

*Circadian Biology:
Integration of
Genes, Circuits and Behavior*

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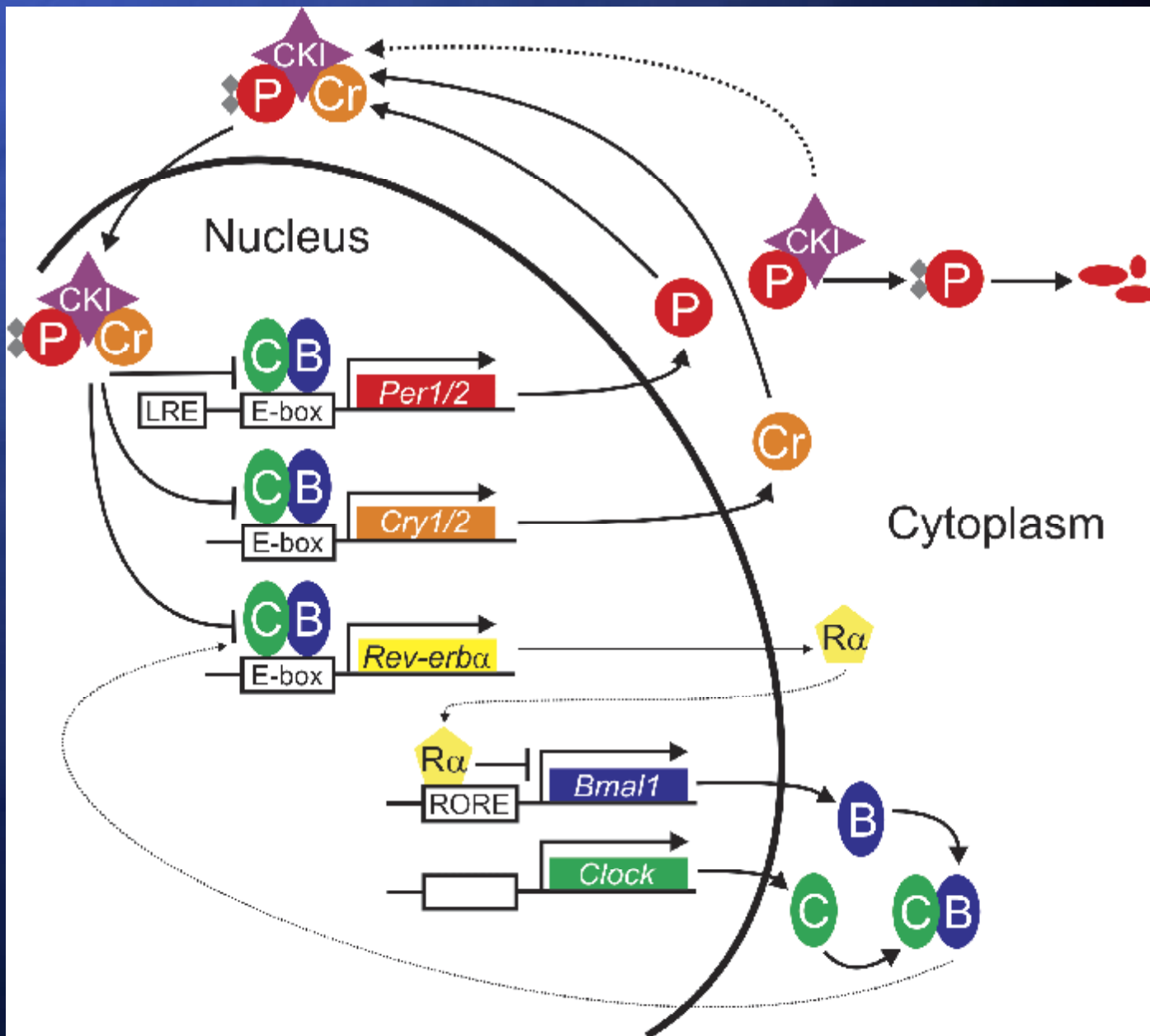
Neuroscience ↔ Genetics/Genomics

