JERNEJ TURNŠEK, PhD

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My research program integrates diatom molecular and cell biology, molecular tool development, and biotechnology. We are advancing basic understanding of diatom biology and translating our findings to applications that will help alleviate the climate crisis.

Diatoms are widespread photosynthetic single-celled algae estimated to account for 20% of the oxygen we breathe. We are pioneering the use of modern molecular tools, including proximity labeling and CRISPR, in diatoms. Our research interests are revolving around biosilicification and silicon metabolism in diatoms. These efforts are improving our molecular understanding of their vital role in global biogeochemical cycles. New insights into diatom biology carry potential for biotechnology innovations in carbon sequestration, materials science, biomedicine, and beyond.

EDUCATION

Harvard University Jan. 2020
PhD, Biological and Biomedical Sciences, *Advisors: Andrew E. Allen, PhD* and *Pamela A. Silver, PhD*
Dissertation: Towards Subcellular Proteomic Maps in Model Marine Diatoms

University of Ljubljana June 2012
MSc, Biotechnology, *Advisor: Roman Jerala, PhD*
Thesis: Synthetic Biology Approach Towards Improvement of Carotenoid Biosynthetic Pathway Using Zinc Fingers

FUNDING

The Gordon and Betty Moore Foundation Grant GBMF4958 | $401,010 Aug. 2015–July 2018

PUBLICATIONS

Turnšek J, Brunson JK, Martinez Viedma MP, Deerinck TJ, Horák A, Oborník M, Bielinski VA, Allen AE. 2021. Proximity proteomics in a marine diatom reveals a putative cell surface-to-chloroplast iron trafficking pathway. *eLife* 10:e52770.

Faktorová D, Nisbet RER, Fernández Robledo JA, Casacuberta E, Sudek L, (…), **Turnšek J**, (…), Lukeš J. 2020. Genetic tool development in marine protists: emerging model organisms for experimental cell biology. *Nature Methods* 17:481–494.

Conrado RJ, Wu GC, Boock JT, Xu H, Chen SY, Lebar T, **Turnšek J**, Tomšič N, Avbelj M, Gaber R, Koprivnjak T, Mori J, Glavnik V, Vovk I, Benčina M, Hodnik V, Anderluh G, Dueber JE, Jerala R, DeLisa MP. 2012. DNA-guided assembly of biosynthetic pathways promotes improved catalytic efficiency. *Nucleic Acids Research* 40:1879–1889.

PATENT APPLICATION

Jerala R, Avbelj M, Benčina M, Mori J, Gaber R, Koprivnjak T, Anderluh G, Vovk I, Lebar T, **Turnšek J**, Ilc T, Tomšič N, Stošicki T, Žnidarič M, Bordon J, Petroni M, Glavnik V. Improved synthesis of biosynthetic product by ordered assembly of biosynthetic enzymes guided by the nucleotide sequence motif template. WO2012053985 filed on 2010-10-22 and published on 2012-04-26.

PRESENTATIONS

Talks (*Invited)
2023 Materials Research Society Spring Meeting, San Francisco, CA Apr. 2023
Plant Genome Engineering Symposium, Berkeley, CA Sep. 2022
Methods for studying phase separation in biology, Dresden, Germany Feb. 2019

ASCB | EMBO 2018 Meeting, San Diego, CA — Dec. 2018
Scripps Institution of Oceanography, La Jolla, CA — Nov. 2017
Wyss Institute for Biologically Inspired Engineering, Boston, MA — Mar. 2016
4th ISS: International Summer School, Piran, Slovenia* — Aug. 2011
6th CeBiTec Symposium: Genome-based Microbiology, Bielefeld, Germany* — July 2011
1st Bio:Fiction, Science, Art and Film Festival, Vienna, Austria* — May 2011
iGEM 2010 Jamboree, Cambridge, MA — Nov. 2010

