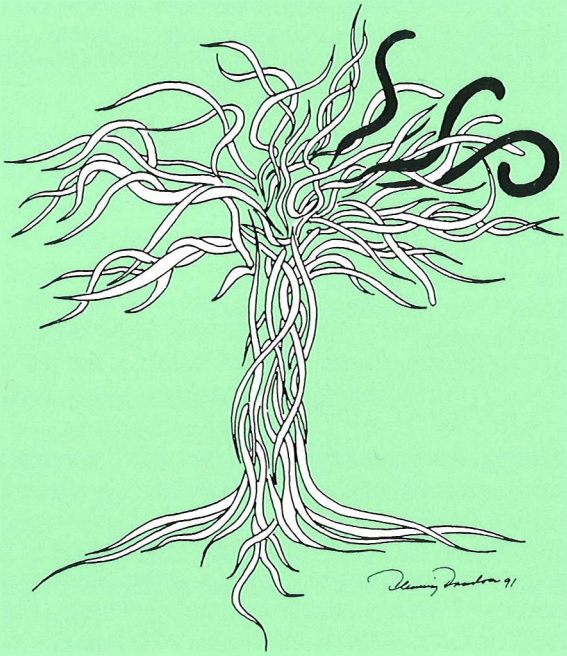
Bulletin

of the

SCANDINAVIAN SOCIETY FOR PARASITOLOGY



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BULLETIN OF THE SCANDINAVIAN SOCIETY FOR PARASITOLGY

The Bulletin is a membership journal of the Scandinavian Society for Parasitology. Besides membership information, it also presents articles on all aspects of parasitology, with priority given to contributors from the Nordic countries and other members of the Society. It will include review articles, short articles/communications. Comments on any topic within the field of parasitology may be presented as Letters to the Editor. The Bulletin is also open for a short presentation of new projects. All contributions should be written in English. Review articles are commissioned by the editor, however, suggestions for reviews are welcomed.

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Cover: In Norse mythology, the giant ash tree - Yggdrasill - spreads its limbs over the entire mankind. The ash has three roots, each of them sucking water from its own spring.
The first spring- Hvergelmir - is found in the ice cold North; next to the spring, the serpent Níðhoggr is ceaselessly gnawing at the roots of the ash. The second spring - Mímisbrunnr - is the source of wisdom and is guarded by Mímir. The third spring - Urðarbrunnr - is guarded by three women, the Norns, which mete out man's thread of life.

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EMÜ
RAAMATUKOGU

The following two papers are slightly modified from lectures given at the celebration of the Danish Society for Parasitology's 25 years anniversary, May 2, 1997. A third contribution, by Peter Nansen (on veterinary aspects), will be presented in a later issue.

PARASITOLOGY IN DENMARK: HISTORY AND FUTURE PERSPECTIVES

1. BIOLOGICAL ASPECTS.

Jørn Andreassen

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In international books on the History of Parasitology, such as Grove's (1990), it is interesting that a small country like Denmark is so well-represented. Indeed, we have world famous scientists within parasitology although they did not call themselves parasitologists at the time they lived. In fact Denmark has a Nobel Prize winner in medicine on a nematode parasite presumed to cause cancer in the stomach of rats.

This overview of the biological aspects of the Danish history of parasitology will - with a single exception - include only deceased persons. It begins more than two hundred years ago with the world-famous fresh-water biologist Otto Friedrich Müller (1730-1784), who worked as a private teacher in Frederiksdal on the Lake Furesø just north of Copenhagen. His contemporaries rightly designated him the Danish Linné. In his first volume on Infusoria in his Vermium terrestrium et fluviatilium (1773), he described for the first time the genus *'Cercaria'*, although he thought it to be an Infusoria. Among other things, he also gave the name *'Filaria'*. In 1779 he was the first to describe the genus *Echinorhynchus* - an acanthocephalan (a spiny-headed worm) from pikes.

In 1782 O.F. Müller published a paper about tapeworms in sticklebacks *(Gasterosteus aculeatus)*, where he described the plerocercoid larval stage of *Schistocephalus* in the body cavity of the fishes (Fig. 1). He also studied *'Gordius*

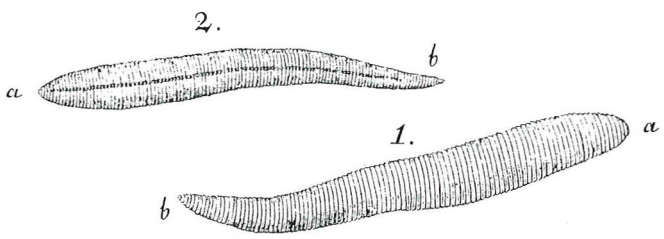

Fig. 1. From O. F. Müller (1782): Tapeworms from the body cavity of three-spined-sticklebacks in natural size. 1. One seen from the dorsal side. 2. One seen from the ventral side. a) The anterior end. b) The posterior end.

marinus' (Müller 1779), which was described by Linné, and, in fact, is the larval stage of an ascarid nematode from the stomach of tooth-whales. We know this larva well from the body cavity of many marine fishes as 'The herring-worm' - a species of the genus *Anisakis*. This worm is able to cause pathological disturbances in man - especially in countries like Japan and The Netherlands, where a lot of raw or lightly salted marine fishes are eaten. In Scandinavia only one human case has been described from Denmark (Andreassen & Jørring, 1970).

The paper by O.F. Müller on tapeworms in sticklebacks was probably an inspiration for the medical doctor, Peter Christian Abildgaard, (1740-1801), who founded the Veterinary School in Denmark. In 1790, he was the first to show that adult tapeworms come from larval stages in another host. Abildgaard is another of the world-famous Danes within parasitology and today better known than O. F. Müller because Professor Desmond Smyth in 1990 - exactly 200 years later - wrote about Abildgaard's discovery in the international journal: Parasitology Today.

Abildgaard showed that the tapeworm found in sticklebacks matured to an adult tapeworm in ducks by experimentally feeding ducks with sticklebacks infected with the plerocercoids. In fact, he was lucky that the worms survived in the two ducks, because the normal hosts for *Schistocephalus* are fish-eating birds like grebes *(Podiceps)* and mergansers *(Mergus)*. Domestic ducks don't normally eat fish, and thus do not become infected with this tapeworm. This epochal observation was the first successful experiment designed to elucidate the life cycle and transmission of an internal parasite. More than fifty years were to pass before Steenstrup published his theory of the "Alternation of Generations" (see below).

Abildgaard described several new parasite species, such as a new species of monogeneans *(Axine bellones)* on the gills of the gar-pike *(Belone belone)*, a new copepod parasite on the skin of a bream *(Abramis brama)* and two new species of the genus *Caligus* from sturgeons *(Acipenser)*.

A zoologist, Otho Fabricius (1744-1822), working at the same time as Abildgaard, published - also in 1794 - a paper on parasites of different marine fishes, where he described and figured (Fig. 2) the previously mentioned 'Herring-worm' (in Danish called 'Sildeqvejsen') as a separate species, *'Ascaris*

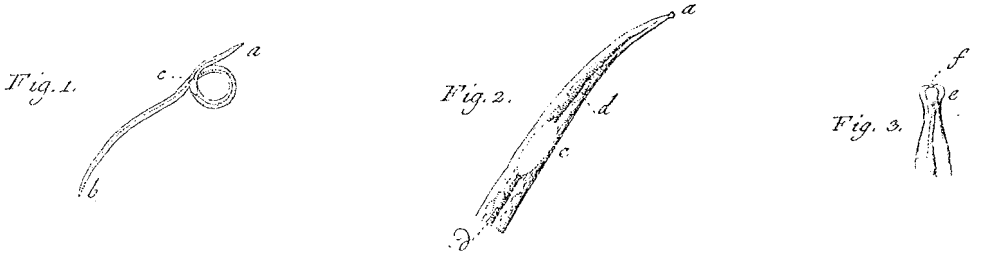

Fig. 2. From O. Fabricius (1794): *'Ascaris clupearum'* (*Anisakis sp*) larva. 1. In natural size. 2. The anterior end enlarged. 3. The anterior end with the three lips further enlarged. a) The anterior end. b) The posterior end. c) The glandular posterior part of the oesophagus (by Fabricius called 'the belt'). d) The oesophagus. e) The three lips. f) The mouth.

clupearum'. Fabricius also wrote quite a number of faunistic papers, especially on helminths in fishes from Greenland.

