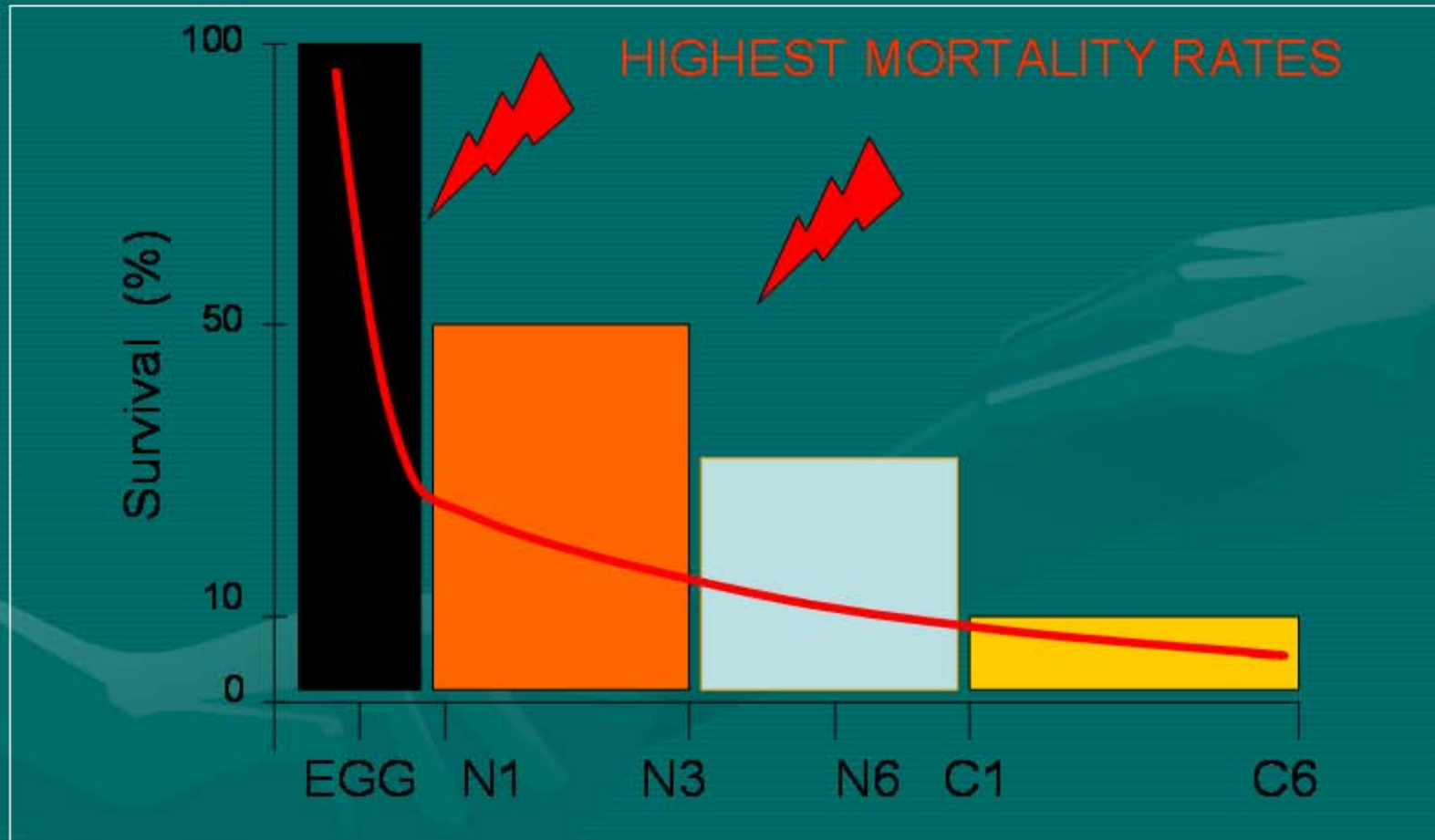


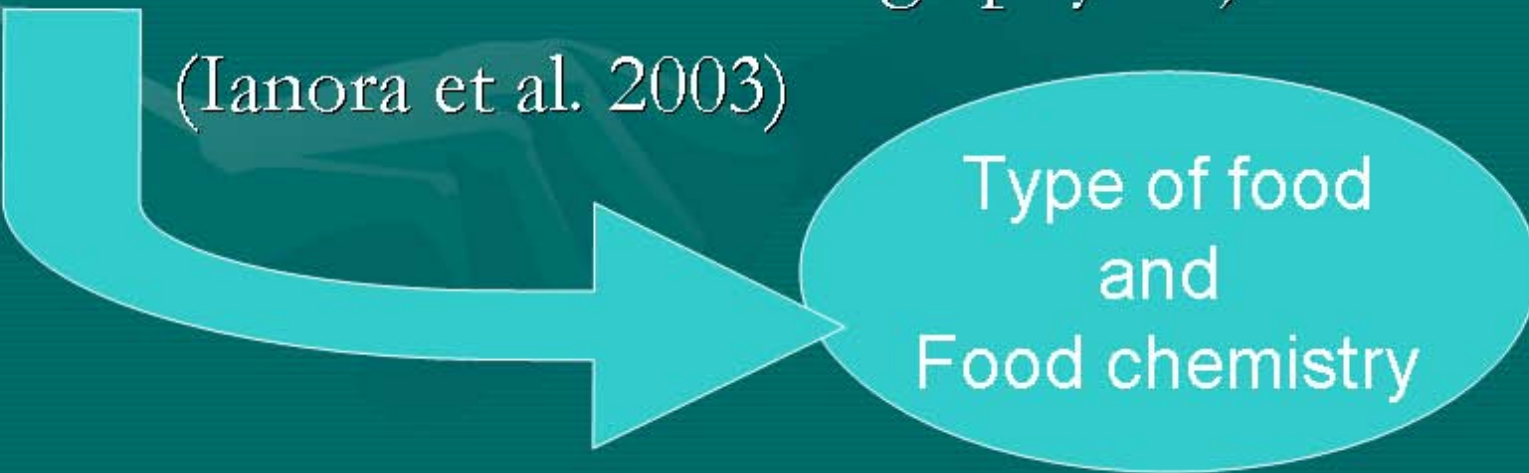
SURVIVAL CURVE OF COHORTS OF CALANOID COPEPODS



