

INTERNSHIP PROPOSAL

Institute and Group: BIG, group LCBM

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Research project title: Characterization of photosynthesis in green microalgae living in an extreme environment

5 Keywords to describe the project: Photosynthesis, microalgae, detoxification

Description of the project (aims, experimental techniques, recommended background):

We have recently isolated a new green microalga from the cooling pool of a nuclear reactor. This microalga possesses exceptional radioresistance properties and strongly concentrates certain pollutants, making it an organism of choice for novel biotechnologies for the depollution of environmental waters and of industrial effluents. In its original biotope, the microalga is submitted to a strong nutritive stress as the pool contains deionized water. Photosynthesis is at the basis of the growth of this phototrophically grown microalga. Controlling its growth is also essential for any biotechnology application.

The aim of the project is to decipher the function of the photosynthetic apparatus of this microalga under different growth conditions. The student will (i) optimize the growth medium after analysing the elemental composition of the microalga grown in different conditions, (II) compare the function of photosynthesis in classical/optimal conditions, and (III) seek for the presence of the protein complexes of photosystem in this peculiar microalga in these conditions.

Experimental techniques: microalgal cultivation, *in vivo* spectroscopic and fluorimetric (chlorophyll fluorescence) measurement of photosynthesis, polarography, Western Blot, elemental analysis by inductively coupled plasma-mass spectrometry.

Background: Microbiology, biochemistry, interest in plant biology

Relevant publications of the team:

1. Rivasseau C., Farhi E., Compagnon E., de Gouvion Saint Cyr D., van Lis R., Falconet D., Kuntz M., Atteia A., Couté A. (2016) *Coccomyxa actinabiotis* sp. nov. (Trebouxiophyceae, Chlorophyta), a new green microalga living in the spent fuel cooling pool of a nuclear reactor. *Journal of Phycology*. 52: 689-703.
2. Rivasseau C, Farhi E, Atteia A, Couté A, Gromova M, Gouvion Saint Cyr D, Boisson A-M, Féret A-S, Compagnon E, Bligny R. (2013) An extremely radioresistant green eukaryote for radionuclide bio-decontamination in the nuclear industry. *Energy & Environmental Science*. 6: 1230-1239.
3. Petroutsos D, Tokutsu R, Maruyama S, Flori S, Greiner A, Magneschi L, Cusant L, Kottke T, Mittag M, Hegemann P, Finazzi G, Minagawa J. (2016) A blue-light photoreceptor mediates the feedback regulation of photosynthesis. *Nature*. Sep 22;537(7621):563-566.



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