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New distributional records of free-living marine Nematodes from Indian waters IV. Linhomids and Axanolaimids

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Abstract

Free-living marine nematodes were found to be higher abundant taxan in the benthic realm. Among these marine nematode community Monhystrids were the second dominant order collected from the southeast continental shelf region of India during FORV *"Sagar Sampada"* Cruise no. 260 consisting 64 out of 192 species. Among these, following 09 species namely *Linhomoeus hirsutus, Metalinhomoeus filiformis, Paralinhomoeus conicaudatus, P. uniovarium, Axonolaimus paraspinosus, Odontophora exharena O. longisetosa O. rectangula and O. setosa* coming under family Linhomidae and Axonolaimidae are found to be new distributional records for the Indian waters.

Keywords: Bay of Bengal, Continental Shelf, Free-Living Marine Nematodes, India, Monhystrida

Introduction

Nematodes are well recognized group of organisms in terms of parasitic nature; this is not the case for free-living nematodes which are living between the interstitial spaces of sediment particles, especially those of aquatic environments (Heip *et al.,* 1985). An important feature of nematode population is the ubiquitous distribution and large species diversity (e.g. Coomans, 2002) whereas only 15-20 % of nematode species are described (Abede *et al.,* 2008), in case of marine nematode species diversity are still largely (>90 %) unknown (e.g., Appeltans *et al.,* 2012). The huge knowledge gap exist globally in the field of marine nematode taxonomy due to the limited number of experienced taxonomists and large number of specimens present in any habitats (review by Moens *et al.,* 2013). In case of Indian free-living marine nematode species diversity has been known only less than 10 % (e.g., Ansari *et al.,* 2012a, 2015, 2017; Bhadury *et al.,* 2015; Ghosh and Mandal, 2016; Ansari and Bhadury, 2017) of total marine nematode species reported (5682 species) globally (Guilini *et al.,* 2017). Nevertheless, rapid taxonomic revisions provide the wide range of new classification which increases the understanding of new species as well as existing species of nematode community (e.g., Hodda, 2011). An increasing interest on meiofauna and free-living marine nematode studies around the Indian region resulting more than 75% of free-living marine nematode species have been reported in last one decade including various biotopes such as estuaries, back waters, lagoon, mangroves and continental margins (Ansari *et al.,* 2016). However, most of the marine nematode species were reported from continental shelf region which is well studied compare to other ecosystems (Ansari *et al.,* 2012b). Therefore, the present study has been undertaken and provides information on taxonomy of nine species of free-living marine nematodes which are reporting first time in Indian waters as per distributional records.

Material and Methods

Study area

The present study area extends from latitude 10º 34.03' to 15º 14.48' N and longitude from 079º 52.13' to 080º 53.87'E of southwest continental shelf of Bay of Bengal

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(southeast coast of India). The sampling design has been prefixed based on latitudinal gradient (i.e. transects) and each transects with various depth profiles (30-50m, 51-75m , 76-100m, 101-150m, 151-175m and >176m). More detailed sampling design and co-ordinates of each sampling station has been discussed in elsewhere (Ansari *et al.,* 2012b, 2017).

Sampling

The samples were collected onboard FORV (Fishery and Oceanographic Research Vessel) *"Sagar Sampada"* during Cruise No. 260 (from 7th to 28th December 2008). Triplicate sediment samples were collected using a Smith McIntyre grab (having a bite area of 0.2m^2) at each depth range of each transect. Immediately after the grab was hauled to the deck, sub-samples were taken from undisturbed grab samples using a glass corer (having an internal diameter of 2.5 cm and a length of 15 cm) from the middle of grab sample (Platt and Warwick, 1983). The samples were fixed in buffered formalin at a concentration of 4%. The samples were washed through a set of 0.5 mm and 0.053 mm sieves. The sediment retained in the 0.053 mm sieve was decanted to extract meiofauna following the standard method proposed by Pfannakuche and Thiel (1988). Sorting of meiofauna from sediment was done by flotation technique followed by enumeration were carried out under a stereomicroscope (Meiji, Japan) and the sorted nematode specimens were mounted onto glass slides, using the formalin-ethanol-glycerol method (Seinhorst, 1959). Identification of nematodes was done to the highest taxonomic level possible using the compound microscope (Olympus CX 41 under higher magnification of 1000x) following the standard pictorial keys (e.g., Platt and Warwick, 1983, 1988; Warwick *et al.,* 1998; Guilini *et al.,* 2017).

Results

A total of nine species of free-living marine nematodes (*Linhomoeus hirsutus, Metalinhomoeus filiformis, Paralinhomoeus conicaudatus, P. uniovarium, Axonolaimus paraspinosus, Odontophora exharena O. longisetosa O. rectangula and O. setosa*) have been reported as new distributional records from the Indian waters. These new distributional recorded species have been subjected to the newly proposed taxonomic revolution (i.e., classification) (Hodda, 2011).

