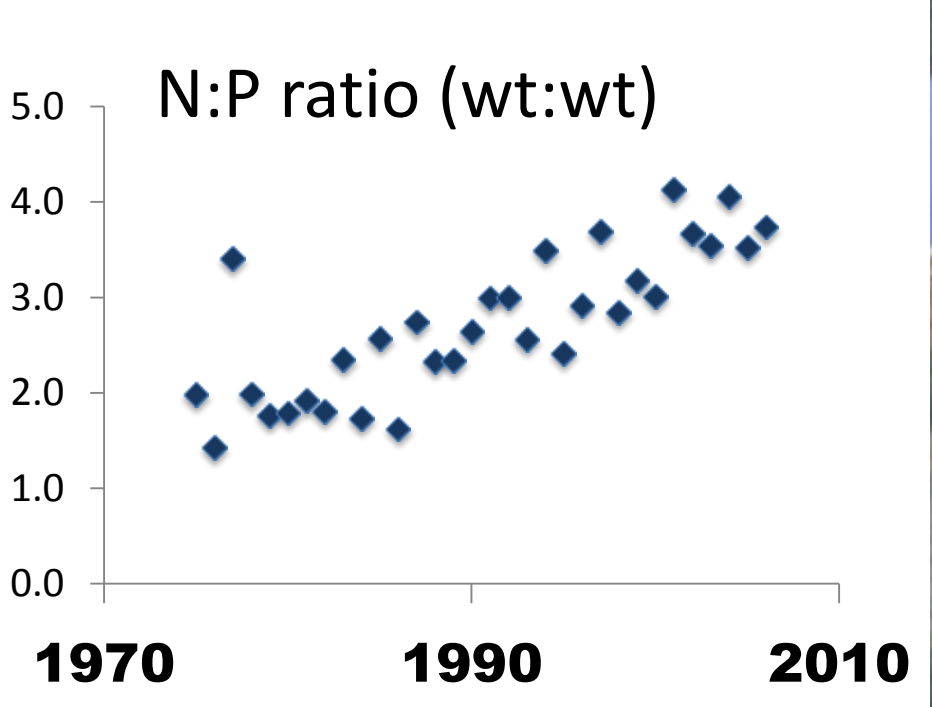
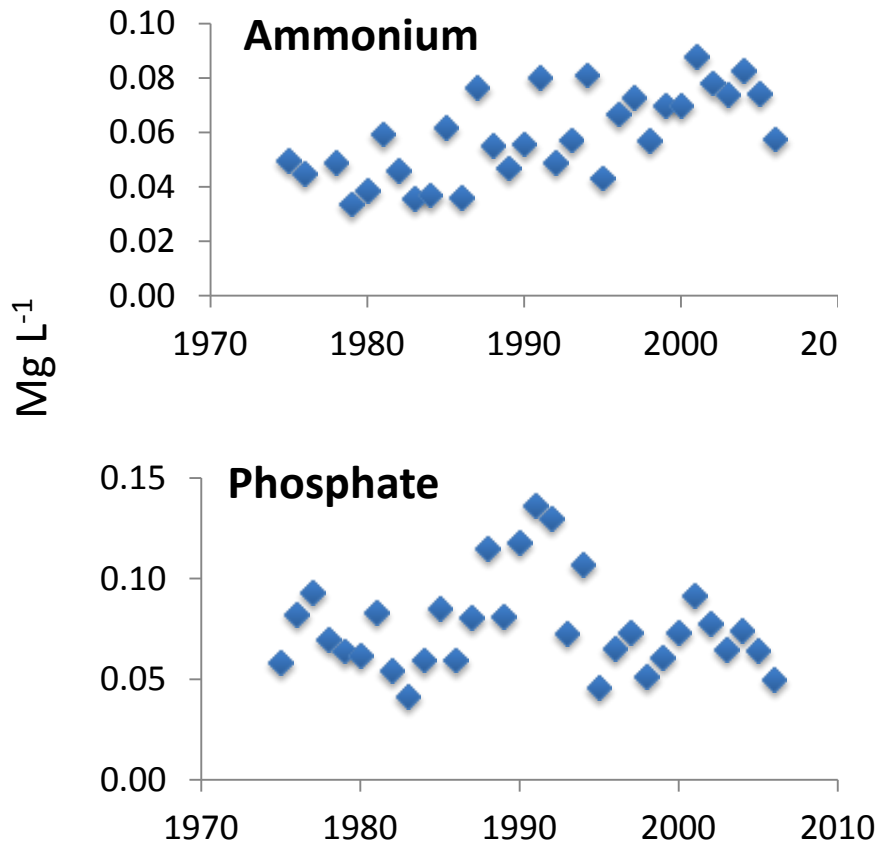


Egg production and egg viability of the copepods *Acartia* and *Eurytemora* differ when grown on food of varying nitrogen:phosphorus ratios

Katie Bentley
James Pierson
Patricia M Glibert
University of Maryland
Center for Environmental Science
Horn Point Laboratory

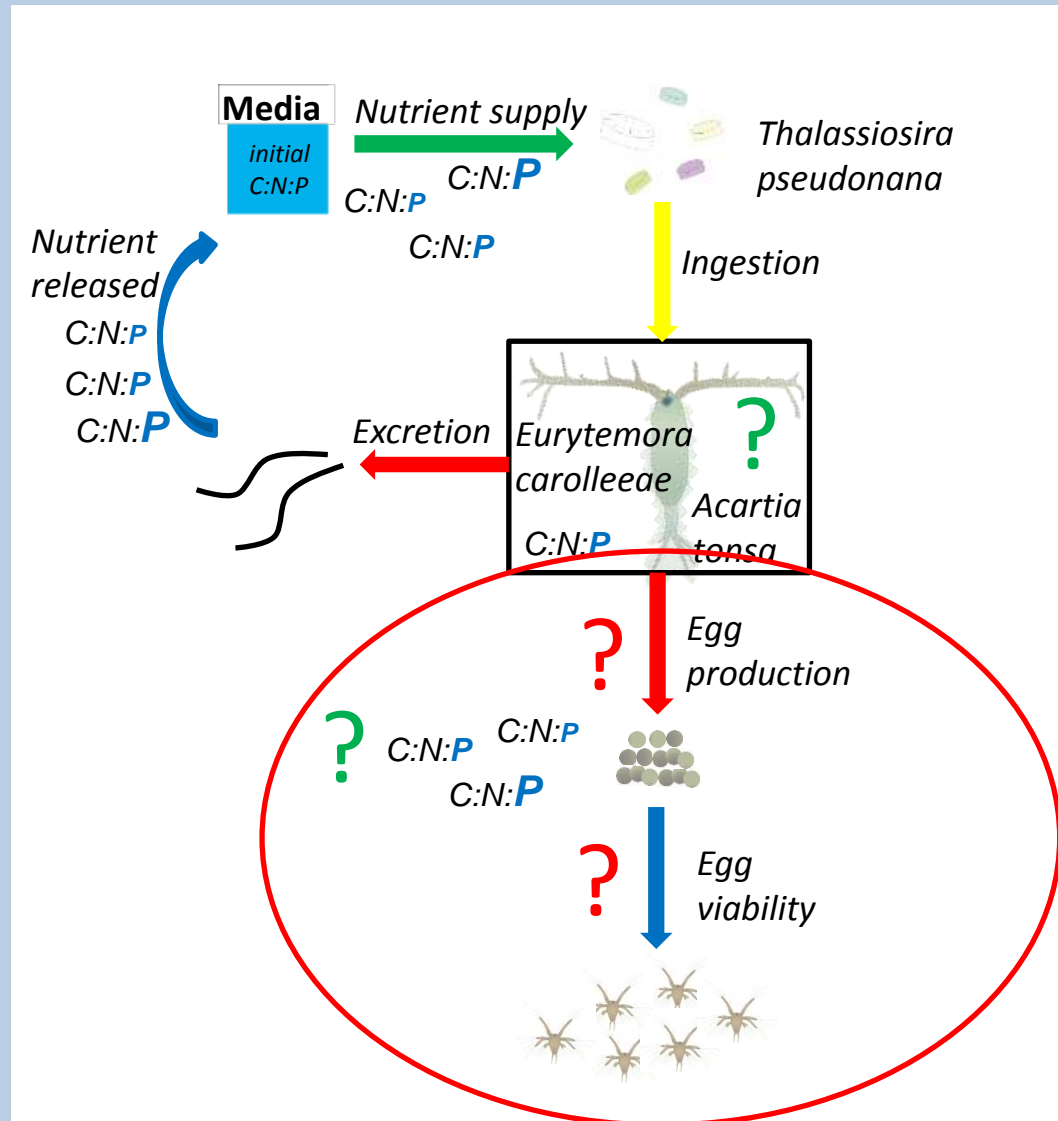


Nitrogen: Phosphorus ratios have increased



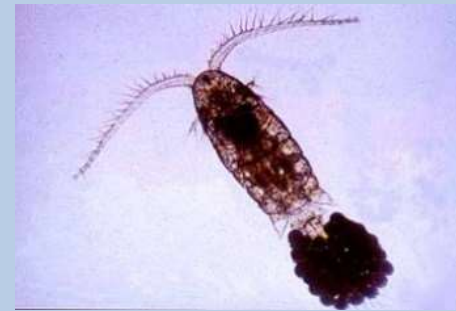
Research Question

- Do changes in nutrient availability and proportion alter food quality for consumers?
- How are the nutrient content of copepods and eggs, egg production rates, and egg viability, affected by varying food quality?



