# Review of: "Day length-dependent thermal COP1 dynamics integrate conflicting seasonal cues in the control of Arabidopsis elongation"

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Potential competing interests: The author(s) declared that no potential competing interests exist.

Both temperature and light play important roles in the regulation of plant growth and development. How plants integrate light and temperature to regulate their growth is an important question in plant biology studies. The present study describes a fitted model which recapitulates day length-dependent thermos-elongation of all lines studied, and correctly predicts temperature responsiveness of new genotypes. Firstly, the authors used hypocotyl lengths of single and double mutant/over-expressing lines to fit a mathematical model incorporating known interactions of the studied proteins (phyB, PIFs, ELF3 and COP1). They used a mathematical model to capture active levels of phyB, PIFs, ELF3 and COP1. They then used the reporter lines of p*ELF3*::LUC, p*ELF3*::ELF3-LUC, p*PIF4*::LUC and p*PIF4*::PIF4-LUC for the noninvasive imaging to analyze temperature effects on ELF3 and PIF4 peak expression and protein levels, and evaluate temperature-dependent dynamics of ELF3 and PIF4. Based on these analyses, they propose a model in which bioactive phyB is reduced at warm temperatures and gets inactivated more rapidly in the dark. They further show that COP1 is a critical component mediating phyB and ELF3 thermosensory signaling. This study is very interesting and of significant novelty. Here, I have some comments listed below.

Major points:

1. I'd like the authors to explain why the middle hypocotyls of *Arabidopsis* were used for confocal imaging (Figure 2G). I found that each image only shows one cell, which may not be representative. I suggest that the authors reduce the magnification of the confocal images and display a large range of cells. Moreover, why are the photobodies seen at 28°C, and why is the number of cells showing photobodies more at 28°C than at 22°C?
2. In the present study, the data fitted by the authors using the mathematical model sometimes are not consistent with the actual experimental data (Figures 1A and 3G), indicating that the mathematical model is not quite convincing.
3. The seedlings used in the study were not at the same stages (5- and 7-day-old, respectively), which may result in inconsistency of the seedlings' physical status. I suggest that the same ages of seedlings should be used.

Minor points:

1. Line 18, page 12, "Fig.3A" should be "Supp.Fig.3A".

2. Line 2, page 14, “Fig.3B” should be “Fig.3C”.
3. The scale bars are missing in Figure 2G.
4. As the loading control protein is not at the same level, please quantify the protein signals in Figure 3E and Supplementary Figure 2A.
5. Why was the hy5 mutant grown at either 22ºC or 28ºC under white light for 5 days, but the HY5-overexpressor seedlings were not grown at the same conditions (Supplementary Figure 1A)? The growth conditions should be the same for these genotypes of plants.