



# BIOLOGY COLLOQUIUM

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Hosted by A/P Christoph Winkler



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## Maternal Control of Embryonic development

Patterning of metazoan embryos with high fidelity requires the coordinated action of maternal and zygotic macromolecular factors. Since gene expression activity is minimal during early embryonic stages, maternal RNA and protein factors deposited during oogenesis play a major role in the earliest steps of embryonic patterning. In zebrafish, the earliest steps of axis formation are also regulated by maternal factors. We previously showed that maternal transcripts of the Nodal-related signaling factor, Squint (Sqt), are localized to future embryonic dorsal cells. Nodal signaling is critical for embryonic germ layer patterning, axis formation, and maintenance of human embryonic stem cell pluripotency. We have identified a non-coding function for sqt RNA in formation of dorsal structures. We biochemically purified and identified a role for conserved Y box-binding protein 1 (Ybx1) in regulation of maternal Nodal signaling. *Ybx1* recognizes the 3' un-translated region (UTR) of sqt RNA, and prevents premature translation and deregulated Sqt/Nodal signaling. Loss of maternal *Ybx1* function leads to gastrulation failure and embryonic lethality. Implantation of beads coated with Nodal protein can phenocopy *ybx1* mutant defects. Our findings show that maternal *Ybx1* prevents ectopic maternal Nodal signaling by translational inhibition, and reveal a new paradigm in regulation of Nodal signaling, which is likely to be conserved.