Martina Preiner, PhD

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Memberships: European Association of Geochemistry (EAG), Origin of Life Early Career Network (OoLEN), American Geophysical Union (AGU)

Education and research

Since January 2023
Head of Max Planck Research Group 'Geochemical Protoenzymes', Microcosm Earth Center, MPI for Terrestrial Microbiology, Marburg

October 2021 – December 2022
Postdoctoral researcher
Catalytic properties of nanoparticulate structures found in- and outside hydrothermal vent systems
Department of Ocean Systems, Royal Netherlands Institute for Sea Research (NIOZ), 't Horntje, Texel & Department of Earth Sciences, Utrecht University, The Netherlands

January 2020 – September 2021 (April – October 2020 on maternal and parental leave)
Postdoctoral researcher
The role of hydrogen, mineral catalysts and water activity in a prebiotic, hydrothermal context
Institute for Molecular Evolution
Heinrich Heine University, Düsseldorf, Germany

October 2016 – January 2020
PhD student at Heinrich Heine University, Düsseldorf, Germany
Including extensive research stays at the University of Strasbourg, France, the University of Durham, UK, and the Max Planck Institute for Coal Research in Mülheim/Ruhr, Germany

Thesis: The abiotic pattern of biotic CO_2 fixation
Advisor: William F. Martin, Institute for Molecular Evolution

October 2006 – December 2009
MSc student at Ludwig-Maximilians-University, Munich, Germany
Physical and inorganic chemistry, biochemistry

Thesis: Monitoring protein conformation and DNA protein interactions via single molecule fluorescence resonance energy transfer
Advisor: Don C. Lamb, FAB Lab

October 2004 – September 2007
BSc student at Ludwig-Maximilians-University, Munich, Germany
Chemistry and biochemistry

Thesis: Site-directed mutagenesis of circulary-permutated red fluorescent proteins
Advisor: Oliver Griesbeck, Max-Planck-Institute for Neurobiology

Professional Science communication/journalism experience

April 2018 – September 2020
Science Podcast 'Undoder zum Quadrat' (German), Audible Deutschland
Researching and presenting complex scientific topics together with Science journalist Franziska Konitzer

December 2009 – September 2016
Freelance science journalist for various German media (Deutschlandfunk, Spektrum der Wissenschaft, Westdeutscher Rundfunk, Quarks & Co., Neue Zürcher Zeitung, Süddeutsche Zeitung, Die Welt)

Awards and scholarships

December 2021
Sponsorship award for science from the city of Düsseldorf
The award is given early career scientists who have achieved significant research results in their subjects to fund their further development.

September 2021
E. Nettersheim Research Award
The award is given to excellent, early career, non-habilitated researchers from the work groups of the Biological Medical Research Centre (BMFZ) at Heinrich Heine University, Düsseldorf, Germany

November 2012
Award for Science Journalism of the German Society for Psychiatry, Psychotherapy and Neurology

October 2010 – June 2011
Scholarship for journalistic training, internships and a one-month research trip to several scientific institutions in San Francisco/Berkeley/Stanford/Santa Cruz, USA

Publications

13. Henriques Pereira D.P., Leethaus J., Beyazay T., do Nascimento Vieira A., Kleinermanns K., Tüysüz H., Martin W.F. & Preiner M.* (2022) 'Role of geochemical protoenzymes (geozymes) in primordial metabolism: specific abiotic hydride transfer by metals to the biological redox cofactor NAD^+', *FEBS Journal*, 16329. doi: 10.1111/febs.16329
12. Wimmer J.L.E., Xavier J.C., Vieira A., Pereira D.P.H., Leidner J., Sousa F.L., Kleinermanns K., Preiner M. & Martin W.F. (2021). 'Energy at origins: favorable thermodynamics of biosynthetic reactions in the Last Universal Common Ancestor (LUCA)', *Frontiers in Microbiology* 12, 793664. doi:10.3389/fmicb.2021.793664.
11. Preiner M.*, Martin W.F. (2021). 'Life in a carbon dioxide world', *Nature* 592:688–689. doi:10.1038/d41586-021-00977-1.
10. Wimmer, J. L. E., Vieira, A., Xavier, J. C., Kleinermanns, K., Martin, W. F., & Preiner, M. (2021). 'The autotrophic core: an ancient network of 404 reactions converts H_2, CO_2, and NH_3 into amino acids, bases, and cofactors', *Microorganisms*, 9:458. doi:10.3390/microorganisms9020458.
9. do Nascimento Vieira, A., Kleinermanns, K., Martin, W. F., Preiner, M.* (2020) 'The ambivalent role of water at the origins of life', *FEBS Letters*, 594:2717–2733. doi:10.1002/1873-3468.13815.

