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Editorial Board

*PLOS Genetics*

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Dear Members of the *PLOS Genetics* Editorial Board,

Please find attached our manuscript “ELF3 polyQ variation reveals a PIF4-independent role in thermosensory flowering” for consideration as a Research Article. We hope that you will find it interesting and give it due consideration.

Briefly, we describe a series of experiments that unexpectedly reveal a role for the *Arabidopsis thaliana* protein ELF3 in the elevated ambient temperature flowering response. Moreover, this role is entirely independent of PIF4, a potent master regulator of the temperature response. While recent work has cast doubt on the centrality of PIF4 (Galvão *et al.* 2015, *Plant J*), alternative pathways for inducing thermoresponsive flowering at elevated temperatures are not well described. With these findings, we 1) challenge the dogma of PIF4 as the central integrator of elevated temperature response, 2) unite disparate ambient temperature response observations into a single model, and 3) assess how different natural *A. thaliana* strains vary in the implementation of this pathway.

A recent review of the literature (Song et al. 2013, *Trends in Plant Science*) stated: “Despite our rapidly accumulating knowledge about lower temperature-induced flowering mechanisms in Arabidopsis, the regulatory mechanisms of higher ambient temperature (*i.e.* 27 ºC)-mediated FT regulation are still not well understood.” Recent high-profile studies have linked the crucial integrator PIF4 to the protein ELF3 as a possible locus of elevated temperature sensing. We undertook experiments with the hypothesis that ELF3 polyQ variation acted as a temperature sensor, gating signals to PIF4. We found little evidence of this, but rather found that ELF3 inputs to PIF4 appear to be restricted to early seedling phenotypes. *elf3* adult plants have ablated temperature responses in a pathway independent of PIF4. Unexpectedly, this appears to be the photoperiodic pathway, which has been previously linked to responses to lower ambient temperatures (which do not involve PIF4). Thus, our study unifies temperatures responses to changes in ambient temperature, both higher and lower.

We highlight and discuss how a complete model of thermoresponsive flowering regulation arises from our data in the context of existing literature. **Overall, our study provides a key piece to the puzzle of thermal responses in plant development, a field with ample relevance to agriculture and ecological applications.**

The following reviewers may be appropriate to assess our manuscript:

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The material in the manuscript has not been published, nor is it under consideration for publication elsewhere.

Please let us know if we can answer any questions. Thank you for your consideration.



Best Regards,

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