Regulation 调控

- 重要性
- 温度
- 水
- 糖
- 昼夜

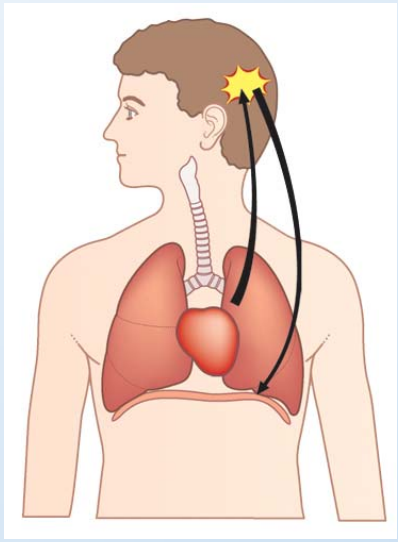
Homoestasis

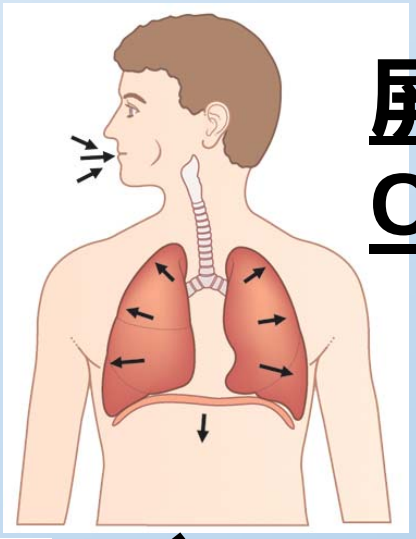
- 维持体内稳态是我们的本能
- 行为的方式
- 生理的方式

Lunch/dinner?

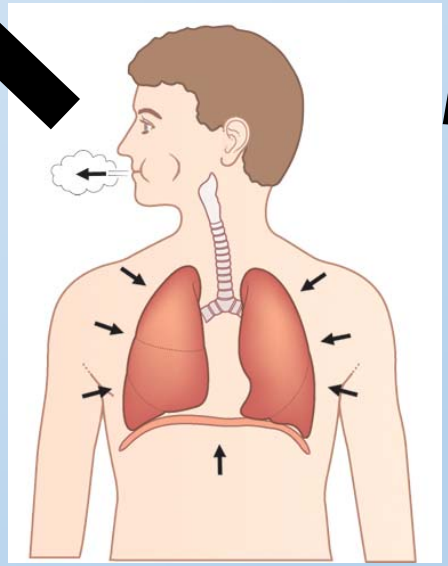
- The scientific name for an animal that doesn't either run from or fight its enemies is **lunch/dinner**

