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EDITORIAL

This is the 26th edition of the *International Ichthyoparasitology Newsletter*, an annual report on the activities of fish parasitologists originally founded in 1996 by Dr Kazuya Nagasawa.

This year, due to other commitments, Leslie Chisholm was unable to edit the Newsletter; this task was undertaken by one of the Associate Editors, David Gibson. The new issue includes obituaries for three eminent fish parasitologists who passed away during the course of 2018: Göran Malmberg, Jo Van As and Haffi Williams. In addition, information is included on three important books on fish parasitology, and activity reports are presented from ten countries.

One major change this year relates to the website from which the Newsletter is available. Due to the closure of the ISP website where the files have been kept for the past 15 years, all files have been transferred to https://sypa75.wixsite.com/diplectanum/international-parasitological-newsl. From this site you can download the present issue and most previous ones in PDF format. It is also worth noting that the related International Symposia on Fish Parasitology Committee Web Page include links for downloading the Abstracts of papers presented at ISFP 8 and ISFP 9.

MEETING REPORTS

XV ENBRAPOA (Brazilian Meeting of Pathologists of Aquatic Organisms)

provided by Maria de los Angeles Perez Lizama (Unicesumar/ICETI, Maringá, Paraná State, Brazil) maria.lizama@unicesumar.edu.br and Ricardo Massato Takemoto (Universidade Estadual de Maringá, Paraná State, Brazil) takemotorm@nupelia.uem.br

The XV ENBRAPOA, promoted by ABRAPOA (Brazilian Association of Pathologists of Aquatic Organisms) with the support of FIOCRUZ (Instituto Oswaldo Cruz), was held October 29 to

November 1, 2018, in the beautiful city of Rio de Janeiro. Participants included students and post-graduates, aquaculture professionals and researchers from Brazil, Chile and Peru. The central theme was “Biodiversity, Environment and Health”, and included discussions on diverse aspects of diseases that affect aquatic organisms, especially emerging diseases, the use and implementation of preventive and therapeutic measures and the means of disease transmission. Two hundred and seven scientific abstracts on the pathology of aquatic animals were presented, enabling the exchange of considerable knowledge between students and research workers.

We would like to highlight the participation of some delegates. Dr Delir Correa Gomes Maués da Serra Freire (Laboratory of Parasitic Helminths of Vertebrates, Instituto Oswaldo Cruz) spoke on helminths in aquatic organisms from Brazil. Dr. Marcelo Oliva (UANTOF, Universidad de Antofagasta, Chile) discussed fish parasites found at great depths. Other topics discussed included: ecotoxicology in fish farming and the environment; freshwater parasite diversity; parasite ecology; fish health in public aquariums; and sudden mortalities in reservoirs. Post-graduate courses on the health of aquatics organisms and mortality in aquatic marine animals were also highlighted.

XIV INTERNATIONAL SYMPOSIUM ON FLATWORM BIOLOGY

provided by Prof. Jean-Lou Justine, jean-lou.justine@mnhn.fr

The series of symposia on flatworms had its fourteen the meeting this summer (August 27-31, 2018) at Alghero, Italy (photo below). In the past, these meetings were called “International Symposium on Turbellaria”, i.e. excluding parasites, but the recent meetings have welcomed both parasitologists and specialists on free-living flatworms. Fish parasitologists were mainly represented in this symposium by teams from France, the Czech Republic and Belgium.

The field day involved a boat trip along the spectacular Sardinian coast, and everybody could snorkel. A couple of dolphins also joined the assembly.

TENTH INTERNATIONAL SYMPOSIUM ON FISH PARASITES (ISFP10)

We are pleased to announce that the 10th International Symposium on Fish Parasites will be held in Cairns, Australia from **6-10 July 2020**. The meeting will be held in conjunction with that of the annual meeting of the Australian Society for Parasitology; holding the meeting with the ASP gives us excellent organisational support and intellectual input.

We think you will enjoy Cairns as a venue. Cairns boasts wonderful weather in July, with temperatures between 17-26 °C and very little rain, and is perfectly placed for exploring everything Queensland has to offer, being on the doorstep of both the Great Barrier Reef and the tropical north Queensland rainforest. Please put the meeting in your diaries and mention it to colleagues and students and stand-by for further announcements (and a website) as the details are organised. Should you be interested in running (or helping to run) a special symposium during the meeting, then please let us know about your ideas (please email B.Nowak@utas.edu.au). We look forward to seeing you in Cairns in 2020.

With best regards from Australia.

The Organising Committee:
Thomas Cribb, Robert Adlard, Nathan Bott, Scott Cutmore, Kate Hutson, Lisa Jones, Alan Lymbery, Terrence Miller, Barbara Nowak and Shokoofeh Shamsi.

CURRENT RESEARCH ACTIVITY IN VARIOUS COUNTRIES

BRAZIL

provided by Simone Cohen, cohen.simone@gmail.com

The **Laboratory of the Evaluation and Promotion of Environmental Health**, Institute of Oswaldo Cruz, is led by **Dr Cláudia Portes Santos**. Projects on fish parasites include experimental work with metacercariae of heterophyid digeneans. Cláudia, with **Dr Juliana Novo Borges**, has studied the viability of *Ascocotyle* (*Phagicola*) metacercariae from mullets off Rio de Janeiro after exposure to freezing and heating within the temperature range -35°C to 180°C, work which has been published in the journal *Food Control*.

In northwest Amazonia two students, **Maralina da Silva Torres** and **Pedro Hercílio de Oliveira Cavalcante**, finished their PhDs working with the parasites of cultured *Arapaima gigas* and *Colossoma macropomum* and also of a catfish, *Pimelodus blochii*. From the latter, a new nematode species, *Philometroides acreanensis,* was described in cooperation with **Dr František Moravec**.

Our research on monogeneans included the PhD studies of **Ana Carolina Alves de Camargo**, who described *Mexicana rubra* and redescribed other species of dactylogyridean, capsalidean and mazocraeidean taxa from marine fishes based on both morphological and molecular methodologies. In addition, a new hexabothriid genus and species was described as *Hypanocotyle bullardi* in cooperation with **Dr José Luis Luque** and his students. Morphological and molecular taxonomic studies of acanthocephalans by Master's students supervised by Cláudia included the description of a new species of *Filisoma* by **Viviane Costa** in cooperation with **Prof. Omar Amin**. In addition, the studies of **Lucas Keidel** on a species of *Dollfusentis* include a comparison of its elemental composition in relation to that of the organs of its fish host.

Photos, right to left: Pedro, Cláudia, Maralina, Everton, Juliana, Ana Carolina, Cláudia and Lucas

In southern Brazil, the **Aquatic Organisms Health Laboratory - AQUOS**, led by **Prof. Maurício Laterça Martins and Prof. José Luiz Pedreira Mouriño,** has been promoting an extensive study, in partnership with the Brazilian Agricultural Research Corporation – EMBRAPA Western Amazon and Nilton Lins University, on the battle against acanthocephalosis in tambaqui *Colossoma macropomum* in the North of Brazil. One of the goals of this project was developing a method to produce the best *in vitro* culture condition for *Neoechinorhynchus buttnerae,* ensuring its survival and adaptation out of the host in order to allow for the testing of substances to be used to control the parasite. The RPMI 1640 + agar 2% culture medium resulted in the best survival of 24 days at 24°C. No morphological alterations, such as swollen parasites, body deformation, dehydration or hardening were observed.

In a Master's project, based on *Oreochromis niloticus* collected from the River Cachoeira (Joinville, Brazil) polluted with industrial effluents, the monogeneans *Cichlidogyrus* spp. and *Enterogyrus cichlidarum* and four trichodinid species were found on the gills and body surface. Several histopathological changes were observed in the liver and kidney. In another Master's project, a treatment with an essential oil derived from *Pinus* sp. was tested *in vitro* against nauplii and copedodids of *Lernaea cyprinacea*. The results were very promising, as the oil inhibited the development of the early stages of the parasite.

The AQUOS Laboratory (photo of the team above) has enhanced its research profile with recent projects on essential oils used as an antiparasitic agent and immunostimulant against

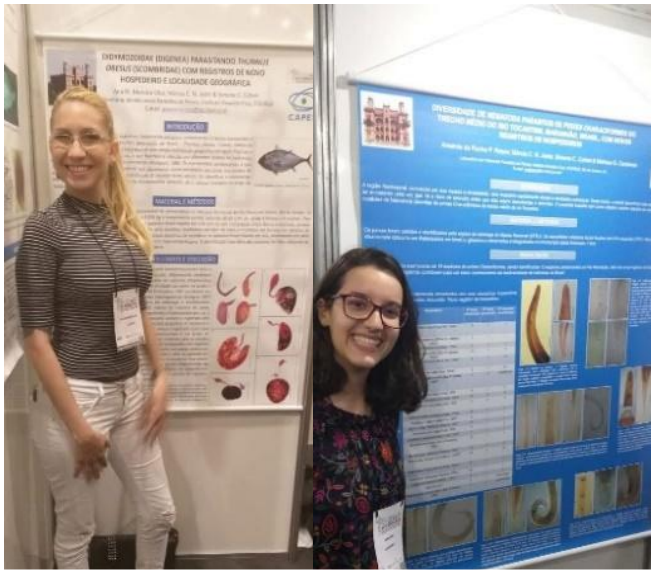
Left: New bioassay laboratory to hold zebrafish experiments; Right: Course on the management and use of cephalopods, fish and amphibians in research.

zootechnical parameters, haematology, immunology, histology and electronic microscopy. The laboratory also promotes several academic training courses.

