'Bacterial raincoat' found to protect bacteria from the environment

July 30 2013

(Phys.org) —Research led by scientists at the University of Dundee has uncovered the workings of a 'bacterial raincoat' that helps to protect bacteria from the changing environment in which they live.

Many bacteria grow in large communities called biofilms, where the cells work together and produce a sticky matrix that holds the cells together and provides protection from environmental threats. The team have shown how a bacterium called Bacillus, commonly found in soil, protects itself by forming a water repellent coat. They found that the process is due to a protein produced by the bacterium called BslA. This protein spontaneously assembles to form a water repellent coat, protecting the Bacillus cells underneath.

As Bacillus subtilis is currently being examined to assess its suitability for use as a widespread bio-fertilizer, the discovery has the potential to aid the development of an ecologically sound method of protecting crops.

The findings of the team, led by Dr Nicola Stanley-Wall and Professor Daan van Aalten from the College of Life Sciences at Dundee, alongside their colleague Professor Cait MacPhee, from the University of Edinburgh, are published today in the journal *Proceedings of the National Academy of Sciences.*

'We have determined the structure of the BslA protein, and used the information gained from it to identify the important parts of the protein

that are responsible for making the biofilm coat water repellent,' explained Dr Stanley-Wall.

'What we have shown is that this protein is very unusual in its ability to repel water from the environment whilst keeping the bacteria inside the biofilm in optimal conditions. The more we understand how the raincoat assembles the more we can work to encourage this process and increase the effectiveness of Bacillus subtilis as an environmentally friendly alternative to chemical fertilizers.'

Bacteria are small, single-celled organisms, which play a variety of roles in nature. Although some types are linked to infection and disease, others are entirely benign and indeed are beneficial, such as those that live side-by side with plants and protect them from disease or those in the gut that are essential for the maintenance of human health.

Although the research centred upon the workings of a single bacterium, it may potentially help scientists to better understand how biofilms formed in the human body become resistant to antibiotics, according to Dr Stanley-Wall.

She continued, 'There are possible implications for many different plants and even for human health as the principles guiding the research are the same. If we know how bacteria assemble into a bacterium assembles biofilm then we know how to disrupt it in the case of harmful, or to encourage the growth of good bacteria.'

Provided by University of Dundee