

Effects of resources and predation on small eukaryote community structure in an eutrophic lake: mesocosm experiments

Cécile Lepère¹, Isabelle Domaizon², Didier Debroas¹

¹Laboratoire de Biologie des Protistes

UMR CNRS 6023 - Aubière

²Équipe Microbiologie Aquatique

UMR CARRTEL - Le Bourget du Lac



Small eukaryotes?

Formed by:

- **pico-algae** which participate in **primary production**
- colorless **heterotrophic** cells, mostly flagellates, which are considered as **important grazers of prokaryotic and eukaryotic cells**

Essential components in aquatic trophic food webs (Caron et al., 1999)

Small Eukaryote Community Composition (SECC)

Molecular perspective only recently (e.g. Diez et al., 2001; Massana et al., 2002).

High diversity of marine picoeukaryotes and existence of novel lineages (Moreira and Lopez-Garcia, 2002; Baldauf, 2003).

Freshwater eukaryote picoplankton structure and factors involved in the regulation of this community have poorly been investigated until now.

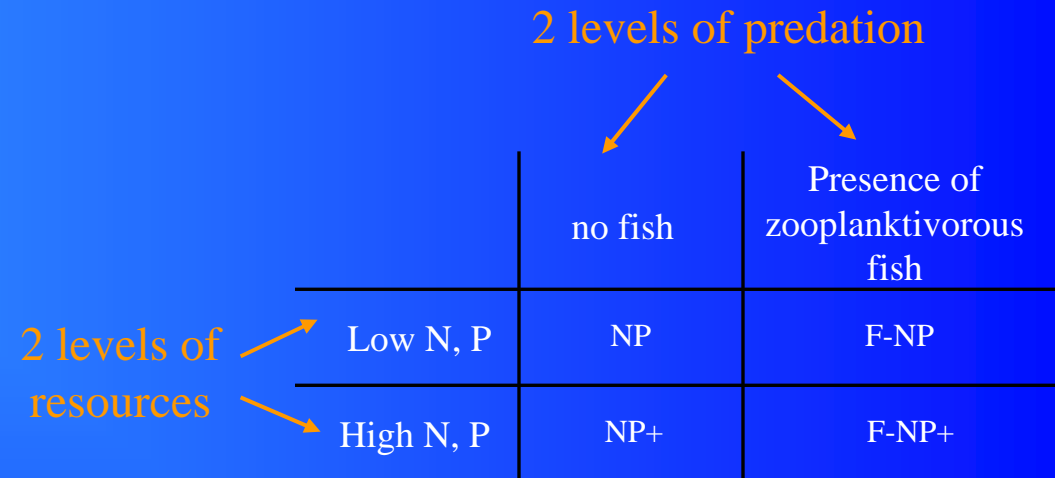
Aims



Investigate the structure and regulation of small eukaryote community using experimental approach
(Villerest - eutrophic reservoir)

Mesocosm experiments

Experimental design



- 4 treatments in triplicate (mesocosms of 5.5m³)
- 21 days, sampling every three days