The staff of the **Laboratory of the Helminth Parasites of Fishes** at the Institute of Oswaldo Cruz (LHPP) includes **Dr Simone C. Cohen** (scohen@ioc.fiocruz.br), Head of the Laboratory, **Dr Marcia C. N. Justo** (marciajusto@ioc.fiocruz.br), **Dr Melissa Q. Cárdenas** (melissaq@ioc.fiocruz.br) and **Dr Ana Claudia Ribeiro Fiuza** (ana.fuiza@ioc.fiocruz.br).

Several projects are being carried out by the group, including studies of tuna parasites by Marcia C.N. Justo, Simone C. Cohen and **Ana Maria Moreira da Silva**, who finished her Master's degree with a dissertation on the taxonomy of didymozoid trematodes from *Thunnus obesus*, using morphological and molecular approaches. Other graduate student projects are being developed involving helminths of freshwater fishes from river basins in the northern region of Brazil, including the descriptions and redescriptions of species of Monogenea, Digenea and Nematoda, some of which are new to science, using morphological and molecular data. **Carine Bezerra** and **Diego Carvalho Viana,** from the Estadual University of Maranhão, are studying helminths from the River Tocantins, working on a Master's dissertation and post-doctoral internship, respectively.

The team (photo: left) of the laboratory participated in the XV Enbrapoa (Brazilian Meeting of Pathologists of Aquatic Organisms), which was held in Rio de Janeiro. In addition to scientific talks and posters presented by the students, Simone Chinicz Cohen presented a talk on alternative treatments for fish diseases caused by Monogenea, which is published as chapter in the book "Biotecnologia e Sanidade de Organismos Aquáticos" with Marcia C. N. Justo. Two students of the laboratory were recognised with honourable mentions in the awards granted to the best scientific papers



Photos: Left to right, Ana Maria Moreira Silva and Amanda Reyes presenting their awarded posters.

presented at the meeting; these studies were selected from almost 200 oral and poster presentations. Honourable mentions were given to **Amanda Reyes,** supervised by Melissa Q. Cárdenas, for her study of the diversity of nematodes from characiform fishes in the River Tocantins, and to Ana Maria Moreira da Silva, for her Master's project, as part the Post-Graduate Programme of Biodiversity and Health from the Institute of Oswaldo Cruz, on the integrative taxonomy of didymozoids from tunas.

The **Laboratory of Helminth Parasites of Vertebrates** of the Institute of Oswaldo Cruz (LHPV/IOC) led by **Dr Delir Corrêa Gomes Maués da Serra Freire** and **Dr Marcelo Knoff**, in addition to studies on non-aquatic vertebrates with helminths of medical importance, has been developing studies on helminth parasites (involving digeneans, monogeneans, cestodes, nematodes and acanthocephalans) of Brazilian marine and freshwater fishes of commercial importance, in partnership with other laboratories of the IOC, the Federal Fluminense University (UFF), the Coordination of Improvement of Higher Level Personnel (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES) and the National Council of Scientific and Technological Development (Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq). These works involve several PhD, Master's and Post-graduate projects. (Photos below: The team).

Aline Monteiro da Silva MSc recently finished her Master's dissertation on a trypanorhynch cestode parasitizing a malacanthid fish, *Lopholatilus villarii,* using morphological, morphometric and molecular analyses. **Bianca Porto Kuraiem MSc** is involved in a study to analyse the immunological response to antigens of the nematode *Eustrongylides* sp. collected from freshwater teleosts. **Dr Michelle Cristie Gonçalves da Fonseca** and **Nilza Nunes Felizardo** have worked for their Master's dissertation, PhD theses and Post-docs on trypanorhynch cestode, acanthocephalan, digenean trematode and nematode parasites of the flounders *Paralichthys patagonicus, P. isosceles* and *Xystreurys rasile* from the state of Rio de Janeiro. During last February, **Priscila Queiroz Faria de Menezes MSc** defended her Master's dissertation involving morphological and genetic analyses of the trypanorynch cestode *Callitetrarhynchus gracilis* from *Sardinella brasiliensis*. Other student projects, one PhD and two Masters, are being developed on anisakid and raphidascaridid nematodes and trypanorhynch cestodes from other teleosts purchased in the state of Rio de Janeiro for **Mayla Monique dos Santos Leite MSc**, **Jessica Botti Diniz** and **Sandra Helena Gomes Miguel. João Victor Ferreira de Oliveira**, a graduate student of Veterinary Medicine, is finishing his Bachelor's degree with an analysis of the trypanorhynch cestodes parasitizing *Mugil liza* collected in the state of Rio de Janeiro.

CAMEROON

provided by Guy Benoît Lekeufack Folefack, leguyzo@yahoo.fr

The information provided here by Dr Guy Benoît Lekeufack Folefack, Department of Animals Biology and Physiology, University of Yaounde, Cameroon, relates to the result of research conducted since 1985 on the myxosporean parasites of freshwater fishes from rivers of Cameroon, a country considered by some as 'Africa in miniature' and a world biodiversity hotspot. Classical sampling and identification methods have been employed, including fishing, the necropsy of host fish and the staining, mounting and study of parasites using a light microscope. Identifications of myxosporeans have mainly been based on morphological characteristics of the myxospores, but also on organ specificity and tissue tropism. Myxospores with similar characteristics and from systematically distant fishes have frequently been identified as belonging to the same species. Furthermore, variability within the myxospores of some host species has precluded their identification.

The examination of fish from rivers in Cameroon revealed that the myxosporean fauna is abundant and diverse. A total of 79 myxosporean species have been recorded. These belong to the genera *Myxobolus* (42 species), *Henneguya* (12), *Myxidium* (11), *Thelohanellus* (9), *Sphaerospora* (4) and *Chloromyxum* (1). Among these, 54 are new and belong to the genera *Myxobolus* (24 species), *Henneguya* (11), *Myxidium* (8), *Thelohanellus* (6), *Sphaerospora* (4) and *Chloromyxum* (1). Twenty-five species have previously been described from other geographical areas; some appear to have extended their host range and others extended their target organs relative to their original descriptions.

Nowadays, molecular biological methods have become increasingly applied to parasitological studies and ribosomal DNA sequence analyses have enabled the correct identification of several myxozoan species around the world. Therefore, the main task for

future research in Cameroon is a rigorous, detailed morphological description combined with molecular techniques for the establishment of new species and the revision of existing ones. In the future, an acceptable classification of the Myxozoa in Cameroon is needed based on morphological, biological and phylogenetic data.

CANADA

provided by Dr David Marcogliese

Dr David Marcogliese retired from Environment and Climate Change Canada (ECCC) in February 2017, after 27 years of service as a research scientist with the Canadian Government [7 years with Fisheries and Oceans (DFO) and 20 years with ECCC]. He continues to be active in science in general and parasitology in particular, and has an appointment as Scientist Emeritus with ECCC.

He currently co-supervises two PhD students at Concordia University in Montreal. **Angela Rose Lapierre** is completing her dissertation on life history and interactions between species of the eyefluke *Diplostomum* in fish and bird hosts. For his dissertation, **John Forest** is examining the effects of the introduction of the round goby, *Neogobius melanostomus*, on parasite communities of three species of native fish in the St. Lawrence River, Quebec.

Angela Rose Lapierre (left) and John Forest (right) collecting fish in the St. Lawrence River

Dave is actively involved in research projects with numerous collaborators both nationally and internationally on parasites in freshwater and marine ecosystems. Currently living in St. Andrews, New Brunswick, he also maintains an office at the St. Andrews Biological Station (DFO). He can be reached by e-mail at: david.marcogliese@canada.ca or david.marcogliese@dfo-mpo.gc.ca

CRIMEA

provided by Evgenija Dmitrieva, genijadmitrieva@gmail.com

The **A.O. Kovalevsky Institute of Biology of the Southern Seas** (IBSS), located in Sevastopol on the Black Sea coast, was founded in 1871 as the Sevastopol Biological Station. Regular parasitological studies began here in 1956 by a group of researchers led by **Dr V. Nikolaeva**, a well-known specialist on didymozoid trematode parasites of fishes. At various times, eminent ichthyoparasitologists, such as **Dr A. Parukhin**, **Dr A. Kovaleva** and **Prof. A. Gaevskaya**, worked at the IBSS. Indeed, Albina Gaevskaya headed the Department of Parasitology of the IBSS from 1988 to 2013.