The checklist of free-living marine nematodes from the continental shelf of southeast coast India (Bay of Bengal) has been published in the earlier publication (Ansari *et al.,* 2012a), whereas this results discussed mainly on taxonomic characteristics which are compared with the global distribution of aforementioned species from the families Linhomids and Axanolaimids. Detailed systematic account including synonym representation of the species, de Man ratio (a = body length divided by maximum body diameter; b = body length divided by pharyngeal length; c = body length divided by tail length), material examined (number of specimens, place of collection, depth range and date of collection), brief description, feeding type, habitat and geographical distribution besides remarks of the above nine species are presented here.

Systematic Accounts

Phylum NEMATODA Cobb, 1932
Class CHROMADOREA Inglis, 1983
Subclass PLECTIA Hodda, 2007
Superorder MONHYSTERICA Hodda, 2007
Order MONHYSTERIDA Filipjev, 1929
Suborder LINHOMOEINA Andrassy, 1974
Superfamily SIPHONOLAIMOIDEA Chitwood, 1937 (de Coninck, 1965)
Family LINHOMOEIDAE Filipjev, 1922 (Filipjev, 1934)
Genus ***Linhomoeus*** Bastian, 1865
1. ***Linhomoeus hirsutus*** Bastian, 1865
Synonym : *Linhomoeus buetschlii* Allgen, 1929
: *Sphaerocephalum crassicauda* Gerlach, 1958

Material examined: Single male collected from Tammenapatanam 101-150m depth (16.12.2008).

de Man ratio :	**a**	**b**	**c**
Male :	64.12	7.18	16.77

Description: Body length 2.1mm. Maximum diameter 34-37µm. Cuticle striated. Four submedian cephalic setae 14µm accompanied by much smaller, almost papilliform, setae. Cervical setae 10µm, begin just posterior to cephalic setae. Circular amphids (4µm in diameter) wide central fleck. Buccal cavity not markedly cuticularised and armed with teeth or very thick cuticular plates. Tail conical (3.6 a.b.d.). Spicules 43µm long. Gubernaculum with a dorsal apophysis (Figure 1).

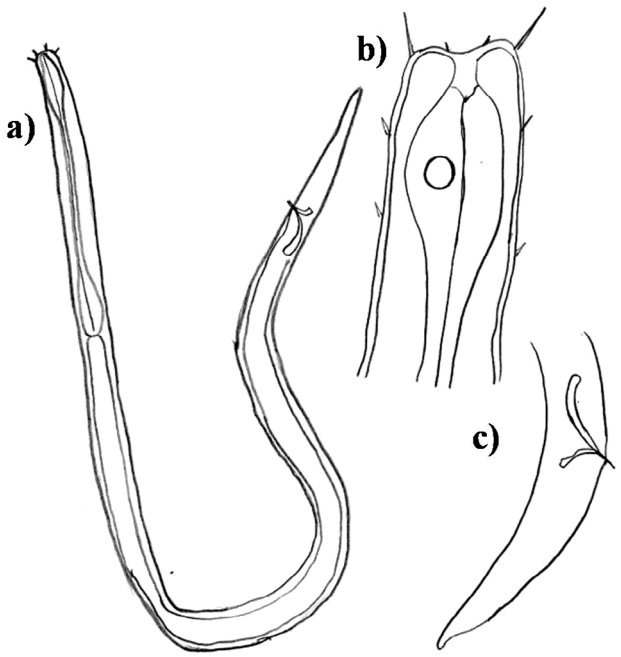

Figure 1. *Linhomoeus hirsutus* Bastian, 1865 a) entire male, b) male head, c) male tail.

Female: Not found

Feeding type: The specimen showed buccal cavity armed with small. According to the

classification of buccal cavity by Wieser (1953), this species is an epigrowth feeder (2A).

Habitat: Silty sediments.

Distribution: India: Tammenapatanam. *Elsewhere:* England (Warwick *et al.,* 1998); English Channel (Hansson, 1998); North Sea (Gerlach and Riemann, 1974; Vincx, 1989; Hansson, 1998); Kieler Buchat, Skagerrak, Oresund and Mediterranean (Hansson, 1998).

Remarks: The specimens examined conformed well to the earlier description of Warwick *et al.,* (1998) except for the smaller body size. The total body length described was 3-3.4mm and tail length 3.5-4.5a.b.d. The body length of the specimen studied at present was found smaller being 2.1mm and the tail length 3.6 a.b.d. This is the first record of the species from the Indian waters.

Genus ***Metalinhomoeus*** de Man, 1907

2. Species ***Metalinhomoeus filiformis*** de Man, 1907

Synonym : *Terschellingia filiformis* de Man, 1907
: *Metalinhomoeus cylindricauda* Stekhoven, 1950
: *Metalinhomoeus similis* Allgen, 1935

Material examined: 20 males and 12 females collected from Karaikal 30-50m, 51-75m depths (20.12.2008); Parangipettai 30-50m, 51-75m, 76-100m 101-150m depths (19.12.2008); Cuddalore – SIPCOT 30-50m depth (19.12.2008); Chennai 30-50m, 51-75m, 101-150m, 151-175m depths (17.12.2008) and Tammenapatanam 30-50m, 101-150m, 151-175m depths (16.12.2008).