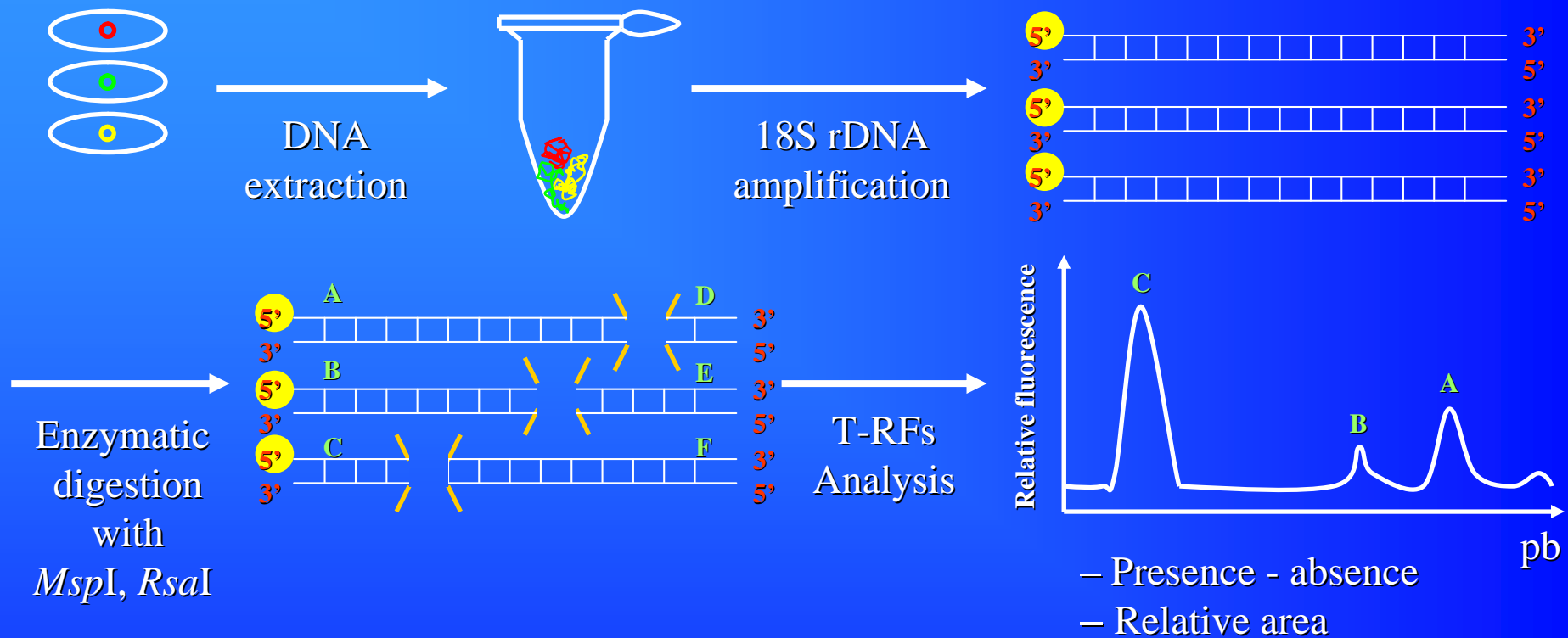
Small eukaryote diversity

- < 5 μm
- T=21 days

➤ T-RFLP and Cloning-Sequencing on each type of treatment

SECC characterization by T-RFLP

(Terminal restriction fragment length polymorphism)



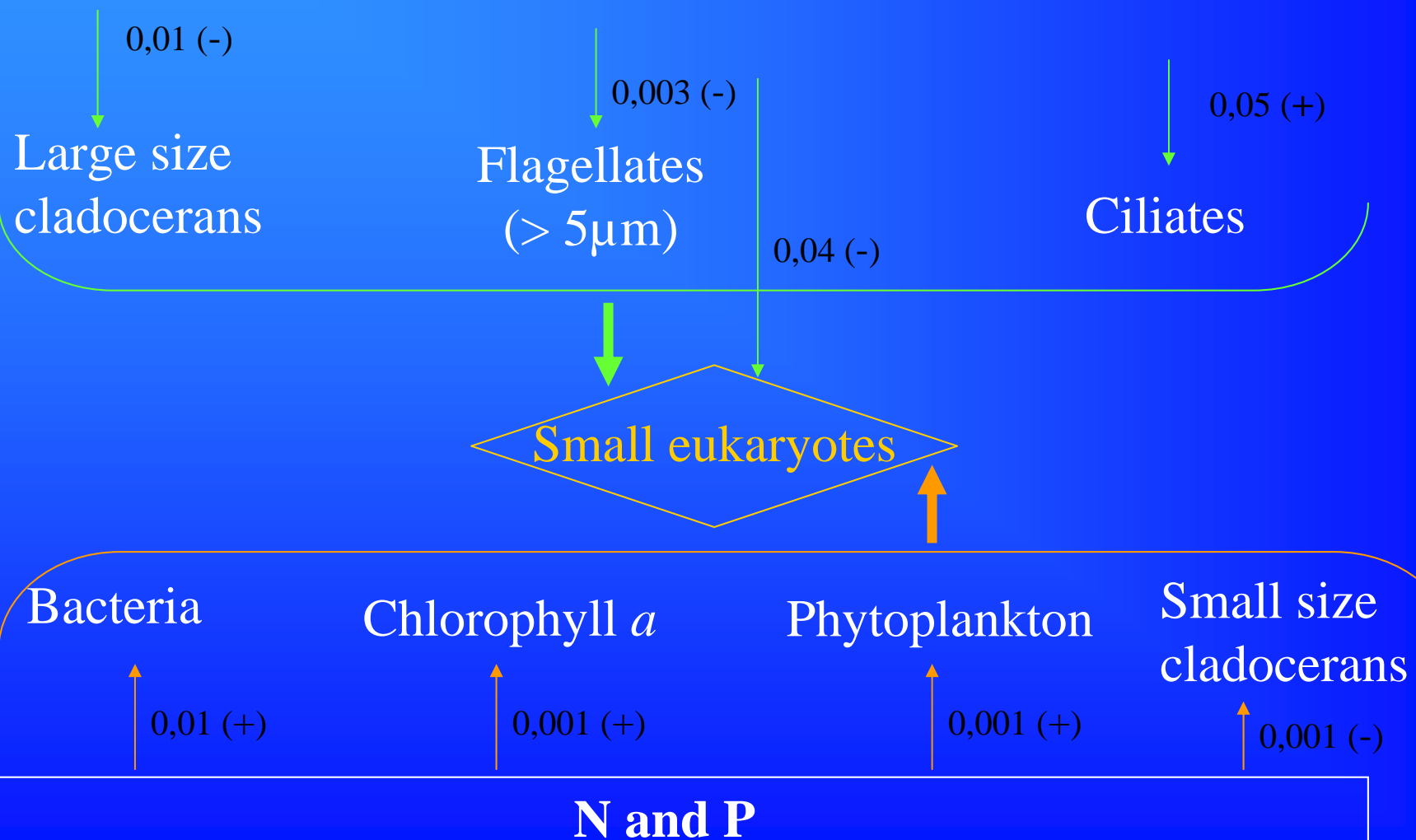
□ **Reproducible** (González et al., 2000)

