

Irma Querques, Ph.D.

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Research interests: Mobile genetic elements, CRISPR, DNA rearrangements mechanisms, genome engineering, biochemistry, structural biology, molecular biology

CURRENT POSITION

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

EDUCATION AND PROFESSIONAL EXPERIENCE

04/2019- **Postdoctoral Fellow**, Department of Biochemistry, University of Zurich

04/2023 *Advisor:* Prof. Martin Jinek, Department of Biochemistry, University of Zurich

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 Heidelberg, Germany

06/2018

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

10/2008- **B.Sc. in Biotechnology** | University of Bologna, Italy

10/2011 *Supervisor:* Prof. Giovanni Capranico, Department of Biochemistry, University of Bologna

PEER-REVIEWED PUBLICATIONS

*Equal contribution; #Corresponding author; Senior author is listed last.

1. Finocchio G, **Querques I**, Chanez C, Speichert KJ, Jinek M (2025) Structural basis of TnsC oligomerization and transposase recruitment in type I-B CRISPR-associated transposons. *Nucleic Acids Res* 53: gkaf149
2. Schmitz M*, **Querques I**# (2024) DNA on the move: mechanisms, functions and applications of transposable elements. *FEBS Open Bio* 14: 13–22 (review article)
3. Pacesa M, Loeffl L*, **Querques I***, Muckenfuss LM*, Sawicka M, Jinek M (2022) R-loop formation and conformational activation mechanisms of Cas9. *Nature* 609: 191–196
4. Schmitz M*, **Querques I***, Oberli S, Chanez C, Jinek M (2022) Structural basis for the assembly of the type V CRISPR-associated transposon complex. *Cell* 185: 4999–5010.e17
5. Miskey C*, Kesselring L*, **Querques I**, Abrusán G, Barabas O, Ivics Z (2022) Engineered Sleeping Beauty transposase redirects transposon integration away from genes. *Nucleic Acids Res* 50: 2807–2825
6. **Querques I***, Schmitz M*, Oberli S, Chanez C, Jinek M (2021) Target site selection and remodelling by type V CRISPR-transposon systems. *Nature* 599: 497–502
7. Kesselring L, Miskey C, Zuliani C, Querques I, Kapitonov V, Laukó A, Fehér A, Palazzo A, Diem T, Lustig J, et al (2020) 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: 316–331
8. **Querques I***, Madés A*, Zuliani C*, Miskey C, Alb M, Grueso E, Machwirth M, Rausch T, Einsele H, Ivics Z, et al (2019) A highly soluble Sleeping Beauty transposase improves control of gene insertion. *Nat Biotechnol* 37: 1502–1512
9. Voigt F, Wiedemann L, Zuliani C, **Querques I**, Sebe A, Mátés L, Izsvák Z, Ivics Z, Barabas O (2016) Sleeping Beauty transposase structure allows rational design of hyperactive variants for genetic engineering. *Nat Commun* 7: 11126

INVENTIONS AND PATENTS

1. *Improved transposase polypeptide and uses thereof* (Co-inventor)
U.S. Patent 11,441,132 (granted August 24, 2022)
Japanese Patent JP7240007 (granted March 15, 2023)

- Australian Patent AU2018321105 (granted January 30, 2025)
- European Patent Application EP18756421 (filed August 17, 2018)
- Chinese Patent Application CN110997909 (filed August 17, 2018)
- International Patent Application (PCT) WO2019/038197 (published February 28, 2019)
- 2. *Ribosomal protein S15 in CRISPR transposon mediated sequence engineering* (Co-inventor)
 - International Patent Application (PCT) WO2023/242225 (published December 21, 2023)
- 3. *Cell penetrating transposase* (Co-inventor)
 - International Patent Application (PCT) WO2020/169673 (published August 27, 2020)

