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A. EDUCATION

a-1 **Ph.D.** *Harvard University*, Biological and Biomedical Sciences, March 2020, Advisor: Norbert Perrimon. *Thesis:* **Elucidating protein communication between organs and organisms in homeostasis and stress**

a-2 **B.Sc.** *University of Waterloo*, Honours Biochemistry, Co-op, 2011. **Ranked #1 in the Faculty of Science graduating class (660 people)**, Alumni Gold Medal, GPA 95.2%

B. AWARDS (*Selected from* **43** *in total*)

b-1 Ellen Browning Scripps Foundation, 2021

b-2 ASBMB Annual Meeting Presentation Award, 2021

b-3 Scripps Independent Fellow and Principal Investigator, Scripps Research, 2020-2025

b-4 EMBO Poster/Presentation Prize, EMBO Workshop on Organ Crosstalk, 2019

b-5 Herbert Tabor Young Investigator Award, J Biol Chem/ASBMB (best research at a FASEB meeting), 2017 ($1,000)

b-6 HMS Innovation Grant Program (IGP) Research Award, HMS, 2014-2017 ($100,000 for research spending)

b-7 Osher Center for Integrative Medicine Pre-Doctoral Fellowship, HMS, 2014-2017 ($36,000)

b-8 NSERC PGS-D, HMS, 2012-2015 ($63,000)

b-9 Alumni Gold Medal (Highest ranked graduating student in the Univ. of Waterloo Faculty of Science), 2011

b-10 NSERC PGS-M, Harvard University, 2011-2012 ($17,300)

b-11 Ontario International Opportunity Education Scholarship, Cambridge, MA, 2010 ($2,500)

b-12 Gretchen Mueller Memorial Biochemistry Scholarship (top biochemistry student), University of Waterloo, 2009 ($2,000)

b-13 Max Planck Society International Research School Scholarship, Freiburg, Germany, 2009 ($2,738)

b-14 President's International Experience Award, Freiburg, Germany, 2009 ($1,500)

b-15 J.R. Coutts International Experience Award, Freiburg, Germany, 2009 ($2,000)

b-16 NSERC USRA (Undergraduate Student Research Award), University of Waterloo, 2008 ($4,500)

b-17 President's Research Award, University of Waterloo, 2008 ($1,500)

b-18 CHEM 13 News Research Assistantships (top 0.3% finish in Canada in chemistry exam), 2006-2007 ($1,000)

b-19 Queen Elizabeth II Aiming for the Top Scholarship, Government of Ontario, 2006-2011 ($6,533)

b-20 President's Scholarship of Distinction, University of Waterloo, 2006 ($2,000)

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

c-1 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.

c-2 **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.

c-3 **Droujinine I#**. Elucidating protein communication between organs and organisms in homeostasis and stress. ***Harvard University PhD Thesis*** (2020).

c-4 **Droujinine IA#**, Perrimon N#. The Multidimensional Organization of Interorgan Communication Networks. ***Dev Cell*** **50**(4), 395-396 (2019).

c-5 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).

c-6 **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.

c-7 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).

c-8 **Droujinine IA**, Yan D, Perrimon N. A sharp end to sugary Wingless travels. ***J Cell Biol*** **206**(7), 819-821 (2014).

c-9 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).

c-10 **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.

c-11 **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).

c-12 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).

c-13 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).

c-14 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).

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

Elucidating protein communication between organs and organisms in homeostasis and stress:

d-1 Scripps Chemical Biology Work-In-Progress, La Jolla CA, February 2021 ***[Invited talk].***
d-2 Scripps DNC Seminar, La Jolla CA, December 2020 ***[Invited* talk*].***
d-3 Harvard Medical School, Boston MA, Jan 6, 2020 ***[defense seminar].***
d-4 Zhejiang University, Hangzhou China, Nov 7, 2019 ***[Invited talk].***
d-5 Soochow University, Suzhou China, Nov 6, 2019 ***[Invited talk].***
d-6 Scripps Research, La Jolla, June 24, 2019 ***[Invited talk].***
d-7 University of California, San Francisco (UCSF), April 30 2019 ***[Invited talk].***

Proteomics of protein trafficking by *in vivo* tissue-specific labeling:

d-8 EMBO Workshop: Energy balance in metabolic disorders, October 2022 ***[Talk]***.
d-9 EMBO Symposium: Inter-organ communication in physiology and disease, March 2022 ***[Talk]***.
d-10 Scripps Department of Molecular Medicine Retreat, October 2021 ***[Talk]***.
d-11 ASBMB Annual Meeting, April 2021 ***[Invited Talk]***.
d-12 Scripps/SBP ER Stress Club, February 2021 ***[Invited talk].***
d-13 The Allied Genetics Conference (TAGC), Washington, DC, April 2020 ***[Talk]***.
d-14 Harvard Genetics Retreat, Broad Institute, Cambridge MA, February 2020 ***[Invited Talk]***.

