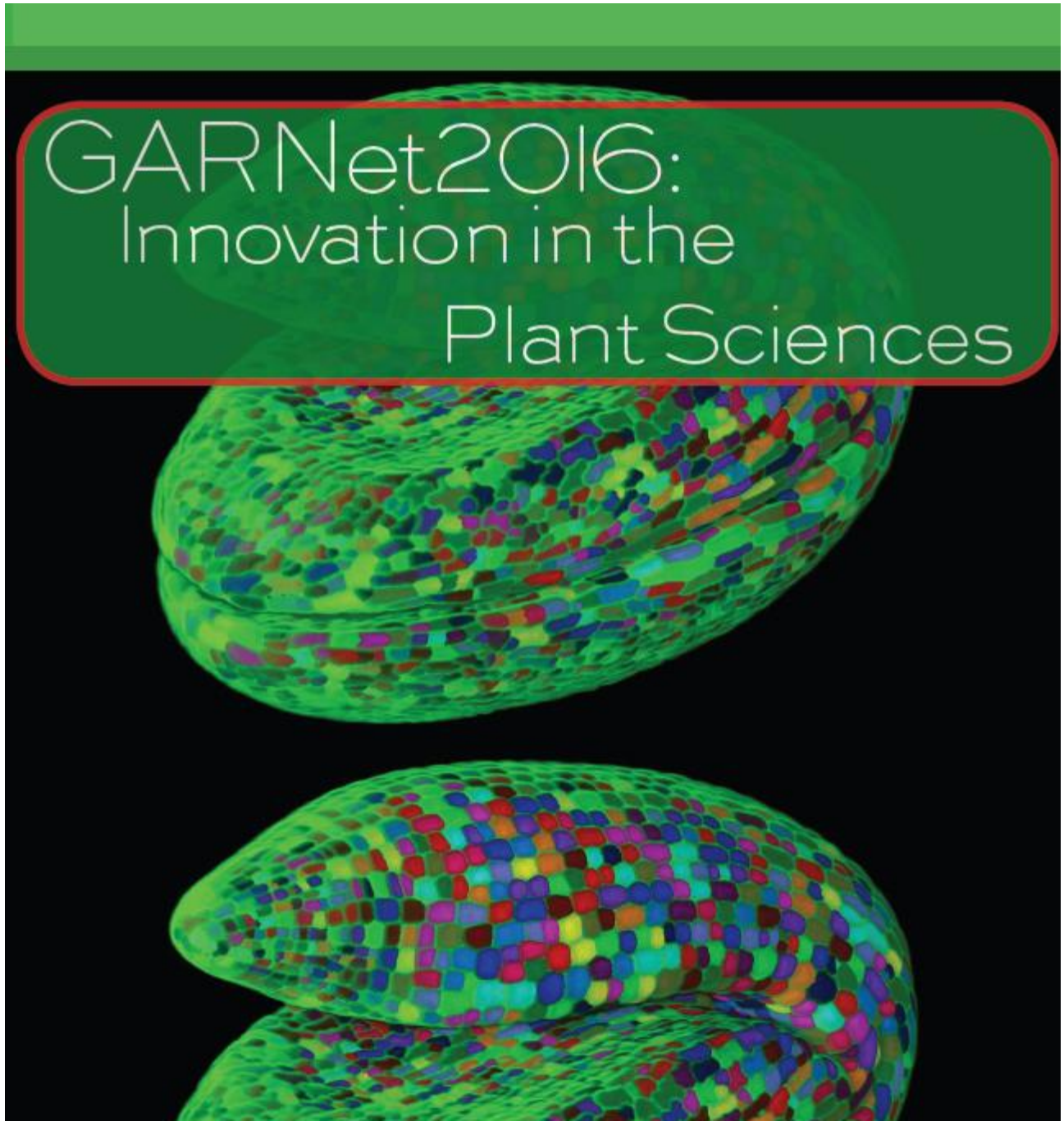
GARNet2016:
Innovation in the
Plant Sciences

Poster Abstract 45

A class of small cysteine-rich pollen coat proteins are key regulators of the hydration checkpoint in *Arabidopsis thaliana* pollen-stigma interaction

Ludi Wang, James Doughty, Rod Scott

University of Bath

The early stages of post-pollination in angiosperms involve multiple phases of interaction between male and female reproductive tissues. The establishment of the pollen-stigma interaction is proposed to involve a basal compatibility system that enables compatible pollen to be recognised by the receptive stigma. Divergence of components involved in this system could facilitate the establishment of prezygotic breeding barriers that would limit wasted mating opportunities, restrict interspecies gene flow and contribute to reproductive isolation. A diverse family of small secreted cysteine-rich proteins (CRPs) has been identified as having multiple roles in plant reproduction. CRPs found in the pollen coat of members of the Brassicaceae, the pollen coat proteins (PCPs), are emerging as important regulators of the pollen-stigma interaction. One class of PCPs isolated from the pollen coat of Brassica oleracea, the PCP-Bs, have previously been described, but their function was unknown.

