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Plants have innate defense mechanisms against invading bacteria
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Plants Employ 'Door Guards' Against Invading Pathogens

Bacteria and other organisms are thus kept away

In a new study funded by the National Institutes of Health (NIH) and the National Science Foundation (NSF), researchers from the University of California in Davis (UCD), working together with colleagues from Denmark and the University of California in Berkeley (UCB), have discovered a group of proteins in plants that simply does not allow bacteria to gain a foothold inside or outside the organisms. The find is extremely important for future research on better crop designs, and also for elaborating new ways of preventing crop infestation. Details will appear in the June 29th issue of the online journal Public Library of Science Biology (PLoS Biology).

"The ability of a plant's immune system to recognize disease-causing microorganisms is critical to the plant's survival and productivity. In this study, we identified a complex of proteins in the common research plant *Arabidopsis* that appear to play important roles in the biochemical mechanisms that enable plants to recognize and block out invading bacteria," UCD Plant Pathologist Gitta Coaker, who has also been the lead author of the new study, explains.

"Our ability to purify an immune protein complex will serve as a starting point to understand how these proteins signal in the plant. A greater understanding of how these proteins function is fundamental knowledge that can be applied to prevent plant disease," she adds, also noting the fact that the exact class to which these proteins belong, and how they are created in the way that they are are still a mystery.

It's also interesting to point out that plants do not rely on the same type of defense mechanisms as animals, in that they do not have a pre-programmed immune system, which is able to learn from experience. Rather, they rely on a batch of proteins, which is apparently perfectly able to hold out any invading bacteria, or other pathogenic microorganisms, which can be found in abundance in the environment. The plant immune system employs two different "branches" in its fight against invaders.

The first one is made up of specially designed proteins working outside of the cells, which are able to stick to and identify any incoming threats. The second is made up of similar proteins, but which reside inside the cells, and alert the plant when an infection occurs. Thus far, the only proteins noted to be involved in both branches has been RIN4. It's known that the protein somehow interacts with the two parts of the immune system to create a response, but exactly how that happens is still unknown.

In the new study, six other proteins playing important roles in immunity were found and, of those six, the one called AHA1 was discovered to be the essential one. It controls the opening of the stomatas, tiny holes on the underside of leaves, which allow air and water to pass in or out of the cells. It also works together with the two guard cells on the side of each stomata. These cells send signals when invaders are detected, as the stomata is the main portal through which bacteria and other invaders can enter plants.