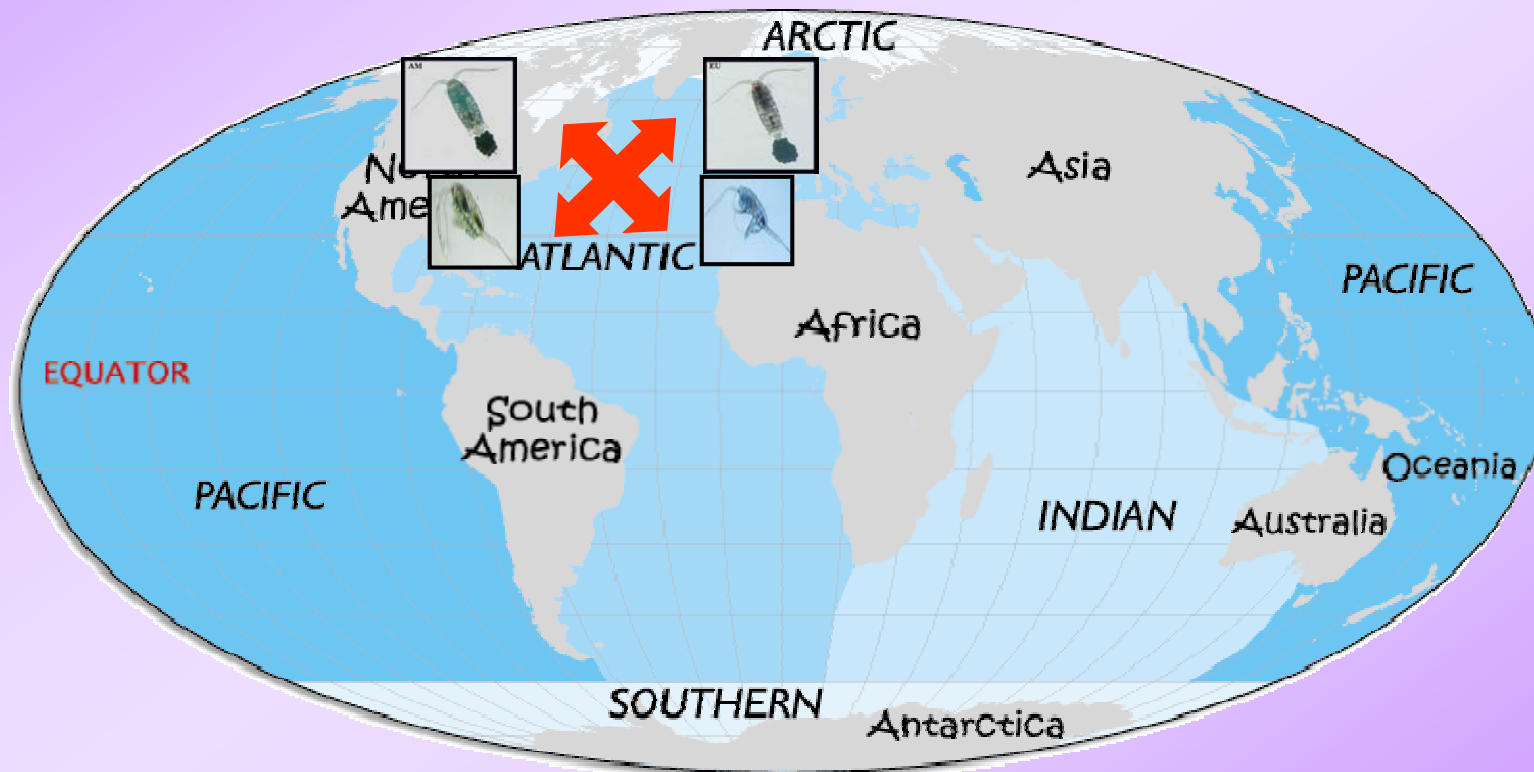


Salinity effects on the life cycle traits of two genetically divergent populations of *Eurytemora affinis* (Copepoda: Calanoida): a laboratory study



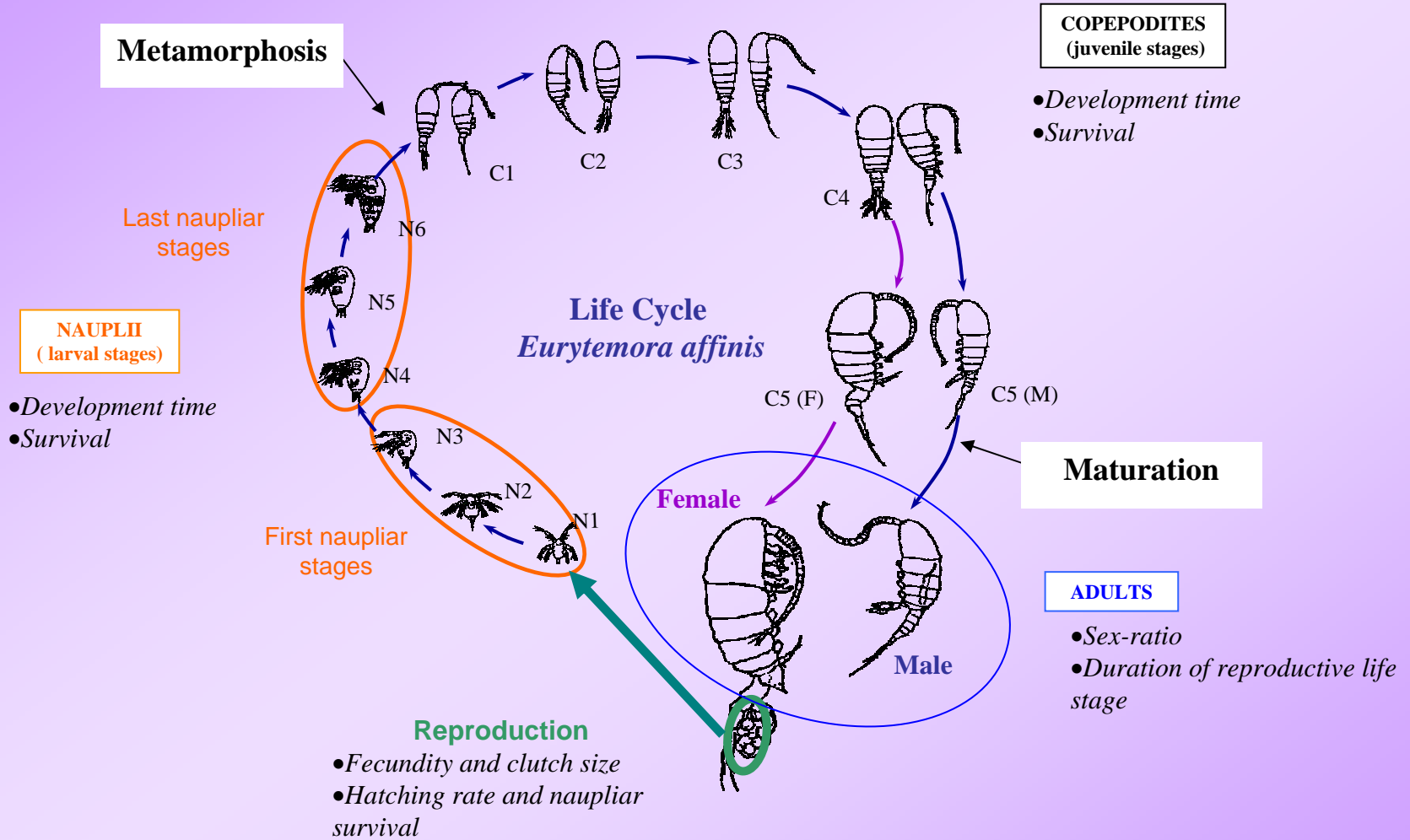
Delphine Beyrend-Dur, David Devreker, Sami Souissi, Gesche Winkler and Jiang S. Hwang

