

OPEN PHD POSITION

in Laboratory of Developmental Mechanobiology

A fully-funded PhD position is available in the Laboratory of Developmental Mechanobiology (led by Teije Middelkoop), which is a part of the Institute of Molecular Genetics (Prague, Czech Republic) and is located in the BIOCEV Centre (Vestec, Czech Republic). Our group is interested in how forces arising in the cytoskeleton of embryonic cells drive embryonic shape generation in early *C. elegans* embryos. In this project the successful candidate will establish novel optogenetic methodology to experimentally control cytoskeletal force-generation with tight spatiotemporal precision.

About the research group

Our interdisciplinary research operates at the intersection between developmental genetics and biophysics. On one hand, we exploit the strength of *C. elegans* genetics to experimentally tune molecular-scale force generation. On the other hand, we perform quantitative time-lapse fluorescence microscopy to monitor the effect of perturbed force-generation on 1) cellular-scale mechanics and 2) embryo-scale morphogenesis. Using this methodology, we previously showed that molecular-scale rotatory forces (i.e. torques), generated via an actin polymerase of the Formin family, facilitates morphogenetic reorientations of embryonic cells.

About the research project

In order for development to occur normally, cytoskeletal forces must be tightly regulated in space and time. Therefore, a mechanistic understanding of morphogenesis inevitably requires spatiotemporal control over these forces in experiment. In recent years, optogenetics has been used to facilitate spatiotemporal control over biological processes. This methodology makes use of light-sensitive protein domains that can either recruit proteins of interest or modulate enzymatic activity in a light-sensitive manner. In this project the successful candidate will adopt novel optogenetic methodology to gain spatiotemporal control over cytoskeletal force generation in *C. elegans*. To this end, she/he/d will optogenetically target molecular-scale force generators, like myosins and formins, and their upstream activators and monitor the effect on morphogenesis. Importantly, our preliminary results already show proof-of-principle of this approach. As this project will involve molecular biology, transgenesis, fluorescence time-lapse imaging and quantitative image analysis, it will provide a highly versatile and cross-disciplinary training. At the

same time, it will pave the way towards a detailed mechanistic understanding of the physical principles underlying morphogenesis.

About the candidate

Candidates should have a MSc degree in biology, biophysics, biochemistry, engineering or equivalent. The candidate should be enthusiastic about performing interdisciplinary work outside of her/his/d comfort zone and be open to collaborate with scientists from various disciplines. Experience in any of the methodology described above will be considered positively.

About the Institute

The Laboratory of Developmental Mechanobiology at the Institute of Molecular Genetics (IMG) is situated in the BIOCEV Centre (www.biocev.eu), which is a collaborative project of 6 institutes of the Czech Academy of Sciences. Both the BIOCEV Centre and the IMG come with state-of-the-art research infrastructure, including top-notch microscopy facilities.

We offer

- A fully funded PhD position, for four years.
- Interdisciplinary training at the interface between developmental biology and biophysics.
- A collaborative scientific environment with state-of-the-art microscopy facilities.
- Full focus on research without teaching obligations.

For more information

Visit the website(s):

www.middelkooplab.com

www.img.cas.cz/research/teije-corneel-middelkoop/

To apply

Written applications should include a cover letter, a structured CV and contact information of three potential references, and can be sent to the group leader: Teije Middelkoop, teije.middelkoop@img.cas.cz