

Circadian rhythms as genetic oscillators

Rhythms are circadian if they have four characteristics

Have a period of approximately 24 hours

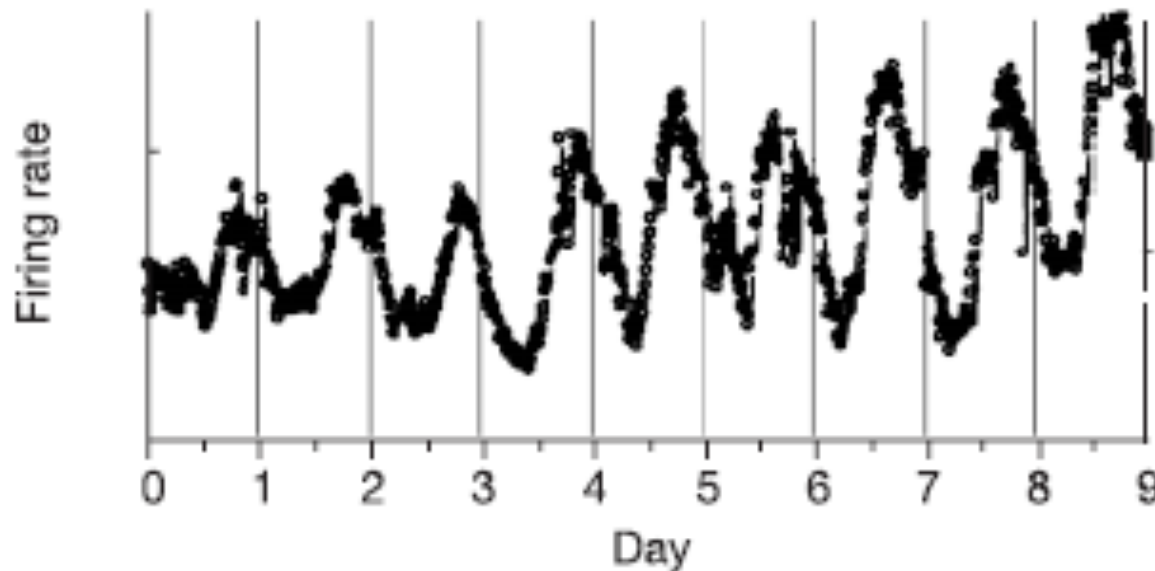
Are free running and exist in the absence of cues to the earth's 24-hour rotation

Are synchronised by environmental signals, usually light

Are able to run over a range of temperatures.

