CARL E. HJELMEN, PHD

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EDUCATION, RESEARCH, AND TRAINING

2019-Pres:	**Postdoctoral Research Associate**, Dept. of Biology, Texas A&M University, College Station, TX
	PI: Heath Blackmon
2017-2018:	**Postdoctoral Research Associate**, Dept. 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

REVIEWED PUBLICATIONS: †Mentored Student, ǀUndergraduate Author

16. ǀAnderson NW, **Hjelmen CE**, Blackmon H. The probability of fusions joining sex chromosomes and autosomes. *Accepted to Biology Letters*

15. Sylvester TP, **Hjelmen 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.

14. Malawey, AS, Zhang HY, †ǀMcGuane AS, Walsh E, Rusch TW, **Hjelmen 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

13. **Hjelmen CE**, †Holmes VR, ǀBurrus CG, †ǀPiron E, †ǀMynes M, †ǀGarrett 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

12. †ǀJonika MM, **Hjelmen CE**, Faris AM, †ǀMcGuane 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

11. Johnston JS, ǀZapalac ME, **Hjelmen CE**. (2020). Flying High—Muscle specific underreplication in *Drosophila*. *Genes* 11, 246; doi: 10.3390/genes11030246.

10. **Hjelmen CE**, Parrott JJ, Srivastav S, †ǀMcGuane AS, Ellis L, Stewart A, 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

9. **Hjelmen CE**, Blackmon H, †Holmes VR, ǀBurrus 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. **Hjelmen CE**, †ǀGarrett M, †ǀHolmes VR, †ǀMynes M, †ǀPiron E, and Johnston JS. (2018) Genome size evolution within and between the sexes. *Journal of Heredity*. 110(2): 219-228.

7. Lower, S Sander, Johnston JS, Stanger-Hall K, **Hjelmen 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.

6. **Hjelmen CE** and Johnston JS (2017). The mode and tempo of genome size evolution in the subgenus *Sophophora*. *PLOS One* 12(3), e0173505

5. Arnqvist, G, Sayadi A, Immonen E, Hotzy C, Rankin D, Tuda M, **Hjelmen CE**, Johnston JS(2015). Genome size correlates with reproductive fitness in seed beetles. *Proc. R. Soc. B.* 282(1815).

4. Rangel J, [!]Strauss K, [!]Seedorf K, **Hjelmen CE**, Johnston JS (2015). Endopolyploidy changes with age-related polyethism in the honey bee, *Apis mellifera*. *PloS one,* 10(4), e0122208-e0122208.

3. Ellis LL, Huang W, Quinn AM, Ahuja A, Alfrejd B, Gomez FE, **Hjelmen 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

2. The DGRP Consortium. (2014). Natural variation in genome architecture among 205 *Drosophila melanogaster* Genetic Reference Panel lines. *Genome Research*: 1193-1208.

1. Larson MK, Tormoen GW, Weaver LJ, Luepke KJ, Patel IA, **Hjelmen CE**, Ensz 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:

- **Hjelmen 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*
- Tvedte ES, Gasser M, Sparklin BC, Michalski J, **Hjelmen 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. *In review.*
- Pimsler ML, **Hjelmen 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.*

BOOK CHAPTERS:

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

PROCEEDINGS PAPER:

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

OTHER:

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

ORAL PRESENTATIONS: ***Presenting Author, †Mentored Student**

2020:

Working out the "bugs" in genome size evolution. **Hjelmen CE.**

- Rutgers University, Department of Entomology Invited Seminar

An evaluation of differentially spliced genes as markers of sex for forensic entomology. *[†]Jonika MM, **Hjelmen 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. ***Hjelmen 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? ***Hjelmen 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, **Hjelmen CE,** Tarone AM

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

2018:

Differential expression of proteins in species of forensically relevant Diptera. ***Hjelmen 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, **Hjelmen 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, **Hjelmen 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, **Hjelmen CE**, Tarone AM

- Undergraduate Research Scholars Symposium, Texas A&M University

What amount of DNA is just right? ***Hjelmen 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*? ***Hjelmen CE** and Johnston JS

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

2016:

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

- International Congress of Entomology, Orlando, FL

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

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

How do temperature differences relate to genome size variation? ***Hjelmen 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*. ***Hjelmen CE** and Johnston JS

- Entomological Society of America Meeting, Minneapolis, MN (1st place)

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

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

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

- Ecological Integration Symposium, Texas A&M University (1st place)
- Student Research Week, Texas A&M University (1st place)

2012:

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

- Augustana College Biology Department—Invited Oral Presentation

POSTER PRESENTATIONS: *Presenting Author, †Mentored Student

2020:

Heterochromatin profiles and sex chromosomes of desert *Drosophila*. ***Hjelmen CE**

- Arthropod Genomics 2020—Virtual meeting

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)
- 60th 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.

- 60th 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.

- 58th 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.

- 58th 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(1st 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. ***Hjelmen 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. ***Hjelmen, CE** and Johnston, JS

- Arthropod Genomics Symposium, University of Illinois at Urbana Champaign

Genome size evolution in *Drosophila melanogaster*. *Johnston JS, **Hjelmen 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.* ***Hjelmen CE**, Ott JR, Egan SP, and Johnston JS.

