

New records of epibiont *Thecacineta calix* (Ciliophora, Suctorina) from the Caspian Sea and Angria Bank, Arabian Sea

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Abstract:

The suctorian *Thecacineta calix* is reported from an abandoned exploration well of North Caspian Sea and from Angria Bank, India, Arabian Sea as epibiont on halacarid mites and nematodes, respectively. This is the first report of *T. calix* from both the Caspian Sea and the Angria Bank of Arabian Sea.

Résumé : Le suctorien *Thecacineta calix* a été signalé dans un puits d'exploration abandonné du nord de la mer Caspienne et du banc Angria, en Inde, dans la mer d'Arabie sous forme d'épibionte sur des acariens halacarides et des nématodes, respectivement. Ceci est le premier signalement de *T. calix* provenant à la fois de la mer Caspienne et de la rive Angria de la mer d'Arabie.

Key words: ciliate, suctorian, epibiont, *Thecacineta calix*, Caspian Sea, Arabian Sea

Introduction

Suctorian ciliates are common epibionts of marine meiobenthic fauna such as nematodes, halacarid mites, herpacticoid copepods, kinorhynchs etc. (eg., Precht 1935; Jankowski 1981, 2007; Dovgal 1996, 2002; Dovgal *et al.* 2008a, b, 2009a, b; Fernandez- Leborans & Tato-Porto 2000a, b, c; Ingole *et al.* 2010; Fernandez-Leborans *et al.* 2012; Chatterjee *et al.* 2012, 2013a, b, c, 2014a, b, 2018, 2019)

Thecacineta calix, a marine loricate suctorian ciliate with a single apical fascicle of tentacles, was described from marine nematodes (Schröder 1907) as *Acineta calix*. Subsequently Collin (1909) combined all known species that had a similar morphology into the genus *Thecacineta*. Detailed remarks on the systematics and nomenclature of this species are provided in Dovgal *et al.* (2008a).

We report the suctorian *T. calix* from an abandoned exploration well of the North Caspian Sea and from Angria Bank of Arabian Sea, India. The ciliate was observed as epibiont on halacarid mites in Caspian Sea and nematodes in Angria Bank. This is the first report of *T. calix* from the Caspian Sea and second find of epibiont suctorian on halacaridmites in the Caspian Sea. It is also first record of this species from Angria Bank.

Study area

Study area 1: Khvalynskoe - In August 2016, meiobenthos were collected from 15 abandoned exploration oil wells of the group “Khvalynskoe” in Northern Caspian Sea (Sergeeva & Vodovsky 2018 *in press*). The collection site (44°21'05.43" N, 49°02'05.57" E) where the suctorians were found is about 240 km away from Astrakhan City of Russia (Fig. 1). The depth of the collection place was 27m, salinity of water was 10.2‰, pH was 9.1 and dissolved O₂ was 7 ml/L.

Study area 2: Angria Bank - It is a newly discovered submerged bank along with west coast of India (Arabian Sea) which is located (collection site 16°37'19.92" N, 72°04'45.65" E) approximately 130 km offshore from the coast of Vijaydurg, Maharashtra, India (Fig. 2). This submerged plateau is known to harbour rich corals reefs and associated biota. Although there are diving teams visiting the site, the region remains, scientifically, one of the least explored reef ecosystem of India. The depth of the collection place was 58m, salinity of water was 35.4‰, pH was 8.2, and water temperature was 28.2°C (sample collected in February 2018).

Material and methods

Meiobenthic samples were sieved in the laboratory using 45 µm mesh size sieve. Infested meiofauna were hand sorted, mounted on a 50% glycerine slide and sealed with DPX.

Five specimens of *T. calix* were found in the Khvalynskoe, northern Caspian Sea attached to the surface body of one individual of halacarid mite *Halacarellus* sp. (Figs. 3 & 4). Three individuals were attached on a nematode collected from the Angria Bank (Arabian Sea) (Figs. 5 & 6).

The systematic position of suctorian ciliates follows Dovgal (2002 & 2013). Measurements were carried out on four specimens using the program Toup View 3.7 for digital camera. Specimens from Caspian Sea are kept in the collection of the fourth author (NS) and specimens from Angria Bank are kept in the collection of the second author (MN).

Results and Discussion

Class Suctorea Claparéde & Lachmann, 1859

Subclass Exogenia Collin, 1912

Order Vermigemmidia Jankowski, 1973

Family Thecacinetidae Matthes, 1956

Genus *Thecacineta* Collin, 1909

Thecacineta calix (Schröder, 1907) (Figs. 3-6)

= *Acineta calix* Schröder, 1907

= *Acineta crenata* Moebius, 1888

= *Paracineta crenata* (Moebius, 1888)

= *Paracineta moebiusi* Kahl, 1934

= *Thecacineta desmodorae* Schulz, 1931

= *Thecacineta donsi* Allgén, 1935

= *Thecacineta subantarctica* Allgén, 1949

= *Thecacineta paradesmodorae* Allgén, 1949

= *Thecacineta oblonga* Allgén, 1955

= *Thecacineta laophontis* Jankowski, 1981

Diagnosis: Marine loricate suctorian. Cell body entirely fills the lorica and attach to its base. Lorica ribbed with a series of transverse annular ridges that become progressively closer toward the base. Apical part of body protrudes beyond lorica aperture. Up to 30 clavate tentacles with length about 90 µm arise from apical surface of body. Stalk with various length, from one fourth to the same length as

lorica. Macronucleus ovoid, located in the basal region of the cell body. Large contractile vacuole located in basal region of body usually near macronucleus.

