

EDUCATION

- 2015 – 2021 California Institute of Technology
PhD, Geobiology
- 2008 – 2012 Hampshire College
BA, self-designed major in Astrobiology

RESEARCH POSITIONS

- 2021 – present University of California Berkeley
Postdoctoral Scholar, Institute for Quantitative Biosciences
- 2015 – 2021 California Institute of Technology
Graduate Research Fellow, Division of Geological and Planetary Sciences
- 2012 – 2015 NASA Ames Research Center/SETI Institute
Ames Associate, Division of Space Sciences and Astrobiology
- 2009 – 2015 Prosetta Biosciences
Program Manager, Rabies Drug Discovery (2014-2015)
Assistant Research Scientist, Biochemistry Team (2012-2015)
Intern, Biochemistry Team (summer 2009, summer 2010)
- 2009 – 2011 Hampshire College
Undergraduate Researcher, School of Natural Sciences
- 2010 Cerro Tololo Inter-American Observatory
Research Assistant

AWARDS

- 2018 Society of Exploration Geophysicists JaWS Entrepreneurial Pitch Contest (1st place)
- 2017 Oral Presentation Award (1st place), Gordon Research Conference on Photosynthesis
- 2017 Metzner Prize (2nd place), Caltech Art of Science Competition
- 2017 Beverly Green Award (1st place oral presentation), Western Photosynthesis Conference
- 2016 – 2019 NSF Graduate Research Fellowship
- 2015 – 2016 Caltech CEMI Fellowship
- 2013 Poster Presentation Award (2nd place), Intl. Conference on Antiviral Research
- 2012 Earl Ubell Science Communication Award

SCIENTIFIC PRESENTATIONS

Conference abstract titles and authors listed at end of CV

Talks

- 2022 Science Journey Lecture Series, Caltech Public Programming
<https://youtu.be/V1YM2HwUpqQ>
- 2019 Yuk Lunch Seminar Series, Caltech Planetary Sciences
- 2018 MicroMorning Seminar Series, Caltech Center for Environmental Microbial Interactions
- 2018 Berkeley Symposium on Photosynthesis, Carbon, and the Environment, Berkeley, CA
- 2017 Gordon Research Conference on Photosynthesis, Sunday River, ME
- 2017 Western Photosynthesis Conference, Marshall, CA

2013 Bay Area Symposium on Viruses, Berkeley, CA

Posters

2019 American Geophysical Union Fall Meeting, San Francisco, CA
2019 Workshop on Cyanobacteria, Boulder, CO
2018 International Society on Photosynthesis Research Conference, Vancouver, BC
2017 Southern California Geobiology Symposium, Los Angeles, CA
2016 American Geophysical Union Fall Meeting, San Francisco, CA
2013 International Conference on Antiviral Research, San Francisco, CA
2012 American Society for Cell Biology Meeting, San Francisco, CA
2010 International Conference on Antiviral Research, San Francisco, CA

FIELDWORK

2022 Gill Tract Community Farm and UC Botanical Garden, CA, USA
2021 Big Pine Key and Marquesas Keys, FL, USA
2019 Great Salt Lake, UT, USA
2019 Et-then Group and Pethei Group, NWT, Canada
2017 Transvaal Supergroup, NC, South Africa
2017 Black Point Lava Flow, AZ, USA
2017 Chapin Wash Formation and Pinal Creek, AZ, USA
2016, 17, 18, 19 Little Ambergris Cay, Turks and Caicos Islands
2016 Van Horn Formation, TX, USA
2016 Little Hot Creek, CA, USA
2011, 2013 Mars Desert Research Station, UT, USA
2010 San Pedro de Atacama, Chile
2009, 16, 17, 18 Death Valley, CA, USA

ART EXHIBITIONS

2020 Contributor to *Incendiary Traces* by Hillary Mushkin
COLA exhibition, LA Municipal Art Gallery (cancelled due to COVID-19)
2017 Contributor to *Art of Science*, Red Door Café, Caltech, Pasadena CA
also shown at the Armory Center for the Arts, Pasadena, CA
2016 *Blueshift*, PRACTICE Gallery, Philadelphia, PA (collaboration with Ian Etter)
2012 *That's Life*, Centrum Gallery, Hampshire College, Amherst, MA (collaboration
with Casey Andrews)

OTHER OUTREACH & SCI COMM

[in production] Featured scientist, BBC Earth/NOVA documentary series
2018 – 2021 Caltech Letters (online publication, www.caltechletters.org)
Graphics Director (2019 – 2021)
Staff Artist (2018 – 2021)
2012 – 2016 Science Illustrator, Institute for Science and Interdisciplinary Studies
2010 – present Volunteer for various science outreach events/enrichment programs/schools
Including with: TechBoston Academy, El Cerrito High School, Gateway High
School, Hamilton Elementary School, Muir High School, Blair High School,

ACE Middle School, Nava Elementary School, Techbridge, NexGeneGirls,
NASA ARC Women's Influence Network, SETI Institute.

