SIGNALLING

Metal transceptor

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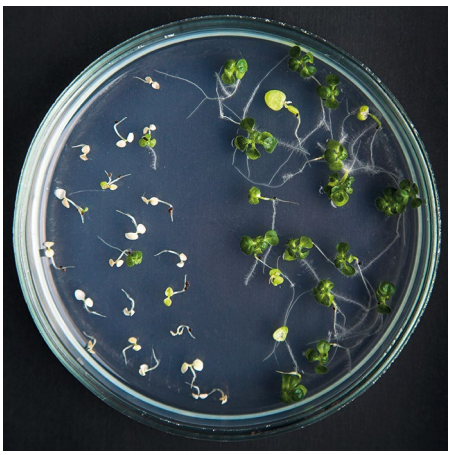

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Important molecules such as glucose and nitrate play a double role in plants: they are nutrients assimilated in metabolic processes; they are also transduction signals that activate specific downstream molecular cascades, leading to plant physiological adaptations. Processing of these two independent functions can be achieved by one protein only. Nitrate, for example, is both perceived and transported inside the roots by a plasma membrane transceptor called NRT1.1. This concept of dual transporter/receptor was first proposed in yeast. Now, Gregory Vert and colleagues have identified a new *Arabidopsis* transceptor involved in metal sensing and transport.

IRT1 is a plasma membrane protein that primarily transports reduced iron inside root epidermal cells. It is necessary for iron homeostasis, but also transports other heavy metal cations, such as zinc and manganese. Using cell biology, genetics and biochemical assays, Vert and colleages show that these non-iron metals, when present in excess, are perceived by IRT1 through binding to a cytosolic histidine-rich domain of the protein. This interaction induces two concomitant, post-translational modifications of IRT1: phosphorylation by the CIPK23 kinase and polyubiquitination by the ubiquitin ligase IDF1. This double tagging is necessary to target IRT1 to the lytic vacuole to be degraded.

In other words, IRT1 is a sensor for high soil concentration of metals, and triggers its own degradation to avoid flooding the root with metal ions, which would have negative consequence for growth. It is an exciting, novel example of a complex feedback loop regulating plant nutrition, and controlled by a bifunctional transceptor.

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