

## New records of six *Sabatieria* species (Nematoda: Comesomatidae) from Indian waters

K.G.M.T. Ansari\*, P.S. Lyla & S. Ajmal Khan

Centre of Advanced Study in Marine Biology, Faculty of Marine Sciences  
Annamalai University, Parangipettai – 608 502, Tamil Nadu, India

\*[E-mail: [ansari.cas@gmail.com](mailto:ansari.cas@gmail.com) ]

Received 26 April 2013; revised 19 June 2013

One hundred and ninety two species of free-living marine nematodes were collected during Cruise No. 260 of “FORV *Sagar Sampada*” from the southeast continental shelf of India. Comesomatidae is the third most abundant family (six genera and sixteen species) along the southeast continental shelf of India. Among these, nine species were identified under the genus of *Sabatieria*. Six of these species *Sabatieria celtica*, *Sabatieria longisetosa*, *Sabatieria ornata*, *Sabatieria praedatrix*, *Sabatieria pulchra* and *Sabatieria punctata* which happen to be first record from Indian waters are described.

[Key words: Meiofauna, nematodes, *Sabatieria*, continental shelf, India]

### Introduction

Meiofauna has been regarded as a major metazoan component in the benthic ecosystem due to high abundance and fast turnover rates<sup>1</sup>. Its production is equal or higher than macrofauna in shallow waters to deep sea<sup>2</sup>. Free-living marine nematodes are usually the most abundant 60-90% metazoans meiofauna<sup>3,4</sup>. An important feature of nematode populations is the large number of species present in any one habitat, often an order of magnitude higher than for any other taxon<sup>5</sup>, short life span, high fecundity<sup>6</sup>, represent several trophic levels (herbivores, bacterial feeders and carnivores) and at least some species can be easily cultured<sup>1</sup>.

As the free-living marine nematodes are normally few millimeters long and its taxonomic studies are difficult<sup>7</sup>. To date only few studies have been undertaken on meiobenthos in Indian waters. However most of them have been on qualitative and quantitative aspects<sup>8-15</sup> and only little information is available on their taxonomy<sup>16-21</sup>. *Sabatieria* is the most abundant genus in southeast continental shelf of India accounting to all depth ranges<sup>15</sup>. Present study was undertaken on the nematodes of the southeast continental shelf region and this paper describes six nematode species from genus *Sabatieria* are recorded for the first time in Indian waters.

### Materials and Methods

The study area extends from 10° 34.03' to 15° 14.48' N lat. and from 79° 52.13' to 80° 53.87'E long. in the continental shelf region of the southeast coast of India (Fig.1). Totally 35 sediment samples were collected from the seven

transects in the present study (off Singarayakonda, Tammennapattanam, Chennai, Cheyyur, Cuddalore – SIPCOT, Parangipettai and Karaikkal) at the depths of 30-50m, 51-75m, 76-100m, 101-150m, 151-175m and above 176m.

The samples were collected onboard FORV (Fishery and Oceanographic Research Vessel) “*Sagar Sampada*” during Cruise No. 260 (from 7<sup>th</sup> to 28<sup>th</sup> December 2008). Two sediment samples were collected using a Smith McIntyre grab (having a bite area of 0.2m<sup>2</sup>) at each depth range. 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<sup>22</sup>. Samples were fixed in buffered formalin at a concentration of 4%. Replicate core samples were processed separately in the laboratory and data were pooled for analyses. Samples were washed through a set of 0.5 mm and 0.053 mm sieves. Sediment retained in the 0.053 mm sieve was decanted to extract meiofauna following the method<sup>23</sup>. Sorting of meiofauna from sediment was done by flotation technique. The efficiency of this technique is around 95%<sup>24</sup>. Meiofaunal organisms were stained with Rose Bengal. Sorting and enumeration were under a stereomicroscope (Meiji, Japan). Sorted nematodes were mounted onto glass slides, using the formalin-ethanol-glycerol method<sup>25</sup>. 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<sup>22, 26-28</sup>.

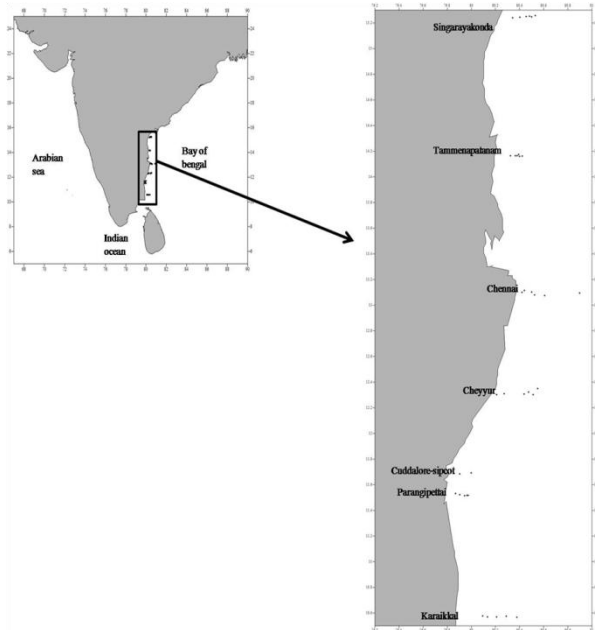


Fig.1- Depths sampled at various transects of southeast coast of India

## Results

Totally 4235 nematode specimens were isolated and 192 species were identified belonging to 96 genera and 33 families from the southeast coast of India. Family Comesomatidae is the third dominant one after Xyalidae (18 species) and Desmodoridae (17 species). It consists of sixteen species, among these, nine species were coming under genus *Sabatieria* and six of these (*Sabatieria celtica*, *Sabatieria longisetosa*, *Sabatieria ornata*, *Sabatieria praedatrix*, *Sabatieria pulchra* and *Sabatieria punctata*) were found to be new distributional records for the Indian waters. According to the NeMys data base ([www.nemys.ugent.be](http://www.nemys.ugent.be)), world-wide valid species of genus *Sabatieria* (88 species) were presented in Table 1. Detailed systematic account, 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 six species are presented here.

**1. *Sabatieria celtica*** Southern, 1914  
 Phylum: Nematoda Rudolphi, 1808  
 Class : Adenophorea von Linstow, 1905  
 Order : Chromadorida Filipjev, 1929  
 Family : Comesomatidae Filipjev, 1918  
 Genus : *Sabatieria* Rouville, 1903  
 Species: *Sabatieria celtica* Southern, 1914

**Synonym:** *Sabatieria tenuicaudata* (Sp.ing.) (Bastian, 1865)

: *Spira tenuicaudata* Bastian, 1865  
 : *Sabatieria longisetosa* Steiner, 1916  
 : *Parasabatieria longisetosa* Allgen, 1934  
 : *Sabatieria cupida* Bresslau & Stekhoven, 1940

**Material examined:** 10 males and 5 females collected from Singarayakonda 51-75m, 101-150m depths (15.12.2008), Tammenapatanam 30-50m depth (16.12.2008), Chennai 30-50m depth (17.12.2008), Parangipettai 30-50m (18.12.2008), 76-100m, 101-150m depths (19.12.2008) and Karaikkal 30-50m depth (19.12.2008).