负反馈与正反馈





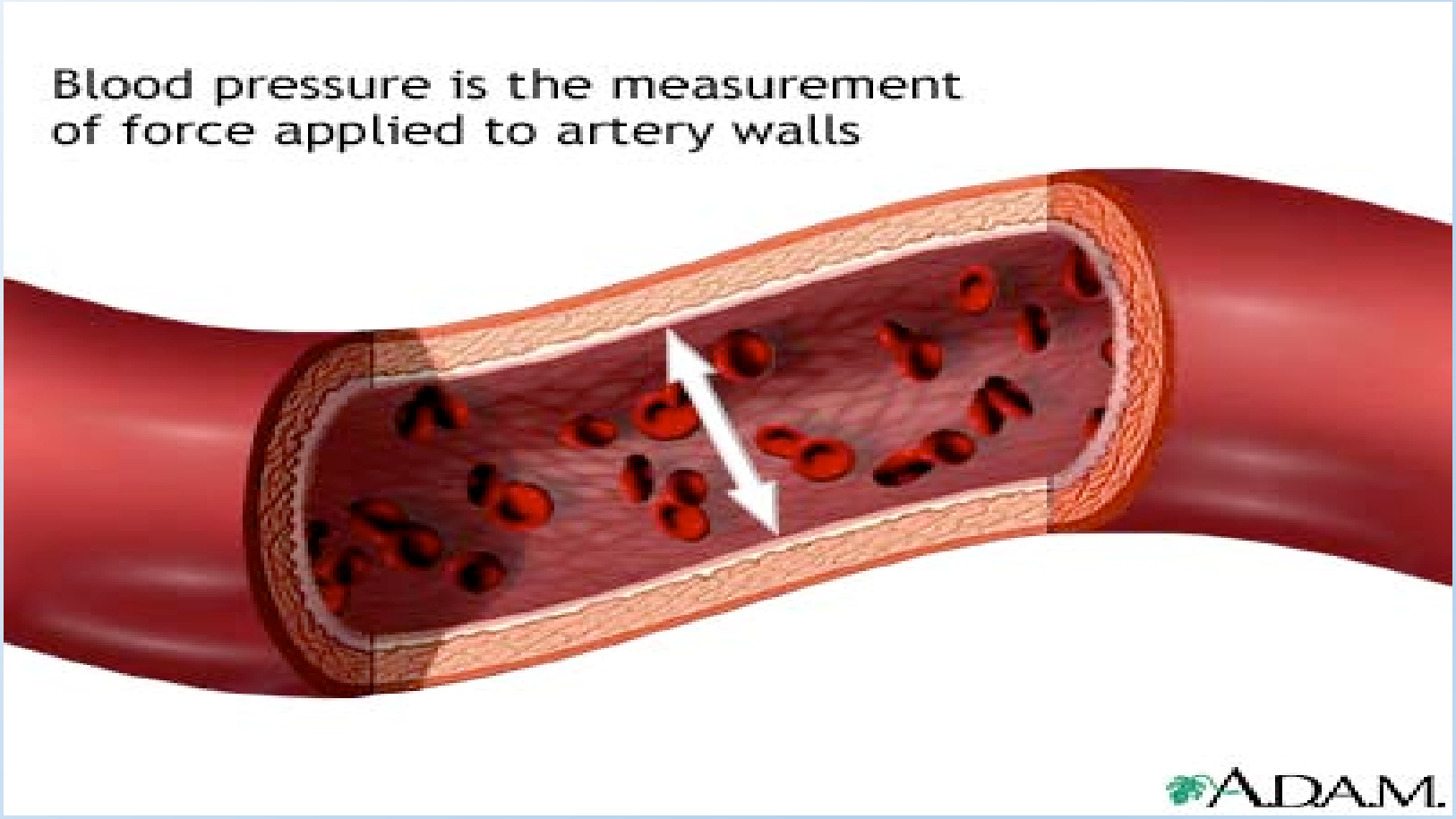
屏住呼吸，CO_2 升高



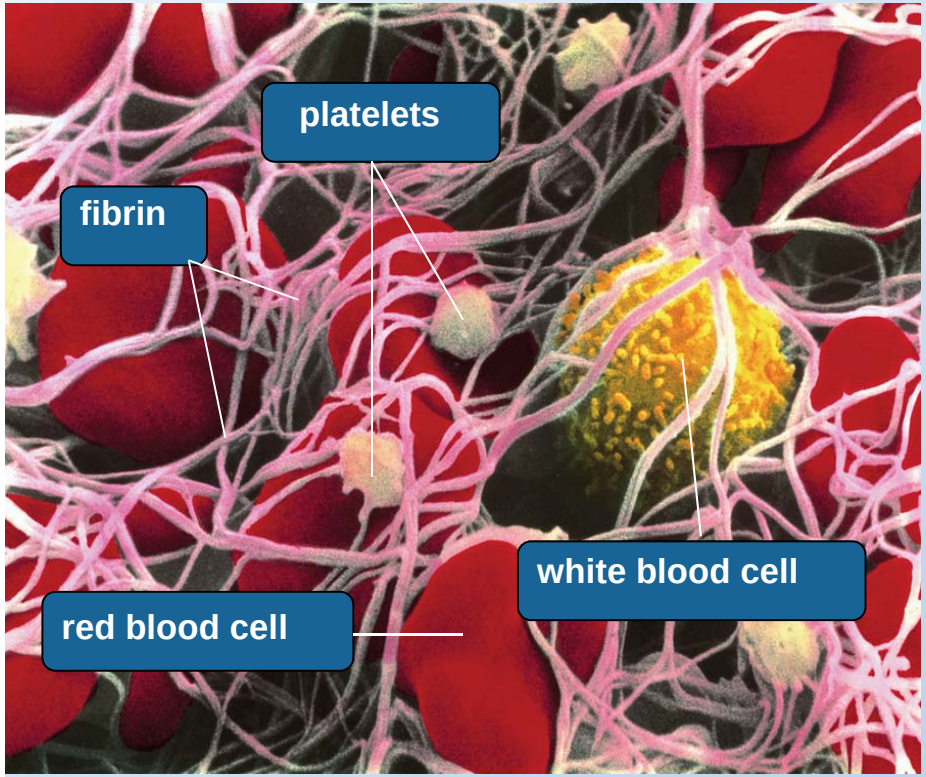
强迫呼气

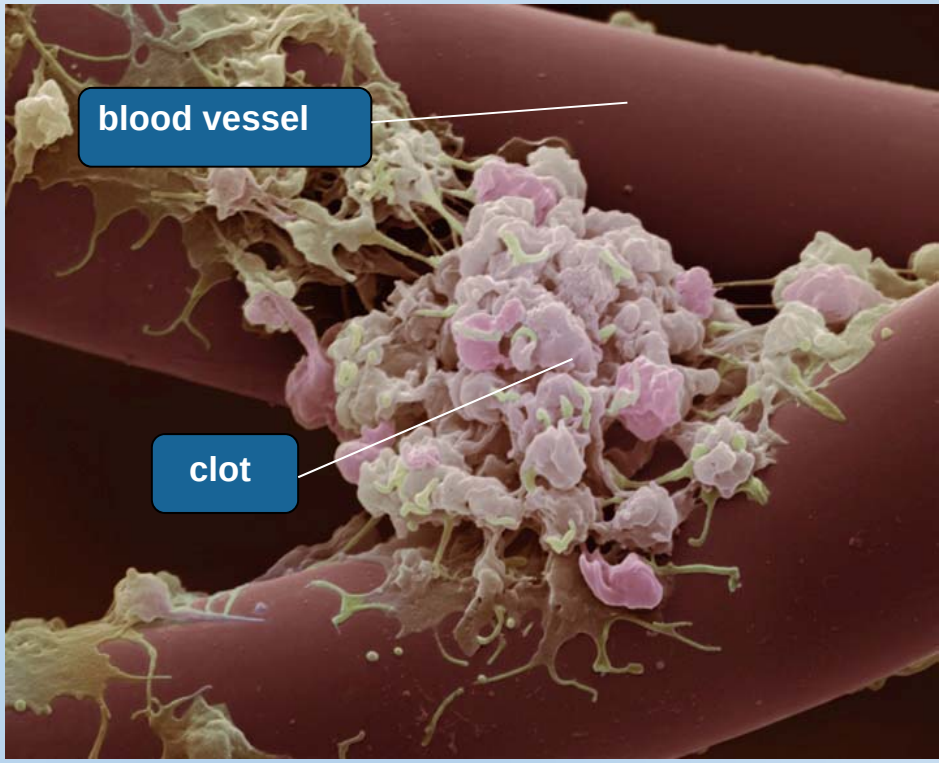