Traditionally, the research direction of the team was towards the parasite fauna of fishes and invertebrates inhabiting the southern seas, from the Azov and Black Seas to the Gulf of Mexico in the Atlantic, the Indian Ocean and the western seas of the Pacific Ocean. The result of these studies was the description of more than 200 new species of protozoans, microsporidians, myxosporeans and helminths and the erection of dozens of new genera and several new subfamilies. As a result of this work, much material, including many type-specimens, is stored in the Collection of Marine Parasites maintained at the IBSS. This includes more than 5,000 lots of 450 parasitic species, 86 of which are represented as holotypes and more than 100 as paratypes and syntypes. Of special scientific importance are representatives of 52 species of didymozoid trematodes, 25 of which are holotypes or paratypes, collected from the dozens of fish species in the Indian, Atlantic and Pacific Oceans.

In recent years, we have had a project to create an electronic resource which provides on-line access to the collection that is available to anyone interested. The website with information on the collection – http://marineparasites.org – includes an electronic catalogue of the collection, a taxonomic database and details of publications. The latter bibliographic database contains references and original texts of articles containing the descriptions of parasitic species. Many of these articles are otherwise inaccessible or in rare publications that have never previously been digitised. A useful addition is the presence of transliterated bibliographic titles to articles in Russian which will help non-Russian speakers to use the repository and cite these works properly in publications. Currently, work is underway to complete the website.

The current generation of IBSS parasitologists continues with faunistic studies on marine parasites:
Dr Evgenija Dmitrieva, Head the Department of Ecological Parasitology, is focused on studying monogeneans from the Black, Azov, Mediterranean, Red, Arabian, South China and Sea of Japan (www.researchgate.net/profile/Evgenija_Dmitrieva2). Recently, a new genus, *Xenoligophoroides* Dmitrieva, Sanna, Piras, Garippa & Merella, 2018, has been erected with the collaboration of Italian colleagues from the Università di Sassari. Currently, the same collaborative team has begun studies on the morphological and genetic diversity of *Gyrodactylus* spp. occurring in the Mediterranean and Black Seas. Evgenija is also working on a project to develop methods for the application of geometric morphometrics to analyse the shape variability of the haptoral attachment structures of *Ligophorus* species. Using this

method, it is hoped to create a semi-automatic key for the identification of lower monogeneans, which are mainly distinguished by the shape and dimensions of their attachment organs.

Dr Julia Korniychuk has, for many years, studied the trematode fauna of the Black Sea (www.researchgate.net/profile/Julia_Korniychuk). Presently she investigates the host-dependent versus genetic determinate morphological variability of trematodes of the genus *Cainocreadium*.

Dr Violetta Yurakhno (www.researchgate.net/profile/Violetta_Yurakhno2) (photo left)

investigates marine fish microparasites: Myxosporea, Microsporidia, Coccidiasina and Cliiata. She has described 17 new species from the Mediterranean, Black Sea and Sea of Azov, studied parasites in the open waters of the Central-East Atlantic region off Mauritania and in the coastal zone of the USA in the western Atlantic, and investigated myxosporeans of mullets and other fish in the Sea of Japan.

Julia Korniychuk and Violetta Yurakhno, together with colleagues from Poland and the Ukraine, participated in a study of the parasites of invasive gobiids in the eastern part of the Central Trans-European Corridor of invasive Ponto-Caspian hydrobionts. They also collaborate with **Prof. Ahmet Ozer** and his scientific group from Sinop University (Turkey) and carried out an interesting study of the parasite fauna of the whiting *Merlangius merlangus* in the northern and southern parts of the Black Sea. As a result of the recent revision of the myxosporean fauna off the southern coast of the Black Sea conducted by Turkish colleagues, with help of Violetta Yurakhno, 25 species of these parasites were identified in this region and four of them were described as new species. Violetta also studied microparasites of mugilid and gobiid fishes, in cooperation with **Dr Mykola Ovcharenko** from the W. Stefański Institute of Parasitology (Poland), revising the worldwide fauna of mullet myxosporeans and describing two new species. Violetta is especially interested in the problem of the negative effect of microparasites on the host fish organism. She has described diseases of marine fishes in the Black Sea and the Sea of Azov, caused by myxosporeans, and organised all data on conditionally pathogenic microparasites in these seas.

Tatyana Polyakova (photo right, with Evgenija Dmitrieva) defended her PhD thesis on “Cestodes

of elasmobranchs (Elasmobranchii: Batoidea) in the Black Sea off the Crimea (systematics, fauna, ecology)" in 2015. She revised our current knowledge of the cestode fauna of Black Sea elasmobranchs, i.e. the stingray *Dasyatis pastinaca,* ray *Raja clavata* and shark *Squalus acanthias*. Representatives of one order, five genera and 21 species of cestode were found for the first time in Black Sea elasmobranchs. A new genus, *Cairaeanthus* Kornyushin & Polyakova, 2012, with two new species, *C. ruhnkei* and *C. healyae,* were described. Equal numbers of cestode species, namely 29, were found in the three species of fish investigated in the Mediterranean and Black Seas, but only 12 of them are common. The distribution of cestodes in their host population was described, and the inter- and intra-specific relationships of *Cairaeanthus* spp. simultaneously parasitizing one fish specimen have been investigated. Currently she is studying the inter- and intra-specific morphological and genetic, based on 18S and 28A rDNA, variability of "*Bothriocephalus scorpii"* and "*B. gregarius*" in order the verify the validity of these taxa.

Natalia Pronkina, together with **Prof. Sergei Spiridonov** from the Parasitology Centre (A.N. Severtsov Institute of Ecology and Evolution, Russia), identified, for the first time in the Black Sea, the anisakid nematode *Contracaecum multipapillatum* (Drasche, 1882), the larvae of which parasitise the golden grey mullet. Their partial 28S and ITS1 rDNA sequences coincided with those deposited in the GenBank as *C. multipapillatum* in pelicans from Greece and Australia (*Russian Journal of Nematodology*, 2018: 26, 87-92).

In 2018, IBSS parasitologists started to study the parasite fauna of coastal fishes in the South China Sea off the coast of southern Vietnam together with Vietnamese colleagues.

IRAQ

provided by Prof. Dr Z. I. F. Rahemo, zohair.f.rahemo@gmail.com

At the University of Salahaldin, Erbil, Kurdistan**, Prof. Dr Shamall M. A. Abdulla**, with his colleague **Dr Furhan T. Mhaisen**, completed a compilation entitled 'Parasites of Fishes of Kurdistan Region, Iraq: Checklists'. This is a literature review of all references concerning the parasite fauna of fishes in the Kurdistan region of Iraq up to the end of 2016. This resulted in data on a total of 188 valid parasite species from 33 valid freshwater fish species (27 cyprinid and six non-cyprinid species) in different aquatic habitats. The parasite fauna included one euglenozoan, one microsporidian, 21 ciliophorans, 19 myxozoans, 11 trematodes, 82 monogeneans, 19 cestodes, 16 nematodes, five acanthocephalans, two annelids, one mollusc and 10 arthropods.

In another study, with **Samir J. Bilal**, **Shwan K. Rahman** and **Younis S. Abdullah,** the nematode *Rhabdochona* (*Rhabdochona*) *longispicula* was recorded for the first time in *Glyptothorax kurdistanicus* from the Greater Zab River in the Kurdistan Region.

At the **University of Basrah**, **Dr Ather Ali** carried out research on several projects, including: the morphological variability, ultrastructure and molecular characterisation of the nematode *Hysterothylacium reliquens* from the oriental sole *Brachirus orientalis* (with **Prof.**

Liang Li and other Chinese workers); checklists of fish parasites of the Basrah marshlands, Iraq (with F. T. Mhaisen and **N. R. Khamees**); Pacific transvenid acanthocephalans in the Arabian Gulf, with the description of a new species and genus (with **O. M. Amin** and **R. A. Heckmann**); the inhibition of some aquatic and aromatic plant extracts on fungal infections of common carp (*Cyprinus carpio* L.) and its eggs (with **A. M. Al-Jenae'e**); and a review of marine fish parasitology in Iraq, including checklists (with F. T. Mhaisen and N. R. Khamees).

Also at the University of Basrah, **Assist. Prof. Dr Khalidah S. Al-Niaeem** (photo below) carried out a number of studies. Research on the occurrence of two parasitic copepods, *Caligus cossackii* and *Lernanthropus sarbae,* on the sparid fish *Acanthopagrus bifasciatus* in Iraqi marine waters (with **Hayder A. H. Al-Hasson** and **Suzan A. Al-Aziz**), found both male and female specimens of these two copepods on the gill filaments of this host. Clinical diagnoses of some diseases and parasites infecting the common carp (*Cyprinus carpio*) cultivated in floating cages in Babylon Province were also carried out. The team found two species of parasites, the plerocercoid stage of *Ligula intestinalis* with an infection rate of 3.93% (11 infections) and the larval nematode *Contracaecum* sp. with an infection rate of 1.78% (5 infections). In a collaborative project with **Lesley R. Smales**, Hayder A. H. Al-Hasson and Suzan A. Al-Azizz a new species of the acanthocephalan genus *Neorhadinorhynch*us was described from *Platax teira* (Ephippidae) in Iraqi marine waters, which was distinguished from its congeners by the proboscis armature of 12 rows of 8–10 hooks, the largest hooks being up to a third larger than the those of other species of the genus described from the Indian Ocean. Finally, **Dr Khalidah S. Al-Niaeem** also studied the seasonality of monogeneans from some perciform fishes in Iraqi marine waters (with Suzan A. Al-Azizz and Hayder A. H. Al-Hasson).

