

**David Talmy**  
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## Education

- 2009-2013     **PhD Environmental Science**  
School of Biological Sciences, University of Essex
- 2008-2009     **MRes Mathematics in the Living Environment (with Distinction)**  
Departments of Biology and Mathematics, University of York
- 2004-2008     **MMath Mathematics**  
School of Mathematical and Physical Sciences, University of Sussex

## Professional Experience

- 2018-present   **Assistant Professor**  
Department of Microbiology and the National Institute of Mathematical and Biological Synthesis (NIMBioS), University of Tennessee
- 2020-present   **Adjunct Assistant Professor**  
Department of Ecology and Evolutionary Biology, University of Tennessee
- 2016-2018     **Research Scientist**  
Department of Earth, Atmosphere and Planetary Science, Massachusetts Institute of Technology
- 2013-2016     **Postdoctoral Associate**  
Department of Earth, Atmosphere and Planetary Science, Massachusetts Institute of Technology
- 2010-2013     **Graduate Research Assistant**  
Plymouth Marine Laboratory

## Research Interests

Microbial physiology and metabolism, microbial ecosystem interactions, marine biogeochemistry, organic matter elemental composition

## Publications

Garcia, N.S., **Talmy, D.**, Fu, W., Larkin, A.A., Lee, J., Martiny, A. The diel cycle of surface ocean elemental stoichiometry has implications for ocean productivity. (2022). *Global Biogeochemical Cycles*, 36, 1-13

Martiny, A.C., Hagstrom, G.I., DeVries, T., Letscher, R.T., Britten, G.L., Garcia, C.A., Galbraith, E., Karl, D., Levin, S.A., Lomas, M.W., Moreno, A.R., **Talmy, D.**, Wang, W., Matsumoto, K. (2022). Marine phytoplankton resilience may moderate oligotrophic

ecosystem responses and biogeochemical feedbacks to climate change. *Limnology and Oceanography*, 9999, 1-12

Cael, B. B., Bisson, K., Conte, M., Duret, M. T., Follett, C. L., Henson, S.A., Honda, M.C., Iversen, M.H., Karl, D.M., Lampitt, R.S., Mouw, C.B., Muller-Karger, F., Pebody, C.A., Smith, K.L., **Talmy, D.** (2021). Open ocean particle flux variability from surface to seafloor. *Geophysical Research Letters*, 48, 1-10.

Papoulis, S.E., Wilhelm, S.W., **Talmy, D.\***, Zinser, E.R.\* (2021). Nutrient loading and viral memory drive accumulation of restriction modification systems in bloom-forming cyanobacteria. *mBio*.

\*co-corresponding authors.

Omta, A.W., **Talmy, D.**, Sher, D., Finkel, Z.V., Irwin, A.J., Inomura, K., Follows, M.J. (2020). Quantifying nutrient throughput and DOM production by algae in continuous culture. *Journal of Theoretical Biology*, 494, 1-16.

Pound, H.L., Gann, E.R., Tang, X., Krausfeldt, L. E., Huff, M., Staton, M. E., **Talmy, D.**, Wilhelm, S.W. (2020) The “neglected viruses” of *Taihu*: Abundant transcripts for viruses infecting eukaryotes and their potential role in phytoplankton succession. *Frontiers in Microbiology*, 11, 1-11.

Inomura, K., Omta, A.W., **Talmy, D.**, Bragg, J., Deutsch, C., Follows, M.J. (2020). Elemental composition and growth rate of phytoplankton governed by macromolecular allocation. *Frontiers in Microbiology*, 11, 1-22.

**Talmy, D.**, Beckett, S.J., Taniguchi, D.A.A., Weitz, J., Follows, M.J. (2019). An empirical model of carbon transfer through marine viruses and microzooplankton grazers. *Environmental Microbiology*, 21, 2171-2181.

Nissimov, J.I., **Talmy, D.**, Haramaty, L., Fredricks, H., Zelzion, U., Eren, M., Gardella, R., Laber, C., More, K.D., Bhattacharya, D., Follows, M.J., Coolen, M.J.L., Van Mooy, B.A.S., Bidle, K.D. (2019) Biochemical diversity of sphingolipid biosynthesis as a driver of algal-virus competitive ecology. *Environmental Microbiology*. 21, 2182-2197.

**Talmy, D.**, Beckett, S.J., Taniguchi, D.A.A., Weitz, J., Follows, M.J. (2019). Contrasting controls on microzooplankton grazing and viral infection of microbial prey. *Frontiers in Marine Science*. 6, 1-12.