<i>De Man ratio:</i>	<b>a</b>	<b>b</b>	<b>c</b>
Male:	27.05±0.16 (26.74-27.28)	4.83±0.09 (4.67-4.98)	12.17±0.05 (12.08-12.26)
Female :	26.93±0.14 (26.74-27.12)	4.81±0.10 (4.67-4.92)	12.15±0.05 (12.08-12.2)

## Description

Body length 1.1-1.5mm in male and 1.2-1.5mm in female. Maximum diameter 42-58µm in male and 48-64µm in female. Cuticle with lateral differentiation of larger and less closely spaced dots, irregularly arranged in pharyngeal and tail regions but arranged transverse rows in mid-body. Six short (4-9µm) and four long (8-14µm) cephalic setae. Cervical and somatic setae present and cervical setae slightly larger than the somatic setae. Amphid multi-spiral with a turn of 2.5. Buccal cavity cup-shaped without teeth. Pharyngeal region cylindrical, 240-257µm in male and 208- 226µm in female. Tail conico-cylindrical with the cylindrical part about half of the total tail length (3-4.2a.b.d. in male 3.2-4.3a.b.d.). Spicules 38-56µm, arcuate with central lamella. Gubernaculum apophysis distinctly curved, about half the spicule length. 16-20 precloacal supplements, gradually increasing in distance apart anteriorly. Ovaries paired, opposed and outstretched, not reflexed. Vulva present at 54- 58% of body length (Figs.2 and 3).

**Feeding type:** The specimens showed large buccal cavity that is not armed with teeth. According to the classification of buccal cavity by Wieser<sup>29</sup>, this species is a non-selective deposit feeder (1B).

**Habitat:** Sandy and sandy silt sediments.

## Distribution

**India:** Singarayakonda, Tammenapatanam, Chennai, Parangipettai and Karaikkal.

**Elsewhere:** England<sup>26</sup>, Ireland, European waters, Kieler Buchat, Bay of Kiel, Oresund, Skagerrak, Helgoland, Zuidersee, Gullmarn, Mediterranean and Barents Sea<sup>30</sup>.

**Table 1. Valid species of *Sabatieria* based on NeMys data base**

1	<i>Sabatieria abyssalis</i>	31	<i>Sabatieria granniosa</i>	61	<i>Sabatieria pellucida</i>
2	<i>Sabatieria alata</i>	32	<i>Sabatieria granulosa</i>	62	<i>Sabatieria pisinna</i>
3	<i>Sabatieria ancudiana</i>	33	<i>Sabatieria heipi</i>	63	<i>Sabatieria pomarei</i>
4	<i>Sabatieria antarctica</i>	34	<i>Sabatieria heterospiculum</i>	64	<i>Sabatieria possjetica</i>
5	<i>Sabatieria arctica</i>	35	<i>Sabatieria heterura</i>	65	<i>Sabatieria praebosporica</i>
6	<i>Sabatieria arcuata</i>	36	<i>Sabatieria intermissa</i>	66	<b><i>Sabatieria praedatrix*</i></b>
7	<i>Sabatieria armata</i>	37	<i>Sabatieria kelletti</i>	67	<i>Sabatieria propisinna</i>
8	<i>Sabatieria aspera</i>	38	<i>Sabatieria kolaensis</i>	68	<b><i>Sabatieria pulchra*</i></b>
9	<i>Sabatieria australis</i>	39	<i>Sabatieria lawsi</i>	69	<b><i>Sabatieria punctata*</i></b>
10	<i>Sabatieria bitumen</i>	40	<i>Sabatieria lepida</i>	70	<i>Sabatieria rota</i>
11	<b><i>Sabatieria breviseta</i></b>	41	<i>Sabatieria longicaudata</i>	71	<i>Sabatieria rotundicauda</i>
12	<b><i>Sabatieria celtica*</i></b>	42	<b><i>Sabatieria longisetosa*</i></b>	72	<i>Sabatieria sanjosensis</i>
13	<i>Sabatieria cettensis</i>	43	<i>Sabatieria longispinosa</i>	73	<i>Sabatieria sarcina</i>
14	<i>Sabatieria cleopatriss</i>	44	<i>Sabatieria lucia</i>	74	<i>Sabatieria sp.</i>
15	<i>Sabatieria conicauda</i>	45	<i>Sabatieria lyonessa</i>	75	<i>Sabatieria species 1</i>
16	<i>Sabatieria coomansi</i>	46	<i>Sabatieria maboyae</i>	76	<i>Sabatieria spiculata</i>
17	<i>Sabatieria curvispiculum</i>	47	<i>Sabatieria macramphis</i>	77	<i>Sabatieria splendens</i>
18	<i>Sabatieria demani</i>	48	<i>Sabatieria mawsoni</i>	78	<i>Sabatieria stekhoveni</i>
19	<i>Sabatieria dodecaspapillata</i>	49	<i>Sabatieria microsetosa</i>	79	<i>Sabatieria stenocephalus</i>
20	<i>Sabatieria dorylaimopsoides</i>	50	<i>Sabatieria migrans</i>	80	<i>Sabatieria strigosa</i>
21	<i>Sabatieria effilata</i>	51	<i>Sabatieria mortenseni</i>	81	<i>Sabatieria subrotundicauda</i>
22	<i>Sabatieria elongata</i>	52	<i>Sabatieria norwegica</i>	82	<i>Sabatieria supplicans</i>
23	<i>Sabatieria exilis</i>	53	<b><i>Sabatieria ornata*</i></b>	83	<i>Sabatieria taboguillensis</i>
24	<b><i>Sabatieria falcifera</i></b>	54	<i>Sabatieria pacifica</i>	84	<i>Sabatieria tenuiseta</i>
25	<i>Sabatieria fidelis</i>	55	<i>Sabatieria palmaris</i>	85	<i>Sabatieria triplex</i>
26	<i>Sabatieria filicauda</i>	56	<i>Sabatieria parabyssalis</i>	86	<i>Sabatieria tubilaima</i>
27	<i>Sabatieria flecha</i>	57	<b><i>Sabatieria paracupida</i></b>	87	<i>Sabatieria vasicola</i>
28	<i>Sabatieria foetida</i>	58	<i>Sabatieria paradoxa</i>	88	<i>Sabatieria wieseri</i>
29	<i>Sabatieria furcillata</i>	59	<i>Sabatieria paraspiculata</i>		
30	<i>Sabatieria granifer</i>	60	<i>Sabatieria paravulgaris</i>		

Bold letters denotes species recorded from Indian waters, \* denotes Present study observation

### Remarks

The specimens examined conformed well to the earlier description, except for the smaller body size. The total body length described by Platt and Warwick<sup>26</sup> was 1.8-3.3mm and tail length 3.1-4.1a.b.d in male and in female these were not recorded. Body length of the specimen studied at present was found larger being 1.1-1.5mm and the tail length 3-4.2a.b.d.in male and in female 1.2-1.5mm body length and tail length 3.2-4.3a.b.d. This is the first record of the species from the Indian waters.

