J Ind Microbiol Biotechnol (2003) 30: 446–447
DOI 10.1007/s10295-003-0037-1

DEDICATION

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Sir David Alan Hopwood

Published online: 3 July 2003

The 7th International Conference on the Biotechnology of Microbial Products (BMP), held in Honolulu, 27–30 October 2002, was dedicated to Sir David Hopwood, in tribute to his extensive contributions to basic and applied research in the discovery, improvement or manipulation of microbial products and their producing organisms. Sir David's undisputed leadership in the field of streptomycete genetics and molecular biology, and his personal involvement with the many students, associates and colleagues in academia and industry over a period of more than 40 years has influenced greatly the ways microbial products are discovered, their titers improved, and their structures altered through manipulation of their determining genes.

Sir David completed both his undergraduate and doctoral studies at the University of Cambridge. After obtaining his PhD, he stayed on at Cambridge as an Assistant Lecturer for 3 years and then took a lectureship at the University of Glasgow. In 1968, he was appointed John Innes Professor of Genetics at the University of East Anglia, and Head of the Genetics Department at the John Innes Center in Norwich, positions he held for 30 years until his "official" retirement in 1998. But Sir David has not retired: he currently holds the titles of John Innes Emeritus Fellow, Emeritus Professor of Genetics at the University of East Anglia, and Visiting Research Fellow at Kosan Biosciences. Furthermore, he is the current President of the Society for General Microbiology.

Sir David has spent his entire career working with streptomycetes, in particular *Streptomyces coelicolor*. In his PhD work, he was the first to demonstrate that this antibiotic-producing bacterium can participate in natural mating and, therefore, can undergo genetic exchange. He isolated auxotrophic mutants of this organism and mapped their genetic locations, employing reciprocal three-factor crosses. In the 1970s, under his leadership, his laboratory and associates at the John Innes Center began to develop the tools of molecular biology for streptomycetes. During this period, methods for the transformation of protoplasts with plasmid or phage DNA were developed and several antibiotic resistance genes from antibiotic-producing organisms were cloned and used to construct numerous streptomycete plasmid and phage vectors for use in many actinomycete hosts, including industrially important ones. Protoplast fusion technology and its use in strain development (titer improvements) were also developed at the John Innes Center.

At the heart of this work was Sir David's interest in the genetic control of biosynthesis of secondary metabolites. In the 1960s and 1970s his group was the first to show, from mapping studies, that antibiotic biosynthesis genes are clustered. In the 1980s, once sequencing became available, his group was the first to sequence an antibiotic biosynthesis gene cluster. This work uncovered regulatory genes among the biosynthesis cluster. Global regulatory genes, affecting not only antibiotic biosynthesis but also development, were also found during this period. Complete sequence analysis of an entire cluster established the concept that all the genes required for the biosynthesis of a specific antibiotic can be moved as a single linkage group from one organism to another. This led to work, performed in collaboration with Professors Heinz Floss and Satoshi Omura, on the generation of hybrid antibiotics, produced through judicious gene cloning resulting in new combinations of biosynthesis genes from different *Streptomyces* hosts. This 1985 landmark *Nature* paper created great interest in the pharmaceutical industry in using rational genetic approaches to the discovery of novel antibiotics and other drugs, and many companies established significant research groups to exploit this technology. Though interested in secondary metabolites in general, Sir David focussed his efforts on the class of compounds known as

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aromatic polyketides. In collaboration with Chaitan Khosla, a former postdoctoral fellow in his laboratory, a series of rules were proposed explaining how a small set of 3–6 genes, each encoding a single function, can be used reiteratively to determine the composition, length, folding and cyclization of this class of molecules; in other words, how the genes determine the structure of the antibiotic.

In the 1990s, while whole genome sequencing projects centered on bacterial pathogens or *Archaea*, Sir David single-handedly took on the task of obtaining funding to have the *S. coelicolor* genome fully sequenced. His laboratory constructed an ordered set of overlapping cosmids spanning the entire 7.8 million nucleotides of the genome, to date the largest bacterial genome to have been so mapped. These cosmids served as the source from which the sequence was obtained, a project completed by colleagues at the Sanger Center in 2002 that he personally oversaw. Genomic approaches to the understanding of how secondary metabolism and sporulation are regulated and how bacteria can adapt to live in different environments are now made possible and have been initiated with Sir David's continued enthusiastic involvement.

To list all of Sir David's honors and awards would take the rest of this special issue, so only a few of the major ones will be named. These include the Hoechst-Rousell (now Aventis) Award for Research in Antimicrobial Chemotherapy, the Chiron Biotechnology Award, the Medal of the Kitasato Institute for Research in New Bioactive Compounds, the Mendel Medal of the Czech Academy of Sciences and the Gabor Medal of the Royal Society. Sir David is a Fellow of the Royal Society of London, a Fellow of the Institute of Biology of London, a Foreign Fellow of the Indian National Science Academy and Honorary Fellow of the International Institute of Biotechnology of London. He has honorary Doctorates from the ETH in Zurich and the University of East Anglia and is an Honorary Professor at many universities and research institutes around the world. In 1994, he was knighted by Queen Elizabeth II.

One cannot end without re-addressing the impact that Sir David has had on the field of Industrial Microbiology. As mentioned above, in the late 1970s and early 1980s, companies interested in natural products became aware of his accomplishments and began to reexamine the way they looked at natural product discovery and development. Many companies, often under his personal guidance, started to build groups to take genetic approaches to increasing titers and producing novel bioactive molecules. The rational, more scientific flavor of the work appealed to many scientists and attracted to industry many new people, many of whom had spent time in Norwich. Exchange between Norwich and industry flourished and Sir David spent a lot of time visiting companies, encouraging the scientists and, most importantly, influencing management. With his laboratory at the center, he established a scientific community of people interested in natural products and genetics: a rare community composed equally of academic and industrial scientists from around the world.

For his remarkable scientific achievements in the fields of biotechnology, microbial genetics and microbial products, as well as his great personal influence on the people who practice in these fields, the Society for Industrial Microbiology is honored to have dedicated this 7th BMP Conference to Sir David Hopwood.