Thamatrakoln, K., **Talmy, D.**, Haramaty, L., Maniscalco, C., Latham, J., Natale, F., Coolen, M.J.L., Follows, M.J., Bidle, K.D. (2018). Light-dependent regulation of coccolithophore host-virus interactions. *New Phytologist*. 221, 1289-1302.

Omta, A.W., **Talmy, D.**, Sher, D., Finkel, Z.V., Irwin, A.J., Follows, M.J. (2017). Extracting phytoplankton physiological traits from batch and chemostat culture data. *Limnology and Oceanography: Methods*, 15, 453-466.

Record, N.R., **Talmy, D.**, Våge, S. (2016). Quantifying tradeoffs for marine viruses. *Frontiers in Marine Science*, 3, 251.

Li, G., **Talmy, D.**, Campbell, D.A. (2016) Diatom responses to photoperiod and light are predictable from diel reductant generation. *Journal of Phycology*, 10.1111/jpy.12483-16-032.

Lopez, J.S., Garcia, N.S., **Talmy, D.**, Martiny, A.C. (2016) Diel variability in the elemental composition of the marine cyanobacterium *Synechococcus*. *Journal of Plankton Research*, fbv120.

**Talmy, D.**, Martiny, A.C., Hill, C.N., Hickman, A.E., Follows, M.J. (2016) Microzooplankton regulation of surface ocean POC:PON ratios. *Global Biogeochemical Cycles*, 30, 1-22.

**Talmy, D.**, Blackford, J., Hardman-Mountford, N., Polimene, L. Follows, M.J. Geider, R.J., (2014) Flexible C:N ratio enhances metabolism of large phytoplankton when resource supply is intermittent. *Biogeosciences*, 11, 601-602.

**Talmy, D.**, Blackford, J., Hardman-Mountford, N., Dumbrell, A.J., Geider, R.J., (2013) An optimality model of phytoplankton photoadaptation in contrasting aquatic light regimes. *Limnology and Oceanography*, 58, 1802-1818.

### **Invited talks**

Talmy, D. Nutrient enrichment and predation defense drive cyanobacteria population dynamics. University of Waterloo, USA March 11<sup>th</sup>, 2022 Host: *Prof. Jozef Nissimov*.

Talmy, D. Trade-offs between resource acquisition and defense shape cyanobacteria communities. University of Southern California, USA, October 13<sup>th</sup>, 2020 Host: *Dr. Naomi Levine*.

Talmy, D. Trade-offs modify ecosystem biomass structure along trophic gradients. SIMPLEX project kick-off meeting. University of Bergen, Norway, August 22<sup>nd</sup>, 2019 Host: *Dr. Selina Vage*.

Talmy, D. Inferring phytoplankton host-virus traits and trade-offs from laboratory population dynamics. Weizmann Institute of Science, Rehovot, Israel, August 14<sup>th</sup>, 2019. Host: *Prof. Assaf Vardi*.

Talmy, D. Understanding microbial ecosystem structure and function on large scales using mathematical models. American Society for Microbiology Annual Meeting, San Francisco, California, USA, June 21<sup>st</sup> 2019.

Talmy, D. Trait-based modeling of viruses in global ocean microbial ecosystems. Gordon Research Conference: Elucidating microbial processes across spatial and temporal scales. Lucca, Italy, July 5<sup>th</sup>, 2018.

Talmy, D. What controls virus dynamics in global ocean microbial ecosystems? University of Texas, Austin, USA, March 23<sup>rd</sup>, 2018. Host: *Prof. Patrick Heimbach*.

Talmy, D. What controls microbial predator-prey ratios in the global ocean? Lamont-Doherty Earth Observatory, Columbia University, New York, USA, October 2<sup>nd</sup>, 2017. Host: *Prof. Andrew Juhl*.

Talmy, D., Martiny, A.C., Hickman, A.E., Follows, M.J. Microzooplankton regulation of particulate organic matter elemental composition. Bigelow Laboratory for Ocean Sciences, Maine, USA, March 9<sup>th</sup>, 2016. Host: *Dr. Nicolas Record*.

Talmy, D., Martiny, A.C., Hickman, A.E., Hill, C.N., Follows, M.J. Microzooplankton regulation of surface ocean POC:PON ratios. Rutgers University, New Jersey, USA, December 15<sup>th</sup>, 2015. Host: *Dr. Jozef Nissimov*.

Talmy, D., Martiny, A.C., Hickman, A.E., Follows, M.J. Zooplankton regulation of particulate organic matter elemental composition. National Oceanography Center, Southampton, UK, November 10<sup>th</sup>, 2015. Host: *Dr. Anna Hickman*.

