Heterotrophic Euglenids from Marine Sediments of Cape Tribulation, Tropical Australia

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Abstract
− This paper presents new data on free-living heterotrophic euglenids (Euglenozoa, Protista) that occurred in the marine sediments at Cape Tribulation, Queensland, Australia. Twenty-nine species from 9 genera are described with uninterpreted records based on light microscopy, including one new taxon: Notosolenus capetrabilatorii n. sp. There was little evidence for endemism because the majority of heterotrophic euglenid species encountered here have been reported or were found from other habitats.

Key words − Biogeography, heterotrophic flagellates, Notosolenus capetrabilatorii, Euglenozoa, protista

1. Introduction

Heterotrophic flagellates are known to play an important role as bacterivorous in aquatic ecosystems (Azam et al. 1983; Starink et al. 1996a, b; Epstein 1997a, b; Dietrich and Arndt 2000; Lee and Patterson 2002). Despite their importance, the diversity of many groups of heterotrophic flagellates, with the exception of chenoflagellates and other siliceous taxa, is not well known. Recently there have been a number of studies describing the species and composition of heterotrophic flagellates in marine and freshwater sediments (Larsen and Patterson 1990; Vors 1992a, b; Ekeborn et al. 1996; Patterson and Simpson 1996; Bernard et al. 2000; Lee and Patterson 2000; Al-Quassab et al. 2002; Lee 2002; Schroeckh et al. 2003; Lee et al. 2003, 2005).

The status of the euglenids is reviewed elsewhere (Simpson 1997) and there are purportedly about 1500 species of euglenids. About 27 genera have been widely regarded as heterotrophic genera. Among them, 14 genera are reported from marine habitats and these include Anisonema Dujardin 1841, Asasia Dujardin 1841, Chiasmotoema Massart 1920, Dinema Perty 1852, Dolium Larsen & Patterson 1990, Heteronema Dujardin 1841, Jenningsia Schaeffer 1918, Metanema Senn 1900, Notosolenus Stein 1859, Peranema Dujardin 1841, Pedersononas Stein 1859, Phloeria Dujardin 1841, Sphenomonas Stein 1878 and Urecalus Merechowsky 1877. Previous taxonomic studies of marine benthic heterotrophic euglenids in Australia are Larsen and Patterson (1990), Ekeborn et al. (1996), Patterson and Simpson (1996), Lee and Patterson (2000), Bernard et al. (2000), Al-Quassab et al. (2002), Lee et al. (2003); and of freshwater benthic euglenids are Schroeckh et al. (2003) and Lee et al. (2005).

Our current insights into large-scale patchiness of heterotrophic flagellates are that most taxa have a cosmopolitan distribution (Lee and Patterson 1998; Patterson and Lee 2000). This paper is one of a series of studies on heterotrophic flagellates addressing issues of endemism in this group (Lee and Patterson 1998; Patterson and Lee 2000). The aims of this study are to document the diversity of heterotrophic euglenids from tropical marine intertidal sediments and to use that information to address issues of endemism.

2. Materials and Methods

This study was carried out in Cape Tribulation (14° 90'E; 16°00'S–16°10'S, Figure 1), Queensland, Australia
in July 1998. Cape Tribulation is a lowland tropical rainforest site bordering on the sea. Samples were collected at 3 sampling sites near the Cape Tribulation Research Station on 5 sampling occasions. The seawater temperature was 24-28 °C. Site 1 is a waterway to Site 2 and is approximately 200 m away from Site 2 (14°57'90"E; 16°06'20"S), and had low salinity (about 7 psu). Site 2 was on Myall beach with normal salinity (27-35 psu) and Site 3 (14°26'20"E; 16°10'65"S) was about 9 km south of Site 2, on the front of Cooper creek and had 21-30 psu of salinity. Sediments were taken from intertidal sandy sediments to a depth of about 1 cm from 1 square metre quadrat. The sediments were placed in plastic trays in 1 cm deep layers. Coverslips (No.1 22 × 22 mm) were placed on the lens tissue laid on the surface of the sediments. After 12-24 hours, heterotrophic flagellates, which are colourless, were observed using a Zeiss microscope (Axiophot) equipped with photographic and video facilities (see Lee and Patterson 2000). The samples were maintained at in situ temperature for 7 days.

3. Results

Nomenclature here follows the ICZN (International Commission on Zoological Nomenclature 1999).

Detailed accounts of the taxonomy of heterotrophic euglenids have already been published by Larsen and Patterson (1990), Lee and Patterson (2000), Al-Qassab et al. (2002) and Lee et al. (2003). Therefore, only taxa not described by these authors, or which are different from previous descriptions, are described in detail and commented on. This section contains descriptions of taxa observed at the study sites. The ‘Previous records’ represent only marine records.

Lists of species encountered during this study are presented in Table 1.

<table>
<thead>
<tr>
<th>Species / Sites</th>
<th>Site 1</th>
<th>Site 2</th>
<th>Site 3</th>
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<tbody>
<tr>
<td>Anisonema acinatus</td>
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<td>Anisonema trepidum</td>
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<td>Dinema platysomum</td>
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<td>Heteronema excisa</td>
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<td>Heteronema globiferum</td>
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<td>Heteronema larseni</td>
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<td>Heteronema ovale</td>
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<td>Jenningsia fusiforme</td>
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<td>Jenningsia macrostoma</td>
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<td>Notosolenus apocampus</td>
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<td>Notosolenus capetribulati</td>
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<td>Notosolenus trevelius</td>
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<td>Peranema trichophorum</td>
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<td>Petalomonas abscissa</td>
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<td>Petalomonas minor</td>
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<td>Petalomonas possilla</td>
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<td>Plœotia corrugata</td>
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<td>Plœotia longifilum</td>
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<td>Plœotia virea</td>
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<td>Ursodus cornutus</td>
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| Total               | 16     | 19     | 20     |

Table 1. List of species encountered during the study.

Fig. 1. Map showing sampling sites.