Introduction

Eurytemora affinis :

- Broad geographic range within the Northern Hemisphere
- Key role in food web of many estuaries
- Confined environment → physiological consequences on the life cycle

Introduction



Introduction

Eurytemora affinis :

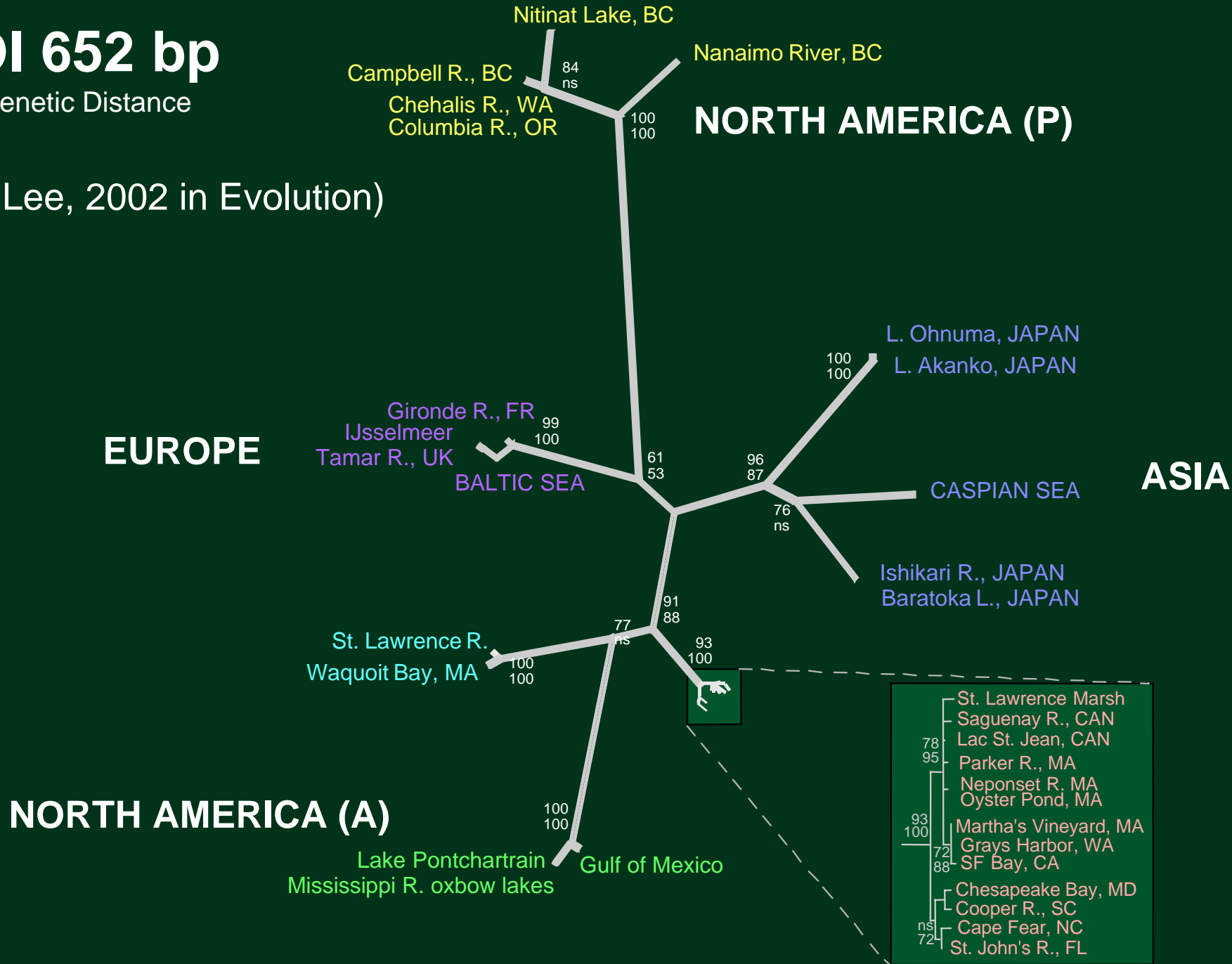
- Broad geographic range within the Northern Hemisphere
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- Confined environment → physiological consequences on the life cycle
- Confined environment + wide distribution → genetically and morphologically divergent populations (Lee, 2000)