### **Selected Oral Presentations**

Papoulis, S.E., Wilhelm, S.W., Talmy, D., Zinser, E.R. Nutrient enrichment and predation defense drive cyanobacteria population dynamics. Ocean Sciences Meeting, Virtual, March 3<sup>rd</sup>, 2022.

Rajakaruna, H., Omta, A.W., Carr, E., Talmy, D. The power-law biomass scaling relationship in natural microbial ecosystems. Ocean Sciences Meeting, Virtual, March 4<sup>th</sup> 2022.

Talmy, D., Vage, S., Cael, B.B., Follows, M.J. Trade-offs modify ecosystem biomass structure along trophic gradients. 4<sup>th</sup> workshop on trait-based approaches to ocean life, Buckinghamshire, UK, Aug 18<sup>th</sup>, 2019.

Showalter, G.M., Talmy, D., Deming, J.W. Modeling virus-host dynamics in sea ice brines. International Symposium on Sea Ice, Winnipeg, Manitoba, Canada, August 17-21<sup>st</sup>, 2019.

Hinson, A., Talmy, D. What controls algal-virus population dynamics in diverse systems? Aquatic Sciences Meeting, San Juan, Puerto Rico, Feb 26<sup>th</sup>, 2019.

Talmy, D., Bidle, K.D., Kranzler, C., Thamatrakoln, K. Inferring nutrient and light sensitivity of phytoplankton host-virus metabolism from laboratory population dynamics. 9<sup>th</sup> Aquatic Virus Workshop, Lincoln, Nebraska, USA, June 20<sup>th</sup>, 2018.

Talmy, D., Zakem, E., Follows, M.J. Modeling competitive interactions among viruses and microzooplankton grazers in the global ocean. Ocean Sciences Meeting, Portland, Oregon, USA, February 15<sup>th</sup>, 2018.

Talmy, D., Follett, C.L., Follows, M.J. Does viral lysis influence dissolved organic matter elemental composition? Aquatic Sciences Meeting, Honolulu, Hawaii, USA, February 28<sup>th</sup>, 2017.

Talmy, D., Thamatrakoln, K., Bidle, K.D., Follows, M.J. How does viral infection of *Emiliania huxleyi* depend on ambient irradiance? Monteiro group meeting, University of Bristol, Bristol, UK, July 26<sup>th</sup>, 2016.

Talmy, D., Hussain, F., Follows, M.J. The influence of lytic vs. lysogenic viral reproduction on host-virus populations. 8<sup>th</sup> Aquatic Virus Workshop, Plymouth, UK, July 11<sup>th</sup>, 2016.

Talmy, D., Martiny, A.C., Hickman, A.E., Hill, C.N., Follows, M.J. Microzooplankton regulation of surface ocean POC:PON ratios. Ocean Sciences Meeting, New Orleans, Louisiana, USA, February 25<sup>th</sup>, 2016.

Talmy, D., Hussain, F., Follows, M.J. The influence of viral reproduction strategies on marine microbial community dynamics. Trait-based approaches to ocean life workshop, New Hampshire, USA, October 5<sup>th</sup>, 2015.

Talmy, D., Hussain, F., Follows, M.J. The influence of viral reproductive strategies on marine microbial community dynamics. Aquatic Sciences Meeting, Granada, Spain, February 27<sup>th</sup>, 2015.

Talmy, D., Hardman-Mountford, N.J., Blackford, J.C., Geider, R.J. Phytoplankton photoadaptation in contrasting aquatic light regimes. Ocean Sciences Meeting, Honolulu, Hawaii, USA, February 27<sup>th</sup>, 2014.

Talmy, D., Hardman-Mountford, N.J., Blackford, J.C., Polimene, L., Hill, C.N., Follows, M.J., Geider, R.J. Phytoplankton photoadaptation in contrasting aquatic light regimes. Sack Lunch Seminar Series, Department of Earth, Atmosphere and Planetary Sciences, Massachusetts Institute of Technology, Massachusetts, USA, October 23<sup>rd</sup>, 2013.

Talmy, D., Blackford, J., Hardman-Mountford, Geider, R.J. Adaptation to variable light determines resource allocation in phytoplankton. Ocean Sciences Meeting, Salt Lake City, Utah, USA, February 23<sup>rd</sup>, 2012.

Talmy, D., Blackford, J., Hardman-Mountford, Geider, R.J. Modeling phytoplankton growth in non steady-state environments. Marine Sciences Seminar, Plymouth Marine Laboratory, Plymouth, UK, May 26<sup>th</sup>, 2011.

