Master thesis or IRT project opportunity

The many costs of self-(in)compatibility

Experimental evolution of self-compatibility in fission yeast

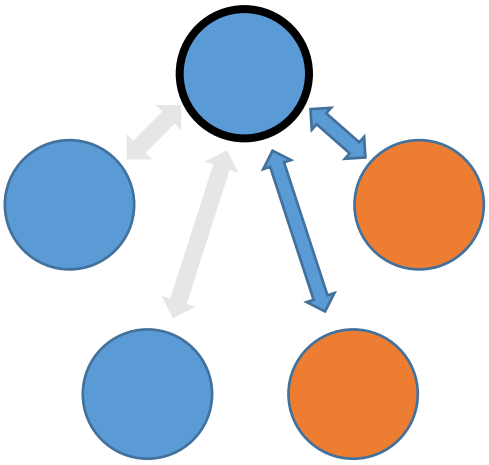
Background: Mating with an individual of a different 'type', whether sexes in animals and plant or mating types in fungi, algae and ciliates reduces mating opportunity by half, and many organisms have lost these forms of self-incompatibility. The result is universal compatibility, which increases the chance of outcrossing and the possibility to mate even if no partners are around through selfing. Even though increased mating success seems very beneficial, many costs are associated with the loss of self-compatibility. Due to reduction in effective population size and increased Hill-Robertson interference, adaptation to novel environments is expected to slow down. Physiologically, universal compatibility will lead to autocrine (i.e. self-activating) reactions, which can affect cellular development and even lead to reduced mate finding efficiency. Here you will test under which circumstances self-compatibility can be selected, by quantifying its costs and benefits on a variety of life-history traits.

Project: You will genetically modify fission yeast strains to become self-compatible using *CRISPR*/*Cas9*, measure fitness for these strains, and perform experimental evolution to

1. understand the benefits of self-compatibility in sexual reproduction,
2. assess how self-compatibility affects somatic growth, and
3. test the benefits of self-compatibility to adapt to novel environments.

Microbiological and/or molecular lab experience are preferred though not required.

If you are interested in this research,
please contact Bart Nieuwenhuis at nieuwenhuis@bio.lmu.de



Background reading:

Nieuwenhuis & Immler. 2016. "The Evolution of Mating-Type Switching for Reproductive Assurance." BioEssays 38(11): 1141–49..
Nieuwenhuis et al. 2018. "Repeated Evolution of Self-Compatibility for Reproductive Assurance." Nature Communications 9(1):1639.
Perrin. 2012. "What Uses Are Mating Types? The 'Developmental Switch' Model." Evolution 66(4): 947–56.