Arabidopsis bZIP11-related transcription factors link low energy signalling to auxin mediated growth

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Background:

To ensure plant fitness, plants have to adapt their metabolism and growth to prevailing endogenous and environmental conditions. The phytohormone auxin controls plant growth and predominantly exerts its function via auxin-mediated transcriptional regulation[1]. Previous studies revealed that binding sites of basic leucine Zipper (bZIP) transcription factors (TFs) are enriched in promoters of the auxin-inducible *GH3* gene family[2]. GH3s are well-known to play a central role in auxin mediated growth responses by regulating auxin homeostasis[3].

Questions:

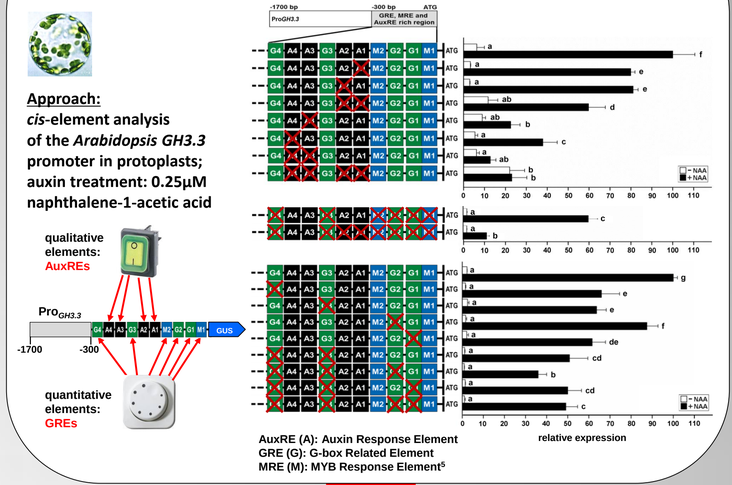
1.) Do bZIP binding sites (G-box Related Elements, GREs) affect *GH3* transcription?

2.) Which bZIPs regulate *GH3* expression via GREs?

3.) Which stimuli are integrated by GREs and their corresponding bZIPs?

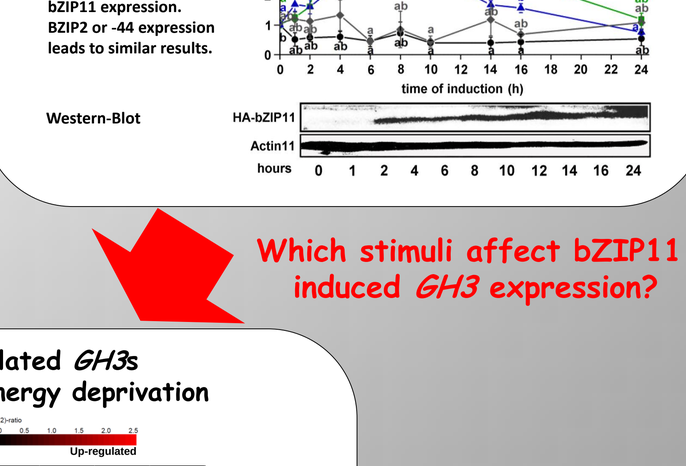
Which *cis*-elements are involved in auxin-responsive *GH3* transcription?

G-BOX RELATED ELEMENTS (GREs) are quantitative *cis*-elements in auxin-regulated transcription



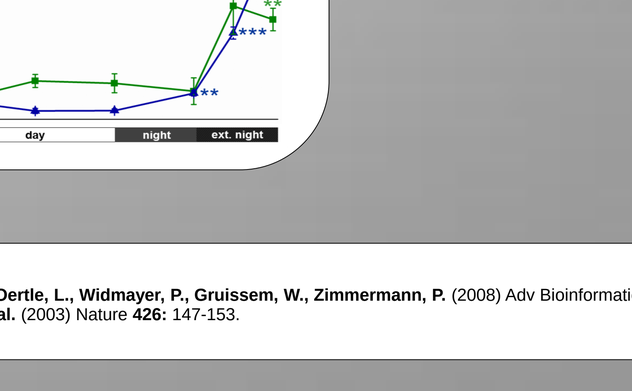
Which TFs regulate auxin-induced *GH3* transcription?

