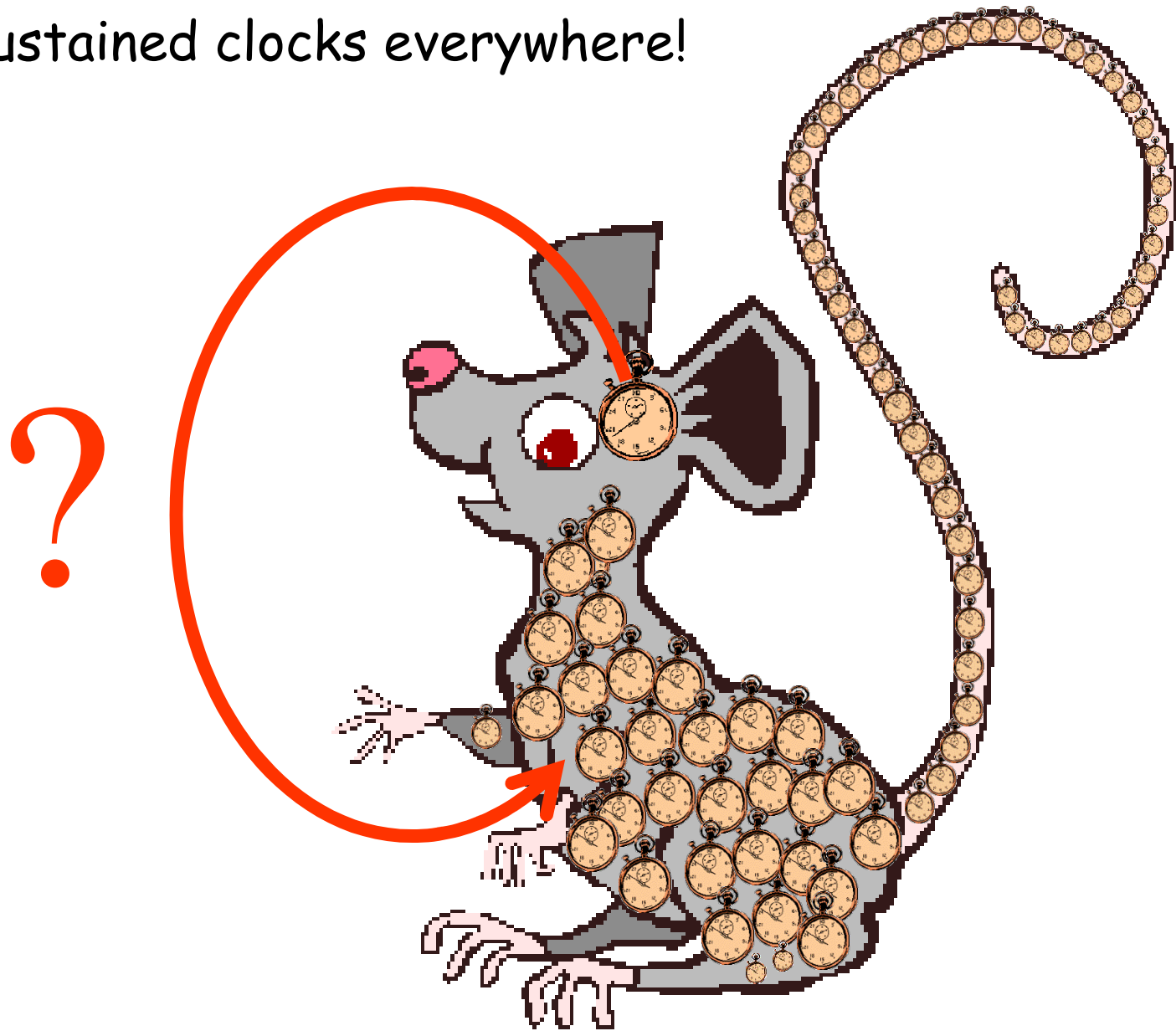