A former professor in zoology at the University of Copenhagen, Japetus Steenstrup, (1813-1897), published in 1842 a paper in Danish: "Om Forplantning og Udvikling gjennem vexlende Generationsrækker, en særegen Form for Opfostringen i de lavere Dyreklasser", for which he became world-famous. The year after it was translated into German, and in England it was translated by the Ray Society in 1845. It was incorporated by the famous Richard Owen in his book: "On parthenogenesis" in a modified form. Steenstrup's paper illustrated for the first time that redia and cercariae are stages in the life cycle of digenean trematodes (Fig. 3), and that O.F. Müller's free-living cercariae were not a separate group of free-living animals.

The last of the world famous Danes in relation to parasitology, is Johannes Fibiger (1867-1928). Although Fibiger was a medical doctor interested in cancer research, his main parasitological work was on a nematode in the rat stomach which he claimed was capable of producing papillomatous and carcinomatous tumours. He published his first paper on this subject in French in 1913 and in the years until 1919 he published more papers in both German, Danish and English. Those in Danish were published more and less as a weekly series in 'Hospitalstidende' in April, 1913.

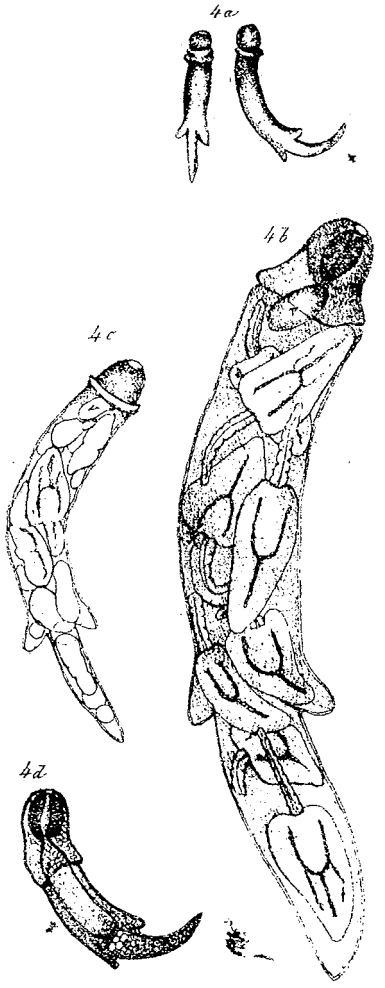

Fig. 3. From J. J. Steenstrup (1845): The growth of the second generation (Redia) and incubation of the third generation (Cercaria). 4a. Completed redia slightly magnified. 4b. Redia with fully developed cercariae with a long tail and bifurcated intestine. 4c. Half-grown redia with immature cercariae. 4d. Very young redia.

Together with Ditlevsen, he described this nematode in 1914 as a new species *Spiroptera (Gongylonema) neoplastica*, a name later changed to *Gongylonema neoplasticum*. Fibiger tried to transmit the nematode from rat to rat by eggs, but without success. He then came up with the idea that the nematode could be transmitted by an intermediate host and his thoughts settled on cockroaches, probably because they were running around in his animal facilities. In a sugar-refinery, Fibiger was lucky to find many American cockroaches and also found some of them infected with the larval stages of *G. neoplasticum*. He then succeeded in infecting different species of cockroaches with this nematode by giving them infective eggs to eat, and later infecting rats by feeding them with infected cockroaches. In

a series of experiments, he was able to obtain tumour growth in more than 50 % of the infected rats. For these studies, the Nobel Prize in medicine for 1927) was awarded to Fibiger.

Although Fibiger's results were critized in an article in Lancet (Anonymous, 1938) indicating that the tumours probably were non-malignant and more and less a result of Vitamin A-deficiency due to the rats' bread-only diet, the notion that "Perhaps Fibiger's reputation can be resuscitated, and we as parasitologists, can dust off our only Nobel Prize in helminthology" has been recently raised (Campbell, 1997).

Harald Krabbe, who was a zoologist at the Royal Veterinary School, and worked mainly with zoonotic tapeworm infections in husbandry animals, is only mentioned here because of his studies on the tapeworms of birds (Krabbe, 1869) and later had a *Taenia*-species, *Taenia krabbei* named after him.

Personally, I learned about Krabbe in the 60's, when I looked in the literature for human cases of *Diphyllobothrium latum* in Denmark (Krabbe, 1905). Human cases of the broad or fish tapeworm were still present in Denmark in the second half of the last century, but more and less disappeared in this century. However, in the sixties, Holger Madsen and I found it in pikes from Lake Esrum (Andreassen & Madsen 1970). Perhaps the life cycle was sustained by a local fisherman's dog, which was found to be infected. But it was said that the tapeworm was reintroduced to the area by Finnish children living there after the second world war.

The Professor in Freshwater Biology at the University of Copenhagen from 1922-1939, C. Wesenberg-Lund, published in 1931 a study on the biology of a peculiar trematode sporocyst, *Leucochloridium paradoxum* in amber snails and in 1934 a monograph on the cercariae in mollusks from Danish fresh waters. He made these studies at the field station "Suserup" at Lake Tystrup in the years 1926-28 and the amber snails there are still infected. I can say that, because infected amber snails have been found on the same locality nearly every year the last 15 years, when parasitology students visit it in the end of August. The behaviour of infected snails has later been investigated by Hindsbo, 1985 and 1986, who also experimentally investigated the question about how songbirds become infected with the metacercariae in the brilliant colouring sporocysts from the antennae of the amber snails. These studies showed that songbirds are able to recognize the movements of the sporocysts and pick the sporocyst directly from an infected snail, or the snail will quickly retract the tentacles and thereby release the sporocyst after disturbance from the attacking bird which will immediately eat the sporocyst. These fascinating studies were photographed by BBC and shown in a programme called "Living together" in the television series "The trials of life" in 1990 and later shown in many other countries.

Personally I have kept infected snails in the laboratory and observed that the sporocysts are able to leave the antenna and continue pulsations in the free, where they look very much like a dipteran larva. In nature the life time of these free living sporocysts are of course dependent on the humidity, but I'm sure some of them will be found and eaten by songbirds. Furthermore, the advantage of this method is that new sporocysts are then able to reuse the empty antenna of the amber snail.

Hans Roth was a German zoologist who fled to Denmark in 1933 and worked as a parasitologist at the Royal Veteri-

nary School. He published quite a number of papers on *Trichinella spiralis* of which his experimental infections in guinea pigs were outstanding (see e.g. Roth 1939), in which he was among the very first to show an acquired immunity to reinfection. In Nature (1945), Roth published a serodiagnostic *Trichinella* test using living larvae. Because of a series of outbreaks of trichinellosis in Greenland in 1947, he looked at trichinosis in arctic animals (Roth, 1949) and started a huge investigation on *Trichinella* in Greenlandic sledge dogs and wild mammals. He had collected more than 10,000 samples but only investigated a small part of them before his sudden death.

Although the successor of Hans Roth, Johan Adam Guildal, mainly was interested in birds he got the chance to be a parasitologist. As a result, he conducted studies on helminths in birds, inspired by Harald Krabbe's papers and the collection Krabbe had established at the Royal Veterinary School. The most interesting study by Guildal is probably the demonstration of *Taenia*-eggs passing unharmed through the intestinal tract of gulls (Guildal, 1956). Guildal's position at the Royal Veterinary School was taken over by a veterinarian.

My own teacher, Holger Madsen (1909-1991), who had worked with *Trichinella*, took over the *Trichinella*-material collected by Hans Roth and published quite a large paper (124 pages) entitled "The distribution of *Trichinella spiralis* in sledge dogs and wild mammals in Greenland, under a global aspect" in 1961. With this monograph, Holger Madsen became world famous among people working with *Trichinella.* In fact, he was already known as a specialist in species of *Capillaria.* For his thesis "Study on the nematodes of Danish gallinaceous gamebirds" he was awarded his Doctor of Science degree in 1952 as the first in parasitology at the University of Copenhagen. A species of *Capillaria* was later named *Capillaria madseni* after Holger Madsen by Derek Wakelin (later professor at Nottingham University), who was a Ph. D. student at the Houghton Poultry Research Station in U.K., when Holger Madsen carried out experiments there.