ITALY

provided by Prof. Simonetta Mattiucci, simonetta.mattiucci@uniroma1.it

Simonetta Mattiucci's Research Group in the Parasitology Unit, Department of Public Health and Infectious Diseases of "Sapienza-University of Rome", has continued with studies on the

parasites of fish. The main research topics of the team involve anisakid nematodes (species of *Anisakis, Contracaecum* and *Pseudoterranova*), aetiological agents of human anisakidosis. Research on these nematodes has been carried out in collaboration with a long-time friend and colleague, **Giuseppe Nascetti** (Tuscia University, Department of Biological and Ecological Sciences, Viterbo, Italy). The team carrying out these challenging studies includes researchers and PhD students from both Universities: **Michela Paoletti, Paolo Cipriani, Gianluca Sbaraglia, Marialetizia Palomba, Eleonora Bello, Alessandra Colantoni, Lucilla Giulietti** and **Armando Macali** (Photo below: the Team, with **Dr Mohsen Najjari**, Iran).

The research work on anisakid nematodes includes: molecular systematics, population genetics, morphology, phylogeny, ecology, hybridization and introgression events between closely related species, pathological aspects, and epidemiological surveys in both natural and accidental (human) hosts. The team has applied different molecular/genetic methodologies in the molecular systematics and population genetics of anisakids (nuclear and mitochondrial DNA gene loci sequences analysis, allozymes, Real-Time PCR methodologies, etc.). Recently, a genomic library has been developed for the species *Anisakis pegreffii,* and DNA microsatellites have been developed which successfully cross-amplify species of the *Anisakis simplex* (*s. l.*) complex (i.e. *Anisakis pegreffii, A. simplex* (*s. s.*) and *A. berlandi*).

The molecular systematics approach has allowed the team to discover and describe several new species of anisakids and to deposit in GenBank hundreds of sequences of nuclear and mitochondrial DNA gene loci of fish parasite species. The descriptions and nomenclatural designations of other anisakid species are in progress.

Recent studies on the molecular characterization of anisakid worms infecting fishes involve investigations on other co-evolutionary aspects of these parasites. In particular, a transcriptomic (RNA-Seq and *q*PCR) approach has been undertaken to investigate the gene expression profiles of target proteins involved in the fish host–anisakid parasite interactions and co-adaptation.

The team is also continuing to perform parasitological analysis of fish species from Antarctic waters, participating in several collecting trips to the Ross Sea with the Italian Expedition to Antarctica. The Antarctic Ocean is considered a “pristine ecosystem” and a biodiversity “hotspot”. This provides a chance to investigate a marine ecosystem scarcely impacted by humans. We have therefore the possibility of testing the hypothesis that quantifying population density and estimating the genetic diversity of anisakid nematodes, whose life-cycle is embedded in marine ecosystem food webs. This could be an indirect way of analysing demographic reductions and population bottlenecks (due to anthropogenic causes, such as habitat fragmentation and over-exploitation) of definitive and intermediate/paratenic hosts which are involved in their life-cycle. Indeed, the completion of such a life-cycle requires stable trophic webs. As a result, the life-cycle of anisakid nematodes in marine ecosystems, characterised by various degrees of habitat disturbance, could be affected by changes in host population size. Indeed, when the population size of the hosts participating in the life-cycle of these parasites is reduced, due to different causes, the population size of their anisakid endoparasites could also be reduced. This would result in a higher probability of genetic drift phenomena in the parasite gene pools. Comparative analysis of genetic variability values (at both nuclear and mitochondrial levels) and of the infection levels with anisakids in the Antarctic Ocean has been carried out over a long period (25 years). High values of genetic variability and parasitic infection have been observed. These data suggest that a significantly higher level of genetic diversity found in the Antarctic members considered (i.e. *Contracaecum osculatum* sp. D, *C. osculatum* sp. E, *C. radiatum* and *Pseudoterranova decipiens* sp. E) coincides with a lower degree of habitat disturbance (e.g. overfishing, by-catch of cetaceans, hunting and disease mortality of seals, sea water pollution and acidification). We therefore maintain that monitoring the demography of anisakid parasites and their genetic variability values will be useful tools for monitoring the impact of habitat disturbance on biodiversity, at both species and gene level, over spatial and temporal scales. Furthermore, these parameters can be used as indicators of food-web stability and the integrity of marine ecosystems.

The research team is also continuing to apply parasites as ecological markers within the framework of a holistic approach for the stock identification of fish species. Some case studies comparing Mediterranean *vs* Atlantic fish stocks in a multidisciplinary framework already have been performed and other cases are under study. Particularly, the differential distributions of species of *Anisakis* in demersal (hake) and pelagic (horse mackerel, swordfish) species have been useful in providing support for fish stock characterization, using a holistic approach. The generalised Procrustes Rotation (PR) was used to assess the association between parasite data and fish host genetics. While fish population genetics can detect changes over an evolutionary timescale, providing indications on the cohesive action of gene flow, parasites are more suitable biomarkers when considering fish stocks over smaller temporal and spatial scales, hence giving information on fish movements over their lifespan. Furthermore, population genetic studies, inferred on both mitochondrial genes (mtDNA *cox2*) and nuclear (DNA microsatellites) markers, performed on target species of *Anisakis* in distinct fish populations of the same species (phylogeographical aspects of the parasite species), would represent a further tool to be included in multidisciplinary studies on fish stock structure.

The long-term collaboration between Simonetta and Giuseppe has also enabled us to establish and develop a "Laboratory of Fish Parasitology" close to the Tyrrhenian Sea, at **CISMAR** (The Ichthyogenic Experimental Marine Centre), located in the Natural Reserve “Le Saline di Tarquinia", which has recently received a grant from the Italian Ministry of Research and University (MIUR), for the implementation of its infrastructures. Primary goals of the Centre are the study and monitoring of the biodiversity of coastal and transitional environments. Its activity is primarily focused on the genetic characterization of marine animal populations, applying genetics and behavioural biology to population management, and restocking coastal marine organisms (fish and crustacean species). Among the actions at the CISMAR, one is devoted to a study of the ecology of parasites of organisms (co-tutored by Simonetta) from coastal marine and brackish ecosystems. In this field, one on-going research project is the study of the molecular systematics and ecology of species of *Contracaecum* infecting fish-eating birds, especially in relation to the behavioural biology of their avian definitive hosts. Furthermore, at CISMAR it has been possible to perform experimental infections of fish with some parasite species under controlled conditions. Recently, we were able to successfully infect *Dicentrarchus labrax* with larvae of *A. pegreffii* and undertake further analysis of the parasite-host interaction.

The development of molecular markers in anisakid nematodes has also enabled us to apply new molecular methods in the diagnosis of human anisakidosis, as well as in the rapid, sensitive and specific detection of the DNA of different anisakid species co-infecting the same fish species, by using Real-Time PCR, DNA methodologies. In addition, immunological methods for the serodiagnosis of human anisakiasis (gastric, intestinal and gastroallergic) have been proposed. In terms of the zoonotic aspects, the team is also presently investigating the molecular and immunological mechanisms involved in human disease (mainly anisakiasis) due to two zoonotic fish parasites, i.e. *A. pegreffii* and *A. simplex* (*s. s.*), using a multi-methodological approach. Specific objectives have been: i) the study of the modulation of dendritic cell (DC) functions in response to parasite interaction (DCs have a key role in orchestrating the immune response); ii) to assess the presence and role of microvesicles (MVs) and miRNA released by *Anisakis* spp.; and iii) to improve our knowledge of the molecular mechanisms involved in the differential invasiveness of the two *Anisakis* species in host tissues.

We recently established a network of collaborative work with a friend and colleague, **Dr Arne Levsen** of the Institute of Marine Research (IMR), Bergen, Norway (formerly NIFES), aimed at carrying out a large epidemiological survey of anisakid nematodes collected from different fishes from Norwegian waters, in comparison with Mediterranean waters. Paolo Cipriani from the Simonetta's team has recently obtained, following peer competition, a permanent Researcher position in Arne’s laboratory at IMR. Similarly, student Lucilla Giulietti received a contract position at the same institute to perform molecular identifications and

characterization of *Kudoa* spp.