THIRD PARTY FUNDING, FELLOWSHIPS AND AWARDS

- 2025 **EMBL John Kendrew Young Scientist Award** for excellence in scientific research and science communication, EMBL Alumni Association
- 2024-2028 **European Research Council 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** in Biotechnologies – awarded to Italians under 35 for extraordinary contributions
- 2022-2025 **Branco Weiss Fellowship Award** - 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
- 2018 Selected participant in 350th Anniversary Merck Innovation Cup competition and Curious2018 Future Insight Conference organized and funded by Merck KGaA, Darmstadt, Germany
- 2017 Fuchs Fund, Travel grant | Awarded to participate in ICMSE conference, Basel, Switzerland
- 2013 Erasmus Placement Scholarship | European Union LLP Programme

SCIENTIFIC TALKS

- 11/2025 EMBO Workshop “The Mobile Genome” | Heidelberg, Germany – Invited speaker
- 05/2025 8th Comparative Medicine Symposium | Vienna, Austria – Invited speaker
- 04/2025 10th IMPRS-LM Symposium “Molecules in Motion”, Max Planck Institute of Molecular Physiology | Dortmund, Germany – Invited speaker
- 02/2025 Department of Biochemistry Seminar Series, University of Cambridge | Cambridge, UK – Invited speaker
- 11/2024 7th Austrian Cryo-EM Symposium | Vienna, Austria – Invited speaker
- 10/2024 Cold Spring Harbor Laboratory Meeting on Transposable Elements | Cold Spring Harbor, USA – Invited speaker
- 04/2024 Microsymposium on RNA Biology | Vienna, Austria – Invited speaker
- 11/2023 EMBO Workshop “CRISPR-Cas: From biology to therapeutic applications” | Seville, Spain – Invited speaker
- 07/2023 EMBO Workshop “The Mobile Genome: Genetic and Physiological Impacts of Transposable Elements” | EMBL Heidelberg, Germany – Selected talk and Prize
- 07/2022 FEBS Congress 2022 “The Biochemistry Global Summit” | Lisbon, Portugal – Selected talk
- 06/2022 CRISPR Meeting 2022 | Boston, USA – Selected talk
- 06/2022 Innovative Genomics Institute Seminar Series, UC Berkeley | Berkeley, USA – Invited speaker (remote)
- 04/2022 Mosbacher Kolloquium “The World of RNAs” | Mosbach, Germany – Invited speaker (remote)
- 04/2022 FEBS LS2 Annual Meeting “Life Sciences in 2020s” | University of Zurich, Switzerland – Selected talk
- 08/2021 EMBO/EMBL Symposium “The Mobile Genome: Genetic and Physiological Impacts of Transposable Elements” | EMBL Heidelberg, Germany – Selected talk and Prize (remote)
- 02/2020 FEBS LS2 Annual Meeting “Cells, Molecules and Organisms” | University of Zurich, Switzerland – Selected talk and FEBS Letters Poster Prize
- 11/2018 20th EMBL PhD Symposium “Game Changers – Taking Life Sciences to the Next Level” | EMBL Heidelberg, Germany – Selected talk
- 10/2017 EMBO/EMBL Symposium “The Mobile Genome: Genetic and Physiological Impacts of Transposable Elements” | EMBL Heidelberg, Germany – Selected talk
- 10/2017 19th EMBL PhD Symposium “Bridging the Gaps – Interdisciplinary Approaches in Life Science” | EMBL Heidelberg, Germany – Selected talk
- 11/2016 Cold Spring Harbor Laboratory Meeting on Transposable Elements | Cold Spring Harbor, USA – Selected talk