Holger Madsen used the rest of his life to agitate against the prevailing theory that rats are important in the infection of pigs with *Trichinella.* According to Madsen, rats are not able to sustain a *Trichinella*-infection among themselves without addition of trichines from outside and infected rats are only a symptom of infected pig meat in their surroundings. Furthermore, he regarded all described species of *Trichinella* as synonyms of *T. spiralis* (which today is not accepted), and he introduced the idea that trichines have a free-living larval stage in its life cycle: the muscle trichine in a dead animal (Madsen, 1976).

In 1962, Holger Madsen became external lecturer at the University of Copenhagen and started the first colloquia in parasitology for zoology students. During the first Scandinavian Symposium in Parasitology in 1966 in Turku, Finland, he was very eager to arrange the second symposium in Denmark the following year, when the Scandinavian Society for Parasitology was founded. Holger Madsen was very satisfied with the foundation of the Danish Society for Parasitology in 1972, and he was an eager participant and debater at the meetings. He was elected as the first honorary member of the Danish Society for Parasitology in 1985.

Two Danish medical doctors, J. Chr. Siim (honorary member of the Danish Society for Parasitology) and K. Work, have, together with two Scottish biolo-

gists, W.M. Hutchison and J.F. Dunachie, discovered the life cycle of *Toxoplasma gondii* in close competition with an American group. Hutchison et. al. published in 1970 their final paper showing that *T. gondii* is a coccidian using cats as the final host. See Bygbjerg for further details of Siim's other work.

The future:

Although "It is difficult to tell fortunes especially about the future" as the Danish humorist Robert Storm Petersen said, I'll touch upon the future of parasitology and parasitologists in general and in Denmark, as seen with a biologist's and university teacher's eyes.

Since we have described only a small part of all existing free-living animal species and due to the fact that nearly every free-living species has a species-specific parasite, there will be much to do just to describe all the yet undescribed parasite species and to establish their life cycles. Even today there are many known parasite species for which we do not know their life cycle.

Parasites are wholly dependent upon their hosts. Their presence thus indicates an adaptation to at least one host species and/or an adaptation of the host to ensure survival of both species.

When this society was founded in 1972, little was known about immunity to parasites. We have since learned a lot, but the field "Immunity to Parasites" is still a quickly expanding field, where only a small "snip" has yet been discovered. The direct use of it in the way of vaccine production against even the major parasitic diseases of man and livestock is still very poor.

We have also discovered that some parasites, in one way or another, change the behaviour of their hosts and in most cases, so that the chances of the parasite finishing its life cycle is increased. However, there is still a lot to do in this field, which probably is more important than previously thought. Especially the influence on the neurophysiology of the host and the impact this may have on the host training and immune reactions may prove to be of vital interest.

That parasites can cause disease and even kill a host has been known for a long time but we have, in the last 10-20 years, learned that also those parasites which don't normally cause real diseases can have an impact on their hosts. This is of the same magnitude as the impact of a predator on its prey. Therefore, parasites also play a role in the endangerment of species of free-living animals. Parasites may induce the extra stress necessary to cause extinction of the endangered species.

In these days of talk of biodiversity, this effect of parasites is naturally unwanted, but as a parasitologist I have to cry: "What about the poor parasite which will also die? And what about all the parasites which we try to control and the veterinarians and medical people want to eradicate? Why should they - my 'pet animals' - not have the right to survive? And what is the effect on the biosphere if we eradicate too many parasites?" I dare not think about it, but, on the other hand, I'm not that afraid of it because - as we know now - parasites very easily develop resistance against antiparasitic drugs. They have already developed many sophisticated mechanisms to avoid the host immune reactions against them, and we still need to discover new ones before we can develop effective vaccines. As professor Ronald Terry once said: "The parasites - like e.g. trypanosomes and schistosomes - are much more clever than the bacteria".

The link between parasites and immunity, and its importance, has recently been highlighted. It has been proposed that the immune system developed only because of the simultaneous development of parasites. That is to say, without the presence of parasites, birds and mammals - and man - had perhaps never developed?

With this in mind, the reason for the extinction of dinosaurs could be due to the appearance of malaria-like parasites which adapted to the new mammals which in turn further developed immune reactions. However, the dinosaurs were not able to develope an immunity and thus to defend themselves against the new parasites. An interesting and challenging speculation!

There are an immense number of questions to answer, so I'm sure young parasitologists won't be without an interesting project in the future. The question is whether there is someone to sponsor it?

With regard to the future of learning about parasites for biology students, in Denmark this is still only possible at the University of Copenhagen, where Parasitology is a special subject biology students may choose in the second half of their studies. We can only hope that biology students in Denmark, also in the future, should be given the chance to learn more about the important parasites.

I'll finish now wishing all of you a prosperous future within parasitology and hope that another Dane - perhaps one of you - like Fibiger - will get the Nobel Prize sometime - but I can assure you: It won't be that easy!

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PARASITOLOGY IN DENMARK: HISTORY AND FUTURE PERSPECTIVES

2. MEDICAL ASPECTS, WITH EMPHASIS ON MALARIA, FILARIOSIS, AND TOXOPLASMOSIS

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Malaria before the 20th Century

The history of medical parasitology in Denmark dates back to the Middle Ages. The most significant recognisable disease was the "trembling sickness", malaria. One of the earliest descriptions can be found in the Danish National Museum, Copenhagen, on a rune stick of pine-wood, which also is the longest runic inscription found in Denmark:

It was carved by a Jute, about 1300 a.d., but after a Norwegian text, and is a magic spell against that disease:

The Nordic readers will notice the alliterations in the Danish version so typical of Old Norse poetry.

Remedies to cure the trembles or fever ("rithæ" or "rythæ" in Old Norse), are mentioned in Henrik Harpestrengs (dead 1244) Urtebog (Book of Herbal Medicine): kale (*Caulis romana*), camomile, and *Chrysanthemum* are recommended. For jaundice, a potential complication of malaria, wormwood (*Artemisia*) is recommended. It is interesting that

In Danish:	In English translation:
Jorden beder jeg vare	*Earth I pray guard*
og i den høje himmel	*and the heaven above*
solen og Sankta Maria	*sun and St. Mary*
og selve Gud Drotten	*and himself the Lord God*
at han låner mig lægehånd	*that he grants me hands to make whole*
og helbredelsestunge	*and healing tongue*
at helbrede "bævende"	*to cure the trembles*
når den behøver bod	*when treatment is needed.*

present days' most promising antimalarial drug, artemisinin, is an extract of the Chinese wormwood *Quing-hao (Artemisia annua)*, while the most promising insecticide and repellent is pyrethrum, derived from *Chrysanthemum.*

Malaria remained a significant health problem in parts of Denmark up to the end of the 19th century.

The annual incidence is known since 1862, when there were 37996 cases; in 1900 there were 171 cases, much like the annual incidence in the late 1990's.

However, all cases are now imported. The history of malaria in Denmark has been reviewed by C.A. Hansen, (1886).

Lymphatic filariosis before the 20th Century

The earliest Danish description of the clinical symptoms of lymphatic filariosis dates back to 1678, when Frideric Bolling, a Norwegian/Danish chaplain, in his "Oost-Indiske Reise-bog", from a travel to India and present-day Indonesia, noted the unilateral elephantiasis of the leg in Batavia, Ceylon and Tranquebar, named "the Curse of St. Thomas"; it was thought that the people were cursed with elephantiasis because they murdered the apostle Thomas. However, the description and the accompanying figures (Fig. 1) were "stolen" from a previous description by Linschoten, 1614, as pointed out by prof. G.S. Nelson (Bygbjerg *et al.,* 1992).

