



20th CDE international seminar (online)

Mar 11th (Fri), 17:00-18:00 (Japan time) [Lang: English]

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<https://ki.se/en/cmb/rickard-sandbergs-group>

Decoding Transcriptional Regulation and Kinetics Using Single-Cell Transcriptomics

Click this URL for registration (free event)

<https://forms.gle/H8bgQBpM8QaJ7F169>

(Zoom URL will be sent to you based on the registered information)

- Abstract -

The advancement of single-cell RNA-sequencing (scRNA-seq) has opened up for transcriptome-wide analyses of transcriptional regulation and dynamics. My lab has developed full-length scRNA-seq protocols (e.g. Smart-seq2, Smart-seq3) used to study allele-resolution gene expression analysis in single cells. We recently inferred transcriptional burst kinetics for both alleles of thousands of endogenous genes using allele-resolution scRNA-seq, which revealed that core promoter elements and enhancers control burst size and frequency, respectively. Metabolic labeling (4sU) together with scRNA-seq can provide improved time-resolution for inferred transcriptional kinetics, that we are exploring. Having transcriptome-wide readouts of bursting kinetics opens up for more detailed investigations into patterns of transcriptional dynamics in response to the perturbation of transcriptional regulators and co-factors, which we are also actively pursuing. The separation of newly transcribed and pre-existing RNAs in single cells enables us to also investigate whether any transcriptional units are coordinated, or whether transcription acts uniquely on each gene locus, and potential coordination in post-transcriptional regulation. Altogether, transcriptome-wide single-cell measurements of gene expression enable quantitative investigation of the episodic transcription of our genes, and opens up for mechanistic inquiries into how genomic sequence elements are read by trans-factors to control transcriptional burst sizes and frequencies.

【領域代表より、抜粋】(原文は HP をご覧ください)

過去半世紀の間、生物の進化についての私たちの理解はどれほど深まったろうか。いま目の前にいるちっぽけな虫のかたちすら満足に説明してくれない。進化に関する私の理解はあの頃とあまり変わってはいない。さりとして、このままでよいとも思わない。いよいよ謎を解くべく、何かを始めなければならない。動植物のかたちがなぜこのようなものでなければならないのか、そしてそれが洗練されて行く過程にどのように目的性が入り込むのか、自然選択説や中立説を包含するのみならず、それらが扱うことのできなかった本質的要素を統合することを通じ、本領域は進化生物学の新たな理論体系の構築を目標とする。この試み自体、進化生物学領域における梁山泊であり、自ら新たな潮流となり、進化研究を変える第一歩ならんと欲するものである。

<http://constrained-evo.org/greeting.html>

For all of you who are interested in Evolutionary Biology

We are happy to announce open, online international seminar provided by the research project "Constrained and Directional Evolution" (led by Dr. Shigeru Kuratani).

The aim of this open seminar is to share and discuss over the challenging topics in evolutionary biology, such as Evolvability, Constraints, Directionality in phenotypic evolution etc., and to boost interactions between scientists interested in these topics. It's an open seminar with participation free of charge, and we welcome your participation (Students, Postdocs, PIs etc.)

[Greeting from the chair of this project]

How much has our understanding of biological evolution improved in the past half century? Not even the shape of the tiny insect in front of us now can be satisfactorily explained. My understanding of evolution has not changed much since then. I do not think it's the way it should be. it's good enough. At last, it's time we start doing something to solve the mystery.

Why should the shapes of plants and animals be the way they are? How does purposefulness explain the process of these refinement of shapes? This project aims to construct a new theoretical system of evolutionary biology by not only encompassing natural selection and neutral theories but also integrating essential elements that previous theories failed to address. We hope that this attempt will provide a place for gathering bold challengers, and further leads to a new trend in the field of evolutionary biology.

<http://constrained-evo.org/greeting.html>

進化にご興味のある全ての皆様へ

新学術領域「進化制約方向性 (倉谷代表)」公開オンラインセミナーのお知らせです。表現型進化の方向性、拘束、進化可能性といった概念や問題について、考え、議論したり新たな考えや人の相互作用をもたらすための不定期で行う国際オンラインセミナーです(公開。参加費無料)。フランクなオンラインミーティングです。大学院生の方々も広くご参加いただけましたら幸いです。近くに興味を持たれそうな方がおられましたらお声がけいただけると幸いです。