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Calanus feeding rates estimated by quantitative PCR

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Background

NO METHODS allow to quantify in situ copepod feeding on specific prey

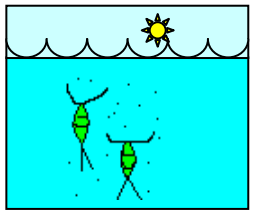
Principal Methods

INTRUSIVE

Food removal and microscopy

PERTURBED PREDATORS AND PREY

NON-INTRUSIVE



Microscopy on gut and fecal pellet contents

Gut pigment analysis

UNDERESTIMATED PREY

Background

New methods to accurately asses copepod feeding in situ are needed !

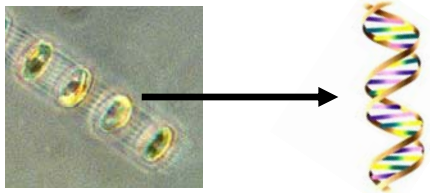
Prey DNA as biomarker

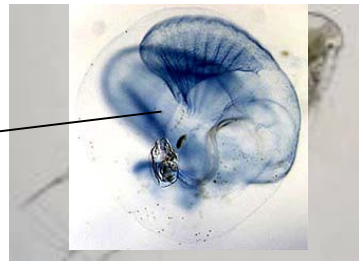
- ✓ Common to all prey organisms
- ✓ Specific to prey species
- ✓ Allows gut content analysis from in situ conditions

