University of Birmingham

Dr Pete Lund MA DPhil

Reader in Molecular Microbiology

School of Biosciences (/schools/biosciences/index.aspx)

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About

Research in our group focusses on stress responses, using prokaryotes as model systems, and using a range of appropriate methods to understand both the mechanistic details and the adaptive significance of different aspects of organismal responses to stress. We have specific interests in molecular chaperones and in acid stress responses, and also a more general interest in methods that can be used to uncover regulatory networks of genes responding to individual or combinations of stresses.

Qualifications

MA (University of Cambridge)

DPhil (University of Sussex)

Biography

Since graduating from Cambridge University in Natural Sciences (specialising in Genetics) my career has been spent both in academia and industry. I did my DPhil at the University of Sussex, followed by post-doctoral work at Sussex and in the Department of Biochemistry at Bristol University. This was followed by a stint working in one of the first agri-biotechnology companies, Advanced Genetic Sciences Inc., in California, USA. This gave me an insight into the application of molecular biology techniques in a commercial setting, and developed my interest in the interface of science and society. This in turn led both to an interest in the ethical aspects of science, a subject which I now teach, and to appointment to the Food Standards Agency committee that oversaw the regulation of GM food in the UK. I returned to the UK to a position at the University of Birmingham in 1990 and have worked here as lecturer, senior lecturer and Reader since then apart from a spell as a visiting senior research fellow at the University of Melbourne, Australia.

Teaching

I have responsibility for the Molecular Biotechnology MSc programme. I teach various aspects of cell biology, structural biology, microbiology, genetics, and bioethics, at undergraduate and postgraduate levels. I emphasise the importance of an understanding of research findings in science teaching and run several practicals incorporating experimental design

Postgraduate supervision

I have successfully supervised over twenty PhD students while at Birmingham, including several joint students and several CASE projects with industrial partners. For a list of possible PhD projects see **www.findaphd.com/search/customlink.asp?inst=birm-Biol&supersurname=Lund (http://www.findaphd.com/search/customlink.asp?inst=birm-Biol&supersurname=Lund)** .

Doctoral research

PhD title An in vitro system for studying transposition of bacteriophage Mu.

Research

Research Theme within School of Biosciences: Molecular Microbiology

Short research description: Understanding stress responses from molecules to systems.

Full research description:

Stress responses: understanding the mechanisms and roles of molecular chaperones, signalling systems, and regulatory networks

The over-arching aim of our research is to understand cellular stress responses. By stress responses we mean the changes that take place in organisms when they are placed under stressful conditions. Such stresses may involve changes in temperature, pH, osmotic potential, redox potential, starvation for essential nutrients, etc. In understanding stress responses we would like ultimately to know

- how stresses are detected
- how detection leads to a response
- what the nature of the response is

- what the roles of the different components of the response are
- how these roles are fulfilled by the components of the stress response

We use bacteria as model systems for investigating the points above. Our methodological approaches range from classical molecular genetics, biochemistry, and biophysics, to high throughput approaches including whole genome sequencing, transcriptomics, and network prediction and analysis. We are currently studying four specific topics.

1) The acid stress network of E. coli

2) Stress response networks and transcriptional responses in the gut

3) The role of duplicated molecular chaperone proteins in Mycobacteria

4) The structure and function of the archaeal thermosome protein

Funding: Our work is currently supported by funding from BBSRC and the Darwin Trust of Edinburgh.

PhD students:

Recently graduated:

Riddhi Shah: Genetic analysis of thermosome function in archaea and E. coli

Current student:

Hrishiraj Sen: Studies on the acid sterss response of E. coli

Collaborations:

We have an extensive set of collaborations in Birmingham, in the UK, and internationally. UK collaborators include Dr Apoorva Bhatt (Birmingham) on the Mycobacterial chaperonins, Dr sarah Jabbari (Birmingham) and Dr Dov Stekel (Nottingham) on the acid stress project, Professors Brian Henderson (UCL) and Tony Coates (St George's Hospital) on the Mycobacterial work, and Professor Francesco Falciani (Liverpool) and Professor Martin Woodward (Reading) on stresses in the gut. We also collaborate with colleagues in Germany (Dr Joerg Martin in Martinsried) on the thermosome project, and with colleagues in Japan (Dr Yoko Eguchi and Professor Ryutaro Utsumi) and the Indian Institute of Science, Bangalore (Dr Deepak Saini) on the acid stress project.

Other activities

Cochair of the University of Birmingham India Steering Group.

I currently am a member of the BBSRC's “Panel of Experts” and an editor of FEMS Microbiology Letters.

I am convener for the UK Molecular Chaperone Club.

Publications

Publications since 2009 are shown below

Johnson MD, Burton NA, Gutiérrez B, Painter K, Lund PA. RcsB is required for inducible acid resistance in E. coli and acts at gadE dependent and independent promoters. J Bacteriol. 2011 May 13. [Epub ahead of print]

Stincone A, Daudi N, Rahman AS, Antczak P, Henderson IR, Cole JA, Johnson MD, Lund Pa and Falciani F. A systems biology approach sheds new light on Escherichia coli acid resistance. Nucleic Acids Res., 2011, in press.

Large AT and Lund PA. Archaeal chaperonins. Frontiers in Biosci, 14 1304-1324 (2009)

Lund PA Multiple chaperonins in bacteria – why so many? FEMS Microbiology Reviews 4: 785-800 (2009)

Liu H, Kovács E, and Lund PA. Characterisation of mutations in GroES that allow GroEL to function as a single ring. FEBS Letters 583: 2365-2371 (2009)

Holmes CW, Penn CW, Lund PA. The hrcA and hspR regulons of Campylobacter jejuni. Microbiology. 156: 158-166 (2010).

Kovács E, Sun Z, Liu H, Scott DJ, Karsisiotis AI, Clarke AR, Burston SG, Lund PA. Characterisation of a GroEL single-ring mutant that supports growth of Escherichia coli and has GroES-dependent ATPase activity. J Mol Biol. 396: 1271-83 (2010).

Henderson B, Lund PA, Coates AR. Multiple moonlighting functions of mycobacterial molecular chaperones. Tuberculosis (Edinb). 90: 119-124 (2010).

Burton NA, Johnson MD, Antczak P, Robinson A, Lund PA. Novel aspects of the acid response network of E. coli K-12 are revealed by a study of transcriptional dynamics. J Mol Biol. 401: 726-42 (2010)

Rao T, Lund PA. Differential expression of the multiple chaperonins of Mycobacterium smegmatis. FEMS Microbiol Lett. 310: 24-31. (2010)

Lund PA. Insights into chaperonin function from studies on archaeal thermosomes. Biochem Soc Trans 39:94-98 (2011)