Object: 3 years PhD scholarship in Physical Chemistry and Organic Chemistry applied to the quest of the Origins of Life in ASTRO team at the PIIM laboratory of the Aix-Marseille University in France

Context: Since fifteen years, the ASTRO team draws a unique scenario that starts from the primitive dense molecular cloud up to the development of a prebiotic chemistry at the surface of the early Earth. They develop experimental approaches questioning the origin of the organic matter observed in the various interplanetary bodies of our solar system. They demonstrated that a part of this matter could be related to the chemistry occurring during the collapse of the native dense molecular clouds and its evolution to a protoplanetary disk. The accretion step could have then led to an incorporation of a fraction of this primitive organic matter in asteroids and comets, where, depending on the body, secondary alterations could have occurred, leading to a new evolution of the organic content. As observed on Earth with the presence of meteorites, the organic content of interplanetary bodies may have been delivered at the surface of the early Earth, 4.3 to 3.8 Go ago. This extraterrestrial organic matter may have been an important reservoir of organic matter that could have played a role in the emergence of life on the early Earth.

Objectives the scientific project: The aim is to develop, under the supervision of Pr. Grégoire Danger and in collaboration with Dr. Robert Pascal and Dr Vassilissa Vinogradoff, prebiotic chemistry experiments in order to understand the chemistry occurring in the context of the early Earth. A reductionist approach will be developed that aims to investigate the reactivity possibly occurring in the known conditions of the early Earth, by working on simple chemical systems to understand the role of specific chemical compounds involving high energy components such as nitriles and species capable of overcoming their otherwise limited reactivity like thiols and others. Our research will focus on amino acid and sugar chemistries, as well as on the chirality evolution.

Situation of the position: He/She will integrate the current project developed in the reductionist approach. The candidate will be part of a unique interdisciplinary project in the ASTRO team at the PIIM laboratory of the CNRS/Aix-Marseille University. We week for a candidate with skills in analytical chemistry, physical chemistry and/or organic chemistry.

Administrative information:

- The position is for three years. The funding is part of the AMIDEX IMOTEP project AMX-22-RE-AB-190.
- Applicants must have a Master degree in analytical chemistry, physical chemistry or organic chemistry by the date of appointment.
- The starting date is no later than October 2024.
- Applicants should submit a cover letter, a CV, a statement (2 pages max) explaining interests and qualifications, and if available letters of recommendation.
- Review of applications will begin upon receipt until the position is filled and all applications received by the deadline will receive full consideration.
- Selected applicants will be interviewed. They will have to present their research background and to propose a project in relation with the aim of the current position. The selection of the candidate will be held after these interviews.

Application Deadline: June 1th, 2024
Audition Deadline: July 1th, 2024
Starting date: October, 2024
End Date: October, 2027
Attention To: Grégoire Danger - Email: gregoire.danger@univ-amu.fr

Selected references:

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5. The Prebiotic C-Terminal Elongation of Peptides can be Initiated by N-Carbamoyl Amino Acids. N. Abou Mrad, G. Ajram, J-C Rossi, L. Boiteau, F. Duvernay, R. Pascal and G. Danger*. Chemistry - A European Journal, 2017, 23, 7418-7421

6. 5-(4H)-Oxazolones as Effective Aminoacylation Reagents for the 3′-Terminus of RNA. Z. Liu, C. Hanson, G. Ajram, L. Boiteau, J-C Rossi, G. Danger, R. Pascal* Synthetic Letters, 2017, 28, 73-77

7. Characterization of interstellar/cometary organic residue analogs using very high resolution mass spectrometry, G. Danger*, F-R. Orthous-Daunay, P. de Marcellus, P. Modica, V. Vuitton, F. Duvernay, L. Le Sergeant d'Hendecourt, R. Thissen, and T. Chiavassa, Geochimica & Cosmochimica Acta, 2013, 118, 184-201

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