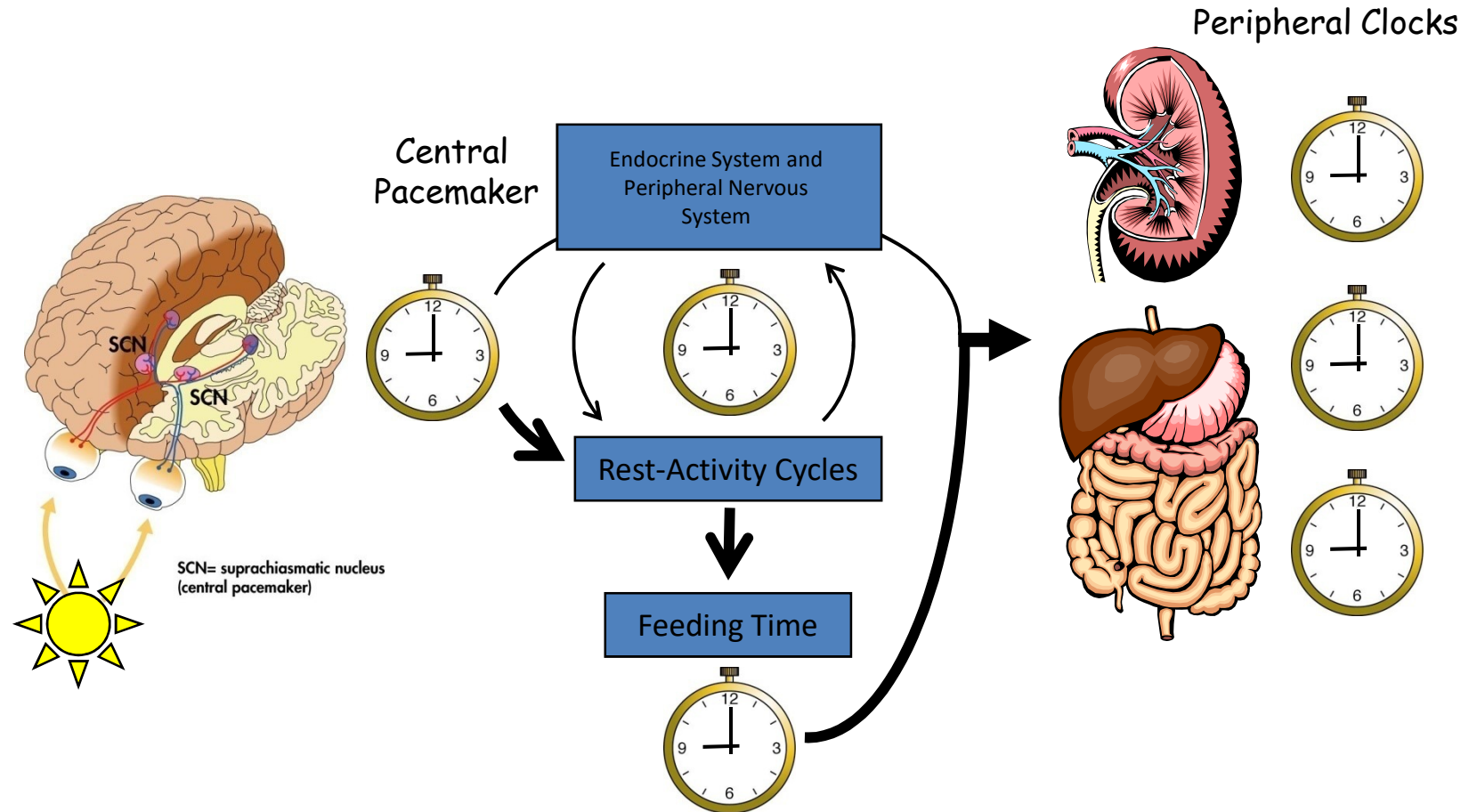


