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ROLE OF BIOTIC INTERACTIONS IN PATTERNING EPIPHYTIC DIATOMS ASSEMBLAGES

ELLS-IAGLR
September 23-28, 2018

INTRODUCTION

- Lake are complex ecosystems
- Diversity patterns explained by environmental factors
  - bioindication
- Biotic relationships are rarely considered in explaining species assemblages

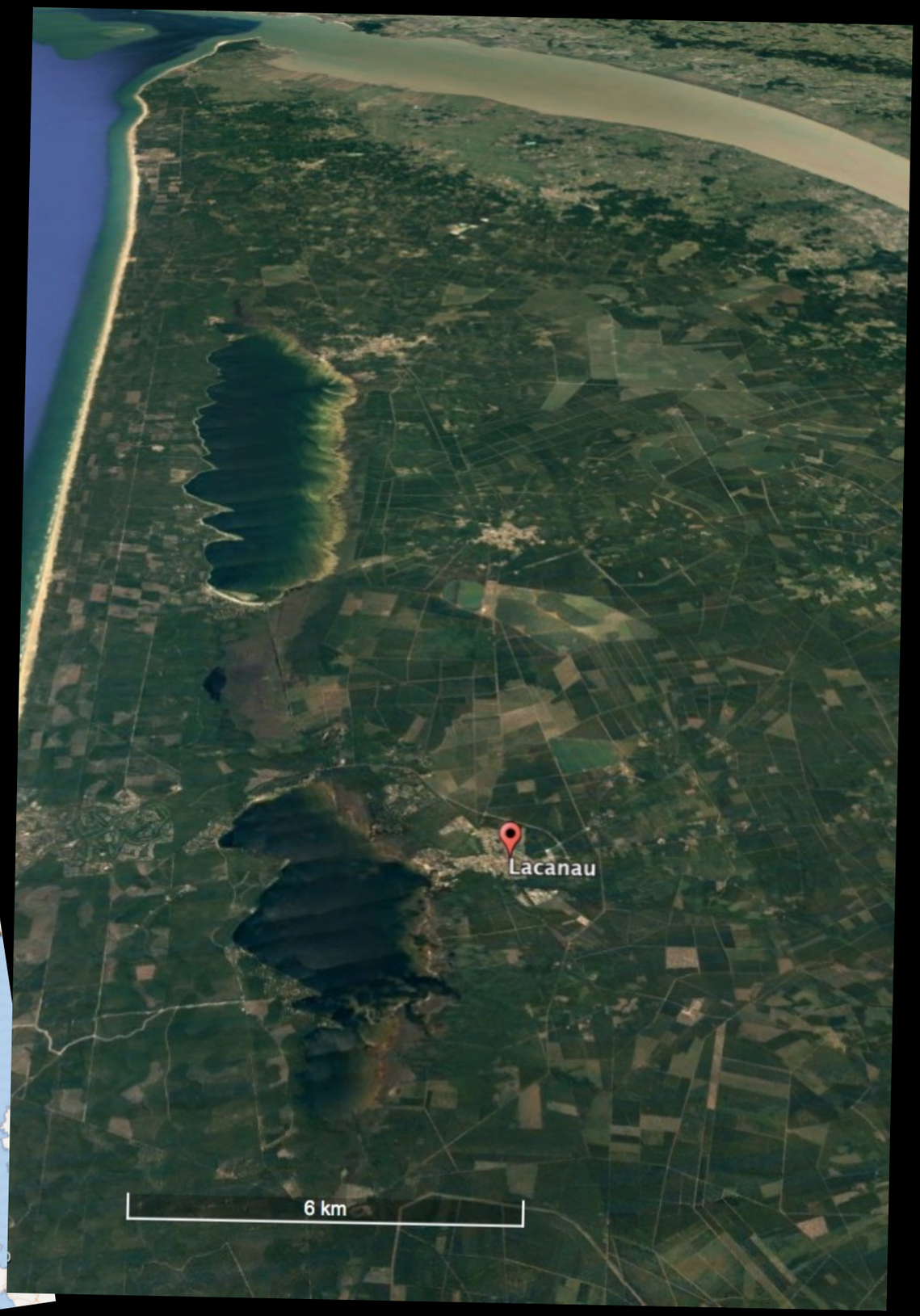
OBJECTIVES

Identify the biotic factors influencing diversity patterns of epiphytic diatoms communities

1. Role of macrophytes = substrate effect

2. Phytoplankton interactions = competition / facilitation

3. Micro-meiofauna interactions = grazing



Lacanau Lake

Surface =17 km^2

Max depth = 8 m

Mean volume = $53.10^6 m^3$

- 6 stations
- Spring, Summer, Autumn, Winter
- Physico-chemical measures (N=3)
- Phytoplankton composition
- Phytoplankton biomass (N=12 / stations)

Epibenthos sampling

P. australis *C. fragifera* *L. dortmanna* *L. major* *J. bulbosus*

« Shaking sampling (2') »

