

A Study of Technologies to Benefit Farmers in Africa and South Asia

Committee

Brian A. Larkins

Chair

Brian A. Larkins is the Associate Vice Chancellor for Research and Distinguished University Professor of Life Sciences at the University of Nebraska – Lincoln. He previously was the Porterfield Professor of Plant Sciences at the University of Arizona. Dr. Larkins is an expert in seed biology. He characterized the zein seed protein genes of maize and illuminated the events leading from gene expression through deposition of zein proteins into protein bodies of the maize kernel, with significant implications for protein nutrition of humans worldwide. Dr. Larkins was elected to the National Academy of Sciences in 1996. He was a member of the NRC Subcommittee on Environmental Impacts Associated with Commercialization of Transgenic Crops: Issues and Approaches to Monitoring. Dr. Larkins was an associate editor of *Plant and Cell Physiology* from 2002-2005. From 1991-1992, he was President of the International Society for Plant Molecular Biology and from 1998-1999, the president of the American Society of Plant Physiologists. Dr. Larkins earned a B.S. (1969) in biology and a Ph.D. (1974) in botany, both from the University of Nebraska, Lincoln, and he was a Postdoctoral Research Associate in Biochemical Genetics and Plant Physiology at Purdue University from 1975-76.

Steven P. Briggs

Member

Steven P. Briggs is a professor of cell and developmental biology at the University of California, San Diego. His research looks at post-transcriptional determinants of plant innate resistance to infectious disease using protein profiling by tandem mass spectrometry combined with plant gene engineering. His formal training is in plant biology, but his interests encompass the broader issues of systems biology and regulatory problems in a variety of organisms. Dr. Briggs was elected to the National Academy of Sciences for being the first to isolate and characterize the mode of action of a plant disease resistance gene, Hm1, from maize. Before joining the UC San Diego faculty, Dr. Briggs was the Senior Vice President for R&D Platforms at Diversa Corporation, and before that, the President and Chief Executive Officer of Novartis Torrey Mesa Research Institute, and global Head of Genomics at Syngenta AG. Dr. Briggs received his Ph.D. and M.S. in plant pathology from Michigan State University, and his B.S. in botany from the University of Vermont.

Deborah P. Delmer

Member

Deborah P. Delmer recently retired from her position as the associate director of food security at the Rockefeller Foundation, where she was the science and policy advisor for research related to the advancement of agriculture in developing countries. The focus of her work with the Rockefeller Foundation was agricultural development in Africa. She particularly highlighted abiotic stresses, such as poor soil quality, metal toxicity, and drought, and biotic stresses such as pests, pathogens, and parasitic organisms, as two central problems facing African farmers. She has discussed the need for plant biologists to devote more energy to the realm of translational science, much like the health sciences have recently done. Dr. Delmer was formerly a professor and chair of the Department of Plant Biology at the University of California, Davis (1997–2001). She identified the first cellulose synthase gene in flowering plants. Her research has provided fundamental insights into the enzymatic mechanisms by which cellulose and other complex cell wall polysaccharides are synthesized. Dr. Delmer was elected into the National Academy of Sciences for work that pioneered research in cellulose biosynthesis. Dr. Delmer received her Ph.D. (1968) in cellular biology from the University of California, San Diego, and A.B. (1963) in bacteriology from Indiana University.

