ON THE COVER

The oomycete pathogen *Phytophthora infestans* has a cell wall composed mainly of cellulose, by contrast with most fungal pathogens, which have chitin-based cell walls. During infection, *P. infestans* breaks down host cell walls but synthesizes a new cell wall of its own to make infection-associated structures and grow and proliferate within the host. Grenville-Briggs et al. (pages 720–738) present a functional characterization of a family of four *P. infestans* cellulose synthase (CesA) genes, which form a distinct phylogenetic group that is most closely related to cyanobacterial CesA genes. The authors show that expression of all four genes is upregulated during early infection stages of potato, and chemical inhibition of cellulose synthesis leads to defects in the infection process and a complete loss of pathogenicity. These results show that cellulose synthesis is required for infection of potato by *P. infestans*.

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