DI FI

ChA ChA ChA

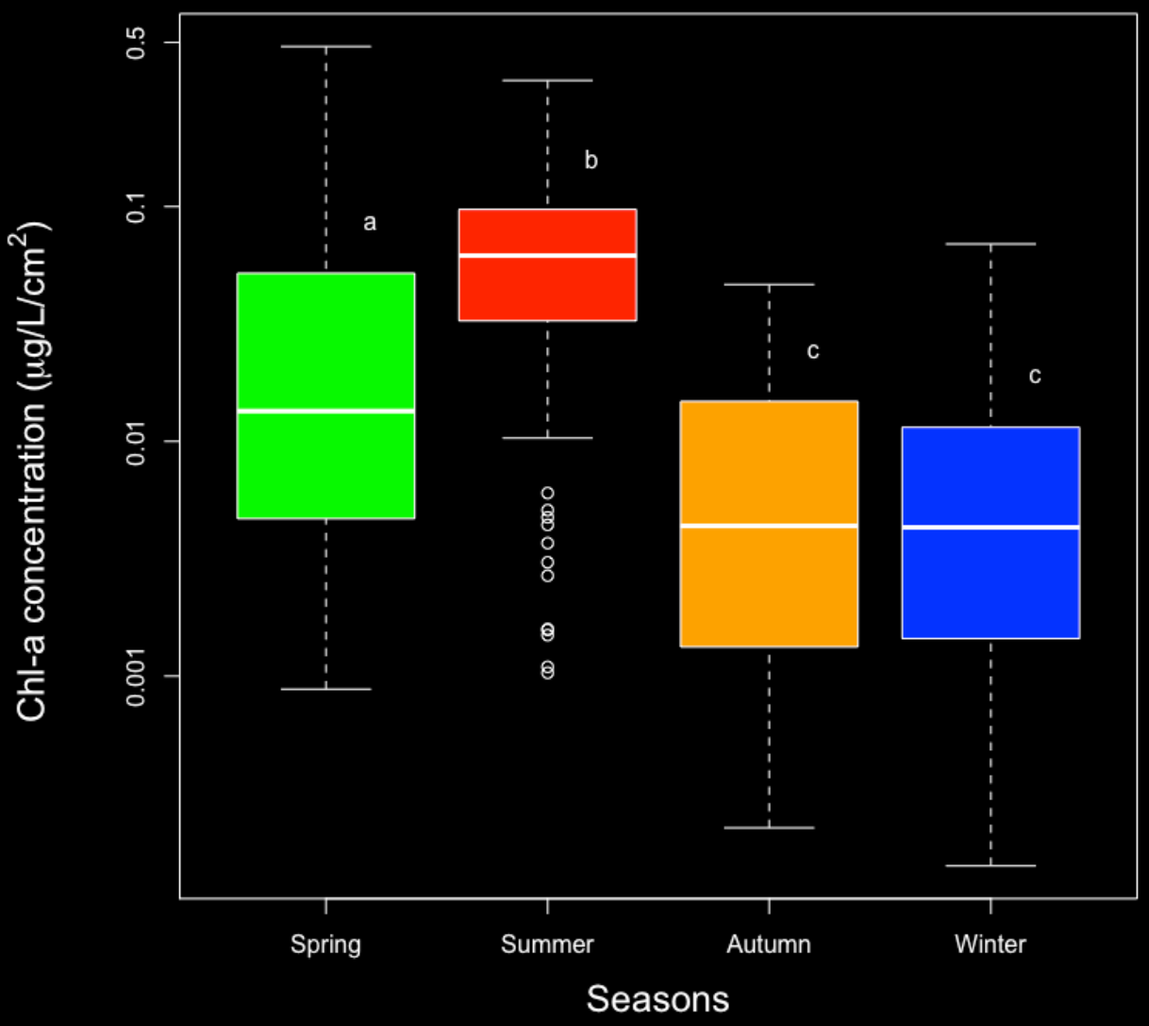
\+ \+ \+

OM OM OM

DI = Diatoms identification FI = micro-meiofauna identification ChA = Chlorophylle-*a* OM = organic matter

Epiphytic diatoms variation with seasons

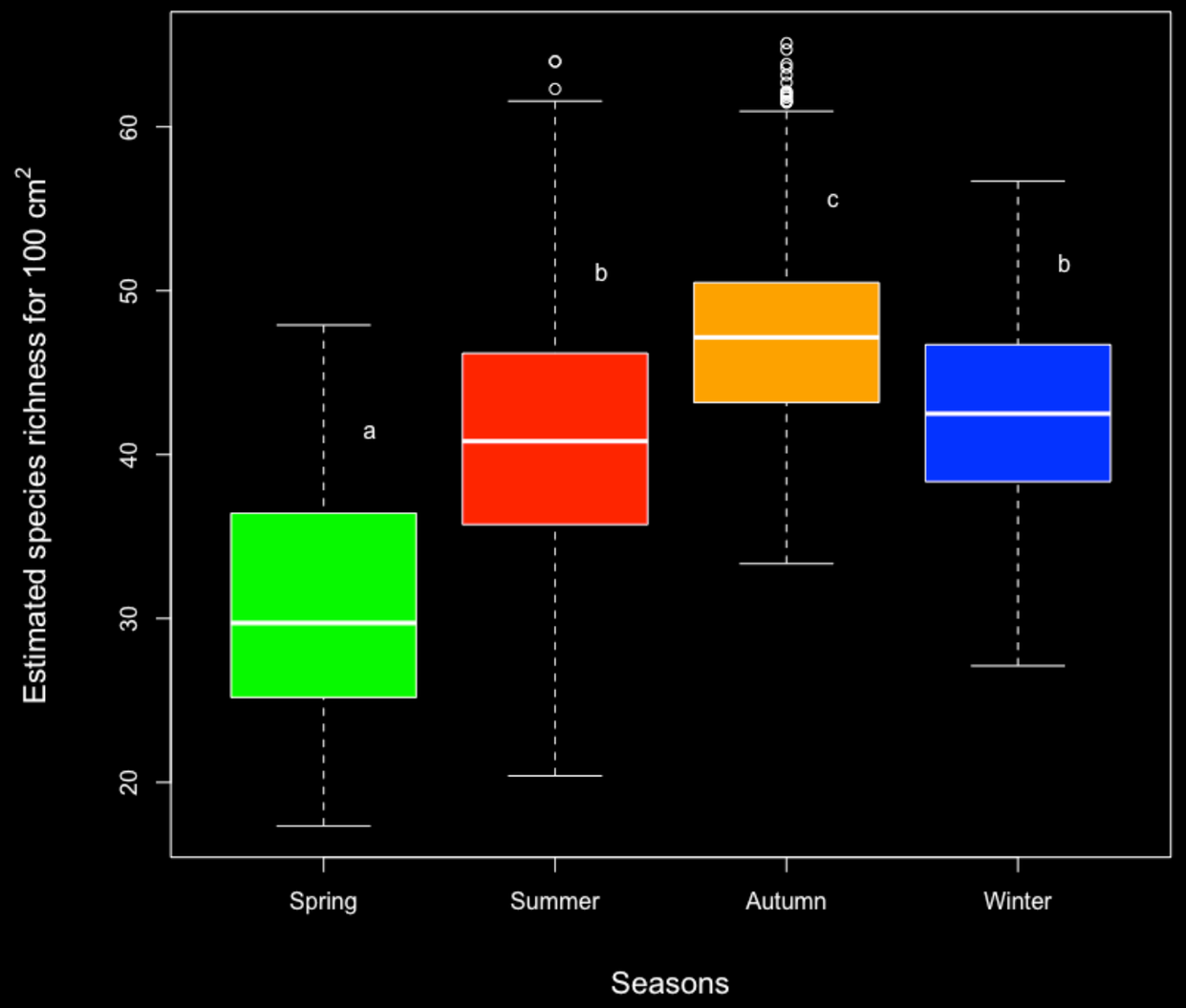
Biomass



Correlations with:

- pH, T°C (+)
- Mg, Ca (-)

