

Biotechnology: finding new microbes and making good ones better

Environmental biotechnology is an exciting field, not least because the characteristics and roles of countless microbes are still unknown.

Professor Andy Ball, recently appointed to the inaugural Chair in Environmental Biotechnology at Flinders, said that advances in microbiology in the past few years mean that science has found new ways to identify unknown micro-organisms and establish their functions.

He and other biotechnologists hope to find previously unidentified microbes that have potential roles ranging from being sources of new antibiotics to improving the biodegradation of pollutant. Professor Ball said that the current scientific knowledge of micro-organisms in the environment only scratches the surface.

"Until now, it's been like having a set of yellow pages that are mostly blank - they list only a few names with very few addresses or headings to let you know what they do," he said.

He said the development of a molecular approach to research on micro-organisms, which allows them to be identified by their functions, has set the scene for a vast expansion of knowledge in the field.

Professor Ball has come to Flinders after 16 years teaching and research in the field of environmental microbiology at the University of Essex in the UK.

His specific research interests covered both chemical and biological contamination: he has specialised in the development of techniques to study the degradation of hydrocarbons from petroleum and petroleum derivatives in soil and water, and has also been involved in finding ways to clean up bathing beaches and shellfish beds affected

by toxins and pollutant.

In these roles, he has worked with both government agencies and the polluting industries.

"My expertise is in clearing up the environment and understanding how we can make the process more efficient," he said.

His work at Flinders will represent a continuation of these interests.



Professor Andy Ball

"Environmental pollution is not just a national but a global issue, and here in South Australia there are a number of environmental issues to face," he said.

Professor Ball said that so far he has found the attitudes of government agencies, local councils and industry in South Australia very encouraging: "I have met a lot of companies and individuals who are really adamant about improving the quality of the environment," he said,

Professor Ball said his research will be closely linked with the activities of Flinders Bioremediation, the University's bioremediation consulting company.

"Having a close association with Flinders Bioremediation will add a new applied angle to my research. As far as I know this close relationship between research capacity and a commercial, industrial application is unique."

Another aspect of his research, one less known in Australia, is in the area of environmental forensics.

"The problem in the past was that you have always been clearly able to identify pollution events, but it was very difficult to work out who caused it," Professor Ball said.

"A lot of my research has involved finding out what the contamination is and then attempting to find a microbiological or chemical 'signature', a unique pattern or marker, that will tell you who caused it."

Professor Ball said he expects Australia to follow North America and Europe in the increasing use of environmental forensics. He said that since legislation in the US has made current owners financially responsible for cleaning up polluted sites, there is a strong incentive for the costs to be recovered from the companies that created the problem originally.

"Environmental forensics is one of the growth areas of biotechnology, and I expect it to become more widespread throughout the world and in Australia," he said.

Although environmental villains still need to be caught, Professor Ball said there are

signs that potential polluters are increasingly interested in working with environmental agencies and biotechnologists.

"And in terms of the environment, legislation is getting tougher and tougher; diverting waste streams from landfill is a key, and there is huge interest in composting and bioremediation activities," he said.

"In the past, there has been a black box approach: it works, but we don't know how it works.

"The techniques we have evolved in the last five years have really started to probe these very basic processes to work out what is doing it, and how we can improve it."