can be pathogenic if ingested by humans. Dr. Moravec has devoted many years to the study of fish nematodes and is a world expert on these organisms. Much of his extensive personal research is mentioned in the book; indeed, he is senior author of 61 papers among the 570 references cited.

The Introduction outlines the history of studies of fish parasites in Europe. This is followed by general accounts of: Methods of Study; Morphology and Taxonomy; Bionomy; Reproduction and Dispersal; Intermediate Host-Parasite Relationships; Definitive Host-Parasite Relationships; Paratenic Parasitism; Postcyclic Parasitism, Polyvalent Hosts and Alternative Life Cycles; Influence of the Environment; and Pathogenicity. These general sections encompass 101 pages of the book and have a number of references to non-European work to illustrate certain principles considered important.

In chapters entitled Paratenic Parasitism and Postcyclic Parasitism, Moravec defines a variety of terms to describe the type of hosts that may contain larval stages and the role they may play in transmission and considers as well the significance of the transfer of adult worms from one fish host to another by carnivorousness. Examples of terms used are

bioreceptive, georeceptive, facultative astadiogenous, stadiogenous, euparatenic, para-paratenic, metaparatenic, preintermediate, postintermediate, eumetaparatenic, protometaparatenic, postmetareservoir, preeuparatenic, postintermediate-predefinitive, homopostcyclic, heteropostcyclic. These two sections will probably be helpful to specialists consulting the European (especially eastern) literature where these terms have considerable currency but one wonders if many of them do not, in fact, obscure rather than illuminate features of epizootiology in fish parasites. Generally, there are little or no quantitative field or experimental data that would determine the importance of various aquatic organisms that might, or might not be, significant in the epizootiology of a specific species of nematode. How many of these relationships are dead ends with little or no significance? This is not to imply that definitions are unimportant but there is a danger that excessive defining can fall into pedantry and limit communication between scientists.

Fortunately, Dr. Moravec does not overdo the above terminology in his subsequent reviews of the taxonomy and biology of specific nematodes and the writing is generally clear and direct. The treatment of 58 individual species forms the bulk of the book (pp. 102–373) and includes excellent illustrations, many by the author himself, as well as host lists, location in host, and distribution. The classification follows that in the CIH Keys to the Nematode Parasites of Vertebrates. This section will be extremely useful for students of fish nematodes who must identify nematodes and require some basic information about them.

Pages 374–375 consist of descriptions of larval stage in fish, including Dioctophymatoidea (*Dioctophyma*, *Eustrongylides*, *Hystriichis*), Ascaridoidea (*Porrocaecum*, *Goezia*, *Hysterothylacium*, *Raphidascaris*, *Contracaecum*, *Pseudoterranova* and *Anisakis*), Seuratoidea (*Ichthyobronema*, *Cucullanus*), Gnathostomatoidea (*Gnathostoma*, *Spiroxys*), Dracunculoidea (*Avioserpens*, *Philometra*), Aproctoidea (*Desmidocerella*), Acuaroidea (*Syncuaria*, *Paracuaria*, *Cosmophalus*, *Streptocara*). Some material in this section overlaps that in the previous section.

Pages 422–434 consist of a host-parasite list which indicates clearly when a larval stage is referred to.

Finally there are about 570 references, all unfortunately with abbreviated journal citations. A number of references are from non-European literature. The index (pp. 462–473) includes page numbers to species of parasites and the genus name of hosts. Unfortunately the main reference is not highlighted in places where numerous page numbers are given and there is no index to technical terms used in text.

This book is a significant contribution to the study of the parasites of fishes. It brings together a great deal of information in a usable format and it will be appreciated by workers in the field, specialists and non-specialists alike. It is, however, an expensive book.

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