### 2. *Sabatieria longisetosa* (Kreis, 1929)

Species: ***Sabatieria longisetosa*** (Kreis, 1929)

Synonym : *Parasabatieria longisetosa* Kreis, 1929

Material examined: 14 males and 7 females collected from Singarayakonda 51-75m, 101-150m depths (15.12.2008) and Tammenapatanam 30-50m, 151-175m depths (16.12.2008).

De Man ratio	a	b	c
Male	: 41.39±0.23 (41.08-41.84)	9.64±0.27 (9.13-10.12)	6.82±0.36 (6.12-7.24)
Female	: 41.38±0.30 (41.12-41.64)	9.79±0.18 (9.57-10.01)	6.98±0.22 (6.54-7.16)

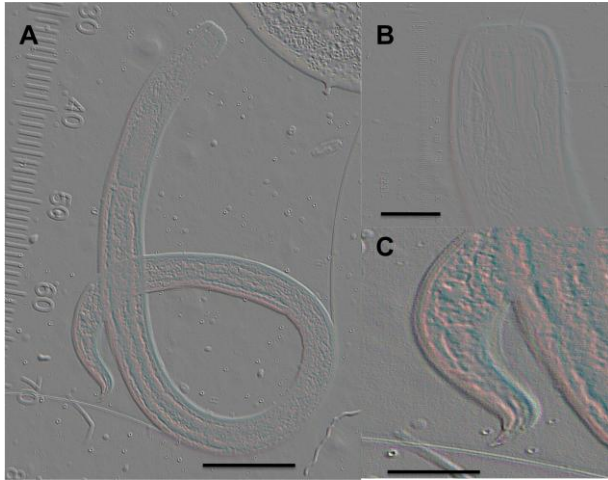


Fig.2. Differential Interference Contrast (DIC) microscopy photomicrograph of *Sabatieria celtica* A) entire male, scale bar - 210 $\mu$ m B) male head, scale bar - 80 $\mu$ m C) mail tail, scale bar - 45 $\mu$ m

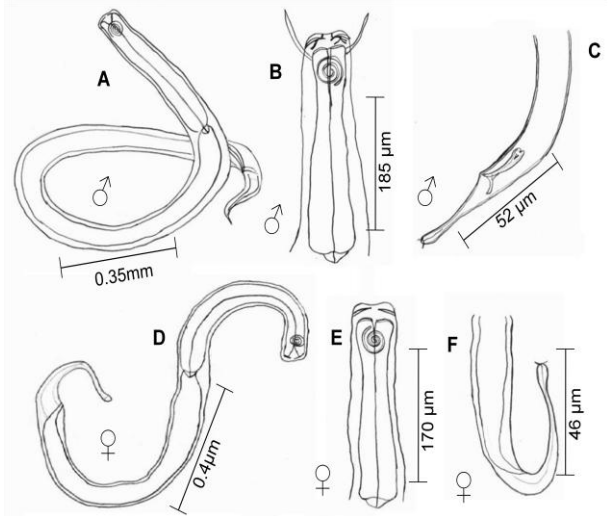


Fig.3. *Sabatieria celtica* A) entire male, B) male head, C) male tail, D) entire female, E) female head, F) female tail

#### Description

Body length 1.9-2.2mm in male and 1.7-2.1mm in female. Maximum diameter 35-49 $\mu$ m in male and 34-44 $\mu$ m in female. Cuticle with lateral differentiation of larger more irregularly arranged dots, especially noticeable in caudal region. Six short (3-6 $\mu$ m) and four longer (6-10 $\mu$ m) cephalic setae. Amphid multi-spiral and smaller in size and in male 3-3.5 turns and in females 2.5-3 turns. Buccal cavity cup-shaped without teeth. Pharyngeal region cylindrical, 240-257 $\mu$ m in male and 208- 226 $\mu$ m in female. Tail not so slender (4.6-5.7a.b.d. in male and 4.8-5.9a.b.d. in female). Spicules 29-48 $\mu$ m, arcuate with central lamella. Gubernaculum apophysis distinctly curved. 10-13 tubular precloacal supplements present. Ovaries paired, opposed and outstretched, not reflexed.

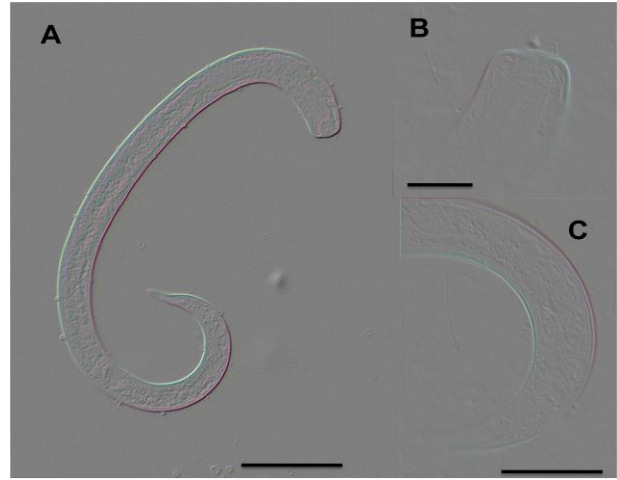


Fig.4- Differential Interference Contrast (DIC) microscopy photomicrograph of *Sabatieria longisetosa* A) entire male, scale bar - 190 $\mu$ m B) male head - scale bar - 40 $\mu$ m C) mail tail, scale bar - 40 $\mu$ m

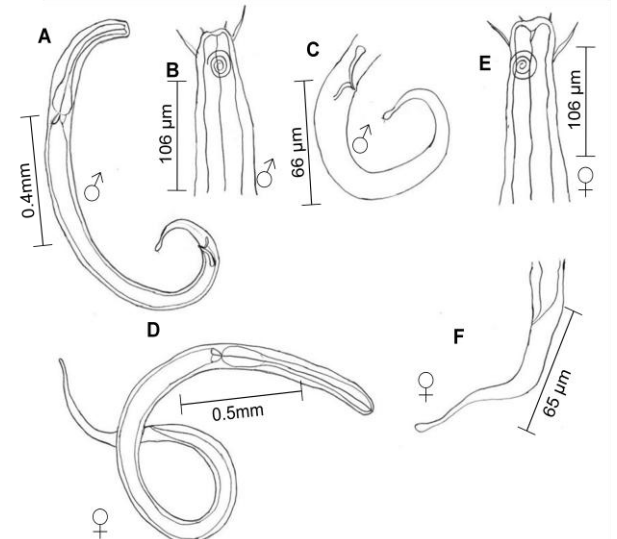


Fig.5- *Sabatieria longisetosa* A) entire male, B) male head, C) male tail, D) entire female, E) female head, F) female tail

Vulva present at 58- 61% of body length (Figs. 4 and 5).

