



Master Biologie Moléculaire et Cellulaire 'BMC',
Université Paris Cité - UFR Sciences du Vivant

Parcours : **Biologie et Développement Cellulaires 'BDC'**

<http://www.master2bdc.fr/>

Fiche de Projet de Stage de M2, 2022-2023

Unité INSERM ou CNRS ou Université : Institut Pasteur	Responsable du Stage : Thibaut Brunet
Intitulé Equipe : Evolutionary cell biology and evolution of morphogenesis	Contacts Adresse : Institut Pasteur, 25-28 rue du docteur Roux 75015 Paris
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Titre du projet : Emergence of multicellularity and collective behavior in a close relative of animals

Résumé du Projet de Stage (en 300 mots maximum, mots clés en gras)

Our lab investigates a key transition in our evolutionary history: **the switch from unicellular to multicellular organisms**. Our model system are **the choanoflagellates**, a group of aquatic microeukaryotes which are the closest living relatives of animals and can reversibly switch between unicellular and multicellular lifestyles. We are generally interested in **the emergence and control of shape in choanoflagellates**, both at the unicellular and at the multicellular levels, on both slow timescales (morphogenesis) and fast timescales (behavior). We have recently discovered a new choanoflagellate species, ***Choanoeca flexa*** (Brunet et al., *Science* 2019) which makes large sheet colonies resembling a « swimming epithelium ». These colonies are contractile and are capable of rapid inversion of their global curvature in response to environmental stimuli in order to modulate swimming and feeding behaviors. However, little is known about the development of these colonies and the potential communication between cells during collective contractions. During the internship, the candidate will use a combination of biochemistry, functional genetics, optogenetics and live imaging to dissect intercellular interactions during *C. flexa* development and behavior.

Publications de l'équipe relatives au projet de stage (max 5)

1. Reyes-Rivera, J., Wu, Y., Guthrie, B., Marletta, M. A., King, N., & Brunet, T. (2022). Nitric oxide signaling controls collective contractions in a colonial choanoflagellate. *Current biology* : CB, S0960-9822(22)00586-3. doi: 10.1016/j.cub.2022.04.017
2. Brunet, T.*, Larson, B. T.*, Linden, T. A.*, Vermeij, M. J. A., McDonald, K., and King, N. (2019) Light-regulated collective contractility in a multicellular choanoflagellate. *Science* 366, 326-334 doi: 10.1126/science.aay2346
3. Brunet, T., and King, N. (2017) The origin of animal multicellularity and cell differentiation. *Dev. Cell* 43, 124-140 doi: 10.1016/j.devcel.2017.09.016