LLM-domain B-GATAs control stomata formation downstream from light and PIF transcription factors

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LLM-domain B-GATAs are a subfamily of the thirty-membered GATA transcription factor family from *Arabidopsis thaliana*. We have shown that all six Arabidopsis LLM- domain B-GATAs have redundant functions in the control of germination, greening, phyllotaxy, accesaroy meristem formation, flowering time, and senescence downstream from auxin, cytokinin, gibberellin, and light signaling.
Here, we show that mutants of *Arabidopsis thaliana* LLM-domain B-GATA genes are defective in stomata formation in hypocotyls. Conversely, stomata formation is strongly promoted by overexpression of various LLM-domain B-class GATA genes, most strikingly in hypocotyls but also in cotyledons. Genetic analyses indicate that these B-GATAs act upstream from the stomata formation regulators *SPCH (*SPEECHLESS), *MUTE*, and *SCREAM/SCREAM2* and downstream or independent from the patterning regulators *TMM* (*TOO MANY MOUTHS*) and *SDD1* (*STOMATAL DENSITY AND DISTRIBUTION1*). The effects of the GATAs on stomata formation are light-dependent but can be induced in dark-grown seedlings by red, far-red or blue light treatments. *PHYTOCHROME INTERACTING FACTORS* (*PIFs*) mutants form stomata in the dark and, in this genetic background, also *GATA* expression is sufficient to induce stomata formation in the dark. Since the expression of the LLM- domain B-GATAs *GNC* and *GNL* as well as that of *SPCH* is red light-induced but the induction of *SPCH* is compromised in a *GATA* gene mutant background, we hypothesize that PIF- and light-regulated stomata formation in hypocotyls is critically dependent on LLM-domain B-GATA genes.

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