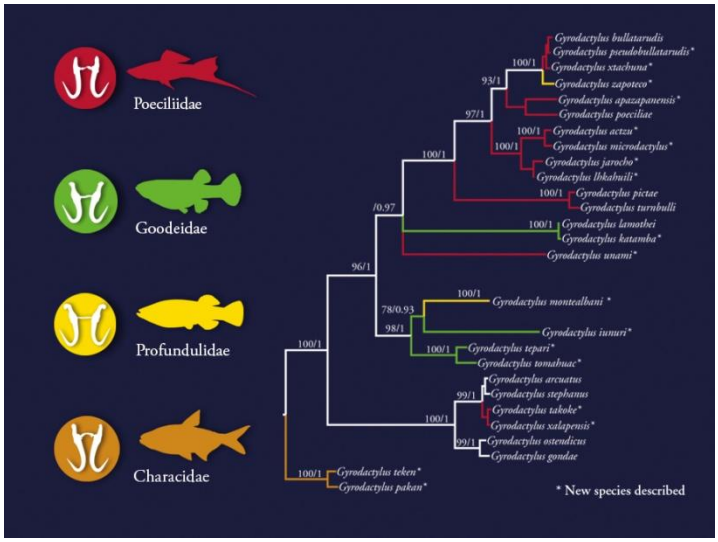
The team is also continuing collaborations with colleagues and friends **Prof. Juan Timi** (Laboratorio de Parasitología, Universidad Nacional de Mar del Plata, Mar del Plata, Argentina) and **Dr Steve C. Webb** (Cawthron Institute, Nelson, New Zealand).

Some of the main results obtained by the team were presented by Simonetta, in an invited plenary talk, at the 14th ICOPA (19-24 August 2018), Daegu, South Korea (Photo above: Simonetta and team members at ICOPA).

MEXICO

provided by Miguel Rubio-Godoy, miguel.rubio@inecol.mx

Miguel Rubio-Godoy's research group at the **Instituto de Ecología, A.C. (INECOL)**, Veracruz, has grown a little this year: in addition to long-time collaborators **Adriana García-Vásquez** and **Ismael Guzmán-Valdivieso**, we now count **Carlos Daniel Pinacho-Pinacho** as part of the lab. We have continued characterising monogeneans of the genus *Gyrodactylus* found on farmed and wild freshwater fishes in Mexico, and have described several new species infecting native fishes from different families: Poeciliidae, Goodeidae, Profundulidae and Characidae (photo left).



In addition to monogeneans, Carlos' varied interests include acanthocephalans, cestodes and trematodes infecting fishes, and he has published several papers on these parasites with colleagues from the Universidad Nacional Autónoma de México – mainly with **Martín García-Varela** and **Gerardo Pérez-Ponce de León**.

Biology students **Mirna Milán-Lara** and **Brenda Rodríguez-Delgado**, both from the Universidad Veracruzana, analyzed the gyrodactylid fauna infecting a common, widely-distributed fish host , the twospot livebearer *Pseudoxiphophorus bimaculatus* (syn. *Heterandria bimaculata*), in the La Antigua River basin, characterizing parasite populations ecologically (Mirna) and morphometrically (Brenda) along an elevation gradient from *ca*. 1300 metres to sea level.

Miguel co-supervised, with **Edgardo Soriano-Vargas** (Universidad Autónoma del Estado de México), PhD student **Andrea Paloma Zepeda-Velázquez**, who characterised *Aeromonas* bacteria infecting farmed rainbow trout in Mexico. After graduating, Paloma secured a teaching position at the Universidad Autónoma de Hidalgo.

Photos: Left, Miguel Rubio; centre, Adriana; right, Carlos and Miguel Calixto

PhD student **Miguel Calixto Rojas**, co-supervised by Miguel and Carlos, recently joined the lab. and will study co-evolutionary patterns of species of *Profundulus* and their *Gyrodactylus* parasites in Mexico.

PORTUGAL

provided by Maria João Santos, mjsantos@fc.up.pt

The Animal Pathology Group of CIIMAR – CIMAR Associated Laboratory, University of Porto, headed by **Prof. Maria João Santos**, includes other senior team members, including **Prof. Aurélia Saraiva** (amsaraiv@fc.up.pt), **Prof. Carlos Azevedo** (azevedoc@icbas.up.pt), **Prof. Cristina Cruz** (cfcruz@fc.up.pt), **Prof. Graça Casal** (gcasal@icbas.up.pt) and **Prof. Jorge Eiras** (jceiras@fc.up.pt). Several students and collaborators are currently working on their theses or other projects in fish parasitology, including: the postdocs **Margarida Hermida**, **Luis Rangel** and **Andreia Caldeiras**; PhD students **Sónia Rocha**, **Karen Tankredo**, **Thainá Vieira** and **Kouloud Bouderbala**; Master's students **Sara Nogueira, Fernando Rodrigues, Duarte Frade** (Volunteer); and BSc students **Rita Cortinhas**, **José Silva, Ana Catarina Silva, André Reis, Henrique Rodrigues, Bárbara Costa** and **Liliana Ribeiro**. Also present is an Aquaculture collaborator, **Ricardo Severino**.

The Laboratory of Pathology investigates the pathology of freshwater and marine fishes not only from Portugal but also of important tropical fish species from South America (Brazil), Tunisia and Saudi Arabia. We have strong collaborative research programmes which were established more than two decades ago. Current projects include a survey of pathogenic agents of important farmed fishes and a study of Apicomplexa and Myxozoa from seabass (*Dicentrarchus labrax*) and seabream (*Sparus aurata*). Studies on the nematode *Dioctophyme renale,* involving several partners in Thailand, Japan, Russia, China and Brazil, are underway with the Portuguese collaboration of Jorge Eiras.

More detailed information on our previous work and publications is available at https://www2.ciimar.up.pt/research.php?team=22. A national website on aquatic parasitology, Parasitologia_Aquática.PT, is being developed by Maria João Santos (in Portuguese) at http://mjsantos.wixsite.com/parasitologiaaqua-pt

Prof. Sanny Porto (pictured on the right with Maria João Santos) from UFAM, University Federal of Amazonia, Brazil, visited our laboratory during October, 2018.

Prof. Graça Costa (gcosta@uma.pt), of Madeira University, is carrying out research on fish parasitology off Madeira, the Selvagens (Savage) Islands and the Portuguese mainland.

UNITED STATES

provided by Apryle Panyi and Robin Overstreet, Robin.Overstreet@usm.edu

The **Overstreet Parasitology Group** at the Gulf Coast Research Laboratory, University of Southern Mississippi, has continued extensive research projects on fish and shellfish parasites throughout the past year. Doctoral student **Juan Carrillo** is in the home stretch of his dissertation work that involves investigating the effects of white spot syndrome virus, *Haematodinium perezi* and various environmental parameters on the catch per unit effort of a host in the Mississippi Sound. Master's student **Apryle Panyi** has had a very busy year finishing all of her fieldwork, collecting and dissecting fishes for her master's research with the help of former student **Stephen Curran** (Associate Editor of *Comparative Parasitology*). Apryle's research involves investigating the taxonomy and phylogenetics of members of the Monorchiidae (Trematoda) in the northwestern Atlantic Ocean (US East Coast, Gulf of Mexico, and Caribbean). Another doctoral student in the lab, **Andrew Claxton**, has spent the year collecting pinfish from inside and outside seagrass habitats and examining differences in parasite assemblages. In addition, he continues to process and analyze parasite assemblages from Atlantic croaker as part of a long-term data set examining parasite community structure in regard to environmental conditions. Another master's student, **Jaime Smith,** has spent the year conducting lab and field experiments on a protist that causes mass mortalities of its hosts.

Stephen Curran, Michael Andres and **Eric Pulis**, former students still affiliated with our group, continue to conduct research and publish on fish parasite taxonomy and ecology.

They have published several papers this year on members of the Haploporidae (Trematoda) in addition to publishing on other parasite groups. Michael has continued working on and publishing on the ecology of Gulf sturgeon and has begun investigating parasitic copepods that infest this host.

Photo (left to right): Robin, technician Jean Jovonovich, Apryle and Jaime.

Robin Overstreet, our fearless leader, has continued his work as an emeritus professor on a variety of trematodes, microsporidians and other groups as well as general parasitology.

WALES

provided by Prof. Jo Cable, cablej@cardiff.ac.uk

Our condolences go to the families of Haffi Williams, Jo Van As and Göran Malmberg. When I first moved to Cardiff (Dec 1999), Haffi welcomed me to Wales with tea and welsh cakes, and we spent many a fine hour at the Natural History Museum of Wales with his parasite collection. Göran - gyrodactylid biology would not have progressed to the extent that it has without his seminal works, and I am again personally grateful for his encouragement to me.

It has been a busy year for the team in the lab. Final year PhD student **Emily Matthews** is writing up her thesis focussed on the molecular and environmental factors that underpin salmonid pathogens. The Environment Agency (EA) has been an integral part of this PhD studentship and Emily will miss the “hard graft” of sampling with her EA colleagues. Our collaboration with the EA continues as **Rhi Hunt** is gathering data to model parasite populations in the field. This modelling will hopefully be used to inform management strategies for industry and help mitigate losses from parasite infections. This work will see our first collaboration with the School of Maths, welcoming PhD student **Clement Twumasi** to our group.