Posters

Plant & Microbial Biology Department Retreat, Berkeley, CA — Sep. 2022
Biomineralization Gordon Research Seminar and Conference, Castelldefels, Spain — Aug. 2022
Ocean Sciences Meeting 2020, San Diego, CA — Feb. 2020
Phase Transitions in Polymeric and Protein Systems, Dresden, Germany — Feb. 2019
ASCB | EMBO 2018 Meeting, San Diego, CA — Dec. 2018
ASM Microbe 2018, Atlanta, GA — June 2018
A New Age of Discovery for Aquatic Microeukaryotes, Heidelberg, Germany — Jan. 2016
The Eleventh Annual Broad Institute Retreat, Boston, MA — Dec. 2015
Wyss Institute 7th Annual Retreat, Boston, MA — Nov. 2015
Molecular Life of Diatoms 2015, Seattle, WA — July 2015

TEACHING AND MENTORING

Research Mentor, UC Berkeley, Berkeley, CA — Sep. 2022–present
Training two undergraduates to perform molecular cloning, genetically engineer diatoms, and conduct fluorescence microscopy experiments.

Guest Lecturer, UC Berkeley, Berkeley, CA — Feb. 2022
Lectured on diatom biology in the Biology of Algae (PMB 120) course.

Research Mentor, J. Craig Venter Institute, La Jolla, CA — Apr. 2017–Sept. 2018
Trained a Research Associate to perform molecular cloning, genetically engineer diatoms, and conduct fluorescence microscopy and proximity labeling experiments.

Biochemistry Bootcamp Mentor, Wellesley College, Wellesley, MA — Jan. 2015
Guided two undergraduates through protein expression, purification, and activity experiments.

Mathematics, Physics, and English Tutor — 2006–2008
Conducted High School level Mathematics, Physics, and English tutoring in Slovenia.

SERVICE AND OUTREACH

SERVICE

Proposal Reviewer — Nov. 2023
Homeworld Collective Garden Grants, San Francisco, CA

Discussion Leader — Aug. 2022
Biomineralization Gordon Research Seminar, Castelldefels, Spain

Ambassador — Nov. 2017–Sept. 2020
protocols.io, Berkeley, CA

Pre-Proposal Reviewer — Aug.–Sept. 2019
Symbiosis in Aquatic Systems Initiative by the Gordon and Betty Moore Foundation, Palo Alto, CA

OUTREACH

Ocean Lights: bioluminescent bloom information booth, La Jolla, CA — May 2018
Turnšek J. 2018. Marine Microbes: Triathlete's Best Friends. *Triathlon Club of San Diego newsletter* Jan./Feb. 2018:1 & 6. — Feb. 2018
TriForOceans: saving coral reefs through triathlon, Gilford, NH — Aug. 2016
Turnšek J. Going with the Flow: New Evidence for Liquid Water on Mars. — Oct. 2015

Turnšek J. Diatoms: Nature's nanotechnologists. May 2014
Turnšek J. 2013. Slovenian success in the biomolecular design competition BIOMOD 2011 Apr. 2013
Proteus 75:347–352. (Kavčič Award)
Jerala R, Gaber R, Mori J, **Turnšek J**. 2012. Synthetic Biology: from Nanoscale to the July 2012
Molecular Assembly Line. *Quark, Research and Development in Slovenia* Summer 2012:20–23.

PROFESSIONAL EXPERIENCE

HHMI Postdoctoral Associate July 2020–present
Department of Plant and Microbial Biology, UC Berkeley, Berkeley, CA
Advisor: Krishna K. Niyogi, PhD

Postdoctoral Researcher Jan. 2020–May 2020
Microbial and Environmental Genomics, J. Craig Venter Institute, La Jolla, CA
Advisor: Andrew E. Allen, PhD

Research Fellow Sept. 2016–Dec. 2019
Microbial and Environmental Genomics, J. Craig Venter Institute, La Jolla, CA
Advisor: Andrew E. Allen, PhD

Visiting Graduate Student Sept. 2016–May 2019
Scripps Institution of Oceanography, UC San Diego, La Jolla, CA
Center for Research in Biological Systems, UC San Diego, La Jolla, CA
Advisor: Andrew E. Allen, PhD

Graduate Research Fellow May 2014–Dec. 2019
Department of Systems Biology, Harvard Medical School, Boston, MA
Advisor: Pamela A. Silver, PhD

