

Professor Laura Piddock

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About

Laura Piddock is Professor of Microbiology. Since she started her PhD in 1982, she has been at the forefront of antimicrobial research. Laura started her career in a clinical environment and has successfully integrated this background with academic research. She has published 158 original articles in international peer reviewed journals, 41 invited review articles, 43 research letters, 132 conference proceedings and five chapters in academic books. She has given 50 plenary lectures at international conferences. She has an H-index of 55. Her current research focuses on understanding mechanisms of antibiotic resistance as a basis for drug discovery and includes (1) multidrug efflux (pumping out of the bacterial cell) and regulation (switching on and off) of multidrug efflux pumps, and (2) furthering understanding of the mechanism of transfer of plasmids (mobile genetic elements) between bacteria. For further information about the work of Laura's team, please see the Antimicrobials Research Group website: <http://www.antimicrobialagentsresearchgroup.com/> (<http://www.antimicrobialagentsresearchgroup.com/>)

Laura receives support for her research from the MRC, BBSRC, Defra and Health Protection Agency and is an active participant in international consortia. Since 1985 Laura has successfully supervised 24 PhD students. She currently supervises four postgraduate students.

Laura is an enthusiastic communicator about antibiotic resistance and the lack of new antibacterial treatments. She gives talks to various groups at local, national and international level. Laura frequently contributes to both the local, national and international media (print, radio, television and digital) and has advised on, and appeared in, several documentaries. Laura is the British Society for Antimicrobial Chemotherapy (to find out more please see <http://bsac.org.uk/> (<http://bsac.org.uk/>)) Chair in Public Engagement and in this role is the Director of Antibiotic Action (<http://antibiotic-action.com/> (<http://antibiotic-action.com/>)).

Laura Piddock is the Deputy Director of the Institute of Microbiology and Infection (IMI; to find out more please see <http://www.birmingham.ac.uk/research/activity/microbiology-infection/index.aspx> (<http://www.birmingham.ac.uk/research/activity/microbiology-infection/index.aspx>)) and a leading member of the NIHR SRMRC (to find out more please see the [SRMRC website](http://www.srmrc.nihr.ac.uk/) (<http://www.srmrc.nihr.ac.uk/>)).

Qualifications

- PhD, The Penicillin Binding Proteins of four species of Bacteroides 1985
- BSc (Hons) Biological Sciences (Biochemistry and Microbiology) 1981

Biography

Despite initial intentions to follow a career in forensic science, Laura carried out a PhD with Professor Richard Wise at Dudley Road Hospital (now City Hospital) in Birmingham. She became fascinated with the world of microbiology especially antibiotic resistance. Her research focuses on how antibiotic resistance arises, defining and characterising clinically relevant mechanisms of resistance in zoonoses such as *Salmonella enterica* and pathogens of the respiratory tract such as *Streptococcus pneumoniae*. Laura's team has provided seminal contributions on antibacterial resistance, and this information has been used globally to aid rational antibiotic use by clinicians and veterinarians. In particular, her team's pioneering work on resistance to the fluoroquinolone antibiotics showed that bacteria from humans and animals became resistant via the same mechanism due to identical mutations in the same genes. Laura has advised organisations such as the World Health Organisation, and scientific data from her team has been used by national governmental agencies when deciding whether to withdraw the licences of some antibiotics from veterinary medicine. For example, with collaborators, molecular and epidemiological data showed fluoroquinolone use in commercial poultry production led to antibiotic resistant bacteria entering the food chain. Laura's team has also led the way for other scientists in the use of high throughput state of the art technologies to analyse large numbers of clinical isolates of antibiotic-resistant bacteria. Laura's current work is in three areas (1) mechanisms of regulation of expression of bacterial efflux pumps and how this impacts upon the biology of the bacterium and so its ability to infect the host, (2) identifying inhibitors of efflux, and (3) genomics of plasmid and chromosomally mediated antibiotic resistance.

She collaborates widely with other researchers in Birmingham, elsewhere in the UK and overseas; this has included formally funded projects with colleagues in China, Singapore and Canada.

Teaching

Teaching Programmes

BMedSci years 1-3 lectures, tutorials, practical classes, project students;

MChB lectures;

MChB intercalated students, lectures, projects;

MSci Biosciences, project students;

BSc Biosciences, project students;

MPhil toxicology, project students;

MSc toxicology, project students.

Postgraduate supervision

Laura is interested in supervising doctoral research students in the following areas:

- Mechanisms of multi-drug resistance, especially efflux
- Impact of antibiotic resistance upon the fitness of the bacterium to colonise and infect the host.
- Transmissible antibiotic resistance

If you are interesting in studying any of these subject areas please contact Laura on the contact details above, or for any general doctoral research enquiries, please email: dr@contacts.bham.ac.uk (mailto:dr@contacts.bham.ac.uk) or call +44 (0)121 414 5005.

For a full list of available Doctoral Research opportunities, please visit our [Doctoral Research programme listings \(http://www.bham.findaphd.com/?es=y&apl=y&apit=&show\)](http://www.bham.findaphd.com/?es=y&apl=y&apit=&show).

