Karen G. Hales, PhD

Professor of Biology, Davidson College
Box 7118, Davidson NC 28035-7118

Education

Ph.D., 1997, Stanford University School of Medicine, Department of Genetics

B.A. with Distinction in Biology, 1991, Swarthmore College

Academic Appointments

Davidson College
- Professor of Biology, August 2013-present
- Associate Professor of Biology, August 2006-July 2013
- Assistant Professor of Biology, August 2000-July 2006

University of North Carolina at Chapel Hill
- Instructor, Department of Biology, Summer 2000 and Summer 1999
- Postdoctoral Fellow, 1998-2000 (advisors Dr. J. R. Pringle and Dr. M. Peifer)

Grants, Fellowships, Honors, and Awards

National Institutes of Health Academic Research Enhancement Award (AREA), 2012-2017. AAA ATPases linking mitochondria and microtubule processing in flies and yeast.
National Science Foundation Research in Undergraduate Institutions Award (RUI), 2012-2016. Roles for tissue-specific ATP synthase subunits and other proteins in mitochondrial shaping during *Drosophila* spermatogenesis
National Institutes of Health Academic Research Enhancement Award (AREA), 2007-2011. Genetic control of mitochondrial aggregation in Drosophila spermatogenesis.
Davidson Research Initiative Group Investigation Grant, 2010-2011
MacArthur Assistant Professor of Biology (named professorship), Davidson College, 2003-2005
Faculty Study and Research Awards, Davidson College, 2001-2003, 2006-2018
National Science Foundation Faculty Early Career Development Award (CAREER), 2002-2007. Genetic dissection of mitochondrial morphogenesis during *Drosophila* spermatogenesis.
National Institutes of Health Postdoctoral Fellowship, May 1999-July 2000
Howard Hughes Medical Institute Predoctoral Fellowship, 1991-1996
National Science Foundation Graduate Fellowship (declined), 1991
Leo Leva Memorial Prize in Biology (departmental award), Swarthmore College, 1991
Gladys Irish Prize in Athletics, Swarthmore College, 1991
Phi Beta Kappa, 1991
Sigma Xi, 1991
National Merit Scholarship, 1987

Publications (* indicates undergraduate coauthors)

Hales, Karen G.. 2020. Signaling inclusivity in undergraduate biology courses through deliberate framing of genetics topics relevant to gender identity, disability, and race. *CBE—Life Sciences Education* 19(2): https://doi.org/10.1187/cbe.19-08-0156.

D.E. Miller, K.R. Cook, E.A. Hemenway, *V. Fang, A.L. Miller, K.G. Hales, and R.S. Hawley. 2018. The molecular and genetic characterization of second chromosome balancers in *Drosophila melanogaster*. *G3:Genes|Genomes|Genetics: 8:* 1161-1171.

*Sawyer, E.M., *E.C. Brunner, *Y. Hwang, *L.E. Ivey, *O. Brown, *M. Bannon, *D. Akrobetu, *K.E. Sheaffer, *O. Morgan, *C.O. Field, *N. Suresh, *M.G. Gordon, *E.T. Gunnell,, L.A. Regruto, C.G. Wood, M.T. Fuller, and K.G. Hales. 2017. Testis-specific ATP synthase peripheral stalk subunits required for tissue-specific mitochondrial morphogenesis in *Drosophila. BMC Cell Biology 18:*16.

Hales, K.G., C. A. Korey, A.M. Larracuente, and D.M. Roberts. 2015. Genetics on the fly: a primer on the *Drosophila* model system. *Genetics 201*: 815-842.

Hales, K.G. 2013. Denying genetic causality. Review of *Genetic Explanations: Sense and Nonsense,* edited by Krimsky and Gruber. *CBE Life Sciences Education 12*: 604-605.

*Bergner, L.M., *F. E. Hickman, *K. H. Wood, *C. M. Wakeman, *H. H. Stone, *T. J. Campbell, S. B. Lightcap, S. M. Favors, A. C. Aldridge, and K. G. Hales. 2010. A novel predicted bromodomain-related protein affects coordination between meiosis and spermiogenesis in *Drosophila* and is required for male meiotic cytokinesis. *DNA and Cell Biology* 29: 487-498.

Hales, K.G. 2010. Mitochondrial fusion and division. *Nature Education* 3(9): 12.

Hales, K.G. 2010. Iron testes: sperm mitochondria as a context for dissecting iron metabolism. *BMC Biology* 8: 79.

Anderson, M.A., J.N. Jodoin, E. Lee, K.G. Hales, T.S. Hays, and L.A. Lee. 2009. asunder coordinates spermatogenesis in *Drosophila* by regulating dynein-dynactin localization. *Mol. Biol. Cell* 20: 2709-2721.

Silverman-Gavrila, R.V., K.G. Hales, and A. Wilde. 2008. Anillin-mediated targeting of Peanut to pseudocleavage furrows is regulated by the GTPase Ran. *Mol. Biol. Cell.* 19: 3735-3744.

Aldridge, A.C., *L.P. Benson, *M.M. Siegenthaler, *B.T. Whigham, R. S. Stowers, and K.G. Hales. 2007. Roles for Drp1, a dynamin-related protein, and Milton, a kinesin-associated protein, in mitochondrial segregation, unfurling, and elongation during *Drosophila* spermatogenesis. *FLY* 1: 38-46.

Fuller, M.T., K.G. Hales, and A.H. Santel. 2005. Mitofusins, Fzo homologs, and functional derivatives thereof. United States Patent 6,953,680.

