

## Andrew R. Marderstein

PhD candidate at Cornell University and Weill Cornell Medical College  
Mobile: (914) 806-1890. E-Mail: [anm2868@med.cornell.edu](mailto:anm2868@med.cornell.edu) / [arm286@cornell.edu](mailto:arm286@cornell.edu)  
Twitter: @amarderstein. GitHub: [github.com/drewmard](https://github.com/drewmard)

### Education

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#### PhD - Computational Biology & Medicine (CBM), Tri-Institutional Program 2017 – Present

Cornell University / Weill Cornell Medical College | Memorial Sloan Kettering Cancer Center | Rockefeller University  
PIs: Andrew Clark (CU) and Olivier Elemento (WCMC).

#### BS, Cornell University 2013 - 2017

Major in Biometry & Statistics (Concentration: Statistical Genomics) and a Minor in Biological Sciences.  
PI: Philipp Messer. Graduated with honors and distinction in research. Departmental (Major) GPA: 4.00.

### Research Experience

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#### Cornell University and Weill Cornell Medical College 2017 - Present

Dr. Andrew Clark Lab and Dr. Olivier Elemento Lab  
PhD Candidate

- Analysis of modifiable risk factors using human genetic variation; genetic interactions & immune infiltration
- 3-month rotations: Andrew Clark, Chris Mason/Randy Longman, Iwijn De Vlamincx, and Olivier Elemento

#### Regeneron Genetics Center Summer 2016/Summer 2017

Supervised by Dr. Cristopher Van Hout and Dr. Shane McCarthy  
Statistical Genetics Intern

- '17: Investigated statistical methods for inference of genetic interactions in population sequencing data
- '16: Employed simulations to evaluate false positive rates of statistical methods in genetic association studies

#### Cornell Department of Biological Statistics and Computational Biology 2015 – 2017

Dr. Philipp Messer Lab  
Undergraduate Honors Researcher

- Developed a Bayesian coalescent framework for studying selective sweeps in population genetic data

#### Cornell Department of Natural Resources 2016 – 2017

Dr. Pat Sullivan, Department Chair  
Statistician – Consultant for Hudson River Fisheries Unit

- Modeled fish population dynamics in time-series data using statistical approaches

#### Cornell Institute for Resource Information Sciences (IRIS) 2015 – 2016

Supervised by Dr. Magdelaine Laba  
Student Researcher & Engagement Intern

- Developed New York State 4-H youth education programs; mapped invasive species in the Hudson River

### Presented Work

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#### Publications: (\* = co-first or co-corresponding authors)

##### Submitted, in preparation:

1. **Marderstein, A.R.**, Kulm, S., Peng, C., Kraft, P., Tamimi, R.M., Elemento, O.\*, Clark, A.G.\* A biobank-based approach to identify gene-drug interactions stratifying breast cancer risk. (In prep)
2. Kulm, S., **Marderstein, A.R.**, Mezey, J.\*, Elemento, O.\* A systematic framework for assessing the clinical impact of polygenic risk scores. Preprint on *medRxiv*. doi: <https://doi.org/10.1101/2020.04.06.20055574> (Under review)
3. Lima, S.F., Gogokhia, L., Viladomiu, M., Woo, V., **Marderstein, A.R.**, Putzel, G., Scherl, E.J., Brown, S.E., Hambor, J.,

Rosenthal, M., Jacob, V., Crawford, C., Chou, L., Longman, R. Transferable Immune Reactive Microbiota Determine Clinical and Immunologic Outcome of Fecal Microbiota Transplant in Ulcerative Colitis. (Submitted)

4. Shah, Y.\*, Verma, A.\*, **Marderstein, A.R.**, Bhinder, B., Elemento, O. Pan-cancer analysis reveals unique molecular patterns associated with age. Preprint on *medRxiv*. doi: <https://doi.org/10.1101/2020.08.30.20184762>. (Under review)
5. Lima, S., Rupert, A., Putzel, G., **Marderstein, A.R.**, Woo, V., Viladomiu, M., Metz, M., Scherl, E., Longman, R. The Intestinal Microbiome Stratifies Clinical Response to Sulfasalazine in IBD-associated Spondyloarthritis. (In revision)
6. Kong, Y., Harrington, D., **Marderstein, A.R.**, Alonso, L.C. Low frequency T2D-associated polymorphisms at CCND2 influence CCND2 mRNA abundance, but not proliferation, in human pancreatic islets. (In revision)

