

Comparative assessment of gammarids under stressful conditions

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Introduction



- Gammarids belong to the crustacean order Amphipoda
- successful invaders
- 12 amphipod species are non-indigenous in the Baltic Sea



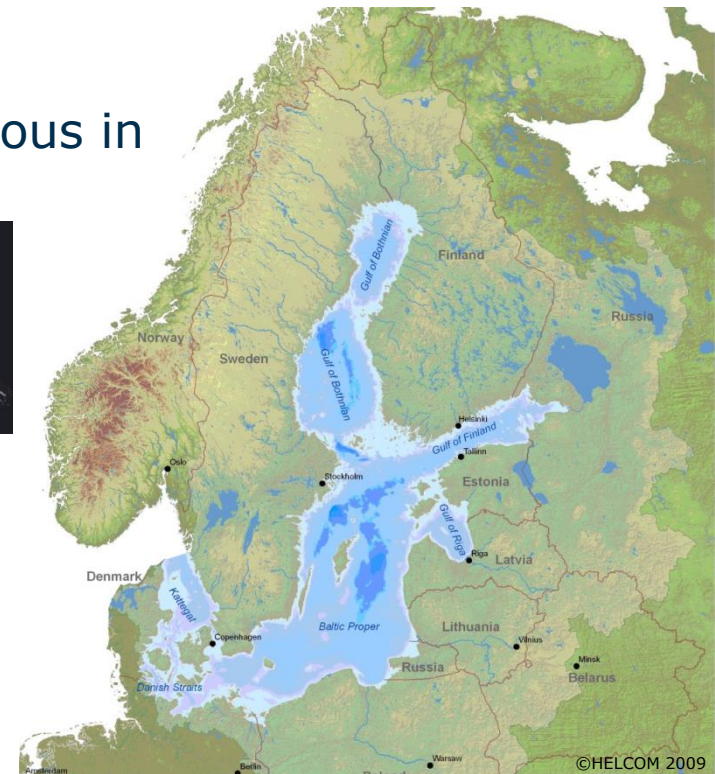
Dikerogammarus villosus
by Michal Grabowski



Gammarus tigrinus

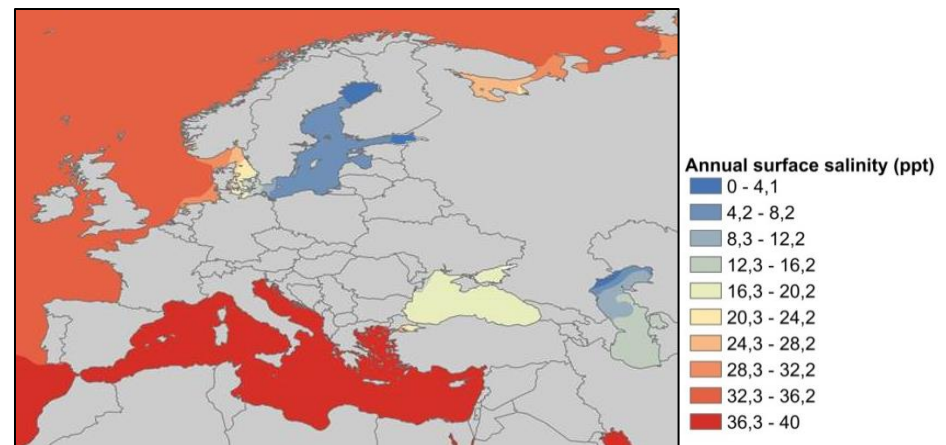


Echinogammarus ischnus
<http://www.neozoen-bodensee.de>





- 30% of non-indigenous species in the Baltic Sea originate from the Ponto-Caspian region (*i.e.*, Black, Azov and Caspian Seas)
 - millions of years of evolution with widely varying climates, salinities and water levels
- Potential of Ponto-Caspian species to adapt rapidly to global changes





1. How is the temperature tolerance of a Ponto-Caspian species compared to Baltic Sea species (native and non-native)?
2. Does original salinity favor higher survival rates under temperature stress?
3. Do survival rates differ among the two temperature treatments (cold/warm)?