(Landry 1978; Mullin 1988; Uye & Shibuno 1992; Poulet et al. 1995; Ohman et al. 2004)

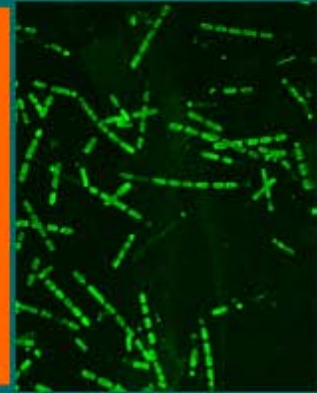
VARIOUS CAUSES INFLUENCE POPULATION CURVE

- 1-Predation (Ohman et al. 2004)
- 2-Infection & disease (Albaina & Irigoien 2006)
- 3-Birth control & demography of juveniles
(Ianora et al. 2003)



Type of food
and
Food chemistry

Parental phytoplankton diets indirectly induce variable mortality rates in copepods



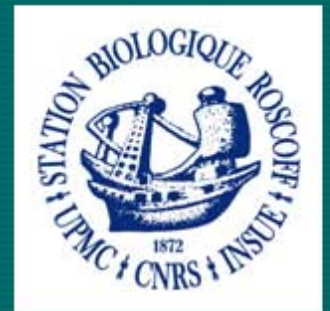
4 th. IZPS
Iroshima, JAPAN– Session 4

Dr. Serge A. POULET

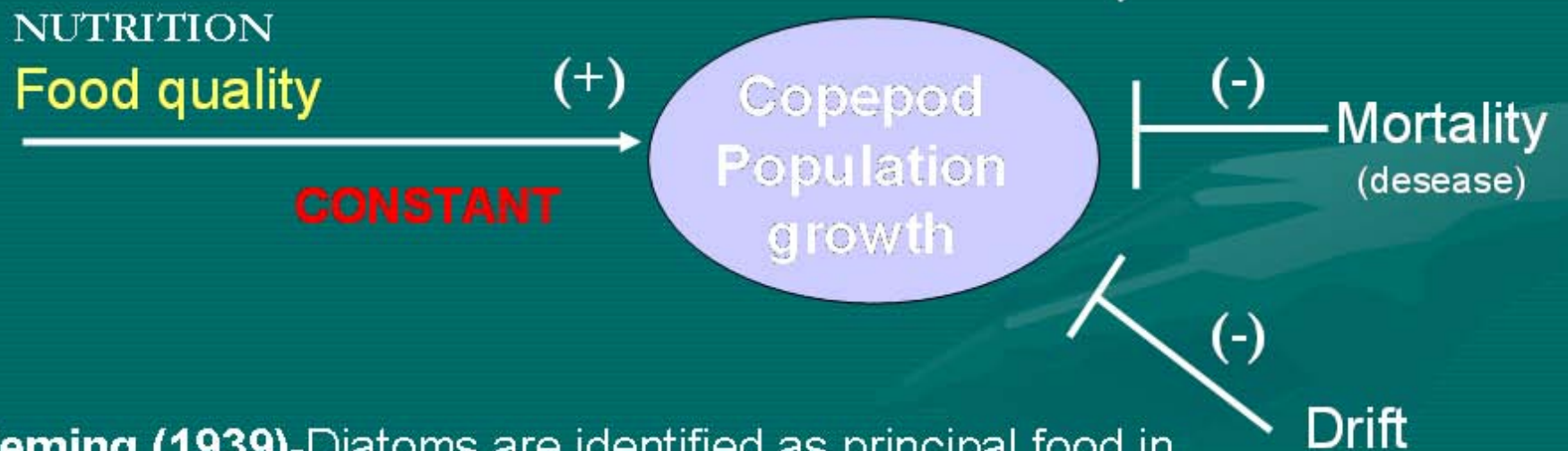
Centre National de la Recherche
Scientifique (CNRS)

Station Biologique de Roscoff, France

Email- poulet@sb-roscoff.fr



Traditional point of view:
1890-today



Fleming (1939)-Diatoms are identified as principal food in copepods diet

Cushing (1989)-In the classic paradigm, diatoms form the base of an efficient food chain via copepods to fish

Runge (1988)-The role of copepod dynamics as a filter of trophic variability

Kleppel (1991)-Egg production was not food-dependent
Diatoms may compose only a small part of the copepod diet

since 1994 ...

