News

Scientists unearth new antibiotic in Italian soil

Oliver Moody Science Correspondent

A lethally precise chemical borrowed from a strain of bacteria found in Italian soil has emerged as a promising new kind of antibiotic.

The molecule, which is used by microbes in the natural world to break down other bacteria in the ground, cripples bacterial cells' inner machinery but leaves other tissue unscathed.

In laboratory tests it has wiped out MRSA and a strain of pneumonia-causing superbugs that were resistant to nine other kinds of medicine.

It also cured mice of peritonitis, a potentially fatal abdominal condition, although it has yet to be put to the test in humans.

Richard Ebright, a molecular biologist at Rutgers University, New Jersey, who is leading the work, said the breakthrough could have the same "transformative" effect on hospital infections that similar treatments have had on HIV and hepatitis C.

The compound, known as pseudouridimycin, was discovered decades ago by scientists at Lepetit, a now-defunct pharmaceutical company, as they sifted through samples of soil.

This was the way many of the most successful antibiotics were originally found, and in 2015 it yielded teixobactin, which is expected to usher in the first new class of the drugs in 30 years.

"This approach of screening soil samples for compounds that microbes use to compete with their neighbours took off after World War Two and had its heyday in the 1950s and 1960s," Professor Ebright said.

"Pharma left that field after the 1960s because it figured all the low-hanging fruit had been picked. But every major pharma company built itself on antibiotic discovery and they all made large internal collections with tens or hundreds of thousands of [soil] samples."

Half a century on, those samples are brown gold, the world's strongest hope in the face of superbugs that have evolved to withstand almost everything medicine can throw at them.

Pseudouridimycin belongs in a family of drugs that latch on to bacterial RNA polymerase, the tool with which bacteria make the intricate molecules that ferry around the instructions from their genes.

Unlike the other antibiotics in this group, however, the bacteria struggle to evolve a coping mechanism for pseudouridimycin because the genetic changes involved would rip up the core of their biological systems.

Findings published in the journal *Cell* suggest that it is at least ten times harder to resist than its competitors, which include established drugs such as rifampin and lipiarmycin. At present it can be manufactured in industrial quantities simply by fermenting the bacteria that make it in a tub of soil.

The next step will be to run the drug through an exhaustive year-long battery of tests in other animal species, including monkeys, before it can go into clinical trials. Professor Ebright said the fact that it had done so well in infected mice gave him good reason to believe that it would work in humans.

"For antibiotics and antivirals, activity in a vertebrate model is a sure indicator of activity in a human," he said.