Philip John Freda, Jr., Ph.D.

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Research Experience

Cedars-Sinai Medical Center, Los Angeles, CA
Postdoctoral Scientist, 2022-Present
Machine Learning and Artificial Intelligence Pipelines for Assessing Quantitative Traits
QTL and eQTL analysis using genetic programming and evolutionary algorithms

University of Pennsylvania, Philadelphia, PA
Postdoctoral Researcher, 2019-2022
Opioid Dependence/Misuse Risk Assessment
Opioid use disorder (OUD) risk assessment from electronic health records using machine learning and natural language processing

Kansas State University, Manhattan, KS
Ph.D. Candidate, 2014 - 2018
Constraint across Development
Measurement of genetic, phenotypic, and gene expression constraint across the major life cycle transition in the model species, *Drosophila melanogaster*

Saint Joseph's University, Philadelphia, PA
Post-baccalaureate and M.S. Student, 2010 – 2014
Temporal Genetic Variation in a Natural System
Assessment of population shifts from over time from genomic data in a wild population of *Drosophila simulans*.

Research Interests

- Machine learning/NLP/Deep Learning
- Quantitative Trait Loci
- Disease Risk Assessment
- Evolutionary Biology & Computation
- Epistatic Gene Interactions

Education

Postdoctoral Studies (T32), Human Genomics & Artificial Intelligence, University of Pennsylvania. 2019 - Present

- *Research*: Assessing opioid dependence and addiction risk from electronic health records using natural language processing
- *Principal Investigator*: Jason H. Moore, Ph.D.

Ph.D., Entomology, Kansas State University. 2018 (G.P.A. 4.0/4.0)

- ❖ *Thesis*: Identifying mechanisms of cold hardiness across metamorphosis in *Drosophila melanogaster*
- ❖ *Advisors*: Gregory Ragland, Ph.D., Theodore Morgan, Ph.D.

M.S., Biology, Saint Joseph's University. 2014 (G.P.A. 4.0/4.0)

- ❖ *Thesis*: Temporal variation in microsatellite loci in wild-caught *Drosophila simulans*
- ❖ *Advisor*: John Braverman, S.J., Ph.D.

B.S., Administration of Justice, Pennsylvania State University, Abington. 2005

Publications

Freda, P.J., Moore, J.H., and Kranzler, H.R. 2021. The phenomics and genetics of addictive and affective comorbidity in opioid use disorder. *Drug and Alcohol Dependence,* https://doi.org/10.1016/j.drugalcdep.2021.108602

Freda, P.J., Ali, Z., Heter, N., Ragland, G.J., and Morgan, T.J. 2019. Stage-specific phenotypic plasticity and genotype-by-environment interactions for cold and heat hardiness in Drosophila melanogaster. *Heredity*, https://doi.org/10.1038/s41437-019-0236-9

Everman, E.R, **Freda, P.J.**, Brown, M., Schieferecke, A.J., Ragland, G.J., and Morgan, T.J. 2018. Ovary development and cold tolerance of the invasive pest *Drosophila suzukii* (Matsumura) in the central plains. *Environmental Entomology*. nvy074, https://doi.org/10.1093/ee/nvy074

Freda, P.J., Alex, J.T., Morgan, T.J., and Ragland, G.J. 2017. Genetic decoupling of thermal tolerance across metamorphosis in *Drosophila melanogaster*. *Integrative and Comparative Biology*, *57*(5), 999-1009.

Leung, W., Shaffer, C.D., Reed, L.K., […], **Freda, P.J.,** […], and Elgin, S.C.R. 2015. *Drosophila* Muller F elements maintain a distinct set of genomic properties over 40 million years of evolution. *G3: Genes|Genomes|Genetics*, *5*(5), 719-740.

Freda, P.J. and Braverman, J.M. 2013. *Drosophila suzukii*, or Spotted Wing Drosophila, Recorded in Southeastern Pennsylvania, U.S.A. *Entomological News*, *123*(1), 71-75.

