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Semicryptic Diversity around *Chaetoceros elegans* (Bacillariophyta, Mediophyceae), and the Description of Two New Species

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Abstract: The globally distributed *Chaetoceros elegans* belongs to the *Chaetoceros lorenzianus* (*C. lorenzianus*) complex and is characterized by having tear-shaped setae poroids. Several strains of *C. elegans* were established from Chinese coastal waters. The vegetative cells and the resting spores were observed using light and electron microscopy. Phylogenetic analyses of two nuclear ribosomal RNA genes (SSU and the D1–D3 region of LSU) and the internal transcribed spacer (ITS) revealed that the *C. elegans* strains clustered into three clades, corresponding to different morphotypes. Based on the type material, the delineation of *C. elegans* was amended, and two new taxa, (*Chaetoceros macroelegans*) *C. macroelegans* sp. nov. and (*Chaetoceros densoelegans*) *C. densoelegans* sp. nov., were described. The two new taxa are featured by the presence of two types of setae poroids, tear-shaped and round-oval setae poroids, whereas only tear-shaped setae poroids are seen in *C. elegans*. The setae base is distinct in *C. elegans*, but absent or short in the two new taxa. In *C. macroelegans*, the tear-shaped poroids on the intercalary setae are larger and less densely spaced than in the other two species. The round-oval setae poroids are more densely spaced in *C. densoelegans* than in *C. macroelegans*, although they have more or less the same size. Resting spores characterize the two new taxa, but are unknown in the amended *C. elegans*. When comparing the ITS2 secondary structure, two and four compensatory base changes (CBCs) distinguish *C. elegans* from *C. macroelegans* and *C. densoelegans*, respectively. Between the two new taxa, no CBC but five hemi-CBCs (HCBCs) are present. The shape, size and density of the setae poroids, as well as the morphology of the resting spores, are important characteristics for species identification among the presently nine known species within the *C. lorenzianus* complex.

Keywords: setae poroid; resting spore; phylogeny; *Chaetoceros elegans*; *C. macroelegans*; *C. densoelegans*

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1. Introduction

Chaetoceros is one of the most diverse marine planktonic diatom genera, with more than 500 species and infraspecies recorded, and over 200 considered as taxonomically accepted species [1]. Species recognition is normally difficult because a number of the species have been described based on light microscopy only. The delineation of several commonly recorded species has been amended—for example, *C. socialis* [2], *C. compressus* and *C. contortus* [3], *C. debilis* [4]—and new species have also been described [5–10].

Recently, the section *Dicladia*, also called the *C. lorenzianus* complex, was explored, and the delineations of *C. decipiens*, *C. mitra* and *C. lorenzianus* were amended and four new species were described [11,12]. *Chaetoceros elegans*, one of the four new taxa, was characterized by tear-shaped setae poroids, a distinct seta base and the primary valve of resting