


Irma Querques, PhD

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Research interests: Mobile genetic elements, CRISPR, DNA rearrangements mechanisms, Genome engineering

CURRENT POSITION

From **Assistant Professor and Group Leader** | Max Perutz Labs/University of Vienna, Austria
05/2023

EDUCATION AND PROFESSIONAL EXPERIENCE

- 04/2019- **Postdoctoral Fellow** in the group of Prof. Martin Jinek, Department of Biochemistry, University of Zurich
04/2023 *Projects:* Mechanistic and structural studies of CRISPR-associated transposons
- 04/2014- **Ph.D.** Dr. rer. nat., Joint Degree by European Molecular Biology Laboratory (EMBL) and University of
06/2018 Heidelberg, Germany
Supervisor: Dr. Orsolya Barabas, Structural and Computational Biology Unit, EMBL Heidelberg
Thesis: Mechanisms and design of Tc1/mariner transposons for genome engineering
- 12/2013- **Visiting Scientist** in the group of Dr. Orsolya Barabas at EMBL Heidelberg
03/2014
- 10/2011- **M.Sc. in Pharmaceutical Biotechnology** | University of Bologna, Italy
12/2013 *Supervisors:* Prof. Giovanni Capranico, University of Bologna and Dr. Orsolya Barabas, EMBL Heidelberg
- 10/2008- **B.Sc. in Biotechnology** | University of Bologna, Italy
10/2011 *Supervisor:* Prof. Giovanni Capranico, Department of Biochemistry, University of Bologna

LIST OF PUBLICATIONS

- 1) Schmitz M*, Querques I[#]. DNA on the move: mechanisms, functions and applications of transposable elements. **FEBS Open Bio** 14: 13-22 (Jan 2024)
- 2) Schmitz M*, Querques I*, Oberli S, Chanez C and Jinek M. Structural basis for the assembly of the type V CRISPR-associated transposon complex. **Cell** 185(26):4999-5010.e17 (Dec 2022)
- 3) Querques I*, Schmitz M*, Oberli S, Chanez C and Jinek M. Target site selection and remodelling by type V CRISPR-transposon systems. **Nature** 599, 497-502 (Nov 2021)
- 4) Pacesa M, Loeff L*, Querques I*, Muckenfuss LM*, Sawicka M & Jinek M. R-loop formation and conformational activation mechanisms of Cas9. **Nature** 609, 191–196. (Aug 2022)
- 5) Miskey C*, Kesselring L*, Querques I, Abrusán G, Barabas O, and Ivics Z. Engineered Sleeping Beauty Transposase Redirects Transposon Integration Away from Genes. **Nucleic Acids Res.** 21;50(5):2807-2825 (Mar 2022)
- 6) Kesselring L, Miskey C, Zuliani C, Querques I, Kapitonov V, Laukó A, Fehér A, Palazzo A, Diem T, Lustig J, Sebe A, Wang Y, Dinnyés A, Izsvák Z, Barabas O, Ivics Z. A single amino acid switch converts the Sleeping Beauty transposase into an efficient unidirectional excisionase with utility in stem cell reprogramming. **Nucleic Acids Res.** 48(1):316-331 (Jan 2020)
- 7) Querques I*, Madés A*, Zuliani C*, Miskey C, Alb M, Grueso E, Machwirth M, Rausch T, Einsele H, Ivics Z, Hudecek M and Barabas O. A highly soluble Sleeping Beauty transposase improves control of gene insertion. **Nat Biotechnol** 37, 1502-1512 (Dec 2019)
- 8) Voigt F, Wiedemann L, Zuliani C, Querques I, Sebe A, Mátés L, Izsvák Z, Ivics Z, Barabas O. Sleeping Beauty transposase structure allows rational design of hyperactive variants for genetic engineering. **Nat Commun** Mar 30;7:11126 (Mar 2016)

*Equal contribution; #Corresponding author

INVENTIONS AND PATENTS

- European Patent Application No. EP22178728 *S15 as a factor of the CRISPR-transposon activity* (Co-inventor)
 International Patent Application No. PCT/EP2018/072320 *Improved Transposase Polypeptide and Uses Thereof* (Co-inventor)
 International Patent Application No. PCT/EP2020/054371 *Cell Penetrating Transposase* (Co-inventor)

THIRD PARTY FUNDING AND AWARDS

- 2024-2028 **ERC Starting Grant**, BROADCAST, € 1.500.000, Role: PI
 2024-2028 **Vallee Scholar Award** – The Vallee Foundation, \$ 340.000, Role: PI
 2024 Finalist for the **Eppendorf Award** for Young European Investigators 2024
 2023 **Premio Italia Giovane** – awarded to Italians under 35 for extraordinary contributions
 2022-2025 **Branco Weiss Fellowship** – Society in Science, ETH Zurich, CHF 500.000, Role: Post-doc and PI
 2022-2023 **UZH Postdoc Grant**, Faculty of Medicine, University of Zurich, CHF 100.000, Role: Post-doc
 2021-2023 European Molecular Biology Organization (**EMBO**) Long Term Fellowship, € 170.000, Role: Post-doc
 2020-2021 Federation of European Biochemical Societies(**FEBS**) Long Term Fellowship CHF 66.000, Role: Post-doc
 2021 **Best Flash Talk** Prize at the EMBO workshop ‘The Mobile Genome’
 2020 FEBS Letters **Poster Prize** at the FEBS LS² Annual Meeting 2020