Tested species



Gammarus oceanicus



- Native to the Baltic Sea
- Population from a salinity of 16 psu



Tested species



Gammarus tigrinus



- Native to the Northwest Atlantic
- Non-indigenous species in Northern Europe
- Population from a salinity of 10 psu



Tested species



Pontogammarus maeoticus



- Native to the Ponto-Caspian region
- Invasion history in freshwater areas of Turkey, but not in the Baltic Sea
- Population from a salinity of 10 psu



<http://www.primap.com>

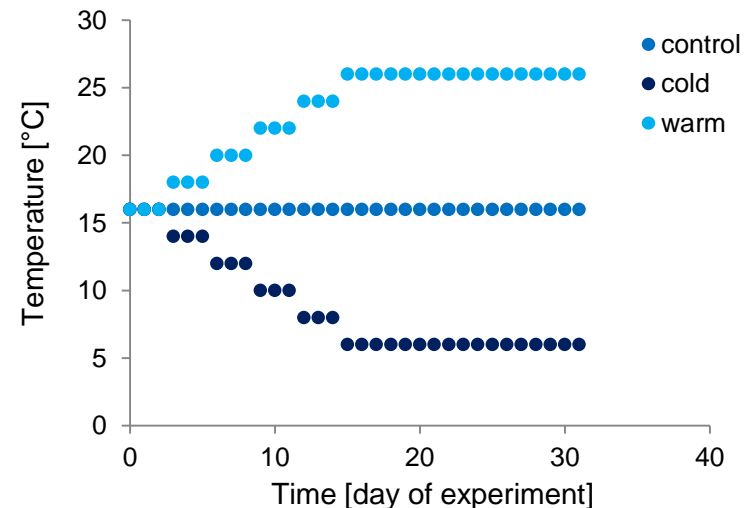


2 experiments

- 10 psu
- 16 psu (average in Kiel Fjord)

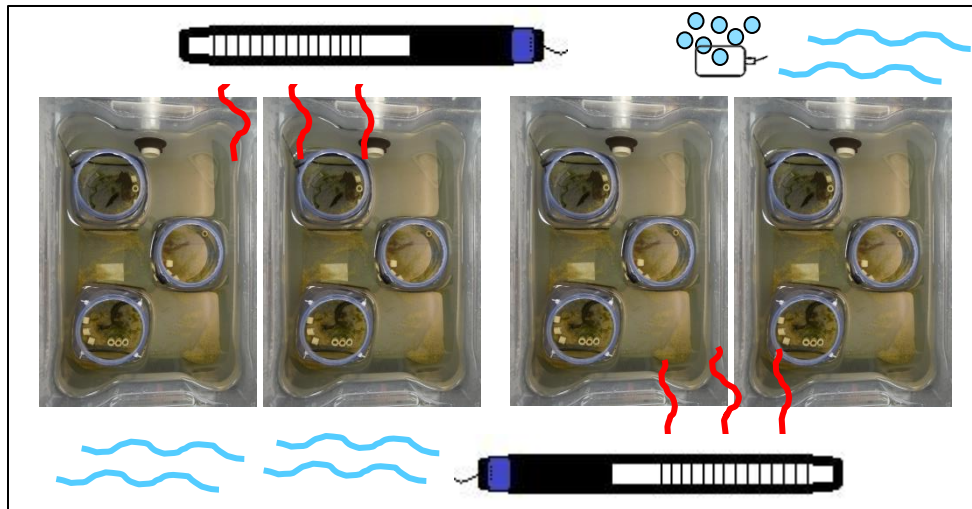
3 treatments

- control: 16°C
- warm: increasing temperature by 2°C every three days until 26°C
- cold: decreasing temperature by 2°C every three days until 6°C

