DEVELOPMENT

Disposable cuticle for young roots

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The transition of plants to land required major innovations to avoid desiccation and to protect exposed organs. An epidermal waterproof cuticle at the interface between the aerial organs and the outside world is one of them. This thin extracellular film is composed of polymeric lipids and soluble waxes. Roots also have diffusion barriers formed of lignin and suberin, but they are located deep inside the organ. Now, a team led by Christiane Nawrath at the University of Lausanne, Switzerland, has discovered the seemingly counterintuitive fact that roots also have a cuticle on their surface.

This root cuticle is spatially and temporally restricted to the root cap cells of young seedlings, in which all the genes necessary for its biosynthesis are expressed. Mutations in these genes produce an absent or deficient cuticle. The cutin layer disappears after a few days, when the first root cap cellular layer is shed, and its chemical composition is slightly different from the leaf cuticle. Early lateral roots are also covered by a similar structure. In terms

of function, the authors showed that the cuticle is a diffusion barrier that protects the meristem against toxic soil components during the critical seedling establishment stage. It also facilitates lateral root emergence by acting as a lubricant to reduce cellular adherence.

Textbook-changing discoveries are becoming scarce these days. Identifying a new anatomical structure in plants is a significant advance and modifies the way we will consider young roots from now on. While the apical hook mechanically protects the shoot meristem transiently during seedling emergence, this newly discovered cuticle chemically protects the root meristem on the other extremity of the seedling. The door is now open for more studies on this novel structure.

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