Talmy, D., Blackford, J., Hardman-Mountford, Geider, R.J. Modeling phytoplankton productivity in the open ocean: including the effects of adaptation to different light regimes. Marine Science and Environmental Microbiology Seminar, University of Essex, January 26<sup>th</sup>, 2011.

Talmy, D., Blackford, J., Hardman-Mountford, Geider, R.J. Optimality in phytoplankton growth models and the link with satellite data. NCEO Ocean Carbon Cycle Meeting, Plymouth, UK, July 15<sup>th</sup>, 2010.

### **Poster Presentations**

Carr, E., Rajakaruna, H., Talmy, D., On the influence of mortality on microbial predator-prey relationships in the surface ocean. 5<sup>th</sup> workshop on trait-based approaches to ocean-life, Knoxville, TN, Jan 27<sup>th</sup> 2022.

McCullough, D.K., Calfee, B., Zinser, E.R., Talmy, D. Toward a general model of the effects of exogenous reactive oxygen on bacterial community dynamics. 5<sup>th</sup> workshop on trait-based approaches to ocean-life, Knoxville, TN, Jan 27<sup>th</sup> 2022.

Rajakaruna, H., Omta, A.W., Carr, E., Talmy, D. The power-law biomass scaling relationship in natural microbial ecosystems. 5<sup>th</sup> workshop on trait-based approaches to ocean-life, Knoxville, TN, Jan 27<sup>th</sup> 2022.

McCullough, D.K., Calfee, B., Zinser, E.R., Talmy, D. Connecting hydrogen peroxide damage and nutrient limitation controls on marine cyanobacterial growth. 4<sup>th</sup> workshop on trait-based approaches to ocean life, Buckinghamshire, UK, Aug 19<sup>th</sup>, 2019.

Papoulis, S.E., Wilhelm, S.W., Talmy, D., Zinser, E.R. Environmental nutrients explain the distribution of restriction modification systems in prokaryotic genomes. 4<sup>th</sup> workshop on trait-based approaches to ocean life, Buckinghamshire, UK, Aug 20<sup>th</sup>, 2019.

Talmy, D., Follett, C.L., Follows, M.J. Viral regulation of dissolved organic matter elemental composition. Viruses of Microbes Meeting, Liverpool, UK, July 19<sup>th</sup>, 2016.

Talmy, D., Blackford, J., Hardman-Mountford, Geider, R.J. Phytoplankton optimal resource allocation in response to variable light intensity. Advances in Marine Ecosystem Modelling Research (AMEMR) Symposium, Plymouth, UK, June 28<sup>th</sup>, 2011.

Talmy, D., Blackford, J., Hardman-Mountford, Geider, R.J. Optimality in phytoplankton growth models and the link with satellite data. Advanced School on Complexity, Adaptation and Emergence in Marine Ecosystems, Trieste, Italy, October 21<sup>st</sup>, 2010.

### **Workshops and Summer Schools**

2022	5 <sup>th</sup> workshop on trait-based approaches to ocean life, Knoxville, Tennessee, USA
2020	NIMBioS/SCMB Investigative Workshop on Quantitative Education in Life Sciences Graduate Programs, Virtual
2019	4 <sup>th</sup> workshop on trait-based approaches to ocean life, Buckinghamshire, UK
2018	9 <sup>th</sup> Aquatic Virus Workshop, Lincoln, Nebraska, USA
2016	8 <sup>th</sup> Aquatic Virus Workshop, Plymouth, UK
2015	Trait-Based Approaches to Ocean Life Workshop, Waterville Valley, New Hampshire, USA
2015	Workshop for Development of macromolecular models of marine algae, Sackville, New Brunswick, Canada
2014	The Gordon and Betty Moore Foundation Research Associate and Postdoctoral Scholar Summit, Dorado, Puerto Rico
2014	North Atlantic Virus Infection of Coccolithophores Expedition (Na-VICE) post cruise meeting, Woods Hole Oceanographic Institution, Falmouth, Massachusetts, USA
2013	Trait and Resource Allocation Based Modeling of Microbial Communities, University of Exeter, UK
2013	Workshop for Understanding Microbial Macromolecular Composition, Haifa, Israel
2010	Advanced School on Complexity, Adaptation and Emergence in Marine Ecosystems, Trieste, Italy
2010	Earth System Science Spring School, Scarborough, UK