Richard P. Dick

Member

Richard P. Dick joined Ohio State University's College of Natural Resources as an Eminent Scholar in Soil Microbial Ecology in 2004. His research interests are focused on soil ecology and the role of management in affecting soil functions within ecosystems. Dr. Dick studies the biochemical properties and processes in the soils in combination with microbial community analysis by using techniques that measure enzyme activities, microbial biomass, functional diversity, stable isotope probing, and phospholipid profiling (PLFA) of the microbial community structure. Dr. Dick's research has led to the development of soil-enzyme assays that can be used as rapid indicators of the effects of soil management and pollution on soil biology. Land managers and public and regulatory personnel can use those assays to identify degraded soils and to determine when remediation of soils is complete. He has supervised many graduate students from developing countries and had a leadership role in a large USAID ag. capacity building project in Senegal. Dr. Dick is currently working on a large NSF grant (Biocomplexity) on the regulation of hydrologic and C cycles by native shrubs in sub-Saharan Africa. Dr. Dick earned his doctorate in soil science from Iowa State University in 1985. He joined Oregon State University as an assistant professor in that year and attained the rank of associate professor in 1991 and of professor in 1996. In 2004 he was awarded an endowed chair as an Ohio Eminent Scholar, and where he is currently a professor of soil microbial ecology. He is a Fellow of the Soil Science Society of America and the American Society of Agronomy and was awarded the Senior Research Fulbright Scholar Award in 2000 to conduct research in West Africa.

Richard B. Flavell

Member

Richard B. Flavell is the Chief Scientific Officer of Ceres, Inc., a California-based plant genomics company. He also is currently an Adjunct Professor in the Department of Molecular, Cellular and Developmental Biology at the University of California, Los Angeles. From 1987 to 1998, he was the Director of the John Innes Centre in Norwich, England, a premier UK plant and microbial research institute. Dr. Flavell is an expert in cereal plant genomics, having produced the first molecular maps of plant chromosomes to reveal their constituent sequences. In 2004, he chaired a scientific and management review of the International Rice Research Institute in the Phillipines. He currently serves on the International Biofortification Program Advisory Committee of the World Bank's Consultative Group on International Agricultural Research (CGIAR). He served previously as Secretary to the Board and Executive Committee of ISAAA (International Service for the Acquisition of Agri-biotech Applications). In 1999, Dr. Flavell was named a Commander of the British Empire for his contributions to plant and microbial sciences. Dr. Flavell received his Ph.D. from the University of East Anglia and is a Fellow of EMBO and of The Royal Society of London.

Jonathan Gressel

Member

Jonathan Gressel is professor emeritus of plant sciences at the Weizmann Institute of Science in Israel. He and his research group are actively developing crops, biocontrol agents, and agrotechnologies to facilitate control of parasitic weeds (such as Striga) with colleagues in Mexico and Kenya. He is the author of over 265 scientific papers and book chapters and author, co-author, or editor of 6 books. His most recent books are the Molecular Biology of Weed Control (2002), and Genetic Glass Ceilings: Transgenics for Crop Biodiversity, to be released in 2007. Dr. Gressel is a past-president of the International Weed Science Society. He was chairman of the scientific program committee for the 3rd International Weed Science Congress, held in June 2000 in Brazil. Dr. Gressel received his Ph.D. (1963) in botany and horticulture and M.Sc. in botany from the University of Wisconsin, and his B.Sc. from Ohio State University.

Tsegaye Habtemariam

Member

Tsegaye Habtemariam is the Dean of the College of Veterinary Medicine, Nursing, and Allied Health at Tuskegee University. Prior to his appointment as dean, Dr. Habtemariam served as associate dean for Research and Graduate Studies; director of the Center for Computational Epidemiology, Bioinformatics, and Risk Analysis; director of Biomedical Information Management Systems; and professor of Epidemiology and Biomedical Informatics. Dr. Habtemariam has conducted more than a dozen international workshops in Africa, the Caribbean, and the United States in order to train scientists in science-based risk analysis of animal disease. He has served as a consultant for the Pan American Health Organization and the World Health Organization; was elected honorary member of the American Veterinary Epidemiology Society (2004); and served on the National Advisory Committee in Microbiological Criteria in Foods (2000-2002). Dr. Habtemariam received his Ph.D. (1979) in epidemiology and MPVM degrees from the University of California, Davis, a D.V.M. (1970) from Colorado State University, and B.S. in animal sciences from H.S.I. University, Ethiopia. Dr. Habtemariam has a broad knowledge of animal diseases that affect developing countries.

