



PHD Thesis, financial support : UNIVERSITE PARIS-SUD 11

Institut d'Astrophysique Spatiale, UMR 8617

***Studies on organic matter with a potentially prebiotic interest : from the
Interstellar Medium to the Solar Nebula and the Oceans on Primitive Earth***

Primitive carbonaceous meteorites and micrometeorites are thought to be potentially important in the exogeneous delivery of free organic materials at the surface of primitive Earth. This matter, together with the proper conditions (essentially liquid water) may be essential for prebiotic chemistry and, later on, for the first biochemical reactions. However, this organic material is not very well known and in particular, its selectivity towards prebiotic significance is, for the moment not considered within an astrophysical context. Moreover, prior experiments performed at IAS by the team « Astrochemistry and Origins », an evolutionary scenario involving the photo/thermo chemistry of interstellar and pre-cometary dirty ices has produced organic residues whose possible analogies with cometary and meteoritic materials have been noted. This macromolecular material, chemically highly functionalized and water soluble but with high molecular masses seems a very good candidate for evaluating its prebiotic possibilities in aqueous phase (terrestrial oceans).

The goal of this thesis is to compare the soluble organic phase from various meteorites and compare their compositions with our organic residues from the laboratory. Thus traditional contamination problems arising from weathering and bad manipulations will be greatly reduced. The main goal can be divided in three items (1) to analyze the soluble organic matter of meteorites according to their classification, (2) to evaluate once and for all if ices photo and thermo chemistry is important not only in ISM objects but also in the ecosphere of the Solar Nebula and on primitive telluric planets and finally (3) to propose to more specialized chemists a more realistic prebiotic "soup" possibly leading to the first autocatalytic molecules. Emphasizes will be given to scenarios that are relevant to our knowledge of primitive Solar System and planetary evolution as IAS has an important scientific activity in these fields.

This subject is thus largely interdisciplinary (chemistry, physical-chemistry and astrophysics). The candidate (M/F), must be in possession of a MsC in any domain related to this interdisciplinary activity. Special attention will be given to experience in physical-chemistry and/or analytical chemistry. In any case, the candidate should have an experimentalist profile, ready to devote much time in the laboratory. IAS is an institute of fundamental research with application to space instrumentation, running and exploiting space instruments. About 200 people work there (around 80 scientists), an average of 15 Ph.D. students and 15 post-docs. The scientific environment within the laboratory and the Orsay Campus, not far from Paris, is truly exceptional. **For more information, please contact:**

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