The lymph system was first described in 1653 by the outstanding Danish *anatomicus* and physician Thomas Bartholin (in G.Tryde, ed. 1940): " *Vasa lymphatica nuper Hafniæ in Animatibu inventa et Hepatis exseqviæ",* two months before the similar descriptions by the Swede Olof Rudbeck: *"Nova excercitatio anatomica ecxhibens ductus*

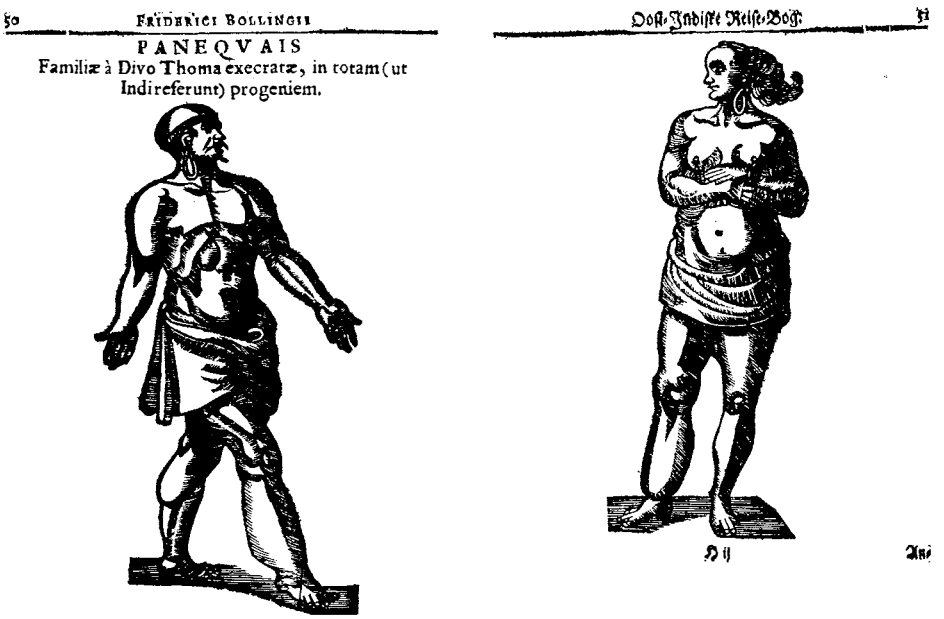

Fig. 1. Man and woman with an elephantiasis leg.

hepaticos aqvosos et vasa glandularum serosa nunc primum inventa aeneisqve figuris delineata". Bartholin's descriptions included the chylus' way from the gut towards the liver. However he was mistaken, when comparing the whitish bladders in a dropsy dead woman with "the hydatid cysts so often found on the surface of the liver of deer". Unknowingly, he may have described hydatid disease (*Echinococcus granulosus)* in that animal.

Interestingly, Chyluria, another filaria-induced symptom, was described from the former Danish colony St. Thomas, in the West Indies, 200 years later, by E. Pontoppidan, in a paper in "Hospitalstidende" (1879). The transmission of lymphatic filariosis had already been described by Manson in China. Several other clinical manifestations of lymphatic filariosis were also suspected by Pontoppidan, but writing in Danish, none of these have been ascribed to him. In "Hospitalstidende", he writes:
"... muligvis vil her Tilstedeværelsen af *Filaria sangvinis* vise sig at være et vigtigt Aarsagsmoment ... ved ... de her særdeles hyppige recidiverende Lymfangiter med konsekutive kroniske Ødemer og Elephanthiasis, Hydroceler, Kirtelsvulster og Kirtelabscesser, hvor muligvis Tilstedeværelsen af Filarier kan spille en Rolle ved Tilstopning af Kapillærer og Lymfekar". (In English: perhaps the presence of *Filaria sangvinis* will prove to be an important cause ... of ... the very common recurrent lymphangitis with consecutive chronic oedema and elephantiasis, hydroceles, lymphadenopathy and lymph node-abscesses, where perhaps the blockage by filaria of capillaries and lymph-vessels may play a role).

Parasitology in the 20th Century

Admittedly, more literary than scientific descriptions of protozoan and nematode pathology by Danish authors appeared until the middle of the present century, with one exception: the studies by J. Fibiger, of the nematode, *Gongylonema neoplasticum* - see Andreassen above.

The Danish story-teller Karen Blixen's well-known "The African Farm" (1937), and her "Letters from Africa 1914-31" frequently refer to malaria, and black-water fever. Already three months after her wedding in Mombassa, she had to stay in bed with a few days interval from malarial fever, for three weeks, and was a convalescent for the next three months. One of her and Denys Finch Hatton's best friends Eric Otter, died from black-water fever, as did the young Somali Abdullai, who had been with Karen Blixen in Denmark 1919-21.

The ethiological agent of malaria was described by the Frenchman Laveran already in 1880, and 20 years later he also detected toxoplasmosis in an American songbird. Human toxoplasmosis congenita was described in USA in 1937-39 by Wolf, Cowen and Paige.

In 1950, J.C. Siim, who later became director of Statens Seruminstitut (SSI), Copenhagen, presented his first case of acquired lymph node toxoplasmosis, at the Sixth International Congress of Paediatrics, in Zurich. Fortunately, Siim followed up his publications both in Danish and in English (1951). Although he might have deserved the Noble Prize more than Fibiger, he received the Novo Prize, in 1972 for his outstanding studies, including his thesis "Toxoplasmosis Acquisita Lymphonodosa" from 1961.

The Novo Prize was given to the Danish biologist G. Mandahl-Barth in 1975 for his studies on control of intermediate host-snails of Schistosomosis. Mandahl-Barth was the founder of The Danish Bilharziasis Laboratory (DBL). DBL, in beautiful Charlottenlund north of Copenhagen, is now a well-established training and research institution, supported by Danida (the Danish International Development Agency), and focusing on water-borne infections in the tropics and more recently on nutritional and related health problems, in collaboration with several other Danish and foreign institutions.

In the late 1970s and early 1980s, research in medical parasitology expanded in more Danish institutions. Tropical medicine became a speciality, and clinical tropical medicine became an important part of the activities at the Department of Infectious Diseases, Rigshospitalet, and elsewhere in the university hospitals in Denmark, when infectious diseases departments unfolded.

In the wake of the arrival of Vietnamese and other refugees in Denmark, the number of exotic parasitic diseases increased constantly. Also, the explosion in international travel increased the risks for Danes of exotic infections. Thus, malaria rose from a few to almost 200 cases annually, unfortunately increasingly in the form of the potentially life-threatening *Plasmodium falciparum.*

In 1978/79 the first case of chloroquine-resistant falciparum malaria from Kenya was proven by Fogh *et al.* (1979), and within the next few years falciparum malaria from Kenya and Tanzania resistant to sulfadoxin-pyrimethamine and even mefloquine was reported (Bygbjerg *et al.*, 1983, Schapira *et al.*, 1986). Fortunately, the interest to do basic as well as clinical research in tropical parasites expanded concurrently, although the interest from research councils and donors lagged behind. In 1979, S. Jepsen, at SSI, took up *in vitro* long-term culture of *P. falciparum,* and the immunological and pharmacological studies with roots in these *P. falciparum* cultures, originally derived from Liberian placentas, have been numerous. Malaria research is now a significant part of the research laboratories at SSI, DBL, Rigshospitalet and the Panum Institut, University of Copenhagen. The two latter institutions have formed a Centre for Medical Parasitology (CMP). The support from Danida to research capability strengthening has done much to cement this positive development. Malaria, filariosis, schistosomosis, and leishmaniosis research networks in Denmark and in Africa are now being supported.

The ideas of investing more in research of human parasitic diseases was repeatedly, but unfortunately also prematurely, proposed by H. Fuglsang, an outstanding Danish field researcher, who spent 10 years in Africa to disclose the natural history of the blinding filarial infection onchocercosis (Fuglsang *et al.*, 1979), before returning to Denmark, to unblind the potential donors to parasitic research. After attempting for 10 years, he retired to the fields of Jutland.

The AIDS epidemic opened the eyes of many local clinicians for medical parasitology. Well-known remedies for the prophylaxis and therapy of malaria and other exotic parasitoses are now being used for controlling opportunistic parasitic infections in patients with acquired immunodeficiency whether HIV- or iatrogenic: toxoplasmosis, pneumocystosis, crypto-, cyclo-, and microsporidiosis, isosporosis or leishmaniosis. Leishmaniosis is also the subject of

an active research collaboration between several institution in developing countries and the CMP.

The future

It is highly appreciated that the Royal Veterinary School, Copenhagen very recently appointed the director of DBL N.Ø. Christensen adjunct professor of parasitology. The formation of the Centre for Experimental Parasitology at the Royal Veterinary School, under professor P. Nansen is another example of the increasing interest in parasitology in the 1990's.

In the next century, the time may even have come to prioritise parasitology at the Faculty of Human Health?

