

ROWAN R. TERRA

Ph.D. Candidate in Biological Sciences | ORISE Research Fellow

Pittsburgh, PA | rowan.r.terra@gmail.com

EDUCATION

Duquesne University

Anticipated Fall 2026: Ph.D. in Biological Sciences

Advisors: Dr. Nancy J. Trun & Dr. Djuna M. Gulliver

Committee Members: Dr. John F. Stolz & Dr. Jill A. Dembowski

2022 - Present

Pittsburgh, PA

Carnegie Mellon University

Graduate Coursework in Biology, Chemistry, and Computer Science

Advanced Microbiology, Statistical Computing I and II, and Transition Metal Chemistry

2023 - 2025

Pittsburgh, PA

University of Pittsburgh

M.A.T. in Science (2020)

Advisor: Dr. Kari Kokka

B.S. in Biological Sciences (2019)

Minors in Chemistry, Secondary Education, and Religious Studies

2016 - 2020

Pittsburgh, PA

PROFESSIONAL EXPERIENCE

Graduate Student Researcher & Teaching Assistant

Duquesne University | Pittsburgh, PA

- Used microbiological culture and enrichment methods to identify biological mining pathways from unconventional critical mineral feedstocks
- Determined microbiological mining capacity and metabolic pathways via assays and sequencing analysis
- Mentored undergraduate and graduate student learners
- Instructed biology lab coursework for >100 undergraduate students

2022 - Present

Oak Ridge Institute for Science and Education (ORISE) Research Fellow

Dept. of Energy, National Energy Technology Laboratory | Pittsburgh, PA

- Characterized critical mineral and microbiological feedstocks using ICP-MS, IC, and SEM
- Developed a machine learning tool to identify rare earth element feedstocks using standard indicator parameters and historic survey data
- Standardized field and biological mining techniques to ensure cross-lab data comparability

2022 - Present

Principal

Terra Artificial Intelligence LLC | Pittsburgh, PA

- A small AI startup producing data visualization and machine learning solutions for datasets across many disciplines; certified business operating in Pennsylvania
- Assist clients with acquisition, visualization, and analysis of datasets across STEM and educational subfields

2024 - Present

Data Scientist and Researcher

Freelance Tree Inventorying | Pittsburgh, PA

- Designed custom projects, inventory maps (through ArcGIS and Google Earth Pro), and reports for clients assessing tree species, health, size, and value, among 10+ other attributes

2018 - 2023

Associate Scientist

Castle Biosciences | Pittsburgh, Pennsylvania

- Used immunofluorescent staining and confocal imaging on Barrett's esophagus tissue samples to evaluate progression of disease.
- Assisted with developing computer vision technology to reduce hand annotation on sample confocal images for prediction of disease severity and likelihood for progression to cancer.
- Conducted internal audits, developed standard operating procedures, and produced white papers.

2021 - 2022

K-12 Science Educator

2019 - 2021

Pittsburgh Public Schools and Oakland Catholic HS | Pittsburgh, Pennsylvania

- Instructed over 150 students in biological and chemical sciences coursework at two secondary schools in Pittsburgh, PA
- Utilized flexible instruction during the COVID-19 pandemic to provide the best educational experience possible for students
- Developed and implemented hands-on lab approaches that were engaging and accessible

FELLOWSHIPS, GRANTS, & AWARDS

Fellowships

- Oak Ridge Institute for Science and Education (ORISE) Fellowship. (2022-Present). ~ \$250,000 total. Fellowship covering Ph.D. *stipend, benefits, major experimental costs, and some travel.*
- American Society for Microbiology Future Leaders Fellowship (*term*: 2025-2027).

Research Grants and Awards

- Oak Ridge Institute for Science and Education (ORISE) Fellowship. (2022-Present). ~ \$250,000 total. Fellowship covering Ph.D. *stipend, benefits, major experimental costs, and some travel.*
- Geological Society of America. Outstanding Proposal Research Grant. (2025). \$3,000.

Conference/Travel Awards

- Duquesne University Women in STEM Travel Award. (2026). \$750.
- Geological Society of America Travel Grant. (2025). \$500.
- Allegheny Branch of the American Society for Microbiology. (2024, 2025). ~\$250.
- American Society of Reclamation Sciences Travel Grant (2026, \$350).