NUTRITION

Food quality

(+)

CONSTANT ?

Copepod
Population
growth

Deleterious
Missing
substances (-)

Predator

(fish, jellyfish, crustaceans)

(-)

Mortality
(disease)

(-)

(-)

Drift

Poulet et al. (1994, 1995)

Do diatoms arrest embryonic development in copepods ?

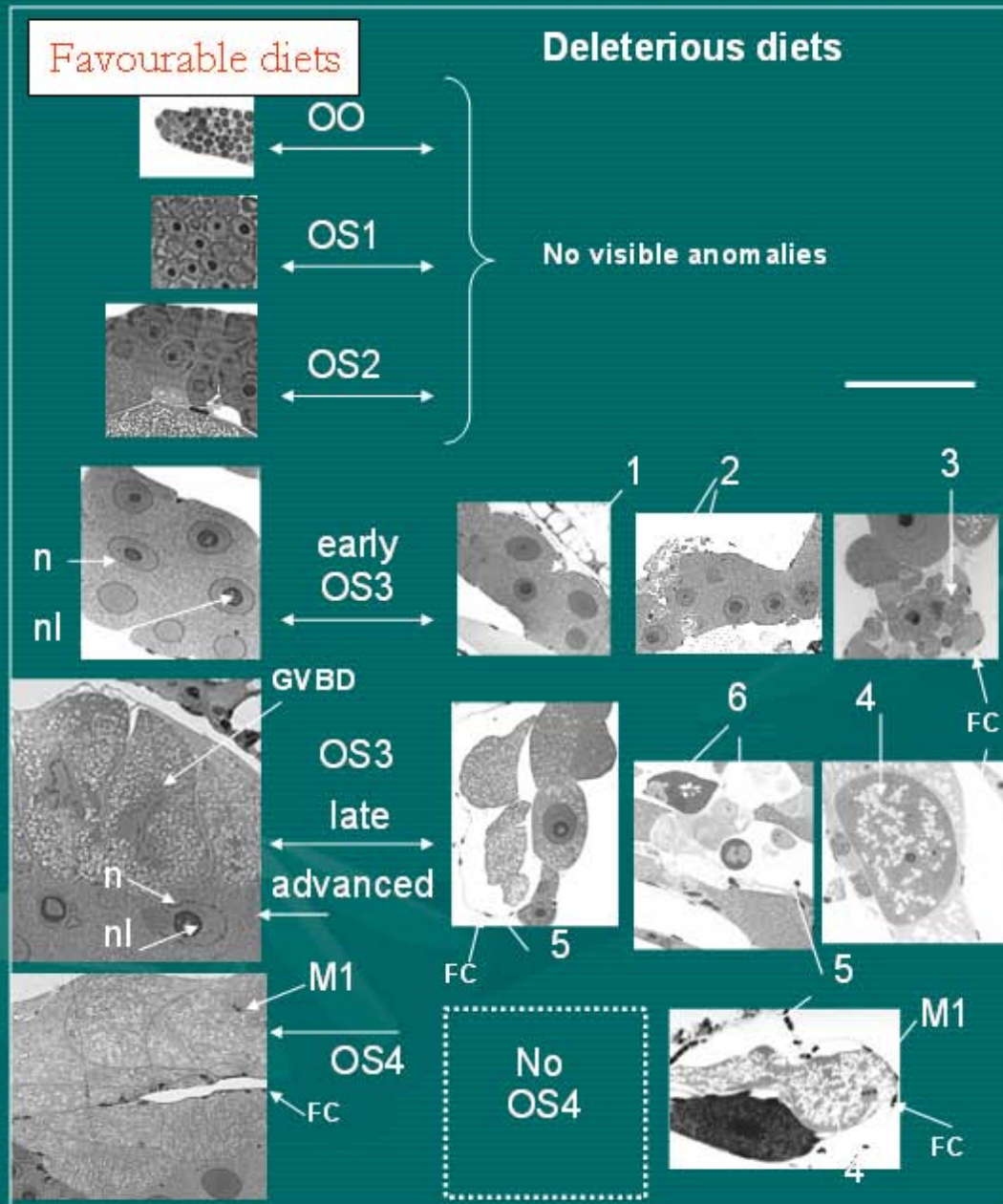
Miralto et al. (1999)

Diatoms have a deleterious effect on copepod recruitment (**HS**)

Poulet et al. (2006; 2007)

