

Note on the genus *Lecanophryella* (Ciliophora: Suctorea) with description of a new species from west coast of India

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Abstract

The article presents a review of the literature on known representatives of the genus *Lecanophryella* containing general characteristics of the members of this genus, information on morphology and data on distribution. Diagnostic characters of *L. satyanandani* is emended based on material collected from a new locality. A new species, *Lecanophryella indica* as epibiont on the body surface of cyclopoid copepod from the Zuari estuary, west coast of India is also described.

Key words: ciliate, epibiont, suctorian, *Lecanophryella*.

Introduction

The genus *Lecanophryella* Dovgal, 1985 was established by Dovgal (1985) with the type species *L. paraleptactaci* Dovgal, 1985 based on material from a freshwater reservoir in Ukraine. The genus *Lecanophryella* remained monotypic for a long time. However, Jankowski (1992) proposed to transfer *Acineta satyanandani*, which was described as an epibiont on the marine seed shrimp *Cypridina dentata* (Mueller, 1906) by Santhakumari (1986) from Cochin, Kerala India, into genus *Lecanophryella* in the name combination *L. satyanandani*. Dovgal (2002) agreed on this and adopted it as *Lecanophryella satyanandani*. Padmakumar *et al.* (2015) reported for the second time *Lecanophryella satyanandani* (reported as *Acineta satyanandani*) from the North eastern Arabian Sea.

Present article is devoted to a revision of the genus *Lecanophryella*, including a redescription of *L. satyanandani* from new finds, and also describes a new species *L. indica* from west coast of India (Arabian Sea).

Material and methods

Study Area 1: Zuari Estuary, West Coast of India, 15°24'09"N and 73°48'34"E (Fig. 1).

The waters of the Zuari River flows out into the Arabian Sea at Cabo Aguada, a point forming the Mormugoa harbour. The port city of (Vasco da Gama, Goa) lies on the mouth of the Zuari River. The Zuari estuary is called “monsoonal” because it receives heavy freshwater influx (400 m³ s⁻¹) during the southwest monsoon (June–September). During most of the year, except June–September, it is a well-mixed estuary and the tidal influence reaches up stream up to 50 km from the mouth (Shetye *et al.*, 1995). At this sampling location, the salinity was 33.5 PSU. The Zooplankton samples were collected on 2.2.2018 by horizontal haul of a Heron-Trantor Net, collector Mandar Nanajkar & Kalisa Bogati.

Study Area 2: West coast of India, Arabian Sea, 13°20'35.00"N and Long 73°44'45.00"E (Fig. 1). At this sampling location, the sea surface temperature was 29.0°C and the salinity was 35 PSU. Zooplankton samplings were collected from the west coast of India in the coastal Arabian Sea on-board *RV Sindhu Sadhana* (SSD055) during August 2018. Samples were collected (collector Kalisa Bogati) through a vertical haul by Multiple Plankton Net from 40 to 0m and placed in a clean plastic bottle.

Zooplankton samples were preserved by adding 10% formaldehyde. Slide was prepared by placing the specimen in 50% Glycerol and ethanol solution which was sealed with DPX for further microscopic analysis carried out using Nikon Eclipse Ti2 Inverted microscope. Photomicrographs were obtained by using an Nikon DS-Ri2 digital camera.

Measurements of ciliates were made using the software TopView 3.7 for processing of digital images. Total of 8 individuals of *L. satyanandani* and 5 individuals of *L. indica* were measured.

The terminology and systematic position of suctorian ciliates follows Dovgal (2002 & 2013).

A type series for new species is deposited and registered at CSIR- National Institute of Oceanography Taxonomic Reference Centre, Goa, India (CSIR-NIO) with the deposition no: NIO1008.

Results and discussion

Class Suctorea Claparède & Lachmann, 1859

Subclass Exogenia Collin, 1912

Order Vermigemmidida Jankowski, 1973

Family Lecanophryidae Jankowski, 1973

Genus *Lecanophryella* Dovgal, 1985

Suctorian ciliates with unloricate, weakly laterally flattened cell body, with two or three well-developed actinophores equipped with thin, clavate, tentacles at the apical ends. Stalk, short, dense. Macronucleus spherical or elongated. Reproduction by vermigemmic budding with forming of swarmers that are devoid of ciliature.

