

## DR. ISABEL “IZZY” BAKER

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### EDUCATION

2016-2022	Harvard University <b>Ph.D., Organismic and Evolutionary Biology</b>
2015-2016	New York University <b>M.Sc., Bioinformatics and Systems Biology</b>
2012-2015	New York University <b>B.A., Biology</b> (minor in Chemistry)

### ADDITIONAL EDUCATIONAL TRAINING

2019-2022	Harvard University <b>Origins of Life Initiative Certificate</b>
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### PROFESSIONAL EXPERIENCE

2023-present	<b>Geobiology Postdoctoral Fellow</b> , Advisor: Maya Gomes Department of Earth & Planetary Sciences, Johns Hopkins University
2024-present	<b>Postdoctoral Associate</b> , Advisor: Jocelyne DiRuggiero Department of Biology, Johns Hopkins University
2022-2023	<b>Research Biologist</b> , Advisors: Lina Bird and Matthew Yates Center for Bio/Molecular Science and Engineering, U.S. Naval Research Laboratory
2016-2022	<b>Doctoral Research Scientist</b> , Advisor: Peter Girguis Department of Organismic and Evolutionary Biology, Harvard University
2014-2016	<b>Undergraduate &amp; Masters Research Associate</b> , Advisor: Stephen Small Center for Developmental Genetics, New York University

### AWARDS, GRANTS, & FELLOWSHIPS

2023-2025	<b>Geobiology Postdoctoral Fellowship</b> , Agouron Institute ( <u>Total: \$167,000</u> ) <u>Title:</u> Settling the sulfur score: the genesis of superheavy pyrites and the environmental conditions they record.
2022-2024	<b>Geobiology Postdoctoral Fellowship</b> , Agouron Institute ( <u>Total: \$142,000</u> , declined)
2022	<b>Distinction in Teaching</b> , Harvard University, Undergraduate Course ‘Deep Sea Biology’
2017, 2018	<b>Simmons’ Microscopy Grant</b> , Harvard Center for Biological Imaging ( <u>Total: \$5,000</u> )
2018	<b>Distinction in Teaching</b> , Harvard University, Undergraduate Course ‘Cell Biology in the World’
2017	<b>AbbVie Immunology Scholarship</b> , AbbVie Inc. ( <u>Total: \$15,000</u> )
2016	<b>Biology Masters Research Grant</b> , New York University ( <u>Total: \$1,500</u> )
2016	<b>Master’s College Scholarship</b> , New York University
2015	<b>Women in Science Scholarship</b> , New York University
2014, 2015	<b>Dean’s Undergraduate Research Grant</b> , New York University ( <u>Total: \$2,000</u> )

## PEER-REVIEWED PUBLICATIONS

### PUBLISHED

- (11) **Baker, I.** and Girguis, P. (2024). Sulfur cycling likely obscures dynamic biologically-driven iron-redox cycling in contemporary methane seep environments. *Environ. Microbiol. Rep.* 16 (3), e13263.
- (10) **Baker, I.**, Matzen, S., Schuler, C., Toner, B., and Girguis, P. (2023). Aerobic iron-oxidizing bacteria secrete metabolites that markedly impede abiotic iron oxidation. *PNAS Nexus*. 2(12), pgad42.
- (9) **Baker, I.**, Colston, S., Hervey, W., and Bird, L. (2023). Complete Genome of a Novel *Serratia* Species Isolated from PFAS-Impacted Soil. *Microbiol. Resour. Announc.* 12(12), e00640-23.
- (8) **Baker, I.**, Conley, B., Gralnick, J., and Girguis, P. (2022). Evidence for Horizontal and Vertical Transmission of Mtr-Mediated Extracellular Electron Transfer among the Bacteria. *mBio*. 13(1), e02904-21.
- (7) Datta, R., Ling, J., Kurland, J., Ren, X., Zhe, X., Yucel, G., Moore, J., Shokri, L., **Baker, I.**, Bishop, T., et al. (2018). A feed-forward relay integrates the regulatory activities of Bicoid and Orthodenticle via sequential binding to suboptimal sites. *Genes & Dev.* 32(9-10), 723-736.

