

# Carl E. Hjelman, Ph.D.

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## Education, Research, and Training:

- 2019-Pres: **Postdoctoral Research Associate**, Department of Biology, Texas A&M University, College Station, TX  
PI: Heath Blackmon
- 2017-2018: **Postdoctoral Research Associate**, Department of Entomology, Texas A&M University, College Station, TX  
PI: Aaron Tarone  
Project Title: Proteomic and microRNA markers of fly development
- Aug. 2017: **Ph.D.**, Entomology, Texas A&M University, College Station, TX  
Advisor: J. Spencer Johnston  
Dissertation Title: Phylogenetic analyses of genome size evolution in Drosophilidae
- May 2013: **B.A.** in Biology, Augustana College, Sioux Falls, SD
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## Reviewed Publications: †Mentored Student

1. Sylvester TP, **Hjelman CE**, Hanrahan SJ, Lehnart PA, Johnston SJ, Blackmon H. (2020) Lineage-specific patterns of chromosome evolution are the rule and not the exception in Polyneopteran insects. *Proceedings B*, 287: 20201388. doi: 10.1098/rspb.2020.1388.
  2. Malawey, AS, Zhang HY, †McGuane AS, Walsh E, Rusch TW, **Hjelman CE**, Delclos PJ, Rangel J, Zheng L, Cai M, Yu Z, Tarone AM, Zhang J, Tomberlin JK. (2020). Interaction of age and temperature on heat shock protein expression, sperm count and sperm viability of the Adult Black Soldier Fly. *Journal of Insects as Food and Feed*. doi: 10.3920/JIFF2020.0017
  3. **Hjelman CE**, †Holmes VR, Burrus CG, †Piron E, †Mynes M, †Garrett M, Blackmon H, Johnston JS. (2020). Thoracic underreplication in *Drosophila* species estimates a minimum genome size and the dynamics of added DNA. *Evolution*. doi: 10.1111/evo.14022
  4. †Jonika MM, **Hjelman CE**, Faris AM, †McGuane AS, Tarone AM. (2020). An evaluation of differentially spliced genes as markers for sex for forensic entomology. *Journal of Forensic Sciences*. doi: 10.1111/1556-4029.14461
  5. Johnston JS, Zapalac ME, **Hjelman CE**. (2020). Flying High—Muscle specific underreplication in *Drosophila*. *Genes* 11, 246; doi: 10.3390/genes11030246.
  6. **Hjelman CE**, Parrott JJ, Srivastav S, †McGuane AS, Ellis L, Stewart S, Johnston JS, Tarone AM. (2020). Effect of phenotype selection on genome size variation in two species of Diptera. *Genes* 11, 218; doi: 10.3390/genes11020218
  7. **Hjelman CE**, Blackmon H, †Holmes VR, Burrus CG, Johnston JS. (2019). Genome size evolution differs between *Drosophila* subgenera with striking differences in male and female genome size in *Sophophora*. *G3: Genes, Genomes, Genetics* 9(10): 3167-3179.
  8. **Hjelman CE**, †Garrett M, Holmes VR, †Mynes M, †Piron E, and Johnston JS. (2018) Genome size evolution within and between the sexes. *Journal of Heredity*. 110(2): 219-228.
  9. Lower, S Sander, Johnston JS, Stanger-Hall K, **Hjelman CE**, Hanrahan SJ, Korunes K, Hall D (2017). Genome size in North American fireflies: Substantial variation likely driven by neutral processes. *Genome Biol. Evol.* evx097.
  10. **Hjelman CE** and Johnston JS (2017). The mode and tempo of genome size evolution in the subgenus *Sophophora*. *PLOS One* 12(3), e0173505
  11. Arnqvist, G, Sayadi A, Immonen E, Hotzy C, Rankin D, Tuda M, **Hjelman CE**, Johnston JS(2015). Genome size correlates with reproductive fitness in seed beetles. *Proc. R. Soc. B*. 282(1815).
  12. Rangel J, Strauss K, Seedorf K, **Hjelman CE**, Johnston JS (2015). Endopolyploidy changes with age-related polyethism in the honey bee, *Apis mellifera*. *PloS one*, 10(4), e0122208-e0122208.
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13. Ellis LL, Huang W, Quinn AM, Ahuja A, Alfnejd B, Gomez FE, **Hjelman CE**, Moore KL, Mackay TFC, Johnston JS, Tarone AM. (2014) Intrapopulation Genome Size Variation in *D. melanogaster* Reflects Life History Variation and Plasticity. *PLoS Genet* 10(7): e1004522. doi:10.1371/journal.pgen.1004522
14. The DGRP Consortium. (2014). Natural variation in genome architecture among 205 *Drosophila melanogaster* Genetic Reference Panel lines. *Genome Research*: 1193-1208.
15. Larson MK, Tormoen GW, Weaver LJ, Luepke KJ, Patel IA, **Hjelman CE**, Enszt NM, McComas LS, McCarty OJ. (2012). Exogenous modification of platelet membranes with the omega-3 fatty acids EPA and DHA reduces platelet procoagulant activity and thrombus formation. *Am J Physiol Cell Physiol* 304(3):273

