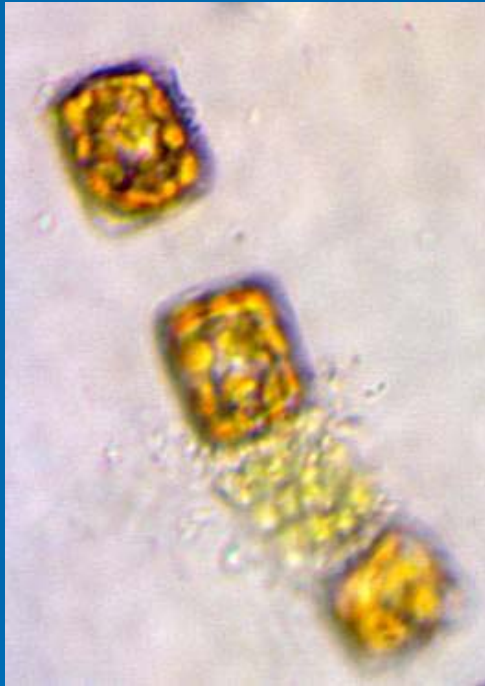
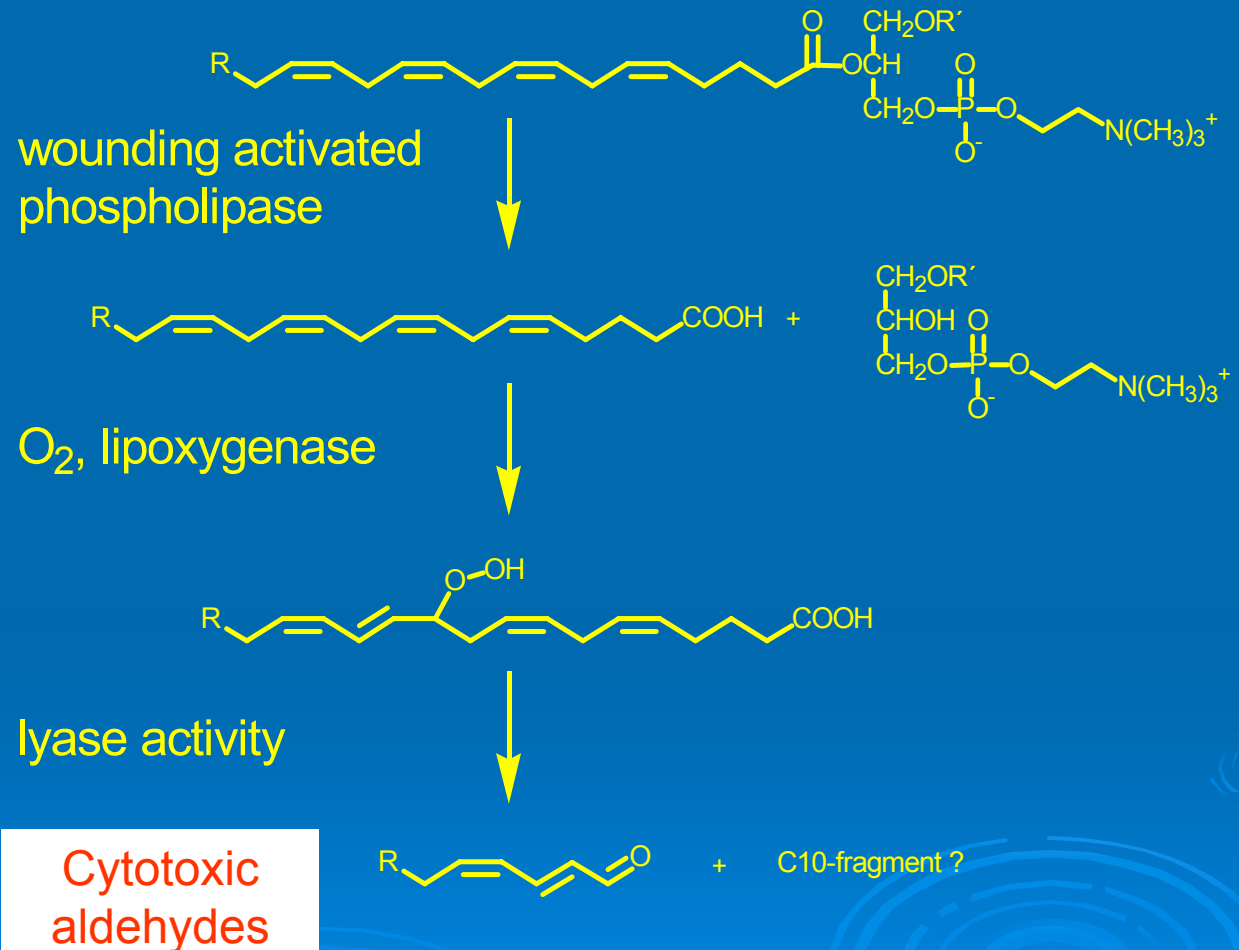




