



# 10th CDE international seminar (online)

July 27th (Tue), 14:00-15:00 (Japan time) [Lang: English]

## Dr. Vikas Trivedi

(Group Leader, EMBL)

<https://www.embl.org/groups/trivedi/>

# Axial organization in animal development: a synthetic approach.

Click this URL for registration (free event)

<https://forms.gle/SYgLGiXZCChu2seKA>

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

### - Abstract -

The metazoan body plan is established during early embryogenesis via collective cell rearrangements and evolutionarily conserved gene networks, as part of a process commonly referred to as gastrulation. While substantial progress has been achieved in terms of characterizing the embryonic development of several model organisms, underlying principles of many early patterning processes nevertheless remain enigmatic. Despite the diversity of (pre-)gastrulating embryo and adult body shapes across the animal kingdom, the body axes, which are arguably the most fundamental features, generally remain identical between phyla. Recently there has been a renewed appreciation of *ex vivo* and *in vitro* embryo-like systems to model early embryonic patterning events. Through our work with 3D cell aggregates from different species (mouse embryonic stem cells and zebrafish blastula cells, which we term gastruloids and pescoids respectively) we aim to explore the similarities in morphogenesis as well as associated gene expression dynamics that may reveal an evolutionarily conserved developmental mode as well as provide further insights into the role of external or extraembryonic cues in shaping the early embryo. We study how these cell aggregates generate spatial asymmetries in gene expression and cell behavior within otherwise equivalent groups of cells, to develop a global coordinate system (body axes) *de novo*. Combining light-sheet imaging with genetic labelling of cells we are now gaining some insights into the spatio-temporal precision and species-independent manner, with which such 3D embryonic cell aggregates generate the major body axes even in the absence of any embryonic information. Using these embryonic organoids, as a minimal alternate system, sufficient to generate embryonic axes, we aim to understand early development in embryos as an emergent phenomenon of the self-organization of pluripotent cells.

### 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。

### 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>

### [領域代表より、挨拶] (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だろうか。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。

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