

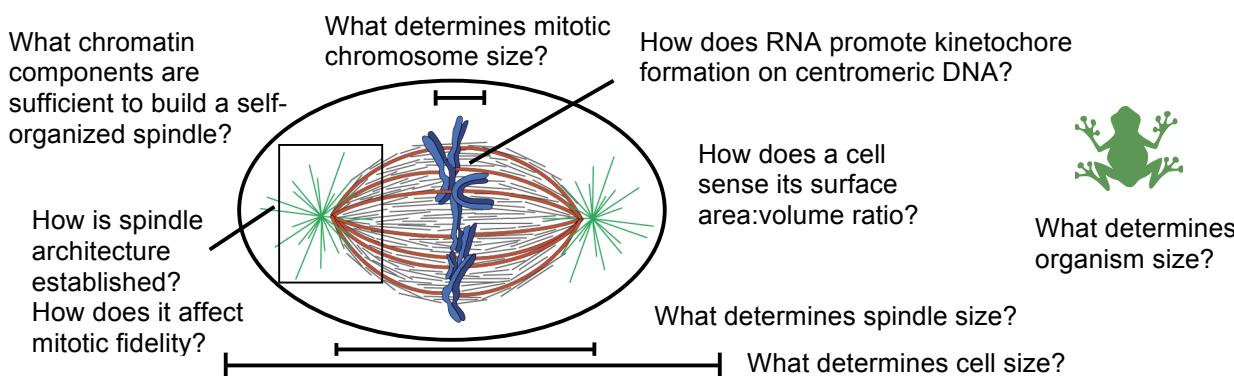
REBECCA WRIGHT HEALD
Professor
Division of Cell and Developmental Biology
Molecular and Cell Biology Department
University of California, Berkeley

Education

INSTITUTION AND LOCATION	DEGREE	YEAR completed	FIELD OF STUDY	MENTOR
Hamilton College, Clinton NY	B.A.	1985	Chemistry	
Harvard University, Boston, MA	Ph.D.	1993	Cell Physiology	Frank McKeon
European Molecular Biology Laboratory, Heidelberg, Germany	postdoc	1997	Cell Biology	Eric Karsenti

Personal Statement

The goal of my laboratory is to elucidate the molecular mechanisms of cell division and size control. Our approaches take advantage of in vitro systems, particularly cytoplasmic extracts prepared from eggs of the frog *Xenopus laevis* that reconstitute mitotic chromosome condensation and spindle assembly and function in vitro. To study mechanisms of spindle and organelle size control, we have utilized a smaller, related frog, *Xenopus tropicalis*, to investigate interspecies scaling, and extracts prepared from fertilized eggs at different stages of embryogenesis to study developmental scaling. Our research has provided novel insight into how cell/organelle scaling contributes to intracellular morphogenesis and cell division, processes essential for viability and development, and defective in human diseases including cancer. We currently pursue projects in two broad areas. The first is to elucidate mitotic mechanisms, characterize the key players that define spindle architecture, and advance reconstitution experiments toward a systems-level understanding of the spindle. The second is to investigate size control mechanisms at the subcellular, cellular and organism level, developing tools for chromosome labeling and mutagenesis in *Xenopus*, and leveraging phylogenetic relationships among different frog species. Our research is highly collaborative and provides new insight into the underlying principles of spindle assembly and biological size control, as well as the molecular basis of variation that contributes to genomic instability and evolution.



Positions and Honors

Positions and Employment

1985-1987	Research Assistant, UMDNJ- R.W. Johnson Medical School, Piscataway, NJ. Advisor: S.E. Hitchcock-DeGregori Ph.D.
1987-1992	Ryan Predoctoral Fellow, Harvard Medical School, Boston, MA, Advisor: F. McKeon, Ph.D.
1993-1997	American Cancer Society Postdoctoral Fellow, Cell Biology Program, European Molecular Biology Laboratory, Heidelberg, Germany, Advisor: E. Karsenti, Ph.D.
1997-2003	Assistant Professor of Cell & Developmental Biology, MCB Department, UC Berkeley
2003-2006	Associate Professor of Cell & Developmental Biology, MCB Department, UC Berkeley
2006-	Professor of Cell & Developmental Biology, MCB Department, UC Berkeley
2013-	Head, Division of Cell & Developmental Biology, MCB Department, UC Berkeley

