

Mark C. Field M.A. (Oxon), D.Phil., FLS Professor of Cell Biology



School of Life Sciences, University of Dundee, Dundee, Scotland and
Institute of Parasitology, Biology Centre, Czech Academy of Sciences, Ceske
Budejovice, Czechia.
+44 (0)751-550-7880, mfield@mac.com, fieldlab.org

Mark was born in London, and has the dubious honour of being a true cockney. He is currently Professor of Cell Biology at the Wellcome Centre for Anti-Infectives Research and Division of Biological Chemistry and Drug Discovery, University of Dundee. He was educated at Corpus Christi College, Oxford and gained first class honours in Biochemistry, remaining at Oxford for his graduate work studying glycoprotein structure and function at the Department of Biochemistry. His postdoctoral career was spent in the United States, at the Rockefeller University characterising glycosylphosphatidylinositol lipid biosynthesis with a further period in California, firstly at pioneering biotechnology company Genentech Inc., dissecting protein processing and targeting and subsequently at Stanford University, where he analysed protist surface protein families and began characterising the trypanosome endomembrane system. He returned to England in 1994 to establish a research group at Imperial College London, moving to the University of Cambridge in 2005 and to the University of Dundee in 2013. He was appointed visiting scientist at the Rockefeller University in 2013 and to the faculty of the Institute of Parasitology, Biology Centre of the Czech Academy of Sciences, České Budějovice, Czech Republic in 2018. He has also served on the teaching faculty of the Marine Biological Laboratory at Wood's Hole, Massachusetts, USA. His research focused principally on the parasitic protozoan *Trypanosoma brucei* and pioneers efforts to exploit genomics and proteomics resources to provide insights into virulence mechanisms and basic cell biology, with specific interests in protein transport systems, nuclear organisation and small G protein-mediated signalling. He retains interests in bioinformatics, graphic design, functional genomics and eukaryotic evolutionary biology.

Mark reviews for many journals and granting agencies and is an External Advisor for MiCoBion at BioCev, Charles University, Praha. He is Chief Editor for Molecular and Cellular Parasitology in *Frontiers in Parasitology*, a Fellow of the Linnean Society and a member of the Faculty of a Thousand. In the past he served on the Wellcome Trust Infection and Immunity panel (2018 - 2020), Medical Research Council Infection and Immunity board (2014 - 2018), the council of the British Society for Parasitology (2011 - 2014) and MODBIOLIN, an EU-funded project in the Czech Republic (2011 - 2016), as an advisor for TrypDB (2008 - 2018), and as a Board member for CamPOD, a local charity in Cambridge (2010 - 2013). In 2010, he was awarded the British Society for Parasitology C.A. Wright medal for recognition of contributions to the field.

Employment

2018 - present Institute of Parasitology, Biology Centre of the Czech Academy of Sciences, České Budějovice, Czech Republic.

2013 - 2024 Professor of Cell Biology, Wellcome Centre for Anti-Infectives Research, Division of Drug Discovery and Biological Chemistry, School of Life Sciences, University of Dundee, Dow Street, Dundee, Scotland, DD1 5EH.

2013 - 2018 Visiting Professor, The Rockefeller University, Laboratory of Cell and Structural Biology, New York, NY 10021, USA.

2008 - 2013 Professor of Cell Biology and Parasitology, Department of Pathology, University of Cambridge, Tennis Court Road, Cambridge, CB2 1QP, UK

2006 - 2013 Fellow, St Edmund's College, Cambridge, CB3 0BN, UK.

2006 - 2012 Director of Studies (Natural Sciences Biological), St Edmund's College, Cambridge, CB3 0BN, UK.

2008 - 2009 Leverhulme Trust Research Fellow, University of California at San Francisco, San Francisco, CA 94143-0552, USA.

2005 - 2008 Reader in Cell Biology, Department of Pathology, University of Cambridge, Tennis Court Road, Cambridge, CB2 1QP, UK.

2000 Guest Investigator, The Rockefeller University, Laboratory of Cell and Structural Biology, New York, NY 10021, USA.

1994 - 2004 Lecturer, then Senior Lecturer, then Reader in Molecular Cell Biology, Department of Biochemistry, Imperial College of Science, Technology and Medicine, London, SW7 2AY, UK.

1993 - 1994 Postdoctoral Fellow, Department of Microbiology and Immunology, Stanford University School of Medicine, Stanford, CA94305, USA.

1992 - 1993 Postdoctoral Fellow, Immunology Division, Genentech Inc., South San Francisco, CA94080, USA.

1989 - 1992 Postdoctoral Associate, Laboratory of Molecular Parasitology, The Rockefeller University, New York, NY10021, USA.