8. Preiner, M.*, Asche, S., Becker, S., *et al.* (2020) 'The future of origin of life research: bridging decades-old divisions', *Life*, 10:20. doi: 10.3390/life10030020.
7. Preiner, M., Igarashi, K., Muchowska, K. B., *et al.* (2020) 'A hydrogen dependent geochemical analogue of primordial carbon and energy metabolism', *Nature Ecology and Evolution*, 4:534–542. doi: 10.1038/s41559-020-1125-6.
6. Preiner, M.*, Xavier, J. C., do Nascimento Vieira, A., *et al.* (2019) 'Catalysts, autocatalysis and the origin of metabolism', *Interface Focus*, 9:20190072. doi: 10.1098/rsfs.2019.0072.
5. Preiner, M.*, Xavier, J. C., Sousa, F. L., *et al.* 2018. 'Serpentinization: connecting geochemistry, ancient metabolism and industrial hydrogenation', *Life*, 8:41. doi: 10.3390/life8040041.
4. Xavier, J. C., Preiner, M. and Martin, W. F. (2018) 'Something special about CO-dependent CO_2 fixation', *FEBS Letters*, 285:4181–4195. doi: 10.1111/febs.14664.
3. Weiss, M. C., Preiner, M., Xavier, J. C., *et al.* (2018) 'The last universal common ancestor between ancient Earth chemistry and the onset of genetics', *PloS Genetics*, 14:e1007518. doi: 10.1371/journal.pgen.1007518.
2. Sousa, F. L., Preiner, M. and Martin, W. F. (2018) 'Native metals, electron bifurcation, and CO_2 reduction in early biochemical evolution', *Current Opinion in Microbiology*. Elsevier Ltd, 43:77–83. doi: 10.1016/j.mib.2017.12.010.
1. Martin, W. F. and Preiner, M. (2017) 'Origin of Life, Theories of', *Reference Module in Life Sciences*. Elsevier Inc., Oxford. doi: 10.1016/B978-0-12-809633-8.02403-1.

Scientific talks

March 2023
S^3C Conference
Title: 'How to connect hydrogen, geochemical nanoparticles and primordial metabolism' (invited)

November 2022
oLife Meeting
Title: 'Hydrogen, rocks and the emergence of life'

September 2022
NAC Conference
Title: 'How nanoparticles might connect serpentinization, origin of life and carbon fixation'

May 2022
AbSciCon
Title: 'The role of geochemical protoenzymes ('geozymes') in primordial metabolism: hydrogen activation in mineral-assisted CO_2 fixation and NAD^+ reduction'

February 2022
Emergence of Life Symposium
Title: 'Serpentinizing systems and hydrogen activation in early metabolism' (invited)

November 2021
Astrobiology seminar talk series, Rensselaer Polytechnic Institute (RPI)
Title: 'Serpentinizing systems and hydrogen activation in early metabolism' (invited)

July 2021
Goldschmidt, virtual
Title: 'Serpentinizing systems and hydrogen activation in early metabolism'

June 2021
Exoplanets seminar talk series, NASA Goddard, virtual

Title: ‘Serpentinizing systems and hydrogen activation in early metabolism’ (invited)

November 2020
Thermal Biology Institute seminar series, Montana State University, virtual
Title: ‘A geochemical route to primordial carbon and energy metabolism?’ (invited)

August 2020
Astrobiology Graduate Conference, virtual
Title: ‘The ambivalent role of water at the origins of life’

June 2020
Goldschmidt, virtual
Title: ‘The ambivalent role of water at the origins of life’

February 2020
32. Irseer Naturstofftage, Irsee, Germany
Title: ‘A geochemical route to primordial carbon and energy metabolism?’ (invited)

September 2019
Thermophiles, Fukuoka, Japan
Title: ‘A geochemical route to primordial carbon and energy metabolism?’ (invited Keynote)

August 2019
Goldschmidt, Barcelona, Spain
Title: ‘The role of hydrogen activation in early metabolism’