COI 652 bp

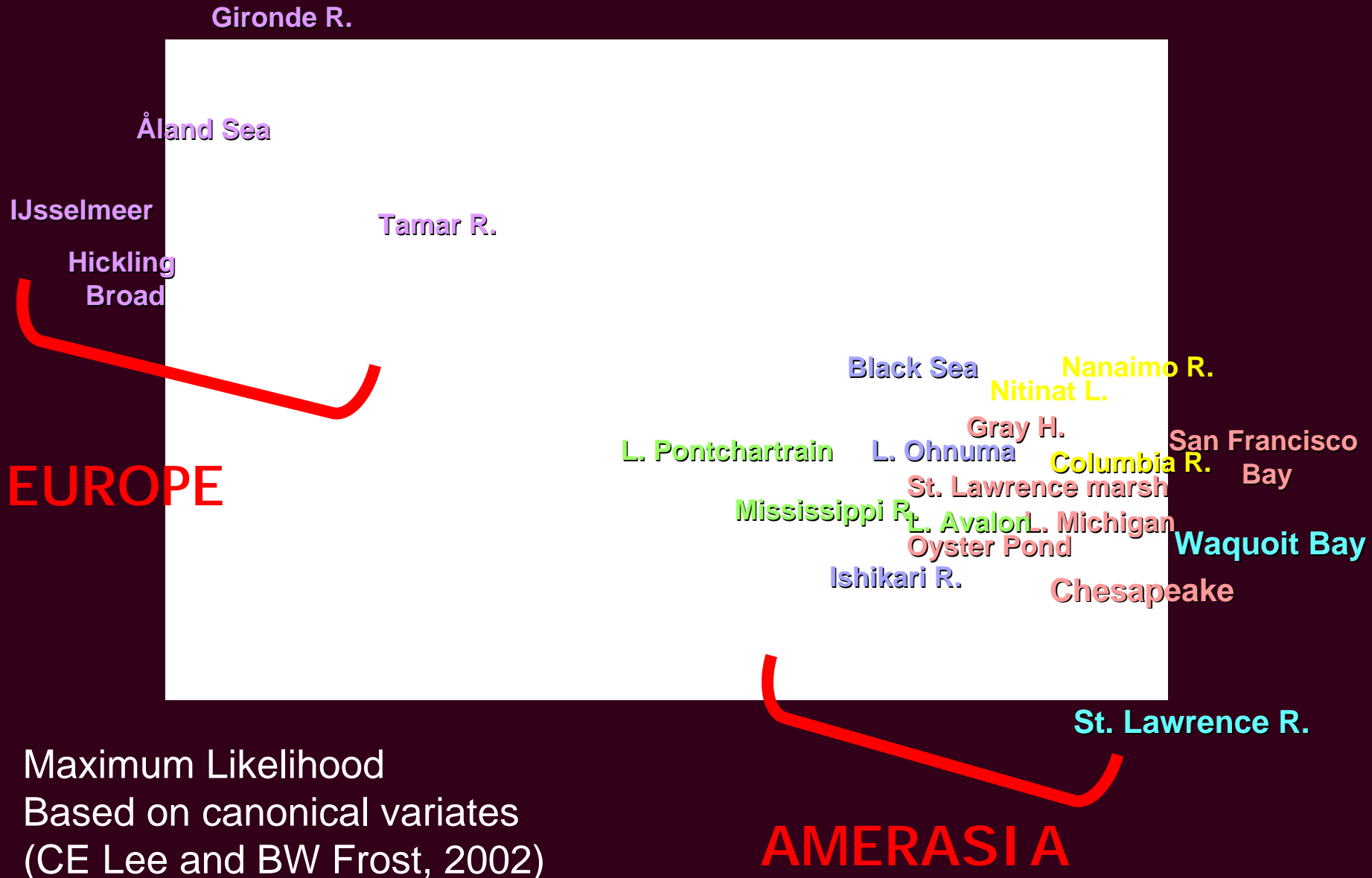
5% Genetic Distance



(C.E. Lee, 2002 in Evolution)



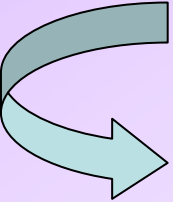
Morphometrics



Introduction

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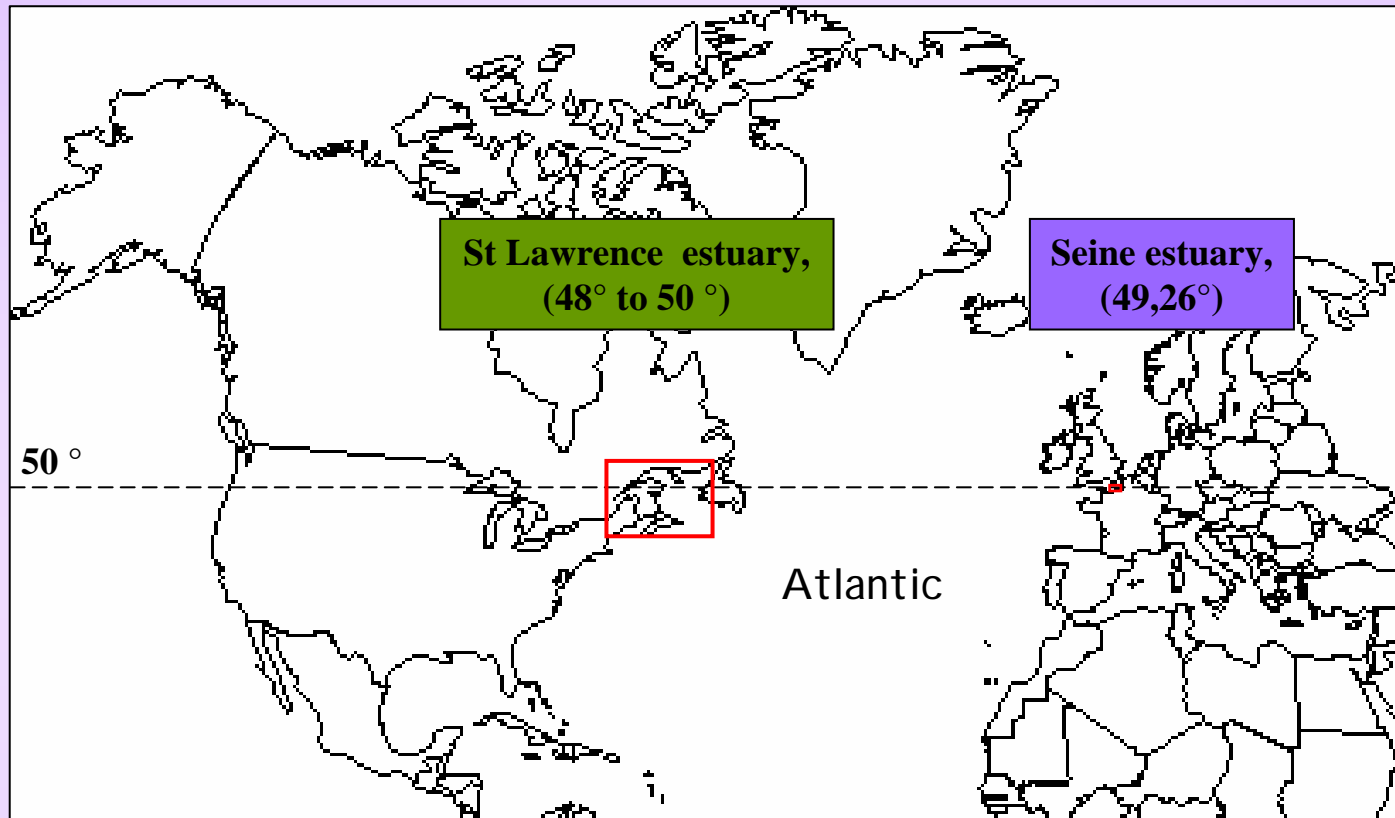
Interpopulation comparison of physiological responses is quite difficult from literature (different protocols, populations...)

