

## CURRICULUM VITAE

### a) Contact Information

#### **Amy Shaub Maddox**

Associate Professor of Biology  
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As an Associate Professor of Biology 12 years into my independent career (6 years at UNC), I am living at dynamic equilibrium. My lab studies the molecular and mechanical bases for animal cell shape during division and oogenesis, subjects relevant to fertility, development, and the evasion of diseases including cancer. My team of 4 (plus 8 undergraduates) currently operates with grants from the NIH/NIGMS and NSF. In accordance with the NSF's mission, I do several forms of community scientific outreach. In the classroom, I teach Development, and Undergraduate Research Honors Thesis. I serve on several Department and University committees including the Biology Diversity and Inclusion committee, and am engaged in my global research community via conference organization and refereeing of grants and manuscripts. I have two young children and enjoy performing choral music. In addition, I have a budding LLC Cbeda that sells is a web-based administrator tool for community networking and enrichment.

### b) Education

2003 PhD, Cell Biology and Anatomy, University of North Carolina at Chapel Hill

1997 BA, Biology, *cum laude*, Illinois Wesleyan University, Bloomington, Illinois

### Research Training

2003-2007 **Post-doctoral research with Dr. Karen Oegema**, Professor of Cell and Molecular Medicine, University of California at San Diego, La Jolla, CA

1997-2003 **Graduate research with Dr. Keith Burrige**, Professor of Cell Biology & Physiology, University of North Carolina at Chapel Hill, Chapel Hill, NC

1998 Marine Biological Laboratories Physiology Course, Woods Hole, MA

1996-1997 **Undergraduate research with Dr. David Borst**, Professor of Biological Sciences, Illinois State University, Normal, IL & Marine Biological Labs, Woods Hole, MA

### **c) Professional Experience & Appointments**

I began my independent career at the Université de Montréal (U de M) in the Institute for Research in Immunology and Cancer. The U de M is the 5<sup>th</sup>-ranked university in Canada, and the top French-speaking Canadian university. It has 67,000 students and offers 600 programs of study. It is a powerhouse of research, with \$500M annually in research funding. The U de M was a terrific place to launch my independent career; as listed below, I was successful in securing operating, equipment and salary funds, each of which are awarded via separate competitions. In early 2013, an opportunity arose to return to the US and to The University of North Carolina at Chapel Hill (UNC-CH). The timing of my transition was such that I was promoted to a tenured position at U de M only a month before I moved. I left one operating grant and three prestigious salary awards behind in Canada. My receipt of an NIH grant while still in Canada streamlined the move.

2018-	Associate Professor with Tenure, Department of Biology, UNC-CH
2017-	Mentor, NIH T32 Training Program: Big Data to Knowledge (BD2K), UNC-CH
2017-2019	Whitman Associate (Fellow = Paul Maddox), Marine Biological Labs, Woods Hole MA
2016-	Executive Committee, NIH T32 Training Program: Mechanistic, Interdisciplinary Studies of Biological Systems (MiBio), UNC-CH
2014-	Member, Biochemistry and Biophysics Program, UNC-CH
2014-	Member, Curriculum in Cell Biology and Physiology, UNC-CH
2014-	Member, Curriculum in Bioinformatics and Computational Biology, UNC-CH
2013-	Member, Curriculum in Genetics and Molecular Biology, UNC-CH
2013-	Member, Integrative Program for Genomics and Biological Sciences, UNC-CH
2013-2018	Assistant Professor, Department of Biology, UNC-CH
2013-2016	Adjunct Professor, Université de Montréal (U de M), Québec, Canada
2013	Associate Professor with tenure, Department of Pathology & Cell Biology, U de M
2007-2013	Principal Investigator, Institute for Research in Immunology & Cancer, U de M
2007-2013	Assistant Professor, Department of Pathology & Cell Biology, U de M
2003-2007	Post-doctoral Fellow with Dr. Karen Oegema, Ludwig Inst. for Cancer Res., La Jolla, CA

### **d) Honors and Awards**

2018	William C. Friday Award for Excellence in Undergraduate Teaching, UNC <a href="https://www.unc.edu/story/teaching-awards/">https://www.unc.edu/story/teaching-awards/</a>
2018, '19	Carolina Women's Center Univ. Awards for the Advancement of Women nominee
2018	Selection to attend Banff International Research Station for Mathematical Innovation & Discovery workshop "Mathematics of the Cell: Mechanical & Chemical Signaling across Scales"
2017, '18	Selection to attend "Cell Modeling Hackathon" NSF-sponsored Quantitative Cell Biology Network, Halfmoon Bay, CA
2015	Selection to attend "Modeling cellular process in space and time" EMBL workshop, Porquerolles, France
2015, '18	UNC Women in Science "Power Couples" / "Two-body Problem" WINS panelist
2013	KITP Workshop on Morphogenesis in Cell & Developmental Biology (declined)
2011	Childcare Award, ASCB Annual Meeting, Denver, CO
2007	Travel Award, ASCB Summer Mtg: Cytoskeletal-Membrane Interactions, Dijon, France
2005	Travel Award, ASCB Annual Meeting, San Francisco, CA
2004	Travel Award, ASCB Cytokinesis Meeting, Burlington VT
2004-2007	A.P. Gianinni Foundation Postdoctoral Fellow
1997-1998	National Institutes of Health Cell and Molecular Biology Training Program, UNC-CH

## e) Bibliography and Products of Scholarship

### e.i.) Book Chapters

1. **Maddox AS** & Field CM. The septins and cytokinesis. The Septins and Cytokinesis, *Elsevier Encyclopedia for Biological Chemistry 2nd Edition*. Eds. Parent C. and Pierre Coulombe, P. **Book ISBN: 9780123786319** (2013)
2. **Maddox AS** & Maddox PS. Imaging Methods. *Methods in Cell Biology: C. elegans*. Ed.: Joel Rothman. 107: 1-34. (2012)
3. Field CM, **Maddox AS**, Pringle JR & Oegema KF. Septins in the metazoan model systems *Drosophila melanogaster* and *Caenorhabditis elegans*. In *The Septins* (P.A. Hall, S.E.H. Russell & J.R. Pringle, eds.), London: Wiley Blackwells, p 147-168. (2008)