Behavior

SCN circuit ← Clock genes

Circadian behavior

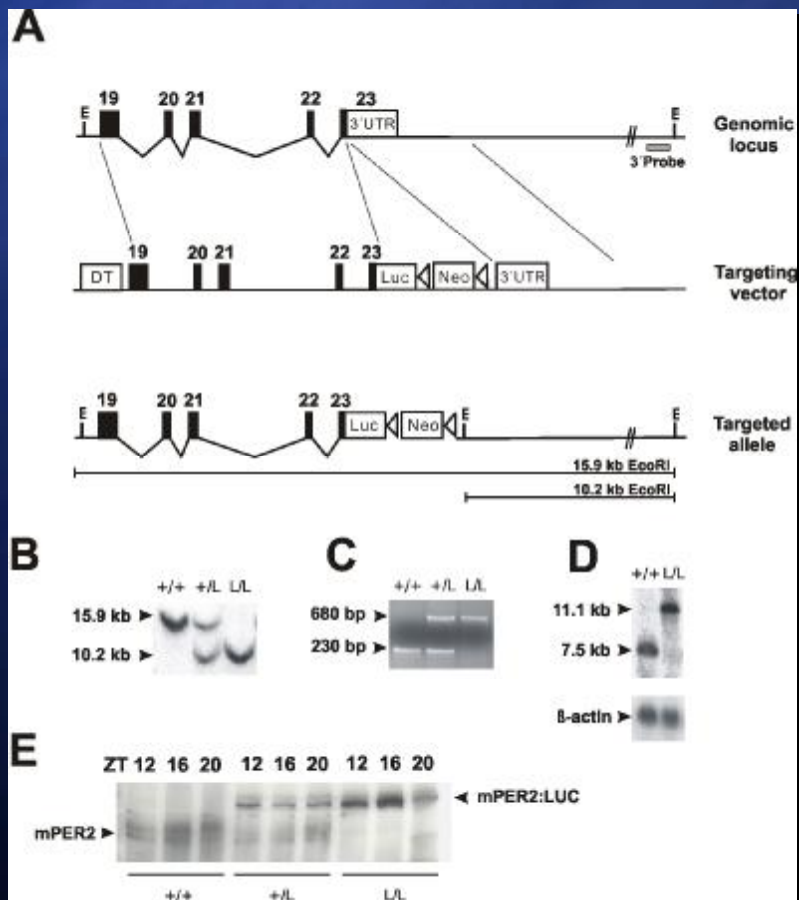
Metabolism



Lowrey & Takahashi 2004 *Annu Rev Genom Hum Genet* 5:407-441