#### In review and prep:

1. **Hjelman CE**, Parrott JJ, Yuan Y, Srivastav S, Pimsler ML, Sing-Hoi S, Tarone AM. Identification and characterization of small RNA markers of age in *Cochliomyia macellaria* (Diptera: Calliphoridae) Fabricius. *Submitted*
2. Anderson NW, **Hjelman CE**, Blackmon H. The probability of fusions joining sex chromosomes and autosomes. *Submitted*
3. Tvedte ES, Gasser M, Sparklin BC, Michalski J, **Hjelman CE**, Johnston JS, Zhao X, Bromley R, Tallon LJ, Sadzewicz L, Rasko DA, Hotopp JCD. Comparison of long read sequencing technologies in resolving bacteria and fly genomes. *Submitted*
4. Pimsler ML, **Hjelman CE**, †Jonika MM, †Sharma A, Bala M, Sze S, Fu S., Tomberin JK, Tarone AM. Sexual dimorphism in growth rate and gene expression throughout immature development in *Chrysomya rufifacies* (Diptera: Calliphoridae) Macquart. *In prep for submission to special issue of Frontiers in Ecology and Evolution: Life and Death: New Perspectives and Applications in Forensic Science.*

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#### Book Chapters:

- J. Spencer Johnston, Angelina Bernardini, **Carl E. Hjelman** (2019). Genome Size Estimation and Quantitative Cytogenetics in Insects. *Insect Genomics: Methods and Protocols*

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#### Proceedings Paper:

- †Michelle M. Jonika, Ashleigh M. Faris, **Carl E. Hjelman**, Aaron M. Tarone. Transcriptional Markers of Sex Determination for Forensic Entomology (2019). Proceedings of the American Academy of Forensic Sciences. 71<sup>st</sup> Annual Scientific Meeting.

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#### Other:

- Comparative phylogenetic lab activity on phylogenetic independent contrasts and phylogenetic generalized least squares for Spring 2016 ENTO 606 (Quantitative Phylogenetics)

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#### Oral Presentations: \*Presenting Author, †Mentored Student

##### 2020:

An evaluation of differentially spliced genes as markers of sex for forensic entomology. \*†Jonika MM, **Hjelman CE**, Faris AM, McGuane AS, Tarone AM

- Annual Meeting of the North American Forensic Entomology Association

##### 2019:

What does the rate of change in heterochromatin tell us about genome size evolution and the minimum DNA content of a fly. \***Hjelman CE**, Johnston JS, Blackmon H

- Biology Department Student Postdoc Research Conference. Texas A&M University

How much DNA does it take to be a fly and what happens to the rest? \***Hjelman CE**, Johnston JS, Blackmon H

- Ecology and Evolutionary Biology Seminar Series, Texas A&M University, College Station, TX

Transcriptional Markers of Sex Determination for Forensic Entomology. \*†Jonika MM, Faris AM, **Hjelman CE**, Tarone AM

- American Academy of Forensic Sciences Annual Meeting, Baltimore, MD

**2018:**

Differential expression of proteins in species of forensically relevant Diptera. \***Hjelman CE**, Srivastav S, Parrott JJ, Dangott LJ, Tarone AM.

