

## 23 000 sexes? The evolutionary dynamic of sexual types in a mushroom

### *Genomic analyses of highly variable supergenes*

**Background:** Mating requires finding a compatible partner. In most species two different types exist, for example in sexes (males and females) but also in organisms without sexes such as green algae, diatoms or many fungi, compatibility is limited to two different types. However, any mutant that can mate with all other types would be favoured when rare and thus increase in the population. It is this negative frequency dependence, which probably has led to the estimated 23,000 mating types in the mushroom *Schizophyllum commune*. Studying what leads to these large numbers of mating types might shed light on the constraints in other mating systems.

**Project:** You will analyze the genetic variation of the highly polymorphic *S. commune* mating type regions, which consist of non-recombining regions containing multiple genes, together forming so-called supergenes.

You will use comparative genomic approaches to analyze *de novo* assemblies of the mating type regions (based on Nanopore and Illumina data) to

1. understand the genetic basis of the large number of mating-type alleles,
2. estimate the relative ages of mating-type alleles, and
3. study potential signs of degeneration of the non-recombining regions.

Experience in population genomics and/or coding in *bash* and *R* are preferred though not required.

If you are interested in this research,  
please contact Bart Nieuwenhuis at [nieuwenhuis@bio.lmu.de](mailto:nieuwenhuis@bio.lmu.de)

**Background reading:**

[Constable & Kokko. 2018](#) "The Rate of Facultative Sex Governs the Number of Expected Mating Types in Isogamous Species." *Nat Eco Evo*

[Nieuwenhuis & Aanen. 2012](#) "Sexual Selection in Fungi." *J Evol Bio* 25: 2397–2411.

[Nieuwenhuis et al. 2013](#) "Evolution of Uni- and Bifactorial Sexual Compatibility Systems in Fungi." *Heredity* 445–55.

September 2021