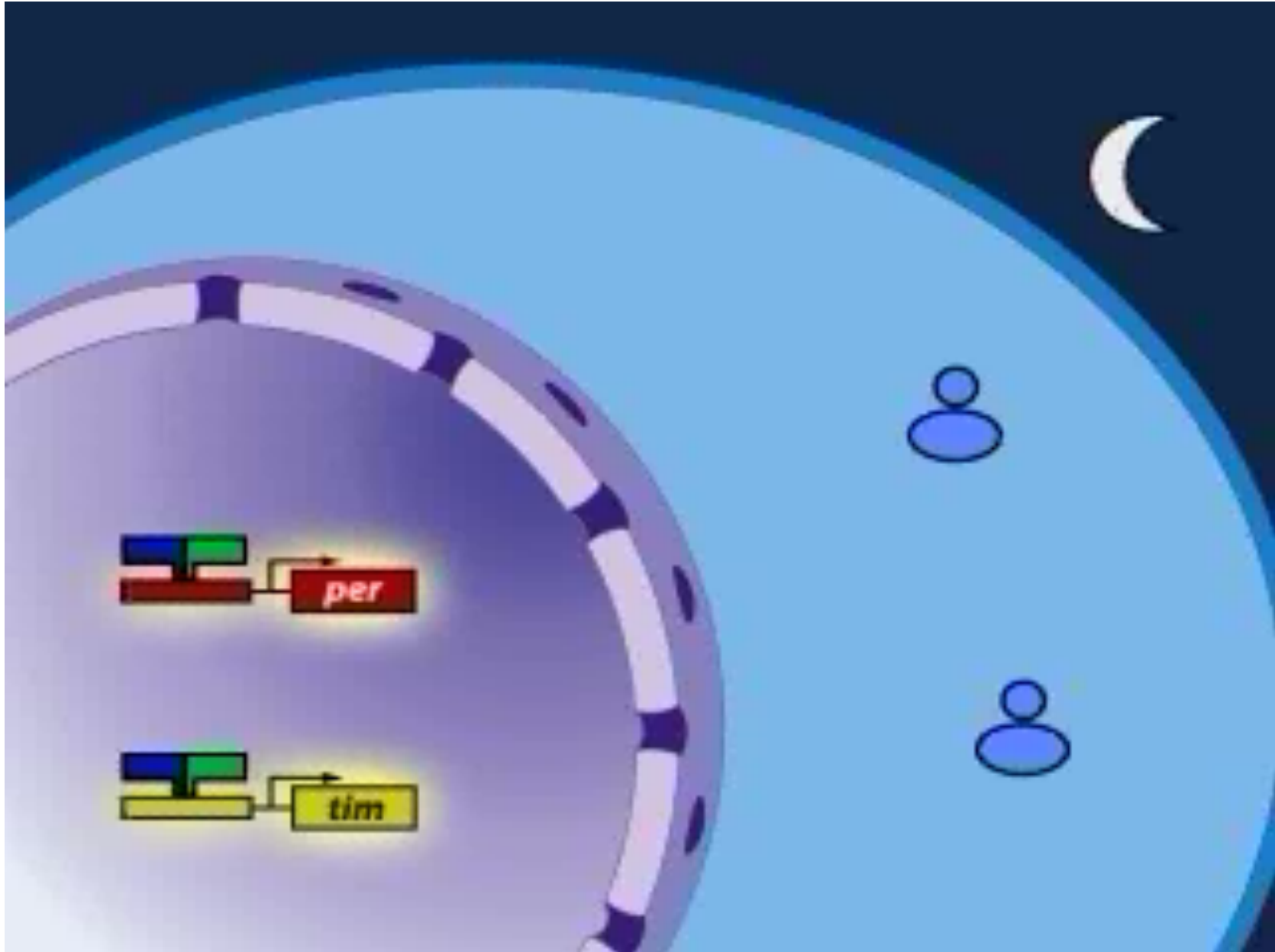
Circadian rhythms occur in single cells

The suprachiasmatic nucleus comprises numerous clock cells, but a single neuron from the nucleus has circadian rhythms in culture.

