

Report of *Cothurnia cf. pedunculata* Dons, 1918 (Ciliophora, Peritrichia) found as epibiont on Entoprocta from the Indian Ocean

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Abstract :

Peritrich ciliate *Cothurnia cf. pedunculata* Dons, 1918 is reported for the first time from the Indian ocean, along Mumbai, west coast of India as epibiont on entoproct *Barentsia* Hincks, 1880. This is first report of this species as epibiont on entoproct. This also first authentic report of the genus *Cothurnia* as epibiont on Entropocta.

Résumé : Le cilié de Peritrich *Cothurnia cf. pedunculata* Dons, 1918 est signalé pour la première fois dans l'océan Indien, le long de Mumbai, sur la côte ouest de l'Inde, comme épibionte sur entoproct *Barentsia* Hincks, 1880. Il s'agit du premier signalement de cette espèce comme épibionte sur entoproct. C'est aussi le premier rapport authentique du genre *Cothurnia* comme épibionte sur Entropocta.

Keywords: Peritrich, Ciliate , New record , Entoprocta, India

Introduction

Epibiosis is a facultative and interspecific association where one organism lives on the surface (epibiont) of another organism (basibiont). Peritrich ciliate protozoans were found as epibionts on different marine organisms, such as nematodes, crustaceans, bryozoans, cnidarians, arachnids, insects, polychaetes etc. (e.g., Fernandez-Leborans & Tato-Porto 2000; Chatterjee et al. 2013a, 2018, 2020a, 2021; Mayén-Estrada & Utz, 2018; Chatterjee & Dovgal 2020). Epibiont ciliates from the west coast of India were studied by many authors (e.g., Santhakumari, 1985; Chatterjee et al., 2013b, 2019, 2020b, c, d).

In this article we report for the first time peritrich ciliate *Cothurnia* cf. *pedunculata* Dons, 1918 as epibiont on Entoprocta from Mumbai, west coast of India. This is first record of *C. pedunculata* from the Indian ocean. This also first authentic report of the genus *Cothurnia* as epibiont on Entoprocta.

Material and methods

Entoprocts were collected at Worli, Mumbai coast, Arabian Sea (Lat19°0'41.44"N, Long 72°48'54.01"E) on 11/02/2021, by Sabyasachi Sautya.

Ciliate infested entoprocts were sorted under a stereo-zoom microscope. Slides were prepared by placing the specimen in 50% glycerol and ethanol solution, and sealed. Further microscopic analysis was carried out using Nikon SMZ18 and Nikon Eclipse Ei compound microscope. Measurements of ciliates were made using the software NIS Elements and TopView 3.7 for processing of digital images. The terminology and systematic position of ciliates follows Warren & Paynter (1991) and Lynn (2008). Specimens are kept in the collection of the third author (SS) in CSIR—National Institute of Oceanography, Mumbai.

Result & Discussion

Phylum: Ciliophora Doflein, 1901

Subphylum: Intramacronucleata Lynn, 1996

Class: Oligohymenophorea de Puytorac et al., 1974

Subclass: Peritrichia Stein, 1859

Order: Sessilida Kahl, 1933

Family: Vaginicolidae Fromentel, 1874

Genus: *Cothurnia* Ehrenberg, 1831

***Cothurnia cf. pedunculata* Dons, 1918**

(Fig. 1 A-F)

Synonyms: *Cothurnia trophoniae* Dons, 1946

Cothurnia nodosa Mereschkowsky, 1879 (in part) Dons, 1918

Material Examined

Two entoprocts belonging to the genus *Barentsia* Hincks, 1880 were infested by ciliate epibiont *C. cf. pedunculata*. Twenty one ciliate specimens were found on the 1st specimen of entoproct (14 on head-calyx and 7 on stalk) while 5 ciliate specimens were found on the 2nd entoproct specimen (3 on head-calyx and 2 on stalk) from Worli, Mumbai coast of India. Morphometric measurements were based on 10 individuals of *C. cf. pedunculata*.