Copepods

- *Eurytemora carolleeae* - brood spawners
 - lay their eggs in sacs that develop attached to females



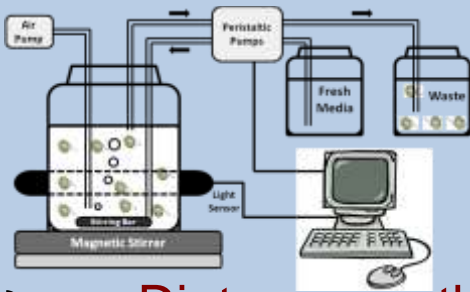
- *Acartia tonsa* - broadcast spawners
 - release large numbers of eggs to environment



Hypotheses

- While phytoplankton nutrient content can be quite variable, due to their ability to take up and store nutrient in excess of their growth requirement, copepod nutrient content should not vary substantially with prey nutrient content.
- Copepods should maintain relatively invariant nutrient content because their excretion, and egg nutrient content should change as diet changes
- As diet changes, and as egg nutrient content changes, egg production rates and egg viability should change

Methods

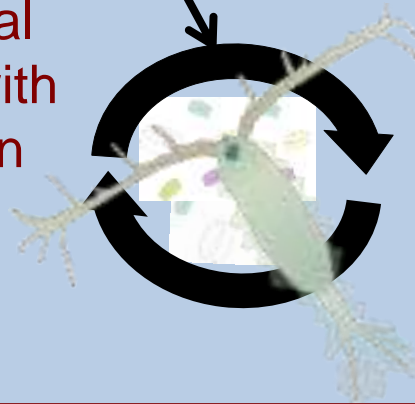
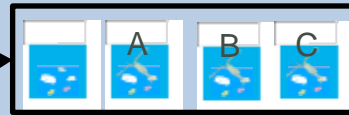


1 Diatom growth,
variable N:P

1:20 dilution
culture:ASW



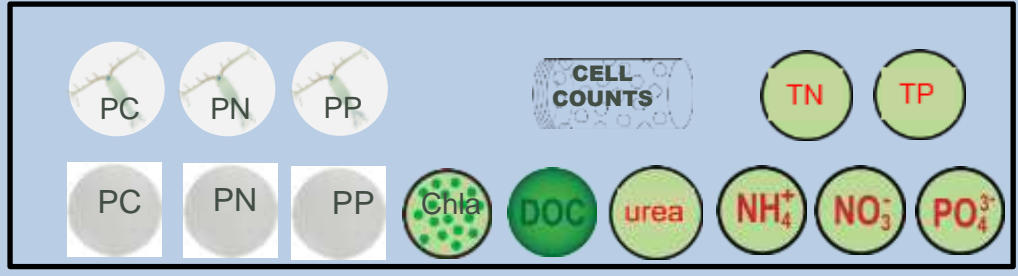
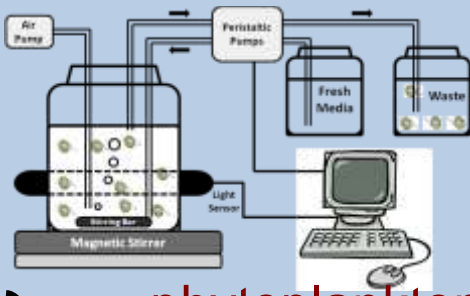
2 experimental
exposures with
zooplankton



8 laboratory experiments conducted:

Diatom grown at 4 N:P ratios

Exposed to 2 zooplankton: *Eurytemora* and *Acartia*
at same total food amount (in terms of C)



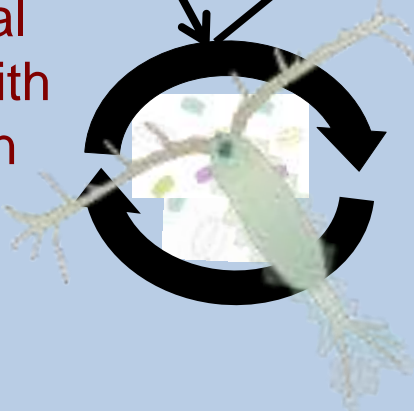
1 phytoplankton growth, variable N:P

1:20 dilution culture:ASW

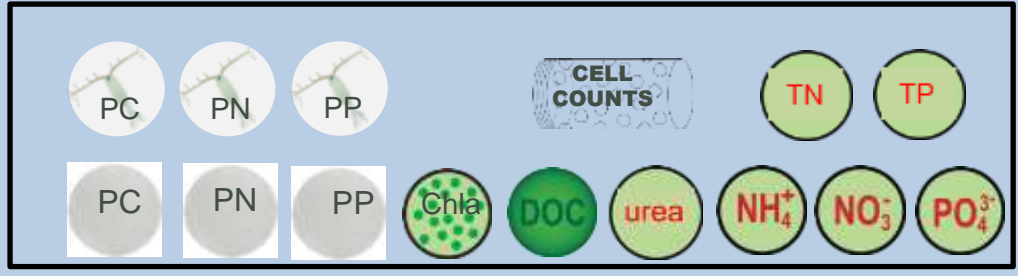
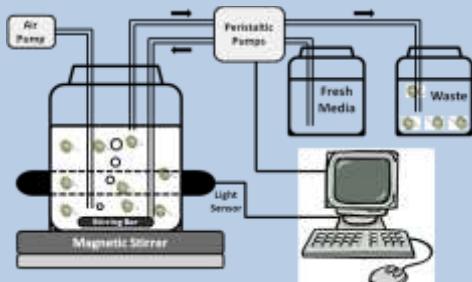


2

experimental exposures with zooplankton



3 time dependent chemical measurements



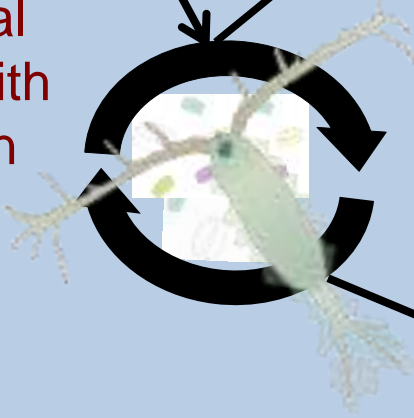
1 phytoplankton growth, variable N:P

1:20 dilution culture:ASW



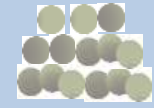
2

experimental exposures with zooplankton

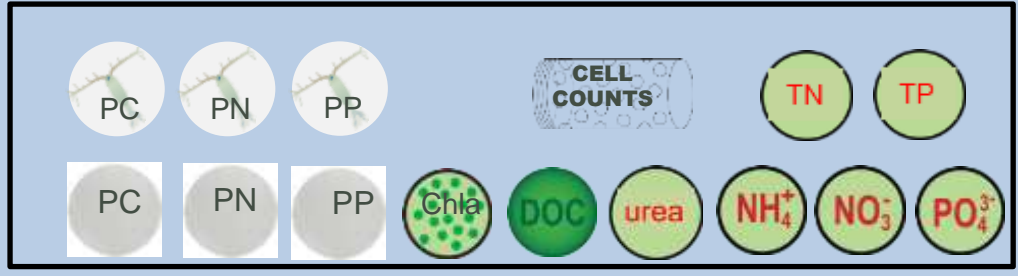
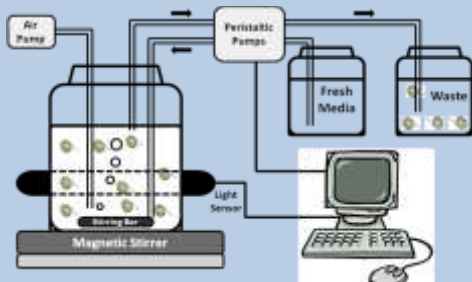


3 time dependent chemical measurements

4



egg chemical composition

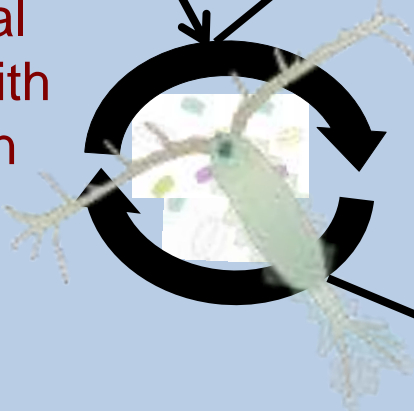


1 phytoplankton growth, variable N:P

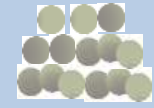
1:20 dilution culture:ASW



2 experimental exposures with zooplankton



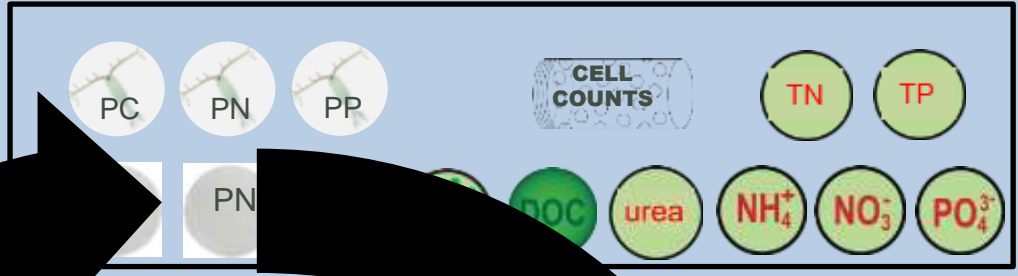
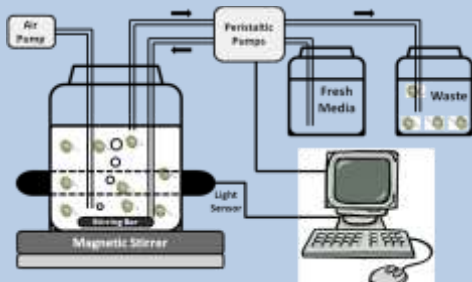
3 time dependent chemical measurements



4 egg chemical composition



5 egg viability



1 phytoplankton growth, variable N

1:20 dilution culture:ASW

Repeat after copepods exposed for 7 days to food of experimentally determined food quality