# Summary of aldehyde production by diatoms

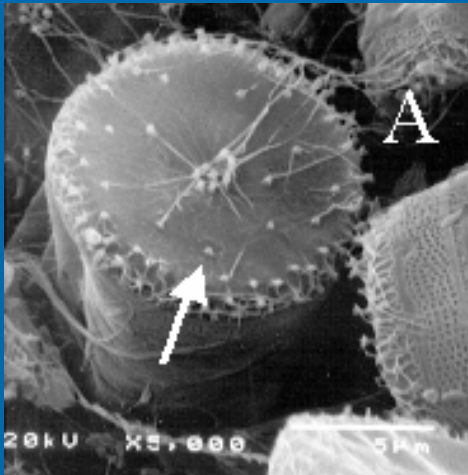


Process after wounding

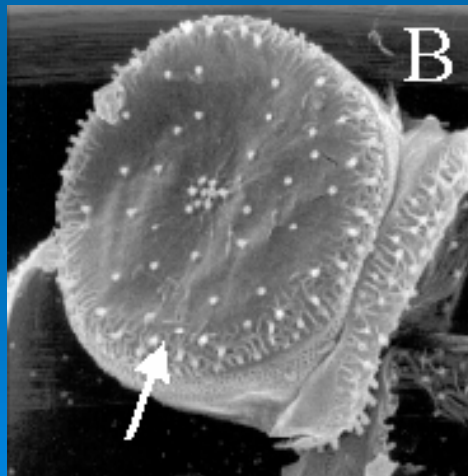


# The production of aldehydes is strain