JACOPO RAZZAUTI

Graduate Fellow — The Rockefeller University

jrazzauti@rockefeller.edu
jacoporazzauti.com
JacopoRazzauti
jacopo-razzauti

PhD candidate studying mosquito neurogenetics and behavior with a focus on computer vision, neuronal imaging, and behavioral quantification. Co-developer of **FERAL**, a supervised video-understanding system that maps raw pixels directly to frame-level behavioral labels. Experienced in multi-animal 3D tracking, imaging system design, and large-scale ML pipelines. Extensive experience as a field biologist in extreme environments. Fellow of the Boehringer Ingelheim Fonds and the Price Center for the Social Brain. Member of **The Explorers Club**.

EDUCATION

PhD Neurosciences — Lab. of Neurogenetics and Behavior 07/2021–Present

***The Rockefeller University**, New York, USA*

- PhD Researcher in the lab of Dr. Leslie Vosshall (neurogenetics, neuronal imaging, computational ethology).

Visiting Student — Computer Vision 01/2025–Present

***Cornell Tech**, New York, USA*

- Advanced work in modern computer vision and video understanding.

Visiting Student — Ethology and the Evolution of Behavior 01/2022–05/2022

***Columbia University**, New York, USA*

BSc Neurosciences — First Class (Honours) 09/2017–06/2021

***University of Dundee**, Scotland*

Visiting Student — 2nd Year Exchange Program (GPA: 4.27/4.33) 09/2018–05/2019

***University of Northern British Columbia**, Prince George, Canada*

RESEARCH EXPERIENCE (LABORATORY)

The Rockefeller University 07/2021–Present

PhD Student; Supervisor: Dr. Leslie Vosshall — Laboratory of Neurogenetics and Behavior

- **FERAL**: Co-developed **FERAL (Feature Extraction for Recognition of Animal Locomotion)**, a supervised video-understanding system for direct video-to-behavior mapping (*bioRxiv*, 2025: 10.1101/2025.11.16.688666). Achieved **95.4 mAP on CalMS21**, outperforming prior state-of-the-art baselines, and demonstrated strong performance with substantially reduced labeled data. Built **getferal.ai** and a CLI-based workflow enabling biologists to run behavior detection directly from raw pixels. Adopted by research groups across major institutions (e.g., Harvard, Yale, Princeton, UCL, Max Planck, EPFL).

- **Animal Tracking:** Designed and implemented state-of-the-art computer vision systems for multi-animal **3D tracking**, with a focus on mosquito behavior.
- **Neuronal Imaging:** Developed custom imaging systems for non-conventional biological samples (mosquito sensory appendages), improving signal-to-noise and experimental throughput. Experience with functional neuronal imaging across two-photon, lightsheet, and spinning-disk modalities; familiarity with downstream analysis workflows.

First Year Rotations 07/2021–09/2022

1st Rotation (07/2021–12/2021): Mentor: Dr. Leslie Vosshall

- Used genetically-encoded calcium sensors to study how the yellow-fever mosquito taste system responds to tastants.
- Showed that a subset of tarsal neurons responds to DEET.

2nd Rotation (01/2022–04/2022): Mentor: Dr. Vanessa Ruta

- Quantified courtship behavior of distinct *Drosophila melanogaster* strains (two males and one female), testing the role of male-male competition in mating success.

3rd Rotation (04/2022–07/2022): Mentor: Dr. Daniel Kronauer

- Designed and implemented a protocol for bright-field imaging of the abdominal tip of *Ooceraea biroi* pupae.
- Work contributed to publication in *Nature*.

University of Dundee 09/2020–12/2020

Honours Student; Mentor: Prof. Jeremy Lambert
Thesis Project: Investigating tianeptine electrophysiological effects in a mouse model of early-life adversity.

- Electrophysiology acquisition and analysis; neuropharmacology; experimental design and quantitative data interpretation.

Max Planck Institute of Neurobiology 06/2019–09/2019

AMGEN Scholar at Ludwig Maximilian University of Munich; Mentor: Dr. Herwig Baier
Project: Optogenetic dissection of descending behavioural control in zebrafish larvae.

- Experience with optogenetics, imaging, behavioral quantification, and vertebrate genetics workflows.

University of Northern British Columbia 01/2019–04/2019

Research Assistant; Mentor: Dr. R. Luke Harris
Project: Investigation of acute exercise effects on cognition and its neural correlates.

