

Curriculum Vitae

Lance A. Davidson

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Personal:

Born: Jan. 9, 1962, Citizenship: United States

Education:

Ph.D., Biophysics, 1995
University of California at Berkeley, Berkeley, CA
"Biomechanics of Sea Urchin Invagination"
Thesis Advisors: George Oster and Mimi Koehl

M.Sc., Experimental Space Science, 1986
York University, Toronto, Canada
Thesis Advisor: Richard Link

B.S. in Physics, 1984
University of Illinois at Champaign-Urbana, Urbana, IL

Present Position:

Postdoctoral Fellow, 1996 to present
Department of Cell Biology, School of Medicine
University of Virginia Health System, and
Department of Biology,
University of Virginia
Sponsors: Douglas DeSimone and Raymond Keller

Special Field:

The integration of the cytoskeleton, cell-cell and cell-matrix adhesion, and extracellular matrix into tissue mechanics and how these biomechanical properties guide morphogenesis during development.

Previous Research Experience:

Laboratories of Mimi Koehl, Department of Integrative Biology, University of California at Berkeley, and George Oster, Department of Molecular and Cell Biology, University of California: 1991 - 1996

Embryology Course, Marine Biological Laboratory, Woods Hole, MA: Summer 1993

Professional Organizations:

American Society For Cell Biology
Society of Developmental Biology

Awards and Fellowships:

1999: American Cancer Society Postdoctoral Fellowship
1999: Best poster, Workshop on Advances in Cellular Imaging,
W. M. Keck Center for Cellular Imaging, University of Virginia
1993: Fellowship to attend the Summer Course in Embryology at the Marine Biological
Laboratory at Woods Hole, MA
1992: Fellowship to present a poster at the Gordon Conference on Theoretical Biology
1989-1992: Systems in Integrative Biology - National Research Service Award.
U.C. Berkeley

Teaching Experience:

2003: Developmental Biology Laboratory, Dept. of Biology, University of Virginia
2000 to 2001: Developmental Biology Laboratory, Section on Microscopy and Imaging
Dept. of Biology, University of Virginia
2000: Summer Methods Course, Section on Microscopy and Imaging
University of Virginia School of Medicine
1991: (spring) Biophysics, University of California at Berkeley
1989: (fall) General Physics, University of California at Berkeley

Peer Review Service:

Mechanisms of Development, since 2003
Developmental Biology, since 2000
Physical Review Letters, since 2000
Journal of Biomechanical Engineering: since 1998
Journal of Theoretical Biology: since 1998
BioEssays: since 1997

Invited Lectures:

2003 Center for Cell Dynamics, Friday Harbor Laboratories
2003 Society for Developmental Biology: Mid-Atlantic Regional Meeting, Philadelphia.
2002 Gordon Research Conference on Theoretical Biology - Chaired session on
morphogenesis.
2001 ASME Summer Bioengineering Conference, Snowbird, Utah
2000 International Sea Urchin Conference, Woods Hole, Massachusetts
2000 First Virginia Colloquium on the Biomechanics of Adhesion Molecules
University of Virginia
1998 Workshop on Advances in Cellular Imaging, Center for Cellular Imaging,
University of Virginia
1998 International Xenopus Conference, Sardenga, Italy
1996 Annual Meeting of the Society for Integrative and Comparative Biology
Symposium on Mechanical Design in Organisms
1995 Department of Biology Seminar - California State University at Hayward
1995 Symposium on Pattern Formation in Biology - University of Arizona at Tucson
1994 Annual Meeting of the Western Society of Naturalists - Monterey, California

Publications:

- L. A. Davidson, M. Marsden, R. Keller, and D.W. DeSimone (in prep). Mediolateral cell intercalation during *Xenopus laevis* gastrulation requires integrin $\alpha_5\beta_1$ recognition of a fibrillar fibronectin matrix.
- T. Goto*, L. A. Davidson*, and R. E. Keller (in prep). Distinct extracellular matrix requirements for Prickle and Strabismus in gastrulation. (* equal contributions)
- M. C. Lane, L. A. Davidson, and M. D. Sheets (in prep). BMP antagonists from Spemann's organizer rostralize dorsal mesoderm.
- L. A. Davidson, R. Keller, and D. W. DeSimone (submitted). Patterning and tissue movements in a novel explant of the marginal zone of *Xenopus laevis*. *Gene Expression Patterns in Mechanisms of Development*.
- D. Longo, S. M. Peirce, T. C. Skalak, L. A. Davidson, M. Marsden, B. Dzamba, and D. W. DeSimone (in press). Multicellular computer simulation of morphogenesis: blastocoel roof thinning and matrix assembly in *Xenopus laevis*. *Developmental Biology*.
- D. W. DeSimone, L. A. Davidson, M. Marsden, and D. Alfandari (in press) The *Xenopus* embryo as a model system for studies of cell migration. Chapter in *Methods in Molecular Biology: Cell Migration in Development*. (ed. by Jun Lin Guan), 2004 Humana Press, Totowa, NJ.
- R. Keller and L. A. Davidson (in press) Cell Movements. Chapter in *Gastrulation* (ed. C. Stern), 2004 Cold Spring Harbor Laboratory Press, NY.
- L. A. Davidson and J. B. Wallingford (in press). Visualizing cell biology and tissue movements during morphogenesis in the frog embryo. Chapter in *Imaging in Neuroscience and Development: a Laboratory Manual*. (ed. by R. Yuste and A. Konnerth), 2003, Cold Spring Harbor Laboratory Press, NY.
- R. Keller and L. A. Davidson. (in press). Cell crawling, cell behavior and biomechanics during convergence and extension. Chapter in *Cell Motility: From Molecules to Organisms*. (ed. A. Ridley, P. Clark, and M. Peckham), John Wiley & Sons.
- R. Keller, L. A. Davidson, and D. R. Shook (2003). How we are shaped: the biomechanics of gastrulation. *Differentiation*, 71: 171-205.
- L. A. Davidson, R. E. Keller, and D.W. DeSimone (2002). Mesendoderm extension and mantle closure in *Xenopus laevis* gastrulation: combined roles for integrin $\alpha_5\beta_1$, fibronectin and tissue geometry. *Developmental Biology*, 242: 109-129
- L. A. Davidson, M. Ezin, and R. E. Keller (2002). Wound healing by apical contraction and ingression in early *Xenopus laevis* embryos. *Cell Motility and the Cytoskeleton*, 53: 163- 176.

- S. George, D. Evans, L. Davidson (2002). A biologically inspired programming model for self-healing systems. Paper contributed to Association for Computing Machinery - Workshop on Self-Healing Systems 2002, Charleston, SC. p. 102-104.
- L. A. Davidson and R. E. Keller (2001). Basics of a Light Microscopy Imaging System and its Application in Biology. Chapter in *Methods in Cellular Imaging* (ed. A. Periasami; American Physiological Society Book Series), Oxford University Press.
- R. Keller, L. Davidson, A. Edlund, T. Elul, M. Ezin, D. Shook, and P. Skoglund (2000). The mechanism of convergence and extension by cell intercalation. *Philosophical Transactions B: Biological Sciences*, 355:897-922.
- L. A. Davidson, R. E. Keller (1999). Neural tube closure in *Xenopus leavis* involves medial migration, directed protrusive activity, cell intercalation, and convergent extension. *Development* 126: 4547-4556
- L. A. Davidson, G.F. Oster, R. E. Keller, and M.A.R. Koehl (1999). Measurements of mechanical properties of the blastula wall reveal which hypothesized mechanisms of primary invagination are physically plausible in the sea urchin *Strongylocentrotus purpuratus*. *Developmental Biology*, 209: 221-238.
- L. A. Davidson, M.A.R. Koehl, R. E. Keller, and G.F. Oster (1995). How do sea urchins gastrulate? Using biomechanics to distinguish between mechanisms of primary invagination. *Development*, 121(7): 2005-2018.

References:

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Professor Raymond Keller, Chair
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Professor Mimi Koehl
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