Freda, P.J. and Braverman, J.M. 2013. An efficient, practical, and reliable *Drosophila* trap. *Drosophila Information Service*, *96*, 199-201.

❖ In Progress

Freda, P.J., Toxopeus, J., Dowle, E.J., Ali, Z.M., Heter, N., Lambert-Collier, R., Sower, I., Tucker, J.C., Morgan, T.J., Ragland, G.J. 2022. Transcriptomic and functional genetic evidence suggest dinstinct cold stress responses in a complex life cycle. Accepted pending revision. *Journal of Experimental Biology.*

Presentations

❖ Oral

Freda, P.J., Morgan, T.J., and Ragland, G.J. 2018. Phenotypic, Genetic, and Transcriptomic Decoupling of Thermal Hardiness across Metamorphosis in *Drosophila melanogaster*. Kansas State University, Division of Biology Seminar Series, November 6th, 2018.

Freda, P.J., Morgan, T.J., and Ragland, G.J. 2017. Identifying mechanisms of cold hardiness across metamorphosis in Drosophila melanogaster. 7th International Symposium of the Environmental Physiology of Ectotherms and Plants (ISEPEP7), Tartu, Estonia, August 1st, 2017.

Freda, P.J., Morgan, T.J., and Ragland, G.J. 2016. Decoupling of physiology across metamorphosis. Kansas State University, Department of Entomology 3-minute thesis competition, April 6th, 2016.

Freda, P.J., Morgan, T.J., and Ragland, G.J. 2016. Decoupling of physiology across metamorphosis. Society for Integrative and Comparative Biology (SICB) Conference, Portland, Oregon, January 4th, 2016.

Freda, P.J., Morgan, T.J., and Ragland, G.J. 2015. Ontogenetic constraint in the thermal physiology of Drosophila melanogaster: A genomic assessment of the adaptive decoupling hypothesis. Ecological Genomics Summer Research Forum, Manhattan, KS, June 23rd, 2015.

Freda, P.J., Morgan, T.J., and Ragland, G.J. 2015. Decoupling of physiology across metamorphosis. Kansas State University, Department of Entomology seminar series, November 30th, 2015.

Freda, P. and Braverman, J. 2014. Temporal Variation at Microsatellite Loci in Wild-Caught *Drosophila simulans*. Thesis defense presentation. Saint Joseph's University, Department of Biology seminar series, Philadelphia, PA, August 18th, 2014.

❖ Posters

Freda, P.J., Ali, Z., Heter, N., Morgan, T.J., and Ragland, G.J. 2018. Phenotypic and Genetic Decoupling of Thermal Hardiness across Metamorphosis. 59th Annual Drosophila Research Conference, Philadelphia, PA, April 11th – 15th, 2018.

Brown, M., **Freda, P.J.**, Everman, E.R., Morgan, T.J., and Ragland, G.J. 2016. Phenotypic plasticity promotes persistence of an invasive pest following environmental stress. Sigma Xi Undergraduate Research Forum, Manhattan, KS, April 21st, 2016.

Freda, P.J., Morgan, T.J., and Ragland, G.J. 2015. Evolution of complex life cycles: Is performance constrained across metamorphosis. 13th Annual Ecological Genomics Symposium, Manhattan, KS. November 6th – 8th, 2015.

Freda, P., DiMeglio, M., and Braverman, J. 2015. Temporal Variation at Microsatellite Loci in Wild-Caught *Drosophila simulans*. Arthropod Genomics Research Symposium, Kansas State University, Manhattan, Kansas, June 18th, 2015.

Freda, P., DiMeglio, M., and Braverman, J.M. (2014). Temporal Variation at Microsatellite Loci in Wild-Caught *Drosophila simulans*. 12th Annual Ecological Genomics Symposium, Kansas City, MO, October 31st - November 2nd, 2014.

