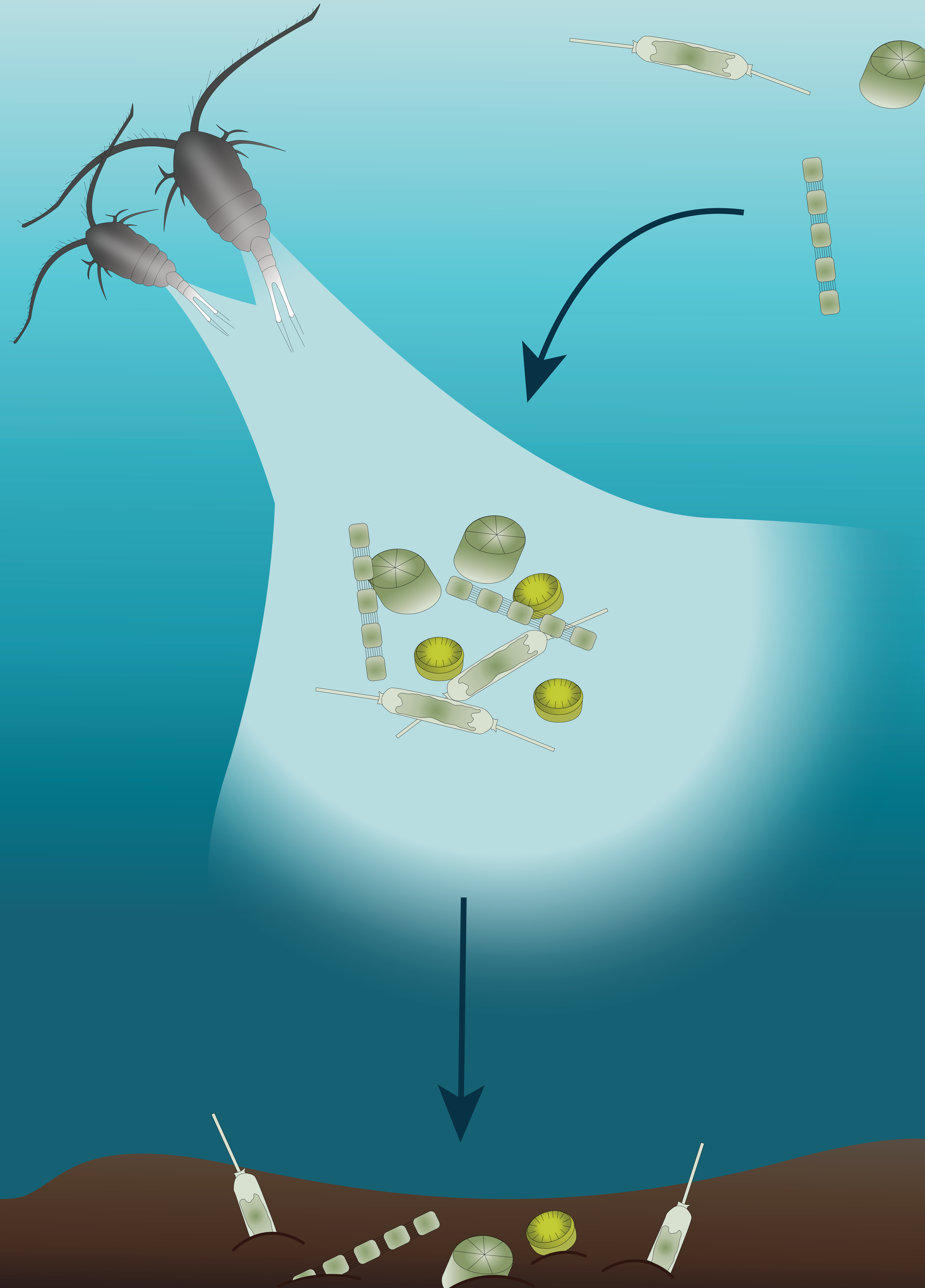
Aggregation as a defence mechanism in diatoms