Morphometric measurements: Morphometric measurements of specimens of *Thecacineteta calix* observed in the present study:

North Caspian Sea specimens -- Length of lorica 88-96 μ m; width of lorica 23-28 μ m; stalk length 71-101 μ m; stalk diameter 3-3.5 μ m.

Angira Bank specimens -- Length of lorica: 58-70 μ m; Width of lorica: 32-41 μ m; Length of body: 59-72 μ m; Width of body: 21-27 μ m; Stalk length: 12 μ m; Stalk diameter: 1.5 μ m; Macronucleus diameter: 7-17 μ m; Length of tentacles: 6-19 μ m.

Distribution and Host Specificity: *Thecacineteta calix* has been reported as an epibiont on nematodes, copepods, and halacarid mites from the Atlantic, Pacific, Antarctic and Indian Oceans, from the intertidal region to the deep sea. Table 1 shows the basibiont with localities of *T. calix* and map (Fig. 7) shows the world distribution of this species.

Remarks: Charubhun & Charubhun (2000) reported this species from a freshwater system in Thailand; however, this record needs confirmation because *T. calix* is otherwise only known from marine environments (Chatterjee *et al.*, 2012, 2014b).

This species has been reported from a widely distributed area, whether all these records belong to the same species or comprise of a closely related species complex should be resolved with molecular markers (Chatterjee *et al.* 2014a).

It may be mentioned that the length of stalk could depend on the host group. Hence, the length of stalk in individuals from halacarid mites is about the same length as the length lorica (Figs. 3 & 4), whereas in specimens from nematode hosts the stalks have length about one fourth of the lorica length (Figs. 5 & 6).

Susetiono (2006) commented that heavily infested basibionts *Paradesmodora* sp. by *T. calix* have decreased movement capabilities which were also reported in Chatterjee (1996) and Chatterjee *et al.* (2018). Chatterjee (1996) commented that the ciliate infestation on meiofauna might affect the competitive ability, locomotion etc. of the infested specimens and Chatterjee *et al.* (2018) reported that the locomotion speed of a ciliate infested (heavily infested on legs) halacarid mite was very slow compared with non-infested individuals of the same species.

We found that *T. calix* does not show host specificity. From the literature survey (see Table 1), it seems that this species prefer small invertebrates as hosts, although it is predominately found on

nematodes and halacarid mites. Only in one case (Martínez-Murillo, 1997) this species was reported on algae.

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References

- Abé H. 1997.** Halacarid mites of the genus *Actacarus* (Acari: Halacaridae) from Hokkaido, Northern Japan. *Species Diversity*, **2**: 31-42.
- Allgén C.A. 1935.** Über eine neue, epizoisch auf einer *Desmodora* (Nematodes) lebende Art der Gattung *Thecacinetia* Collin, *Th. donsi* n. sp. aus der Strandregion bei Tarva (Norwegen). *Det Konglige Videnskabers Selskab Forhandling*, **8(16)**: 51-53.
- Allgén C.A. 1949.** Über zwei neue subantarktische Suctorien. *Archiv für Zoologie*, **42**: 1-3.
- Allgén C.A. 1955.** Die Suctorien der schwedischen Sudpolar-Expedition (1901–1903). *Zoologischer Anzeiger*, **154**: 36-48.
- Ansari K.G.M.T, Guidi L., Dovgal I., Balsamo M. & Semprucci F. 2017.** Some epibiont suctorian ciliates from meiofaunal organisms of Maldivian archipelago with description of a new ciliate species. *Zootaxa*, **4258 (4)**: 375-387.
- Bartsch I. 1989.** *Copidognathus brifacius* n. sp. (Halacaridae, Acari) und Bemerkungen zu weiteren Bewohnern des Seeigels *Spatangus purpureus* (Echinoidea). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut*, **86**: 315-328.
- Bartsch I. 1998.** Halacarinae (Acari, Halacaroida) from the northwestern Black Sea: A review. *Mitteilungen aus dem Hamburgischen zoologischen Museum Institut*, **95**: 143-178.
- Bartsch I. 2015.** *Thalassarachna basteri* and *T. affinis* (Acari, Halacaridae), history, characters, biology, and distribution. *Ecologica Montenegrina*, **2 (3)**: 228-241.
- Bartsch I. & Dovgal I.V. 2010.** A hydrothermal vent mite (Halacaridae, Acari) with a new *Corynophrya* species (Suctorina, Ciliophora), description of the suctorian and its distribution on the halacarid mite. *European Journal of Protistology*, **46(3)**: 196-203
- Charubhun B. & Charubhun N. 2000.** Biodiversity of freshwater Protozoa in Thailand. *Kasetsart Journal (Natural Science)*, **34**: 486-494.
- Collin B. 1909.** Diagnoses préliminaires d'Acinétiens nouveaux ou mal connus, *Comptes rendus hebdomadaires des séances de l'Académie des sciences*, **149**: 1094-1095.
- Chatterjee T. 1996.** Ciliate infestation on the phytal Halacaridae (Acari) from the Kovalam beach, Kerala. *Journal of the Bombay Natural History Society*. **93**: 107-108.

