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## The plant clock

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Previous analyses of the circadian clock in the plant *Arabidopsis thaliana* have turned up just a few genes regulated by the clock. In the 15 December *Science*, Harmer *et al.* use oligonucleotide-based arrays to find a vast new collection of clock-regulated genes (*Science* 2000, **290**:2110-2113). Using probes derived from tissue harvested every four hours, and an array representing 8,200 different genes, Harmer *et al.* find that 453 genes (6%) fit a cosine test wave with a period between 20 and 28 hours. The day begins with induction of photosynthetic genes, and genes for making photoprotective pigments. Genes for the energy-intensive process of nitrate assimilation are induced only during the daytime. As night approaches, genes for chilling resistance are induced, and metabolic and sugar transporter genes are induced, so that energy resources can be mobilized for the long night ahead. Energy management is further aided by the nighttime induction of genes for starch mobilization. Cell elongation genes peak late in the day, followed by cell wall synthesis during the night. These findings focus on metabolism, because metabolic genes are the best characterized in plants. But numerous kinases and phosphatases were also found to be clock regulated. These are prime suspects for fulfilling the all-important regulatory roles in the plant circadian clock.

## References

1. ZEITLUPE encodes a novel clock-associated PAS protein from *Arabidopsis*.
2. *Science*, [<http://www.sciencemag.org/>]