**Feeding type:** The specimens showed large buccal cavity that is not armed with teeth. According to the classification of buccal cavity by Wieser<sup>29</sup>, this species is a non-selective deposit feeder (1B).

**Habitat:** Sandy and sandy silt sediments.

**Distribution**

**India:** Singarayakonda and Tammenapatanam.

**Elsewhere:** England<sup>26</sup> and Scilly<sup>30</sup>.

**Remarks**

Specimens examined conformed well to the earlier description, except for the smaller body size. Total body length described by Platt and Warwick<sup>26</sup> was 2-2.2mm and tail length 4.6-5.9a.b.d in male and in female these were not recorded. Body length of the specimen studied at

present was found larger being 1.9-1.9-2.2mm and the tail length 4.6-5.7a.b.d. in male and in female 1.7-2.1mm body length and tail length 4.8-5.9a.b.d. This is the first record of the species from the Indian waters.

### 3. *Sabatieria ornata* (Ditlevsen, 1918)

Species: *Sabatieria ornata* (Ditlevsen, 1918)

Synonym: *Parasabatieria ornata* Ditlevsen, 1918

: *Sabatieria similis* (Allgen, 1933)

: *Sabatieria proabyssalis* Vitiello & Boucher, 1971

**Material examined:** 9 males and 3 females collected from Tammenapatanam 30-50m, 151-175m depths (16.12.2008) and Chennai 30-50m, 51-75m, 76-100m depths (17.12.2008).

<i>De Man ratio:</i>	a	b	c
Male	: 36.82±0.19 (36.46-37.04)	8.20±0.11 (8.03-8.36)	10.22±0.09 (10.12-10.43)
Female	: 36.67±0.23 (36.46-36.92)	8.09±0.06 (8.03-8.15)	10.19±0.04 (10.16-10.23)

#### Description

Body length 1.4-1.9mm in male and 1.6-1.8mm in female. Maximum diameter 35-47µm in male and 39-44µm in female. Cuticle with lateral differentiation of larger more irregularly arranged dots, especially noticeable in caudal region. Six short (5-6µm) and four longer (6-8µm) cephalic setae. Amphid multi-spiral and 3-3.5 turns in male and females 2.5-3 turns. Buccal cavity cup-shaped without teeth. Pharyngeal region cylindrical, 173-194µm in male and 182-206µm in female. Tail conico-cylindrical with cylindrical part about half of total tail length (3.6-4.4a.b.d. in male and 3.9-4.8a.b.d. in female). Spicules 44-59µm, arcuate with central lamella. Gubernaculum apophysis distinctly curved. 10-13 tubular preloocal supplements present. Ovaries paired, opposed and outstretched, not reflexed. Vulva present at 52-60% of body length (Figs. 6 and 7).

**Feeding type:** The specimens showed large buccal cavity that is not armed with teeth. According to the classification of buccal cavity by Wieser<sup>29</sup>, this species is a non-selective deposit feeder (1B).

**Habitat:** Sandy sediments.

**Distribution**

**India:** Tammenapatanam and Chennai.

**Elsewhere:** England<sup>26</sup>; Northeast England, Skagerrak, Oresund and Gullmarsfjorden<sup>30</sup>.



Fig.6- Phase Contrast microscopy photomicrograph of *Sabatieria ornata* A) entire male, scale bar - 165µm B) male head, scale bar - 25µm C) male tail, scale bar - 40µm

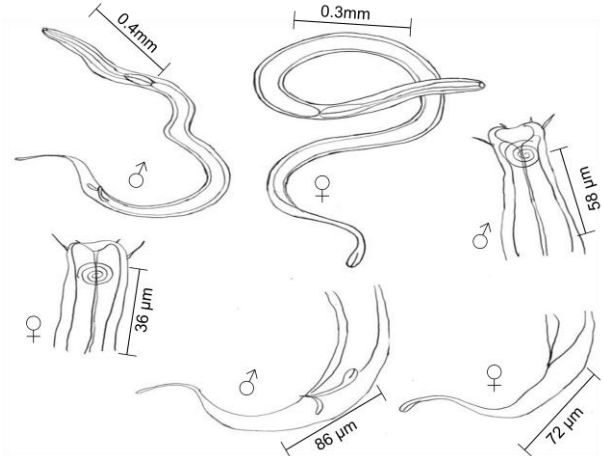


Fig.7- *Sabatieria ornata* A) entire male B) male head, C) male tail, D) entire female, E) female head, F) female tail

#### Remarks

The specimens examined conformed well to the earlier description, except for the smaller body size. The total body length described by Platt and Warwick<sup>26</sup> was 2-2.2mm and tail length was 4.6-5.9a.b.d in male and in female these were not recorded. The body length of the specimen studied at present was found larger being 1.4-1.9mm and the tail length 3.6-4.4a.b.d. in male and in female 1.6-1.8mm body length and tail length 3.9-4.8a.b.d. This is the first record of the species from the Indian waters.

### 4. *Sabatieria praedatrix* De Man, 1907

Species: *Sabatieria praedatrix* De Man, 1907

Synonym : *Sabatieria dubia* Ditlevsen, 1918

: *Sabatieria cobbi* Kreis, 1929

: *Sabatieria rugosa* Stekhoven, 1950

**Material examined:** 7 males and 4 females collected from Singarayakonda 30-50m, 51-75m,

76-100m and 101-150m depths (15.12.2008) and Chennai 76-100m depth (17.12.2008).

<i>De Man ratio:</i>	<b>a</b>	<b>b</b>	<b>c</b>
Male	: 55.26±0.10 (55.12-55.38)	9.39±0.22 (9.12-9.83)	14.53±0.21 (14.32-14.91)
Female	: 55.27±0.11 (55.12-55.36)	9.27±0.11 (9.12-9.36)	14.42±0.10 (14.32-14.54)

#### Description

Body length 1.4-1.8mm in male and 1.6-1.9mm in female. Maximum diameter 28-39µm in male and 31-42µm in female. Cuticle annulated and ornamented with transverse rows of dots: fewer rows of larger dots laterally which may appear longitudinally elongated. Six short (4-6µm) and four longer (6-9µm) cephalic setae. Short scattered setae fairly numerous in cervical and caudal regions but scarce in the middle of the body. Amphid multi-spiral and 3-3.5 turns in male and females 2.5-3 turns. Buccal cavity cup-shaped without teeth. Pharyngeal region cylindrical, 158-186µm in male and 161-180µm in female. Tail conical in anterior two-thirds, cylindrical in posterior third (4-4.7a.b.d. in male and 3.9-4.4a.b.d. in female). Spicules 38-49µm, measured as curve, arcuate with a short central projection at the proximal end. Apophysis of gubernaculum straight. 17 tubular precloacal supplements, which can be overlooked. Ovaries paired, opposed and outstretched, not reflexed. Vulva present at 51-63% of body length (Figs. 8 and 9).

