Report of *Thecacineta calix* (Ciliophora: Suctoria) on nematode *Desmodora* from the intertidal sediments of Southwest Bay of Bengal


Environment & Safety Division, Indira Gandhi Centre for Atomic Research, Kalpakkam, India- 603102

1Schmalhausen Institute of Zoology, B. Khmelinitsky str., 15, 01601, Kiev, Ukraine

*E Mail: snpanigrahi@yahoo.com*

Received 14 October 2013 ; revised 18 December 2013

*Thecacineta calix*, a suctorian epibiont, attached to the cuticle of nematodes, *Desmodora schulzi* and *D. communis* are reported from the mid tide mark of the intertidal sediments of southwest Bay of Bengal. The epibiont *T. calix* is reported for the first time from the intertidal zone of Bay of Bengal.

**Keywords:** Epibiont, Suctoria, Ciliate, Desmodora, *Thecacineta calix*, Bay of Bengal, Intertidal

**Introduction**

Suctorians are sessile ciliates which feed by extracellular digestion and lack cilia in the adult phase. They usually feed by suction and by use of specialized microtubules and toxic extrusomes at the tip to ensnare and manipulate their prey. These sessile suctorians often live as epibionts on a variety of species of aquatic metazoans viz. sponges, crustaceans, nematodes, polychaetes, mollusks and vertebrates like fishes, tadpoles, and turtles. Epibionts constitute a significant component of aquatic ecosystems and play an important role in the food chain. In marine environments they were noticed as epibionts on benthic invertebrates like harpacticoid copepods, nematodes, halacarid mites etc. A number of suctorian ciliate ectocommensals have been observed occurring on the cuticle of various members of family Desmodoridae. As a part of marine and benthic biodiversity study in the vicinity of a nuclear power plant, in the southwest Bay of Bengal (Fig. 1), sediment and intertidal benthic fauna was collected. In the present investigation, we report suctorian ciliate as an epibiont on the cuticle of two nematode species, *Desmodora schulzi* and *Desmodora communis* belong to the family Desmodoridae separated from the intertidal region of Southwest Bay of Bengal (Fig. 1).

Conscientious microscopic observations revealed suctorian epibionts are conspecific with *Thecacineta calix*. *T. calix* is reported here for first time from the Bay of Bengal intertidal sediment.

**Materials and Methods**

During the investigations on the benthic faunal diversity, sediment samples from the intertidal region of the south west Bay of Bengal has been collected. Samples were collected from the low tide, mid tide and high tide mark regions of the intertidal region of Tamilnadu coast (Southwest Bay of Bengal) during 2011-12. Samples were collected from a stretch of 20 KM using a hand hold corer from the upper few centimeters of the tidal exposed area of the beach. The beach is more used by tourist and local fishermen dwell in the surrounding villages and a
nuclear power plant is being operational in the vicinity. Sediment samples were sieved through 500 and 40 µm sieves to get the meio-benthic forms (40-500 µm) separated. On the process of sieving the meio-benthic forms were narcotized and further preserved in 5% formalin. Nematodes were identified to genera and species level according to the available identifying keys and recent online literature (www.nemys.ugent.be). Zeiss Axio-observer A1 microscope attached with Jenoptik ProgRes® CFScan camera and CapturePro software was used for the identification purpose. Measurement of the ciliates and nematodes were made using the image analysis software. Slides were prepared by staining the organism with Boehmer’s haematoxylin solution and mounted in Canada balsam. Permanent slides of the basibiont and the suctorian epibiont were deposited in the collections of the museum of marine organisms at Indira Gandhi Centre for Atomic Research, Kalpakkam, India.

**Results and Discussion**

The detailed taxonomic study of the suctorian revealed that they belong to the ectocommensal *Thecacineta calix*17. *T. calix*, a marine loricate suctorian ciliate with a single apical fascicle of tentacles, was first described from marine nematodes17. Subsequently, Collin18 combined all known species that had a similar morphology into the genus *Thecacineta*. Later, Matthes15 investigated *T. calix* as epibionts on harpacticoid copepode *Laophonte cornuta* from the Mediterranean Sea. This epibiont is also reported from various meio-benthic organisms such as halacarid mites, harpacticoid copepods and nematodes. Earlier *T. calix* was reported as an epibiont on nematodes, crustacean copepods, halacarid mites from the Atlantic, Pacific, Indian Ocean (Andaman Sea and Arabian Sea) and Antarctic Ocean19.