Group S1 bZIP transcription factors regulate auxin-induced *GH3.3* transcription



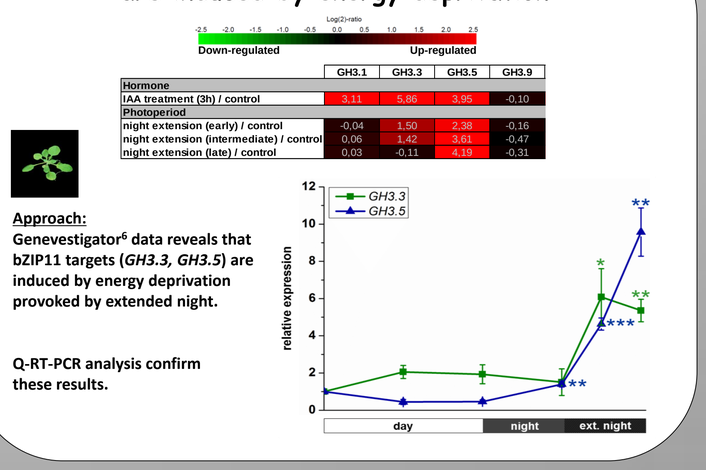
Does bZIP expression alter auxin-regulated *GH3* transcription *in planta*?

bZIP11 expression enhances transcription of particular auxin-induced *GH3* genes



Which stimuli affect bZIP11 induced *GH3* expression?

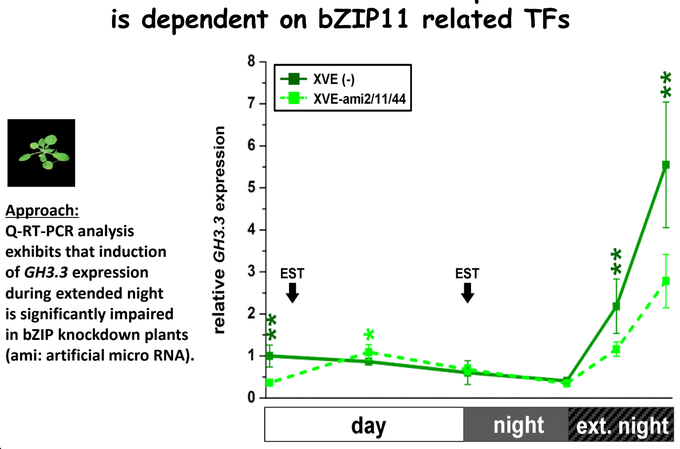
bZIP11 regulated *GH3*s are induced by energy deprivation



Do bZIP11 related TFs regulate *GH3* expression under energy deprivation?

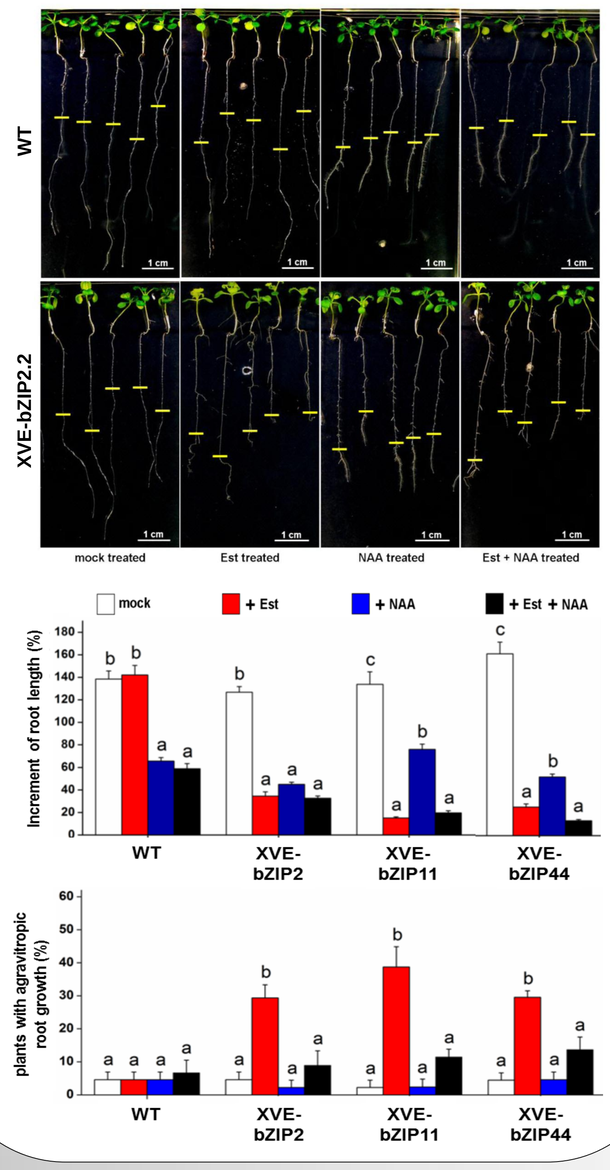
Does bZIP expression lead to altered auxin homeostasis or signalling?