□ Comparison of **numerous samples** (Osborn et al., 2000)

□ **Semi-quantitative** (Liu et al., 1997)

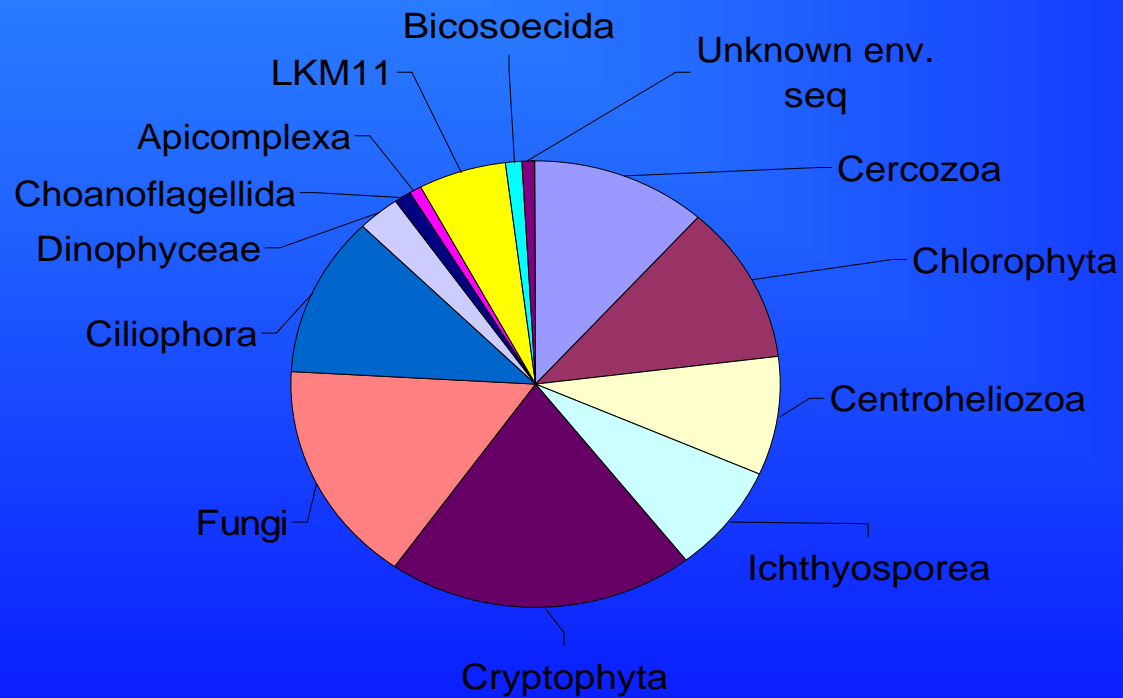
Impact of nutrients and fish on biological variables (2 ways Anova)