### e.ii.) Refereed Articles

1. Cortes DB, Dawes A, Liu J, Nickaeen M, Strychalski W, and **Maddox AS**. Unite to divide – how models and biological experimentation have come together to reveal mechanisms of cytokinesis. *J Cell Sci.* 131(24). pii: jcs203570. doi: 10.1242/jcs.203570. (2018)
2. Lacroix B, Letort G, Pitayu L, Sallé J, Stefanutti M, Maton G, Ladouceur AM, Canman JC, Maddox PS, **Maddox AS**, Minc N, Nédélec F, Dumont J. Microtubule dynamics scale with cell size to set spindle size and assembly timing. *Dev Cell.* 45:496-511.e6. doi: 10.1016/j.devcel.2018.04.022. (2018)
3. Patino Descovich C, Cortes DB, Ryan S, Nash J, Zhang L, Maddox PS, Nedelec F, and **Maddox AS**. Crosslinkers both drive and brake cytoskeletal remodeling and furrowing in cytokinesis. *Mol Biol Cell.* 29:5 622-31. doi.org/10.1091/mbc.E17-06-0392. (2018) (journal cover image)
4. Fadero TC, Gerbich TM, Rana K, Suzuki A, DiSalvo M, Schaefer KN, Heppert JK, Boothby TC, Goldstein B, Peifer M, Allbritton NL, Gladfelter AS, **Maddox AS**, and Maddox, PS. LITE microscopy: a technology for high numerical aperture, low photobleaching fluorescence imaging. *J Cell Biology.* Doi: 10.1083/jcb.201710087. (2018)
5. Ladouceur A-M, Ranjan R, Smith L, Fadero T, Heppert J, Goldstein R, **Maddox AS**, & Maddox PS. Cenp-A and Topoisomerase-II Antagonistically affect Chromosome Length. *J Cell Biol.* 216:2645-55. doi: 10.1083/jcb.201608084. (2017)
6. Rehai-Bell K, Love A, Werner ME, MacLeod I, Yates III JR, & **Maddox AS**. A Sterile 20 Family Kinase and Its Co-factor CCM-3 Regulate Contractile Ring Proteins on Germline Intercellular Bridges. *Curr. Biol.* 27: 1-8. doi: 10.1016/j.cub.2017.01.058. (2017)
7. Lacroix B, Ryan J, Dumont J, Maddox PS, & **Maddox AS**. Identification of microtubule growth deceleration and its regulation by conserved and novel proteins. *Mol Biol Cell.* 27(9):1479-87. doi: 10.1091/mbc.E16-01-0056. (2016)
8. Dorn JF, Zhang L, Phi TT, Lacroix B, Maddox PS, Liu J, & **Maddox AS**. A theoretical model of cytokinesis implicates feedback between membrane curvature and cytoskeletal organization in

- asymmetric cytokinetic furrowing. *Mol Biol Cell*. 27(8):1286-99. doi: 10.1091/mbc.E15-06-0374. (2016)
9. Sharif, B, Fadero T, & **Maddox AS**. Anillin localization suggests distinct mechanisms of division plane specification in mouse oogenic meiosis I and II. *Gene Expr. Patterns*. doi: 10.1016/j.gep.2015.03.002. (2015)
  10. Bourdages, KG, B Lacroix, JF Dorn, CP Descovich, & **Maddox AS**. Quantitative analysis of cytokinesis *in situ* during *C. elegans* postembryonic development. *PLoS One* DOI: 10.1371/journal.pone.0110689. (2014)
  11. Lacroix B, Bourdages KG, Dorn JF, Ihara S, Sherwood D, Maddox PS, & **Maddox AS**. *In situ* imaging in *C. elegans* reveals developmental regulation of microtubule dynamics. *Dev. Cell* 29:203-16. (2014)
  12. Amini R, Goupil E, Labella S, Zetka M, **Maddox AS**, Labbé J-C, & Chartier NT. *C. elegans* Anillin proteins regulate intercellular bridge stability and germline syncytial organization. *J. Cell Biol.*, 206:129-43. (2014)
  13. Chartier N, Salazar DP, Benkemoun L, Mayer M, Grill S, **Maddox AS**, & Labbé J-C. PAR-4/LKB1 mobilizes cortical non-muscle myosin by negatively regulating ANI-2/Anillin in the early *C. elegans* embryo. *Curr. Biol*. 21:259-69. (2011)
  14. Lewellyn L, Carvalho A, Desai A, **Maddox AS**, & Oegema KF. The Chromosomal Passenger Complex and Centralspindlin Make Independent Contributions to Contractile Ring Constriction. *J. Cell Biol*. 193:155-169. (2011)
  15. Lagana A, Dorn JF, De Rop V, **Maddox AS**, & Maddox PS. The small GTPase Cdc42 regulates epigenetic centromere maintenance by stabilizing newly incorporated CENP-A. *Nat. Cell Biol*. 12:1186-93. (2010)
  16. Dorn JF, Zhang L, Paradis V, Etoh-Bedi D, Jusu S, Maddox PS, & **Maddox AS**. Actomyosin tube formation is a conserved event in polar body cytokinesis that requires Anillin in *C. elegans*. *Curr. Biol*. 20:2046-51. (2010)
  17. **Maddox AS**, Lewellyn LK, Desai A, & Oegema KF. Anillin and the septins promote asymmetric ingression of the cytokinetic furrow. *Dev. Cell*. 12:827-835. (2007)
  18. Audhya A, Hyndman F, McLeod IX, **Maddox AS**, Yates III JR, Desai A, & Oegema KF. A complex containing the Sm-protein CAR-1 and the RNA helicase CGH-1 is required for embryonic cytokinesis in *C. elegans*. *J. Cell Biol*. 171:267-279. (2005)
  19. **Maddox AS**, Habermann B, Desai A, & Oegema KF. Distinct roles for two *C. elegans* anillins in the gonad and early embryo. *Development*. 132:2837-48. (2005)
  20. Peterson LJ, Rajfur Z, **Maddox AS**, Freel CD, Chen Y, Edlund M, Otey C, & Burrridge K. Simultaneous stretching and contraction of stress fibers *in vivo*. *Mol Biol Cell*. 15:3497-508. (2004)
  21. **Maddox AS**, & Burrridge K. RhoA is required for cortical retraction and rigidity during mitotic cell rounding. *J. Cell Biol*. 160:255-265. (2003)