- Entomological Society of America Annual Meeting, Vancouver, Canada

- Annual North American Forensic Entomology Association (NAFEA) meeting, Orlando, FL

Transcript-based sex determination for forensic entomology. \*†Jonika MM, Faris AM, **Hjelman CE**, Tarone AM

- Entomological Society of America Annual Meeting, Vancouver, Canada

Let's Talk About Sex: Identifying Female and Male Markers in Blow Flies. \*†Jonika MM, Faris AM, **Hjelman CE**, Tarone AM

- Ecological Integration Symposium, Texas A&M University

- Undergraduate Research Presentation, Student Research Week, Texas A&M University

- Department of Entomology Mentorship Symposium, Texas A&M University

Genes as Markers of Sex for Forensic Entomology. \*†Jonika MM, Faris AM, **Hjelman CE**, Tarone AM

- Undergraduate Research Scholars Symposium, Texas A&M University

What amount of DNA is just right? \***Hjelman CE**, Holmes VR, Johnston JS

- Southeast Texas Evolutionary Genetics and Genomics Meeting, Houston, TX

**2017:**

What is underreplication and how does this phenomenon contribute to the enigma of genome size evolution in *Drosophila*? \***Hjelman CE** and Johnston JS

- Entomological Society of America Southwestern Branch Meeting, Austin, TX (1<sup>st</sup> place)

**2016:**

What's the buzz in *Drosophila* genome size: A phylogenetic comparison of *Sophophora* and *Drosophila*. \***Hjelman CE** and Johnston JS

- International Congress of Entomology, Orlando, FL

How does replication level contribute to genome size evolution in *Drosophila*? \***Hjelman CE** and Johnston JS

- 19<sup>th</sup> Annual Graduate Student Forum, Department of Entomology, Texas A&M University

How do temperature differences relate to genome size variation? \***Hjelman CE** and Johnston JS

- Ecological Integration Symposium, Texas A&M University

- Student Research Week, Texas A&M University

- Entomological Society of America Southwestern Branch Meeting, Tyler, TX

**2015:**

Phylogenetic basis for understanding genome size evolution in *Drosophila*. \***Hjelman CE** and Johnston JS

- Entomological Society of America Meeting, Minneapolis, MN (1<sup>st</sup> place)

Use of phylogenetic analysis to better understand genome size evolution in *Drosophila*. \***Hjelman CE** and Johnston JS

- 18<sup>th</sup> Annual Graduate Student Forum, Department of Entomology, Texas A&M University

Size DOES Matter: Finding phylogenetic signal in *Drosophila* genome size. \***Hjelman CE** and Johnston JS

- Ecological Integration Symposium, Texas A&M University (1<sup>st</sup> place)

- Student Research Week, Texas A&M University (1<sup>st</sup> place)

**2012:**

Beyond the Augie Borders: Student Research Off Campus (Texas A&M University). \***Hjelmen CE**

- Augustana College Biology Department—Invited Oral Presentation

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**Poster Presentations: \*Presenting Author, †Mentored Student**

**2020:**

Rates of Change in Heterochromatin and Estimating the Minimum Genome Size of a Fly. \***Hjelmen CE**, †Holmes VR, Burrus CG, †Piron E, †Mynes M, †Garrett MA, Blackmon H, Johnston JS.

