

Systems Biology of Microorganisms: Funding success for researchers from Groningen University

SysMO is a European transnational funding and research initiative on "Systems Biology of Microorganisms", funding large multinational research projects aimed at recording and describing the dynamic molecular processes going on in unicellular microorganisms in a comprehensive way and to present these processes in the form of computerized mathematical models.

Recently, the results of the second funding round of SysMO were announced. In total, 7 consortia got funded, 5 of which are continuations of projects from the first round. There are 2 new consortia, both of which are coordinated by researchers from Groningen University, Groningen Biomolecular Sciences and Biotechnology Institute!

These are **Noisy-Strep** (coordinated by Jan-Willem Veening) and **SilicoTryp** (coordinated by Rainer Breitling).



The SysMO2-funded **SilicoTryp project** aims at the creation of a "Silicon Trypanosome", a comprehensive, experiment-based, multi-scale mathematical model of trypanosome physiology.

Trypanosomes are blood-stream parasites transmitted by tsetse flies; they cause African sleeping sickness in humans and livestock. Currently available drugs have severe side effects, and the parasites are rapidly developing resistance.

In this project, we collect a wide range of new experimental data on the parasite in its various life stages and different conditions. These are then integrated in a detailed computational description of parasite biology, which can be used to predict how the organism reacts to a wide range of perturbations. We expect that, in the long run, the quantitative modelling enabled by the Silicon Trypanosome will play a key role in selecting molecular targets for new anti-parasite drugs.

In this project we bring together molecular biologists, parasitologists, biochemists, mathematical modellers, systems biologists and statisticians from universities in Groningen (GBB and UMCG), Glasgow, Edinburgh and Heidelberg. The total sum awarded is 2.0 Mio€.

The project is coordinated by Rainer Breitling, who is Honorary Professor of Computational Systems Biology at the Groningen Bioinformatics Centre, as well as Professor in Systems Biology at the University of Glasgow. Another

Groningen participant is Barbara M. Bakker, Associate Professor in Medical Systems Biology and Rosalind Franklin Fellow at the UMCG, who is leading the dynamic modelling component of the project.

Contacts:

r.breitling@rug.nl, 0044 141 330 7374

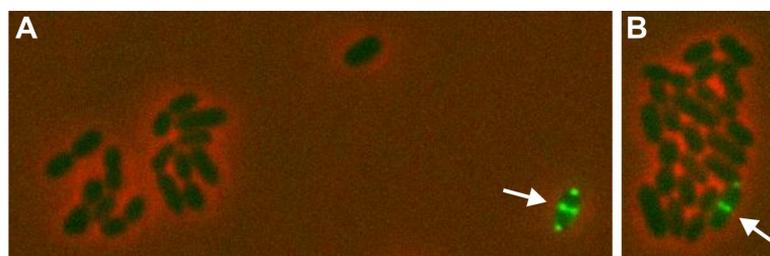
b.m.bakker@med.umcg.nl, 0031 50 361 1542

The SysMO2 funded project '**Noisy-Strep**' aims at unravelling how transcription fidelity and processivity influences (noisy) gene expression in the human pathogen *Streptococcus pneumoniae*.

Streptococcus pneumoniae is a major pathogen causing invasive (pneumonia, meningitis, bacteraemia) and non-invasive (acute otitis media, sinusitis) diseases in young children and in elderly and/or immunocompromised adults. The last decades have seen the emergence and spread of pneumococcal strains with multiple antibiotic resistance posing a serious threat to human health. A common mechanism to evade stresses such as antibiotic stress, immune response stress or to invade the host is by cellular differentiation of a fraction of the clonal population. This heterogeneity can originate from noise that arises during the process of transcription.

In this project, using clever genetic screens, whole transcriptome sequencing, sensitive biochemical assays and mathematical modelling we will identify the molecular sources and key parameters that cause noise in transcription. Our results might lead to novel drug discovery projects specifically aimed to reduce or increase transcriptional noise to prevent unwanted development of pathogenic bacteria such as *S. pneumoniae*.

The project is coordinated by Jan-Willem Veening, who is Assistant Professor at the Molecular Genetics Department (GBB). The research team further consists of Dr. Nikolay Zenkin (Newcastle University), an expert on the biochemistry of transcription, and Dr. Johannes Berg (University of Cologne), an expert in modelling of biological systems. The total sum awarded is 0.8 Mio€.



Transcriptional noise in action in *S. pneumoniae*.

Contact:

j.w.veening@rug.nl, 0031 50 363 2408

<http://www.molgenrug.nl>