Beckstead, R.B., S.S. Ner, K.G. Hales, T.A. Grigliatti, B.S. Baker, and H.J. Bellen. 2005. Bonus, a TIF1 homologue, interacts with heterochromatin and is an enhancer and suppressor of position effect variegation. *Genetics* 169: 783-794.

Hales, K.G. 2004. The machinery of mitochondrial fusion, division, and distribution, and emerging connections to apoptosis. *Mitochondrion* 4: 285-308.

Hales, K.G. 2003. Review of Decoding Darkness: In Search of the Genetic Causes of Alzheimer's Disease by Rudolph E. Tanzi and Ann B. Parson. *Journal of Undergraduate Neuroscience Education* 1(2): R12-R13.

Shih, H.-P., K.G. Hales, J.R. Pringle, and M. Peifer. 2002. Identification of septin-interacting proteins and characterization of the Smt3/SUMO-conjugation system in *Drosophila*. *J. Cell Sci* 115: 1259-1271.

Hales, K.G. 2001. "Finding a Lost Mouse" Refined. *The American Biology Teacher* 63: 470.

Fuller, M.T. and K.G. Hales. 2001. Mitofusin genes and their uses. United States Patent 6,284,507.

Fuller, M.T. and K.G. Hales. 2000. Mitofusin genes and their uses. United States Patent 6,127,159.

Hales, K.G., E. Bi, J.-Q. Wu, J.C. Adam, I.-C. Yu, and J.R. Pringle. 1999. Cytokinesis: an emerging unified theory for eukaryotes? *Curr. Opin. Cell Biol.* 11: 717-725.

Hermann, G.J., J. Thatcher, J. P. Mills, K.G. Hales, M. T. Fuller, J. Nunnari, and J. M. Shaw. 1998. Mitochondrial fusion in yeast requires the transmembrane GTPase Fzo1p. *J. Cell Biol.* 143: 359-373.

Molina, I., S. Baars, J. A. Brill, K. G. Hales, M.T. Fuller, and P. Ripoll. 1997. A chromatin-associated kinesin-related protein required for normal mitotic chromosome segregation in *Drosophila*. *J. Cell Biol.* 139: 1361-1371.

Hales, K.G. and M.T. Fuller. 1997. Developmentally regulated mitochondrial fusion mediated by a conserved novel predicted GTPase. *Cell* 90: 121-129.

Professional Organizations

Genetics Society of America
American Society for Cell Biology
Sigma Xi Research Society

Official Roles in Professional Organizations

Co-organizer, 62nd Annual *Drosophila* Research Conference, 2021, Genetics Society of America.

Education Committee, Genetics Society of America. Appointed by Executive Director, 2012-2014. Chair, 2014.

North American *Drosophila* Board (affiliated with Genetics Society of America). Elected representative for primarily undergraduate institutions (PUIs), 2010-2013. Facilitate addition of undergraduate-oriented programming at the Annual *Drosophila* Research Conference and represent PUI needs regarding community resources.

Selection committee member, Genetics Society of America Victoria Finnerty Undergraduate Travel Award, 2011-2012 (appointed position).

Other Professional Activities

Invited Presentations

University of Maryland, February 2021
Auburn University, November 2020
American Society for Cell Biology "Online with LSE" webinar series, September 2020 (featured author) and October 2020 (interviewer of featured author)
University of Florida, September 2020
Duke University, December 2018 (postponed due to snowstorm)
University of North Carolina, Chapel Hill, July 2016, part of the Mark Peifer 25th lab anniversary symposium
Union College, September 2014
NC Research Campus, Kannapolis, NC, January 2013
University of Miami, February 2012
University of North Carolina, Charlotte, September 2010
University of Georgia, May 2005
Bowdoin College, April 2004
St. John's University, October, 2002
University of North Carolina, Charlotte, September, 2003
Swarthmore College, June 1996

External PhD Thesis committee member

University of Melbourne, 2018
Vanderbilt University, 2007-2009

Workshops and Panels

Research, Teaching, and Careers at Primarily Undergraduate Institutions (PUIs). Workshop speaker/panelist. 62nd Annual Drosophila Research Conference, March 17th, 2021. Virtual.

Roundtable: Inclusive Language Frameworks and Approaches in the Biology Classroom. Discussion leader, Cell Bio Virtual 2020 (American Society for Cell Biology), December 2, 2020.

Using *Drosophila* to bring authentic course-based undergraduate research experiences (CUREs) into the undergraduate classroom. Workshop speaker/panelist. 60th Annual Drosophila Research Conference (Dallas, TX) March 27-31, 2019.

Teaching and University Administration Career Panel, Annual Meeting of the American Society for Cell Biology, San Diego, CA, December 14, 2015.

Drosophila Male Fertility as a Cell Biological Model. Workshop speaker. 55th Annual Drosophila Research Conference (San Diego, CA) March 26-30, 2014.

Mentoring roundtable discussion at the Annual Meeting of the American Society for Cell Biology, Table Leader, December 2010 and December 2012.

Drosophila Research and Pedagogy at Primarily Undergraduate Institutions. Co-organizer and co-moderator. 46th Annual *Drosophila* Research Conference (San Diego, CA), March 30-April 3, 2005.*

Drosophila Research and Pedagogy at Primarily Undergraduate Institutions. Co-organizer and co-moderator. 45th Annual *Drosophila* Research Conference (Washington, DC), March 24-28, 2004.*

Alternative Career Paths: Life after Stanford. Stanford University School of Medicine Department of Genetics Annual Scientific Meeting (Monterey, CA) September 17-19, 2003.

