SL801 A thermosensory pathway controlling flowering time in Arabidopsis

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The onset of flowering relies on the integration of multiple endogenous and environmental signals. These signals are interpreted through distinct mechanisms, with several signaling pathways controlling flowering of Arabidopsis1-3. Endogenous controls are knownto involve plant hormones of the gibberellin class as well as the so-called autonomous pathway, which has been reported to function independently of the environment. The three most important environmental cues are photoperiod, or daylength, vernalization, or transient exposure to winter-like temperatures, and ambient growth temperature. While genetic and molecular studies have provided detailed information on the signaling pathways that promote flowering of Arabidopsis in response to long days and vernalization, nothing is known about how ambient growth temperature is perceived and transduced. Here, I show that genes of the autonomous pathway mediate the effects of ambient growth temperature, and that the floral inducer FT acts downstream of this pathway to integrate growth temperature and photoperiodic information. These observations provide a new avenue for the study of temperature perception in plants at the molecular level.

SL802 Interaction of light signals with developmental cues in plant growth

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Light regulates virtually all aspects of plant growth and developmental processes, ranging from seed germination to flowering. However, it does not function independently but is integrated with endogenous growth regulators, such as growth hormones, for temporal and spatial regulation of plant Photomorphogenesis. We recently demonstrated that a dark-induced small G-protein, pea Pra2, regulates a cytochrome P450 that catalyzes brassinosteroid biosynthesis. Transgenic plants with reduced Pra2 exhibit a dark-specific dwarfism, which is completely rescued by brassinolide. Overexpression of the cytochrome P450 results in enhanced hypocotyl growth even in the light, which phenocopies the etiolated hypocotyls. We therefore proposed that Pra2 is a molecular mediator for the cross-talk between light and brassinosteroids in the etiolation process in plants.

Another example of light regulation in plant growth and development is the photoperiodic control of flowering. At least two photoreceptors, red and far-red light absorbing phytochromes and blue light absorbing cryptochromes, are functioning, and a variety of genes have been identified in flowering time control, floral meristem identity, and floral organ identity. We isolated a serine/threonine-specific protein phosphatase 2A (PP2A) that directly interacts with the phytochromes in the control of flowering time. The PP2A is predominantly expressed in floral organs and localized into nucleus. The recombinant PP2A dephosphorylates oat phytochrome A in the presence of $Fe2^{+}$ or $Zn2^{+}$. Transgenic *Arabidopsis* plants with the overexpressed or reduced PP2A level exhibit delayed or accelerated flowering, respectively, indicating that the PP2A is a repressor in flowering time control. These observations demonstrate that the self-regulatory phytochrome kinase-protein phosphatase interaction is a key signaling component in the photoperiodic control of flowering.