

Katie Kretovich Billmyre, PhD

Department of Genetics
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EDUCATION

- 2015 **Duke University**, Durham, NC
PhD, Cell Biology
“The role of the ventral foregut endoderm during craniofacial and foregut development”
Advisor: Dr. John Klingensmith
Certificate in College Teaching
Certificate in Cellular and Molecular Biology
- 2009 **University of Michigan**, Ann Arbor, MI
Bachelor of Science, Molecular, Cellular and Developmental Biology

RESEARCH EXPERIENCE

- 2023-present **Assistant Professor**
University of Georgia, Department of Genetics
Research topics: chromosome-specific dynamics during meiosis, synaptonemal complex structure and function, DNA repair, and recombination
- 2017-2023 **Postdoctoral Researcher**
Dr. R. Scott Hawley, Stowers Institute for Medical Research
Research topics: synaptonemal complex biology and chromosome-specific events during *Drosophila* meiosis
- 2015-2017 **Postdoctoral Researcher**
Dr. Shawn Ahmed, Department of Genetics, University of North Carolina-Chapel Hill
Research topics: Meiotic chromosome cohesion and pairing in *C. elegans* germline immortality
- 2009-2015 **Graduate Student**
Dr. John Klingensmith, Department of Cell Biology, Duke University
Research topics: epithelial cell behaviors during murine foregut compartmentalization
- 2006-2009 **Undergraduate Researcher**
Dr. Deb Gumucio, Department of Cell & Developmental Biology, University of Michigan
Research topics: Sonic Hedgehog signaling in murine intestinal development, inflammatory bowel disease models

FUNDING

Active:

- 2023- NIGMS R00 Pathway to Independence Award (\$473,160 direct costs)
“Uncovering mechanisms controlling chromosome-specific behaviors during meiosis”

Complete:

- 2020-2023 NIGMS K99/R00 Pathway to Independence Award
 “Uncovering mechanisms controlling chromosome-specific behaviors during meiosis”
- 2016-2017 NIGMS F32 Postdoctoral Fellowship
 “Non-disjunction in germline immortality”

HONORS & AWARDS

- 2020 GSA DeLill Nasser Award
- 2019 YISR Poster Award
- 2018 YISR Talk Award
- 2018 GRS Meiosis Poster Award
- 2016 UNC Poster Award
- 2014-2015 Bass Fellow, Duke University
- 2013-2014 Preparing Future Faculty Fellow, Duke University

PUBLICATIONS

1. **Billmyre KK**, Kesler EA, Tsuchiya D, Corbin TJ, Weaver K, Moran A, Yu Z, Adams L, Delventhal K, Durnin M, Davies OR, Hawley RS. 2023. SYCP1 head-to-head assembly is required for chromosome synapsis in mouse meiosis. *Sci Adv.* 9(42):ead1562. DOI: 10.1126/sciadv.adi1562.
2. **Billmyre, K.K.**, 2023. Chromosome-specific behaviors during early meiosis. In *Meiosis in development and disease* (Vol. 151, pp. 127–154). essay, Elsevier Academic Press. <https://doi.org/10.1016/bs.ctdb.2022.05.002>
3. **Billmyre, K.K.***, Bravo Núñez, M. A.*, Bishop, D. K., Cole, F., 2021. Meiosis in Quarantine discussions lead to an action plan to increase diversity and inclusion within the broader genetics community. (*equal co-authors). *PLoS Genetics.* 17. <https://doi.org/10.1371/journal.pgen.1009648>
4. **Billmyre, K.K.***, Hughes, S. E.*, 2021. Meiosis: The elusive sister chromatid repair. *Current Biology.* 31, 454-456. doi: 10.1016/j.cub.2021.03.093 (*equal co-authors)
5. Spichal, M., Heestand, B.*, **Billmyre, K.K.***, Frenk, S.*, Mello, C.C., Ahmed, S., 2021. Germ granule dysfunction is a hallmark and mirror of Piwi mutant sterility. *Nat. Commun.* 12, 1–15. <https://doi.org/10.1038/s41467-021-21635-0> (*equal co-authors)
6. Wesley, E.R., Hawley, R.S., **Billmyre, K.K.#**, 2020. Genetic background impacts the timing of synaptonemal complex breakdown in *Drosophila melanogaster*. *Chromosoma* 129, 243–254. <https://doi.org/10.1007/s00412-020-00742-9> (#Last author)
7. **Billmyre, K.K.***, Cahoon, C.K.*, Heenan M.G., Wesley, E.R., Yu, Z., Unruh, J.R., Takeo, S., Scott Hawley, R., 2019. X chromosome and autosomal recombination are differentially sensitive to disruptions in SC maintenance. *Proc. Natl. Acad. Sci. U. S. A.* 116, 21641–21650. <https://doi.org/10.1073/pnas.1910840116> (*equal co-authors)
8. **Billmyre, K.K.**, Doebley, A.L., Spichal, M., Heestand, B., Belicard, T., Sato-Carlton, A., Flibotte, S., Simon, M., Gnazzo, M., Skop, A., Moerman, D., Carlton, P.M., Sarkies, P., Ahmed, S., 2019. The meiotic phosphatase GSP-2/PP1 promotes germline immortality and small RNA-mediated genome silencing. *PLoS Genetics.* 15. <https://doi.org/10.1371/journal.pgen.1008004>
9. **Billmyre, K.K.**, Klingensmith, J., 2015. Sonic hedgehog from pharyngeal arch 1 epithelium is