Research and Pedagogy at Primarily Undergraduate Institutions. Co-organizer and co-moderator. 44th Annual *Drosophila* Research Conference (Chicago, IL), March 5-9, 2003.*

Careers at Primarily Undergraduate Institutions. 42nd Annual *Drosophila* Research Conference (Washington, DC), March 21-25, 2001.

Drosophila Research at Primarily Undergraduate Institutions. Co-organizer and co-moderator. 42nd Annual *Drosophila* Research Conference (Washington, DC), March 21-25, 2001.*

Abstracts (* indicates undergraduate coauthors)

Voelker, A., C. Miller, and K.G. Hales. 2021. Potential role of CG5050 in *Drosophila melanogaster* sperm transfer and/or storage. 62nd Annual *Drosophila* Research Conference (virtual), 441C.

Abstracts accepted but not presented due to COVID-19:

*Miller, C. and K.G. Hales. 2020. Roles for *CG5043* and *CG5050* in spermatid mitochondrial shaping and fertility in *Drosophila melanogaster*. The Allied Genetics Conference/61st Annual *Drosophila* Research Conference 1811B.

*Phan, C., *T. Mason, V. Fang, and K.G. Hales. 2020. SLC25A46 ortholog CG5755 localizes to spermatid bundles and is required for mitochondrial shaping during *Drosophila* spermatogenesis. The Allied Genetics Conference/61st Annual *Drosophila* Research Conference 1812C.

*Young, E., *V. Williams, and K.G. Hales. 2020. Role for *CG4701* in mitochondrial shaping during *Drosophila* spermatogenesis and possible peroxisome interactions. The Allied Genetics Conference/61st Annual *Drosophila* Research Conference 1813A.

*Pagon, W., *M.U. Qureshi, and K.G. Hales. 2020. Role of *nmd* in mitochondrial morphogenesis and peroxisome biogenesis during spermatogenesis in *Drosophila melanogaster*. The Allied Genetics Conference/61st Annual *Drosophila* Research Conference 1814B.

*Young, E., *V. Williams, *M. U. Qureshi, and K.G. Hales. 2019. Role of *CG4701* during mitochondria and peroxisome shaping in *Drosophila melanogaster* spermatogenesis. 60th Annual *Drosophila* Research Conference (Dallas, TX), 311.

*Pagon, W., *M. Ummer Qureshi, and K.G. Hales. 2019. Role for *nmd* in mitochondria-peroxisome interactions during *Drosophila melanogaster* spermatogenesis. 60th Annual *Drosophila* Research Conference (Dallas, TX), 307.

*Miller, C., *K. Copenhaver, and K.G. Hales. 2019. Roles for CG5050 and CG5043 during spermatogenesis in *Drosophila melanogaster*. 60th Annual *Drosophila* Research Conference (Dallas, TX), 310.

*Phan, C., *V. Fang, and K.G. Hales. 2019. Role for the SLC25A46 ortholog CG5755 in *Drosophila* spermatogenesis. 60th Annual *Drosophila* Research Conference (Dallas, TX), 308.

*Copenhaver, K. and K.G. Hales. 2018. Roles for two novel genes in post-meiotic mitochondrial shaping during *Drosophila* spermatogenesis. 59th Annual *Drosophila* Research Conference (Philadelphia, PA) 419.

*Qureshi, M. U. and K.G. Hales. 2018. Nmd regulates peroxisome biogenesis and mitochondrial shaping in *Drosophila*spermatogenesis. 59th Annual *Drosophila* Research Conference (Philadelphia, PA) 429.

*Copenhaver, K. and K.G. Hales. 2017. Two novel related genes required for post-meiotic mitochondrial shaping in *Drosophila* spermatogenesis. 58th Annual *Drosophila* Research Conference (San Diego, CA) 328A.

*Fang, V. and K.G. Hales. 2017. Characterization of a *Drosophila* ortholog of SLC25A46 which is required for mitochondrial shaping during spermatogenesis. 58th Annual *Drosophila* Research Conference (San Diego, CA) 332B.

*Morgan-Asiedu, P.K., *M.U. Qureshi, and K.G Hales. 2017. Defective *Drosophila* spermatogenesis in CG4701 and nmd mutants possibly connected to faulty protein transport and peroxisome biogenesis. 58th Annual *Drosophila* Research Conference (San Diego, CA) 338B.

*Lim, J., *E. Brunner, *E.M Sawyer, L. Regruto; K.G. Hales. 2017. Testis-specific ATP synthase subunits associated with shaping mitochondrial membranes in the nebenkern. 58th Annual *Drosophila* Research Conference (San Diego, CA) 337A.

Hales, K.G., *E. C. Brunner; *M. Bannon; *N. Suresh; *L. Regruto; B. Jepson; *E. M. Sawyer. 2016. Roles for tissue-specific ATP synthase subunits in mitochondrial shaping and ATP synthase dimerization in *Drosophila*. The Allied Genetics Conference/57th Annual *Drosophila* Research Conference (Orlando, FL) D1176.

*Brunner, E., *D. Akrobetu, *E.M. Sawyer, *M. Bannon, *N. Suresh, B. Jepson, L. Regruto, K.G. Hales. 2015. Possible roles for tissue-specific ATP synthase subunits in mitochondrial shaping and ATP synthase dimerization in *Drosophila*. Annual Meeting of the American Society for Cell Biology (San Diego CA) P1315.

*Akrobetu, D., *B. Johnson, L. Regruto, *E. Sawyer, and K. Hales. 2015. Expression of the testis-specific paralog of ATP synthase subunit d in *Drosophila* flight muscle. 56th Annual *Drosophila* Research Conference (Chicago, IL) 222B.

