

Molecular dissection of an insect circadian clock with RNAi

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Most insects show daily rhythms in their physiology, including general activity, responsiveness of the sensory systems, hormonal secretion, etc. The rhythm is driven by an endogenous timing mechanism, so-called circadian clock. Although the molecular oscillatory mechanism has been extensively studied in the fruit fly, *Drosophila melanogaster*, recent molecular technology allows us to use crickets as a new model insect. We have investigated the molecular clock work in the cricket, *Gryllus bimaculatus*. We first made molecular cloning of clock and clock-related genes such as *period (per)*, *timeless (tim)*, mammalian type-*cryptochrome* (m-*cry*), *clock (clk)*, and *cycle (cyc)*, and found that *per*, *tim*, m-*cry* showed clear rhythms under light dark cycle (LD) and constant darkness (DD). Knocking-down of mRNA expression of these genes by RNA interference revealed that *per*, *clk* plays an important role in rhythm generation since their knock-down resulted in a loss of rhythms, while *tim* is not essential for the rhythm generation. We also found that light-induced resetting of the clock was associated with transcription of clock genes. These properties are different from those of *Drosophila* but rather resemble those of mammalian clock, suggesting a close relationship between insect and mammalian clocks.