necessary for early mandibular arch cell survival and later cartilage condensation differentiation. *Dev. Dyn.* 244, 564–576. <https://doi.org/10.1002/dvdy.24256>

10. **Billmyre, K.K.**, Hutson, M., Klingensmith, J., 2014. One shall become two: Separation of the esophagus and trachea from the common foregut tube. *Dev. Dyn.* 244, 277–288. <https://doi.org/10.1002/dvdy.24219>
11. Zacharias, W.J., Madison, B.B., **Kretovich, K.E.**, Walton, K.D., Richards, N., Udager, A.M., Li, X., Gumucio, D.L., 2011. Hedgehog signaling controls homeostasis of adult intestinal smooth muscle. *Dev. Biol.* 355, 152–162. <https://doi.org/10.1016/j.ydbio.2011.04.025>
12. Zacharias, W.J., Li, X., Madison, B.B., **Kretovich, K.**, Kao, J.Y., Merchant, J.L., Gumucio, D.L., 2010. Hedgehog Is an Anti-Inflammatory Epithelial Signal for the Intestinal Lamina Propria. *Gastroenterology*. [https://doi: 10.1053/j.gastro.2010.02.057](https://doi:10.1053/j.gastro.2010.02.057)
13. Kolterud, Å., Grosse, A.S., Zacharias, W.J., Walton, K.D., **Kretovich, K.E.**, Madison, B.B., Waghray, M., Ferris, J.E., Hu, C., Merchant, J.L., Dlugosz, A.A., Kottmann, A.H., Gumucio, D.L., 2009. Paracrine Hedgehog Signaling in Stomach and Intestine: New Roles for Hedgehog in Gastrointestinal Patterning. *Gastroenterology* 137, 618–628. <https://doi.org/10.1053/j.gastro.2009.05.002>

TEACHING EXPERIENCE

University of Georgia

Spring 2024 GENE 4950: Senior Capstone-Chromosome Biology (instructor of record)
GENE 4540/6540: Cancer Genetics (instructor of record)

Stowers Institute/University of Missouri- Kansas City

Spring 2021 Bio 206H: Honors Genetics (guest lecture), UMKC, MO
Spring 2020 Bio 206H: Honors Genetics (guest lecture), UMKC, MO
Fall 2020 Graduate Genetics Module (guest lecture), Stowers Institute, MO
Spring 2019 Bio 206H: Honors Genetics (guest lecture), UMKC, MO
Fall 2019 Graduate Genetics Module (guest lecture), Stowers Institute, MO
Spring 2018 Bio 206H: Honors Genetics (teaching assistant), UMKC, MO

University of North Carolina

Fall 2015 Genetics 615: Retrotransposons (guest lecture)

Elon University

May 2014 BIO 245: Genetics of Cancer (guest lecture)
Nov. 2014 BIO 111: Regeneration (guest lecture)

