SEMINAR

ALL ARE WELCOME

TEMASEK LIFESCIENCES LABORATORY

03 August 2015 (Monday), 11am
The Auditorium (Level 1)

The make of a minimal cell

Dr. Weihua CHEN
Geneva University Medical School, Switzerland



Dr Weihua CHEN got his PhD in Beijing Institute of Genomics, Chinese Academy of Sciences. He moved from genetics to bioinformatics during his PhD and has been working in the field since then. He did his postdoc in Peer Bork's group at EMBL Germany and now he is working in University of Geneva. His work involved mostly microbes but he is interested more and more in understand human diseases with system biology.

Identifying all essential genomic components is critical for the assembly of minimal artificial life. In the genome-reduced bacterium Mycoplasma pneumoniae, we found that small ORFs (smORFs; < 100 residues), accounting for 10% of all ORFs, are the most frequently essential genomic components (53%), followed by conventional ORFs (49%). Essentiality of smORFs may be explained by their function as members of protein and/or DNA/RNA complexes. In larger proteins, essentiality applied to individual domains and not entire proteins, a notion we could confirm by expression of truncated domains. The fraction of essential noncoding RNAs (ncRNAs) non-overlapping with essential genes is 5% higher than of non-transcribed regions (0.9%), pointing to the important functions of the former. Our data highlight an unexpected hidden layer of smORFs with essential functions, as well as non-coding regions, thus changing the focus when aiming to define the minimal essential genome.

Recent Publications:

1. Lluch-Senar, M., Delgado, J., **Chen, W.H**., Llorens-Rico, V., O'Reilly, F.J., Wodke, J.A., Unal, E.B., Yus, E., Martinez, S., Nichols, R.J. et al. (2015) Defining a minimal cell: essentiality of small ORFs and ncRNAs in a genome-reduced bacterium. Molecular systems biology, 11, 780.
2. **Chen, W.H**., et al., Human Monogenic Disease Genes Have Frequently Functionally Redundant Paralogs. PLoS Comput Biol, 2013. 9(5): p. e1003073
3. Schonknecht, G., **Chen, W.H**., Ternes, C.M., Barbier, G.G., Shrestha, R.P., Stanke, M., Brautigam, A., Baker, B.J., Banfield, J.F., Garavito, R.M. et al. (2013) Gene transfer from bacteria and archaea facilitated evolution of an extremophilic eukaryote. Science, 339, 1207-1210.