

## Phylogenetic Analysis and a Review of the History of the Accidental Phytoplankter, *Phaeodactylum tricornutum* Bohlin (Bacillariophyta)

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**Abstract :** The diatom *Phaeodactylum tricornutum* has been used as a model for cell biologists and ecologists for over a century. We have incorporated several new raphid pennates into a three-gene phylogenetic dataset (SSU, rbcL, psbC), and recover *Gomphonemopsis* sp. as sister to *P. tricornutum* with 100% BS support. This is the first time a close relative has been identified for *P. tricornutum* with robust statistical support. We test and reject a succession of hypotheses for other relatives. Our molecular data are statistically significantly incongruent with placement of either or both species among the Cymbellales, an order of diatoms with which both have been associated. We believe that further resolution of the phylogenetic position of *P. tricornutum* will rely more on increased taxon sampling than increased genetic sampling. *Gomphonemopsis* is a benthic diatom, and its phylogenetic relationship with *P. tricornutum* is congruent with the hypothesis that *P. tricornutum* is a benthic diatom with specific adaptations that lead to active recruitment into the plankton. We hypothesize that other benthic diatoms are likely to have similar adaptations and are not merely passively recruited into the plankton.

**Keywords :** benthic, diatoms; ecology, *Phaeodactylum tricornutum*, phylogeny, tycho plankton

**Conference Title :** ICABB 2018 : International Conference on Algal Biotechnology and Biochemistry

**Conference Location :** San Francisco, United States

**Conference Dates :** June 06-07, 2018