

---

## REVISITING THE TAXONOMY OF THE GENUS *LEPTOCYLINDRUS* CLEVE (BACILLARIOPHYCEAE) IN THE GULF OF NAPLES USING MORPHOLOGICAL, MOLECULAR AND PHYSIOLOGICAL APPROACHES

Deepak Nanjappa, Wiebe H.C.F. Kooistra, Marina Montresor & Adriana Zingone

Stazione Zoologica Anton Dohrn

*Leptocylindrus* is a radial centric diatom genus within which two species, *L. danicus* and *L. minimus*, are reported as abundant in coastal waters worldwide. In the Gulf of Naples, *L. danicus* is found all year round, with major blooms in summer, while *L. minimus* recurs in autumn. However the diversity of the genus has not been investigated in detail so far. We analysed 85 strains from the Gulf of Naples and strain CCMP 1856 from the Atlantic US coast using nuclear rDNA (18S, D1/D2 region of the 28S and ITS), the plastid 16S rDNA, the large subunit of the ribulose biphosphate carboxylase gene (*rbcL*) and the photosystem II gene, *psbC*. Morphology of the strains was investigated using light and electron microscopy. The strains grouped into five clades, suggesting the existence of five distinct species. Two of these matched the description of *L. danicus* Cleve, which typically has a subcentral pore on the valve and forms spiny resting spores following sexual reproduction. Genetically, they were nearest sisters and they showed subtle morphological differences; one of these is described as a new species. The taxon in another clade was previously reported as *L. danicus* var. *apora*, differing from the nominal species because it lacks the pore in the valve and does not form resting spores. This taxon is raised to the species status. A fourth clade consisted of a species new to science, which had distinctively convex valves. Finally, the strains in the basal clade matched the description of *L. belgicus* Meunier, so far considered as synonym of *L. minimus* Gran. However, based on marked ultrastructural differences, a new genus is erected for it. The actual *Leptocylindrus minimus* was not found in the Gulf of Naples, but its 18S sequence from Genbank differed from those of all our strains. The five *Leptocylindrus* species found in the Gulf of Naples showed different seasonal distributions, though with overlaps. *Leptocylindrus danicus* and *L. aporus* showed opposite seasonal distributions. The former occurred year round except during summer, rarely attaining high concentrations, whereas the latter was found from the summer throughout mid-autumn, producing intense blooms in summer. Physiological experiments showed that the two species responded differently to lower temperature (12°C) but had similar performances at higher temperatures (19 and 26 °C). The study demonstrates that taxa occurring year-round, i.e., under markedly different environmental conditions, may in fact consist of genetically, morphologically and physiologically distinct species.