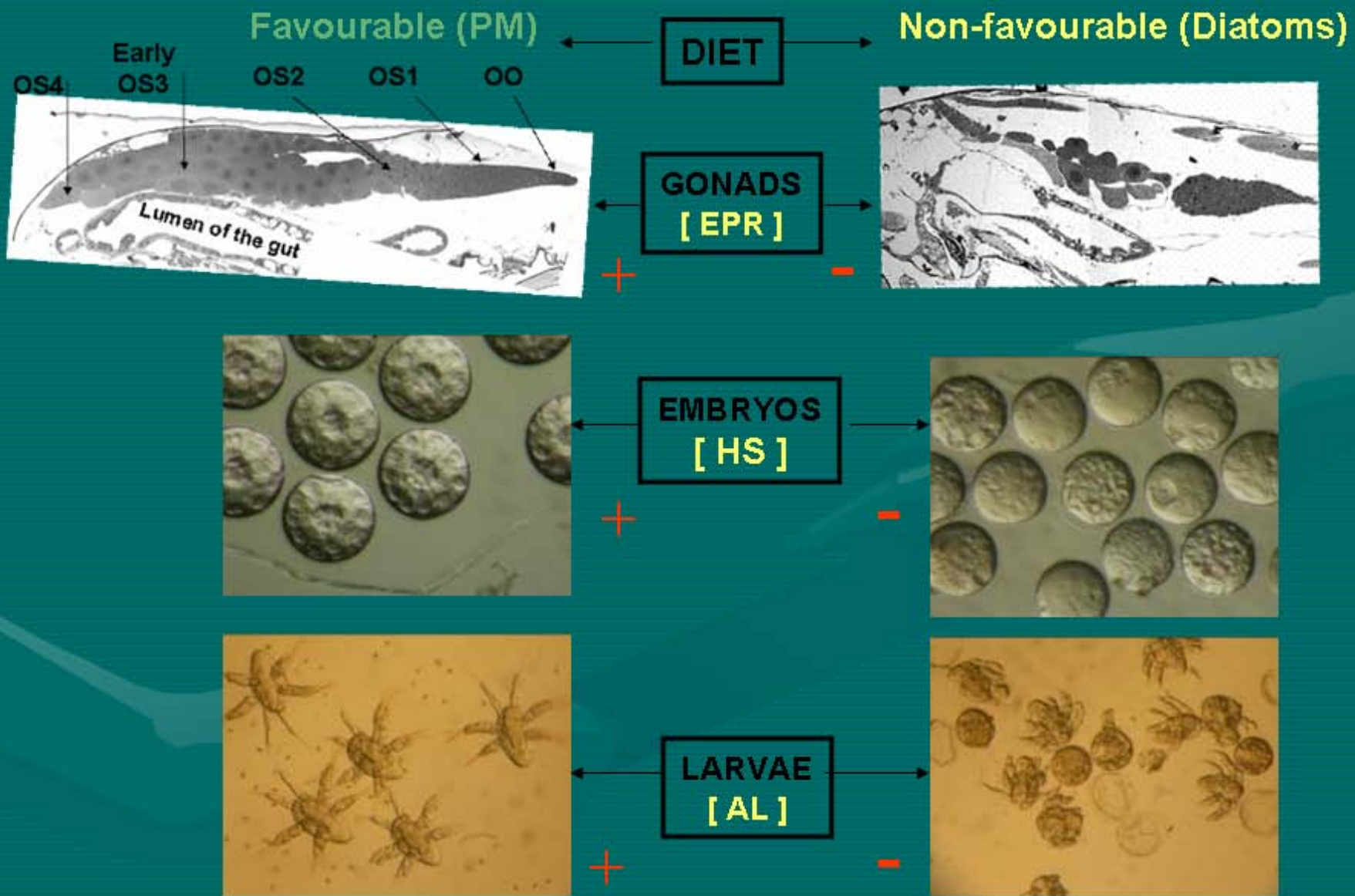
Diatoms have a deleterious effect on copepod reproduction (**EP**) and recruitment (**HS, AL**)