# Peripheral oscillators

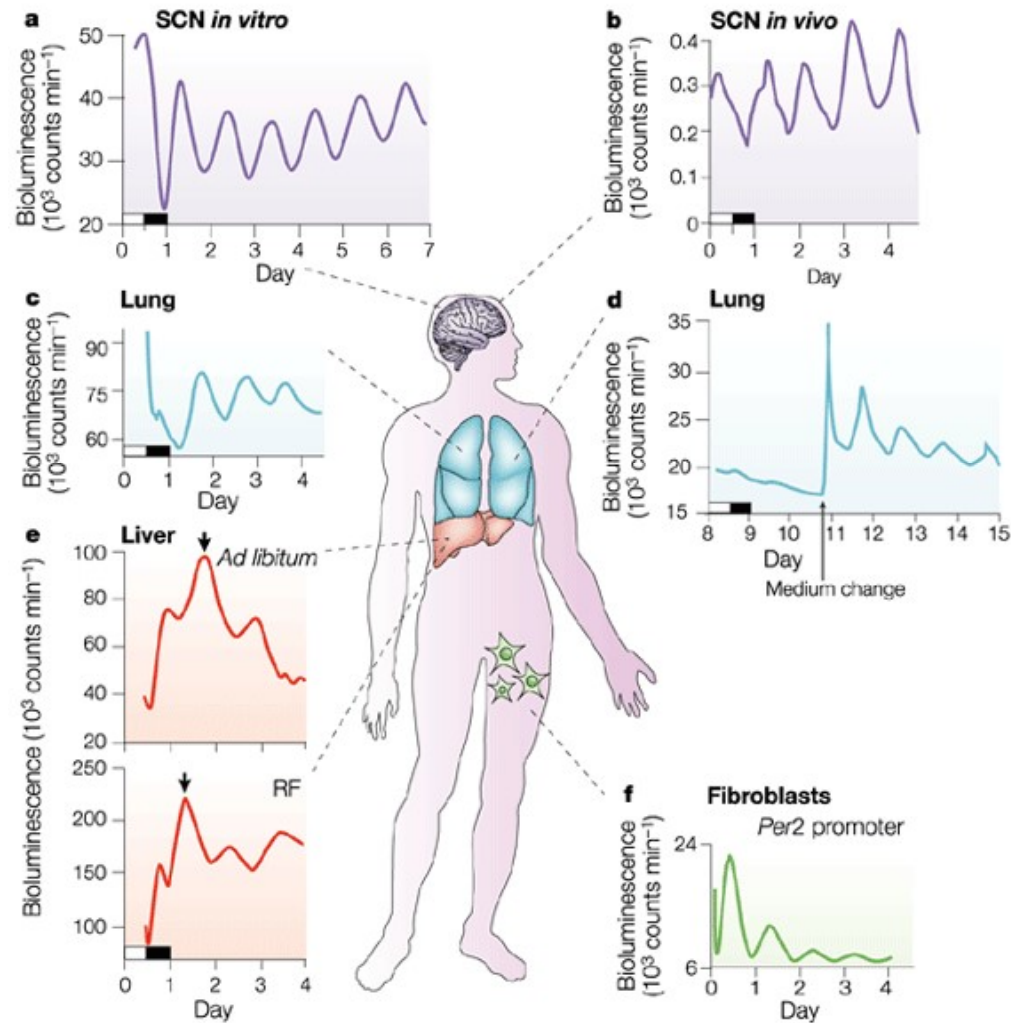
... self-sustained clocks everywhere!



