

INCIDENCE OF ASCARIDOID LARVAE IN KUWAITI FOOD FISHES

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Abstract. Three hundred and six fish of 83 species were carefully examined in Kuwait during the period from October 1992 to September 1995 for ascaridoid larvae. Thirty-nine fishes (12.7%) belonging to 23 species were infected with 9 types of ascaridoid third-stage larvae: *Anisakis simplex*, *Terranova* spp, *Contracaecum* spp and 6 different types of *Hysterothylacium* spp (KA-KF). *Hysterothylacium* larvae (including all types) were found in all the infected fish except one (94.6%); *Terranova* larvae were found in 12 fishes (10 species, 56.1%); *Anisakis simplex* larvae occurred in 2 fishes (2 species, 8.6%) and *Contracaecum* spp larvae in one fish only.

INTRODUCTION

After the first report on human anisakiasis in the Netherlands (Thiel Van *et al*, 1960) it became evident that ascaridoid larvae can be pathogenic in humans (causing gastric granuloma). The results of the extensive examinations conducted so far revealed that larvae of the genera *Anisakis*, *Pseudoterranova*, *Terranova*, *Hysterothylacium* and *Contracaecum* might be potentially pathogenic but the large majority of anisakiasis is due to the genera *Anisakis* and less frequently *Pseudoterranova*. *Anisakis* larvae have been reported from many parts of the world, *eg* from Europe (Grabda 1976; Lagoin, 1980; Berland, 1961; Petter, 1969; Smith and Wootten, 1978; Knofler and Lorenz, 1982) from Japan (Shiraki, 1974; Asaishi *et al*, 1989; Ishikura and Namiki, 1989; Hayasaka *et al*, 1971) from the USA (Valdiserri, 1981; Kliks, 1983; Mckerrow and Deardorff, 1988) from Australia (Cannon, 1977) from China (Sun *et al*, 1991, 1992) from the Indian Ocean (Parukhin, 1988; Gavrilyuk, 1978). Concerning the areas adjacent to the Arabian Gulf, reports have come from Pakistan (Bilgees and Fatima, 1986; Khan and Begum, 1971) and from the western coast of India (Nammalwar, 1980). *Anisakis* larvae were also reported from the Arabian Gulf region, from Iran (Eslami and Mokhayer, 1997, 1994) and the coasts of the United Arab Emirates (Kardousha, 1992; Al-Ghais and Kardousha, 1994; El-Naffar

et al, 1992). They have not previously been reported from Kuwaiti fish.

MATERIALS AND METHODS

Three hundred and six fish of 83 species obtained from the local fish market in Kuwait City between October 1992 and September 1995 were examined for helminth parasites. The collected nematode larvae were washed several times using saline solution, fixed in AFA and stored in glycerin-alcohol. They were cleared in lactophenol for examination and were identified using stereo- and light microscopy.

Thirty-nine fish (12.7%) belonging to 23 species were infected with third-stage ascaridoid larvae. A total of 9 types of larvae belonging to 4 genera were collected: *Anisakis simplex*, *Terranova* spp, *Contracaecum* spp, and 6 different types of *Hysterothylacium* spp (KA, KB, KC, HD, KE, HF). These larvae will be described in another paper (Petter and Sey, in preparation). The main features are given in Fig 1 in the following key:

Key to third-stage ascaridoid larvae parasitizing Kuwaiti fish

1(6) Excretory pore at anterior extremity.

- 2(5) Ventriculus long and cylindrical. Ventricular appendix lacking.
- 3(4) Intestinal cecum lacking. Tip of tail with mucron. *Anisakis simplex* (Rud, 1809).
- 4(3) Intestinal cecum present. e/c (esophagus length/intestinal cecum length) 1.1-1.6; e/v (esophagus length/ventriculus length) 2.2-2.8 : *Terranova* sp.
- 5(2) Ventriculus short and more or less spherical. Tip of tail lacking mucron. L 2750-2800; e/c 1.6-1.7; e/a (esophagus length/ventricular appendix length) 1.0-0.9 : *Contracaecum* sp.
- 6(1) Excretory pore at level of nerve ring.
- 7(10) Tip of tail with 6-8 spines arranged in a circle. Boring tooth lacking.
- 8(9) Ventricular appendix about the same length as esophagus. L 2400-7600; e/c 2.7-7.7; e/a 0.8-2.2: *Hysterothylacium* sp type KA.
- 9(8) Ventricular appendix much longer than esophagus. L 2050-2300; e/c 3.2-3.5 ; e/a 0.2-0.4 ; *Hysterothylacium* sp type KD.
- 10(7) Tip of tail without a circle of spines.
- 11(14) Ventricular appendix shorter than twice the esophagus length.
- 12(13) Boring tooth lacking. Tail with a single terminal spine. L 3400-9800 e/c 3.1-8.8 ; e/a 0.7-1.3 : *Hysterothylacium* sp type KB.
- 13(12) Boring tooth present. Tail without terminal

spine. L4200 ; e/c 3.2- ; e/a 1.4 : *Hysterothylacium* sp type KC.