2010 Modeling Evolutionary and Ecological Processes in Biogeochemical Cycles, University of East Anglia, UK

### **Teaching Experience**

2022 Invited lecturer, Quantitative methods in virus ecology and evolution (~10 graduate students), University of Bergen, Norway  
2020-2022 Lecturer, General Microbiology (~100 undergraduate students), University of Tennessee, Knoxville  
2020-2021 Instructor, Advanced Topics in Microbiology (~10 graduate students), University of Tennessee, Knoxville  
2018-2019 Graduate journal club in computational biology, University of Tennessee, Knoxville  
2016 Invited lecturer, Hjort Summer school in Bergen, Norway: Complexity vs. simplicity in microbial ecology  
2008 Associate Tutor, University of Sussex, UK. Courses taught: Linear algebra II and Introduction to Matlab  
2007 High school classroom assistant as part of the Student Associate Scheme, Worthing High School, Worthing, East Sussex, UK

### **Mentorship**

#### *Undergraduates*

2020 Umang Joshi, Stephanie Westaway, Michael Lin, NIMBioS Research Experiences for Undergraduates, 6-week summer group research project.  
2018-2019 Maitraya Ghatak, 401R, Undergraduate Research in Microbiology.  
2019 Lucas Fiet, Margie Knight, Priscilla Cho, NIMBioS Research Experiences for Undergraduates, 10-week summer group research project.  
2019 Aaron Lin, NSF Research Experiences for Undergraduates, 10-week summer research placement  
2018 Brielle Shortreed, NSF Research Experiences for Undergraduates, 10-week summer research placement.

#### *Graduate students*

2018-present Katie McCullough, Microbiology Graduate Student, Project TBD  
2018-present Kyla Linn, Genome Science and Technology Graduate Student. Masters thesis: Ecological controls on successional patterns in bloom forming cyanobacteria

#### *Postdoctoral researchers*

2020-present Dr. Harshana Rajakaruna  
2020-present Dr. Spiro Papoulis  
2018-2020 Dr. Audra Hinson

### **Professional Service and Outreach**

2022	Lead organizer, Fifth Workshop on Trait-Based Approaches to Ocean Life, Knoxville, TN.
2021	NSF Panelist, Oceanography Postdoctoral Fellowship program.
Ongoing	Reviewer, <i>Science</i> , <i>Nature Communications</i> , <i>Nature Ecology and Evolution</i> , <i>Science Advances</i> , <i>The ISME Journal</i> , <i>The American Naturalist</i> , <i>Limnology and Oceanography</i> , <i>Global Biogeochemical Cycles</i> , <i>Biological Invasions</i> , <i>Biophysical Journal</i> , <i>New Biotechnology</i> , <i>Journal of Theoretical Biology</i> , <i>Marine Ecology Progress Series</i> , <i>PLOS ONE</i> , <i>Frontiers in Marine Science</i> , <i>Journal of Marine Systems</i>
Ongoing	NSF Biological Oceanography, mail-in reviewer
2016-2018	Volunteer, development of an interactive web app for high school students to learn about scientific modeling, with Janice McDonnell and Carrie Ferraro in the Department of Marine and Coastal Sciences (DMCS) at Rutgers University
2017	NASA panelist, EXPORTS program
2015-2016	Interviewee for outreach movie for high school students to learn about scientific modeling, collaboration between Tilapia Film (Los Angeles) and scientists in the DMCS at Rutgers University
2016	Demonstrator, The 6 <sup>th</sup> Annual John Carlson Lecture, New England Aquarium
2016	Demonstrator, Oceans Alive! Display for MIT Open House
2014	Demonstrator, Nautical Night at the MIT Museum
2011-2012	STEMNET (Science, Technology and Engineering Network) Ambassador (various locations)
2011	Researcher in Residence, Ridgeway School (now Plympton Academy), Plympton, UK

## Grants and Awards

2020-2024	NSF Principle Investigator award (\$913,189) “ <i>Characterizing the effects of exogenous reactive oxygen species on marine microbial ecosystem dynamics</i> ” ID number: OCE-2023680
2020-2023	Simons Early Career Investigator in Marine Microbial Ecology and Evolution Award (\$666,000). ID number: 690671
2018-2020	Burroughs Wellcome Fund (\$150,000): “ <i>Enhancing Quantitative and Data Science Education for Graduate Students in Biomedical Science at the University of Tennessee, Knoxville</i> ” ID number: 1018963
2015-2019	NSF Co-Principle Investigator award (\$326,864): “ <i>Elucidating algal host-virus dynamics in different nutrient regimes - mechanistic interactions and biogeochemical impact</i> . ID number: OCE-1536521.
2009-2013	National Centre for Earth Observation PhD studentship
2009	NERC subsidy to attend Earth System Science Spring School
2008-2009	NERC Masters studentship