Development of a forward genetic screen based on mitotic recombination in diatoms

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Diatoms are one of the most diverse types of microalgae, promising for wastewater treatment, bioremediation and production of numerous valuable compounds. However, functional information is missing for a big proportion of diatom genes and consequently their full biotechnological potential has not been unlocked yet. In order to fully harness their abilities, development of high-throughput methods for functional analysis of diatom genes is needed. To date, several factors precluded forward genetic screening in diatoms. The model species *Phaeodactylum tricornutum* has never been observed to reproduce sexually in laboratory settings, which makes the generation of homozygous cell lines challenging. Recently, our lab has observed high mitotic recombination rates between homologous chromosomes in cultures of *P. tricornutum*. Our data showed that the mitotic recombination rate is extremely high, occurring in 4.2 out of 100 diatom cell divisions. Random segregation of sister chromatids during mitosis results in loss-of- heterozygosity (LOH) regions in 50% of cases, allowing generation of homozygous cell lines (*Bulankova et al, 2021*). Within our project we want to make use of this phenomenon to develop forward genetic screens in diatoms as a novel platform for identification of genes of interest for biotechnology.

Keywords
Forward Genetic Screen; Diatoms; Biotechnology