Type species: *Lecanophryella paraleptastaci* Dovgal, 1985

***Lecanophryella paraleptastaci* Dovgal, 1985** (Fig. 2A-C)

Lecanophryella paraleptastaci Dovgal, 1985, 1256-1259, Figs. 1-4.

Diagnosis and dimensions of this species is given here following Dovgal (1985). As Dovgal (1985) was primarily a Russian language description, the present article provides a re-description of diagnosis and dimensions to appraise a wide range of workers.

Diagnosis. Suctorian ciliate with slightly laterally flattened body, equipped with two (Fig. 2B), rarely three (Fig. 2C) well-developed actinophores, at the extended ends of which positioned groups of the clavate tentacles, which extended at the base. The cell pellicula with well-defined longitudinal folds. Stalk short, dense, slightly curved. Macronucleus is rounded, located medially, or located in one of the actinophores. Reproduction by vermigemmic budding. Swarmers (Fig. 2A) are unciliary, leaf-shaped, with a well-developed apical sucker.

Commensal of freshwater harpacticoid copepods. Localization: host body segments.

Dimensions (in μm): body length 36-72, body width 10-36, actinophore length 17-46, tentacle length 9-14, stalk length 7-19, stalk diameter 4-5, size of macronucleus 10-14 \times 5-10. Dimensions of swarmer: length 36-46, width 19-22, sucker diameter 11-13.

Type material: A hapantotype slide №118 deposited in I.I. Schmalhausen Institute of Zoology National Academy of Sciences of Ukraine (Kiev, Ukraine).

Type host: *Paraleptastacus spinicauda triseta* Noodt, 1954.

Type locality: Kremenchug water reservoir on the Dnieper River (Ukraine).

***Lecanophryella satyanandani* (Santhakumari, 1986)** (Fig. 3A-D)

= *Acineta satyanandani* Santhakumari, 1986a, 472-473, Figs. 1-D; Santhakumari 1997, 172-173; Padmakumar *et al.* 2015, 176-177, Figs 2, 4.

Diagnosis (*character emend.*). Suctorian ciliate with cup shaped body furnished with three good developed actinophores (Fig 3 B-D). Lorica absent. From 10 to 16 clavate tentacles are located on the tops of actinophores. The protoplasm is finely granular and the body is of straw colour. The shape of the macronucleus changes from oval to rounded. The attachment of the stalk to the host is by means of a circular disc or basal plate. Reproduction was not observed.

Dimensions (in μm): (measurements of present finds were taken from 8 individuals) body length (before the bases of actinophores) 39-50, body width 34-45 (upto 55 after Santhakumari, 1986), body thickness 30, actinophore length 14-41, actinophore width 15-22, length of tentacles 15-34, stalk length 8-12 (20-30 after Santhakumari, 1986), stalk diameter 5-6, size of macronucleus 9 \times 13.

Type material: Type specimens on the host were deposited in the reference collection of the Indian Ocean Biological Centre with the Catalogue Number IOBC0391-02-15-1985 (Santhakumari 1986).

Type host: *Cypridina dentata* (Mueller, 1906).

Type locality: Southwest coast of India.

Other localities: North Eastern Arabian Sea, 21°59'84" N; 65°59'52"E, on ostracod *Cypridina dentate* (Muller, 1906) (Padmakumar, 2015).

New finds: In the present study the specimens were from Study Area 2: surface pelagic waters off the central west coast of India, Arabian Sea, 13°20'35.00" N and 73°44'45.00" E on ostracod *Cypridina dentata*.

Differential diagnosis: From the type species of the genus, the *L. satyanandani* differs by the presence of always three actinophores, which are cylindrical, with a rounded apical surface, but with absence of any apical extensions. The macronucleus of this species is rounded, almost spherical, and not elongated. Unlike other species of the genus *Lecanophryella*, the *L. satyanandani* specific to ostracode nor copepode hosts.