de Man ratio :	**a**	**b**	**c**
Male :	93.06±1.92	10.06±0.87	8.35±1.02
	(91.98-94.89)	(9.12-10.86)	(7.54-9.16)
Female :	87.14±1.40	9.64±0.67	9.12±0.41
	(85.92-88.98)	(9.02-10.12)	(8.78-9.76)

Description: Body length 1.5-2.2mm in male and 1.7-2.5mm in female. Maximum diameter 15-17 µm in male and 21-28µm in female. Cuticle faintly striated. Six minute cephalic papillae. Four 12µm cephalic setae and subcephalic setae 4µm: two situates medially between cephalic and amphids. Circular amphids (7-12µm in diameter). Buccal cavity with a cuticularised base. Oesophagus relatively short, with a small posterior bulb. Tail gradually tapering (8.4-8.9a.b.d. in male and 8.2-8.6a.b.d. in female). Spicules 19-23µm slightly curved. Gubernaculum with a pair of 6-9µm dorsal apophysis. Two outstretched ovaries. Vulva present at 49-52% of body length (Figure 2).

Feeding type: The specimens showed large buccal cavity that is not armed with teeth. According to the classification of buccal cavity by Wieser (1953), this species is a non-selective deposit feeder (1B).

Habitat: Sandy sediments.

Distribution: India: Karaikal, Parangipettai, Cuddalore – SIPCOT, Chennai and Tammenapatanam. *Elsewhere:* Helgoland and Netherland (Hansson, 1998); England (Warwick *et al.,* 1998); European waters and English Channel (Hansson, 1998; De Smet *et al.,* 2001); Kieler Buchat, Skagerrak, Oresund and Kattegatt (Hansson, 1998).

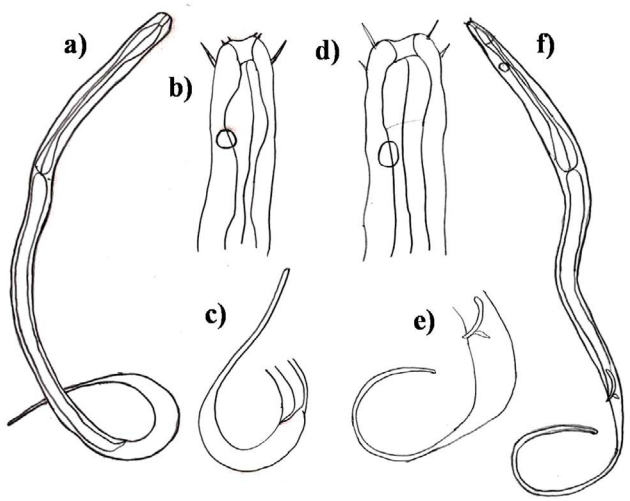

Figure 2. *Metalinhomoeus filiformis* de Man, 1907 a) entire female b) female head, c) female tail, d) male head, e) female tail, f) male tail.

Remarks: The specimens examined conformed well to the earlier description of Warwick *et al.* (1998) except for the smaller body size. The total body length described was 2.9-3.3mm and tail length 5.9a.b.d. The body length of the specimen studied at present was found smaller being 1.5-2.2mm and the tail length 8.4-8.9a.b.d. in male and in female 1.7-2.5mm body length and tail length 8.2-8.6a.b.d. This is the first record of the species from the Indian waters.

Genus ***Paralinhomoeus*** de Man, 1907

3. Species ***Paralinhomoeus conicaudatus*** (Allgen, 1930)

Synonym : *Linhomoeus (Paralinhomoeus) conicaudatus* Allgen, 1930

Material examined : 7 males and 3 females collected from Karaikal 30-50m depth (20.12.2008) and Parangipettai 30-50m, 76-100m and >176m depths (19.12.2008).

de Man ratio	:	**a**	**b**	**c**
Male	:	54.74±0.40	9.05±0.13	10.55±0.20
		(54.12-55.16)	(8.88-9.22)	(10.22-10.84)
Female	:	54.63±0.35	9.01±0.10	10.50±0.06
		(54.24-54.92)	(8.94-9.12)	(10.43-10.55)

Description: Body length 0.8-1.9mm in male and 1.4-3.1mm in female. Maximum diameter 85-87 µm in male and 76-88µm in female. Faint cuticle striations. Six minute labial papillae. Cephalic setae in six groups, two per lateral, three per submedian group. Four subcephalic setae situated at level with the anterior of amphids. Somatic setae virtually absent apart from tail. Circular amphids (13-14µm) wide. Buccal cavity cup-shaped, somewhat cuticularised but apparently without any tooth-like structures. Oesophagus gradually widens towards posterior but no bulb. Tail conical with short cylindrical tip (6.7-6.9a.b.d. in male and 6.2-7.9a.b.d. in female). Spicules 69-73µm curved. Gubernaculum with apophysis. Two outstretched ovaries. Vulva present at 48-51% of body length (Figure 3).

Feeding type: The specimens showed large buccal cavity that is not armed with teeth. According to the classification of buccal cavity by Wieser (1953), this species is a non-selective feeder (1B).