Education

1989 D.Phil. in Biochemistry, Wolfson College, University of Oxford, UK.

1985 Bachelor of Arts (First class honours) in Biochemistry, Corpus Christi College, University of Oxford, UK. Converted to Master of Arts, June 1989.

Award, honours

British Society for Parasitology C. A. Wright medal 2010.

Wellcome Trust Investigator 2017.

External Advisory Board, MiCoBion, BioCev, Charles University, Praha.

Wellcome Trust Traveling Fellowship 2000, 2012.

Leverhulme Trust Traveling Fellowship 2008.

Specialty Chief Editor, *Frontiers in Parasitology Molecular and Cellular Parasitology*.

Special editor for *Molecular and Biochemical Parasitology*, *Nature Scientific Reports* and *Traffic* for volumes devoted to evolution. Special editor for *Parasitology*.

Invited speaker at international meetings, including FASEB, FEBS, ASCB, KMCB, MPM, ICOPA, BSP, SBPz, SEB.

Key achievements

Research: Author and coauthor of ~250 peer reviewed research articles and papers, ~300 conference proceedings and 250 invited seminars and symposium presentations with an h-factor of 68. Raised over £40 million in research and educational support and twenty years of program grant support. Over thirty five years of active research, encompassing molecular biology, glycoprotein and glycolipid structural and biosynthetic analysis, carbohydrate structural determination, molecular parasitology, protein processing, genomics, molecular evolutionary biology and intracellular trafficking.

Teaching/outreach: Experienced undergraduate and postgraduate teacher, with skills in lecturing, course design, laboratory based research projects, tutorials/supervisions and examining. Founding Director Imperial College of Science, Technology and Medicine M.Sc. in Bioinformatics (2000-2004). External examiner for University of Glasgow B.Sc. in Parasitology (2012-2015), London School of Hygiene and Tropical Medicine M.Sc. in Molecular Biology of Infectious Disease (2008 - 2011). Senior examiner for Natural Sciences Tripos (Pathology Part II), University of Cambridge (2010), Director of Studies Natural Sciences Tripos (Biological) for St Edmund's College Cambridge (2006 - 2012), module coordinator Biology of Parasitism postgraduate summer course Woods Hole, USA (2010 - 2011). Organiser British Society for Parasitology (BSP) Spring meeting

Trypanosomiasis/Leishmaniasis stream 2012 (Glasgow) and 2018 (Aberystwyth), and overall meeting local organiser for BSP Spring meeting University of Cambridge 2014 and University of Dundee 2017. Also, organiser/scientific committee Kinetoplastid Molecular Cell Biology Meeting 2015 and 2017, Wood's Hole, Massachusetts. Lead co-organizer Nucleocytoplasmic Transport meeting, 2019.

Other: Established the Wellcome Trust Laboratories for Molecular Parasitology at Imperial College of Science, Technology and Medicine (extant 1998-2004). Board member for CamPOD (2009 - 2013), College Council of St Edmund's College (2013), member of the Council of the British Society for Parasitology (2011 - 2014), board member Medical Research Council Infection and Immunity Board (2014 - 2018), *ad hoc* Wellcome Trust Senior Investigator Award panel (2014, 2017), member Wellcome Trust Expert Reading Group (2018 - 2020).

Membership of professional organisations

Fellow of the Linnean Society, Royal Society for Biology, Institute for Learning and Teaching (Higher Education). Member of the Biochemical Society, British Society for Cell Biology, British Arachnid Society, American Society for Cell Biology, American Society for Microbiology, British Society for Parasitology, Glycobiology Society, MRC College of Experts, AAAS. Member of F1000, editorial boards of *Traffic* (2009 - 2020), *Microbial Cell* (2013 - 2020), *Glycobiology* (1996 - 2005), *Eukaryotic Cell* (2007 - 2015), *Nature Scientific Reports* (2012 - present), *Molecular and Biochemical Parasitology* (2018 - present), *Genes* (2019 - present), *Tropical Medicine and Infectious Disease* (2019 - 2020) and editorial advisory board of *The Biochemical Journal* (1996 - 2014).