*Bates, T., J. Winkle, and K. Hales. 2015. Characterization of the function of AAA ATPase Nmd in *Drosophila* spermatogenesis and *in vitro*. 56th Annual *Drosophila* Research Conference (Chicago, IL) 391C.

*Harris, D., *B. Wagner, *S. Pyfrom, *J. Gerard, *M. Lorenzo, J. Winkle, L. Regruto, and K. Hales. 2015. Characterization of AAA ATPase proteins Nmd and CG4701 through an analysis of mitochondrial dynamics, cytokinesis, and microtubule organizing centers during *Drosophila melanogaster* spermatogenesis. 56th Annual *Drosophila* Research Conference (Chicago, IL) 396B.

*Sawyer, E.M., L. Regruto, *O. Brown, *Y. Hwang, *L. Ivey , K.G. Hales. 2014. The testis-enriched ATP synthase subunit d paralog Ms(2)1400 is required for Nebenkern organization and elongation in *Drosophila*spermatogenesis. 55th Annual *Drosophila* Research Conference (San Diego, CA) 381B.

*Wagner, B. ,*D. Harris, *S. Pyfrom, *J.L. Gerard, *M.E. Lorenzo, J. WInkle, K.G. Hales. Functional analysis of novel dual localization AAA proteins Nmd and CG4701 in mitochondrial, microtubule, and contractile ring dynamics in *Drosophila*spermatogenesis. 55th Annual *Drosophila* Research Conference (San Diego, CA), 382A.

*Pyfrom, S., *B. Wagner, J. WInkle, L. Regruto, *D. Harris, *B. English, K.G. Hales. 2013. AAA ATPases connecting mitochondrial dynamics with microtubule dynamics in *Drosophila* spermatogenesis. 53rd Annual Meeting of the American Society for Cell Biology (New Orleans, LA), 1576.

*Wagner, B.L., L.A. Regruto, *M. Lorenzo, *J. Gerard, *S.C. Pyfrom, K.G. Hales. 2013. Localization and functional analysis of Nmd and CG4701 AAA proteins in mitochondrial and microtubule dynamics in *Drosophila* spermatogenesis. 54th Annual *Drosophila* Research Conference (Washington, DC), 142.

*Sawyer, E.M, *O. Brown, *Y. Hwang, *L. Ivey, *K.E. Sheaffer, *C.O. Field, *T. Gunnell, K.G. Hales. 2013. Roles for testis-enriched ATP synthase subunits in mitochondrial shaping during *Drosophila* spermatogenesis. 54th Annual *Drosophila* Research Conference (Washington, DC), 200B.

*W.S. Mitchell, K.G. Hales. 2013. Characterizing the genetic basis for mitochondrial shaping defects in *emmenthal* mutants of *Drosophila melanogaster*. 54th Annual *Drosophila* Research Conference (Washington, DC), 199A.

*Y. Hwang, *L. Ivey, *O. Brown, *C. Field, *M. Lorenzo, *K. Sheaffer, K. G. Hales. 2012. Roles for tissue-specific ATP synthase subunits in mitochondrial shaping. 52nd Annual Meeting of the American Society for Cell Biology (San Francisco, CA), 2197.

*Hwang, Y., *L. Ivey, K.G. Hales. 2012. A testis-enriched predicted ATP synthase subunit required for mitochondrial shaping during spermatogenesis. 53rd Annual *Drosophila* Research Conference (Chicago, IL), 584B.

*Wagner, B.L., *S.C. Pyfrom, K.G. Hales. 2012. Determining molecular roles of *CG4701* and *nmd* in Drosophila spermatogenesis through analysis of β tubulin and anillin localization. 53rd Annual *Drosophila* Research Conference (Chicago, IL), 586A.

*Campbell, T., *C. Genetti, *C. Lima, *T. Gunnell, *C. Shaffner, K. G. Hales. 2011. Possible roles in spermatid mitochondrial shaping for testis-specific paralogs of ATP synthase subunits. 52nd Annual *Drosophila* Research Conference (San Diego, CA), 595A.

*Pyfrom, S.C., *L. Smith, S. Lightcap, H. White-Cooper, K.G. Hales. 2011. Characterizing the function of nmd in mitochondrial morphogenesis and in cytokinesis during spermatogenesis in *Drosophila melanogaster*. 52nd Annual *Drosophila* Research Conference (San Diego, CA), 604A.

*Ivey, L.E., *T. Campbell, C. Wood, A. Mahowald, M.T. Fuller, K. G. Hales. 2011. Characterization of a candidate gene for *ms(2)1400*, a gene required for the internal structure of the Nebenkern in *Drosophila* spermatids. 52nd Annual *Drosophila* Research Conference (San Diego, CA), 600C.

*Coughtrey, D., *L. Smith, *H. Stone, *B. English, K. G. Hales. 2011. Role of CG4701 in mitochondrial morphogenesis during *Drosophila melanogaster* spermatogenesis. 52nd Annual *Drosophila* Research Conference (San Diego, CA), 597C.

*Pyfrom, S.C, *L.K. Smith, *D.G. Coughtrey-Davenport, *B.C. English, *S.T. Burke, S.B. Lightcap, S. Favors, M.T. Fuller, H. White-Cooper, K.G. Hales. 2010. AAA ATPases with dual roles in mitochondrial shaping and microtubule modulation. 50th Annual Meeting of the American Society for Cell Biology (Philadelphia, PA), 2196.

