

## Dr George W. Bassel PhD

Birmingham Fellow

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### About



[\(/university/colleges/les/research-gallery/george-bassel.aspx\)](/university/colleges/les/research-gallery/george-bassel.aspx) George Bassel was appointed as a Birmingham Fellow in 2012. His group focuses on understanding how genes change the shape of plant cells. Using seed germination as a model system, Dr. Bassel is uncovering gene regulatory networks that control cell shape changes, and how these networks are influenced by the environment.

### Qualifications

PhD University of Guelph 2006 in Molecular and Cellular Biology  
BSc University of Guelph 2001 in Biosciences

### Biography

George did a PhD on hormone signal transduction pathways in seeds with Dr. Derek Bewley FRSC at the University of Guelph, Canada. He went on to work as a postdoc with Dr. Nick Provart at the University of Toronto, and with Dr. Hiro Nonogaki at Oregon State University. Following three years of fellowship at the University of Nottingham with Prof. Michael Holdsworth, George was appointed as a Birmingham Fellow.

### Teaching

BIO398 Plant Science for the 21st Century

BIOM26

### Postgraduate supervision

Matthew Jackson MIBTP Student

George is currently accepting applications for postgraduate students to look at the relationship between gene expression and changes in plant cell shape.

### Research

The lab is using a multi-disciplinary approach to understand how genes control changes in the shape of plant cells. By examining post-embryonic growth of the model plant species *Arabidopsis*, we seek to uncover the molecular machinery that underlies the decision making process of a cell to commence expansion and the mechanisms that drive these shape changes.

Towards this, two complementary methodologies are being integrated:

- 1) Inference of co-functional Gene Networks** (how genes influence other genes)
- 2) Quantitative analysis of 3D cellular geometric changes** (how plant cells grow in 3D)

Functional gene interactions that modulate cell shape change have been computationally inferred from publicly available gene expression data in the lab. These predicted functional gene interactions are being investigated using quantitative high resolution imaging. In this way, the effects of these gene interactions can be quantified within the context of 3D cell shape changes.

### Other activities

Society for Experimental Biology

Member of the International Society for Seed Science

### Publications

Bassel GW\*, Stamm P, Mosca G, Barbier de Reuille P, Gibbs DJ, Winter R, Janka A, Holdsworth MJ, Smith RS\* (2014) Mechanical constraints imposed by 3D cellular geometry and arrangement modulate growth patterns in the *Arabidopsis* embryo. *Proc Natl Acad Sci U S A*. 111(23):8685-90

Yoshida S, Barbier de Reuille P, Lane B, Bassel GW, Prusinkiewicz P, Smith RS, Weijers D. (2014) Genetic Control of Plant Development by Overriding a Geometric Division Rule. *Developmental Cell* <http://dx.doi.org/10.1016/j.devcel.2014.02.002> (<http://dx.doi.org/10.1016/j.devcel.2014.02.002>)

Gibbs DJ, Md Isa N, Movahedi M, Lozano-Juste J, Mendiondo GM, Berckhan S, Marín-de la Rosa N, Vicente Conde J, Sousa Correia C, Pearce SP, Bassel GW, Hamali

Dekkers BJ, Pearce S, van Bolderen-Veldkamp RP, Marshall A, Widera P, Gilbert J, Drost HG, Bassel GW, Müller K, King JR, Wood AT, Grosse I, Quint M, Krasnogor N, Leubner-Metzger G, Holdsworth MJ, Bentsink L. Transcriptional dynamics of two seed compartments with opposing roles in Arabidopsis seed germination. *Plant Physiology* 2013 163(1):205-15

Bassel GW, Gaudinier A, Brady SM, Hennig L, Rhee SY, De Smet I (2012) Systems Analysis of Plant Functional, Transcriptional, Physical Interaction, and Metabolic Networks. *The Plant Cell* Published online October 30, 2012 [PDF \(http://www.plantcell.org/cgi/content/short/tpc.112.100776?keytype=ref&ijkey=kvCjmDYeegAWSNn\)](http://www.plantcell.org/cgi/content/short/tpc.112.100776?keytype=ref&ijkey=kvCjmDYeegAWSNn)

Miguel Gonzalez-Guzman, Gaston A. Pizzio, Regina Antoni, Francisco Vera-Sirera, Ebe Merilo, George W. Bassel, Maria A. Fernández, Michael J. Holdsworth, Miguel Angel Perez-Amador, Hannes Kollist, Pedro L. Rodriguez (2012) Arabidopsis PYR/PYL/RCAR Receptors Play a Major Role in Quantitative Regulation of Stomatal Aperture and Transcriptional Response to Abscisic Acid. *The Plant Cell* 2012 tpc.112.098574

Martínez-Andújar C\*, Pluskota WE\*, Bassel GW\*, Asahina M\*, Pupel P, Nguyen TT, Takeda-Kamiya N, Toubiana D, Bai B, Górecki RJ, Fait A, Yamaguchi S, Nonogaki H. (2012) The mechanisms of hormonal regulation of endosperm cap-specific gene expression in tomato seeds. *The Plant Journal* Mar 28. [PubMed \(http://www.ncbi.nlm.nih.gov/pubmed/22458548?dopt=Abstract\)](http://www.ncbi.nlm.nih.gov/pubmed/22458548?dopt=Abstract) \*Equal Contribution

Bassel GW\*, Lan H, Glaab E, Gibbs DJ, Gerjets T, Krasnogor N, Bonner AJ, Holdsworth MJ, Provart NJ (2011) Genome-wide network model capturing seed germination reveals coordinated regulation of plant cellular phase transitions. *Proc Natl Acad Sci U S A*. 108:9709-14 \* Corresponding author

Bassel GW\*, Glaab E, Marquez J, Holdsworth MJ, Bacardit J. (2011) Functional network construction in Arabidopsis using rule-based machine learning on large-scale data sets. *The Plant Cell* 23:3101-16. \* Corresponding author

Gibbs DJ, Lee SC, Isa NM, Gramuglia S, Fukao T, Bassel GW, Correia CS, Corbineau F, Theodoulou FL, Bailey-Serres J, Holdsworth MJ. (2011) Homeostatic response to hypoxia is regulated by the N-end rule pathway in plants. *Nature* 479(7373):415-8

Usadel B, Obayashi T, Mutwil M, Giorgi F, Bassel GW, Tanimoto M, Chow A, Persson S, Provart NJ (2009) Coexpression Tools for Plant Biology: Opportunities for Hypothesis Generation and Caveats. *Plant Cell and Environment* 32: 1633-1651

Bassel GW, Fung P, Chow TF, Foong JA, Provart NJ, Cutler SR (2008) Elucidating the germination transcriptional program using small molecules. *Plant Physiology* 147:143-155

Bassel GW\*, Mullen RT, Bewley JD (2008) *procera* is a putative DELLA mutant in tomato (*Solanum lycopersicon*): effects on the seed and vegetative plant. *Journal of Experimental Botany* 59: 585-593 \* Corresponding author

Bassel GW, Zielinska E, Mullen RT, Bewley JD (2004) Down-regulation of *DELLA* genes is not essential for germination of tomato, soybean and *Arabidopsis* seeds. *Plant Physiology* 136: 2782-2789