

PARASITES OF FISH OF ECONOMIC INTEREST IN NORTHERN EUROPE, A LITERATURE ANALYSIS

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Introduction

The early investigations of fish parasites in European fresh-, brackish- and marine- waters date back several centuries. In other words, fish parasitological research has a history analogous to that of the parasitological science as a whole reaching back to the first naturalists. Thus, when analysing literature relating to parasites of fish of economic value in Northern Europe, one has to review the situation for as long as the last three centuries. A bibliography which has recently been compiled by the present authors (Pugachev & Fagerholm, in press), provides the basis of the analysis presented in this review.

Bibliography

A bibliography on fish parasites and parasitic disease of fish of N. Europe, was compiled (Pugachev & Fagerholm, in press) as it was considered valuable to produce a bibliography by which the Russian literature can be made more easily accessible, as titles are translated into English. Also titles of publications published in Nordic languages have been translated. It was feasible to produce such a work now because of the efficient

means available to deal with bibliographic information which is provided by present day computers and software.

Although the bibliography, upon which the results are based is not claimed to be complete (some 2000 references included), the information given describe the trends in the scientific activities in this field. Published papers up to the early 1990s were included.

Database

One aim of this bibliography was to use the literature which was analysed as a basis for a database on parasites of fish in N Europe. This work is well advanced. In this virtual data-base, a full in-text indexing will be possible. In the work special emphasis was put on the early literature which today, sofar, has not been systematically introduced to any mainframe computers, while current studies efficiently can be retrieved from on line databases.

The criteria used for introducing references into the bibliography, and the database, were that the papers should include parasite- and parasitic disease data of fish from N Europe (Region from

Ural in the east to Greenland in the west, and from the Baltic Sea in the south to the Arctic Ocean in the north). Although, in the Atlantic, information from areas south of the Faroes is generally not included, in order to retain important data on taxonomy, distribution and biology of the parasites, numerous exceptions from this rule was made. In addition numerous old general studies on fish parasites were included.

Results, including some general comments

The number of publications increased constantly from 1700 up to 1940 with a distinct increase in 1850-1900. The effects of the Second World War resulted in a decrease in the production comparable to output of the period 1800-1850.

The number published papers increased rapidly in 1950-1980 but even more so in 1970-1980. During last decade (1980-

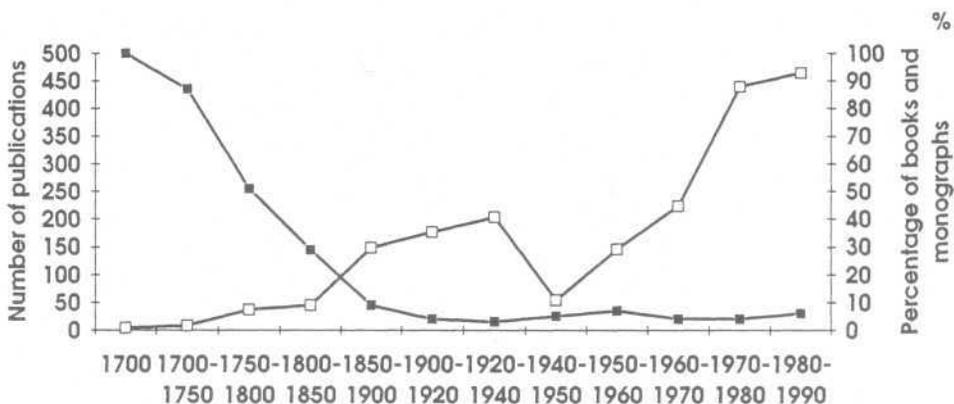


Fig 1. Number of published paper dealing with parasites of fish in N. Europe (open squares), and the proportion (%) of monographs or books in relation to published papers, (closed squares) during the periods shown.

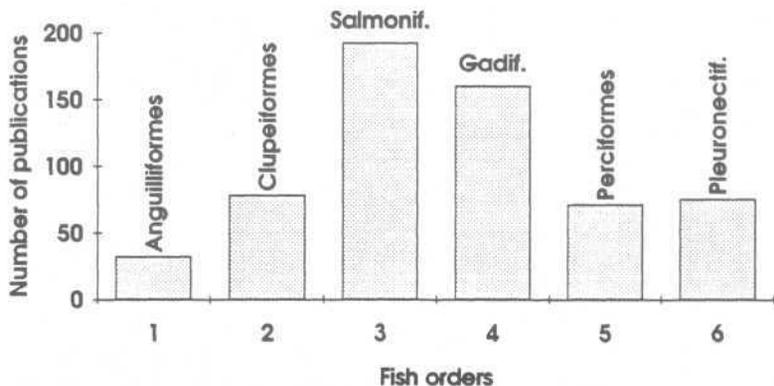


Fig. 2. The number of publications on parasites of certain orders of fish in literature from N. Europe.

