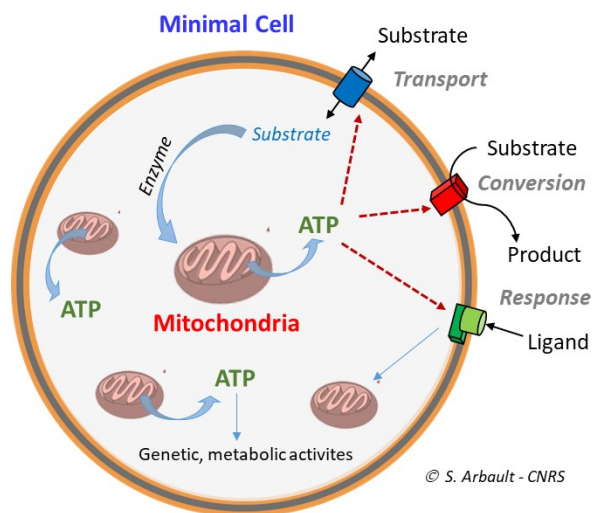


Development of Bioenergetic Hybrid Synthetic Cells

Thesis project : The objective is to develop synthetic or minimal cells based on giant biomimetic liposomes in which bioenergetic enzymes and mitochondria will be integrated. Intact isolated mitochondria will provide minimal cells the ability to produce biochemical energy, namely ATP generation, in order to fuel other membrane, metabolic, proteic or genetic activities. Preliminary results obtained by CBMN and IBGC teams showed the possibility to manipulate, monitor and energize individual mitochondria within micro-compartments. Giant biomimetic liposomes will be prepared from synthetic-natural lipids (GUVs) and from microvesicles produced at cell plasma membranes, i.e. GPMVs, which directly integrate protein (enzyme, pore, etc.) and lipid components of the original cell membrane. Fuelling of the oxidative phosphorylation will be achieved owing to substrates' enzymatic production and transport at the membrane; these processes will be studied in collaboration with several teams at the University of Bordeaux involved in the *Frontiers of Life - FoL* project. The final goal is to develop a new generation of autonomous, long-term working, biocompatible, bioenergetic minimal cells.



Publications by the teams : *Analytical Chemistry*, **2016**, *88*, 6292; *Integrative Biology*, **2016**, *8*, 836; *J. Biol. Chem.*, **2018**, *33*, 12843; *Biosensors Bioelectronics*, **2019**, *126*, 672; *Cells*, **2019**, *4*, 287; *Cell. Molecular Life Sciences* **2020**, *3*, 455; *Frontiers*, **2020**, *10*, 1333; *Advanced Biology*, **2021**, *5(7)*, 2100484; *Mitochondrial Medicine: Methods&Protocols*, **2021**, 153–163. Springer; *Angewandte Chemie*, **2021**, *16*, 18742-18749; *Analytical Chemistry*, **2021**, *93 (39)*, 13143–13151.

Expected candidate's profile. MSc or Engineer degree in biochemistry, biophysics, chemical biology or bioanalytical chemistry with a strong interest for interdisciplinary research and methodological developments. The University of Bordeaux is an equal opportunity employer that supports gender equality.

Work environment. The thesis will be supervised by Drs Stéphane ARBAULT (DR CNRS), CBMN Institute, and Anne DEVIN (DR CNRS), IBGC Institute at the University of Bordeaux, France. These institutes provide cutting-edge facilities and knowledges in bioenergetics, mitochondrial metabolism, biophysics of synthetic and natural membranes, membrane proteins, spectro-electrochemistry, microscopies, etc. Supervisors have a long-term collaboration (2 PhDs, 3 post-docs, 2 masters co-supervised). The candidate will also be involved in collaborations with other teams within the *FoL* network (<https://frontiersoflife.wordpress.com/>).

Application. The PhD is expected to start in September/October 2022. Applications including a CV, the last academic transcripts and a motivation letter related to the project and minimal cell development should be sent to: stephane.arbault@u-bordeaux.fr, anne.devin@u-bordeaux.fr