

The Evolutionary Causes and Consequences of Successful Asexuality in *Tetrahymena* ciliate

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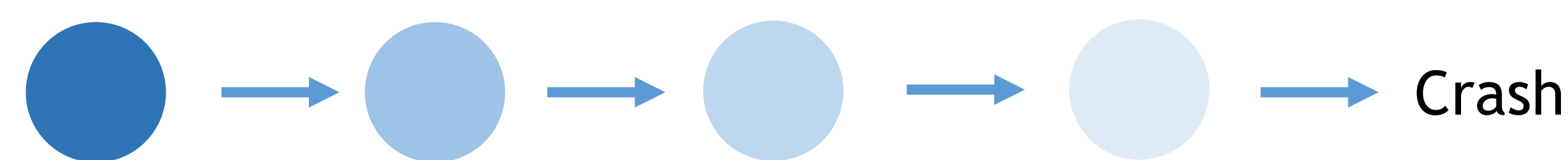
Introduction

- For eukaryotes, obligate asexual reproduction has long been regarded as an evolutionary dead-end due to its less efficiency to purge deleterious mutations.

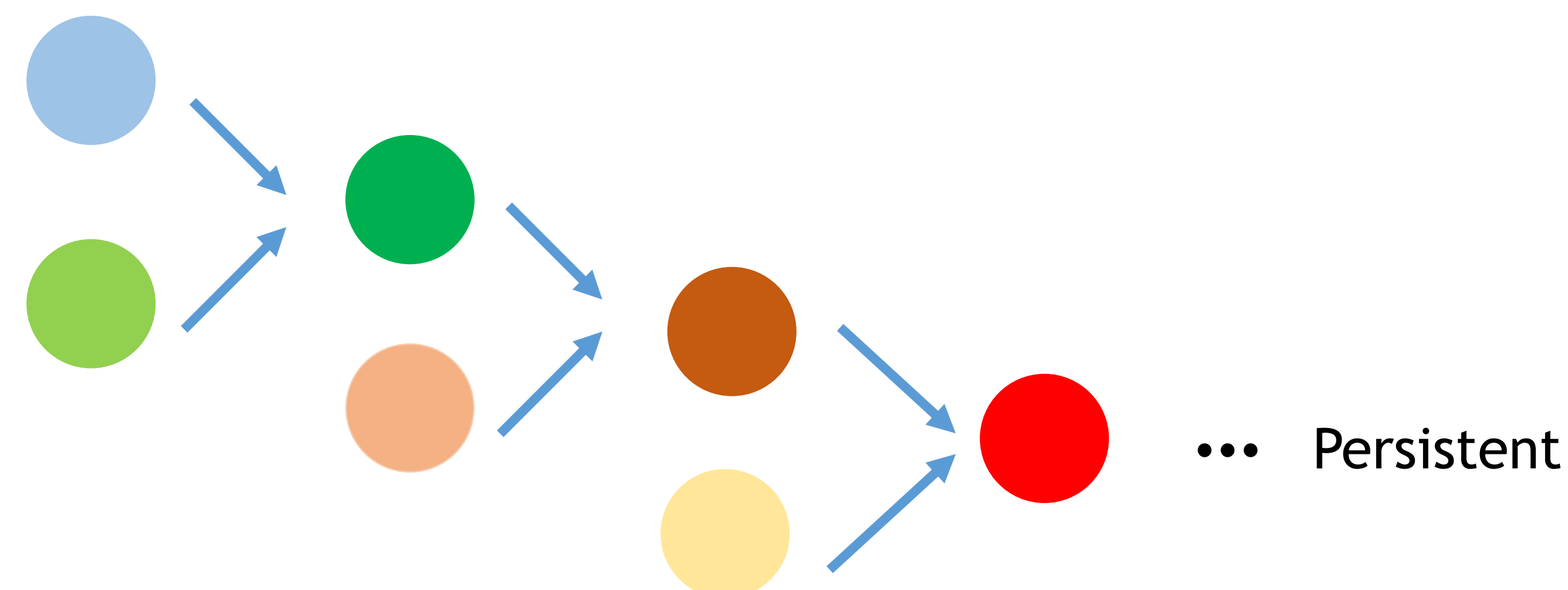
- The successful asexuality of *Tetrahymena* may rely on its unique genome architecture:

- Nuclear dimorphism

Asexual reproduction:

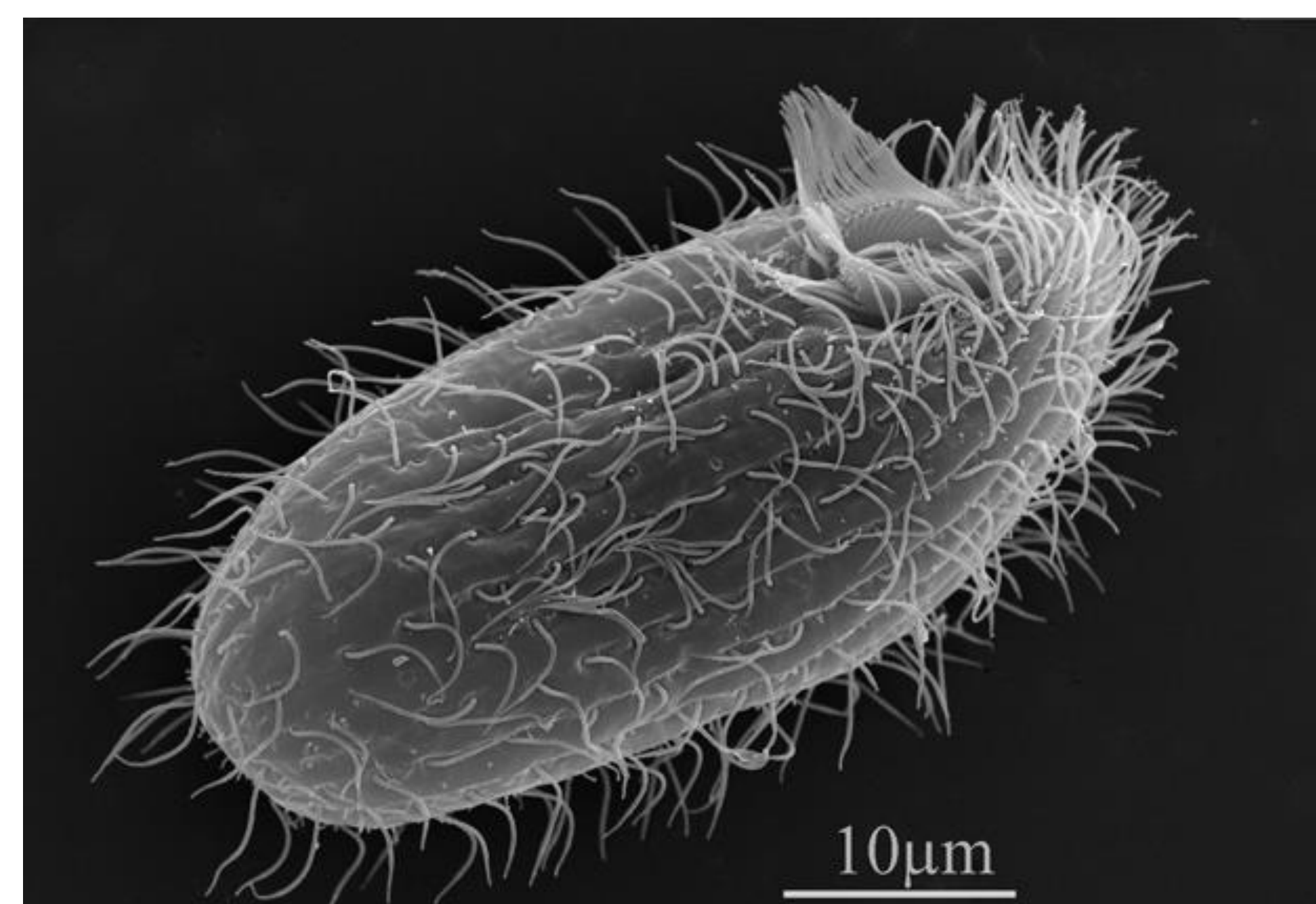


Sex:

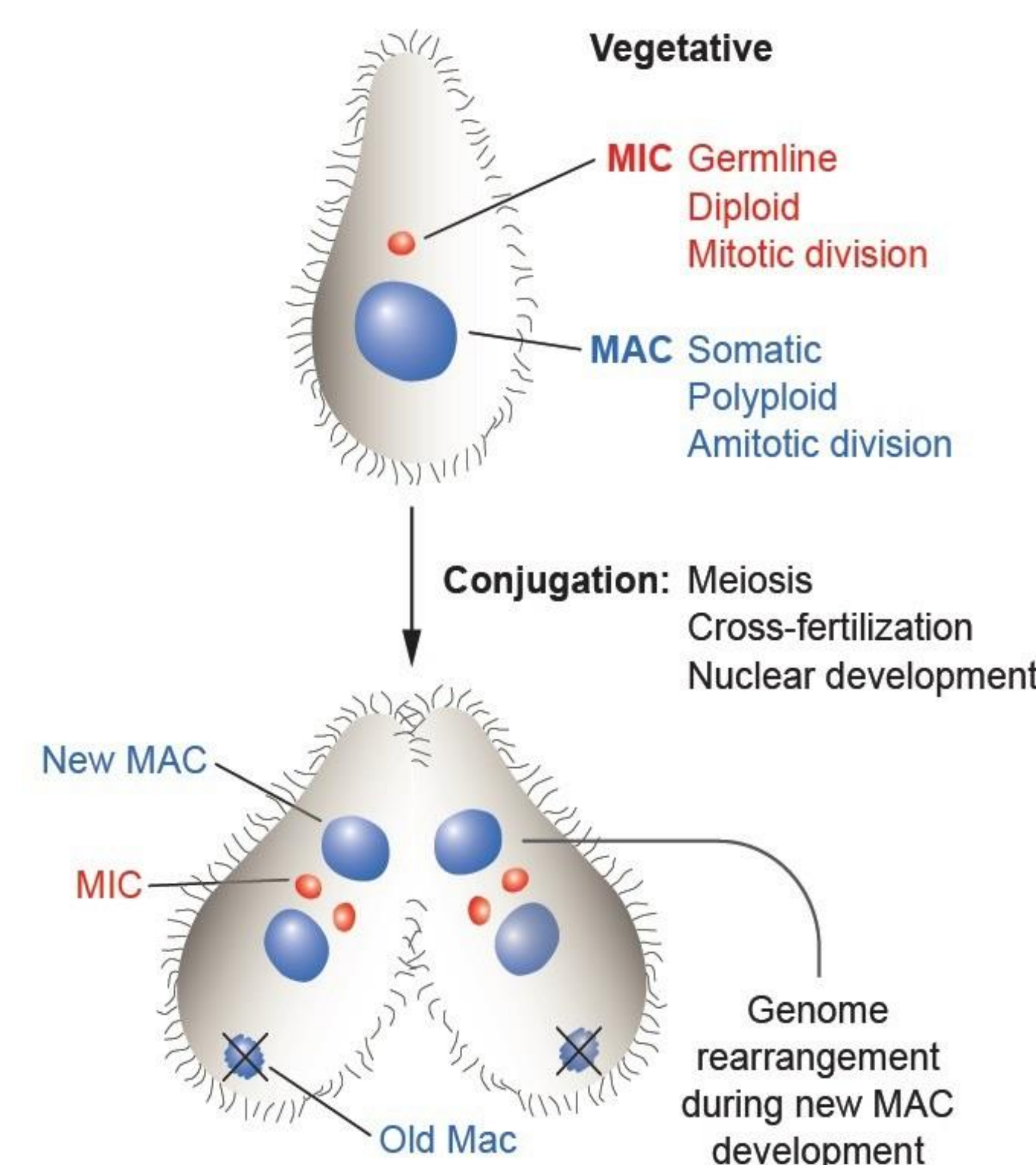


- However, asexual reproduction seems to be successful in several lineages.

