SERENA SUNG-CLARKE

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Ph.D. candidate in Biological Oceanography in the MIT-WHOI Joint Program. Ecologist integrating laboratory experiments, field ecology, and molecular tools to understand the organisms causing harmful algal blooms.

EDUCATION

Ph.D. Candidate **MIT-Woods Hole Oceanographic Institution, Biological Oceanography** 2021-present

B.A. **Swarthmore College, Biology and Political Science** May 2019
High Honors, 3.89 GPA

RESEARCH EXPERIENCE

Graduate Research Assistant, Brosnahan Lab, Woods Hole Oceanographic Institution, MA **2021 – present**
Dissertation*:* "Drivers of *Dinophysis* Bloom Proliferation, Persistence, and Spread"

- **Life cycle dynamics:** discovered sexual reproduction in *Dinophysis* is rapid, associated with vegetative growth, and drives most of bloom proliferation (publication in review, pre-print available)
- **Physical-ecological interactions:** demonstrated how coastal hydrography and physico-chemical niche stability in kettle ponds during blooms promotes persistence of *Dinophysis* populations.
- **Population genetics:** developing high-throughput SNP haplotyping for population genetics in microbial eukaryotes, funded in part by the Grassle Fellowship.
- Organized coastal field sampling campaigns, designed and conducted lab culture experiments, developed molecular methods, and deployed diverse computational tools (CNN classifiers, bioinformatic pipelines).

In addition to dissertation work:

- Led or assisted with field sampling efforts on the Cape Cod National Seashore, MA to deploy or recover instruments, and sample for nutrients, plankton community, and toxins (about 8-10 times per year).
- Developed a convolutional neural net (CNN) model for phytoplankton image identification and evaluated 3-4 other CNN models for five HAB species across seven locations.
- Designed and coded new applications for a sensor-coordinating robot operating system (ROS).
- Mentored 2-3 undergraduate and other graduate students, including being primary mentor for a summer undergraduate student in 2025.

Research Assistant, Vallen Lab, Swarthmore College, PA **2017 – 2019**

- Developed project identifying novel immune protein homologues in the sea anemone *Aiptasia pallida* using transcriptomic and molecular methods to understand the cellular processes behind coral bleaching.

OTHER WORK EXPERIENCE

Teaching Fellow, Biological Oceanography, Massachusetts Institute of Technology, MA **2025**

- Instructed weekly 1-hour recitation sessions reviewing course content for the class.
- Developed and presented a lecture on marine protists.
- Graded project papers, quick writes, and problem sets for seven students.

Analyst, Cadmus Group, LLC, Waltham, MA **2019 – 2021**
For U.S. EPA Office of Water clients:

- developed national physical and social watershed vulnerability indicators for states and other stakeholders
- created pipeline for summarizing health effects and occurrence of 250 drinking water contaminants for the regulatory Contaminant Candidate List
- produced maps and graphs on sea-level rise and extreme weather events for EPA tools
- moderated trainings for water utilities on EPA emergency resilience rules

PUBLICATIONS

Sung-Clarke, S., N. Ayache, W. Zhang, M. Tong, J. L. Smith, and M. Brosnahan. Rapid sexual reproduction in *Dinophysis acuminata* revealed through temporal partitioning of cellular processes. [pre-print, in review]

PRESENTATIONS

Sung-Clarke, S., N. Ayache, W. Zhang, M. Tong, J.L. Smith, & M. Brosnahan (October 2025). "Rapid sexual reproduction intensifies and prolongs blooms of *Dinophysis acuminata*" [Oral Presentation]. International Conference on Harmful Algae, Punta Arenas, Chile. [One of 10% of presentations nominated for publication in special issue of *Harmful Algae*].

Sung-Clarke, S., N. Ayache, W. Zhang, M. Tong, J.L. Smith, & M. Brosnahan (April 2025). "Time partitioning of grazing, division, and mating promotes rapid sexual reproduction by a mixotrophic dinoflagellate" [Seminar Presentation]. Woods Hole Oceanographic Institution, Woods Hole, MA.

