

Conserved Peptide Upstream Open Reading Frames Act Via Ribosome Stalling to Regulate Translation in Response to Environmental Signals.

Barry Causier¹, Tayah Hopes¹, Mary McKay¹, Zachary Paling¹, and Brendan Davies¹

¹University of Leeds

May 1, 2021

Abstract

The regulation of protein synthesis plays a key role in growth and development in all organisms. Upstream open reading frames (uORFs) are commonly found in eukaryotic mRNA transcripts and typically inhibit translation of downstream ORFs, in part by stalling ribosomes. Conserved peptide uORFs (CPuORFs) are a rare subset of uORFs, some of which conditionally regulate translation. Here we identify three *Arabidopsis* CPuORFs that specifically regulate translation of any downstream ORF, in response to the agriculturally significant environmental signals, heat shock and water limitation. Mechanistically, we provide evidence that CPuORF translation causes ribosome stalling, in a peptide sequence-dependent manner, attenuating translation of downstream ORFs. We propose a model in which plant CPuORFs are not simply on/off switches for translation, but rather act conditionally, along a continuum, to fine-tune translation dynamically.

Hosted file

Causier et al. CPuORFs.pdf available at <https://authorea.com/users/411212/articles/520323-conserved-peptide-upstream-open-reading-frames-act-via-ribosome-stalling-to-regulate-translation-in-response-to-environmental-signals>