# Central and peripheral circadian clocks

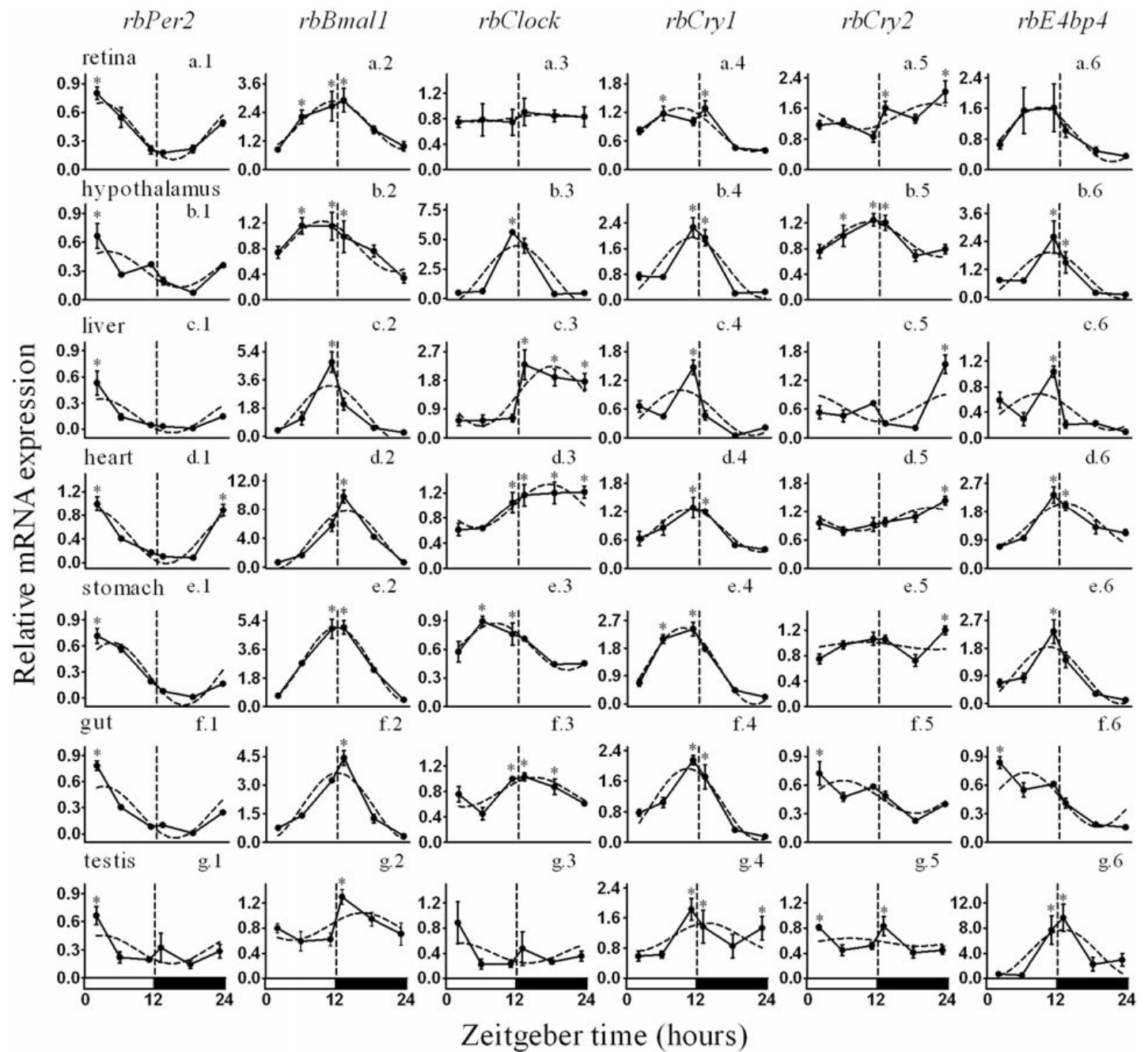


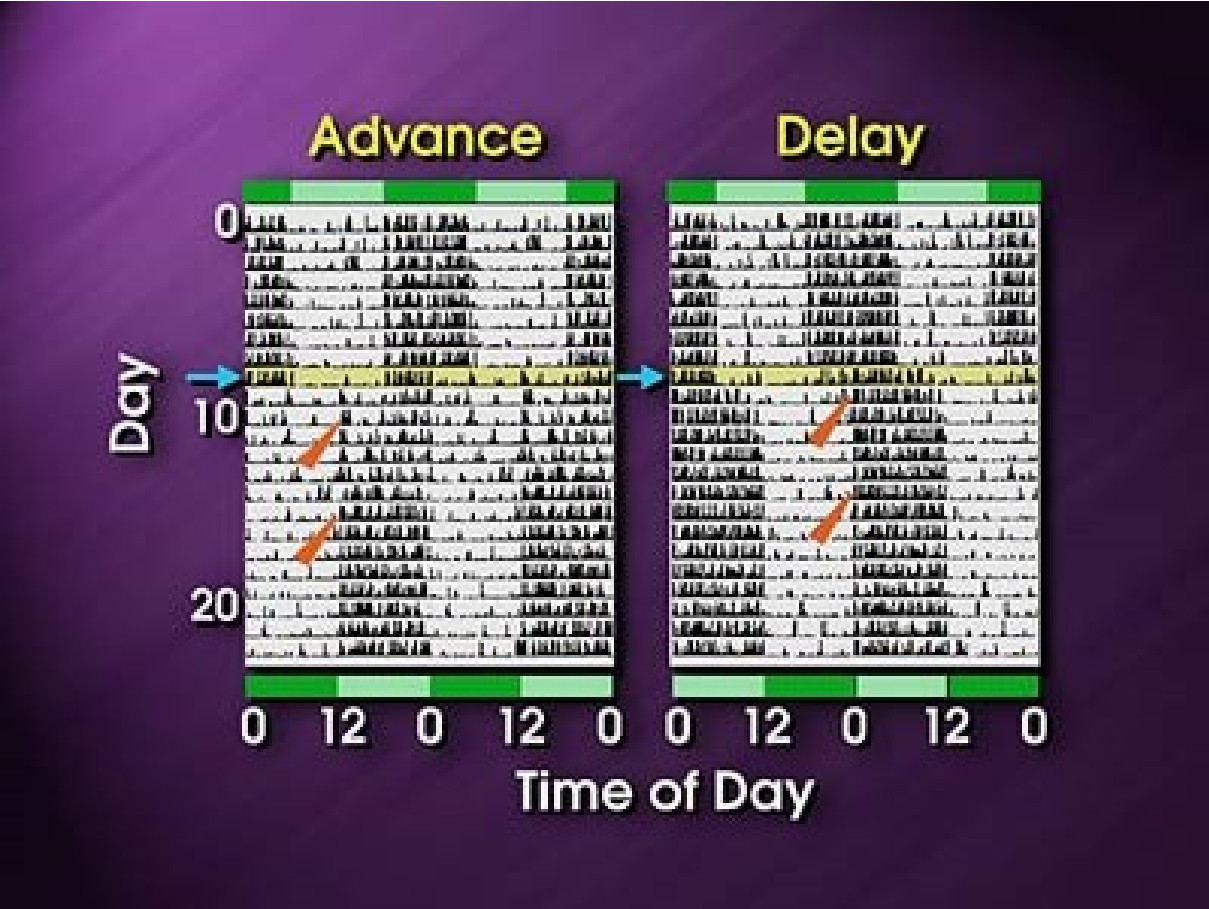
# Peripheral oscillators

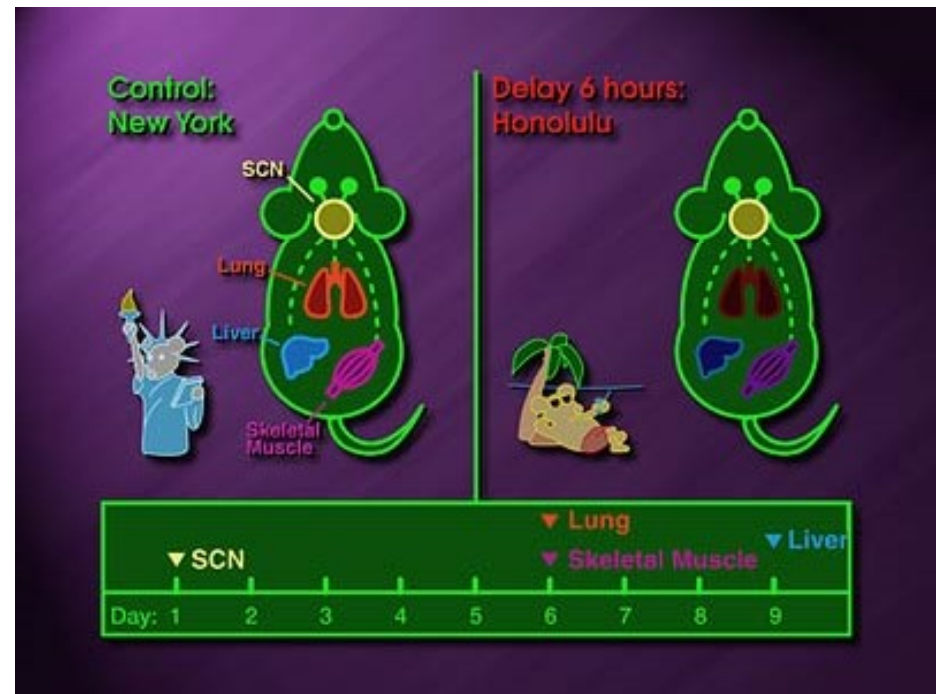