d-15 EMBO Workshop: Organ crosstalk in energy balance and metabolic disease, Cadiz, Spain, April 2019. ***[Talk and poster]. #awarded the EMBO Poster/Presentation Prize (b-2).***

d-16 2nd Annual Boston Area *Drosophila* Meeting, HMS, Boston MA, June 2018. ***[Talk]***

d-17 25th European *Drosophila* Research Conference (EDRC), Imperial College, London, UK, September 2017. ***[Talk]***

d-18 FASEB SRC: Glucose Transport: Gateway to Metabolic Systems Biology, Snowmass CO, July 2017. ***[Talk and poster]. #awarded the JBC Tabor Award for best research (b-3).***

d-19 Innovation Grant Program Symposium, Department of Cell Biology, HMS, Boston MA, May 2017. ***[Invited talk]***

Inter-organism communication:

d-20 59th Annual Drosophila Research Conference (ADRC), Philadelphia PA, April 2018. ***[Talk]***

d-21 Program in Genetics and Genomics, HMS, November 2017. ***[Invited talk]***

d-22 2nd Junior Scientist Workshop: Neural Circuits and Behavior, HHMI Janelia Campus, Ashburn VA, Oct 2017. ***[Talk]***

d-23 15th European Symposium for Insect Taste and Olfaction (ESITO), Villasimius, Italy, September 2017. ***[Talk]***

d-24 Harvard Behavior Meeting, Harvard Brain Initiative, Boston MA, May 2017. ***[Invited talk]***

d-25 HMS Genetics Data Club, January 22, 2016. ***[Invited talk]***

Genetic analysis of *Drosophila* inter-organ communication networks:

d-26 BWH Osher Center for Integrative Medicine Network Forum, Boston MA, November 2016. ***[Invited talk]***

d-27 HMS Genetics Data Club, July 2014. ***[Invited talk]***

d-28 54th Annual Drosophila Research Conference (ADRC), Washington DC, April 2013 *[Poster]*

Stem cells and regeneration (undergraduate research).

d-29 International Society for Stem Cell Research (ISSCR) 9th Annual Meeting, Toronto ON, June 2011. *[Poster]*

d-30 Soochow University, Suzhou China, May 2011. ***[Invited talk]***

d-31 5th Annual Harvard Stem Cell Institute Retreat. Harvard University, Cambridge MA, June 2010. *[Poster]*

d-32 Canadian Undergraduate Conference on Healthcare (CUCOH). Queens University, Kingston ON, Nov 2009. **[*Talk*]**

E. PATENTS

e-1 Reed MA, Mu L, **Droujinine IA**. A portable universal electronic analyte detection system. USA USPTO 62/741,324, *patent pending* (2018).

F. RESEARCH APPOINTMENTS (*including selected undergraduate appointments*)

f-1 **Scripps Independent Fellow and Principal Investigator**, Scripps Research, Oct. 2020–

f-2 PhD student, Norbert Perrimon lab, Department of Genetics, HMS, Sept. 2012—Aug. 2020.
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 of muscle activity.
- Developed genetic and proteomic platforms to investigate inter-organism secreted peptides.

f-3 Undergraduate Researcher, Jeffrey Karp lab, BWH, HMS, January—August 2010. **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

f-4 Undergraduate Researcher, Rudolf Grosschedl lab, Max Planck Institute for Immunobiology, May–Aug. 2009. **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.

f-5 Undergraduate Researcher, Cindi Morshead lab, Institute of Medical Science, Univ. Toronto, Sept—Dec 2008. **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

G. TEACHING

g-1 **Scripps Cell Biology Course.** Jan 11/13, 2021 (Course Directors: R. Luke Wiseman, Danielle Grotjahn, and Mia Huang) and March 15/17, 2022 (Course Directors: Danielle Grotjahn, Mia Huang, and Giordano Lippi).

- *My role:* Giving a seminar on Systemic Homeostasis and leading a manuscript discussion session.

g-2 **Harvard Nanocourse CB399: Interorgan Communication Pathways in Physiology and Disease.** Feb 26 and Mar 2, 2016. With Norbert Perrimon, Bruce Spiegelman, and Amy Wagers.

- *My Role:* conception, design, syllabus, lecturer recruitment, lecturing, assignment writing and grading, leading the discussion session.

H. MENTORING

h-1 *Alexandra Salazar*, PhD rotation student, 2022

h-2 *Felix Kreissl*, PhD rotation student, 2022

h-3 *Siyu Song*, Research Intern, 2022–present

h-4 *Margaret Campbell*, Research Assistant I, 2021–present

h-5 *Michael Banki*, Graduate Student, 2021–present

h-6 *Gaurie Gunasekaran*, Research Intern, 2020–present

h-7 *David Rocco*, Technician, 2018–2020, currently PhD student, University of North Carolina, Chapel Hill

h-8 *Rebecca Zeng*, Technician, 2017-2018, currently MD student, BU

h-9 *Dan Wang*, Visiting Scholar, 2016-2017, currently Instructor, Dept. Entomology, China Agricultural University

h-10 *Areya Tabatabai*, Technician, 2015-2016, currently MS bioinformatics, Northeastern

h-11 *Aldina Mesic*, Technician, 2014-2015, currently Clinical Research Coordinator II, Infectious Disease/Gastrointestinal Unit, MGH

I. SERVICE

i-1 Organized and invited a speaker to the Genetics Department at HMS (Vanessa Ruta from Rockefeller), January 2020

i-2 Interviewed shortlisted students for the Scripps PhD program, 2020, 2021, 2022

i-3 Introduced my lab's research to Scripps incoming PhD students by giving a Lightning Talk, August 2020, August 2021