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ALGAECOM NEWSLETTER

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EDITORIAL

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New People in the ALGAECOM project

A new postdoctoral researcher has joined ALAGECOM project. He is working in Enzyme Technology Laboratory, Department of Agricultural Biotechnology, Agricultural University of Athens (AUA), in Greece.

Christos Karamitros

"I have been recruited by ALGAECOM project since 1st of August 2014. I will be working for 10 months at the Enzyme Technology Laboratory, Department of Agricultural Biotechnology, Agricultural University of Athens (AUA), Greece.

I graduated from Agricultural University of Athens in 2008 and I obtained my Master's degree in Protein Biotechnology from the same University in 2010 under the guidance of Associate Prof. Dr. Nikolao Labrou. The same year I started my Ph.D. at the Max Planck Institute for Biophysical Chemistry in Göttingen, Germany, under the supervision of Prof. Dr. Manfred Konrad. During my thesis I focused on protein and enzyme biochemistry and biophysics. More specifically, I worked on the development of state-of-the-art high-throughput screening platforms for the characterization of enzyme mutant libraries (resulted from protein engineering schemes) by capitalizing on fluorescence-activated cell sorting (FACS) and droplet-based microfluidic technologies. The ultimate goal of my thesis was the generation of catalytically improved human L-asparaginase enzymes, aiming at the replacement of the bacterial ones which are currently used as anti-leukemic agents and cause numerous side-effects. In parallel, I worked with the development of technologies for drug delivery applications as a complementary approach for the generation of improved protein therapeutics. In parallel to my Ph.D. studies in Germany, I spent four months as exchange student at the Institute of Cell and Molecular Biology at the University of Texas at Austin under the supervision of Prof. Dr. George Geogiou. At Georgiou's lab I had the great opportunity to master my knowledge of protein engineering techniques and applications. In August 2014, after the completion of my Ph.D. studies, I returned to the Enzyme Technology Laboratory at the Agricultural University of Athens and started working for the ALGAECOM project. This period of 10 months I will be focusing on the investigation of the antioxidant content of green algae. Particular attention and concern will be given to the antioxidant enzymes, notably the Superoxide Dismutase (SOD), which plays a pivotal role in scavenging of oxygen-derived free radicals. Algae, like the majority of organisms, encode different types of SODs that are differentiated based on the divalent metal ion, which is complexed with the enzyme and is essential for its activity. Green algae are a unique source for SODs and antioxidant enzymes in general. The endogenous SOD levels may be influenced by a number of different environmental stresses such as high temperature, nitrogen starvation and high salinity. The impact of those factors on the SOD levels will be studied and evaluated by means of enzymatic activity determination employing a wide range of activity assays. Additionally, taking advantage of the extended laboratory experience in chromatographic techniques, I will try to optimize the partial purification of SODs with the lowest possible cost and highest possible simplicity and efficiency. Based on our current knowledge regarding the antioxidant content of green algae, there are very good reasons to believe that appropriate formulations with extracts from those organisms can become high-added value products in cosmetics.

I am convinced that my participation to the ALGAECOM project will be absolutely beneficial for my scientific career and I will enrich my knowledge in a wide range of techniques with particular emphasis on green algae biotechnology. In addition, I will have the great opportunity to interact with scientists coming from different scientific disciplines, thus promoting my global way of thinking. ''

Secondments

Exchanges between members of Apivita and Cermav have been quite important over the last period.

William Helbert, from CERMAV seconded Apivita from April to June 2014. He was trained and did perform some formulation of cosmetic products incorporating Nanochloropsis water/glycerol extract. The physicochemical stability of the formulations was assessed during the secondment.

☆ ☆ ☆ ☆ ☆

Spyridon Georgakopoulos has settled at Cermav for a year Apivita's secondments from October 2014. "I have been recruited into the ALGAECOM project since October 2014 under a 12 month contract by APIVITA SA. I studied chemistry at the University of Ioannina, where I emphasized on the synthesis of natural product analogues. I hold a MSc on coordination chemistry and catalysis from the University of Athens and a PhD that focused on the synthesis of functional dendrimers from the University of Crete. For the next three and a half years I worked as a postdoctoral researcher at the National Hellenic Research Foundation focusing mostly on dendrimer chemistry, catalysis and the application of high power techniques in organic synthesis. As an APIVITA SA employee I was involved in the development of an HPTLC protocol for propolis screening.The purpose of my work in the ALGAECOM project is to purify microalgae extracts and characterize their sugar content.Having a mostly synthetic background I have had the opportunity to work with various techniques for the separation and characterization of compounds. In particular, my previous work on dendrimer chemistry allowed me to gain experience on the handling and manipulation of macromolecules. My involvement in the ALGAECOM project will give me the opportunity to use my expertise under the scope of a different discipline, thus allowing me to broaden my scientific horizons ''

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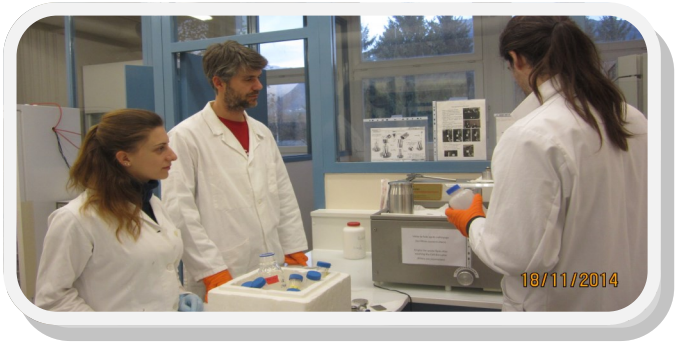

Spyridon Georgakopoulos, Konstantinos Gardikis and Natalia Vardoulaki working at Cermav.