In this study, four putative *Arabidopsis thaliana* PCP-B-encoding genes were identified, determined to be gametophytically expressed during the late stages of pollen development and confirmed as pollen coat proteins. Bioassays utilising single and multiple pcp-b gene knockouts revealed that AtPCP-Bs function in the early stages of post-pollination. Pollen morphology was unaffected in pcp-b lines, however mutant pollen grains showed striking defects in pollen hydration, delays in pollen tube emergence, as well as weakened anchoring of pollen grains to the stigma surface. This evidence suggests that AtPCP-Bs, are important components of the basal compatibility system, establishing a molecular dialogue between compatible pollen grains and the stigma.

Ongoing work focuses on analysing molecular evolution of PCP-B genes and identifying stigmatic targets for the AtPCP-Bs. This study sheds new light on the biological and evolutionary significance of CRPs in plant reproductive signalling.

Poster Abstract 46

Comparative biochemical studies of wheat and its wild relative *Brachypodium distachyon* upon infection by brown rust pathogen *Puccinia recondita*

N.Zh. Omirbekova, **Aizhan Zhussupova**, Zh.K. Zhunusbayeva, B.N. Askanbayeva, S.S. Kenzhebaeva

Al-Farabi Kazakh National University

An indicator of the national security of any country is the satisfaction of dietary needs of its population. Under current conditions of growing shortage of wheat, humanity might once again face an acute problem of the food crisis. Annual production of wheat on average is about 600 mln tons. It is expected that by 2020 the demand for it may reach more than 840 mln tons. Satisfying this need is a rather difficult task, taking into account the fact that the number of cultivating areas decreases, and wheat yields in most developed countries have already reached the maximum level. Production of high-quality grain in Kazakhstan is an important strategic direction, contributing to stabilization of agriculture, food security of the country and a decent position in the club of grain exporters in the world market. One of the major factors causing significant damage to grain production in Kazakhstan is a brown rust caused by Puccinia recondita, obligatory wheat pathogen common throughout the world, which might lead to a possible loss of yield up to 30-50%.

Model plant *Arabidopsis thaliana* provided unique opportunities for the study of key biological aspects of plant biology, including resistance to disease. However, Puccinia's inability to infect Arabidopsis provided further prospects for Brachypodium distachyon application in rust research. Comparative study of its molecular, genetic and biochemical features with related cereal grains enables us to understand mechanisms of wheat resistance to both abiotic and biotic factors.

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Participants

Darren Wells
University of Nottingham
darren.wells@nottingham.ac.uk

Zoe Wilson
University of Nottingham
zoe.wilson@nottingham.ac.uk

Jon Wood
Innovate UK
Jon.Wood@innovateuk.gov.uk
@innovatejon

Mutian Yang
University of Bath
my461@bath.ac.uk

Aizhan Zhussupova
Al-Farabi Kazakh National University
Aizhan.Zhussupova@sainsbury-laboratory.ac.uk
@AiJanim

Usnam Aslam
University of Chinese Academy of Sciences
wellusman@genetics.ac.cn

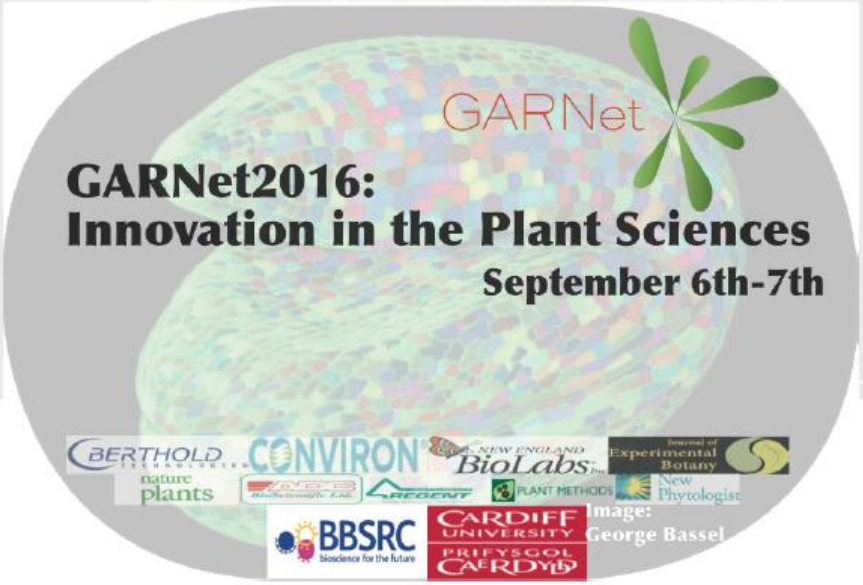

Image: George Bassel

GARNet NatVar16:
Natural Variation as a tool for Gene Discovery and Crop Improvement

Sessions and Keynote Speakers:

- Epigenetic Variation
  - Detlef Weigel (Tuebingen)
- Ecology and Population Studies
  - Joy Bergelson (Chicago)
- GWAS
  - Magnus Nordberg (GMI)
- NatVar and QTL Analysis
  - Carlos Alonso-Blanco (CNB)
- Genetics of Adaptation
  - Jon Agren (Uppsala)
- Breakthrough Technologies
  - Robin Allaby (Warwick)
- Translational Studies
  - Ian Bancroft (York)

Image: Detlef Weigel

Cambridge: Dec 12th-13th 2016

www.GARNetNatVar2016.weebly.com

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