Professional Memberships and Committees

1997-	Member, American Society for Cell Biology (ASCB)
2001-2006	Monitoring Editor, <i>Journal of Cell Biology</i>
2003-2008	Member, Cancer Research Coordinating Committee
2004-2005	Physiology Course Faculty, MBL Woods Hole
2004-2008	Member, NIH study section NDT
2005-	Editorial Board, <i>ACS Chemical Biology</i> ,
2006-	NSF Research Opportunities for Undergraduates Program for underrepresented minorities
2006	Co-organizer, CDB Symposium "Frontiers in Chromosome Research", Berkeley
2007-	Senior Editor, <i>Journal of Cell Biology</i>
2007-	NIH Special Emphasis Panels/Scientific Review Groups (P01,K99,DP1,DP2,R01,R15, R35)
2009-	Editorial board, <i>Cytoskeleton</i>
2010,2012	Co-organizer, EMBO Conference "Microtubules – Structure, Regulation and Functions"
2011	Program Committee, American Society for Cell Biology
2011-	Contributing author, Alberts et al. textbook, "Molecular Biology of the Cell"
2012-	Summer research sponsor, NIH Bridges to Baccalaureate program
2012-	Editorial board, <i>Developmental Cell</i>
2012-	External Advisor, National <i>Xenopus</i> Resource Center
2013	Program Committee, Biophysical Society
2013	NIH NIGMS Council ad hoc member
2013-	Member, ASCB Women in Cell Biology Committee
2015	Vice-chair, FASEB Meeting "Mitosis: Spindle Assembly and Function"
2015	Vice-chair, Gordon Research Conference "Chromosome Dynamics"
2016-2018	Member, ASCB Council

Honors

1999-2003	Pew Scholar Award in Biomedical Sciences
2000	Hellman Faculty Fund Award
2005	Alumni Scientist Medal in Biochemistry, Hamilton College
2005	American Society for Cell Biology, Women in Cell Biology Junior Career Award
2006	Symposium speaker, Annual Meeting of the ASCB, "Mechanisms in Mitosis"
2006	NIH Director's Pioneer Award
2007	Plenary speaker, 20 th Anniversary, Pew Scholars Program in the Biomedical Sciences
2009-2010	Professorship, Miller Institute for Basic Research in Science
2010	Outstanding Postdoc Mentoring Award, UC Berkeley
2011-	Flora Lamson Hewlett Endowed Chair in Biochemistry
2014	Keynote speaker, 15 th International <i>Xenopus</i> Conference
2015	Keynote speaker, Janelia Evolutionary Cell Biology Conference
2015	Symposium speaker, Annual Meeting of the ASCB, "Size and Spacing of Biological Structures"