Zooplanktivorous fish



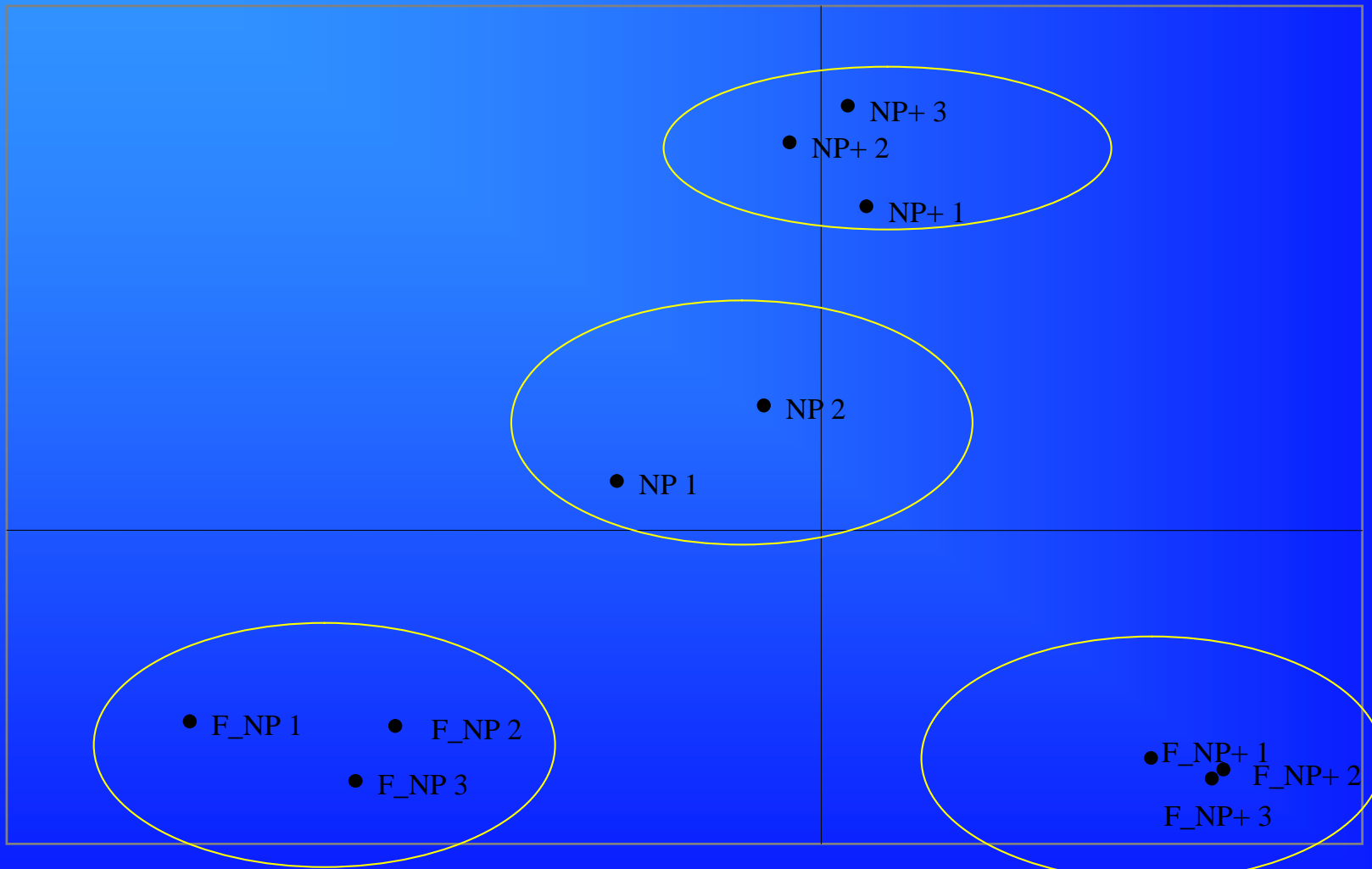
Phylogenetic composition of small eukaryotes