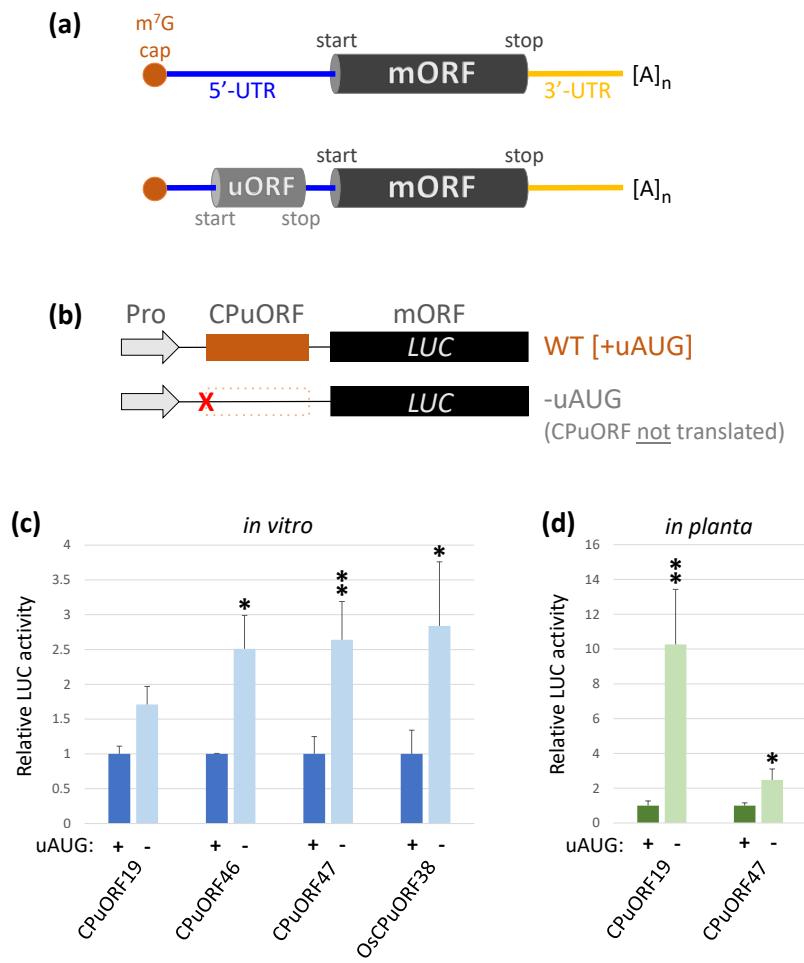


Figure 1

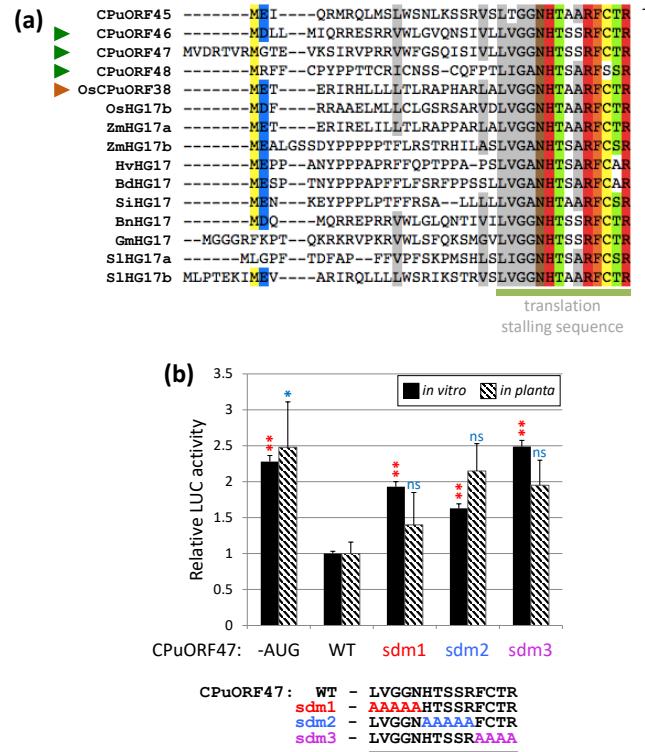
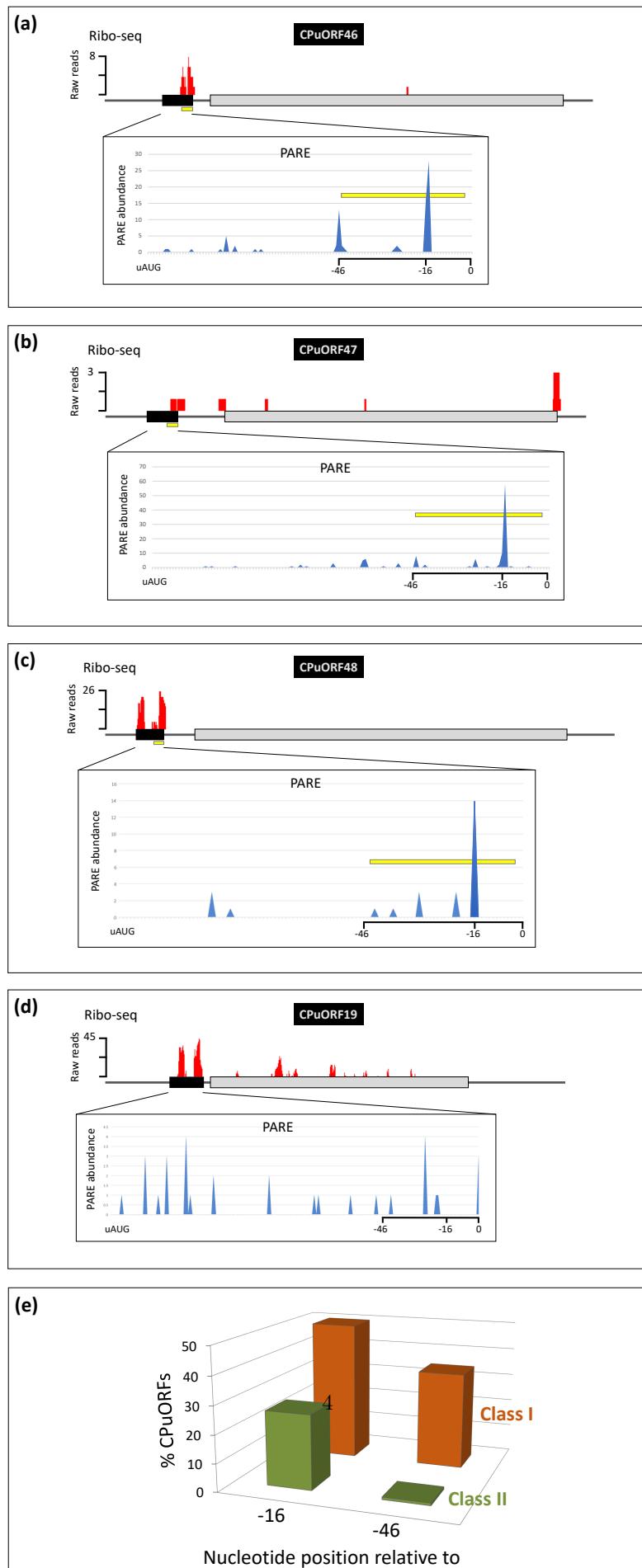