#### Published:

7. **Marderstein, A.R.**, Davenport, E.R., Van Hout, C.V., Kulm, S., Elemento, O.\*, Clark, A.G.\* (2021). Leveraging phenotypic variability to identify genetic interactions in human phenotypes. *American Journal of Human Genetics* 108, 1-19. <https://doi.org/10.1016/j.ajhg.2020.11.016>
  - > **Cornell Chronicle highlight: "Cross-campus team probes gene-environment interactions"**
  - > **Weill Cornell Newsroom highlight: "Researchers simplify the study of gene-environment interactions"**
8. **Marderstein, A.R.**, Uppal, M., Verma, A., Bhinder, B., Tayyebi, Z., Mezey, J., Clark, A.G.\*, Elemento, O.\* (2020). Demographic and genetic factors influence the abundance of infiltrating immune cells in human tissues. *Nature Communications* 11, 2213. <https://doi.org/10.1038/s41467-020-16097-9>
9. Castellanos, J.G., Woo, V., Viladomiu, M., Putzel, G., Lima, S., Diehl, G.E., **Marderstein, A.R.**, Gandara, J., Perez, A.R., Withers, D.R., Targan, S.R., Shih, D.Q., Scherl, E.J., Longman, R.S. (2018). Microbiota-induced TNF-like ligand 1A drives Group 3 innate lymphoid cell-mediated barrier protection and intestinal T cell activation during colitis. *Immunity*. 49(6):1077-1089.e5. doi: 10.1016/j.immuni.2018.10.014
10. **Marderstein, A.R.** (2017). Approximate Bayesian Computation for Studying Selective Sweep Signatures in Local Coalescence Trees. Honors Thesis, College of Agriculture and Life Sciences, Cornell University. Supervisor: Philipp Messer.

#### **Platform Presentations:**

##### Conference:

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|------|---|
| 2020 | eKeystone Virtual Symposia: Beyond a Million Genomes ( <b>Invited Talk</b> ) (Virtual)  |
| 2020 | Beyond a Million Genomes: From Discovery to Precision Health, Keystone Symposia, Breckenridge, CO.  |
| 2019 | American Society of Human Genetics conference in Houston, TX.<br>(Platform title: "Mechanisms of Immune Cell Phenotypes and Clonal Hematopoiesis") <ul style="list-style-type: none"><li>&gt; <b>Semifinalist: 2019 Charles J. Epstein Trainee Awards for Excellence in Human Genetics Research</b></li></ul> |
| 2019 | New York Academy of Sciences: Translating Genetics into Medicine Conference in New York, NY.  |
| 2018 | Population, Evolutionary, and Quantitative Genetics conference in Madison, WI.  |

##### Local:

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|------|---|
| 2021 | Tri-I Computational Biology & Medicine Seminar at Weill Cornell Medicine (Virtual)  |
| 2021 | Student Talk at Tri-I Computational Biology & Medicine Program Recruitment (Virtual)  |
| 2021 | Department of Computational Medicine, UCLA (Virtual)  |
| 2020 | Analytical & Translational Genetics Unit, Broad Institute ( <b>Invited Talk</b> ) (Virtual)   |
| 2020 | Student Talk at Tri-I Computational Biology & Medicine Retreat (Virtual)  |
| 2020 | Tri-I Computational Biology & Medicine Seminar at Weill Cornell Medicine, New York, NY  |
| 2020 | Computational Biology Student Seminar at Cornell University, Ithaca, NY   |
| 2019 | Basic Research Working Group meeting at Weill Cornell Medicine, New York, NY  |
| 2019 | Panelist, Precision Medicine Symposium at Weill Cornell Medicine, New York, NY.<br>(Panel discussion title: "Facilitating Cross Campus Collaboration for Trainees") |
| 2019 | Microbiome Meeting at Cornell University, Ithaca, NY  |
| 2019 | Invited alumni panelist, Cornell Accepted Students Reception in Rye, NY   |