- 14(11) Ventricular appendix longer than twice the esophagus length. L 8300-10500; e/c 1.2-1.4; e/a 0.1-0.2: *Hysterothylacium* sp type KF.

- 15(16) Intestinal cecum short. L 7100-20800; e/c 4.0-11.5; e/a 0.2-0.3: *Hysterothylacium* sp type KE.

- 16(15) Intestinal cecum longer than half esophagus length. L 8300-10500 ; e/c 1.2-1.4 ; e/a 0.1-0.2 *Hysterothylacium* sp type KF.

Data referring to the hosts and the incidence of the nematode larvae are given in Table 1. *Hysterothylacium* larvae were found in 38 fishes (22 species, 95.7%). The highest prevalence (56.4%) and the highest abundance (3.1) were shown by *Hysterothylacium* type KA, followed by *Terranova* sp (prevalence 30.7%) and *Hysterothylacium* type KB (prevalence 25.6%). *Anisakis simplex* was recorded in 2 fishes belonging to species (*Atropus atropus* and *Trichiurus lepturus*) and *Contracaecum* sp in one fish only (*Mulloidichthys auriflamma*). Double or manifold infestations were fish frequent (in 17 fish, 73.9 and 14 species 60.8%); the most variable parasite community was harbored by *Mulloidichthys auriflamma* (6 types of larvae : 5 of *Hysterothylacium* sp and one of *Contracaecum* sp) and *Trichiurus lepturus* (6 type : 4 of *Hysterothylacium* sp, one of *Terranova* sp and *Anisakis simplex*).

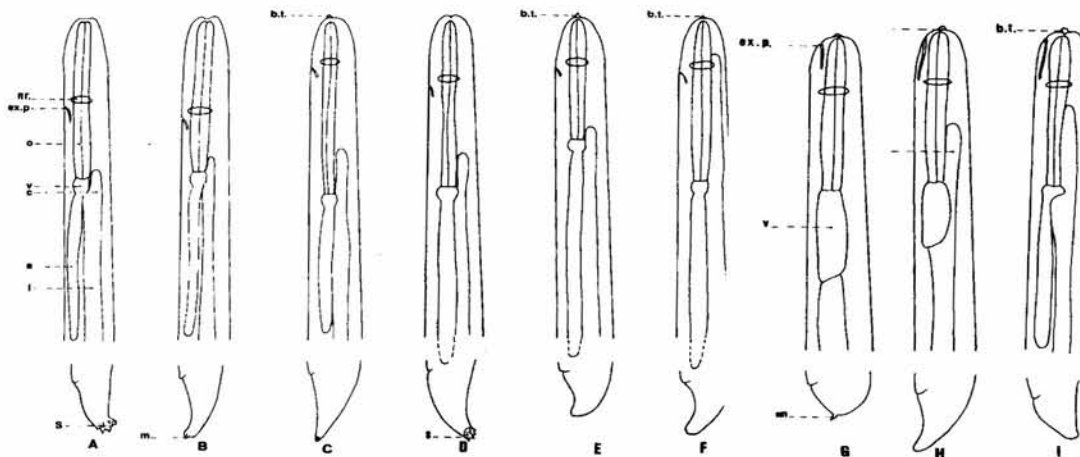


Fig 1 - Diagram of anterior regions and tails of ascaridoid larvae recorded from Kuwaiti food fishes.

A. *Hysterothylacium* type KA ; B. *Hysterothylacium* type KB ; C. *Hysterothylacium* type KC ;

D. *Hysterothylacium* type KD ; E. *Hysterothylacium* type KE ; F. *Hysterothylacium* type KF ;

G. *Anisakis simplex* ; H. *Terranova* sp ; I. *Contracaecum* sp.

a : ventricular appendix ; bt : boring tooth ; c : intestinal cecum ; exp : excretory pore ; i : intestine ; m : mucron ; nr : nerve ring ; o : esophagus ; s : spines ; v : ventriculus.