O_2 / CO_2 恢复稳态

血压调控

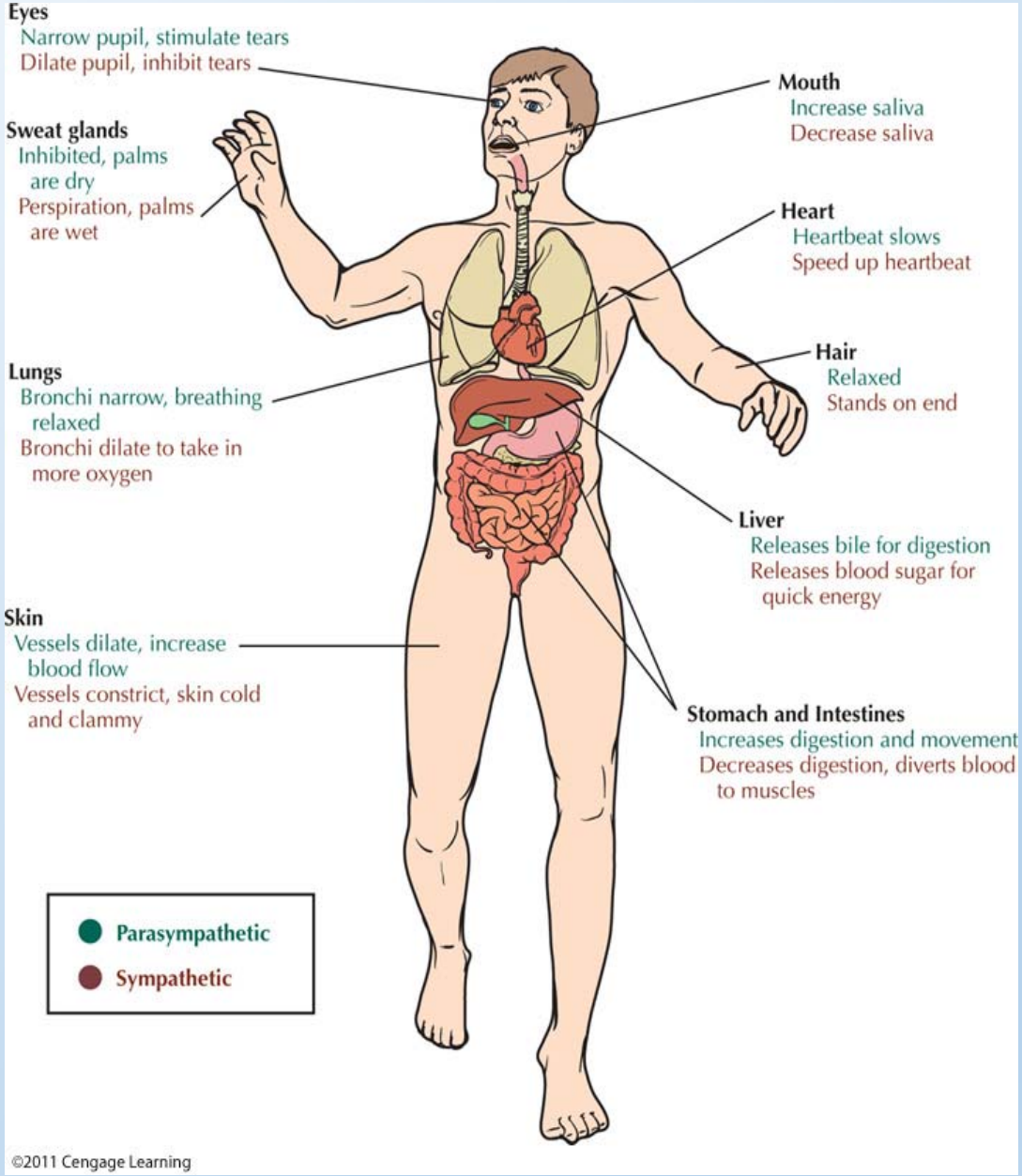

Blood pressure is the measurement
of force applied to artery walls
A.D.A.M.