2019 Computational Biology Student Seminar at Cornell University, Ithaca, NY  
 2017 Regeneron Genetics Center in Tarrytown, NY  
 2016 Intern B&B, Regeneron Pharmaceuticals, Inc in Tarrytown, NY  
 > **Intern project was selected to be part of a company-wide telecast and presentation**

## Poster Presentations:

### Conference:

2020 American Society of Human Genetics conference (held virtually due to the COVID-19 pandemic).  
 > **Awarded "Reviewer's Choice" for top 10% of all submitted abstracts.**  
 2020 Beyond a Million Genomes: From Discovery to Precision Health, Keystone Symposia in Breckenridge, CO  
 2019 New York Academy of Sciences: Translating Genetics into Medicine Conference in New York, NY.  
 > **Awarded the "F1000 Outstanding Presentation Prize" for best poster**  
 2018 American Society of Human Genetics conference in San Diego, CA.  
 2018 Population, Evolutionary, and Quantitative Genetics conference in Madison, WI.

### Local:

2020 Tri-I Symposium in Computational Biology & Medicine at Memorial Sloan Kettering Cancer Center, New York, NY.  
 2019 39<sup>th</sup> Annual Vincent du Vigneaud Student Research Symposium at Weill Cornell Medicine, New York, NY.  
 2017 Honors Symposium, Cornell University in Ithaca, NY  
 2016 Cornell Undergraduate Research Board Fall Forum in Ithaca, NY

## Leadership and Service

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### Current:

Career Development Committee Member, **American Society of Human Genetics** 2020 – 2022

- Organize career fairs, panels, workshops, speakers, and events for early-career members and trainees
- Lead organizer of the "Entrepreneurship in Human Genetics" panel at the 2020 meeting (200 attendees)
- Panel moderator for the "Career Development" webinar at the 2021 career fair (100 attendees)

President, **Tri-Institutional Biotech Club** 2019 – Present

- Discuss emerging technologies with Biotech professionals by organizing & leading major Tri-I-wide events
- Panel moderator: "Emerging Technologies in Biotech", "Scientific Research in the Biopharma Industry" (x2), "Biomedical Innovation in a Non-Profit Organization", "Business Careers in Big Pharma" (~100 attendees)

Student Leadership, **Tri-Institutional CBM PhD Program** 2018 – Present

- Student Representative, CBM Curriculum Committee (2018); Organizer, Research-in-Progress Seminars (2018-2019); Organizer, CBM Annual Retreat (2019); Head of Social Media (2019 – Present); Summer Internship Admissions Committee (2020)

Speaker, **Skype a Scientist** 2017 – Present

- Chat about fascinating genetics research with 7<sup>th</sup> to 12<sup>th</sup> grade classrooms, with an emphasis on captivating students' interests and clearly explaining complex topics to students that may have limited scientific backgrounds. I've engaged over 1,000 students total around the country through this program.

Fundraiser, **Crohn's & Colitis Foundation of America (CCFA)** 2011 – Present

- Fundraising to promote awareness and find a cure. Half-marathon Team Challenge finisher.

### Previous:

DNA Day Essay Contest – Round 2 Judge, **American Society of Human Genetics** 2020

Tutor, **Grade Expectations** 2018 – 2019

- Teach introductory statistics to high school and college students in the NYC area