dependant

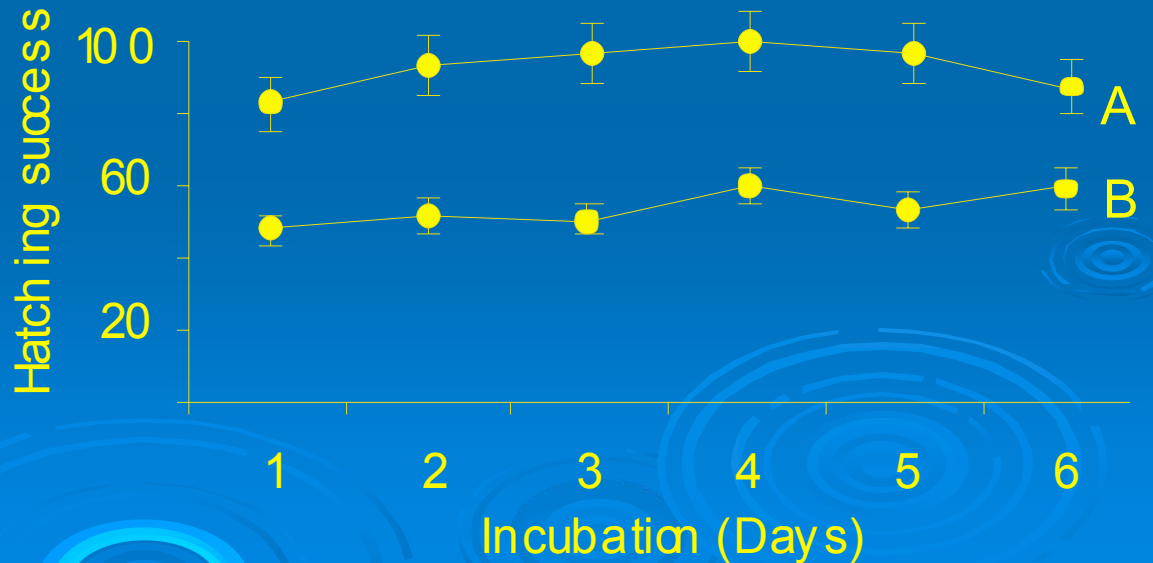
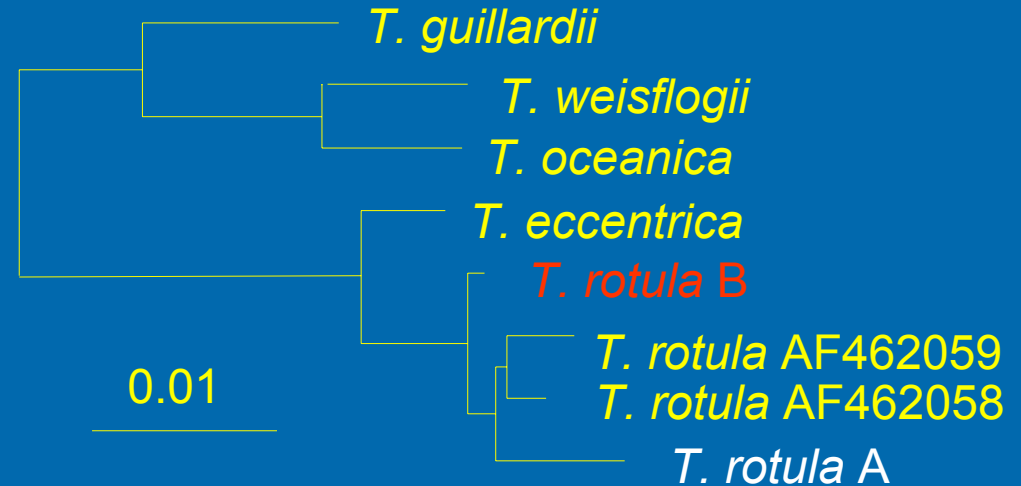
Pohnert et al., 2002



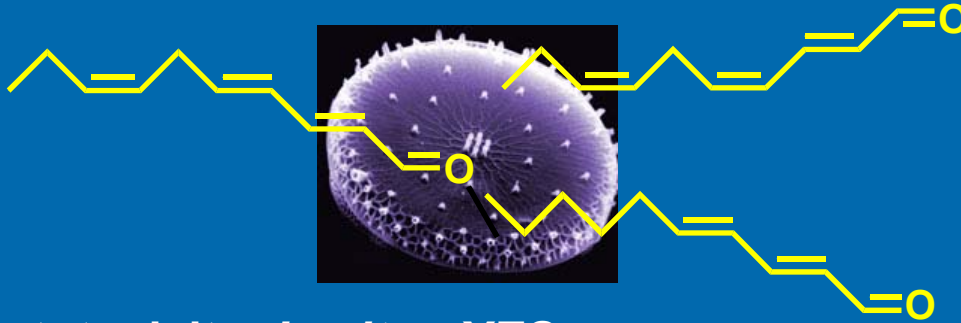
*T. rotula* A  
no decatrienal production



