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**Description of *Procamallanus (Spirocamallanus) ruberii* n.sp. (Camallanidae Railliet and Henry, 1915) from marine fish *Otolithus ruber* (Sciaenidae) based on Light and Scanning Electron Microscopy**

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**ABSTRACT**

A new species of parasitic nematode *Procamallanus (Spirocamallanus) ruberii* n. sp. (Camallanidae) is described using light and scanning electron microscopy based on specimens collected from intestine of *Otolithus ruber* (Schn, 1792), which is a common marine Sciaenid fish of economic importance, collected during February 2006 to July 2007 from fresh landing of Karachi coast, Pakistan. Detailed light and scanning electron microscopy revealed some important taxonomical features like, Moderate sized worms, the body of the worms tapers gradually at its anterior and posterior extremity which is curved ventrally. The buccal capsule is oval in shape, surrounded by eight submedian cephalic papillae arranged in two circles. Inner surface of the whole capsule provided with 16---18 spiral thickenings. The tail is pointed in male and dull pointed in female.

**Key words:** Parasitic nematode, new species, *Otolithus ruber*, Marine fish, Karachi coast.

**INTRODUCTION**

During a survey of nematodes from fishes of Karachi coast, Pakistan, a new species of the nematode of the family Camallanidae Railliet and Henry, 1915 from the intestine of *Otolithus ruber* (Sciaenidae) was recovered, during the year 2006 to 2007. This species is described here in detail and is regarded a new species. Information on camallanid nematodes of marine water fishes is meager and it is an important addition to scientific literature.

**MATERIALS AND METHODS**

Nematodes collected from the intestine of *Otolithus ruber* (4 male and 6 female specimens) were processed for light and electron microscopy.

**Examination of specimens for nematode parasites:**

A total of 60 fish specimens were subjected to parasitological examination. The body cavity of fish was opened, and the gut and liver were removed by cuts in the region of the anus and the division between esophagus and anterior stomach. The gut was then placed in a large Petri dish filled with distilled water. The section of the gut was opened with a longitudinal cut, and the whole inner surface lightly scraped to remove the parasites with mucus, if any. The nematode recovered were washed in physiological saline and preserved in 70% ethanol. For light microscopy the nematodes were cleared in glycerin. Diagrams were prepared with a camera Lucida E 200 Nikon Drawing Tube. Measurements are given length by width in millimeters. Specimens for scanning electron microscopy were fixed in cold 4% glutaraldehyde in buffer (pH=7.2) and kept in it for 24 hours, then dehydrated through a graded series of alcohols, infiltrated with amyl acetate, after critical point drying mounted on stubs, coated with gold and photographs were taken with the help of SEM. Joel Japan JSM 6380A at an accelerating voltage of 15KV at Karachi University, central laboratory. The SEM measurements are in micrometers.

**RESULTS**

Altogether, 10 new nematode specimens

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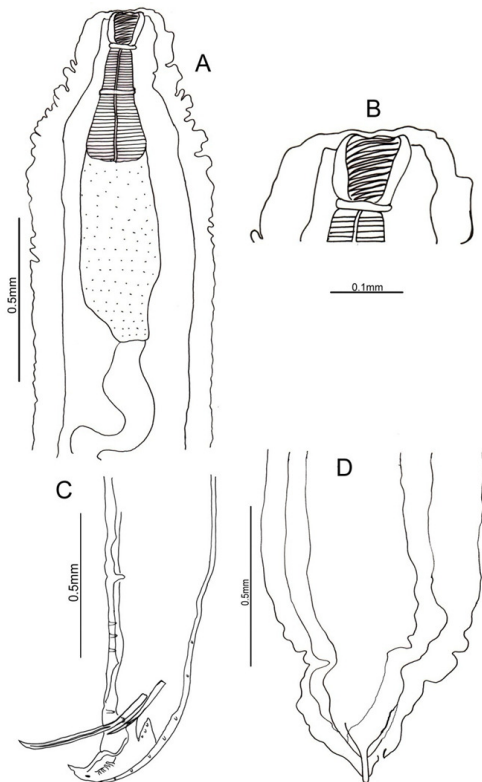
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including 4 males and 6 females were collected. These nematodes were recovered from the intestine. The new nematode species was identified and compared with the available literature (Yamaguti, 1961; Sood, 1989; Akhtar and Bilqees, 2006; Akhtar and Bilqees, 2008 and Akhtar and Bilqees, 2009) and through Research service of British Library, provided by Nadja Noel and Rupert Lee.

