

EUROPEAN EXPERTISE IN RESEARCH ON THERMAL ADAPTATION

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General scope of the group's research: We want to obtain insight into the ecology and evolution of aquatic organisms inhabiting ponds and lakes, focusing on zooplankton and aquatic insects. We are particularly interested in (genetic) adaptation to both natural (parasites, predators) and anthropogenic stressors (climate change, pollution) and their interaction. We take a multitrait and multifactor approach, trying to integrate ecology, genetics, genomics, physiology and behaviour. One major goal in addressing both ecology and evolution is to unravel the interaction between ecological and evolutionary patterns and processes in a landscape (metacommunity) context.

Topics & Questions: Evolution of life history and behaviour; physio-ecology of adaptation to stress; synergistic effects of combined stresses; reconstruction of micro-evolution; dynamics of evolutionary responses; clinal patterns; relationship between molecular (F_{ST}) and quantitative genetic (Q_{ST}) variation among populations; population (genetic) structure in relation to thermal gradients; evolution in a metacommunity context; genetic priority effects; integration of ecology and evolution

Organisms: Primarily arthropods, particularly water fleas (*Daphnia* species) and aquatic insects (damselfly larvae, Ephemeroptera and Heteroptera).

Methods & Expertise we use: population genetics (microsatellite markers), phylogenetics and quantitative genetics; genomics (starting up QTL analysis, micro-array development and genome scans in *Daphnia*); behavioural assays; physiological and biochemical traits (RNA/DNA ratios, heat shock proteins, phenoloxidase activity,...); resurrection ecology using dormant egg banks; artificial selection & experimental evolution; statistical methods; ecological and behavioural field and lab experiments; field surveys; simulation modeling.

Methods & Expertise sought: Methods for assessing metabolic energetics of small invertebrates (e.g. respirometry); elaboration of our physiological and biochemical trait measurements; proteomics and peptidomics; bio-informatics.

Five sample publications:

- Cousyn, C., L. De Meester, J.K. Colbourne, L. Brendonck, D. Verschuren & F. Volckaert, 2001. Rapid local adaptation of zooplankton behavior to changes in predation pressure in absence of neutral genetic changes. **Proceedings of the National Academy of Sciences USA** 98: 6256-6260.
- Decaestecker, E., L. De Meester & D. Ebert, 2002. In deep trouble: habitat selection constrained by multiple enemies in zooplankton. **Proceedings of the National Academy of Sciences USA** 99: 5481-5485.
- Pauwels, K., R. Stoks & L. De Meester, 2005. Coping with predator stress: interclonal differences in induction of heat shock proteins in the water flea *Daphnia magna*. **Journal of Evolutionary Biology** 18: 867-872.
- De Meester, L., G. Louette, C. Duvivier, C. Van Damme & E. Michels, 2007. Genetic composition of resident populations influences establishment success of immigrant species. **Oecologia**, in press.
- Van Doorslaer, W., R. Stoks, E. Jeppesen & L. De Meester, 2007. Adaptive responses to simulated global warming in *Simocephalus vetulus*: a mesocosm study. **Global Change Biology**, in press