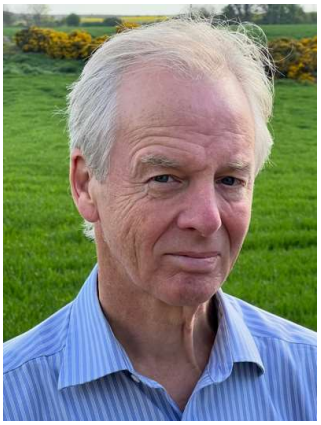
Prof Jeff Errington FMedSci FAA FRS; short cv



Brief Scientific Narrative

Basic Science

Jeff Errington is a globally recognised leader in research on the structure and basic functions of bacterial cells. In the 1990's he pioneered the use of digital fluorescence imaging in bacterial cells, which revolutionised our understanding of the structural complexity and fine scale organization of these organisms, and helped establish the modern field of bacterial cell biology. His lab has made major contributions to understanding various fundamental functions of bacterial cells, including endospore formation, cell wall synthesis, chromosome replication and segregation, cell division and cell morphogenesis. His lab helped identify and characterise the key transcription factors (sigma factors) that underpin spore formation in *B. subtilis* and showed how they control temporal and spatial changes in gene expression during the two-cell, 8 hour long developmental process. Turning to studies of the bacterial cell cycle, the lab identified the SpoIIIE/FtsK protein as a central player in bacterial chromosome segregation and showed that it is a remarkable transmembrane chromosomal DNA pump. Later, the lab showed how the Soj-Spo0J (ParAB) proteins control and integrate various key cell cycle events, including chromosome replication and segregation, and that one function of ParB is to load the ubiquitous SMC (Structural Maintenance of Chromosomes) complex onto DNA in bacteria. The lab discovered the DivIVA protein that targets to cell tips and controls a plethora of different cell cycle processes in a wide range of Gram positive bacteria. In seminal work, the lab identified MreB proteins as key actin-like, filamentous proteins that spatially control cell wall synthesis, and determine the form of most rod-shaped cells. Also, how bacteria lacking MreB can be rod-shaped via a completely different mechanism involving tip growth, often guided by the DivIVA protein. Recently, the Errington lab has pioneered modern work on the mysterious cell-wall-deficient "L-form" bacteria, and identified key mechanisms underpinning the growth of these cells. This work has far reaching implications, ranging from understanding early steps in the origins of life, through to recurrent infection. The L-form work has also led to advances in our understanding of how critical antibiotics, such as penicillins, actually kill bacteria, via damage from reactive oxygen species (ROS). In recent years the lab has also developed an interest in the neglected tropical disease, mycetoma, especially the role of actinobacteria and their small molecule effector compounds.

Translation

Errington founded and ran two significant spin out companies, dedicated to antibiotic discovery and development. Prolysis Ltd (Oxford, 1998-2009) developed two classes of novel antibiotics, including the first, long-sought-after inhibitors of FtsZ protein. Prolysis was acquired by Australian biotech, Biota Holdings, which later moved to the US NASDAQ, with Errington as a Director. Demuris Ltd (Newcastle 2008-2021) developed novel methods to discover natural product antibiotics from microbes and was acquired by US based Odyssey Therapeutics in 2021. Errington was heavily involved in both companies, acting from time to time as Director, CSO and CEO, including key roles in both company exits.

Education and appointments

Professor of Microbiology and ARC Laureate Fellow, University of Sydney, 2022-date
Director of the Centre for Bacterial Cell Biology, Newcastle, 2008-2022
Director of the Institute for Cell and Molecular Biosciences, Newcastle, 2006-12
BBSRC Professorial Fellow, 1996-2001
Lecturer then Professor of Microbiology, Sir William Dunn School of Pathology, Oxford, 1989-2005
Royal Society University Research Fellow (group leader), Biochemistry, Oxford, 1985-9
Departmental Demonstrator, Biochemistry, Oxford, 1983-5
Post-doctoral Researcher, Oxford, 1981-3
PhD Microbial Genetics, London, 1981
BSc Genetics and Zoology, Newcastle University, 1977

Recent important grants

ARC Laureate Fellowship ($6.0 m), 2022-2027
Wellcome Trust Senior Investigator (£1.9 m), 2018-2023
European Research Council Advanced Grant (€2.4m) 2016-2020
Wellcome Trust Senior Investigator (£1.6 m), 2012-2018
European Research Council Advanced Grant (€2.1 m), 2010-2016
Capital award (Wellcome Trust) £6 m for the Bacterial Cell Biology Building, 2009

