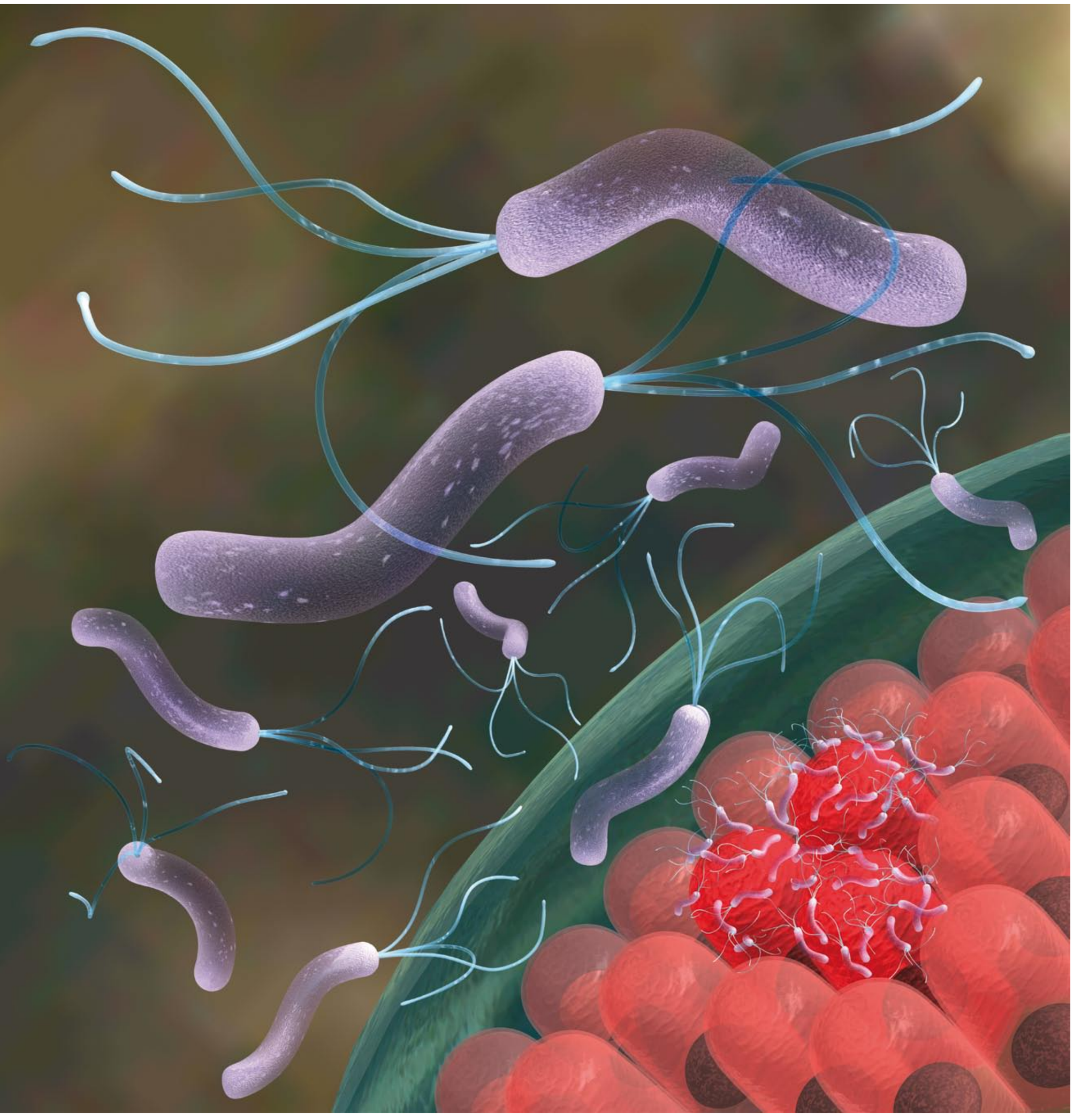
2005

Nobel Prize

in Physiology or Medicine



In 1979, Robin Warren (right), a pathologist with an interest in gastric ulcers, noticed spiral-shaped bacteria wherever he saw signs of inflammation in biopsies from patients with gastritis and ulcers. When Barry Marshall (left), who had recently completed his medical training, decided to find a research project, he talked to Robin Warren about his unusual observations.

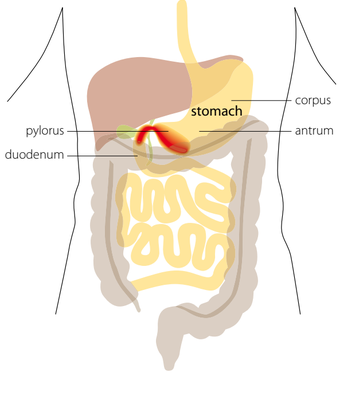
Working together at the Royal Perth Hospital, over the following years their research showed that bacteria, not stress or lifestyle, caused the majority of gastric ulcers. It defied accepted wisdom that the stomach was too acidic to allow bacteria to survive, grow and cause disease. Their work was to rewrite the text books and go on to earn the greatest scientific prize of all, the Nobel Prize.

The discovery has led to a deeper understanding of the link between chronic infection, inflammation and cancer. Doctors world-wide routinely treat patients who suffer from painful ulcers with a simple course of antibiotics.

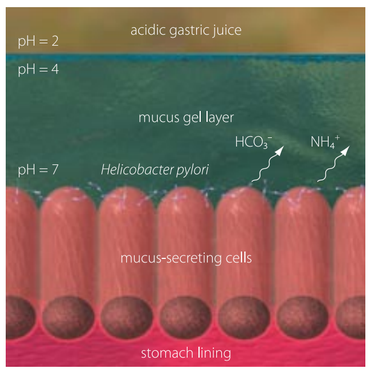
Since then, Warren has retired, but Marshall continues his research at The University of Western Australia on the bacteria that causes gastric ulcers.

They travelled to Stockholm in December 2005 to receive the award from the Nobel Committee. And it all started as an interesting observation by Warren on his birthday.

▲ *Helicobacter pylori* — so-named because of its shape and where it is found — is spiral shaped when it is actively growing and invading the epithelial cells of the stomach and duodenum. The bacteria use their spiral shape and flagella to move through the mucus of the stomach, which is present to protect the cells against the acid and enzymes that break down ingested food. The mucus also protects the bacteria against the effects of the acids. Once attached to the cells, the bacteria start to cause damage by secreting enzymes and toxins, initiating a self-destructive immune response.



◀ To cause a peptic or duodenal ulcer, *H. pylori* infects the lower stomach and the upper part of the duodenum. When *H. pylori* colonises the upper area of the stomach, more widespread inflammation predisposes patients to form ulcers and possibly cancer.



◀ *H. pylori* makes an enzyme called urease, which degrades urea to produce bicarbonate and ammonia, neutralising the acid in the area. But the ammonia and other toxins made by the bacteria cause the cells to become inflamed or to die. Inflammation is caused by the body's immune system trying to defend itself against invasion by the bacteria.

For more information about the discovery and the underlying science, visit the Australian Academy of Science website: **www.science.org.au/nobel/2005/**

Australian Academy of Science

Sponsored by

Australian Government
National Health and Medical Research Council

Department of Health

Winners' photograph: Frances Andrijich Photographer [www.andrijich.com.au] Design and illustrations: Jan Schmoeger [www.designpoint.com.au]