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Small diatoms (Bacillariophyta) in cultures from the Styx River, New Zealand, including descriptions of three new species

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Abstract

We obtained morphological and molecular data for 12 strains of small culturable diatoms from the Styx River, a semi-urban catchment in Christchurch, New Zealand, associated with high nutrient levels and increasing development pressure. *Sellaphora styxii*, *Planothidium victori*, and *Eolimna krummensis* are described as new to science, and material referable to the *Nitzschia palea* complex is genetically distinctive and would represent a new species if the genus was revised. *E. krummensis* had already been sequenced (but not described or named) from Europe. The other strains, *Planothidium frequentissimum*, *Gomphonema parvulum*, *Fistulifera saprophila*, *Navicula cryptocephala*, *N. veneta*, *Craticula molestiformis*, and *Cyclotella meneghiniana* are well known from the Northern Hemisphere; thus 3 of the 12 strains are presently known only from New Zealand. It is difficult to evaluate the likelihood of their endemism, but we expect that they will ultimately be found to be cosmopolitan. Infraspecific distribution patterns could be evaluated with molecular data, but would require the widespread sequencing of more variable gene regions.

Key words: Freshwater, diatoms, biogeography, 18S, *rbc*L, phylogeny, New Zealand

Introduction

The Styx River is a small (54.8 km^2) spring-fed catchment running through the northern suburbs of Christchurch, New Zealand (Taylor *et al.* 2000). The Styx catchment, which includes two major tributaries (Kaputone Creek and Smacks Creek), drains suburban, horticultural, agricultural and industrial land before reaching the sea via the Waimakariri River at Brooklands Lagoon (Hills 2002). In recent years, due to changing land-uses and population growth through the northward expansion of Christchurch city, parts of the catchment that have not previously been urbanised have undergone extensive modification. This has increased pressure on the catchment and resulted in damage to the river environment as shown by a reduction in stream health indicators, caused by loss of riparian vegetation, increased siltation, excessive macrophyte growths and other factors (Taylor *et al.* 2000). The Styx catchment is now a focus for community-led conservation and monitoring efforts, including surveys of animals and plants. However, algae have hitherto been a neglected component of the Styx ecosystem.

Here, we used short-term cultures from the Styx to derive morphological and molecular data for some small diatom species. Twelve unique strains were recovered, including *Planothidium victori* Novis, Braidwood & Kilroy *sp. nov.*, *Eolimna krummensis* Novis, Braidwood & Kilory *sp. nov.*, and *Sellaphora styxii* Novis, Braidwood & Kilroy *sp. nov.*, which are described here. Cultured material is relatively rare in diatom studies, and confers certain advantages (Mann & Chepurnov 2004), including the ability to obtain gene sequence data. In addition, molecular data are scarce from New Zealand diatoms, so sequences obtained for common species are of value in comparisons with Northern Hemisphere strains.

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