

FICHE NAVETTE: DOCTORANTS IDEX

SECTOR : Higher Education Institution

LOCATION: France, Grenoble

RESEARCH FIELD:

RESEARCHER PROFILE:

□ *First stage researcher,*

INSTITUTION: Univ. Grenoble Alpes, University of Innovation

One of the major research-intensive French universities, Univ. Grenoble Alpes**¹ enjoys an international reputation in many scientific fields, as confirmed by international rankings. It benefits from the implementation of major European instruments (ESRF, ILL, EMBL, IRAM, EMFL*²). The vibrant ecosystem, grounded on a close interaction between research, education and companies, has earned Grenoble to be ranked as the 5th most innovative city in the world. Surrounded by mountains, the campus benefits from a natural environment and a high quality of life and work environment. With 7000 foreign students and the annual visit of more than 8000 researchers from all over the world, Univ. Grenoble Alps is an internationally engaged university.

A personalized Welcome Center for international students, PhDs and researchers facilitates your arrival and installation.

In 2016, Univ. Grenoble Alpes was labeled «Initiative of Excellence ». This label aims at the emergence of around ten French world class research universities. By joining Univ. Grenoble Alpes, you have the opportunity to conduct world-class research, and to contribute to the social and economic challenges of the 21st century ("sustainable planet and society", "health, well-being and technology", "understanding and supporting innovation: culture, technology, organizations" "Digital technology").

* ESRF (European Synchrotron Radiation Facility), ILL (Institut Laue-Langevin), IRAM (International Institute for Radio Astronomy), EMBL (European Molecular Biology Laboratory), EMFL (European Magnetic Field Laboratory)

Key figures:

- + 50,000 students including 7,000 international students
- 3,700 PhD students, 45% international
- 5,500 faculty members
- 180 different nationalities
- 1st city in France where it feels good to study and 5th city where it feels good to work
- ISSO: International Students & Scholars Office affiliated to EURAXESS

MANDATORY REFERENCES:

CDP TITLE: Origin of Life

SUBJECT TITLE: Thiols at the origin of Life

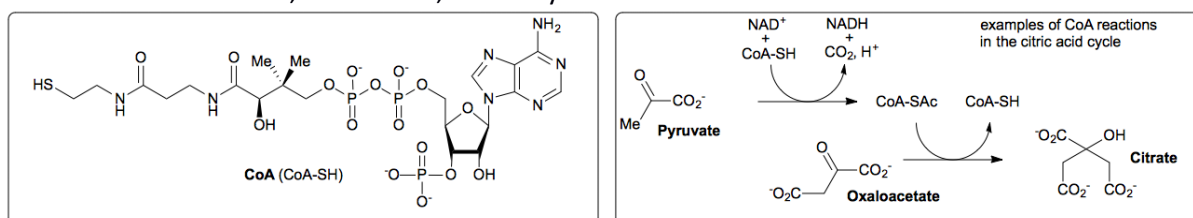
SCIENTIFIC DEPARTMENT (LABORATORY'S NAME): Département de Chimie Moléculaire (DCM)

DOCTORAL SCHOOL'S: EDCSV

SUPPORTER'S NAME: *Yannick Vallée*

SUBJECT DESCRIPTION:

Where did we come from? Humanity has for a long time wondered about the origin of life (OoL) and asked the subsidiary question: "are we alone in the universe?". More recently, refined questions such as: "How can it be possible to become alive from inert matter?" or "Are there other chemical solutions than the one we know that could lead to life?" have been also asked. Many hypotheses concerning OoL, sometimes partly supported by preliminary experiments, have been proposed over the last decades. The discovery of catalytic RNAs has originated the 'RNA world' theory claiming that information came before metabolism. Conversely, other researchers have put forward the hypothesis that catalysts, such as genetically un-coded proteins, came first. Each side has endeavored to find chemical evidences to show that it is possible to produce either nucleotides or amino acids from a prebiotic 'soup'. As an alternative to these two positions, it can be postulated that initially the chemistry of simple organic molecules determined the process; it generated metabolism sequences that were optimized through the replacement of catalysts, which became increasingly efficient, without affecting the reactions themselves. In line with this alternative approach, a key role has been proposed to minerals and transition metals in the acceleration of relevant chemical reactions. We aim at addressing the origin of chemical processes involving key cofactors from modern metabolism and we have decided in this thesis project, to begin this analysis by focusing on the role of thiols as represented by coenzyme A (see figure). Coenzyme A and the related pantothenic acid (vitamin B5) and ACP (acyl carrier protein), play a central role in metabolism, are ubiquitous and are involved in over one hundred reactions. Indeed, they are found as key actors in fatty acid synthesis and degradation as well as in pyruvate oxidation. They are also involved in non-ribosomal polypeptide synthesis. Thiolates are used to produce 'activated' acyls through thioester bond in esterifications, amidations, and anhydride and C-C bond formation.



The candidate's project will be initially centered on the reactivity of coenzyme A mimics towards simple molecules such as H_2 , N_2 , H_2O , H_2S , NH_3 , CH_4 , CO , CO_2 , HCN and P_4O_{10} , known to be exhaled from magma. He/she will also look for conditions to produce thioester bonds from more complex molecules derived from the citric acid cycle. He/she will search for activating systems such as transition metals and/or polyphosphate to produce peptide bonds. The student will develop the required detection protocols and will interpret the results taking into account the physical properties of the factors in order to determine which are contingent and which are chemically determined. From his/her work it is expected that a better understanding of biological thiol evolution will emerge.

This thesis project is part of a comprehensive cross disciplinary project focused on the 'Cross-disciplinary approach on the Origin of Life' (COOL) supported by the Grenoble-Alpes IDEX (ANR-15-IDEX-02) bringing together astrophysicists, chemists, biologists and humanists. The work will be co-supervised by Pr. Yannick Vallée at the Département de Chimie Moléculaire, UGA and Dr. Yvain Nicolet at Institut de Biologie Structurale, both in Grenoble. Candidate profile: The candidate should have a Master2 or equivalent in organic chemistry with a strong background in inorganic chemistry and a good background in biochemistry. The project should start by October 1st 2018.

ELIGIBILITY CRITERIA

Applicants:

- must hold a Master's degree (or be about to earn one) or have a university degree equivalent to a European Master's (5-year duration),

Applicants will have to send an application letter in English or in French and attach:

- Their last diploma
- Their detailed CV
- Their grades obtained during Master 1 and Master 2
- A letter of motivation (2 to 3 pages max)
- Letters of recommendation are welcome.

Address to send their application: yannick.vallee@univ-grenoble-alpes.fr and yvain.nicolet@ibs.fr

SELECTION PROCESS

Application deadline: **01 June 2018** at 17:00 (CET)de

Applications will be evaluated through a three-step process:

1. 1st round of selection: the applications will be evaluated by a Review Board in the week of 11 June 2018. Results will be given the 15 June 2018.
2. If necessary a 2nd round of selection will be organized: shortlisted candidates will be invited for an interview session in Grenoble or by skype during the week of 18 June 2018. (if necessary)
3. Eligibility check by doctoral school early July
4. Beginning of the PhD : October or November 2018

TYPE of CONTRACT: temporary-3 years of doctoral contract

JOB STATUS: Full time

HOURS PER WEEK: 35

OFFER STARTING DATE:

APPLICATION DEADLINE: **01 June 2018**

Salary: between 1768.55 € and 2100 € brut per month (depending on complementary activity or not)

Financements de la thèse : si co-financements, préciser la durée de chacun des financements et l'organisme ou l'institution partenaire