- Chatterjee T., Fernandez-Leborans G. & Chan B.K.K. 2012.** New record of ciliate *Thecacineta calix* (Ciliophora: Suctorea) epibiont on *Agauopsis* halacarid mite (Acari, Halacaridae) from Taiwan. *Scripta Scientarium Naturalium*, **2**: 121-127.
- Chatterjee T., Fernandez-Leborans G., Ramteke D. & Ingole B. 2013a.** New records of epibiont ciliates (Ciliophora) from Indian coast with descriptions of six new species. *Cahiers de Biologie Marine*, **54**: 143-159.
- Chatterjee T., Fernandez-Leborans G. & Senna A.R. 2013b.** Ciliate epibionts on *Melita petronio* Senna *et al.*, 2012 (Crustacea: Amphipoda) from Brazil. *Cahiers de Biologie Marine*, **54**: 393-404.
- Chatterjee T., Kotov A. & Fernandez-Leborans G. 2013c.** A checklist of epibiotic ciliates (Peritrichia and Suctoria) on the cladoceran crustaceans. *Biologia*, **68 (3)**: 439-477.
- Chatterjee T., Fernandez-Leborans G. & Schizas N.V. 2014a.** Report of *Thecacineta calix* (Ciliophora: Suctorea) as an epibiont of harpacticoid copepods from Caribbean mesophotic reefs. *Caribbean Journal of Science*, **48**: 44-48.
- Chatterjee T., Fernandez-Leborans G. & Marshall D.J. 2014b.** New records of ciliate epibionts (Ciliophora: Suctorea) from Brunei Darussalam. *Marine Biodiversity Records*, **7(e87)**: 1-4. <https://doi.org/10.1017/S1755267214000943>
- Chatterjee T., Dovgal I., Péšic V. & Zawal A. 2018.** A checklist of epibiont suctorian and peritrich ciliates (Ciliophora) on halacarid and hydrachnid mites (Acari: Halacaridae & Hydrachnidia). *Zootaxa*, **4457(3)**: 415-430. <https://doi.org/10.11646/zootaxa.4457.3.4>
- Chatterjee T., Nanajkar M. & Dovgal I. 2019.** New record of *Loricophrya stresemanni* (Ciliophora, Suctorea) as epibiont on nematodes from the Indian Ocean and notes on the genus *Loricophrya*. *Cahiers de Biologie Marine*, **60(3)**: (In Press).
- Dovgal I.V. 1996.** Keys for identification of tentaculous infusoria (Ciliophora, Suctoria) of the Ukrainian fauna. *Vestnik Zoologii, Supplement*, **2**: 1-42.
- Dovgal I.V. 2002.** Evolution, phylogeny and classification of Suctorea (Ciliophora). *Protistology*, **24**: 194-270
- Dovgal I.V. 2013.** Fauna of Ukraine. Vol. 36. Ciliates—Ciliophora. Issue 1. Class Suctorea. Naukova dumka, Kiev, 267 pp.
- Dovgal I., Chatterjee T. & Ingole B. 2008a.** Suctorian ciliates (Ciliophora, Suctorea) as epibionts of halacarid mites (Acari: Halacaridae): an overview. *Zootaxa*, **1810**: 60-68.
- Dovgal I., Chatterjee T., Ingole B. & Nanajkar M. 2008b.** First report of *Limnoricus ponticus* Dovgal and Lozowskiy (Ciliophora, Suctorea) as epibionts on *Pycnophyes* (Kinorhyncha) from Indian Ocean with key to species of the genus *Limnoricus*. *Cahiers de Biologie marine*, **49 (4)**: 381-385.
- Dovgal I., Chatterjee T. & Ingole B. 2009a.** New records of *Thecacineta cothurnoides* and *Trematosoma rotunda* (Ciliophora, Suctorea) as epibionts on nematodes from Indian Ocean. *Protistology*, **6(1)**: 9-23.

