

**Stony Brook University
The Graduate School**

Doctoral Defense Announcement

Abstract

Developmentally Regulated Transcription Elongation in the *Drosophila* Embryo

By

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For *Drosophila* embryos, gastrulation happens within a 30 minute window, spanning the completion of cellularization and the beginning of germ band extension. During this short time period, the segmentation pattern is established, as cell fates are specified at a single-cell level of resolution. Transcription plays an important role during this critical stage. The simple combinatorial rules for regulation of the *sloppy-paired-1* (*slp1*) gene by the pair-rule transcription factors during early embryogenesis offer a unique opportunity to investigate the molecular mechanisms of developmentally regulated transcription. We found that the initial repression of *slp1* in response to pair-rule factors *Runt* and *Fushi tarazu* (*Ftz*) does not involve chromatin remodeling, or histone modification. Instead, in *slp1*-repressed cells, RNA-polymerase II initiates transcription at the *slp1* promoter and pauses downstream in a complex that includes negative elongation factor (NELF). Additionally studies indicated that NELF is maternally provided and recruited to gene promoters prior to their transcription. Further functional studies demonstrated that NELF plays a pivotal role in transcriptional regulation during this critical stage of *Drosophila* embryogenesis.

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