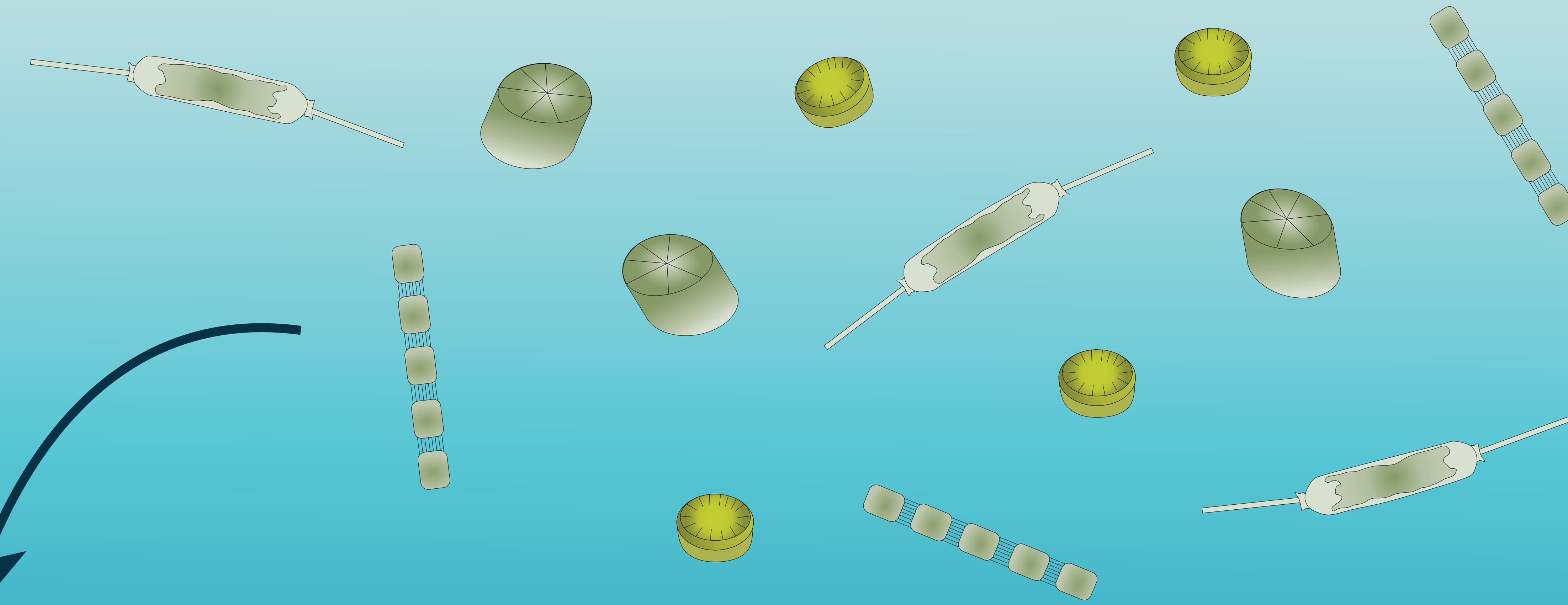
Josephine Grønning & Thomas Kiørboe

Centre for Ocean Life, Technical University of Denmark, Kemitorvet B201, 2800 Kgs. Lyngby, Denmark

