

**Report of February 2012 Meeting
Royal Society
Southern Highlands Branch**

Speaker: Dr Bruce Lee
Director
CSIRO Food Futures National Research Flagship

Topic: GM Essential for Health and Food Security

Dr Bruce Lee was welcomed by a packed audience of seventy at the Frensham School Drama Hall. Bruce is the Director of the Food Futures National Research Flagship at CSIRO, his lecture topic clearly offering wide appeal to the scientific community, senior science students and the public in general.

Dr Lee stated that between now and 2050, analysis of food demand suggests an increased requirement from 50 to 80% in total supply. This is a major challenge, brought about by four key drivers: 1) population growth – 9 billion people by 2050, 2) changing shifts in diet associated with greater affluence, 3) diversion of crops to biofuel – currently a couple of per cent, and 4) wastage from paddock to fork – estimates vary from 10 to 40%. CSIRO through the Food Futures Flagship is taking on these challenges and is developing new plant varieties through breeding and biotechnology solutions to help increase farm yields throughout the world.

Dr Lee's lecture detailed the types of research and development being undertaken in order to provide global communities with options to address these challenges sustainably. He also addressed the consideration of nutritional quality, essential for optimal growth and development, and also playing a significant role in the prevention of important diet-related diseases. In addition, he described the positive attributes of several new grains either currently on the market or in the development pipeline.

The Flagship's programs embrace work on grains, aquaculture, beef and biosensors, the programs in the last eight years having delivered commercial impact in the market place. Notably, a novel barley grain, *BARLEY max*, can currently be found in the breakfast cereal category of the major supermarkets here in Australia, selective breeding of Black Tiger prawns has achieved yields of threefold increase in commercial production, and similar results have been achieved in selective breeding for the Australian salmon industry based in Tasmania. In the development pipeline, products include healthy grains such as high amylose wheats for resistant starch, celiac friendly barley, increased yielding wheat, healthy oils and a novel aquafeed.

Development of superior high quality wheat varieties is a main focus of the Flagship because wheat is not only Australia's most important grain crop, but also one of the most important sources of food in the world. One of the innovative techniques to increase the

speed and efficiency of wheat breeding has been termed MAGIC by the CSIRO Food Futures Flagship. MAGIC will have a direct impact on farm production, as well as changing the way that scientists identify the genes that control characteristics such as quality and disease resistance.

Traditional wheat genetic studies, involving only two parent varieties, have limited ability to define the genes determining key traits. In some cases, they produce results which may reflect the parent varieties, but are not applicable for use on a commercial scale. The new approach, MAGIC – Multi-parent Advanced Gene Inter-Cross, allows the identification of genes controlling quantitative traits by crossing different combinations of multiple parents. The results of these crosses are plants that have a genome which is a mosaic of their multiple parents.

MAGIC has multiple advantages compared with existing approaches. It permits a more precise identification of genes that are responsible for wheat traits, and even allows the pinpointing of genes that have only minor effects. In addition, as the multiple parents originate from geographically diverse regions from Australia and around the world, MAGIC incorporates genetic factors useful for adaptation for a range of environments.

Anne Wood