Thomas C. Day

PhD | Department of Biological Sciences, University of Southern California

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Google Scholar

Current Position :
Postdoctoral researcher in the Schwartzman Lab. Marine and Environmental Biology Section, USC.
Interested in how soft matter physics constrains biology and ecology, and how these constraints lead to organization and patterning.

Education

2018-2023 **PhD - School of Physics, Georgia Institute of Technology**, Atlanta, GA USA
2017-2018 **MS - School of Physics, Georgia Institute of Technology**, Atlanta, GA USA
2012-2016 **BS - Magna Cum Laude - Department of Physics, Lafayette College**, Easton, PA USA

Publications

2024 K Tong, S Datta, V Cheng, DJ Haas, S Gourisetti, HL Yopp, **Thomas C. Day**, DT Lac, PL Conlin, GO Bozdag, WC Ratcliff, *Whole-genome duplication in the Multicellularity Long-Term Evolution Experiment*, BioArxiv, doi : https://doi.org/10.1101/2024.04.18.588554

2024 RM Pineau, D Demory, E Libby, D Demory, DT Lac, **Thomas C. Day**, P Bravo, PJ Yunker, JS Weitz, GO Bozdag, WC Ratcliff, *Emergence and maintenance of stable coexistence during a long-term evolution experiment*, Nature Ecology and Evolution, doi : 10.1038/s41559-024-02367-y

2024 **Thomas C. Day**, SA Zamani-Dahaj, GO Bozdag, AJ Burnetti, EP Bingham, PL Conlin, WC Ratcliff, PJ Yunker, *Morphological entanglement in living systems*, Physical Review X, doi : https://doi.org/10.1103/PhysRevX.14.011008

2024 AR Pokhrel, G Steinbach, A Krueger, **Thomas C. Day**, J Tijani, SL Ng, BK Hammer, PJ Yunker, *The biophysical basis of bacterial colony growth*, BioArxiv, doi : https://doi.org/10.1101/2023.11.17.567592

2023 GO Bozdag, SA Zamani-Dahaj, **Thomas C. Day**, PC Kahn, K Tong, AH Balwani, EL Dyer, PJ Yunker, WC Ratcliff, *De novo evolution of macroscopic multicellularity*, Nature, https://doi.org/10.1038/s41586-023-06052-1

2023 SA Zamani-Dahaj, A Burnetti, **Thomas C. Day**, PJ Yunker, WC Ratcliff, MD Herron, *Spontaneous emergence of multicellular heritability*, Genes **14**(8)doi : https://doi.org/10.3390/genes14081635

2022 **Thomas C. Day**, SS Hohn, SA Zamani-Dahaj, A Burnetti, J Pentz, AR Honerkamp-Smith, H Wioland, HR Sleath, WC Ratcliff, RE Goldstein, PJ Yunker, *Cellular Packing in lab-evolved and extant multicellular species obeys a maximum entropy law*, eLife, doi : https://doi.org/10.7554/eLife.72707

2022 **Thomas C. Day**, P Marquez-Zacarias, P Bravo, AR Pokhrel, KA MacGillivray, WC Ratcliff, PJ Yunker, *Varied solutions to multicellularity : The biophysical and evolutionary consequences of diverse intercellular bonds*, Biophysics Reviews, doi : https://doi.org/10.1063/5.0080845

2018 S Jacobeen, EC Graba, CG Brandys, **Thomas C. Day**, WC Ratcliff, PJ Yunker, *Geometry, packing, and evolutionary paths to increased multicellular size*, Physical Review E, doi : https://doi.org/10.1103/PhysRevE.97.050401

2022 YM Wong, **Thomas C. Day**, JS Tumulty, BC Antanaitis, *Phase transitions detected in complex time series by multifractal detrended fluctuation analysis*, International Journal of Modern Physics B, doi : https://doi.org/10.1142/S0217979222400793

Honors and Awards

2022 **WD Hamilton Award**, Society for the Study of Evolution. Awarded to the most outstanding research talk at the annual Evolution conference. Link for more information about the award.