**Feeding type:** The specimens showed large buccal cavity that is not armed with teeth. According to the classification of buccal cavity by Wieser<sup>29</sup>, this species is a non-selective deposit feeder (1B).

**Habitat:** Sandy and sandy silt sediments.

#### Distribution

**India:** Singarayakonda and Chennai.

**Elsewhere:** England<sup>26</sup>; Southwest England, Netherland, Baltic Sea, Norway, Skagerrak, Kattegatt, Baeltand and Limfjorden<sup>30</sup>.

#### Remarks

The specimens examined conformed well to the earlier description, except for the larger body size. The total body length described by Platt and Warwick<sup>26</sup> was 1.8mm and tail length 4a.b.d in male and in female these were not recorded. The body length of the specimen studied at present was found larger being 1.4-1.8mm and the tail length 4-4.7a.b.d. in male and in female 1.6-1.9mm body length and tail length 3.9-4.4a.b.d. This is the first record of the species from the Indian waters.

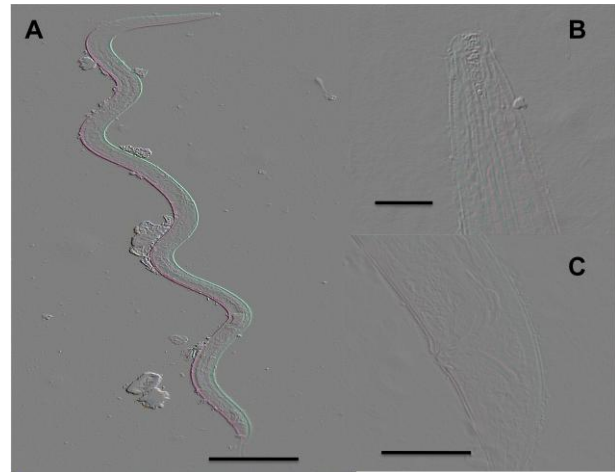


Fig.8- Differential Interference Contrast (DIC) microscopy photomicrograph of *Sabatieria praedatrix* A) entire male, scale bar - 190µm B) male head, scale bar - 35µm C) male tail, scale bar - 30µm

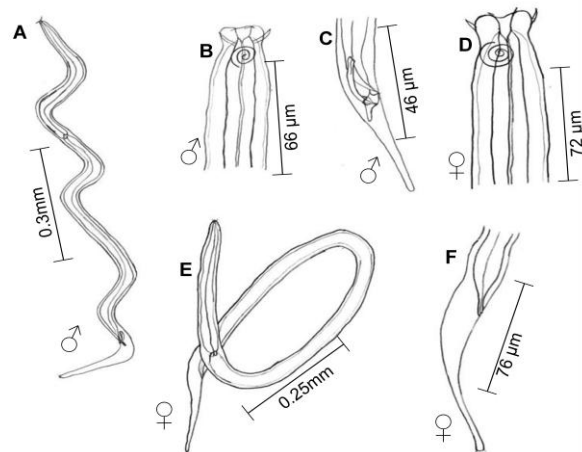


Fig.9- *Sabatieria praedatrix* A) entire male B) male head, C) male tail, D) female head, E) entire female, F) female tail

#### 5. *Sabatieria pulchra* (Schneider, 1906)

Species: *Sabatieria pulchra* (Schneider, 1906)

Synonym: *Aphanolaimus pulcher* Schneider, 1906

: *Sabatieria vulgaris* De Man, 1907

: *Parasabatieria vulgaris* De Man, 1907

: *Sabatieria clavicauda* Filipjev, 1918

: *Parasabatieria clavicauda* Filipjev, 1918

: *Sabatieria quadripapillata* (sp.ing.)

Filipjev, 1922

: *Parasabatieria punctata* Kreis, 1924

: *Sabatieria breviseta* (Stekhoven, 1935)

: *Sabatieria trivialis* Tchesunov, 1978

**Material examined:** 32 males and 41 females collected from Singarayakonda 30-50m, 51-75m, 76-100m, 101-150m, 151-175m depths (15.12.2008); Tammenapatanam 30-50m, 76-100m, 151-175m depths (16.12.2008); Chennai 30-50m, 51-75m, 76-100m, 101-150m, 151-175m

depths (17.12.2008); Cheyyur 30-50m, 76-100m, 101-150m depths (18.12.2008); Cuddalore – SIPCOT 30-50m, >176m depths (19.12.2008) and Karaikkal 30-50m, 51-75m, 101-150m, 151-175m, >176m depths (20.12.2008).

<i>De Man ratio:</i>	<b>a</b>	<b>b</b>	<b>c</b>
Male	:35.78±0.68 (35.56-36.02)	7.48±0.53 (7.21-7.74)	7.74±0.58 (7.49-7.98)
Female	:42.52±0.57 (42.28-42.89)	6.19±0.33 (6.01-6.36)	8.89±0.58 (8.66-9.12)

#### Description

Body length 1.1-1.8mm in male and 0.9 - 2.1mm in female. Maximum diameter 46-68µm in male and 55-72µm in female. Cuticle with transverse rows of small dots throughout body length. Dots more irregularly arranged laterally than in medially, tending to be larger in the oesophagus and tail region than in mid-body; however, there are not conspicuously fewer transverse rows of dots in the lateral fields. Six short (4-6µm) and four longer (6-9µm) cephalic setae. Body setae short and sparse, in four files down body length. Amphid multi-spiral and 2.5-3 turns in male and females. Buccal cavity cup-shaped without teeth. Pharyngeal region cylindrical, 152-196µm in male and 156-203µm in female. Tail conical (4.5-6.2a.b.d. in male and 4.9-6.9a.b.d. in female) for most of its length with rounded swollen tip bearing three terminal setae. Spicules 32-68µm, measured as curve, arcuate, rounded proximally with a central lamella along part of the length. Gubernaculum with a pair of long straight dorso-caudally directed apophysis 9-14µm long and a conspicuous median piece. 7-9 prominent tubular precloacal supplements anterior ones more closely spaced. Ovaries paired, opposed and outstretched, not reflexed. Vulva present at 48- 59% of body length (Figs. 10 and 11).

**Feeding type:** The specimens showed large buccal cavity that is not armed with teeth. According to the classification of buccal cavity by Wieser<sup>29</sup>, this species is a non-selective deposit feeder (1B).

