ILIA A. DROUJININE idroujinine@scripps.edu
Scripps Fellow and Principal Investigator scripps.edu/droujinine
Scripps Research

EDUCATION

2020	Ph.D. *Harvard University*, Biological and Biomedical Sciences, Advisor: Norbert Perrimon. *Thesis:* Elucidating protein communication between organs and organisms in homeostasis and stress
2011	B.Sc. *University of Waterloo*, Honours Biochemistry, Co-op. Ranked #1 in the Faculty of Science graduating class (660 people), Alumni Gold Medal, GPA 95.2%

SELECTED AWARDS AND HONORS

2021	ASBMB Annual Meeting Presentation Award
2019	EMBO Poster/Presentation Prize, EMBO Workshop on Organ Crosstalk
2017	Herbert Tabor Young Investigator Award, J Biol Chem/ASBMB (best research at a FASEB meeting)
2014-2017	HMS Innovation Grant Program (IGP) Research Award, HMS
2014-2017	Osher Center for Integrative Medicine Pre-Doctoral Fellowship, HMS
2012-2015	NSERC PGS-D, HMS
2011	Alumni Gold Medal (Highest ranked graduating student in the Univ. of Waterloo Faculty of Science)
2011-2012	NSERC PGS-M, Harvard University
2010	Ontario International Opportunity Education Scholarship, Cambridge, MA
2009	Gretchen Mueller Memorial Biochemistry Scholarship (top biochemistry student), University of Waterloo
2009	Max Planck Society International Research School Scholarship, Freiburg, Germany
2009	President's International Experience Award, Freiburg, Germany
2009	J.R. Coutts International Experience Award, Freiburg, Germany
2008	NSERC USRA (Undergraduate Student Research Award), University of Waterloo
2008	President's Research Award, University of Waterloo
2006-2007	CHEM 13 News Research Assistantships (top 0.3% finish in Canada in chemistry exam)
2006-2011	Queen Elizabeth II Aiming for the Top Scholarship, Government of Ontario
2006	President's Scholarship of Distinction, University of Waterloo

PUBLICATIONS (**co-first author; #Corresponding author*)

1. Kreissl FK*, Banki MA*, **Droujinine IA#**. Molecular methods to study protein trafficking between organs. *Proteomics* Dec 7;e2100331 (2022). DOI:10.1002/pmic.202100331. PMID: 36478633.
2. Yang R*, Meyer AS*, **Droujinine IA***, Udeshi ND, Hu Y, Guo J, McMahon JA, Carey DK, Xu C, Fang Q, Sha J, Qin S, Rocco D, Wohlschlegel J, Ting AY, Carr SA, Perrimon N, McMahon AP. A genetic model for *in vivo* proximity labeling of the mammalian secretome. *Open Biol* 12, 220149 (2022). DOI:10.1098/rsob.220149. PMCID: PMC9364151. Preprint available on April 15, 2022 (BioRxiv 2022.04.13.488228).
    - Media coverage**:** EurekAlert and Scripps Research "New research model illuminates how organs communicate with each other" 2022.

3. **Droujinine IA#**, Meyer AS, Wang D, Udeshi ND, Hu Y, Rocco D, McMahon JA, Yang R, Guo JJ, Mu L, Carey DK, Svinkina T, Zeng R, Branon T, Tabatabai A, Bosch JA, Asara JM, Ting AY, Carr SA, McMahon AP, Perrimon N#. Proteomics of protein trafficking by in vivo tissue-specific labeling. *Nat Commun* 12, 2382 (2021). DOI:10.1038/s41467-021-22599-x. PMCID: PMC8062696. Preprint available on April 15, 2020 (BioRxiv 2020.04.15.039933).
   - Highlighted in: Nature Methods "Revealing the secretome" 2021.
4. **Droujinine I#**. Elucidating protein communication between organs and organisms in homeostasis and stress. *Harvard University PhD Thesis* (2020).
5. **Droujinine IA#**, Perrimon N#. The Multidimensional Organization of Interorgan Communication Networks. *Dev Cell* 50(4), 395-396 (2019).
6. Mu L*#, **Droujinine IA*#**, Lee J, Wipf M, Davis P, Adams C, Hannant J, Reed MA#. A nanoelectronic platform for ultrasensitive detection of protein biomarkers in serum using DNA amplification. *Anal Chem* 89, 11325-11331 (2017).
7. **Droujinine IA#**, Perrimon N#. Interorgan communication pathways in physiology: Focus on *Drosophila*. *Annu Rev Genet* 50, 539-570 (2016).
   - Media coverage: Aeon "Hormones United" 2019.
8. Kwon Y, Song W, **Droujinine IA**, Hu Y, Asara JM, Perrimon N. Systemic organ wasting induced by localized expression of the secreted insulin/IGF antagonist ImpL2. *Dev Cell* 33(1), 36-46 (2015).
9. **Droujinine IA**, Yan D, Perrimon N. A sharp end to sugary Wingless travels. *J Cell Biol* 206(7), 819-821 (2014).
10. Mu L, **Droujinine IA**, Rajan NK, Sawtelle SD, Reed MA. Direct, rapid, and label-free detection of enzyme-substrate interactions in physiological buffers using CMOS-compatible nanoribbon sensors. *Nano Lett* 14(9), 5315-5322 (2014).
11. **Droujinine, IA#**, Perrimon N#. Defining the interorgan communication network: systemic coordination of organismal cellular processes under homeostasis and localized stress. *Front Cell Infect Microbiol* 3, 82 (2013).
    - Media coverage: Aeon "Hormones United" 2019.
12. **Droujinine, IA**, Eckert M, Zhao W. To grab the stroma by the horns: From biology to cancer therapy with mesenchymal stem cells. *Oncotarget* 4(5), 651-664 (2013).
13. Babona-Pilipos R, **Droujinine IA**, Popovic MR, Morshead CM. Adult subependymal neural precursors, but not differentiated cells, undergo rapid cathodal migration in the presence of direct current electric fields. *PLoS ONE* 6(8), e23808 (2011).
14. Zhao W, Loh W, **Droujinine IA**, Teo W, Kumar N, Schafer S, Cui CH, Zhang L, Sarkar D, Karnik R, Karp JM. Mimicking the inflammatory cell adhesion cascade by nucleic acid aptamer programmed cell-cell interactions. *FASEB J* 25, 3045-3056 (2011).
15. Zhao W, Schafer S, Choi J, Yamanaka Y, Lombardi ML, Bose S, Carlson A, Phillips JA, Teo W, **Droujinine IA**, Cui C, Sarkar D, Jain RK, Lammerding J, Love JC, Lin CP, Karp JM. Cell surface sensors for real-time probing of cellular environments. *Nat Nanotechnol* 6, 524-531 (2011).