**Taxonomic summary:**

**(Figs. 1-2)**

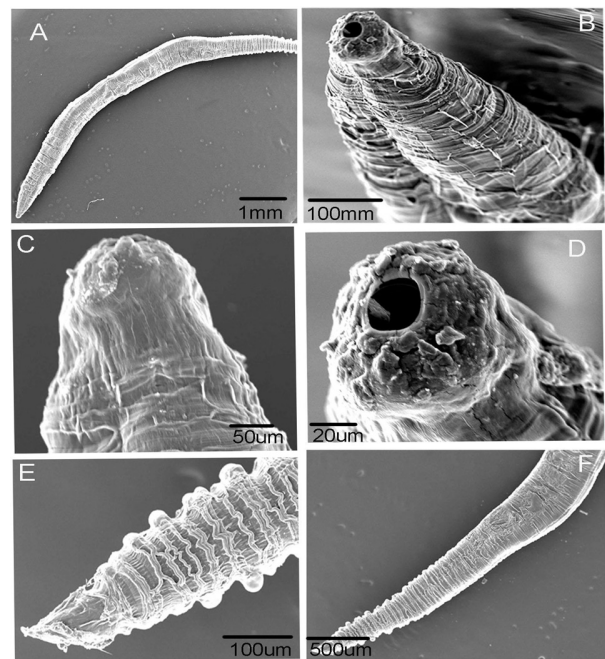
Type Host: *Otolithus ruber* (Schiender)  
 Type Locality: Fish harbor, Karachi coast.  
 Location: Intestine  
 Prevalence: 11.66% (7 infected /60 host examined)  
 Intensity: 1.44 (with 4 male and 6 female)  
 Holotype (male): JUW.N.23  
 Allotype (female): JUW.N.24



**Fig.1. (A-D) Procammallanus(Spirocammallanus)**  
 A: Anterior end of male(hollotype)  
 B: Cephalic end  
 C: Posterior end of female(allotype)  
 D: Posterior end of male

**DIAGNOSIS:**

Moderate sized worms, the body of the worms tapers gradually at its anterior and posterior extremity which is curved ventrally. The cuticle of the body is striated at its anterior and posterior extremities. The buccal capsule is oval in shape, surrounded by eight submedian cephalic papillae arranged in two circles. Inner surface of the whole capsule provided with 16---18 spiral thickenings. With simple well developed- basal ring. Muscular esophagus is shorter and narrower than glandular esophagus. Intestine narrow and brown. Excretory pore slightly posterior to the anterior part of the glandular esophagus. The tail is pointed in male and dull pointed in female.



**Fig.2. 66** SEM micrographs f male. n.sp.

- A: Entire specemen (lateral view)
- B: Cephalic end (dorsoventral view)
- C: Cephalic end (Lateral view)
- D: Cephalic end (Enface view)
- E: Posterior end showing cuticular striations
- F: Posterior end (sublateral view)

Male (4 specimens, including holotype): Length of body 10.5-12.0, maximum width 0.43. The wall of the buccal capsule is provided with 11-13 spiral thickenings, 0.10x0.12x 0.11x0.14 in

its diameter. The anterior muscular part of the esophagus is 0.65- 0.77 in length and 0.15 at its maximum breadth. The longer posterior glandular part measures 0.84- 0.91 in length and 0.11 in its maximum breadth. The nerve ring is 0.24 from anterior extremity. The spicules are similar in shape, unequal in length, measuring 0.37 and 0.29 in length. Gubernaculum not observed. 12- 14 pairs of caudal papillae are present, including 4 pairs preanal, 4 pairs post anal and 4 pairs of subventral pendulacuate papillae. The tail is curved, 0.19 long with pointed end.

Female (6 specimens including allotype): Length of body 10.10, maximum width 0.41. The mouth leads into a buccal capsule, it measures 0.09--0.10 in its diameter, wall of the buccal capsule is provided with 13 spiral thickenings, the anterior muscular part of the esophagus is 0.36 in length and 0.16 at its maximum breadth. The longer posterior glandular part measure 0.57 in length and 0.21 in its maximum breadth. The never ring is 0.27 from its anterior extremity. The valva is sub terminal, 0.10 from its posterior extremity. Vagina muscular, directed posteriorly from vulva. The tail is dull pointed

#### REMARKS:

Several species of the genus have been described from Pakistan, *Procamallanus (Spirocamallanus) spiralis* (Khan and Begum, 1971) from *Tachysurus caelatus* in Karachi; the species was originally reported in *Heterobranchus anguillar* from Egypt. *P.(S.) pereirai* (Annereaux, 1946) after Rasheed, 1970 is described from variety of marine fish in Karachi, The head bears four large submedian papillae and a pair of amphids in external circle, the buccal capsule of the species have 8-10 spiral ridges and 11 pairs of caudal papillae in male but in female the spiral ridges are 11-13 in numbers with digit-like tail. *P.(S.) dussumieri* (Bilqees et al., 1971) from *Jhonius*