*Ivey, L.E., *D. Coughtrey-Davenport, C.G. Wood, P.G. Wilson, A. Mahowald, M. T. Fuller, and K. G. Hales. 2010. Identification and characterization of a candidate gene for *ms(2)1400*, a gene required for unfurling and elongation of mitochondrial derivatives during *Drosophila* spermatogenesis. 51st Annual *Drosophila* Research Conference (Washington, DC), 548B.

Lightcap, S.B., *H. H. Stone, *B. C. English, S. E. Favors, K.G. Hales. 2010. An AAA ATPase required for mitochondrial morphogenesis in developing *Drosophila* spermatids associates with both mitochondria and centrosomes. 51st Annual *Drosophila* Research Conference (Washington, DC), 549C.

*Bergner, L.M., *F. E. Hickman, *K. H. Wood, S. M. Favors, A. C. Aldridge, K. G. Hales. 2009. *mitoshell*, a novel gene required for mitochondrial aggregation and cytokinesis in *Drosophila* spermatogenesis, affects formation of the meiotic central spindle and the contractile ring. 50th Annual *Drosophila* Research Conference (Chicago, IL), 546C.

*English, B.C., *S. D. Durnbaugh, *K. M. Koehrn, *S. H. Holmberg, S. E. Favors, K. G. Hales. 2008. Characterization of the hypomorphic male sterile nmd^{ry4} allele and analysis of the Nmd paralog CG4701's putative role in spermatid mitochondrial shaping. 49th Annual *Drosophila* Research Conference (San Diego, CA), Program and Abstracts 496A.

*Wood, K. H., *L. M. Bergner, *F. E. Hickman, *M. C. Beaucaire, A. C. Aldridge, S. E. Favors, K. G. Hales. 2008. Cloning and characterization of *mitoshell*, a gene required for normal mitochondrial aggregation during *Drosophila* spermatogenesis. 49th Annual *Drosophila* Research Conference (San Diego, CA), Program and Abstracts 505A.

Favors, S.E., K.G. Hales. 2008. Separation of Nebenkern anchoring and mitochondrial elongation phenotypes in germ line clones of a *milton* allele. 49th Annual *Drosophila* Research Conference (San Diego, CA), Program and Abstracts 497B.

*Wood, K. H., *L. M. Bergner, *F. E. Hickman, S. E. Favors, A. C. Aldridge, K. G. Hales. 2007. Identification of a *Drosophila* gene required for proper timing and configuration of mitochondrial aggregation during spermatogenesis. 47th Annual Meeting of the American Society for Cell Biology (Washington, DC). Late Abstracts Volume 2806.

Hales, K.G., *S. E. Coffey, S. E. Favors, A. C. Aldridge. 2007. Roles for *mitoshell* in mitochondrial aggregation and meiotic cytokinesis during *Drosophila* spermatogenesis. 48th Annual *Drosophila* Research Conference (Philadelphia, PA), Program and Abstracts 532A.

*English, B.C., *S. D. Durnbaugh, *K. M. Koehrn, A. C. Aldridge, S. H. Holmberg, K. G. Hales. 2007. Characterization of *nmd* and its paralog in mitochondrial morphogenesis in *Drosophila* spermatogenesis. 48th Annual *Drosophila* Research Conference (Philadelphia, PA), Program and Abstracts 530B.

Aldridge, A. C., *S. E. Coffey, *B. C. English, S. E. Favors, K. G. Hales. 2006. Roles for *mitoshell* in mitochondrial aggregation and meiotic cytokinesis in *Drosophila* spermatogenesis. 46th Annual Meeting of the American Society for Cell Biology (San Diego, CA). Late Abstracts Volume L113(W).

*Durnbaugh, S.D., *K.M. Koehrn, A.C. Aldridge, *C.M. Black, *K.O. Saunders, *S.H. Holmberg, and K.G. Hales. 2006. Function of *no mitochondrial derivative* in mitochondrial morphogenesis during spermatogenesis. 47th Annual *Drosophila* Research Conference (Houston, TX), Program and Abstracts 497A.

Hales, K.G., *L.P. Benson, *M.M. Siegenthaler, *B.T. Whigham, R.S. Stowers, and A.C. Aldridge. 2006. Roles for milton and Drp1 in mitochondrial morphogenesis during Drosophila spermatogenesis. 47th Annual *Drosophila* Research Conference (Houston, TX), Program and Abstracts 500A.

Aldridge, A.C., *L.P. Benson, *M.M. Siegenthaler, *B.T. Whigham, R.S. Stowers, and K.G. Hales. 2005. Roles for milton and Drp1 in mitochondrial morphogenesis during Drosophila spermatogenesis. 45th Annual Meeting of the American Society for Cell Biology (San Francisco, CA). Late Abstracts Volume L407.

*Whigham, B.T., *M. M. Siegenthaler, R. S. Stowers, and K.G. Hales. 2005. Milton functions in mitochondrial elongation during *Drosophila* spermatogenesis. 46th Annual *Drosophila* Research Conference (San Diego, CA), Program and Abstracts 577A.

*Baxley, S.E., *Holmberg, S.H., *Burke, S.T., Aldridge, A.C., *Black, C.M., *Whigham, B.T., and K.G. Hales. 2004. Genetic control of mitochondrial aggregation during *Drosophila* spermatogenesis: characterization of the *no mitochondrial derivative* and *mitoshell* genes. 44th Annual Meeting of the American Society for Cell Biology (Washington, DC). Late Abstracts L318.

