

## Dr Jeremy Pritchard

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[School of Biosciences \(/schools/biosciences/index.aspx\)](/schools/biosciences/index.aspx)

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### About

I am a senior lecturer in Biology at the University of Birmingham. My research career started with roots in Wales and currently focuses on aphids in Birmingham with stops in the USA, New Zealand and Europe in between. My teaching spans field ecology through to plant functional genomics.

As a card-carrying Darwinist I am involved in teaching evolution at all levels from primary school to the U3A. As an admissions tutor I am concerned about the opening fault line at the secondary tertiary boundary. Increasingly obsessed with skills, I have developed resources to help teachers and learners at all levels. My favourite thing is phloem and I badger the public about it (and Darwin) at every opportunity.

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

In the video above, Dr Pritchard talks at a recent TEDx event at the University of Birmingham.

### Qualifications

1980 – 1983 BSc (*Hons*) Biological Sciences, Upper Second Class (2.1) Sussex University

1984 – 1988 PhD. *The control of growth rate in wheat seedling roots*. University of Wales.

**Society Experimental Biology (SEB) Presidents Medal, Swansea 1994**

### Biography

I did an undergraduate degree in Biology at the University of Sussex followed by a PhD in how plant roots grow at University College of North Wales, Bangor. In my research career I have worked in the US, Germany, Scotland and back in Wales on projects related to the adaptive response of plants to changing environments.

### Teaching

My teaching is diverse. I teach courses about my plant research area and also lead a range courses on evolution, ecology and field biology. Biology is an increasingly diverse subject, but the one common factor is evolution, whether it is the molecular motors that drive it, or the biodiversity that is its consequence.

### Postgraduate supervision

For a list of possible PhD projects offered by Dr Pritchard [www.findaphd.com/search/customlink.asp?inst=birm-Biol&supersurname=Pritchard](http://www.findaphd.com/search/customlink.asp?inst=birm-Biol&supersurname=Pritchard) (<http://www.findaphd.com/search/customlink.asp?inst=birm-Biol&supersurname=Pritchard>)

### Research

By training I am a plant physiologist, but like most biologists, the recent rise of genetic technologies has revolutionised my research, so that now I also work in the more molecular areas.

My core research is aimed at understanding how plants regulate the transport of water, sugars and salts. Like the human genome, the genetic information of many plants has been sequenced, but like humans we know very little about what the all the DNA does. To find out, we genetically modify plants to understand the function of the

different genes. Our work has many applications, from producing agricultural plants that are more tolerant of salt and drought, through to those that are less palatable to herbivores such as aphids.

Research Theme within School of Biosciences: [Organisms and Environment \(/research/activity/organisms-environment/index.aspx\)](#)

## Understanding plants in changing environments

We are interested in the physiological and biochemical processes which control plant growth at both cellular and whole plant level, and how changes in the environment alter this. We are interested in how the composition of plant compartments such as the xylem and phloem are regulated.

Our interest in the phloem in particular has developed our research into the area of plant - insect interaction as model systems to study defence against herbivores and other pathogens. Sap feeding pests such as aphids are predicted to become more important as climate change accelerates so novel control methods will be needed – one strategy is to modifying phloem composition to determine its effect on aphids.

Techniques for the measurement of turgor, osmotic pressure and solutes in single cells are central. Additionally, the use of specific insects allows access to phloem (aphid stylectomy) and xylem (spittle bugs). We use molecular techniques to analyse environmentally (stress) induced changes in gene expression (RT-PCR and transcriptomics). Candidate genes are investigated using gene knockout mutants in *Arabidopsis* to determine the role of individual genes in a range of biotic and abiotic interactions.

We have had going collaborations with industry including Syngenta in the area of plant insect interaction and Humber VHB in projects aiming to optimise nutrient transport in greenhouse grown crops.

## Other activities

I am involved in the development of knowledge transfer at a national level. I chair the Society of Experimental Biology (SEB) Education and Public Affairs Committee (EPA) and am the BBSRC Local Outreach Co-ordinator. I speak on outreach and PuS policy issues nationally (e.g. ASE, BSF, Wellcome Trust Science Engagement). I am a school admissions tutor for Biology and am heavily involved in various school liaison projects that aim to address the public understanding of science and also facilitate progression across the secondary – tertiary boundary.