22. Zhong C, Chrzanowska-Wodnicka M, Brown J, **Shaub A**, Belkin AM, & Burridge K. Rho-mediated contractility exposes a cryptic site in fibronectin and induces fibronectin matrix assembly. *J Cell Biol.* 141:539-51. (1998)

e.iii.) Other Articles (invited & non-refereed)

23. **Maddox AS** & Skotheim JM. Cell cycle, cell division, cell death. *Mol Biol Cell.* 30:732 (2019)
24. Werner ME & **Maddox AS**. Developmental diversity in cell division mechanisms. *Dev Cell.* 47:535-6. DOI: 10.1016/j.devcel. 2018.11.028. (2018)
25. Rehai K & **Maddox AS**. Neuron migration: anillin protects leading edge actin. *Curr. Biol.* 25: R423-5. (2015)
26. Lacroix B & **Maddox AS**. Microtubule dynamics followed through cell differentiation and tissue biogenesis in *C. elegans*. *Worm.* DOI:10.4161/21624046.2014.967611 (2014)
27. Bourdages KG & **Maddox AS**. Dividing in epithelia: cells let loose during cytokinesis. *Dev Cell.* 24:336-8. (2013)
28. Lacroix B & **Maddox AS**. Cytokinesis, Ploidy and Aneuploidy. Invited submission for the *J. Pathology* annual review issue. Eds. N. Wright and R. Poulson. 226:338-51. (2012)
29. Sharif B & **Maddox AS**. Wound healing: Rho GTPases flux their muscles. *Dev. Cell.* 23:236-8. (2012)
30. Dorn JF & **Maddox AS**. Cytokinesis: cells go back and forth about division. *Curr. Biol.* 21: R848-50. (2011)
31. **Maddox AS** & Harris TJC. Cell Biology in Canada Cell Biology, Eh! Yes, It's Great in Canada. La Biologie Cellulaire au Canada - Oui, Ça Marche! *American Society for Cell Biology Newsletter.* 34: 23-24. (2011)
32. Piekny AJ & **Maddox AS**. The myriad roles of Anillin in Cytokinesis. *Seminars in Cell and Developmental Biology issue on Cytokinesis.* 21(9):881-91. (2010)
33. Zhang L & **Maddox AS**. Quick Guide: Anillin. *Curr. Biol.* 20(4):R135-6. (2010)
34. **Maddox AS** & Oegema K. Deconstructing Cytokinesis. *Nat Cell Biol.* 5:773-6. (2003)
35. **Maddox AS** & Oegema K. Closing the GAP: A Role for a RhoA GAP in Cytokinesis. *Mol Cell.* 11:846-8. (2003)
36. **Maddox AS** & Burridge K. Mitotic regulation of the actin cytoskeleton by phosphorylation. *Innovations in Cellular Dynamics.* 2:1-3. (2003)
37. Shields JM, Pruitt K, McFall A, **Shaub A**, & Der CJ. Understanding Ras: 'it ain't over 'til it's over'. *Trends Cell Biol.*10:147-54. (2000)

38. **Shaub A.** Unravelling the extracellular matrix. *Nat Cell Biol.* 1:E173-5. (1999)
39. Ogan J, **Shaub A**, Lovett D & Borst DW. Relationship of methyl transferase activity and methyl farnesoate levels in the spider crab *Libinia emarginata*. *Biol Bull.* 193: 267-268. (1997)

e.iv.) Other Articles (pre-prints)

Rehain Bell K, Werner ME, Doshi A, Cortes DB, Sattler A, Vuong-Brender T, Labouesse M & **Maddox AS**. Novel cytokinetic ring components limit RhoA activity and contractility. bioRxiv 633743; doi: <https://doi.org/10.1101/633743>

Cortes DB, Gordon M, Nédélec F & **Maddox AS**. Bond type and discretization of non-muscle myosin II are critical for simulated contractile dynamics. bioRxiv 669382; doi: <https://doi.org/10.1101/669382>

e.v.) Other: Contextualized contributions, by field

*Mechanisms of asymmetric cytokinesis* – Asymmetric, or unilateral, furrowing is a prevalent feature of cytokinesis seen in large eggs and differentiated, polarized epithelial cells, and may be important for rapidly placing a barrier between daughter nuclei. Using the *C. elegans* zygote, I discovered that symmetry breaking is intrinsic to the cortical cytoskeleton and requires the conserved hetero-oligomeric septins and cytoskeletal cross-linker Anillin. My 2007 paper was the featured article of its issue of *Developmental Cell*. Since then, we have explored mechanisms of furrow asymmetry in epithelia in intact animals (Bourdages *et al.*, 2014). Most recently (2016), we presented a theoretical model and quantitative cell biology that supports the hypothesis that furrow asymmetry arises from positive feedback among contractility, cortical topology, and cytoskeletal alignment. This work introduced a novel concept to the field of cytokinesis: that membrane curvature influences actomyosin organization. In the two more recent papers, we collaboratively implemented continuum mechanics theory and agent-based modeling (2016 and 2018, respectively). In collaboration with 4 distinctly-trained modelers, we have produced a Rosetta Stone-like review article about mathematical modeling, for biologists, using the study of cytokinesis as a backdrop (Cortes *et al.*, 2018).