- Dovgal I., Chatterjee T., Subba Rao D.V., Chan B.K.K. & De Troch M. 2009b.** New Records of *Prathecacineta halacari* (Schulz) (Suctorea: Ciliophora) from Taiwan, Tanzania and Canada. *Marine Biodiversity Records*, **2(e136)**: 1-3. <https://doi.org/10.1017/s175526720999056x>
- Fernandez-Leborans G. & Tato-Porto M.L. 2000a.** A review of the species of protozoan epibionts on crustaceans. I. Peritrich ciliates. *Crustaceana*, **73**: 643-683. <https://doi.org/10.1163/156854000504705>
- Fernandez-Leborans G. & Tato-Porto M.L. 2000b.** A review of the species of protozoan epibionts on crustaceans. I. Suctorian ciliates. *Crustaceana*, **73**: 1205-1237. <https://doi.org/10.1163/156854000505209>
- Fernandez-Leborans G. & Tato-Porto M.L. 2000c.** Presence of two suctorian ciliate species of the genera *Acineta* and *Pelagacineta*, epibionts on marine copepod crustaceans. *Cytobios*, **103**: 139-148.
- Fernandez-Leborans G., Chatterjee T. & Grego M. 2012.** New records of epibiont ciliates (ciliophora) on Harpacticoida (Copepoda, Crustacea) from the Bay of Piran (Gulf of Trieste, Northern Adriatic). *Cahiers de Biologie marine*, **53**: 53-63.
- Gelmboldt M.V. & Dovgal I.V. 2005.** The new finds of suctorian ciliates (Ciliophora, Suctorea) at the halacarid mites (Acari, Halacaridae) from the Ukrainian coast of the Black Sea. *Vestnik Zoologii, Supplement*, **19**: 85-86.
- Ingole B., Singh R., Sautya S., Dovgal I. & Chatterjee T. 2010.** Report of epibiont *Thecacineta calix* (Ciliophora, Suctorea) on deep sea *Desmodora* (Nematoda) from the Andaman Sea, Indian Ocean. *Marine Biodiversity Records*, **3(e46)**: 1-3. <https://doi.org/10.1017/S1755267209990777>
- Jankowski A.V. 1981.** New species, genera and families of tentacled infusoria (class Suctoria). *Proceedings of the Zoological Institute*, **107**: 80-115.
- Jankowski A.V. 2007.** Review of taxa Phylum Ciliophora Doflein, 1901. In: Alimov, A.F. (Ed.), *Protista: Handbook on Zoology*. Pt. 2. Nauka, St. Petersburg, pp. 415-993.
- Kahl A. 1934.** Suctoria. In: Grimpe, G. & Wagler, E (Eds.). *Die Tierwelt der Nord- und Ostsee*. Lief. 26 (Teil II, C4), Leipzig, pp. 184-226.
- Martinez-Murillo, M.E. 1997.** Ciliados asociados a la vegetacion sumergida y a las raices de mangle en la Laguna de Tamiahua, Veracruz, México. – Ph. D. Thesis. Facultad de Ciencias, Universidad Nacional Autonoma de México. 264pp.
- Matthes D. 1956.** Suktorienstudien VIII. *Thecacineta calix* (Schröder, 1907) (*Thecacinetidae* nov. fam.) und ihre Fort pflanzung durch Vermoid-Schwärmer. *Archiv für Protistenkunde*, **101**: 477-528.
- Moebius K. 1888.** Bruchstücke einer Infusorienfauna der Kieler Bucht. *Archiv für Naturgeschichte*, **54**: 81-116.

- Panigrahi S., Bindu V.K., Bramha S.N., Samantara M. K., Mohanty A. K., Satpathy K.K. & Dvlgal I. 2015.** Report of *Thecacineta calix* (Ciliophora: Suctoria) on nematode *Desmodora* from the intertidal sediments of Southwest Bay of Bengal. *Indian Journal of Geo-Marine Science*, **43(12)**: 1840-1843
- Precht H. 1935.** Epizoen der Kielr Bucht. *Nova Acta Leopoldina Halle*, **3**: 405–474.
- Schröder O. 1907.** Die Infusorien der Deutschen Sudpolar-Expedition 1901–1903. In: von Drygalski, E. (Ed.), Deutschen Sudpolar-Expedition 1901–1903, **9**: 349-360.
- Schulz E. 1931.** Beitrage zur Kenntnis marinen suctorien I. *Zoologischer Anzeiger*, **96**: 95-99.
- Steiner G. 1931.** Die Nematoden der Deutschen Sudpolar-Expedition 1901-1903. In: von Drygalski, E. (Ed.), Deutschen Sudpolar-Expedition 1901-1903, **20**: 167-216.
- Sergeeva N.G. & Vodovsky N.B. 2018.** Meiobenthos of abandoned oil wells in the north Caspian Sea. *Joint Meeting and Field Trip of IGCP 610 and INQUA POCAS Focus Group, Antalya, Turkey, 14-21 October 2018*. (In Press)
- Susetiono P. 2006.** Epibiosis *Thecacineta calix* (protozoa, ciliophora) pada meiofauna *Paradesmodora* sp. (Nematoda, Desmodoridae) dari perairan Indonesia. *Oseana*, **31**: 41-49.
- Wailles G.H. 1943.** Protozoa et suctoria. *Canadian Pacific Fauna*, **1**: 1-46.