*T. rotula* B  
high decatrienal production



# Cytotoxic PUAs are produced by *specific* diatoms



**Cytotoxicity- *In vitro*: YES.**

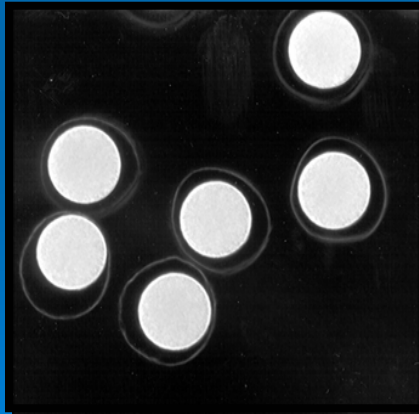
**Bioassays with sea urchin eggs**

***In vivo*: IS open to question.**

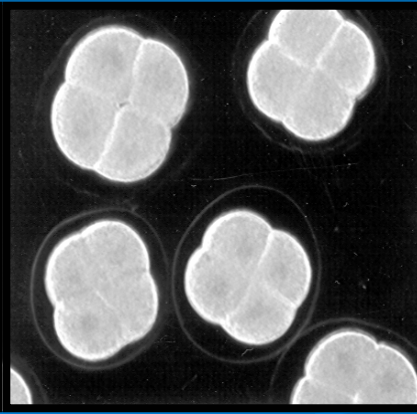
Aldehydes from *T. rotula*, and *S. costatum* are believed to inhibit cell division in copepod eggs.

Miralto *et al.*, 1999  
Ivanora *et al.*, 2004

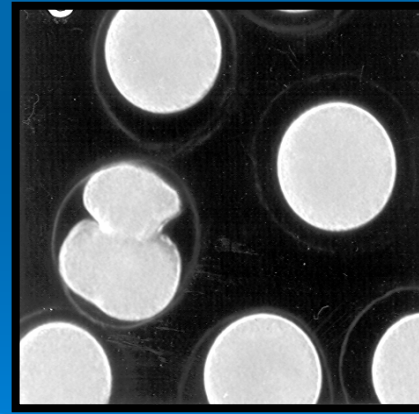
Presence of PUAs in diatoms does not reduce the feeding activity of herbivorous copepods.



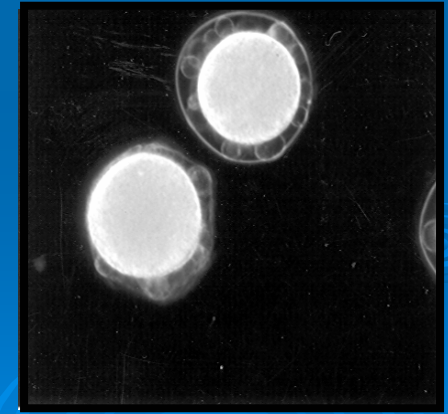
Control t = 10 min



Control t = 4h



After addition  
of decadienal  
(1mg / l)