Research objectives

Post-translational processing, trafficking and signalling in Trypanosoma brucei: In our long-term program we are investigating the molecular mechanisms of vesicle trafficking in the protozoan parasite *Trypanosoma brucei*, with a focus on endocytosis and how this system participates in virulence and host-pathogen interactions. We are also investigating G protein-mediated signalling and function. Endocytosis is implicated as important in evasion of immunological clearance by the host. The site of all vesicle traffic between the cell surface and internal membrane organelles in *T. brucei* is the flagellar pocket, a structure located at the base of the flagellum. This represents a unique mode of membrane specialisation, which is conceptually analogous to polarised secretion in many cell-types in higher eukaryotes. In terms of signalling, there are a number of unique small ras-like GTPases in the trypanosome genome and we are seeking to determine their roles in cell physiology, control of gene expression and virulence. We are also highly active in using comparative genomics and phylogenetic reconstruction to understand the origins of these systems in eukaryotes, a major interest.

Biology of the nucleus of Trypanosoma brucei: In collaboration with groups at the Rockefeller University, we developed a procedure for the efficient isolation of highly purified nuclei from *T. brucei*. We are pursuing a proteomic and functional analysis of the trypanosome nucleus and by gene knockout/knockdown approaches. This exciting development provides a new strategy for analysis of the nuclear matrix, the nuclear pore complex, and mechanisms of mRNA transport. All of these features are linked to the evolutionary diversity of the trypanosomatids, and are anticipated to provide important insight into eukaryotic biology.

Evolution of the eukaryotic cell: Comparative genomics and de novo sequencing of protist genomes, directed towards understanding the deep evolutionary relationships behind vesicle trafficking systems and their origins, and their adaptations in parasitic protists that are associated with virulence mechanisms.

Publications

<https://fieldlab.org.s3-eu-west-2.amazonaws.com/Reprints/Reprints.html>

Research and conference seminars

<http://fieldlab.org/lectures.html>

Abstracts

<http://fieldlab.org/abstracts.html>

Research and educational funding

1. Medical Research Council of the United Kingdom. 'Intracellular retention and degradation of proteins.' Duration 11.94-10.97. Value £192 457.
2. The Wellcome Trust. 'Vesicle Trafficking in *Trypanosoma brucei*.' Duration 3.95-2.98. Value £162 405.
3. Medical Research Council of the United Kingdom. 'Functional analysis of protein prenylases in *Trypanosoma brucei*.' Duration 1.4.97-31.3.00. Value £176 988.

4. The Wellcome Trust. 'Functional analysis of small G proteins in *Trypanosoma brucei*.' Duration 3.98-2.01. Value £159 829.
5. The Wellcome Trust. 'Functional characterisation of components of the *Trypanosoma brucei* endosomal system.' Duration 3.98-2.01. Value £145, 807.
6. The Wellcome Trust. 'Refurbishment of research laboratories at Imperial College.' With Dr D.F. Smith (Principal Applicant). Value £291 249.
7. The Wellcome Trust. 'Confocal microscopy in the Department of Biochemistry, Imperial College' With Prof. G. Dougan (Principal Applicant) and others. Value £40 000.
8. British Council/IAESTE. 'Eukaryotic secretion.' Duration 9.96-11.96 Value £1000.
9. The Nuffield Foundation. 'Probing the degradative capacity of the mammalian secretory pathway.' Duration 8.96-10.96 Value £1300.
10. Medical Research Council of the United Kingdom. 'High resolution microscopy of protozoan parasites.' With Dr. D. F. Smith. Total value £37 033.
11. The Wellcome Trust. 'Reconstitution of nuclear import in vitro in a parasitic protozoan.' Wellcome research travel grant for collaboration with Prof. M.P. Rout, Rockefeller University, New York. Value £2187. April 1999.
12. Biotechnology and Biological Sciences Research Council. 'Examination of endoplasmic reticulum-associated degradation (ERAD) in vitro.' Duration 9.98-8.01. Value £202 828.
13. The Royal Society & British Association Millennium Awards. 'Public understanding of science in the community: The truth shall set you free; Africa.' With Dr H. Field and others (Group application). Duration 5.99-11.99. Value £3 637.
14. The Wellcome Trust. 'Secretory and endocytic systems in the protozoan parasite *Trypanosoma brucei*; morphological and functional characterisation.' Duration 7.99-6.04. Value £646 184.
15. The British Council. 'In vitro induced stress response in *Trichomonas vaginalis* upregulates the production of a P-glycoprotein.' Joint research programme with Athens University. Co-applicant Dr N.M. Kapotas. Duration 7.99-6.01. Value £2340.
16. The Royal Society. Study visit to University of Marburg, Germany. Duration 11.99-12.99. Value £602.
17. The Wellcome Trust. 'Isolation and characterisation of nuclear and subnuclear fractions from *Trypanosoma brucei*.' Wellcome short-term travel grant for collaboration with Prof. M.P. Rout, Rockefeller University, New York. Value £3600. August-September 2000.