Legend for Figures & Table:

Figure 1: Map of sampling location in the Caspian Sea.

Figure 2: Map of sampling location in the Angria Bank, Arabian Sea.

Figures 3-6: Suctorian *Thecacineta calix* (Schröder, 1907) epibiont on a halacarid mite (Figs. 3 & 4) from an abandoned exploration well of North Caspian Sea and on a nematode (Figs. 5 & 6) from Angria Bank, Arabian Sea- India. Scale Bars: 3 & 5 = 100 µm; 4 & 6 = 50 µm.

Figure 7. Distribution of *Thecacineta calix* (Schröder, 1907) : locations : 1= Kerguelen Islands, Antarctica; 2 = Kiel Bay, Germany; 3 = Island of Heard, Antarctica; 4 = Tarva, Norway; 5 = Koprino harbour, Quatsino sound, Pacific coast of Canada; 6 = Tierra Del Fuego; 7 = Falkland Islands; 8 = Adriatic Sea, Mediterranean Sea; 9 = Veracruz, Mexico; 10 = Odessa, Black Sea; 11= Siladeu and Nias Islands, Indonesia; 12 = Sevastopol, Black Sea; 13 = North Sea; 14 = Hokkaido, Japan; 15 = Near Andaman & Nicobar Islands; 16 = He-Ping-Dao, Taiwan; 17 = Bay of Piran, Gulf of Trieste, North Adriatic, Slovenia; 18 = East St. John, U.S. Virgin Islands; 19 = Caja de Muertos Island; 20 = Buoy, La Parguera, Puerto Rico; 21 = Pulau Bedukang , Brunei Darussalam; 22 = Tamil Nadu, India; 23 = Brittany, France; 24 = Suvadiva atoll, Maldives; 25 = Northern Caspian Sea; 26 = Angria Bank, Arabian Sea.

Table 1. Basibionts with localities of *Thecacineteta calix* (Schröder, 1907).

