Here, we describe the mechanism of action of SPT in the regulation of cotyledon expansion during seedling de-etiolation. As well as examining SPT targets, we will show that SPT acts in an integrative manner, together with other protein partners, to control cell expansion. A dual function for SPT, both as a transcription factor and as a protein stability regulator, will be discussed.

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Email Address for correspondence: Eve-Marie.Josse@ed.ac.uk

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P4.10

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FHY3 and FAR1 mediate red light input to the *Arabidopsis* circadian clock

Paul F. Devlin (Royal Holloway University of London), Hamad Siddiqui (Royal Holloway University of London)

The circadian clock is tightly tied to the light environment. Transcriptional feedback loops are able to generate a self-sustaining rhythm of approximately 24 h which impinges on almost every aspect of physiology in higher organisms. However, light signals are essential to maintain an exact 24 h rhythm.

In the model plant, *Arabidopsis thaliana*, an endogenous circadian rhythm is generated by a set of interlocked transcriptional feedback loops. Light directly affects the level of a number of the clock components in plants. The photoreceptors involved have been well characterised but the way in which they affect clock components is only beginning to be understood.

The transcription factors, FHY3 and FAR1, play a key role in red light input to the clock. We have shown that FHY3 and FAR1 positively regulate transcription of key clock components in red light. As a result, *fhy3* and *far1* mutant seedlings specifically display aberrant circadian rhythmicity under these conditions. Moreover, this specific action of FHY3 and FAR1 has revealed novel interactions between the various clock loops and has given us new insights into the mechanism by which light can fine-tune the clock throughout the cycle of day and night.

Email Address for correspondence: Paul.Devlin@rhul.ac.uk

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P4.11

Poster Session – Tuesday 30th June 2009

Pseudostem artificial extension with colored tubes led to the modulation of leaf elongation in Tall Fescue (*Festuca arundinacea* S.)

Alban Verdenal (INRA), Didier Combes (INRA), Abraham Escobar-Gutierrez (INRA)

Leaf length is a key parameter in grass plant morphogenesis, and thus in the determination of grasslands agricultural use-value. Regarding leaf elongation regulation, the pseudostem appears to play a morphogenetic role, mainly via an influence on i) the timing of leaf tip emergence and ii) the length of the leaf growth zone. These effects have been demonstrated by incising or artificially extending pseudostems, and are presumably due to light effects. In order to determine i) if no other physical factor than light interfered in these reactions, ii) if this putative light influence would be mediated by a qualitative or quantitative spectral modification, and iii) if sheath elongation is also dynamically impinged by the pseudostem length, we tested the effect of pseudostem extension with plastic tubes on the leaf growth of uncut tall fescue plants. Tubes exhibiting contrasted optical properties were used: red-colored tubes affecting the “blue” domain of the spectrum (cryptochrome stimulation), green-colored tubes affecting the Red:Far Red ratio (modification of the phytochrome equilibrium), transparent tubes and opaque foil tubes. It appeared that the less light can pass through the tubes the faster the leaves elongate, and the longer the leaves and the sheaths. Red and green tubes effects were not significantly different. These results support the hypothesis that the pseudostem morphogenetic effect is due to light effects. Furthermore, in this context, leaf elongation does not react to a qualitative modification of a unique domain of the light spectrum, but rather to a quantitative general decrease of the irradiance.

Email Address for correspondence: alban.verdenal@lusignan.inra.fr

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Functional genomics approaches to study the involvement of transcription factors in the microalgae *Ostreococcus tauri* circadian clock

Sophie Sanchez (Université Pierre et Marie Curie, Laboratoire Arago (Banyuls sur mer), FRE3247 CNR-PMC), François-Yves Bouget (Université Pierre et Marie Curie, Laboratoire Arago (Banyuls sur mer), FRE3247 CNR-PMC), Frédéric Sanchez, Lionel Garnier (Université Pierre et Marie Curie, Laboratoire Arago (Banyuls sur mer), FRE3247 CNR-UPMC)

The unicellular algae *Ostreococcus tauri* is known as the smallest free-living eukaryote. This photosynthetic organism contains a nucleus with a highly compacted genome, one mitochondria and one chloroplast. The whole genome was recently sequenced and allowed the annotation of numerous genes. Given that genes duplications are very rare in this organism, it represents a very interesting model because only few genes are suspected to be involved in key functions, particularly in the biological clock. The *O. tauri* clock mainly consists of positive and negative elements homologous to the ones known in *Arabidopsis thaliana* (TOC and CCA1), but more actors are likely to be involved, interacting in interconnected loops. We decided to focus on some transcription factors that are known to have an impact on the functioning of the circadian clock in several other organisms. We overexpressed transcription factor genes (with sense or antisense constructions) in *O. tauri* luciferase reporter lines. This allowed us to determine the effect of these genes on the rhythmical expression of a key clock protein by following the luminescence level of the line. We focused on transcription factors from the RRB (type-B response regulators) and bHLH (basic Helix-Loop-Helix) protein families, this latter being present as single member in *O. tauri* but widespread in animals, plants and fungi. Here, we report the preliminary results obtained for these two kinds of transcription factors.

Email Address for correspondence: sophie.sanchez1@obs-banyuls.fr

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