Dr Rachel Paterson and PhD student **Alice Jones** continue to investigate the effects of multiple stressors on parasite assemblages across Wales and northern Norway. **Jelena**

Nefjodova joins our collaboration with the Norwegian Veterinary Institute and The Arctic University of Norway (UIT) to assess the consequences of *Gyrodactylus salaris* eradication programmes on native parasite assemblages. Rachel is also joined by Master's student **Meg Huggins** to assess the effects of parasites on host vision, in collaboration with the School of Ophthalmology and Vision Sciences. Our lab. continues our lasting collaborating with **Prof. Tor Bakke** (Oslo, Norway) to assess the reservoir potential of alpine bullhead for *G. salaris.*

Our PhD students **Numair Masud** and **Elisavet Arapi** are using the model guppy-*Gyrodactylus* spp. to further our understanding of this host-parasite system. Numair is investigating how multiple stressors faced by fish in the ornamental trade influence behaviour, susceptibility to disease and underlying physiology. This includes an interdisciplinary project with the School of Engineering and Master's student **Laura Hayes** investigating the impact of mechanical disturbance on fish welfare. Numair's fish welfare studies attracted a summer student from Poland, **Lukasz Jan**, as part of the IAESTE programme. Elisavet is collaborating with an animal nutrition company, testing control strategies against parasitic infections. Additionally, with the help of Master's student **Ben Goodman,** she is exploring the circadian rhythm of *G. turnbulli.*

This summer, **Dr Amy Ellison** launched the *FutureFish* project - a BBSRC-funded fellowship - investigating the role of circadian rhythms in aquatic host-pathogen interactions. This project was inspired by some intriguing results from our recent NRN-LCEE funded *AquaWales* project - recently published in *BMC Genomics* - demonstrating that infection and stress dysregulate clock gene expression. Amy has also been working with **Dr Karl Phillips** and **Prof. Jacek Radwan** on gyrodactylid-guppy gene expression.

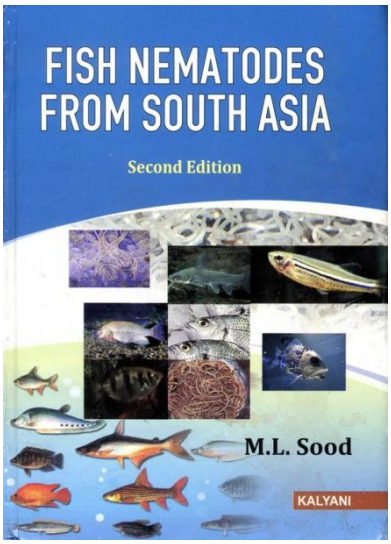
After a wonderful sunny summer in Wales, the weather has turned a bit colder now, so a good excuse for the lab. to visit the Winter Wonderland (photo), which is just minutes from the lab!. For more information about our research see our lab webpage, designed and managed by our post-graduates (www.cripescardiff.ac.uk), and/or follow us on twitter @CRIPESCardiff.

NEW BOOKS

Fish Nematodes from South Asia
Second edition, revised and enlarged

Mohinder L. Sood

ISBN: 978-93-272-8124-8: Published 2017; 1039 pages
Publisher: Kalyani Publishers, India.
www.kalyanipublishers.co.in; kalyani_delhi@yahoo.co.in

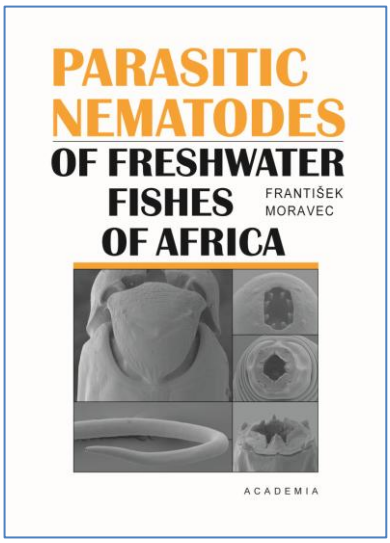


This monograph provides basic data on all hitherto known parasitic nematodes of freshwater, brackish-water and marine fishes in South Asia (Bangladesh, Bhutan, Myanmar, India, Nepal, Pakistan and Sri Lanka). It summarises present knowledge of the taxonomy, morphology, biology and ecology of these parasites, and provides keys to identification, diagnoses, descriptions and illustrations of the nematode species. Data on the host(s), location, locality, material and taxonomic remarks (if any) are also provided for each species. A host-parasite list is available. The list of references includes 875 papers. This publication is intended for biologists, parasitologists, veterinarians, workers in fisheries, university students and those engaged in nature conservation.

Parasitic Nematodes of Freshwater Fishes of Africa

František Moravec

ISBN: 978-80-200-2924-9; to be published in first quarter of 2019; 405 pages.
Publisher: Academia, Prague, Czech Republic



Parasitic nematodes (Nematoda) represent one of the most important groups of fish parasites. To date, this book is the first monograph dealing with nematodes parasitizing freshwater fishes in Africa and enabling their species identification. In addition to three short, more general chapters, the publication provides keys for identification, diagnoses of higher taxonomic units and descriptions and illustrations of all nematode species (including two newly established) parasitic in fishes, either as adults or only as larvae. The text also provides information about their hosts,

location in the host, distribution and, provided that such data are available, their life cycles and ecology. In this way, 120 nematode species belonging to 47 genera and 21 families are dealt with. A host-parasite list and an extensive list of cited papers are provided.

A Guide to the Parasites of African Freshwater Fishes

Tomáš Scholz, Maarten P.M. Vanhove, Nico Smit, Zuzana Jayasundera & Milan Gelnar (Editors)

ISSN 1784-1283 (hard copy); ISSN 1784-1291 (on-line pdf); to be published in December 2018; 421 pages
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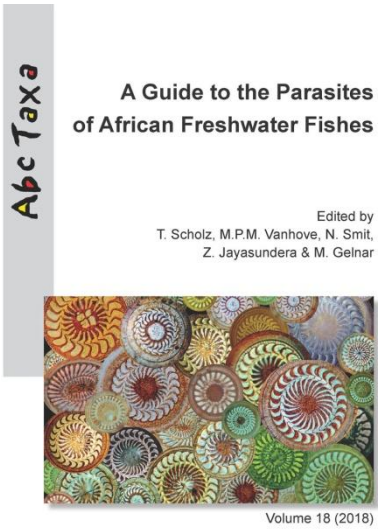
Publisher: CEBioS, Royal Belgian Institute of Natural Sciences, 2018; 29 Vautier Street, 1000 Brussels – www.naturalsciences.be Free copies (and PDF copy of the book) upon request to the publisher



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 aid 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.

IN MEMORIAM

Dr Göran Malmberg (1926 – 2018)

Göran Malmberg, who died earlier this year (Jan. 18th) aged 91, began studying Zoology at Stockholm University in 1948 and was awarded Bachelor of Arts in 1954 and his Licentiate in 1958. He finished his PhD in 1970, with a thesis based on the excretory system and marginal hooks of the monogenean *Gyrodactylus*, and in 1979 became a Docent in Zoology. *Gyrodactylus* came into his life in 1950 when the 2nd Swedish expedition to the Gambia returned to Stockholm with living collections of *Polypterus senegalensis*. Göran was fascinated by the monogeneans living on the skin of these fishes and, encouraged by his professor, Lars Silén, he began studies on *Gyrodactylus senegalensis*. During this time he developed techniques involving a mixture of ammonium picrate and glycerol as both fixative and embedding medium, procedures still in use by gyrodactylid specialists today with the name 'Malmberg's fixative' (see below). With this he had begun a career-long passion for the genus *Gyrodactylus* and was the first to describe the now-notorious *Gyrodactylus salaris* in 1957.

Göran was a friendly, enthusiastic and caring teacher. He became a lecturer in invertebrate morphology at Stockholm University in 1955 and, unimpressed by the materials used until then in coursework, he set about reinvigorating student teaching especially with living specimens. Photography was a favourite aid to teaching as well as in research. In later years, fellow delegates at international conferences, including the *International Symposia on Monogenea*, may have memories (and their own photographs) of Göran typically wearing a camera around his neck.

Among the students taught by Göran was his future wife, Marianne. They married in 1965 and made a strong team in teaching and research. Marianne was course assistant for Göran's invertebrate teaching, she published her own research studies, and gave patient and loyal support to Göran throughout his field and laboratory studies on *Gyrodactylus.* In the late 1980s and early 1990s, they travelled together throughout Sweden to collect samples of *Gyrodactylus* species in rivers, lakes and fish farms, with Marianne driving by day and both of them engaged in microscope studies in the evenings. They were co-authors on this and other studies. They had three daughters, Asa, Ylva and Eva, who made a great impression at our home, especially for our much younger children, when each stayed with us in summer vacations in the 1980s to improve their English.

Göran's lectures and seminars were characterised by great enthusiasm and energy, displaying a deep knowledge of his subjects. This was illustrated for me not only by his contributions to international conferences but also by a seminar at my institution (Westfield College, London University) in about 1980. These seminars were informal, given between about 1.05 and 1.55 pm, but Göran's review of gyrodactylid phylogeny was still in progress at 2.15pm, continuing in 'full flow' at 3pm. I had to ask him to begin his conclusions at 4pm but he was still talking at 4.15pm when Marianne arrived to insist that he stopped: she had been waiting for him since 2.30pm in nearby Hampstead where they had arranged to meet after the seminar. It was a mark of the respect and affection that Göran immediately gained from those who met him that my colleagues (all non-parasitologists) had remained throughout his extended talk!