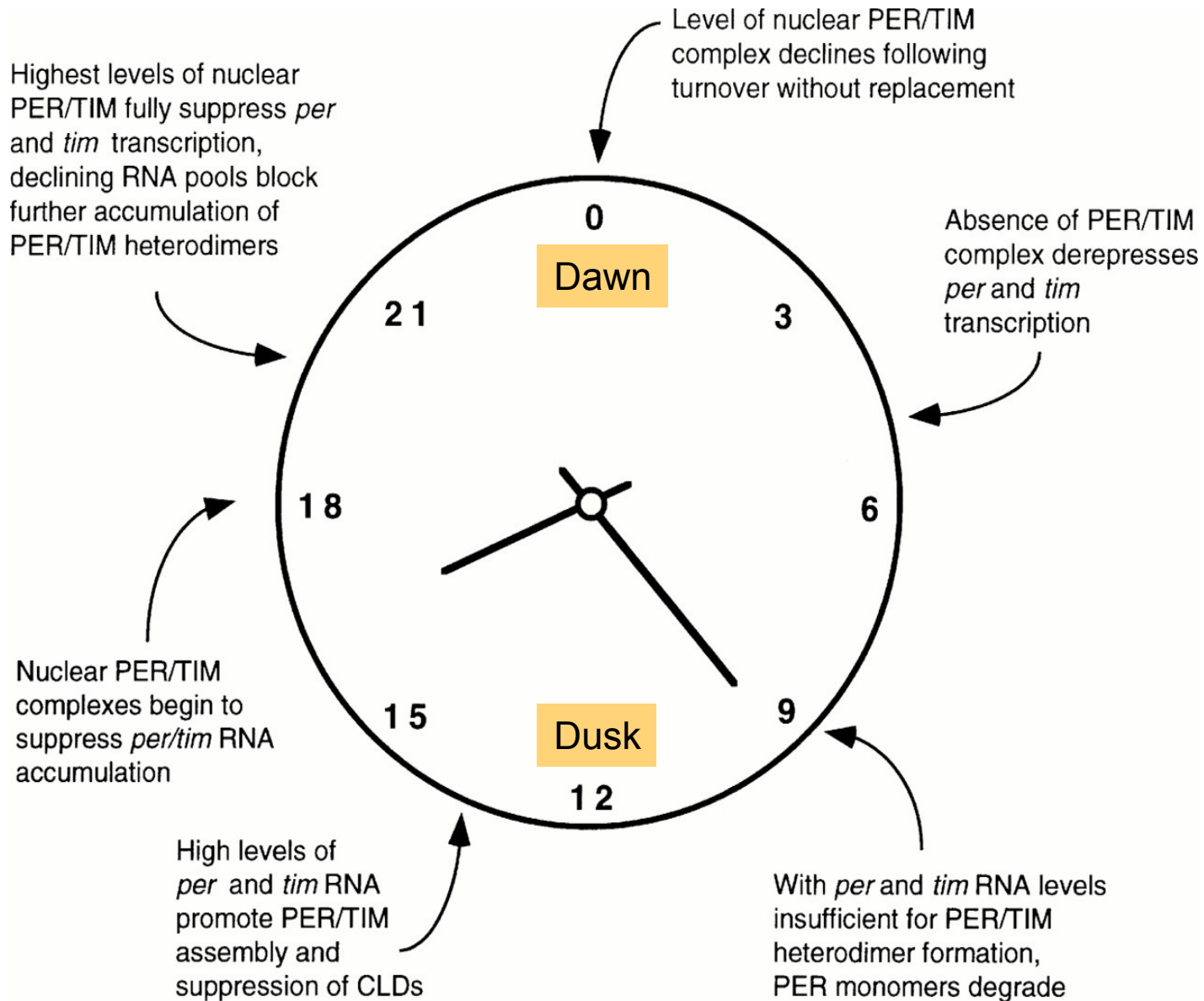


Reppert, Weaver 2002

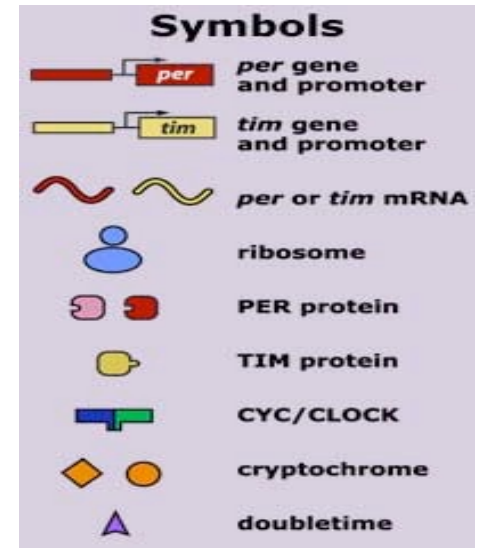
