

Invited Talk

Imaging-Based Systems Biology

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Arguably the most significant contribution of the human genome project is that we can now build a recombinant construct of every gene and every promoter in *C. elegans* (worm), *D. melanogaster* (fly), *M. musculus* (mouse), and *H. sapiens* (human). These include fluorescent proteins and other markers that can be induced at controlled time points via a change in temperature, light, or chemistry. Combined with tremendous advances in light and electron microscopy in recent years, I believe we are now poised to visualize the meso-scale of the cell, and development and small organs (e.g. a fly's brain) at the resolution of individual cells.

Toward this end, my group is working on a number of preliminary imaging projects along these lines. These include (a) studies of development and gene expression in worms and flies, (b) the biophysics of mitosis, (c) neural patterning in flies and mice, and (d) the interpretation of signals from a new sub-wavelength resolution light microscope. We describe preliminary results on limited data sets and extrapolate on what we might be able to infer from such data. We further speculate on the potential implications of such work for the future of molecular biology.