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.
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*A Amino Acid Residues Critical for the Specificity for Betaine Aldehyde of the Plant ALDH10 Isoenzyme Involved in the Synthesis of Glycine Betaine.
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*Subclassification and Biochemical Analysis of Plant Papain-Like Cysteine Proteases Displays Subfamily-Specific Characteristics.
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*Prunasin Hydrolases during Fruit Development in Sweet and Bitter Almonds.

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