

BIOGRAPHICAL SKETCH

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NAME Gary M. Wessel	POSITION TITLE Professor of Biology		
eRA COMMONS USER NAME WESSEL			
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
University of Virginia	B.A.	1978	Biology; Environmental Sciences
Duke University	Ph.D.	1986	Developmental Biology
University of Texas M.D. Anderson Cancer Center	Postdoctoral fellow	1986-1990	Molecular Developmental Biology

A. Professional Experience:

1978-1981: Research Assistant, Department of Zoology, Duke University

1990 - 1996: Assistant Professor of Biology

1996 - 2000: Associate Professor of Biology

2000 - present: Professor of Biology, Department of Molecular and Cell Biology & Biochemistry, Division of Biology and Medicine; Brown University

Honors, Awards, Professional Service:

- NIH Postdoctoral Fellowship; 1986-1989
- Basil O'Conner Scholar, March of Dimes Birth Defects Foundation; 1992-1994
- Trustee, Society for Developmental Biology; 1993-1996
- Treasurer, Society for Developmental Biology; 1996-1999
- NIH Research Career Development Award; 1997-2002
- Marine Biological Laboratory, Woods Hole MA, Embryology course Faculty, 2003 – 2006
- Editorial Boards:
 - Editor in Chief designate, *Molecular Reproduction and Development*, 2008
 - Editor, *Developmental Biology*, 1998 – 2008
 - Executive Editor, *Molecular Reproduction and Development*, 2006 – 2008
 - Associate Editor, *Molecular Reproduction and Development*, 2000 – 2006
 - Member, *Reproductive Biology and Endocrinology*. 2002 – present
 - Member, *Developmental Dynamics*. 2002 - present
 - Member, *BMC Developmental Biology*, 2004 – present
 - Section Editor, MCB, *BMC Biology Image Library*, 2006 – present

B. Representative Publications**Publications - Refereed Journals: (75 total)**

- Laidlaw, M. and Wessel, G.M. (1994). Cortical granule biogenesis is active throughout oogenesis in sea urchins. *Development*. **120**: 1325-1333.
- Wessel, G.M. (1995). A protein of the sea urchin cortical granules is targeted to the fertilization envelope and contains an LDL-receptor-like motif. *Dev. Biol.* **167**:388-397.
- Berg, L. and Wessel, G.M. (1997). Cortical granules of the sea urchin translocate early in oocyte maturation. *Development*, **124**:1845-1850.
- Conner, S., and Wessel, G. W. (1998). Rab3 mediates cortical granule exocytosis in the sea urchin egg. *Dev. Biol.* **203**:334-344.
- Haley, S. and Wessel, G.M. (1999). A cortical granule serine protease CGSP1 of the sea urchin *Strongylocentrotus purpuratus*, is autocatalytic and contains a low-density lipoprotein receptor-like domain. *Dev. Biol* **211**:1-10.

- Conner, S. and Wessel, G. M. (1999). Syntaxin is required for cell division. *Mol. Biol. Cell* **10**:2735-2743.
- Wessel, G.M., Berg, L., and Conner, S.D. (2002). Cortical granule translocation is linked to meiotic maturation in the sea urchin oocyte. *Development* **129**: 4315-4325.
- Szule, J.A., Jarvis, S.E., Hibbert, J.E., Spafford, J.D., Braun, J.E., Zamponi, G.W., Wessel, G.M., Coorsen, J. (2003). Calcium-triggered membrane fusion proceeds independently of specific presynaptic proteins. *J. Biol. Chem.***278**: 24251-24254.
- Wong, J., and Wessel, G.M. (2004). Major components in a sea urchin block to polyspermy are structurally and functionally conserved. *Evo. Dev.***6**: 134-152.
- Haley, S.A. and Wessel, G.M. (2004). Regulated proteolysis by CGSP1 at fertilization. *Mol. Biol. Cell* **15**: 2084-2092.
- Haley, S.A. and Wessel, G.M. (2004). Proteolytic cleavage of the cell surface protein p160 is required for detachment of the fertilization envelop in the sea urchin. *Dev. Biol.* **272**: 191-202.
- Voronina, E. and Wessel, G.M. (2004). Beta/gamma subunits of heterotrimeric G-proteins contribute to calcium release at fertilization in sea urchins. *J. Cell Science* **117**: 5995-6005.
- Wong, J., Creton, R., and Wessel, G. M. (2004). The Oxidative Burst At Fertilization Is Dependent Upon Activation of the Dual Oxidase, Udx1. *Developmental Cell* **7**:801-814.
- Wong, J. and Wessel, G. M. (2005). Reactive Oxygen Species and Udx1 During Early Sea Urchin Development. *Dev. Bio.* **288**: 317-333.
- Leguia, M. Berg, L., Conner, S., and Wessel, G.M. (2006). Synaptotagmin I is involved in the regulation of cortical granule exocytosis in the sea urchin. *Mol. Reprod. Dev.* **73**:895–905.
- Leguia, M. and Wessel, G.M. (2006). The Histamine H1 Receptor Activates the Nitric Oxide Pathway at Fertilization. *Mol. Reprod. Dev.* **73**: 1550-1563.
- Beane, W.S., Voronina, E., Wessel, G.M. and McClay, D.R. (2006). Lineage-specific expansions provide genomic complexity among sea urchin GTPases. *Dev. Biol.* **300**:165-179.
- Roux, M.M. Townley, I.K., Raisch, M., Reade, A., Bradham, C., Humphreys, G., Gunaratne, H.J., Killian, C.E., Moy, G., Su, Y-H., Etensohn, C.E., Wilt, F., Vacquier, V.D., Wessel, G.M., and Foltz, K.R. (2006). A functional genomic and proteomic perspective of sea urchin calcium signaling and egg activation. *Dev. Biol.* **300**:416-433.
- Juliano, C., Voronina, E., Stack, C., Cameron, A., and Wessel, G.M. (2006). Germ line determinants are not localized early in sea urchin development. *Dev. Biol.* **300**: 406-415.
- Song, J., Wong, J., and Wessel, G.M. (2006). Oogenesis: single cell development and differentiation. *Dev. Biol.* **300**: 385-405.
- Briggs, E. and G.M. Wessel (2006). In the beginning Animal fertilization and sea urchin development. *Dev. Biol.* **300**:15-26.
- Weinstock, G., Gibbs, R., Sodergren, E., Davidson, E.H., Cameron, A., The Sea Urchin Genome Sequencing Consortium (2006). The Genome of the Sea Urchin *Strongylocentrotus purpuratus*. *Science* **314**: 941-952
- Wong, J. and Wessel, G.M. (2006). Rendezvin: an essential gene encoding independent, differentially secreted egg proteins that organize the fertilization envelope proteome after self-association. *Mol. Biol. Cell* **17**: 5241-5252.
- Wong, J., Koppel, D., Cowan, A, Wessel, G.M. (2007). Membrane Hemifusion Is a Stable Intermediate of Exocytosis. *Developmental Cell* **12**: 653-659.
- Wong, J. and Wessel, G.M. (2008).Free-Radical Crosslinking of Specific Proteins Alters the Function of the Egg Extracellular Matrix At Fertilization. *Development* **135**:431-440.
- Voronina, E., Lopez, M., Juliano, C., Gustafson, E., Song, J., Extavour, C., George, S., Oliveri, P., McClay, D.R., and Wessel, G.M. (2008). Vasa protein expression is restricted to the small micromeres of the sea urchin, but is inducible in other lineages early in development. *Dev. Biol.***314**: 276-286.