- Life Sciences PhD Recruiting Event, Texas A&M University, College Station, TX

**2019:**

Genome size evolution differs between *Drosophila* subgenera with striking differences in male and female genome size in *Sophophora*. \***Hjelmen CE**, Blackmon †H, Holmes VR, Burrus CG, Johnston JS

- Society for the Study of Evolution Annual Meeting, Providence, RI
- Southeast Texas Evolutionary Genetics and Genomics Meeting, College Station, TX

Thoracic underreplication predicts minimal *Drosophila* genome size. \***Hjelmen CE**, Holmes VR, Burrus C, Johnston JS

- Texas Genetics Society Annual Meeting, College Station, TX (Postdoc Poster Winner)
- 60<sup>th</sup> Annual *Drosophila* Research Conference, Dallas, TX

DNA replication stalls during S-phase in the longitudinal flight muscle of *Drosophila* spp. **Hjelmen CE**, Novak M, †Holmes VR, Czajkowski E, \*Johnston JS.

- 60<sup>th</sup> Annual *Drosophila* Research Conference, Dallas, TX

**2018:**

Markers of Sex Determination in Blow Flies. \*†Jonika MM, Faris AM, **Hjelmen CE**, Tarone AM

- LAUNCH Undergraduate Research Summer Poster Session, Texas A&M University

Transcript-Based Sex Determination for Forensic Entomology. \*†Jonika MM, Faris AM, **Hjelmen CE**, Tarone AM

- International Association for Identification, San Antonio, TX
- Southeast Texas Evolutionary Genetics & Genomics Symposium, Rice University

**2017:**

The impact of regional climate variables on genome size evolution in *Drosophila* species. \***Hjelmen CE**, Johnston JS.

- 58<sup>th</sup> Annual *Drosophila* Research Conference, San Diego, CA

Lessons learned from an examination of genome size variation in inbred lines of *D. melanogaster*.

\*Johnston JS, Tarone AM, **Hjelmen CE**, Kelleher E, MacDonald S.

- 58<sup>th</sup> Annual *Drosophila* Research Conference, San Diego, CA

**2016:**

How does replication level contribute to genome size evolution in *Drosophila* species? \***Hjelmen CE**, Johnston JS.

- The Allied Genetics Conference, Orlando, FL

**2015:**

Transcriptomics must take into account unexpected levels of endoreduplication and underreplication. \***Hjelmen CE**, †Mynes M, Johnston JS.

- Arthropod Genomics Symposium, Kansas State University

The rate and pattern of genome size evolution in *Drosophilidae* and *Formicidae*. \***Hjelmen CE** and Johnston JS

- Entomological Society of America Southwestern Branch Meeting, Tulsa, OK(1<sup>st</sup> place)

**2014:**

Genome size variation within and among the sexual and asexual generations of the gall wasp *Belonocnema treatae*, and the putative role of tannins: Further comparisons of sexual and asexual

forms. \***Hjelman CE**, Ott JR, Egan SP, and Johnston, JS

- Entomological Society of America Meeting, Portland, OR

The rate and pattern of genome size evolution in Drosophilidae and Formicidae. \***Hjelman, CE** and Johnston, JS

• Arthropod Genomics Symposium, University of Illinois at Urbana Champaign  
Genome size evolution in *Drosophila melanogaster*. \*Johnston JS, **Hjelman CE.**, Tarone AM

• Arthropod Genomics Symposium, University of Illinois at Urbana **Champaign**  
Sex, ecology, and the genome: How a novel sex determination mechanism interacts with genome evolution during ecological speciation in the gall wasp *Belonocnema treatae*. \***Hjelman CE**, Ott JR, Egan SP, and Johnston JS.

- Ecological Integration Symposium, Texas A&M University (2<sup>nd</sup> place)

#### **2013:**

Extensive variation in genome size among populations and a novel sex determining mechanism in the gall wasp, *Belonocnema treatae*. \***Hjelman, CE**; Ott, JR; Egan, SP; Johnston, JS.

