

# Graduate School of Natural Sciences



## Re-advertisement: Haploid and sex-specific selection: modelling and detection in deep mutational scanning of sperm samples and trios

Applications are invited for a PhD fellowship/scholarship at Graduate School of Natural Sciences, Aarhus University, Denmark, within the Computer Science programme. The position is available from February 2023 or later.

**Title:**

Re-advertisement: Haploid and sex-specific selection: modelling and detection in deep mutational scanning of sperm samples and trios

**Research area and project description:**

Background:

Traditionally, population genetics models focus on selection in the diploid phase. However, there is also in principle ample potential for selection to occur during the haploid phase both in female and male gametes. In principle, haploid selection can be very effective relative to diploid where dominance often occurs and blurs the effect of positive or negative selection. A few documented cases in animal plants and fungi attest to the potential importance of haploid selection and theory demonstrates that haploid selection is a neglected mechanism that can potentially affect rates of adaptation, the magnitude and purging of inbreeding depression and the load of deleterious mutations detected in genomes or even provide a plausible explanation for sex differences in recombination rates (a ubiquitous find that remains poorly understood). However, empirically detecting haploid selection is challenging.

Project:

This project is a unique opportunity to do that: we will generate deep mutational scanning datasets that can also be leveraged to examine in detail how haploid selection can affect both new variants but also pre-existing variants (SNPs where the father is heterozygous). The project is funded by the Novo Nordisk foundation as an interdisciplinary Data Science collaborative project between the Department of Growth and Reproduction at Copenhagen University Hospital (Kristian Almstrup), and Aarhus University with the department of Mathematics (Asger Hobolth), the department of Molecular Medicine (Søren Besenbacher & Lasse Marrety) and the Bioinformatics Research Centre (Mikkel Heide Schierup & Thomas Bataillon).

The candidate will work on developing new evolutionary methods to analyze data from testes and sperm samples as well as pre-existing trio data. The relative weight of theoretical modeling,

methods development and data analysis will depend on the interests of the candidate.

For technical reasons, you must upload a project description. When - as here - you apply for a specific project, please simply copy the project description above, and upload it as a PDF in the application. If you wish to, you can indicate an URL where further information can be found. Please note that we reserve the right to remove scientific papers, large reports, theses, and the like.

For technical reasons, you must upload a project description. When - as here - you apply for a specific project, please simply copy the project description above, and upload it as a PDF in the application. If you wish to, you can indicate an URL where further information can be found.

**Qualifications and specific competences:**

The applicant must hold an MSc in Bioinformatics or related fields, or a BSc and have completed at least 1 year of MSc in Bioinformatics, Statistical Genetics, or Evolutionary Biology with an emphasis on mathematical models of Evolution.

Applicants must have at least one year of a Master's degree in molecular biology, mathematics, statistics, bioinformatics or similar and have an interest in addressing biological problems with large scale data analyses. An interest in evolutionary biology and/or population genetics will be an advantage. The PhD study can be three years (with an MSc) or four years (with one year of an MSc completed at the time of enrollment)

**Place of employment and place of work:**

The place of employment is Aarhus University, and the place of work is Bioinformatics Research Center, Aarhus University University City 81, building 1872, 3rd floor. DK-8000 Aarhus., Denmark.

**Contacts:**

Applicants seeking further information for this project are invited to contact: Associate Professor Thomas Bataillon, e-mail: [tbata@birc.au.dk](mailto:tbata@birc.au.dk)

**How to apply:**

For information about application requirements and mandatory attachments, please see the [Application guide](#). Please read the Application guide thoroughly before applying.

When ready to apply, go to <https://phd.nat.au.dk/for-applicants/apply-here/> (Note, the online application system opens 1 September 2022)

1. Choose November 2022 Call with deadline 1 November 2022 at 23:59 CEST.
2. You will be directed to the call and must choose the programme "Computer Science".
3. Under the headline Study: **In the dropdown menu, please choose:** "Re-advertisement: Haploid and sex-specific selection: modelling and detection in deep mutational scanning of sperm samples and trios (RHssmd)"

Please note:

- The programme committee may request further information or invite the applicant to attend an interview.

*Aarhus University's ambition is to be an attractive and inspiring workplace for all and to foster a culture in which each individual has opportunities to thrive, achieve and develop. We view equality and diversity as assets, and we welcome all applicants. All interested candidates are encouraged to apply, regardless of their personal background.*

**Thomas Bataillon**

Associate Professor

M [tbata@birc.au.dk](mailto:tbata@birc.au.dk)

H [1872. 365](tel:1872365)

P [+4527827282](tel:+4527827282)

Revised 09.09.2022