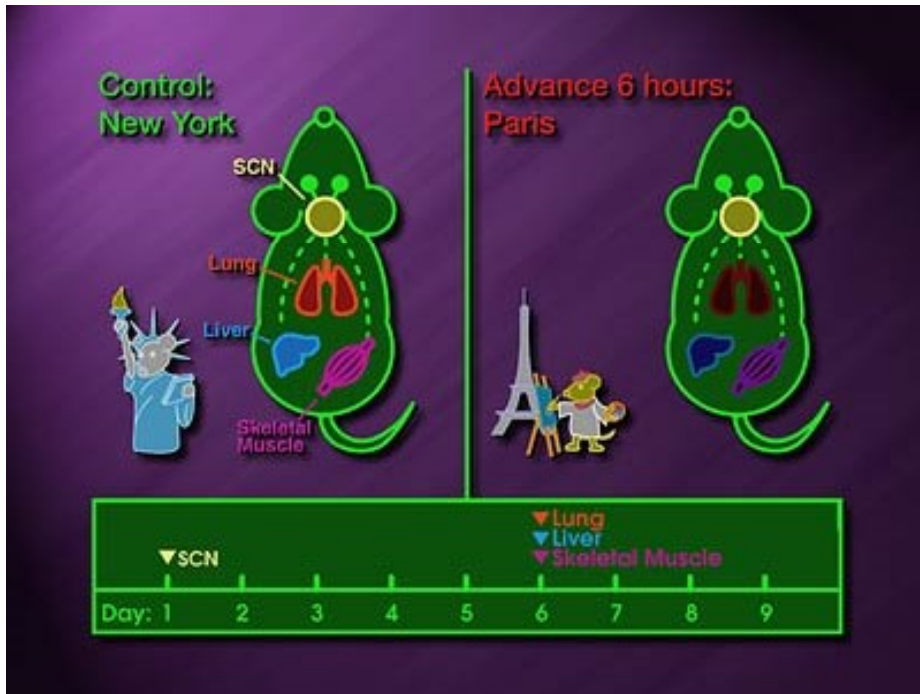


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# Daily Expression of Six Clock Genes in Central and Peripheral Tissues of a Night-Migratory Songbird