**Habitat:** Sandy, sandy silt sediments.

#### Distribution

**India:** Singarayakonda, Tammenapatanam, Chennai, Cheyyur, Cuddalore – SIPCOT and Karaikkal.

**Elsewhere:** England<sup>26</sup>, Helgoland, East & West Scotland, Finland, Baltic Sea, Netherland and Southeast England, Norway, Skagerrak, Kieler Buchat, Oresund, Mediterranean and Black Sea<sup>30</sup>, European waters<sup>31, 32</sup>; Belgium<sup>33</sup>.

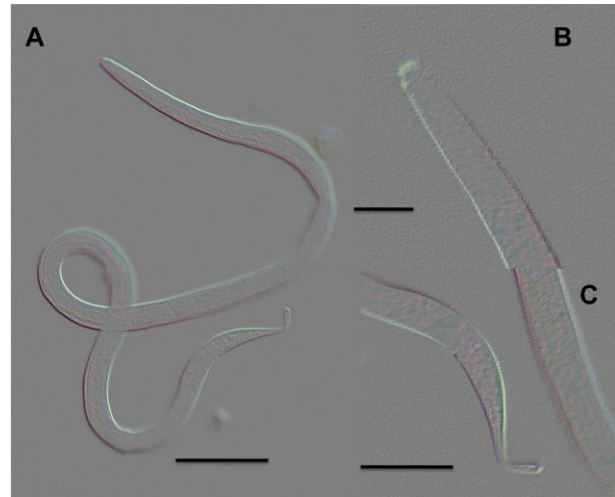


Fig.10. Differential Interference Contrast (DIC) microscopy photomicrograph of *Sabatieria pulchra* A) entire male, scale bar - 175µm B) male head, scale bar - 52µm C) mail tail, scale bar - 45µm

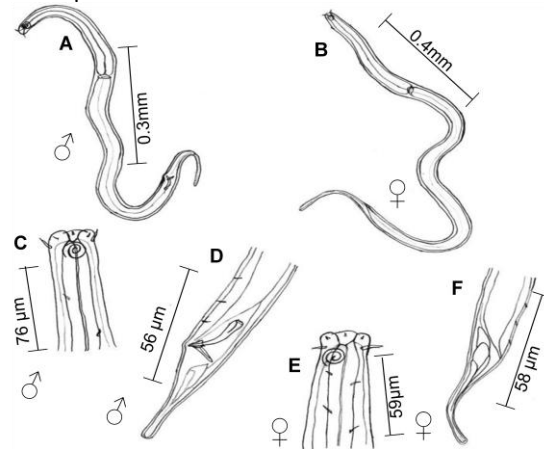


Fig.11. *Sabatieria pulchra* A) entire male B) entire female, C) male head, D) male tail, E) female head, F) female tail

#### Remarks

The specimens examined conformed well to the earlier description, except for the smaller body size. The total body length described by Platt and Warwick<sup>26</sup> was 1.9-2.3mm and tail length 3-3.5a.b.d in male and in female these were not recorded. The body length of the specimen studied at present was found smaller being 1.1-1.8mm and the tail length 4.5-6.2a.b.d. in male and in female 0.9 -2.1mm body length and tail length 4.9-6.9a.b.d. This is the first record of the species from the Indian waters.

#### 6. *Sabatieria punctata* (Kreis, 1924)

Species: *Sabatieria punctata* (Kreis, 1924)

Synonym: *Sabatieria americana* Timm, 1952

Material examined : 7 males and 5 females collected from Chennai 30-50m, 51-75m, 76-

100m, 101-150m and 151-175m depths (17.12.2008).

<i>De Man ratio:</i>	<b>a</b>	<b>b</b>	<b>c</b>
Male	:22.85±0.87 (22.62-23.12)	6.25±0.43 (6.01-6.43)	8.37±0.68 (8.09-8.56)
Female	:22.93±0.67 (22.68-23.16)	6.19±0.23 (6.04-6.33)	8.44±0.38 (8.16-8.44)

#### Description

Body length 0.9-1.3mm in male and 1.1-1.4mm in female. Maximum diameter 47-61µm in male and 48-67µm in female. Cuticle has lateral differentiation of clearly larger dots in fewer transverse rows but may be rather irregularly arranged, most conspicuous in pharyngeal and tail regions. Six short (2-5µm) and four longer (4-8µm) cephalic setae. Body setae short and sparse, in four files down body length. Amphid multi-spiral and 2.5-3.5 turns in male and females. Buccal cavity cup-shaped without teeth. Pharyngeal region cylindrical, 182-226µm in male and 186-233µm in female. Tail conical (3.8-4.9a.b.d. in male and 4-5.2a.b.d. in female) for most of its length with rounded swollen tip bearing three terminal setae. Spicules 22-36µm, measured as curve, arcuate, rounded proximally with a central lamella along part of the length. Gubernaculum with a pair of long straight dorso-caudally directed apophysis 6-10µm long and median piece of gubernaculum not conspicuous. 7-9 prominent tubular preloocal supplements anterior ones more closely spaced. Ovaries paired, opposed and outstretched, not reflexed. Vulva present at 47- 54% of body length (Figs. 12 and 13).

**Feeding type:** The specimens showed large buccal cavity that is not armed with teeth. According to the classification of buccal cavity by Wieser<sup>29</sup>, this species is a non-selective deposit feeder (1B).

**Habitat:** Sandy sediments.

**Distribution**

**India:** Chennai.

**Elsewhere:** England<sup>26</sup>; Baltic Sea, Northeast England, South Wales, Belgium, Skagerrak, Kieler Buchat, Oresund, Gullmarsfjorden, Busum and Zuidersee<sup>30</sup>; European waters<sup>31,32</sup>.

#### Remarks

The specimens examined conformed well to the earlier description, except for the larger body size. The total body length described by Platt and Warwick<sup>26</sup> was 1.1-1.2mm and tail length 3-3.5a.b.d in male and in female these were not recorded. The body length of the specimen studied at present was found larger being 0.9-1.3mm and the tail length 3.8-4.9a.b.d. in male and in female

1.1-1.4mm body length and tail length 4-5.2a.b.d. This is the first record of the species from the Indian waters.

