

The genus *Cladophora* Kutzing (Ulvophyceae) as a globally distributed ecological engineer

Abstract

The green algal genus *Cladophora* forms conspicuous nearshore populations in marine and freshwaters worldwide, commonly dominating peri-phyton communities. As the result of human activities, including the nutrient pollution of nearshore waters, *Cladophora*-dominated periphyton can form nuisance blooms. On the other hand, *Cladophora* has ecological functions that are beneficial, but less well appreciated. For example, *Cladophora* has previously been characterized as an ecological engineer because its complex structure fosters functional and taxonomic diversity of benthic microfauna. Here, we review classic and recent literature concerning taxonomy, cell biology, morphology, reproductive biology, and ecology of the genus *Cladophora*, to examine how this alga functions to modify habitats and influence littoral biogeochemistry. We review the evidence that *Cladophora* supports large, diverse populations of microalgal and bacterial epiphytes that influence the cycling of carbon and other key elements, and that the high production of cellulose and hydrocarbons by *Cladophora*-dominated periphyton has the potential for diverse technological applications, including wastewater remediation coupled to renewable biofuel production. We postulate that well-known aspects of *Cladophora* morphology, hydrodynamically stable and perennial holdfasts, distinctively branched architecture, unusually large cell and sporangial size and robust cell wall construction, are major factors contributing to the multiple roles of this organism as an ecological engineer.

Keyword: *Cladophora*; Ecological engineer; Periphyton