- Arthropod Genomics Symposium, University of Notre Dame
- Entomological Society of America Meeting, Austin, TX

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#### **Teaching Experience:**

##### ***Department of Entomology, Texas A&M University***

The Science of Forensic Entomology (ENTO/FIVS 431)—Lecture TA

- Spring 2017—100 Students

Applied Forensic Entomology (ENTO/FIVS 432)—Laboratory TA

- Spring 2017—12 Students

Forensic Investigations (FIVS 123)—Online/Distance Learning TA

- Spring 2017—250 Students
- Fall 2016—250 Students
- Spring 2016—430 Students

Forensic Implications of Inheritance (FIVS 308)—Laboratory TA

- Fall 2016—13 Students

Biology of Insects (ENTO 313)—Laboratory TA

- Fall 2015—30 Students

Insect Biodiversity and Biology (ENTO 301)—Laboratory TA

- Spring 2015—30 Students

General Entomology (ENTO 201)—Laboratory TA

- Fall 2014—30 Students

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#### **Workshops**

##### ***Open Source for Open Science 2020, Texas A&M University (Online)***

Basic Statistical Analysis and Visualization in R—Developed and instructed online module for introduction to R. Covered statistics such as T-tests, ANOVA, MANOVA, Regression, PCA and their non-parametric alternatives. Visualization for data using Base R and ggplot package

- 274 students, faculty, and staff registered for event

##### ***Open Source for Open Science 2019, Texas A&M University***

Basic Statistical Analyses in R—Developed and instructed module for introduction to R. Covered statistics such as T-tests, ANOVA, MANOVA, Regression, PCA and their non-parametric alternatives

- 292 students, faculty, and staff registered for event

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#### **Students Mentored:**

- Alex McGuane
- Michelle Jonika
- Elizabeth Piron
- V. Renee Holmes
- Melissa Mynes
- Margaret Garrett
- Zoe Ward
- Anika Sharma (Fulbright PhD Student)

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### Journal Review

- Guest Editor for special issue of Genes: Genetics of Phenotypic Variation in *Drosophila* and Other Insects
- Reviewed for: BMC Genomics, International Journal of Acarology, Molecular Ecology Resources, Evolution, Insects, Biology, Journal of Insect Science, Genes, International Journal of Molecular Sciences, International Journal of Environmental Research and Public Health, Agricultural and Forest Entomology, Cells

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### University and Professional Service

- 2020 Open Source Open Science Workshop 2020—instructor and assistant 274 students
- 2019 Open Source Open Science Workshop 2019—instructor and assistant 292 students
- 2019 Southeast Texas Evolutionary Genetics and Genomics 2019—Planning Committee
- 2019 Planning committee-Southeast Texas Evolutionary Genetics and Genomics (STEGG)
- Sept. 2018 AWE (Aggie Women in Entomology) Mentor Panel: The Next Chapter
- Feb. 2018 Postdoctoral Judge for Entomology Mentoring in Research Symposium
- Oct. 2017 AWE (Aggie Women in Entomology) Mentor Panel: The Next Chapter
- Aug. 2017 Postdoctoral Judge for Texas A&M Entomology Graduate Student Forum
- 2016-2017 President-Entomology Graduate Student Organization—TAMU
- 2016-2017 Graduate Student Representative for Department Faculty Meetings
- 2016-2017 Chair of SW Branch ESA Student Affairs Committee
- 2015-2017 New Graduate Student Panel
- 2015-2016 Vice President-Entomology Graduate Student Organization—TAMU
- 2015-2016 Entomology Representative for Graduate and Professional Student Council
- 2014-2016 Chair of Photo Salon -SW Branch of ESA
- 2014-2015 Social Activities Chair-Entomology Graduate Student Organization—TAMU
- 2014-2017 Texas A&M University Linnaean Games Team

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### Community Outreach:

- Feb. 2020 “Why are there so many insects in Texas?” For 100 2<sup>nd</sup> grade students.
- Apr. 2017 SWB ESA Insect Expo
- Mar. 2017 Family Fun Night Creek View Elem.
- May 2015 Creek View Elementary Event
- May 2014 Covenant Presbyterian Church Preschool Event
- May 2015 Be the Match Found. Fundraiser
- Feb 2015 SWB ESA Insect Expo
- Oct. 2014 “Trunk or Treat” Ento. Halloween Event
- Oct. 2014 “Boonville Days” Outreach Event

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### Memberships:

- Texas Genetics Society
- North American Forensic Entomology Association
- Mentor for Aggie Women in Entomology Mentorship Program
- Entomological Society of America
- Southwest Branch of ESA
- Society for the Study of Evolution
- Genetics Society of America
- American Society of Naturalists
- Southwest Association of Naturalists
- Beta Beta Beta Biological Honor Society

- Phi Sigma Tau Philosophy Honor Society

- Gamma Sigma Delta Agriculture Honor Society

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**Awards:**

- 2019 Texas Genetics Society Annual Meeting Postdoctoral Poster Award Winner
- 2017 Entomological Society of America Southwestern Branch 1<sup>st</sup> Place PhD Oral Presentation
- 2017 Department of Entomology: Award for Outstanding Ph.D. Student
- 2016 Single-Cell and Gene Expression Grant Award provide by Fluidigm and the TIGGS Shared Molecular-genomics workspace
- 2016 Department of Entomology: Award for Outstanding Ph.D. Student
- 2015 Entomological Society of America National Meeting 1<sup>st</sup> place graduate student talk in SysEB: Citizen Science, New Methods, and Physiology section
- 2015 Vice President for Research: Excellence in Research Award Nomination
- 2015 Ecological Integration Symposium 1<sup>st</sup> place graduate student oral presentation
- 2015 Student Research Week 1<sup>st</sup> place graduate student oral presentation
- 2015 Entomological Society of America Southwestern Branch 1<sup>st</sup> place Ph.D. poster
- 2014 Theodore Roosevelt Memorial Fund
- 2014 Induction into Gamma Sigma Delta Agriculture Honor Society
- 2014 Ecological Integration Symposium 2<sup>nd</sup> place graduate student poster
- 2013 Texas A&M Merit Fellowship
- 2013 Induction into Phi Sigma Tau Philosophy Honor Society
- 2012 Will Rosine Memorial Biology Scholarship
- 2012 Texas A&M REU EXCITE
- 2012 Council on Undergraduate Research (CUR) Biology Travel Award
- 2011 BRIN Research Fellowship
- 2011 Induction into Beta Beta Beta Biological Honor Society
- 2010 Sven G. Froiland Biology Scholarship

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**Skills:**

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| • Flow Cytometry   | • Comparative Phylogenetics          |
| • Genome Size Estimation                                   | • Proficient in R Program            |
| • Bayesian and Maximum Likelihood Phylogeny Reconstruction | • Western Blots                      |
| • Experience Utilizing Supercomputer Clusters              | • DNA and RNA Extraction             |
| • Sequence Alignments                                      | • Fly care and maintenance           |
|  | • Insect Curation and Identification |

**References:**

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| • Heath Blackmon<br>Assistant Professor<br>Dept. of Biology<br>Texas A&M University<br>979-862-4880<br><a href="mailto:blackmon@tamu.edu">blackmon@tamu.edu</a> | • Aaron M. Tarone<br>Professor<br>Dept. of Entomology<br>Texas A&M University<br>979-862-1311<br><a href="mailto:tamlucilia@tamu.edu">tamlucilia@tamu.edu</a> | • J. Spencer Johnston<br>Professor<br>Dept. of Entomology<br>Texas A&M University<br>979-845-8295<br><a href="mailto:spencerj@tamu.edu">spencerj@tamu.edu</a> |
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