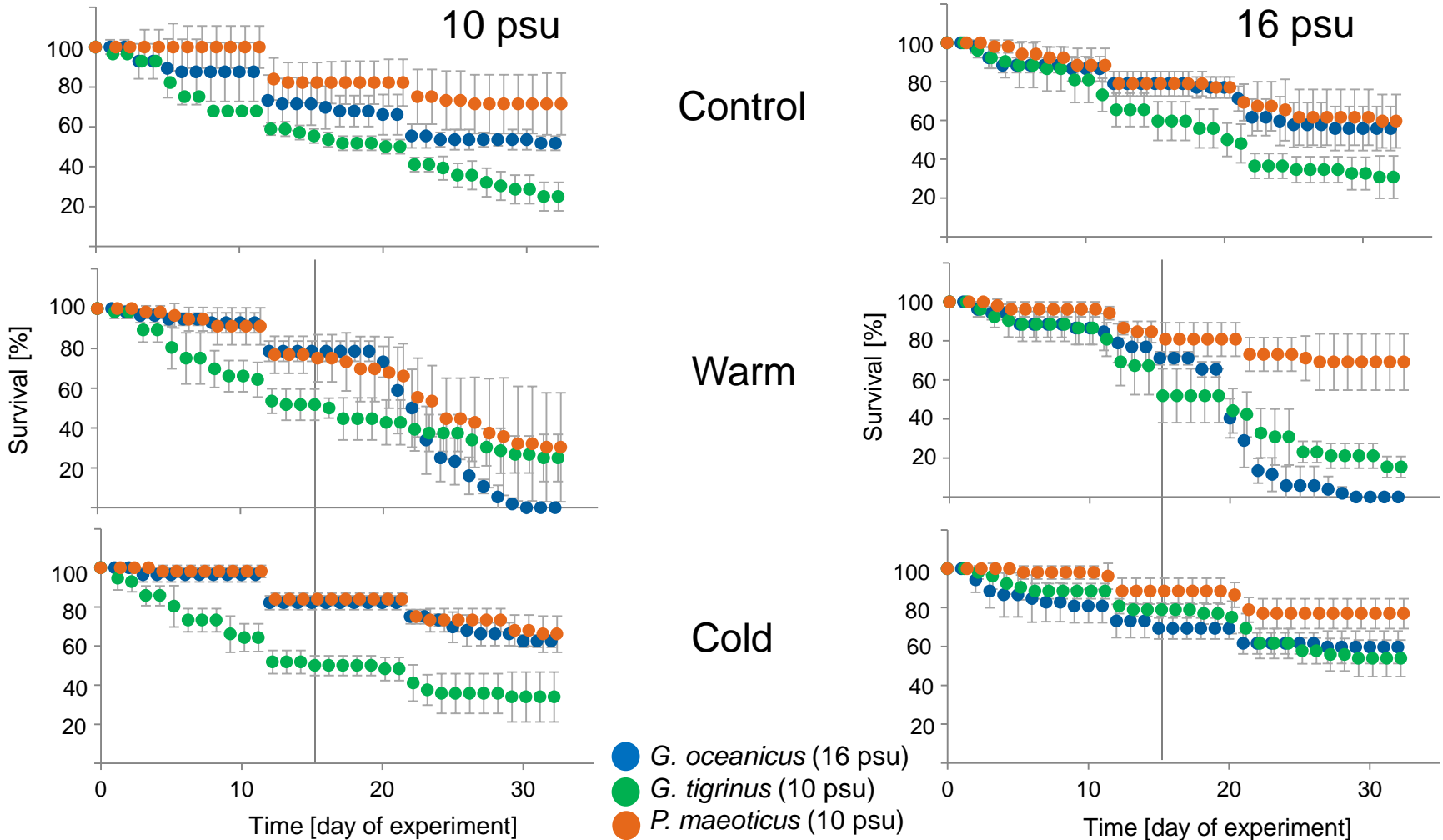




Each treatment was replicated four times with 14 (13) individuals of each species per replicate.



