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On the Cover: Aphids (Hemiptera: Aphididae) are phloem sap-feeding insects that are important pests of plants. Also, several aphids vector plant viral diseases. Aphids utilize their slender stylets, which are modified mouthparts, to consume phloem sap from sieve elements. As depicted in this illustration, the flexible stylet follows an intercellular path to the sieve elements, thereby minimizing wounding damage to plant tissues. Both antixenotic and antibiotic mechanisms contribute to host defenses against aphids. Antixenotic factors impact insect behavior, for example, the aphid's ability to find and feed from sieve elements. In comparison, antibiotic factors impact aphid physiology, resulting in adverse effects on insect growth, development, and/or reproduction. The interaction between Arabidopsis (*Arabidopsis thaliana*) and green peach aphid (GPA; *Myzus persicae*) identified Arabidopsis *PHYTOALEXIN-DEFICIENT4* (*PAD4*) as an important modulator of antixenotic and antibiotic defenses against GPA. *PAD4* encodes a protein with homology to α/β-fold acyl hydrolases that include lipases and esterases. PAD4 is also a component of Arabidopsis defense against pathogens operating with its interacting partner ENHANCED DISEASE SUSCEPTIBILITY1 (EDS1). However, EDS1 is not required for PAD4's involvement in defense against GPA. In this issue, Louis et al. (pp. 1860–1872) demonstrate that mutation of a conserved Ser (S118) in the predicted lipase active site of PAD4 permits the discrimination of PAD4 activities in defense against GPA, suggesting that PAD4 is capable of adopting a number of molecularly and mechanistically different forms, which determine different functions of PAD4 in fighting aphid infestation. Cover image by Nick Sloff (University Park, PA). The cover image by Nick Sloff includes an aphid image adapted from a drawing by Thomas Degen (www.thomas-degen.ch) and an image of plant cells adapted from a drawing by Kerry Mauck.

ON THE INSIDE

GENOME ANALYSIS

BREAKTHROUGH TECHNOLOGIES

BIOINFORMATICS

SCIENTIFIC CORRESPONDENCE

Continued on next page

Continued from preceding page

RESEARCH ARTICLES

BIOCHEMICAL PROCESSES AND MACROMOLECULAR STRUCTURES

BIOENERGETICS AND PHOTOSYNTHESIS

CELL BIOLOGY AND SIGNAL TRANSDUCTION

Continued on next page

Continued from preceding page

DEVELOPMENT AND HORMONE ACTION

ENVIRONMENTAL STRESS AND ADAPTATION TO STRESS

GENETICS, GENOMICS, AND MOLECULAR EVOLUTION

PLANTS INTERACTING WITH OTHER ORGANISMS

Continued on next page

Continued from preceding page

WHOLE PLANT AND ECOPHYSIOLOGY

SYSTEMS BIOLOGY, MOLECULAR BIOLOGY, AND GENE REGULATION

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