Remarks: Santhakumari (1986) has mentioned that inside the body of the large specimens of *L. satyanandani* the observed oval masses could be seen, may be embryos. However, Jankovski (2007) points out that this is a mistake and in fact, the author's figure shows the macronucleus, not budding.

As stated above Jankowski (1992) has proposed to transfer the Santhakumari's species from genus *Acineta* into genus *Lecanophryella*. It is our opinion that this is fully justified because all representatives of genus *Acineta* are loricated and have two instead of three bundles of tentacles (Curds 1985, Dovgal 2002, 2013). According to all other characters, the diagnosis of the Santhakumari's species corresponds to the diagnosis of the genus *Lecanophryella*.

This species was found as commensal of marine seed shrimps (Ostracoda), near or at the anterior portion of the host (Santhakumari 1986, 1997). In our material as well the location of the ciliate was in the antero-ventral region of carapace on the host body (Fig. 3A).

***Lecanophryella indica* Chatterjee, Dovgal, Nanajkar & Bogati sp. nov.** (Fig. 4A-F)

Diagnosis: Suctorian ciliate with slightly laterally flattened, elongated, body, narrowed at the bottom, with a short, thin, straight stalk. There are two well-developed flattened, trapezoidal actinophores, on the inner (facing the central axis of the body) side of each has a small hemispherical protrusion with from 10 to 20 thin, clavate tentacles. Macronucleus elongated, medial. Reproduction by vermigemmic budding, with unciliated swarmer positioned (Fig. 4F) on the lateral side of the body.

Dimensions (in μm): (measurements were taken from 5 individuals) length of the extended (upper) body part 128-159; width of the extended body part 22-45; length of the constricted (lower) part of the body 63-92; width of the constricted body part 34-86; actinophore length 47-54; actinophore width 8-36; stalk length 18-22; tentacle length 9-62. Size of macronucleus 41-79 \times 16-23.

Type locality: Surface waters of Zuari estuarine mouth, 15°24'09"N and 73°48'34"E, West coast of India, Arabian Sea.

Type host: Planktonic pelagic cyclopoid copepods (Fig. 4A).

Type material: Type specimens on the host were deposited in the reference collection of the CSIR-National Institute of Oceanography Taxonomic Reference Centre, Goa, India (CSIR-NIO) with the deposition no: NIO1008.

Differential diagnosis: From the *L. paraleptastaci* and *L. satyanandani*, the new species is distinguished by the presence of always two actinophores, a flattened shape of actinophores, the presence of a hemispherical out growth on their inner sides. The new species differs from other representatives of the genus by epibiosis on cyclopoid copepods, not harpacticoids and ostracods, respectively.

Etymology: The specific name reflects the geographical distribution of the species in India.

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Legends to the figures

Fig. 1. Map of study areas.

Fig. 2. *Lecanophryella paraleptastaci* Dovgal, 1985. A. Trophont and two swarmers on host body (orig.); B. Trophont with two actinophores; C – trophont with three actinophores. B-C after Dovgal. 1985, Scale bar – 10 μm .

Fig. 3. Trophonts of *Lecanophryella satyanandani* (Santhakumari, 1986). A. trophonts on host body; B-D. magnified view of trophonts (orig).

Fig 4. Trophont of *Lecanophryella indica* sp. nov. A. position of *L. indica* trophonts on host body; B-E magnified view of trophonts; F. Budding individual marked by arrow.