2022 **Outstanding Graduate Research Prize, Center for Microbial Dynamics and Infection**, Georgia Institute of Technology.

2020-2022 **3x Weatherly Travel Award**, Georgia Institute of Technology.

2017 **Presidential Fellowship**, Georgia Institute of Technology. Fellowship awarded to outstanding graduate students.

2016 **Physics Scholastic Award**, Lafayette College. Inaugural recipient. Awarded to the most outstanding physics undergraduate student.

2016 **Henry Richard Jahn Award**, Lafayette College. Awarded to the most outstanding Track and Field student-athlete.

Presentations

Invited Talks

April 2022 **Kennesaw State University**, Kennesaw, Georgia. Invited to give an hour-long lecture as part of the Center for Microbial Dynamics and Infection Seminar Series.

March 2022 **American Physical Society (APS) March Meeting**, Chicago, Illinois. Invited to give two 30-minute presentations at the annual APS March Meeting.

- Cellular Organization
- Material property changes from physical entanglement

Contributed Talks

March 2023 **APS March Meeting**, Las Vegas, Nevada.
June 2022 **Evolution**, Cleveland, Ohio. Hamilton Award Symposium.
May 2022 **International Physics of Living Systems Conference**, Montpellier, France.
October 2021 **Southeastern Regional Society of Integrative and Comparative Biology**, Atlanta, GA.
June 2021 **Center for Microbial Dynamics and Infection**, Atlanta, GA.
March 2021 **APS March Meeting**, Virtual.
March 2020 **APS March Meeting**, Virtual.
March 2019 **APS March Meeting**, Boston, MA

Research Experience

Today – 2023 | Postdoctoral Associate, Advisor : Julia Schwartzman,

- Characterizing developmental program of transiently multicellular marine bacteria.

Microbiology wet lab | PCR | Conjugations | Confocal microscopy | Particle Tracking | Image Analysis | Numerical Simulations

2023 – 2018 | Research Assistantship, Co-advisors : Peter J. Yunker and William C. Ratcliff,

- Uncovered physical constraints underlying cellular spatial organization in nascent multicellular organisms using a combination of experiments and simulations.
- Identified and measured material characteristics of growing, tangled branches of cells.
- Described and reviewed biophysical consequence of diverse intercellular bond types.

Confocal microscopy | AFM | Materials Science | Particle Tracking | Image Analysis | Numerical Simulations | General wet lab | Experimental evolution

2016 – 2014 | Undergraduate Research, Co-advisors : Bradley C. Antanaitis and Yiu-man Wong,

- Analyzed data heart rate data from a variety of patients, identifying features of phase transitions in the heart rate time series for unhealthy patients.

Data analysis | Nonlinear dynamics | Phase transition theory

Teaching

2022 | Instructor of Record, Physics 4801/8801, Georgia Institute of Technology, Image Analysis in Dynamic Biophysical Systems

- Designed, created, and taught a course as the primary instructor.
- Taught 17 total students in a cross-listed undergraduate/graduate course.

2019 – 2017 | Teaching Assistant, Georgia Institute of Technology,

- Teaching assistant, Physics 4321/4322 Advanced Lab.
- Lab teaching assistant, Physics 2212.
- Recitation teaching assistant, Physics 2211.

2017 – 2016 | Instructor and Tutor, Summit Education Group,

- Taught classes in math, science and test preparation.
- One-on-one academic tutoring with high school students.

Certifications and Professional Development

2022 **Tech to Teaching Certificate**, Georgia Institute of Technology. Completed both the foundation level and the capstone level. Developed an understanding of the scholarship of teaching and learning, and applied these skills in the classroom. For the capstone project, designed, created, and instructed Physics 4801/8801 : Image Analysis of Dynamic Biophysical Systems.

References

Peter J. Yunker
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William C. Ratcliff
Associate Professor, Biology, Quantitative Biosciences
@ william.ratcliff@biology.gatech.edu
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