Habitat: Sandy and silty sediments.

Distribution: India: Karaikal and Parangipettai. *Elsewhere:* England (Warwick *et al.,* 1998); European waters (De Smet *et al.,* 2001); Norway, Oresund and Scilly Island (Hansson, 1998).

Remarks: The specimens examined conformed well to the earlier description of Warwick *et al.* (1998) except for the smaller body size. The total body length described was 2.6-3.9mm and tail length 4.6a.b.d. The body length of the specimen studied at present was found smaller being 0.8-1.9mm and the tail length 6.7-6.9a.b.d. in male

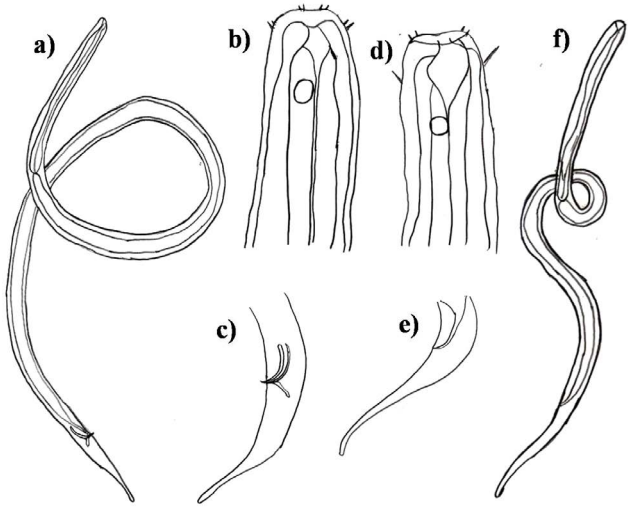

Figure 3. *Paralinhomoeus conicaudatus* (Allgen, 1930) a) entire male b) male head, c) male tail, d) female head, e) female tail, f) entire female.

and in female 1.4-3.1mm body length and tail length 6.2-7.9a.b.d. This is the first record of the species from the Indian waters.

Genus ***Paralinhomoeus*** de Man, 1907
4. Species ***Paralinhomoeus uniovarium*** Warwick, 1970

Material examined: Single male collected from Karaikal 30-50m depth (20.12.2008).

de Man ratio :	**a**	**b**	**c**
Male :	50.69	8.19	12.48

Description: Body length 1.7mm. Maximum diameter 33µm. Cuticle striations begin at the level of the amphids. Six small conical labial setae. Six short (11-15µm) and four long (16-21µm) cephalic setae. Lateral subcephalic setae situated just posterior to lateral cephalic setae. A few scattered somatic setae in cervical and tail regions. Circular amphids (13-19µm). Buccal cavity cup-shaped and weakly cuticularised. Oesophagus slightly swollen at its posterior end (202µm).Tail conico-cylindrical (3.7a.b.d.). Spicules 26µm as curve, strongly arcuate. Gubernaculum roughly triangular with a pair of weekly cuticularised dorsal apophysis (Figure 4).

Female: Not found

Feeding type: The specimen showed large buccal cavity that is not armed with teeth. According to the classification of buccal cavity by Wieser (1953), this species is a non-selective feeder (1B).

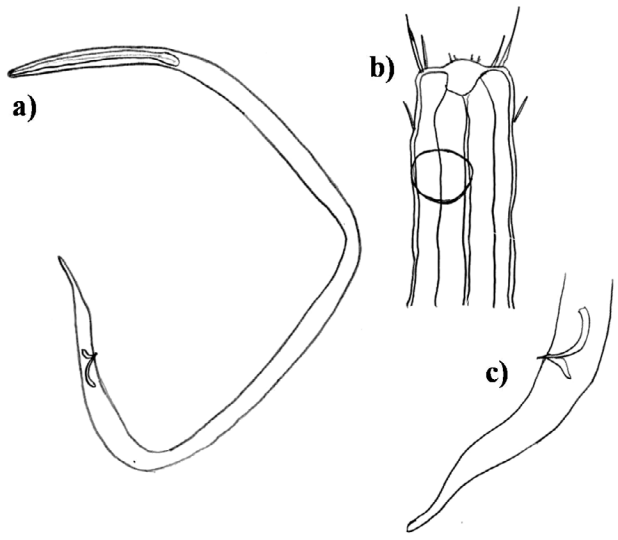

Figure 4. *Paralinhomoeus uniovarium* Warwick, 1970 a) entire male, b) male head, c) male tail.

Habitat: Sandy sediments.

Distribution: India: Karaikal. *Elsewhere:* England (Warwick *et al.,* 1998); European waters (De Smet *et al.,* 2001) and English Channel (Hansson, 1998).

Remarks: The specimens examined conformed well to the earlier description of Warwick *et al.,* (1998) except for the smaller body size. The total body length described was 2.1-2.8mm and tail length 7.9a.b.d. The body length of the specimen studied at present was found smaller being 1.7mm and the tail length 3.7a.b.d. This is the first record of the species from the Indian waters.