Major elected awards

Fellow of the Australian Academy of Science (2025)
European Academy of Microbiology (2014)
UK Academy of Medical Sciences (2007)
American Academy of Microbiology (2007)
EMBO (2004)
Fellow of the Royal Society (2003)

Medals and Prizes

2017 Lwoff Prize and Medal, Federation of European Microbiological Societies
2015 Leeuwenhoek Lecture, Prize and Medal of the Royal Society
2014 BBSRC 20th Anniversary Medal for Excellence in Bioscience
2014 Novartis Medal, UK Biochemical Society

Named lectures

2018 Edmond de Rothschild Lecture, l'Institut de Biologie Physico-Chimique, Paris
2017 12th David Vázquez Memorial Lecture, Madrid
2015 Jean Shanks Lecture, UK Academy of Medical Sciences
2015 Leeuwenhoek Lecture, Royal Society (also above)
2011 8th Sir William Dunn Lecture, Cambridge
2011 Mendel Lecture, Brno, Czech Republic
2009 Inaugural Mandelstam Memorial Lecture, Oxford
2009 Fred Griffiths Prize Lecture, UK Society for General Microbiology
2008 Kluyver Lecture, Dutch Microbiology Society
2005 Krampitz Lecture, Cleveland, USA
2002 Nordström Lecture, Uppsala, Sweden
2001 Franco Tatò Memorial Lecture, Italian Molecular Biology Society

Significant professional service (last 20 years)

2025- International review panel for German “Universities of Excellence”.
2022- International Steering Committee CEPID B^3 Programme, Brazil
2019. Chair, Royal Society Scoping Round Table on antimicrobial resistance
2018- International Scientific Advisory Board, Biomedicine Discovery Institute, Monash University, Australia

2016 EMBL Heidelberg, Genome Biology Review Panel
2015-2021. Member then Chair, Scientific Advisory Panel, ARC Centre of Excellence in Advanced Molecular Imaging (Monash University, Australia)
2015-2017 Chair, Molecules Genes and Cells Expert Review Group (ERG8), Wellcome Trust
2012 BBSRC Health portfolio Working Group
2012-2014 UK Gov Blackett Review Committee on wide-area biological detection
2012-2017 Scientific Advisory Board, I2B Centre, Paris, France
2007-2009 Elected Council member of the Royal Society
2006-2009 Molecules, Genes and Cells funding committee, The Wellcome Trust
2006 Member of European Academies Science Advisory Council (EASAC) working party on Antimicrobial Resistance
2005-2006 UK Microbial Science Review Panel (BBSRC)
1999- Trustee, EPA Cephalosporin Research Fund, Oxford (holds ~£110 m in capital)

Commercial activity

Prolysis Ltd. Scientific founder and Director (1998-2009)
Biota Holdings, Aviragen Therapeutics (following acquisition of Prolysis) (NASDAQ) (Director) (2010-13)
Demuris Ltd. Scientific founder and Director (2008-2021)
Odyssey Therapeutics (following acquisition of Demuris Ltd), VP Natural Products and Site Head, Odyssey Newcastle (2021-2022)

Invited seminars and conferences

Over 300 significant invited oral presentations in 35 different countries
Co-organiser, EMBO Workshop on “DNA replication, chromosome segregation and cell division”, London (2015)
Founding organiser of the Zing (now Fusion) Conference series on “Bacterial Cell Biology”, Mexico (2010, 2013), Bahamas (2020)
Co-Chair then Chair, Gordon Conference on Bacterial Cell Surfaces, New Hampshire, USA (2006, 2008).

Training and mentoring

About 27 graduate students or post-docs from my lab have gone on to independent group leader positions, mostly focusing on bacterial cell biology.

Publications

245 peer reviewed publications in significant international journals, including *Cell* (8), *Science* (4), *Nature* (2), *EMBO Journal* (16). “World record holder” for *Molecular Microbiology* (55 papers). (ORCID 0000-0002-6977-9388).
38,166 citations; h-index, 103 (Google Scholar).
13 patents filed.