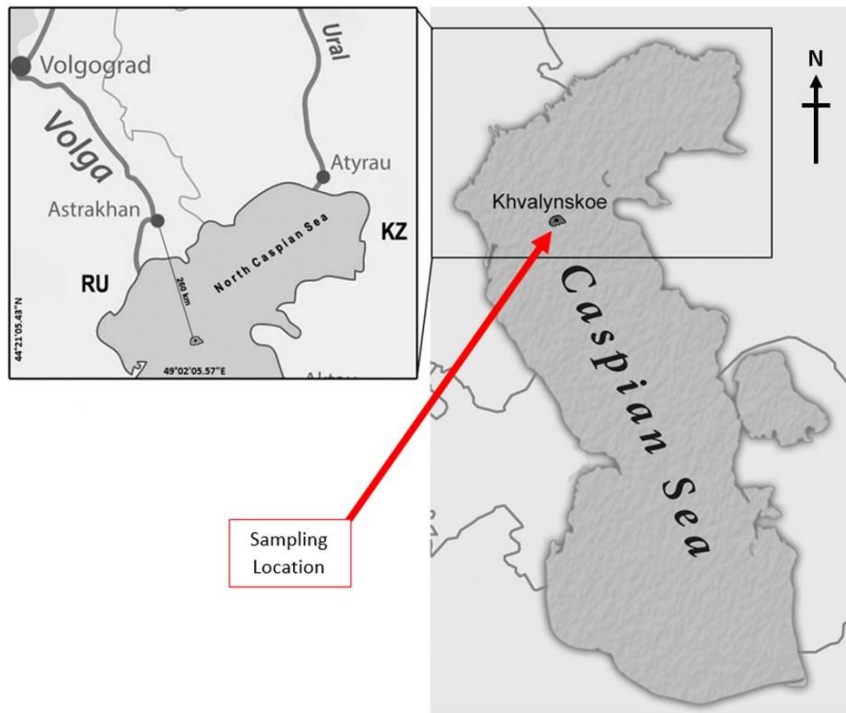


Figure 1

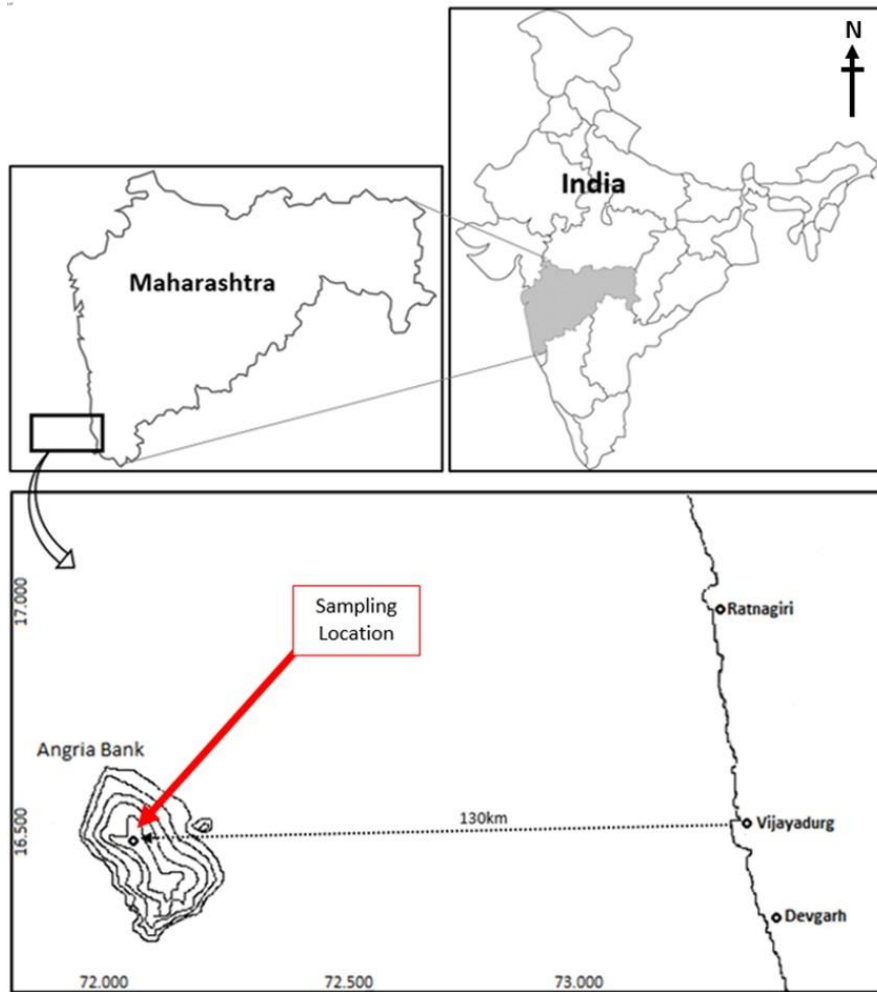


Figure 2

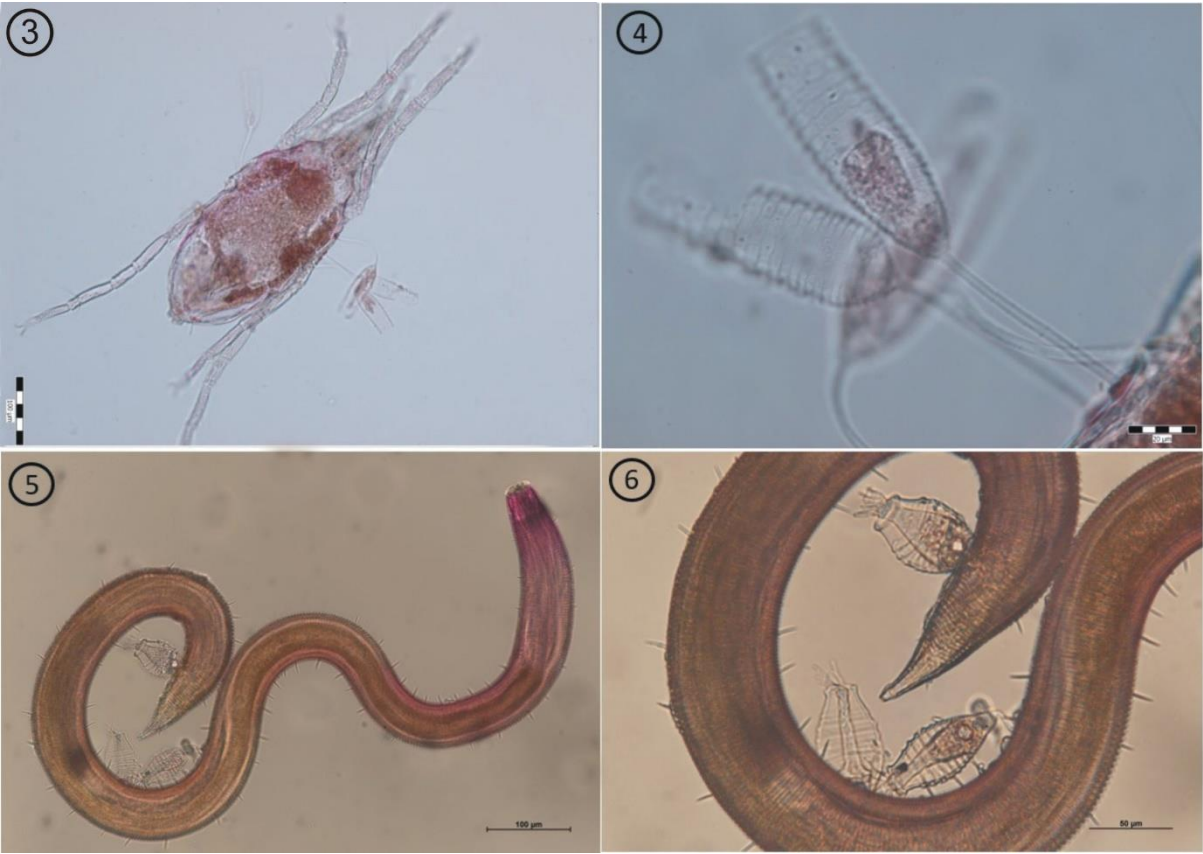


Figure 3-6

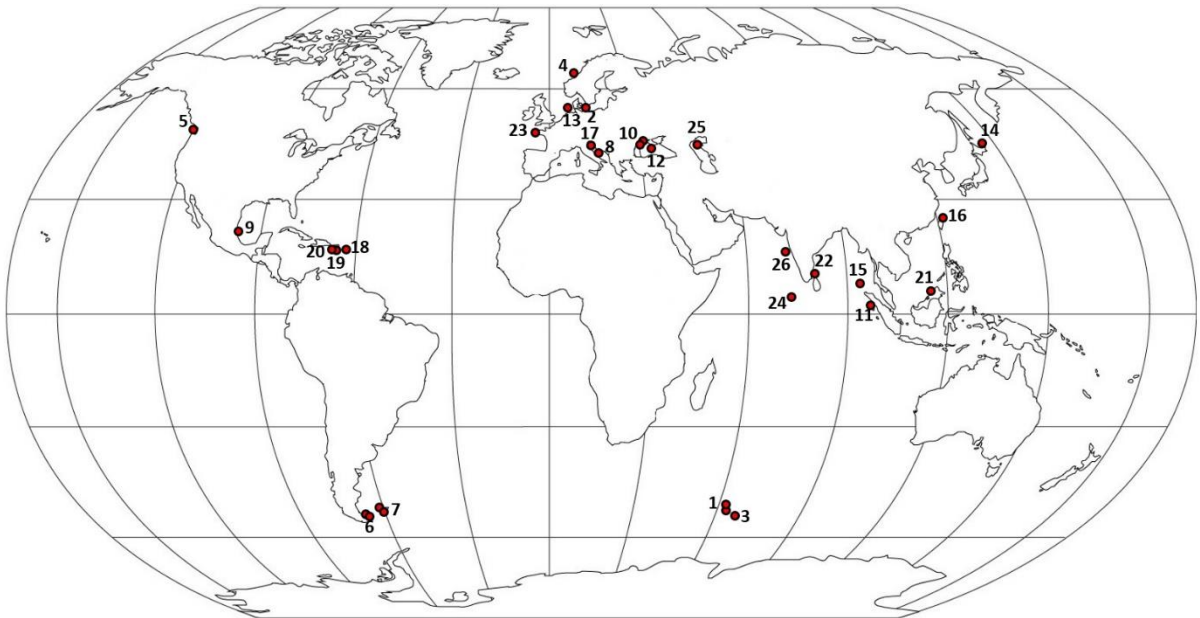


Figure 7

Table 1

<i>Basibiont (Host)</i>	Locality	Reference	Remarks
Nematode	Kerguelen Islands, Antarctica (Fig. 7 location: 1)	Schröder (1907)	Epibiont reported as <i>Acenita calix</i>
Halacarid mite <i>Halacarus</i> sp. (?)	Kiel Bay, Germany (Fig. 7 location: 2)	Moebius (1888)	Epibiont reported as <i>Acineta crenata</i> Moebius, 1888; Kahl (1934) renamed this species as <i>Paracineta moebiusi</i>
Nematode worm <i>Desmodora</i> sp	Island of Heard (?), Antarctica (Fig. 7 location: 3)	Schulz (1931)	Epibiont reported as <i>Thecacineta desmodorae</i> Schulz, 1931
Nematode <i>Mastodex kerguelensis</i> Steiner, 1921- <i>taxon inquirendum</i>	Kerguelen Islands, Antarctica (Fig. 7 location: 1)	Steiner (1931) (cf. Matthes, 1956)	<i>T. calix</i> misidentified as tintinnid ciliate
Nematode <i>Desmodora</i> sp.	Tarva, Norway (Fig. 7 location: 4)	Allgén (1935)	Epibiont reported as <i>Thecacineta donsi</i> Allgén, 1935