Species richness

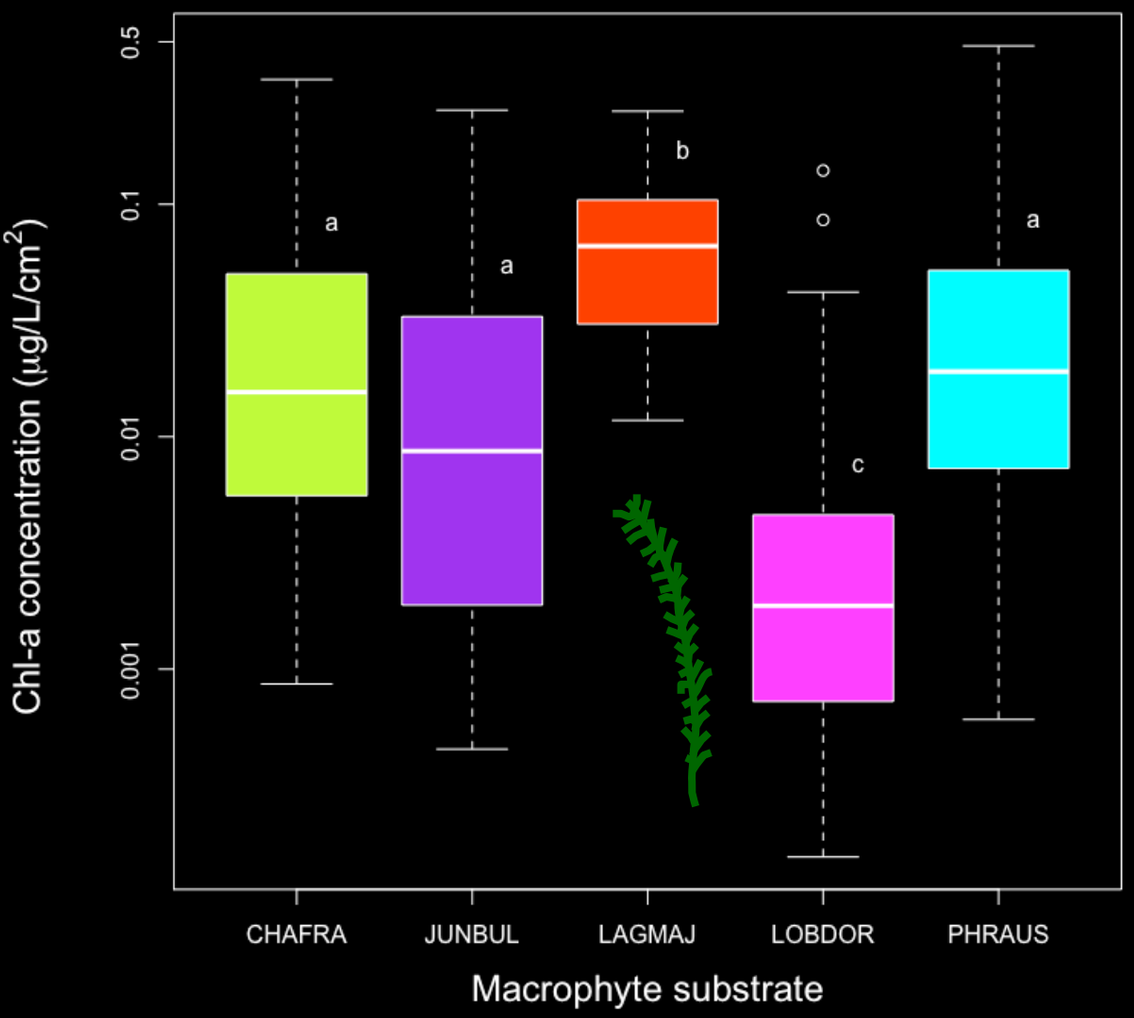


Correlations with:

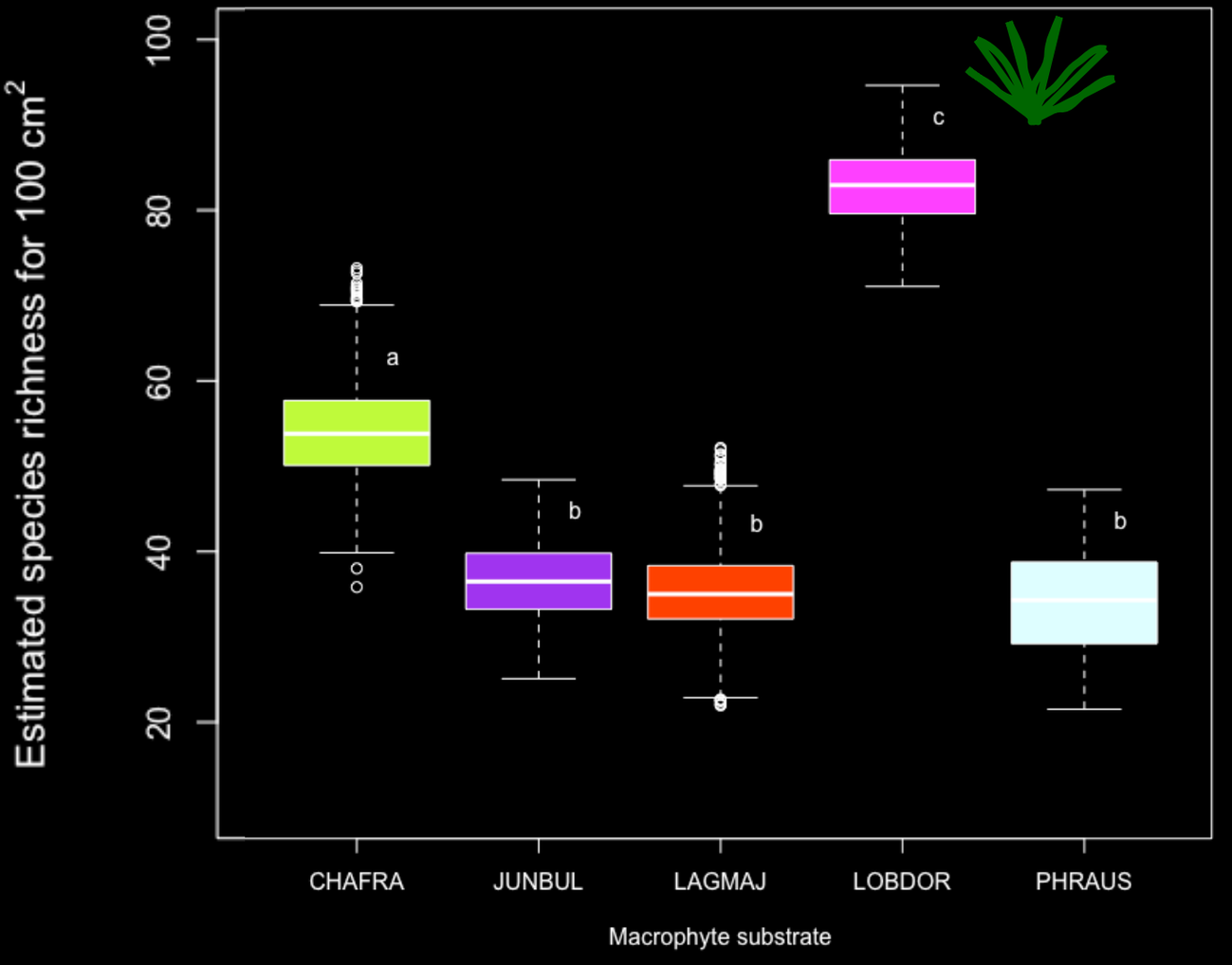
- NH_4, Cl, TP (+)
- N-organic, NO_3 (-)