OOCYTE MATURATION

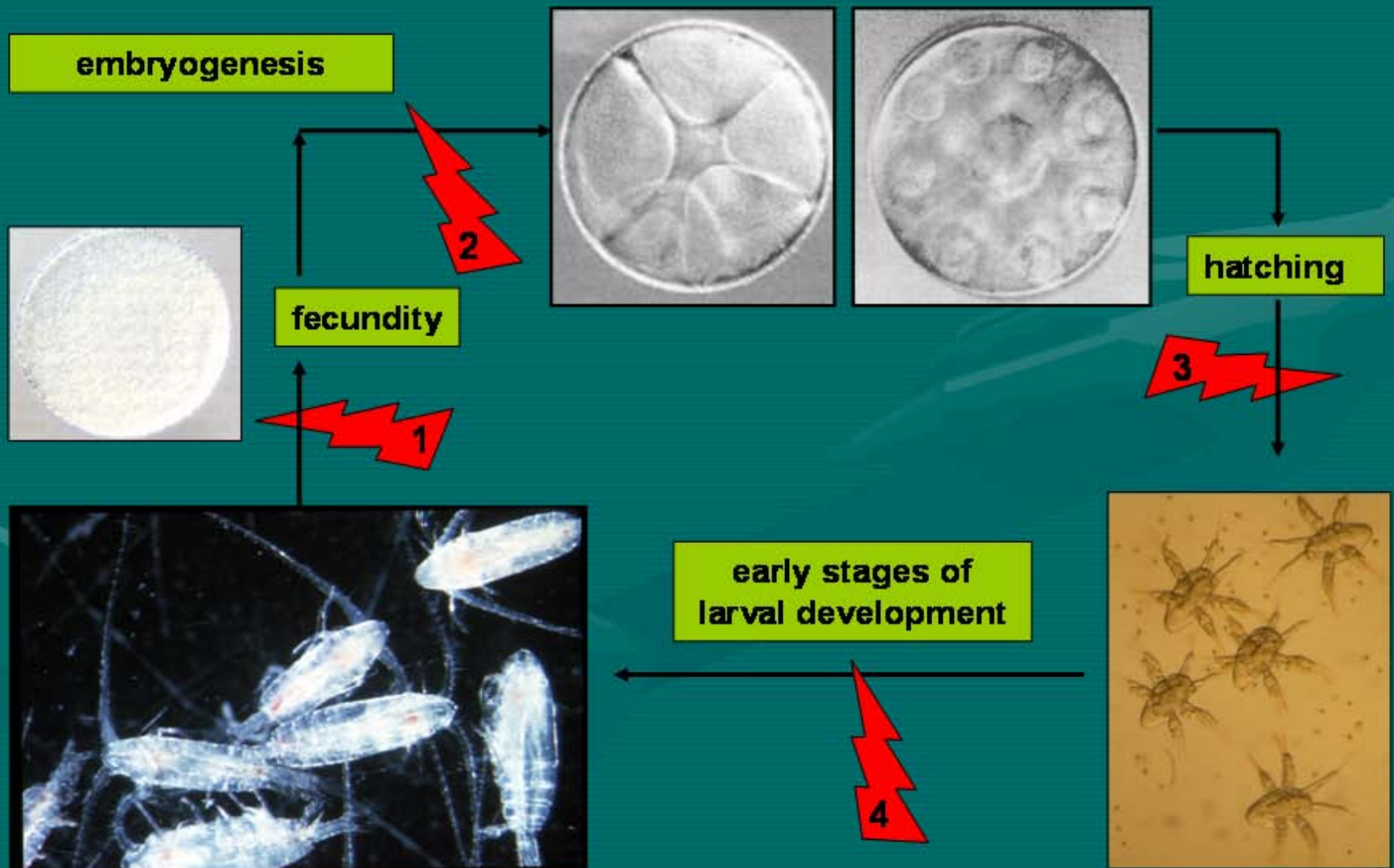


(Poulet et al. 2007)

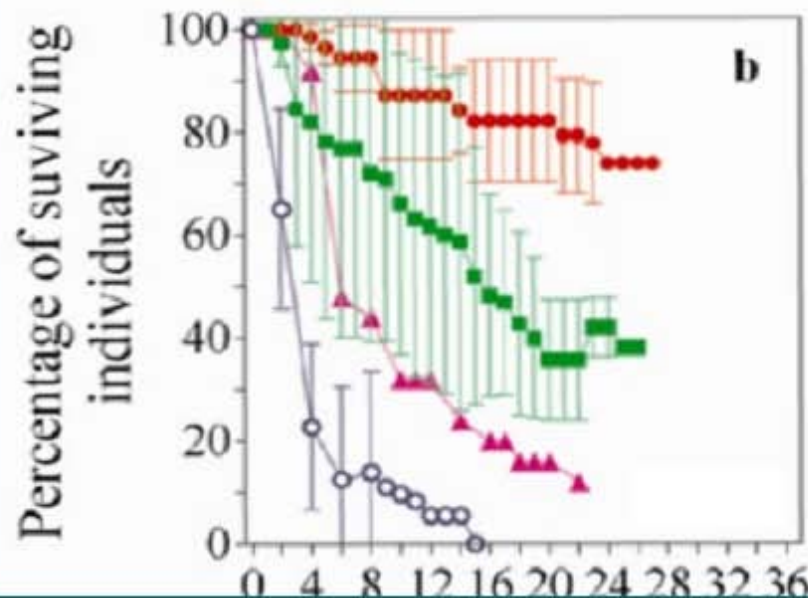
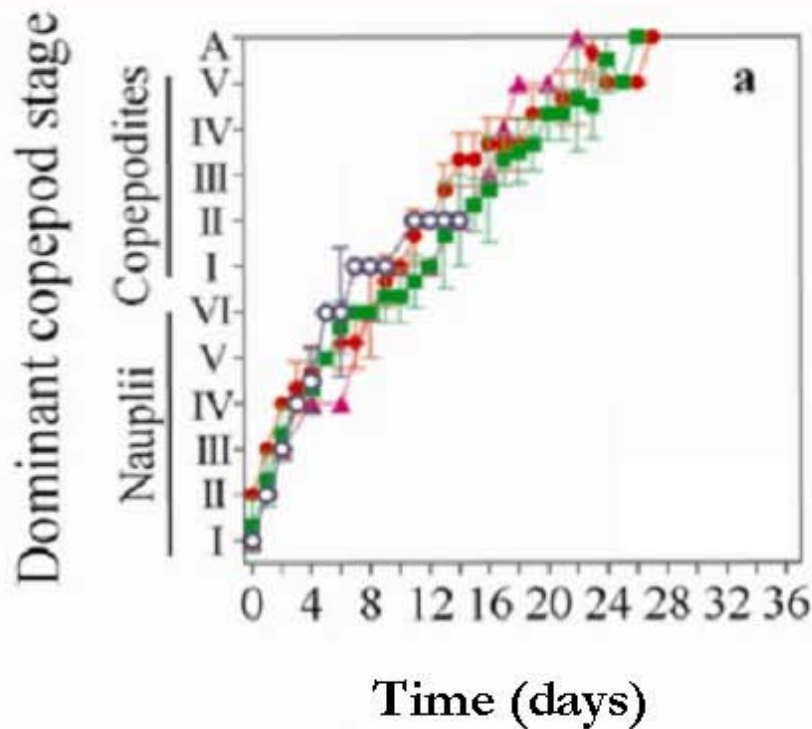
MATERNAL FOOD EFFECT