*Mechanism of polar body ring closure* – Oogenic cytokinesis is accomplished by a ring rich in actin filaments and myosin motor proteins. Whereas in mitosis the contractile ring encircles the cell equator, the polar body ring assembles as a flat disc. We showed that in *C. elegans*, the meiotic contractile ring transforms during closure from a disc into a cylinder comprising stacked cytoskeletal rings. This transformation, and stable polar body extrusion, depends on the conserved membrane-cytoskeleton scaffold protein Anillin. We also observed stacked rings in mouse polar bodies, and that anillin is highly enriched in mouse meiotic cytokinetic rings.

*Actomyosin contractility in stress fibers and the pre-anaphase cortex* – Most cells change shape during cell division, becoming more spherical to accommodate spindle assembly and chromosome capture and alignment. I performed one of the few (11) studies on the molecular mechanisms of mitotic cell rounding and found that the small GTPase RhoA activates Rho-kinase and thus myosin II to stiffen the cortex, thus causing cell retraction. I also helped demonstrate non-uniform stress fiber dynamics in cells, and that forces across stress fibers are sufficient to unfold the integrin ligand fibronectin. I published a single-author comment piece about the latter work (Shaub, 1999).

*Structure of a syncytial germline* – Animals can create oocytes that are exceptionally large cells by virtue of the presence of stable intercellular bridges between the enlarging oocyte and nurse cells. I used the *C. elegans* oogenic germline to demonstrate that the endogenous Anillin family truncation ANI-2 is required for sustained connection between developing oocytes and the gonad syncytium. Further studies in collaboration with the group of Jean-Claude Labbé led to the model that the full-length and truncated forms of Anillins in *C. elegans* compete for binding partners and coordinately regulate the contractile cytoskeleton. Our findings on the structure of the *C. elegans* oogenic germline impact *C. elegans* embryonic cell biology, since a major advantage of this system is the ability to perform protein depletions that are exceptionally complete or quantitatively graded, and this is possible due to the unique syncytial architecture of the oogenic gonad. I published a comprehensive review on the mechanisms of variations on the theme of cytokinesis including regulated cytokinesis failure, which is thought to be the basis of syncytiogenesis (Lacroix & Maddox, 2012).

*Cytoskeleton and cell division in situ* – The cytoskeletons are essential for cell division and myriad other cellular functions, including tissue biogenesis and the coordination of cells within tissues. While cell-intrinsic, the cytoskeletons are responsive to external cues and cellular geometry and identity. However, the vast majority of what we know about the cytoskeletons and cell division comes from work with purified proteins and isolated cells such as zygotes and immortalized cultured cells. We developed a muscle cell lineage as a system for visualizing microtubule dynamics in an intact animal. We found that all aspects of microtubule dynamics change significantly throughout differentiation of a proliferative precursor cell into muscle cells. We screened ~100 microtubule associated proteins to begin to define the molecular basis for the evolution of dynamics. In separate work, we studied cytokinesis in situ during the biogenesis of an epithelial tissue. Quantitative image analysis revealed that cytokinetic furrowing first accelerates and then decelerates. Contractile ring breadth but not maximum speed scales with cell length. Maximum speed scales instead with division plane dimensions, even among cells of very different sizes within a species, suggesting that contractile rings in all these cells operate with the same contractile unit.

## **f) Teaching**

### **f.i.) Undergraduate Courses (past three years)**

<u>Semester</u>	<u>Course</u>	<u>Contact hours</u>	<u>Student enrollment</u>
2019 Spring	Senior Honors Thesis in Biology BIOL692H	40	40
2019 Spring	Honors Cell & Developmental Biology BIOL205H	24	24
2018 Fall	Senior Honors Thesis in Biology BIOL692H	40	9
2018 Spring	Senior Honors Thesis in Biology BIOL692H	40	34
2018 Spring	Honors Cell & Developmental Biology BIOL205H	24	24
2017 Fall	Senior Honors Thesis in Biology BIOL692H	40	1
2017 Spring	Honors Cell & Developmental Biology BIOL205H	24	25
2017 Spring	Senior Honors Thesis in Biology BIOL692H	40	30
2016 Fall	Senior Honors Thesis in Biology BIOL692H	40	2

### **f.ii.) UNC Course Guest Lectures (past three years)**

2019	PHYI 706 Grant Writing	4	4
2017, 2018	CBPH850 Modern Concepts in Cell Bio.	2	7

f.iii.) Special Courses (past three years)

2016 - 2018	Marine Biological Labs Embryology Course nematode module, Woods Hole, MA	36	24
2016, 2017	Biophysical Society's Summer Research Program	1.5	14

f.iv.) Outreach (past three years)

2017 - 2019	Hosted 1, 2, 2 Kenan Fellow gradeschool teachers in lab	100	N.A.
2017, 2019	Cell & Dev. Biol. for 2 <sup>nd</sup> graders & kindergarteners	6, 10	106, 180
2017	S-connect-TEM Interdisciplinary Speed Dating	6	23

f.v.) Research Advising

Research Assistant Professor

2018- Michael Werner, Regulation and mechanisms of cell shape change in cytokinesis

Postdoctoral Fellows

2019- Jenna Perry, Cellular mechanisms of septins in development and disease  
 2016- Daniel Cortes, Physical mechanisms of cytoskeletal remodeling in cytokinesis  
 2015-2018 Michael Werner, Regulation and mechanisms of cell shape change in cytokinesis  
 2010-2104 Benjamin Lacroix, Developmental regulation of microtubule dynamics *in situ*  
 2012-2013 Bedra Sharif, Characterization of Anillin in mouse polar body cytokinesis  
 2007-2013 Jonas Dorn, Positive feedback loops in asymmetric cytokinetic furrowing  
 2007-2011 Nicolas Chartier, Interplay between anillin isoforms (*co-direction w J-C Labbé*)

