



Opinion

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Ciliates as Potential Single-Celled Eukaryotes for Biological Research

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Received Date: January 02, 2024

Published Date: January 25, 2024

Opinion

Ciliates are unicellular organisms with hair-like cilia and nuclear dualism. They are used in genome evolution studies and are adaptable to different environments due to their diverse shapes and behaviors [1]. More than 8000 species of ciliates have been identified. However, their taxonomy, biodiversity and functions still need to be better understood [2].

Ciliates play important roles in ecosystems, contributing to ecological balance and nutrient cycling. Some key aspects of their role are:

- a) **Food web and nutrient recycling:** Ciliates break organic matter in aquatic environments. As decomposers, they recycle nutrients by consuming bacteria and other organic particles and converting them into more readily available forms for other organisms [3].
- b) **Microbial Control:** Ciliates control bacteria and maintain water quality in wastewater treatment plants [4].
- c) **Bioindicator:** Ciliates can be used as indicators of environmental health, as they are sensitive to changes in water quality and can signal shifts in ecosystem health or disturbances caused by pollution [5].
- d) **Symbiotic Relationships:** Ciliates form symbiotic relationships with larger eukaryotic organisms in their digestive tracts. Additionally, many ciliates host bacteria and algae as symbionts within their cytoplasm [6].
- e) **Model organism:** Certain ciliates, such as *Paramecium* and *Tetrahymena*, are used in research as a model organism due to

their genetic tractability and simplicity [1]. They are valuable in environmental toxicology and molecular biology studies [7].

Future Research Direction

The study of ciliate phylogeny has revealed connections between species that challenge our current understanding of the tree of eukaryotic life. These studies provide valuable insights into the complex microscopic world and challenge our knowledge of evolutionary relationships. It is essential to understand the roles of ciliates in diverse environments to grasp their impact on the complex web of interactions that sustain life. Therefore, examining omics data is necessary for understanding the function of ciliates. Additionally, studying the genomic structure of ciliates will help in understanding the evolution of genomes in the tree of eukaryotic life.

Acknowledgement

None

Conflict of Interest

No conflict of interest

References

1. Howard Till RA, Kar UP, Fabritius AS, Winey M (2022) Recent advances in ciliate biology. *Annual Review of Cell and Developmental Biology* 38(1): 75-102.
2. Lynn DH (2008) *The ciliated protozoa: characterization, classification, and guide to the literature* (Third edition). Springer Dordrecht pp. XXXIII, 605.
3. Beaver JR, Crisman TL (1989) The role of ciliated protozoa in pelagic freshwater ecosystems. *Microbial ecology* 17(2): 111-136.

4. Madoni P (2011) Protozoa in wastewater treatment processes: A minireview. *Italian Journal of Zoology* 78(1): 3-11.
5. Chen QH, Xu RL, Tam NF, Cheung SG, Shin PK (2008) Use of ciliates (Protozoa: Ciliophora) as bioindicator to assess sediment quality of two constructed mangrove sewage treatment belts in Southern China. *Marine Pollution Bulletin* 57(6-12): 689-694.
6. Dziallas C, Allgaier M, Monaghan MT, Grossart HP (2012) Act together—implications of symbioses in aquatic ciliates. *Frontiers in microbiology* 3(1): 288-292.
7. Vilas Boas JA, Cardoso SJ, Senra MVX, Rico A, Dias RJP (2020) Ciliates as model organisms for the ecotoxicological risk assessment of heavy metals: a meta-analysis. *Ecotoxicology and environmental safety* 199(1): 110669-110675.