Merit Based Awards

- "Outstanding Proposal Research Grant." Geological Society of America, 2025.
- "Outstanding Graduate Research Award." Duquesne University Graduate Research Symposium, 2024.
- "Memorial Scholarship, Ph.D. Level." American Society of Reclamation Sciences, 2026.

MENTORSHIP & PROFESSIONAL ASSOCIATIONS

† Contributed significantly to a published manuscript. ‡ Contributed significantly to a manuscript in preparation or under review. Mentorship covers all endeavors 2022-2026, including independent studies for USA-GER STEM groups.

Name	Department	Institution	Years
J. Bowman ‡	Computer Science	Duquesne University	2026
I. Cann ‡	Biological Sciences	Duquesne University	2023-2026
C. Crawford ‡	Computer Science	Duquesne University	2026
N. Dalgaard ‡	Computer Science	Duquesne University	2026
P. DiGirolamo ‡	Computer Science	Stevens Institute of Technology	2025-2026
K. Kelly ‡	Biological Sciences	Duquesne University	2025-2026
T. Kellman ‡	Environmental Science	Duquesne University	2026
M. Lamke	Biological Sciences	Duquesne University	2025-2026
C. Pugh	Biological Sciences	Duquesne University	2025-2026
J. Rahman ‡	Computer Science	Duquesne University	2026
A. Strassner ‡	Biological Sciences	Duquesne University	2024-2026
R. Sumner	Biological Sciences	Duquesne University	2025
M. Meinzer	Psychologie und Psychotherapie	Technische Universität Braunschweig	2024

Name	Department	Institution	Years
A. Thiele	Psychologie und Psychotherapie	Technische Universität Braunschweig	2024
N. Lamagna ‡	Biological Sciences	Duquesne University	2022-2023

Professional Memberships:

- Duquesne University Women in STEM (WIS)
 - Small group mentor for four undergraduate students
- American Society for Microbiology (ASM)
 - Additional Allegheny Branch Membership (ABASM)
- American Chemical Society (ACS)
- American Society of Reclamation Sciences (ASRS)
- Geological Society of America (GSA)
 - Member of several divisions: (1) Div. of Geobiology and Geomicrobiology, (2) Div. of Geoinformatics and Data Science, (3) Div. of Mineralogy, Geochemistry, Petrology, and Volcanology, (4) Economic Geology, (5) Energy Geology.
- Pittsburgh Geological Society (PGS)

SKILLS

Research Methods:

Bench

- Aerobic and anaerobic microbiological culture, biological mining, amplicon and whole genome library preparation and sequencing, selectivity enrichment assays, liquid-liquid extraction, column chromatography

Instrumentation and Analysis

- Microscopy: SEM, SEM+EDS, Confocal, Fluorescent, Compound
- Elemental Analysis and Chromatography: IC, ICP-MS, ICP-OES, HPLC, NMR, SEM+EDS, TGA

Computational

- Languages: Python, R, C#, HTML, JavaScript
- Techniques: Machine Learning, application development, end-to-end automatic processing workflows, HTML dashboards
- Mapping and Remote Sensing: ArcGIS, NAIP, Earth Pro

Environmental

- Water/soil biological and chemical sampling, site characterization, acid mine drainage monitoring, mapping, satellite monitoring

PUBLICATIONS

★ Included in **Box** Submission for Research Award Submission, PDF size prohibits email

Published

1. ★R. Terra, C. Parker, M.I. Martinez (2025). Mountain Pass Rare Earth Mine Inspires a New Generation of Economic Geoscience Professionals. *Society of Economic Geology, Discovery Journal*, 140.
2. ★R. Terra, V. Hrach (2026). Biology and Chemistry Ph.D. Student Perspectives on Graduate Teaching Assistant Experiences in Pennsylvania Identify Pedagogical Gaps. *Journal of College Science Teaching*, 55(1), 69-82.

Under Journal or PI Review

3. ★R. Terra, D. Gulliver, M. Beebe, N. Trun (2026). Spatiotemporal Biogeochemistry of a Critical Mineral Rich Abandoned Mine Drainage Passive Remediation System. *Applied Environmental Microbiology*. Under review.