Graduate Student Advising

<u>Student</u>	<u>Thesis Title</u>	<u>Degree, Year</u>
Kathryn Rehain-Bell	Differential regulation of contractility in cytokinesis & syncytium formation	PhD, 2019
Karine Bourdages	Regulation of cytokinesis <i>in situ</i> by junctional complexes ( <i>co-direction with Mike Tyers at University de Montreal</i> )	PhD, 2018
Carlos Patino Descovich	Crosslinking & motor roles of myosin in cytokinesis	MSc, 2014
Raphael Cautain	Probabilistic segmentation-driven computer vision of cell shape change	<i>deceased</i>
Debabrata Paul	Measuring cell shape changes in cytokinesis ( <i>co-direction with Ben Kwok at Univ. de Montreal</i> )	MSc, 2011
Karine Bourdages	A novel model for cytokinesis <i>in situ</i> ( <i>co-direction with Sylvie Mader at Univ. de Montreal</i> )	MSc, 2011
Thai-Hang Nguyen	Domain analysis of Anillin's roles in cytokinesis	MSc, 2008

Graduate Rotation Student Advising

Kathryn Rehain	David Lee	Jennifer Potter-Birriel
Melissa Plooster	Rachel Battaglia	Kira Glynn
Allyson Roberts	Ian Windham	Molly Plehaty Kulikauskas
Tatyana Bodrug		

Undergraduate Researcher Advising

2019-	Kaitlin Venevongsoth	2017-2018	Arielle Patra
2019-	Caitlin Vickery	2016-2017	Sean Ryan
2019-	Shivanandh Kammala	2016-2017	Adam Sattler
2019-	Thomas Jarman	2016-2017	Shilpa Kancharla
2019-	John Wainwright	2016-2019	Anusha Doshi
2018-2019	Iris Brammer	2015-2017	Nicholas Britt
2018-2019	Abby Chen	2014-2015	Andrew Love
2018-2019	Max Gordon	2014	Rita Meganck
2018-	Jade Dang	2014	Julie Reiff
2018-	Adhham Zaatri	2014	Kristen Livengood
2018-2019	Daisy Hensley	2011	Ibrahim Rashid
2017-	Coleman Breen	2010	Raphaël Cautain
2017-2019	Larry Yang	2009	Georges Gaba
2017-2018	Molly Paul	2009-2011	Daniel Edoh-Bedi
2017-2018	Anjali Venkat	2008-2010	Carlos Patino Descovich

Sponsored undergraduate research outside of the Department of Biology (PI; Department)

Sophie Troyer (Mehmet Kesimer, Path & Lab)	Manisha Mishra (Richard Loeser, Medicine)
Alex Eaker (Jonathan Schisler, Pharmacy)	Joel Anil (Stephanie Gupton, CBP)
Priya Vasan (Stephanie Gupton, CBP)	Brittney Allyn (Matthew Billard, Medicine)
Emily Wolfgram (Stephanie Gupton, CBP)	Jared Zopp (John Gilmore, Psychiatry)
John Kwiatkowski (Gary Slade, Dental Sch.)	Bronwyn Fadem (Ken McCarthy, Neurosci.)
Nathalie Eegholm (CEE)	James Zhu (Ken Jacobsen, CBP)
Noah Crees (Keith Burridge, CBP)	Julia Filler (Nackley, Pharmacology)
Kushnood Faraz (Thomas McCown, Gene Ther)	

Other Trainee Advising

Rachel Brown and Nicole Emmert (Kenan Fellowship for K-12 educators)	2019
Dylan Ray (computational technician)	2018-2019
Wendell Smith and Dennis Wayne Shore (Kenan Fellowship for K-12 educators)	2018
Jade Dang (work-study lab assistant)	2017-
Adhham Zaatri (work-study lab assistant)	2017-
Coleman Breen (work-study data analysis assistant)	2017-
Anna Glasgow (Kenan Fellowship for K-12 educators)	2017
Jazmine Nash (visiting undergraduate, Biophysics summer program)	2016
Kishan Rana (undergraduate work study / researcher)	2014-2016
Xiaohu Wan (post-doctoral research assistant)	2014-2015
Carlos Patino Descovich (technician)	2013-2015
Tanner Fadero (work study researcher; research technician)	2013-2016
Li Zhang (technician)	2008-2013

Thesis Committee Service (Advisor; Department / University)

Completed Thesis Committees (14)

Lyndsay Wylie (Vicki Bautch; Biology)  
Kristina Schaefer (Mark Peifer; Biology/GMB)  
Allyson Roberts (Bob Goldstein; Biology)  
Erin Langdon (Amy Gladfelter, Biology)  
Kaitlin Curry (Bob Duronio; GMB)  
Chris Higgins (Bob Goldstein; Biology)  
Melissa Babilonia-Rosa (Saskia Neher; Biochemistry & Biophysics)  
Tim Cupp (Bob Goldstein; Cell Biology and Physiology)  
Caroline LaPlante (Laura Nilson, McGill University)  
Lara Cushieri (Jackie Vogel, McGill University)  
Michael Hebeisen (Richard Roy, McGill University)  
Patrick Narbonne (Richard Roy, McGill University)  
Alexandra Vaccaro (Alex Parker; Université de Montréal)  
Elizabeth Lawrence (Craig Mandato; McGill University)

Current Thesis Committees (7)

Cody Herron (Tim Elston; Comp Medicine)  
Molly Kulikauskas (Chair; Vicki Bautch; Biology)  
Kira Glynn (Bob Goldstein, Biology)  
Reem Hakeem (Jim Bear, CBP)  
Casey Schmidt (Greg Matera, GMB)  
Therese Gerbich (Amy Gladfelter, Biology)  
David Adam (Sorin Mitran, Math)

Senior Honors Thesis in Biology (BIOL692H)

This course brings together graduating senior Biology majors who have been doing research anywhere on campus and who have maintained a high GPA. I assemble the students into topical writing groups of 2-4. I guide the students through the general principles of written and oral scientific communication, as they prepare their senior honors thesis for faculty evaluation and deposition into the Carolina Digital Repository, and a 15-minute talk for our Koeppe Undergraduate Honors Symposium. Each writing group also devises a general audience (lay) introduction on the topic of their shared research interests. I coordinate the faculty evaluation of theses and talks, and consult with an advisory committee on the designation of Honors and Highest Honors, and assignment of departmental awards.