ONTOGENESIS OF COPEPODS CAN BE IMPAIRED BY UNFAVOURABLE DIETS

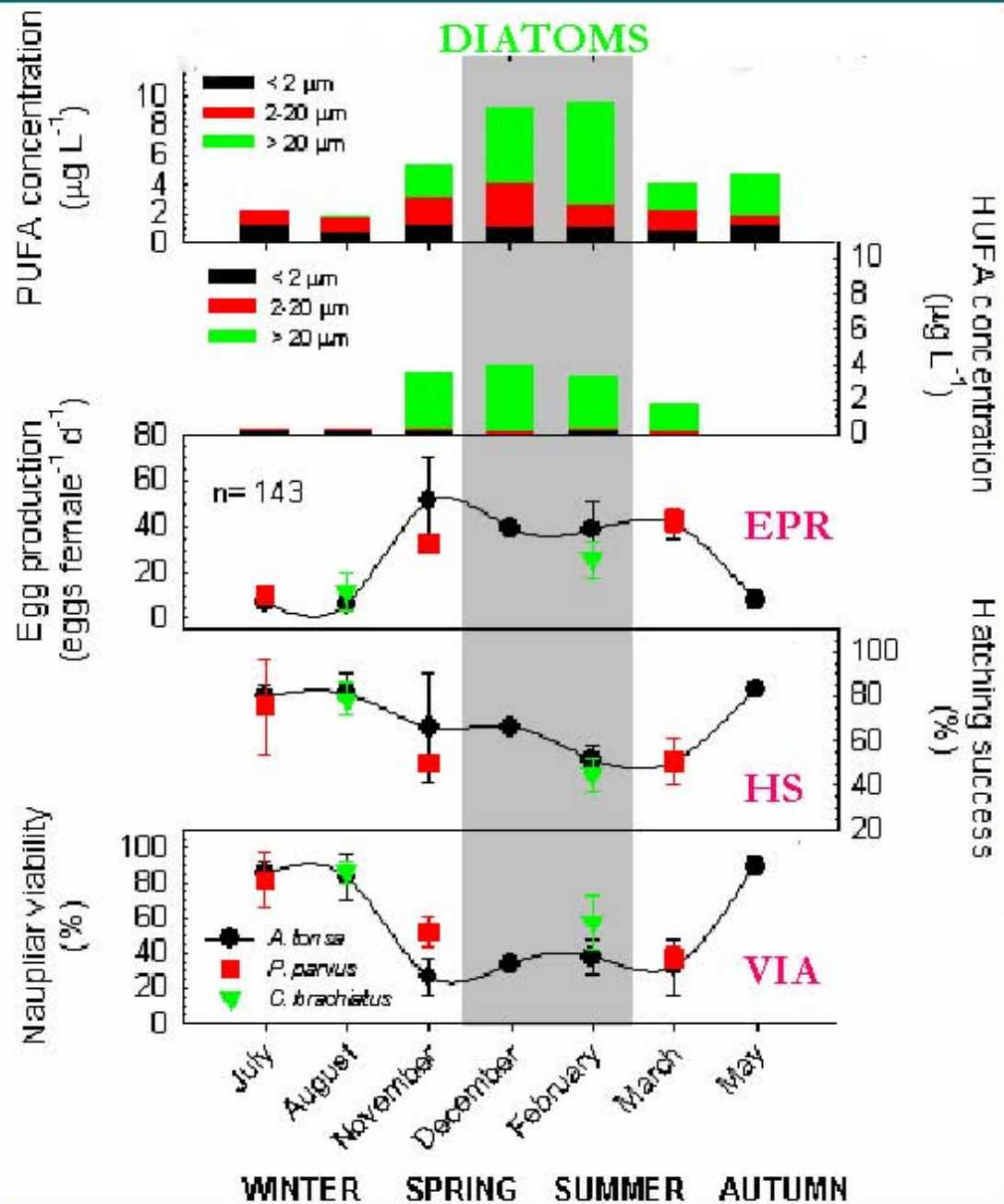


VARIATION OF COPEPOD REPRODUCTIVE FACTORS IN THE LABORATORY



ADULT ♀/ JUVENILE
DIETS

- Symbol
- PRO / PRO
 - SKE / PRO
 - ▲- PRO / SKE
 - SKE / SKE



VARIATION OF COPEPOD REPRODUCTIVE FACTORS IN THE FIELD

Several chemical factors can be involved

Reflecting variability of diatom chemistry
(e.g Toxic and/or deficient)

Wichard et al. (2005)

Wichard et al. (2007)

Jonasdottir et al. (2006)

Arendt et al. (2005)

Henssen (1997)

