



# ZN REMOVAL BY DESMODESMUS PLEIOMORPHUS - A WILD STRAIN



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## INTRODUCTION

Contamination of aquatic environments by heavy metals has received increased attention in the past few decades. As those metals can not undergo chemical breakdown, such a form of pollution is a threat to health and welfare of men at large – so it should be carefully addressed.

Bioremediation using microalgae – which constitute some of the most important microorganisms in aquatic ecosystems, has been taken advantage of in recent years, due to the associated low cost coupled with an extremely high removal capacity; some species are also able to grow in sites contaminated with those elements, and have developed an efficient capacity to uptake them from the environment.

The aim of this study was thus to test the ability to remove  $Zn^{2+}$  of the green microalga *Desmodesmus pleiomorphus* – which had previously been isolated from a polluted site in Northern Portugal, when exposed to various initial Zn concentrations.

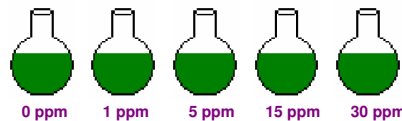
## MATERIALS AND METHODS

### Experimental conditions

- ✓ Microalga: *Desmodesmus pleiomorphus*
- ✓ 1 L batch cultures
- ✓ OHM medium
- ✓ pH = 6.9 (in the beginning of each experiment)
- ✓ Biomass: 0.02 g/L
- ✓ Temperature: 25°C
- ✓ 24 h continuous light
- ✓  $[Zn^{2+}] = 0, 1, 5, 15$  and 30 ppm

## EXPERIMENTAL PROCEDURE

Triplicate batch cultures for each initial  $[Zn^{2+}]$

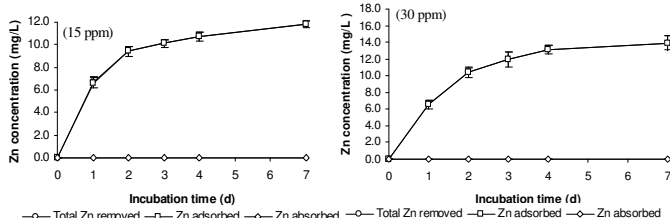
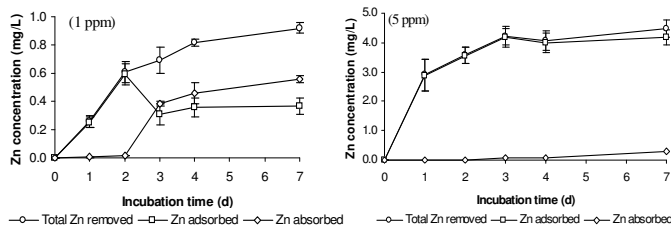


- ✓ 75 mL- samples taken daily for 7 d
- ✓ Centrifugation at 4000 rpm, 15 min, 4 °C

- ✓ Measurement of:
  - Total Zn removed
  - Zn adsorbed
  - Zn intracellular

✓ Statistical analysis

## RESULTS AND DISCUSSION



Analysing the time courses of Zn removed, Zn adsorbed and Zn absorbed by *D. pleiomorphus*, one concludes that:

- ✓ **Total Zn removal increases with time**, for all concentrations tested, following an initial stage of fast uptake;
- ✓ **Most Zn removal is via adsorption onto the cell surface** – which is a self-protection and tolerance mechanism of microalgae against toxic metals;
- ✓ **Maximum amount of metal removal of 13.9 mg Zn/L** (or 360 mg Zn/g microalga) when exposed to 30 mg Zn/L, by 7 d, which corresponds to a Zn removal of 46.4% of the initial Zn added;
- ✓ **Total amount removed is higher** when cells were exposed to higher initial metal concentrations, so adsorption/absorption capacity was not depleted.

*D. pleiomorphus* cells have a great potential for bioremediation purposes

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