*Per2:luciferase
C-terminal fusion
knockin construct*

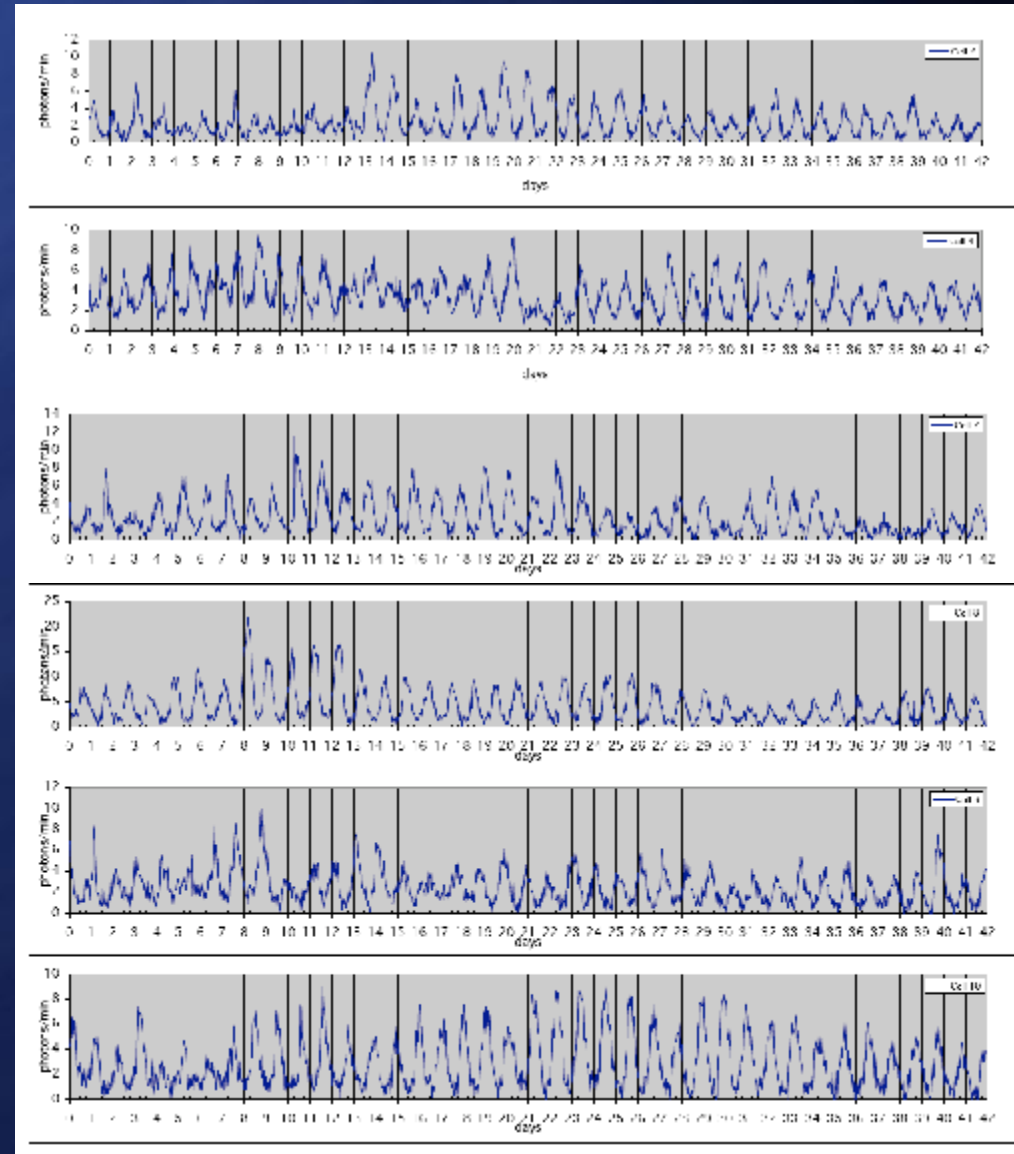
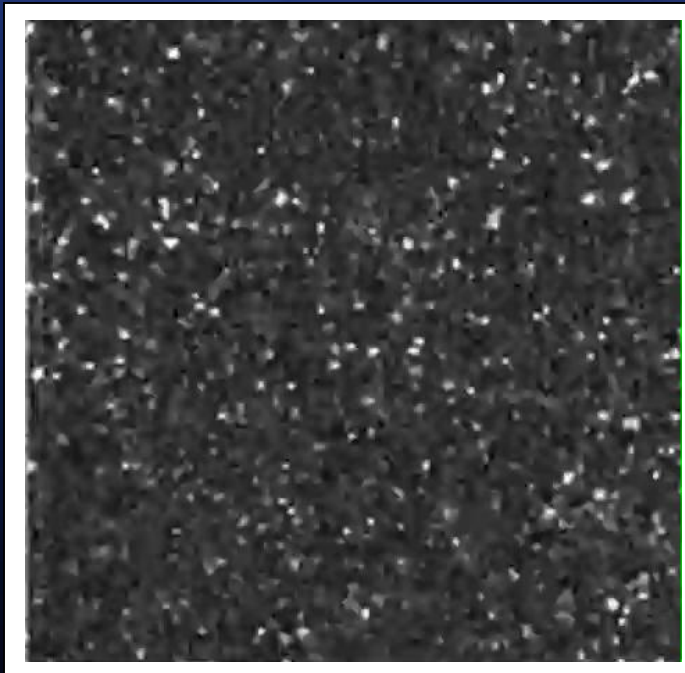
*Per2:luciferase
imaging*