CONFERENCES, SEMINARS, AND MEETINGS (*Presenting author*)

2023 Cambridge University Wellcome-MRC Institute of Metabolic Science, Cambridge UK *[Invited talk].*

2023 MRC London Institute of Medical Sciences (LMS), London UK *[Invited talk]*.

2022 EMBO Workshop: Energy balance in metabolic disorders *[Talk]*.

2022 EMBO Symposium: Inter-organ communication in physiology and disease *[Talk]*.

2021 Scripps Department of Molecular Medicine Retreat *[Talk]*.

2021 ASBMB Annual Meeting *[Invited talk]*. *#awarded the ASBMB Annual Meeting Presentation Award.*

2021 Scripps Chemical Biology Work-In-Progress, La Jolla CA *[Invited talk].*

2021 Scripps/SBP ER Stress Club *[Invited talk].*

2020 Scripps DNC Seminar, La Jolla CA *[Invited talk].*

2020 The Allied Genetics Conference (TAGC), Washington, DC *[Talk]*.

2020 Harvard Genetics Retreat, Broad Institute, Cambridge MA *[Invited Talk]*.

2020 Harvard Medical School, Boston MA *[Defense seminar].*

2019 Zhejiang University, Hangzhou China *[Invited talk].*

2019 Soochow University, Suzhou China *[Invited talk].*

2019 Scripps Research, La Jolla *[Invited talk].*

2019 University of California, San Francisco (UCSF) *[Invited talk].*

2019 EMBO Workshop: Organ crosstalk in energy balance and metabolic disease, Cadiz, Spain. *[Talk and poster]. #awarded the EMBO Poster/Presentation Prize.*

2018 2nd Annual Boston Area *Drosophila* Meeting, HMS, Boston MA. *[Talk]*

2018 59th Annual Drosophila Research Conference (ADRC), Philadelphia PA. *[Talk]*

2017 Program in Genetics and Genomics, HMS. *[Invited talk]*

2017 2nd Junior Scientist Workshop: Neural Circuits and Behavior, HHMI Janelia Campus, Ashburn VA. *[Talk]*

2017 25th European *Drosophila* Research Conference (EDRC), Imperial College, London, UK *[Talk]*

2017 15th European Symposium for Insect Taste and Olfaction (ESITO), Villasimius, Italy. *[Talk]*

2017 FASEB SRC: Glucose Transport: Gateway to Metabolic Systems Biology, Snowmass CO. *[Talk and poster]. #awarded the JBC Tabor Award for best research.*

2017 Innovation Grant Program Symposium, Department of Cell Biology, HMS, Boston MA. *[Invited talk]*

2017 Harvard Behavior Meeting, Harvard Brain Initiative, Boston MA. *[Invited talk]*

2016 BWH Osher Center for Integrative Medicine Network Forum, Boston MA. *[Invited talk]*

2016 HMS Genetics Data Club. *[Invited talk]*

2014 HMS Genetics Data Club. *[Invited talk]*

2013 54th Annual Drosophila Research Conference (ADRC), Washington DC.*[Poster]*

2011 International Society for Stem Cell Research (ISSCR) 9th Annual Meeting, Toronto ON *[Poster]*

2011 Soochow University, Suzhou China. *[Invited talk]*

2010 5th Annual Harvard Stem Cell Institute Retreat. Harvard University, Cambridge MA. *[Poster]*

2009 Canadian Undergraduate Conference on Healthcare (CUCOH). Queens University, Kingston ON. [*Talk*]

PATENTS

Reed MA, Mu L, **Droujinine IA**. A portable universal electronic analyte detection system. USA USPTO 62/741,324, *patent pending* (2018).