Research

RESEARCH THEMES

- Antimicrobial resistance
- Multi-drug efflux pumps
- Microbial pathogenesis
- Transmissible antibiotic resistance

RESEARCH ACTIVITY

Laura's work focuses on how bacteria develop resistance to antibiotics. This is a growing problem, as more strains of bacteria become resistant to the drugs that were primarily developed more than 20 years ago. Her research focuses on how antibiotic resistance arises, and defining and characterising mechanisms of resistance that have a clinical relevance.

She is also exploring the role of antibiotic resistance mechanisms in the ability of the organism to colonise, survive and cause infection in their host. Laura is particularly interested in the systems that allow transport of antibiotics into and out of bacteria. Adaptations to these systems occur in bacteria and cause multiple drug resistance. Although this work has many applications, Laura has made particularly detailed studies of food borne bacteria such as *Salmonella* and *Campylobacter*, and the pneumococcus that causes pneumonia.

Current work is in three areas (1) mechanisms of regulation of expression of bacterial efflux pumps and how this impacts upon the ability of the bacterium to infect the host, (2) identifying inhibitors of efflux, and (3) genomics of plasmid and chromosomally mediated antibiotic resistance.

Laura receives support for her research from the MRC, BBSRC, NIHR and Public Health England. Since 1985 Laura has successfully supervised 28 PhD projects. Her team currently comprises three post-doctoral research fellows, one technician, four postgraduate students, two MChB intercalated students and several undergraduate project students.

Adobe Flash Player or QuickTime is required for video playback. [Get the latest Flash Player](#) [Get the latest version of QuickTime](#)

Other activities

- Longitude Prize Expert Advisory Panel
- National Institute for Health Research Reference Group - Antimicrobial Resistance Themed Call
- MRC Cross Funder AMR committee
- Member of Wellcome Trust Expert Review Group on Pathogens and Transmissible Diseases
- Elected Fellow of the Society of Biology
- President of BSAC 2009-2012
- MRC Infections and Immunity Board Member 2004-2010
- Chair, Bristol Myers Squibb Foundation Distinguished Award Committee

Responsibilities

Publications

Please follow this link to PubMed for an up to date list of publications: <http://www.ncbi.nlm.nih.gov/pubmed/?term=Piddock+lj> (<http://www.ncbi.nlm.nih.gov/pubmed/?term=Piddock+lj>)

Examples include:

1. Blair JM, Cloeckaert A, Nishino K, **Piddock LJ**. (2013). Alternative explanation for indole-induced antibiotic tolerance in Salmonella. 2013 *PNAS* Nov 26 **110**(48):E4569. PMID: 24198338.
2. Ricci V, Blair JM, **Piddock LJ**. (2014). RamA, which controls expression of the MDR efflux pump AcrAB-TolC, is regulated by the Lon protease. *J Antimicrob Chemother.* **69**(3):643-50 PMID: 24169580
3. Baugh S, Phillips CR, Ekanayaka AS, **Piddock LJ**, Webber MA. (2014). Inhibition of multidrug efflux as a strategy to prevent biofilm formation. 2013 *J Antimicrob Chemother.* **69**(3):673-81 PMID: 24176982
4. Hong-Xia Jiang, Li Song, Ji Liu, Xiao-Hua Zhang, Yan-Na Ren, Wen-Hui Zhang, Jing-Yuan Zhang, Ya-Hong Liu, Mark A. Webber, David O. Ogbolu, Zhen-Ling Zeng and **Laura J. V. Piddock**. (2014). Multiple transmissible genes encoding fluoroquinolone and third generation cephalosporin resistance co-located in non-typhoidal Salmonella isolated from food producing animals in China. *International Journal of Antimicrobial Agents.* 43(3):242-7 PMID: 24581597
5. **Cottell J, Saw H, Webber MA, & Piddock LJV. (2014). Functional genomics to identify the factors contributing to successful persistence and global spread of an antibiotic resistance plasmid. BMC Microbiology** PMID: 24961279
6. Carlet J, Pulcini C, **Piddock LJVP**. (2014). Antibiotic Resistance: A geo-political issue. *Clin Microbiol Infect.* PMID: 25040923
7. **Bragginton, E. & Piddock LJV. (2014). Public funding from UK and EU for Bacteriology and antibiotic research from 2008-2013 does not correlate with the burden of antibacterial resistance. The Lancet Infectious Diseases.** 14(9):857-68
8. **Piddock LJV.** (2014). Understanding the basis of antibiotic resistance: a platform for drug discovery. *Microbiology.* PMID: 25122880
9. Anuforum O, Wallace GR, **Piddock LJVP**. (2014). The immune response and antibacterial therapy. *Med Microbial Immunol.* PMID: 25189424
10. Blair, J; Smith, Helen; Ricci, Vito; Lawler, Amelia; Thompson, Louisa; **Piddock, L. J. V.** (2014). Expression of homologous RND efflux pump genes is dependent upon AcrB expression: Implications for efflux and virulence inhibitor design. *J Antimicrob Chemother.* PMID: 25288678

Expertise

Antibiotic resistance in bacteria, especially food borne pathogens and those that infect the respiratory tract

Alternative contact number available for this expert: [contact the press office \(http://www.birmingham.ac.uk/news/contacts/index.aspx\)](http://www.birmingham.ac.uk/news/contacts/index.aspx)