Konstantinos Gardikis and Natalia Vardoulaki also had the opportunity to work for the screening of new enzymes active on polysaccharides degradation. Three bacterial strains were tested during their stay. The strains were selected among the collection isolated by William Helbert during his secondments at Fitoplancton marino.

"Exceptional experience on biotechnology and biochemistry of polysaccharides. The transfer of knowledge was very useful in order to elaborate on the function of sugars used in cosmetology - but also as a means to better understand the complexity of nature."

Dr. Konstantinos Gardikis

Konstantinos Gardikis and Natalia Vardoulaki working at Cermav.

FITMAR acquired new devices for its R&D

Figure 1. New FITOMAR building

With the intention to develop its R&D department, Fitoplancton Marino (FITOMAR) has extended its facility with the construction of a new building, 100% equipped as a laboratory (fig.1). This laboratory aims to develop new processes at a pre-industrial scale, from the extraction to the analysis of microalga products.

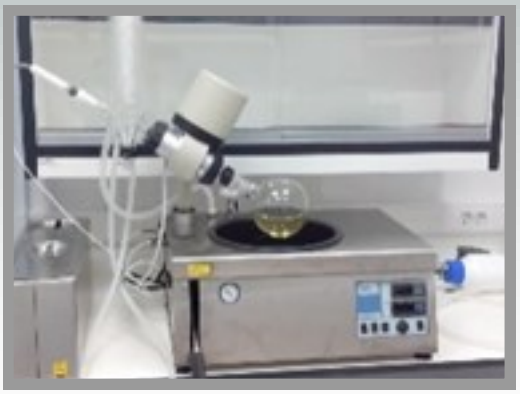

Figure 2. Rotary evaporator

Awaiting the installation of some equipment that will fill this laboratory, FITMAR already acquired a rotary evaporator (fig. 2)in order to prepare enriched fractions as well as a gas chromatography mainly focused to analyze the fatty acids (fig. 3). Moreover, some trials have been performed with a tangential cross flow filtration system. This device is very useful to prepare some sequential fractions, each of them comprising a specific range of molecular weight .

Figure 3. Gas chromatography device

Altogether, these devices will allow FITMAR to prepare higher quantity of fractions that will be tested for their bioactivities as well as base for cosmetic products. The analytical devices will also confirm the composition of extract in order to go further in the characterization.

DID YOU KNOW

Thoughts on cosmetic efficacy testing

Is she kind as she is fair?
For beauty lives with kindness:
Love doth to her eye repair, to help him from blindness; and being helped, inhabits there"
William Shakespeare, Two gentlemen of Verona, 1954

Like most of Shaekspeare 's verse, this needs an interpretation, and the writings of Dr. Samuel Johnson (1704-1782), that great expert on the use of the English language, he offers us some useful quidance paraphrasing the line "For beauty lives with kindness" to read: "Beauty without kindness dies, unenjoyed and underlighting....."
This theme sums up the dilemma which faces the cosmetic industry today. Rightly or wrongly it stands accused that its claims to provide cleanliness, beauty, happiness and contentment are built on foundations which, inescapably, one way or another, involve discomfort and distress and even pain and outright suffering in laboratory animals. A solution to this problem must be found if the industry is not to continue to attract hostility and recrimination and even to die 'unenjoyed and underlighting'. Solution won't be provided by antivivisectionists, by advertising copy-writers or marketing executives, or by personalities who so regularly grace the pages of women's magazines or address us from our television screens. The problem is principally a scientific one.
Nowadays, the evolution of cosmetic science from its original purpose (enhancement of appearance and odor) to more functional role such as the drastic modification, protection and maintenance of the appearance shows to right way to go. The substantiation of the efficacy claims has become obligatory for the protection of the consumer. In vivo testing in animals is - or tends to be - forbidden, several in vitro methods for efficacy evaluation have been developed. In vitro testing is an alternative way to assess the efficacy of cosmetics, since in vitro studies simulate the human epidermis and dermis (see below the scheme). Basic methodologies on in vitro assessments are widely established. Set-ups are small using little test substance and allowing low costs and high-number of replicates. Novel technologies are quickly emerging which include image technologies as well as the diverse ''omic'' technologies. On the other hand, the main constraint of the in vitro methods is that the in vivo architecture of normal human skin involves complex interactions between epidermis and dermis that are very difficult to model. However, this difficulty can be overcame either by using three dimensional models or tissue-engineered skin substitutes.