

# **Scientists examine bacterium found 1,000 feet underground**

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Credit: Max Wisshak (2012) McMaster University

Pioneering work being carried out in a cave in New Mexico by researchers at McMaster University and The University of Akron, Ohio, is changing the understanding of how antibiotic resistance may have emerged and how doctors can combat it in the future.

In research published in *Nature Communications* today, the scientists examined one bacterium found 1,000 feet underground (called *Paenibacillus*) that demonstrated resistance to most [antibiotics](#) used today, including so-called 'drugs of last resort' such as daptomycin. These microorganisms have been isolated from the outside world for more than four million years within the [cave](#).

The results show the bacterium is resistant to 18 different antibiotics and uses identical methods of defense as similar species found in soils. This suggests that the evolutionary pressure to conserve these [resistance genes](#) has existed for millions of years—not just since antibiotics were first used to treat disease.

Among the different ways that the bacteria could be resistant to antibiotics, the scientists identified five novel pathways that were of potential clinical concern. Finding these new pathways is particularly valuable, as it gives researchers time to develop new drugs to combat this type of resistance, potentially decades before it will become a problem for doctors and their patients.

"The diversity of [antibiotic resistance](#) and its prevalence in microbes across the globe should be humbling to everyone who uses these



lifesaving drugs," said Gerry Wright, an author of the paper and scientific director of McMaster's Michael G. DeGroote Institute for Infectious Disease Research.

"It reflects the fact that we must understand that antibiotic use and resistance go hand in hand."

Hazel Barton, professor and director, Integrative Bioscience at The University of Akron, said: "Exploring these challenging and remote environments offers a unique opportunity to sample the genetic diversity of microbes untouched by human activity"

The bacteria were found in Lechuguilla Cave, which is one of the longest caves in the world and deepest in the United States. It is an UNESCO World Heritage Site. Due to the fragile and highly technical nature of the cave, it has been closed to all except a few scientific researchers and cave experts since its original discovery in 1986. This restricted access makes it an ideal environment in which to study how microbes have evolved without the influence of [human activity](#).

Today's research publication follows work by the researchers in 2012 to examine microorganisms from the cave.

Although use of antibiotics revolutionized the treatment of bacterial infections in the 20th century, overuse of antibiotics has led to the emergence of antibiotic resistance in disease causing bacteria. In the U.S., the Centers for Disease Control estimate that more than 20,000 people die each year from otherwise treatable disease.

Both Health Canada and the U.S. national government have released national action plans to address the resistance crisis.

Provided by McMaster University

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