TEACHING & MENTORSHIP

- 2017 – 2019 Research mentor, Caltech
- Summer 2019: Joshua Phelan, undergraduate from CSU Fullerton
 - Summer 2018: Jenny Ji, high school student from Troy Tech
 - Summer 2017: Kabir Mohammed, undergraduate from Caltech
 - 2nd place, Vodopia-Hasson poster competition
- 2016 – 2020 Teaching assistant, Caltech
- Ge197: Special topics in Geobiology: Photosynthesis
 - Ge11b/Ge104: Earth and the Biosphere/Introduction to Geobiology
- 2014 – 2015 Girlz Climb On mentor, Girl Ventures
- 2010 – 2012 Teaching assistant, Hampshire College
- NS-212: Organic Chemistry I
 - NS-257: Astrobiology
 - NS-227: Life on Mars
 - NS-101: Gene Cloning (molecular biology bootcamp)
 - NS-204: Physics I

ACADEMIC SERVICE

- 2021 Peer reviewer, *Earth and Planetary Science Letters*
- 2016, 2019 Organizer and Session Chair, Southern California Geobiology Symposium, Caltech
- 2017 – 2018 Organizer, Geoclub Seminar Series, Caltech
- 2009 – 2010,
2011 – 2012 Voting student rep, School of Natural Science Faculty Meetings, Hampshire College
- 2008 – 2010 Community Council Subcommittee for Public Health and Safety, Hampshire College
Co-Chair (2009 – 2010)
Member (2008 – 2009)

PATENTS

Trower, E J, **U F Lingappa**, J P Grotzinger, W W Fischer. "Microabrasive compositions containing ooids." US Patent US10407601 (2018).

PUBLICATIONS

*equal contribution

Lingappa, U F, N T Stein, K S Metcalfe, T M Present, V J Orphan, A H Knoll, J P Grotzinger, E J Trower*, M L Gomes*, W W Fischer*. "Early impacts of climate change on a coastal marine microbial mat ecosystem." Accepted, *Science Advances*.

Yu, H, G L Chadwick, **U F Lingappa**, J R Leadbetter. "Comparative studies on cultivated and uncultivated, freshwater and marine "Ca. Manganitrophaceae" genomes implicates their worldwide reach in manganese chemolithoautotrophy." *mBio* e0342121 (2022).

Kim, B*, **U F Lingappa***, J S Magyar, D R Monteverde, J S Valentine, W W Fischer, J Cho. “Challenges of measuring soluble Mn(III) in natural samples.” *Molecules* 27:1661 (2022).

Lingappa, U F, C M Yeager, A Sharma, N L Lanza, D P Morales, G Xie, A D Atencio, G L Chadwick, D R Monteverde, J S Magyar, S M Webb, J S Valentine, B M Hoffman, W W Fischer. “An ecophysiological explanation for manganese enrichment in rock varnish.” *Proceedings of the National Academy of Sciences* 118(25):e2025188118 (2021).

Douglas, M M, **U F Lingappa**, M P Lamb, J C Rowland, A J West, G Li, P C Kemeny, A J Chadwick, A Piliouras, J Schwenk, W W Fischer. “Impact of river channel lateral migration on microbial communities across a discontinuous permafrost floodplain.” *Applied and Environmental Microbiology* 01339-21 (2021).

Present, T M, M L Gomes, E J Trower, N T Stein, **U F Lingappa**, J Naviaux, M T Thorpe, M D Cantine, W W Fischer, A H Knoll, J P Grotzinger. “Non-lithifying microbial ecosystem dissolves peritidal lime sand.” *Nature Communications* 12:3037 (2021).

Liu, Y, W W Fischer, C Ma, Y Guan, J R Beckett, O Tschauener, Y Guan, **U F Lingappa**, S M Webb, V B Prakapenka, N L Lanza, C B Agee. “Manganese oxides in Martian meteorites Northwest Africa (NWA) 7034 and 7533.” *Icarus* 364:114471 (2021).