A good example: ciliate *Tetrahymena*

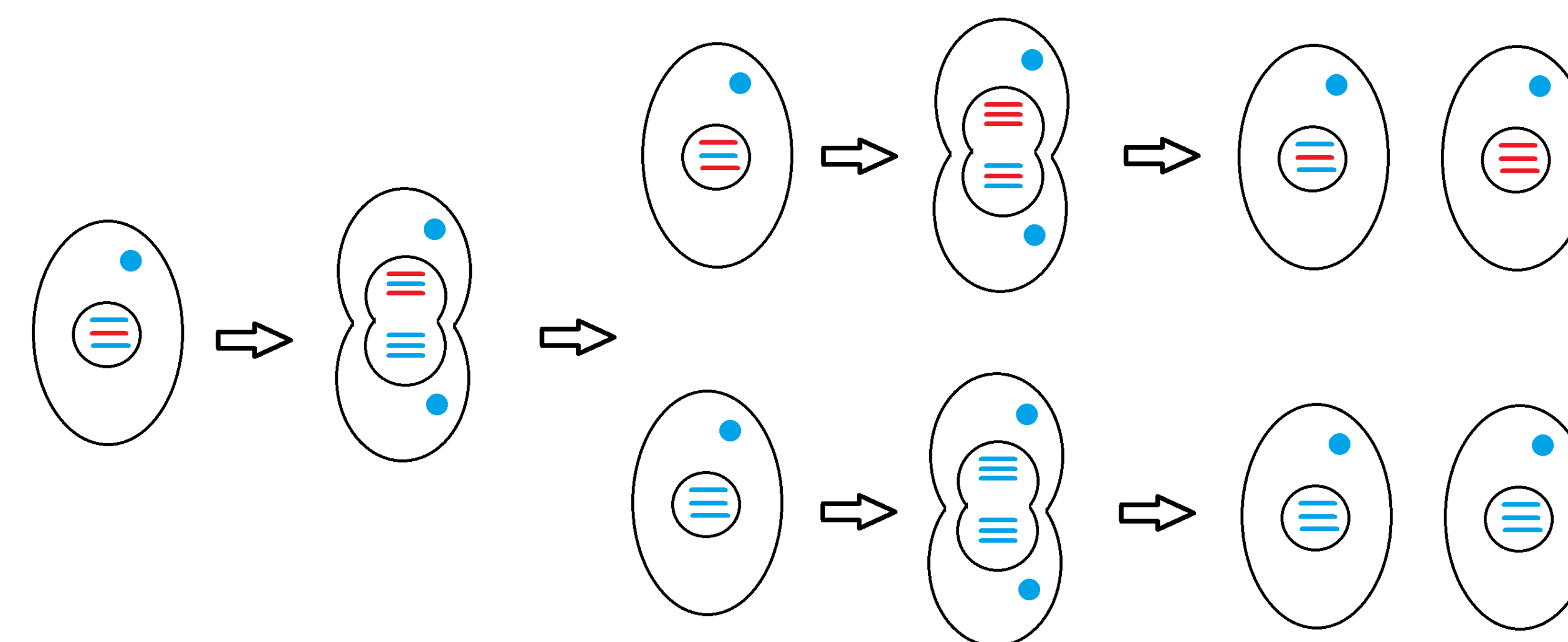


(<http://miamioh.edu/news/article/view/12718>)



(Hamilton et al., 2016)