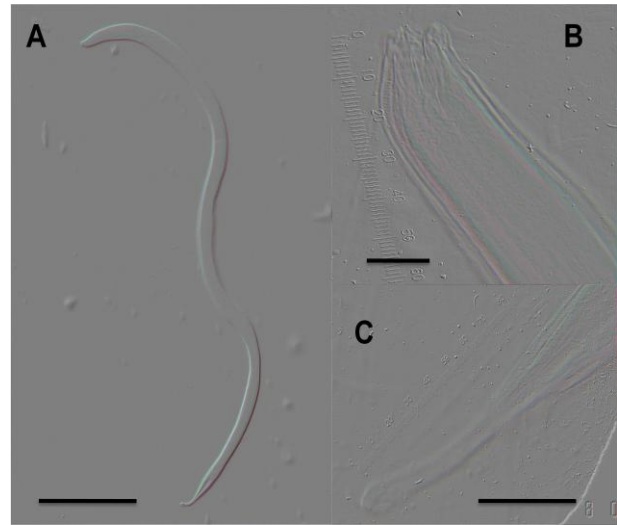


Fig.12. Differential Interference Contrast (DIC) microscopy photomicrograph of *Sabatieria punctata* A) entire male, scale bar - 225µm B) male head, scale bar - 60µm C) mail tail, scale bar - 15µm

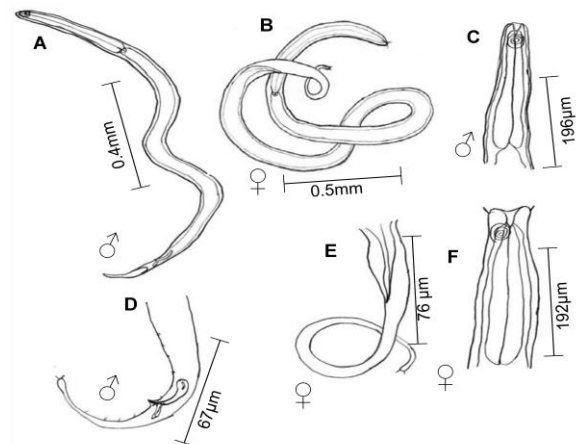


Fig.13. *Sabatieria punctata* A) entire male B) entire female, C) male head, D) male tail, E) female tail, F) female head

#### Discussion

In the present study, the occurrence of six species (*Sabatieria celtica*, *Sabatieria longisetosa*, *Sabatieria ornata*, *Sabatieria praedatrix*, *Sabatieria pulchra* and *Sabatieria punctata*) of free-living marine nematodes belonging to family Comesomatidae under order Chromadorida is reported for the first time in Indian waters from the continental shelf region (southeast coast of India). So far, around 225 species of nematodes have been reported from various regions including estuaries, backwaters, lagoons and mangroves on the east and west coasts of India<sup>11, 12, 14, 16, 17, 34-38</sup>. Sajan and Damodaran<sup>13</sup> reported 154 species in the western



continental shelf of India. However none of these six species of *Sabatieria* have been reported earlier from Indian waters and 6935 free-living marine nematode species were recorded globally (NeMys data base)<sup>28</sup>. Last few decades free-living marine nematodes used as well focused as indicators of aquatic pollution and aquatic eco-toxicological studies worldwide<sup>39-43</sup>. Therefore, these new recorded species might be useful in future studies especially in the polluted environments of Indian waters.

### Acknowledgements

Authors are thankful to Prof. K. Kathiresan, Director, Centre of Advanced Study in Marine Biology for the encouragement, University authorities for facilities and to Centre for Marine Living Resources and Ecology (CMLRE) of Ministry of Earth Sciences (MoES), Kochi, Government of India, for financial assistance.

### References

- 1 Heip C., Vincx, M. & Vranken, G., The ecology of marine nematodes, *Oceanogr. Mar. Biol. Annu. Rev.*, 23 (1985) 399-489.
- 2 Coull, B.C., Role of meiofauna in estuarine soft-bottom habitats, *Aust. J. Ecol.*, 24 (1999) 327-343.
- 3 Sajan, S., Joydas T.V. & Damodaran, R., Meiofauna of the western continental shelf of India, Arabian Sea, *Estuar. Coast. Shelf Sci.*, 86 (4) (2010) 665-674.
- 4 Ansari, K.G.M.T., Manokaran, S., Raja, S., Lyla, P.S & Ajmal Khan, S., Checklist of nematodes (Nematoda: Adenophorea) from southeast continental shelf of India, *Checklist*, 8(3) (2012a) 414 - 420.
- 5 Schratzberger, M., Warr, K. and Rogers, S.I., Patterns of nematode population in the southwestern North Sea and their like to other components of benthic fauna. *J. Sea Res.*, 55 (2007) 113-127.
- 6 Vranken, G. & Heip, C., Calculation of the intrinsic rate of natural increase.  $r_m$  with *Rhabditis marina* Bastian, 1865 (Nematoda). *Nematologica*, 29 (1983) 468-477.
- 7 Heip, C., Herman, R. & Vincx, M., Subtidal meiofauna of the North Sea: a review. *Biol. Jb. Dodonaea*, 51 (1983) 116-170.
- 8 Ansari, Z. A., Parulekar A. H. & Jagtap, T. G., Distribution of sub-littoral meiobenthos off Goa coast, India, *Hydrobiologia*, 74 (3) (1980) 209-214.
- 9 Harkantra, S.N., Nair, A., Ansari, Z.A. & Parulekar, A.H., Benthos of the shelf region along the west coast of India, *Indian J. Mar. Sci.*, 9 (1980) 106-110.
- 10 Ansari, Z.A. & Ganus, M.U., A quantitative analysis of fine scale distribution of intertidal meiofauna in response to food resources. *Indian J. Mar. Sci.*, 25 (1996) 259-263.
- 11 Sultan Ali M A, Ajmal Khan S & Balasubramanian T, *Nematodes of the Pichavaram mangroves*, (GIS Based Information System for Pichavaram-Government of India) 1998, pp.47.
- 12 Nanajkar M R & Ingole B S, Nematode species diversity as indicator of stressed benthic environment along the central west coast of India, in: *Diversity and life processes from ocean and land*, edited by P.V. Desai & R. Roy (Goa University, India) 2007, pp. 42-52.
- 13 Sajan, S. & Damodaran, R., Faunal composition of meiobenthos from the shelf region off west coast of India. *J. Mar. Biol. Ass. India*, 49(1) (2007) 19-26.
- 14 Anila Kumary, K.S., Diversity of meiobenthic nematodes in the Poonthura estuary (Southwest coast of India). *J. Mar. Biol. Ass. India*, 50(1) (2008) 23-28.
- 15 Ansari, K.G.M.T., Lyla, P.S & Ajmal Khan, S., Faunal composition of metazoan meiofauna from the southeast continental shelf of India. *Indian J. Geo-Mar. Sci.*, 41(5) (2012b) 457 - 467.
- 16 Timm R.W., The marine nematodes of the Bay of Bengal. *Proc. Pakistan Acad. Sci.*, 1(1961) 1-84.
- 17 Timm, R.W., Some estuarine nematodes from the Sunderbans. *Proc. Pakistan Acad. Sci.*, 4(1967a) 1-14.
- 18 Chinnadurai, G. & Fernando, O.J., New records of free-living marine nematodes from India. *Rec. Zool. Surv. India*, 106(4) (2006a) 45-54.
- 19 Chinnadurai, G. & Fernando, O.J., New records of free-living marine nematodes from an artificial mangrove of India. *J. Mar. Biol. Ass. India*, 48(1) (2006b) 105-107.
- 20 Ansari, K.G.M.T., Lyla, P.S & Ajmal Khan, S., New records of free-living marine nematodes (Nematoda: Enoplida) from Indian waters, *J. Mar. Biol. Assoc. India*, 54(2) (2012c) 39 - 45.
- 21 Annapurna, C., Vijaya Bhanu, Ch., Srinivasa Rao, M., Sivalakshmi, M.V. Cooper, L.M.G. & Rao, Y.K., Free-living nematodes along the continental slope off northeast coast of India, *J. Mar. Biol. Assoc. India*, 54(2) (2012) 52 - 60.
- 22 Platt H M & Warwick R M, Free living marine nematodes, Part I, British Enoplids, Pictorial key to world genera and notes for the identification of British species, in: *Synopses of the British Fauna*, volume 28, edited by D.M. Kermack & R.S.K. Barnes, (Cambridge University Press, Cambridge) 1983, pp. 307.
- 23 Pfannkuche O & Thiel H, Sample Processing, in: *Introduction to the study of Meiofauna* Edited by R.P. Higgins & H. Thiel, (Smithsonian Institute Press, Washington DC, USA) 1988, 134-145.
- 24 Armenteros, M., Perez-Garcia, J.A., Perez-Angulo, A. & Williams, J.P., Efficiency of extraction of meiofauna from sandy and muddy marine sediments, *Rev. Invest. Mar.*, 29 (2008) 113-118.
- 25 Vincx M, Meiofauna in marine and brackish water sediments, in: *Methods for Examination of Organismal Diversity in Soils and Sediments*, edited by Hall, G.S., (CAB International) 1996, pp. 187-195.
- 26 Platt H M & Warwick, R M, Free living marine nematodes, Part II, British Chromodorids, Pictorial key to world genera and notes for the identification of British species, in: *Synopses of the British Fauna (New series)*, volume 38, edited by D.M. Kermack & R.S.K. Barnes, (Brill/ Backhuys, Leiden) 1988, pp. 502.
- 27 Warwick R M, Platt H M & Somerfield P J D, Freelifving marine nematodes, Part III, Monhysterids, in: *Synopses of the British Fauna (New Series)*, volume 53, edited by R.S.K. Barnes & J.H. Crothers, (Field Studies Council, Shrewsbury, UK) 1998, pp. 296.
- 28 Steyaert, M., Deprez, T., Raes, M., Bezerra, T., Demesel, I., Derycke, S., Desmet, G., Fonseca, G., de Assunc ão Franco M., Gheskiere, T., Hoste E., Ingels, J., Moens, T., Vanaverbeke, J., VanGaever, S., Vanhove, S., Vanreusel, A., Verschelde, D. & Vincx, M., *Electronic Key to the*

