

ESF Research Conferences

A Programme of the European Science Foundation

**Final
Programme**

ESF-EMBO Symposium

Bacterial Networks

Joining the Strengths of Structural- and Systems Biology to reach 'Synthetic' Biology

Sant Feliu de Guixols (Costa Brava) • Spain • 14-19 October 2006

Chair: Klaas J. Hellingwerf • Swammerdam Institute for Life Sciences, BioCentrum Amsterdam, NL

Vice-Chair: Mark Buttner • Department of Molecular Microbiology, John Innes Centre, Norwich, UK

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Stichting Antonie van Leeuwenhoek

Dear Participants,

Welcome to San Feliu de Guixols; Welcome to this meeting.

This symposium is the first event in a series, but in a way it also is the continuation of the Bacterial *Neural* Networks series, organized under the former EURESCO programme. The latter consisted of four international meetings on the analysis of the structure and function of regulatory networks involved in the signal transduction in – and between – bacteria, and in their general metabolism.

The objective of this current **ESF/EMBO Symposium** is to bridge – and in doing so, profit from – the insights gained in the field of structural biology (both at the molecular and at the cellular level) and those gained in the field of systems biology. This then ultimately will lead to ‘synthetic biology’, *i.e.* our ability to rationally engineer the properties of living cells.

Bacteria are the organisms of choice to make this merge of structural- and systems biology, because of their smaller genome size, restricted compartmentalization, robust growth characteristics, enormous flexibility, excellent accessibility to molecular- and genetic analyses, etc.

The grand challenge therefore is to integrate systems biology models for metabolic- and morphological aspects of bacterial growth, and base the required modeling on solid structural and physicochemical characteristics of the underlying molecules. This merge will ultimately allow computational prediction of bacterial growth, *i.e.* to a form of ‘synthetic bacteriology’, which implies the design and construction of bacteria with pre-defined properties.

This conference aims to bring together scientists with diverse backgrounds to foster cross-fertilization and the generation of new ideas.

I wish you all a rewarding and enjoyable symposium! Klaas J. Hellingwerf, Conference Chair.

Saturday 14 October	16.00 onwards	Registration at ESF-RC desk	
	20.00	Dinner	
	21.00	Welcome Drink	
Sunday 15 October	08.45-09.00	Conference Opening Klaas Hellingwerf • Swammerdam Institute for Life Sciences, BioCentrum Amsterdam, NL	
	Session 1 • Structural Biology of Molecules and Cells Chair: Klaas Hellingwerf • Swammerdam Institute for Life Sciences, Amsterdam, NL		
	09.00-09.45	Seiki Kuramitsu • Osaka University, Osaka, JP	<i>Structural Genomics of Thermus thermophilus HB8</i>
	09.45-10.30	Rolf Boelens • Bijvoet Center for Biomolecular Research, Utrecht, NL	<i>Structural Genomics with NMR spectroscopy</i>
	10.30-11.00	Coffee break	
	11.00-11.45	Julia Kurner • Max Planck Institute of Biochemistry, Martinsried, DE	<i>On the use of cryo-electron tomography to reveal the bacterial ultrastructure</i>
	11.45-12.30	Peter Graumann • Institute of Microbiology, Freiburg, DE	<i>On the ultra-structural aspects of DNA uptake in bacteria</i>
	Short oral presentations		
	12.30-12.55	Marcela Avila-Perez • Swammerdam Institute for Life Sciences, BioCentrum Amsterdam, NL	<i>Light-activation of the stress response in Bacillus subtilis: Colorful & Complex</i>
	13.00	Lunch	
	15.30-16.15	George Wadhams • University of Oxford, Oxford, UK	<i>Signal transduction networks in Rhodobacter</i>
	16.15-17.00	Urs Jenal • Biozentrum, Basel, CH	<i>The regulatory network in Caulobacter based on the cyclic guanylate di-c-GMP</i>
	17.00-17.30	Coffee break	
	Short oral presentations		
	17.30-17.55	Victor Sourjik • University of Heidelberg, Heidelberg, DE	<i>Design principles of the chemosensory pathway in E. coli</i>
	17.55-18.20	Pramod Wangikar • Bombay Indian Institute of Technology, Bombay, IN	<i>Geometric invariant based framework for the analysis for protein conformational space</i>
	18.20-18.45	Michael Sadovsky • Institute of biophysics of SD of RAS, Krasnoyarsk, RU	<i>Statistical semantics of genomes and data mining</i>
19.00	Dinner		
20.30	Poster session		