*Baxley, S.E., *S.T. Burke, and K.G. Hales. 2004. Genetic control of mitochondrial aggregation during spermatogenesis: characterization of an *nmd* candidate gene. 45th Annual *Drosophila* Research Conference (Washington, DC), Program and Abstracts 587B.

*Holmberg, S.H. and K.G. Hales. 2004. Characterization of the subcellular localization of the *nmd* gene product. 45th Annual *Drosophila* Research Conference (Washington, DC), Program and Abstracts 592A.

Hales, K.G. 2003. Synthesizing molecular and classical genetics in inquiry-based laboratory courses for undergraduates. 43rd Annual Meeting of the American Society for Cell Biology (San Francisco, CA). Late Abstracts L414.

*Siegenthaler, M.M., R. S. Stowers, and K. G. Hales. 2003. Role of *milton* in mitochondrial morphogenesis during *Drosophila* spermatogenesis. 44th Annual *Drosophila* Research Conference (Chicago, IL), Program and Abstracts: 648C.

*Quillian, L.B., *M.M. Wilson , K.G. Hales. 2003. Characterization and mapping of new Drosophila mutants defective in mitochondrial morphogenesis during spermatogenesis. 44th Annual *Drosophila* Research Conference (Chicago, IL), Program and Abstracts: 645C.

*Burke, S.T., *J.F. Sturgill, N. Wolf, M.T. Fuller, and K.G. Hales. 2002. Genetic control of mitochondrial aggregation during *Drosophila melanogaster* spermatogenesis. 2002 Meeting on Germ Cells (Cold Spring Harbor, NY, October 2002).

*Burke, S.T., *J.F. Sturgill, N. Wolf, M.T. Fuller, and K.G. Hales. 2002. Identification of a candidate gene for *no mitochondrial derivative* (*nmd*). 43rd Annual *Drosophila* Research Conference (San Diego, CA), Program and Abstracts: 631A.

*Wilson, M.M. and K.G. Hales. 2002. Characterization of new *Drosophila* mutants defective in mitochondrial morphogenesis during spermatogenesis. 43rd Annual *Drosophila* Research Conference (San Diego, CA), Program and Abstracts: 642C.

*Burke, S., *J.F. Sturgill, and K.G. Hales. 2001. Molecular cloning of the *nmd* gene in Drosophila melanogaster. Sigma Xi Student Research Symposium (Raleigh, NC), D10.

Hales, K.G. 2001. A semester-long laboratory project synthesizing molecular and classical approaches to gene mapping and cloning. 42nd Annual *Drosophila* Research Conference (Washington, DC), Program and Abstracts: 3W.

Hales, K.G., M. Peifer, and J.R. Pringle. 2000. Genetic analysis of the Sep2 and Sep5 septins. 41st Annual *Drosophila* Research Conference (Pittsburgh, PA), Program and Abstracts: 456B.

Shih, H.-P., K.G. Hales, M. Peifer, and J.R. Pringle. 2000. Identification and characterization of a Drosophila ubiquitin-like protein conjugation pathway that may be involved in septin modification. 41st Annual *Drosophila* Research Conference (Pittsburgh, PA), Program and Abstracts: 35.

Hales, K.G., O. Al-Awar, M. Peifer, and J.R. Pringle. 1999. Immunolocalization, structural studies, and genetic analysis of the Sep2 septin. 40th Annual *Drosophila* Research Conference (Bellevue, WA), Program and Abstracts: 292C.

Hales, K.G. and M.T. Fuller. 1997. Novel predicted GTPase is required for developmentally regulated mitochondrial fusion during spermatogenesis. 38th Annual *Drosophila* Research Conference (Chicago, IL), Program and Abstracts: 13C.

Hales, K.G. and M.T. Fuller. 1996. A novel transmembrane GTPase is required for developmentally regulated mitochondrial fusion during *Drosophila* spermatogenesis. 6th International Congress on Cell Biology and 36th Annual Meeting of the American Society for Cell Biology (San Francisco, CA). Molec. Biol. Cell 7: 615a.

Hales, K.G. and M.T. Fuller. 1996. The *Drosophila fuzzy onions* gene encodes a putative GTPase required for mitochondrial fusion during spermatogenesis. Howard Hughes Medical Institute Meeting of Predoctoral and Physician Postdoctoral Fellows (Chevy Chase, MD), Program and Abstracts: 49.

Hales, K.G. and M.T. Fuller. 1996. Genetic control of mitochondrial fusion during spermatogenesis: cloning of the *fuzzy onions* gene. 37th Annual *Drosophila* Research Conference (San Diego, CA), Program and Abstracts: 221B.

Hales, K.G. and M.T. Fuller. 1995. The *fuzzy onions* gene affects mitochondrial fusion during spermatogenesis. 36th Annual *Drosophila* Research Conference (Atlanta, GA), Program and Abstracts: 137A.

Hales, K.G. and M.T. Fuller. 1994. Genetic control of mitochondrial morphogenesis during spermatogenesis in *Drosophila*. 34th Annual Meeting of the American Society for Cell Biology (San Francisco, CA). Molec. Biol. Cell 5: 99a.

Hales, K. and M. Fuller. 1994. Genetic control of mitochondrial morphogenesis during spermatogenesis. 35th Annual *Drosophila* Research Conference (Chicago, IL), Program and Abstracts: 110A.

Fuller, M.T., K. Hales, I. Molina, and G. Hime. 1993. Cellular mechanisms of spermatid differentiation. 33rd Annual Meeting of the American Society for Cell Biology (New Orleans, LA). *Molec. Biol. Cell* 4: 30a.

