



Occurrence of Free-Living Marine Nematode *Thoracostomopsis doveae* Warwick 1970 and *Crenopharynx marion* Southern 1914 (Nematoda: Enoplida) From Uppanar Estuary Cuddalore – South East Coast of India

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Abstract

As many as 72 species of nematodes belonging to 42 genera and 21 families were identified in Uppanar estuary of southeast coast of India. The species *Thoracostomopsis doveae* was recorded first time in India and *Crenopharynx marion* (order: enoplida) was found to be a rare occurrence in the study area was described in this paper.

Keywords

Free-living nematodes, *Thoracostomopsis doveae*, *Crenopharynx marion*, Uppanar.

INTRODUCTION

Free-living nematodes are important members of the meiobenthos along the many marine environments, often constituting more than 90% of all metazoa (Vincx *et al.*, 1994). Free-living nematodes are amongst the most speciose marine benthic organisms in the world (Snelgrove, 1999), with nearly 7000 recognized marine species and many more undescribed or undiscovered ones (Appeltans *et al.*, 2012). Estimates of marine nematodes diversity may range from 10,000 to 1,000,000, depending on the source and how 'conservative' or 'liberal' the estimate itself was (Lambshhead 1993; Snelgrove 1999 Mokievsky and Azovsky 2002). Of the meiofaunal taxa, nematodes in particular offer a variety of possibilities for assessing

changes in assemblage structure, due to their high structural and functional diversity, as the most diverse and numerically dominant metazoans in aquatic habitats, with a wide distribution varying from pristine to extremely in environmental quality assessment studies and have proved to be suitable bio-indicators for pollution-induced disturbances of benthic ecosystems (Coull and Chandler 1992; Bongers and Ferris, 1999; Hoss *et al.*, 2011). Moreover, most of the studies carried out on free living marine nematode systematics and biogeography are from European coastal ecosystems. Understanding about various aspects of nematodes of tropical and subtropical coastal environments is very poor (Semprucci and Balsamo 2012). Few works done on the taxonomy of free-

living nematodes include Timm (1961,1967a), Sulthan Ali (1983) Chinnadurai (2004), Lilly Cooper (2005), Chinnadurai and Fernando (2006a, b), Sivalakshmi (2007), Annapurana *et al.* (2012), Ansari (2012, 2014 and 2015). The present paper occurrence of two species of free living marine nematodes recorded in Uppanar estuary. *Thoracostomopsis Doveae* species recorded for the first time Indian waters, *Crenopharynx marion* for the first time recorded in east coast of India.

MATERIALS AND METHODS

Study area

The Uppanar estuary (lat. 11°30' -11° 43' N and long.79°30'-79° 47' E) is formed by the confluence of Gadilam and Paravanar rivers in Cuddalore of Tamil

Nadu State, India (Fig. 1). The Perumal Lake is the major recharge area for the river Uppanar. This river also receives water from the canals like Murattaru, Manambattan and Buckingham canals flowing on the southern side of this river. State Industries Promotion Corporation of Tamil Nadu (SIPCO) complex covering an area of 520 acres with 44 industries manufacturing chemicals, petrochemicals, fertilizers, pharmaceuticals, dyes, soap, detergents, packing materials, resins, beverages, pesticides, drugs, antibiotic etc., is situated on the western bank of this estuary. These industrial units' discharge treated/untreated effluents into the estuary. In addition to the industrial wastes, the estuary receives also the municipal wastes from Cuddalore old town.



Fig. 1. Map showing the study area

Sampling

Totally 36 samples were collected from three stations (Station1- mouth, Station2- landing center and Station 3 industrial area) during the present study done for one year. The sediment samples were collected using a Peterson grab (having a bite area of 0.02 m²). Immediately after the grab was hauled sample was collected, sub sample were taken from undisturbed grab sample using long glass corer (having an internal diameter of 2.5 cm and a length of 15 cm) from the middle of grab samples (Platt and Warwick, 1983). All the samples were anaesthetized with MgCl₂ and preserved in 4 % formaldehyde solution. The meiofauna was extracted from the sediment by decantation over a 45µm mesh sieve. The material retained on the sieve was stained with Rose Bengal and identified to possible taxon level under a stereo zoom microscope. All the nematodes were extracted subsequently, counted, sorted by hand picking using a fine needle and mounted on

permanent glycerin slides. Taxonomic identification was done based on the pictorial keys (Platt and Warwick 1983, 1988; Warwick *et al.*, 1998) and Nemys online identification Key (Steyart *et al.*, 2005). Identified marine nematodes were subsequently photographed using on Olympus CX 41 microscope equipped with digital camera. All the measurements are in µm, and all curved structures were measured along the arc. The abbreviations used for measurements are: a = body length divided by maximum body diameter, b= body length divided by esophagus length, c = body length divided by tail length, c' = tail length divided by anal body diameter, V=distance from head to vulva, V%= vulva distance from anterior end of body X 100 / total body length, L = total body length, cbd = corresponding body diameter, and M= maximum body diameter.

