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Richard Yamada* (ryamada@umich.edu), 530 Church Street, 2074 East Hall, Ann Arbor, MI 48109-1043. *What can noise do for you? Understanding the role of molecular noise in mammalian time-keeping.*

Biological cells can best be described as a complex machine; the cell's survival depends on regulating many processes and transporting materials with exacting precision. Each of these individual cells contain a wide array of macromolecules, including proteins and messenger ribo-nucleotide triphosphates (mRNA). However, the specific number of particular proteins (such as activators and repressors) and mRNA molecules is hypothesized to be small. Thus, fluctuations in molecular number (i.e. molecular noise) may play an important role in affecting cellular physiology, such as transcription regulation and post-translational modifications.

In this talk, we discuss the effect of noise on an important physiological process: cellular time-keeping. Specifically, we explore the role of molecular noise at both the intra-cellular and inter-cellular level. We will see that biological phenomena presents us with interesting questions that can be further simplified (as 'toy models') for mathematical analysis. We then conclude with a brief discussion of the mathematical tools that must be developed in order to properly understand the results from these models. (This talk is joint work with Joseph Takahashi, Caroline Ko, David Welsh, Kara Fulton, and Danny Forger.) (Received August 15, 2010)