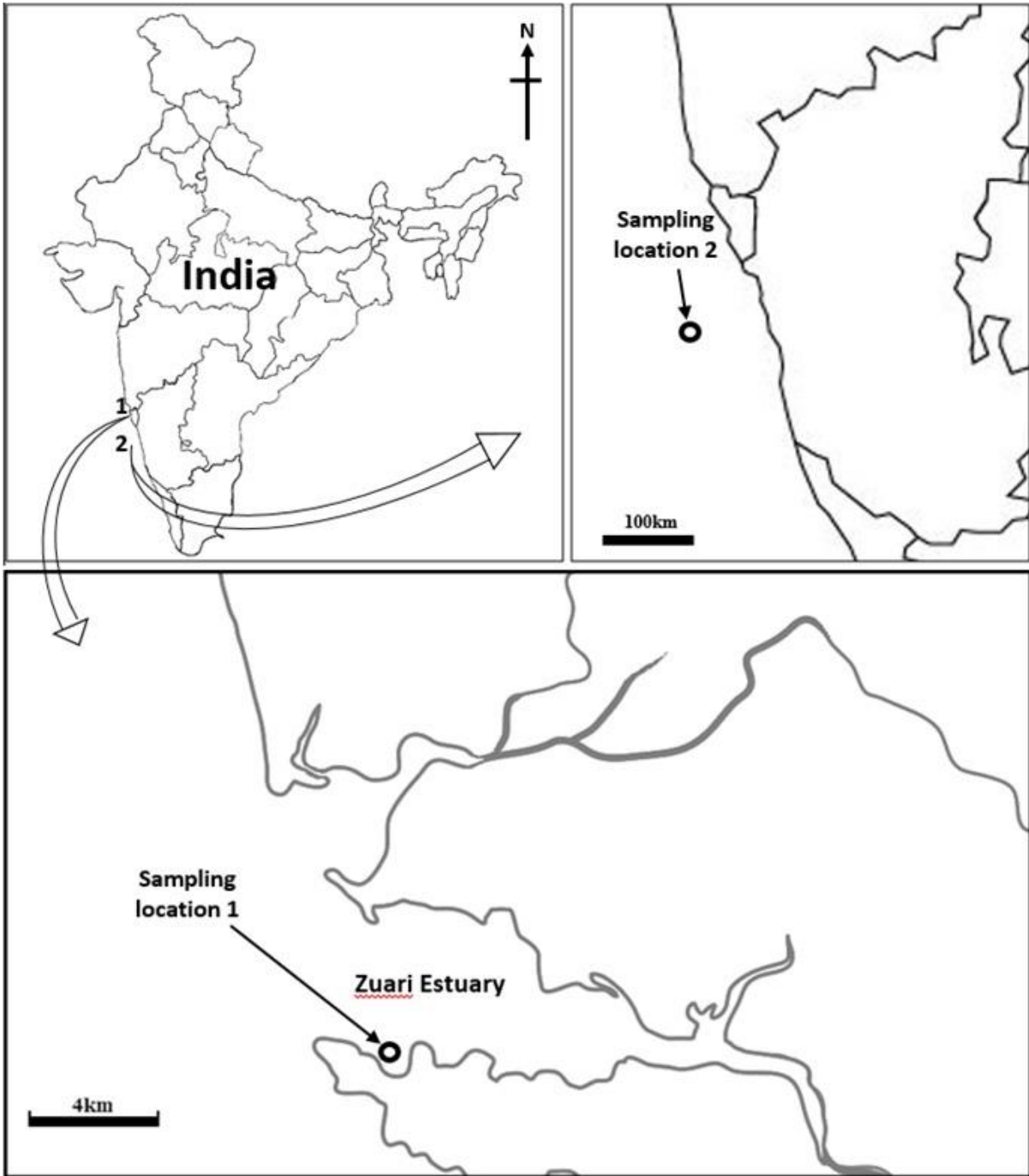


Fig.1

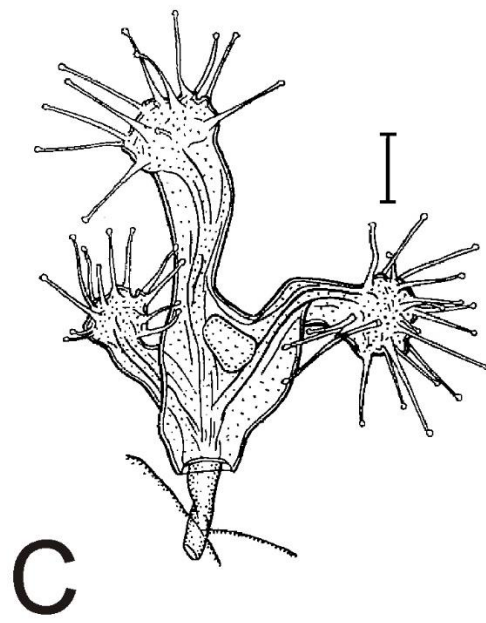