Freda, P. and Braverman, J. 2014. Temporal Variation at Microsatellite Loci in Wild-Caught *Drosophila simulans*. Sigma Xi Research Symposium Poster, Saint Joseph's University, Philadelphia, PA, April 12th, 2014.

Meghan M. M., London, S. C., Angelucci, V. C., Burke, S. M., Del Buono, M., Dell'Arciprete, A. M., Eastman, J. M., **Freda, P. J.**, *et al.* Estimating Phage Genome Sizes by Pulsed-Field Gel Electrophoresis for Preliminary Cluster Identification. 5th Annual SEA-PHAGES Symposium, Janelia Farm Research Campus, Ashburn, VA. June 7th – 9th, 2013.

Castro, R., DiMeglio, M., **Freda, P.J.,** and Braverman, J.M. 2013. *Drosophila* Biodiversity on the Campus of Saint Joseph's University. Sigma Xi Research Symposium Poster, Saint Joseph's University, Philadelphia, PA, April 19th, 2013.

Healy, B.E., Springer, C.J., **Freda, P.J.,** and Braverman, J.M. 2012. Genomic regions responsible for altered reproductive characteristics of *Arabidopsis thaliana* grown at elevated [CO_2]. ASPB Plant Biology Meeting, Austin, Texas, July 20th – 24th, 2012.

Freda, P.J. and Braverman, J.M. 2012. *Drosophila* Biodiversity on the Campus of Saint Joseph's University. Sigma Xi Research Symposium, Saint Joseph's University, Philadelphia, PA, April 13th, 2012.

Freda, P.J., Springer, C. and Braverman, J.M. 2011. Computational Study of Flowering Time Genetics with QTL Cartographer. Sigma Xi Research Symposium, Saint Joseph's University, Philadelphia, PA, April 8th, 2011.

Grants and Fellowships

- Ruth L. Kirschstein Institutional National Research Service Award (NIH-T32), 2019
- Roger C. Smith Ph.D. Award in Entomology ($1,000), 2017
- Kansas State University, Department of Entomology Travel Award ($500), 2017
- Timothy R. Donoghue Graduate Scholarship ($5,000), 2014 – 2017
- Don C. Warren Genetic Scholarship ($5,000), 2016 – 2017
- Kansas State University, Department of Entomology Travel Award ($500), 2016
- Reginald H. Paint Memorial Scholarship ($1,000), 2015
- Sigma Xi Grants-in-aid-of-research (GIAR), Kansas State University Chapter ($1,000), 2015
- American Genetics Association – Ecological Genomics Travel Fellowship, 2014 ($400)
- HHMI Graduate Assistantship, 2012 – 2014
- HHMI GK-12 Fellowship, 2012 – 2014

Awards/Certificates

- Certification: Mathematics for Machine Learning: Linear Algebra, Coursera, 2019
- Certification: Python for Everybody, Coursera, 2019

- ❖ Certification: RNA sequencing and gene expression analysis, Kansas State University, 2015
- ❖ Certification: Quantitative real-time PCR protocol and diagnosis, Kansas State University, 2015
- ❖ Award: Saint Joseph's University – Biology Graduate Award, May 2014

Research Techniques

Computational: NLP ❖ NGS/RNAseq pipelines ❖ GWAS ❖ PRS ❖ R ❖ Python ❖ Unix/Linux ❖ LaTeX ❖ Matlab/Octave ❖ Sequence alignment ❖ Sequence assembly ❖ Gene annotation ❖ NCBI: BLAST ❖ QTL mapping ❖ phylogenetics

Molecular: PCR ❖ qPCR ❖ Gel electrophoresis ❖ Primer design ❖ DNA extraction ❖ DNA quantification ❖ DNA purification ❖ Pulsed-field gel electrophoresis ❖ Restriction digest ❖ RNAi ❖ RNA extraction and purification ❖ cDNA library preparation

