Jan.30-Feb.1, 2007
MCB 231
Developmental Biology of Sea Urchins
Fred Wilt

Reading List

1. Reviews and Background

Angerer, L.M., and Angerer, R.C. 2003. Patterning the Sea Urchin Embryo. Curr. Topics Dev. Biol. 53, 159-198

Brandhorst, B.P. and Klein, W.H. 2002. Molecular Patterning along the Sea Urchin Animal-Vegetal Axis. Intern. Rev. Cytol. 213, 183-232.

Developmental Biology, Volume 300, # 1, December 1, 2006. The entire issue consists of articles on the sea urchin genome.

Ettensohn, C.A., and Sweet, H.C. 2000. Patterning the Early Sea Urchin Embryo. Curr. Topic Dev. Biol. 50, 1-44.

Horstadius, S. 1973. Experimental Embryology of Echinoderms. Clarendon Press, Oxford.

The Genome of the Sea Urchin Strongylocentrotus purpuratus. 2006. The Sea Urchin Genome Sequencing consortium. Science, 314, 941-952.

2. Cell Biology of Gastrulation

Ettensohn, C.A. 1984. Primary invagination of the vegetal plate during sea urchin gastrulation. Am. Zool. 24, 571-588.

Kimberly, E.L., and Hardin, J. 1998. Bottle Cells are required for the Initiation of primary invagination in the sea urchin embryo. Dev. Biol. 204, 233-250.

Croce, J., Duloquiin, L, Lhomond, G., McClay, D.R., and Gache, C. 2006. Frizzled 5/8 is required in secondary mesenchyme cells to initiate archenteron invaginatiion during sea urchin development. Develop. 133,547-557.

Beane, W.S., Gross, J.M., McClay, D.R. 2006. RhoA regulates initiation of invagination, but not convergent extension, during sea urchin gastrulation. Dev.Bio. 292,213-225.

3. Early Cell Specification

Angerer, L.M., Oleksyn, D.W., Levine, A.M., Li, X., Klein, W.H., and Angerer, R.C. 2001. Sea urchin goosecoid function links fate specification along the animal vegetal and oral-aboral axes. Develop. 128, 4393-4404.

Bradham, C.A., and McClay, D.R. 2006. p38 MAPK is essential for secondary axis specification and patterning in sea urchin embryos. Develop. 133,21-32**.

Coffman, J.A., McCarthy, J.J., Dickey-Simms, C., and Robertson, A.J. 2004. Oral-aboral axis specification in the sea urchin embryo II. Mitochondrial distribution and redox state contribute to establishing polarity in *Strongylocentrotus purpuratus*. Dev. Biol. 273,160-171.

Duboce, V., Rottinger, E., Besnardeau, L, and Lepage, T. 2004. Nodal and BMP 2/4 signaling organizes the oral-aboral axis of the sea urchin embryo. Develop.Cell 6, 397-410.

Logan, C.Y., Miller, JK.R., Ferkowicz, and mcClay, D.R. 1999. Nuclear β catetnin is required to specify vegetal cell fates in the sea urchin embryo. Develop. 126, 345-357.

Minokawa, T., and Amemiya, S. 1999. Timing of the potential of micromere-descendants in echinoid embryos to induce endoderm differentiation of mesomere descendants. Develop. Growth Differ. 41, 535-547.

Rottinger, E., Croce, J., Lhomond, G., Besnardeau, L, Gache, C. Lepage, T. 2006. Nemo-like kinase acts downstream of Notch/Delta signaling to downregulate TCF during mesoderm induction in the sea urchin embryo. Dev. 133,4341-4353.

Oliveri, P., Walton, K.D., Davidson, E.H., and McClay, D.R. 2006. Repression of mesodermal fate by foxa, a key endoderm regulator of the sea urchlin embryo. Dev. 133,4173-4181.**

Peterson, R.E. and McClay, D.R. 2005. A Fringe-modified Notch signal affects specification of mesoderm and endoderm in the sea urchin embryo. Dev. Biol. 282,126-127/

Sweet, H. C., Hodor, P.G., and Ettensohn, C.A. 1999. The role of micromere signaling in Notch activation and mesoderm specification during sea urchin embryogenesis. Develop. 126,5255-5265.

Sweet, H.C., Gehring, M., and Ettensohn, C.A. 2002. LvDelta is a mesoderm-inducing signal in the sea urchin embryo and can endow blastomeres with organizer-like properties. Develop. 129, 1945-1955.

Weitzel, HK.E., Illies, M.R., Byrum, C.A., Xu, R., Wikramanayake, A.H., and Ettensohn, C.A. 2004. Differential stability of β-catenin along the animal-vegetal axis of the sea urchin embryo mediated by dishevelled. Develop. 131, 2947-2956.

4. Promoter Bashing

Yuh, C.H. and Davidson, E.H. 1996. Modular cis-regulatory organization of Endo16, a gut-specific gene of the sea urchin embryo. Develop. 122,1069-1082.

5. Gene regulatory networks

Davidson, E.H., and 24 other authors. 2002. A provisional regulatory gene network for specification of endomesoderm in the sea urchin embryo. Dev. Biol. 246,162-190.

Minokawa, T., Wikramanayake, A.H., and Davidson, E. H. 2005. cis-Regulatory inputs of the wnt8 gene in the sea urchin endomesoderm network. Dev. Biol. 288k545-558.

Oliveri, P., Carrick, D.M., and Davidson, E.H. 2002. A regulatory Gene Network that directs micromere specification in the sea urchin embryo. Dev. Biol. 246,209-228.

de Leon, S. B-T, and Davidson, E.H. 2006. Deciphering the Underlying Mechanism of Specification and Differentiation: The Sea Urchin Gene Regulatory Network. In Science, STKE of Nov. 14, 2006. www.stke.org/cgi/content/full/2006/361.pe47

6. Organogenesis: Spicule formation

Cavalieri, V ., Spinelli, g., and DiBernardo, M. 2003. Impairing Otp homeodomain function in oral ectoderm cells affects skeletogenesis in sea urchin embryos. Dev. Biol. 262,207-118.

Wilt, F.H. (2002). Biomineralization of the Spicules of Sea Urchin Embryos. Zool. Sci. , 19,253-261.

Wilt, F.H., and Ettensohn, C.E. 2007. Morphogeneisis and biomineralizatiion of the sea urchin larval endoskeleton. In, "Handbook of Biomineralization" (E. Baeuerlein, Ed.) Wiley-VCH, Weinheim. pp. 181-210.

** Paper for discussion on Feb. 2