TEACHING AND MENTORING

Lectures and practical courses

- 2023-present Assistant Professor at the University of Vienna, Centre for Molecular Biology
- UE301046 Practical course in Microbiology and Genetics (BSc, SS & WS, 2wks)
 - VO301463 Biophysical Chemistry of Macromolecules (MSc lecture series, SS, 1 lecture)
- 2019-2023 Teaching assistant at the University of Zurich, Department of Biochemistry
- 2020 Basic measurement techniques and Photometry course, Spring semester | Biochemistry practicals for Bachelor students of Medicine, Faculty of Medicine
- 2019 Basic measurement techniques and Photometry course, Fall semester | Biochemistry practicals for Bachelor students of Biochemistry, Faculty of Science
- 2014-2017 Instructor in X-ray crystallography, EMBL Predoctoral Course, EMBL Heidelberg | 1 week per year
- 2018 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

Supervision and Mentorship

2023-present Supervisor/advisor, Querques group, University of Vienna

Current group members

Postdoctoral researcher

- Dr. Thomas Swartjes (since 07/2023)
Ph.D. in Microbiology, Wageningen University & Research, NL, Advisor: Prof. John van der Oost

PhD candidates

- Mateusz Walter (since 06/2023), MSc. from University of Bristol, UK
- Olivia Ozguc (since 06/2023), BSc. from University of Oregon, USA
- Iana Camilla Hammerschmid (since 12/2024), MSc. from University of Vienna, AT
- Leonie Opitz (since 11/2025), MSc. from University of Applied Sciences Krems, AT

MSc and BSc students

- Anna Gfrerer (since 11/2025)
- Timofei Kiselev (since 02/2026)

Visiting PhD Candidate

- Cristian Barrera, Department of Evolutionary Biology, University of Vienna (since 04/2025)

Former group members

MSc students

- Hannes Senoner (08/2025–10/2025)
- Julia Karan (03/2025–06/2025)
- Boglárka Bata (09/2024–10/2024)
- Sarah Daud (10/2023–08/2024)

BSc students

- Julia Karan (02/2024–06/2024), Thesis completed BSc Biology, University of Vienna (UA033630), SS2024

Visiting graduate students

- Kostiantyn Romaniuk (10/2024–07/2025), MSc. University of Bologna, IT, now PhD candidate, IRB Bellinzona
- Maddalena Fuso (02/2024–07/2024), MSc. University of Milan, now PhD candidate, University of Tübingen

Academic Supervision and Examination

- Member of 5 PhD thesis advisory committees
- Examiner for 3 PhD dissertations
- Examiner for 9 MSc dissertations

SERVICE TO THE SCIENTIFIC COMMUNITY AND OUTREACH

Member of the Review Panel, Italian National Facility for Structural Biology (2024–present)

Member of the Studienkonferenz (StuKo), University of Vienna (since 09/2024)

Member of the Search Committee for Full Professorship in Structural Biology, Max Perutz Labs (2024, 2026)

Panelist in the EMBL Skills & Careers Webinar "Negotiating Your First Group Leader Position" (March 2026)

Ad hoc Reviewer for *Nature Structural & Molecular Biology*, *Nature Communications*, *Proceedings of the National Academy of Sciences (PNAS)*, and *Mobile DNA*

Contributor to the *Nature Bioengineering Community Blog*

Co-organiser, European Researchers' Night (Heidelberg, 2018); organised Science Flashmob and delivered TED talk "Smart Mobile DNA: Past and Future of Genetic Data Transfer"

EMBL School Ambassador, European Learning Laboratory for the Life Sciences (ELLS) (2015–2018); taught

molecular biology concepts to high school students and teachers in Italy and Germany

Co-organiser, 17th EMBL PhD Symposium “Just by Chance? Randomness and Variability Shaping Biology,”
EMBL Heidelberg (2015); selected speakers and developed scientific programme

Participant, REMIX – Science and Creativity Industry Project (EMBL ELLS & Dezernat16 Heidelberg, 2018);
collaborated with artists to produce artwork visualising the cell

MEMBERSHIPS OF SCIENTIFIC SOCIETIES

FEBS (Federation of European Biochemical Societies)

GBM (Gesellschaft für Biochemie und Molekularbiologie)