

## Randomness and precision: using experiment and theory to understand epigenetic regulation

*Thursday, August 10, 2023 4:10 PM (50 minutes)*

I am a molecular biologist on a journey towards theoretical biology. My field of research is epigenetic gene regulation by the Polycomb and Trithorax groups of proteins. I am fascinated by the apparently incompatible properties of randomness and precision in this system, both of which have been observed experimentally.

The field of Polycomb and Trithorax regulation has seen a rapid expansion in the last 20 years, fuelled in part by an explosion of high-throughput technologies enabling the generation of vast amounts of data. Like any large, fast moving field, different ideas have risen to popularity, not only due to their scientific merits but also for more esoteric reasons. These latter include catchy names for ideas, misconceptions of journalists about the magical properties of the epigenome, and a tendency amongst scientists to assume that things must be very different between mammals and fruit flies.

I will use examples from the field and from my own research to present the case for biologists to make more use of mathematical modeling and theoretical thinking, as a way to question dogma, to reconcile apparently conflicting experimental observations, to convert information into understanding, and perhaps most importantly, to raise good questions about what we still don't understand.

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