

Sean Bresnahan

Bioinformatics Scientist



Contact

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Skills

Programming

- R & RStudio *****
- Python ***
- Bash ****
- HPC; Cloud *****

Statistics

- Mixed-effects models *****
- Machine learning (Support Vector Machines) **
- Dimensionality reduction (PCA, t-SNE) ***
- Cluster analysis (hierarchical, k-means) ***
- Differential expression (DESeq2, edgeR) *****
- Gene network inference (WGCNA, ASTRIX) ****

Molecular Biology

- Nucleic acid extraction & QC *****
- ChIP, ATAC, PCR, qPCR *****
- Library prep. & seq. *****

Bioinformatics

- Read processing (fastQC, fastp, seqtk) *****
- Read alignment (BWA, STAR, bowtie) *****
- Analysis (samtools, bedtools, bcftools, GATK, BLAST) *****

Reproducibility

- Databases *****
- RMarkdown *****
- GitHub ***

Profile

Highly motivated and integrative Bioinformatics Scientist with expertise in molecular biology and multi-omics analyses. Proficient in generating, processing, analyzing, and interpreting diverse omics data using R, python, and bash. Extensive experience in mentoring, collaborating with multidisciplinary teams, and software development.

Education

- PhD** – Molecular, Cellular, and Integrative Biosciences
Penn State University **2024**
- BS** – Neuroscience
University of Nebraska, Omaha **2019**

Research Experience

- Used differential expression and clustering analyses to investigate tissue-specific transcriptional profiles associated with honey bee phenotypic and behavioral responses to seasonal changes.
- Used multilevel modeling, support vector classification, and gene network inference methods to investigate the roles of allele-specific transcription, post-transcriptional modifications, and chromatin architecture in mediating intragenomic conflicts that generate phenotypic and behavioral variation necessary for maintaining homeostasis within honey bee colonies.
- Designed, optimized, and implemented software for metagenomics sequence database curation to assess species diversity in environmental samples for collaborative research projects.

Professional Development

- EMBL-EBI – Systems biology: from large datasets to biological insights. October 2023. Wellcome Genome Campus, Hinxton, UK.

Work Experience

Data, AI, & Genome Sciences Intern: Cancer Genomics
Merck **June – August 2024**

Publications

- **Bresnahan ST**, Ma R, Galbraith D, Rangel J, Grozinger CM. (2023). Beyond conflict: Kinship theory of intragenomic conflict predicts individual variation in altruistic behaviour. *Molecular Ecology* 32, 5823-5837. <https://doi.org/10.1111/mec.17145>
- **Bresnahan ST**, Lee E, Clark L, Ma R, Rangel J, Grozinger CM, Li-Byarlay H. (2023). Examining parent-of-origin effects on transcription and RNA methylation in mediating aggressive behavior in honey bees (*Apis mellifera*). *BMC Genomics* 24:315. <https://doi.org/10.1186/s12864-023-09411-4>
- Crone M, Boyle N, **Bresnahan ST**, Biddinger D, Grozinger CM. (2023). More than mesolectic: Characterizing the nutritional niche of *Osmia cornifrons*. *Ecology and Evolution* 13, e10640. <https://doi.org/10.1002/ece3.10640>
- **Bresnahan ST**, Döke MA, Giray T, Grozinger CM. (2021). Tissue-specific transcriptional patterns underlie seasonal phenotypes in honey bees (*Apis mellifera*). *Molecular Ecology* 31, 174-184. <https://doi.org/10.1111/mec.16220>

Presentations

- **Invited International Talk** – Plant and Animal Genomics Annual Meeting: San Diego, CA, 2024. “Investigating the Molecular Mechanisms of Intragenomic Conflict in Honey Bees.”
- **Poster** – International Conference on Pollinator Biology, Health, and Policy: State College, PA, 2023. “Kinship Theory of Intragenomic Conflict Predicts Altruistic and Selfish Behaviors in Honey Bees.”
- **Invited International Talk** – Entomological Societies Joint Annual Meeting: Vancouver, BC, 2022. “Intragenomic Conflict and its Epigenetic Basis in Honey Bees.”
- **Invited International Talk** – International Union for the Study of Social Insects: San Diego, CA, 2022. “Intragenomic Conflict and its Epigenetic Basis in Honey Bees.”
- **Invited Talk** – Plant and Animal Genomics Annual Meeting: San Diego, CA, 2022. “Evaluating piRNAs as a Mechanism of Intragenomic Conflict in Honey Bees.”
- **Invited Talk** – Penn State University Center for Pollinator Research Symposium: State College, PA, 2021. “Tissue-Specific Transcriptional Patterns Underlie Seasonal Phenotypes in Honey Bees.”
- **Oral Presentation** – Cold Spring Harbor Laboratory, Biology and Genomics of Social Insects Meeting, virtual, 2021. “Evaluating Intragenomic Conflict in Altruistic, Pheromone-Mediated Honey Bee Behaviors.”
- **Poster** – Cold Spring Harbor Laboratory, Regulatory and Non-Coding RNAs Meeting, virtual, 2020. “Evaluating the Role of PIWI/piRNAs in Intragenomic Conflict in Honey Bees.”

Teaching, Mentoring, & Management

- 2023 (June-present) – Graduate student mentor: Avi Eliyahu, Hebrew University of Jerusalem. Small RNA library preparation, sequencing, and bioinformatics.
- 2022-present – Undergraduate student mentor: Owen Christopher, Penn State. Molecular biology, honey bee husbandry, and data analysis.
- 2022 – Undergraduate student mentor: Mariam Tananibe, Penn State. Honey bee husbandry.
- 2021 (August-December) – TA for ENT 222, Honey Bees and Humans, Penn State (general ed course for undergraduates, approx. 100 students). Instructors: Christina Grozinger, Harland Patch.
- 2020 (February-March) – organized and co-instructed with Briana Ezray Wham (Penn State) a short virtual course on introductory bioinformatics to 12 graduate students.
- 2018-2019 – Trained and managed team of undergraduate researchers to assist in construction of dynamical systems models in the laboratory of Dr. Jim Rogers at the University of Nebraska, Omaha.
- 2017-2018 – Co-founder and Director: Community Science Table. 501(c)(3).

Awards

- Graduate Research Fellowship Program – The U.S. National Science Foundation
- Integrative Pollinator Ecology Training Fellowship Program – Penn State Center for Pollinator Research
- Distinguished University Graduate Fellow – Penn State Graduate School