Ward, L M, **U F Lingappa**, J Grotzinger, W Fischer. “Microbial mats in the Turks and Caicos Islands reveal diversity and evolution of phototrophy in the Chloroflexota order *Aggregatilineales*.” *Environmental Microbiome* 15:9 (2020).

Smith, B P, M Ingalls, E J Trower, **U F Lingappa**, T M Present, J S Magyar, W W Fischer. “Physical Controls on Carbonate Intraclasts: Modern Flat Pebbles from Great Salt Lake, Utah.” *Journal of Geophysical Research: Earth Surface* 125:e2020JF005733 (2020).

Gomes, M, L A Reidman, S O’Reilly, **U F Lingappa**, K Metcalfe, D A Fike, J P Grotzinger, W W Fischer, A H Knoll. “Taphonomy of biosignatures in microbial mats on Little Ambergris Cay, Turks and Caicos Islands.” *Frontiers in Earth Science* 8:576712 (2020).

Lingappa, U F, D Monteverde, J Magyar, J S Valentine, W W Fischer. “How manganese empowered life with dioxygen (and vice versa).” *Free Radical Biology and Medicine* 140:113-125 (2019).

- Featured on NASA Astrobiology Portal, April 2019. [<https://astrobiology.nasa.gov/news/how-manganese-played-a-pivotal-role-in-photosynthesis-and-oxidation-protection/>]

Lingappa, U F, W W Fischer. “Oxygenic Photosynthesis.” Entry in: Gargaud M et al. (eds) *Encyclopedia of Astrobiology*. Springer, Berlin, Heidelberg (2019).

Trower, E J, M Cantine, M Gomes, **U F Lingappa**, S O’Reilly, T M Present, N Stein, J V Strauss, M P Lamb, J P Grotzinger, A H Knoll, W W Fischer. “Active ooid growth driven by sediment transport in a high energy shoal, Little Ambergris Cay, Turks and Caicos Islands.” *Journal of Sedimentary Research* 88(9):1132-1151 (2018).

Lingappa, U F*, X Wu*, A Macieik, S F Yu, A Atuegbu, J Francis, C Nichols, A Calayag, H Shi, J A Ellison, E K T Harrell, V Asundi, J R Lingappa, M D Prasad, W I Lipkin, D Dey, C R Hurt, V R Lingappa, W J Hansen, C E Rupprecht. 2013. “Host-rabies virus protein-protein interactions as druggable antiviral targets.” *Proceedings of the National Academy of Sciences* 110(10):E861-868 (2013).

- Featured in *Cell* Select Leading Edge, May 2013. [[https://www.cell.com/cell/pdf/S0092-8674\(13\)00515-1.pdf](https://www.cell.com/cell/pdf/S0092-8674(13)00515-1.pdf)]

CONFERENCE ABSTRACTS

Present, T, **U Lingappa**, M Ingalls, J Grotzinger. “Recognition of Paleoproterozoic alkaline environments.” Simons Collaboration on the Origins of Life Annual Symposium, online, 2020.

Gomes, M, C Howard, E J Trower, E C Sibert, T M Present, **U Lingappa**. “Carbon isotope signatures in microbial mat carbonates—how do different carbonate components record information about local versus global carbon cycling?” GSA connects online, 2020.

Lingappa, U F, W W Fischer, E J Trower. “Ecophysiology of ooid microborings excavated by endolithic Cyanobacteria.” AGU fall meeting, 2019.

Trower, E, T Mahseredjian, I Overeem, M Gomes, C Howard, **U Lingappa**, T Present, E Sibert. “Grain-Trapping by Microbial Mats—A Key Mechanism of Sediment Accumulation in Mangroves?” AGU fall meeting, 2019.

Magyar, J, **U Lingappa**, D Monteverde, J Valentine, A Sharma, B Hoffman, W Fischer. “Cyanobacterial Mn(II) as Defense Against Oxidative Stress.” Goldschmidt, 2019.

Marti-Arbona, R, N Lanza, M Teshima, **U Lingappa**, W Fischer, C Yeager. “Rock Varnish: Implications for Biosignatures on Mars.” Goldschmidt, 2019.

Lanza, N L, W W Fischer, C Yeager, **U Lingappa**, A M Ollila, P J Gasda, S N Lamm, M Salvatore, S M Clegg, R C Wiens. “Targeting Manganese Minerals on Mars as Potential Biosignatures.” Mars Extant Life, 2019.

