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Innovation and Creativity

## Multigeneration laboratory cultures of *Calanus finmarchicus*

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## The cultures


- Descendants from individuals collected from Trondheimsfjorden autumn 2004.
- At present the tenth generation is reproducing.
- The individuals of the cultures are apparently now well fit to the rearing conditions. Growth and fat deposition proceed as expected. The portion of infected or otherwise impaired individuals is low.
- The portion of males in the cultures seems to be sufficient high for good reproduction.
- The cultures have generally been maintained at 10°C, corresponding to a generation time span of 8-10 weeks.




Newly hatched nauplius stage 1. Tora Bardal photo



Adult female dorsal view. Dag Altin photo



Stage V copepodid with a bulky oil sac. Lateral view. Dag Altin photo




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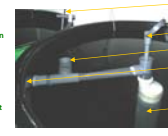
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## Rearing vessels and water supply


- Several plastic vessels/tanks 50 litre and above have been successfully used for the rearing of *C. finmarchicus*.
- A 250 L polyester tank with tapered bottom (rotifer tank) has proved particular convenient for the purpose.
- Full strength seawater is "matured", temperature equilibrated and adjusted with regard to nitrogen saturation before use. Before entering the rearing vessels the water is filtered down to ca. 1 µm.
- Water enter the tank via two inlets. One through the bottom apex (to prevent stagnant water), the other close to the surface to secure some circulation of the water.
- Water and particulate debris leave the tanks through an large-surface screen made from nylon mesh, mesh width 120 µm.



Rearing tank, lateral view. Dag Altin photo



Rearing tank seen from above. Dag Altin photo




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## Feeding regime

- Fed a diet of three common micro algae in mixture.
- Continuous feeding from stock culture by the aid of peristaltic pumps.
- The algal concentration in the rearing vessel is kept sufficient high to be non-limiting with regard to growth and development (about 150 µgC x L<sup>-1</sup>).
- Feed algae are cultivated as mono cultures at or slightly below room temperature. A new mixed stock is prepared daily.
- All stages of *C. finmarchicus* thrive on the same diet.



Monocultures of feed micro algae. Here cultivated in 1.5 L soft-drink bottles

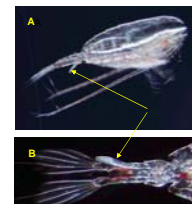


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## Reproduction


- Large number of offspring are produced each generation. However, at the moment we do not know the proportion of females reproducing.
- The males behave very active during courtship, and obviously successfully carry out spermatophore transfer.



Adult female with attached spermatophore. A: Whole body (lateral view). B: Urosome only (dorsal view) Dag Altin photo



Male with spermatophore. Lateral view. Dag Altin photo




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## Maintaining the synchronicity of the culture

- Due to heavy cannibalism on the offspring in dense cultures, newly hatched nauplii are removed from their mother cultures and transferred to a second tank for development.
- A simple custom-made equipment is used for this operation.



Submerged cylinder of nylon mesh (upper ring of PVC), mesh width 300 µm. The nauplii pass through the mesh but the bigger copepodids and adults do not.

Siphon

Collecting aquarium

Outlet nylon mesh, mesh width 120 µm

Custom-made equipment for nauplii removal. Per Harald Olsen photo



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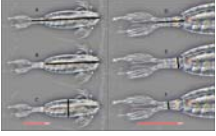
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## Inbreeding hazards

There is an obvious risk for inbreeding effects with increasing generation number in the laboratory. So far, we have tested deviations in the following parameters:


- Morphology
- Chemical sensitivity

Morphological deviations have been evaluated from a biometric scheme as outlined below. Increasing or decreasing chemical sensitivity has also been evaluated, from a standard exposure/toxicological test involving acute exposure to 3,5 Dichlorophenol.



In the future, we should also turn to the genomic realm of the species looking for breeding-related deviations, e.g. increased homozygosity.


Morphologic measurement program. Dag Altin photo



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## Thank you for your attention

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