Hypothesis

qPCR can quantify specific prey in copepod gut

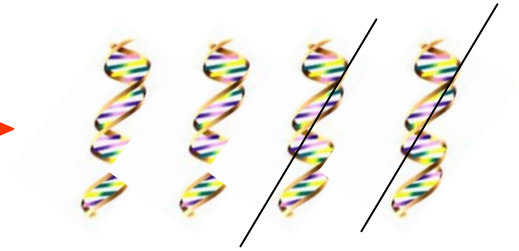
Number of DNA per prey





predator with specific prey in the gut

Prey DNA are partially digested in copepod gut



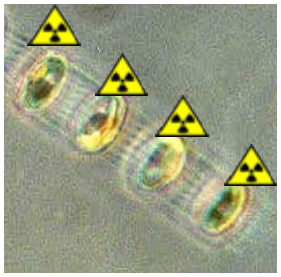
Prey DNA

qPCR

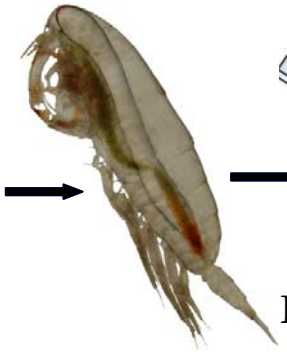
Underestimation of the prey number

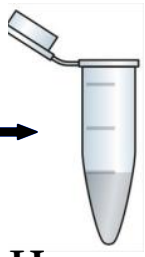
Underestimation of the prey number

Troedsson et al. 2007



radiolabeled (^{14}C)
Skeletonema marinoi





Homogenate sample

DNA analysis

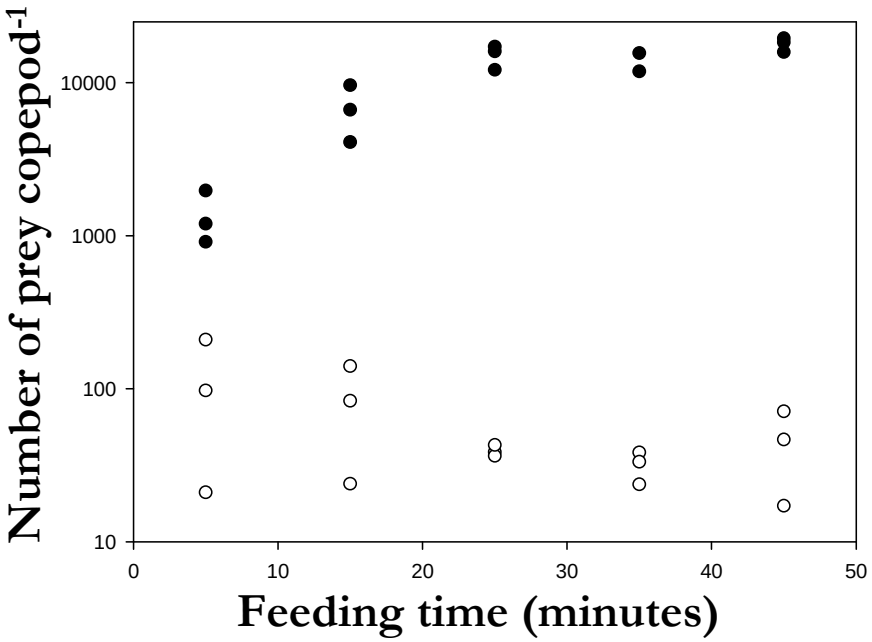
qPCR

Number of detected prey

^{14}C analysis

Scintillation counter

Total number of prey



• ^{14}C analysis

○ DNA analysis

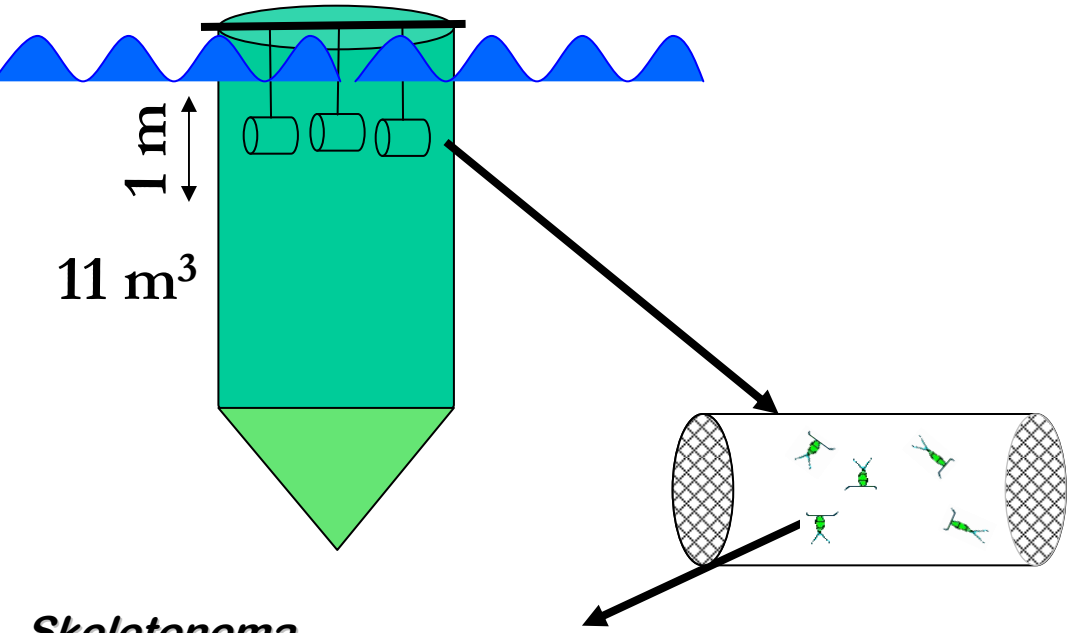
First conclusion

qPCR assay underestimates the number of ingested prey

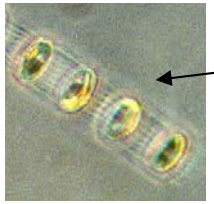
But

...Is the LAB the best place to test a FIELD method?

