About the Beach Lectures

David W. Beach was born in 1925 in London, England. Following service in the Royal Navy, he was married to Doris Holmes and began his career as a Chartered Accountant. Feeling the urge to expand his horizons, he moved to Canada and began a series of jobs in the aluminum industry that included General Manager of Kawneer, Canada and Vice-President of Kawneer, Inc.

As Vice-President of ALUMAX Aluminum Corporation he was instrumental in making it one of the largest and most profitable aluminum companies in the world, prior to his retirement. Inspired by his son's enthusiasm for science, he has chosen to share his good fortune by supporting this biochemistry graduate program.

This long-term support is intended to promote intellectual curiosity, a commitment to excellence, and an appreciation of science in all those involved.

Previous Speakers in the David Beach Lecture Series

2009	Erich Nigg	University of Basel, Switzerland
2008	Tom Kunkel	National Institute of Environmental Health Sciences
2007	David Allis	The Rockefeller University
2006	Chris Somerville	Carnegie Institution and Stanford University
2005	Mark Stitt	Max Planck Institute of Molecular Plant Physiology
2004	Craig Garner	Stanford University
2000	Timothy J. Richmond	Swiss Federal Institute of Technology, Zurich, Switzerland

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PURDUE UNIVERSITY

The Department of Biochemistry
Presents

The 2010 Beach Distinguished Lectures

September 13-September 14

Dr. Cathie Martin

John Innes Centre, Colney, Norwich, UK
Department of Cell & Developmental Biology

Brief Biography

Dr. Cathie Martin is a group leader at the John Innes Centre, the leading plant research institute in Europe and Professor at the University of East Anglia. Her interests span from fundamental to applied plant science. Her fundamental research has focused on cellular specialisation in plants and she was the first to identify genes regulating cell shaping in plants. She is particularly interested in cellular specialization in flowers (colour and cell shape) and how these traits are used by different plants for pollinator attraction.

Recently Cathie Martin has been coordinating research into the relationship between diet and health and how crops can be fortified to improve diets. This work has involved linking leading clinical and epidemiological researchers with plant breeders and metabolic engineers to develop scientific understanding of how diet can help to maintain health, lead to healthy ageing and reduce the risk of chronic disease. She has also been involved in developing genetic screens to identify crops which lack toxins that cause nutritional diseases such as konzo.

Cathy Martin is Editor-in-Chief of *The Plant Cell*, through which she has been piloting new features in scientific publishing, including 'Teaching Tools in Plant Biology' and she is co-author of the undergraduate-level text book: *Plant Biology* published by Garland Science (2009).

The Potential of Genetic Modification of Crops for Dietary Improvement

Monday, September 13 at 4:00pm
Deans Auditorium, PFEN

A major challenge over the next 50 years is to reduce the frequency of the major chronic diseases; cardiovascular disease, cancer and age-related degenerative diseases. Although chronic disease is traditionally considered the affliction of wealthier developed countries, the numbers of people suffering from chronic non-communicable diseases is much higher in low income, developing countries and equals the levels of mortality from nutritional and communicable diseases in these countries. Chronic disease has a particularly serious impact on the poor of all countries, since the inability to work or mortality has catastrophic consequences when they affect the principal breadwinner in a family. In addition medicines to treat chronic diseases are often very expensive and difficult to obtain. Chronic diseases are particularly exacerbated by the metabolic syndrome which is increasing in frequency associated with a general increase in obesity, linked to declining levels of exercise and increasingly poor diets.

Numerous epidemiological studies have demonstrated the efficacy of diets high in fruit and vegetables in reducing the incidence of cardiovascular disease, cancer and age-related degenerative diseases. The importance of fruit and vegetables in the diet comes from them contributing a number of important phytonutrients or bioactives which often serve to promote antioxidant defence mechanisms. The relative cost of low quality foods rich in salt and sugar has decreased over the past 30 years, whereas the relative cost of fresh fruit and vegetables has increased, again shifting the burden of chronic disease onto the poor of developed and developing countries, alike.

Despite the specific recommendations of the "five-a-day" program of the National Cancer Institute of America (launched 15 years ago and now adopted by many countries) which encourage consumption of at least five servings of fruit or vegetables a day, the most recent estimates are that only 23% of the US population reach these dietary targets and, even more worryingly, that the numbers of people that do reach them have declined in recent years. These figures argue strongly for strategies to increase the levels of health-promoting bioactive compounds, in the fruits and vegetables that people actually consume in significant amounts. Plant biotechnology can make a very significant contribution to exploring this option in a number of ways: developing model foods that test the importance of specific bioactives in promoting particular aspects of health, developing markers that allow molecular breeding for enhanced levels of bioactives in crops and genetic engineering that provides novel, health-promoting foods. Due mainly to the increasing cost of curative medicine, preventive medicine is becoming crucial for improving health in developed societies, and remains often the only resort of those in developing countries. Amongst non pharmacological interventions, nutritional improvements developed through plant breeding and plant genetic engineering represent a feasible means of developing preventive strategies against chronic degenerative diseases for the future.

Engineering Phenylpropanoid Production for Healthy Foods

Tuesday, September 14 at 4:00pm
Deans Auditorium, PFEN

The past 20 years has seen an enormous rise in publicity about super foods that promote health and reduce the risk of cardiovascular disease, cancer and age-related degenerative diseases, related specifically to the metabolic syndrome. These claims are supported by robust evidence from cell studies, animal feeding trials, human intervention studies and epidemiological studies. However, despite all the positive messages about the value of eating fruit and vegetables (the 5-aday program has been running for 25 years) the numbers of people meeting these dietary recommendations in the US remains below 25% of the population, numbers are falling, and chronic diseases, especially those associated with obesity and the metabolic syndrome, are reaching epidemic proportions in Western societies.

There is a need to engineer high levels of protective bioactives in the foods that people actually do consume, to help combat this rise in chronic diseases. Most attempts at engineering the levels of bioactives have focused on increasing the activity of key, rate-limiting steps, but such strategies usually result in only modest improvements in flux to bioactive end-products. Use of transcription factors to up-regulate entire pathways of plant secondary metabolism is a far more effective strategy and results in food material with very significantly elevated levels of health-promoting bioactives. While such improvements may, in part, be achievable for some crops through selective breeding, genetic modification offers bigger improvements because it can overcome limits in the natural variation available in transcription factor specificity and activity.

Use of genetically improved foods in animal feeding studies with models of tumorigenesis have revealed that protection is afforded by diets enriched in high bioactive foods. Such health-promoting foods will offer consumers tangible improvements in the products available to them, and have the potential for public approval of genetically improved plant varieties and foods derived from them, in Europe.