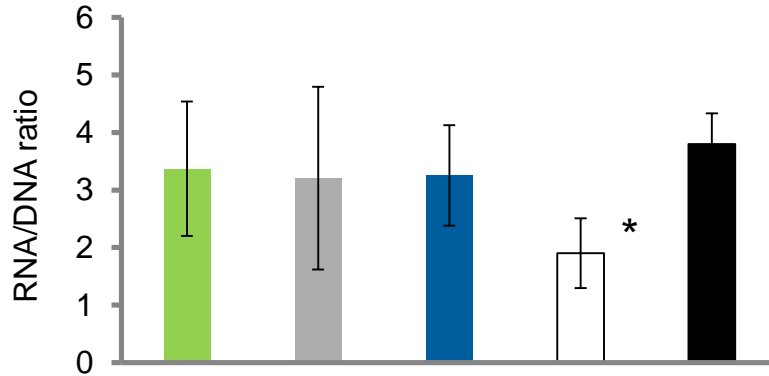
Results: survival



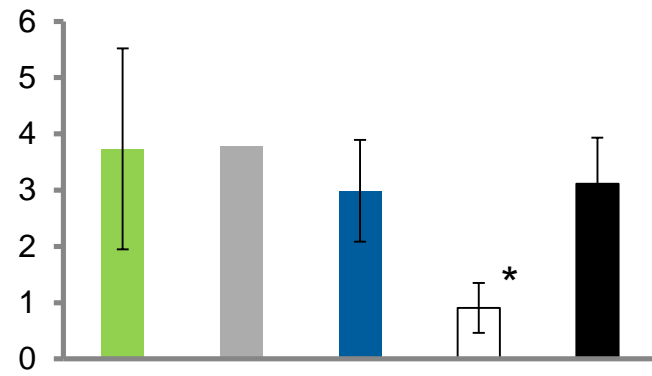
Results: RNA/DNA



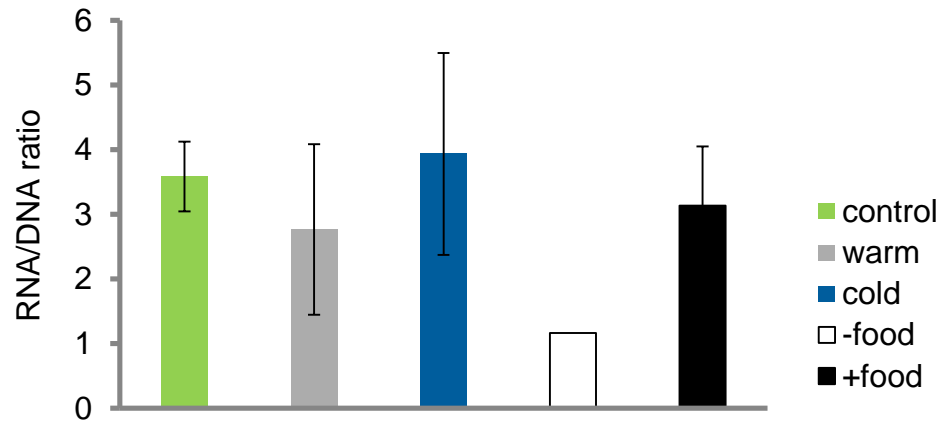
P. maeoticus



G. oceanicus



G. tigrinus





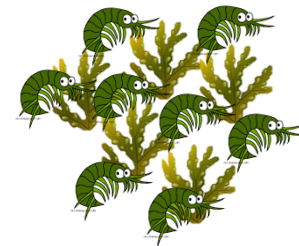
1. How is the temperature tolerance of the Ponto-Caspian species compared to Baltic Sea species (native and non-indigenous)?
 - When kept at 26 °C, survival decreases dramatically for *G. tigrinus* (5-25 %) and *G. oceanicus* (0 %). *P. maeoticus* had survival rates of up to 70 %.
2. Does original salinity favor higher survival rates under temperature stress?
 - No, the experiments showed similar results for the two salinity treatments.
3. Do survival rates differ between the two temperature treatments (cold/warm)?
 - All amphipod species have survival rates between 45 and 80 % when exposed to 26 °C for a short time (up to five days). Higher survival during the whole time of exposure to the cold temperature (34-77 %).



- Native species *G. oceanicus* has lowest survival in the warm treatment
 - >This might indicate that in the case of global warming *P. maeoticus* and *G. tigrinus* could have the potential to outcompete *G. oceanicus*
- RNA/DNA ratios of body tissue -> no differences between temperature treatments

