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NOTE

Nematode parasites of commercially important fish in NW Spain

M. L. Sanmartín Durán, P. Quinteiro, F. M. Ubeira

Departamento de Microbiología y Parasitología, Cátedra de Parasitología, Facultad de Farmacia, Universidad de Santiago de Compostela, Santiago, Spain

ABSTRACT: A study of the nematode parasites of 496 fish caught off NW Spain between December 1985 and March 1986 resulted in the identification of the following species: *Proleptus obtusus* (in 91.2 % of *Scyliorhinus canicula* specimens); *Cucullanus hians* (in 31.8 % of *Conger conger*); *Cucullanus heterochrous* (in 1 % of *Scophthalmus maximus*); *Cristitectus congeri* (in 8.2 % of *C. conger*); *Anisakis simplex* L_3 (larvae Stage 3) (in 3.5 % of *S. canicula*, 62.3 % of *Micromesistius poutassou*, 25 % of *Zeus faber*, 43.9 % of *Trachurus trachurus*, 10.8 % of *Lepidorhombus wiffiagonis*, 30.4 % of *L. boseii* and 9.1 % of *C. conger*); *Hysterothylacium aduncum* L_3 (in 23.9 % of *M. poutassou*, 14.3 % of *Trigla lucerna*, 78.1 % of *Trachurus trachurus*, 27.7 % of *L. wiffiagonis*, 13 % of *L. boseii*, 5.8 % of *Microchirus variegatus* and 1.8 % of *C. conger*) and *H. aduncum* (in 2.7 % of *C. conger* and 10 % of *S. maximus*).

In addition to its taxonomic interest, characterization of the helminth fauna of fish is of considerable importance from the point of view of hygiene and public health. There have, for example, been numerous reports of human anisakiosis resulting from the consumption of raw or undercooked fish (Chitwood 1970, Dailey et al. 1981). Though the larvae of the ascarids responsable for anisakiosis are found in almost all marine fish, the main source of human infection in Japan is the common mackerel *Scomber japonicus*, whereas in the USA it is smoked salmon (Oshima 1987). In continuance of our study of helminths in hosts of commercial importance off the coast of Galicia (NW Spain), we report here the prevalence and intensity of infections by nematodes.

Material and methods. We examined a total of 496 fish caught between 4 December 1985 and 1 March 1986 by boats fishing in the northeast Atlantic in the area 9°18′ to 9°34′ W, 42°38′ to 42°50′ N. The fish were inmediately transported to the laboratory where they were examined under a stereomicroscope. Later they were carefully dissected for observation of the internal organs. Muscle was filleted to observe nematode larvae. In the case of mackerrel it was placed in digestion solution (7 g pepsin powder + 5 ml HCl + 950 ml 0.9 % NaCl). Nematodes were killed and fixed with Berland's fluid or warm ethanol, stored in 70 % alcohol, cleared in lactophenol, and mounted in Hoyer's fluid containing a small amount of Cotton Blue (which brings out cuticular structures).

Results and discussion. We identified 6 species of adult nematodes and 2 species of larvae belonging to the Physalopteridae, Cystidicolidae, Anisakidae and Cucullanidae. Table 1 lists the hosts examined, their infection rates, and the prevalence and intensity of infection of each host by its main nematode parasites. It is noteworthy that most of the nematodes found were the larval phase ascarids *Hysterothylacium aduncum* L_3 and *Anisakis simplex* L_3 which were most prevalent in *Trachurus trachurus* and *Micromesistius poutassou* respectively; numerous authors consider these to be the most common marine fish nematodes.

The Anisakis specimens where found to fit Berland's (1961) description of *Anisakis* Type I, which later authors (Pippy & Banning 1974, Smith 1983) found to correspond to *Anisakis simplex*, whose geographical range covers cold zones (Kagei 1974). *Anisakis* was most prevalent among *Micromesistius poutassou* specimens, over 60 % of which were infected, though this rate is slightly lower then that reported by Mackenzie (1979) for the north-east Atlantic off Scotland. None of our specimens exceeded 30 cm in length, and it is known that the prevalence and intensity of infection by *Anisakis* larvae increase with fish size (McGladery & Burt 1985). In *Trachurus trachurus* we observed encysted *Anisakis* larvae in the body cavity and in some cases, in the flesh (2.4 %). In *M. poutassou* we observed postmortem migrations from the body cavity, but the larvae left the fish, piercing the skin, without encysting in the flesh. Smith (1984) found postmortem migrations of *A. simplex* L_3 into the flesh of some fatty species (herring, mackerel) but not of non-fatty species

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Table 1. Parasite-host distribution data

Host	No. examined	% Infected	Parasites	Prevalence	Intensity
Scyliorhinus canicula	57	91 %	*Proleptus obtusus*	91.2 %	37.3
			Anisakis simplex L_3	3.5 %	1.5
Micromesistius poutassaou	67	65.6 %	*Anisakis simplex* L_3	63.3 %	5.8
			Hysterothylacium aduncum L_3	23.9 %	6.1
Trisopterus luscus	4	0	0	0	0
Zeus faber	4	25 %	*Anisakis simplex* L_3	25 %	1
Trigla lucerna	14	14.3 %	*Hysterothylacium aduncum* L_3	14.3 %	4.5
Trachurus trachurus	82	84.1 %	*Anisakis simplex* L_3	43.9 %	7.3
			Hysterothylacium aduncum L_3	78 %	16.7
Lepidorhombus whiffiagonis	65	35.4 %	*Anisakis simplex* L_3	10.8 %	1.1
			Hysterothylacium aduncum L_3	27.7 %	2.2
Lepidorhombus boscii	23	30.4 %	*Anisakis simplex* L_3	30.4 %	3
			Hysterothylacium aduncum L_3	13 %	3
Scophthalmus maximus	10	10 %	*Cucullanus heterochrous*	10 %	1
			Hysterothylacium aduncum	10 %	1
Microchirus variegatus	52	5.8 %	*Hysterothylacium aduncum* L_3	1 %	1
Solea lascaris	9	0	0	0	0
Conger conger	110	45.5 %	*Anisakis simplex* L_3	9 %	2
			Hysterothylacium aduncum L_3	1.8 %	1
			Hysterothylacium aduncum	2.7 %	2
			Cucullanus hians	31.8 %	1.9
			Cristitectus congeri	8.2 %	5.3

(blue whiting, whiting, walleye pollock). McGladery (1986) has suggested that host feeding habits may be an important factor in the establishment of *A. simplex* L_3 in flesh.

The *Hysterothylacium aduncum* larvae found in this study fit the descriptions given by Fagerholm (1982), Moravec & Nagasawa (1985). They were most prevalent among *Trachurus trachurus* specimens (78 % in body cavity and 1.2 % in muscle). According to Fagerholm (1982), whereas *H. aduncum* L_3 is commonest in autumn and winter, the adult phase is most frequent in summer, which explains the low prevalence of adults recorded in *Conger conger* and *Scophthalmus maximus*, the *H. aduncum* hosts mentioned by Petter (1969).

The prevalence of *Cucullanus hians* in *Conger conger* was moderate to low, 32 % as against the 58 % observed in this host in the Mediterranean by Muñoz et al. (1988). Those found in our study were mature adults (the number of which diminished as winter advanced) together with a few larvae encysted in the intestinal wall. This suggests seasonal behaviour similar to that reported by MacKenzie & Gibson (1970) for *Cucullanus minutus* and *C. heterochrous*.

There is hardly any literature on *Christitectus congeri* (Petter 1970, Quinteiro et al. 1989). The prevalence observed is low but it must be taken into account that the sampling was made in the winter

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