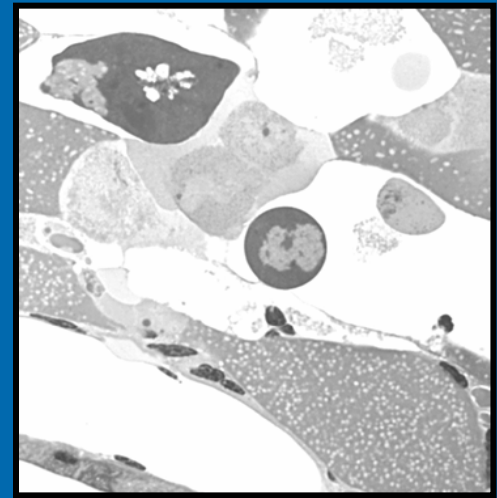
Toxic effects

Adolph *et al.*, 2004

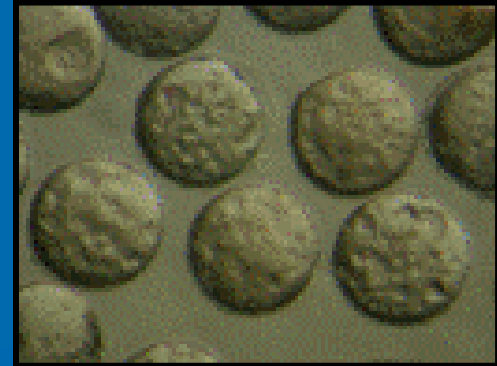
# Deleterious effects of diatoms

DETECTABLE SYMPTOMS  
IN CALANOID COPEPODS

Oocytes



Embryos



Larvae



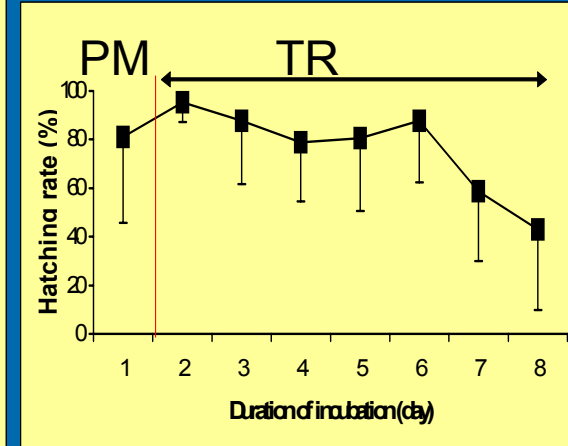
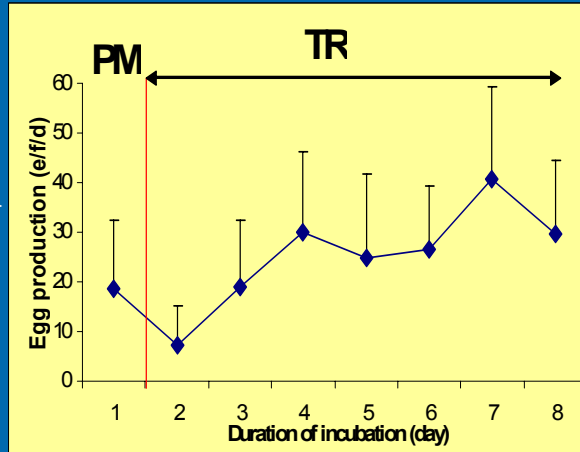


# Functional responses in calanoid copepods

PM (control) : induces [Normal EPR and Hatching]

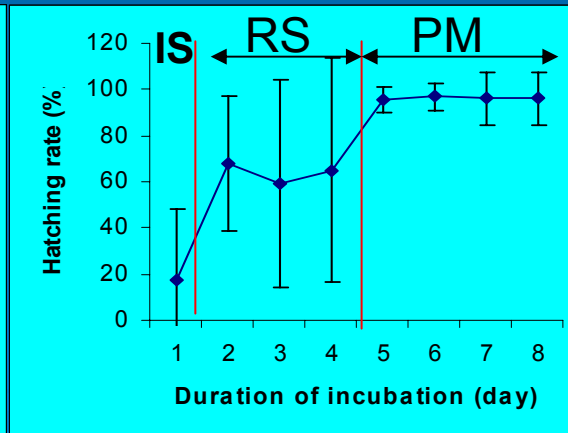
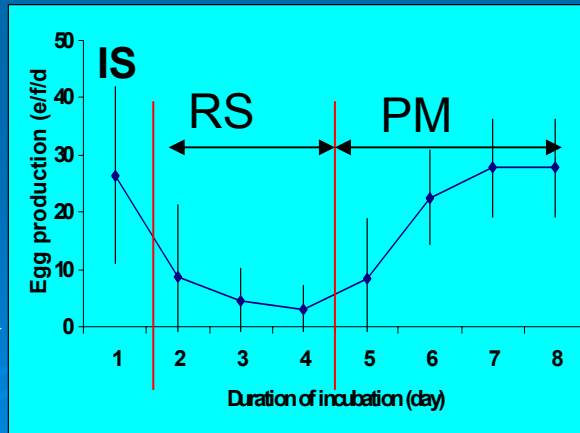
TR  
aldehyde producer