## Publications

Pritchard J, Ford-Lloyd B and Newbury HJ (2005) Roots as an Integrated Part of the Translocation Pathway In 'Vascular Transport in Plants' Eds: N.M. Holbrook and M. Zwieniecki, Elsevier/AP co-imprint, Oxford

Xunlin Zhu, P. Nicholas Shaw, Jeremy Pritchard, John Newbury, Emma J. Hunt, David A. Barrett (2005) Amino acid analysis by micellar electrokinetic chromatography with laser-induced fluorescence detection: Application to nanolitre-volume biological samples from *Arabidopsis thaliana* and *Myzus persicae*. *Electrophoresis* 26, 911-919

A.J. Karley, D.A. Ashford, L.M. Minto, J. Pritchard and A.E. Douglas (2005) The significance of gut sucrase activity for osmoregulation in the pea aphid, *Acyrtosiphon pisum* *Journal of Insect Physiology* 51, 1313-1319

Hall D, Evans AR, Newbury HJ, Pritchard J (2006) Functional analysis of CHX21: a putative sodium transporter in *Arabidopsis* *Journal of Experimental Botany* 57, 1201-1210

Pritchard J 2006 Preface to phloem-insect interaction *Journal of Experimental Botany* 57, 728-728

Douglas AE, Price DRG, Minto LB, Jones E, Pescod KV, Francois CLMJ, Pritchard J, Boonham N (2006) Sweet problems: insect traits defining the limits to dietary sugar utilisation by the pea aphid, *Acyrtosiphon pisum* *Journal of Experimental Biology* 209, 1395-1403.

Emma J Hunt, J Pritchard, MJ Bennett, X Zhu, DA Barrett, T Allen, Bale JS and HJ Newbury (2006) The *Arabidopsis thaliana*/*Myzus persicae* model system demonstrates that a single gene can influence the interaction between a plant and a sucking insect pest. *Molecular Ecology*. 15, 4203.

C. Doering-Saad , H.J. Newbury, C.E. Couldridge, J.S. Bale and J. Pritchard(2006) A phloem-enriched cDNA library from *Ricinus*: insights into phloem function *Journal of Experimental Botany* 55, 3183-3193.

Lan Wang, David Hukin, Jeremy Pritchard, Colin Thomas (2006) Comparison of plant cell turgor pressure measurement by pressure probe and micromanipulation, *Biotechnology Letters*, 28, 1147-1150

Wang, C. X., Pritchard, J., Thomas, C. R. (2006) Investigation of the mechanics of single tomato fruit cells *Journal of Texture Studies* 37, 597-606

Pritchard J, Griffiths B and Hunt EJ (2007) Can the plant mediated impacts on aphids of elevated CO<sub>2</sub> and drought be predicted? *Global Change Biology* 13, 1616-1629.

Pritchard J (2007) Solute transport in the Phloem In "Plant Solute Transport" Edited by: Dr Anthony Yeo and Professor Tim Flowers Blackwell Publishing, Oxford, UK

Couldridge CEC, Newbury HJ, Ford-Lloyd B, Bale JS and Pritchard J (2007) Exploring plant responses to aphid feeding using a full *Arabidopsis* microarray reveals a small number of genes with significantly altered expression *Bulletin of Entomological Research* [www.journals.cambridge.org/action/displayJournal?jid=BER](http://www.journals.cambridge.org/action/displayJournal?jid=BER) (<http://www.journals.cambridge.org/action/displayJournal?jid=BER>), 97, 523-532

Faria CA, Wäckers FL, Pritchard J, Barrett DA, Turlings TC (2007) High Susceptibility of *Bt* Maize to Aphids Enhances the Performance of Parasitoids of Lepidopteran Pests. *PLoS ONE* **2(7)**: e600. doi:10.1371/journal.pone.0000600

Stefano Gattolin, H. John Newbury, Jeffrey S. Bale, Hua-Ming Tseng, David A.Barrett, Jeremy Pritchard (2008) A Diurnal Component to the Variation in Sieve Tube Amino Acid Content in Wheat *Triticum aestivum* L. *Plant Physiology* **147**: 912-921

Wang CX, Wang L, McQueen-Mason SJ, Pritchard J, Thomas CR (2008) pH and expansin action on single suspension-cultured tomato (*Lycopersicon esculentum*) cells. *Journal of Plant Research* **121**. 527-534.

Shakesby AJ, Wallace IS, Isaacs HV, Pritchard J, Roberts DM, Douglas AE . (2009) A water-specific aquaporin involved in aphid osmoregulation: *Insect Biochemistry and Molecular Biology* **39**: 1-10.

Kerton M, Newbury HJ, Hand D. Pritchard J. (2009) Accumulation of calcium in the centre of leaves of coriander (*Coriandrum sativum* L.) is due to an uncoupling of water and ion transport. *Journal of Experimental Botany* 60: 227-235.

Tseng, HM; Gattolin, S; Pritchard, J, Newbury HJ, Barrett DA (2009) Analysis of mono-, di- and oligosaccharides by CE using a two-stage derivatization method and LIF detection *Electrophoresis* **30**: 1399-1405.

Daniels M, Bale JS, Newbury HJ, Lind RJ, Pritchard J. (2009). A sublethal dose of thiamethoxam causes a reduction in xylem feeding by the bird cherry-oat aphid (*Rhopalosiphum padi*), which is associated with dehydration and reduced performance. *Journal of Insect Physiology* **55**: 758-765

## Expertise

How plants grow and are affected by changes in the environment (stress) including insect pests; evolution and creationism; teaching and learning strategies at school and university

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