- Ecological Integration Symposium, Texas A&M University (2nd place)

2013:

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

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

TEACHING EXPERIENCE:

DEPARTMENT OF ENTOMOLOGY, TEXAS A&M UNIVERSITY

THE SCIENCE OF FORENSIC ENTOMOLOGY (ENTO/FIVS 431)—Lecture TA

Assist in classroom instruction of Forensic Entomology, specifically in the application of collection and identification of insects for courtroom depositions.

- Spring 2017—100 Students

APPLIED FORENSIC ENTOMOLOGY (ENTO/FIVS 432)—Laboratory TA

Instruct upper-level Forensics and Entomology students in collection, identification, and curation of entomological materials for forensic investigations.

- Spring 2017—12 Students

FORENSIC INVESTIGATIONS (FIVS 123)—Online/Distance Learning TA

Assist in online/distance education of students in the field of forensics. Specifically in their ability to identify ability to evaluate evidence, critically analyze information, and implement scientific methods for problem solving

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

FORENSIC IMPLICATIONS OF INHERITANCE (FIVS 308)—Laboratory TA

Instruct upper level Forensics majors in basic genetics, including laboratory techniques, such as DNA extraction, PCR, and gel electrophoresis.

- Fall 2016—13 Students

BIOLOGY OF INSECTS (ENTO 313)—Laboratory TA

Instruct non-major students on important biological aspects of insects, stressing biodiversity. Teach how to correctly curate and identify insects to order and family level.

- Fall 2015—30 Students

INSECT BIODIVERSITY AND BIOLOGY (ENTO 301)—Laboratory TA

Instruct upper-level undergraduate entomology majors to correctly curate and identify insects to family using morphological information.

- Spring 2015—30 Students

GENERAL ENTOMOLOGY (ENTO 201)—Laboratory TA

Instruct primarily non-major students in multiple lab sections on the evolutionary and biological importance of insets and related arthropods as well as the ability to identify insects to the order level.

- Fall 2014—30 Students

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

STUDENTS MENTORED—(CURRENT POSITION):

- Alex McGuane—(DNA Analyst at Harris Country Forensic Science Center)
- Michelle Jonika—(Genetics PhD Student in Heath Blackmon Lab, Texas A&M University)
- Elizabeth Piron—(Public Health Graduate Student at University of Texas Health Science Center)
- V. Renee Holmes—(MS in Veterinary Epidemiology, Entomology PhD student in Spencer Johnston Lab)
- Melissa Mynes—(Laboratory Technician for Aqua Solutions)
- Margaret Garrett—(Medical Student at McGovern Medical School)
- Zoe Ward—(Current Undergraduate)
- Anika Sharma-Fulbright PhD Scholar –(Received PhD)
- Alli Konstantinov—(Current Undergraduate)

EDITOR EXPERIENCE:

Guest Editor for special issue of Genes: Genetics of Phenotypic Variation in *Drosophila* and Other Insects (10 articles)

PEER REVIEW (NUMBER OF REVIEWS)

- BMC Genomics (1)
- International Journal of Acarology (1)
- Molecular Ecology Resources (1)
- Evolution (1)
- Insects (2)
- Biology (2)
- Journal of Insect Science (1)
- Genes (4)
- International Journal of Molecular Sciences (1)
- International Journal of Environmental Research and Public Health (1)
- Agricultural and Forest Entomology (1)
- Cells (2)
- Plants (1)

UNIVERSITY AND PROFESSIONAL SERVICE:

- 2020 Open Source Open Science Workshop 2020—instructor and assistant 274 students
- 2020 Deposition Panel for Texas A&M University Forensic Entomology Final Project
- 2019 Open Source Open Science Workshop 2019—instructor and assistant 292 students
- 2019 Southeast Texas Evolutionary Genetics and Genomics 2019—Planning Committee
- 2019 Deposition Panel for Texas A&M University Forensic Entomology Final Project
- 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

COMMUNITY OUTREACH:

- Feb. 2020 "Why are there so many insects in Texas?" For 100 2nd grade students.
- Apr. 2017 SWB ESA Insect Expo
- Mar. 2017 Family Fun Night Creek View Elem.
- May 2015 Creek View Elementary 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
- May 2014 Covenant Presbyterian Church Preschool Event

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

AWARDS:

- 2019 Texas Genetics Society Annual Meeting Postdoctoral Poster Award Winner
- 2017 Entomological Society of America Southwestern Branch 1st 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 1st 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 1st place graduate student oral presentation
- 2015 Student Research Week 1st place graduate student oral presentation
- 2015 Entomological Society of America Southwestern Branch 1st place Ph.D. poster
- 2014 Theodore Roosevelt Memorial Fund
- 2014 Induction into Gamma Sigma Delta Agriculture Honor Society
- 2014 Ecological Integration Symposium 2nd 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

SKILLS:

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

References:

- Heath Blackmon
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  Texas A&M University
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  Professor
  Dept. of Entomology
  Texas A&M University
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- J. Spencer Johnston
  Professor
  Dept. of Entomology
  Texas A&M University
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  spencerj@tamu.edu