As for research priorities, it is hoped that the renewed interest in human parasitology after the AIDS epidemic may stimulate the interest of even pharmaceutical companies in investing in new drugs and vaccines. A spin-off may be new antiparasitic remedies for those in developing countries who cannot afford investing in the wide-spread parasitic diseases adversely affecting human health and development. Closer collaboration between North and South, East and West, and human, veterinary, and natural scientist are requested, but it should not be forgotten that collaboration with the populations suffering from parasitic diseases is even more important. Large-scale intervention trials, like bed-nets and chemoprophylaxis against malaria and filariosis, are now being implemented in several places in Africa with Danish support (Meyrowitsch, 1995). Their success depends on school teachers and district health management teams as much as on scientists.

Acknowledgement

I would like to thank I. Kabell and H. Lauridsen, Department of English, University of Copenhagen, who kindly provided me with the illustration.

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NEWS

Award winners

The Danish Society for Parasitology (DSP) recently awarded DKK 2000,- to each of two young researchers contributing with oral or poster presentations at the 18th Symposium of the Scandinavian Society for Parasitology held on Bornholm on 22-24 May 1997.

The criteria for being considered for the award were that the candidate should be a member of DSP, M.Sc. or Ph.D. student and first author of the presentation. The presentations were assessed by the DSP board members participating in the symposium on the basis of scientific content and quality of presentation.

The winners were **Hanne Giver** from the Danish Bilharziasis Laboratory/Center for Experimental Parasitology and **Sylvina Fernandez** from the Center for Experimental Parasitology.

Bull Scand Soc Parasitol 1997; 7 (2): 15-18

PARASITES OF BLEAK *(ALBURNUS ALBURNUS)* FROM THE RIVER GLOMMA WATER-SYSTEM, SOUTH-EASTERN NORWAY

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Abstract

The parasite fauna of adult bleak *(Alburnus alburnus)* has been studied from two localities in the Glomma river-system in south-eastern Norway. A total of 27 parasite species were found on the 19 fish examined; 10 were new records for Norway.

Introduction

The parasite fauna of several species of Norwegian freshwater fish is poorly known, one such species is bleak, *Alburnus alburnus* (L.). As far as we know, only *Philometra rischta* Skrjabin, 1923 from lake Øyeren (Hansen & Brabrand, 1979) and *Gyrodactylus decorus* Malmberg, 1956 from Drammenselva (T. A. Mo, unpublished), have been recorded from bleak in Norway. The purpose of the present study was to register the species diversity of parasites in bleak, from winter and spring samples from two localities in the river Glomma water-system.

Materials and methods

The fish were caught by angling 13. February 1997 in the river Glomma itself, (Grønsund, Eidsberg municipality, Østfold county), and 28. May 1997 in the river Nitelva (Skedsmo municipality, Akershus county), a tributary to Glomma. All fish were kept alive in river water in the laboratory until examination. They were killed by inserting a stout needle into the brain through the cavity of one eye. Total length, weight and sex was determined for all hosts. All external and internal organs were examined for parasites by the aid of a dissecting microscope and a microscope equipped with phase contrast. If possible, the number of each parasite species was determined, and is presented as intensity range in Table 1. Ecological terms follow Margolis *et al.*, (1982).

The following references were mainly used for species determination: Bykhovskaya-Pavlovskaya *et al.* (1962) (protozoans, myxosporidians, *Dactylogyrus*, trematodes, molluscs and crustaceans); Lom & Dykova (1992)

(protozoans and myxosporidians); Malmberg (1970) and Prost (1972) *(Gyrodactylus)*; Gibson *et al.* (1992) *(Rhipidocotyle)* and Moravec (1994) (nematodes).

Results and discussion

The results are presented in Table 1 and discussed below:

Of the protozoan species found, the host specific *Eimeria cylindrospora* and *Paratrichodina alburni* are new records for Norway. This is the first discovery of the latter genus in Norway, and also the first published report of an endoparasitic trichodinid from Norwegian freshwaters.

Four myxosporidian species were found. However, we could only identify two of them. The taxonomy of *Myxobolus* is rather confusing, and many species are difficult to identify with certainty based merely upon observations of spore morphology by light-microscopy. However, there seemed to be three species present in our material. One of these fits the description of the morphologically variable *M. muelleri*, which has previously been found by us in burbot, *Lota lota* (L.) (Appleby & Sterud, 1996). Identifying species of the genus *Chloromyxum* should ideally include the use of scanning electron microscopy of the spores (Lom & Dykova, 1993). This was not possible in the present study. However, we tentatively identify it as *C. fluviatile*, a species commonly found in bleak and other cyprinids in Europe (Lom & Dykova, 1993). This species has not previously been reported from Norwegian fish.

Of the 8 monogeneans found in the present study, 5 belong to the genus *Dactylogyrus*. Even if the number of species was high, prevalence and intensity was low in both localities. However, the data in Table 1 is incomplete, as we did not succeed in recovering all *Dactylogyrus* specimens. None of the *Gyrodactylus* and *Dactylogyrus* species found in the present study have previously been recorded from Norway.

The nematode *Rhabdocona denudata* was quite common in bleak. This species has apparently been found in char, *Salvelinus alpinus* (L.) in north Norway by Kennedy (1977). According to Moravec (1994), however, *R. denudata* is a typical parasite of cyprinids, and many reports of *R. denudata* in salmonids are probably due to misidentifications. It is likely that the nematode in char was not correctly identified. Kennedy (pers. comm.) only found one specimen in char, and is also inclined to believe he might have misidentified it. If so, the present study probably represents the first finding of *R. denudata* in Norway. The statement that this is a marine species with larvae in anadromous salmonids (Daverdin & Dolmen, 1996) is erroneous.

Of the 27 parasite species found in the present survey, at least 10 are new records for Norway. Together with the earlier records mentioned in the introduction, a total of 29 parasite species have been found in bleak - probably the largest number of species found in any freshwater fish in Norway.

Acknowledgements

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Table 1. List of parasites found on 19 specimens of *Alburnus alburnus* from the river Glomma water-system.

Intensity=range (?=intensity not recorded). Abbreviations: i=immature, l=larvae, m=metacercariae, E=eye, F=fins, I=intestine, L=lens, S=skin, BC=body cavity, GA=gill arches, GB=gall bladder, GF=gill filaments, LI=liver, ST=stomach, UB=urinary bladder, UD=urinary ducts.

Locality (number of specimens studied)	Glomma 13.2.97 (10)			Nitelva 28.5.97 (9)		
Weight (range in g)	13 - 22			15 - 29		
Length (range in mm)	120 - 155			127 - 160		
Parasite species	No. inf.	Intensity	Site	No. inf.	Intensity	Site
PROTOZOA						
Eimeria cylindrospora Stankovich, 1921	1	?	GB, I			
Epistylis sp.				7	?	F, S
Paratrichodina alburni (Vojtjek, 1957)	6	?	UB, UD			
Trichodina sp.	1	?	S	6	?	F, S
MYXOZOA						
Chloromyxum fluviatile Thélohan, 1892				3	?	GB
Myxobolus muelleri Bütschli, 1882	3	?	GF, UB	2	?	GF
Myxobolus sp. 1	3	?	E			
Myxobolus sp. 2				1	?	GB
MONOGENEA						
Gyrodactylus alburnensis Prost, 1972	1	4	GA			
G. gracilihamatus Malmberg, 1970	1	2	F	4	1 - 8	F, S
Dactylogyrus alatus Linstow, 1878				1	2	GF
D. fallax Wagener, 1857				2	1	GF
D. fraternus Wegener, 1909				1	4	GF
D. minor Wagener, 1857				2	1	GF
D. parvus Wegener, 1909	1	2	GF	2	1	GF
Paradiplozoon sp.	2	1	GF			
CESTODA						
Proteocephalus sp. (i)	2	2 - 8	I, ST	2	3	I
TREMATODA						
Allocreadium isoporum (Looss, 1894)	1	2	ST	2	1 - 2	I
Diplostomum sp. (m)	9	1 - 7	L	6	1 - 10	L
Ichthyocotylurus sp. (m)	2	?	BC, LI			
Phyllodistomum sp.	1	1	UB			
Rhipidocotyle campanula (Dujardin, 1845) (m)	5	?	GA	4	?	GA
R. fennica Gibson, Taskinen & Valtonen, 1992 (m)	3	?	F	5	?	F
NEMATODA						
Raphidascaris acus (Bloch, 1779) (l)	9	1 - 20	LI	5	1 - 5	LI
Rhabdocona denudata (Dujardin, 1845)	3	10 - 100	I, ST	3	1 - 5	I, ST
MOLLUSCA						
Anodonta anatina (L., 1758) (l)	2	?	GF, F	5	1 - 3	GF, F
CRUSTACEA						
Ergasilus sieboldi Nordmann, 1832	1	1	GF			

EMÜ
RAAMATUKOGU

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Bull Scand Soc Parasitol 1997; 7 (2): 19-24

PARASITES OF DACE *(LEUCISCUS LEUCISCUS)*, IDE *(L. IDUS)* AND CHUB *(L. CEPHALUS)* FROM SOUTH-EASTERN NORWAY

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Abstract

Adult dace *(Leuciscus leuciscus)*, ide *(L. idus)* and chub *(L. cephalus)* from the river Glomma water-system in South-Eastern Norway have been examined for parasites. A total of 39 parasite species were found. At least 8 of these are new species records for Norway.