Role of macrophytes substrate

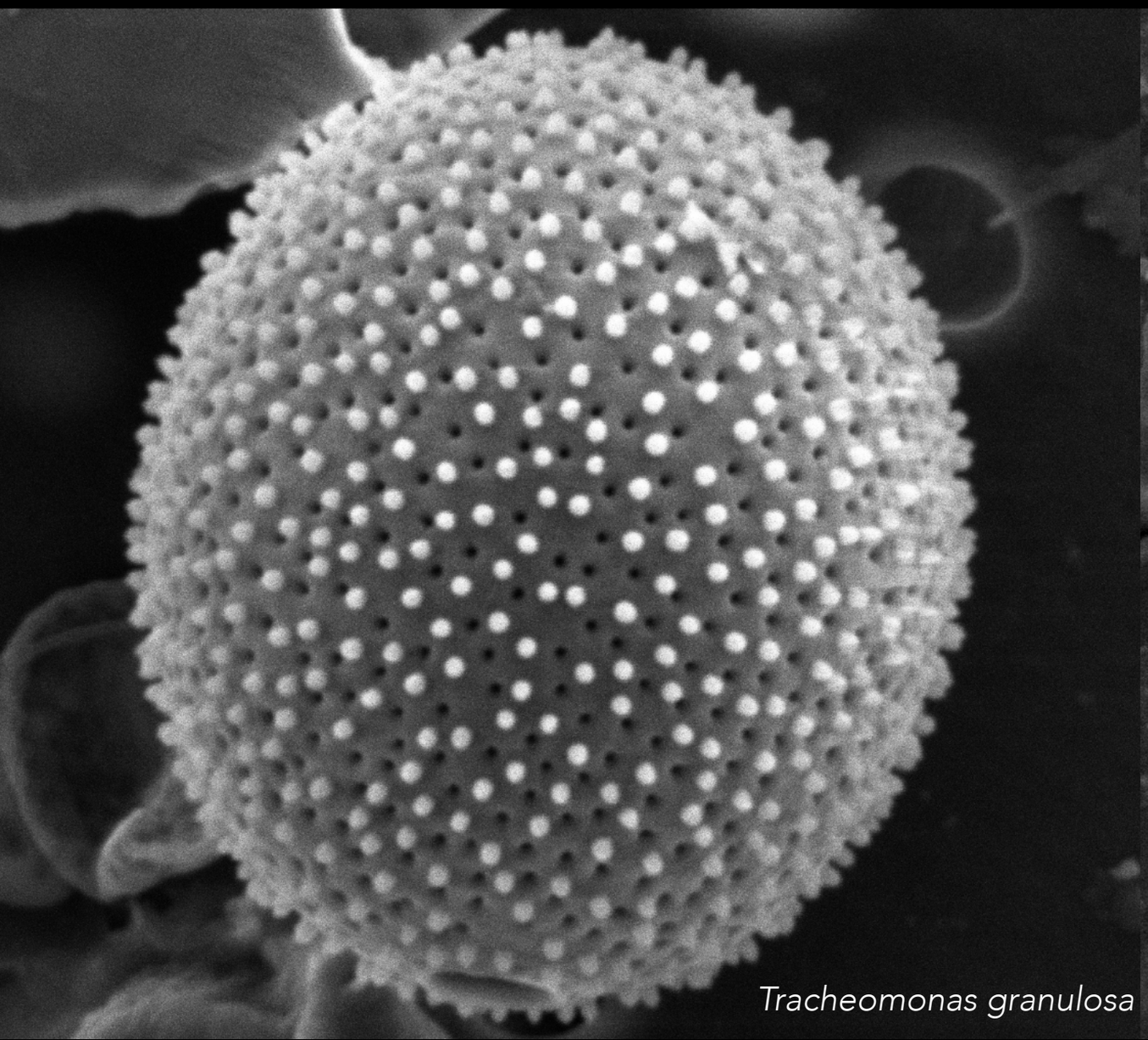
Biomass



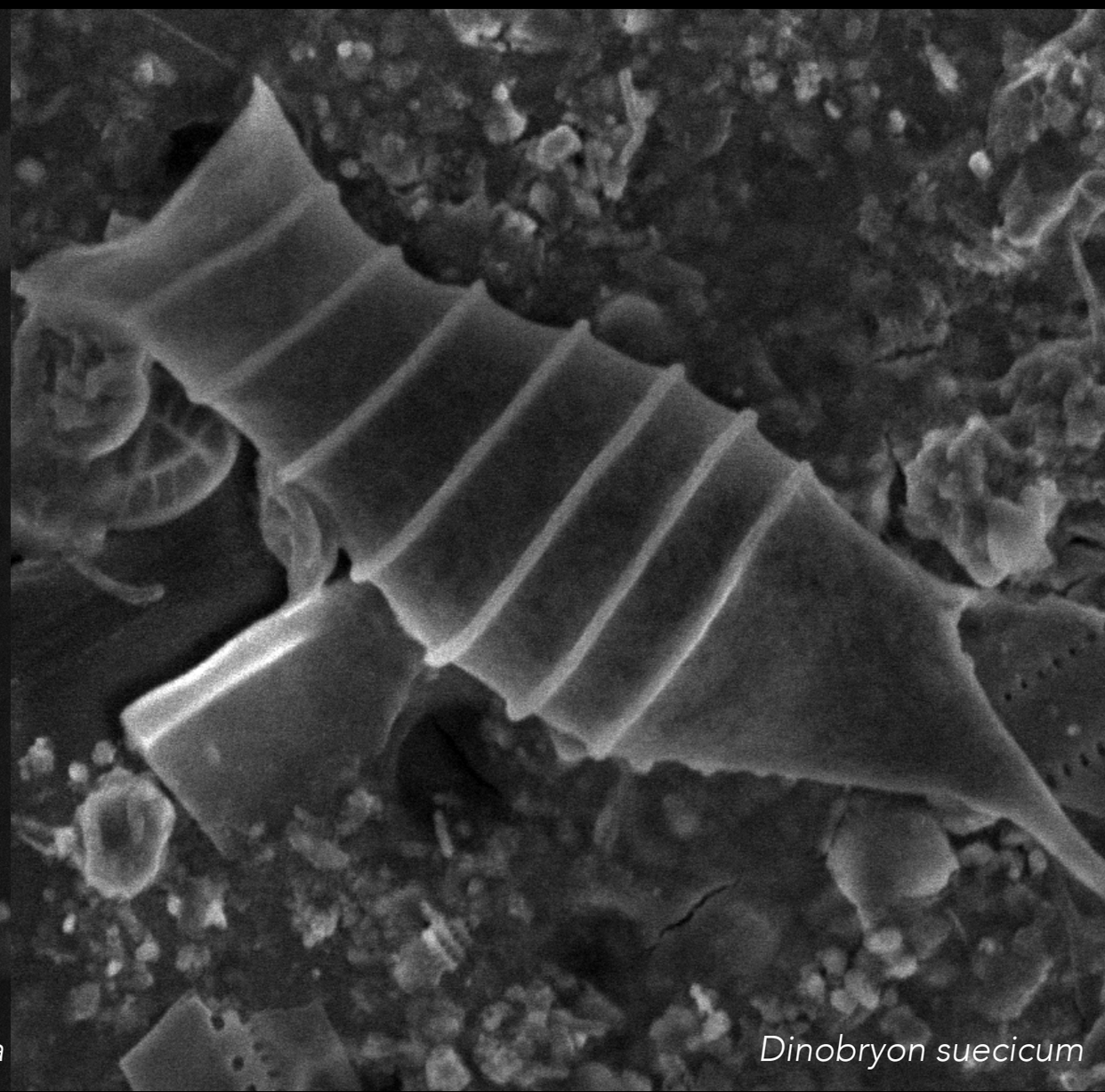
Species richness



Interaction with phytoplankton

