

## Seminar in Microbiology

Monday, September 21, 2015

Salle de séminaire 7172, CMU

**11:30 – 12:30**

**Béatrice CLOUET D'ORVAL**



## Archaeal $\beta$ -CASP Ribonucleases: Universal RNA-degrading enzymes

RNA processing, which involves ribonucleases and ancillary enzymes such as RNA helicases, has a pivotal role in living cells and constitutes a crucial step in the regulation of gene expression. Most of our knowledge on RNA processing comes only from two of the three domains of life, Eukarya and Bacteria. However, in Archaea, exploration of messenger RNA (mRNA) maturation and decay pathways is still in its early stages. First hints towards identifying mRNA processing and degradation pathways came from our recent phylogenomic studies and biochemical characterizations of two major archaeal  $\beta$ -CASP ribonucleases, aCPSF1 and aRNase J. The  $\beta$ -CASP nucleases have emerged as central to RNA metabolism over the last decade. These enzymes, catalyzing both endo- and 5'-to-3' exo-ribonucleolytic degradation, are unique among all known ribonucleases. The  $\beta$ -CASP enzymes acting on RNA form two separated groups, one related to the eukaryal cleavage and polyadenylation factor CPSF73 and the other to bacterial RNase J. aCPSF1 and aRNase J are orthologs of CPSF73 and RNase J, respectively, showing that Archaea might possess a composite RNA processing system sharing both eukaryal and bacterial features. This highlights the advantage of the archaeal model to gain further mechanistic and evolutionary information on RNA processing pathway.

Clouet-d'Orval et al., 2015. Universal RNA-degrading enzymes in Archaea: Prevalence, activities and functions of  $\beta$ -CASP ribonucleases. *Biochimie*. 2015 Jun 6. pii: S0300-9084(15)00171-6.

Diversity of CRISPR systems in the euryarchaeal Pyrococcales.

Norais et al. 2013 Diversity of CRISPR systems in the euryarchaeal Pyrococcales. *RNA Biol*. 2013 May;10(5):659-70.

Phung et al., 2013. Archaeal  $\beta$ -CASP ribonucleases of the aCPSF1 family are orthologs of the eukaryal CPSF-73 factor. *Nucleic Acids Res*. 2013 Jan;41(2):1091-103.

Clouet-d'Orval et al., Euryarchaeal beta-CASP proteins with homology to bacterial RNase J Have 5'- to 3'-exoribonuclease activity. *J Biol Chem*. 2010 Jun 4;285(23):17574-83.

Contact: V. Khemici

Sandwiches will be offered after the seminar