Yoo et al. 2004
PNAS 101:5339

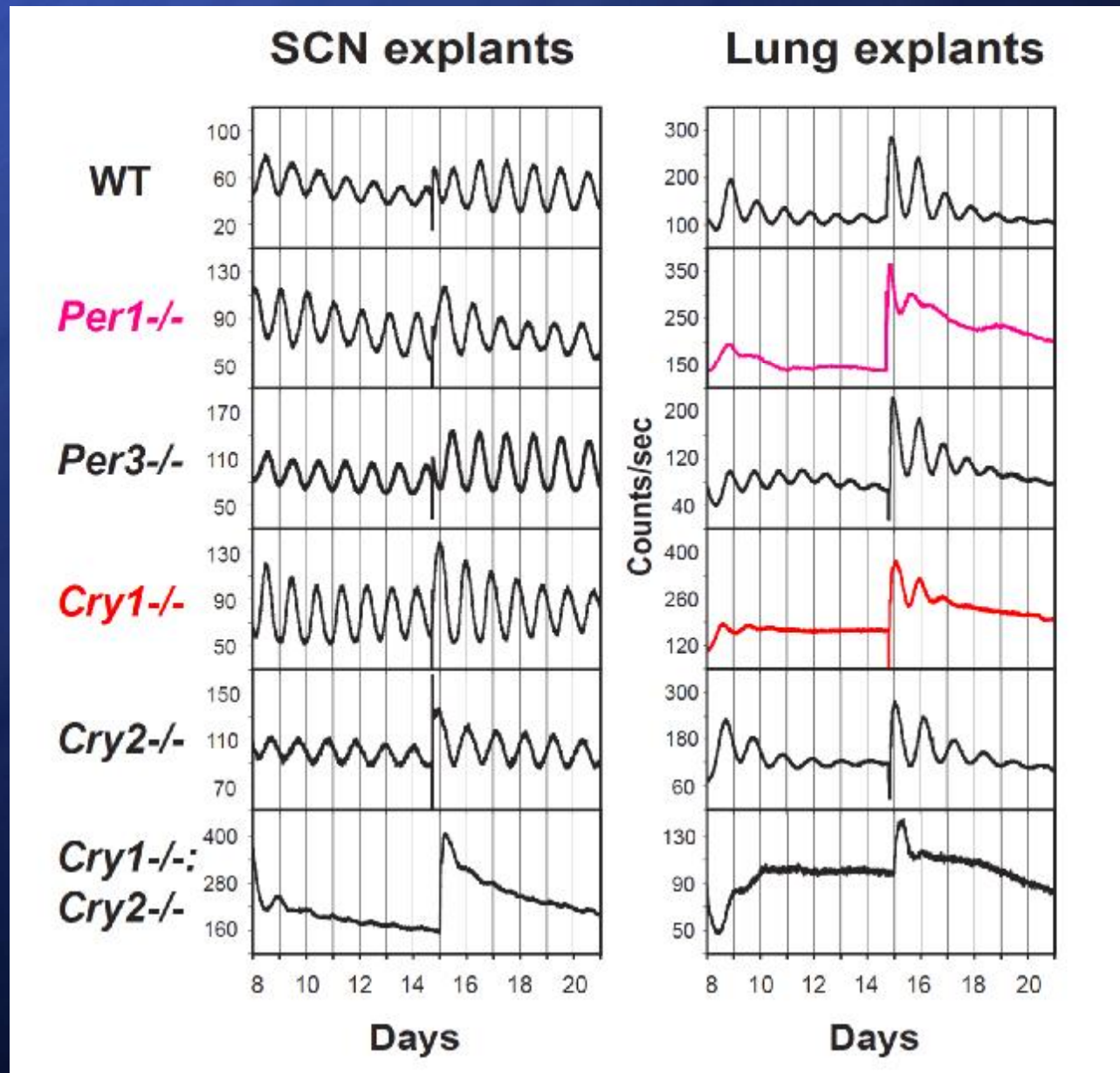
7 day recording, David Welsh

Circadian rhythms of individual *Per2::luc* fibroblasts

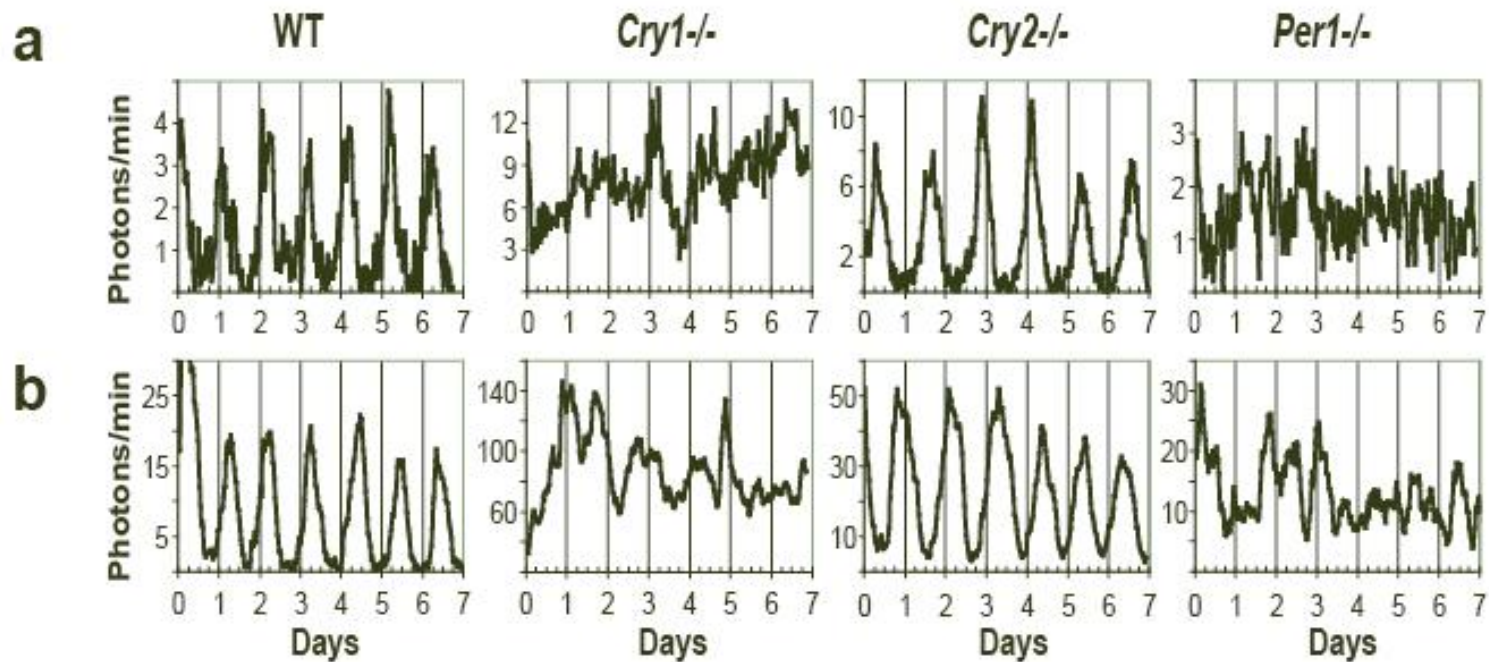