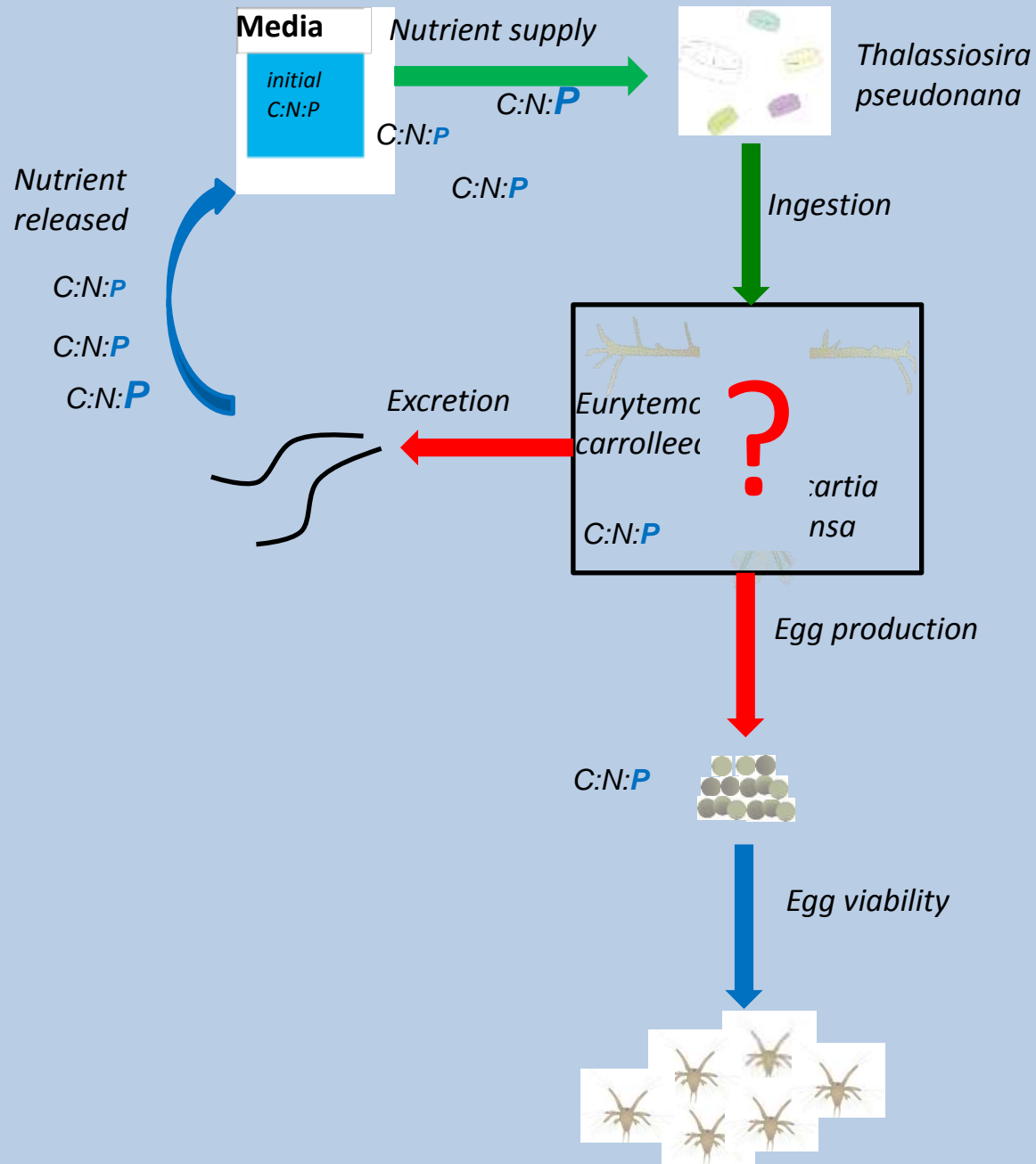
2 e dependent chemical requirements

4 egg production, chemical composition

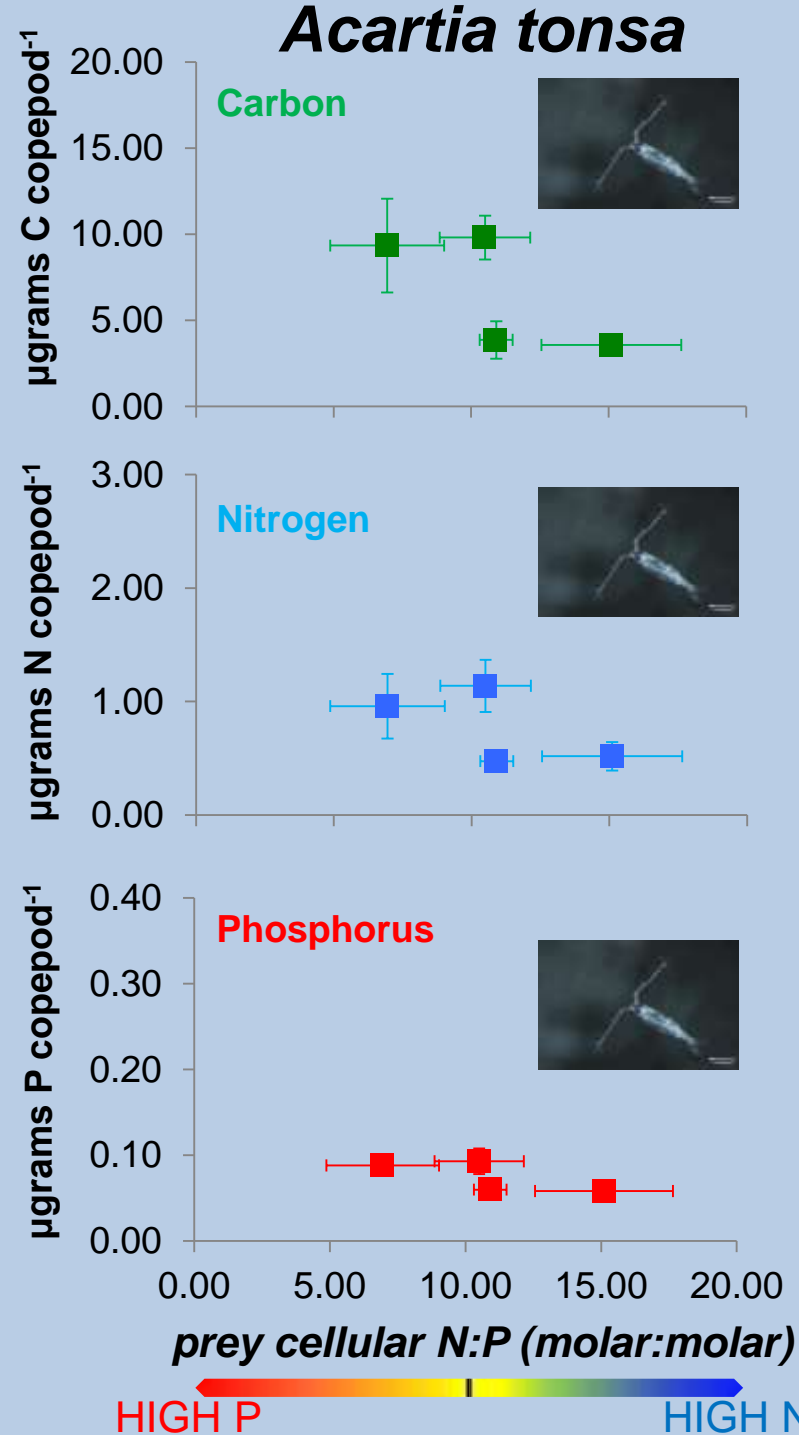


5 egg viability

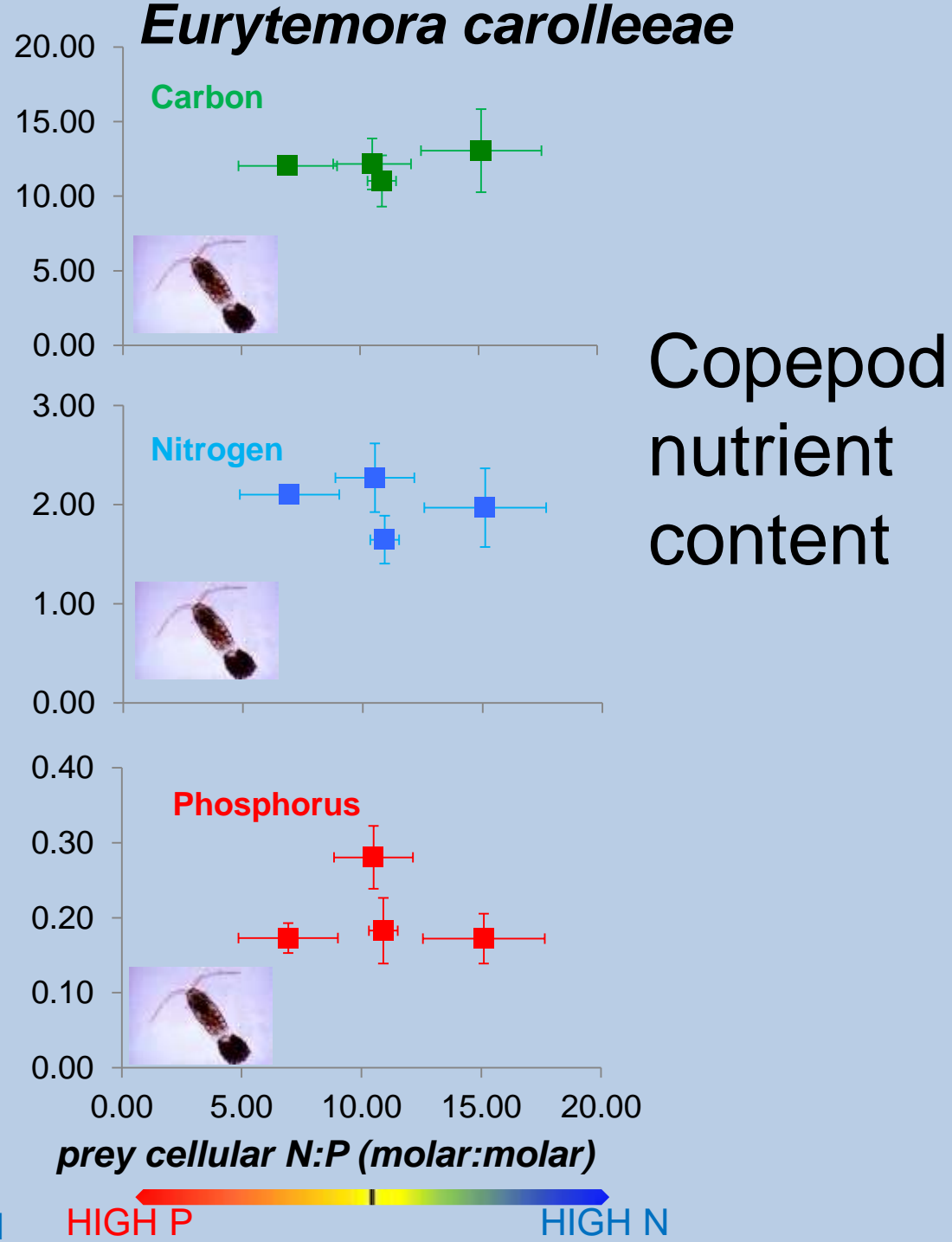


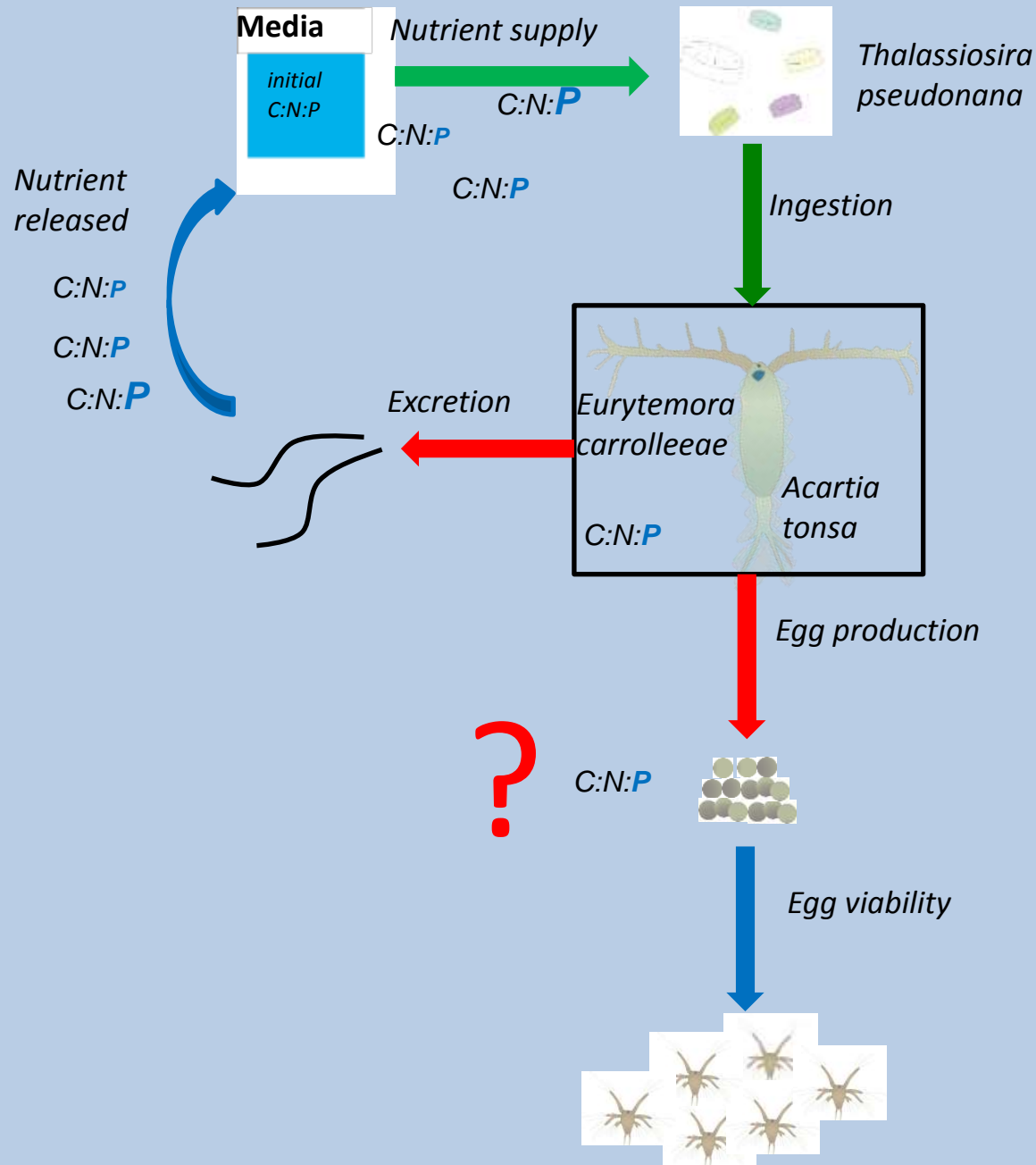


Acartia tonsa

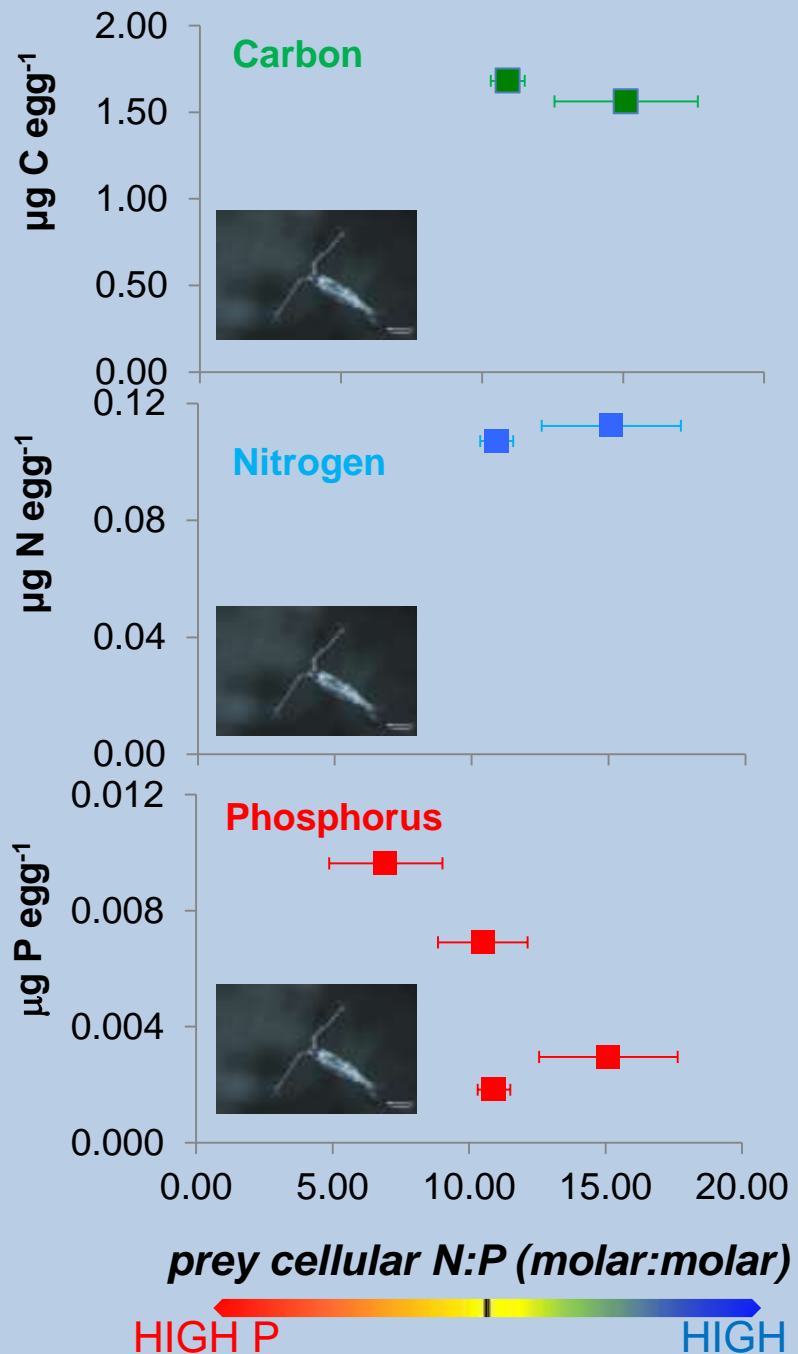


Eurytemora carolleeae