*dussumieri* in Karachi, having 13 spiral thickenings and 9 pairs of caudal papillae. *P.(S.) sihamai* (Khan and Begum, 1971) from *Sillago sihama* in Karachi having 11 spiral ridges and 6 pairs of caudal papillae. *P.(S.) wallagus* (Rehana and Bilqees, 1973) from *Wallago attu* in Sind; *P.(S.) crossohombii* (Zaidi and Khan, 1975) from *Crossorhombus azureus* in Karachi with 13 buccal ridges and 9 pairs of caudal papillae. *P.(S.) sparus* (Akram, 1975) from *Argyrops spinifer* in Karachi, mouth bounded by two pairs of submedian papillae and one pair of lateral amphids, caudal papillae are 10 in numbers and tail is provided with spines. *P.(S.) otolithi* (Ashraf et al., 1977) from *Otolithus argenteus* in Karachi; *P.(S.) kalriai* (Rehana and Bilqees, 1979) from *Wallago attu* in Pakistan; *P.(S.) karachii* (Rehana and Bilqees, 1979) from *Wallago attu* in Pakistan. But there are no electron-scanning micrographs so it is difficult to compare with these species.

The present species *P.(S.) ruberii* is different from the standing point of length and width of body, length of esophagus, number of spiral bands, arrangement of papillae, spicule length, and also host, from the species reported from South Asia including Pakistan.

The present species having ventrally bent posterior end of body, provided with subventral pedunculate papillae is similar to *P.(S.) longus* (Moravec et al., 2006). The present species is different from *P.(S.) longus* (Morevac et al., 2006) having 22 ridges but there are only 16-18 spiral ridges in the present species. The number and position of cephalic and caudal papillae in male (except the first post anal, close to the anal region) are more or less similar to *P.(S.) longus* (Morevac et al., 2006). The described species resemble only by the shape of female tail (dull point) with *P.(S.) colei* (Rigby and Adamson, 1997) reported from coral reef

perciform fish *Acanthurus achilles* from French Polynesia. Deirids are absent in the present species but present in *P.(S.) longus*, and also in *P.(S.) colei*.

#### DISCUSSION:

Spirocamallanoids are equally dominated in Asia and South America, while in North America, Africa and Australia these are less common. Sood (1982) listed 75 species of *Procamallanus* (*Spirocamallanus*) from South Asia, of which 9 species have been reported from marine fish of Karachi coast Pakistan, including *Procamallanus* (*Spirocamallanus*) *spiralis* (Khan and Begum, 1971)

Species of the genus *Procamallanus* Baylis, 1923, subgenus *Spirocamallanus*, (Olsen, 1952; Petter, 1979) have been reported in a variety of piscine hosts in different geographical zones, and in both freshwater and marine systems. Although many authors consider *Spirocamallanus* Olsen, 1952 a distinct genus, we agree with Moravec and Sey (1988) in considering *Spirocamallanus* a subgenus of *Procamallanus*. This subgenus is characterized by the presence of a buccal capsule with internal spiral thickening in both males and females (Moravec and Thatcher, 1997). Spirocamallanids are equally dominated in Asia and South America and also found in North America, Africa and Australia. The transmission and development of this genus has been little studied but a number of species in fish have been investigated. But it is not relevant to mention all the species of *Procamallanus* (*Spirocamallanus*) from all geographical zones.

The species described from Karachi coast, Pakistan are *Procamallanus* (*Spirocamallanus*) *spiralis* (Khan and Begum, 1971) from *Tachysurus caelatus*; *P.(S.) pereirai*

(Rasheed, 1970) from variety of marine fish; *P.(S.) dussumieri* (Bilqees et al., 1971) from *Jhoniussussumeieri*; *P.(S.) sihamai* (Khan and Begum 1971) from *Sillago sihama*; *P.(S.) crossohombii* (Zaidi and Khan, 1975) from *Crossorhombus azureus*; *P.(S.) sparus* (Akram, 1975) from *Argyrops spinifer*; *P.(S.) otolithi* (Ashraf et al., 1977) from *Otolithus argenteus*; *P.(S.) wallagus* (Rehana and Bilqees, 1973) from *Wallago attu* in Sindh. (Akhtar and Mujib, 2010) reported *Procamallanus* (*Spirocamallanus*) *riaziai* n.sp. from marine fish *Otolithus ruber* (Sciaenidae).

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