18. Medical Research Council of the United Kingdom. 'Proteomics of pathogenic organisms.' With Dr. D. F. Smith and others. Total value £31 000.
19. The Wellcome Trust. 'Endocytic systems in the protozoan parasite Trypanosoma brucei; functional characterisation.' Duration 10.00 - 9.03. Value £90 391.
20. The British Council. 'Reconstitution of glycopeptide transport from ER microsomes in protozoan parasites.' With Prof R.T. Schwartz (University of Marburg) Value £3570.
21. The British Heart Foundation. 'Functional analysis of the thromboxane receptor response to oxidative stress.' With Dr J. Tippins (Imperial College) Duration 1.01.-12.03. Value £130 000.
22. Medical Research Council of the United Kingdom. 'Proteomics and protein-networks in pathogenic organisms.' Principal applicant, with others. Total value £92 000.
23. The Wellcome Trust. 'Functional Genomics for Trypanosoma brucei.' Principal applicant, with others. Duration 10.01-9.04. Value £794 476.
24. The Wellcome Trust. Vacation Scholarship on Trypanosoma brucei. Duration 7.02-9.02. Value £1240.
25. The Wellcome Trust. 'Proteomics and function of the nucleus of Trypanosoma brucei.' Short term Travel Grant. Duration 3.03 - 9.03. Value £13 420.
26. Medical Research Council. Support for MSc. programme in Bioinformatics. Special subjects studentships (two). Total Value £32 000. Duration 01.10.02 – 31.9.03.
27. The Wellcome Trust. Establishment of a Wellcome Trust Four Year PhD Programme in Bioinformatics at Imperial College. Duration 10.03 - 9.08. Total value £1 172 346.
28. Medical Research Council. Support for MSc. programme in Bioinformatics. Special subjects studentship. Duration 10.03 – 9.04. Total Value £16 000.
29. The Wellcome Trust. Vacation Scholarship for Miles Ryan. Duration 7.03 - 9.04. Total value £1 320.
30. The Nuffield Foundation. Undergraduate Research Bursary. 'RNAi as a tool for dissection of small G protein function.' Duration 7.03 - 9.03 Total value £1 700.
31. Biotechnology and Biological Sciences Research Council. 'Biomolecular imaging for molecular and cellular biology and proteomics.' with G. S. Baldwin, M. Buck, D. Mann, M. Deonarain, N. Fairweather, K. Brown, R. Weinzierl and J. Saffell. Duration 10.03-11.04. Total value £194, 766.

32. Biotechnology and Biological Sciences Research Council Support for MSc. programme in Bioinformatics. Five masters studentships for three years. Duration 10.04 – 9.07. Total Value ~£250 000.
33. Medical Research Council. Support for MSc. programme in Bioinformatics. Two advanced course masters studentships. Duration 10.04 – 9.05. Total Value £32 000.
34. The Wellcome Trust. 'Identification and characterisation of trafficking signals in trans-membrane surface proteins of trypanosomes'. With M. Carrington. Duration 10.04 - 9.07. Total value £142 677.
35. The Wellcome Trust. 'Function and control of the endocytic system of the African Trypanosome.' Duration 1.01.05 – 31.12.09. Total value £853 201.
36. The British Heart Foundation. 'Thromboxane receptor function at the subcellular level in oxidative stress.' With Dr J. Tippins (Imperial College) Duration 05.05 – 04.08. Total value £150 198.
37. The Nuffield Foundation. Undergraduate Research Bursary. 'Role of E3 ligases in endocytosis in trypanosomes.' Duration 7.05 - 9.05. Total value £1 500.
38. The Wellcome Trust. 'Chaperone requirements for ER-folding and exit of GPI and trans-membrane anchored proteins.' With M. Carrington. Duration 10.05 – 9.08. Total value £172 126.
39. The Nuffield Foundation. Undergraduate Research Bursary. 'Characterisation of the late endosome/multivesicular body (MVB) of trypanosomes' Duration 7.06 - 9.06. Total value £1 440.
40. The Sandler Center Pilot Grant program. 'To investigate the roles of endocytosis and peptidases in IgG degradation in African trypanosomes.' With J. Mottram and G. Coombs (University of Glasgow). Duration 09.06 – 08.07. Total Value \$80 000 (£42 530).
41. The Royal Society International Travelling Fellowship. 'α1,3-galactosyltransferases in malaria parasites and trypanosomatids.' With R. Ramasamy, University of Brunei. Total value £3 250.
42. Marmaduke Shields Fund. 'Nucleofactor for parasitology.' Equipment Grant. Total value £8 100.
43. The Wellcome Trust. 'Structure, function and evolution of the trypanosome nuclear envelope.' Coapplicant M. Rout (Rockefeller University, New York). Duration 01.08 – 12.10. Total Value £285 279.
44. CamPOD. 'qRT-PCR for parasitology.' Equipment Grant. Total value £10 000.

