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Myxosporean gall bladder parasites of gadid fishes in the North Atlantic: Their geographical distributions and an assessment of their economic importance in fisheries and mariculture

K. MacKenzie [a,*], C. Kalavati [b], M. Gaard [c], W. Hemmingsen [d]

[a] *School of Biological Sciences (Zoology), The University of Aberdeen, Tillydrone Avenue, Aberdeen AB24 2TZ, UK*
[b] *Department of Zoology, Andhra University, Waltair 530 003, Andhra Pradesh, India*
[c] *Museum of Natural History, Debesartrøð, FO-100 Tórshavn, Faroe Islands*
[d] *Institute of Biology, Department of Ecology and Zoology, The University of Tromsø, 9037 Tromsø, Norway*

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Abstract

Between 1992 and 2003, samples of four species of gadid fish from the northern North Sea, the Faroe Islands and northern Norway were examined for myxosporean gall bladder parasites. Total numbers of each host species examined were: 665 cod *Gadus morhua* L., 621 haddock *Melanogrammus aeglefinus* (L.), 389 saithe *Pollachius virens* (L.) and 445 whiting *Merlangius merlangus* (L.). Nine species of myxosporeans were found: *Ceratomyxa arcuata* Thélohan, 1892, *Leptotheca informis* Auerbach, 1910, *Leptotheca longipes* Auerbach, 1910, *Myxidium bergense* Auerbach, 1909, *Myxidium gadi* Georgévitch, 1916, *Myxidium oviforme* Parisi, 1912, *Myxidium sphaericum* Thélohan, 1895, *Sphaeromyxa hellandi* Auerbach, 1909, and a hitherto undescribed species of *Myxidium*. The taxonomy and likely geographical distributions of these and other gall bladder myxosporeans of gadid fish reported from both sides of the North Atlantic are discussed. These myxosporeans fulfil most criteria for use as biological tags in host population studies and some have been used successfully already. They also have potential use as indicators of environmental change and marine pollution. Some species are likely to become serious pathogens in mariculture, particularly of cod and haddock. It is clear from our assessment that a great deal has still to be learned about their taxonomy, host specificities, life cycles and general ecology. For their more efficient use as tags and indicators, and for successful control of infections and the application of preventative measures in mariculture, more information on the their biology and ecology is essential.
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Keywords: Myxosporean parasites; Gadid fish; North Atlantic; Economic importance

1. Introduction

A variety of myxosporean species have been reported from the gall bladders of gadid fishes in the North Atlantic (Kabata, 1967; Khan et al., 1986;

* Corresponding author. Tel.: +44 1224 314532; fax: +44 1224 272396.
E-mail address: k.mackenzie@abdn.ac.uk (K. MacKenzie).

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MacKenzie and Kalavati, 1995; Kalavati and MacKenzie, 1999). This paper brings together the results of several surveys of these myxosporeans carried out by us in the northeast Atlantic and those of earlier studies throughout the North Atlantic. We describe the likely geographical distributions, host ranges and patterns of infection with host length/age of these parasites and attempt to assess their potential value as biological tags in population studies of gadid fishes throughout the North Atlantic and their importance as pathogens, particularly in the developing field of gadid mariculture.

Some gall bladder myxosporeans infecting gadid fishes have previously been shown to be of value as biological tags in population studies of their hosts. Species in the genera *Ceratomyxa*, *Leptotheca*, *Myxidium* and *Sphaeromyxa* were all used by Kabata (1963, 1967) as biological tags for stock identification of whiting, *Merlangius merlangus* (L.), and haddock, *Melanogrammus aeglefini* (L.), in British and Faroese waters, while *Myxidium gadi* and *M. oviforme* were used to help identify stocks of cod, *Gadus morhua* L., off Newfoundland and northern Norway by Khan and Tuck (1995) and Larsen et al. (1997), respectively. Kabata (1967) commented on the pathology associated with gall bladder myxosporeans in general, but with particular reference to those infecting gadids. He described hypertrophy and increased thickness of the gall bladder wall and loss of contractility of the bladder, with the likely final outcome of a heavy infection being complete functional elimination of the bladder. The pathology of myxosporean parasites in mariculture was reviewed by Alvarez-Pelliterro and Sitjà-Bobadilla (1993a), who described the pathogenic effects of several gall bladder myxosporeans.

Little use has so far been made of myxosporeans as indicators of aquatic pollution, but Bucher et al. (1992) and Marcogliese and Cone (2001) found that levels of infections with gall bladder myxozoans in freshwater fish increased at sewage-contaminated sites. The latter authors suggested that increased populations of oligochaete hosts of actinosporean stages in sewage-enriched sediments could have accounted for the increased levels of infection in the fish hosts. In

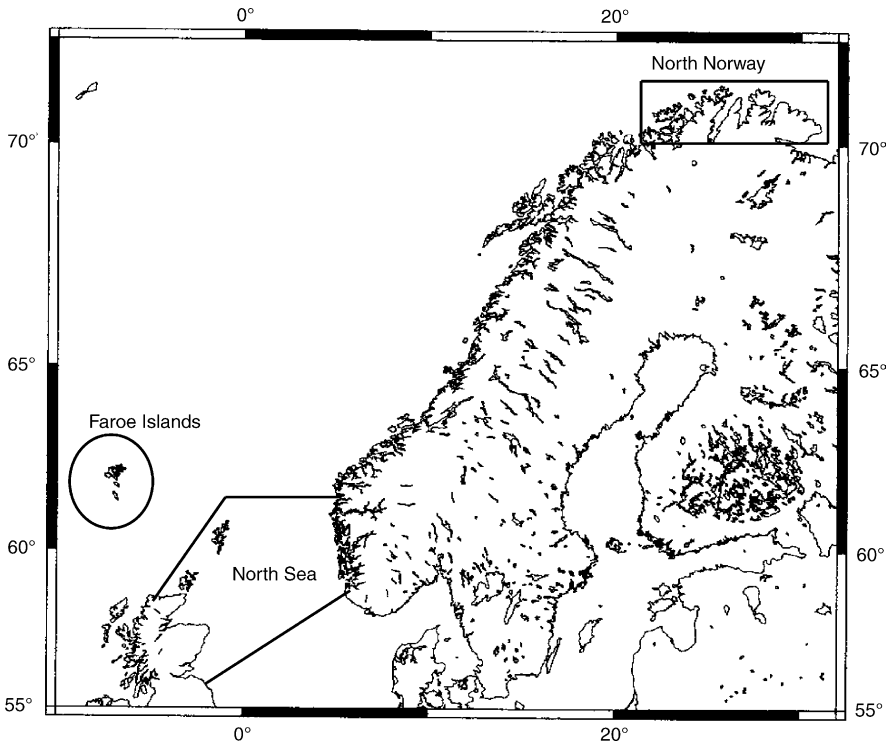

Fig. 1. Map of the northeast Atlantic showing areas from which samples of fish were taken.

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