Cell and Developmental Biology (BIO205H)

I teach the second half of this “core” class, required for all Biology Majors. My lectures chronologically cover early animal development, including the essential related cell biological concepts that were not covered in the Cell Biology half of the course. I also cover several advanced topics in Developmental Biology such as body axis determination and organogenesis. I employ slides, clicker-pop-quizzes, guided reading questions and quizzes, lecture main points, learning goals, distribution of old exam questions, office hours, review sessions, and group work on parts of one exam. Two class periods are “fun days,” watching embryonic development in real time by projecting microscopic images, and creating lightning talks on Developmental Biology topics. (Before the transformation of this course into an Honors version, I taught similar material to ~200 students in BIOL205 for two semesters.)

Other teaching

I have offered seminar classes that introduce undergraduates or graduate students to primary research literature and train them to summarize and present published work. They then devise “next

steps” experiments. My students have prepared several styles and lengths of oral presentation, including for general audiences. I have also taught general principles of grant writing to graduate students. I have served as a guest lecturer for School of Medicine graduate classes on cell biology, speaking on my areas of research expertise. I have served similarly in UNC’s Biophysics summer undergraduate program. For thirteen years, I lectured and taught hands-on skills in the Embryology course of the Marine Biological Labs in Woods Hole, MA. This century-old course boasts outstanding students and has been leading the way in experiential learning before it was a buzz-word.

### Outreach

To translate my knowledge of and enthusiasm for fundamental mechanistic research to the broader public, I have devised and delivered teaching modules for grade-school students and pre-schoolers. I have taught middle-schoolers in a science-themed summer camp. I have partnered with the Kenan Fellows program at NC State to host 1 or 2 fellows (K-12 teachers) in the lab for 3 weeks the past 3 summers. The teachers then translate their hands-on experience with research into curriculum for their students and share curriculum development with other fellows.

### Research Advising

As the principal investigator of an active research lab, I spend at least 70% of my non-classroom-teaching time mentoring junior researchers in my lab and beyond. The training I provide includes cell and developmental biology, microscopy, image analysis, critical thinking, scientific writing, figure preparation, oral presentation, grantsmanship and career development. I make use of Individual Development Plans (IDPs) and meet regularly with my trainees: currently, a Research Assistant Professor, two post-doctoral fellows, a post-baccalaureate data analysis specialist, and 8 undergraduates. I have also trained 10 UNC graduate students during research rotations, many UNC undergraduates, one PhD and 4 MSc students in Montreal, and 3 other postdoctoral fellows who have gone on to permanent- or group leader positions.

## **g) Grants**

My research is currently supported by operating grants from the NIH and the NSF. Spanning the research missions of these two federal agencies, my research program is truly interdisciplinary and strives to not only improve human health, but also expand the horizons of human understanding of the natural world. I have parlayed my NIH grant into Supplemental funds for shared instrumentation and for the salary of a URM post-doctoral fellow. Over the course of my independent career, I have garnered \$4,510,000 in direct research funds, \$343,000 external funds for shared instrumentation, \$704,355 in my salary support, and over \$300,000 in trainee salaries.

### g.i.) Current grants

Title:	Molecular Mechanisms of Cell Shape Change in Cytokinesis, 2R01GM102390-07
Role:	PI
Total direct funds:	\$918,746
Percent effort:	50%
Agency:	National Institutes of Health, NIGMS
Dates:	2012/09 to 2021/08
Aims:	The goals of this grant are to determine the mesoscale cytoskeletal remodeling that drives contractile ring closure, and to define the positive and negative feedback that controls remodeling dynamics.

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Title: The cell biology of dynamic and stable intercellular bridges *in situ*; 1616661  
Role: PI  
Total direct funds: \$574,013  
Percent effort: 50%  
Agency: National Science Foundation  
Dates: 2016/09 to 2019/08  
Aims: Determine the composition, dynamics and regulation of intercellular bridges that connect developing oocytes (egg cells) to a common syncytial cytoplasm, using high-resolution light microscopy, quantitative image analysis, photo- and micro-manipulation, biochemistry, reverse genetics and collaborative modeling.

Title: T32: Mechanistic, Interdisciplinary Studies of Biological Systems, GM119999  
Role: Executive Committee  
Total direct funds: ~\$1,200,000  
Percent effort: N.A. (training grant)  
Agency: National Institutes of Health, NIGMS  
Dates: 2017/07 to 2022/06  
Aims: I co-wrote the application, and serve on the Executive Committee, for this new Cell Biology training program, "MiBio." The training grant funds 6 PhD students per year. It offers the growing cohort special opportunities for interdisciplinary education and enrichment such as reading and presenting original research and planning a day-long symposium hosting speakers from around the country.

## **h) Professional Service**

### h.i.) Department

Within the Biology department, I serve on the Diversity Initiatives Committee, as well as other minor committees, and initiated our New Faculty Orientation committee. My most significant contribution to the department has been the introduction of a networking activity (the lunchMatrix) in which participants are randomly and iteratively paired, avoiding previous combinations. This activity has strengthened bonds throughout our large department and broken down the barrier of dysfunctional power dynamics across the ranks of faculty and trainees.

- Organized Specific Aims Workshops for Faculty, 2019
- Curriculum Revision Committee, 2018-'19
- Diversity Initiatives Committee, 2018-
- Imaging Core Facility Committee, 2015-
- Undergraduate Honors Committee (Chair), 2015-
- Undergraduate Research Honors Committee, 2015-
- New Faculty Orientation Committee, 2014-2016
- Initiative: LunchMatrix for faculty and trainee interactions, 2014-
- Faculty Secretary, Spring 2014
- Seminar Committee, 2014-

### h.ii.) University

My University service has been strongly geared towards recruiting and supporting the best students at UNC.