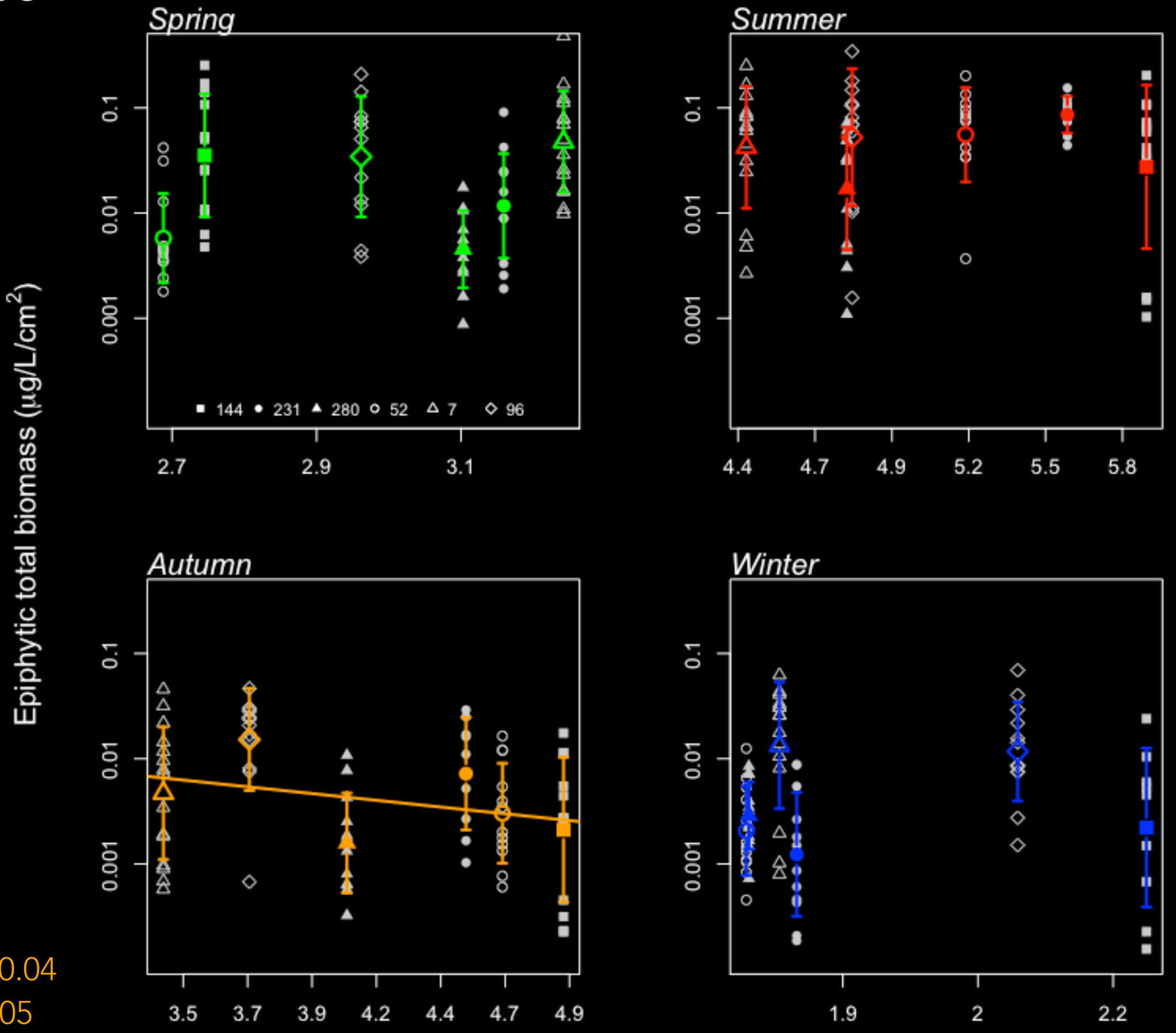


Tracheomonas granulosa



Dinobryon suecicum

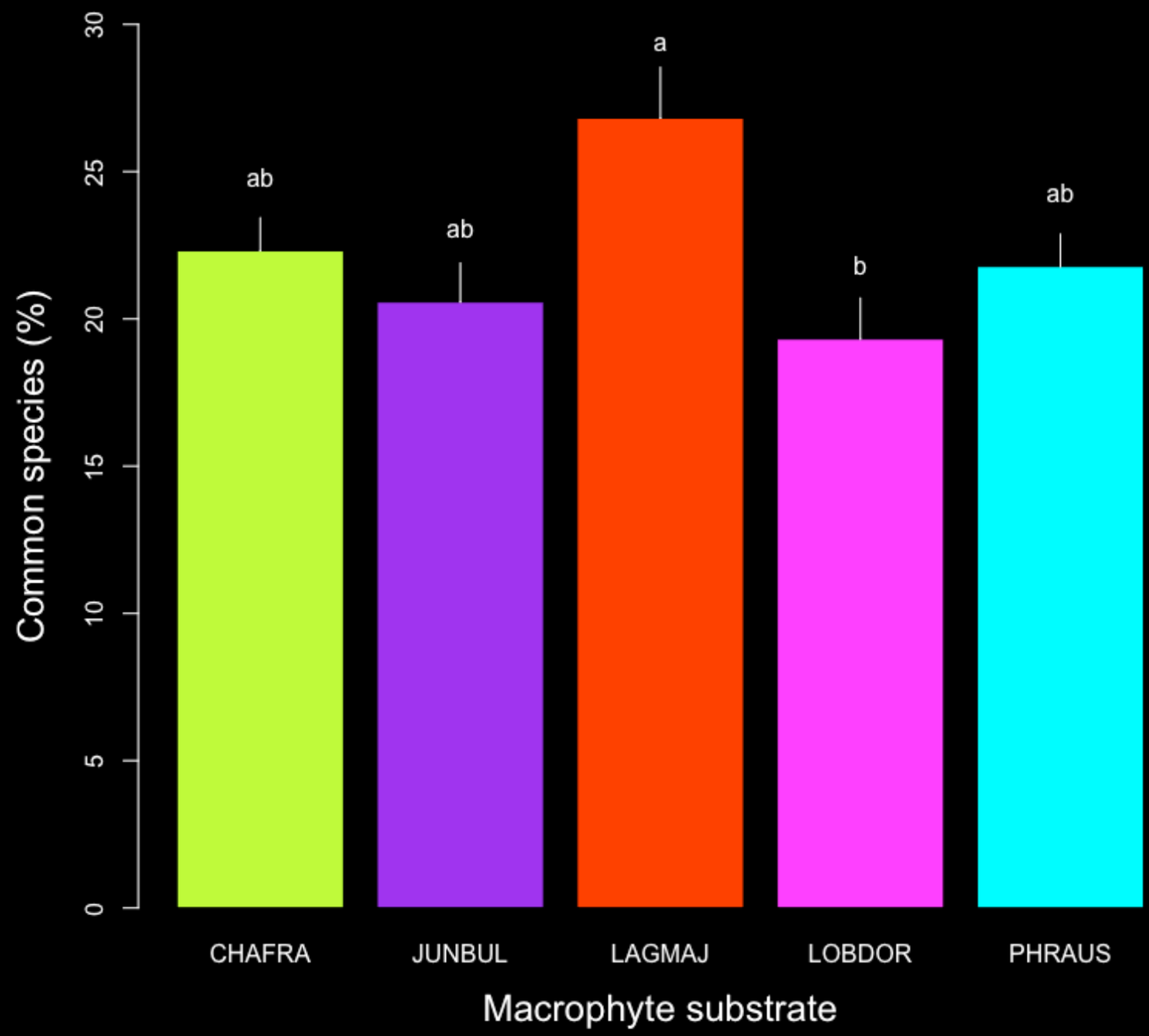
Biomass



$R^2_{aj} = 0.04$

