

Dr Russell J. Howard, BSc (Hons), PhD.

Dr Russell J Howard is an Australian-born scientist and entrepreneur. He was a pioneer in the fields of molecular parasitology, especially malaria, and in leading the commercialisation of one of the most important methods used widely today in molecular biology called 'DNA Shuffling' or 'Molecular Breeding'. Dr Howard completed a BSc and PhD at the University of Melbourne.

Dr Howard's 18 year contribution to malaria research began at the Walter & Eliza Hall Institute of Medical Research. He later continued as a tenured principal investigator at the Malaria Section of the National Institutes of Health in the USA, and continued at the biotechnology companies DNAX and Affymax in California. Thirteen years of his group's malaria research on antigenic variation in malaria culminated in the first molecular cloning of the malarial antigen PfEMP1, a parasite protein that this human malaria parasite expresses on the surface of malaria-infected red cells. During this time Dr Howard served on the World Health Organization's Special Program for Research & Training in Tropical Diseases and the USAID program for research and vaccine development in malaria.

While Dr Howard was President and Scientific Director at Affymax Research Institute, Willem 'Pim' Stemmer developed DNA Shuffling Technology. This revolutionary technology for improving the expressed phenotype of genes, pathways, plasmids, viruses and genomes gave birth to the creation and spinout of Maxygen Inc. where Dr Howard was CEO for 12 years. Maxygen exploited DNA Shuffling technology across the entire life sciences spectrum, creating new companies dedicated to agricultural products and industrial chemical opportunities as well as a protein pharmaceuticals business. After Affymax was purchased by GlaxoWellcome, Dr Howard led the technology transfer and interchange in combinatorial chemistry, drug discovery and optimisation between Affymax and GlaxoWellcome worldwide.

In 2008, he left Maxygen and started Oakbio, Inc., a seed-stage, privately held clean technology company in California. Oakbio captures CO₂ from industrial waste gas streams and uses microbial chemosynthetic systems to capture and convert this carbon resource to valuable chemicals, thereby sequestering greenhouse gas.

Dr Howard has been awarded Doctor of Science (*honoris causa*) degrees from the University of Technology, Sydney and the University of Queensland. His publications tackle topics ranging from the metabolism of the algae *Caulerpa simpliciuscula*, to the molecular pathogenesis of human cerebral malaria and the role of parasite antigenic variation and infected cell adherence in disease virulence. They reflect successful use of the tools of biochemistry, protein chemistry and structure-function, molecular biology and cell biology.

Dr Howard is also an inventor of five patents which include the discovery, characterization and cloning of a novel gene encoding a soluble malarial antigen that the most lethal human malaria releases into the blood. This led to a rapid, inexpensive and reliable diagnostic test for malaria that the NIH licensed commercially. This test has been used worldwide for over 15 years.

Upon his recent return to Australia, Dr Howard became Executive Chairman at Neoclone, a Sydney company developing biosimilar monoclonal antibody drugs. Neoclone's proprietary manufacturing technology generates products differentiated by low production cost. Price-competitive biosimilar drugs can share in multi-billion dollar emerging markets while simultaneously providing cost-affordable treatments to millions more people.

Dr Russell J Howard has dedicated his career to life sciences and biotechnology to generate valuable products that provide solutions to problems in medicine, agriculture and the chemical manufacturing business. It is, therefore, fitting that the Faculty of Science recognise such a distinguished scientist through the award of the Doctor of Science *Honoris Causa*.