RESULTS

Thoracostomopsis doveae Warwick 1970

Phylum: Nematoda Cobb 1932

Class: Adenophorea Von Linstow 1905

Order: Enoplida Filipjev 1929

Sub order: Enoplina Chitwood and Chitwood 1937

Family: Thoracostomopsidae Filipjev 1927

Genus: *Thoracostomopsis*

Species: *Thoracostomopsis doveae* Warwick 1970

Material examined: Single female specimen collected from Uppanar estuary (station-2)

Diagnosis: Cuticle with fine and presence of longer cephalic setae and shorter cephalic seta. Cuticle faint transverse striation.

Parameter	(μm)
Total body length	2.2
Maximum body diameter	0.5
Length of oesophagus	3.4
Length of tail	1.8
% V	59.9
Length of cephalic seta	1.1
a*	44.4
b*	6.5
C*	12.3

Table 1. Morphometrics of *Thoracostomopsis doveae* (a: body length/maximum body diameter, b: body length/pharynx length, c: body length /tail length, %V: V/total body length).

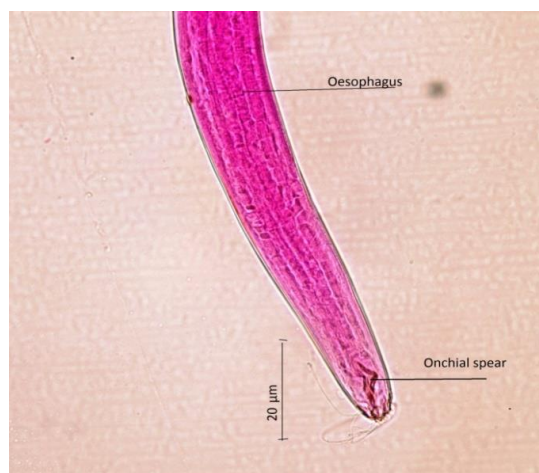
Description: Identification was done based on examination of female specimen. The specimen was slender (Fig. 1). Body length was 2 mm. Cuticle with fine and faint transverse striation. Maximum diameter 0.5. Six longer cephalic setae (9 μm) and four shorter cephalic setae. Onchial spear-like structure jointed, accommodated in anterior end of

oesophagus. Tail length was 16 μm and vulva are present and vulva 59.9% of body length.

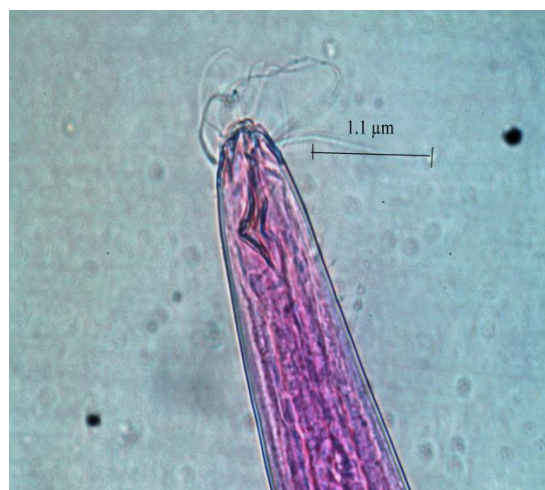
Male: Not found

Distribution: India (Tamil Nadu): Uppanar estuary-Cuddalore

Elsewhere: North East England



(A)



(B)



(C)

Fig.2. *Thoracostomopsis doveae* A) head, B) cephalic seta and C) tail

Crenopharynx marioni Southern 1914

Family : Phodermatidae

Genus : *Crenopharynx* Filipjev 1934

Species : *Crenopharynx marioni* Souther 1914

Material examined: Single female specimen collected from Uppanar estuary (station 2)

Diagnosis: Cuticle smooth and devoid of somatic setae. Buccal cavity small. Crenellated part of oesophagus.