Yeager, C, N Lanza, R Marti-Arbona, M Teshima, **U Lingappa**, W Fischer. “Terrestrial Rock Varnish: Implications for Biosignatures on Mars.” Mars Extant Life, 2019.

Fischer, W, **U Lingappa**, E Trower, J Magyar, S Slotznick, J Johnson, S Webb, C Ma, Y Guan, B Rasmussen, Y Liu. “Chemical Imaging Approaches to Untangle Depositional and Post-Depositional Processes in Ancient Rocks on Earth and Mars.” Goldschmidt, 2018.

Lingappa, U, W Fischer, N Lanza, J Challacome, C Yeager. “Microbial inhabitants of rock varnish: visitors or niche specialists.” Goldschmidt, 2018.

Magyar, J, **U Lingappa**, D Monteverde, J Valentine, W Fischer. “Manganese Speciation in Modern Cyanobacteria and its Relationship to the Evolution of Photosynthesis.” Goldschmidt, 2018.

Lingappa, U, H Johnson, J Hemp, J Magyar, D Monteverde, J Valentine, W Fischer. “Manganese oxidation by Cyanobacteria and the evolution of photosystem II.” International Society of Photosynthesis Research Conference on Microbial Photosynthesis, 2018.

Hemp, J, R Soo, P Shih, L Ward, **U Lingappa**, L Pace, P Hugenholz, W Fischer. “Evolution of photosynthesis.” International Symposium on Photosynthetic Prokaryotes, 2018.

Trower, E, M Cantine, M Gomes, **U F Lingappa**, S O'Reilly, T M Present, N Stein, J V Strauss, M P Lamb, J P Grotzinger, A H Knoll, W W Fischer. “Physical, Chemical, and Microbial Controls on Growth and Degradation of Ooids on Ambergris Shoal, Little Ambergris Cay, Turks and Caicos Islands, British Overseas Territories.” AAPG annual meeting, 2018.

Grotzinger, J, M Gomes, **U Lingappa**, N Stein, E Trower, J Alleon, A M Bahniuk, M Cantine, H Grotzinger, K Metcalfe, D K Morris, S O'Reilly, E Orzechowski, D Quinn, C Sanders, E Sibert, J Strauss, M Tarika, M Thorpe, W Fischer, A Knoll. “Diverse and Spatially Extensive Microbial Mat and Ooid Sand Depositional System, Little Ambergris Cay, Turks and Caicos Islands.” AAPG annual meeting, 2018.

Present, T M, E Trower, M Gomes, **U Lingappa**, N Stein, M Thorpe, M Tarika, J Alleon, A M Bahniuk, D K Morris, E Orzechowski, C Sanders, E Sibert, W Fischer, A Knoll, J Grotzinger. “Sedimentology and Geochemistry of Ooid Sands Buried Beneath Microbial Mats, Little Ambergris Cay, Turks and Caicos Islands.” AAPG annual meeting, 2018.

Stein, N, D Quinn, J Grotzinger, W Fischer, B Ehlmann, M Gomes, A Hayden, **U Lingappa**, A Knoll, E Trower. “Distribution of and Environmental Impacts on Microbial Mat Ecosystems of Little Ambergris Cay, Turks and Caicos.” AAPG annual meeting, 2018.

Lingappa, U, M Gomes, K Metcalfe, L Riedman, S O'Reilly, N Stein, E Trower, T M Present, W Fischer, A Knoll, J Grotzinger. “Ecology and Biogeochemistry of Microbial Mats on Little Ambergris Cay.” AAPG annual meeting, 2018.

Magyar, J, **U Lingappa**, W Fischer. “Insights into Ancient Manganese Biogeochemistry from Studies of Modern Photosystem II.” Gordon Research Conference on Metals in Biology, 2018.

Stein, N, J P Grotzinger, A Hayden, D P Quinn, L Trower, **U Lingappa**, T M Present, M Gomes, E A Orzechowski, W W Fischer. “Impact of Hurricane Irma on Little Ambergris Cay, Turks and Caicos.” AGU fall meeting, 2017.

Liu, Y, C Ma, Y Guan, J R Beckett, **U F Lingappa**, S M Webb, W W Fischer, A Allwood. “Diverse fluid activities on Mars: Zn-bearing silicate and oxide in Martian breccia meteorite Northwest Africa (NWA) 7533.” LPSC, 2017.

