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On the Cover: The use of in vivo fluorescence-based microscopy has allowed direct visualization of intracellular infection by nitrogen-fixing *Sinorhizobium meliloti* in living root hair cells of the legume *Medicago truncatula* (see Fournier et al., pp. 1985–1995). This highly regulated process involves the progressive formation of an apoplastic intracellular compartment known as the infection thread (IT). The panels on the cover illustrate three stages of IT growth within a single root hair viewed over a 20-h period. The GFP-HDEL marker labels the endoplasmic reticulum within the host cytoplasm (in green), and the CFP fluorescence labels the colonizing rhizobia (in magenta) within the IT. During early stages of IT growth (top), there are relatively few rhizobia in the thread and the frequent gaps within the bacterial file result from differential movement of rhizobia. A broad column of cytoplasm links the root hair nucleus to the rapidly elongating thread. Subsequently, the IT continues its growth towards the base of the hair (middle and bottom), and the thread is progressively colonized by rhizobia. Time-lapse imaging of growing ITs has revealed that the extension of the IT precedes rhizobial colonization of the thread and also that rhizobial progress within the thread involves a combination of cell division and collective "sliding" movement. Finally, the dynamics of the root hair cytoarchitecture suggests that the underlying cellular mechanism of IT development closely resembles that recently described for arbuscular mycorrhizal infection. Confocal images by J. Fournier.

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SYSTEMS BIOLOGY, MOLECULAR BIOLOGY, AND GENE REGULATION

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