42 day recording, David Welsh

Circadian mutants: SCN vs. peripheral tissues



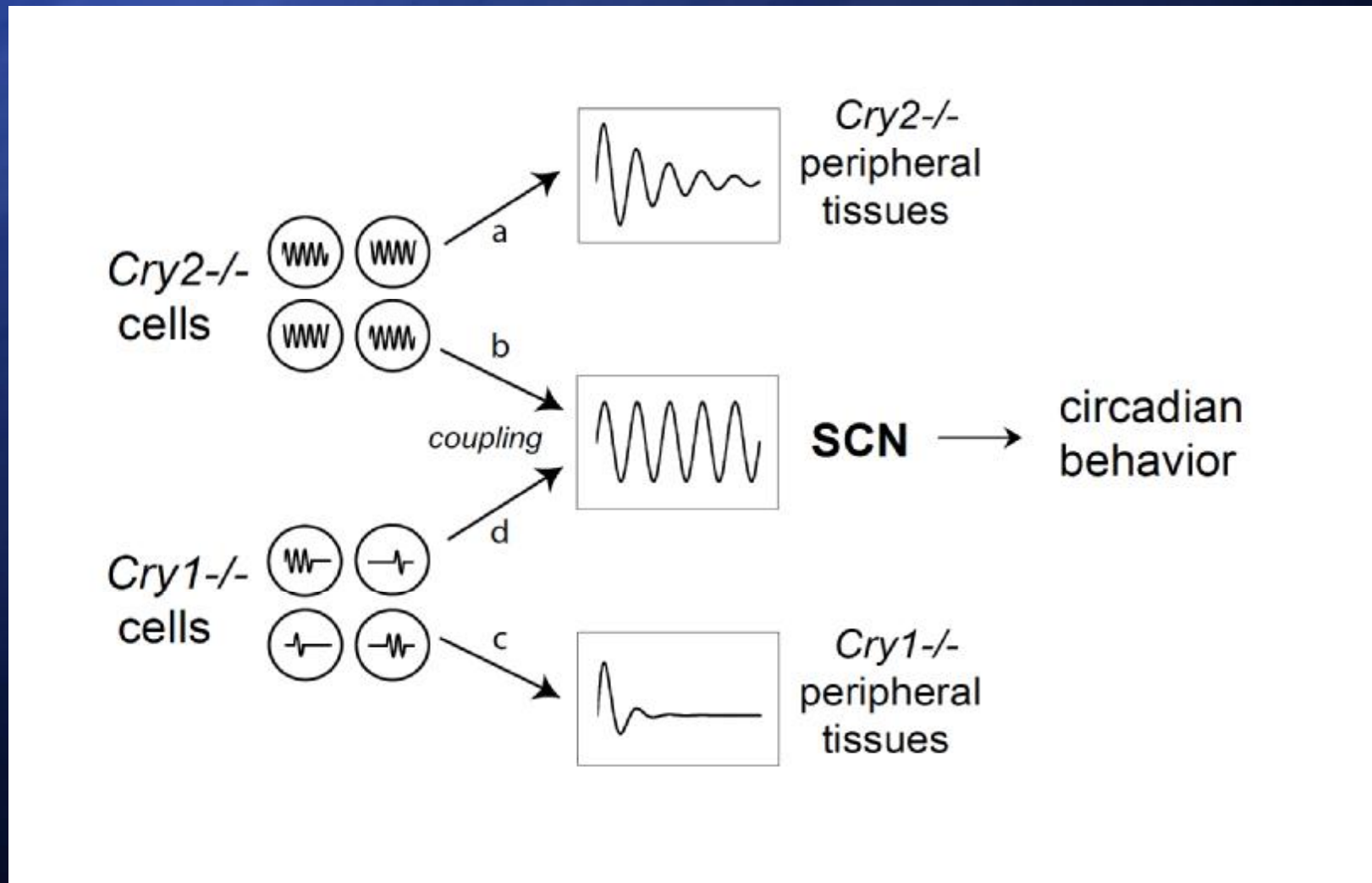
Dissociated SCN neurons vs. fibroblasts



*Fibro-
blasts*

SCN

SCN Circuitry Rescues Cell Autonomous Clock Defects



Genes



Circuits



Behavior
&
Behavioral
Disorders

Clock genes



SCN



Circadian
behavior



Metabolism



Grand Challenge

Complex Behaviors: learning & memory, mood, emotion, addiction, anxiety, social