Poster | 33.Poster

Wed. Jul 1, 2026 12:10 PM - 1:00 PM JST | Wed. Jul 1, 2026 3:10 AM - 4:00 AM UTC | Poster 1(4FFoyer+401+402)
[P005] Poster

12:10 PM - 1:00 PM JST | 3:10 AM - 4:00 AM UTC

[P03-441] Investigation of cell cycle analysis in *Euglena gracilis* and elucidation of the relationship between the cell cycle and cell morphology

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Euglena is unicellular eukaryote, and most of its species have chloroplasts. It can grow autotrophically, but it can also grow heterotrophically by consuming organic carbon sources. It accumulates linear β-1,3-glucan molecules called “paramylon”, which have been investigated as raw materials like bioplastics and nanofibers.*Euglena gracilis* strain Z has been used as a model organism in many laboratories. *E. gracilis* strain SM-ZK is a streptomycin-bleached mutant derived from strain Z that has permanently lost its chloroplasts. There is little information about the culture characteristics of strain SM-ZK for industrial purposes, although it has been stated that the mutant strain could accumulate more paramylon than the wild strain.In our previous study, we performed a high-density culture using jar fermenters. This revealed that strain SM-ZK had substantially higher productivity in terms of both biomass and paramylon than strain Z (156.16 ± 0.69 g/L vs 137.73 ± 13.07 g/L in biomass, and 109.04 ± 4.36 g/L vs 83.41 ± 6.7 g/L in paramylon production, respectively). Additionally, a unique cellular morphological change of strain SM-ZK was observed: the cells clearly enlarged compared to strain Z cells, as the cultivation time progressed.It is widely known that there is a close relationship between cell size homeostasis and cell cycle progression for physiologically cellular morphogenesis. Various experimental methods have been used to analyze the cell cycle, ranging from classical approaches, such as cycle synchronization with reagents, to those developed in recent years, which use DNA labels. In *E. gracilis*, cell cycle control or synchronization is achieved by deficiency of vitamin B12 or light/dark regime, which is a long-established technique for cell cycle analysis.The change in the DNA histogram acquired by flow cytometry (FACS) during cultivation showed different appearances and indicated differences in cell cycle progression between the two strains. Therefore, we attempted to quantitatively compare each cell cycle by synchronizing the cycles and DNA labeling with a thymidine analog, while also considering the practicality of these methods in non-model organisms.