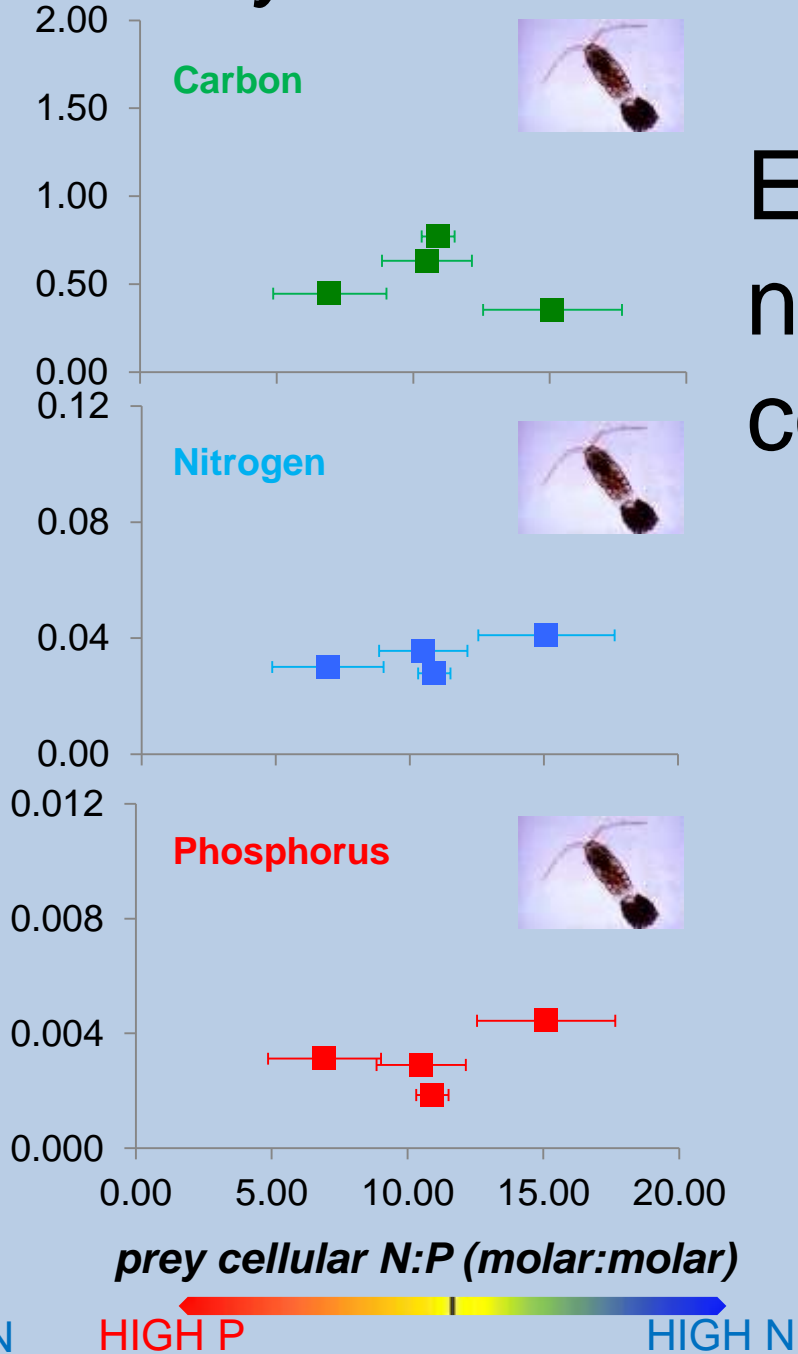




Acartia tonsa

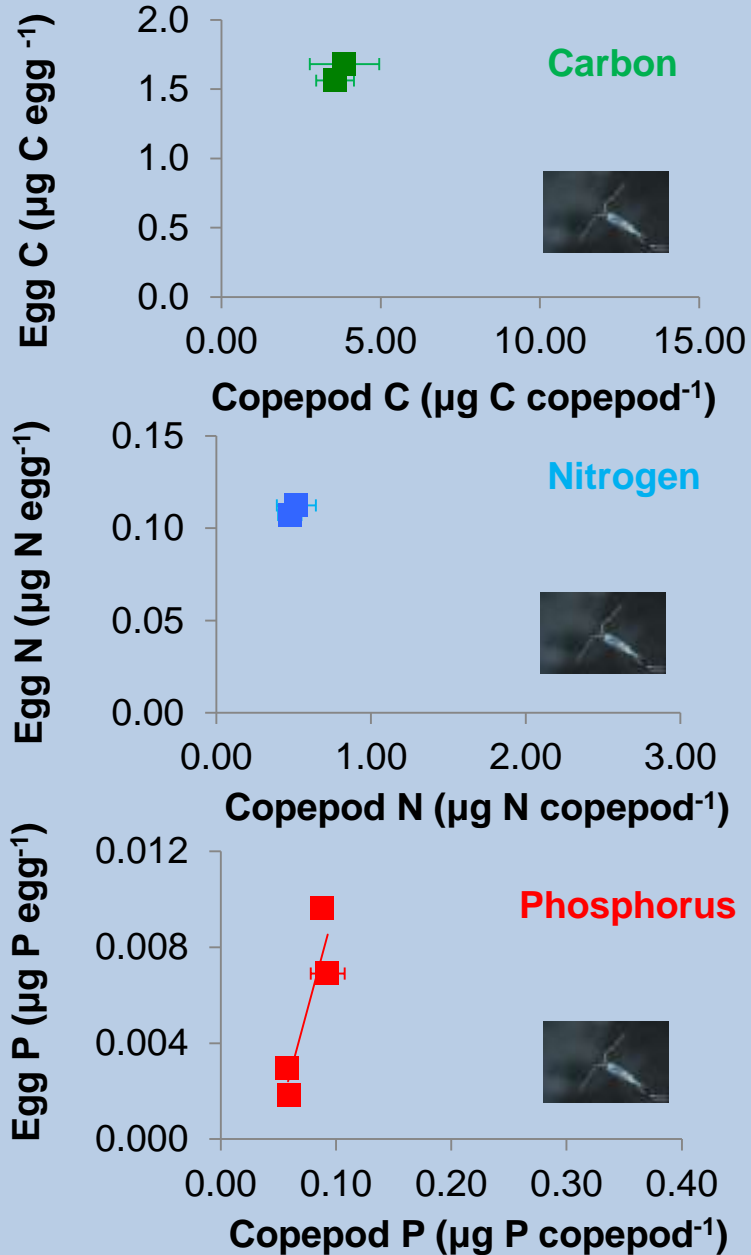


Eurytemora carrolleeae

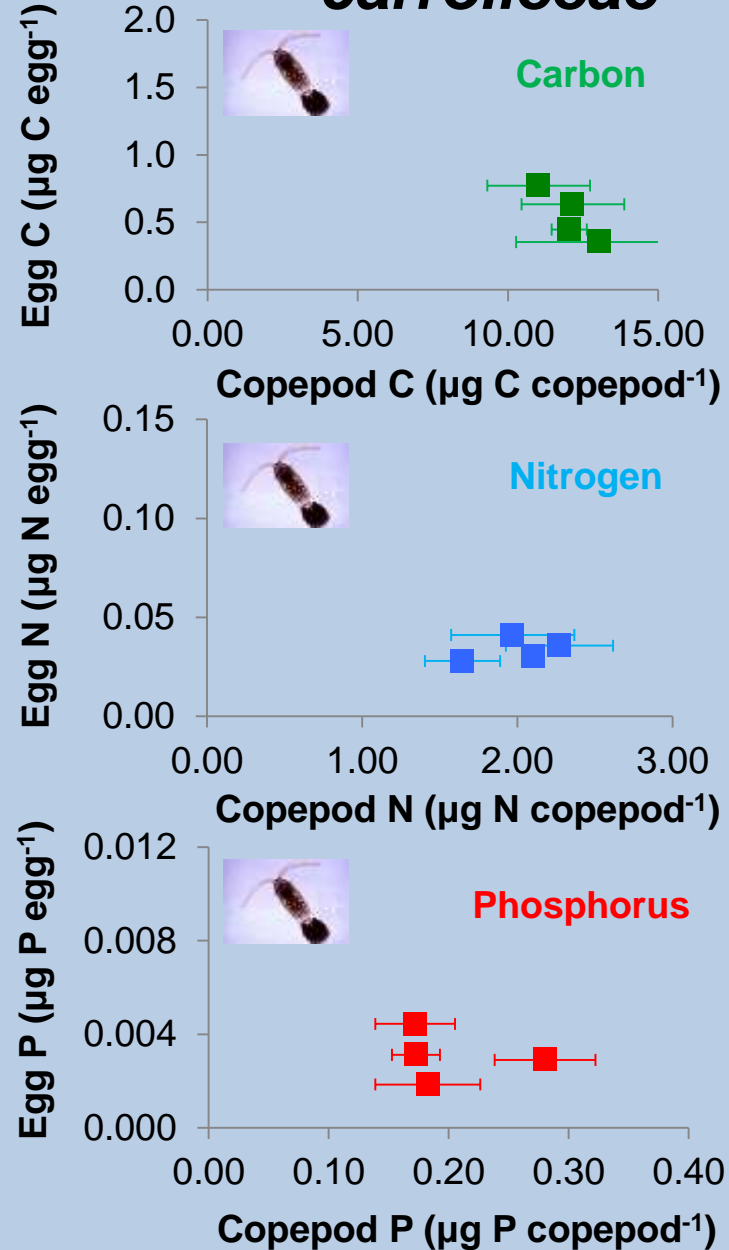


Egg
nutrient
content

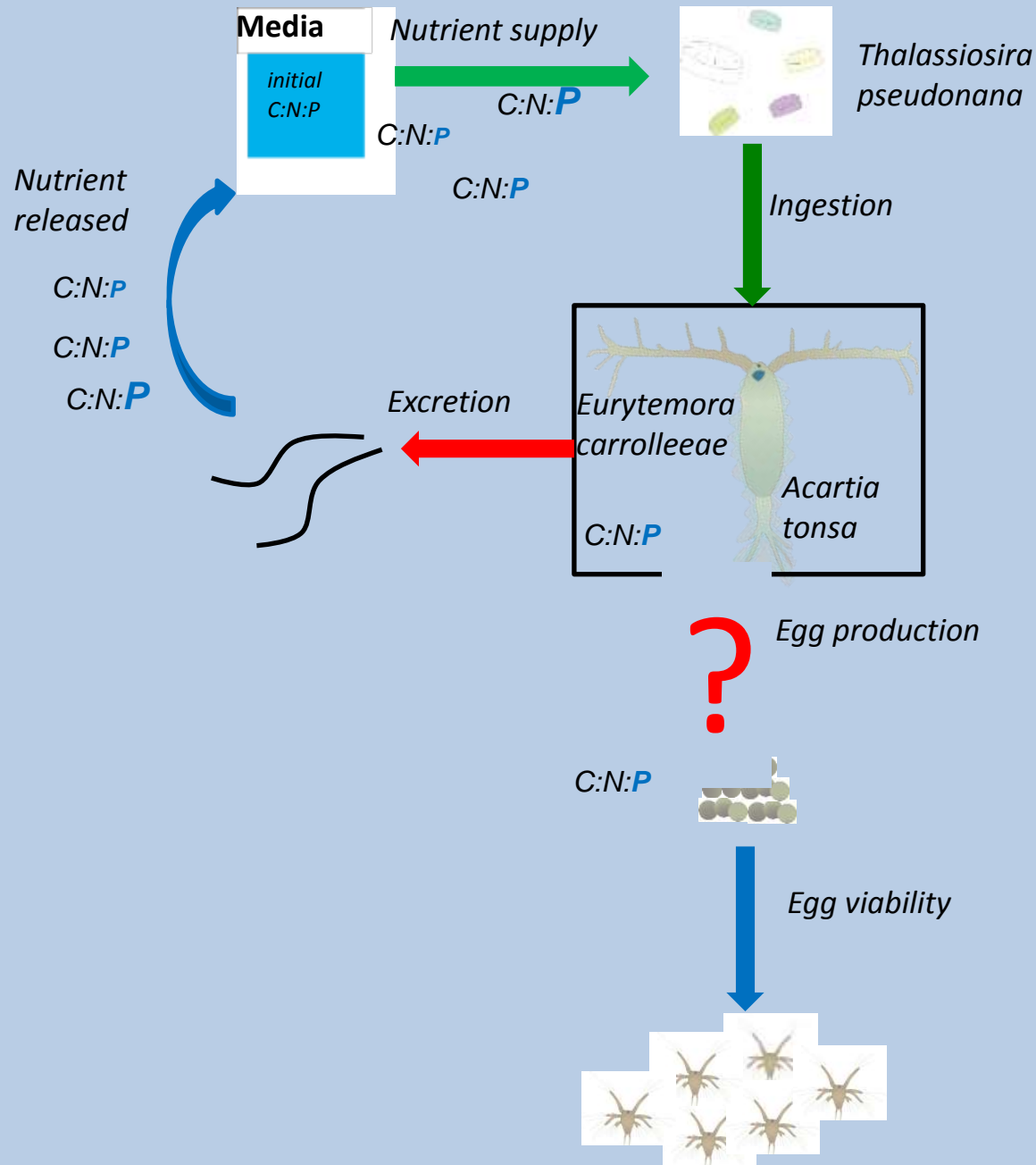
Acartia tonsa



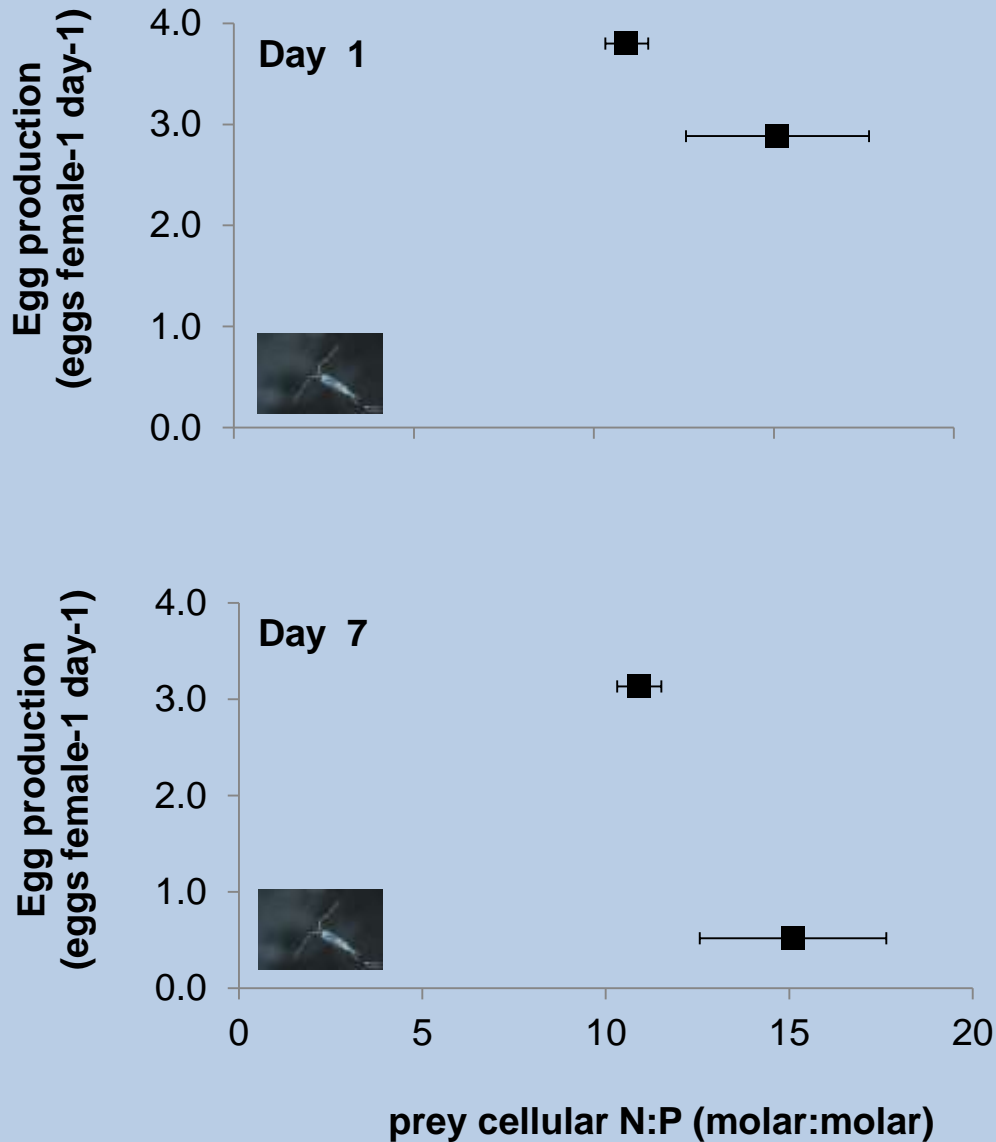
Eurytemora carrolleeae



Egg nutrient content as a function of copepod nutrient content