Ecological and Organismic: Organism collection and trapping (*Drosophila*) ❖ *Drosophila* rearing and care ❖ *Drosophila* thermal stress assessment ❖ *Drosophila* larvae manipulation

Teaching Experience

Teaching Assistant and Lecturer: Kansas State University, Manhattan, KS, 2016-2017
Course: Entom 301B – Insects and People

- ❖ Creation and instruction of lectures focusing on the relationships between insects and humans.
- ❖ Lectured on insect biology, evolution, taxonomy, behavior, and ecology.
- ❖ Grading of exams, essays, and quizzes

GK-12 Teaching Fellow: Wagner Free Institute of Science, Philadelphia, PA, 2012-2014

- ❖ Instruction of hands-on science lessons in Philadelphia school district elementary classrooms and on educational field trips.
- ❖ Collaboration with classroom teachers, full-time museum staff, and other graduate fellows to facilitate activities, field trips, and learning.

Laboratory Research Assistant: Department of Biology, Saint Joseph's University, 2012-Present

- ❖ Instruction of laboratory protocols and procedures to undergraduate researchers.
- ❖ Preparation and instruction of laboratory discussions and workshops.
- ❖ Drafting of laboratory protocols and notebooks.

Intern: Noyce Scholarship Program, Philadelphia School District's Summer Bridge Program, summer 2010.

- ❖ Designed and taught lectures on evolution, general biology, physics, ecology, and astronomy.
- ❖ Collaborated with teachers and fellow interns on pedagogical approaches and lesson plans.
- ❖ Instilled appreciation of the sciences and of nature in students entering high school.

Teaching Assistant: Department of Biology, Saint Joseph's University, 2010
Course: Bio 1011 – Cellular Biology

- ❖ Assisted in laboratory maintenance, preparation, and grading
- ❖ Aided students in understanding the general concepts and goals of the curriculum.

Mentoring

Undergraduates (9 total, 5 women, 4 minorities)
2014-2017 - Colin Bailey, Saadia Cleve, Ashley Helget-Wedin, Oshadhi Athukorala Arachchige, Mariah Brown, Nicholas Heter, Jackson Alex, Adam Schieferecke, Zainab Ali.

Professional Memberships

- Golden Key Honour Society, member, 2016 – present
- Alpha Epsilon Lambda: Graduate Students Honor Society: lifetime member, 2014 – present
- Sigma Xi: The Scientific Research Society: associate member, 2013 – present

Extracurricular Activities & Professional Service

- Committee Member, Public Relations, Popenoe Entomology Club, Kansas State University 2017 – 2018
- Member-at-Large, Committee on Governmental Issues, Kansas State University, 2016 – 2017
- Committee member, Lethal Weapons Event Sub-Committee, Kansas State University, 2016
- Team manager/player, intermural softball, Kansas State University, 2014 – present
- Reviewer, *Entomologia Experimentalis et Applicata*, 2013
- Reviewer, *Biological Control*, 2014
- Reviewer, *Journal of Pest Science*, 2014
- Recognized reviewer, Elsevier, 2014-present
- Reviewer, *Genetica*, 2019
- Reviewer, *Heredity*, 2020
- Reviewer, *Journal of Neuroscience Research*, 2020
- Reviewer, *Scientific Reports,* 2020
- Reviewer, *Drug and Alcohol Dependence*, 2021
- Member, Commencement Speaker Committee, Saint Joseph's University, 2014
- Participant, Northeast Spotted Wing Drosophila Working Group Meeting, 2013
- Recruitment Representative, Saint Joseph's University's Graduate Arts and Sciences Program, Loyola University, Maryland - Biology Career Workshop and Fair, 2013
- *Columnist, "*Practical Science with Phil Freda" - Patch.com, Upper Moreland-Willow Grove Patch, 2010-2012: http://philipfreda.com/articles/
    - *Articles available upon request*

References

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