Project title: **Mapping non-equilibrium fluctuations in the developing fly embryo**

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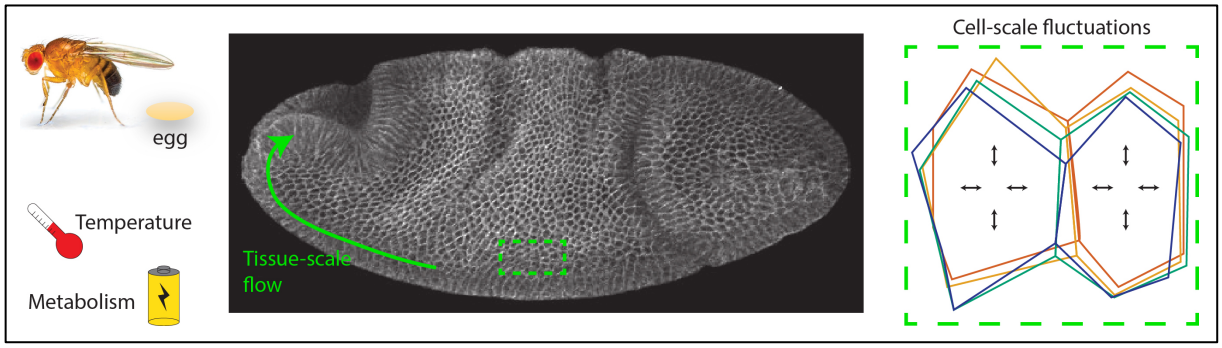
Concepts and objectives:

Cold-blooded animals, which cannot regulate their temperature, develop faster in hot environments than in cold ones – but they achieve the same final form. This simple observation is actually very surprising since the rates of the many chemical reactions and transport phenomena involved in development do not depend on temperature in the same way, and so well-understood thermal effects must be actively compensated by yet-unknown regulation mechanisms. Can we map the contributions of these active mechanisms in space and time by measuring metabolic rates and non-equilibrium fluctuations in live organisms?

The student will tackle this problem by investigating the temperature dependence of Drosophila embryo development, a model organism uniquely suited to decoupling the effects of thermal and actively-regulated processes. By combining live-imaging of the embryo under different, controlled conditions with modern analytic tools to quantify non-equilibrium fluctuations in a non-intrusive way, they will establish a first multi-scale activity map of the developing embryo. This will open a new window towards understanding the robustness of life to environmental perturbations.



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