Abstract
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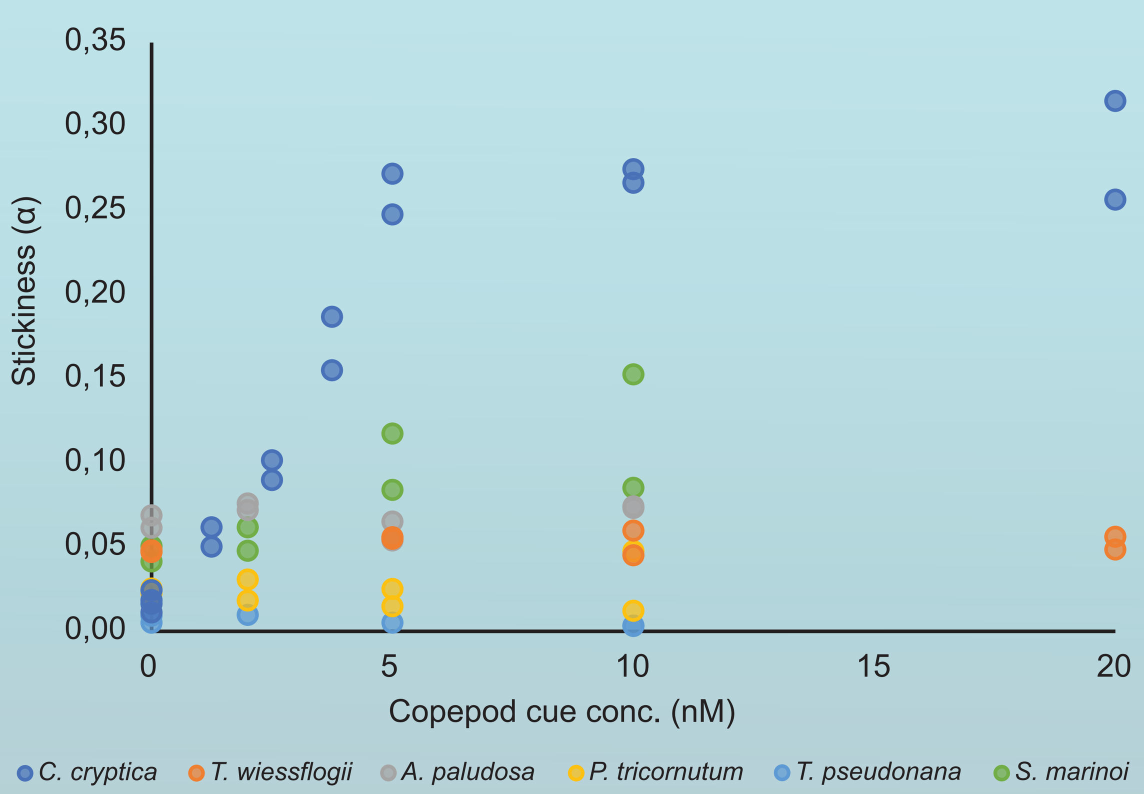
Introduction

Sinking is part of diatom life history. Typically, by the end of a bloom, diatoms form aggregates that sink rapidly to the bottom. This opportunistic lifestyle can be considered an adaptation to reduce predation losses, because predation pressure in the sediment is less that in the water column.

Aim:
We recently discovered that some diatoms form aggregates in response to copepod cues. We aim at exploring this phenomenon by quantifying the stickiness of six species of diatoms in response to copepod cues.

Expamle of results

Below is the result for dose-response experiments of batch cultures. Stickiness of *C. cryptica* and *S. marinoi* increases with the concentration of copepod cues. Other diatoms were more or less sticky but independent of copepod cues.


0,35
0,30
0,25
0,20
0,15
0,10
0,05
0,00
Stickiness (α)
0
5
10
15
20
Copepod cue conc. (nM)
C. cryptica
T. wiessflogii
A. paludosa
P. tricornutum
T. pseudonana
S. marinoi

Summary of results

- Stickiness of some diatom species increased with increasing concentration of copepod cues

- Stickiness of induced *C. cryptica* increased over time

- Stickiness of nutrient (Si or N) limited diatoms were higher in high-nutrient treatments than in low-nutrient treatments

Methods

Stickiness is the probability of two particles sticking together upon collision.

Stickiness was determined based on coagulation theory, which states that cells will collide at a predictable rate when suspended in a fluid shear field.

Diatom cultures was induced with copepod cues (copepodamides), and-three experimental designs were used to test stickiness; dose-response, batch and nutrient limited experiments.

Discussion

Aggregation as a defence mechanism?

We argue that the increase in stickiness is adaptive when grazing mortality exceeds growth rate. Diatoms may form aggregates and sink out of the water column to escape predation. This ensures that the maximum number of cells survive in the sediment, ready to utilize the next window of growth opportunity.

This mechanisms is likely to have implications for vertical carbon flux, however the magnitude is yet to be quantified.

Josephine Grønning
jbgr@aqua.dtu.dk
@J_Groenning

Centre for Ocean Life
VKR Centre of Excellence