Sung-Clarke, S., N. Ayache, W. Zhang, M. Tong, J.L. Smith, & M. Brosnahan (March 2025)**.** "Time partitioning of grazing, division, and mating by a mixotrophic dinoflagellate" [Oral Presentation]. Gulf of Maine Harmful Algal Bloom Symposium, Portsmouth, NH.

Sung-Clarke, S., N. Ayache, W. Zhang, J.L. Smith, & M. Brosnahan (October 2024). "Linked phasing of division and mating in *Dinophysis acuminata* culture and field populations" [Oral Presentation]. U.S. Symposium on Harmful Algae, Portland, ME.

Sung-Clarke, S., M. Pathare, V. Lucke, J.L. Smith, & M. Brosnahan (November 2023). "It's a Trap! Biophysical trapping and phased mating during a *Dinophysis acuminata* bloom in Nauset Marsh." [Oral Presentation]. International Conference on Harmful Algae, Hiroshima, Japan. [Winner of Maureen Keller Best Student Presentation Award].

Sung-Clarke, S., M. Pathare, V. Lucke, J.L. Smith, & M. Brosnahan (June 2023). "Biophysical trapping as a driver of *D. acuminata* bloom development and persistence in Nauset Marsh" [Oral Presentation]. Phycological Society of America Annual Meeting, Providence, RI.

Sung-Clarke, S., M. Pathare, D. Beaudoin, H. Alexander, & M. Brosnahan**.** (October 2022). "Investigating *Dinophysis* response to prey scarcity in Nauset Marsh" [Presentation and Lightning Talk]. U.S. Symposium on Harmful Algae, Albany, NY.

Sung-Clarke, S. (May 2019). "Identifying TIR domains and protein-protein interactions in the sea anemone *Aiptasia pallida*" [Honors Thesis Defense]. Defended to Dr. Angela Poole, Swarthmore College, PA.

Sung-Clarke, S. (May 2019). "Taiwan's Wetland Conservation Act: A tactic for maintaining international space" [Oral Presentation]. Swarthmore College Political Science Thesis Symposium, Swarthmore College, PA.

SERVICE AND LEADERSHIP

Gordon Research Seminar Discussion Leader, Easton, MA June 2025

- At the Mycotoxins and Phycotoxins Gordon Research Seminar, moderated discussion and questions for the session entitled "Environmental Factors Influencing Toxin Production".

MIT-WHOI Joint Program Biology Representative, Woods Hole, MA 2023 – 2024

- Hosted ocean biologist Dr. Kelly Benoit-Bird for two days as the 2024 Steinbach Scholar, organized four events and set up ~20 meetings around her visit.
- Organized social events and bimonthly department coffee hours
- Organized qualifying exam review sessions for pre-candidacy students

Broader Impacts Group, Woods Hole, MA 2022 – 2024

- Matches students to volunteer opportunities in schools and public engagement events.
- Volunteered with several field trips, science nights, and science fairs.

AWARDS AND FELLOWSHIPS

Nominee, Invite-Only Special Issue, *Harmful Algae,* 2025. One of 35 selected from over 300 presentations at the International Conference on Harmful Algae 2025 for the special issue: "Emerging Insights and Perspectives on Harmful Algal Blooms 2026".

Grassle Fellowship, Woods Hole Oceanographic Institution, 2024. $7500 grant to support biodiversity and biophysical research activities for dissertation work.

Maureen Keller Award, International Conference on Harmful Algae, 2023. Awarded to best student presentation at the conference (~600 attendees).

CERTIFICATES

Research Mentorship Certificate, MIT, 2024. 3-week certificate program learning best practices for mentoring research students.

Grant Writing Certificate, MIT, 2024. 2-day certificate program in writing grants to federal agencies.

Subject Design Workshop, MIT, 2024. 3-week workshop to design course curricula.

TECHNICAL SKILLS

Lab and Instrument Skills: Light microscopy, flow cytometry, Imaging FlowCytobot, CTDs, RNA/DNA library preparation
Programming: Bash; SLURM; Python; R; Jupyter; GitHub; ArcGIS; Excel VBA
Applications: Microsoft Office, PowerBI; Adobe Illustrator, Adobe Photoshop, Adobe Captivate