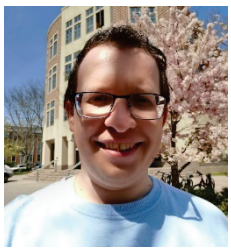
MAX PLANCK INSTITUTE
FOR DYNAMICS AND SELF-ORGANIZATION
MAX PLANCK INSTITUTE
FOR MULTIDISCIPLINARY SCIENCES

FASSBERG-Colloquium

A theory of multicellularity

Dr. Yuriy Pichugin

Department of Ecology and Evolutionary Biology
Princeton University, USA



For our distant ancestors who lived two billion years ago, their entire body was made of just a single cell. Yet, with time passing, multicellular species evolved and now, they constitute an astonishing diversity of macroscopic organisms we observe in nature. But to get there, multicellular lineages needed to evolve a number of adaptations to transform from selfish cells to organisms of millions of interconnected cells coherently acting as a unit. Understanding how multicellularity evolved constitutes one of the most challenging problems in modern evolutionary biology. Many fundamental questions about this transition remain unanswered: Why did individual cells turn to live in colonies? Under which conditions can these colonies evolve into unified organisms and establish a multicellular life cycle? Why did some of these organisms evolve fantastic complexity: cell differentiation, sophisticated body plans, and intricate life cycles, while others did not? I will present the view on the multicellularity emergence through the lens of life cycle evolution. No organism stays the same in the course of life - newborn organisms are not identical to their parents, they must grow and develop before being able to give rise to the next generation. Both uni- and multicellular organisms follow their life cycles but these differ in the complexity of intermediary stages. My talk will cover the evolutionary steps from unicellular life to a simple paradigm multicellular organism. The first one is the transition from a solitary cell to a colonial life form, where it is possible to describe the entire space of all possible clonal life cycles. Then, building on top of this framework, adding dynamic cell types allows for studying the evolution of cell differentiation and for instance, finding the conditions promoting the emergence of dedicated somatic cell lineage - the hallmark adaptation distinguishing a unified organism from a colony of cooperating cells.

Monday, Feb 19th, 2024 at 2:15 pm

MPI-DS, Prandtl Lecture Hall
Am Fassberg 11, Göttingen, and

Zoom Meeting ID: 959 2774 3389
Passcode: 651129, direct link

Max Planck Institute for Dynamics and Self-Organization
Prof. Dr. Ramin Golestanian
Max-Planck-Institute for Multidisciplinary Sciences
Prof. Dr. Jochen Rink
Email: golestanian-office@ds.mpg.de
Am Faßberg 17, 37077 Göttingen, Germany