### IN REVIEW

- (6) Moore, K., Gomes, M., **Baker, I.**, Hibner, B., DiRuggiero, J., Larson, J., Wenick, M., and Trower, L. Impact of ultraviolet light and desiccation stress on microbial mat community composition and morphology.
- (5) Keller, K., Baum, M., Liu, X., Ashing-Giwa, K., **Baker, I.**, Blewett, J., and Pearson, A. Constraining the sources of archaeal tetraether lipids in multiple cold seep provinces of the Cascadia Margin.
- (4) **Baker, I.**, Colston, S., Hervey, W., Eddie, B., and Bird, L. Draft genome of a fluorescent *Pseudomonas* species isolated from a PFAS groundwater treatment plant.

### IN PREPARATION

- (3) **Baker, I.** and Gomes, M. Isotopically “superheavy” pyrites in the oxygen-stressed Chesapeake Bay as a warning sign for shifting microbial controls on methane flux.
- (2) **Baker, I.**, Cohen, J., Emerson, D., and Girguis, P. Diverse iron-oxidizing Zetaproteobacteria exert differential controls on mineral dissolution.
- (1) Mickol, R., Pazol, J., **Baker, I.**, and Bird, L. Detection of fluoride in natural waters and laboratory medium.

## PATENTS

**Baker, I.** and Bird, L. Fluorescence Detection of Perfluorooctanoic acid and Perfluorooctanesulfonic Acid Using Living Cultures of a Newly Isolated *Pseudomonas* sp. Bacterium. U.S. Patent 63/542, 562 filed October 05, 2023. Patent pending.

## POLICY BRIEFS

### PUBLISHED

Lidström, S., Levin, L., Annasawmy, P., **Baker, I.**, et al. (2023). Incorporating Deep-Ocean Biodiversity into Climate Change Policy. Deep-Ocean Stewardship Initiative.

### IN PREPARATION

Bax, N., Escobar, E., Hilmi, N., Baker, M., Gertz, B., Esquete, P., Annasawmy, P., **Baker, I.**, et al. (2024) Deep-Sea and Mesophotic priorities for biodiversity protection in British Overseas Territories. Deep-Ocean Stewardship Initiative.

## PRESENTATIONS

### INVITED SEMINARS & CONFERENCE TALKS

- (15) 'The chemical footprint of an iron-oxidizing bacterium and its impacts on iron oxidation and mineralization' (2024). Goldschmidt Conference, Chicago, IL.
- (14) 'Settling the Sulfur Score: What are isotopically "superheavy" pyrites trying to tell us about the co-evolution of life and Earth?' (2024). Earth and Planetary Science Research Day, Johns Hopkins University, Baltimore, MD.
- (13) 'Aerobic iron-oxidizing bacteria secrete metabolites that markedly impede abiotic iron oxidation' (2024). Northeast Geobiology Symposium, New Haven, CT.
- (12) 'How to Make a Habitable Planet: Lessons from Microbe-Mineral Interactions,' (2024). Invited Speaker. Bromery Seminar Series, Department of Earth & Planetary Science, Johns Hopkins University, Baltimore, MD.
- (11) Secreted metabolites of an iron-oxidizing bacterium impede abiotic iron oxidation in the presence of O<sub>2</sub>' (2023). Mid-Atlantic Geobiology Symposium, Newark, DE.
- (10) 'How do iron-oxidizing bacteria survive in an iron-oxidizing ocean?' (2023). Invited Speaker. Monthly Meeting for NASA-funded initiative 'Exploring Ocean Worlds: Ocean System Science to Support the Search for Life,' Virtual.
- (9) 'Adaptations to life on an oxidizing planet – insights from the iron-respiring bacteria,' (2023). Invited Speaker. Mineral Sciences Seminar Series, National Museum of Natural History, Washington, DC.
- (8) 'The Diversity and Evolution of the MtrCAB Extracellular Electron Transfer System,' (2022). Invited Speaker. Center for Bio/Molecular Science and Engineering Seminar Series, U.S. Naval Research Laboratory, Washington, DC.
- (7) 'Evidence for horizontal and vertical transmission of Mtr-mediated extracellular electron transfer among the Bacteria,' (2022). Ocean Sciences Meeting, Virtual.
- (6) 'The Limits of Life: New Developments in Biogeochemistry and Ecology,' (2022). Invited Speaker. Gordon Research Seminar on Geobiology, Ventura, CA.
- (5) 'Academic Paper Writing,' (2022). Invited Panelist. Ocean Sciences Meeting, Virtual.
- (4) 'The Energy Crisis: (Some) Solutions from the Deep Sea and Right Beneath Your Feet,' (2021). Invited Panelist. *Microbes and the UN Sustainable Development Goals (After Chat)*, FEMS Symposium, World Microbe Forum, Virtual.
- (3) 'The Evolution of MtrCAB-Mediated Extracellular Electron Transfer,' (2021). Northeast Geobiology Symposium, Virtual.
- (2) 'An All You Can EET Buffet: Insights into the Evolution of Extracellular Electron Transfer,' (2020). Department of Organismic and Evolutionary Biology, G5 Symposium, Harvard University, Virtual.
- (1) 'Oil in an Iron Skillet (or the tale of iron-oxidizing bacteria at seafloor methane seeps),' (2019). Department of Organismic and Evolutionary Biology Student Seminar Series, Harvard University, Cambridge, MA.