Duke University

Summer 2015 BIO 190S: Frontiers in Medicine: Non-majors (instructor of record)
Spring 2015 BIO 490S: Biomedical Models of Human Disease (instructor of record)
Spring 2014 BIO 179S: Biology in Medicine (teaching assistant)
Spring 2013 BIO 179S: Biology in Medicine (teaching assistant)

MENTORING

University of Georgia

Graduate Students (2):

Ralph Angel Lopez Fortun (2024-present)

Clayton Parker (2024-present)

Graduate Rotation Students (4):

Dilani Rajapakse (2023)

Ralph Angel Lopez Fortun (2023)

Clayton Parker (2023)

Chandler Lowe (2023)

Research Assistants (1):

Adam Bomar (2023-present)

Undergraduates (3):

Cameron Kim (2023-present)

Ava Murphy (2023-present)

Sidney Nguyen (2024-present)

Honors and Awards of Lab Members

T32 Genetics Training Fellowship (Ralph Lopez Fortun 2024-2025)

CURO Research Award (Cameron Kim Spring 2024)

Stowers Institute for Medical Research

Research Assistants (2):

Emily Kesler (2022)

Salam Briggs (2020)

Undergraduates (4):

Emily Kesler (2021)

Emily Wesley (2018-2021)

Mary Rose (Summer 2019)

Tara Proffitt (Summer 2018)

University of North Carolina

Undergraduates (2):

Katharine Coomar (2016-2017)

Ayush Kaushish (2016-2017)

Duke University

Undergraduates (1):

Jeanette Cheng (2011-2013)

SERVICE

Professional (National and International)

Manuscript Reviews: PNAS, Science Advances, Genetics, G3, Nature Ecology & Evolution

Meetings Organized:

Meiosis GRS (2020, 2022)
MiQ-Virtual Meeting (2020)

Professional Memberships
Genetics Society of America
American Society of Cell Biology

University

Invited Career Development Workshops:
Office of Research: An Inside Look at the Academic Job Search Process Panel (2023)

Department of Genetics

Undergraduate Advising Committee (UAC) (2023-present)
Outstanding Thesis Award Committee (2024)

Student Committees:

Alexis Lambert (2024-present)
Elise Nanista (2024-present)
Evelyn Baaba Quansah (2024-present)
Kaitlyn Camp (2024-present)

PRESENTATIONS

Invited Speaker

Sept 2024 “Investigating chromosome-specific behaviors” FASEB Aneuploidy
March 2022 “Why do some chromosomes misbehave?” Penn State University
March 2022 “Why do some chromosomes misbehave?” University of Georgia
March 2022 “Why do some chromosomes misbehave?” University of Louisville
February 2022 “Why do some chromosomes misbehave?” Dartmouth University
February 2022 “Why do some chromosomes misbehave?” University of Wisconsin
February 2022 “Why do some chromosomes misbehave?” University of Kansas
January 2022 “Why do some chromosomes misbehave?” OMRF (Zoom)
Dec 2021 “Why do some chromosomes misbehave?” Virginia Tech University (Zoom)
Nov 2021 “Why do some chromosomes misbehave?” University of Connecticut
July 2021 “Why do some chromosomes misbehave?” Cornell University

Conference Talks

June 2024 “Roles of the synaptonemal complex in chromosome-specific meiotic biology”,
Meiosis GRC
March 2024 “The synaptonemal complex plays multiple roles in establishing the recombination
landscape across chromosomes”, TAGC
Dec 2022 “Investigating the mechanisms underlying meiotic chromosome-specific differences”,
ASCB
April 2021 “Investigating chromosome-specific differences”, Postdoc and Student Meiosis Workshop,
Online Zoom
Sept 2021 “Chromosome-specific differences in meiosis”, CSHL Germ Cells, Online Zoom

- Sept 2021 “Chromosome-specific differences in meiosis” Young Investigators Science Retreat, Stowers Institute Online Zoom
- April 2020 “Chromosome-specific differences in meiosis” Meiosis in Quarantine, Online Zoom