- Amitotic division

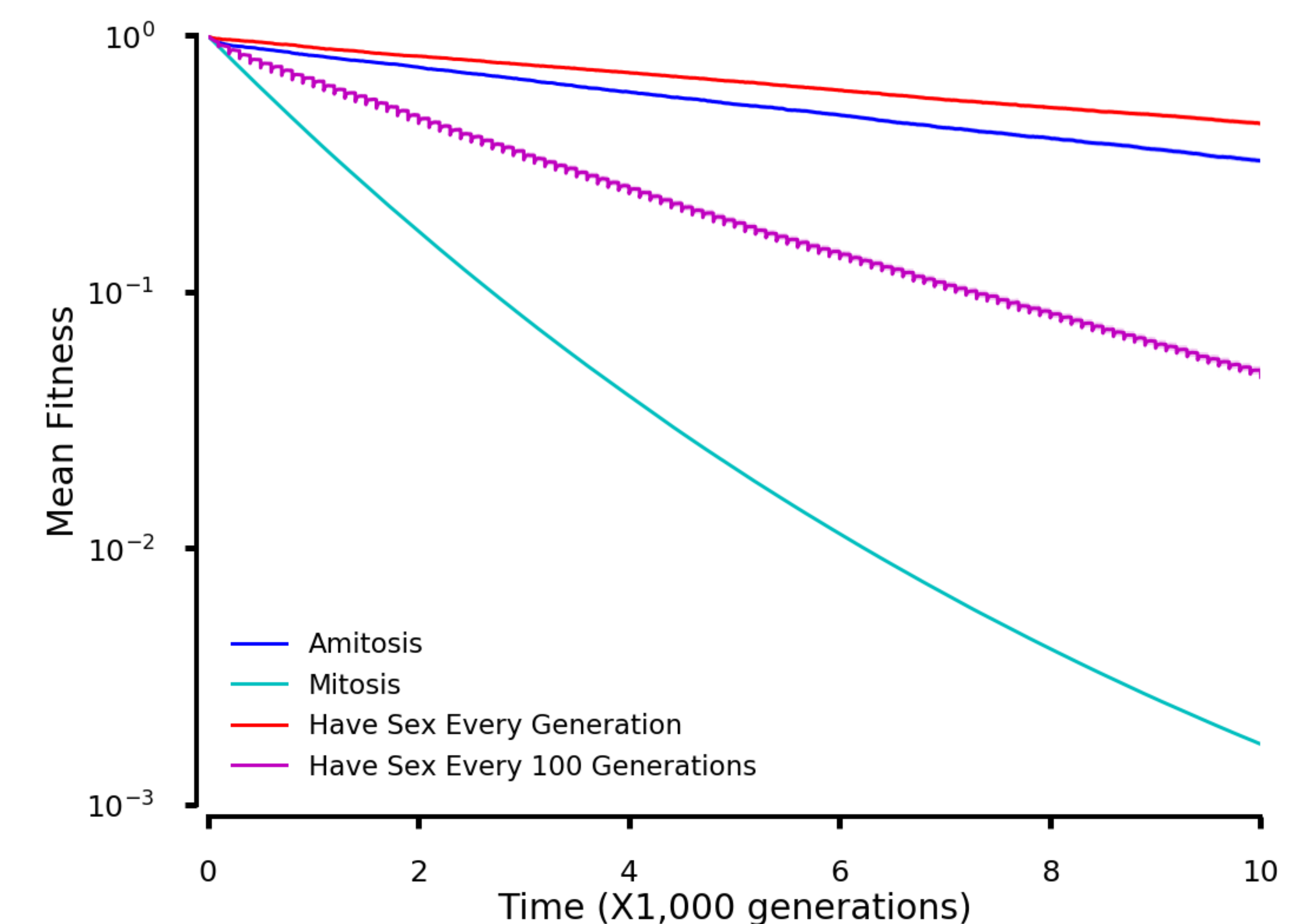


(Redrawn from Brito, Guilherme, Soares, & Gordo, 2010)

- In this study, we tested the hypothesis that unusual genome architecture may contribute to the successful asexuality of *Tetrahymena* by conferring sexual-like benefit using computational modelling.

Result

The benefits of amitosis is comparable with sex, and much higher than normal mitotic asexual reproduction



Conclusion

- Amitosis can dramatically slow down the fitness loss caused by accumulation of deleterious mutations than the normal mitotic asexual reproduction.
- The benefit of amitosis is comparable with having sex every generation.
- The benefit of amitosis is much higher than having sex every 100 generations, which is approximately the highest frequency for *Tetrahymena* to have sex.
- Amitosis may be among one of the most important factors to contribute to the successful asexuality of *Tetrahymena*.