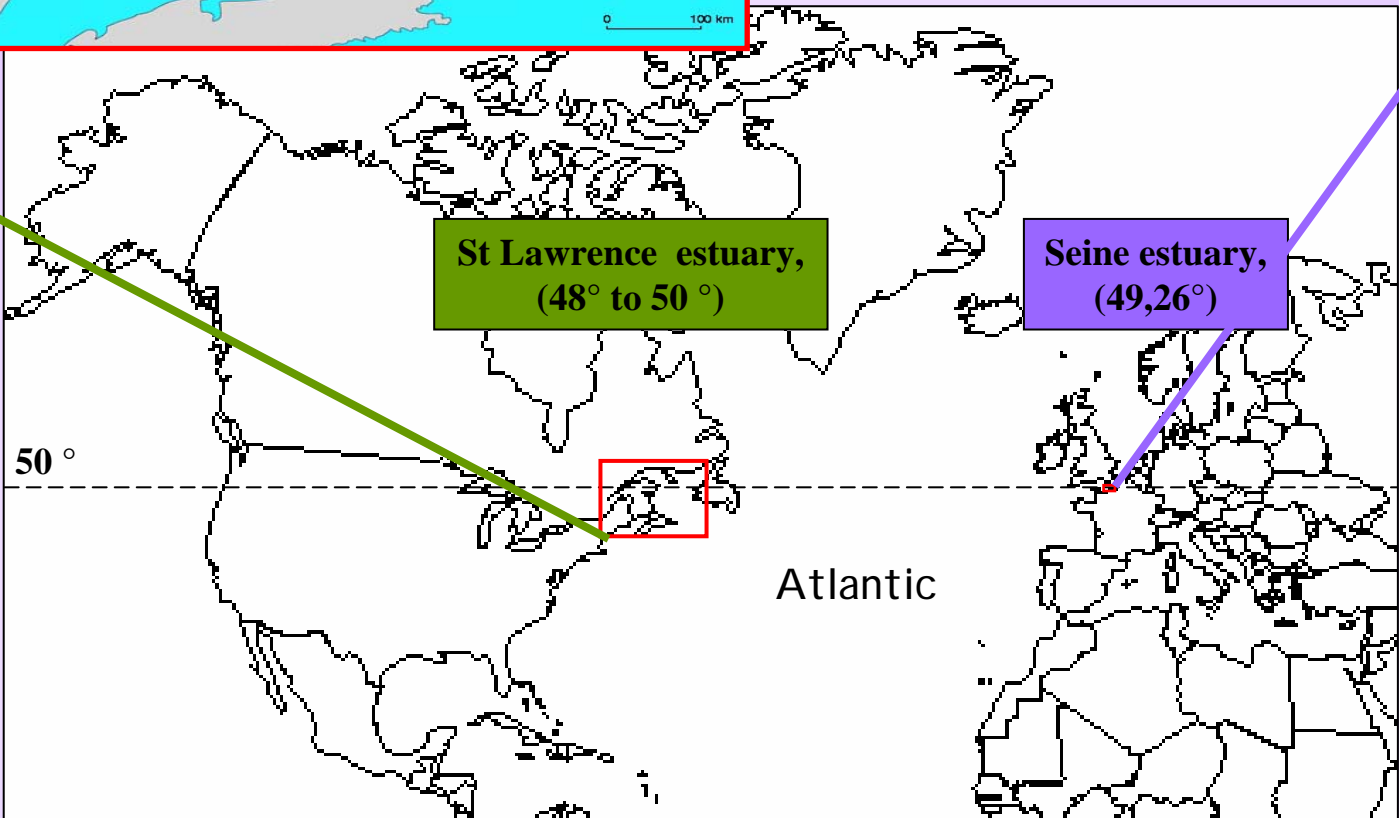
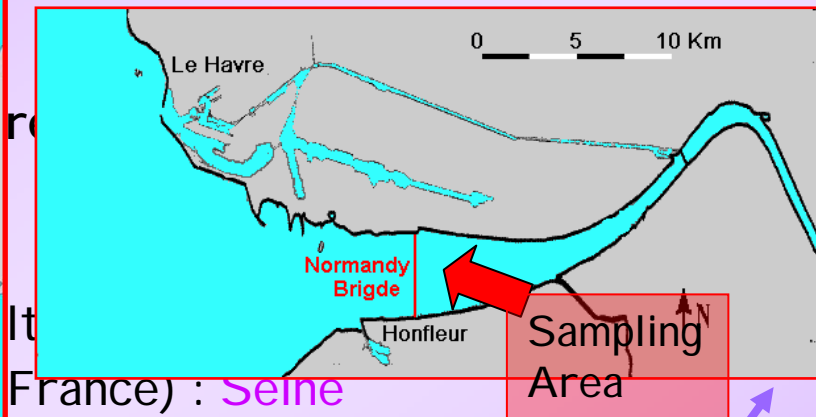
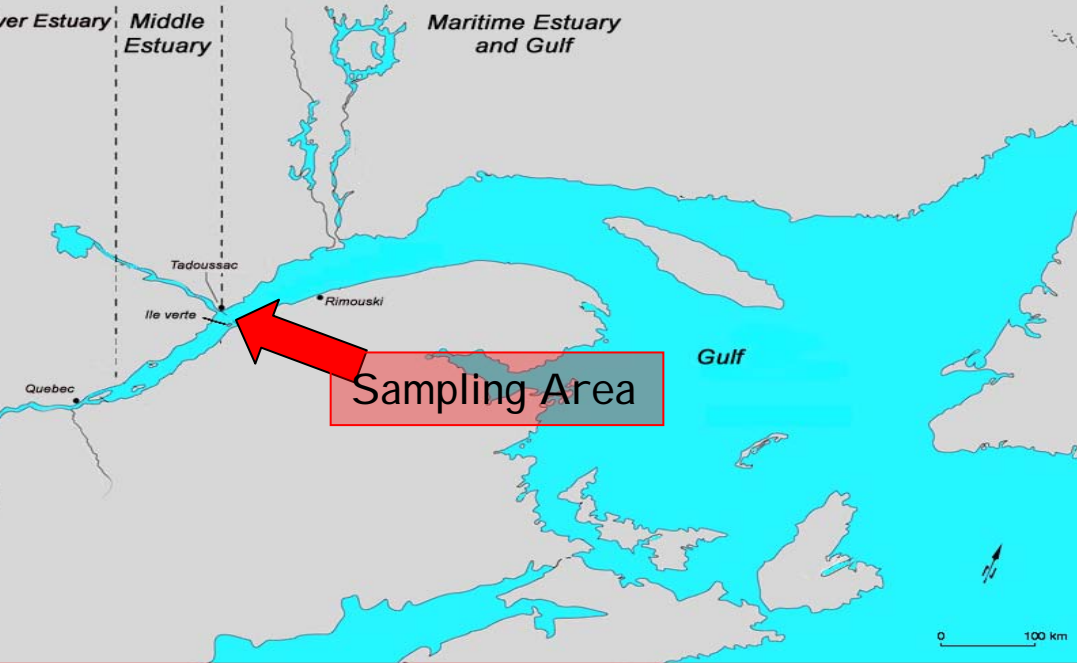
A comparative method for the study of the life cycle strategy to understand the population dynamic of *E. affinis*

