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 **PERSPECTIVE** PLANT BIOLOGY





# Nervous system-like signaling in plant defense

Herbivory induces rapid long-distance calcium signals through glutamate-like receptors

GLORIA K. MUDAY AND HEATHER BROWN-HARDING, [Authors Info & Affiliations](#)

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## Abstract

The ability to initiate a rapid defense against biotic attacks and mechanical damage is critical for all organisms. Multicellular organisms have developed mechanisms to systemically communicate the occurrence of a wound to help them escape or defend themselves from predators. Because plants are stationary and cannot escape herbivory, they must respond with chemical defenses to deter herbivores and repair damaged tissue. On page 1112 of this issue, Toyota *et al.* (1) report long-distance calcium ion signaling in the model plant *Arabidopsis thaliana* in response to caterpillar herbivory or mechanical wounding (see the image). They uncover long-distance calcium signals that require glutamate-like receptor (GLR) channels for signal propagation. These channels are activated by extracellular glutamate, a well-known mammalian neurotransmitter and a more recently uncovered developmental signal in plants (2). In mammals, glutamate receptors are central to fast excitatory neurotransmission, which is an intriguing parallel to their role as long-distance signals in wounding and defense in plants.

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## References

- 1 M. Toyota et al., *Science* **361**, 1112 (2018).

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2 B. G. Forde, *J. Exp. Bot.* **65**, 779 (2014).[CROSSREF](#) • [PUBMED](#) • [ISI](#) • [GOOGLE SCHOLAR](#)[SHOW ALL REFERENCES](#)

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