#### University Service

- Assistant Dean for Honors Carolina (*declined*)
- Goldwater Scholarship selection committee chair (*declined*)

- Teaching Award Selection Committee (2018-'19)
- Priority Registration Advisory Committee (*declined*)
- Goldwater Scholarship selection committee (2017)
- Administrative Boards of the General College and the College of Arts and Sciences (*declined*)
- Chancellor's Science Scholars interview team & Biology Dept. Rep. (2014 - )
- Chancellor's Science Scholars Mentor (mentee: Victoria Davis; 2014-2015)
- BBSP Graduate Admissions Committee NCGC2 (2013-2015)
- iBGS Director's Advisory Committee (2013-2017)
- Institute for Research in Immunology and Cancer (IRIC) Scientific Priorities Committee (2012-2013)
- IRIC Awards Committee (2012-2013)
- IRIC Student Admissions Committee (2009-2013)
- IRIC Scientific Life Committee (2009-2013)

Other UNC service and participation

- Diversity & Inclusivity Thinkposium on Voice, 2019
- Better Angels Workshop on Bridging the Red/Blue Divide, 2018
- Diversity & Inclusivity Thinkposium on Belonging, 2018
- Mental Health First Aid USA, 2018
- UNC Office of Graduate Studies Mentoring workshop, 2018
- Featured in DTH "Chemistry in the Biology Department," 2018
- Guest of IDST194 "All about Research" undergraduate course, 2017
- Carolina Seminars Women in Science discussion, 2017
- SafeZone training, 2016
- Featured in Carolina Scientific, 2016
- "Meet the Faculty" evening event, 2016
- Interviewed by students for Carolina Scientific, 2015, 2016
- Honors Carolina Research Panel, 2015
- Understanding Differences One-day Workshop, 2015
- Featured in departmental newsletter, 2015

h.iii.) National / International

Grant and Program Review

National Science Foundation Molecular and Cell Biology panel, 2018

Poster judge: Motile & Contractile Systems Gordon Research Conference, August 2017

National Institutes of Health Office of Scientific Review

Member, Nuclear & Cytoplasmic Structure/Function & Dynamics study section, 2020-2026

*Ad hoc* referee, Nuclear & Cytoplasmic Structure/Function & Dynamics study section, 2019

NIH Scientific Review Panel on Support of Competitive Research (SCORE) grants (*declined*)

NIH Special Emphasis Panel (SEP) on High-end and Shared Confocal Microscopes (*declined*)

*Ad hoc* referee, Nuclear & Cytoplasmic Structure/Function & Dynamics study section, 2016

Early Career Researcher *ad hoc* referee for Pathogenic Eukaryotes study section, 2014

Canadian Inst. of Health Research, Member, Doctoral & MSc Training awards review panels, 2012-'13

Cancer Research Society (Canada), Member, Panel A 2009-2011

*Ad hoc* referee (2009 - )

Wellcome Trust (UK)

Agence Nationale de la Recherche (France)

Cancer Research UK

European Research Council

Portuguese Foundation for Science & Training

National Science Foundation, USA

Natural Sci. & Engin. Research Council, Canada

Ignaz L. Lieben Award (Austria)

Wellcome Trust India Alliance

Editorial Review

Guest editor: *PLoS Genetics*

Editorial board: *Cytoskeleton* (2017- )

Ad hoc:

<i>Biochemistry</i>	<i>Experimental Cell Research</i>	<i>PLoS Biology</i>
<i>Biological Chemistry</i>	<i>Journal of Cell Biology</i>	<i>PLoS Genetics</i>
<i>Cell Division</i>	<i>Journal of Cell Science</i>	<i>PLoS ONE</i>
<i>Current Biology</i>	<i>Laboratory Investigation</i>	<i>PNAS</i>
<i>Cytoskeleton</i>	<i>Molecular Biology of the Cell</i>	<i>Reprod, Fertiliz, &amp; Devel.</i>
<i>Development</i>	<i>Nature Cell Biology</i>	<i>Science</i>
<i>Developmental Cell</i>	<i>Nature Communications</i>	<i>Trends in Cell Biology</i>
<i>eLife</i>	<i>Oncogene</i>	

Meeting planning

2018	American Society for Cell Biology annual meeting mini-symposium chair
2017	Triangle Syncytium Fest
2018, '16, '14, '12	American Society for Cell Biology annual meeting member-organized Special Interest subgroup "Frontiers in Cytokinesis"

**i) Invited Symposia and Lectures**

University of Tennessee Biochemistry Cellular & Molecular Biology Dept, Fall 2020, Knoxville, TN  
NIDDK/NIH Lab of Biochemistry & Genetics (student-invited speaker), May 2020, Bethesda, MD  
Southeast Center for Mathematics & Biology, February 2020, Atlanta, GA  
Vanderbilt University Cell & Developmental Biology Department, January 2020, Nashville TN  
American Society for Cell Biology Meeting, December 2018, San Diego, CA  
Workshop invited speaker, and Member-organized subgroup invited speaker  
(Post-doc Daniel Cortes selected for minisymposium oral presentation)  
National University of Singapore, October 2019, Singapore  
University of Colorado Molecular Biology (student-invited speaker) October, 2019, Denver, CO  
Motile & Contractile Systems Gordon Research Conf. (discussion leader), July 2019, New London, NH  
Society for Math Biology, July 2019, Montreal, Canada  
Southeast Center for Mathematics & Biology, February 2019, Atlanta, GA  
American Society for Cell Biology Meeting, December 2018, San Diego, CA  
(Post-doc Daniel Cortes selected for minisymposium oral presentation)  
Mini-symposium co-chair, American Society for Cell Biology Meeting, December 2018, San Diego, CA  
(Post-doc Michael Werner delivered minisymposium oral presentation)  
Special-interest subgroup co-organizer & speaker, ASCB Meeting, December 2018, San Diego, CA  
Istanbul Technical Univ. Molecular Biol. & Genetics Student Congress, October 2018, Istanbul Turkey  
Workshop on Mathematics of the Cell, Banff Internat. Res. Stat. August 2018, Banff, Alberta, Canada  
UCLA Biochemistry Seminar series, Student-invited speaker, January 2018, Los Angeles, CA  
American Society for Cell Biology Meeting, December 2017, Philadelphia, PA  
(Post-docs Daniel Cortes and Michael Werner selected for oral presentations)  
EMBO Workshop: Molecular & Cellular Biology of Septins (lightning talk), Oct. 2017, Berlin, Germany  
Johns Hopkins University Biology Departmental Seminar, October 2017, Baltimore, MD  
UNC GMB/BCB Training Program Retreat invited faculty speaker, August, 2017, Asheville, NC  
Motile and Contractile Systems Gordon Conference, July 2017, Lebanon, NH  
Marine Biological Laboratories Nikon Cytoskeleton Series, July 2017, Woods Hole, MA