20 selected publications

Kawai Y, Kawai M, Mackenzie ES, Dashti Y, Kepplinger B, Waldron KJ, Errington J. (2023) On the mechanisms of lysis triggered by perturbations of bacterial cell wall biosynthesis. **Nature Communications** 14(1):4123.

Roberts DM, Anchimiuk A, Kloosterman TG, Murray H, Wu LJ, Gruber S, Errington J. (2022) Chromosome remodelling by SMC/Condensin in *B. subtilis* is regulated by monomeric Soj/ParA during growth and sporulation. **Proc Natl Acad Sci USA** 119(41):e2204042119.

Wu LJ, Holden S, Lee S, Park S, Eland LE, Wipat A, Errington J. (2020) Geometric principles underlying the proliferation of a model cell system. **Nature Communications** 11, 4149.

Mickiewicz K, Kawai Y, Drage L, Davison F, Pickard R, Aldridge P, Errington J. (2019) L-form switching as a potential mechanism for the recurrence of urinary tract infection. **Nature Communications** 10, 379.

Kawai Y, Mercier R, Mickiewicz K, Serafini A, Pedro Sório de Carvalho L, Errington J. (2019) Crucial role for central carbon metabolism in the bacterial L-form switch and killing by β-lactam antibiotics. **Nature Microbiology** 4, 1716-1726.

Kawai Y, Mickiewicz K, Errington J. (2017) Lysozyme counteracts β-lactam antibiotics by promoting the emergence of L-form bacteria. **Cell** *172*, 1038–1104.

Emami K, Guyet A, Kawai Y, Devi J, Wu LJ, Allenby N, Daniel RA, Errington J. (2017) RodA as the missing glycosyltransferase in *B. subtilis* and discovery of a novel antibiotic for the peptidoglycan polymerase pathway. **Nature Microbiology** *2*, 16253.

Mercier R, Kawai Y, Errington J (2016) Wall proficient *E. coli* capable of sustained growth in the absence of the Z-ring division machine. **Nature Microbiology** *1*, 16091.

Mercier R, Kawai Y, Errington J. (2013) Excess membrane synthesis drives a primitive mode of cell proliferation. **Cell** *152*, 997-1007.

Kawai Y, Marles-Wright J, Cleverley RM, Emmins R, Ishikawa S, Kuwano M, Heinz N, Bui NK, Hoyland CN, Ogasawara N, Lewis RL, Vollmer W, Daniel RA, Errington J. (2011) A widespread family of bacterial cell wall assembly proteins. **EMBO J** *30*, 4931-4941.

Su'etsugu M, Errington J. (2011) The replicase sliding clamp dynamically accumulates behind progressing replication forks in *Bacillus subtilis* cells. **Mol. Cell** *41*, 720-732.

Gruber S, Errington J. (2009) Recruitment of the SMC complex to replication origin regions by Spo0J/ParB bound to *parS* sites in *Bacillus subtilis*. **Cell** 137, 685-696.

Leaver M, Domínguez-Cuevas P, Coxhead JM, Daniel RA, Errington J. (2009) Life without a wall or division machine in *Bacillus subtilis*. **Nature** *457*, 849-853.

Murray H and Errington J (2008) Dynamic control of the DNA replication initiation protein DnaA by Soj / ParA. **Cell** *135*, 74-84.

Haydon DJ, Stokes NR, Ure R, Galbraith G, Bennett JM, Brown DR, Baker PJ, Barynin VV, Rice DW, Sedelnikova SE, Heal JR, Sheridan JM, Aiwale ST, Chauhan PK, Srivastava A, Taneja A, Collins I, Errington J and Czaplewski LG (2008) An inhibitor of FtsZ with potent and selective anti-staphylococcal activity. **Science** *321*, 1673-1675.

Wu LJ and Errington J. (2004) Coordination of cell division and chromosome segregation by a nucleoid occlusion protein in *Bacillus subtilis*. **Cell** *117*, 915-925.

Daniel RA and Errington J. (2003) Control of cell morphogenesis in bacteria: two distinct ways to make a rod-shaped cell. **Cell** *113*, 767-776.

Jones LJF, Carballido-López R and Errington J. (2001) Control of cell shape in bacteria: helical, actin-like filaments in *Bacillus subtilis*. **Cell** *104*, 913-922.

Wu LJ and Errington J. (1994) *Bacillus subtilis* SpoIIIE protein required for DNA segregation during asymmetric cell division. **Science** *264*, 572-575.