University of Birmingham

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About

Marks research is focused on antimicrobial action and resistance with specific interests in bacterial evolution in response to stress, mechanisms of biofilm formation and transferrable resistance as well as numerous other smaller areas of study. Mark co-heads the Antimicrobials Research Group with Professor Laura Piddock.

www.antimicrobialagentsresearchgroup.com

Mark has received major grants from the BBSRC as well as other support from MRC, Royal Society and British Society for Antimicrobial Chemotherapy.

Qualifications

- PhD, Mechanisms of multiple antibiotic resistance in Escherichia coli, University of Birmingham, 2001
- MSc in Medical Microbiology and Infectious Diseases, University of Birmingham, 1998
- BSc in Microbiology, University of Birmingham, 1997

Biography

Mark Webber studied for a BSc (Hons) in Microbiology from the University of Birmingham between 1994 and 1997. He went on to complete a master's degree in Medical Microbiology and Infectious diseases (1998) and then study for a PhD in the School of Immunity and Infection between 1998 and 2001 with Professor Laura Piddock. Subsequently Mark has continued to work in Birmingham investigating aspects of multiple antibiotic resistance, bacterial stress responses and biofilm formation, predominantly in Grgam negative pathogens.

Mark was awarded a BBSRC David Phillips fellowship to study novel mechanisms of resistance to the common antimicrobial, triclosan in 2007.

Mark is active within the antimicrobial resistance research community and was appointed as an Editor for the Journal of Antimicrobial Chemotherapy in December 2006, was appointed as an Editor for the Journal of Medical Microbiology in November 2009 and appointed to the editorial board of PLoS ONE in December 2010. Mark was co-organiser of both the 'Antimicrobial Resistance Mechanisms Workshops' in Nov 2009 and Nov 2010, which attracted ~110 academic attendees from the UK.

Mark was awarded the 2010 WH Pierce prize for 'Outstanding contribution to microbiology' by the Society for Applied Microbiology. He acts as an expert assessor of grant applications for the Wellcome trust, British Society for Antimicrobial Chemotherapy, Agencie National de la Recherche and Irish Health Research Board. Mark also is an expert member of the CAAMIC (centre for application of advanced materials in infection control) panel.

Teaching

Mark currently devises and delivers teaching content for a arange of programmes:

- **BMedSci**
- MBChB
- **MBChB** (Intercalating programme)
- **Dentistry**
- Pharmacy

Postgraduate supervision

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

- The role of stress as a signal and how supercoiling can alter global gene expression.
- How does adaptation to high density life (biofilm) alter metabolite and drug transport

If you are interesting in studying any of these subject areas please contact Mark on the contact details above, or for any general doctoral research enquiries, please email: **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**.

Research

RESEARCH THEMES

Microbial drug resistance, Bacterial stress responses, Regulation of gene expression, Mechanisms of biofilm formation

RESEARCH ACTIVITY

Biocide-antibiotic cross resistance

The main focus of Marks current work (supported by his fellowship and a project grant from BBSRC) is investigation of how exposure of bacteria to biocides can select for cross resistance to antibiotics. The role of generic stress responses relevant to both biocide and antibiotic resistance are being investigated using a combination of contemporary sequencing, transcriptomic and proteomic approaches to identify key loci involved in increased tolerance to biocides and antibiotics. Most of this work focuses on the food borne pathogen *Salmonella*.

Efflux pumps and biofilm formation

Recently Mark has been involved in work demonstrating that multidrug efflux systems have roles beyond solute export in Gram negative bacteria, this includes a requirement for some efflux systems to be intact to form a normal biofilm. Mark supervises a PhD project investigating the mechanisms by which multidrug efflux systems contribute to biofilm formation, again in *Salmonella*.

Transferable antibiotic resistance

Mark also has an interest in mobile genetic elements which mediate transfer of antibiotic resistance genes, he co-supervises a PhD student with Professor Laura Piddock who has determined the sequence of a plasmid carrying an extended spectrum beta lactamase and designed a PCR based molecular test to follow its epidemiology in isolates around the world. Mark also has an active collaboration with a Nigerian research group where levels of antibiotic resistance are very high and has characterised the nature of resistance genes and plasmids present in Nigeria which may act as a reservoir for spread of resistance around the world.

Other activities

- Mark acts as an Editor for the Journal of Medical Microbiology and PLoS ONE.
- Mark is a regular expert assessor of grant applications for the Wellcome trust, British Society for Antimicrobial Chemotherapy, Agencie National de la Recherche (French government) and Irish Health Research Board
- Mark is an expert member of CAAMIC (centre for application of advanced materials in infection control) panel
- Mark acts as an external examiner for PhD candidates
- Mark is a member of the Society for General Microbiology, British Society for Antimicrobial Chemotherapy, American Society for Microbiology, European Society for Clinical Microbiology and Infectious Diseases and the Society for Applied Microbiology

Publications

Laboratory adapted Escherichia coli K-12 becomes a pathogen of Caenorhabditis elegans upon restoration of O antigen biosynthesis. Browning DF, Wells TJ, França FL, Morris FC, Sevastsyanovich YR, Bryant JA, Johnson MD, Lund PA, Cunningham AF, Hobman JL, May RC, **Webber MA**, Henderson IR. Mol Microbiol. 2013 Mar;87(5):939-50. doi: 10.1111/mmi.12144. Epub 2013 Jan 28. PMID: 23350972

Persistence of transferable ESBL resistance in the absence of antibiotic pressure. Cottell JL, **Webber MA**, Piddock LJ. Antimicrob Agents Chemother. 2012 Jun 18.

Loss of or inhibition of all multidrug resistance efflux pumps of Salmonella enterica serovar Typhimurium results in impaired ability to form a biofilm. Baugh S, Ekanayaka AS, Piddock LJ, **Webber MA**. J Antimicrob Chemother. 2012 Oct;67(10):2409-17. doi: 10.1093/jac/dks228. Epub 2012 Jun 25. PMID: 22733653

Exposure of Salmonella enterica Serovar Typhimurium to High Level Biocide Challenge Can Select Multidrug Resistant Mutants in a Single Step. Whitehead RN, Overton TW, Kemp CL, **Webber MA**. PLoS One. 2011;6(7):e22833.

Cottell JL, **Webber MA**, Coldham NG, Taylor D, Cerdeño-Tárraga Ana, Hauser H, Thomson N, Woodward MJ, Piddock LJ. (2011), Complete Sequence and Molecular Epidemiology of an IncK Epidemic Plasmid Encoding bla CTX-M-14 Widely Disseminated in Humans and Animals. Emerging Infectious Diseases. In press.

Porsby CH, **Webber MA**, Nielsen KF, Piddock LJ, Gram L. (2011), Resistance and Tolerance to Tropodithietic Acid, an Antimicrobial in Aquaculture, is Hard to Select. Antimicrob Agents Chemother. Jan 24. [Epub ahead of print]

Ogbolu DO, Daini OA, Ogunledun A, Alli AO, **Webber MA**. (2011), High levels of multidrug resistance in clinical isolates of Gram-negative pathogens from Nigeria. Int J Antimicrob Agents. 37(1):62-6.

Copitch JL, Whitehead RN, **Webber MA**. (2010), Prevalence of decreased susceptibility to triclosan in Salmonella enterica isolates from animals and humans and association with multiple drug resistance. Int J Antimicrob Agents. 36(3):247-51.

Expertise

NATO; US foreign policy; European Union

Alternative contact number available for this expert: **contact the press office**

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