

Candidate's Name: David C. Baulcombe
Professional Title and Affiliation: Regius Professor of Botany, Royal Society Research Professor and Head
Department of Plant Sciences
University of Cambridge
Cambridge, UK

50-Word Abstract:

Characterized mechanisms of viral pathogenesis in plants and identified virus resistance genes. Recognized the importance of gene silencing as a natural antiviral defense mechanism. Elucidated many aspects of gene silencing mechanisms relevant to all eukaryotes, including the discovery of short silencing RNA molecules, a seminal discovery in the RNAi field.

Curriculum Vitae:

Born April 7, 1952 in Solihull, Warwickshire, UK. B.Sc. University of Leeds (Botany), 1973; Ph.D. University of Edinburgh, 1977. Postdoctoral Fellow McGill University, 1977-1978; University of Georgia, 1978-1980. 1980-1986 Higher Scientific Officer 1980-1986 and Principal Scientific Officer 1986-1988, Plant Breeding Institute, Cambridge, UK. Senior Scientist 1988-2007 and Head of Laboratory, 1990-1993, 1999-2003, Sainsbury Laboratory, Norwich, UK. Professor, University of East Anglia, Norwich, UK, 2002-2007. Regius Professor of Botany, Royal Society Research Professor and Head of the Department of Plant Sciences, University of Cambridge, Cambridge, UK, 2007-present. Elected Memberships, Fellowships and Offices: Member, European Molecular Biology Organization, 1997; Fellow of the Royal Society, 2001; Member, Academia Europaea, 2002; Advisory Board, Academia Sinica Institute of Genetics, 2003; President, International Society of Plant Molecular Biology, 2003-4; Foreign Associate, National Academy of Sciences USA, 2005; Fellow, Trinity College Cambridge, 2009; Fellow of the Academy of Medical Sciences, 2010. Major Awards: Prix des Cerealiers de France, 1990; Kumho Science International Award in Plant Molecular Biology and Biotechnology, Kumho Cultural Foundation, Korea, 2002; Ruth Allen Award, American Phytopathology Society, 2002; Wiley Prize in Biomedical Science, Rockefeller University, 2003 (shared with A. Fire, C. Mello and T. Tuschl); Beijerinck Virology Prize, Royal Netherlands Academy of Arts and Sciences, 2004; Massry Prize, Massry Foundation, 2005 (shared with A. Fire and C. Mello); Royal Medal, Royal Society (UK), 2006; Honorary Doctorate, 2008, Wageningen Univ.; Benjamin Franklin Award in Life Science, Franklin Institute, 2008 (shared with V. Ambros and G. Ruvkun); Albert Lasker Award for Basic Medical Research, 2008 (shared with V. Ambros and G. Ruvkun); Knight Bachelor, 2009; Harvey Prize in Science and Technology, Technion Israel Institute of Technology, 2009; Wolf Prize for Agriculture, 2010.

Statement of Accomplishments

David Baulcombe and his coworkers have pioneered one of the most exciting discoveries in gene regulation - small inhibitory RNA molecules. Baulcombe's laboratory was the first to identify these ~25nt molecules through their role in silencing plant genes. The starting point of his ground-breaking research was two papers in which he showed that viruses could be a target of RNA silencing. He went on to show that this type of viral-induced resistance was related to transgene-induced gene silencing, implying that gene silencing was of general biological significance. He then showed that the silencing signal could move from cell to cell in the plant. The next milestone was the discovery of small RNA species (siRNA), approximately 25 bases in length, similar in sequence to the RNA that is targeted for silencing. These small RNAs provided the molecular explanation for gene silencing. He then showed that an RNA-dependent RNA polymerase gene, SDE1, was important for transgene silencing and identified further genes involved in this pathway through analysis of silencing suppressors. The small RNA molecules discovered by Baulcombe's laboratory have subsequently been shown to be of major significance for gene regulation in plants and animals, reflecting a conserved and previously unsuspected regulatory pathway that is of great importance for the understanding of gene regulation. The discovery has also provided the basis of novel technologies for gene interference. Dr. Baulcombe's H index as of 6/11/13 was 75 at Web of Science.

Key Publications

- 1986 **D.C Baulcombe**, G.R. Saunders, M.W. Bevan, M.A. Mayo, and B.D. Harrison. Expression of biologically active viral satellite RNA from the nuclear genome of transformed plants. *Nature*, 321, 446-449.
- 1987 B.D Harrison, M.A. Mayo, and **D.C Baulcombe**. Virus resistance in transgenic plants that express

cucumber mosaic virus satellite RNA. *Nature*, 328, 799-802.

1997 F. Ratcliff, B.D. Harrison, and **D.C Baulcombe**. A similarity between viral defense and gene silencing in plants. *Science*, 276, 1558-1560.

1997 O. Voinnet, and **D.C Baulcombe**. Systemic signalling in gene silencing. *Nature*, 389, 553.

1998 G. Brigneti, O. Voinnet, W.X. Li, L.H. Ji, S.W. Ding and **D.C Baulcombe**. Viral pathogenicity determinants are suppressors of transgene silencing in *Nicotiana benthamiana*. *EMBO J.*, 17, 6739-6746.

1998 O. Voinnet, P. Vain, S. Angell, and **D.C Baulcombe**. Systemic spread of sequence-specific transgene RNA degradation is initiated by localised introduction of ectopic promoterless DNA. *Cell*, 95, 177-187.

1999 A.J. Hamilton, and **D.C Baulcombe**. A novel species of small antisense RNA in post-transcriptional gene silencing. *Science*, 286, 950-952.

1999 O. Voinnet, C. Lederer and **D.C Baulcombe**. A viral movement protein prevents systemic spread of the gene silencing signal in *Nicotiana benthamiana*. *Cell*, 103, 157-167.

2000 T. Dalmay, A.J. Hamilton, S. Rudd, S. Angell, and **D.C Baulcombe**. An RNA-dependent RNA polymerase gene in *Arabidopsis* is required for posttranscriptional gene silencing mediated by a transgene but not by a virus. *Cell*, 101, 543-553.

2001 L. Jones, F. Ratcliff, and **D.C Baulcombe**. RNA-directed transcriptional gene silencing in plants can be inherited independently of the RNA trigger and requires Met1 for maintenance. *Curr. Biol.*, 11, 747-757.

2002 A.J. Hamilton, O. Voinnet, L. Chappell, and **D.C Baulcombe**. Two classes of short interfering RNA in RNA silencing. *EMBO J.*, 21, 4671-4679.

2002 P. Moffett, G. Farnham, J.R. Peart, and **D.C Baulcombe**. Interaction between domains of a plant NBS-LRR protein in disease resistance-related cell death. *EMBO J.*, 21, 4511-4519

2005 A. J. Herr, M.B. Jensen, T. Dalmay, and **D.C Baulcombe**. RNA polymerase IV directs silencing of endogenous DNA. *Science*, 308, 118-120.

2007 A. Molnar, F. Schwach, D.J. Studholme, E.C. Thuenemann, and **D.C Baulcombe**. miRNA controls gene expression in the single-cell alga *Chlamydomonas reinhardtii*. *Nature*, 447, 1126-1129.

2009 R.A. Mosher, C.W. Melnyk, K.A. Kelly, R.M. Dunn, D.J. Studholme, and **D.C Baulcombe**. Uniparental expression of PolIV-dependent siRNAs in developing endosperm of *Arabidopsis*. *Nature*, 460, 283-286.