Aims

Compare life cycle traits (development and reproduction) of two transatlantic populations of *E. affinis*:

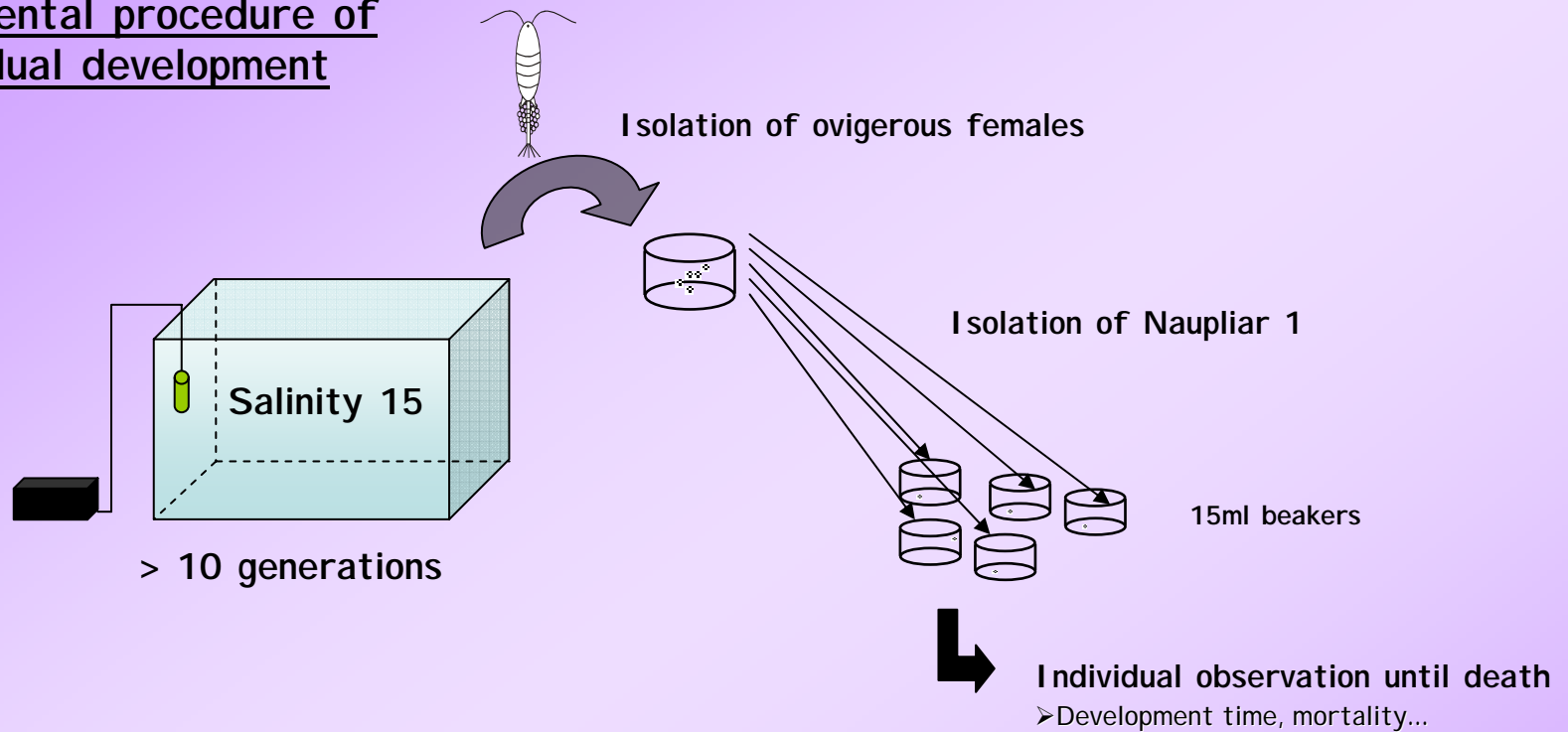
- American population from the St Lawrence salt marshes (Canada) : **St Lawrence**
- European population from the Seine estuary (France) : **Seine**