正反馈很少见


platelets
fibrin
white blood cell
red blood cell


blood vessel
clot

正反馈


Eyes
Narrow pupil, stimulate tears
Dilate pupil, inhibit tears
Sweat glands
Inhibited, palms are dry
Perspiration, palms are wet
Lungs
Bronchi narrow, breathing relaxed
Bronchi dilate to take in more oxygen
Skin
Vessels dilate, increase blood flow
Vessels constrict, skin cold and clammy
Mouth
Increase saliva
Decrease saliva
Heart
Heartbeat slows
Speed up heartbeat
Hair
Relaxed
Stands on end
Liver
Releases bile for digestion
Releases blood sugar for quick energy
Stomach and Intestines
Increases digestion and movement
Decreases digestion, diverts blood to muscles
Parasympathetic
Sympathetic
©2011 Cengage Learning

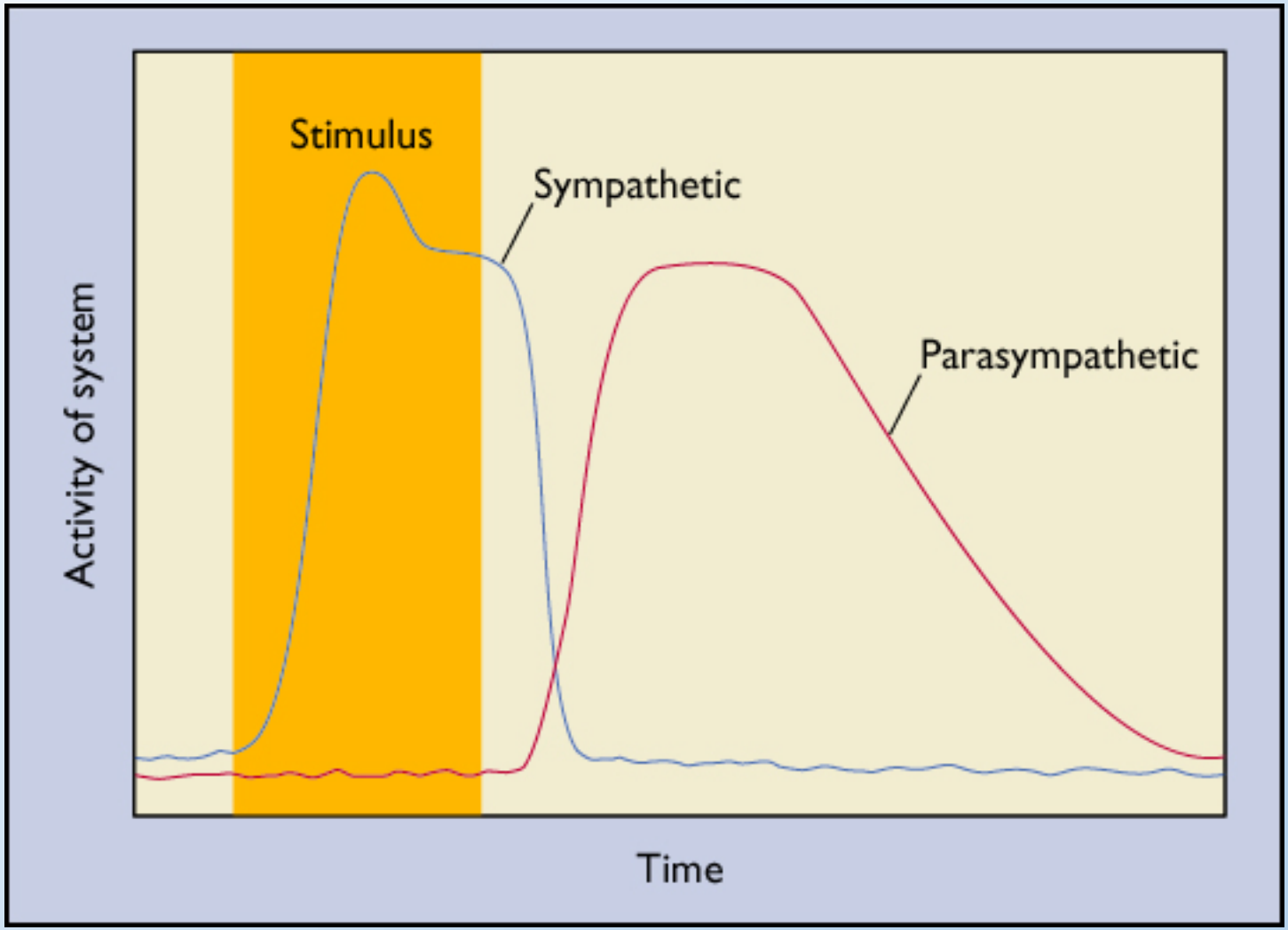


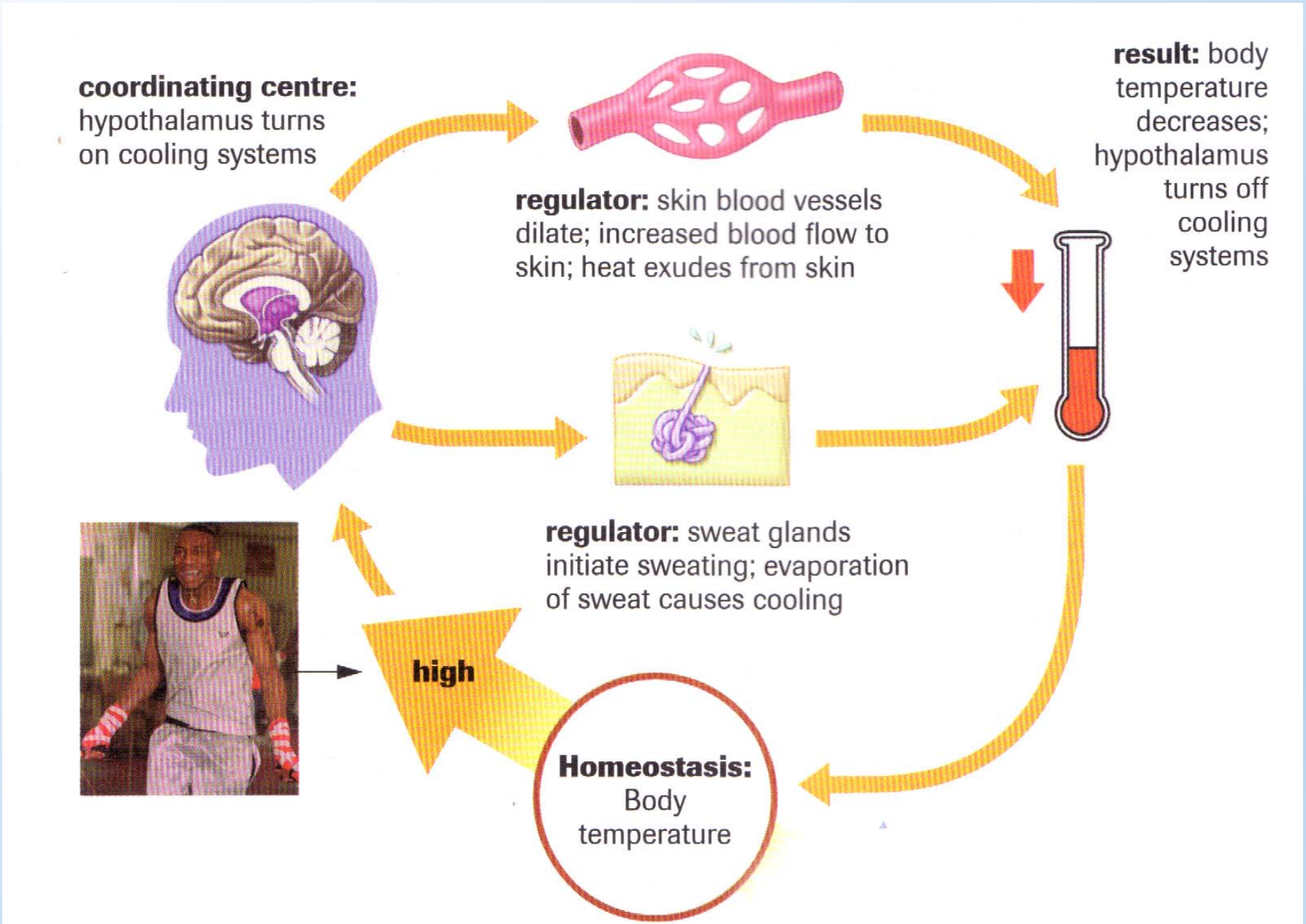
Figure 12.4 PARASYMPATHETIC REBOUND

After the stimulus eliciting the sympathetic response is removed, that response is reduced, and the opposing parasympathetic response is enhanced. This is why people sometimes feel faint at the end of an exciting experience.

