Evolution and regulation of gene expression

"DNA makes RNA makes protein." After transcription, mRNAs undergo a series of intertwining processes to be finally translated into functional proteins. Our previous studies, by genome-wide measuring the absolute copy number of mRNAs and their encoded proteins in both mammalian cells and yeast, clearly showed that transcription alone can explain at most half of the cellular protein abundance. The ‘post-transcriptional’ regulation provides cells an extended option to fine-tune their proteomes. To meet the demands of complex organism development and the appropriate response to environmental stimuli, every step in these processes needs to be finely regulated. Moreover, changes in these regulatory processes represent the major driving forces underlying the evolution of phenotypic differences across different species. In this talk, I will introduce our long-term goal on global investigation of post-transcriptional regulatory network in mammals, with an example on genome-wide characterization of cis-elements in translational regulation.