INTEGRATIVE BIOLOGY

Towards a virtual root

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The Centre for Plant Integrative Biology (CPIB) at the University of Nottingham aims to create a *virtual root* which will serve as an exemplar for using Integrative Systems Biology (ISB) to model multi-cellular systems. CPIB brings together biologists, engineers, mathematicians and computer scientists to generate new data, biological resources and virtual models of plant roots that will aid understanding of how they grow and develop. The Nottingham Centre will integrate advanced experimental and imaging approaches with innovative mathematical, engineering and computer science research in collaboration with Rothamsted Research and several international groups.

The research programme will involve multidisciplinary teams working simultaneously in sub-programmes at the molecular, cellular and organ levels. The research activities are structured as three overlapping 3-year strands of increasing sophistication. **Strand 1** will focus on cell elongation during radicle emergence and primary root growth. **Strand 2** will commence in the second year and will focus on the root apical meristem, the principal site for cell division during primary root growth. **Strand 3** will begin in year three and will examine the initiation, patterning and emergence of lateral roots which enable the root system to elaborate its architecture. **Strand 4** also commences in the third year and will integrate the models at different physical scale across the first three strands. The **output of the programme** will be quantitative observational data, validated models constituting the prototype "virtual root" and proofs of concept which will form the basis for further research programmes.

Strand 1 started in March 2007. I will review progress made to date, highlighting the approaches, tools and results obtained so far.