- free-living marine Nematodes*, (2005), <http://nemys.ugent.be/>.
- 29 Wieser, W., Die Beziehung zwischen Mundhohlgestalt, ernährungsweise und Vorkommen bei freilebenden marinen Nematoden. *Arkiv. fur. Zoologi*, 4 (1953) 439-484.
- 30 Hansson H C, North East Atlantic Taxa (NEAT): *Scandinavian Marine nematoda check-list*, (Tjarn Marine Biological laboratory, Tjarn) 1998, 1-37pp.
- 31 De Smet G, Vincx M, Vanreusel A, Vanhove S, Vanaverbeke J & Steyaert M, Nematoda - free living, in: *European register of marine species: a check-list of the marine species in Europe and a bibliography of guides to their identification*. Volume 50, edited by Costello, M.J. (Collection Patrimoines Naturels, UK) pp. 161-174.
- 32 Medin, 2011. UK checklist of marine species derived from the applications Marine Recorder and UNICORN, version 1.0.
- 33 Coomans A, Overzicht van de vrijlevende nematofauna van België (Nematoda), [The free-living nematofauna of Belgium: a review], in: *Proceedings of the Symposium "Invertebrates of Belgium"*, edited by Wouters, K. & L. Baert (Koninklijk Belgisch Instituut voor Natuurwetenschappen: Brussel, Belgium) 1989, pp. 43-56.
- 34 Timm, R.W., New marine nematodes of the family Linhomoeidae from East Pakistan. *Proc. Pakist. Acad. Sci.*, 4 (1967b) 15-22.
- 35 Rao, G.C. & Ganapati, P.N., Interstitial fauna inhabiting the beach of sands of Waltivar coast. *Proc. Nat. Ins. Sci. India*, 34 (1968) 82-125.
- 36 Krishnamurthy K, Sulthan Ali M A & Jayaseelan M P J, Structure and dynamics of the aquatic food web community with special reference to nematodes in mangrove ecosystems, in: *Proceeding Asia Symposium on Mangrove Research and Management*, edited by Soecpandmo, E., A.N. Rao & D.J. MacIntosh, (University of Malaya, Kuala Lumpur) pp. 429-452.
- 37 Rao, G.C., Meiofauna of the mangrove sediments in South Andaman. *J. Andaman Sci. Assoc.*, 2(2) (1986) 23-32.
- 38 Sinha, B., Choudhury, A. & Baquri, B.H., Studies on the nematodes from mangrove swamps of deltaic Sundarbans, West Bengal, India. III. *Anoplostoma macrospiculun* n.sp. (Anoplostomatidae: Nematoda). *Curr. Sci.*, 56 (1987) 539-540.
- 39 Gyedn-Ababio, T.K., Furstenberg, J.P., Baird, D. & Vanreusel, A., Nematodes as indicator of pollution a case study from the Swartkops River system, South Africa. *Hydrobiologia* 397 (1999) 155-169.
- 40 Heiningen, P., Hoss, S. Claus, E., Pelzer, J. & Trawnsburger, W., Nematode communities in contaminated River sediments. *Environm. Pollut.*, 146 (2007) 64-76.
- 41 Sutherland, T.F., Levings, C.D., Petersen, S.A., Poon, P. & Piercey, B., The use of meiofauna as an indicator of benthic organic enrichment associated with salmonid aquaculture. *Mar. Pollut. Bull.*, 54 (2007) 1249-1261.
- 42 Grego, M., De Troch, M., Forte, J. & Malej, A., Main Meiofauna taxa as an indicator for assessing the spatial and seasonal impact of fish farming. *Marine Pollution Bulletin, Mar. Pollut. Bull.*, 58 (2009) 1178-1186.
- 43 Nasira, K., Shahina, F. & Kamran, M., Response of free living marine nematode community to heavy metal contamination along the coastal areas of Sindh and Baluchistan, Pakistan. *Pakistan Journal of Nematology*, 28(2010)263-278.