Monday
16
October

Session 2 • Systems Biology: Analysis of Networks Structure

Chair: Mark Buttner • John Innes Centre, Norwich, UK

09.00-09.45	Zoltan Oltvai • University of Pittsburgh, Pittsburgh, US	<i>Organization and Function of Transcriptional-regulatory Networks</i>
09.45-10.30	Pieter-Rein ten Wolde • AMOLF, Amsterdam, NL	<i>Mathematical analysis of biochemical signal-transduction networks</i>
10.30-11.00	Coffee break	
11.00-11.45	Erez Dekel • The Weizmann Institute of Science, Rehovot, IL	<i>Regulatory network structure in bacteria</i>

Short oral presentations

11.45-12.10	Ofer Biham • Hebrew University, Jerusalem, IL	<i>Analysis of Genetic Networks Using Stochastic Methods</i>
12.10-12.35	Oscar Harari • University of Granada, Granada, ES	<i>Identifying the promoter features governing differential expression of co-regulated genes with similar network motifs</i>
12.35-13.00	Igor Zwir • University of Granada, Granada, ES	<i>The elucidation of the design principles controlling gene expression</i>
13.00	Lunch	

Session 3 • Systems Biology: Intracellular Signal Transduction Networks

Chair: Urs Jenal • Biozentrum, Basel, CH

15.30-16.15	Sarah Teichmann • MRC Laboratory of Molecular Biology, Cambridge, UK	<i>Evolution and Dynamics of Transcriptional Regulatory Networks</i>
16.15-17.00	Richard Daniel • Newcastle University, Newcastle upon Tyne, UK	<i>Coordination of cell division processes</i>
17.00-17.30	Coffee break	
17.30-18.15	Oscar Kuipers • University of Groningen, Haren, NL	<i>Bistable switches in the signal transduction network of <i>Bacillus subtilis</i></i>
18.15-19.00	Virginie Molle • CNRS, Lyon, FR	<i>Analysis of the stationary phase signal transduction network in <i>Bacillus</i></i>
19.15	Dinner	

Short oral presentations

20.30-20.55	Emanuelle Bouveret • CNRS, Marseille, FR	<i>A protein interaction network for phospholipid synthesis in the inner membrane of <i>E. coli</i></i>
20.55-21.20	Birgit Scharf • University of Regensburg, Regensburg, DE	<i>Regulatory hierarchy of motility and chemotaxis genes in <i>Sinorhizobium meliloti</i></i>
21.20-21.45	Alon Zaslaver • The Weizmann Institute of Science, Rehovot, IL	<i>Design principles in <i>E. coli</i> transcription network revealed by using a comprehensive library of fluorescent transcriptional reporters</i>
21.45-22.10	Anat Bren • The Weizmann Institute of Science, Rehovot, IL	<i>Mapping <i>E. coli</i> promoters input functions</i>