SCIENTIFIC TALKS

- 11/2024 7th Annual Austrian Cryo-EM (ACE) Symposium, Vienna AT | Invited speaker
 10/2024 CSHL meeting on Transposable Elements, Cold Spring Harbor USA | Invited speaker
 04/2024 Microsymposium on RNA Biology, Vienna AT | Invited speaker
 07/2023 EMBO Workshop ‘CRISPR-Cas: From biology to therapeutic applications’, Seville ES | Invited speaker
 07/2022 FEBS congress 2022 ‘The Biochemistry Global Summit’, Selected talk | Lisbon, Portugal
 06/2022 CRISPR Meeting 2022 (Boston, USA), Selected talk
 06/2022 Innovative Genomics Institute (UC Berkeley, USA) Seminar Series, Invited speaker
 04/2022 Mosbacher Kolloquium ‘The world of RNAs’, Invited speaker | Mosbach, Germany
 04/2022 FEBS LS² Annual Meeting ‘Life Sciences in 2020s’, Selected talk | University of Zurich, Switzerland
 08/2021 EMBO Workshop ‘The Mobile Genome: Genetic and Physiological Impacts of Transposable Elements’, Selected talk and Prize | EMBL Heidelberg, Germany
 02/2020 FEBS LS² Annual Meeting ‘Cells, Molecules and Organisms’, Selected talk and FEBS Letters Poster Prize | University of Zurich, Switzerland

TEACHING ACTIVITIES

List of courses and lectures

- 2023-present **Assistant Professor at the University of Vienna**, Centre for Molecular Biology
 2024 Practical Course 2024S and 2024W 301046-4 Übungen I B in Microbiology and Genetics, Centre for Molecular Biology, University of Vienna
 Lecture at Seminar Series Modern Concepts in Structural Biology, University of Vienna (Jan 2024)
 Lecture at PyP (Prime Your PhD) Vienna BioCenter PhD Program Course, (Jan 2024)
 2019-2023 **Teaching assistant at the University of Zurich**, Department of Biochemistry
 2020 PIP/PHO (Basic measurement techniques and Photometry) course, Spring semester | Biochemistry practicals for Bachelor students of Medicine, Faculty of Medicine
 PIP/PHO (Basic measurement techniques and Photometry) course, Fall semester | Biochemistry practicals for Bachelor students of Biochemistry, Faculty of Science
 2019 **Instructor** in X-ray crystallography, EMBL Predoctoral Course, EMBL Heidelberg | 1 week per year
 2014-2017 **Organiser and instructor** of the EMBL workshop ‘Inventors of Proteins’ | Molecular biology course and practicals for 20 selected High School students, High School Bonghi-Rosmini, Lucera, Italy
 2018

Mentorship

- 2023-present **Supervisor and mentor** of students, Querques group, **University of Vienna**

Mateusz Walter, PhD Student, Max Perutz Labs, University of Vienna (Jun 2023–Present)

Olivia Ozguc, PhD Student, Max Perutz Labs, University of Vienna (Jun 2024–Present)

Iana Hammerschmid, PhD Student, Max Perutz Labs, University of Vienna (Dec 2024–Present)

Kostiantyn Romaniuk, Research Internship, Max Perutz Labs, University of Vienna (Oct 2024–Present)

Boglárka Bata, Master's Research Internship, Centre for Molecular Biology, University of Vienna (Sep 2024–Present)

Sarah Daud, Master's Thesis in Molecular Biology, Centre for Molecular Biology, University of Vienna (Oct 2023–Aug 2024)

Maddalena Fuso, Research Internship, Max Perutz Labs, University of Vienna (Feb 2024–Jul 2024)

Julia Karan, Bachelor's Thesis in Molecular Biology, Centre for Molecular Biology, University of Vienna (Feb 2024–Aug 2024)

SERVICES TO THE SCIENTIFIC COMMUNITY

Member of **Review Panel** for the Italian National Facility for Structural Biology (2024-present)

Contributor for the **Nature Bioengineering Community blog**

Peer-reviewed manuscripts for Mobile DNA and Nature Communications

Co-organiser of European Researchers' Night | Organised Science Flashmob and contributed to scientific programme with the TED talk "Smart mobile DNA: past and future of genetic data transfer", Heidelberg

EMBL School Ambassador, European Learning Laboratory for the Life Sciences (ELLS) | Taught molecular biology concepts to High School students and teachers in Italy and Germany (2015-2018)

Co-organiser of the 17th EMBL PhD Symposium "Just by chance? Randomness and Variability Shaping Biology", EMBL Heidelberg | Selected speakers, constructed the scientific programme and organised scientific sessions (2015)

Participation in REMIX-Science and Creativity Industry Project organised by EMBL ELLS and Dezernat16 Heidelberg | Teamed up with artists to produce a piece of art visualizing the structural unit of life, the cell (2018)

MEMBERSHIPS OF SCIENTIFIC SOCIETIES

FEBS (Federation of European Biochemical Societies)

GBM (Gesellschaft für Biochemie und Molekularbiologie)