

Relationship between immaturity period and lifespan in *Paramecium*

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SUMMARY

The age structure of *Paramecium caudatum* was computer-simulated using a model culture that mimics its life in nature. After thousands of cell generations, the average and maximum ages were converged to 43 ± 2 and 140 ± 5 fissions, respectively. This indicates that in a natural population the cells of average age are immature and the most elderly cells are still vigorous, because the age of sexual maturation and the maximum clonal lifespan are set at 60 and 600 fissions, respectively, as revealed in laboratory. The average and maximum ages remained unchanged when the initial condition for starting the culture was changed from two complementary mating-type cells to a population with a quadratic-function distribution, and when the fission rate at the log-phase or the death rate at the stationary phase was modified. The average and maximum ages somewhat increased when either the probability of conjugation or the proportion of transplanting cells was lowered. The lifespan changed in correlation with the age at sexual maturity: the average and maximum ages were 26 ± 3 and 106 ± 5 when the immaturity period was set at 30 fissions, and 80 ± 30 and 165 ± 45 when it was set at 120 fissions. Since the correlation between sexual maturation and lifespan cannot work as the *intraspecies* rule as we have shown with *P. tetraurelia* mutants, we conclude that our simulation shows the *interspecies* rule implying the life of *Paramecium* in nature.