March 2019
30/80 Meeting, Granada, Spain
Title: ‘The role of hydrogen activation in early metabolism’

October 2018
Interdisciplinary Origin of Life Meeting, Düsseldorf, Germany
Title: ‘Connecting serpentinization, CO_2 reduction and early metabolism’

September 2018
Astrobiology Graduate Conference, Berlin, Germany
Title: ‘Connecting serpentinization, CO_2 reduction and early metabolism’

Poster presentations

June 2022
Molecular Origins of Life, Munich, Germany
Title: ‘The role of geochemical protoenzymes (‘geozymes’) in primordial metabolism: hydrogen activation in mineral-assisted CO2 fixation and NAD^+ reduction.’

July 2021
Molecular Origins of Life, virtual
Title: ‘Serpentinizing systems and hydrogen activation in early metabolism’

July 2020
Molecular Origins of Life, virtual
Title: ‘The ambivalent role of water at the origins of life’

November 2019
Science of Early Life, Seeon, Germany
Title: ‘Serpentinizing systems, hydrogen activation and possible links between geo- and biochemistry’

June 2019
VII Congress of Vavilov Society of Geneticists and Breeders (VSGB) Symposium, St. Petersburg, Russia
Title: ‘From CO_2 to metabolism: The role of hydrogen activation in early metabolism’

July 2018
Society for Molecular Biology and Evolution Meeting, Yokohama, Japan
Title: 'From CO_2 to metabolism: Prebiotic chemistry with metals found in hydrothermal vents'

June 2018
Astrobiology Graduate Conference, Atlanta, USA
Title: 'From CO_2 to metabolism: Prebiotic chemistry with metals found in hydrothermal vents'

Conference organization and outreach activity

March 2022
Background interview for National geographic feature ''Impossible' chemistry may reveal origins of life on Earth'

June 2021
Guided tour on the origin and evolution of life, organized by the Düsseldorfer Aufklärungsdienst (humanistic network), Germany

December 2020
Interview for the *Nature* features 'How the first life on Earth survived its biggest threat – water' and 'The water paradox and the origins of life'

November 2020 – November 2021
Founding member and executive board of the Origin of Life Early Career Network (OoLEN)

January 2020

Curation of an Origin of Life exhibition at Heinrich Heine University (postponed due to Covid19)

November 2019
'Unbelievable and/or Inevitable?' (in German): Presentation on the origin of life as part of a lecture series on evolution, organized by the Düsseldorfer Aufklärungsdienst (humanistic network), Germany

September 2019
'Origin of Life': Presentation for students at Norf grammar school, Germany

March 2019

Supervision of a 14 year old grammar school student intern for career orientation week.

January 2019

Interview for the German daily newspaper "Die Welt" and a feature on origin of life in deep-sea hydrothermal vents.

October 2018
Interdisciplinary Origin of Life (IOoL) Meeting in Düsseldorf, Germany:
Idea, conception and implementation of a meeting for PhD students and Postdocs. This meeting became a biannual meeting, the next edition is taking place in August

June 2018
'An evening of wonder: Life and art on Earth and beyond': Volunteer at an outreach event for children as part of AbGradCon 2018 in Atlanta, USA

Teaching experience

November 2021
Lectures for "Advanced Mineralogy" lecture series on catalysis.

Since October 2016

Supervisor of nine undergrad students and co-supervisor of two PhD students: project design, daily lab supervision, editing of thesis manuscripts.

July 2017, 2018 and 2019
Tutor for practical course: “Photosynthesis”, Heinrich Heine University

December 2016, 2017 and 2018
Tutor for practical course (Master): “Biochemistry of plants”, Heinrich Heine University

December 2016, 2017 and 2018
Tutor for practical course (Bachelor): “Biochemistry of plants”, Heinrich Heine University

January – December 2009
Tutor for physical chemistry, Ludwig-Maximilians-University, Munich

Seafaring experience

August 2022
Co-chief for ‘i-Nano’ cruise onboard the NIOZ research vessel ‘Pelagia’ to sample hydrothermal vent plumes at the Mid Atlantic Ridge.

Reviewing

Journals: Science, Astrobiology, Nature Communications, Life**,** Interface Focus**,** Molecular Biology and Evolution, Science Advances, Acta Biotheoretica
Funding: French National Research Agency