qPCR to quantify feeding by Calanus spp. collect from a mesocosm



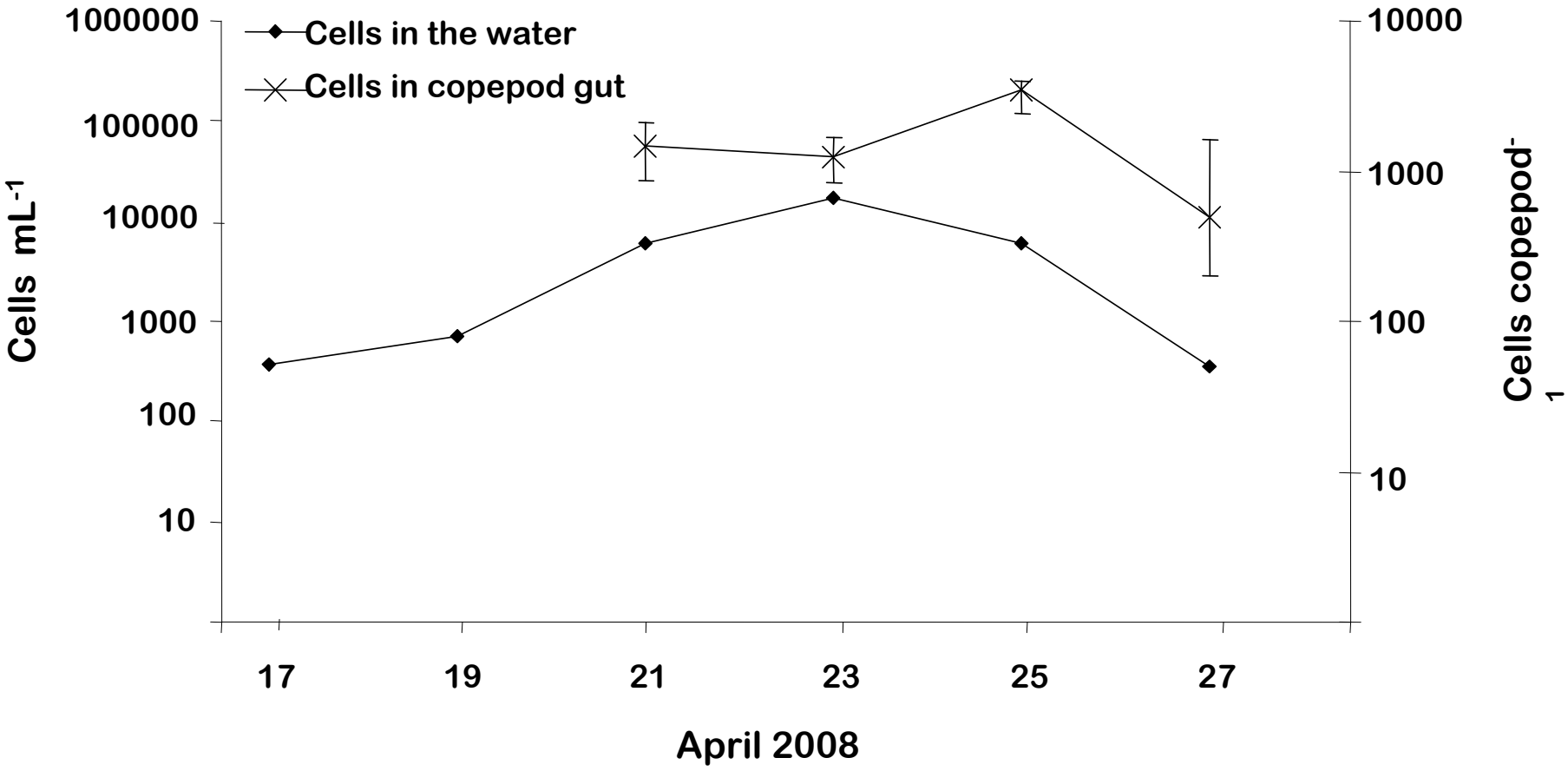
Skeletonema marinoi



Calanus sp

Number of ingested prey

Calanus sp. feeding on S. marinoi



Average Calanus spp. feeding rates on S. marinoi

qPCR

Bottle incubation exp

15 ± 5 17 ± 6

mL / copepod / day

!!!!

qPCR to quantify feeding by Calanus spp. collect from a Norwegian fjord

qPCR

Literatur e data

19 ± 9

32 ± 28

!!!!

mL / copepod / day

Conclusions

qPCR assay works in the FIELD but not in the LAB

The strong prey DNA digestion in copepod gut observed in the lab was not observed in the field

WHY?

Copepod digestion is more efficient in the lab…?

Prey cell are more resistant in the field…?

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