Normal EPR  
Hatching  
Inhibition



RS  
aldehyde non-producer

Abnormal EPR  
Hatching  
Inhibition

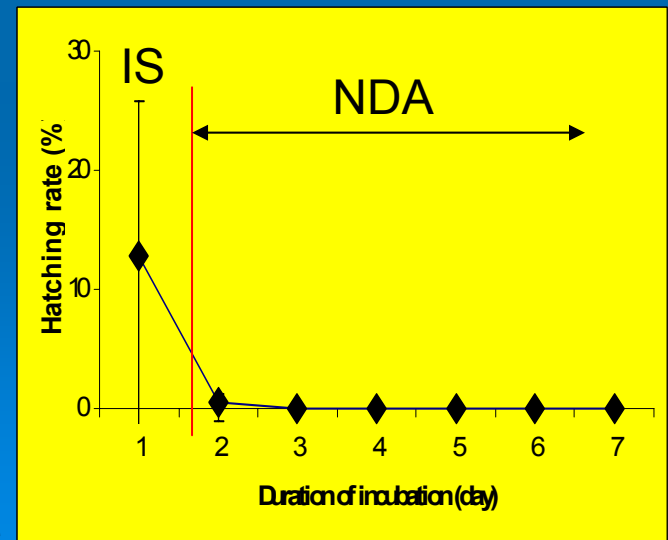
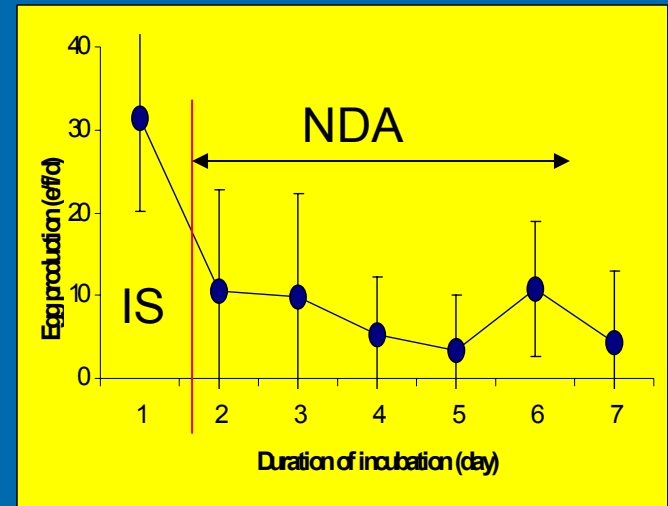