Reviewing

Reviewer for manuscripts to *EMBO* (2021), *Developmental Biology* (2021), *CBE-Life Sciences Education* (2021), *Insect Molecular Biology* (2020), *PLOS Genetics* (2018), *Gene* (2018), *PLOS One* (2014), *Journal of Visualized Experiments* (2013), *FLY* (2007).

Reviewer for HHMI Biointeractive inclusivity style guide (2021) and online videos at the iBio web site of the American Society for Cell Biology (2009).

National Science Foundation grant review study section, 2015.

Ad hoc reviewer for six National Science Foundation grant proposals as requested by program officers, 2004-2012.

External reviewer for eleven tenure candidates and three full professor candidates at other institutions, 2007-2018.

Reviewer for seven textbook projects with various publishers, 2001-2009.

Teaching

Mentoring Undergraduate Research Students

Davidson College, 2000-present. Mentored 86 students in laboratory projects of varying lengths during the academic years and summers, including 17 Honors students who completed and presented theses. Took 34 students to the Annual *Drosophila* Research Conference between 2002 and 2019; all presented posters, one gave a platform presentation, and four gave slide presentations at the workshop on *Drosophila* Research and Teaching at Primarily Undergraduate Institutions. Six performed a study funded by the Davidson Research Initiative at the 2011 *Drosophila* conference to assess scientists' views on science communication with the general public. All students presented work at on-campus poster sessions. See above for student coauthorship on publications and national conference abstracts.
University of North Carolina, Chapel Hill, 1998-2000. Supervisor of two undergraduate projects in the laboratory of Dr. Mark Peifer. Trained the students in basic *Drosophila* techniques; oversaw project to mobilize a transposable element and screen for new insertions in a nearby gene.
Stanford University, 1995-1996. Supervisor of undergraduate projects in the laboratory of Dr. Margaret Fuller. Taught practical *Drosophila* genetics to four undergraduates who helped to perform a genetic screen for new alleles of genes required in *Drosophila* spermatogenesis. Subsequently supervised two of those students as they mapped by recombination new male-sterile mutants.

Courses

Davidson College, 2000-present
BIO201 Genetics (course was numbered Bio301 in 2000-2010)
Intermediate level course with classroom portion integrating the most modern advances such as epigenetics, RNA-based regulation, and gene editing, and laboratory portion including new and original experiments related to independent research in the Hales lab. Taught 16 times, revised every year, with major course reorganization in 2015.
BIO111 Molecules Genes and Cells
Introductory cell and molecular biology course with both a classroom and laboratory component. Each faculty member who teaches this course is solely in charge of lecture and lab for thirty two students for the full semester. The course follows the Study Guide, a community-developed document that introduces students to basic concepts through framing information around interesting questions. Taught 14 times.
BIO363 Human Genetics
Upper level seminar focusing on one human genetic disorder a week, covering the genetic basis for the disease at the DNA, protein, cell, tissue, and organism levels, and using research articles as the primary resources. Taught 10 times; revised for each new iteration.
BIO100W Clones, Clones, Clones (Spring 2004 and 2008)
Writing course for first year students, both science and non-science majors, designed to fulfill the college composition requirement. Students learned the science of cloning and explore ethical arguments, religious viewpoints, and portrayals of cloning in popular culture. Writing assignments cover a range of formats, culminating with a final library research paper on scientific revolutions.
BIO352 Group Investigation: Genetics of Mitochondrial Structure in *Drosophila* Spermatogenesis (Spring 2008, Spring 2013, Fall 2019) In this group investigation, students analyzed the genetics and function of the *mitoshell* gene, which is required for proper timing and morphology of mitochondrial aggregation during *Drosophila* spermatogenesis. Work was later incorporated into a 2010 publication.
BIO371/372/373/374/379 Independent Research and Thesis Research in Biology
Course in which individual students pursue research projects in the laboratory. A subset of these students enter the Honors program in which a senior thesis on at least two semesters of research is required.

University of North Carolina at Chapel Hill, 1999-2000
Genetics and Molecular Biology (Summer 1999 and Summer 2000) Sophomore-level undergraduate course. Was half of a team, working closely with another postdoctoral fellow to design all aspects of the course, with each person lecturing for half of the term.

University of California, Berkeley Extension, Menlo Park, CA, 1997
Molecular Biology of the Gene (Fall 1997) Guest lecturer in this undergraduate course in a continuing education program. Was in effect a co-instructor--helped design course, gave ten hours of lecture over the semester term, and wrote and graded problem sets and exam questions.

Stanford University, 1992
Advanced Genetics (Fall 1992)
Teaching assistant in this course for first-year graduate students. Led discussions, tutored students, devised problem sets, and graded papers.

Swarthmore College, 1989
Discrete Mathematics (Spring 1989) Teaching assistant; tutored students and graded papers.
Cellular and Molecular Biology (Fall 1989) Teaching assistant in laboratory sections.

Service

Davidson College committees and elected roles

Faculty Executive Committee, 2021-present and 2010-2014
Equity Advisor, 2021-present and 2018-2020
International Education Committee, 2019-2020
Faculty Tenure Committee, 2016-2019
Phi Beta Kappa, Gamma of North Carolina chapter, Vice president (2017-2018), President (2018-2019), Past President (2019-2020)
Academic Strategic Plan investigative team on Faculty, 2018
Center for Interdisciplinary Studies Advisory Committee, 2015-2018.
Vice Chair of the Faculty *pro tem*, 2011-2014 (highest elected faculty position; represent faculty to the trustees and administration)
Co-chair of VPAA Search Committee (with President Carol Quillen), 2012-2013
Honorary Degrees Committee 2011-2014, 2015-2016
Strategic Advisory Committee, 2011-2012
Institutional Animal Care and Use Committee, 2009-2011
Strategic Plan Implementation Team on Diversity of Faculty and Staff, 2009-2010
Advisory Council on Finance, Personnel, and Development 2007-2010
Advisory Council on Campus and Religious Life, 2007-2009
Advisory Council on Intercollegiate Athletics, 2003-2006
College Composition Committee, 2005-2006
Student Conduct Council, 2001-2004

Davidson College on-campus presentations

Book Discussion Leader, *How to be an Anti-racist* by Ibram X. Kendi. Sponsored by FIRST Inclusive Pedagogy Initiative, June 2020.