Many of us (when younger), attending symposia where monogenean systematics and phylogeny were discussed, were overawed by the fierce debates between the 'father figures' of the subject, including Göran. Sometimes these 'debates' developed into ferocious arguments; those not involved would feel like shrinking into their seats to duck below the fusillade of angry shots exchanged across the lecture theatre. Yet, outside, the invective disappeared and all resumed life-long friendships. Indeed, Göran led these friendships. At the ICOPA in Paris in 1990, Göran organised a dinner for 'monogeneologists' at, appropriately, a fish restaurant. I recall complete chaos as tables and seating were re-arranged and courses were chosen and re-chosen for about 30 diners (to the despair of the waiters!) – but we did eventually eat, with great merriment and appreciation for Göran's 'organisation'.

Göran retired in 1993 – against his wishes: this was at the upper age limit for the Natural History Museum in Stockholm where he had been employed since 1979. But, of course, he did not retire from research: he taught scanning electron microscopy and kept his room in the Department of Zoology until a few years before his death. He continued to publish studies on gyrodactylids for more than 14 years after retirement with his last paper, as senior author (indeed, very senior!), appearing when he was over 80. Appropriately, this was another new species of *Gyrodactylus*! Long after his retirement, Göran's energy and capacity for hard work were conspicuous: his letters with Christmas and New Year greetings (and always with a photograph!) typically contained a review of the past year's productivity in his garden, with inventories of prodigious quantities of vegetables grown and a summary of which crops had been successful and which not.

Göran's interests in protonephridial systems and monogenean phylogeny took him into ideas on wider relationships, with a series of publications on evolution within the Platyhelminthes. This led him into controversies, including his view that parasitic platyhelminths evolved from acoel turbellarians rather than rhabdocoel-like ancestors as was the prevailing view. He also argued that monogeneans, rather than being primitive, were derived members of the Cercomeromorphae. Certainly, Göran's views were often regarded as controversial but, whatever the 'rights and wrongs', his evidence was always based on accurate, first-hand, meticulous microscope observations. Ultimately, his publications over the period 1956 – 2007 totalled over 60 papers, almost certainly limited in number by his perfectionist preparation of results. His attention to detail is illustrated by his 1990 paper 'On the ontogeny of the haptor and the evolution of the Monogenea' which

took up an entire issue (65 pages) of *Systematic Parasitology* (vol. 17). Göran was happy to confront controversy: the title of his 1982 paper 'On evolutionary processes in Monogenea …' had the subtitle 'though basically from a less traditional viewpoint'! With Göran's distinctive and in-depth approach to parasitology, it is best that assessment of the legacy of this research is provided by other experts in his field and Professor Phil Harris has contributed the following overview:

In my view, Göran's single most significant publication is his 1970 *Archiv für Zoologi* paper, 'The excretory system and marginal hooks as a basis for systematics of *Gyrodactylus* (Trematoda, Monogenea)' - 236 pages of pure gold which was a lifeline for generations of young postgraduates working on the genus for the first time and arguably the most important paper on this parasite ever produced. This paper was an extension and maturation of the ideas expressed in the less accessible Swedish language paper from 1956 (*Skrifter utgivna av Sodra Sveriges Fiskeriforening Arsskrift* 1957, 19-76) which contained most of the new species descriptions that Göran produced and the original description of *Macrogyrodactylus*, also published in 1956 (*Archiv für Zoologi* 10, 317-329). Not only did the 1970 paper provide a workable approach to gyrodactylid taxonomy and systematics, it contained hundreds of useful if seemingly trivial facts based on years of observation which helped so much when it came to culturing gyrodactylids. The ammonium picrate glycerol mountant-preservative for small monogeneans he introduced remains standard practice to this day, and despite concerns about its long-term stability, it is the mountant for 90% of gyrodactylid material deposited in European museums since the 1960s, presenting an important legacy issue for the next generation of museum curators. Ammonium picrate is extraordinarily unstable and explosive and more or less unavailable to European workers; Göran was always generous with his little pots of 'malmberry juice', ensuring we were able to work with this method. His approach based on careful study of the marginal hooks and excretory systems allowed him to subdivide *Gyrodactylus* into a number of subgenera and, despite differences in detail, these subgenera have retained their validity alongside the developments in molecular technologies. Ziętara et al. (2002 *Parasitolo*gy 124, 39-52) point out that molecular differences between subgenera at the 5.8S ribosomal locus are similar to those normally seen between families in other metazoans; Göran seems to have been spot-on in identifying the different subgenera based on tiny differences in marginal hook morphology and the distribution of protonephridia within the excretory system. The other area where Göran made a significant contribution, together with Radim Ergens in the then Czechoslovakia and the Americans John Mizelle and Delane Kritsky, was in recognizing the extent of gyrodactylid diversity. Göran was not afraid to unpick the taxonomic messes created by previous workers, as shown in his short (too short) conference paper from 1964 (In Parasitic Worms and Aquatic Conditions, Czechoslovak Acad. Sci., Prague). By and large, his species descriptions have stood the test of time and molecular barcoding, and indeed have provided the springboard for much of the cryptic molecular diversity which has since been uncovered in the genus. This description of fine-grained biodiversity by Göran went against the tide of monogenean taxonomy and ecology in Europe at that time, which was much more comfortable with the idea that there were only few gyrodactylid species with catholic host preferences.

In the 1970s, Göran began the electron microscope unit in the Rijksmuseum and became interested in the evolution of parasitic platyhelminths as a whole, especially in Janicki's theory of the Cercomeromorpha, in the linkage between monogeneans, cestodes, gyrocotylids and amphilinids, and in wider evolution within monogenean groups. This field was, and still is, confused: 50 years later, molecular approaches confirm the existence of the Neodermata (Monogenea + Digenea + Cestoda) but only generate controversy as to which of these groups is basal to which. During this latter phase of his career, Göran produced a lovely piece of work on the monogeneans of deep-water hagfishes, describing acanthocotylids (*Myxinidocotyle*) in which the haptor is bilaterally symmetrical, and of course he became increasingly involved in the beginnings of the *Gyrodactylus salaris* outbreak in Norway which came to dominate gyrodactylid biology research from the 1990s

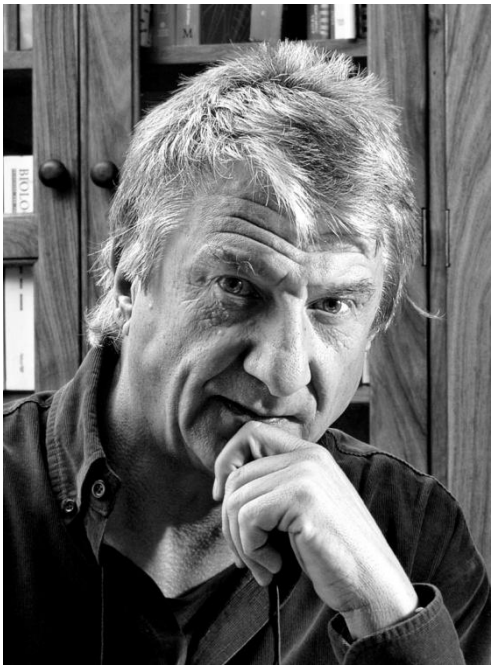
onwards. Göran had described *G. salaris* in 1957, so when the Norwegians began to pay attention to the outbreak in the early 1980s, they turned to Göran to provide taxonomic expertise; he trained Kjetil Tanum and Tor Atle Mo, the first generation of Norwegians with expertise in the field, and trawled his own collections for other gyrodactylids that might be related to *G. salaris*. He was the first to postulate the relationship between *G. salaris* and *G. thymalli*, although he was probably surprised at how closely they turned out to be related, and he also suggested a relationship between *G. salaris* and the far-eastern species from *Salmothymus*, suggesting that the parasite was the result of a westward expansion. These excursions into *G. salaris* research led Göran to collaborate increasingly with molecular biologists, completing the journey from pure uncompromising morphology through to molecular taxonomy.

Phil Harris

All those whom I consulted in the 'monogenean community' for this appreciation of Göran emphasised the generous help that he always gave to younger researchers, with carefully-considered advice, direction and inspiration, and meticulous editing of manuscripts. He was also distinguished by his sense of humour – often mischievous but always full of kindness and merriment. Two words that recur consistently in conversations about Göran – and in this obituary – are enthusiasm and energy. In paying tribute to Göran's long and very full life, it is important also to recognise the contribution of Marianne who gave quiet, patient and devoted support for all his endeavours for over half a century.

Richard Tinsley

Professor Jo G. van As (1949 – 2018)



Professor Jo van As passed away on 17 February, 2018 after a brief illness. We all knew Jo as a dedicated, passionate teacher and scientist, specifically in the broad field of fish parasitology.