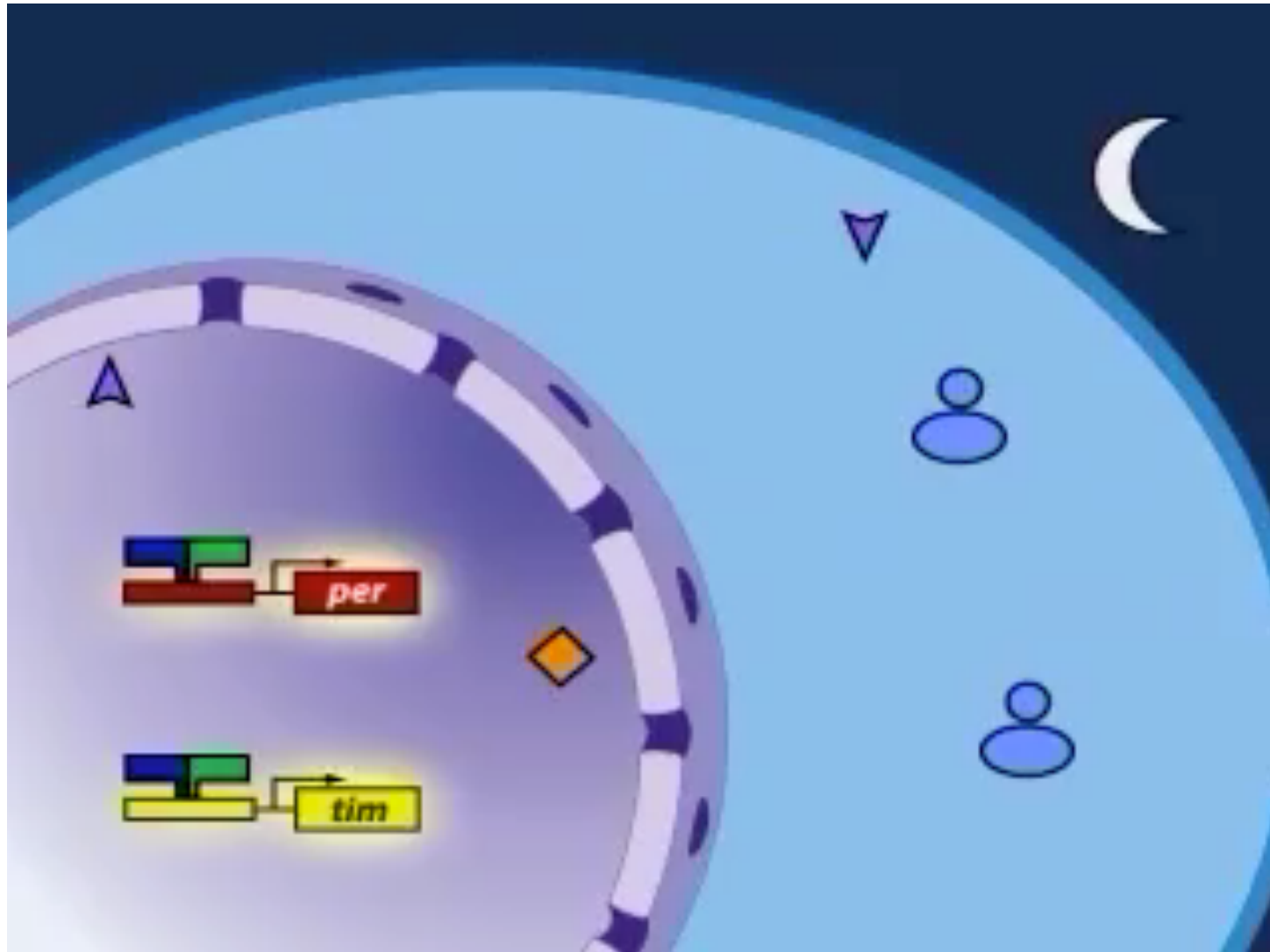
Negative transcriptional feedback controls circadian rhythms in *Drosophila*



