

## IMAGING AUTONOMOUSLY LUMINESCENT TOBACCO PLANTS

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We have developed autonomously luminescent tobacco plants [1]. We integrated the enzymatic machinery of glowing fungi into the metabolism of plants and achieved intense luminescence of the whole plant without an external supply of luciferin. We studied unperturbed developing organisms for months, from seeds to flowering with consumer-grade cameras and simple optical setup. Due to a direct connection to the metabolism, the luminescence intensity of these model organisms reflected progression through development, response to injuries, circadian oscillations. We believe that auto-luminescent plants pave the way to functional studies previously inaccessible with fluorescence imaging or any other reporter technology. We imaged injury response in a time scale of seconds, observed, with microscope objectives, the light production preceding branching of roots (see Fig. 1), and captured large-scale changes of light production in leaves and shoots, probably related to transport. The extent of spatio-temporal patterns of light production in model plants challenges the ability of existing imaging solutions to capture and analyze whole-organism luminescence data.

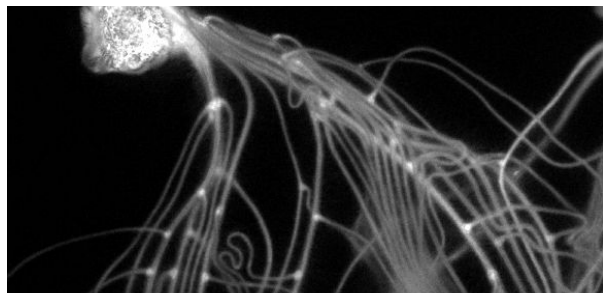


Fig 1. Luminescence image of roots of autonomously luminescent *Nicotiana tabacum* plants, captured with Sony ILCE-7M3 consumer-grade camera

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