Report for JSPS Website Dr Alex Webb March 2014

The major purpose of my Fellowship was to visit to the laboratory of Dr Akiko Satake at Hokkaido University. We discussed the formulation and implementation of a new mathematical approach to understand the inter-regulation of the plant circadian clock and metabolism in plants. The initial goal was to build a mechanistic model of the circadian clock of Arabidopsis to describe experimental data obtained in the Webb laboratory. During the visit mornings were spent sand pitting the problem, and afternoons in research. This resulted in the development of a novel solution that is simple to implement but will provide a global understanding of the mechanisms of entrainment of the circadian system by light and sugars. Our solution is an advanced model of great simplicity with considerably more power than we envisaged in our discussions prior to the Fellowship. It would have not been possible to formulate a model with such analytical power without the award of a JSPS Fellowship. A framework model structure, theoretical basis and the required datasets have all been developed. Additionally, the model will be used to provide a global understanding of the effect of perturbations to the circadian system on the growth of plants. This is a new avenue of research that has arisen solely as an outcome of the Fellowship and the discussions in Sapporo. I also had the opportunity to discuss research with those from related fields at Hokkaido University, RIKEN Yokohama, Kyoto University and Osaka Prefecture University. I am extremely grateful to the JSPS for the award of the Fellowship. I had an outstanding time in Japan, both scientifically and culturally. My hosts were incredibly generous with their time and ensured I obtained a full knowledge of the cultural, gastronomic and scientific delights of Japan.