Introduction

There are no published records of the parasite fauna of the *Leuciscus* species in Norway. Halvorsen (1971), who studied the helminth fauna of coarse fish in the river Glomma, omitted these species. The only information we have on parasites from these cyprinids, is an account of *Gyrodactylus decorus* Malmberg, 1956 from ide *Leuciscus idus* (L.) in the river Drammenselva (T.A. Mo, unpublished). The present study aims to increase our knowledge on the occurrence of parasites of cyprinids in Norway, and surveys the parasite fauna of dace *L. leuciscus* (L.), ide and chub *L. cephalus* (L.), from different seasons and localities in the river Glomma water-system.

Materials and methods

The three fish species were caught by angling in the period from May to September at three localities in the rivers Leira and Nitelva, tributaries to the river Glomma (Gjerdrum and Skedsmo municipalities in Akershus county). The fish were kept alive in river water in the laboratory until examination. They were killed by a sharp blow to the head. All external and internal organs were examined using a dissecting microscope and a phase contrast light microscope. When possible, the number of each parasite species was determined. The range of intensity is presented in Table 1. Ecological terms follow Margolis *et al.* (1982).

Parasites which could not immediately be identified were preserved and identified later mainly by the following literature: Bykhovskaya-Pavlovskaya *et al.* (1962) (protozoans, myxosporidians, cestodes, monogeneans, trematodes, acanthocephalans, crustaceans, molluscs), Lom & Dykova (1992) (protozoans, myxosporidians), Malmberg (1970) *(Gyrodactylus)*, Gibson *et al.* (1992) *(Rhipidocotyle)* and Moravec (1994) (nematodes).

Results and discussion

The results are presented in Table 1 and discussed below:

Table 1. List of parasites found on *Leuciscus leuciscus*, *L. idus* and *L. cephalus* from the rivers Leira and Nitelva.

Intensity = range (? = intensity not recorded). Abbreviations: l = larvae, m = metacercariae, B = blood, BR = brain, BC = body cavity, CV = corpus vitreum, F = fins, GA = gill arches, GB = gall bladder, GF = gill filaments, I = intestine, K = kidney, L = lens, LI = liver, O = operculum, OC = oral cavity, S = skin, SP = spleen, UB = urinary bladder.

Host (number of specimens examined)	*Leuciscus leuciscus* (14)			*Leusciscus idus* (5)			*Leuciscus cephalus* (11)		
Weight (range in g)	16-86			814-1960			470-1916		
Length (range in mm)	125-220			410-525			340-530		
Parasite species	No.inf.	Int.	Site	No.inf.	Int.	Site	No.inf.	Int.	Site
PROTOZOA									
Hexamitidae sp.				2	?	I			
Trypanoplasma sp.	1	?	B	2	?	B, K			
Cryptobia branchialis Nie (in Chen, 1956)	2	?	GF						
Ichthyphthirius multifiliis Foquet, 1876				2	<100	S, F, GF			
Trichodina sp.	1	?	F						
Apiosoma sp.	1	?	F						
MYXOZOA									
Thelohanellus oculileucisci Trojan 1909	6	?	CV	1	?	CV	3	?	CV
Zschokella nova Klokacheva, 1914	1	?	GB	1	?	GB			
Myxidium rhodei Léger, 1905	1	?	K						
Myxobolus mülleri Bütschli, 1882	6	?	GF	3	?	GF			
Myxobolus dispar Thélohan 1895.	7	?	K, SP	1	?	K			
Myxobulus sp. 1	1	?	BR						
Myxobolus sp. 2	3	?	GB						
Chloromyxum fluviatile Thélohan, 1892	1	?	GB	1	?	GB			
MONOGENEA									
Gyrodactylus prostae Ergens 1963	5	1-2	OC, GF, GA	3	1-7	GF			
Gyrodactylus sp.	3	1	F	2	1-4	F			
Dactylogyrus cordus Nybelin, 1936	2	1-2	GF						
Dactylogyrus folkmanovae Ergens, 1956							1	2	GF
Dactylogurus tuba Linstow, 1878	1	1	GF	3	<200	GF			
Paradiplozoon sp.	1	1	GF						
CESTODA									

CESTODA									
Caryphyllaeus laticeps (Pallas, 1781)				1	1	I			
Cestoda (unidentified)	1	1	I						
TREMATODA									
Allocreadium isoporum (Looss, 1894)	7	1-7	I	3	<100	I	6	1-7	I
Ichthyocotylurus variegatus (Creplin, 1825) (m)				1	?	BC			
Ichthyocotylurus sp. (m)	1	1	BC						
Rhipidocotyle fennica Gibson *et al.* 1992* (m)	7	?	F	3	?	F	7	?	F
Rhipidocotyle campanula (Dujardin, 1843) (m)	10	?	GA	1	?	O			
Phyllodistomum macrocotyle (Lühe, 1909)							1	2	UB
Diplostomum sp. (m)	12	<50	L, CV	4	<120	L	5	<30	L, CV
NEMATODA									
Raphidascaris acus (Bloch, 1779) (l)	12	<20	LI, I, BC	4	<50	LI, I			
ACANTHOCEPHALA									
Acanthocephalus anguillae (Müller, 1780)				5	<100	I	1	1	I
Acanthocephala (unidentified)	1	1	I						
MOLLUSCA									
Anodonta anatina (L., 1758) (l)				1	2	GF			
HIRUDINEA									
Piscicola geometra (L., 1761)							1	1	S
CRUSTACEA									
Tracheliastes polycolpus Nordmann, 1832				3	1	S			
Argulus foliaceus (L., 1758)				2	2-8	S, F, GF			
Ergasilus sieboldi Nordmann, 1832	1	3	GF	1	1	GF			
Ergasilus briani Markevich, 1932	1	19	GF						
Number of species		27			23			8	

* Full reference to authors in discussion

Dace, *Leuciscus leuciscus*

Twenty-seven parasite species were found in the 14 examined specimens of dace. Of these there were 4 «protozoans» and 8 myxosporidians. More than 50 % of the fish had small round plasmodia, less than 1 mm in diameter, in the kidney and spleen. These plasmodia contained spores with polar capsules of different sizes, and fitted the description of *Myxobolus dispar*. This species has not previously been reported from Norway, but is known from different cyprinids in Eurasia (Bykhovskaya-Pavlovskaya *et al.*, 1962; Lom & Dykova, 1992). A species recognized as *M. muelleri* was common in the gill filaments. Based upon spore morphology, it seems possible that another two unidentified *Myxobolus* species were present in dace; in the brain and gall bladder respectively. According to Molnar (1994), myxosporidians are highly tissue specific, supporting our belief that the unidentified spores belong to separate taxa. Plasmodia with the characteristic spores of *Thelohanellus oculileucisci* were common in the corpus vitreum of the eyes. This is the first published account of a species in this genus in Norway. Two species with spores of the *Myxidium/Zschokkella* type was found. A histozoic species in the kidney closely fitted the description of *M. rhodei*, and we therefore assign it to this species. This is the first report of this species from Norway. The species found in the gall bladder of one individual was identified as *Zschokkela nova*. From Norway this species has previously been reported from crucian carp *Carassius carassius* (L.) (Alvik *et al.*, 1995). Small round spores with two unequal pairs of polar capsules were found the gall bladder of one individual. They were identified as spores of *Chloromyxum fluviatile*, a species also found in bleak in Norway (Appleby & Sterud, 1997).