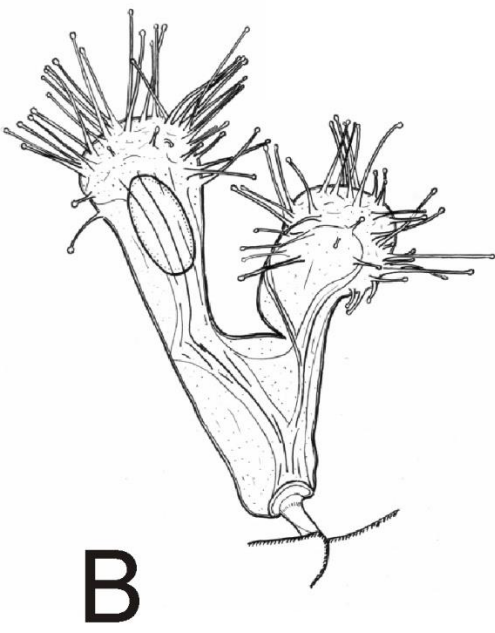
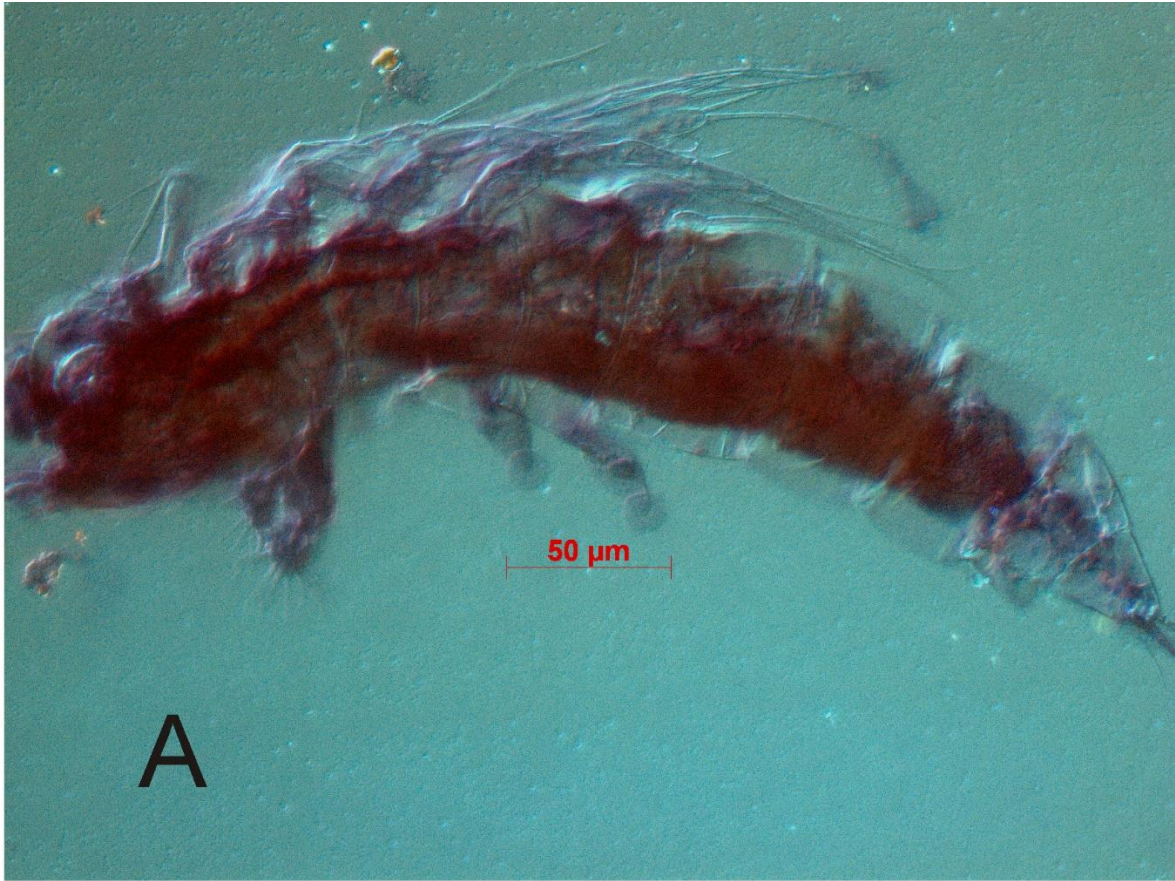


