



Morphology and ultrastructure of *Hippodonta qinghainensis* sp. nov. (Bacillariophyceae), a new diatom from Lake Qinghai, China

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Abstract

A new medium-sized species of *Hippodonta* (Bacillariophyceae) is described from Lake Qinghai, China. The morphology and ultrastructure of *Hippodonta qinghainensis* sp. nov. are described using light and scanning electron microscopy. This new species is compared with similar species of *Hippodonta* using conventional and geometric morphometric analyses. *Hippodonta qinghainensis* can be separated from the other species of *Hippodonta* by a unique combination of characters that include an elliptic-lanceolate to rhombic-lanceolate valve shape, non protracted apices, the absence of fascia, relatively coarse, uniseriate striae and the presence of two rows of lineolae around the valves apices.

Key words: Diatoms, taxonomy, *Hippodonta*, Lake Qinghai, China, landmark analysis

Introduction

The genus *Hippodonta* Lange-Bertalot, Metzeltin & Witkowski in Lange-Bertalot *et al.* (1996: 249) was established in 1996 (Lange-Bertalot *et al.* 1996) by removing from *Navicula* sensu lato taxa with generally small and strongly silicified frustules, characterized by a broad transapical virgae and simple raphe system (Blanco *et al.* 2012). Although the establishment of this genus was originally criticized (Cox 1999), phylogenetic trees based on three molecular markers support the independence of *Hippodonta* as a genus separate from *Navicula* sensu stricto (Bruder & Medlin 2008). Since the establishment of this genus, numerous new species have been described especially from ancient lakes in Eurasia and Africa (Kulikovskiy *et al.* 2012; Pavlov *et al.* 2013) but also from small, young lakes and rivers in various continents (Metzeltin *et al.* 2005; Blanco *et al.* 2012; Van de Vijver *et al.* 2012; Potapova 2013) and from marine habitats (Witkowski *et al.* 2000). A comprehensive review of the taxa belonging to *Hippodonta* was recently provided by Pavlov *et al.* (2013). In their study they listed 70 taxa. Since this publication two more species from the United States of America were transferred from *Navicula* sensu lato to *Hippodonta* by Potapova (2013), namely *Hippodonta dulcis* (R.M.Patrick) Potapova and *Hippodonta gravistriata* (R.M.Patrick) Potapova. Interestingly, none of these 72 taxa have their type locality in China and only one species, *Hippodonta pseudacceptata* Lange-Bertalot, has its type locality in the Far-East (Japan). Until now *Hippodonta* has been very seldom reported from China (Huang *et al.* 1998; Zhu & Chen 2000; Yang *et al.* 2003) although this may be the result of the relatively low number of diatom studies focusing on this large country. This situation however, is changing rapidly and the sampling effort focusing on diatoms from aquatic ecosystems in continental China has considerably increased in the last five years leading to the descriptions of numerous new species (Gong & Li 2011, 2012; Gong *et al.* 2013; Li & Gong 2013; Li *et al.* 2010a, 2010b, 2010d; Liu Q. *et al.* 2014; Liu Y. *et al.* 2010a, 2010b, 2013, 2014; Rioual *et al.* 2013a, 2014a, 2014b; Wu *et al.* 2013; You *et al.* 2008, 2013) and even of genera new to science such as *Sichuania* (Li *et al.* 2009), *Tibetiella* (Li *et al.* 2010c) and *Pseudofallacia* (Liu Y. *et al.* 2012).

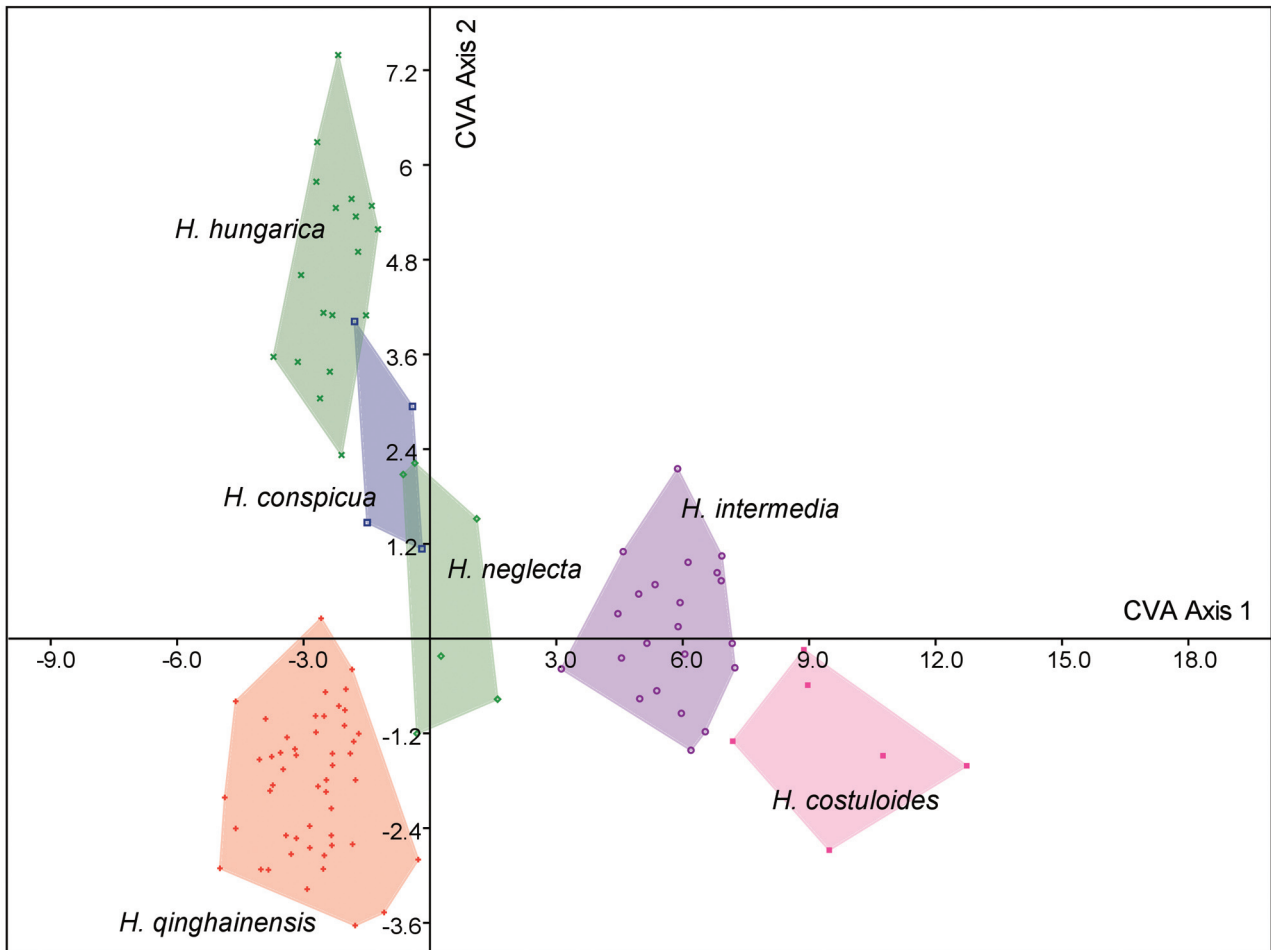


FIGURE 42. Ordination plots representing the first two axes of the Canonical Variates Analysis (CVA) performed on the normalized coordinates of the morphological landmarks digitized on LM images of *Hippodonta qinghainensis* and other species of *Hippodonta*.

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