Publications - Book Chapters, Invited Reviews: (28 total)

- Wessel, G. M., Brooks, J., Green, E., Haley, S., Voronina, E., Wong, J., Zaydfudim, V., and Conner, S.D. (2001). The Biology of Cortical Granules. In *International Review of Cytology*. (Ed. K.W. Jeon) Academic Press, San Diego, CA., Volume 209, pgs 117 – 206.

- Voronina, E. and Wessel, G.M. (2003). The regulation of oocyte maturation. In *Current Topics in Developmental Biology* (G. Schatten, ed) Academic Press, Vol **58**: 53-110.
- Etensohn, C.A., Wessel, G.M. and Wray, G. editors (2004). *Development of Sea Urchins, Ascidians and Other Non-Vertebrate Deuterostomes: An Experimental Analysis*. Academic Press.
- Etensohn, C.A., G.M. Wessel, and Wray, G. (2004). The invertebrate deuterostomes: An introduction to their phylogeny, reproduction, development, and genomics. In *Development of Sea Urchins, Ascidians and Other Non-Vertebrate Deuterostomes: An Experimental Analysis*. Academic Press. pgs. 1-13
- Wessel, G.M. Voronina, E., and Brooks, J.M. (2004). Obtaining and Handling Echinoderm Oocytes In *Development of Sea Urchins, Ascidians and Other Non-Vertebrate Deuterostomes: An Experimental Analysis* (Eds. Etensohn, Wessel, Wray) Academic Press. pgs 87-114.
- Wessel, G. M. and Vacquier, V. (2004). Isolation of Organelles and Components From Sea Urchin Eggs and Embryos. In *Development of Sea Urchins, Ascidians and Other Non-Vertebrate Deuterostomes: An Experimental Analysis* (Eds. Etensohn, Wessel, Wray) Academic Press. pgs. 491-544.
- Song, J.L. and Wessel, G.M. (2005). How to make an egg: transcriptional regulation in oocytes. *Differentiation* 73:1-17.
- Wong, J. and Wessel, G.M. (2006). Defending the zygote: Search for the ancestral animal block to polyspermy. In *Current Topics in Developmental Biology* (G. Schatten, ed) Academic Press, 72: 1-151. 25.
- Leguia, M.L. and Wessel, G. M. (2007). The many faces of egg activation at fertilization. *Signal Transduction*. **7**: 118-141.
- Wong, J. and Wessel, G.M. (2007). FRAP analysis of secretory granule lipids and proteins in the sea urchin egg. In *Methods in Molecular Biology*, Andrei Ivanov, Ed. Vol 440, pages 60-75.
- Parrington, J., Davis, L., Galione, A., Wessel, G.M. (2007). The spark of life – how a sperm activates the egg at fertilization. *Dev. Dynamics*. 236:2027–2038.

C. Research Projects Ongoing or Completed in the Last Three Years:

National Institutes of Health HD28152, 03/02 - 04/06

Title: Cortical Granule Regulation and Function

Principal Investigator: Gary M. Wessel

Goals: This project examines the regulation of the cortical granule protease, and the mechanisms of cortical granule translocation to the cell surface, followed by stimulus-dependent exocytosis.

NSF IOB-0620607, 08/06 - 09/09

Title: Primordial Germ Cell Determination in Basal Deuterostomes

Principal Investigator: Gary M. Wessel

Goals: This project examines the mechanism used by embryos to ascribe a fate of primordial germ cell to a small subset of its population.

National Institutes of Health HD28152, 04/08 - 03/12

Title: The Egg-to-Embryo Cell Surface Transition

Principal Investigator: Gary M. Wessel

Goals: This project examines the mechanisms of the cell surface changes that occur on the egg essential for initiating early embryonic development.