Publications

1. Grenfell AW, Strzelecka M, Crowder ME, Helmke KJ, Schlaitz AL, **Heald R.** (2016) A versatile multivariate image analysis pipeline reveals features of *Xenopus* extract spindles. *J Cell Biol*, in press.
2. Lane AB, Strzelecka M, Ettinger A, Grenfell AW, Wittmann T, **Heald R.** (2015) Enzymatically generated CRISPR libraries for genome labeling and screening. *Dev Cell* 34, 373-8. PMC4536113
3. Levy DL and **Heald R.** (2015) Biological scaling problems and solutions in Amphibians. *Cold Spring Harb Perspect Biol*, 2016;8:a019166. PMID: 26261280
4. Crowder ME, Strzelecka M, Wilbur JD, Good MC, von Dassow G, **Heald R.** (2015) A comparative analysis of spindle morphometrics across metazoans. *Curr Biol*, 25, 1542-50. PMC4464779
5. Miller KE, **Heald R.** (2015) Glutamylation of Nap1 modulates histone H1 dynamics and chromosome condensation in *Xenopus*. *J Cell Biol* 209, 211-20.
6. Helmke KJ, **Heald R.** (2014) TPX2 levels modulate meiotic spindle size and architecture in *Xenopus* egg extracts. *J Cell Biol* 206, 385-93. PMC4121975
7. **Heald R.**, Cohen-Fix O. (2014) Morphology and function of membrane-bound organelles. *Curr Opin Cell Biol* 26, 79-86. PMC3927147
8. Strzelecka M, **Heald R.** (2014) RUVs drive chromosome decondensation after mitosis. *Dev Cell* 31, 259-60. PMID: 25453825
9. Good MC, Vahey MD, Skandarajah A, Fletcher DA, **Heald R.** (2013) Cytoplasmic volume modulates spindle size during embryogenesis. *Science* 342, 856-60. PMC4094345
10. Helmke KJ, **Heald R.**, Wilbur JD. (2013) Interplay between spindle architecture and function. *Int Rev Cell Mol Biol* 306, 83-125. PMID: 24016524
11. Schlaitz A-L, Thompson J, Wong CCL, Yates JR, **Heald R.** (2013) REEP3/4 ensure endoplasmic reticulum clearance from metaphase chromatin and proper nuclear envelope architecture. *Dev Cell*, 26, 316-323. PMC3745822
12. Wilbur JD, **Heald R.** (2013) Cryptic no longer: arrays of CLASP1 TOG domains. *Structure* 21, 869-70. PMID: 23747108
13. Bird SL, **Heald R.**, Weis K. (2013) RanGTP and CLASP1 cooperate to position the mitotic spindle. *Mol Biol Cell*, 24, 2506-14. PMC3744954
14. Whitehead E, **Heald R.**, Wilbur J. (2013) N-terminal phosphorylation of p60 katanin directly regulates microtubule severing. *J Mol Biol* 425, 214-221. PMC3540178
15. Wilbur J, **Heald R.** (2013) Mitotic spindle scaling during *Xenopus* development by kif2a and importin α . *eLife* 2:e00290. PMC3576809
16. Levy DL, **Heald R.** (2012) Mechanisms of intracellular scaling. *Annu Rev Cell Dev Biol* 28, 113-35. PMID: 22804576
17. Riggs B, Bergman ZJ, **Heald R.** (2012). Altering membrane topology with Sar1 does not impair spindle assembly in *Xenopus* egg extracts. *Cytoskeleton* 69, 591-9. PMC3661297
18. Xiao B, Freedman BS, Miller KE, **Heald R.**, Marko JF (2012) Histone H1 compacts DNA under force and during chromatin assembly. *Mol Biol Cell* 23, 4864-71. PMC3521692
19. Patel K, Nogales E, **Heald R.** (2012) Multiple domains of human CLASP contribute to microtubule dynamics and organization in vitro and in *Xenopus* egg extracts. *Cytoskeleton* 69, 155-165. PMC3315288
20. Halpin D, Kalab P, Wang J, Weis K, **Heald R.** (2011) Spindle assembly around RCC1 coated beads in *Xenopus* egg extracts. *PLoS Biol* 9, e1001225. PMC3246454
21. Loughlin R, Wilbur JD, McNally F, Nedelec F, **Heald R.** (2011) Katanin contributes to interspecies spindle length scaling in *Xenopus*. *Cell* 147, 1937- 1407. PMC3240848
22. Kieserman EK, **Heald R.** (2011) Mitotic chromosome size scaling in *Xenopus*. *Cell Cycle* 10, 3863-70. PMC3266116
23. Soderholm JF, Bird S, Kalab P, Sampathkumar Y, Hasegawa K, Uehara-Bingen M, Weis K, **Heald R.**