Suborder ARAEOLAIMINA de Coninck, 1965
Superfamily AXONOLAIMOIDEA de Coninck & Schuurmans Stekhoven, 1933 (Chitwood, 1937)
Family AXONOLAIMIDAE de Coninck & Schuurmans Stekhoven, 1933

Genus ***Axonolaimus*** de Man, 1889
5. Species: ***Axonolaimus paraspinosus*** Stekhoven & Adam, 1931

Synonym : *Axonolaimus similis* Schulz, 1932

Material examined: 2 males collected from Cuddalore – SIPCOT 30-50m depth (19.12.2008) and Tammenapatanam 151-150m depths (16.12.2008).

de Man ratio:	**a**	**b**	**c**
Male :	48.14-49.32	7.96-8.14	6.97-7.16

Description: Body length 1-1.2mm. Maximum diameter 35-37µm. Cuticle finely striated. Six small cephalic papillae. Four (5-8µm) cephalic setae and four subcephalic setae about half the length and situated just posterior to the cephalic setae. Somatic setae short and sparse mainly confined to cervical and caudal regions. Loop-shaped amphids (3-7µm in diameter) wide. Buccal cavity long and double conical shape with longitudinal cuticularised ridges in the anterior part. Oesophagus(135-141µm) widens posteriorly, but with no distinct bulb. Tail (7.9-8.6a.b.d.) conical except for the posterior eighth, with a slight terminal dilation. Spicules 33-36µm. Gubernaculum with two 16-18µm posteriorly directed

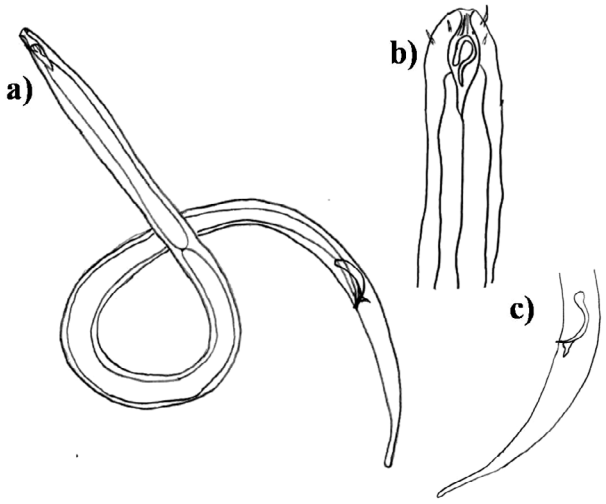

Figure 5. *Axonolaimus paraspinosus* Stekhoven & Adam, 1931 a) entire male, b) male head, c) male tail.

apophysis. 19-21 precloacal supplements consisting of minute ventral pits (Figure 5).

Female: Not found

Feeding type: The specimens showed large buccal cavity that is not armed with teeth. According to the classification of buccal cavity by Wieser (1953), this species is a non-selective deposit feeder (1B).

*Habitat***:** Sandy and silty sediments.

Distribution: India: Cuddalore –SIPCOT and Tammenapatanam. *Elsewhere:* Netherland (Hansson, 1998); England (Warwick *et al.,* 1998); European waters (De Smet *et al.,* 2001); English Channel, Belgium, Finland and Kieler Buchat (Hansson, 1998).

Remarks: The specimens examined conformed well to the earlier description of Warwick *et al.* (1998) except for the smaller body size. The total body length described was 1.3-1.7mm and tail length 4.6a.b.d. The body length of the specimen studied at present was found smaller being 1-1.2mm and the tail length 7.9-8.6a.b.d. This is the first record of the species from the Indian waters.

Genus ***Odontophora*** Bütschli, 1874

6. Species ***Odontophora exharena*** Warwick and Platt, 1973

Material examined: 4 males and 1 female collected from Karaikal 30-50m 101-150m and 151-175m depths (20.12.2008).

de Man ratio	:	**a**	**b**	**c**
Male	:	38.99±0.17 (38.79-39.14)	5.44±0.31 (5.12-5.86)	11.56±0.29 (11.22-11.89)
Female	:	41.12	5.64	12.18

Description: Body length 0.9-1.2mm in male and 1.1mm in female. Maximum diameter 23-25µm in male and 24µm in female. Cuticle finely striated. Six cephalic papillae. Four cephalic setae (18-21µm). Subcephalic setae in two whorls: four (8-11µm) in submedian positions, about half-way down the length of amphids; second whorl of four (9-12µm) sublateral and four (3-6µm) submedian setae jest posterior to amphids. Somatic setae up to 14-16µm, sparsely scattered along the length of the oesophagus, but virtually absent from the remainder of the body except for the tail. Loop-shaped amphids (6-10µm in diameter). Buccal cavity with odontia pointed anteriorly. Oesophagus cylindrical (185-199µm in male and 188µm in female) without posterior bulb. Tail conical (4.6-5.2a.b.d. in male 4.8a.b.d. in female). Spicules 15-23µm, uniformly curved, proximally cephalate. Gubernaculum with 7-12µm dorsal apophysis. Indistinct papilliform precloacal supplements, apparently only four. Two ovaries. Vulva present at 56-58% of body length (Figure 6).