Organism Engineer Oct. 2012–June 2013
Ginkgo Bioworks, Inc., Boston, MA
Advisor: Curt Fischer, PhD

Expert Associate Aug. 2011–July 2012
National Institute of Chemistry, Ljubljana, Slovenia
Advisor: Roman Jerala, PhD

PROFESSIONAL DEVELOPMENT

Academic Lab Management & Leadership Symposium Mar. 2023
Torrey Pines Training Consortium, San Diego, CA

Scientific Leadership and Management Skills Course Feb. 2023
UC Berkeley, Berkeley, CA

EMBO Practical Course: Methods for studying phase separation in biology Feb. 2019
Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany

ASCB and Keck Graduate Institute Biotech Mini-Course Dec. 2018
Biocom, San Diego, CA

Microbial Sciences Initiative Microscopy Short Course Jan. 2016
Harvard University, Cambridge, MA

Material Research Society Science Writing Workshop Nov. 2015
Hynes Convention Center, Boston, MA

Discover Management Program July 2011
IEDC - Bled School of Management, Bled, Slovenia

Regional BioCamp May 2011
LEK - a Sandoz Company, Ljubljana, Slovenia

SKILLS

Wet Lab
Molecular cloning • CRISPR • Bacterial, yeast, diatom genetic engineering • gDNA and RNA extraction • cDNA synthesis • Fluorescence microscopy • Electron microscopy • Proximity labeling • Pull-down assays • Yeast two-hybrid • Protein purification • PAGE • Western blot

Dry Lab
Benchling • SnapGene • Geneious • Chimera • Basic knowledge of Bash, R, Python, and LaTeX

Languages
Slovenian and English (Native or Bilingual Proficiency) • Bosnian-Croatian-Montenegrin-Serbian (Limited Working Proficiency) • German and Spanish (Elementary Proficiency)

HONORS AND AWARDS

Kavčič Award for Popular Science Writing, Ljubljana, Slovenia	Apr. 2013
University of Ljubljana Prešeren Award for MSc Thesis, Ljubljana, Slovenia	Nov. 2012
Krka Prize for MSc Thesis, Novo mesto, Slovenia	Oct. 2012
University of Ljubljana Rector's Best Innovation Award, Ljubljana, Slovenia	Dec. 2011
Gold Medal, BIOMOD 2011, Boston, MA	Nov. 2011
Grand Prize, iGEM 2010, Cambridge, MA	Nov. 2010
Zois Scholarship, Ljubljana, Slovenia	2002–2011

HOBBIES AND INTERESTS

Endurance Sports

USA Triathlon Olympic-Distance Age Group National Championships qualifier.	2018, 2019, 2022
Two-time marathon and four-time Half Ironman triathlon finisher.	2013–present

Basketball

Harvard Medical School intramural basketball league champion.	2014
Two-time University of Ljubljana basketball league champion.	2008, 2009
Played semi-professionally for three Slovenian teams.	2007–2010

Interests
Space exploration • Mathematics • Exercise physiology • Sports performance technology • Traveling • Coffee culture

ACADEMIC REFERENCES

Krishna K. Niyogi, PhD niyogi@berkeley.edu | 510-643-6604
Professor, Department of Plant and Microbial Biology, UC Berkeley
Faculty Scientist, Lawrence Berkeley National Laboratory
Investigator, Howard Hughes Medical Institute

Andrew E. Allen, PhD aallen@jcvi.org | 858-200-1826
Professor, Environmental Sustainability, Synthetic Biology, J. Craig Venter Institute
Professor, Scripps Institution of Oceanography, UC San Diego

Christopher L. Dupont, PhD cdupont@jcvi.org | 858-200-1886
Professor, Environmental Sustainability, Synthetic Biology, Human Health, J. Craig Venter Institute

Sinem Beyhan, PhD sbeyhan@jcvi.org | 858-750-4029
Associate Professor, Human Health, J. Craig Venter Institute
Associate Professor, UC San Diego
Adjunct Professor, San Diego State University