Starvation induced *GH3.3* expression is dependent on bZIP11 related TFs

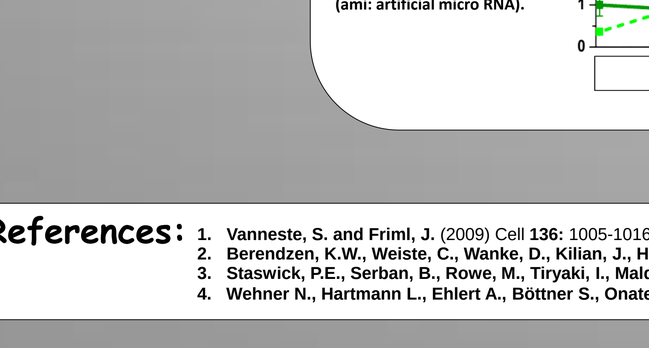


Does bZIP expression alter auxin-related root phenotypes?

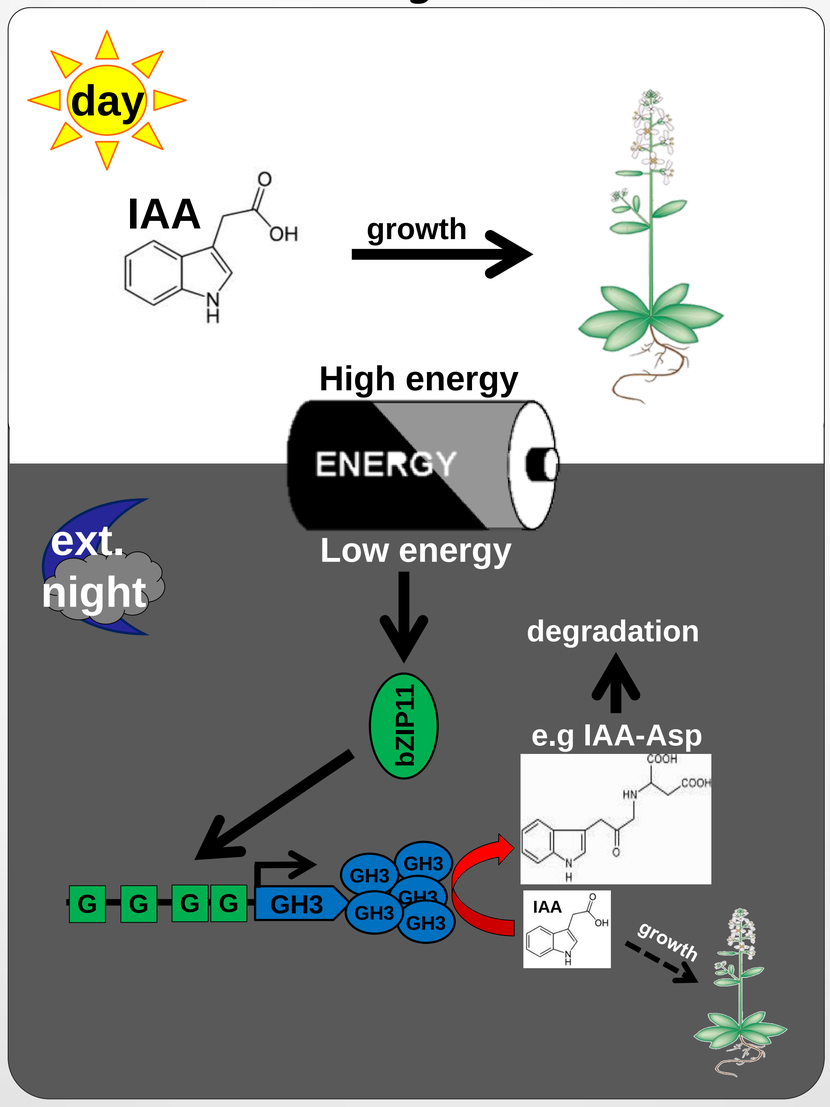
Estradiol (EST) induced expression of bZIP11 related TFs modulates auxin-related root growth



bZIP11 expression correlates with reduced auxin-driven DR5:GFP expression and agravitropic root growth responses



Working model



References:

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Conclusion:

By tuning the transcription of crucial regulators of auxin homeostasis (GH3s), the energy controlled bZIP11 related TFs provide means to adjust plant growth according to the plant`s energy status