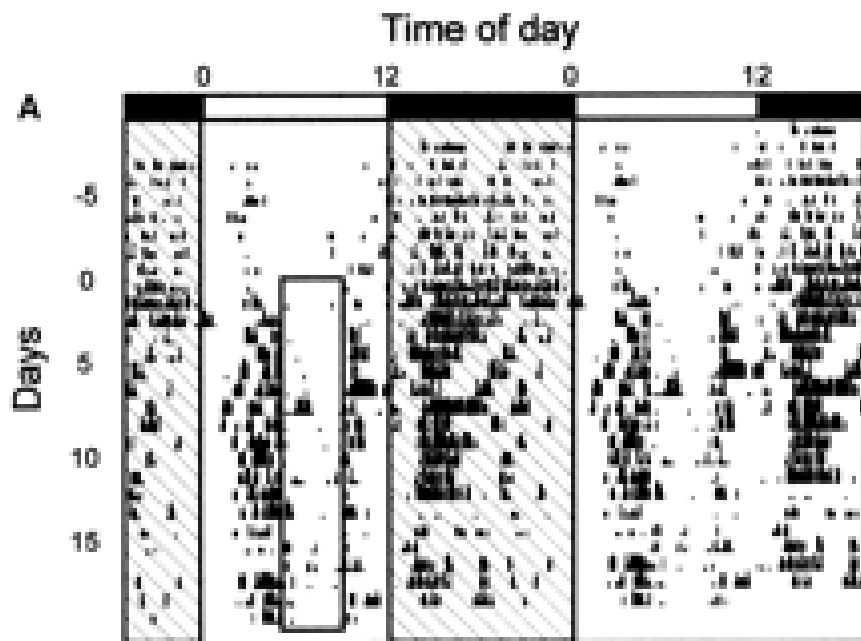




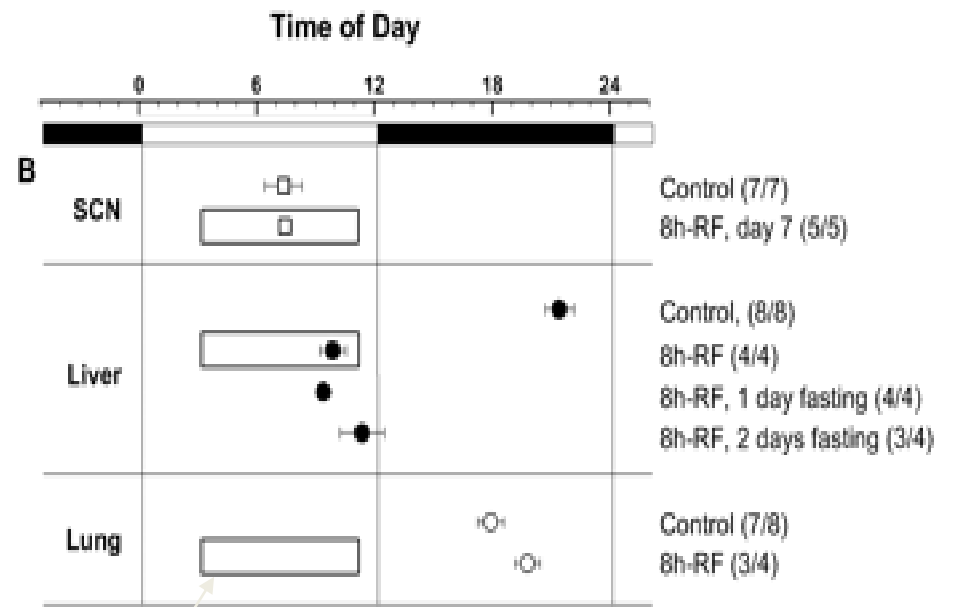
# Rat liver clock is entrained by restricted feeding

Stokkan *et al.* (2001) *Science*, 291(5503), 490-493.  
 Transgenic rat – tissues express luciferase *in vitro*

Wheel-running activity (RF 4)