45. Parke Davis Fund. One year salary support for Dr J. B. Dacks. Duration 01.07 – 12.07. Total value £37 604.
46. The Leverhulme Trust. Leverhulme Research Fellowship for sabbatical work at the University of California at San Francisco. Duration 11.08 – 02.09. Total value £12 450.
47. The Medical Research Council. 'A comparative proteomic approach to identify and validate African trypanosome at the host-parasite interface'. Duration 01.10 – 12.11 Project grant. Total value £323 961.
48. The Wellcome Trust. 'Maintenance of the cell surface of trypanosomes' Programme grant. Duration 06.10 – 05.15. Total value £1 000 124.
49. The Nuffield Foundation. 'Molecular control of antigenic variation and chromatin structure in trypanosomes.' Student bursary. Duration 06.10 – 08.10. Total value £1440.
50. The Wellcome Trust. 'Molecular control of antigenic variation and chromatin structure in trypanosomes.' Student bursary. Duration 06.10 – 08.10. Total value £1400.
51. The Wellcome Trust. 'Interactome analysis of the structure of the trypanosome nuclear lamina and other complexes.' Flexible travel award. Duration 11.11 – 07.12. Total value £22 800.
52. Marie Curie Foundation FP7. 'TRYPNUP: Nuclear envelope proteins of Trypanosoma brucei.' Fellowship award for Dr Ludek Koreny. Duration 3.12 - 2.14. Total value €200 372.
53. Anacor LLC 'Pilot studies on mode of action of oxyborols by RITseq'. Duration 9.12 - 12.12. Total value £15 000.
54. The Medical Research Council. 'Defining and leveraging the mechanism of action of suramin for treatment of trypanosomiasis.' Duration 01.13 – 06.16 Project grant. Total value £485 997.
55. The Wellcome Trust. 'Fluorescence activated cell sorting for immunobiology.' With Smith, G., Holmes, N., Dunne, D., Moffett, A., Goodfellow, I., Kaufman, J., Stevenson, P., Surani, A., and Trowsdale, J., Total value £266 451.
56. Cambridge-Africa Alborada Research Fund 'Development of procedural and computational platforms at trypanosome research centre (TRC) in Kenya for utilization of archived African trypanosome isolates' With Adung`a, V.O., and Murilla, G., Duration 06.13 - 02.14. Total value £10 000.
57. The Medical Research Council. 'Modes of action and resistance mechanisms towards anti-trypanosomal benzoxaboroles.' With Barrett, M.P., and Horn, D., Duration 01.15 – 12.17 Project grant. Total value £625,390.78.

58. The Wellcome Trust. 'Chemical biology: Leveraging phenotypic hits against kinetoplastids.' Coapplicant with with Gilbert, I., Horn, D., Wyatt, P., Gray, D., and Fairlamb, A., Duration 01.15 - 12.20. Total value £2 301 741.
59. RCUK-CONFAP Research Partnerships. 'Targeting the surface proteome of Trypanosoma cruzi.' With Horn, D., and Schenkman, S., Duration 01.15 - 12.15. Total value £31 000.
60. The Medical Research Council. 'Control of gene expression in trypanosomes: Defining the nuclear lamina.' Duration 06.16 – 07.19 Project grant. Total value £572 530.
61. The Medical Research Council. 'Global mechanisms for control of the trypanosome proteome: Defining the composition, origins and roles of cullin E3 ligases.' Duration 01.17 – 03.20 Project grant. Total value £344,375.
62. The Wellcome Trust Investigator award. 'A systems approach for understanding surface dynamics of trypanosomes.' Duration 04.17 – 04.24 Investigator Award. Total value £1,393,659.
63. The Wellcome Trust. Portfolio Award. 'A pipeline of drugs for leishmaniasis and Chagas disease.' Co-applicant with Wyatt, P., Gilbert, I., Horn, D., Ferguson, MAJ., Read, K., Horn, D., Gray, D., and Fairlamb, A., Duration 04.17 - 03.22. Total £7,928,810.
64. The Wellcome Trust 'Creation of the Wellcome Centre for Anti-Infectives Research.' Coapplicant with Wyatt, P., Gilbert, I., Horn, D., Gray, D., and Fairlamb, A., Duration 04.17 – 03.22. Total value £13 611,794.
65. Wellcome Centre for Anti-Infectives Research, £5,168,262.