Description

Marine and brackish loricate peritrichs, with two zooids per lorica (two zooids were observed in at least one lorica). Lorica borne on along externalstalk with basal disc which is attached to aquatic animals, plants or inanimate objects. Lorica roughly cylindrical. Aperture border without clefts. Zooids attached to the base of the lorica via an endostyle and mesostyle. Mesostyle short and broad with slightly noticeable longitudinal striae. Endostyle is very short and broad. After Warren & Paynter (1991) ‘Macronucleus vermiform and coiled irregularly’. Pellicular striations inconspicuous. Measurements in present find: Lorica length 45–55 µm, lorica width 19–25 µm, zooid when contracted length 21–34 µm, width 15–19 µm, external stalk length 13–22 µm, mesostyle length 2–4 µm, mesostyle width 4–6 µm, endostyle length 1–2 µm, endostyle width 3–5 µm (Table 1).

Discussion

Dons (1946) described this species as *Cothurnia trophoniae* Dons, 1946, although Dons (1918) previously described the same species as *C. pedunculata* Dons 1918 (Warren & Paynter, 1991).

Warren & Paynter (1991) made a note: “Dons (1946) applied the name *C. trophoniae* to *C. nodosa* Mereschkowsky, 1879, an organism which Dons (1918) had previously redescribed under the name *C. pedunculata*. It is unclear why Dons (1946) chose not to use the name *C. pedunculata* for this species as it would appear to have priority over the name *C. trophoniae*.” They kept *C. pedunculata* as a synonym under *C. trophoniae* .

In previous literatures both names *C. pedunculata* (e.g., Dons, 1918; Precht, 1935; Mironova et al., 2009, 2014; Mikac et al. 2019) and *C. trophoniae* (e.g., Dons, 1946; Warren & Paynter, 1991; Sergeeva et al., 2020; Chatterjee et al. 2021) were used.

It observed that present ciliate species is most similar to *Cothurnia pedunculata* Dons (1918) and here reported as *Cothurnia cf. pedunculata*.

Initially, *C. pedunculata* was described as an epibiont on the alga *Polysiphonia violacea* (Roth) Sprengel 1827 from the Kiel Bay (the North Sea) (Dons, 1918).

Later it was found on the polychaete *Pherusa plumosa* (Müller, 1776) (= *Trophonia plumosa*; *Stylarioides plumosa*) – on the chaetae from Trøndelag, Norway, Norwegian Sea (Dons, 1928; Dons, 1946); Bay of Kiel, Germany, Baltic Sea (Precht, 1935).

It was reported on the cnidarian *Gonothyrea loveni* (Allman, 1859) (cited as *Laomedea loveni*) and on the pycnogonid *Callipallene brevirostris* (Johnston, 1837) (cited as *Pallene brevirostris*) from Bay of Kiel, Germany (Precht, 1935).

The species was also found on alga *Enteromorpha flexuosa* (Wulfen) J. Agardh, 1883 in Tamiahua Lagoon, Veracruz, Mexico (Aladro-Lubel et al. 2006). Mironova et al (2009, 2014) also enlisted *C. pedunculata* in the checklist of ciliates of Baltic Sea.

It was also found in Sivash Bay (the Sea of Azov) on floating mats of green filamentous algae *Cladophora sivashensis* Meyer, 1922 under salinity from 68 to 84‰ (Sergeeva et al., 2020).

Herein *C. Pedunculata* is reported first time as an epibiont on entoproct. It is also recorded for the first time from the Indian coast as well as from the Indian Ocean.

Entoprocta Nitsche, 1870 (= Kamptozoa Cori, 1929) is a minor group of small, solitary and colonial, sessile, aquatic invertebrate animals. Only about about 180 species are known under this phylum. Investigation on ciliate epibiont on entropocta has not been emphasised in earlier studies. May be, in earlier studies ciliate epibiont on entropoct was lumped together with epibionts of bryozoans (very less specialists worked on entoproct). There are many cases where ciliates were reported as epibiont on bryozoans without determining the bryozoan species (Chatterjee & Dovgal, 2020). Present find is the first authentic report of the genus *Cothurnia* as epibiont on Entropocta.

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Table 1: Measurements of 10 individuals of *Cothurnia cf. pedunculata*.

