

3D modeling of the morphogenesis of embryos and tissues

Job application portal: <https://bit.ly/2Kp79uT>

Deadline: mid-January 2021

Place: Collège de France
Center for Interdisciplinary Research in Biology
11, place Marcelin Berthelot, 75005 Paris

Team: *Multiscale Physics of Morphogenesis* www.turlierlab.com

Supervision: Hervé Turlier, team leader herve.turlier@college-de-france.fr
Phone: +33.1.44.27.14.10

Duration: 24 months, starting Feb 2021 - possibility to extend to 36 months

Salary: between € 2,200 and € 2,500 net monthly depending on experience

Activities: This project aims to develop a generic model of multicellular dynamics, including its mechanical and biochemical aspects, focusing on the development of early embryos and small tissues. The project is part of the ERC DeepEmbryo project led by Hervé Turlier, whose goal is to reverse-engineer the development of embryos by combining biophysical and machine learning methods. It will thus include strong theoretical and numerical aspects, but it will also be applied directly to concrete problems of morphogenesis, in collaboration with several biologists.

Missions: The successful candidate will develop physical and numerical models of the development of embryos and biological tissues. Its role will be to develop a generic modeling framework for multicellular interactions in embryos. She/he will have to work with the other members of the team and will work closely with several biologists. She/he will have to present her/his results at scientific conferences, to write scientific articles and to actively participate in the scientific and social life of the team and of the host Institute.

Expected profile: The candidate should hold a PhD in physics and demonstrate very good computer skills (C++ and python). A PhD in applied mathematics or computer science is also possible if the candidate has already been exposed to the modeling of biological problems. She/he should have already demonstrated the ability to publish in international peer-reviewed scientific journals. Prior experience in biophysical modeling and collaborating with biologists will be particularly appreciated. In addition, a strong desire to acquire new skills in artificial intelligence methods (deep-learning), which may be associated with this project, will be necessary. A great autonomy in work, initiative, and proficiency in English as well as good communication skills are expected.

Working environment: The successful candidate will be welcomed into the interdisciplinary team "Multiscale physics of morphogenesis" led by Hervé Turlier which will have around 8 to 10 people by 2021. The team is located at the Collège de France, in the heart of the Latin Quarter in Paris. Integrated within the PSL University, and close to other major institutions such as the Ecole Normale Supérieure and the Institut Curie, the Collège de France constitutes an exceptional scientific environment unique in the world.

The successful candidate will have access at an individual workstation in renovated premises, to a powerful laptop and to a high performance computing cluster fully dedicated to the team (648 CPUs, Nvidia DGX A100 and DGX Station and 1Po storage).

1. J.G. Dumortier, M. Le Verge-Serandour, A.F. Tortorelli, A. Mielke, L. de Plater, H. Turlier*, & J.L. Maître*. (2019). Hydraulic fracturing and active coarsening position the lumen of the mouse blastocyst. *Science*, 365: 465-468.
2. J-L. Maître, H. Turlier, R. Illukkumbura, B. Eismann, R. Niwayama, F. Nédélec, T. Hiragi. Asymmetric division of contractile domains couples cell positioning and specification. *Nature* 536: 344-348 (2016).
3. H. Turlier*, B. Audoly, J. Prost, J-F. Joanny, Furrow Constriction in Animal Cell Cytokinesis. *Biophysical Journal* 106(1): 114-123 (2014).