4. ★R. Terra*, P. DiGirolamo*, D. Gulliver, N. Trun (2026). DiGiTerra: A No-Code Tool for Machine Learning Exploration. *Journal of Open-Source Software*. *Co-first author. Under review.
5. ★J. Broll, R. Terra, K. Lieb, C. Pester, S. Schaefer (2026). STEM Faculty Mental Health in Germany and the United States: The Role of National Context, Departmental Climate, and Individual Resources. *American Chemical Society*. Under PI editing.
6. ★R. Terra, D. Gulliver, P. DiGirolamo, I. Cann, N. Trun (2026). Computational Prospecting for Rare Earth Element Feedstocks Across Appalachia. Under PI editing.

Drafting

7. ★R. Terra, D. Gulliver, I. Cann, N. Trun (2026). Ubiquitous Microbiological Taxa Across Pennsylvanian Coal Mining Sites Indicate Strategies in Remediation and Metal Extraction. Expected April 2026.
8. R. Terra, D. Gulliver, N. Trun (2026). Biological Mining for Critical Minerals from Secondary Feedstocks is Enhanced by Co-Contaminant Enrichments and Synthetic Communities. Expected June 2026.
9. N. Dalgaard*, J. Rahman*, R. Terra, T. Kellman, K. Kelly, D. Gulliver, N. Trun (2026). AMD Remediation Feature Identification via Computer Vision. *ASRS Reclamation Sciences*. *Co-first author. Expected May 2026.
10. R. Terra, D. Gulliver, N. Dalgaard, J. Rahman, N. Trun (2026). Computer Vision for Identification of Active, Abandoned, and Remediated Coal Mining Sites. *Computers and Geosciences*. Expected July 2026.
11. R. Terra, D. Gulliver, C. Crawford, J. Bowman, N. Trun (2026). Enhancing Experimentation through Thermodynamic Stability Diagrams with Environmental and Biological Constraints. Expected July 2026.
12. ★R. Terra, D. Gulliver, N. Trun (2026). terrahedral: A Tool for Coordination Comparisons Between Mineralogy and Proteins. *SoftwareX / JOSS*. Expected April 2026.
13. ★R. Terra, D. Gulliver, K. Kelly, N. Trun (2026). Comparative Metal Coordination in Microbial Proteins and Minerals Using terrahedral. *Computers and Geosciences*. Expected April 2026.
14. ★R. Terra, D. Gulliver, N. Trun (2026). The Microbiology of Mountain Pass Rare Earth Mine. *Frontiers*. Expected May 2026.
15. A. Strassner, R. Terra, N. Trun (2026). The Co-occurrence of Antibiotic, Zinc, and Cobalt Tolerances from Several Coal Mining Isolates. *Journal of the Pennsylvania Academy of Science*. Experimental phase.
16. D. Moses, R. Terra, N. Trun, B. Porter (2027). Evaluation of Diatom Diversity Across Abandoned Mine Drainage Sites in Pennsylvania. *Applied Environmental Microbiology*.

CRedit Author Contributions by R. Terra

Contributions and expected contributions are indicated by highlight and "X".

Paper	Conceptualization	Data Curation	Formal Analysis	Funding Acquisition	Investigation	Methodology	Project Administration	Resources	Software	Supervision	Validation	Visualization	Writing Original Draft	Writing Review & Editing
1. Mountain Pass REE Mine	X	X			X							X	X	X
2. GTA Pedagogical Gaps	X	X	X	X	X	X	X	X	X		X	X	X	X
3. Spatiotemporal Biogeo. AMD	X	X	X		X	X			X		X	X	X	X
4. DiGiTerra: No-Code ML	X	X				X	X		X		X	X	X	X
5. STEM Faculty Mental Health		X	X		X	X			X					X
6. Comp. Prospecting REE	X	X	X		X	X			X		X	X	X	X
7. Ubiquitous Microbial Taxa	X	X	X		X	X			X		X	X	X	X
8. Biological Mining Co-Contam.	X	X	X		X	X			X		X	X	X	X
9. AMD CV Feature ID	X	X	X		X	X	X		X	X	X	X	X	X
10. CV Mining Sites	X	X	X		X	X			X		X	X	X	X
11. Thermo. Stability Diagrams	X	X	X		X	X	X		X	X	X	X	X	X
12. terrahedral: Tool	X	X	X		X	X			X		X	X	X	X
13. Metal Coord. via terrahedral	X	X	X		X	X			X		X	X	X	X

