MELiSSA menu impact on crew metabolism: focus on *Arthrospira sp.*

Key words: Photobioreactor, *Arthrospira sp.*, metabolome, genome, food chemistry, functional food.

Abstract: The MELiSSA loop as a regenerative life support system has to provide food to the crew. *Arthrospira sp.* biomass is one of the raw material used as ingredients of several MELiSSA recipes. Although introduced in low amounts, *Arthrospira sp.* biomass has the potential to be used as a functional food, i.e. in the present case with a pharmaceutic function in addition to its nutritional function.

Central metabolism of *Arthrospira sp* has been previously established and verified in well defined culture conditions, which are representative of ideal conditions in the MELiSSA loop. In addition, nutritional potential of *Arthrospira sp* was assessed at the genomic level and preliminary tests on consumer (mice) were performed.

Starting from the state of the art, the proposed PhD project would focus on the study/analysis of *Arthrospira sp.* metabolome, range of chemical/nutritional composition of edible biomass versus culture conditions, and subsequent impact on the crew metabolism. From this task, the project will comprise experimental work on *Arthrospira sp.* and possibly on a selected consumer as a representative of the crew. This work would be done at laboratory scale.

Impact on MELiSSA: assessment of *Arthrospira sp.* as functional food, preparation of future MELiSSA menu assessment through nutrigenomics studies

References:

G. Cogne, J-B. Gros, C-G. Dussap (2003), "Identification of a metabolic network structure representative of *Arthrospira (Spirulina) platensis* metabolism" Biotechnology and Bioengineering, 84: 667-678

N. Morin (2010), "Studies on the response to spaceflight related conditions in the cyanobacterium *Arthrospira sp PCC8005* using a genomic approach", PhD thesis.

Desired knowledge: Candidates preferably possess a degree in microbiology, chemistry, biotechnology or bioengineering. They have to be familiar with metabolic network and fluxes analysis, and food chemistry. Experience in running photobioreactor is an asset.

MELiSSA partners: UMons, UClermont Auvergne, SCK•CEN (B)