

bbe10cells-analysis of the impact of chlorine sterilization on different algae species

Andreas Jatzkewitz

index

- introduction
- experiment:
 - procedure
 - results
 - lessons learned
- prospects

introduction

introduction

According to WMO, biological content of ballast water must be **<10 cells/ml** prior to discharge

Common means of ballast water sterilization:

→ chlorine

introduction

According to WMO, biological content of ballast water must be **<10 cells/ml** prior to discharge

Common means of ballast water sterilization:

- chlorine
- UV-exposure

introduction

According to WMO, biological content of ballast water must be **<10 cells/ml** prior to discharge

Common means of ballast water sterilization:

- chlorine
- UV-exposure
- ultrasound

introduction

According to WMO, biological content of ballast water must be **<10 cells/ml** prior to discharge

Common means of ballast water sterilization:

- chlorine
- UV-exposure
- ultrasound
- heat

introduction

According to WMO, biological content of ballast water must be **<10 cells/ml** prior to discharge

Common means of ballast water sterilization:

- chlorine
- UV-exposure
- ultrasound
- heat
- oxygen

experiment: procedure

experiment: procedure

A solution of each of the following species of algae was prepared with artificial sea-water:

green algae	<i>Chlorella vulgaris</i>
	<i>Tetraselmis sp.</i>
blue green algae	<i>Microcystis aeruginosa</i>
	<i>Nostoc sp.</i>
diatoms	<i>Cyclotella meneghiniana</i>

experiment: procedure

6 samples of each species were prepared by adding different amounts of NaClO to the original solutions.

Consequently, these 6 samples contained the following chlorine concentrations (c_{Cl_2}):

- 10 ng/l
- 20 ng/l
- 40 ng/l
- 150 ng/l
- 300 ng/l
- 600 ng/l

experiment: procedure

c_{Cl_2} of each sample was measured with **bbe**

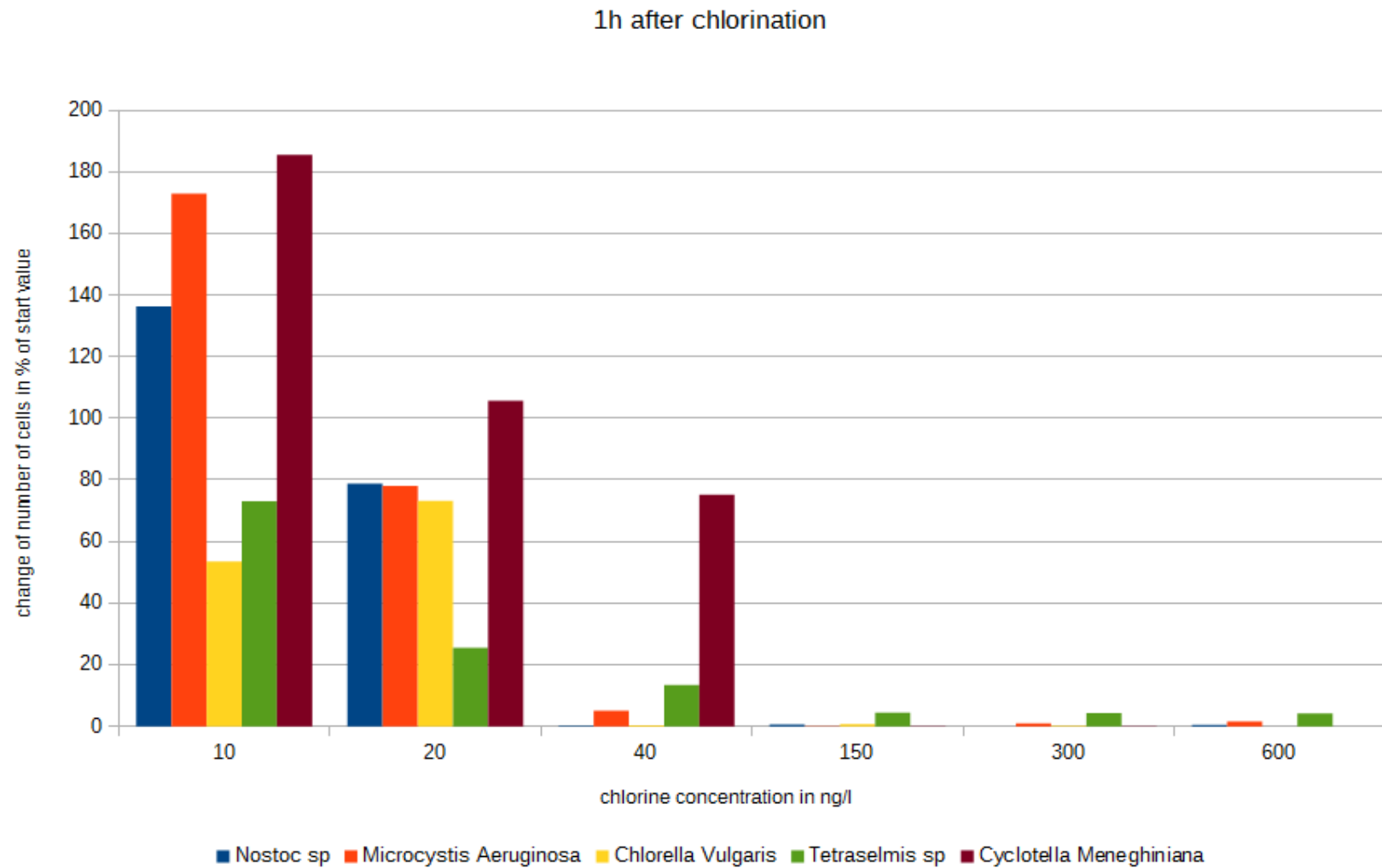
AlgaeLabAnalyser and **bbe 10cells** at 3 points in time:

- before chlorination
- 1h after chlorination
- 6d after chlorination

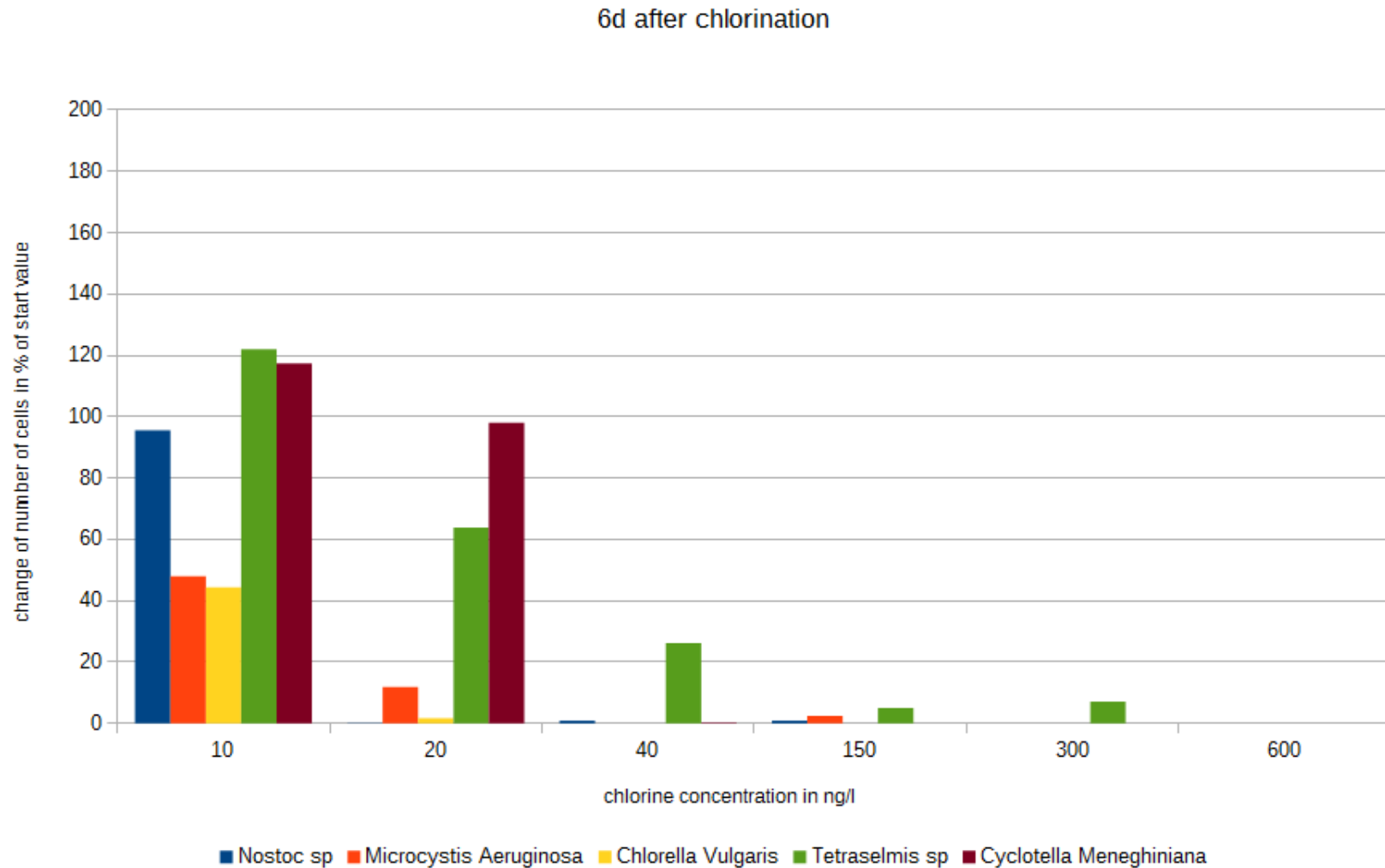
All samples had been stored in a dark refrigerator between measurements.

experiment: results

experiment: results



experiment: results



experiment: lessons learned

- some species are more resistant to chlorination than others (e.g. *Cyclotella meneghiniana*)
 - in most cases, effect of chlorination increases over time
 - for some algae, immediate effect is greater than long term effect (e.g. *Tetraselmis*)
- amount of necessary chlorine source is dependent on anticipated algae species and available reaction time

prospects

prospects

For reliable information about necessary chlorine concentration: further experiments necessary

Reason:

Other organic material in sea-water may also react with chlorine.

→ Much larger chlorine concentrations may be necessary.

Thank you for your attention!