➤ Library : 104 clones, 55 OTUs

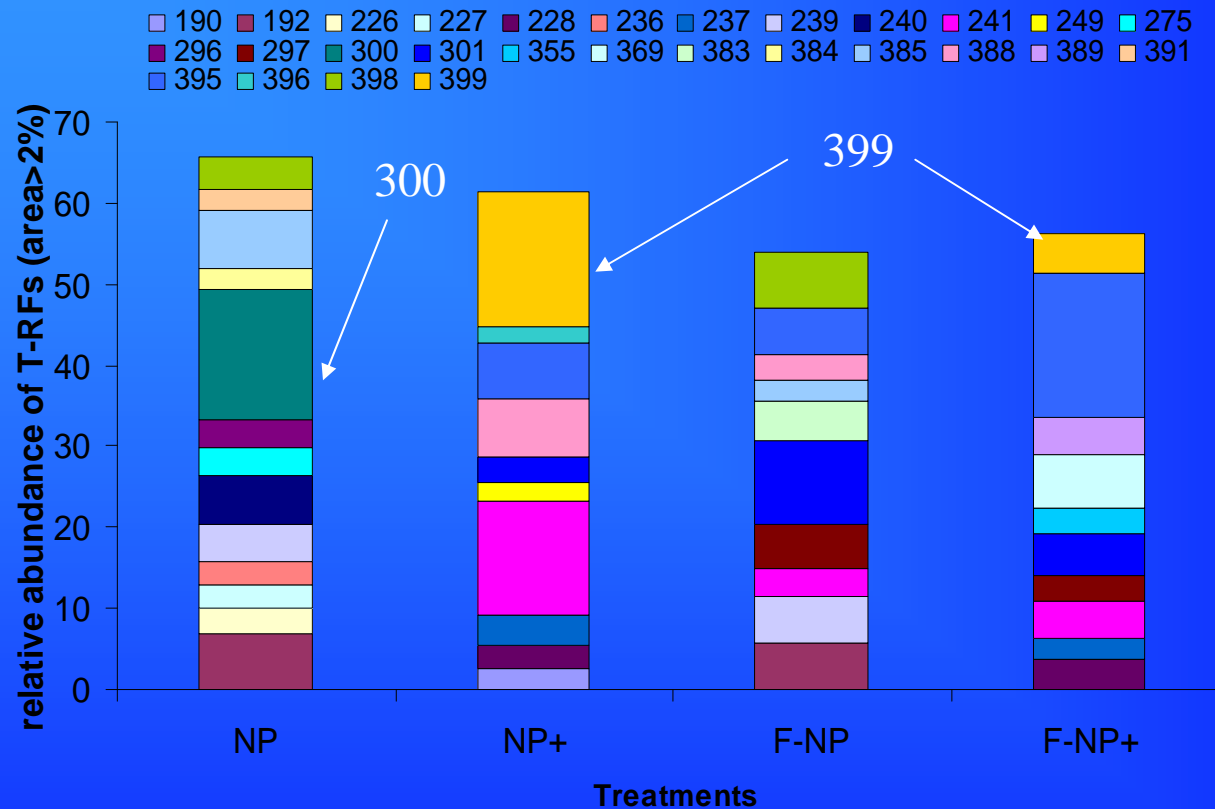


Small eukaryote diversity (T-RFLP)

(Correspondence analysis)