Feeding type: The specimens showed large buccal cavity that is not armed with teeth. According to the classification

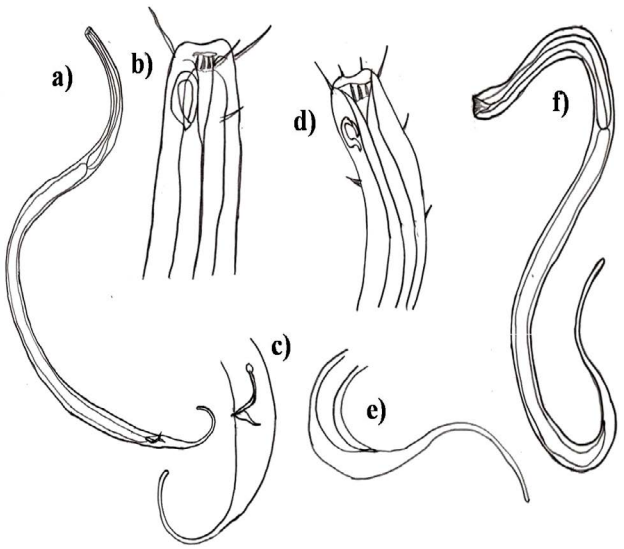

Figure 6. *Odontophora exharena* Warwick and Platt, 1973 a) entire male b) male head, c) male tail, d) female head, e) female tail, f) entire female.

of buccal cavity by Wieser (1953), this species is a non-selective deposit feeder (1B).

Habitat: Sandy sediments.

Distribution: India: Karaikal. *Elsewhere:* West Scotland (Hansson, 1998); England (Warwick *et al.,* 1998) and European waters (De Smet *et al.,* 2001).

Remarks: The specimens examined conformed well to the earlier description of Warwick *et al.* (1998) except for the smaller body size. The total body length described was 2.3mm and tail length 4.7-6.7a.b.d. The body length of the specimen studied at present was found smaller being 0.9-1.2mm and the tail length 4.6-5.2a.b.d. in male and in female 1.1mm body length and tail length 4.8a.b.d. This is the first record of the species from the Indian waters.

Genus ***Odontophora*** Bütschli, 1874
7. Species: ***Odontophora longisetosa*** (Allgen, 1928)

Synonym : *Conolaimus longisetosus* Allgen, 1928

*Material examined***:** 12 males and 7 females collected from Karaikal 30-50m, 101-150m, 151-175m, >176m depths (20.12.2008); Parangipettai 30-50m, 76-100m depths (19.12.2008) and Cheyyur 30-50m, 101-150m, 151-175m depths (18.12.2008).

de Man ratio :	**a**	**b**	**c**
Male :	56.81±0.67	8.90±0.23	10.75±0.28
	(55.98-57.14)	(8.62-9.16)	(10.44-11.12)
Female :	61.12±0.44	9.12±0.14	12.12±0.21
	(60.85-61.44)	(8.88-9.42)	(11.91-12.56)

Description: Body length 1.9-2.5mm in male and 2.1-2.6mm in female. Maximum diameter 43-55µm in male and 44-49µm in female. Cuticle finely striated. Six cephalic papillae. Four cephalic setae (11-18µm). Subcephalic setae in a single circle. Cervical setae present in anterior oesophageal region. Somatic short and sparse except in tail. Loop-shaped amphids (5-9µm in diameter). Buccal cavity (22-24µm) long, but anterior part often everted. Oesophagus cylindrical (273-289µm in male and 288-301µm in female) without posterior bulb. Tail conical (4.6-5.2a.b.d. in male and 4.8-5.2a.b.d. in female), in male a pair of subdorsal setae near the tip. Spicules 35-47µm, curved, with open square-ended distal tip. Gubernaculum with 9-13µm dorsal apophysis. Precloacal supplements present, but very indistinct. Two ovaries. Vulva present at 56- 64% of body length (Figure 7).

Feeding type: The specimens showed large buccal cavity that is not armed with teeth. According to the classification of buccal cavity by Wieser (1953), this species is a non-selective deposit feeder (1B).

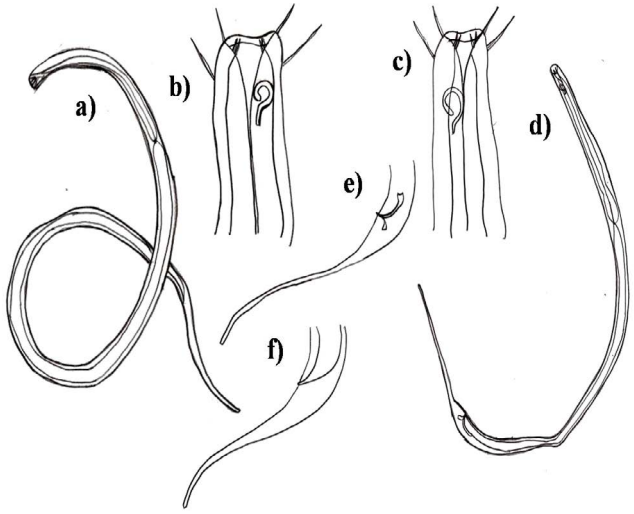

Figure 7. *Odontophora longisetosa* (Allgen, 1928) a) entire female b) female head, c) male head, d) entire female, e) male tail, f) female tail.