### CONFERENCE POSTERS

- (6) 'Deciphering the geobiological formation of isotopically superheavy pyrites in the modern to understand their environmental relevance in oceans past,' (2024, *upcoming*). American Geophysical Union Annual Meeting, Washington, DC.
- (5) 'Non-stalk-forming iron-oxidizing bacterium impedes abiotic iron oxidation,' (2022). Gordon Research Conference on Geobiology, Ventura, CA.
- (4) 'Characterizing the role that iron-oxidizing bacteria play in iron and carbon biogeochemical cycling at deep-sea methane seeps,' (2020). Gordon Research Conference on Geobiology, Galveston, TX.
- (3) 'Iron-Oxidizing Bacteria in an Iron-Oxidizing World: Consequences for Physiology and the Environment,' (2019). Harvard Origins of Life Initiative Symposium, Cambridge, MA.

- (2) 'Iron-Oxidizing Bacteria in an Iron-Oxidizing World: Consequences for Physiology and the Environment,' (2019). Northeast Geobiology Symposium, Amherst, MA.
- (1) 'Diffusion in an Iron-Oxidizing Hydrothermal Vent Biofilm: Management and Environmental Engineering,' (2018). Harvard Simmons Award Symposium, Cambridge, MA.

## MENTORING EXPERIENCE

Undergraduate	Angelina Young (2024-present), Johns Hopkins University Jonas Larson (2024-present), Johns Hopkins University Alexandria Flynn (2024-present), Johns Hopkins University Elida Kocharian (2020-2021), Harvard University Emma Riccardi (2019), Evolution, Ecology, and Environment REU, Harvard University
High School	Carter Pisano (2024-present), Baltimore Polytechnic Institute, Ingenuity Program
Other	Anna Droege (2024), Primary School Teacher at The Park School of Baltimore

## TEACHING EXPERIENCE

Invited Guest Lecturer	'What is life?' Planets, Life, and the Universe course, Johns Hopkins University, 2024 'Mineral-Organic-Microbe Interfacial Chemistry,' Geobiology course, Johns Hopkins University, 2024 'The Ecophysiology of Bacteria that Breathe Rust,' Biology Seminar, Stockton University, 2023 'Life at Hydrothermal Vents,' Senior Seminar, Lake Forest College, 2020 'The Co-Evolution of Earth's Oxygen and Carbon Cycles,' Deep Sea Biology, Harvard University, 2020 'Oxygen Minimum Zones and Dead Zones—What's the difference?' Deep Sea Biology, Harvard University, 2019 'The Early Earth and the Origin of Life,' How to Build a Habitable Planet, Harvard University, 2017
Teaching Fellow	Topics in Organismic and Evolutionary Biology, Harvard University, 2021 Deep Sea Biology, Harvard University, 2020 Cell Biology in the World, Harvard University, 2020 Cell Biology in the World, Harvard University, 2018 How to Build a Habitable Planet, Harvard University, 2017 Physiology Course, Marine Biological Laboratory, 2017