Table 1
Range numbers of Ascaridoid third-stage larvae found in Kuwaiti fishes.

Host (number of fishes)	<i>Hysterothylacium</i> sp						<i>Terra-nova</i> sp	<i>Anisakis simplex</i>	<i>Contra-caecum</i> sp
	KA	KB	KC	KD	KE	KF			
<i>Ariidae</i>									
<i>Arius thalassinus</i> (3)	0-1	-	-	-	-	3-7	-	-	-
<i>Bothidae</i>									
<i>Pseudorhombus arsius</i> (3)	0-1	0-2	-	-	-	1-3	0-3	-	-
<i>Carangidae</i>									
<i>Atropus atropus</i> (1)	1	-	-	-	-	-	1	4	-
<i>Caranx kalla</i> (1)	12	-	-	-	-	-	1	-	-
<i>Caranx leptolepis</i> (4)	4-13	-	-	-	-	-	0-1	-	-
<i>Caranx malabaricus</i> (2)	-	-	-	-	3-4	-	2-3	-	-
<i>Trachurus trachurus</i> (2)	0-20	0-3	-	-	-	-	0-1	-	-
<i>Clupeidae</i>									
<i>Sardinella perforata</i> (3)	1-17	-	-	-	-	-	-	-	-
<i>Exocoelidae</i>									
<i>Hemiramphus marginatus</i> (2)	4-4	-	-	-	-	-	-	-	-
<i>Leiognathidae</i>									
<i>Leiognathus bindus</i> (1)	-	-	-	-	-	1	-	-	-
<i>Leiognathus fasciatus</i> (1)	1	-	-	-	-	-	-	-	-
<i>Lutjanidae</i>									
<i>Lutjanus coccineus</i> (1)	-	-	-	-	3	1	13	-	-
<i>Menidae</i>									
<i>Mene maculata</i> (1)	17	-	-	-	-	-	-	-	-
<i>Mullidae</i>									
<i>Mulloidichthys aurflamma</i> (2)	-	1-3	-	0-1	0-1	0-1	-	-	0-3
<i>Upeneus sulphureus</i> (1)	-	6	1	-	-	-	-	-	-
<i>Sciaenidae</i>									
<i>Otolithes argenteus</i> (3)	0-2	0-4	-	-	-	-	0-1	-	-
<i>Sparidae</i>									
<i>Acanthopagrus sp</i> (1)	0-1	-	-	-	-	-	-	-	-
<i>Argyrops spinifer</i> (1)	-	-	-	-	1	-	-	-	-
<i>Synodontidae</i>									
<i>Saurida undosquamis</i> (1)	-	-	-	-	1	-	-	-	-
<i>Sphyracidae</i>									
<i>Sphyracna jello</i> (1)	2	2	-	-	-	-	-	-	-
<i>Sphyracna obtusata</i> (2)	0-3	2-4	-	-	-	-	0-1	-	-
<i>Theraponidae</i>									
<i>Therapon therops</i> (1)	-	-	-	-	-	-	1	-	-
<i>Trichiuridae</i>									
<i>Trichlurus lepturus</i> (1)	12	-	-	4	1	-	4	1	-
Total number of infected fishes	22	10	1	2	7	8	12	2	1
Total number of infected species	15	7	1	2	6	5	10	2	1
Total number of larvae	124	30	1	5	14	20	34	5	3

DISCUSSION

The definitive hosts of these larvae are either marine mammals (*Anisakis simplex* or piscivorous birds and mammals (*Contracaecum*), or elasmobranchs (*Terranova*) and teleost fishes *Hysterothylacium*). Their larval stages are parasitic in a large number of marine fishes. In their intermediate host fishes, they are found to have encapsulated throughout the viscera and they can penetrate the tissue of fishes.

Ascaridoid larvae have not previously been recorded from Kuwaiti fish and thus these findings are new locality records. The pathogenicity of *Hysterothylacium* and *Terranova* larvae, which were the most frequently found in this survey, has not been proven, however, larvae of *Anisakis simplex*, the principal causative agent of anisakiasis, were found in 2 fish; although these larvae can survive in insufficiently cooked, salted and smoked fish, human cases of anisakiasis have not yet been recorded in Kuwait as a consequence of the feeding habit here (frying is the usual cooking procedure for fish).

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