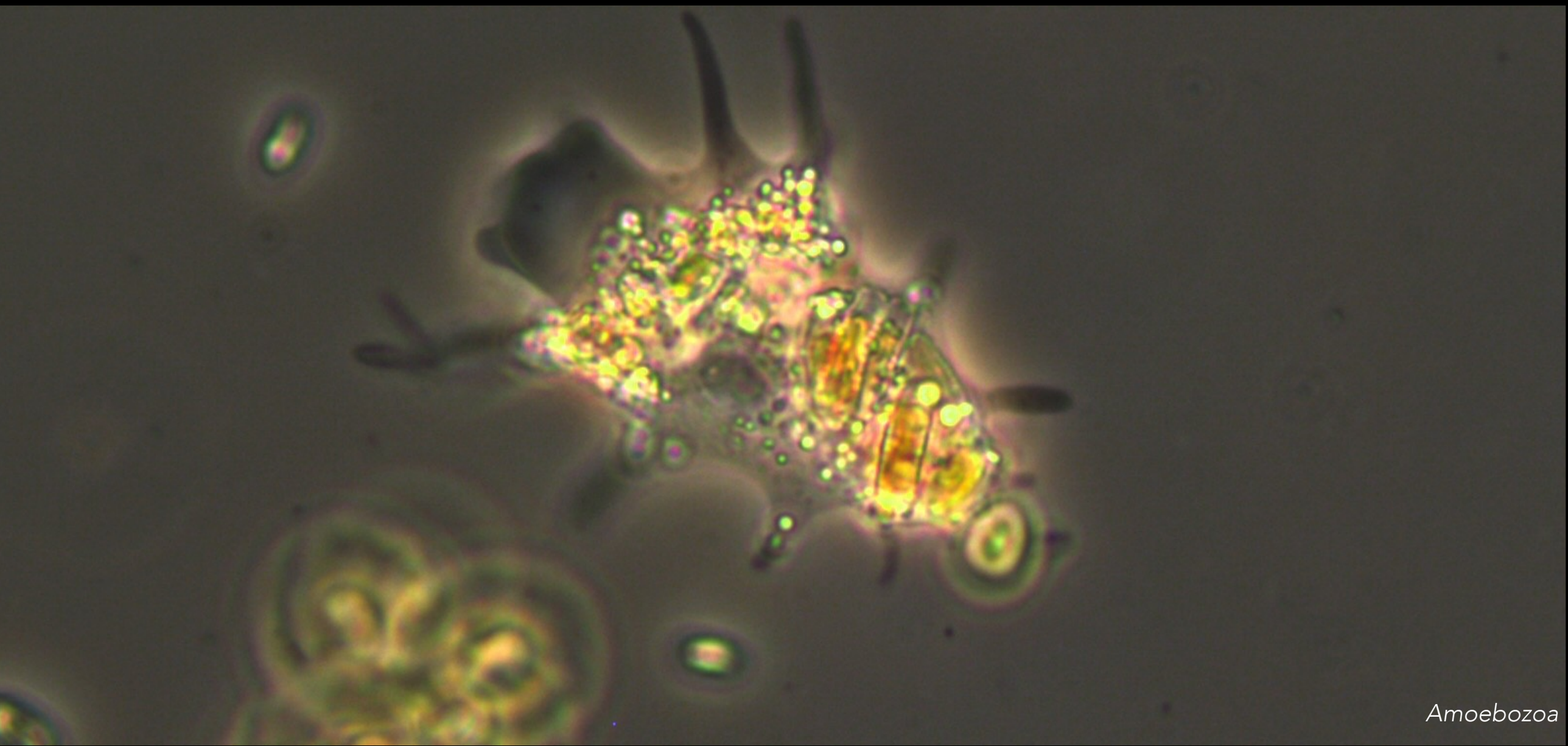
$p = 0.05$

Common species between epiphytes and phytoplankton



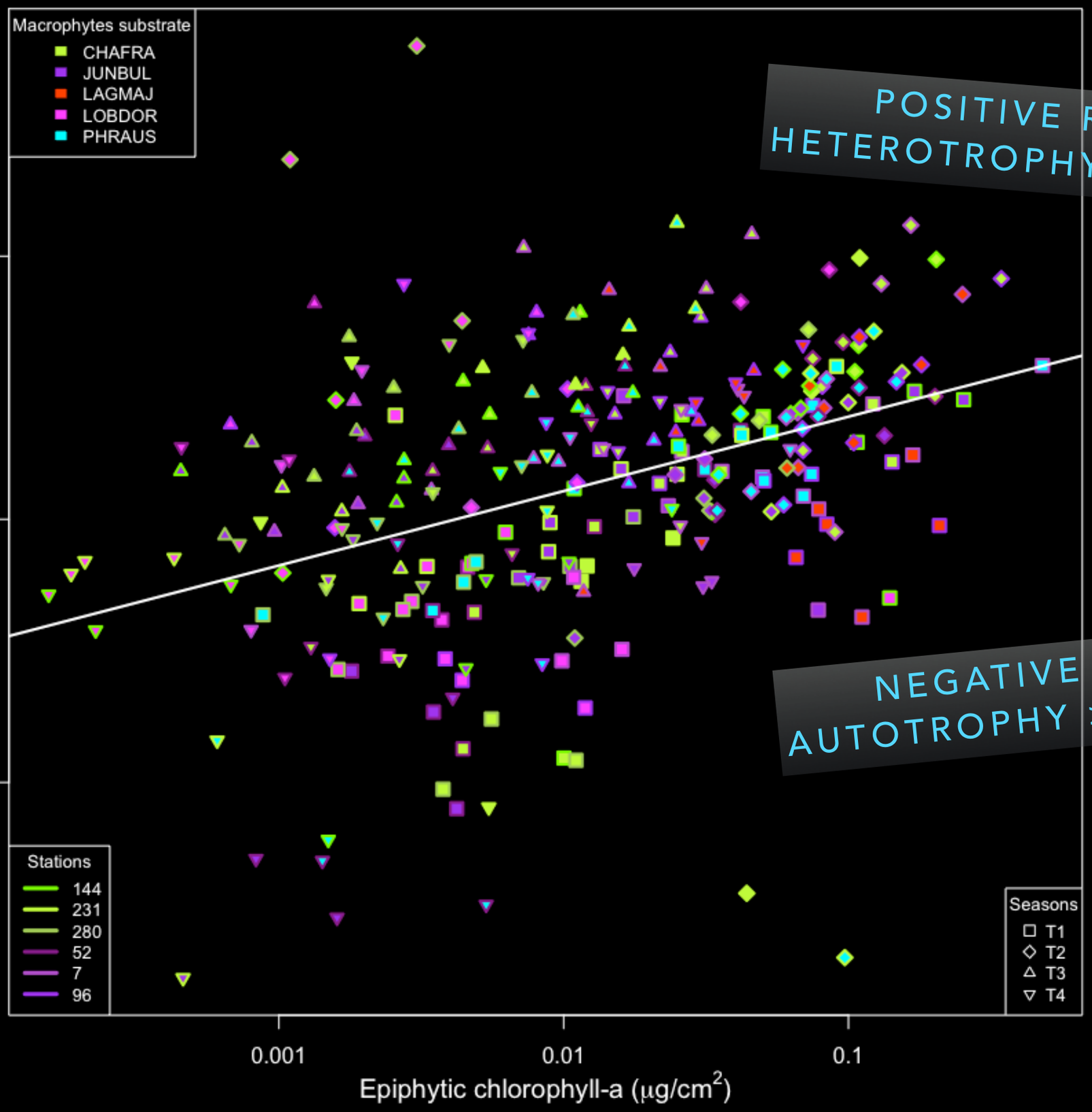
~12% benthic species found in plankton