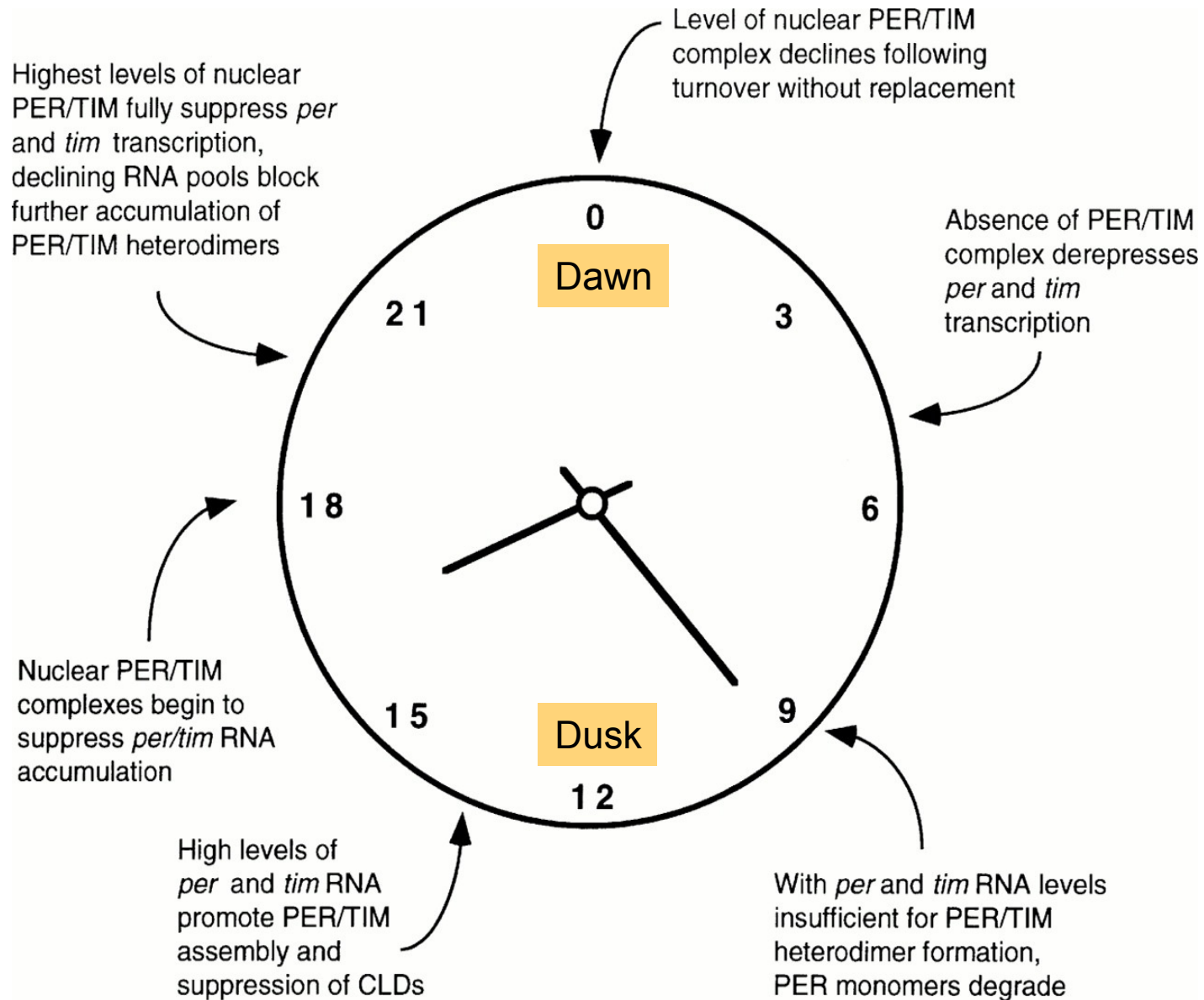
Changes in the levels of PER/TIM are fundamental