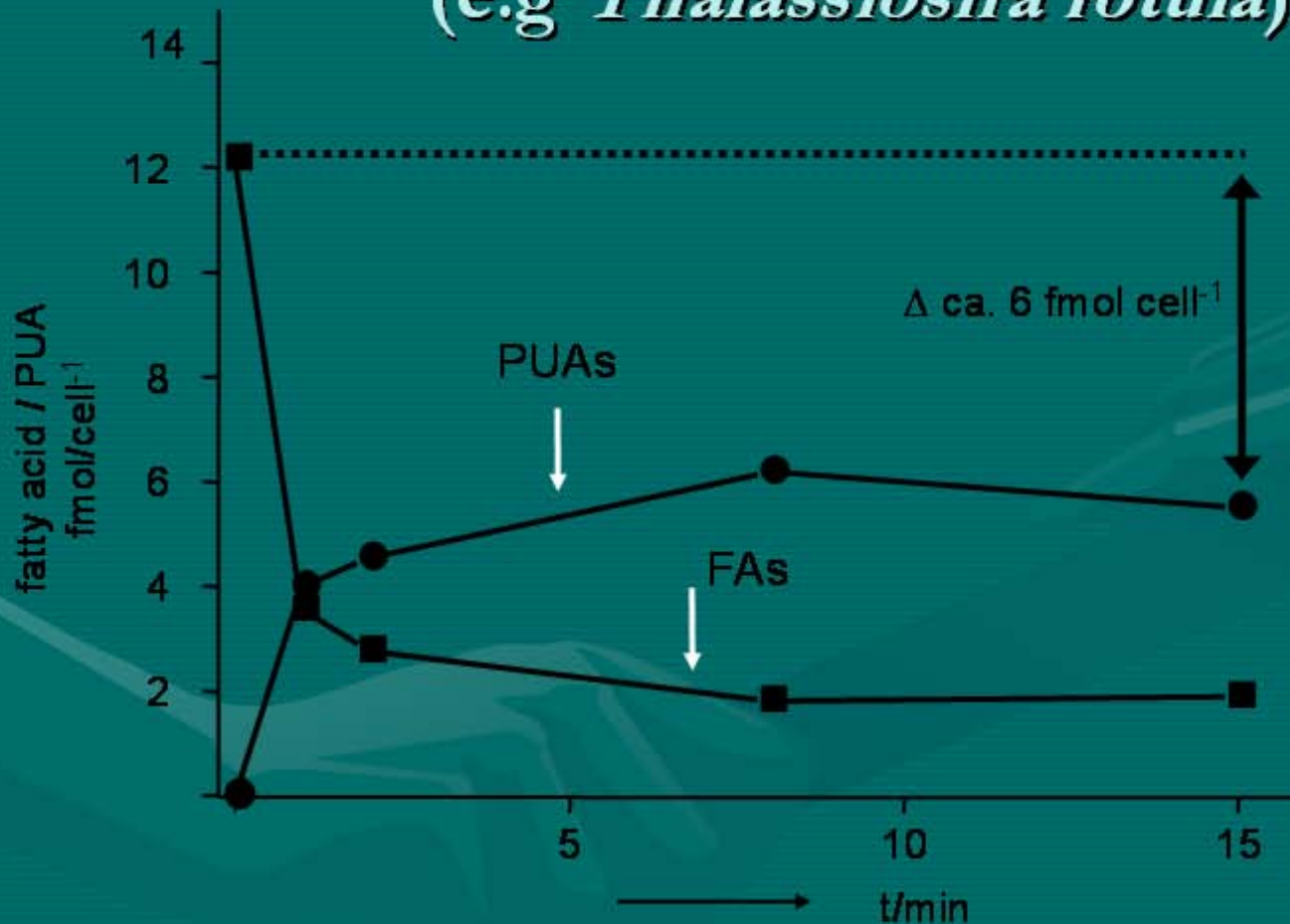
Production of PUAs
by specific diatoms

Proportion of fatty acids
DHA/EPA ratio (<2)

Stoichiometric
proportions of C:N:P
in preys and predators

Depletion of fatty acids
in diet

Depletion of Fatty Acids (FAs) in diatoms producing Polyunsaturated aldehydes (PUAs) (e.g. *Thalassiosira rotula*)



Two-sides point of view:

(1)-toxicity (PUAs, other oxylipins)

(2)-food deficiency (fatty acids depletion, cholesterol, DHA/EPA ratio < 2)

CONSEQUENCE N° 1

Morphologically abnormal Nauplius larvae should be more vulnerable to predators than normal specimens

(Hypothesis N°1)