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and thank you for

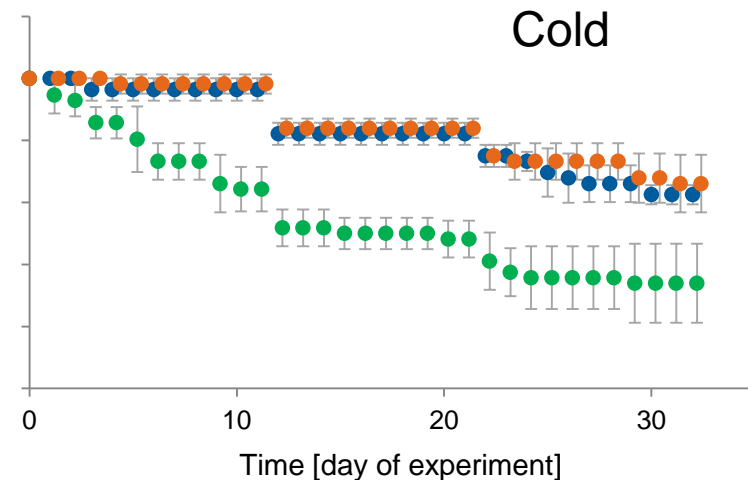
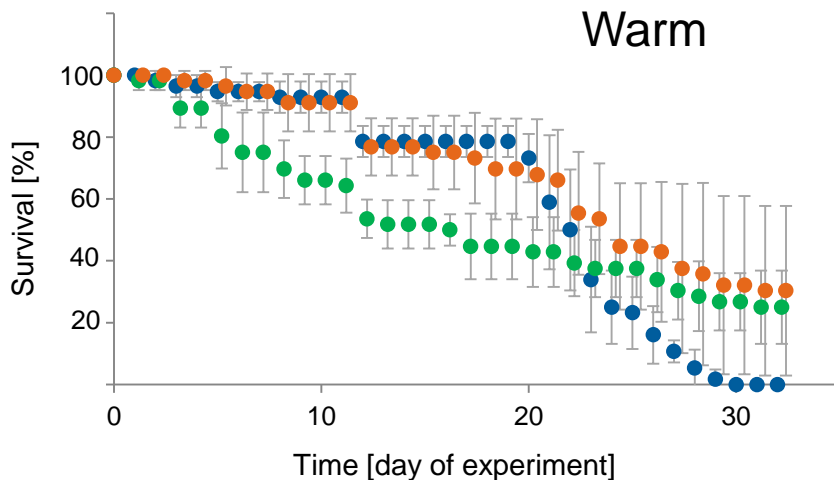
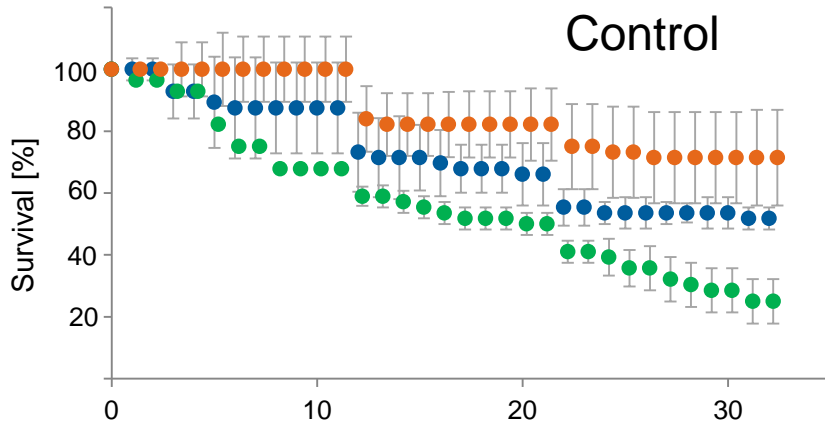
your attention!

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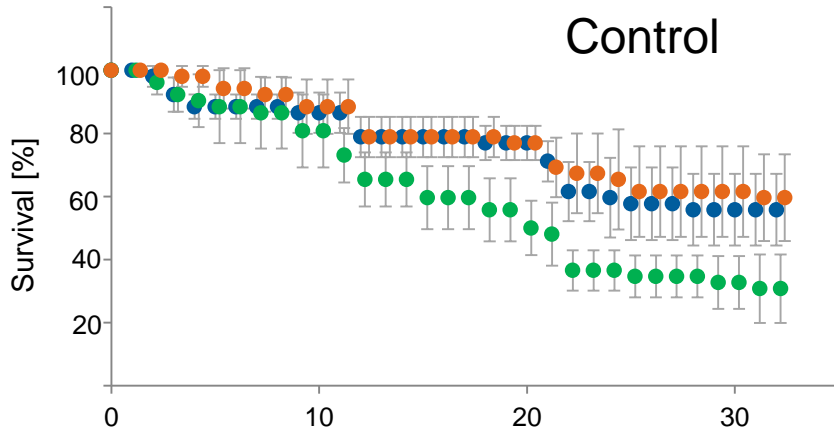


Alexander von Humboldt
Stiftung / Foundation

Results: Salinity 10 psu



Results: Salinity 16 psu



- *Gammarus oceanicus* (16 psu)
- *Gammarus tigrinus* (10 psu)
- *Pontogammarus maeoticus* (10 psu)

