

The electronic form of this issue, available as of November 13, 2006, at www.plantphysiol.org, is considered the journal of record.

On the Cover: Extracellular ATP (eATP) in animals is well documented and known to play an important role in cellular signaling (e.g. at the nerve synapse). The existence of eATP has been postulated in plants but has never been visualized. The photo shows the projection of 36 confocal optical sections (700 nm each) showing an overview of a live root segment demonstrating eATP on several root hairs. Imaging was made possible by the construction of a novel reporter protein made by fusing the cellulose-binding domain (CBD) motif to the ATP-requiring enzyme luciferase. When purified and added to roots, the CBD binds to the plant cell wall, localizing luciferase to the extracellular surface. When the substrate luciferin is added, light is produced only where ATP is being released from living cells. As seen, light production is strongest at the tips of growing root hairs. Similar imaging revealed excretion of ATP preferentially at sites of active cell expansion. Destruction of eATP by the addition of apyrase blocks root hair elongation. The data argue for an essential role for eATP in plant growth. The suggestion is that, as in animals, eATP will be found to play a role in a variety of plant processes. Imaging of eATP using the CBD-luciferase construct will provide a useful way to study such phenomenon. The image was created by Sung-Yong Kim and Mayandi Sivaguru (see Kim et al., pp. 984–992).

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^[W] Indicates Web-only data.

^[OA] Open Access articles can be viewed online without a subscription.