Jo was born in Springs, east of Johannesburg (South Africa), and was educated in small local schools, after which he attended Potchefstroom University, where he obtained his BSc, BSc Hons, MSc and DSc degrees. The latter was awarded in 1977 on the population dynamics of zooplankton in one of the local dams. He accepted a lecturing position in 1978 at the then Rand Afrikaans University in Johannesburg, now the University of Johannesburg (UJ), which is when I first met him. He was my lecturer during my second year in Zoology. He quickly rose in rank, becoming a Senior Lecturer in 1980, an Associate Professor in 1984 and a full Professor in 1986. Since research at UJ concentrated on various aspects of fish, he decided to go to Israel and complete a post-doctoral study under Prof. Ilan Paperna in 1980, as he

saw a vacant niche in the department, i.e. parasites of fish. By the time he returned, he was ready to start his career in fish parasitology, and I became his first MSc student. It was both an exciting and challenging time, as we were both learning the ropes in the new field. This started a long line of students trained under his supervision, totalling 35 MSc and 19 PhD students between 1981 and his passing. Despite retiring in 2014, he was still actively involved with research, as well as supervising several post-graduate students. Of course, being so productive and effective in mentoring students comes at a price, as he essentially trained and produced his own competition for funding and students, but Jo did it with gusto throughout his academic life. Today his former students and their progeny can be found at many South African universities, where fish parasite research is prospering well.

In 1988 Jo was offered the position as Head of Department in Zoology and Entomology at the University of the Free State (Bloemfontein). He also offered me a position as a lecturer. Here the journey in fish parasitology continued and the rest, as they say, is history! It was also here in the city of roses that Jo met and married Liesl, who swiftly became an integral part of our research team and a steadfast supporter of Jo's life as a scientist, though she became a skilled scientist in her own right.

Jo has published 118 papers in national and international journals, 13 books and contributions in books, 52 papers in conference proceedings and 151 research papers presented at national and international conferences. He received several special awards, of which the Elsdon Dew Medal (of the Parasitological Society of southern Africa for a lifetime contribution to parasitology) in 2010 and the Medallion of Honour from the South African Academy: Faculty Natural Sciences and Technology (for the advancement and development of a unique speciality in natural sciences) were the most recent.

Jo's teaching wasn't limited to parasitology, as he also developed and presented courses in conservation and wetland ecology, African ecology, invertebrate biology, systematics and evolution. During Jo's 26 years as HOD in Bloemfontein, his encouragement lead to the establishment of Clinvet, a research organisation conducting laboratory and field-based clinical trials testing the efficacy of veterinary health products, where many of our students have found employment since 1999. He was also responsible for starting the many faceted field of nematology in our department.

Jo's passion for fish parasites reached far and wide (haemoflagellates, myxozoans, monogeneans, cestodes, copepods, isopods and trematodes); however, he focussed primarily on two groups, the peritrich ciliates and branchiuran crustaceans. He was an ecologist at heart and an ardent taxonomist, but was also a builder of people, a mentor for many, an admirable architect of dreams for young people working under his supervision, a great visionary, an eternal thinker and philosopher, a ceaseless idealist, an astute schemer and an incessant planner, but he was also an agitated listener, a fearsome adversary, a ruthless fighter for environmental causes and always the quintessential teacher. On a personal level, Jo was a good gymnast, a terrific hands-on dad for his three sons (Johann, a university lecturer in zoology and an expert in blood parasites, Stefan, a geologist, and Bertus, a mechanical engineer), a devoted husband for Liesl, a first-rate woodworker and an avid reader. For all of us, his colleagues, his descendants, his followers, his friends, he was the patriarch of fish parasitology in southern Africa. His legacy will constantly follow and

impact all those he trained and mentored. His passion for science and teaching will forever be our inspiration. As a true teacher, Jo's influence is eternal. He left us with many lessons, and he never wavered in teaching us what our responsibilities as humans are and what role we play in the bigger ecosystem of our planet.

Linda Basson

Professor H. Harford ("Haffi") Williams (1931 – 2018)

Professor Haffi Williams passed away on July 4th, 2018. Haffi was a renowned fish parasitologist with a special interest in cestodes. Combining his Welsh charm with a winning smile and a good sense of humour, he was always very popular, both with his peers and his students. At scientific meetings, it appeared to his students that everybody knew him.

Haffi was born in Meidrim, a predominantly Welsh-speaking rural village in Carmarthenshire, West Wales, the fifth son of a tailor. Until the age of 11 his education was in Welsh. He read Zoology at the University College of Wales, Aberystwyth, and was awarded a First Class Honours degree in 1954, remaining at Aberystwyth to complete his PhD on '*Studies on Helminth Parasites of Fishes from the Western Seaboard of the British Isles*' in two and a half years under the supervision of Prof. Gwendolen Rees, FRS.

After post-doctoral fellowships at the British Museum (Natural History), the Universities of Montpellier and Neuchâtel, and the Plymouth Marine Laboratory, his university teaching career started in 1959 at University College, Cardiff. This was followed by a period as Assistant Director of the Commonwealth Bureau of Helminthology at St. Albans, where he helped establish a fisheries helminthology research group which developed into the NERC Fisheries Helminthology Unit. Between 1965 and 1970, Haffi was a lecturer in Zoology at the University of Aberdeen and headed the Fish Parasitology Unit at the Marine Laboratory, Aberdeen. In 1970 he was awarded a DSc by the University of Wales for the quality of his research. After his time in Scotland, and until his retirement in 1990, he held a prestigious post as first Director of the Open University in Wales. During and after this time, he acquired a large number of honorary positions and awards, including Professorial Fellow of the University of Wales, Cardiff, a Visiting Fellowship at Sidney Sussex College, Cambridge and Honorary Membership of the British Society for Parasitology. He was also a Parasitology Research Fellow of the National Museum of Wales, an institute which greatly supported him and now houses his specimen collection, library and original illustrations.

Haffi's research contributions ranged greatly, covering many aspects of the biology of the helminth parasites of fishes, including systematics, ecology, host-specificity, physiology and their use as indicators of host-biology. His interest in the fish-gut as an environment for parasites and his studies on the physiology and morphology of their micro-environments, linked to his considerable artistic ability, enabled great insights into the way parasites behave and attach. His ability to comprehend and illustrate the host-parasite interface in three dimensions resulted in the reproduction of some phenomenal illustrations which clearly took weeks to complete. Although he accomplished detailed investigations on nematodes, monogeneans and gyrocotylideans, his main interest was the systematics and biology of 'tetraphyllidean' cestodes, completing very thorough revisions of several genera in the 1960s. Although the administrative load at the Open University took up most of his time, he still maintained an interest in research and supervised post-graduate students. During this period, with Arlene Jones, he also completed an important review of '*Marine helminths and human health*' and a seminal book entitled *'Parasitic worms of fish'.*

Among his postgraduate students were Ken MacKenzie, John W. Smith, Alasdair McVicar, Rod Bray and myself. The fact that we were active in the field of fish parasitology throughout our working lives is testament to the interest in the subject transmitted by Haffi's contagious enthusiasm, but also to the independence he encouraged in his students. He unselfishly made available good projects to students, and was of the opinion that, if one can manage to stimulate another researcher to further investigate the topic from a comment you make in a paper, then science wins!

Away from parasitology, few of his contemporaries knew that in his youth Haffi was quite an athlete, both on the track and on the rugby field. Only an unfortunate knee injury prevented his playing for Llanelli Rugby Club. After his retirement, Haffi occupied his time in different fields of interest, namely, the origins, history and use in society of Labrador-Retrievers, sorting out long-standing collections of old corkscrews and rare postcards by well-known animal artists, and adding to his well-deserved reputation as a maker of quality home-brewed beer.

Haffi leaves his wife Margaret, who supported him throughout his working life and beyond, two sons, a daughter and two grandchildren. He will be greatly missed as a mentor, friend, husband, father and grandfather, but will live on in the smile that memories of him will engender.

David I. Gibson

EDITORIAL POLICY

Please note that material for the next issue should be sent to the Editor, Dr Leslie Chisholm [e-mail: leslie.chisholm@samuseum.sa.gov.au], Parasitology Section, The Science Centre, South Australian Museum, North Terrace, Adelaide 5000, South Australia, Australia; before November 15, 2019.

The Newsletter is issued once a year and the persons listed on the cover page act as regional representatives for disseminating information on the latest and forthcoming issue. Each representative may write or collect information from the members of their country or region. Naturally, direct contributions from any recipient to the Newsletter are also welcome. The Newsletter is intended for any news, notices, comments, etc. that you feel would be of interest to the world's ichthyoparasitologists. Please note that publication lists are not accepted. The editor would be grateful if submissions would follow the format similar to that of the present Newsletter. Images are welcome. Please send images as separate JPG files (do not incorporate them in your text file and do not send image files as PDFs).

National representatives are asked to download a copy of each issue of the Newsletter and make this available e-mail, URL, etc) to his or her domestic members, where necessary. When it is impossible to download a copy, please advise the editor.

Thank you

Leslie Chisholm

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