Copepod <i>Microsetella rosea</i> (Dana, 1947)	Koprino harbour, Quatsino sound, Pacific coast of Canada (Fig. 7 location: 5)	Wailes (1943)	Epibiont reported as <i>Paracineta crenata</i> (Moebius, 1888)
Nematode <i>Desmodora campbelli</i> (Allgén, 1932) - <i>taxon inquirendum</i> .	Tierra Del Fuego (=Feuerland) (Fig. 7 location: 6) and Falkland Islands (Fig. 7 location: 7)	Allgén (1949)	Epibiont reported as <i>Thecacineta subantarctica</i> Allgén, 1949
Nematode <i>Croconema stateni</i> Allgén, 1928 (= <i>Desmodora stateni</i> Allgén, 1928)	Falkland Islands (Fig. 7 location: 7)	Allgén (1949)	Epibiont reported as <i>Thecacineta paradesmodorae</i> Allgén, 1949
Nematode <i>Croconema stateni</i> Allgén, 1928 (= <i>Desmodora stateni</i> Allgén, 1928)	Tierra Del Fuego (=Feuerland) (Fig. 7 location: 6)	Allgén (1955)	Epibiont reported as <i>Thecacineta oblonga</i> Allgén, 1955
Harpacticoid copepod <i>Laophonte cornuta</i> Philippi, 1840	Adriatic Sea (Mediterranean Sea) (Fig. 7 location: 8)	Matthes (1956)	Matthes (1956) wrote that he investigates the <i>T. calix</i> during a three-week stay at the Institute of Marine Biology in Rovinj (Croatia). Hence the locality might be mentioned as the Adriatic Sea