温度调控

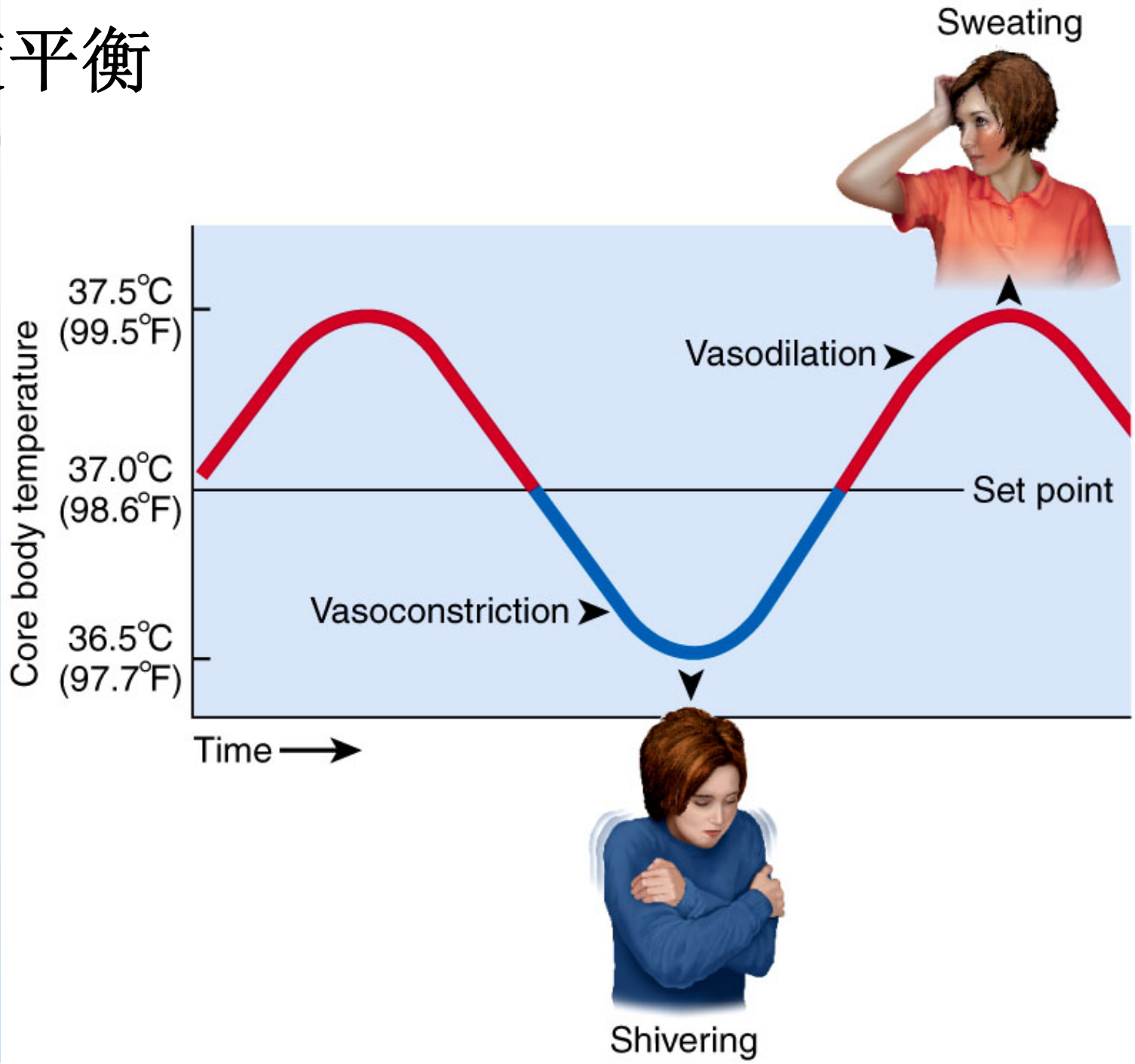
温度应激

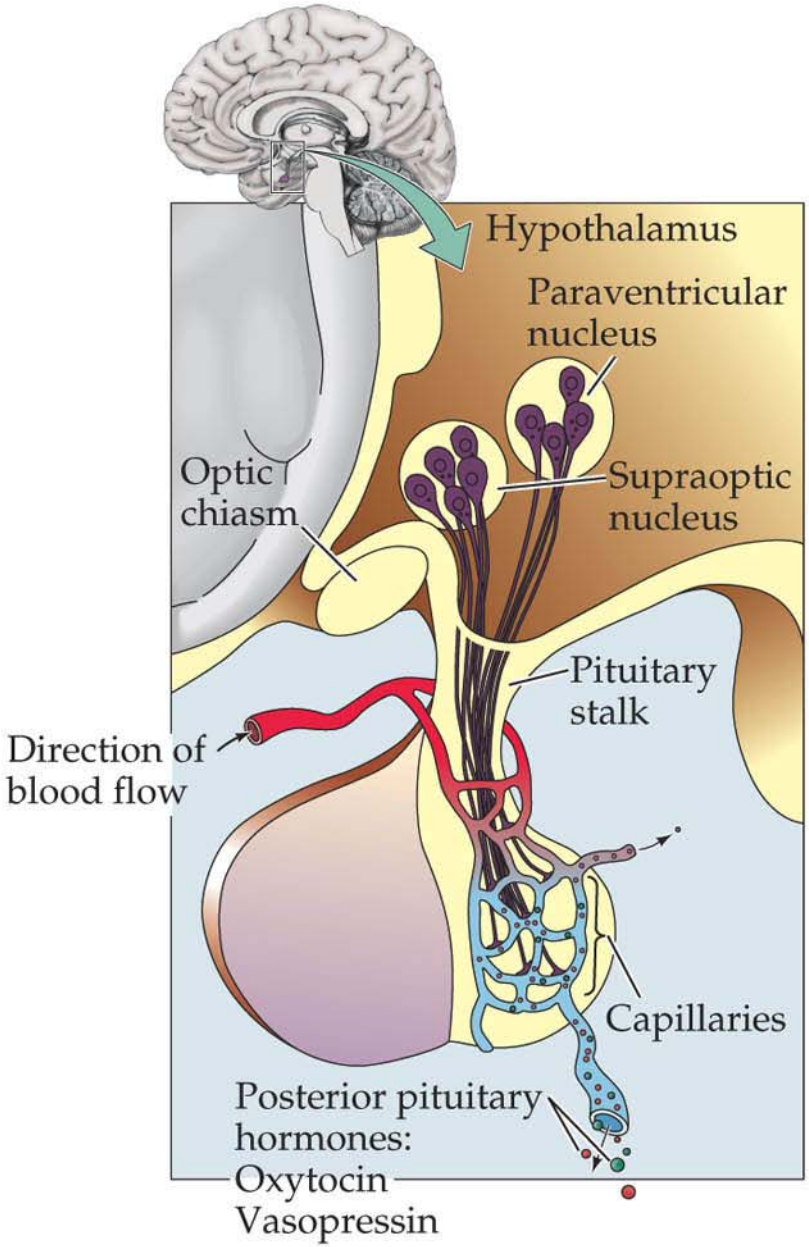
- 热应激
- 冷应激

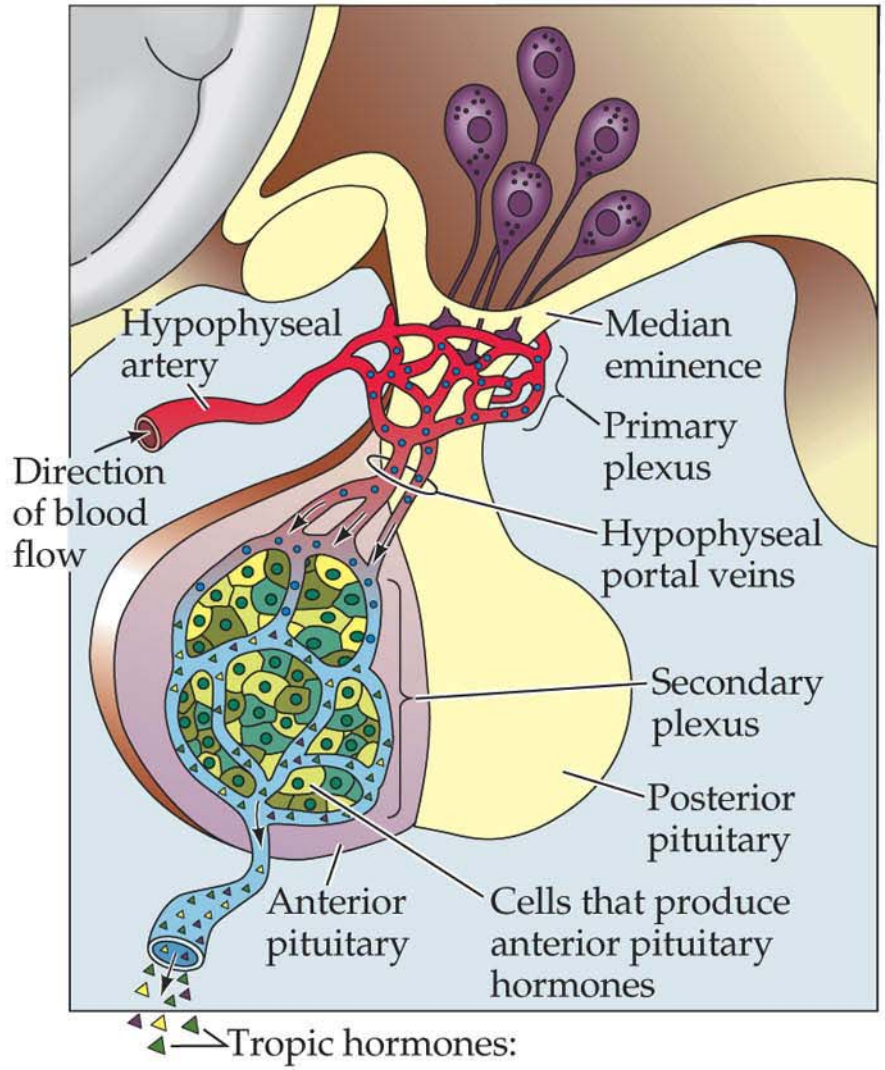

coordinating centre: hypothalamus turns on cooling systems
regulator: skin blood vessels dilate; increased blood flow to skin; heat exudes from skin
result: body temperature decreases; hypothalamus turns off cooling systems
regulator: sweat glands initiate sweating; evaporation of sweat causes cooling
high
Homeostasis: Body temperature