Tuesday 17 October	Session 4 • Systems Biology: Regulation of Metabolism		
	Chair: Barry Holland • Université Paris Sud, FR		
	09.00-09.45	Jildau Bouwman • BioCentrum Amsterdam, NL	<i>Regulation of glycolysis in microorganisms</i>
	09.45-10.30	Bas Teusink • Wageningen Center for Food Sciences, Ede, NL	<i>Systems biology of Lactic Acid Bacteria</i>
	10.30-11.00	Coffee break	
	Short oral presentations		
	11.00-11.25	Mike Merrick • John Innes Centre, Norwich, UK	<i>The E. coli AmtB-GlnK system – a paradigm for integration of intracellular nitrogen metabolism and extracellular ammonium supply</i>
	11.25-11.50	Martijn Bekker • Swammerdam Institute for Life Sciences, BioCentrum Amsterdam, NL	<i>Role of ubiquinol in the distribution of e-fluxes through cytochrome bd and cytochrome bo</i>
	11.50-12.15	Rainer Konig • University of Heidelberg, Heidelberg, DE	<i>Analysing gene expression patterns in metabolic networks with wavelet transformations</i>
	12.15-12.40	Michael Bott • Research Center Juelich, Juelich, DE	<i>A novel signal transduction cascade in corynebacteria involving serine/threonine protein kinase G</i>
	12.40-13.05	Rita Horak • Tartu University, Tartu, EE	<i>ColRS two-component system regulates membrane functions and protects Pseudomonas putida against phenol</i>
	13.05	Lunch	
	14.00	Half-day excursion	
	19.30	Dinner	
21.00	Poster session		
Wednesday 18 October	Session 5 • Systems Biology and Intercellular Interactions		
	Chair: Barry Holland • Université Paris Sud, FR		
	09.00-09.45	Ute Römling • Karolinska Institutet, Stockholm, SE	<i>Regulatory networks, based on c-di-GMP turnover, that govern biofilm formation in Gram-negative bacteria</i>
	09.45-10.30	Alain Filloux • CNRS, Marseille, FR	<i>Two-component- and quorum-sensing networks in Pseudomonas</i>
	10.30-11.00	Coffee break	
	11.00-11.45	Michael Givskov • Technical University of Denmark, Lyngby, DK	<i>Jamming the command language of bacteria: a "quorum sensing approach" to control infections</i>
	Short oral presentations		
	11.45-12.10	Krzysztofa Nagórska • Medical University of Gdansk, Gdansk, PL	<i>Transcriptional and functional analysis of yxaB gene which encode enzyme participating in biofilm formation in B. subtilis</i>
	12.10-12.35	Simone Seror • Paris Sud University, Orsay, FR	<i>Gene expression in time and space in developing swarming communities of Bacillus subtilis; employing genetics and mass spec scanning/image analysis</i>
	12.35-13.00	Alexander Oleskin • Moscow State University, Moscow, RU	<i>Population structures and intercellular communication in microorganisms</i>
13.00	Lunch		

Thursday 19 October	Session 6 • Systems Biology and Virulence Chair: Rüdiger Schmitt • University of Regensburg, DE		
	15.30-16.15	Levente Emody • University of Pécs, Pécs, HU	<i>Regulatory networks leading to virulence of Escherichia coli</i>
	16.15-17.00	Elizabeth Sockett • The University of Nottingham, Nottingham, UK	<i>The predatory motile bacterium Bdellovibrio bacteriovorus: A "living antibiotic"</i>
	17.00-17.30	Coffee break	
	17.30-18.15	Jerry Wells • Swammerdam Institute for Life Sciences, Amsterdam, NL	<i>Function of the YycFG essential two-component regulatory system in Streptococcus pneumoniae and opportunities for antimicrobial drug discovery</i>
	Short oral presentations		
	18.15-18.40	Paul Alan Hoskisson • University of Aberdeen, Aberdeen, UK	<i>The Phage growth limitation (Pgl) system of Streptomyces coelicolor</i>
	18.40-19.05	Xavier de Bolle • University of Namur, Namur, BE	<i>PdhS, an essential cytoplasmic polar histidine kinase in Brucella abortus</i>
	19.05-19.30	Brian Cheetham • University of New England, Armidale, AU	<i>Regulation of virulence gene networks by integration of mobile genetic elements</i>
	20.00	Get-together & Conference Dinner	
	Session 7 • Synthetic Biology Chair: Mark Buttner • Department of Molecular Microbiology, John Innes Centre, Norwich, UK		
	09.30-10.15	David Karig • Princeton University, Princeton, US	<i>Synthetic biology: Engineering cells, Building circuits</i>
10.15-11.00	Julian Kinderlerer • University of Sheffield, Sheffield, UK	<i>Bioethical aspects of synthetic biology</i>	
11.00-11.15	Coffee break		
Short oral presentations			
11.15-11.40	Chinping Chng • Stanford University, Stanford, US	<i>Reverse engineering of an erythromycin overproducing strain</i>	
11.40-12.05	Daniel Dwyer • Boston University, Boston, US	<i>CcdB-mediated DNA damage promotes a breakdown in iron regulatory dynamics and the formation of reactive oxygen species</i>	
12.05-12.40	Forward Look & Plenary Discussion Chair: Mark Buttner • John Innes Centre, Norwich, UK		
12.45	Lunch & departure		

There will be no **short talks** other than those announced on the programme.

All other abstracts are accepted as **posters**.

A prize will be awarded for the best short talk and the best poster.

These will be selected by a committee of experts.