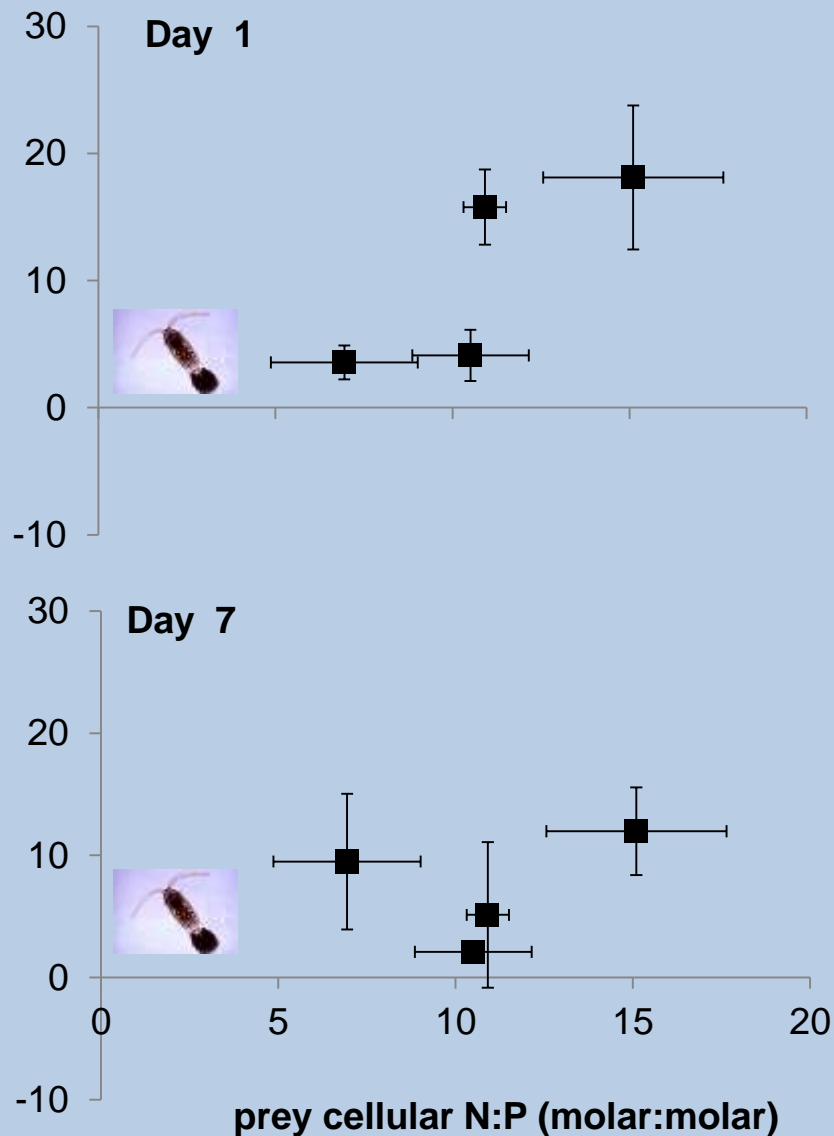


Acartia tonsa

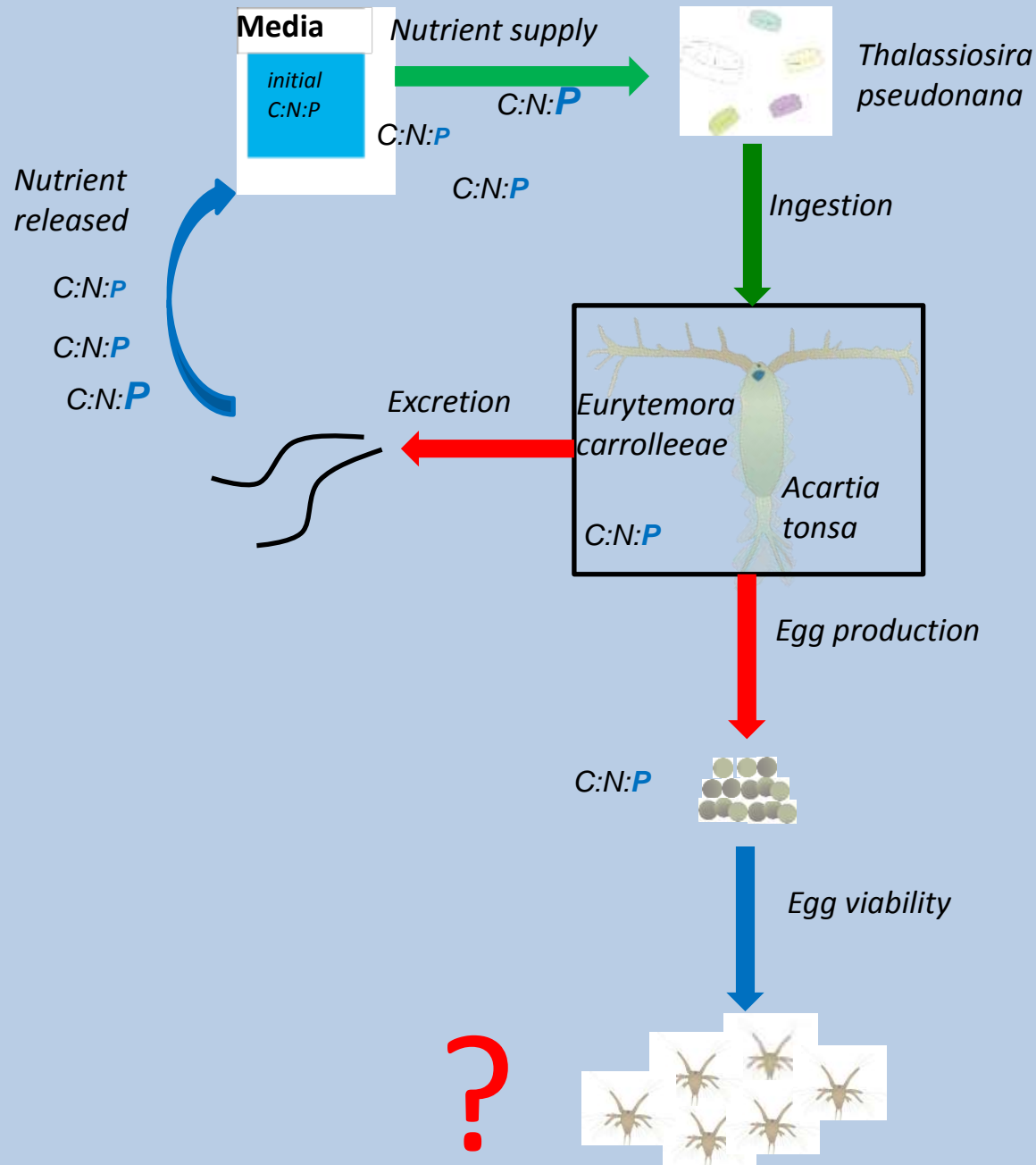


HIGH P HIGH N

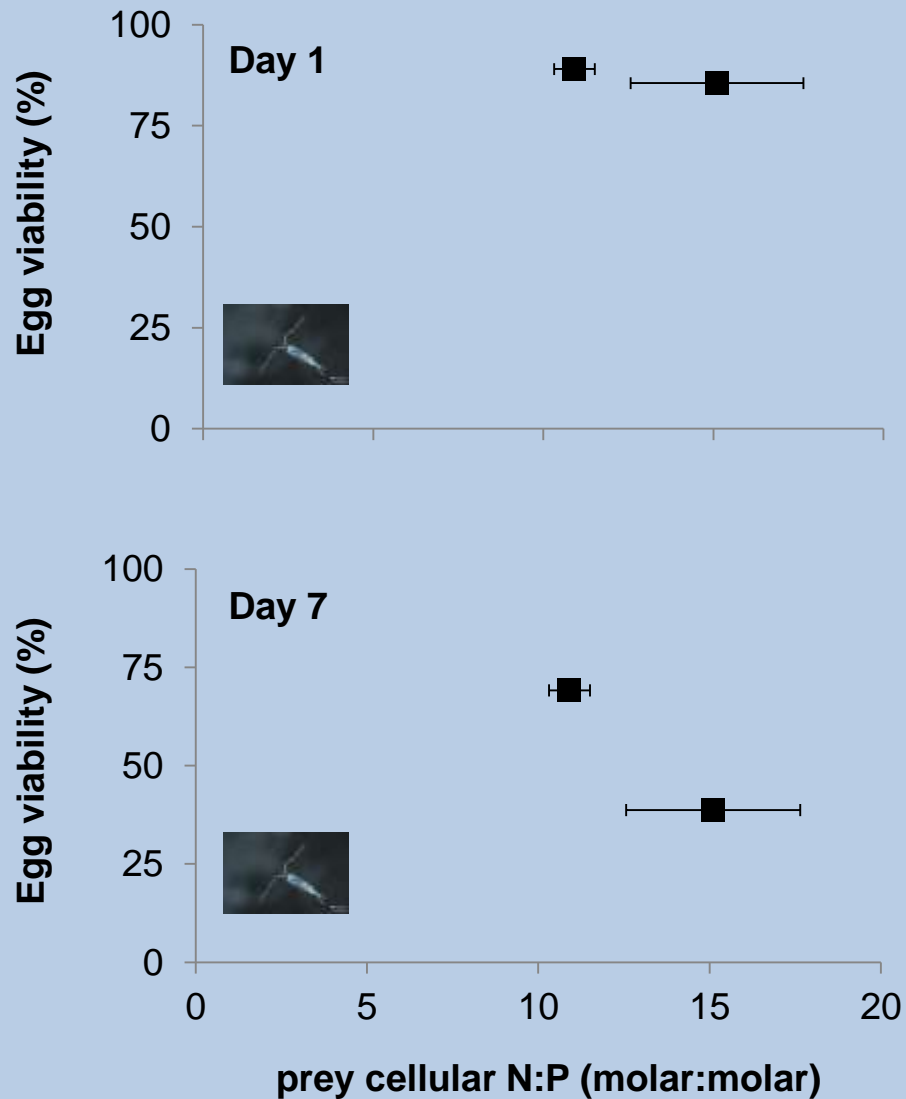
Eurytemora carrolleeae



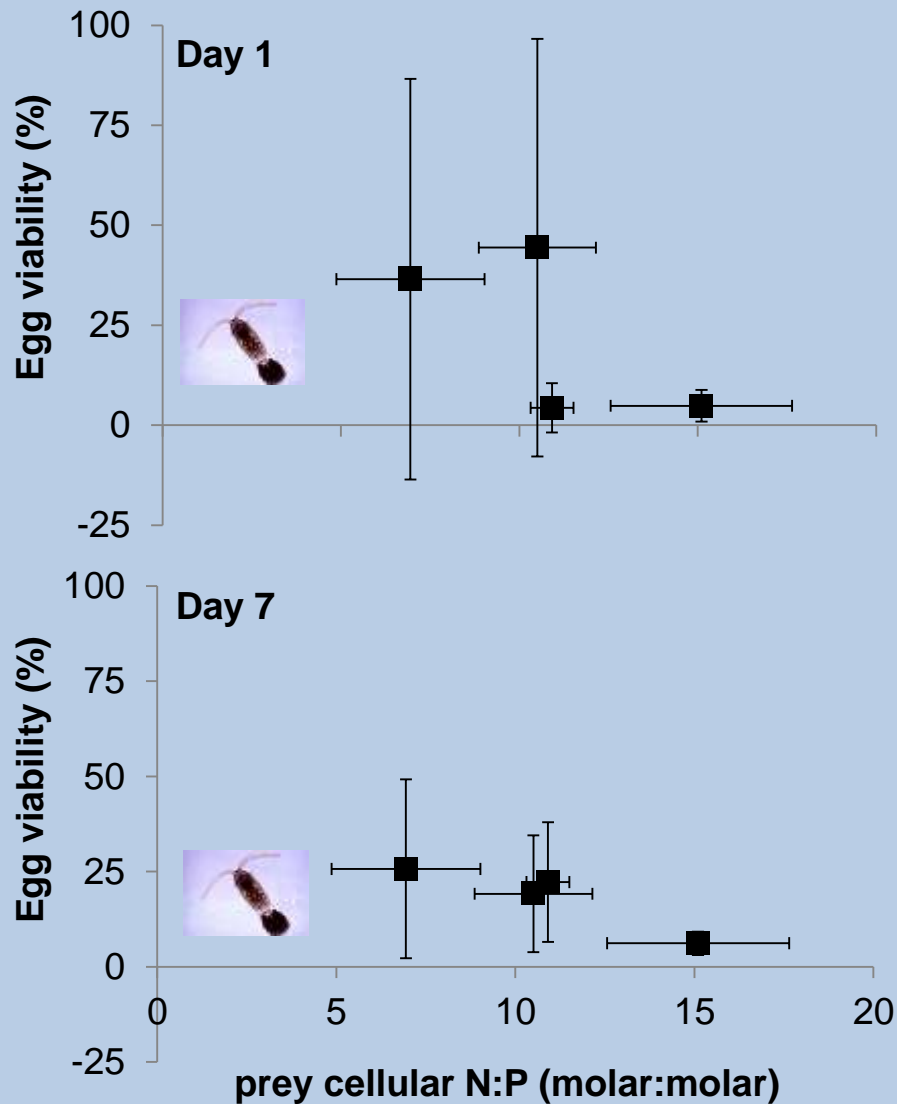
HIGH P HIGH N



Acartia tonsa

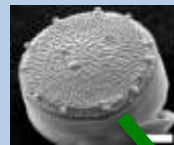
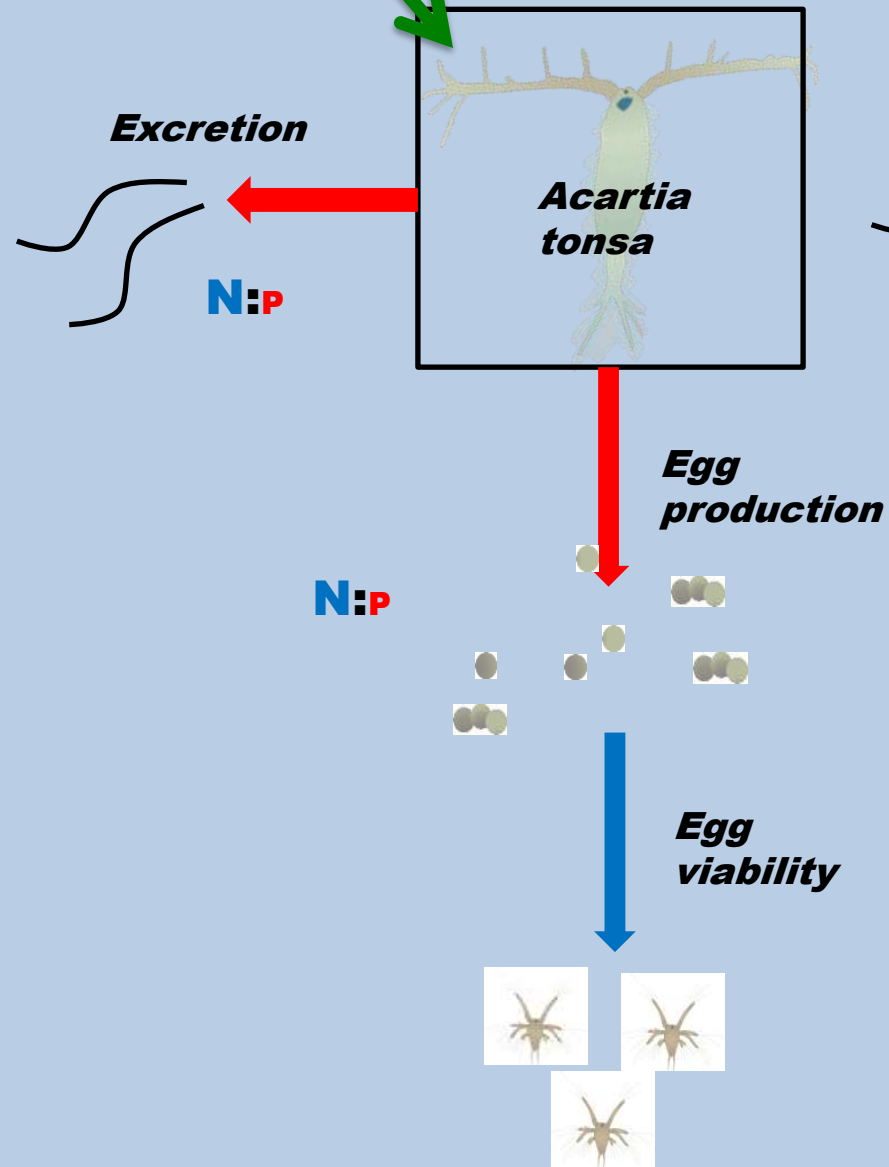


