

A Guide to the Parasites of African Freshwater Fishes

Edited by
T. Scholz, M.P.M. Vanhove, N. Smit,
Z. Jayasundera & M. Gelnar



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Inner page photograph: *Ergasilus* sp. attached to the gill filament of the blackspotted squeaker, *Synodontis nigromaculatus*, from the Okavango Delta, Botswana. Photograph by J. Van As.

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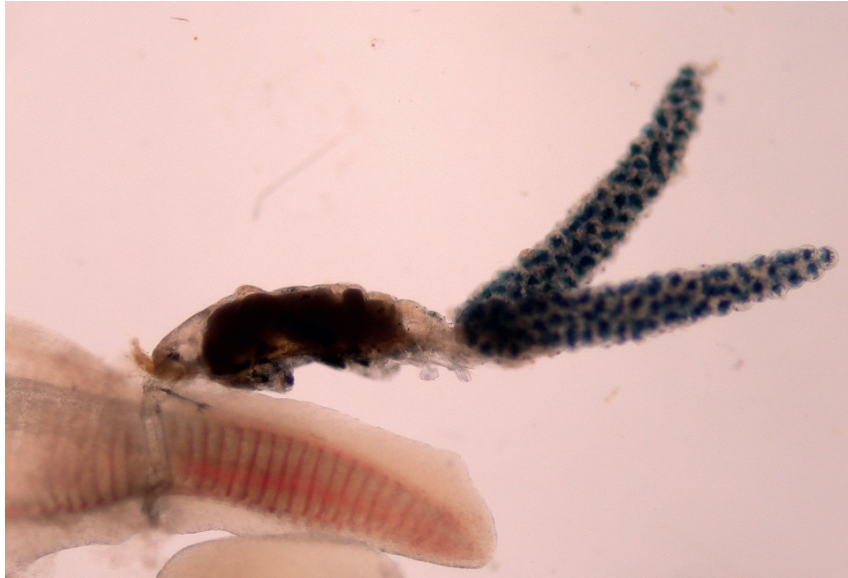
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Abstract

The rivers and lakes of Africa contain almost 25% of the world's 13,000 freshwater fish species and are second only to South America in species richness. These fish are parasitised by a wide range of organisms that can be detrimental to both farmed and wild fishes with consequent effects on economic development, and often on human health. Knowledge of these parasites in African freshwater fishes is limited and this book is intended to promote and advance understanding of African fish parasites by providing information on the best techniques for investigating fish and their parasites and keys to parasite identification. The first comprehensive list of all known freshwater fish parasites in Africa is presented here, with information on their known hosts and distribution, keys to all genera and representative illustrations for every genus. This information should facilitate and stimulate the development of fish parasitology on the African continent which has great potential for aquaculture and fishery development.

Dedication

This book is dedicated to the memory of Jo Van As for his extraordinary contribution to fish parasitology in Africa.

Keywords

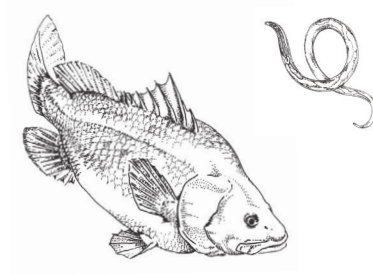
ichthyoparasitology, fish disease, protists, helminths, parasitic crustaceans

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INTRODUCTION



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Freshwater systems in Africa are dominated by 12 large river systems that contribute to the bulk of the surface water including the Nile River, the world's longest river (6,700 km), and the Congo River that transports the second largest annual volume of water of any river in the world. Additionally, on a global scale, Lake Victoria is the third largest natural freshwater lake, Lake Tanganyika the second oldest and deepest and the Okavango Delta is the largest inland delta. Collectively, these freshwater bodies contain almost 25% of the world's 13,000 freshwater fish species, second only in species richness to South America (Lévêque *et al.* 2008; Snoeks *et al.* 2011).

The rich freshwater fish fauna, a high percentage of endemism at the species (almost 100%) and the family (over 40%) level (Lundberg *et al.* 2000), several well-known cases of adaptive radiation and several fish species that are the basis of worldwide aquaculture (*e.g.*, the different species of 'tilapia' and clariid catfishes) contribute to Africa's potential to serve as an important model for ecological and evolutionary studies on fish parasites and their interactions. However, fish parasites are still poorly known, especially when compared with other continents, in particular Europe and North America, which makes it impossible to reliably assess their diversity, interrelations, distribution and potential effects on their fish hosts, whether they are native or invasive species.

Only a small percentage of known African fishes have been examined for parasites and the present knowledge of the parasite fauna of African fishes is fragmentary and represents only the tip of the iceberg. Similarly, data from a majority of African countries are scarce or completely lacking (Khalil & Polling 1997). Therefore, future research should focus on poorly studied fish hosts as well as the regions from where limited or no information is available. Attention should also be paid to potential pathogens of fishes in aquaculture, and the diversity and distribution of invasive parasites. Studies on the life cycles of African fish parasites are almost completely lacking. Since much valuable material of the parasites from Africa is unusable or has been lost due to usage of incorrect methods, the application of adequate methods for collecting, processing and identifying fish parasites is crucial.

Consequently, this book – *A Guide to the Parasites of African Freshwater Fishes* – aims at filling a considerable gap in the present knowledge of an important group of eukaryotic organisms that may have detrimental effect on cultured and wild fishes, but also may negatively influence human health in the case of fish-borne parasites. The focus of the book is on methods necessary for adequately processing fish and their parasites including tools that may help in parasite identification and studies on their life cycles, ecology and pathology. The only comprehensive sources of data on fish parasites in Africa are the checklists of Khalil (1971) and Khalil and Polling (1997), the latter reporting 568 species of helminth parasites of African freshwater fishes, Paperna's (1979) book on the Monogenea of freshwater fishes and his FAO guide to fish parasites (Paperna 1996). However, these books and checklists obviously need an update and they do not provide methodological information. Moreover, recent developments in parasitology, especially molecular tools and

biostatistics, applied in identification, elucidating life cycles and phylogenetic and ecological studies, warrant a new comprehensive text on African fish parasites.

During the previous two decades, considerable progress has been made in unravelling the diversity of fish parasites in Africa, their host associations and distribution, to a large extent thanks to the collaborative effort of several research institutions in Europe and Africa, which are well renowned globally and which are able to apply a multidisciplinary approach in research on a wide spectrum of parasite groups (see Fig. below). In addition to the theoretical importance of data on fish parasites, adequate knowledge of causative agents of fish diseases is crucial for decreasing economic losses they may cause, especially in aquaculture, which is rapidly developing in many African countries. In view of currently widely accepted integrative approaches to human, animal and ecosystem health, capacity development in monitoring and identification of pathogens and vectors in the Global South is crucial (Keune *et al.* 2017).



Fig. Research on fish parasites throughout Africa. **A.** Fish collection in Lake Turkana, Kenya; **B.** Fish examination in the Sudan; **C.** Teaching course on fish parasitology at the University of Khartoum, Sudan; **D.** Field laboratory in the Sudan. (Photographs by R. Blažek, A. de Chambrier and T. Scholz)

It is thus timely to document this progress to the professional public in Africa in a manner that will stimulate and facilitate the development of modern fish parasitology in this continent, which has a great, but yet only partly exploited potential for aquaculture and fisheries. The present book provides basic information about methods used to study unicellular and metazoan parasites of freshwater fishes and an updated list of these parasites found in Africa, together with their hosts, keys to all genera and representative illustrations of members of every genus.

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