- Human-subject data collection and quantitative analysis of behavioral and neuroimaging measures.

RESEARCH EXPERIENCE (FIELDWORK AND EXPEDITIONS)

The Mars Society — Mars Desert Research Station (MDRS)
Crew Biologist on multiple missions focused on desert extremophile biodiversity

- Crew 298: Martian Biology IV 06/2024
- Crew 282: Martian Biology III 06/2023
- Crew 247: Martian Biology II 06/2022

- Conducted transect-based ecological surveys (lizards, insects) with emphasis on mosquitoes.
- Contributed to collection and cataloguing of local desert flora.
- Supported mission logistics and operations in remote environments.

Operation Wallacea
Research Assistant at multiple field sites
Krka National Park, Croatia 08/2020

- Conducted transect-based ecological surveys for census of local tortoise populations.
- Developed a citizen-science trap-based system for monitoring butterfly populations.

Mariarano Forest, Mahajanga, Madagascar 06/2018–07/2018

- Conducted ecological surveys using species-specific methods (e.g., Pollard counts of butterflies) to map distribution and biodiversity of local fauna.

PUBLICATIONS

Peer-Reviewed Articles (Most Recent First)

- Goldman, O. V., DeFoe, A. E., Qi, Y., Jiao, Y., Weng, S.-C., Wick, B., Houri-Zeevi, L., Lakhiani, P., Morita, T., **Razzauti, J.**, Rosas-Villegas, A., [...] Vosshall, L. B., & Shai, N. (2025). *A single-nucleus transcriptomic atlas of the adult Aedes aegypti mosquito. Cell*, 188(25), 7267–7290.e26. doi:10.1016/j.cell.2025.10.008
- Houri-Zeevi, L., Walker, M. M., **Razzauti, J.**, Sharma, A., Pasolli, H. A., & Vosshall, L. B. (2025). *A rapidly evolving female-controlled lock-and-key mechanism determines Aedes mosquito mating success. Current Biology*, 35(22), 5460–5474.e8. doi:10.1016/j.cub.2025.09.066
- Snir, O., Alwaseem, H., Heissel, S., Sharma, A., Valdés-Rodríguez, S., Carroll, T. S., Jiang, C. S., **Razzauti, J.**, & Kronauer, D. J. (2022). *The pupal moulting fluid has evolved social functions in ants. Nature*, 612, 488–494. doi:10.1038/s41586-022-05480-9

Preprints

- Skovorodnikov, P., Zhao, J., Buck, F., Kay, T., Frank, D. D., Koger, B., Costelloe, B. R., Couzin, I. D., & **Razzauti, J.** (2025). **FERAL: A Video-Understanding System for Direct Video-to-Behavior Mapping.** *bioRxiv*. doi:10.1101/2025.11.16.688666

Manuscripts in Preparation

- Sokoloff, P. C., Rupert, S. M., McBeth, S. R. M., Murray, D. A., Irvine, M. G., Bimm, J., **Razzauti, J.**, & Drayson, O. (in preparation). *Further Additions to the "Martian Flora": new vascular plant collections from the Mars Desert Research Station, Utah, U.S.A.*

PRESENTATIONS AND ORGANIZED EVENTS

Invited Talks

- **FERAL: A Video Understanding Tool for Direct Video-to-Behavior Mapping** Max Planck Institute of Animal Behavior 10/2025
- **FERAL: A Video Understanding Tool for Direct Video-to-Behavior Mapping** University of Lausanne 10/2025
- "To Bite or Not To Bite: Understanding Repellency through Mosquito Tracking" European Conference of Insect Taste and Olfaction 09/2025
- "To Bite or Not To Bite: Understanding Repellency through Mosquito Tracking" Rockefeller University Invertebrate Meeting 11/2024

- "To Bite or Not To Bite: Understanding Repellency through Mosquito Tracking" Price Center Dataclub 11/2024
- "Breaking the Unbreakable: Quantifying Mosquito Foraging and Repellency" Mosquito Neuroethology Satellite Meeting, Berlin 07/2024
- "Tracking Mosquitoes with Machine Learning" Price Center Workshop on Tracking and Analysis of Social Behaviors 05/2024
- "A Short Adventure in the Mosquito Brain" Museo di Storia Naturale del Mediterraneo, Livorno, Italy 09/2023
- "Imaging Molting Fluid Secretion in Ant Pupae" Brainiac Breakdown, Fordham University 12/2022