Habitat: Sandy sediments.

Distribution: India: Karaikal, Parangipettai and Cheyyur. *Elsewhere:* England (Warwick *et al.,* 1998); European waters (Medin, 2011); Belgium, Norway, Zuidersee, Skagerrak, Oresund and Kattegatt (Hansson, 1998).

Remarks: The specimens examined conformed well to the earlier description of Warwick *et al.* (1998) except for the longer body size. The total body length described was 1.2-1.8mm and tail length 3.2-4.6a.b.d. The body length of the specimen studied at present was found longer being 1.9-2.5mm and the tail length 4.6-5.2a.b.d. in male and in female 2.1-2.6mm body length and tail length 4.8-5.2a.b.d. This is the first record of the species from the Indian waters.

Genus ***Odontophora*** Bütschli, 1874
8. Species ***Odontophora rectangula*** Lorenzen, 1971

Material examined: 21 males and 14 females collected from Cuddalore – SIPCOT 30-50m, >176m depths (19.12.2008); Cheyyur 30-50m, 76-100m, 101-150m, 151-175m >176m depths (18.12.2008) and Singarayakonda 30-50m depth (15.12.2008).

de Man ratio	:	**a**	**b**	**c**
Male	:	43.54±1.07	10.11±0.63	12.17±0.68
		(42.81-44.28)	(9.78-10.55)	(11.86-12.89)
Female	:	41.12±0.44	9.92±0.14	11.89±0.21
		(40.49-41.66)	(9.66-10.04)	(11.66-12.10)

Description: Body length 1.2-1.9mm in male and 1.6-2mm in female. Maximum diameter 26-34µm in male and 28-43µm in female. Cuticle finely striated. Six cephalic papillae. Four cephalic setae (11-18µm). Eight 14-15µm subcephalic setae in a cervical setae. Loop-shaped amphids (5-9µm in diameter). Buccal cavity (22-28µm) long. Oesophagus widens towards the base (114-134µm in male and 120-131µm in female) without posterior bulb. Tail conical (4.2-4.9a.b.d. in male 4.1-4.6a.b.d. in female) with three long terminal setae. Spicules 21-27µm. Gubernaculum with 7-9µm dorsal apophysis. Two ovaries. Vulva present at 60- 66% of body length (Figure 8).

Feeding type: The specimens showed large buccal cavity that is not armed with teeth. According to the classification of buccal cavity by Wieser (1953), this species is a non-selective deposit feeder (1B).

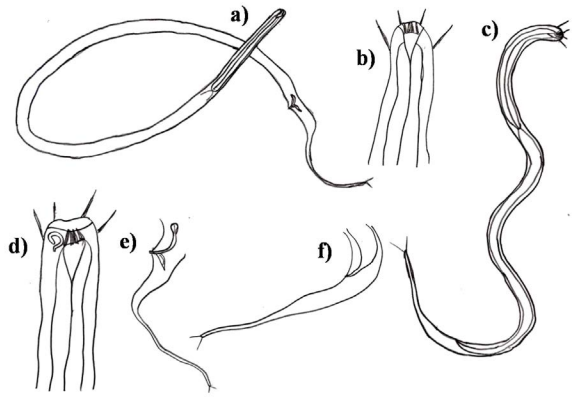

Figure 8. *Odontophora rectangula* Lorenzen, 1971 a) entire male b) female head, c) entire female, d) male head, e) male tail, f) female tail.

Habitat: Sandy and silty sediments.

Distribution: India: Cuddalore – SIPCOT, Cheyyur and Singarayakonda. *Elsewhere:* Helgoland, West Scotland and North Ireland (Hansson, 1998); England (Warwick *et al.,* 1998) and European waters (De Smet *et al.,* 2001; Medin, 2011).

Remarks: The specimens examined conformed well to the earlier description of Warwick *et al.* (1998) except for the smaller body size. The total body length described was 2.8-3.1mm and tail length 3-4.5a.b.d. The body length of the specimen studied at present was found smaller being 1.2-1.9mm and the tail length 4.2-4.9a.b.d. in male and in female 1.6-2mm body length and tail length 4.1-4.6a.b.d. This is the first record of the species from the Indian waters.

