

Cologne Evolution Colloquium

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Molecular Basis of
Evolutionary Innovations
SFB 680

Establishment of dorsal/ventral asymmetry in the sea urchin embryo

During development of the sea urchin embryo, patterning along the Dorsal/Ventral (DV) axis relies on molecular cues emanated by an organizer centre located within the ventral side. Although the nature of such an organizer is intimately linked to the expression of *Nodal*, the mechanisms that allow the initial breaking of the symmetry are not completely understood.

In the Mediterranean sea urchin *Paracentrotus lividus*, the *hbox12* homeobox-containing gene is expressed by prospective dorsal cells, spatially facing and preceding the onset of *nodal* transcription. In a recent paper [Cavalieri and Spinelli (2014). *eLife* 3:e04664], I have shown that misexpression of *hbox12* provokes DV abnormalities, attenuating both *nodal* and *nodal*-dependent transcription. Reciprocally, impairing *hbox12* function disrupts DV axis formation by allowing ectopic expression of *nodal* across the embryo. Clonal loss-of-function, imposed by either blastomere transplantation or gene-transfer assays, highlights that Hbox12 action in prospective dorsal cells is necessary for proper DV polarization. Remarkably, the localized knock-down of *nodal* restores DV polarity of embryos lacking *hbox12* function. Intriguingly, Hbox12 emerged as a dorsal-specific negative regulator of the p38-MAPK, which is known to be required for the activation of *nodal* expression.

This study therefore assigns a functional role to *hbox12*, the earliest known regulatory gene expressed by non-organizer cells and involved in the mechanisms that allow competence for spatial positioning of the DV organizer.

Friday, February 20, 2015, 17:00 c.t.
University of Cologne, Institute for Genetics
Seminar Room 0.34

Hosted by Thomas Wiehe