Figure 2



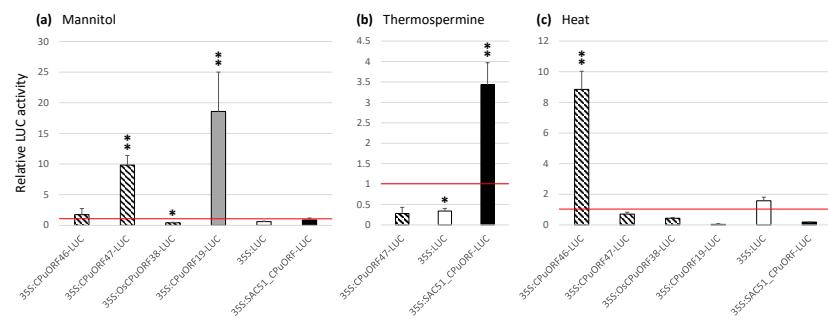


Figure 4

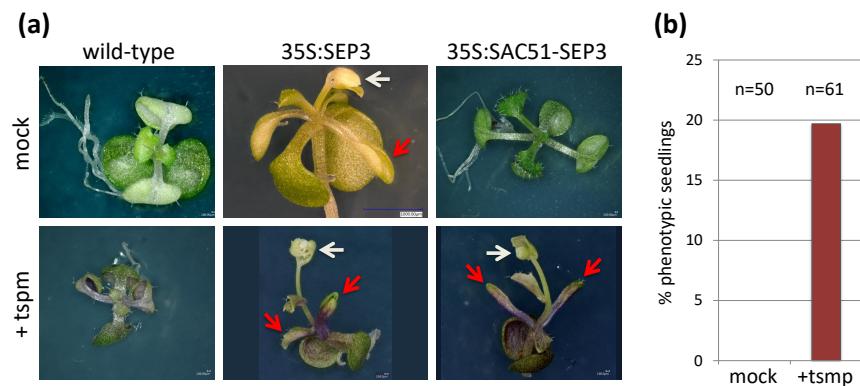


Figure 5

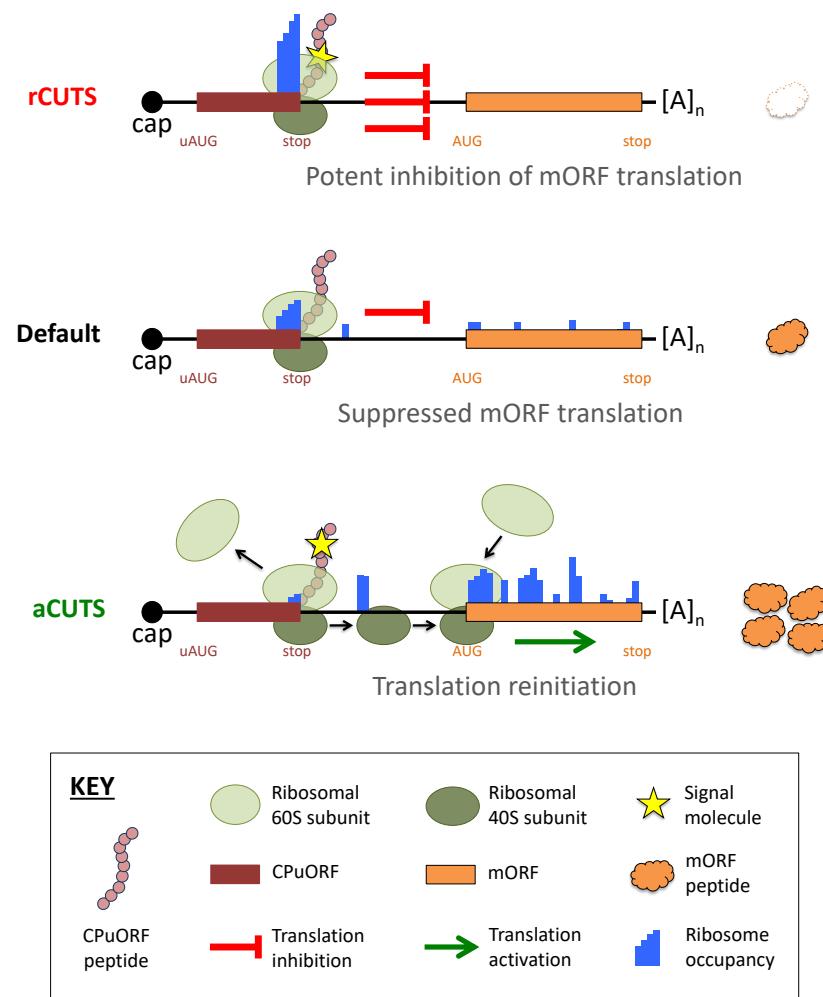


Figure 6