The epibiont was seen associated with nematode species *Desmodora schulzi* and *D. communis*, both belonging to the family Desmodoridae and order Chromadoridae. The basibiont used for this study was collected, separated and isolated from the mid-tide mark of the intertidal sediment from several transects stretching a north-south gradient of 20 Km. A total number of 217 individuals of nematoda belonging to 44 different species were collected from the intertidal zone and adjacent near shore water. These species were belonging to order Chromodoridae (20 no), Monohysteridae (13 no) and Enoplidae (11 no). Out of the total nematode, four were belonged to the family Desmodoridae (*Desmodora communis, D.schulzi, D.sphaerica, D. tenuispiculum*). There were 14 specimens of *Desmodora communis*, 8 specimen of *Desmodora schulzi*, 3 specimen of *Desmodora sphaerica* and 5 specimen of *Desmodora tenuispiculum* reported out of 217 specimens of nematodes. Among the 14 specimens of *D. communis*, two were infested and 3 individuals of *D. schulzi* out of 8 individuals were infested with suctorians. It was important to note that all infested organisms are male and the suctorians are attached uniformly throughout the body (Fig. 2A) unlike other observations made by Ingole et al.20. It was noticed that a maximum of 21 no of *Thecacineta calix* were observed on *Desmodora communis* with a preference of the ciliate to this particular species, from the present study area.

**Fig. 2 (A)-Thecacineta calix** attached with *Desmodora schulzi* from the intertidal sand on southwest Bay of Bengal.

**Systematics**

Classification followed by Dovgal21

Class SUCTOREA Clapared et Lachmann, 1859
Subclass VERMIGENIA Jankowski, 1978
Order SPELAEOPHYRIDA Jankowski, 1978
Family THECACINETIDAE Matthes, 1956
Genus *Thecacineta* Collin, 1909

*Thecacineta calix* (Schroder, 1907) (Figure 2b & 2c) = *Acineta calix* Schroder
= *Thecacineta desmodorae* Schulz
= *Thecacineta subantarctica* Allgen
Thecacineta donsi Allgen
= Thecacineta paradesmodorae Allgen
= Thecacineta laophontis Jankowski
= Paracineta moebiusi Kahl

Fig. 2(B & C)-Magnified view Thecacineta calix attached with Desmodora from the Bay of Bengal.

**Diagnosis**

Marine loricate, suctorian, cell body entirely fills the lorica and attached to their bottom. Lorica totally ribbed transversely. Apical part of body protrudes beyond lorica aperture. Up to 30 clavate tentacles with length about 90 μm arise from upper body surface. Macronucleus is large, oviform, located at the bottom of the cell body. With large contractile vacuole placed in basal body part usually near macronucleus.

**Body measurement**

Measurement (in μm) of five individuals using the materials from the intertidal beach sediments of southeast coast of India (Bay of Bengal) from the nematode (Desmodora schulzi) host are as follows. Lorica height 72.83 – 83.16 μm (75–105 μm after Matthes15; 44–60 μm after Ingole et al.20), loria width 32.93 - 38.61 μm (39–53 μm after Matthes15; 25-26 μm after Ingole, et al.20), body length 87.40 – 92.66 μm, body width 22-28 μm, diameter of loria aperture 19-25 μm (18–30 μm after Matthes15), macronucleus diameter 9.7–11.4 μm (6–8 in nematode host after Ingle et al.20; 13–16 μm in copepod host after Matthes15), stalk length 11.65 – 14.61 μm (10–33 μm after Matthes15), stalk diameter 15-2 μm. Reproduction by vermigemmy with formation of single larval stage (swarmer), devoid of ciliature and crawling over the substrate.

**Distribution and host specificity**

Thecacineta calix has been found attached as an epibiont to a different nematodes, crustacean harpacticoid copepods, halacarid mites from different marine habitats viz. Atlantic, Pacific, Antarctic and Indian Oceans (Andaman Sea and Arabian Sea)17,22,13,14,15,23,11,20,19. Among nematodes T. calix has been reported as epibiontic on Desmodora campbelli, D. microchaeta, D. odhneri, D. reducta, D. stateni, D. sphaerica, D. pontica, Acanthopharynx japonicas, Episolenema symbioticum, E. pocillothrix and Paradesmodora sp17,24,22,25,15,26,27,20. However, in the present study, for the first time T. calix is reported to be associated with the nematode species D. schulzi and D. communis from the intertidal sediments of Bay of Bengal.

**Remarks**

From Indian Ocean, Thecacineta calix was previously reported from the Andaman Sea during 200720. The epibiont was attached to the cuticle of two nematode species, Desmodora sphaerica and D. pontica, isolated from the deep sea sponge (Pheronema sp). Ingle et al.20 has inferred that suctorians were attached close to the cloaca of the nematodes which probably help during reproduction of thecacinetid suctorians (T. calix), by vermigemmic budding. However, the present investigation indicated the attachment of Thecacineta in the anterior region of the basibiont Desmodora, more specifically in the anterior half of the body. Thecacineta calix usually prefers the marine environment and is rarely reported from the intertidal region. It indicates the ability of the epibiont to withstand the churning and disturbances of the tidal fluctuation. The tidal height of the region usually falls between 1-2 m. The growing report of attachment of Thecacineta
calix to the genera Desmodora is not clearly known. Preference of Thecacineteta calix to have a desmodorae host specially the genera Desmodora indicates the physical characteristics of Desmodoridae. We presume that the relatively larger body shape and the cuticle arrangements of Desmodora attract the epibiont.

Acknowledgement

Authors are grateful to Director, Indira Gandhi Centre for Atomic Research, Kalpakkam for providing facilities and encouragement to carry out the above research work.

References