Eurytemora carrolleeae

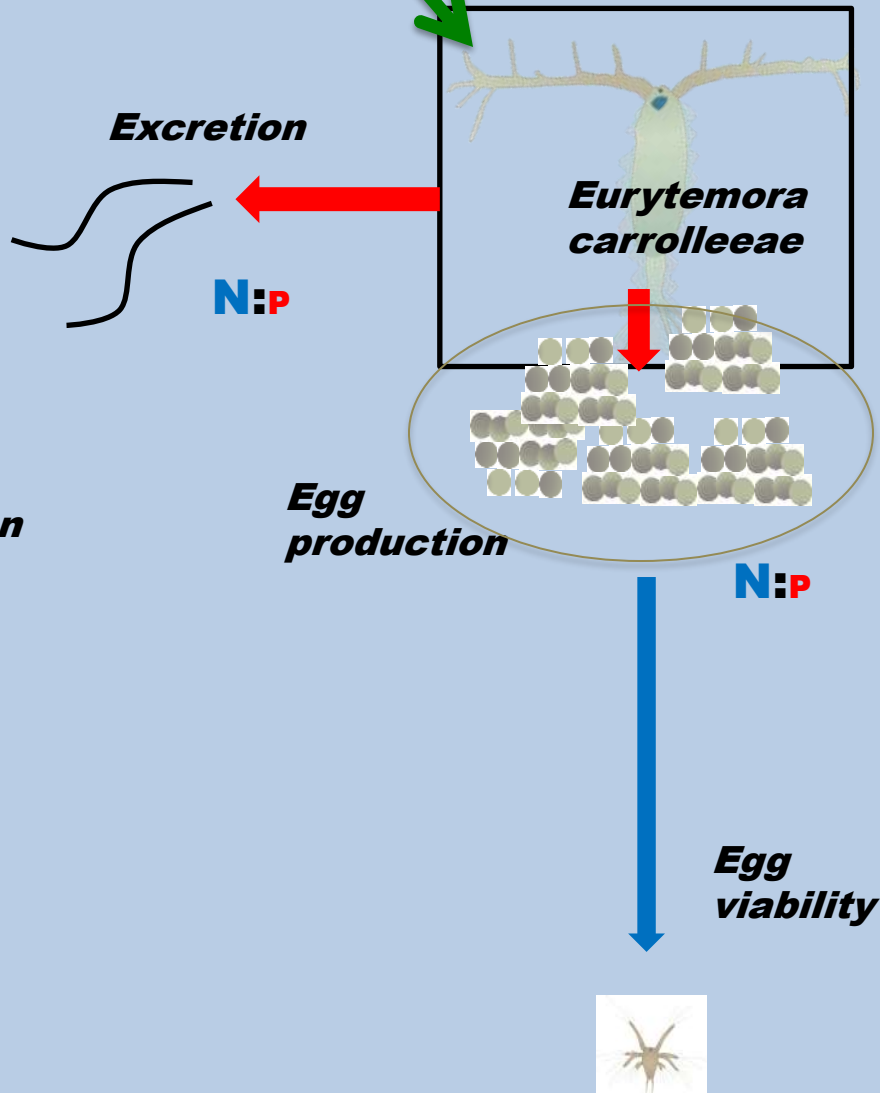


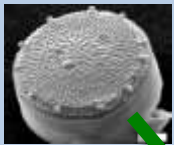


Low P



Low P

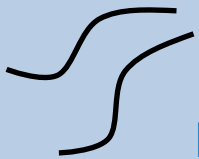




High P



Excretion

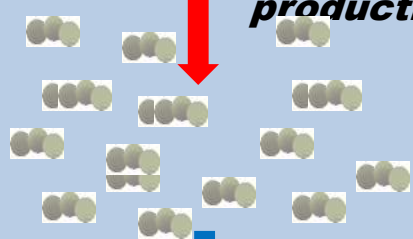


N:P

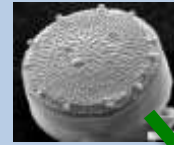
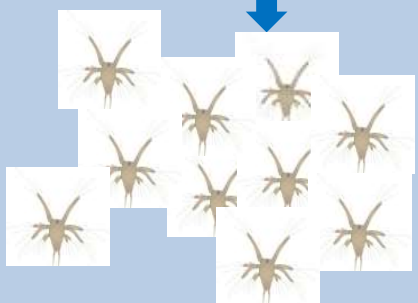
Acartia tonsa