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24. Fu H, Freedman BS, Lim CT, **Heald R**, Yan J. (2011) Atomic force microscope imaging of chromatin assembled in *Xenopus* egg extract. *Chromosoma* 120, 245-254. PMC3464096
25. Ridley A, **Heald R**. Cell Structure and Dynamics. (2011) *Curr Opin Cell Biol* 23, 1-3. PMID: 21190823
26. Loughlin R, **Heald R**, Nedelec F. (2010) A computational model predicts *Xenopus* meiotic spindle organization. *J Cell Biol* 191, 1239-1249. PMC3010074
27. Levy DL, **Heald R**. (2010) Nuclear size is regulated by importin alpha and NTF2 in *Xenopus*. *Cell* 143, 288-298. PMC2966892
28. Freedman BS, Miller KE, **Heald R**. (2011) *Xenopus* egg extracts increase dynamics of histone H1 on sperm chromatin. *PLoS One* 5, pii: e13111. PMC2947519
29. Freedman BS, **Heald R**. (2010) Functional comparison of H1 histones in *Xenopus* reveals isoform-specific regulation by Cdk1 and RanGTP. *Curr Biol* 20, 1048-1052. PMC2902237
30. **Heald R**, Walczak CE. (2009) Mitotic spindle assembly mechanisms. Chapter of book entitled "The Kinetochore: From Molecular Discoveries to Cancer Therapy ", edited by Peter DeWulf and William Earnshaw. Springer Science.
31. Srzen V, Fant X, **Heald R**, Rabouille C, Merdes A. (2009) Centrosome proteins form and insoluble pericentriolar matrix during muscle cell differentiation. *BMC Cell Biol* 10:28. PMC2676252
32. Loughlin R, Riggs B, **Heald R**. (2008) Snapshot: motor proteins in spindle assembly *Cell* 134, 548. PMID: 18692476
33. Kalab P, **Heald R**. (2008) The RanGTP gradient – A GPS for the mitotic spindle. *J. Cell Sci* 121, 1577-1586. PMID: 18469014
34. Andersen CB, Wan Y, Chang, JW, Riggs B, Lee C, Liu Y, Sessa F, Villa F, Kwiatkowski N, Suzuki M, Nallan L, **Heald R**, Musacchio A, Gray NS. (2008) Discovery of selective aminothiozole aurora kinase inhibitors. *ACS Chem Biol* 3, 180-192. PMID: 18307303
35. Walczak CE, **Heald R**. (2008) Mechanisms of mitotic spindle assembly and function. *Int Rev Cytol* 265, 111-158.
36. Blower MD, Feric E, Weis K, **Heald R**. (2007) Genome-wide analysis demonstrates conserved localization of mRNAs to mitotic microtubules. *J Cell Biol* 179, 1365-1373.
37. Brown KS, Blower MD, Maresca TJ, Grammer TC, Harland RM, **Heald R**. (2007) *Xenopus tropicalis* extracts provide insight into scaling of the mitotic spindle. *J Cell Biol* 176, 765-770.
38. **Heald R**. (2007) Brinkley-fest of mitosis. *Dev Cell* 13, 168-176.
39. Yan J, Maresca T, Skoko D, Adams CD, Xiao B, Christensen M, **Heald R**, Marko JF. (2007) Micromanipulation studies of chromatin fibers in *Xenopus* egg extracts reveal ATP-dependent nucleosome assembly dynamics. *Mol Biol Cell* 18, 464-474.
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41. Kalab P, Pralle A, Isacoff EY, Heald R, Weis K. (2006) Analysis of a RanGTP-regulated gradient essential for mitosis in somatic cells. *Nature* 440, 607-701.
42. Hannak E, **Heald R**. (2006) Xorbit/CLASP links dynamic microtubules to chromosomes in the *Xenopus* meiotic spindle. *J Cell Biol* 172, 19-25.
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44. Kenney RD, **Heald R**. (2006) Essential roles for cohesin in kinetochore and spindle function in *Xenopus* egg extracts. *J Cell Sci* 119, 5057-5066.
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46. Soderholm J, Uehara-Bingen M, Weis K, **Heald R**. (2006) Challenges facing the biologist doing chemical genetics. *Nat Chem Biol* 2, 55-58.

47. Budde PP, Desai A, **Heald R.** (2006) Analysis of microtubule polymerization in vitro and during the cell cycle in *Xenopus* egg extracts. *Methods* 38, 29-34.
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49. Maresca TJ, Niederstrasser H, Weis K, **Heald R.** (2005) Xnf7 contributes to spindle integrity through its microtubule bundling activity. *Curr Biol* 15, 1755-61.
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52. Soderholm J, **Heald R.** (2005) Scratch 'n screen for inhibitors of cell migration. *Chem Biol* 12, 263-265.
53. Antonio C, **Heald R.**, Vernos I. (2005). In vitro assays for mitotic spindle assembly and function. *Cell Biology: A Laboratory Handbook*. J. Celis, ed. Vol. 2, Chapter 48, 379-386.
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61. Deehan R, **Heald R.** (2004) Centromere glue provides spindle cue. *Cell* 118, 529-30.
62. Gadde S, **Heald R.** (2004) Mechanisms and molecules of the mitotic spindle. *Curr Biol* 14, R797-805.
63. Krauss SW, Chen C, Penman S, **Heald R.** (2003) Nuclear actin and protein 4.1: essential interactions during nuclear assembly *in vitro*. *Proc Natl Acad Sci USA* 100, 10752-57.
64. Wignall SM, **Heald R.** (2003) The role of chromosome architecture in spindle assembly and anaphase: the condensed version. *Cell Cycle* 2, 590-1.
65. Wignall SM, Deehan R, Maresca TJ, **Heald R.** (2003) The condensin complex is required for proper spindle assembly and chromosome segregation in *Xenopus* extracts. *J Cell Biol* 161, 1041-51.
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84. **Heald R**, Tournebize R, Habermann A, Karsenti E, Hyman A. (1997) Spindle assembly in *Xenopus* egg extracts: Respective roles of centrosomes and microtubule self-organization. *J Cell Biol* 138, 615-628.
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