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Short communication

Occurrence of suctorian ciliates (Ciliophora, Suctoria) in a polluted creek in Southern Brazil

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Abstract. The Subclass Suctoria encompasses ciliates without cilia during the trophont stage, and that mainly feed on other ciliates, rotifers and microcrustaceans. Suctorians are widely distributed in various habitats and can also be found as epibionts in aquatic invertebrates. Although these organisms are widely distributed, they are poorly studied, mainly in the Southern Hemisphere. In the present study we investigated the occurrence of suctorians ciliates in a polluted creek in Rio Grande do Sul state, Brazil. Using taxonomic keys it was possible to identify one species in the genus *Multifasciculatum* , one in the genus *Tokophrya* and two species belonging to the genus *Podophrya* . All of them are aloricate and freshwater suctorians. These organisms differ in zooid shape, and the distribution of their tentacles in the cell, morphological characteristics of each genus. This study presents the first record of *Podophrya fallax , Podophrya sandi , Tokophrya lemnarum*, and *Multifasciculatum elegans* for the state of Rio Grande do Sul.

Key words: ciliates; Suctoria; Southern Brazil.

Introduction

Organisms belonging to the Phylum Ciliophora are commonly found in marine, freshwater, and terrestrial environments. Among these, extreme environments such as hydrothermal vents, bromeliad water, and the interior of animals also harbor ciliates (Lynn, 2008). The majority of ciliates are free-living, but some could be found as parasites (Kreier, 1992) and others as epibionts (Fernandez-Leborans & Tato-Porto, 2000a; Fernandez-Leborans & Tato-Porto, 2000b.). Peritrichs (Subclass Peritrichia) and suctorian ciliates (Subclass Suctoria) are easily found as epibionts, but several species have also been recorded colonizing non-living substrates (Foissner & Berger, 1996).

The ciliates in the Subclass Suctoria are predators (Dovgal, 2002), presenting tentacles during the adult stage (trophont) which are used for prey capture. Prey items include small metazoans as well as other ciliates. This type of nutrition favors the occurrence of suctorian ciliates in polluted environments where there is a high abundance of bacterivores (Foissner *et al.* 1991; Foissner *et al*., 1994), due to deposition of organic matter.

In the present study we collected suctorian ciliates from a polluted creek in southern Brazil. Three genera and four species were identified and characterized in laboratory. This is the first record of these four species suctorian ciliates for the state of Rio Grande do Sul.

Material and Methods

Sampling was carried out in Feijó Creek located on the border of Alvorada, Viamão, and Porto Alegre municipalities, Rio Grande do Sul state, Brazil. This creek is 15 km long, four meters deep, and its basin has a total of 57 km^2. The region has a high density of human occupation and is characterized by the absence of sewage treatment in some areas (Freitas, 2009). The sewage that is deposited in the creek contributes for the poor water quality, including low concentration of dissolved oxygen. Cover-slip traps were used as an artificial substrate for sampling (modified from Small, 1992). The traps were made with a 7cm long plastic hose that possessed six incisions where two glass cover-slips, back-to-back were attached. The trap was put inside a plastic bottle cut on both ends and placed in the water. A nylon string was tied to the trap and to a tree. The whole trap was submerged in the water for five days. This sampling procedure was repeated once a month during five months. Traps were retrieved from the water and taken to the laboratory where the cover-slips were observed using an optic microscope (Olympus CH30). When suctorian ciliates were found they were identified to species level using specialized literature (Kudo, 1966; Matthes *et al*., 1988). Photomicrographs of living cells were taken using a digital camera mounted to an Olympus microscope model BX50.

Results and Discussion

Morphological analyses such as length and width of the cell, number and arrangement of the tentacles and shape of the cell revealed that three genera and four different species of suctorian ciliates were presented in Feijó creek during the sampling period: *Tokophrya lemnarum, Multifasciculatum elegans, Podophrya falax*, and *Podophrya sandii*. The presence of suctorian ciliates in this polluted environment may be due to the high amount of organic matter present in the water and the high abundance of bacterivores, the main prey of suctorians.

Species characterization

Podophrya falax and *Podophrya sandii:* Both species present a round cell body measuring a mean of 41 µm in width. Tentacles are long and distributed evenly around the cell (Table 1), not in fascicles. *Podophrya fallax* Dingfelder, 1962 has been recorded from freshwater enviroments, generally as a free-living species, which does not harbor a loricae. One of its main characteristics is the very long basal stalk, generally longer than the cell body. *Podophrya sandii* Collin, 1911 is a freshwater, free-living or epibiont suctorian ciliate. This species has a narrow basal stalk that has almost the same

Table 1. Morphological measurements (µm) of 25 individuals of *Podophrya sandii* and *Podophrya falax*

	Min.	Max.	Mean
Cell length	35	60	47.5
Cell width	22.5	57.3	41
Length of macronucleus	10	25	16.4
Length of the stalk	10	22.5	16.4
Width of the stalk	25	85	44.2
Length of the apical tentacle	12.5	62.5	29.6

length of the body. The only difference between the two species is the transversal striation of the stalk. *Podophrya falax* presents a transversally striated stalk (Figure 1A arrow) while *Podophrya sandii* has a smooth stalk (Figure 1B)

Multifasciculatum elegans: Freshwater, free-living suctorian. This species presents an ellipsoid zooid with tentacles distributed in three distinct regions of the cell body: apical, median, and basal (Figure 1C). The cell body may reach a length of 85 µm (Table 2)

Tokophrya lemnarum: Freshwater, free-living or facultative ectosymbiont suctorian species, aloricate with a slender stalk. Zooid presents a pyramidal shape with tentacles forming apical and basal fascicles (Figure 1D).

