**Acquiring and maintaining bilateral symmetry in *Parhyale hawaiensis***

Lead supervisor: Léo Guignard

Co-supervisor 1:

If applicable, name of co-supervisor 2:

**Abstract** (10 lines)

Join our dynamic and collaborative research consortium as an Interdisciplinary Scientist, at the exciting crossroads of **Computer Science** and **Developmental Biology**. In collaboration with leading labs in Greece and the USA, you will contribute to an exciting **HFSP-funded** project, aimed at unraveling the intricate **molecular and mechanical mechanisms governing ectoderm bilateral symmetry in the crustacean Parhyale hawaïensis embryos**. This position offers a unique opportunity to drive innovation at the interface of cutting-edge computational techniques and biological insights.

**We look forward to welcoming a passionate and creative scientist to our consortium, driving transformative discoveries in the field of developmental biology through computational innovation.**

**Keywords**

Computer vision, Spatial transcriptomics, developmental biology

**Objectives**(5 lines)

**Algorithm Development (Python)**

Utilise and enhance existing algorithms to analyse of both morphological and molecular data, acquired through light-sheet fluorescence microscopy and near single cell spatial transcriptomics, respectively.

Develop innovative computational methods for creating average atlases of *Parhyale hawaïensis* ectoderm development during embryogenesis.

Pioneer the creation of algorithms that seamlessly integrate morphological and molecular information within the atlases, pushing the boundaries of interdisciplinary research.

**Big Data Analysis**

Implement machine learning techniques to analyse complex datasets and identify patterns, trends, and potential mechanisms underlying symmetry acquisition and maintenance.

**Expected profile**(5 lines)

A Ph.D. in Computer Science, Computational Biology, Bioinformatics, Biology, or a related field.

Strong programming skills, with proficiency in languages such as Python, R, or similar.

Experience in algorithm development and data analysis, particularly in the context of biological data.

Familiarity with machine learning techniques and data integration approaches.

Excellent communication skills, both written and verbal, for effective collaboration and dissemination of results.

Ability to work in interdisciplinary teams and adapt to new challenges.

English fluency (at least B2 on the CEFR).

**Is this project the continuation of an existing project or an entirely new one?**

**In the case of an existing project, please explain the links between the two projects (5 lines)**

**2 to 5 references related to the project**

[Wolff et al. eLife 7:e34410 (2018)](https://doi.org/10.7554/eLife.34410)

[Kumar et al. Nat Genetics, 55, 1176–1185 (2023)](https://www.nature.com/articles/s41588-023-01435-6)

[McDole et al. Cell, 175, 3, 859 - 876.e33 (2018)](https://www.cell.com/cell/fulltext/S0092-8674%2818%2931243-1)

**3 main publications from each PI over the last 5 years**

Sampath Kuma A., Tian L., Bolondi A., Stickel R., Herna ́ndez A., Walther M., Haut L., Murray E., Wittler L., Kretzmer H., Timmermann B., Elkabetz Y., Macosko E.†, Guignard L.†, Chen F.†, Meissner A.†, Spatiotemporal transcriptomic maps of whole mouse embryos at the onset of organogenesis. Nature Genetics, 55, 1176–1185

Guignard L.∗, Fiuza U.-M.∗, Leggio B., Laussu J., Faure E., K., Michelin G., Biasuz K., Hufnagel L., Malandain G., Godin C., Lemaire P., Contact area-dependent cell communication and the morphological invariance of ascidian embryogenesis, Science, 369(6500):eaar5663

McDole K.†, Guignard L.†, Amat F., Berger A., Malandain G., Royer L., Turaga S., Branson K., Keller P.†, In Toto Imaging and Reconstruction of Post-Implantation Mouse Development at the Single-Cell Level, Cell, 175(3):859-876