Gomes, M, L A Riedman, S O'Reilly, **U Lingappa**, K Metcalfe, N Stein, E A Orzechowski, J V Strauss, H Grotzinger, D P Quinn, L Trower, D Fike, J Grotzinger, A Knoll. "Linking the Modern to the Ancient with Morphological and Geochemical Signatures in Microbial Mats." Goldschmidt, 2017.

Lingappa, U and W W Fischer. "Manganese and the Evolution of Photosystem II." Gordon Research Conference on Photosynthesis, 2017.

Lingappa, U, H A Johnson, J Hemp, J S Valentine, W W Fischer. "Manganese Oxidation by Cyanobacteria and the Evolution of Photosystem II." Western Photosynthesis Conference, 2017.

Gomes, M, **U Lingappa**, K Metcalfe, S S O'Reilly, L A Riedman, M Cantine, B Ireland, R Phillips, N Stein, E A Orzechowski, J V Strauss, H M Grotzinger, D P Quinn, L Trower, D Fike, W W Fischer, J P Grotzinger, A H Knoll. "Linking the modern to the ancient with a comprehensive geobiological understanding of biosignature preservation in microbial mats." AGU fall meeting, 2016.

Grotzinger, J P, A H Knoll, W W Fischer, M Cantine, M L Gomes, H M Grotzinger, **U Lingappa**, K Metcalfe, S S O'Reilly, E A Orzechowski, D P Quinn, L A Reidman, N Stein, J V Strauss, L Trower. "Context, Biogeochemistry, and Morphology of Diverse and Spatially Extensive Microbial Mats, Little Ambergris Cay, Turks and Caicos Islands, BWI." AGU fall meeting, 2016.

Stein, N T, D P Quinn, J P Grotzinger, W W Fischer, A H Knoll, M Cantine, M L Gomes, H M Grotzinger, **U Lingappa**, K Metcalfe, S O'reilly, E A Orzechowski, L A Reidman, J V Strauss, L Trower. "UAV, DGPS, and Laser Transit Mapping of Microbial Mat Ecosystems on Little Ambergris Cay, BWI." AGU fall meeting, 2016.

Trower, L, M Cantine, S S O'Reilly, J V Strauss, M L Gomes, H M Grotzinger, J P Grotzinger, A H Knoll, M P Lamb, **U Lingappa**, K Metcalfe, E A Orzechowski, D P Quinn, L A Reidman, N Stein, W W Fischer. "Evidence of Active Ooid Growth from Little Ambergris Cay, Turks and Caicos Islands, BWI." AGU fall meeting, 2016.

E A Orzechowski, J V Strauss, A H Knoll, W W Fischer, M Cantine, K Metcalfe, D P Quinn, N Stein, M L Gomes, H H Grotzinger, **U Lingappa**, S O'Reilly, L A Reidman, L Trower, J P Grotzinger. "Age and Construction of Little Ambergris Cay Bedrock Rim, Southeastern Caicos Platform, British West Indies." AGU fall meeting, 2016.

YoungSmith, D, M Brann, **U Lingappa**, E K Rankin-Gee, B Bebout, O Marcu. "The role of oxidative stress in the evolution of multicellularity." Search for Life Beyond the Solar System: Exoplanets, Biosignatures & Instruments conference, 2014.

Lingappa, U. "Anti-rabies drug discovery targeting host-virus protein-protein interactions." Bay Area Symposium on Viruses, 2013.

Lingappa, U F, X Wu, A Macieik, K Paulvannan, D Solas, A Atuegbu, K Tsutsui, V R Lingappa. "Molecular dissection of the timing and mechanism of action of a small molecule with robust activity against host factors that participate in rabies virus capsid assembly." International Conference on Antiviral Research, 2013.

Rankin-Gee E K, M Lera, **U Lingappa**, B Bebout, O Marcu. "Molecular and biochemical responses of *Volvox carteri* to oxidative stress." American Society for Cell Biology meeting, 2012.

Lingappa, V R, **U Lingappa**, E Borst, J Pajda, I Brown, S Long, B Rami, A Nalca, W I Lipkin, C Rupprecht, M Messerle, C R Hurt, W Hansen. "Overlap in virus specificity leads to the discovery of small molecules active against rabies virus, monkey pox virus, and cytomegalovirus." International Conference on Antiviral Research, 2010.