

### Encadrement :

Nom Prenom : Anssi Laurila

Courriel/email : anssi.laurila@ebc.uu.se Nature du financement de la gratification / Grants: Swedish Research Council  
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### Titre du stage/ Title :

**Induced immune response and local adaptation across environmental gradients**

### Mots clés / Key words:

Immunity, acidification, local adaptation, larval life history, amphibians

### Résumé / Summary:

Induced immune response is a central life history parameter with strong fitness consequences. Importantly, immune response may trade-off with other important life history traits like stress tolerance and growth/development. Our previous studies have demonstrated strong local adaptation in larval life histories of the moor frog (*Rana arvalis*) across acidification and temperature/shadedness gradients (see references below). We have also recently developed a phytohaemagglutinin (PHA) injection-based method to estimate immune response in amphibian larvae. In this project, the candidate will investigate how PHA-response varies across local populations along the environmental gradients and how the mounted immune response is affected by environmental stress (e.g. acidity, temperature). We hypothesize that i) environmental stress in general will reduce the induced immune response and that ii) local adaptation to environmental stress will affect the immune response negatively suggesting a trade-off between immunity and stress tolerance. The study populations are located in southern Sweden and the experiments will be done in the laboratory (Department of Ecology and Genetics, Uppsala university) with tadpoles originating from laboratory crosses or from eggs collected from the wild. The field and laboratory work will be conducted in April-June 2013.

### Deux références bibliographiques / Two references:

Hangartner S, Laurila A & Räsänen K (2012). Adaptive divergence of moor frog *Rana arvalis* along an acidification gradient: inferences from  $Q_{ST}$ - $F_{ST}$  correlations. *Evolution* 66:867-881.  
Richter-Boix A, Quintela M, Segelbacher G & Laurila A (2011) Genetic analysis of differentiation between breeding ponds reveals a candidate gene for local adaptation in *Rana arvalis*. *Molecular Ecology* 20:1882-1600.