Biotechnology finds its origin in biological processes that date back thousands of years. Here, *International Innovation* examines major biotechnological breakthroughs, from using yeast to make beer to cultivating bacteria to clean up the environment.

**Old biological processes**

**8000 BCE** – Approximately 10,000 years ago, humans began early forms of agriculture and animal domestication. As we became more experienced at both, we inadvertently started to practice one of the earliest forms of biotechnology: selective breeding.

**4000 BCE** – Around this time the Sumar people began fermenting bread. From the bread, they made a pulp, and from this pulp, they made beer. In doing so, they became among the first to use the *Saccharomyces cerevisiae* fungus, or yeast, to brew alcohol.

**Beginning towards biotechnology**

**1757** – Edward Jenner used the pus from cowpox blisters as a crude smallpox vaccine. Jenner has been called the ‘Father of Immunology’ for this discovery.

**1856** – Louis Pasteur examined sour beer under a microscope. He saw thousands of microorganisms, believed they were the culprits, and discovered he could kill the organisms by boiling the beer. Scientists now use ‘pasteurisation’ to eradicate bacteria from many liquids.

**1928** – Alexander Fleming was clearing out his office when he stumbled upon a powerful antibiotic. He found the *Penicillium notatum* mould growing on the same glass plates of his Staphylococcus bacteria, and noticed the bacteria around the mould had died. This eventually led to his discovery of penicillin.

**Modern biotechnology**

**1954** – Dr Thomas Peebles isolated the virus that causes measles, *Morbillivirus*, which is a highly infectious airborne disease.

**1971** – Dr Paul Berg was the first scientist to successfully splice the genes of two different viruses together and is considered the inventor of recombinant DNA technology.

**1971** – Dr Ananada Chakrabarty genetically engineered the *Pseudomonas putida* bacterium. This new bacterium is capable of metabolising crude oil, and was the first organism ever to be patented.

**1977** – Dr Expedito Parente submitted a patent for the first industrial process to produce biodiesel. This is a clean and renewable petroleum fuel replacement is made up of mono-alkyl esters of long chain fatty acids that come from vegetable oils or animal fats.

**1999** – This was the first year the term ‘personalised medicine’ appeared in a published work. The completion of the Human Genome Project greatly influenced the field, which is dedicated to creating medical solutions specified to an individual’s genome.

**2007** – Scientists in New Zealand began working on using pig cell transplants to mitigate and treat a range of medical issues in humans, including diabetes, Parkinson’s disease and Huntington’s disease.

**2012** – Researchers from Newcastle University discovered an enzyme released from *Bacillus licheniformis*, a bacterium found on the surface of seaweed, has the ability to prevent tooth decay by destroying plaque.