

Functional studies of micro- and small interfering RNAs during growth and development. 30 hp Degree project

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The aim of this project is to reveal the function and biogenesis of endogenous small interfering (si)- and micro (mi) RNAs in *Dictyostelium discoideum*.

The last few years the discovery of large numbers of si- and miRNAs in different organisms has revolutionized our understanding of how organisms multiply and develop. These tiny RNAs, 21-30 nt, are involved in the control of a great variety of different processes, from stem cell maintenance and inhibition of cancer to cell-differentiation and organism development. The mechanisms behind their regulatory properties are undergoing intense research activities in a number of organisms all over the world.

We have recently isolated a large number of 21-26 nt RNAs from *Dictyostelium discoideum* - a social amoeba that goes through a defined developmental program (Hinas et al. 2007 Nucl. Acids Res.). Some of these small RNAs are developmentally regulated and show different expression patterns in strains where genes predicted to encode homologs to RNAi machinery proteins have been knocked out. Furthermore, we have identified strong miRNA candidates in *Dictyostelium*. If these turns out to be true miRNAs, this is only the second time this class of RNA have been identified in a unicellular organism.

The project involves target search for the small RNAs and in particular for the miRNAs. We are also interested in the function of Argonaute proteins (the effector proteins binding to si/miRNAs). Different techniques will be used for these studies such as Northern blot and RT-PCR to study expression of small RNAs and mRNAs during growth and development as well as 5'RACE and bioinformatic approaches to identify target RNAs upon which these small RNA exert their function. The results will help us not only to reveal the function and biogenesis of small RNAs in *Dictyostelium* but also to understand the evolution of RNA interference. *Dictyostelium* branched out after plants but before the animal/fungi lineages and is in the interface between uni- and multicellularity.

The project will be part of the Linneus center of excellence: Uppsala RNA Research Center (URRC) where twelve research groups, placed at BMC/Uppsala, study different aspects of RNA biology.