Egg production

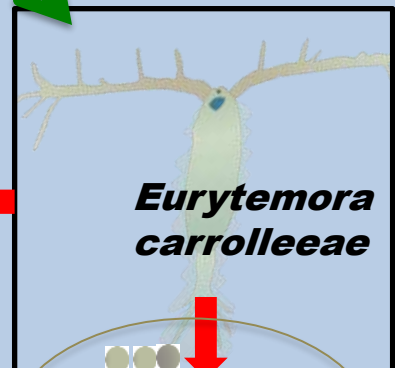
N:P



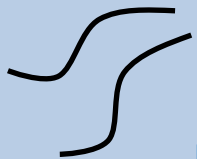
Egg viability



High P



Excretion

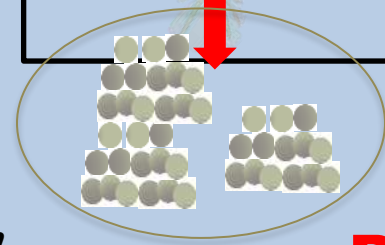


N:P

Eurytemora carrolleeae

Egg production

N:P



Egg viability



Conclusions

- *Acartia* and *Eurytemora* differed in their tissue nutrient content and in their response to variable nutrient quality in their food
- Variable nutrient quality in the diatom prey affected egg production and egg viability even when food quantity (C) was constant and provided in excess

Acknowledgements

- Jeff Alexander, Erica Kiss, Catherine Fitzgerald,
- Horn Point Laboratory Analytical Services



Prey cellular N:P