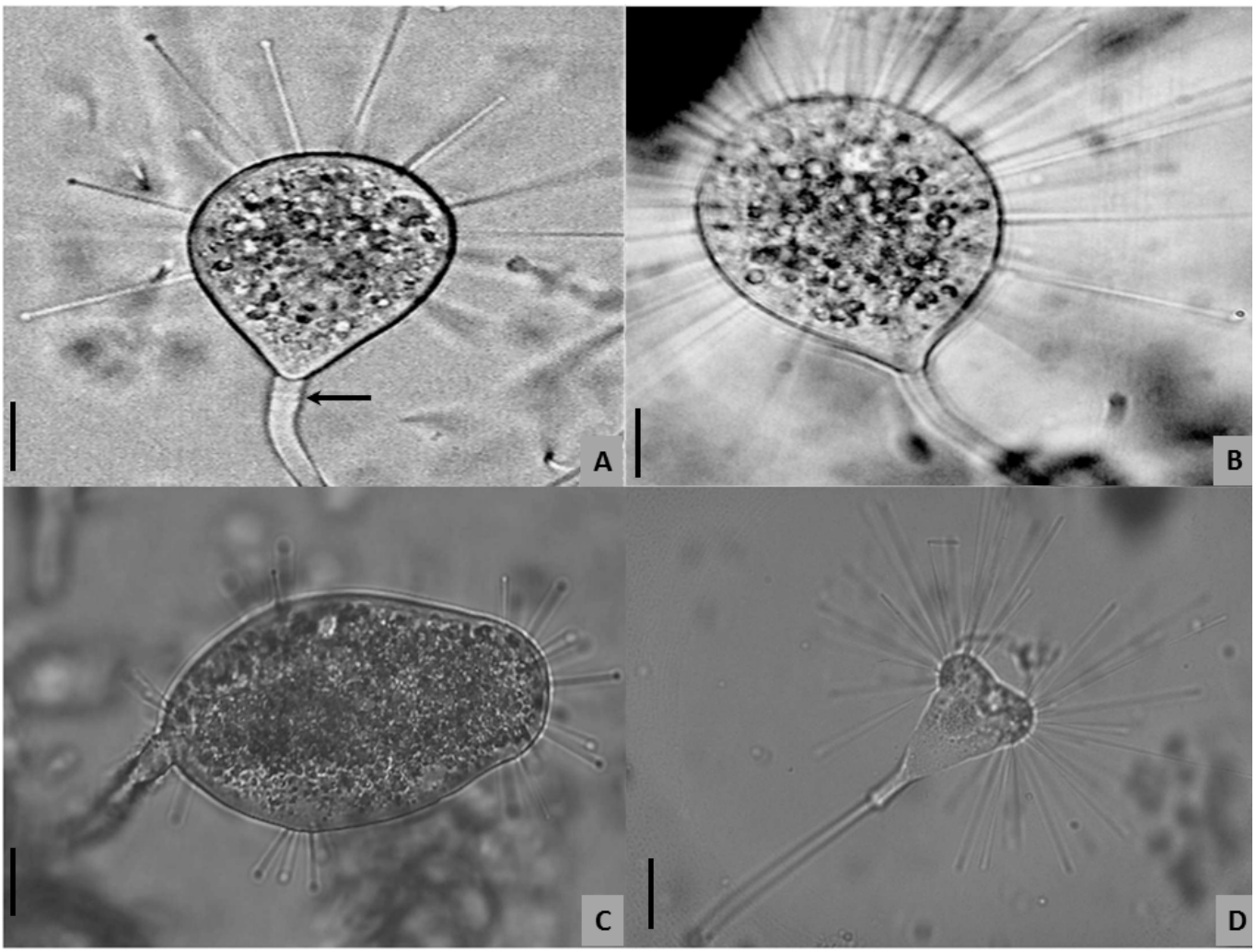

Figure 1. Suctorian ciliates present in Feijó Creek, Alvorada, RS, Brasil **A)** *Podophrya falax* **B)** *Podophrya sandii* **C)** *Multifasciculatum elegans* **D)** *Tokophrya lemnarum*. Scale bars: 10 µm.

Table 2. Morphological measurements (µm) of 20 individuals of *Multifasciculatum elegans*.

	Min	Max	Mean
Cell length	42.5	85	63.75
Cell width	10	42.5	52.5
Length of the stalk	5	7.5	6.25
Length of the apical tentacle	12,5	42.5	27.5
Length of the mean tentacle	12.5	25	18.75
Length of the basal tentacle	10	25	17.5

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