Paper	Conceptualization	Data Curation	Formal Analysis	Funding Acquisition	Investigation	Methodology	Project Administration	Resources	Software	Supervision	Validation	Visualization	Writing Original Draft	Writing Review & Editing
14. Mountain Pass Microbiology	X	X	X	X	X	X			X		X	X	X	X
15. Antibiotic/Zn/Co Tolerances	X	X	X		X	X	X			X	X	X		X

PROFESSIONAL PRESENTATIONS & INVITED PANELS ★ Invited ‡ Oral

- *Upcoming* ★‡ “ACS Graduate Community Professional Panel.” Carnegie Mellon University Chapter of the American Chemical Society. Pittsburgh, PA. April 2026. 60-minute oral presentation and discussion.
- ★‡ “Biology and Chemistry Ph.D. Student Perspectives on Graduate Teaching Assistant Experiences in Pennsylvania Identify Pedagogical Gaps.” Duquesne University, Center for Teaching Excellence. Pittsburgh, PA. March 2026. 60-minute oral presentation and article study. Digital.
- ★‡ “Successes and Challenges in Machine Learning for Critical Mineral Recovery in the Appalachian Coal Basin.” Department of Energy, Multi-National Laboratory HERMES AI Initiative. February 2026. 20-minute oral presentation and study discussion.
- ‡ “Recursive Modeling Connects Geochemistry and Genomics in Critical Minerals Characterization.” Allegheny Branch of the American Society for Microbiology Conference. California, PA. November 2025. 15-minute oral presentation.
- ★ “Computational Biogeochemistry Assists in Critical Mineral Recovery from Abandoned Coal Mine Drainage and Associated Precipitants.” Carnegie Museum of Natural History, WILDS Symposium. October 2025. Poster
- ★‡ “Microbiological Mining of Critical Minerals is Altered by Community Modifying Metal Enrichments.” Geological Society of America Connects 2025 Conference. San Antonio, TX. October 2025. 15-minute oral presentation.
- ‡ “Recursive Modeling Connects Geochemistry and Genomics in Critical Minerals Characterization.” Geological Society of America Connects 2025 Conference. San Antonio, TX. October 2025. 15-minute oral presentation.
- ‡ “Computational Prospecting for Rare Earth Element Feedstocks in Pennsylvania.” American Chemical Society Fall 2025 Conference. Washington, DC. August 2025. 15-minute oral presentation.
- ★‡ “Leveraging Computational Methods in Biogeochemistry: Consolidating Sampling Efforts in the Search for REE Feedstocks.” Appalachian Region Technology Transfer Critical and Rare Earth Minerals. Digital. June 2025. 45-minute oral presentation.
- “Targeted Biomining and Machine Learning Approaches in Critical Minerals Revealed by a Biogeochemical Survey.” Rustbelt Microbiome Conference. Pittsburgh, PA. November 2024. Poster.
- “Targeted Biomining and Machine Learning Approaches in Critical Minerals Revealed by a Biogeochemical Survey.” Geological Society of America Connects 2024 Conference. September 2024. Anaheim, CA. Poster.
- ‡ “Spatiotemporal Stratification of Critical Materials and Minerals at an Acidic AMD Passive Remediation System.” Allegheny Branch of the American Society for Microbiology Conference. Greensburg, PA. September 2024. 12-minute oral presentation.
- ‡ “Spatiotemporal Stratification of Critical Materials and Minerals at an Acidic AMD Passive Remediation System.” Duquesne University Graduate Research Symposium. Pittsburgh, PA. March 2024. 12-minute oral presentation. *Recipient of the Outstanding Graduate Research Award.*
- “Using Mixed Microbial Communities to Solubilize Critical Materials from Abandoned Mine Drainage Remediation System.” Geological Society of America Connects 2023 Conference. Pittsburgh, PA. October 2023. Poster.
- “Profiling Bacterial Communities for Future Manipulation of Abandoned Mine Drainage Contaminants.” Duquesne Graduate Research Symposium. Pittsburgh, PA. March 2023. Poster.

