

# Industrial microbiology



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The exploitation of microorganisms has been part of humankind for millennia. Today this use has increased immensely as we re-purpose microorganisms in many novel ways to facilitate processes in food, pharmaceutical, detergent and mining industries. This issue of *Microbiology Australia* includes a brief look at the breadth of *Industrial Microbiology* and what it is offering us now and into the future.

A brief look at what is going on in traditional Australian industries of beer and wine production is discussed in articles by Peter Rogers and Eveline Bartowsky. Peter Rogers notes a big shift to craft brewing.

One of our best-known biotechnology industries, CSL, now produces influenza vaccines through its new company, Seqiris (see <http://www.csl.com.au/Seqirus.htm>): Ethan Settembre and Yingxia Wen outline how vaccine production is changing via implementation of novel technologies. Alekhya Penumarthi and Peter Smooker present a Lab Report reviewing traditional virus-like particles (also known as subunit vaccines) and how they can now be developed to deliver DNA to Eukaryotic cells.

İpek Kurtböke reviews the approaches to make biodiscoveries that have given us life-saving drugs like penicillin, as well as new approaches that utilise genome mining. These have been more fully dealt with in a new book edited by İpek Kurtböke. Mishal Subhan, Rani Faryal and Ian Macreadie review the fungal production of highly prescribed blockbuster drugs known as statins. Ian Macreadie also reviews the utilisation of yeast to aid in screening of compounds for new biodiscoveries. The global antibiotic resistance problem is on the increase and is of catastrophic proportions; however, solutions may come in the form of bacteriophages that attack problematic microbes. İpek Kurtböke and a phage therapy working group present the latest advances.

Most of the economic gains in biotechnology these days are being made in protein therapeutics that give us immunotherapies, etc., that are providing a revolution in treatment of chronic diseases like cancer. George Lovrecz reviews this technology and compares it to the more traditional microbial systems. We feel it is important to include this under the *Industrial Microbiology* umbrella since mammalian cells are cultured somewhat like microbes and they use microbial elements, often viral promoters and origins of replication.

Renewable energy currently has importance in terms of global sustainability and microorganisms may help our energy and biofuel needs. Munish Puri discusses the use of algae for omega-3 fatty acid production, while Carolyn Bell and Ashley Franks discuss the advancing technologies of electric microbiology and potential for the future.

The pollution of our environment is another important area where microorganisms can help to break down recalcitrant compounds. Gregory Poi, Esmaeil Shahsavari, Arturo Aburto-Medina and Andrew S Ball provide an example of this powerful microbial metabolic activity, showing the removal of phenol from waste water by bioaugmentation.

Finally, there are fascinating new ways to put microorganisms in action, as discussed by Carol J Hartley, Matthew Wilding and Colin Scott. These include advances in synthetic biology that permit re-programming to incorporate non-natural amino acids, and even re-construction of whole microbial genomes.

Future environmentally friendly biotechnologies and global sustainability thus lies in the hands of microorganisms which have been at the service of mankind since the origin of the Earth.