norwich research park
Doctoral Training Partnership

The genomic architecture of sexual conflict

GRIESHOP_U24DTP

This project addresses one of evolutionary biology's most longstanding challenges: what maintains genetic variation for fitness?

Evolution requires genetic variation. Selection would tend to fix the fittest alleles, eroding genetic variation, and arresting any further evolution. But individuals of a population are not genetically identical, and populations do apparently adapt to their environments. So, what maintains the genetic variation that enables evolution to continue?

One explanation is that alternative alleles are not unconditionally beneficial or deleterious, but rather one is fitter in one context and the other in another – a genetic trade-off. These genetic trade-offs can occur between alternative traits, life stages, environments or sexes. In particular, there is a large body of evidence for sexually antagonistic genetic variation, where opposite alleles impose opposite fitness effects on male versus female carriers. This is not only important to our fundamental understanding of evolution, but also conservation, pest management and sex-specific genetic disease.

This project aims to identify and characterize sexually antagonistic genetic variation in the genome of the model fruit fly Drosophila melanogaster using a novel integration of classical quantitative genetics with modern allele-specific transcriptomics. Candidate sexually antagonistic genes will be characterized and validated using publicly available genomic data as well as manipulations of gene expression (Gal4/UAS, siRNA, CRISPR) paired with phenotypic screening and fitness assays.

The student will train at the cutting edge interface of quantitative genetics, bioinformatics, and molecular genetics to test fundamental concepts of evolution. They will benefit from a multidisciplinary supervisory team, joint lab meetings, journal clubs and internationally renowned expertise through Norwich Research Park. They will train at the UEA and attend an external genetics / genomics training course at the Earlham Institute, acquiring highly desirable and readily transferable skills. They will receive excellent training and career development from the thriving Norwich Biosciences Doctoral Training Partnership.

References:

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Mishra P, Barrera TS, Grieshop KH, Agrawal AF. (2022) Cis-regulatory variation in relation to sex and sexual dimorphism in Drosophila melanogaster. bioRxiv. (doi: 10.1101/2022.09.20.508724)

Grieshop K, Ho EKH, Kasimatis KR. (2021) Dominance reversals and the maintenance of genetic variation. arXiv. (doi: arXiv:2109.01571)

Berger D, Grieshop K, Lind MI, Goenaga J, Maklakov AA, Arnqvist G. (2014) Intralocus Sexual Conflict and Environmental Stress. Evolution. 68, 2184–2196. (doi: 10.1111/evo.12439)

Berger D, Martinossi-Allibert I, Grieshop K, Lind MI, Maklakov AA, Arnqvist G. (2016) Intralocus sexual conflict and the tragedy of the commons in seed beetles. The American Naturalist. 188(4):E98-112. (doi: 10.5061/dryad.bc94c)

PARTNER

- The University of East Anglia (UEA)

RESEARCH AREAS

- Understanding Rules of Life

APPLICATION DEADLINE

- 20th November 2023

START DATE

- 1st October 2024

SUPERVISOR

- Dr. Karl Grieshop

HOW TO APPLY