Role of Micro-meiofauna interactions



Amoebozoa

Quantification of heterotrophic biomass



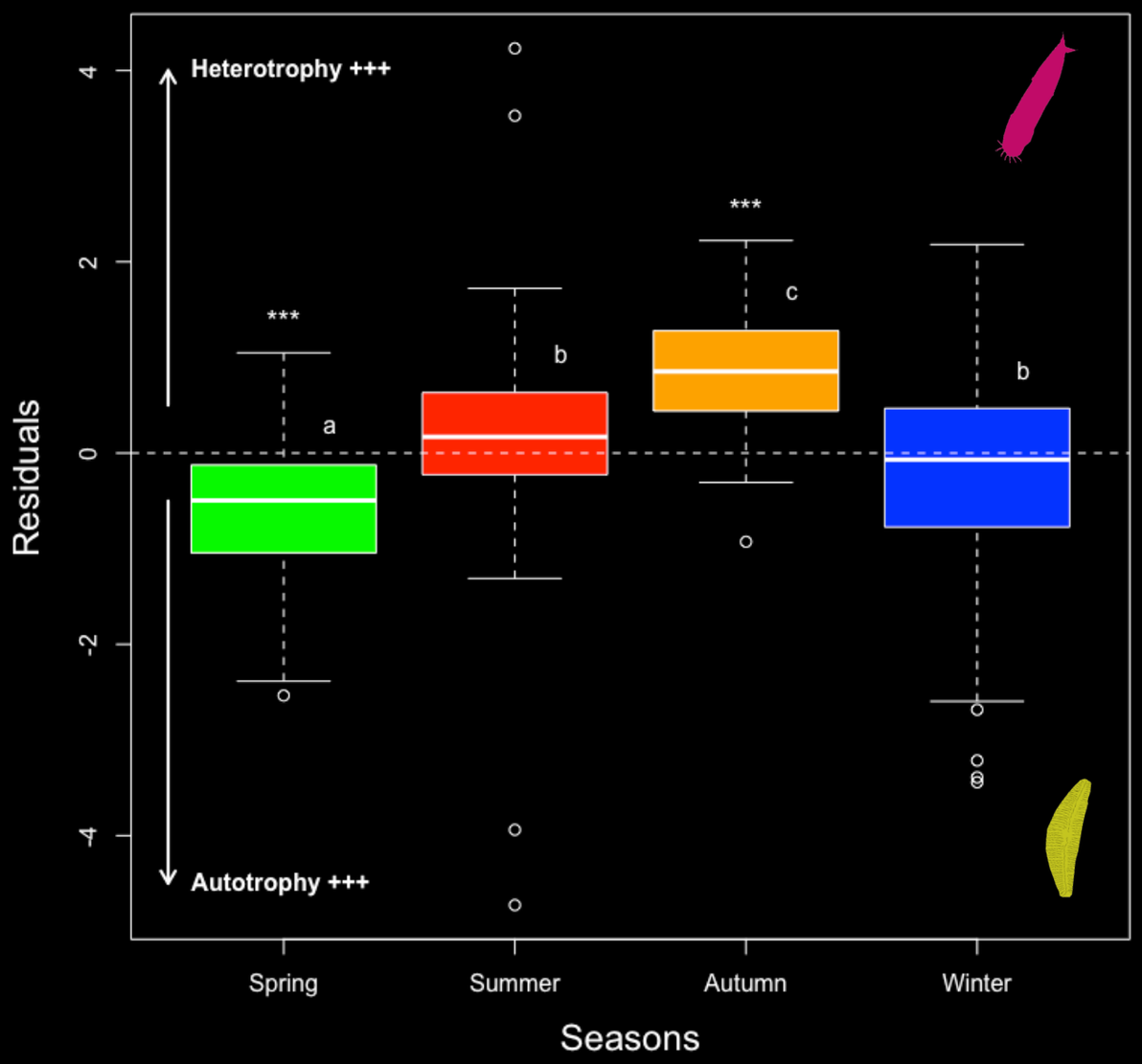
POSITIVE RESIDUALS = HETEROTROPHY > AUTOTROPHY

