

Fully funded PhD Studentship (UK students only)

Dissecting the genomic basis of reproductive mode evolution and speciation in *Littorina* snails

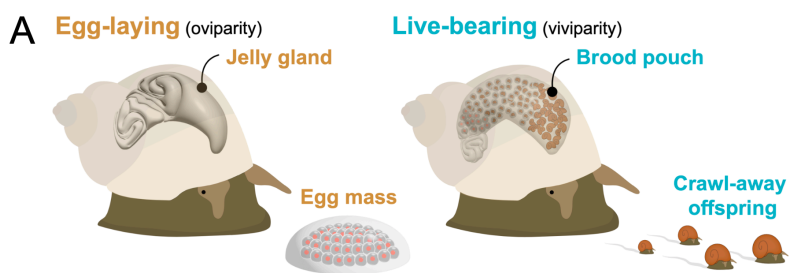
We are seeking an enthusiastic and motivated PhD student (starting September 2024) to study the links between reproductive mode evolution and speciation in intertidal snails.

The project

The process of speciation involves the build-up of isolating barriers that restrict gene exchange between populations. Although barriers to gene flow are critical to divergence and species coexistence, we rarely understand the traits and loci that underpin strong isolation.

The aim of this project is to understand how differences in female reproductive mode contribute to strong isolation between closely-related species of intertidal snail. In the UK and Europe, a live-bearing species of periwinkle (*Littorina saxatilis*) coexists with egg-laying species (*Littorina compressa* and *Littorina arcana*). A lack of hybrids between sympatric egg-layers and live-bearers indicates that the barrier to gene flow between them is very strong.

Recent work has revealed many candidate regions of genome that underpin the difference in reproductive mode. In this project, you will use a new reference genomes, new and existing genomic data, and cutting-edge methods to determine if mode-associated loci also act as barriers to gene flow. Specific objectives include: (1) to more precisely determine the number and genomic distribution of loci associated with the difference in reproductive mode; (2) to determine if reproductive mode acts a barrier by (a) identifying barrier loci and (b) testing for overlap with reproductive mode-associated loci; and (3) to reconstruct the demographic history of divergence to reveal help us understand when and how barriers to gene flow evolved. The successful candidate will be encouraged to take the project in directions that excite them most.



C Left: Reproductive mode variation and speciation in *Littorina*. A: Egg-layers have a jelly gland that produces a large egg mass. Live-bearers have a brood pouch, where eggs are deposited and hatch inside the mother. B: *Littorina* ecotypes and species vary remarkably in shell size, shape and sculpture. C: *Littorina* species and ecotypes occupy a wide range of habitats across the intertidal zone. They often encounter one another, providing us with an excellent opportunity to study adaptation in speciation in action.

The team

You will work in the Speciation Research Group led by Dr Sean Stankowski in the Ecology and Evolution department at the University of Sussex, Brighton. There will be ample opportunity to collaborate and share findings with other scientists from the Littorina research community (<https://littorina.sites.sheffield.ac.uk/home>).

The ideal candidate

Ideal candidates will have some bioinformatics skills, experience working with genomic datasets, will have used a HPC, and will have basic knowledge and be excited about the subject area. Eligible applicants will hold a 2:1 BSc in a relevant subject. Candidates for whom English is not their first language will require an IELTS score of 6.5 overall, with not less than 6.0 in any section.

How to apply

Please submit a formal application through the online admissions portal (<https://www.sussex.ac.uk/study/phd/apply>) attaching a CV, degree transcripts and certificates, statement of interest and two academic references. On the application system select Programme of Study – PhD Biology. Please ensure you state the project title under funding and include the proposed supervisor's name where required. Applications are particularly welcomed from candidates with protected characteristics – e.g., from Black and other ethnic minorities – who are under-represented in postgraduate research at our institution.

Contacts

For enquiries about the project, please contact supervisor: s.stankowski@sussex.ac.uk
For enquiries about the application process, please email Emma Chorley: lifesci-rec@sussex.ac.uk

Further reading

Stankowski, S., Zagrodzka, Z. B., Garlovsky, M. D., Pal, A., Shipilina, D., Castillo, D. G., ... & Butlin, R. K. (2023). The genetic basis of a recent transition to live-bearing in marine snails. *Science*, 2024. <https://www.science.org/doi/10.1126/science.adi2982>

Stankowski, S., Westram, A. M., Zagrodzka, Z. B., Eyres, I., Broquet, T., Johannesson, K., & Butlin, R. K. (2020). The evolution of strong reproductive isolation between sympatric intertidal snails. *Philosophical Transactions of the Royal Society B*. <https://royalsocietypublishing.org/doi/10.1098/rstb.2019.0545>

Ravinet, M., Faria, R., Butlin, R. K., Galindo, J., Bierne, N., Rafajlović, M., ... & Westram, A. M. (2017). Interpreting the genomic landscape of speciation: a road map for finding barriers to gene flow. *Journal of evolutionary biology*. <https://pubmed.ncbi.nlm.nih.gov/28786193/>

Stankowski, S., & Ravinet, M. (2021). Defining the speciation continuum. *Evolution*. <https://onlinelibrary.wiley.com/doi/full/10.1111/evo.14215>