Normal nauplius with
NORMAL
swimming
pattern

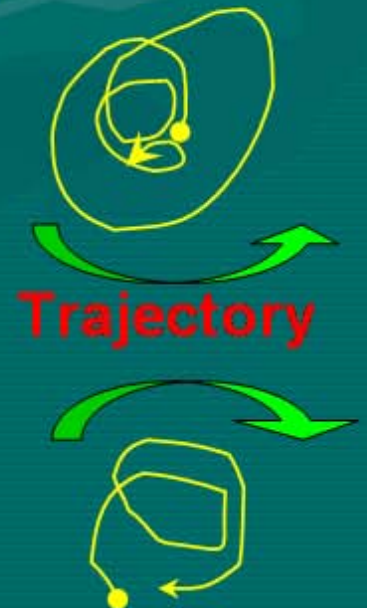


Trajectories

Abnormal nauplius with
ABNORMAL
swimming
pattern



AS



Trajectory

PIPETTE TEST- Escape reaction

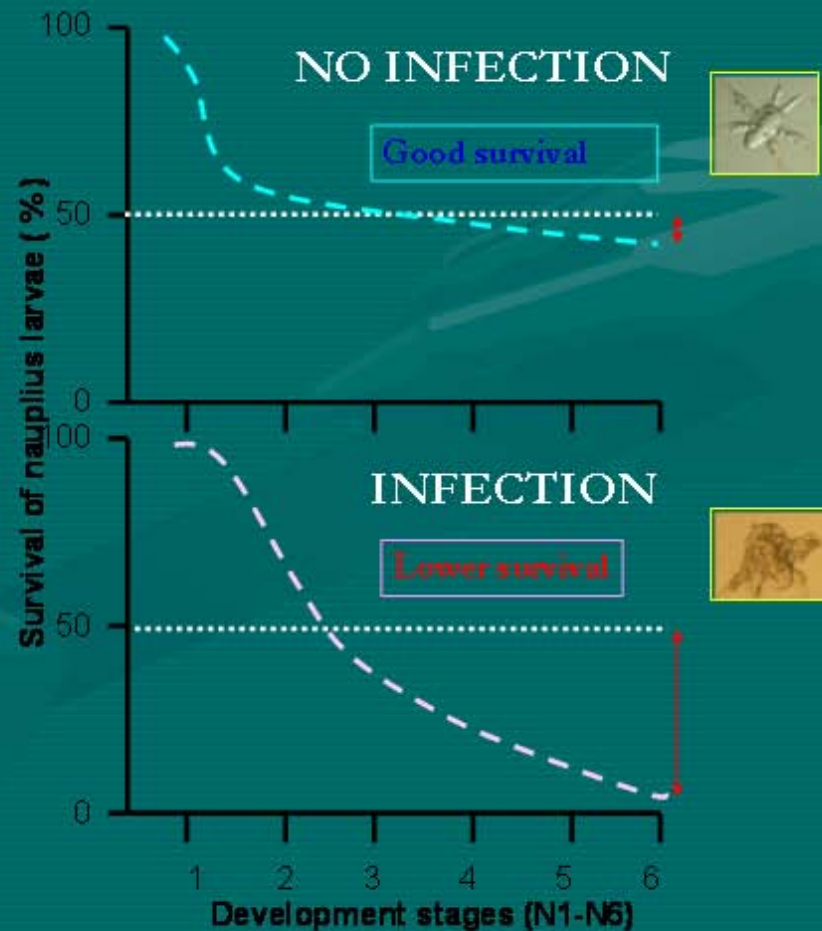
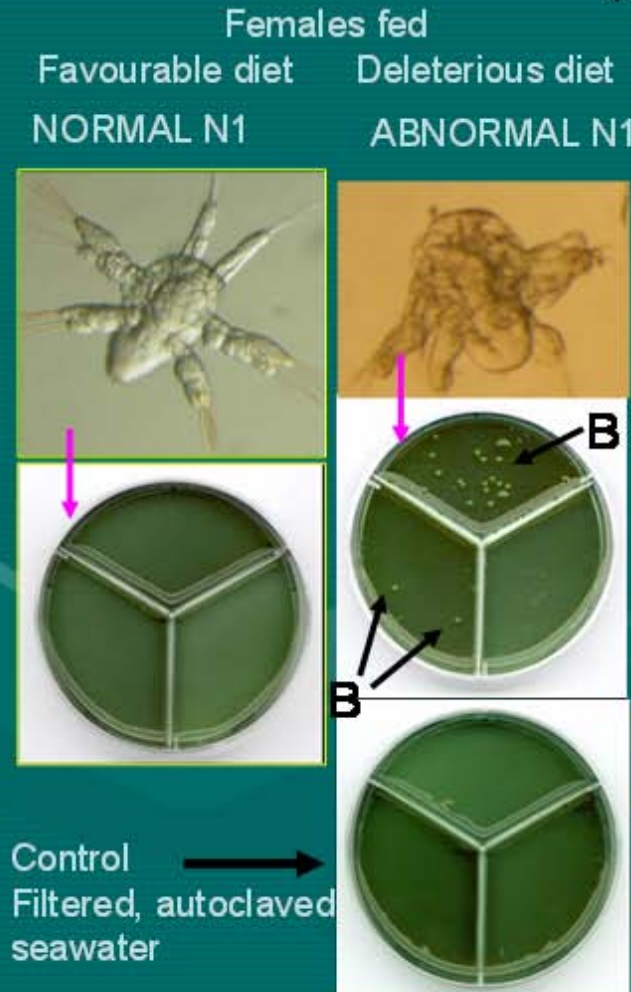


Ambush
or
Cruising
Predators



CONSEQUENCE N° 2

Are morphologically abnormal Nauplius larvae more vulnerable to parasites than normal specimens ??
(Hypothesis N°2)



CONCLUSION

When maternal diet is deleterious copepod mortality should increase and recruitment should decrease

Because juvenile specimens are « weaker », thus more vulnerable

to

[**ontogenic breakdown + predation + infection**]



The Happy-Busy Team



THANK YOU