Signaling Inclusivity in STEM Content. STEM Education Hour sponsored by FIRST Inclusive Pedagogy initiative. October 2019.

Holiday Gala, performed on mandolin in Appalachian Ensemble, December 2019

The Genetics Revolution vs. Lysenkoism in the Soviet Union: Science Denial Then and Now. Presentation as part of the “Revolution &…” series, November 2017.

Honor Code and Honor Council hearings. Presentation for the pre-tenure faculty group, February 2013.

Overview of college governance for new faculty, April 2012.

Writing recommendation letters. Presentations for the pre-tenure faculty group, February 2012 and December 2002.

Panelist in a faculty discussion (with Alan Michael Parker and Kristi Multhaup) on the topic of one-on-one teaching, January 2011.

Constructing CVs and faculty activity reports. Presentation for the pre-tenure faculty group, October 2011.

Evidence for the Biological Basis of Homosexuality. January 2010, co-presented with biology major Natasha Meyer ’10.

Speaker and panelist for a discussion (sponsored by the student organization Changing Minds) on how to approach professors during stressful times, November 2010.

Speaker and panelist (with Annie Ingram and Neil Lerner) for the "Memory &..." interdisciplinary series, in an event entitled "Memory and Evolution," March 2009.

Panelist in a discussion on Women and Religion, coordinated by Interfaith and the Women's International Hall, April 2009.

Speaker and panelist (with Sean McKeever, Doug Ottati, and Alan Michael Parker) in the interdisciplinary film series coordinated by Maggie McCarthy, November 2009. Session focused on the 1982 film *Blade Runner*, and my portion was entitled "Replicants and Clones in Fiction and Reality."

Faculty Research Group talks. September 2008 and February 2004.

Charles Darwin’s Life: Voyage to the Galapagos and Beyond (opening event of the Biology Department’s Darwin Year celebration). September 2008.

Tenure process. Panel discussion for the pre-tenure faculty group, November 2006.

Discovering and handling Honor Code violations. Presentations for the pre-tenure faculty group, February 2005 and October 2003.

Panelist in the Career Services discussions entitled “Graduate School in the Natural Sciences,” August 2005, September 2004, October 2002, October 2000.

The Effective Use of PowerPoint in the Classroom. Presented with Mark Foley from Economics, April 2001. Co-sponsored by the pre-tenure faculty group and ITS.

Interdisciplinary Science Symposium, panelist and presenter on the intersections of genetics and other fields. October 2001, sponsored by the Center for Interdisciplinary Studies and the English Department senior colloquium.

Current Issues in Genetics and Society. For parents and others attending Family Weekend, October 2001.

Networking for Scientists workshop. Sponsored jointly by Career Services and the Biosociety, November 2001.

Genetic control of mitochondrial morphogenesis during *Drosophila melanogaster* spermatogenesis. Biology Department seminar, November 2000.

Presentations for the broader community

Understanding human genetic disorders. Davidson Senior Scholars, Davidson NC. May 2008.

Being a genetics researcher. Lake Norman High School honors biology class, February 2006. Hosted group on campus.

Issues in genetics. Bradley Middle School seventh grade honors science class, Huntersville, NC. May 2006.

Basic genetics and cloning. Bradley Middle School seventh grade honors science class, Huntersville, NC. April 2005.

Current events in genetics and society. Myers Park Presbyterian Church Senior Seminar Class, Charlotte, NC, June 2004 and October 2003.

Cloning, embryo screening, and GM crops. Myers Park Presbyterian Church Senior Seminar Class, Charlotte, NC, February 2003.

Issues in genetics and society. Sharon Towers retirement community, Charlotte, NC, January 2002.

Human genome and current advances in gene therapy. Senior Scholars, a senior citizens' continuing education program loosely affiliated with Queens College, Charlotte, NC, November 2001.

Stem cells and related issues. Myers Park Presbyterian Church Senior Seminar Class, Charlotte, NC, July 2001.

Recent advances in gene therapy treatments. Myers Park Presbyterian Church Senior Seminar Class, Charlotte, NC, June 2001.

Human Genome Project and its implications. Myers Park Presbyterian Church Senior Seminar Class, Charlotte, NC, January 2001.

Cells, DNA, and scientific careers. Foothill Country Day School eighth grade science class, Claremont, CA. Fall 1997.

Other off-campus service

Performed on the mandolin in benefit concerts for Davidson Housing Coalition, Davidson NC, November 2013, August 2015, September 2015.
Performed on the mandolin in benefit concerts for Birdsnest Music Camp, February 2012, March 2013, April 2013, June 2015.
Swarthmore College class of 1991 20th Reunion Gift Committee, Spring 2011.
Volunteer for Davidson Farmer's Market, 2009 and 2008.
Volunteer for Davidson Day Care Dash 5K, 2008.
Alumni Chairman for Annual Fund, Foothill Country Day School, 2001.