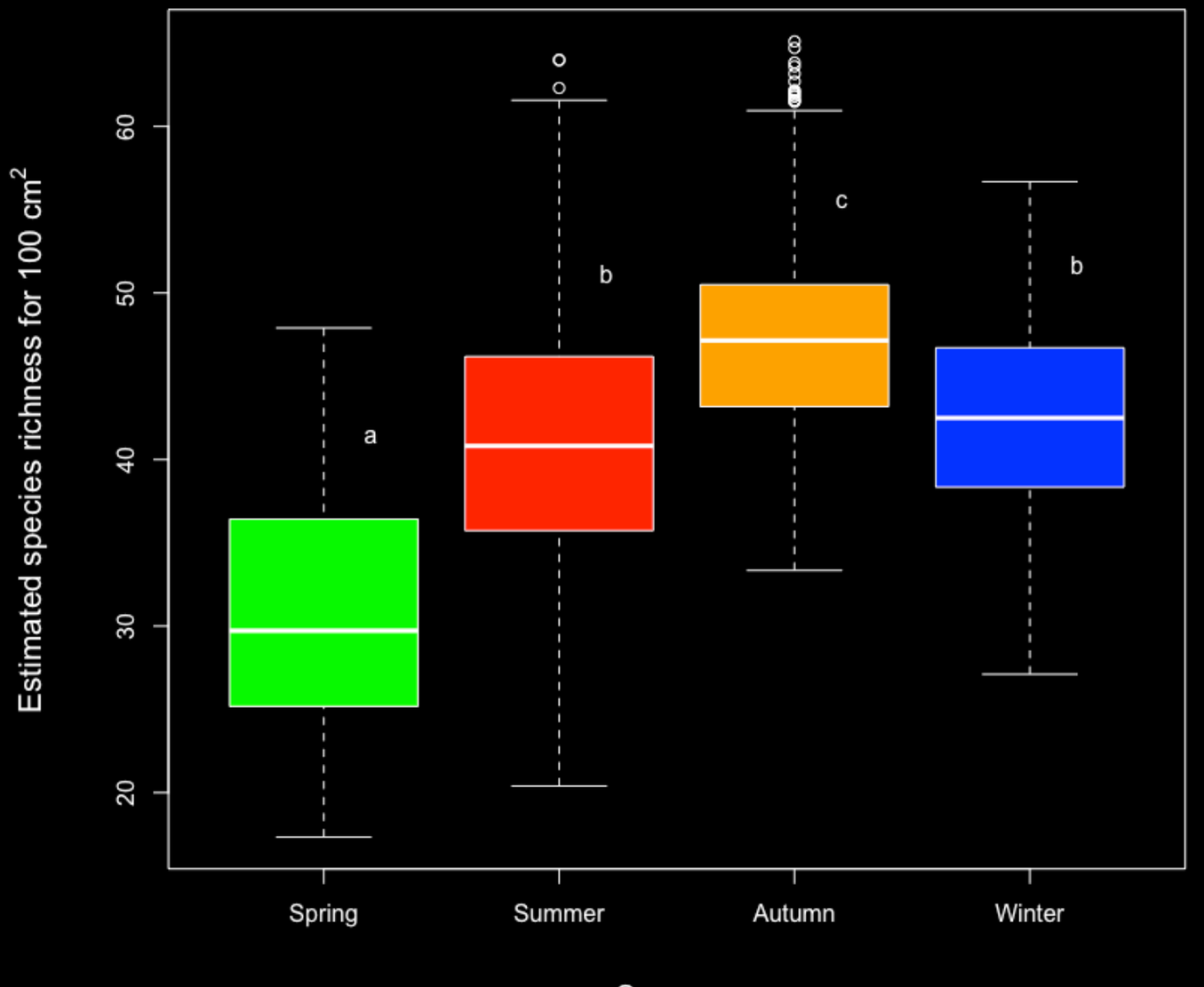
NEGATIVE RESIDUALS = AUTOTROPHY > HETEROTROPHY

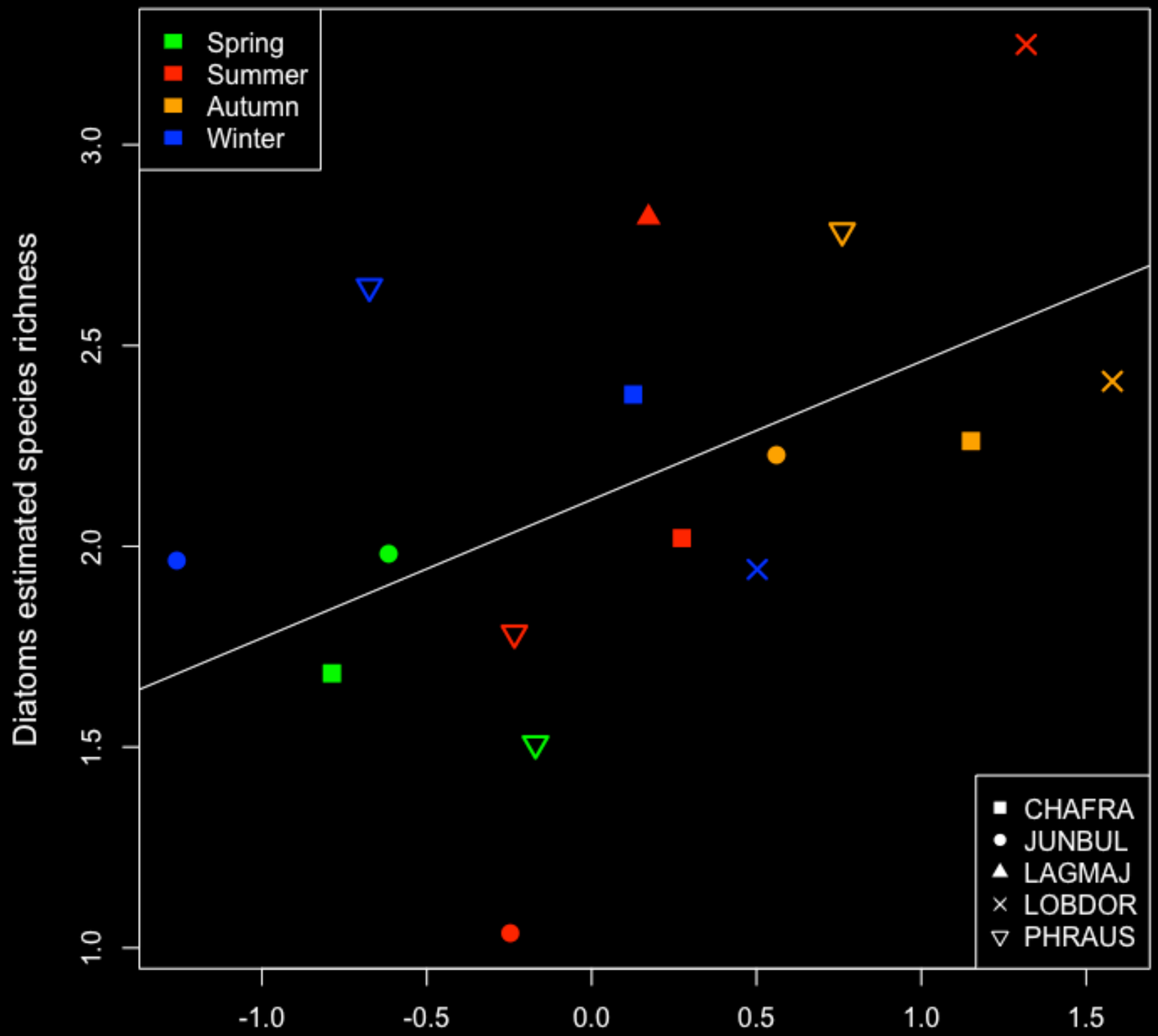
$R^2_{aj} = 0.15$

$p < 0.001$

Variation of heterotrophic biomass







$R^2_{aj} = 0.20$

$p < 0.05$

CONCLUSIONS

- Different processes structure biomass and species richness patterns
  - ≠ More Individuals Hypothesis

    (Srivastava & Lawton, 1998, Storch et al. 2018)
- Macrophytes = non neutral-substrate
  - Complex structure = more individuals

    (Cattaneo & Kalff, 1980; Blindow, 1987; Iwan Jones et al., 2000; Comte & Cazaubon, 2002; Laugaste & Reunanen, 2005; Warfe & Barmuta, 2006; Hao et al., 2017)
  - Isoetids = more species

CONCLUSIONS

- Predation enhance species richness in limiting competitive exclusion (Paine 1966)
- Few evidence of competition with phytoplankton
  - => « facilitation » with species flux (Kanavillil et al. 2016)

Thank you for your attention!