Male: Not found

Distribution: India (Tamil Nadu): Uppanar estuary-Cuddalore

Elsewhere: West Ireland and Scilly.

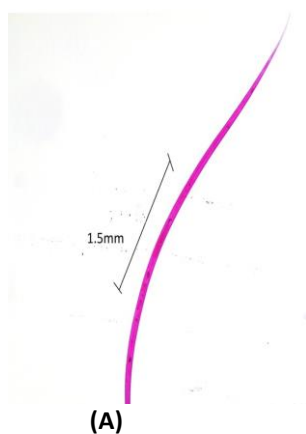
Parameter	(μm)
Total body length	1.53
Maximum body diameter	0.3
Length of oesophagus	5.8
Length of tail	4.3
a*	51.7
b*	2.6
C*	3.6

Table 2. Morphometrics *Crenopharynx marioni* of (a: body length/maximum body diameter, b: body length/pharynx length, c: Body length /tail length

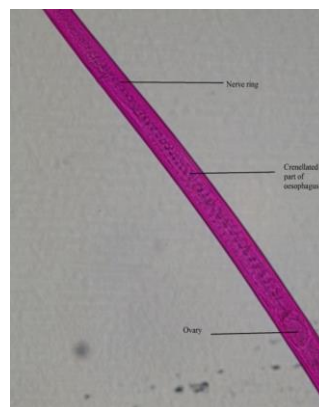
Description:

The specimen was slender (Fig. 3). Body length 153mm. Maximum body diameter 0.3 μm. Cuticle smooth and devoid of somatic setae except for tail and ventral precloacal setae. Six labial papillae.

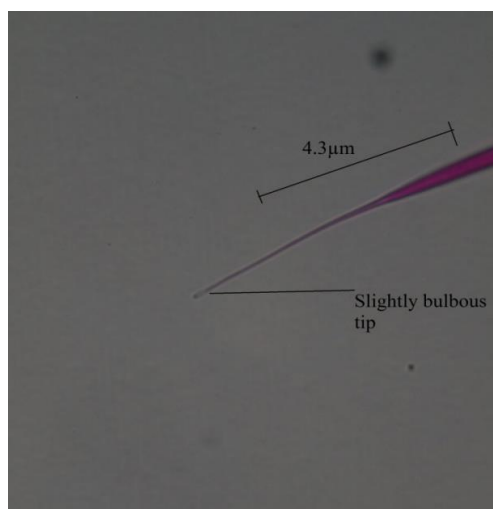
Buccal cavity small. Crenellated outline length of oesophagus 5.8 μm. Tail very long, conico-cylindrical with slightly bulbous tip. Caudal glands entirely in tail and length 4.3 μm.



(A)



(B)



(C)

Fig. 3. *Crenopharynx marion* A) head, B) oesophagus, C) tail

Discussion

In the present study, the occurrence of free-living marine nematodes *Thoracostomopsis doveae* was reported for the first time in India. Ansari *et al.* (2012) recorded several nematode species like *Mesocanthion* sp. *Neochromadora* sp. and *Epsilonema pustulatum* in the continental shelf region of Cuddalore. Sajan and Damodaran (2007) and Sajan *et al.* (2010) reported 154 species in the western continental shelf of India. The *Crenopharynx marion* species was reported from the west coast India (Sajan, 2003). However, in the present study, the *Crenopharynx marion* species was recorded first time in east coast of India. So far, around 225 species of nematodes have been reported from various regions including estuaries, backwaters, lagoons, mangroves and continental shelf region on the east and west coasts of India (Timm, 1961, 1967a, b; Gerlach, 1962; Rao and Ganapathi, 1968; Krishnamurthy *et al.*, 1984; Rao, 1986; Sinha *et al.*, 1987; Sulthan Ali *et al.*, 1998; Nanjkar and Ingole, 2007; Sajan and Damodaran, 2007; Anilakumary, 2008; Eldose, 2008; Mondal, 2009; Annapurana *et al.*, 2012; Ansari *et al.*, 2012 a, b, c). Until now, around 125 free-living marine nematodes were identified in Indian waters and 8921 species were recorded globally (NeMys data base Steyaert *et al.*, 2005). Recently free-living marine nematodes are focused good indicators of aquatic pollution and toxicological studies worldwide. This area represents a stressful one due to industrial activity. There two newly recorded species from this impacted area may be useful in environmental monitoring.

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