Conference Posters

- Dec 2023 Regulation of the synaptonemal complex during meiosis, ASCB Meeting
- Mar 2023 The synaptonemal complex plays multiple roles in establishing the recombination landscape across chromosomes, Drosophila Research Conference
- Mar 2022 Investigating the Mechanisms Underlying Meiotic Chromosome-specific Differences, Drosophila Research Conference
- Dec 2020 Investigating chromosome-specific differences during meiosis, ASCB Meeting
- Dec 2019 Chromosome-specific differences in meiosis, ASCB Meeting
- March 2019 Regulation of recombination and pairing by the synaptonemal complex, Drosophila Research Conference
- Oct 2018 Understanding transverse filament function during synaptonemal complex, Cold Spring Harbor-Germ Cell
- June 2018 Understanding transverse filament function during synaptonemal complex (Poster prize), Meiosis Gordon Conference
- April 2018 Understanding coiled-coil function during synaptonemal complex, Drosophila Research Conference
- Dec 2016 Meiotic chromosome cohesion promotes germline immortality, ASCB meeting
- Oct 2016 Meiotic chromosome cohesion promotes germline immortality, Cold Spring Harbor-Germ Cell
- Sept 2016 Meiotic chromosome cohesion promotes germline immortality, ASCB: Triangle Cytoskeleton Meeting, Chapel Hill, NC
- Dec 2013 Epithelial behaviors during foregut compartmentalization, ASCB meeting
- April 2013 Epithelial behaviors during foregut compartmentalization, Mid-Atlantic SDB meeting

Internal Talks and Posters

- Sept 2024 Why do some chromosomes misbehave?, Talk, Department of Genetics Retreat
- April 2023 SYCP1 head-to-head assembly is required for chromosome synapsis in mouse meiosis, Talk, Stowers Institute Friday Science Club
- Feb 2020 Investigating a functionally conserved meiotic protein in mice using CRISPR/Cas9 site-directed mutagenesis, Talk, Stowers Institute Friday Science Club
- Feb 2019 Investigating the requirement of the synaptonemal complex in early meiosis, Talk, Stowers Institute Friday Science Club
- Sept 2019 Regulation of recombination and pairing by the synaptonemal complex, (2nd place poster prize), Stowers Institute-Kansas City, MO
- Sept 2018 Understanding transverse filament function during synaptonemal complex, (1st place talk prize), Stowers Institute-Kansas City, MO
- Feb 2017 Meiotic chromosome cohesion promotes germline immortality, Talk, Genetics Seminar, University of North Carolina, Chapel Hill, NC
- Aug 2016 Meiotic chromosome cohesion promotes germline immortality, (Poster prize), UNC Genetics Retreat, Asheville, NC

- Dec 2014 Epithelial behaviors during foregut compartmentalization, Talk, Cell Biology Departmental Seminar, Durham, NC
- April 2014 The tale of two tubes: Foregut compartmentalization, Poster, Cell Biology Retreat, Beaufort, NC
- March 2014 The tale of two tubes: Foregut compartmentalization, Talk, UNC Developmental Biology Club, Chapel Hill, NC
- Dec 2013 Epithelial behaviors during foregut compartmentalization, Talk, Cell Biology Departmental Seminar, Durham, NC
- April 2013 The Role of Shh in Lower Jaw Development, Talk, Cellular and Molecular Biology Seminar, Durham, NC
- April 2012 The Role of Shh in Lower Jaw Development, Talk, Cell Biology Retreat, Wilmington, NC
- Sept 2011 The Role of Shh in Lower Jaw Development, Poster, Cell Biology Retreat, Asheville, NC
- April 2011 Using Organ Culture to Visualize Foregut Development, Talk, Young Ones Student Seminar, Durham, NC

OUTREACH

- 2020-2022 KC STEM Alliance- Project Lead the Way, Kansas City, MO
- Nov 2019 The Beauty of Biology: Explore Scientific Micro Imaging, Kansas City, MO
- April 2019 KS DNA Day at Northgate Middle School, Kansas City, MO
- 2015-2017 Invite-a-scientist at Warren County Middle School, Warrenton, NC
- April 2015 UNC DNA Day at TW Andrews HS, High Point, NC
- 2011-2015 Durham School for the Arts and Sciences Olympiad, Durham, NC
- 2012 Summer Sleuths Program, Duke University, Durham, NC
- 2010 Museum of Life and Science, Durham, NC