## FIELD EXPERIENCE

2023	Chesapeake Bay Detachment (US Naval Research Lab facility) – Deployment and weekly monitoring of custom-designed benthic microbial fuel cells in Chesapeake Bay
2018	R/V <i>Falkor</i> – Microbial community analysis and isolation of iron-oxidizing bacteria at methane seeps using ROV <i>SuBastian</i> along Cascadia Margin near Northwest United States, Pacific Ocean, 30 days at sea

## SCIENCE OUTREACH, ENGAGEMENT, & COMMUNICATION

Planning Committee Member, Mid-Atlantic Geobiology Symposium, Johns Hopkins University, 2025

Planning Committee Member, Planets, Life, and the Universe Lecture Series, Johns Hopkins University & the Applied Physics Laboratory, 2024-2025

Co-Chair, Organizing Committee, Earth and Planetary Sciences Research Day, Johns Hopkins University, 2024

Member, Equity, Diversity, and Inclusivity Committee, Department of Earth and Planetary Sciences, Johns Hopkins University, 2024

Member, Task Force for the Conservation of Deep-Ocean Biodiversity, Deep Ocean Stewardship Initiative, 2023-present

Scientific Consultant, Musical Theater Installation “Ocean Filibuster,” PearlDamour, 2020-2022

Invited Speaker, “Life in the Universe” class, Rockland High School (virtual), 2020

Coordinator, Harvard Marine Biology Internship Program, Cambridge Rindge and Latin School, 2019

Writer, “Searching in the Darkness, Scientists Shed Light on Oceans Beyond Earth,” Harvard Science in the News Blog, 2019

Facilitator, Wider Access to Virtual Expeditions (WAVE) Workshop, Harvard University, 2019

Writer, “The Tiny Extremists in Deep Sea Mud,” R/V *Falkor* Cruise Log, 2018

Speaker, “Studying Microbes’ Role in Earth History,” 15 Second Science, DE SeaGrant, 2018

Speaker, “Project Teach,” Harvard Museum of Natural History & Boston Public Schools, 2018

Host, Harvard Museum of Natural History “City of Microbes” Booth, Cambridge Science Festival, 2018

Senior Mentor, Science Club for Girls, Amigos Elementary School, 2017-2018

Science Education Partner, Harvard Museum of Natural History, 2017-2022

Creator/Host, NYU Women in Science “Fruit Flies and You” Booth, World Science Festival, 2016

## **PROFESSIONAL MEMBERSHIP & SERVICE**

Origins of Life Early Career Network, 2023-present

Invited Reviewer, *Global and Planetary Change*, 2024

Invited Reviewer, *Chemical Geology*, 2024

Invited Reviewer, *mSystems*, 2023, 2024

Invited Reviewer, *Applied and Environmental Microbiology*, 2021-2023

Active Member, Geochemical Society, 2021-present

Member, N95 Mask Design and Reuse Task Force, Ad Hoc Consortium of Greater Boston Area Scientists & Healthcare Professionals, 2020

Active Member, Geobiology Society, 2020-present

Coordinator and Founder, Geobiology Journal Club, Harvard University, 2020-2022

Graduate Student Representative, Department of Organismic and Evolutionary Biology, Harvard University, 2018-2019

## **SHORT COURSES ATTENDED**

Introduction to Ocean Governance: Insights into Ongoing Policy Process and Lessons for Early Career Professionals, Crustal Ocean Biosphere Research Accelerator, Virtual, 2023

Microscopy Workshop, Microbial Sciences Initiative, Harvard University, 2019

Metagenomics Workshop, Geomicrobiology Group, University of Calgary, 2018

Physical Biology of the Cell, Marine Biological Laboratory, 2016