

PhD studentship at SynthSys and Simulistics Ltd. in Edinburgh

BBSRC iCASE: Predicting Plant Growth, from Genes to Organism



We invite applications to a fully-funded, interdisciplinary PhD studentship, via the online application form: http://www.ed.ac.uk/studying/postgraduate/degrees?id=12&cw_xml=details.php.

Please contact andrew.millar@ed.ac.uk for informal enquiries, citing the project title above.

Background: Modelling complex biology is a challenge that requires new theoretical tools. Plant development and metabolism respond sensitively to the local conditions, for example, so models of plant growth in a changing environment must include these concurrent, interacting processes. Crop Science models tackle the problem at a coarse level to predict field traits. Systems Biology models include more detailed molecular mechanisms but usually for a limited sub-system. We have linked these two approaches to understand whole-plant growth, in the first 'Framework Model' of the laboratory model plant *Arabidopsis thaliana*. We have recently validated the model in independent experiments. This project will develop the next-generation model, both as a tool for fundamental plant science, and to enable synthetic biology designs that take account of the complex regulation in the plant host.

Approach: Modelling biological systems is a key strength in SynthSys, where we have local expertise in many different modelling approaches, as well as plant metabolism, development and genetic regulation. You will be trained on cutting-edge models from plant Systems Biology, plant development and crop science, building on the concrete example of our Framework Model. The model will be extended to represent larger, molecular networks that control biomass, working with international collaborators in plant science. Simple tools will be developed to visualise the models, including Simulistics' Simile software, suitable for teaching, training and dissemination in the research community. You will have the opportunity to join the international crop modelling and systems biology communities to develop far-reaching standards for this emerging area.

Student profile: background in Computer Science, Engineering, Applied Maths or Physics, or a suitable Life Science (biology, agricultural engineering, geoscience). Computer skills essential; programming experience desirable. Dual-expertise training provided in the interdisciplinary environment of SynthSys, with experience in Simulistics.

The supervisory team: Prof. Andrew Millar FRS, School of Biological Sciences (main supervisor); Prof. Vincent Danos, School of Informatics, Director of SynthSys; Dr. Robert Muetzelfeldt, Simulistics Ltd.



Further information:

www.amillar.org; www.synthsys.ed.ac.uk; www.simulistics.com.

Salazar J.D., Saithong T., Brown P.E., Foreman J., Locke J.C.W., Halliday K.J., Carré I.A., Rand D.A., Millar A.J. (2009) Prediction of Photoperiodic Regulators from Quantitative Gene Circuit Models. *Cell*, 139: 1170-1179.

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