Post-doctoral contract March 1 2014 - Feb 28 2016

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**Function of an orphan ribonuclease conserved in Gram-positive bacteria, Cyanobacteria and higher plants**

Although we have made great strides in identifying the key components of the mRNA turnover machinery, there are still some orphan ribonuclease genes on the *B. subtilis* chromosome, coding for enzymes whose substrates are not yet known. One of these is the *yacP* gene, encoding a putative RNase of the PIN/NYN family. The *yacP* gene is well-conserved, but largely confined to the Firmicutes and the Cyanobacteria. Interestingly, it has made its way all the way to plants, with the gene encoding the *Arabidopsis* YacP paralog AT2G02410 containing 8 introns. In *B. subtilis*, the *yacP* gene is found in an operon with genes encoding three aminoacyl-tRNA synthetases, a 23S rRNA processing enzyme and an rRNA/tRNA modifying enzyme, suggesting that YacP likely plays a role in stable RNA maturation or degradation. The goal of the project is to first identify the substrate(s) of YacP in *B. subtilis* by co-immunoprecipitation coupled with RNA sequencing. Once the principal substrates have been identified, we will perform a thorough characterisation of the enzyme both *in vivo* and *in vitro*. The crystal structure of the enzyme has been solved in the laboratory, which will help guide these studies. Once the function of the enzyme has been determined in *B. subtilis*, we will test to see whether YacP has similar substrates in Cyanobacteria and/or Arabidopsis through in vivo and in vitro experiments. These projects will be done through outside collaborations with groups with the relevant expertise.