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Morphological variability within the *Achnanthidium minutissimum* species complex (Bacillariophyta): comparison between the type material of *Achnanthes minutissima* and related taxa, and new freshwater *Achnanthidium* species from Portugal

MARIA HELENA NOVAIS[1,2*], INGRID JÜTTNER[3], BART VAN DE VIJVER[4,5], MARIA MANUELA MORAIS[1], LUCIEN HOFFMANN[2] & LUC ECTOR[2]

[1]*Instituto Ciências da Terra (ICT), Pólo da Universidade de Évora, Rua Romão Ramalho n° 59, 7000–671 Évora, Portugal*
[2]*Luxembourg Institute of Science and Technology (LIST), Environmental Research and Innovation Department (ERIN), 41 rue du Brill, L-4422 Belvaux, Luxembourg (lucien.hoffmann@list.lu, luc.ector@list.lu)*
[3]*Department of Natural Sciences, National Museum of Wales, Cathays Park, Cardiff CF10 3NP, UK (Ingrid.Juettner@museumwales.ac.uk)*
[4]*Botanic Garden Meise, Department of Bryophyta & Thallophyta, Nieuwelaan 38, B–1860 Meise, Belgium (vandevijver@br.fgov.be)*
[5]*University of Antwerp, Department of Biology, ECOBE, Universiteitsplein 1, B–2610 Wilrijk, Belgium*
** Corresponding author (E-mail: novaismh@gmail.com)*

Abstract

Two new taxa similar to *Achnanthidium minutissimum* were common and abundant in samples collected during a survey of benthic diatoms in watercourses from mainland Portugal. They are described here as *A. duriense*, *sp. nov.* and *A. lusitanicum*, *sp. nov.* In addition, the recently described *A. pseudolineare* is reported from various localities and its ecology is described in detail. The new *Achnanthidium* species from Portugal were compared with the type material of morphologically similar taxa: *Achnanthidium microcephalum*, *Achnanthes minutissima*, *A. minutissima* var. *cryptocephala*, *A. minutissima* var. *inconspicua* and *A. nana*. The analysis of this type material confirmed that *Achnanthes minutissima* var. *cryptocephala* should be regarded as a different taxon, and a new combination is proposed, *Achnanthidium neocryptocephalum*, *stat., comb. et nom. nov. Achnanthes minutissima* var. *inconspicua* is now considered as a younger synonym of *Achnanthidium lineare*. Based on a detailed morphological study of specimens of *Achnanthes nana* from Scotland, Nepal and Portugal, this taxon is transferred to the genus *Achnanthidium* as *Achnanthidium nanum*, *comb. nov.*

Key words: Achnanthaceae, diversity, ecology, freshwater, nomenclature, taxonomy, ultrastructure

Introduction

Achnanthidium (Kütz. 1844: 75) is one of the most abundant and frequently found genera in freshwaters worldwide (*e.g.*, Krammer & Lange-Bertalot 1991, Ponader & Potapova 2007, Potapova & Hamilton 2007). It is characterized by linear-lanceolate to lanceolate-elliptic valves with cells in girdle view forming a shallow V. Striae are radiate or almost parallel, uniseriate and wider spaced in the middle part of the valve, especially on the raphe valve. One valve has a simple central raphe hardly expanded at the centre, with terminal fissures straight or deflected to the secondary side at the apices. On the mantle a row of (slightly) elongated areolae is present (Round & Bukhtiyarova 1996). Within the genus, two groups have repeatedly received attention because of their abundance, their importance for water quality assessments and identification problems: i) the complex around *A. minutissimum* (Kütz. 1833: 578) Czarn. (1994: 157) with straight terminal raphe fissures, and ii) the complex around *A. pyrenaicum* (Hust. 1939: 554–555) H.Kobayasi (1997: 148) with terminal raphe fissures clearly deflected. Recently, several new species have been described in both groups: *e.g.*, *A. atomoides* O.Monnier, Lange-Bertalot & Ector in Monnier *et al.* (2004: 128), *A. dolomiticum* Cantonati & Lange-Bert. (2006: 1185), *A. lailae* Van de Vijver in Zidarova *et al.* (2009: 297), *A. caravelense* Novais & Ector in Novais *et al.* (2011: 142), *A. pseudolineare* Van de Vijver, Novais & Ector in Van de Vijver *et al.* (2011a: 186), *A. sublineare* Van de Vijver, Jarlman & Ector in Van de Vijver *et al.* (2011a: 179), *A. acerosum* Van de Vijver, Lange-Bert. & Jarlman in Van de Vijver *et al.* (2011b: 198), *A. ertzii* Van de Vijver & Lange-Bert. in Van de Vijver *et al.* (2011b: 200), *A. hoffmannii* Van de Vijver, Ector, A.Mertens & Jarlman in Van de Vijver *et al.* (2011b: 195), *A. tepidaricola*

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