1990) the number of papers published was similar to that of the previous one (Fig. 1).

Based upon the literature which was analysed it can be observed that fishes of the orders Salmoniformes and Gadiformes were the most extensively studied while the order Clupeiformes and the large order Perciformes did not attract the same attention (Fig. 2). There are

some fish genera even among Gadiformes and Pleuronectiformes which still have not been studied or have attained only little any attention by researchers (e.g. *Gadiculus*, *Brosme*, *Echiodon*, *Lycodes*, *Microstomus*).

The Cestoda, Trematoda, Monogenea and the parasitic Crustacea were extensively studied, while Nematoda was less so (Fig. 3). Myxosporidia was the leading

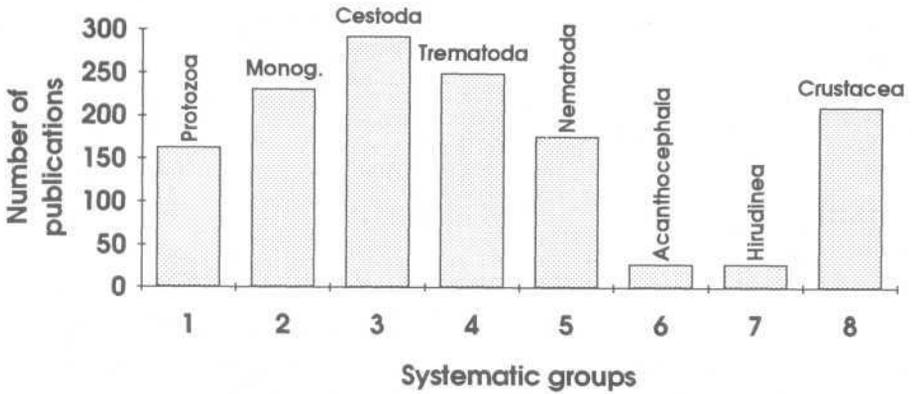


Fig. 3. Number of papers dealing with certain parasite groups in studies on fish parasites from N. Europe.

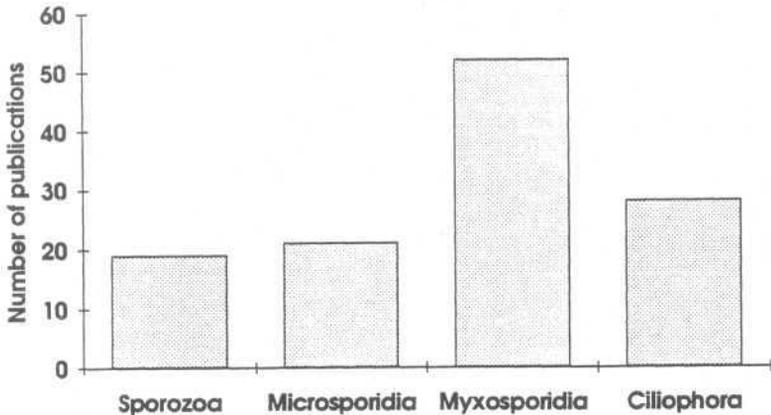


Fig. 4. Number of papers published on certain sporozoan parasites of fish in N Europe.

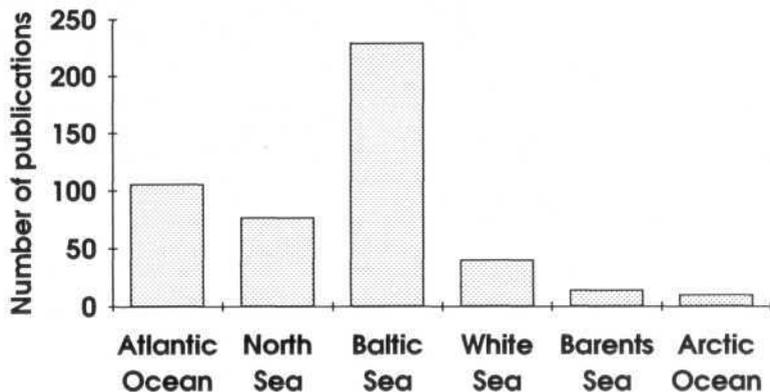


Fig. 5. Number of papers on parasites of fish from certain N European water regions.

group among the Protozoa (Fig. 4). It can be noted that in the case of parasitic protozoans, including Myxosporidia, relatively few studies have been done in the Scandinavian region.