Sample number	Lorica (length), μm	Lorica (width), μm	Loricaa perture (length), μm	Zooid when contract ed (length), μm	Zooid when contract ed (width), μm	External stalk, μm	Mesosty le (length), μm	Mesosty le (width), μm	Endosty le (length), μm	Endosty le (width), μm
1	55	23	20	23	16	21	2	5	1	4
2	55	25	23	31	19	19	4	6	1	5
3	55	24	16	25	15	13	2	4	1	3
4	52	21	15	34	18	14	3	6	2	5
5	53	23	18	24	17	18	3	5	1	4
6	48	23	20	22	16	22	2	4	1	3
7	53	21	18	21	15	20	2	5	2	4
8	52	21	18	27	19	13	2	5	2	4
9	49	19	17	32	15	14	2	5	1	3
10	45	23	16	24	15	20	2	4	1	4

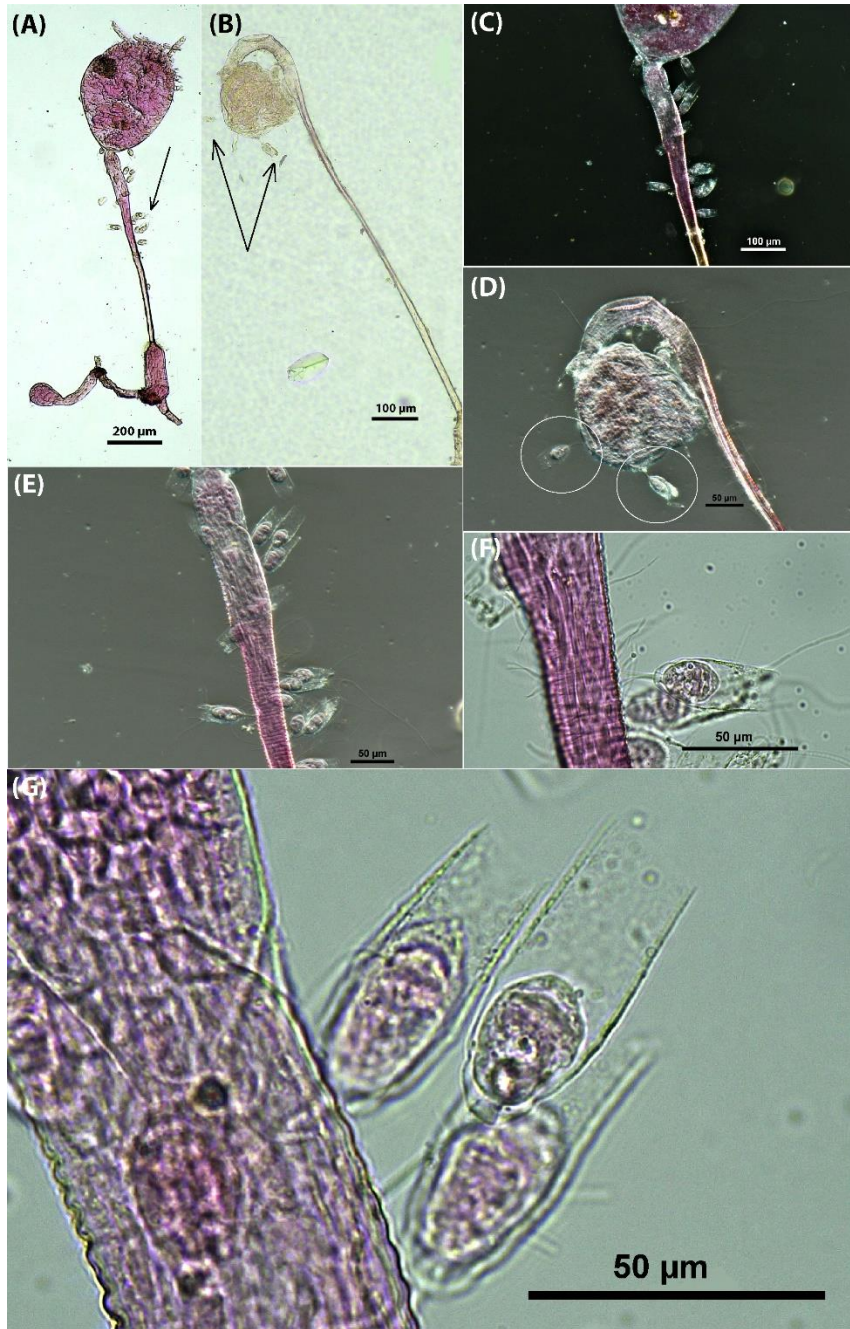


Fig. 1. **A, B.** Ciliate *Cothurnia* cf. *pedunculata* epibiont on entoprocts; **C, E.** Ciliate attached on stalk of entropoct; **D.** Ciliate attached on head (calyx) of entropoct **E, F.** Magnified view of *Cothurnia* cf. *pedunculata*.