Two morphotypes of *Rhipidocotyle metacercariae* were found subcutaneously in the fins and in the gill arches, respectively. According to the description by Gibson *et al.* (1992) they were identified as *R. fennica* Gibson,Taskinen and Valtonen, 1992 and *R. campanula*. The latter species has probably never previously been found in Norway. Halvorsen (1971) however, reported this species from pike, but we agree with Daverdin (1996) that this most likely was *R. fennica*, as judged from the host species. Sterud and Appleby (1996) found adult *Rhipidocotyle* in zander *Stizostedion lucioperca* (L.), which is the type host of *R. campanula*, but were not able to identify the species. Since an identification of the two species preferably should be based upon adult flukes, the present identification of the metacercariae should be regarded as tentative.

The *Gyrodactylus* species from the gills and the oral cavity closely resembled *G. prostae*, and we tentatively assign it to this species. This species has been found in a number of cyprinids in Central Europe, but has not previously been found in Norway. The second *Gyrodactylus* species, found on the fins, belongs to the taxonomically difficult *G. wageneri*-complex, with a number of nominal species (see Malmberg, 1970). The species in this complex are separated by subtle differences in the hard parts of the opisthaptor, and we have not attempted a specific identification of these specimens. The same two species were also found on ide in the present study.

Dactylogyrus tuba and *D. cordus* were found on the gill filaments. The former species has previously been found by us on *Aspius aspius* (see Sterud & Appleby, 1996) and also on ide (this

study), but *D. cordus* has not been reported from Norway before.

Both *Ergasilus sieboldi* and *E. briani* were found in dace. The former species has previously been reported from a number of host species in Norway, while the only published record of *E. briani* is from isolated populations of crucian carp (Midtgaard, 1995).

Ide, *Leuciscus idus*

Twenty-three parasite species were found in the 5 examined specimens of ide. Hexamitid flagellates were found throughout the intestine. Such flagellates, probably of the genus *Spironucleus*, have been reported from cyprinids (Molnar, 1974). At present, hexamitid flagellates can only be distinguished by electron microscopy (Woo & Poynton, 1995) which was not within reach of the present study. This is first record of hexamitid flagellates in Norwegian cyprinids.

We were not able to identify the *Trypanoplasma* species found in the blood and kidney, but previously we have mentioned *T. borreli* Laveran & Mesnil, 1902 as a probable species in cyprinids (see Appleby & Sterud, 1996; Sterud & Appleby, 1996).

Three crustaceans were found on ide. *Tracheliastes polycolpus* was found on the skin of three fishes. This species is host specific for ide and has previously not been reported from Norway. The present finding of *Argulus foliaceus* adds to other personal observations of this parasite from a number of fish species in South-Eastern Norway (unpublished). The statement of Økland (1985) that this is a rare species in Norway is therefore disputed.

Chub, *Leuciscus cephalus*

Eight parasite species were found in the 11 examined specimens of chub. An unexpected low number compared to the results from dace and ide. The only monogenean, which was found on the gill filaments, was *Dactylogyrus folkmanovae* which has never been reported from Norway previously. A *Phyllodistomum* species was found in the urinary bladder of one individual. Lühe (1909) described *P. macrocotyle* from chub and other cyprinids, and the present species fits the description of this species. Although its validity has been doubted (Nybelin, 1926), we assign the present species to *P. macrocotyle.*

Of the thirty-nine parasite species found in the present study, at least 8 are regarded as new records for Norway. In addition to these are the myxosporidians and protozoans which we were not able to identify. The literature shows that a taxonomic revision of many such species, preferably by electron microscopy, is necessary.

Acknowledgements

We thank Rune Fjellvang for valuable information, and both him and Trygve T. Poppe for assistance during field work.

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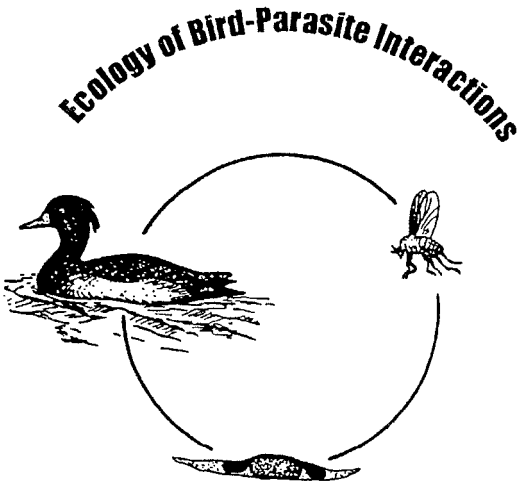
NEWS

FIRST ANNOUNCEMENT



A Special Symposium Arranged on Behalf of the Baltic Society for Parasitology and the Scandinavian Society for Parasitology

in Vilnius, Lithuania, 25-28 June, 1998

A Baltic-Scandinavian Symposium on **Ecologyy of Bird-Parasite Interactions** will be arranged on behalf of the Baltic Society for Parasitology (BSP) and the Scandinavian Society for Parasitology (SSP) with financial support from the Nordic Academy for Advanced Studies (NorFA), Institute of Ecology (Vilnius), Lithuanian Academy of Sciences and the British Society for Parasitology.

The Symposium will take place at the Lithuanian Academy of Sciences in the Centre of Vilnius (Gedimino ave. 3).

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The Symposium will contribute to strengthen the professional links, and to exchange ideas and information between parasitologists, ecologists and ornithologists in the field of ecology of birdparasite interactions. The purpose of the meeting is to present and discuss research results, to enrich the knowledge and stimulate future research in the area as well as to develop cooperative projects in bird ecology that take parasitism into consideration.

The following invited speakers will give lectures on various aspects of ecological and evolutionary bird-parasite interactions:

Prof. Andrei N. ALEKSEEV, Zoological Institute, St Petersburg, Russia
Prof. Richard. WASHFORD, Liverpool School of Tropical Medicine, Liverpool, U.K
Ass. Prof. Lars GUSTAFSSON, Uppsala University, Uppsala, Sweden
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Prof. Arne SKORPING, University of Tromsø, Tromsø, Norway
Dr. Gediminas VALKIUNAS, Institute of Ecology, Vilnius, Lithuania

Participants are encouraged to give oral presentations or to present posters.

The plenary lectures, and abstracts of other talks and posters, will be published in the Bulletin of the Scandinavian Society for Parasitology soon after the Symposium.

A limited number of graduate and post-graduate students, wishing to give talks at the symposium, will be supported by the Organizing Committee. Applications, including a Curriculum vitae and list of publications, should be sent before 1 December 1997 to the Local Organizing Committee.

Deadlines:

Preliminary registration and distribution of final announcement is December 1, 1997.

Final Registration and submission of abstracts is April 1, 1998.

The symposium language is English.

SOCIAL PROGRAM

Open to all registered participants and registered accompanying persons.

- ◊ A half day tour to the Trakai Castle (during the Symposium for accompanying persons only).
- ◊ The Symposium will end with a full day tour to the Open Air Museum of Lithuania (including lunch).

ECOLOGY OF BIRD-PARASITE INTERACTIONS

A special symposium to be held in Vilnius,
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SOCIETY NEWS

REFERAT FRA GENERALFORSAMLING, NORDISK FORENING FOR PARASITTOLOGI.

Generalforsamling i Nordisk forening for Parasittologi ble avholdt 24.05.97 på hotell Griffen, Bornholm, Danmark.

35 av foreningens medlemmer var tilstede på generalforsamlingen.

a) Valg av ordfører

Hans Petter Fagerholm, Finland, ble enstemmig valgt.

b) Valg av sekretær

Rita Hartvigsen Daverdin, Norge, ble enstemmig valgt.

c) Valg av protokolljusterere

Henrik Bøgh og Kurt Buchmann, begge Danmark, ble enstemmig valgt.

d) Styrets virksomhetsberetning for den siste virksomhetsperioden.

Styrets beretning ble enstemmig godkjent.