Fig.2

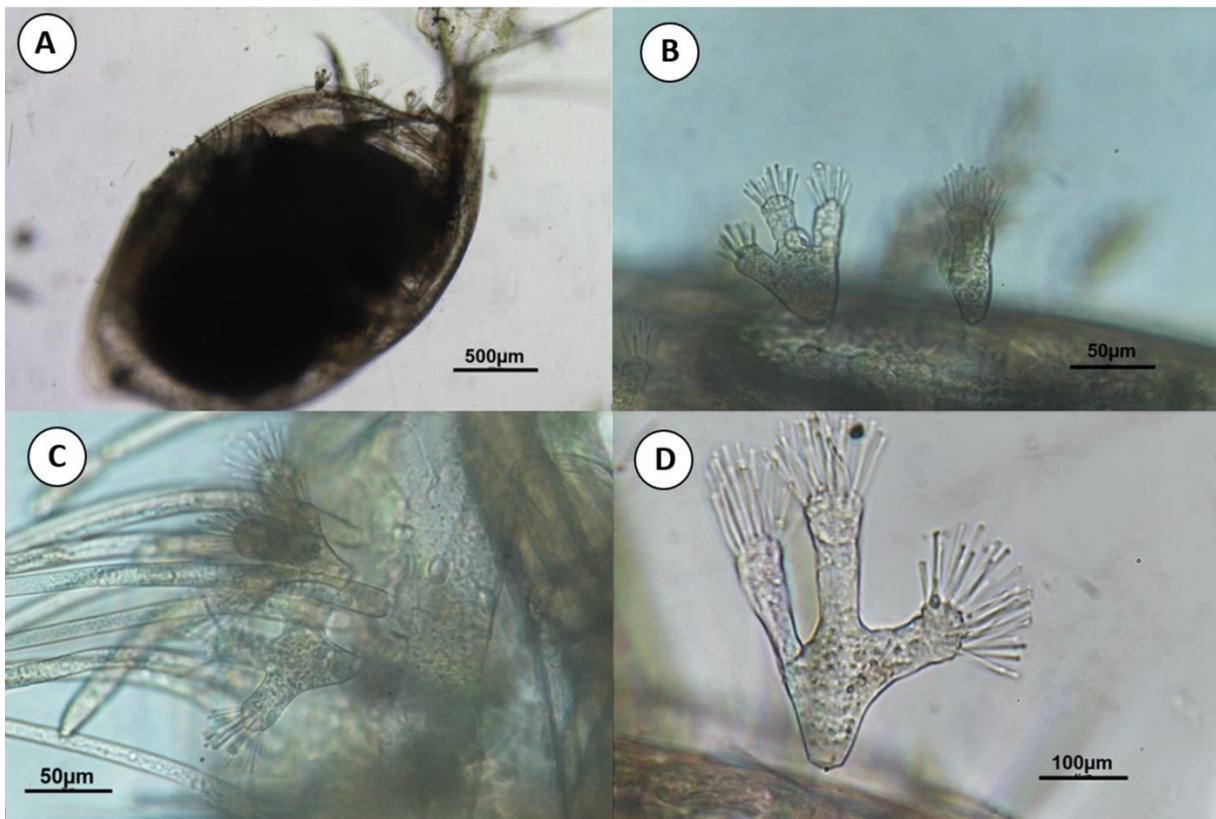


