

## **RHYTHMS & BEHAVIOR**

### **Chronobiology**

1729 Jean Jacques d'Ortours de Mairan & Heliotrope plant

1982 *The Clocks that Time Us: Physiology of the Circadian*

*Timing System*

“biorhythms”

evolution of behavioral rhythms

found in all plants/animals

persist under even constant environmental conditions

are self-sustaining, endogenous, “clock-like”

e.g. core body temperature

**circadian, ultradian** (e.g. **BRAC**), **infradian** rhythms

**“free-running” rhythms**

endogenous (internal) oscillators (“pace-makers”, “clocks”)

role of genetics

exogenous (external) oscillators (“**Zeitgebers**”)

**entrainment**, to entrain or to synchronize

light/dark cycle, light levels, spinning of the earth in  
24 hours

temperature cycles, sound cycles, food supplies, H<sub>2</sub>O,  
lunar (light) cycles, tidal cycles, others

note: **poikilotherms** vs. **homeotherms** & temp. cues

Why endogenous rhythms? Why entrainment of zeitgeber?

Why not just wait and see/react?...anticipation

Under what condition is this possible?...predictable cues

### **Variations in circadian rhythms**

“owls” (delayed) vs. “larks” (advanced) diurnal rhythms

“stretched” vs. “shrunk” rhythms

genetic variation across gene pool (between *S* variance)

“plasticity” within a given individual (within *S* variance)

implications for east/west travel, for shiftwork

Miscel. Information

## **Temporal Isolation Studies...**the early years

Cave “experiments” and phenomenon of **internal desynchronization**

**Michael Siffre, Veronique Le Guen, Stefania Follini**

August 10, 1988 to November 29, 1988 V. in cave

January 17, 1990 she committed suicide...Was there a relationship to her cave experience?

Conditions in the cave

What was known prior to 1988?

Siffre, 1962 – 1972

Weitzman, Czeisler; Kripke, 1983

What was observed while V. was in the cave?

What was known about V. after cave and before death?

Follini – another cave study

## **Current studies**

Ethical issues, IRB reviews, etc.

Safeguards – do “temporal isolation” with very careful screening of participants

no social isolation

normal light levels (intensity and spectrum)

not for extended periods of time (a week or so)

very careful monitoring daily

have not observed internal desynchronization under these conditions

Implications for real world, e.g. shift workers, coal miners, arctic naval bases, space travel, blind persons

The importance of light exposure...for us all