Scientists discover a novel perception mechanism regulating important plant processes

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An international research team has revealed a novel mechanism for the perception of endogenous peptides by a plant receptor. The discovery of this activation mechanism sets a new paradigm for how plants react to internal and external cues. The study "Mechanisms of RALF peptide perception by a heterotypic receptor complex" was published today in the journal *Nature*.

Similar to insulin in humans, plants also produce peptide hormones that orchestrate internal processes and responses, including growth, development, and immunity. One of them is RALF23, which belongs to the large family of RALF plant peptides. Notably, the study revealed a novel recognition mechanism for the RALF23 peptide signals by plant receptors. Since RALF peptides play major roles in multiple important plant processes, these findings will impact our understanding of how several additional important receptors control fundamental plant processes.

Previous work by the group of Professor Dr. Cyril Zipfel at The Sainsbury Laboratory (Norwich, UK) and now at the University of Zürich (Zürich, Switzerland) had identified that RALF23 regulates plant innate immunity. Using a combination of genetics, biochemistry and structural biology, a close collaboration between this group and the group of Professor Dr. Jijie Chai at the Innovation Center for Structural Biology and the Joint Center for Life Sciences of Tsinghua and Peking Universities (Beijing, China) and at the University of Cologne (Cologne, Germany) has now identified the molecular basis for RALF23 perception. This work further involved collaborators from the Gregor Mendel Institute (Vienna, Austria).

Professor Jijie Chai said: "We were excited about the results, when we saw that RALF23 needs two distinct types of proteins—a receptor kinase (FERONIA) and an unrelated membrane-associated protein—to be recognized. The way these three proteins form an impressive perception complex might apply to other plant receptors that recognize peptide hormones."

Professor Cyril Zipfel added: "FERONIA is a plant receptor that was actually identified at the University of Zürich over a decade ago by my colleague Professor Ueli Grossniklaus for its important role in reproduction, but has since been shown to play key roles in multiple plant processes. Now that we understand the molecular basis of how FERONIA can perceive RALF peptides, it will help characterize how this unique receptor controls several aspects of plants' life."

More information: Yu Xiao et al, Mechanisms of RALF peptide perception by a heterotypic receptor complex, *Nature* (2019). DOI: 10.1038/s41586-019-1409-7

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