RESEARCH APPOINTMENTS

2020– : Scripps Independent Fellow and Principal Investigator, Scripps Research. Untangling the interorgan communication network

2012—2020: PhD student, Norbert Perrimon lab, Department of Genetics, HMS. Protein communication between organs and organisms: Stability of complex biological systems depends on long-distance communication between organs and organisms. However, systematic methods have not been developed to specifically isolate long-distance communication secreted proteins, and many remain to be found. During my PhD, I:

- Established an *in vivo* global genetic and proteomic platform to investigate secreted protein trafficking between organs. Using this, I identified a secreted factor which distally controls muscle activity.

- Developed genetic and proteomic platforms to investigate inter-organism secreted peptides.

2010: Undergraduate Researcher, Jeffrey Karp lab, BWH, HMS. Elucidation and utilization of mesenchymal stromal cell (MSC) biology for therapeutic applications.

- Investigated MSC molecular mechanism of homing to diseased tissues *in vitro* and *in vivo* (mice) towards understanding of stromal cell contribution to remodeling tissues in pathological conditions, and design of strategies for enhanced delivery of MSCs for therapeutic applications
- Developed a novel method of delivering anti-tumor chemotherapeutic drugs using MSCs that are capable of specific tumor homing, and fluorescent aptamer-modified MSC, for real time sensing of molecules within cellular microenvironment, using mouse intravital imaging

2009: Undergraduate Researcher, Rudolf Grosschedl lab, Max Planck Institute for Immunobiology. Function of early B cell factor 1 (EBF1) in DNA double strand break repair during early B cell development.

- Independently developed immunofluorescence confocal microscopy and pulsed-field gel electrophoresis methods for studying the role of EBF1 in DNA double strand break repair
- Used knockout mice, fetal liver dissections, FACS, confocal, and pulsed-field gel electrophoresis.

2008: Undergraduate Researcher, Cindi Morshead lab, Institute of Medical Science, Univ. Toronto. Non-invasive adult brain regeneration by directed endogenous stem cell migration.

- Demonstrated that adult neural stem, but not differentiated, cells migrate in the direction of an electric field, using live imaging, immunofluorescence, mouse experiments, dissections, primary neural stem cell culture, and brain-slice methods

TEACHING

2023: Scripps Cell Biology Course. Jan-March, 2023 (Course Co-Director with Danielle Grotjahn and Mia Huang. *My role:* Lecturing a session, assignment writing and grading, leading a discussion session.

2021-2022: Scripps Cell Biology Course. *My role:* Giving a seminar on Systemic Homeostasis and leading a manuscript discussion session.

2016: Harvard Nanocourse CB399: Interorgan Communication Pathways in Physiology and Disease. With Norbert Perrimon, Bruce Spiegelman, and Amy Wagers. *My Role:* conception, design, syllabus, lecturer recruitment, lecturing, assignment writing and grading, leading the discussion session.

SERVICE, OTHER EXPERIENCE, AND PROFESSIONAL MEMBERSHIPS

2022–	NIH Early Career Reviewer Program (POMD (2/28-3/1/2023))
2022–	American Gastroenterological Association
2022–	The Gerontological Society of America
2022	Grant/Whitepaper Reviewer, National Research Foundation, Prime Minister's Office, Singapore
2024	Organized and invited two speaker to the Molecular Medicine Department at Scripps Research
2020	Organized and invited a speaker to the Genetics Department at HMS
2020-2022	Interviewed shortlisted students for the Scripps PhD program
2020-2021	Introduced my lab's research to Scripps incoming PhD students by giving a Lightning Talk
2017–	American Society for Biochemistry and Molecular Biology (ASBMB)

MENTORING

Michael Banki, Graduate Student, 2021–present
Emily Huynh, Research Technician, 2023–present
Siyu Song, Lab Assistant I, 2022–present
Margaret Campbell, Research Assistant II, 2021–present
Gaurie Gunasekaran, Lab Assistant I, 2020–present

Past:
Alexandra Salazar, PhD rotation student, 2022
Felix Kreissl, PhD rotation student, 2022
David Rocco, Technician, 2018–2020, currently PhD student, University of North Carolina, Chapel Hill
Rebecca Zeng, Technician, 2017-2018, currently MD student, BU
Dan Wang, Visiting Scholar, 2016-2017, currently Instructor, Dept. Entomology, China Agricultural University
Areya Tabatabai, Technician, 2015-2016, currently MS bioinformatics, Northeastern
Aldina Mesic, Technician, 2014-2015, currently Clinical Research Coordinator II, Infectious Disease/Gastrointestinal Unit, MGH

GRANTS

2023-2025	Collaborative Innovation Fund, Scripps Research ($273,313)
2022-2024	Glenn Foundation for Medical Research and AFAR Grants for Junior Faculty, Scripps Research ($125,000)
2021	Ellen Browning Scripps Foundation ($55,000)