Title and Abstract: RECOMB 2004 plenary talk by William McGinnis

# Evolutionary change in developmental genetic networks

The different combinations of genes that are active in different cells control the development and diversity of multicellular organisms. The codes that control this process, written in both cis-regulatory and protein-coding DNA sequence, are poorly understood. Decoding those sequences will require many experimental and bioinformatic approaches. One approach that will be useful is discovering the nodal control points that change when genetic networks evolve to change form and function. Recent discoveries will be described on the molecular changes in a network that modifies limb number during arthropod evolution. Another important experimental approach useful to decoding is the determination of precise gene expression patterns during model organism development, including which expression patterns are conserved and which are variable. A new approach has been developed that involves assigning spectral barcodes to many different nascent transcripts in developing animal nuclei. This will allow the rapid determination of precise spatial domains of transcriptional activation, and the construction of virtual embryos with complete maps of combinatorial gene expression.