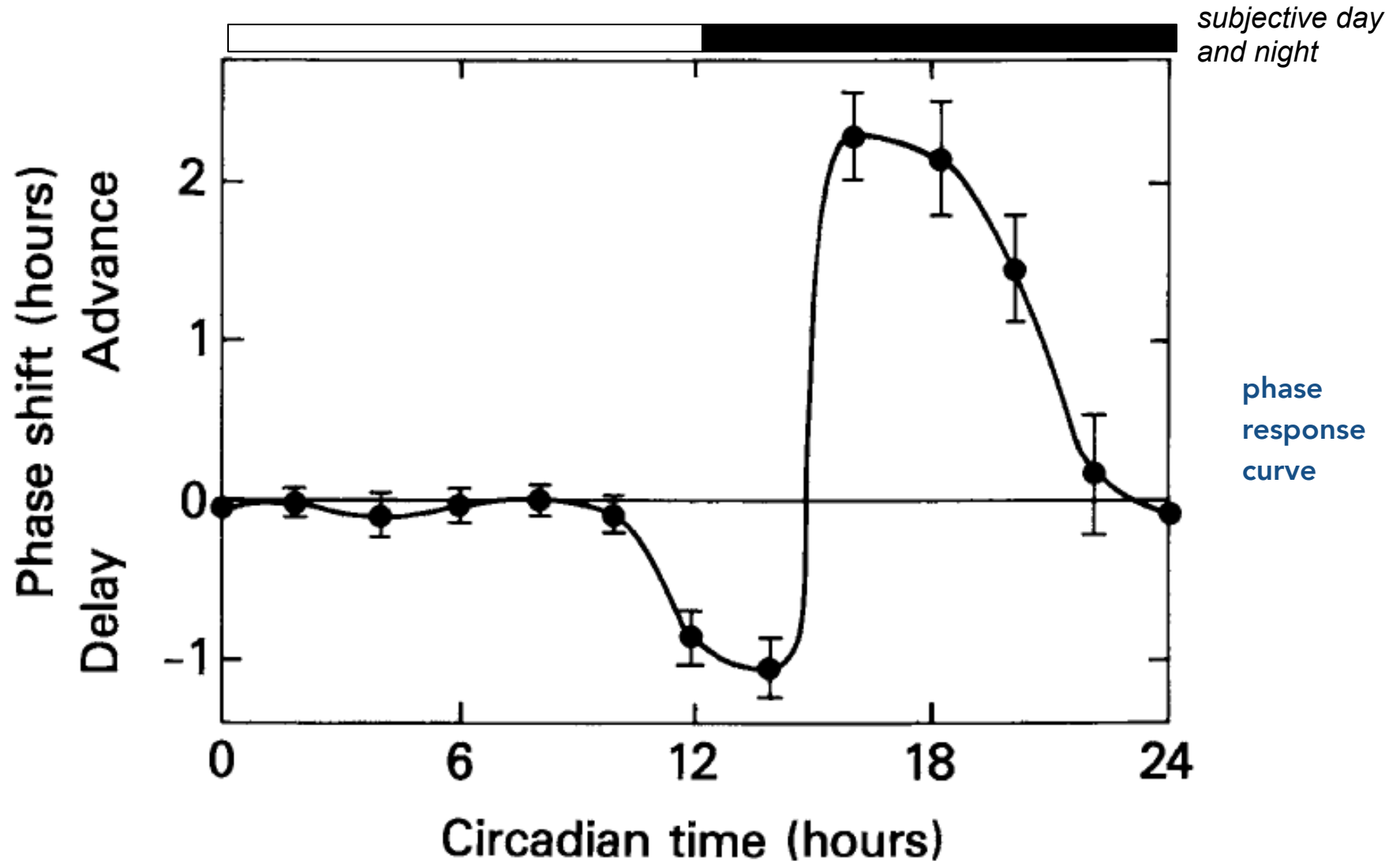
The behaviour is more complex because the clock can be reset by sunlight.



Nuclear levels of PER/TIM **decrease** after dawn and **increase** after dusk



Through cryptochrome, the rhythms adjust to the seasons



Pulse of light early in subjective night delays rhythm and extends day time.
Pulse of light late in subjective night advances rhythm and reduces night time.