Algae <i>Enteromorpha flexuosa</i> (Wulfen) J. Agardh, 1883	Tamiahua lagoon (near Tampache), Veracruz, Mexico (Fig. 7 location: 9)	Martínez-Murillo (1997)	
Halacrid mite <i>Halacarellus</i> sp.	Odessa, Black Sea (Fig. 7 location: 10)	Gelmboldt & Dovgal (2005)	
Nematode <i>Paradesmodora</i> sp.	Siladeu and Nias Islands, Indonesia (Fig. 7 location: 11)	Susetiono (2006)	
Halacarid mite <i>Halacarellus micropectinatus</i> Bartsch, 1972	Sevastopol, Black Sea (Fig. 7 location: 12)	Dovgal <i>et al.</i> (2008a)	Dovgal <i>et al.</i> (2008a) identified ciliates based on Fig. 90 of Bartsch (1998)
Halacarid mite <i>Copidognathus fabricii</i> (Lohmann, 1889)	North Sea (Fig. 7 location: 13)	Dovgal <i>et al.</i> (2008a)	Dovgal <i>et al.</i> (2008a) identified ciliates based on Fig. 19 of Bartsch (1989)
Halacarid mite <i>Actacarus octosetus</i> Abé, 1997	Hokkaido, Japan - North West Pacific Ocean (Fig. 7 location: 14)	Dovgal <i>et al.</i> (2008a)	Dovgal <i>et al.</i> (2008a) identified ciliates based on Fig. 5G & F of Abé (1997)
Nematodes <i>Croconema sphaerica</i> (Kreis, 1928) (= <i>Desmodora sphaerica</i>); <i>Desmodora pontica</i> (Filipjev, 1922) (invalid species),	Northern Seamount located off Nicobar Island (Andaman & Nicobar Islands), Indian Ocean, 1301 m depth (Fig. 7 location: 15)	Ingole <i>et al.</i> (2010)	
Halacarid mite <i>Halacarellus discretus</i> Bartsch, 1998	Odessa, Ukraine, Black Sea (Fig. 7 location: 10)	Bartsch & Dovgal (2010)	
Halacarid mite <i>Agauopsis</i> sp.	He-Ping-Dao, Taiwan (Fig. 7 location: 16)	Chatterjee <i>et al.</i> (2012)	
Harpacticoid copepod <i>Paramphiascella</i> sp.	Bay of Piran, Gulf of Trieste, North Adriatic, Slovenia (Fig. 7 location: 17)	Fernandez-Leborans <i>et al.</i> (2012)	
Harpacticoid copepods	East St. John, U.S. Virgin Islands, 53 m depth (Fig. 7 location: 18); Caja de Muertos Island near Ponce, Puerto Rico, 52 m depth (Fig. 7 location: 19); Buoy, La Parguera, Puerto Rico, 46 m depth, Caribbean Sea (Fig. 7 location: 20)	Chatterjee <i>et al.</i> (2014a)	

Harpacticoid copepods	Pulau Bedukang , Brunei Darussalam, Brunei Bay (Fig. 7 location: 21)	Chatterjee <i>et al.</i> (2014b)	
Nematodes <i>Desmodorella schulzi</i> (Gerlach, 1950) (= <i>Desmodora schulzi</i> Gerlach, 1950); <i>Desmodora communis</i> (Butschli, 1874)	Tamil Nadu, India, Bay of Bengal (Fig. 7 location: 22)	Panigrahi <i>et al.</i> (2015)	
Halacarid mite <i>Thalassarachna</i> <i>litoralis</i> Bartsch, 1976	Brittany, France (Fig. 7 location: 23)	Bartsch (2015)	
Nematodes <i>Croconema cinctum</i> Cobb, 1920; <i>Desmodorella</i> <i>tenuispiculum</i> Allgén, 1928	Suvadiva atoll, Maldives, 61–62 m depth, Arabian Sea(Fig. 7 location: 24)	Ansari <i>et al.</i> (2017)	Few budding stages also reported on harpacticoid copepods
Halacarid mite, <i>Halacarellus</i> sp.	Northern Caspian Sea (Fig. 7 location: 25)	Present Report	
Nematode	Angria Bank, Arabian Sea (Fig. 7 location: 26)	Present Report	