



BIOINFORMATICS 2015 SPRING SEMINAR SERIES

Hosted by: Department of Computer and Information Sciences,
Department of Electrical and Computer Engineering &
Center for Bioinformatics and Computational Biology

<http://bioinformatics.udel.edu/seminars>

MONDAY, March 2, 2015

3:30pm

DBI Room 102

Precision and Reproducibility in Development

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ABSTRACT: Identical body plans across a species result from precise and reproducible embryonic development. However, the environment for developmental processes can be quite variable, and crucial signals inside the embryo are carried by so few molecules that we might expect development to be noisy. It is thus unclear how precision is achieved along the developmental path. Should we imagine that every step in the process is sloppy, so that the result is reproducible only because of error correction mechanisms? Or might each step be more reliable than previously intuited, squeezing as much information as possible out of a limited number of molecules? Using the fruit fly as a model system, our recent work shows that from the macroscopic features of the body plan precision can be traced, through several steps, back to the counting of essential signaling molecules placed in the egg by the mother. Absolute concentrations of molecules are reproducible to better than 10%, which translates to a spatial accuracy in a developing embryo sufficient to distinguish each cell from its neighbor, arguably the highest precision that the organism could achieve. These results argue for an evolutionary design principle by which developmental systems operate near an optimal level of precision.