Poster Presentations

- **FERAL: A Video Understanding Tool for Direct Video-to-Behavior Mapping** Society for Neuroscience (SfN), San Diego, USA 11/2025
- "Tracking Freely-Flying Mosquitoes using Transformers" Short Course on ML for Automated Quantification of Behavior, Jackson Laboratory 10/2024
- "When Predation Becomes Escape: Quantifying Behavioral Effects of Mosquito Repellents" International Congress of Neuroethology, Berlin 07/2024
- "Quantifying Mosquito Foraging to Understand Repellency" HHMI Janelia Research Campus (Mechanistic Basis of Foraging) 02/2024
- "The Mosquito HOSTel: a Modular Behavioral Chamber to Study Repellency" European Symposium for Insect Taste and Olfaction (ESITO), Sardinia 09/2023
- "Optogenetic Dissection of Descending Behavioural Control in Zebrafish Larvae" AMGEN Symposium, University of Cambridge 09/2019

Scientific Events Organized

- Tri-State Mosquito Neurobiology Symposium The Rockefeller University / Princeton University / Columbia University 05/2024

SCIENTIFIC COURSES AND ADVANCED TRAINING

- Machine Learning for Automated Quantification of Behavior Jackson Laboratory, Maine 10/2024
- Communicating Science, Boehringer Ingelheim Fonds (BIF) Seminar Banbury Center, CSHL 04/2024
- Imaging Structure & Function in the Nervous System Cold Spring Harbor Laboratory 07/2023–08/2023
- Neuromatch Academy Online Intensive Course 07/2023
- Modern Approaches to Behavioral Analysis CAJAL Neurokit (Mathis; Kim) 11/2022
- Scientific Presentation Master Class Memorial Sloan Kettering (Melissa Marshall) 02/2020–06/2020
- Introduction to Data Analysis and Advanced Data Analysis LMU Biocenter, Munich 08/2019

FELLOWSHIPS, AWARDS, AND DISTINCTIONS

Graduate Fellowships

- Price Center for the Social Brain Graduate Fellowship 2024–Present
- Boehringer Ingelheim Fonds (BIF) PhD Fellowship 2021–2025

Awards

- Third Place, Nucleate BioHackathon (New York) 11/2023
- Oscar Livornesi, Italian Naval Academy (Livorno, Italy) 09/2023

Undergraduate Awards (University of Dundee)

- Biomedical Sciences Honours Stream Prize 2021
- Waymouth Reid Prize 2021
- Neurosciences Honours Prize 2021
- Biomedical Sciences Stream Prize — Level 3 2020
- Chemers Neustein Summer Undergraduate Fellowship, The Rockefeller University 2020
- Armistead Bursaries 2018, 2020
- Jonathan Glover Core Curriculum Award for Academic Excellence 2018
- Ede and Ravenscroft Prize 2018
- Level 1 Core Curriculum Prize 2018

Academic Distinctions

- Member of The Dean's List, School of Life Sciences, University of Dundee 2018–2021

SKILLS AND CERTIFICATIONS

Computational / ML: Deep learning, video models, action recognition, representation learning, tracking, multi-view geometry, large-scale pipelines

Programming & Tools: Python, PyTorch, OpenCV, NumPy/SciPy, Pandas, Polars, R, Git, Unix/Linux

Imaging & Experimental: Custom imaging system design; calcium imaging; quantitative behavioral assays (mosquito sensory appendages)

Languages: Italian (native), English (C1; IELTS 8, 2017)

Certifications: PADI Open Water Diver 07/2022

PROFESSIONAL AFFILIATIONS

Current

- The Explorers Club Member 2025–Present

Past

- Oxford University Press (OUP) OUP Bioscience Student Panel Member 2020–2021
- The Physiological Society Member 2018–2021
- The Genetics Society Member 2020–2021

REFERENCES

Dr. Leslie Vosshall (PhD Advisor)
Robin Chemers Neustein Professor
Laboratory of Neurogenetics and Behavior, The Rockefeller University
leslie@rockefeller.edu

Dr. Herwig Baier (Undergraduate Mentor)
Director, Max Planck Institute for Biological Intelligence
herwig.baier@bi.mpg.de

Prof. Jeremy Lambert (Undergraduate Mentor)
Professor of Neuropharmacology, University of Dundee
j.j.lambert@dundee.ac.uk