Time of peak luciferase activity



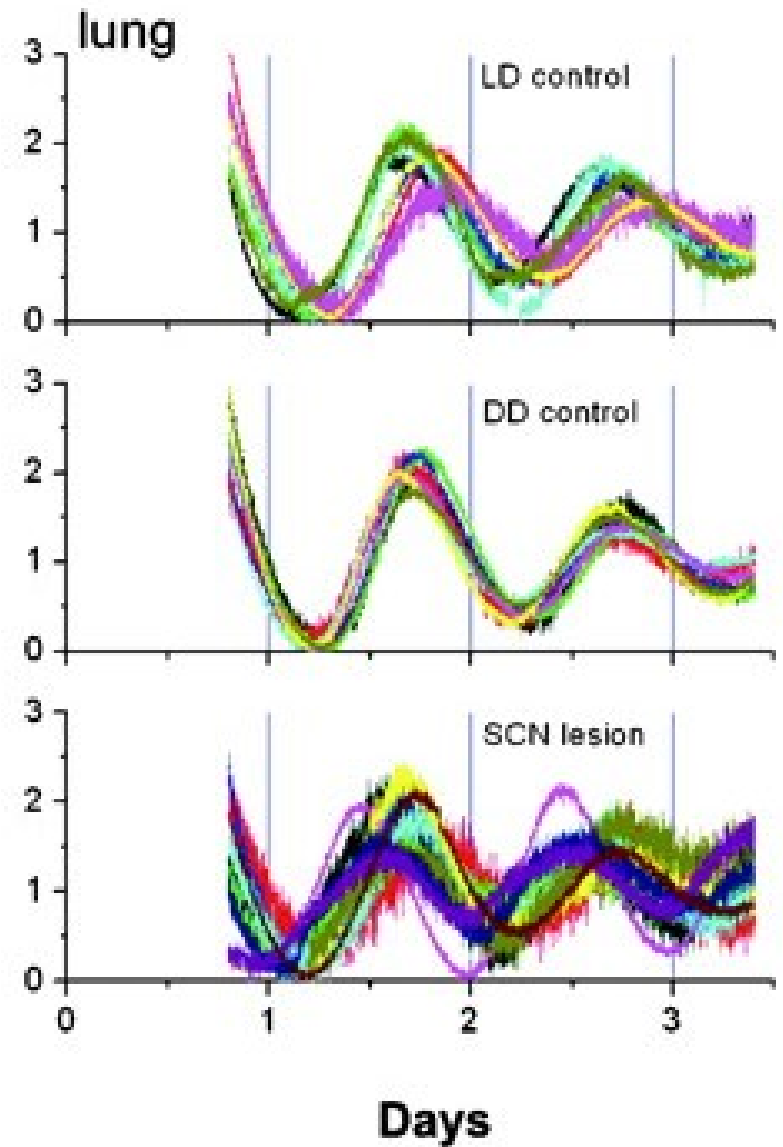
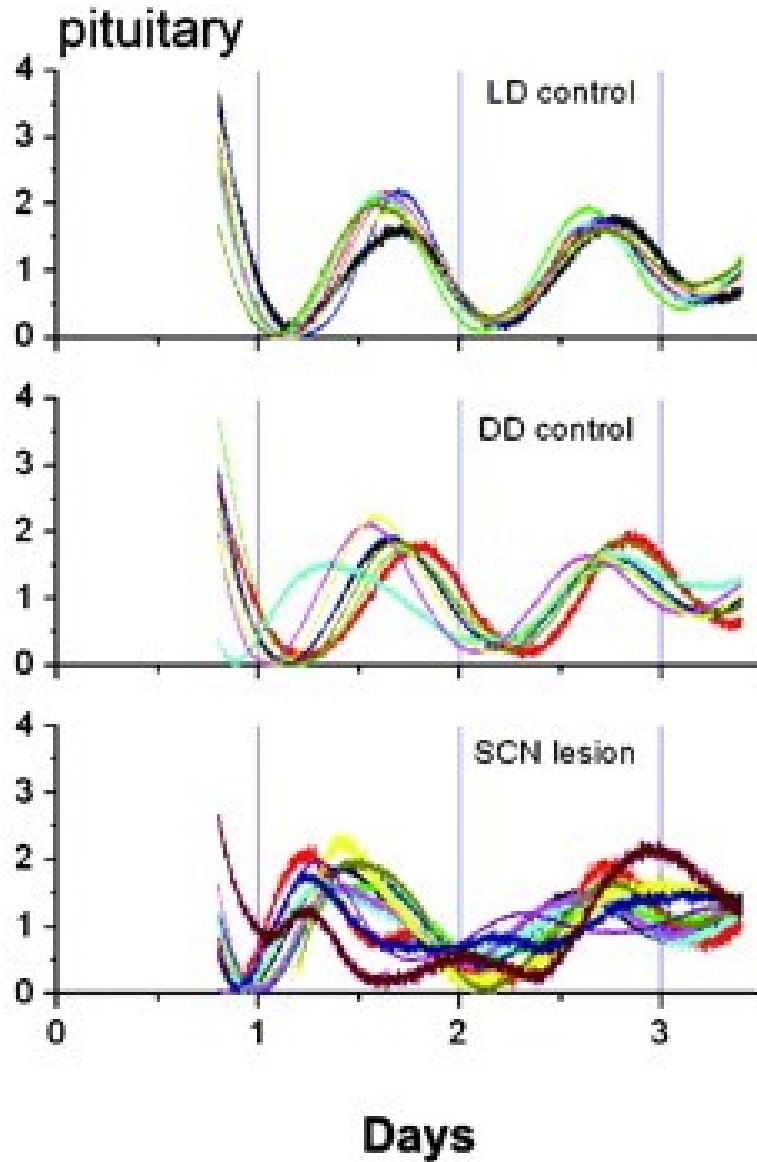
Time of food availability



Are the SCN required for the expression of circadian rhythms in peripheral tissues?



