

*Euglena gracilis* is a common phytoplankton species, which also has motile flagellate characteristics. Recent research and development has enabled the industrial use of *E. gracilis* and selective breeding of this species is expected to further expand its application. However, the production of *E. gracilis* nuclear mutants is difficult because of the robustness of its genome. To establish an efficient mutation induction procedure for *E. gracilis*, we employed Fe-ion beam irradiation in the RIKEN RI beam factory. A decrease in the survival rate was observed with the increase in irradiation dose, and the upper limit used for *E. gracilis* selective breeding was around 50 Gy. For a practical trial of Fe-ion irradiation, we conducted a screening to isolate high-temperature-tolerant mutants. The screening yielded mutants that proliferated faster than the wild-type strain at 32 °C. Our results demonstrate the effectiveness of heavy-ion irradiation on *E. gracilis* selective breeding.

The procedure of screening of mutant *Euglena gracilis* strain. With this procedure thermal stress resistant strains were segregated.

