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Cover Stories:

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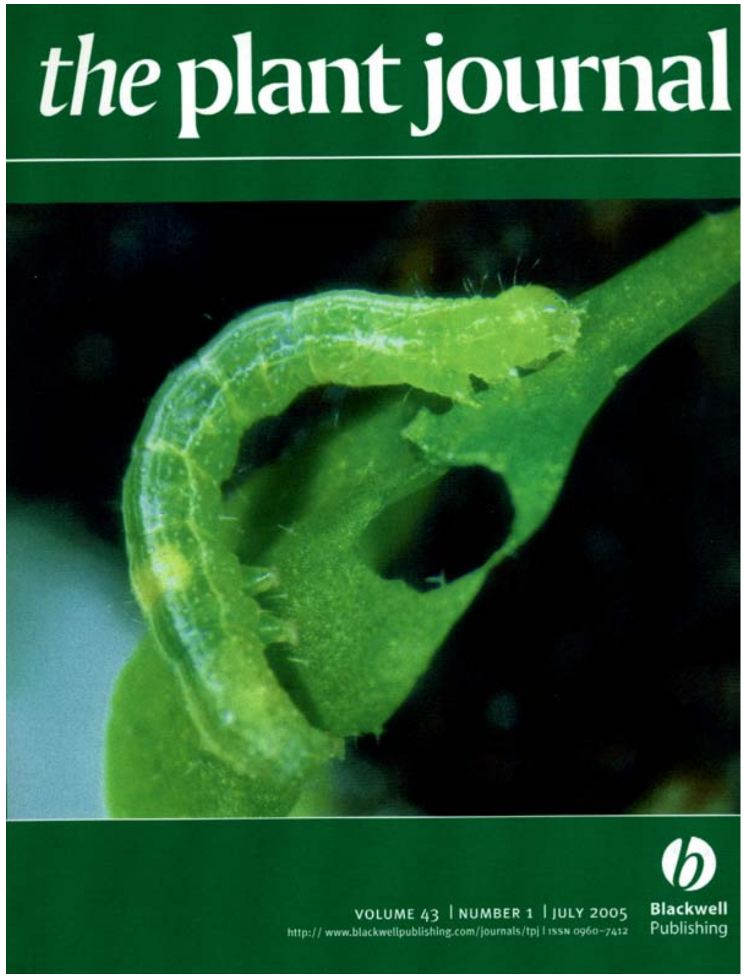

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M. Levy, Q. Want, R. Kaspi, P.P. Parrella, and S. Abel. 2005. **Arabidopsis *IQD1, a novel calmodulin-binding nuclear protein stimulates glucosinolate accumulation and plant defense*.** *The Plant Journal 43(1):79-96*

The distinctive flavor and aroma of cruciferous *Brassica* vegetables, such as cabbage, Brussels sprouts, and broccoli, are due in part to plant compounds called glucosinolates and their breakdown products, such as isothiocyanates. These compounds possess profound biological activities ranging from participation in plant defense to cancer prevention in humans. The pathway for synthesizing these compounds in plants is well-understood. However, little is known about the mechanisms for regulating glucosinolate production during plant development and in response to environmental challenges, such as insect herbivory. In research supported by USDA-NRI, Levy et al. identified *Arabidopsis thaliana* mutants that have altered glucosinolate accumulation and used these mutants to gain insight into how glucosinolate production is regulated. The authors developed a novel screen using cultured liver cells from mice to identify the mutations in plant genes that affected glucosinolate production. The screen is based on the ability of glucosinolate-derived isothiocyanates to induce detoxification enzymes in liver cells, which is believed to be one reason for the cancer-preventive properties of the *Brassica* crops. The authors report the cloning and functional characterization of a novel calmodulin-binding protein, IQD1, which localizes to the cell nucleus and interacts with calmodulin in a calcium-dependent fashion. Analysis of loss- and gain-of-function mutations demonstrates that IQD1 stimulates glucosinolate accumulation and resistance to generalist chewing insects, such as *Trichoplusia ni*, the cabbage looper. The authors hypothesize that as *IQD1* is induced by mechanical stimuli, such as chewing, the increased expression of IQD1 may integrate intracellular calcium signals that fine-tune glucosinolate accumulation in response to biotic challenge. The analysis of the sequences of IQD1 and IQD1-like proteins from different plants show that these proteins share a conserved domain that may play a role in calcium signaling in plants. Based on this analysis, the authors suggest that IQD1-like proteins play broader roles in plant defense and other plant responses to the environment.

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