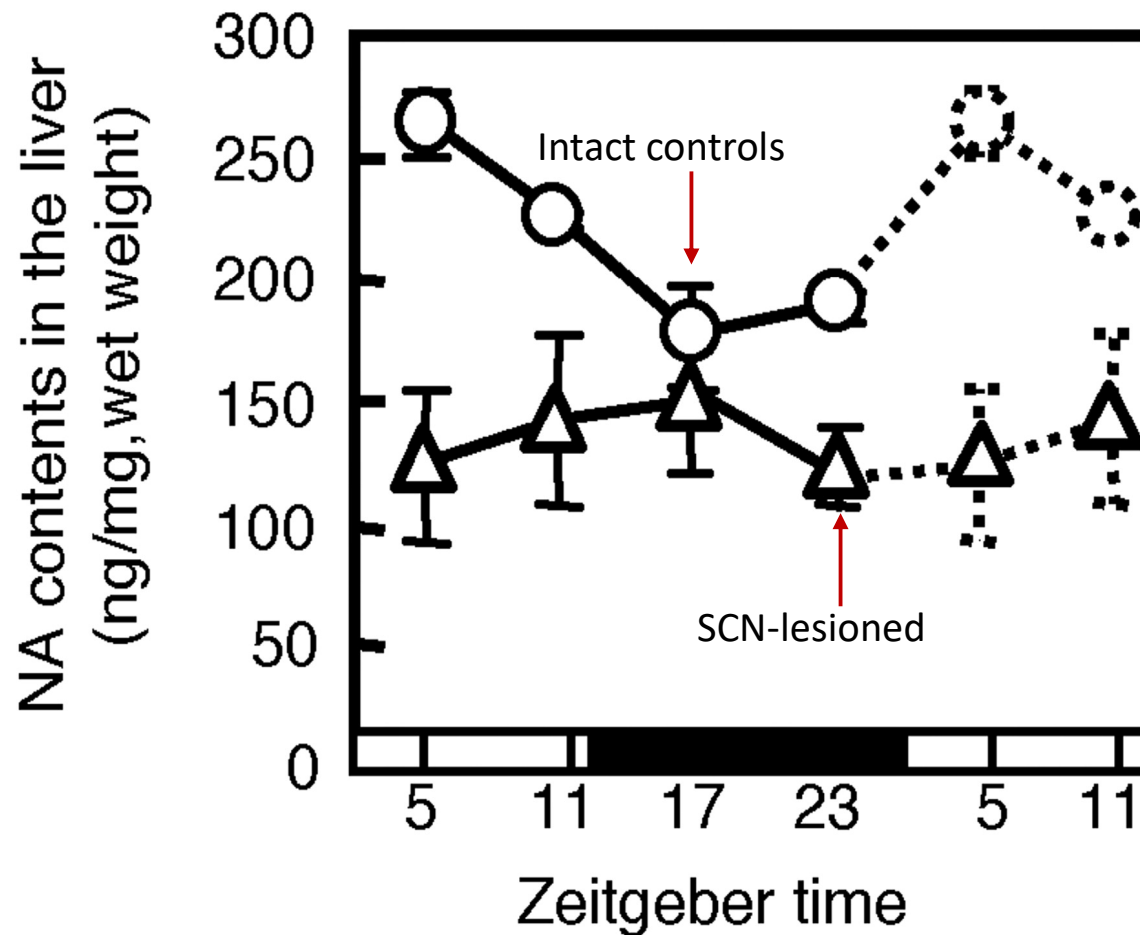
Relative Unit of Bioluminescence



Per2:Luciferase fusion protein used as a real-time reporter of circadian dynamics in mice

Yoo SH, Yoo SH, Yamazaki S, Lowrey PL, et al (2004) *Proc Natl Acad Sci USA*

# Role of SCN in adrenergic regulation of clock gene expression in mouse liver



**“...the hypothalamic SCN of a rodent has to resign from its major function”.**

Brandstaetter R (2004) Circadian lessons from peripheral clocks: Is the time of the mammalian pacemaker up? *Proc Natl Acad Sci USA*, 101, 5699-5700.

“The recent announcement of my  
death is premature.”

Mark Twain

Presented in Rosenwasser AM, Turek FW (2005) *Principles and Practice of Sleep Medicine*