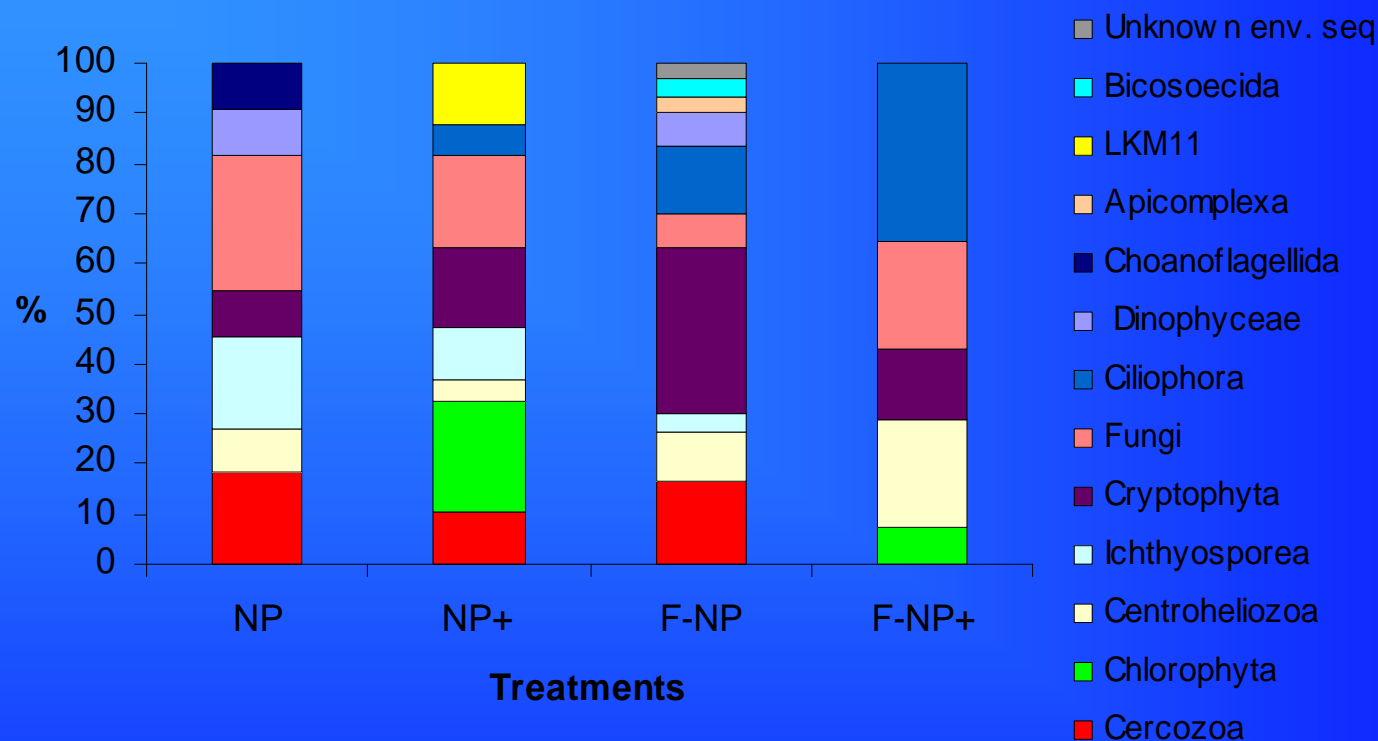


T-RFs variations according to treatments



- Differences in the SECC according to treatments
- Specifics T-RFs with type of treatments

Variations of phylogenetic composition



- Fungi , Cryptophyta, Centroheliozoa : all types of treatments
- Chlorophyta : high nutrient levels
- LKM11 : treatments NP+
- Cercozoa : absent in treatments F-NP+

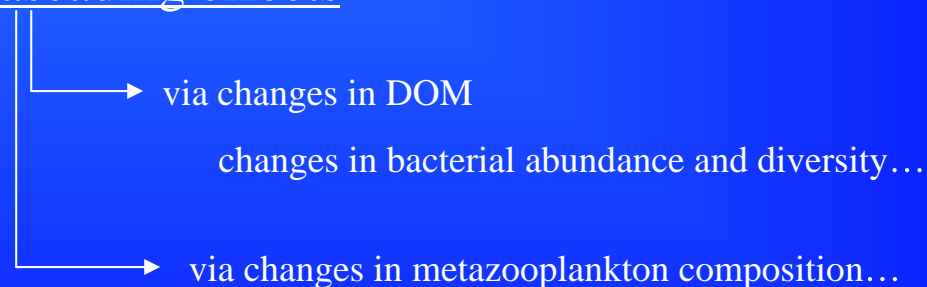
Conclusions

- Different structure in freshwater compared with marine ecosystems :
Centroheliozoa, Cercozoa, Fungi and LKM11

- Top-down and bottom-up effects on small eukaryote structure

Changes in SECC explained

by direct impacts or by cascading effects



- New groups (LKM11, Fungi...) to consider within microbial food web?

Thank you.....!!!!

Merci.....!!!!