Abstract Committee Member, <b>dVRS Research Symposium 2019</b>	2018 – 2019
Pen Pal, <b>Letters to a Pre-Scientist</b>	2018 – 2019
<ul style="list-style-type: none"> <li>Exchanged monthly letters with 8<sup>th</sup> grade students interested in medicine and engineering</li> </ul>	
Moderator, <b>American Society of Human Genetics Annual Meeting (ASHG)</b> , San Diego, CA	2018
<ul style="list-style-type: none"> <li>Platform Session Title: “Scalable Tools to Enable Collaboration and Reproducible Analyses”</li> </ul>	
Grader, <b>BTRY 4840/6840: “Computational Genetics &amp; Genomics”</b> , Cornell University	2017
Invited Judge, <b>Cornell Undergraduate Research Board Fall Forum</b>	2017
Athlete & Two-Year Captain, <b>Cornell University Alpine Ski Team</b>	2013 – 2017
Biometry & Statistics Peer Advisor, <b>Cornell Dept Biological Statistics &amp; Computational Biology</b>	2016 – 2017
Cornell Campus Ambassador, <b>Regeneron University Relations</b>	2016 – 2017
Chair of the Orientation Team, <b>Cornell Hillel</b>	2014 – 2016
Orientation Leader, <b>Cornell University</b>	2014

## **Awards**

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“Reviewer’s Choice” award – scoring in the top 10% of all abstract submissions, American Society of Human Genetics Annual Meeting 2020	2020
NHGRI Scholarship from Keystone Symposia, Beyond a Million Genomes: From Discovery to Precision Health conference (\$1200)	2020
Charles J. Epstein Trainee Award for Excellence in Human Genetics Research (Semi-Finalist), American Society of Human Genetics Annual Meeting 2019 (\$960)	2019
“F1000 Outstanding Presentation Prize” for best poster, New York Academy of Sciences: Translating Genetics into Medicine Conference (\$1000)	2019
Finalist, Cornell Health Hackathon – <i>Grocery♥</i> , a personalized food shopping experience based on high genetic disease risks	2019
NIH Institutional National Research Service Award (T32), NIGMS - T32GM083937	2017-2019
Genomic Scholars Program, Cornell Center for Vertebrate Genomics (\$5000)	2018
Conference Travel Grant, Cornell University – American Society of Human Genetics conference (\$440)	2018
Conference Travel Grant, Cornell University – Population, Evolutionary, and Quantitative Genetics Conference (\$360)	2018
Robert S. Elster Memorial Scholarship, Sigma Alpha Mu National Chapter – for “exhibiting leadership and dedication toward providing outstanding community service to his local community”. (\$1,500)	2017
Dean's List (7x)	2013-2017
Intern B&B Speaker, Regeneron Pharmaceuticals, Inc. – one of 6 interns nominated to present summer research in a company-wide telecasted presentation	2016
Special Recognition for Outstanding Geospatial Sciences Exhibit, 4-H Club, NYS Fair.	2012

## **Relevant Upper-Level Graded Coursework**

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*Weill Cornell Medical College*: Computational Systems Biology; Clinical and Research Genomics; Genomic Innovation

*Cornell University:* Computational Genomics; Quantitative Genetics; Human Genomics; Population Genetics; Precision and Genomic Medicine; Bioinformatics Programming; Bayesian Machine Learning; Data Mining and Machine Learning; Probability Models & Inference; Statistical Computing; Linear Models with Matrices; Theory of Statistics; Biological Statistics I & II; Data Structures and Object-Oriented Programming; Physics I & II

## **Professional Organization Membership**

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American Society of Human Genetics	2018 – Present
Genetics Society of America	2018 – Present
New York Academy of Sciences	2017 – Present

## **Peer Review**

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Frontiers in Genetics	2021
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## **Mentorship**

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<b>Years</b>	<b>Name</b>	<b>Type</b>	<b>Institution</b>	<b>Program</b>
2021-	Jiayu Liang	Masters	Cornell University	Applied Statistics
2021-	Pelin (Lin) Poyraz	Undergrad	Cornell University	Biological Sciences, Computational Biology

## **Other Interests**

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Lifetime skier (previous captain of Cornell's alpine ski team); Avid runner (1 marathon; 5 half-marathons; NYC Marathon entrant post-COVID-19 & 2019 volunteer); Passionate New York sports team fan; Intramural softball; Hiking; Designed a baseball simulation (based on the MLB Showdown card game) as a side project; Practicing beginner French