Rettelser:

- Årstallet for gjennomføring av XVIII Symposium of the Scandinavian Society for Parasitology, skal rettes fra 1996 til 1997.
- "Foreningens grundare, professor Bo-Jungar Wikgren....." skal rettes til "Foreningens initiativtaker, professor Bo-Jungar Wikgren....."

Kommentarer:

Peter Nansen, Danmark, holdt en kort redegjørelse om situasjonen for foreningens tidsskirft, Bulletin of the Scandinavian Society for Parasitology. Redaksjonskomiteen består av tre personer. Bulletinen skal inneholde tre elementer: proceedings, artikler og informasjon. Informasjonsdelen skal inneholde nytt om møter, avhandlinger, personalia etc.
Kvaliteten på dette kan oppsummeres slik:
proceedings: bra
artikler: bra
informasjon: har ikke fungert, fordi redaksjonen ikke har mottatt informasjon

Jorunn Tharaldsen, Norge, foreslo at en representant for hvert medlemsland får ansvar for å lage en oversikt for hvert medlemsland, og at denne oppgaven tillegges til de lokale redaktørene.

e) Kassererens beretning om kassabeholdning og revisors beretning.
Kassererens beretning og revisors beretning ble enstemmig godkjent.

Kommentarer:
Foreningens kasserer i perioden, Birgitte Vennervald, Danmark, gjorde kort rede for forenings økonomi og kassabeholdning. Hun påpekte at kassabeholdningen er lav, og at dette skyldes problemer med å få inn medlemsavgiften. Hun anbefalte at påminnelser må sendes ut, og at eksklusjoner av medlemmer som ikke betaler kan bli aktuelt. Innbetalingen skal fortsatt skje til Dansk Postbank på postgiro, men at det jobbes med å finne en annen og enklere løsning på innbetalingen. Det er viktig at medlemmene setter navn på innbetalingsblanketten.

Det nye styret tar på seg å gå igjennom den finansielle situasjonen. Det ble henstilt til medlemmene om å betale inn medlemsavgiften, slik at foreningens økonomi forbedres. Forslag for å effektivisere innbetalingen er at det oppnevnes en underkasserer i hvert land som samler inn medlemsavgiften og som sender den videre til kontoen i Dansk Postbank. Hovedkasserer beholdes som idag. Styret oppfordres til å komme med en løsning på dette i den kommende perioden.

f) Fastsetting av bokslutet og innvilgning av ansvarsfrihet for den siste virksomhetsperiodens forvaltning.
Innstillingen ble enstemmig vedtatt.

g) Valg av nye medlemmer til styret.
President: Elsa Tellervo Valtonen, Finland
Vise-president: Karl Skirnisson, Island
Sekretær: Maria Vang Johansen, Danmark
Kasserer: Tor Atle Mo, Norge
Styremedlem: Ingela Krantz, Sverige

h) Valg av varamedlemmer til styret

Eskil Petersen, Danmark

Katarina Gustavsson, Sverige

i) Valg av revisor og varamann til revisor.

Siste periodes revisorer, Fleming Frandsen, Danmark og Matthias Eydal, Island, beholdes. Som ny varamann til revisor ble valgt Birgitte Vennervald, Danmark.

j) Fastettelse av medlemsavgiften.

Medlemsavgiften beholdes uforandret.

k) Fastsettelse av tid og sted for neste generalforsamling, og oppnevning av arrangør for neste symposium.

Neste generalforsamling avholdes i forbindelse med neste Symposium. Forslag til sted og tid for generalforsamling og Symposium er Island, i tidsrommet 5. - 15. juni 1999. De islandske medlemmene fikk fire uker til å undersøke mulighetene for å gjennomføre arrangementet.

l) Eventuelt

Etter forslag fra den danske foreningen for parasitologi ble Peter Nansen utnevnt til æresmedlem i foreningen.

Avslutningsvis takket den nye presidenten, Elsa Tellervo Valtonen, Finland, det gamle styret for deres innsats. Hun takket også for oppdraget som president og skisserte veien fremover for foreningen.

På vegne av generalforsamlingen

Rita Hartvigsen Daverdin

Rita Hartvigsen Daverdin,

Sekretær, Generalforsamlingen

Protokolljusterere

Henrik Bøgh

Kurt Buchmann

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All contributions should be submitted as word-processed manuscripts on floppy disk, accompanied by two exactly matching print-outs of good reading-quality. The preferred storage medium is a 3½ inch disk in MS-DOS or MS-DOS compatible format. The text should be written in Word or WordPerfect or other word processing programs convertible to these. **With a Macintosh computer, save the file in the MS-DOS compatible option.** Please indicate the word processor (and version) used to generate the file, the type of computer, the operating system, and the formatted capacity of the diskette.

The articles/communications should normally not exceed 4 printed pages, including tables, figures, and references, and may contain a maximum of 2000 words if there are no figures or tables. The first page should show the title of the article, and the name(s) of the author(s). The authors' addresses should be given, and the complete correspondence address with telephone and telefax number (if available). The text should follow, without subheadings, but a short summary, maximum 100 words, may be included.

The text should be typed unjustified (unaligned right margins), without hyphenation (except for compound words), and at 1 ½ line spacing. Do not type page numbers. Label the hard copies by hand at the bottom of the page. Please ensure that the digit 1 and the letter 'l' have been used properly, likewise with the digit 0 and the letter 'O'. Do not use decorative formatting, such as boldface and centred headings, or underlining of titles or subheads.

Authors are obliged to follow the rules governing biological nomenclatures, as laid down in e.g. the *International Code of Zoological Nomenclature.* Disease names should follow the principles of *Standardized Nomenclature of Parasitic Diseases* (SNOPAD).

Figure legends must be included on the diskette, but the **figures will be handled conventionally.** They should be marked on the back with the title of the article and name of the (first) author.

Line drawings should be provided as good quality hard copies suitable for reproduction as submitted.

Photographs must be provided as glossy prints, and be of sufficiently high quality to allow reproduction on standard (not glossy) paper. Colour plates will not be printed.

References in the text shold be stated by giving in brackets the name of the author and the year of publication, e.g. (Thornhill, 1987) or (Austin & Austin, 1987). If there are more than two authors, only the first name plus *et al.* is given (Lund-Larsen *et al,* 1977). The reference list should be in alphabetical order, and follow the style set forth in *Uniform Requirements to Manuscripts Submitted to Biomedical Journals,* Br Med J 1988; 296: 401-5. References to journals should contain names and initials of the

authors, article title, the abbreviated name of the journal, year of publication, volume, and first and last page numbers of the paper. Journals should be abbreviated according to the "List of journals indexed in *Index Medicus*". Authors without access to this list may type the full name of the journal, and the Editor will take care of the abbreviations. If there are more than six authors, list only the first three and add *'et al'*. Personal communications and unpublished data should not be used as references, but may be inserted in the text (within parenthesis marks).

Examples of correct forms of references are given below:

Standard journal article:

Anonymous. Some facts on small animal practice. Vet Rec 1987; 120: 73

Horsberg TE, Berge GN, Høy T et al. Diklorvos som avlusningsmiddel for fisk: klinisk utprøving og toksisitetstesting. Nor Vet Tidsskr 1987; 99: 611-5

Lund-Larsen TR, Sundby A, Kruse V, Velle W. Relation between growth rate, serum somatomedin and plasma testosterone in young bulls. J Anim Sci 1977; 44: 189-94

Books and other monographs:

Austin B, Austin DA. Bacterial fish pathogens: disease in farmed and wild fish. Chichester: Ellis Horwood, 1987

McFerran JB, McNulty MS, eds. Acute virus infections of poultry: a seminar in the CEC programme, Brussels 1985. Dordrecht: Martinus Nijhoff, 1986. (Current topics in veterinary medicine and animal science 37)

Sosialdepartementet. Tsjernobyl-ulykken: Rapport fra Helsedirektoratets rådgivende faggruppe. Oslo: Universitetsforlaget, 1987 (Norges offentlige utredninger NOU 1987: 1)

Thornhill JA. Renal endocrinology. In: Drazner FH, ed. Small animal endocrinology. New York: Churchill Livingstone, 1987: 315-39

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REPRINTS WILL NOT BE AVAILABLE.

In the interest of speed, no proofs will be sent to authors. It is therefore of vital importance that the manuscripts are carefully checked before submission.

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BULLETIN OF THE SCANDINAVIAN SOCIETY FOR PARASITOLOGY

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