Fig.3

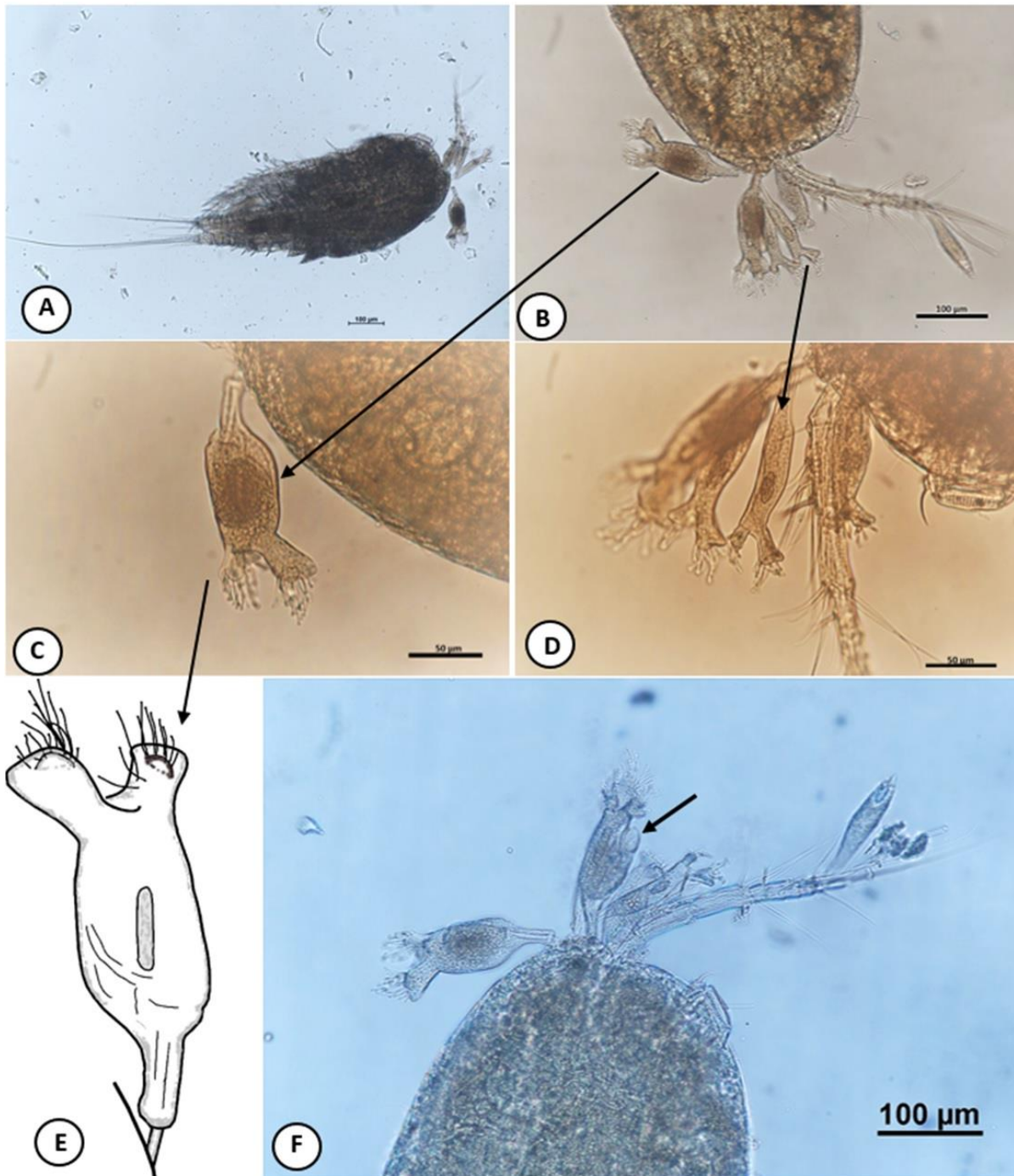


Fig.4