

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, [‡]Undergraduate Author

16. [‡]Anderson 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 JS, 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, [†]McGuane 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, [‡]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
12. [†]Jonika MM, **Hjelmen 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
11. Johnston JS, [‡]Zapalac 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, [†]McGuane 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, [‡]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. **Hjelmen 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.
7. Lower, SS, 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, ¹Strauss K, ¹Seedorf 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, Alfnejd 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**, 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:

- **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)

SEMINARS AND CONFERENCE TALKS: *Presenting Author, [†]Mentored Student, ¹Undergraduate Author

2020

- Working out the “bugs” in genome size evolution. ***Hjelmen CE**.
– Rutgers University, Department of Entomology Invited Seminar

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

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
- 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

COLLABORATOR AND STUDENT TALKS: ^{*}Presenting Author, [†]Mentored Student, [‡]Undergraduate Author

2020

- 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

- 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

- 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**

POSTER PRESENTATIONS: *Presenting Author, †Mentored Student, †Undergraduate Author

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*. *Hjelmén 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*. *Hjelmén, CE; Ott, JR; Egan, SP; Johnston, JS.
– Arthropod Genomics Symposium, University of Notre Dame
– Entomological Society of America Meeting, Austin, TX

TEACHING EXPERIENCE:

- **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—(THEIR CURRENT POSITION):

- Alex McGuane—(DNA Analyst at Harris County 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)

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

UNIVERSITY AND PROFESSIONAL SERVICE:

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| • 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:

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| • Feb. 2020 “Why are there so many insects in Texas?” For 100 2 nd 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:

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

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|--------------------------------------|--|
| • Flow Cytometry | • R for statistics and data visualization |
| • Genome Size Estimation | • Genomic analyses using local and HPC resources |
| • Phylogenetics | – Genome assembly |
| • Western Blots | – Transcriptomic Analysis |
| • DNA and RNA Extraction | – Sequence Alignments |
| • Model insect husbandry | – Comparative Phylogenetics |
| • Insect Curation and Identification | |

References:

- Heath Blackmon
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