Unusual polyketide metabolites found to give potato rotting bacteria ability to live in an oxygen-rich environment

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Source: Wikipedia

(Phys.org)—A team of researchers affiliated with several institutions in Germany has discovered the means by which the common bacteria *Clostridium puniceum*, which causes pink slime rot in potatoes, is able to survive in an oxygen-rich environment. In their paper published in the journal *Science*, the team describes the experiments they conducted that led to their discovery and what it might mean for fighting potato rotting in the future.

Potatoes are one of the four main food types grown in the world today, which means they make up a substantial portion of the human diet. But growing them has proven to be challenging because they are prone to

bacterial infections, which currently result in approximately 65 billion kilograms of lost potatoes every year. Unlike the famous potato blight that caused such misery in Ireland back in the 19th century, most modern infections are bacterial, rather than fungal. In this new effort, the researchers looked at one of the more problematic bacteria, *C.puniceum*, to see if they could learn how it is able to survive where potatoes are stored, because it is normally anaerobic.

Their experiments started with injecting the bacteria into potatoes in their lab and then watching as things developed. Once the bacteria was fully engaged, they studied it under a microscope and discovered that it excreted two unusual polyketide metabolites— clostrubins, type A and type B. To determine if the molecules had something to do with giving the bacteria an ability to live in an oxygen rich environment, the team studied its genes and identified which were responsible for causing the clostrubins to be excreted and then genetically altered some of them so that they were no longer able to do so. Those bacteria, the researchers found, were no longer able to live where oxygen was present, suggesting that the expression of the clostrubins played an essential role in allowing them to live where potatoes are stored.

But that wasn't all—the researchers also found that the clostrubins also served as an anti-bacterial agent against competing bacteria, such as those that cause ring and soft rot and other potato diseases. Thus more study might lead to new types of antibacterial agents for use in warding off potato infections.

More information: G. Shabuer et al. Plant pathogenic anaerobic bacteria use aromatic polyketides to access aerobic territory, *Science* (2015). DOI: 10.1126/science.aac9990

Abstract
Around 25% of vegetable food is lost worldwide because of infectious

plant diseases, including microbe-induced decay of harvested crops. In wet seasons and under humid storage conditions, potato tubers are readily infected and decomposed by anaerobic bacteria (Clostridium puniceum). We found that these anaerobic plant pathogens harbor a gene locus (type II polyketide synthase) to produce unusual polyketide metabolites (clostrubins) with dual functions. The clostrubins, which act as antibiotics against other microbial plant pathogens, enable the anaerobic bacteria to survive an oxygen-rich plant environment.