Research Article

Raphidascaris Larvae (Nematoda: Anisakidae) in Marine Fish *Mugil cephalus* Linn., 1758 from Karachi Coast, Pakistan

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Abstract | Nematodes of the genus *Raphidascaris* were studied from the small intestine and stomach tissue of *Mugil cephalus* Linn., 1758 from Karachi coast, Pakistan. The small intestine of the fish was severely infected with *Raphidascaris* larvae. On the average 40 to 48 percent of the larvae found were alive. Five thousand worms in just 4 fish can be very harmful and may lead to further decline in the population of host fish.

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Introduction

Fish diseases due to nematode family Anisakidae are widespread (Buchmann and Mehrdana, 2016). It has an indirect life cycle. Crustaceans along with marine mammals are definitive hosts whereas crustaceans (Euphausiacea) act as intermediate host. These crustaceans may be eaten by fish or cephalopods which are third stage larvae (Santos *et al*., 2022; Guardone *et al*., 2016; Daschner *et al*., 2000). Various types of anisakid larvae belonging to the genus namely *Anisakis, Raphidascaris, Contracaecum* and *Hysterothylacium* are found in fish.

In a study to examine nematodes of the fish *Mugil cephalus* Linn, 1758 from Karachi coast, Sindh, Pakistan. Larvae of the genus *Raphidascaris* (Railliet and Henry, 1915) were recorded in large numbers. The larvae belonged to the genus *Raphidascaris* (Railliet and Henry, 1915). This nematode genus belonging to the family Raphidascarididae. Different species of the genus are found in Northern America, Europe and Australia (GBIF Secretariat, 2021).

Materials and Methods

During a period of 6 months from March to August 2000, 30 fish (*Mugil cephalus* Linn., 1758) were examined for larval nematodes. A total of 5000 larvae were recovered from the tissue of visceral organs more frequently from stomach and liver. Larvae were fixed and stored in 70% alcohol and glycerine in the ratio of 1:1. Diagrams were prepared using a camera Lucida. Measurements are given length by width in

millimeters. The specimens are in possession of senior author (F.S).

Phylum: Nematoda
Class: Chromadorea
Order: Rhabditida
Superfamily: Ascaridoidea
Family: Raphidascarididae
Genus: *Raphidascaris*

Raphidascaris larvae
(Figure 1a-c)
Host: *Mugil cephalus* Linn, 1758
Location: Small intestine and stomach tissue
Locality: Karachi coast, Pakistan
Number of hosts examined: 12
Number of parasites recovered: 5000 from 4 hosts
Number of specimens studied: 30

Description
Small translucent worms, 30-40 mm long, 0.035-0.0056 wide at the cephalic region, while the width at oesophageal junction is 0.29-0.30. The anterior head is transformed into membranous flap like structure which indicates probably the developing lips, this leads into a well developed oesophagus 1.015 long and 0.04-0.05 at the base, further into simple intestine. The cuticle is thin and does not appear to be striated. An excretory pore is situated at a distance of 0.26-0.28 from the head end, this leads into excretory tube. Nerve ring is anterior to excretory pore. The anterior head end is comparatively broader while the posterior caudal end is pointed. The anal opening lies at a distance of 0.20-0.25 from posterior end.

Remarks
The present larval forms appear to be 3rd stage developing larvae. The first two stages occur in eggs. In the present specimens the membranous lips does not indicate proper development except the formation of an oesophagus and a proper intestine which leads into anal opening. Bilqees and Fatima (1986) reported *Anisakis* larvae type 1=PA1 from fish *Cybium guttatum, Pseudosciaena diacanthus, Muraenesox cinereus, Pampus argenteus, Chondroplites chinensis, Parastromateus niger, Arius serratus, Hilsa ilisha, Pomadasys olivaceus, Chiloscyllium griseum, Stegostoma varium, Galeocerdo arcticus,* and *Mugil* spp. in stomach, intestine, liver, spleen, heart, testes, visceral mesenteries, connective tissues and body cavity. *Anisakis* larva type 2=PA2 from fish *Cybium guttatum, Pseudosciaena diacanthus, Muraenesox cinereus, Pampus argenteus, Chondroplites chinensis, Parastromateus niger, Arius serratus, Hilsa ilisha, Pomadasys olivaceus, Chiloscyllium griseum, Stegostoma varium, Galeocerdo arcticus,* and *Mugil* spp. in stomach, intestine, liver, spleen, testes, visceral mesenteries and connective tissues.

Further surveys are required for *Anisakis* species larvae present in fish of Karachi coast, Pakistan is crucial to ensure food safety, since the worms being present in the fish may be a threat to their health.

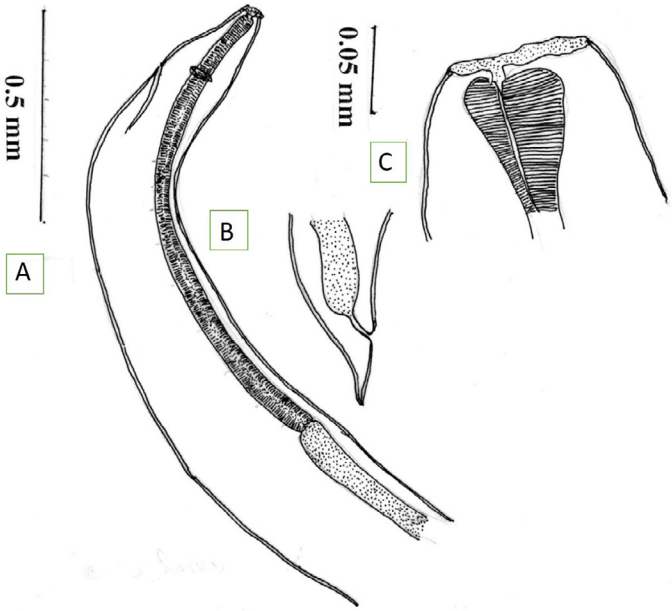

Figure 1: *Raphidascaris larvae. a, Anterior extremity; b, Posterior extremity; c, Head region.*

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Novelty Statement

Severe infection was seen in fish *Mugil cephalus* with *Raphidascaris* larvae.

Author's Contribution

Aly Khan and Faiza Saleem: Prepared manuscript.
Rafia Rehana Ghazi: Prepared diagrams.
Nasira Khatoon and Mian Sayed Khan: Provided literature.
Samina Waheed: Typed the manuscript.

Conflict of interest

The authors have declared no conflict of interest.

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