Marine Biological Laboratories Embryology Course, June 2005-2017 (exc. 2013), Woods Hole, MA  
Baylor University Biochemistry and Molecular Biology Dept. Seminar, January 2017, Houston, TX  
American Society for Cell Biology Meeting, December 2016, San Francisco, CA  
American Society for Cell Biology Meeting, December 2016, San Francisco, CA  
(PhD student Kathryn Rehain selected for oral presentation)  
Building the Cell Conference, September 2016, Paris, France  
Actin in Action EMBO Conference, September 2016, Heidelberg, Germany  
National Heart, Lung and Blood Institute, NIH, September 2016, Bethesda, MD  
The Allied Genetics Conference (GSA) Member Organized Session, July 2016, Orlando, FL  
Duke University Developmental and Stem Cell Biology Colloquium, March 2016, Durham, NC  
UNC Bioinformatics and Computational Biology Colloquium, November 2015, Chapel Hill, NC  
Harvard Medical School Systems Biology department special seminar, May 2015, Boston, MA  
Massachusetts Institute for Technology Biophysics seminar, May 2015, Boston, MA  
UC - Davis Molecular & Cell. Biology Joint Seminar Series student-invited speaker, Jan. 2015  
American Society for Cell Biology Meeting, December 2014 Philadelphia, PA  
(post-doctoral fellow Benjamin Lacroix selected for oral presentation)  
American Society for Cell Biology Meeting, December 2014 Philadelphia, PA  
(Technician Carlos Patino Descovich selected for oral presentation)  
Columbia University Pathology & Cell Biology Dept. seminar, October 2014, New York, NY  
SUNY - Stony Brook Dept. of Biochemistry & Cell Biology seminar, October 2014  
UNC Bioinformatics and Computational Biology Colloquium, September 2014, Chapel Hill, NC  
Society for Math Biology annual meeting, July 2014, Osaka, Japan  
Marine Biological Labs Cytoskeleton and Cell Biology groups, June 2014, Woods Hole, MA  
UNC Biology Dept. Research Symposium, Student-selected junior faculty speaker, April 2014  
UNC Chapel Hill Applied Math seminar series, February 2014, Chapel Hill, NC  
American Society for Cell Biology Meeting, December 2013 New Orleans, LA  
(post-doctoral fellow Benjamin Lacroix selected for oral presentation)  
University of Richmond Biology Department Seminar series, September 2013, Richmond, VA  
Canadian Society for Molecular Bioscience Annual Mtg, June 2013, Niagra-on-the-Lake, Canada  
McGill University Bellairs Quantitative Biology Workshop, April, 2013, Holetown, Barbados  
The Hospital for Sick Children Program in Cell Biology, February 2013, Toronto, ON, Canada  
Virginia Tech Department of Biological Sciences, February 2013, Blacksburg, VA  
UNC at Chapel Hill Department of Biology seminar, January 2013, Chapel Hill, NC  
UNC Department of Physiology and Cell Biology seminar, Sept. 2012, Chapel Hill, NC  
Montréal Cell Cycle & Cytoskeleton ASCB local meeting, August 2012, Montréal, Canada  
American Society for Cell Biology Meeting, December 2011, Denver, CO  
(post-doctoral fellow Jonas Dorn selected for oral presentation)  
Gordon Research Conference, Motile & Contractile Systems. July 2011, New London, NH  
University of Toronto, October 2010, Toronto, Ontario, Canada  
Keith Burridge's 60<sup>th</sup> Birthday Symposium at UNC, August 2010, Chapel Hill, NC  
Lady Davis Institute for Medical Research, March 2010, Montréal, Québec, Canada  
Center for Research in Neuroscience, February 2010, Montréal, Québec, Canada  
Northwestern University Dept. of Cell and Molecular Biology, January 2010, Chicago, IL  
Gordon Research Conference Motile & Contractile Systems. July 2009, New London, NH  
UNC Cytoskeleton group, April 2009, Chapel Hill, NC  
Univ. Ottawa Dept Biochemistry, Microbiology & Immunology. November 2008, Ottawa, Canada  
Workshop: Blebs & Cell Cortex Mechanics in Cell Movement. October 2008, Dresden, Germany  
McGill University Dept of Anatomy & Cell Biology. October 2008. Montréal, Québec, Canada  
Concordia University Department of Biology. September 2008. Montréal, Québec, Canada  
Montréal Cell, Molecular & Developmental Biol Retreat. June 2007, Ste. Adèle, Québec, Canada  
Biology of Shape International Meeting, June 2006, Tarragona, Spain

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Young Investigators' Research Symposium, IRIC, May 2006, University of Montreal  
American Society for Cell Biology Meeting, December 2005, San Francisco, CA  
Genetics Society of America, International *C. elegans* Meeting, June 2005 Los Angeles, CA  
American Society for Cell Biology Cytokinesis Meeting, June 2004, Burlington, VT  
Stanford University cell division group, 2004, Palo Alto, CA  
University of Oregon cytoskeleton group, 2004, Eugene, OR  
Ludwig Institute for Cancer Research, March 2003, UCSD, La Jolla, CA  
Columbia University cytoskeleton group, March 2002, New York, NY