Rattan Lal

Member

Rattan Lal is a professor of soil sciences at Ohio State University (OSU). He also directs the OSU Carbon Management and Sequestration Center and the South Asia Initiative. Dr. Lal worked for 17 years at the International Institute of Tropical Agriculture in Ibadan, Nigeria, where he chaired the International Committee on Tropical Deforestation and Land Development. He is the chief editor of the Encyclopedia of Soil Science, and he has received numerous awards for his work on soils, including the American Society of Agronomy's Environmental Quality Research Award (2004). Dr. Lal received his Ph.D. (1968) in soils at Ohio State University, M.Sc. (1965) in soils at the Indian Agricultural Research Institute in New Delhi, India, and B.Sc. (1963) in agriculture at Punjab Agricultural University in Ludhiana, India. He grew up on a farm in Punjab, India. Dr. Lal has a vast understanding of the soil conditions in many regions of the world, in particular South Asia and Africa.

Alice N. Pell

Member

Alice N. Pell is the director of the Cornell International Institute for Food, Agriculture and Development (CIIFAD). As director of CIIFAD, most of her research focuses on tropical farming systems, with an emphasis on Africa, and the centerpiece being an interdisciplinary project on the relationship between poverty and environmental degradation in the densely populated Kenyan highlands. Prior to that appointment, she was a Professor in the Department of Animal Sciences at Cornell University. Dr. Pell's research areas and teaching fields include rumen microbiology, forage evaluation, modeling and nutrient cycling. Dr. Pell recently completed two-terms as a member of the NRC's Board on Agriculture and Natural Resources. She served as a member of the NRC Subcommittee on Dairy Cattle Nutrition and the Committee on Animal Nutrition. Dr. Pell received her undergraduate degree and a summa cum laude on her thesis in architectural science from Radcliffe College at Harvard University, her master's degree in education from Harvard Graduate School of Education; and her master's and Ph.D. degrees in animal science from the University of Vermont.

Raymond J. St. Leger

Member

Raymond J. St. Leger is a professor of entomology at the University of Maryland. His research focuses on understanding the fundamental biology of insect pathogenic fungi and exploiting their entomopathogenic properties for agricultural benefit. In 1996, he supervised a Centro Nacional de Investigaciones de Café (CENICAFE) project on coffee pest management in Columbia. In 2001, he collaborated with the Biocontrol Institute of China to develop effective mycoinsecticides against grasshopper pests. He currently works with the coffee federation of Columbia to produce a fungus that targets the broca beetle, a major pest of coffee. Dr. St. Leger is a member of the Society of Microbiology (UK), American Mycological Society, American Society of Microbiology, and the Genetics Society of America. In 1998 he was a finalist for the Office of Technology Liason's Invention of the year for a Novel Insecticide. He received his B.S. (1978) in Biology from Exeter University (UK), his M.S. (1980) in Entomology from the University of London (UK), and his Ph.D. (1985) from University of Bath (UK) Dr. St. Leger is an expert on insect biology and novel methods to protect plants from insect pests.

Robert J. Wall

Member

Robert J. Wall is a research physiologist with the Biotechnology and Germplasm Laboratory at the U.S. Department of Agriculture and an adjunct faculty member at the University of Maryland. Dr. Wall's work in genetic engineering has focused on producing healthy transgenic animals by efficient means. His lab has produced genetically engineered cattle that are resistant to infection by a mastitis causing bacterium, demonstrated that a synthetic genetic switch can be used to turn off an oncogene (thus reversing the hyperplasia caused by a virally induced cancer), and included matrix attachment region (MARs) sequences in gene constructs to double the production of functional transgenic animals. In 1988, Dr. Wall was a member of NRC's Panel for Review of Agricultural Sciences Research Proposals Under the A.I.D. Research Grants Program for the Historically Black Colleges and Universities. In 2005, Dr. Wall was recognized with the Beltsville Area Senior Research Scientist Award for his outstanding research accomplishments in the introduction of recombinant DNA molecules into the genome of agricultural animals. Dr. Wall received his Ph.D. in 1981 from Cornell University.