A prominent portion of the publications has dealt with the parasite fauna of Baltic Sea fishes while the number of studies from the White Sea, the Barents Sea and the Arctic Ocean is low (Fig. 5). Freshwater fish parasites were extensively studied in Russia, Norway and

Finland, while in Denmark (hardly any studies, not included in figure) and Sweden more attention was paid to the study of marine fish parasites (Fig. 6).

In spite of the fact that especially during the last three decades, a rapidly increasing number of papers have been published there still remains work to be done with regard to the geographical distribution of parasites, the parasite fauna of certain specific hosts and the structure of parasite communities. The

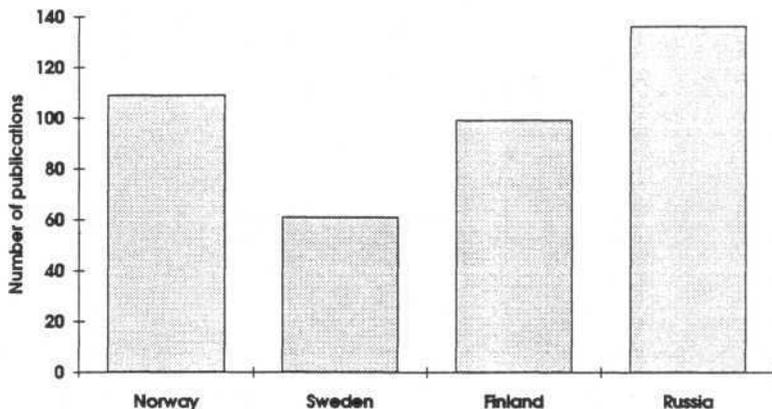


Fig. 6. Papers on freshwater parasites of fish from certain areas in N Europe.

lack of regular monitoring programs of fish parasites even in the case of commercially valuable fishes is also striking.

Studies relating to taxonomy, morphology and life cycles have been

dominating (Fig. 7). However, recently the number of studies dealing with other subjects, such as parasite ecology, problems related to fish disease, pollution studies and genetics have been increasing.

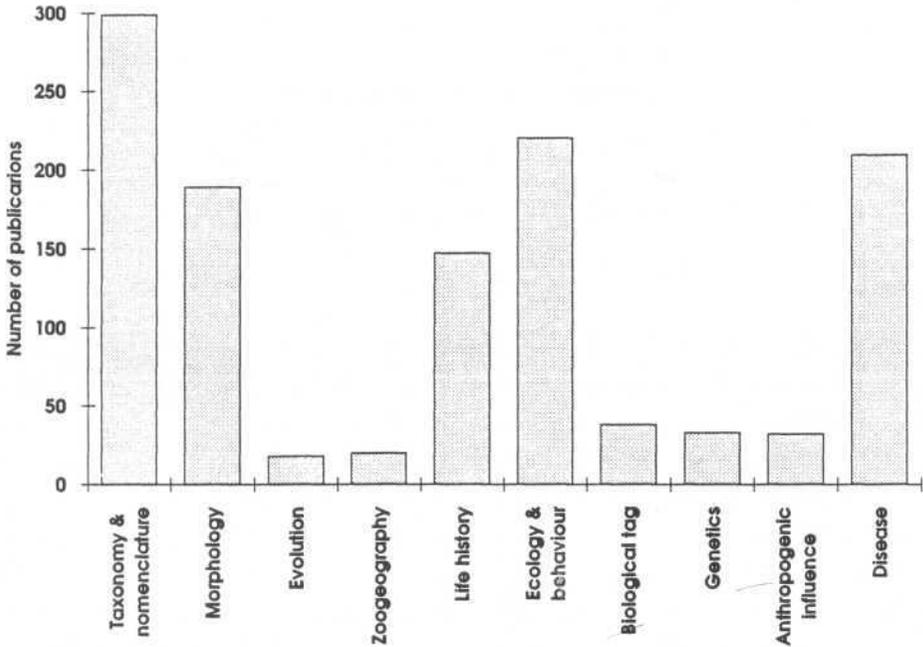


Fig. 7. Different subject areas dealt with in studies on parasites of fish in N Europe

As was shown (Fig. 1), the relative number of books or monographs published during the periods reviewed has decreased and has remained at the same low level as it was already at the start of the century. It appears that during the last few decades we have produced primary data but we still have to sum up the results obtained and, when possible, draw some general conclusions.

According to the present analysis it is possible to predict that there will be a decrease in the number of publications

during next decade. Furthermore, it seems reasonable to anticipate a further substantial increase in the use of computer technology in the dissemination of scientific information.

References

Pugachev O., Fagerholm H-P. A bibliography and an index list on parasites and parasitic disease of fish in Northern Europe. Abo: Abo Akademi Press (In press)