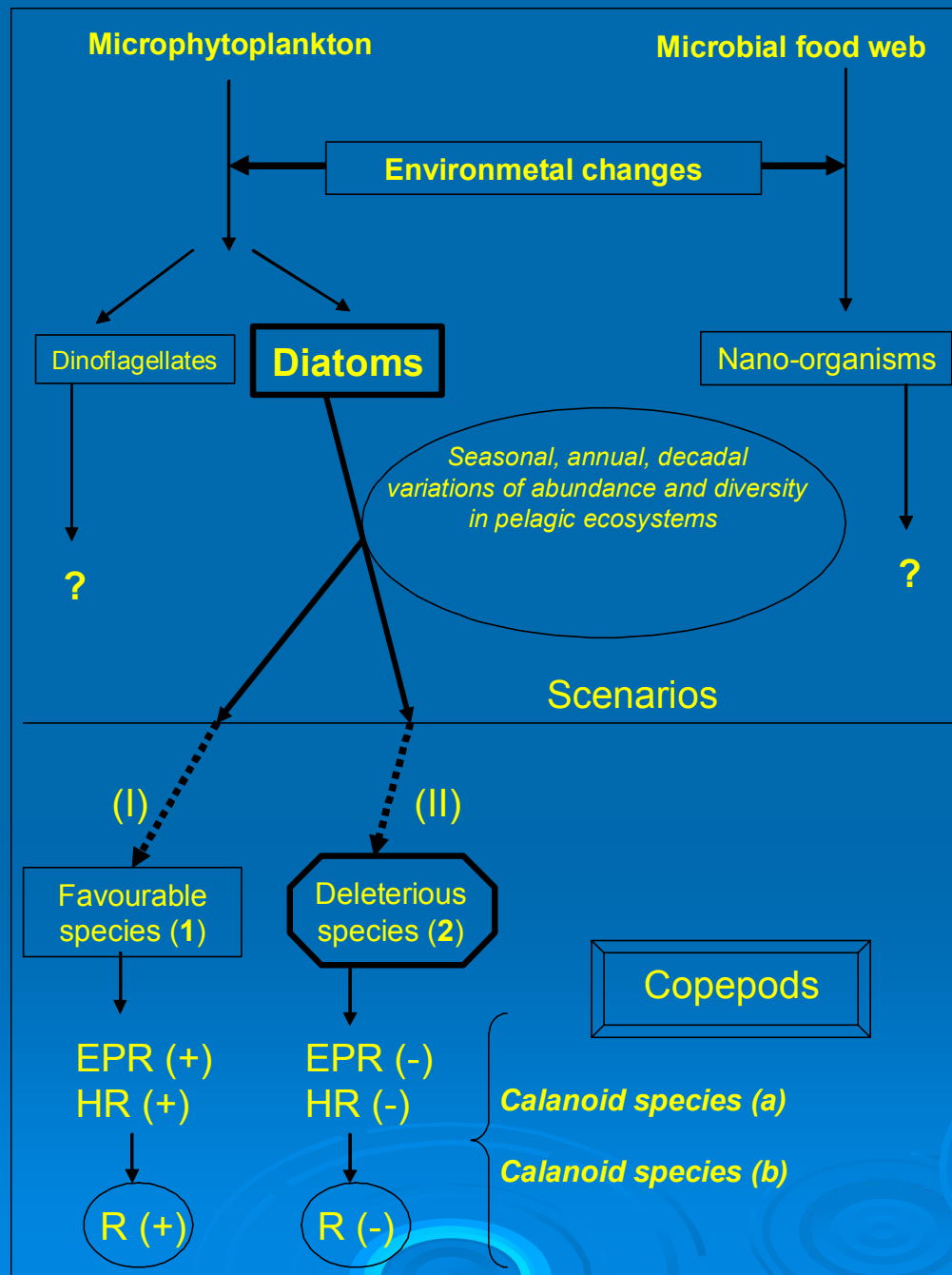
# Functional responses in calanoid copepods

## Natural diatoms in diets (NDA)



PUA (+) or PUA (-)







## CONCLUSION 1- WHAT WE KNOW

### → DIATOMS

50 species, 70 strains

ONLY 30 % are

ALDEHYDE PRODUCERS

→ NO DIRECT CORRELATION between  
PUAs, EPR and/or HS

→ NO CORRELATION between fatty acids,  
and HS

→ Link with EPA/DHA UNCERTAIN

→ NO CORRELATION between diatom  
biomass and EPR, HS

→ Inhibitory effects are  
SPECIES, STRAIN DEPENDANT

## References

Wichard *et al.*, 2004

Wichard *et al.*, 2006

Wichard *et al.*, 2006

Arendt *et al.*, 2005

Hazzard & Kleppel, 2003

Poulet *et al.*, 2005

Irigoien *et al.*, 2005

Ban *et al.*, 1997

Pohnert *et al.*, 2002

Ianora *et al.*, 2004

Poulet *et al.*, 2005

## CONCLUSION 2- WHAT WE SUSPECT

### INHIBITORY EFFECTS MIGHT BE DUE TO :

- Aldehyde secondary compounds
- Unidentified toxins
- Missing essential compounds (cholesterol, C18:)
- Stoichiometric composition of food (C:N:P)

### References

Fonda *et al.*,

Poulet *et al.*, 2005

Hasset 2004

John and Flynn 2005

### ALTERNATIVE HYPOTHESIS

Deleterious diatoms have :

- Active defence mechanism ?
- Passive defence mechanism ?

### QUESTION

Are phytoplankton groups other than diatoms deleterious?

**DIATOM-COPEPOD CHEMICAL INTERACTIONS DEFINITELY HAVE A SIGNIFICANT IMPACT ON DEMOGRAPHY, RECRUITMENT AND POPULATION DYNAMICS**