

Three New Species of *Tursiocola* (Bacillariophyta) from the Skin of the West Indian Manatee (*Trichechus manatus*)

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Abstract

Three new species of *Tursiocola* are described from the skin of the West Indian manatee bringing the total number of known species in the genus to seven. The range of morphological diversity within the genus is greatly expanded. The number of poroid rows on the copulae is no longer a valid characteristic for the separation of *Tursiocola* from the ceticolous genus *Epiphalaina*. The presence of a butterfly-like structure in the central area of the former is at present the best criterion for separating the 2 genera. The 3 new *Tursiocola* species accounted for nearly 90% of all diatom valves on the manatee skin. No other diatom taxa previously described as new from the skin of cetaceans were present on the manatee.

Keywords: biogeographical distribution, epidermal diatoms, Florida, LM, morphology, SEM

Introduction

Unique epizoid diatom floras have been described from marine mammals (see Tiffany 2011 for review). Cetaceans have been the only marine mammal group from which epizoid diatoms were observed (Bennet 1920, Hart 1935). Subsequent investigators of epidermal diatom assemblages from dead whales and porpoises from whaling stations and stranding events have identified obligate epizoid pennate diatoms comprising several genera including *Plumosigma* Nemoto (1956: 111), *Bennettella* Holmes (1985: 48), *Epipellis* Holmes (1985: 53), *Epiphalaina* Holmes, Nagasawa & Takano (1993a: 4), *Tursiocola* Holmes, Nagasawa & Takano (1993: 5), and *Tripterion* Holmes, Nagasawa & Takano (1993a: 7) (Hustedt 1952; Nemoto 1956; Nemoto *et al.* 1980; Holmes 1985; Holmes *et al.* 1989, 1993a; Denys 1997). Though benthic and planktonic diatoms from the marine littoral have also been observed on cetaceans, an endemic flora generally dominates these communities (Denys 1997).

Of particular interest to the present study are the two closely related genera, *Epiphalaina* and *Tursiocola* (Holmes *et al.* 1993a), created by the transfer of the ceticolous taxa *Stauroneis aleutica* Nemoto (1956: 110) and *S. olympica* Hustedt (1952: 288), respectively. Currently, *Epiphalaina* is comprised of three taxa: *E. aleutica* (Nemoto) Holmes, Nagasawa & Takano (1993a: 5), *E. aleutica* var. *lineata* Denys, (1997: 5) and *E. radiata* Holmes, Nagasawa & Takano (1993b: 128), while *Tursiocola* has four taxa: *T. olympica* (Hustedt) Holmes, Nagasawa & Takano (1993a: 6), *T. omurai* (Nemoto 1956: 110) Denys (1997: 7), *T. staurolineata* Denys (1997: 8), and *T. podocnemicola* Wetzel, Van de Vijver & Ector (2012: 2). The recently described *T. podocnemicola* is the first taxon of these genera to be described from an animal (freshwater turtle) other than cetaceans (Wetzel *et al.* 2012), though an unidentified *Tursiocola* species was reported from sea turtles (Mariska Brady, pers. comm.), and *T. olympica* was reported on the barnacle *Coronula diadema* (Hustedt 1952).

The degree of host specificity of these endemic epizoid diatoms is not yet known due to the scarcity of samples from vertebrate animals other than the cetaceans. Holmes *et al.* (1993b) concluded that host specificity was not present within the cetaceans and speculated that ceticolous taxa may be found on other hosts as well. Studies of epizoid diatoms on other aquatic and marine vertebrate hosts are few in number (Wetzel *et al.* 2012). This current scarcity does not allow any conclusions to be made regarding host specificity of endemic diatom communities within and among other groups of marine and aquatic animals.

manatee was found in central Florida Bay where salinities range from 20–45 psu (Boyer *et al.* 1999). The dominance of these new species (almost 90% of the valve count) and the lack of any other ceticolous taxa or *T. podocnemicola* on the manatee raise the question of host specificity, but there are many marine animals that remain unsampled for diatoms. Bodily contact is likely required for the transfer of epidermal diatom taxa from one host to another (Holmes *et al.* 1993a); therefore, host populations would have to mix and interact closely to develop epizoic diatom communities of similar species composition. Such close interactions between the cetaceans, the freshwater turtle from which *T. podocnemicola* was described, and the West Indian manatee are unlikely at best. The West Indian manatee is one of four living species of the aquatic mammal order Sirenia. The West Indian manatee inhabits the coastal areas and rivers of the Caribbean Sea and the Gulf of Mexico and ranges from Georgia and Florida in the southeastern USA through Central America to the northeast coast of Brazil (Domning and Hayek 1986). The other three species of the order Sirenia are the dugong (*Dugong dugon*) of the Indo-Pacific coasts, the West African manatee (*Trichechus senegalensis*) of the West African coasts, and the Amazonian manatee (*Trichechus inunguis*) of the freshwaters of the Amazon Basin. There is not any overlap in the geographical distribution of the four manatee species; therefore, distinct epizoic communities are a possibility, but this hypothesis remains untested. The so-called “ceticolous” diatom taxa have now been found on whales, porpoises, manatees and a freshwater turtle raising many questions related to general ecological principles such as host specificity, endemism, and biogeographical distribution of species. The sampling of additional animal taxa for epizoic diatoms is needed to shed more light on these topics.

An artificial key to *Tursiocola* species

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|----|--|----------------------------------|
| 1. | Copulae differentiated, valvocopulae distinct from abvalvar copulae | <i>Tursiocola varicopulifera</i> |
| - | Copulae undifferentiated | 2. |
| 2. | Transapical costae present on external valve face | <i>Tursiocola costata</i> |
| - | Transapical costae absent | 3. |
| 3. | Valve outline linear with a distinct median constriction and rostrate apices | <i>Tursiocola omurai</i> |
| - | Valve outline otherwise | 4. |
| 4. | External central area diamond-shaped | <i>Tursiocola ziemanii</i> |
| - | External central area otherwise | 5. |
| 5. | External proximal raphe ends deflected | <i>Tursiocola podocnemicola</i> |
| - | External proximal raphe ends straight | 6. |
| 6. | Stauros very broad | <i>Tursiocola olympica</i> |
| - | Stauros narrow and narrowing towards mantle | <i>Tursiocola staurolineata</i> |

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