Genus ***Odontophora*** Bütschli, 1874
9. Species ***Odontophora setosa*** (Allgen, 1929)

Synonym : *Trigonolaimus setosus* Allgen, 1929
: *Conolaimus setosus* Allgen, 1931
: *Conolaimus longisetosus* Stekhoven, 1931
: *Axonolaimus elegans* Schulz, 1932

Material examined: 5 males and 1 female collected from Chennai 30-50m 101-150m depths (17.12.2008).

de Man ratio	:	**a**	**b**	**c**
Male	:	44.98±0.67	9.75±0.12	11.62±0.29
		(44.78-45.22)	(9.58-9.87)	(11.22-11.89)
Female	:	46.12	10.02	11.98

Description: Body length 2.7-3.2mm in male and 2.9mm in female. Maximum diameter 65-84µm in male and 93µm in female. Cuticle striations begin just posterior to the cephalic setae. Six cephalic papillae. Four cephalic setae (14-18µm). Four subcephalic setae (8-9µm) just behind the cephalic setae. Cervical setae (4-8µm) in four longitudinal rows, somatic setae scarce apart from the tail. Loop-shaped amphids (6-9µm in diameter). Buccal cavity (38-42µm) long. Oesophagus elongated (640-682µm in male and 642µm in female) without posterior bulb. Tail conical (3.2-3.9a.b.d. in male 3.6a.b.d. in female) with three long terminal setae. Spicules 61-67µm. Gubernaculum with two 10-12µm long dorsal apophysis. 15-19 indistinct precloacal supplements in the form of simple pits in the cuticle. Two ovaries. Vulva present at 50-54% of body length (Figure 9).

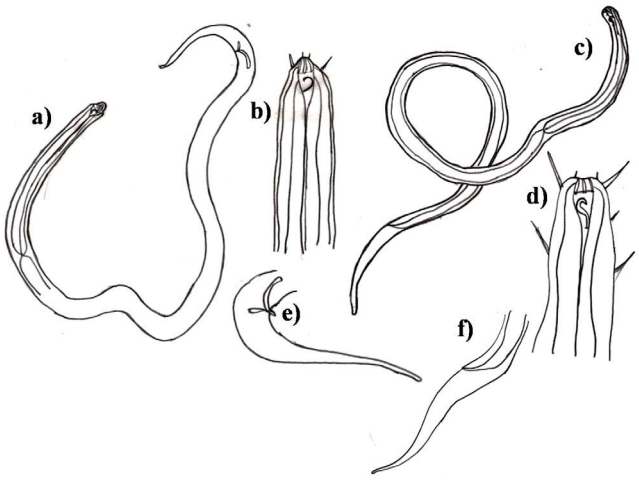

Figure 9. *Odontophora setosa* (Allgen, 1929) a) entire male b) male head, c) entire female, d) female head, e) male tail, f) female tail.

Feeding type: The specimens showed large buccal cavity that is not armed with teeth. According to the classification of buccal cavity by Wieser (1953), this species is a non-selective deposit feeder (1B).

Habitat: Sandy and silty sediments.

Distribution India: Chennai. *Elsewhere:* Portugal, Helgoland, Iceland and Biscay (Hansson, 1998); England (Warwick *et al.,* 1998); European waters (De Smet *et al.,* 2001); North Sea (Gerlach and Riemann, 1974); Norway, Kieler Buchat, Skagerrak, Oresund, Zuidersee, Kattegatt and Mediterranean (Hansson, 1998).

Remarks: The specimens examined conformed well to the earlier description of Warwick *et al.* (1998) except for the longer body size. The total body length described was 2.1-2.9mm and tail length 3.1-3.9a.b.d. The body length of the specimen studied at present was found longer being 2.7-3.2mm and the tail length 3.2-3.9a.b.d. in male and in female 2.9mm body length and tail length 3.6a.b.d. This is the first record of the species from the Indian waters.

Discussion

Sediment living benthic organisms distribution and diversity are still uncertain compare to the pelagic diversity, which may represent/reflect two to three fold higher (Balsamo *et al.,* 2010). In sedimentary realm, meiofauna represents almost tow third of total benthic biomass in particular marine ecosystems (Ansari *et al.,* 2017). Among the meiofauna, free-living marine nematodes are an important component in terms of both abundance and biomass and play a key role in trophic food webs (Giere, 2009; Moens *et al.,* 2013; Ansari *et al.,* 2014). Recent decades, free-living marine nematodes play crucial role in environmental and ecosystem monitoring investigation due to their higher abundance and ubiquitous distribution in any environments/ecosystems (Austin, 2004; Moreno *et al.,* 2011; Semprucci *et al.,* 2012; Ürkmez *et al.,* 2014). Nevertheless free-living marine nematode community studies in various aspects has been well studied globally whereas in case Indian waters still meager even most the coastal ecosystems are still unknown (Ansari *et al.,* 2016) which is mainly due to lack of taxonomical studies and taxonomist (Ansari *et al.,* 2017). In this backdrop, the present study reported the nine free-living marine nematode species (*Linhomoeus hirsutus, Metalinhomoeus filiformis, Paralinhomoeus conicaudatus, P. uniovarium, Axonolaimus paraspinosus, Odontophora exharena O. longisetosa O. rectangula and O. setosa*) belonging to the families Leptolimidae and Axanolaimidae of Order Monhystrida as new distributional records from Indian waters. The continous inclusion of new distributional reports and new species from in and around the Indian coastal ecosystems provide the increasing number of free-living marine nematode species and their diversity to Indian records globally. However, Indian free-living marine nematodes investigations are still vary far from the global studies including taxonomy, environmental impact assessment, ecosystem quality status and also the nematode speciemn collection and libarary preparation.

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