MPIDS Colloquium

MAX-PLANCK-GESELLSCHAFT

Plants: Masters of Defense

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Plants are under constant threat of attack from pathogens, herbivores, and the environment. The techniques employed by plants to defend themselves are very varied and some involve extremely refined armaments. In this lecture, we present two fascinating examples: First, we discuss the stinging nettle, a plant which employs hollow needle-like stinging hairs to deter herbivores. The hairs are constructed from silica, the mineral from which we make glass, and they are filled with poison. The hairs are remarkably rigid and rarely break. Yet the tip is so sharp that the slightest touch cuts human skin, and so fragile that it breaks at that touch and releases poison into the wound. How the seemingly antagonist mechanical functions of rigidity and fragility are achieved, however, is unknown. Our second example concerns the movement of water and minerals from plant roots to leaves in the xylem, a network of vascular conduits made from dead cells. When a plant is subjected to drought stress, air pockets can spread inside the xylem, threatening the survival of the plant. We combine experiments on biomimetic model systems with theory to elucidate the physics of these defense mechanism. The designs are compared to other natural systems and optimal strategies are discussed.

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MPIDS, Seminar room 0.77, Am Faßberg 17, Göttingen

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