Materials and methods

Experimental procedure of individual development

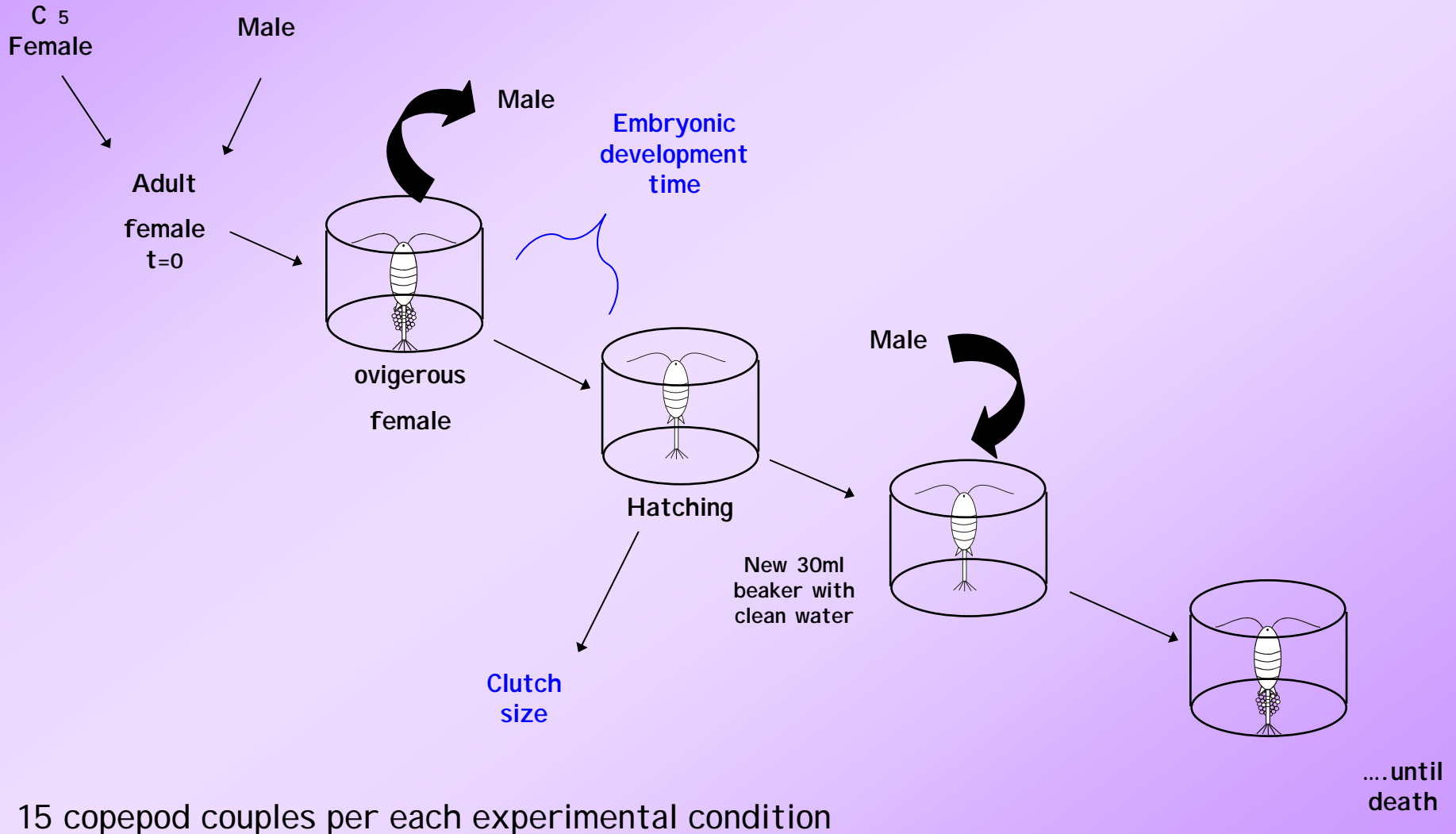


Experimental conditions :

- Temperature: 10°C (development and reproduction for each population)
- Salinity: 5, 15 and 25
- Food : *Rhodomonas baltica* and *Isochrysis galbana* (appropriate size for all stages)

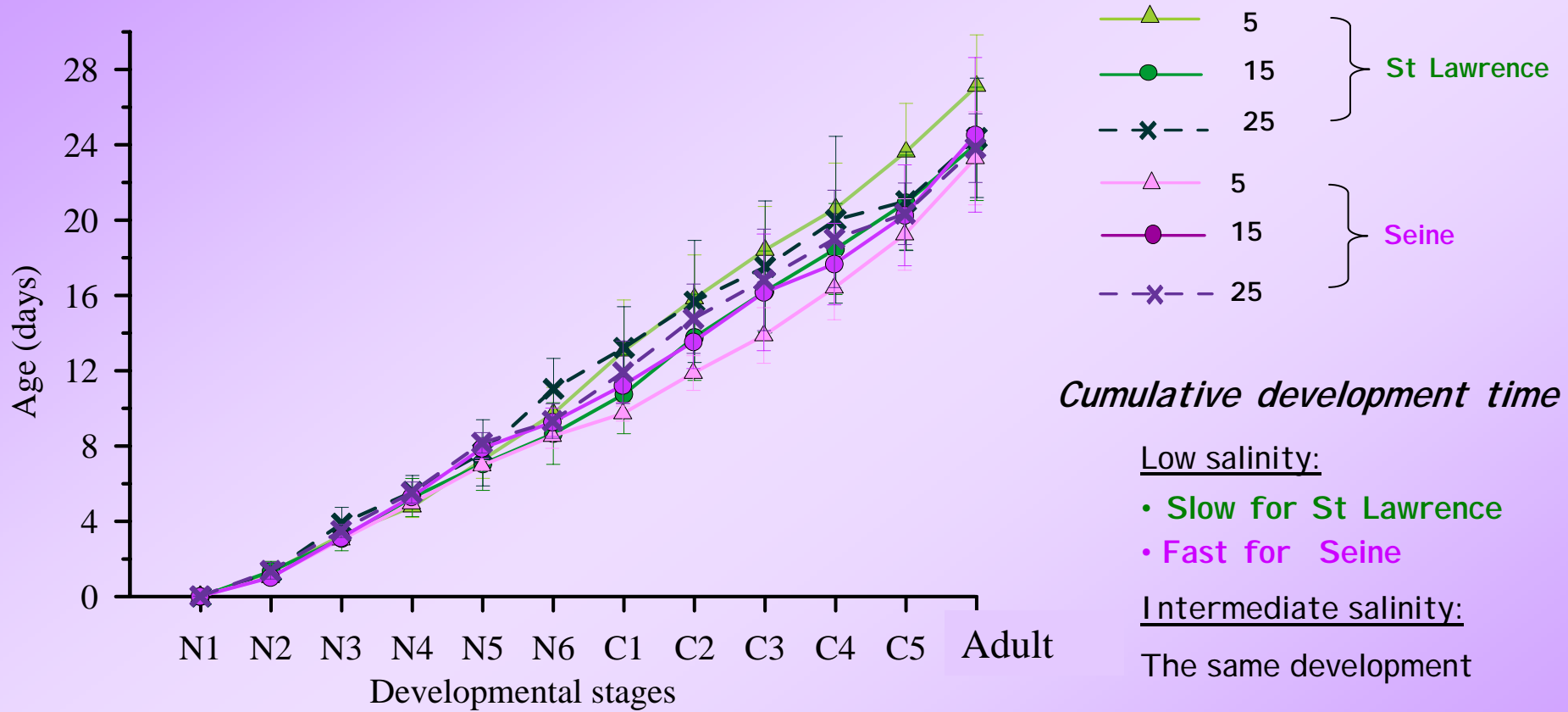
Materials and methods

Experimental procedure of individual reproduction



Results

Salinity effect on individual development :



Cumulative development time

Low salinity:

- Slow for St Lawrence
- Fast for Seine

Intermediate salinity:

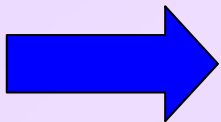
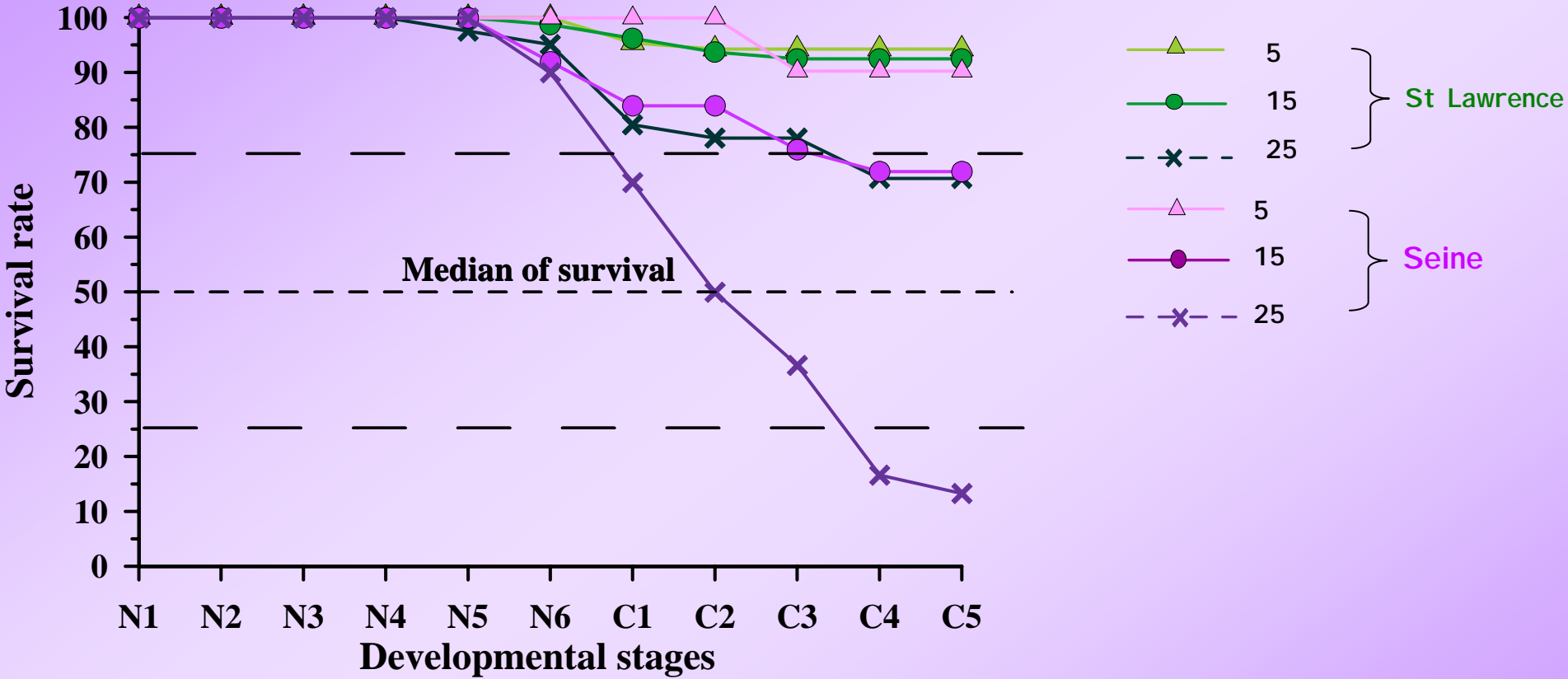
The same development

High salinity:

The same development

Results

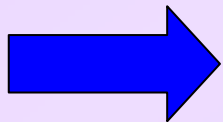
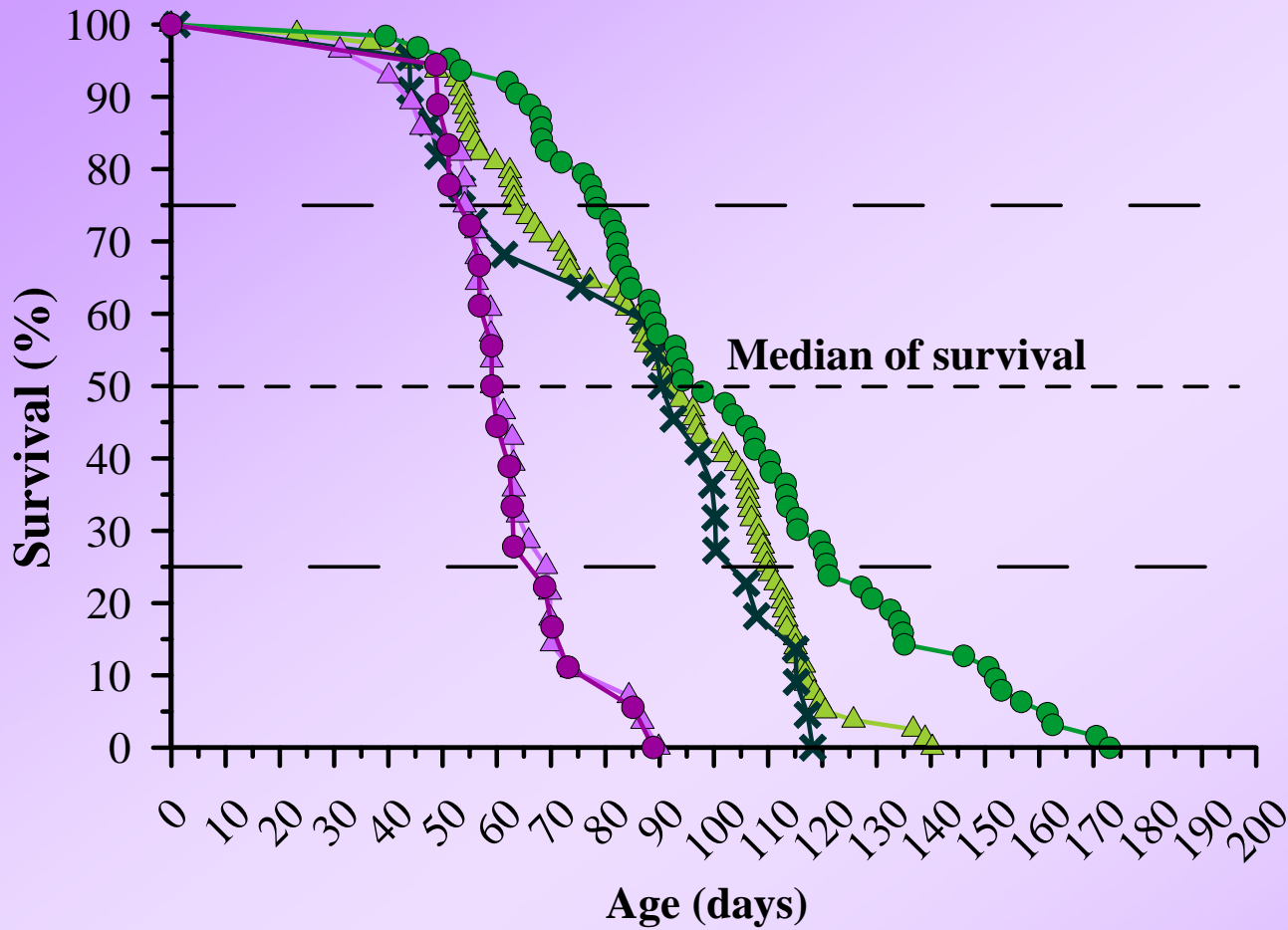
Salinity effect on survival during development:



High mortality for copepodites Seine at 25psu

Results

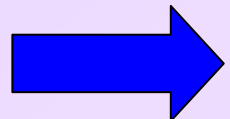
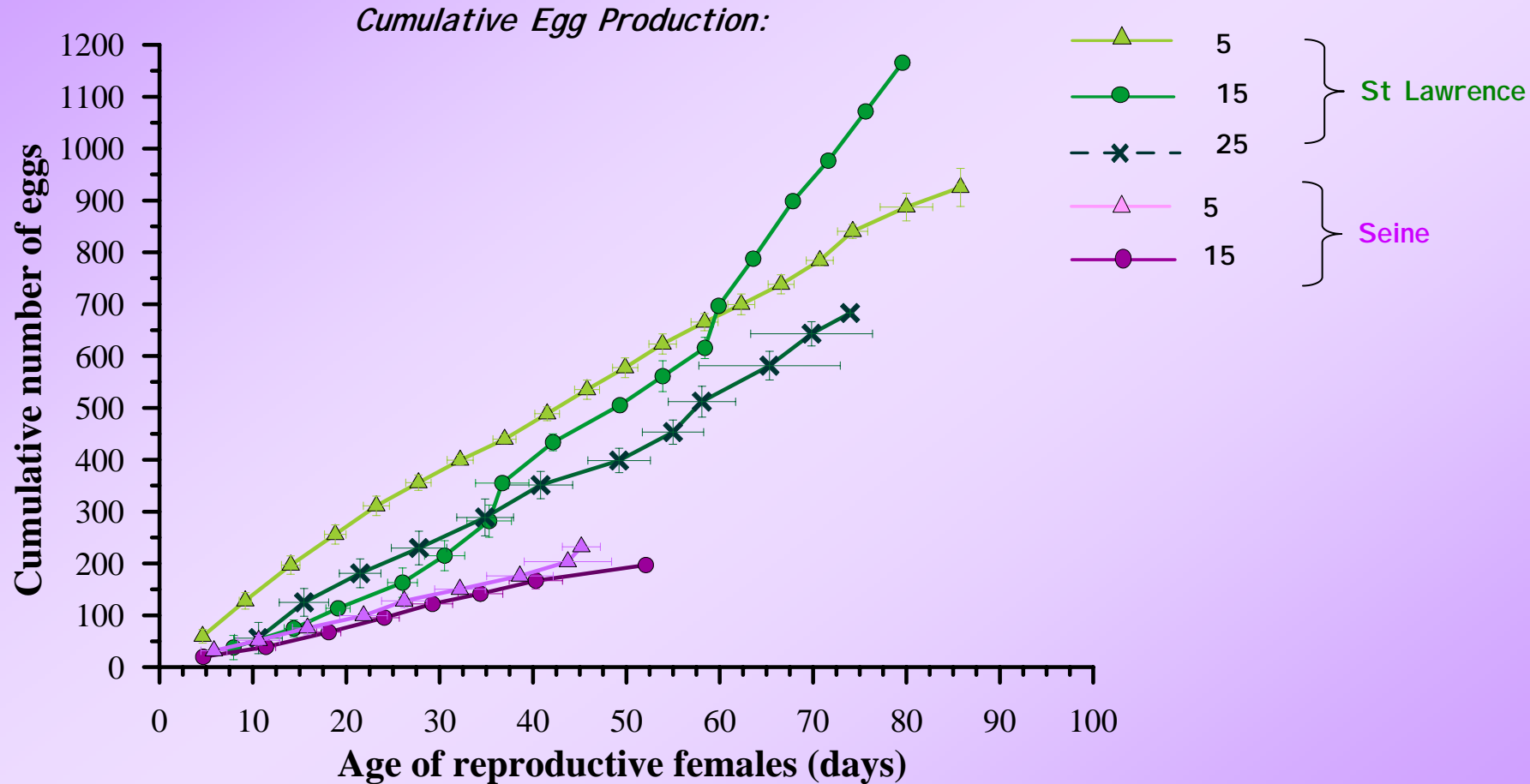
Adult survival evolution:



Longevity : St Lawrence >> Seine

Results

Individual reproduction :



Egg production of the St-Lawrence females is two times higher than egg production of the Seine females

Conclusion

Ecological aspect

Development at salinity 5:

- Seine : Faster development => *in situ* : maximal abundance at salinity 5
- St Lawrence : Slower development and higher mortality rate

Development at salinity 25:

- Seine : High mortality
- St Lawrence : Develop and reproduce well=> *in situ*. salinity range from 5 to 40

Distinct optimal salinity for development

Reproduction: Egg production St Lawrence >> Egg production Seine

Longevity: St Lawrence >> Seine



Distinct life cycle traits (divergent evolution)

Evolutionary aspect

Interpopulation mating:

- Transatlantic mating only one way (male SL and Female S) and G₁ sterile
- European mating easy (Seine X Gironde)

Morphometric study:

- Different adult sizes between SL and S

St Lawrence population and Seine population => sibling species

Future studies

Using the same protocol (salinity and temperature effects):

- Interpopulation comparisons of *E. affinis* life cycle traits within European clade: understanding the mechanisms of adaptations at different scales
- Comparison of life cycle traits of different calanoid copepod species having contrasted temperature preferences (on going work) :

Eurytemora affinis (cold temperate), *Acartia tonsa* (hot temperate) and *Pseudodiaptomus annandalei* (sub- to tropical)

Thank you
for your
attention !!!

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programme

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Jérémy Bailleul and Anais Simiand

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