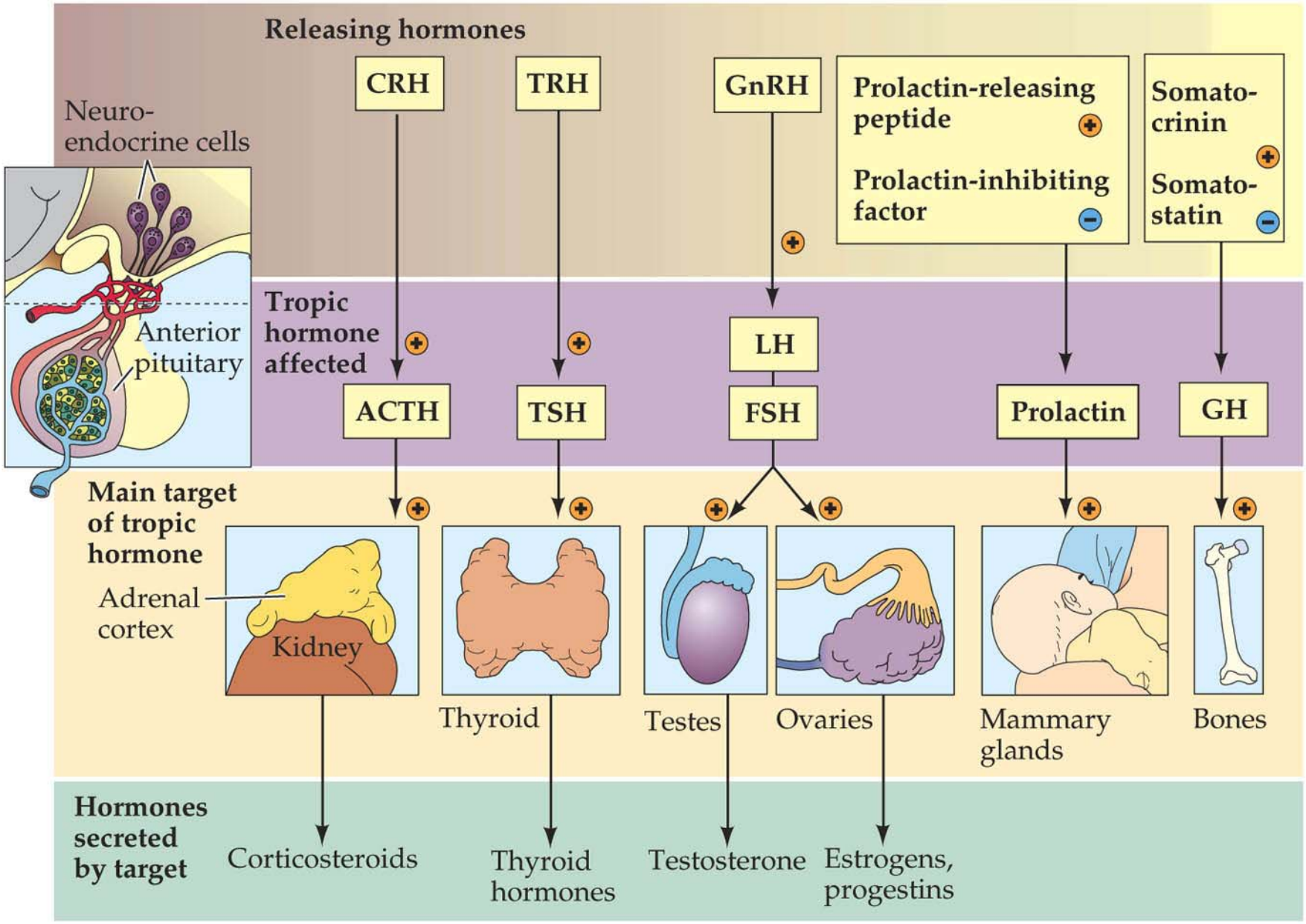
温度平衡

Figu

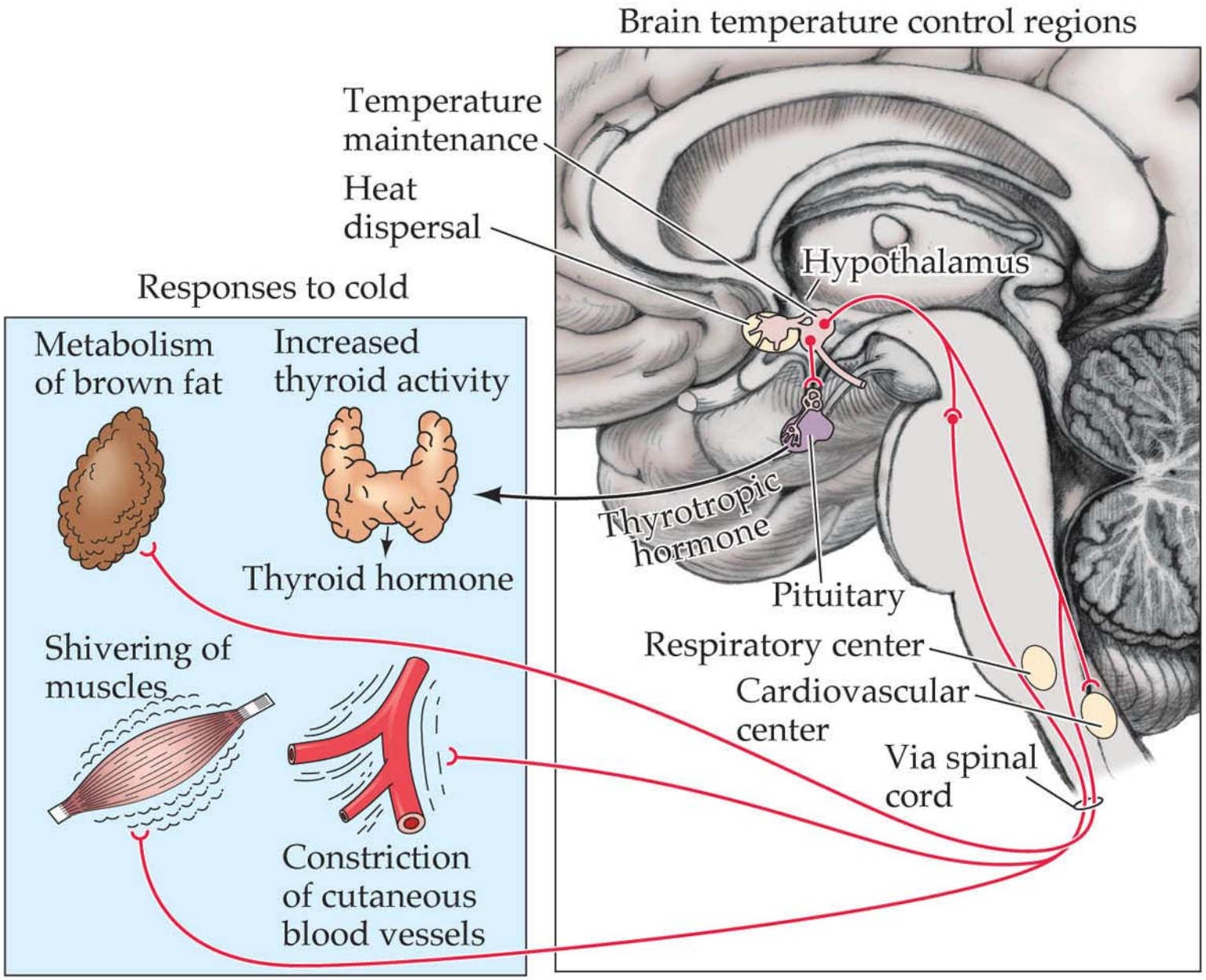


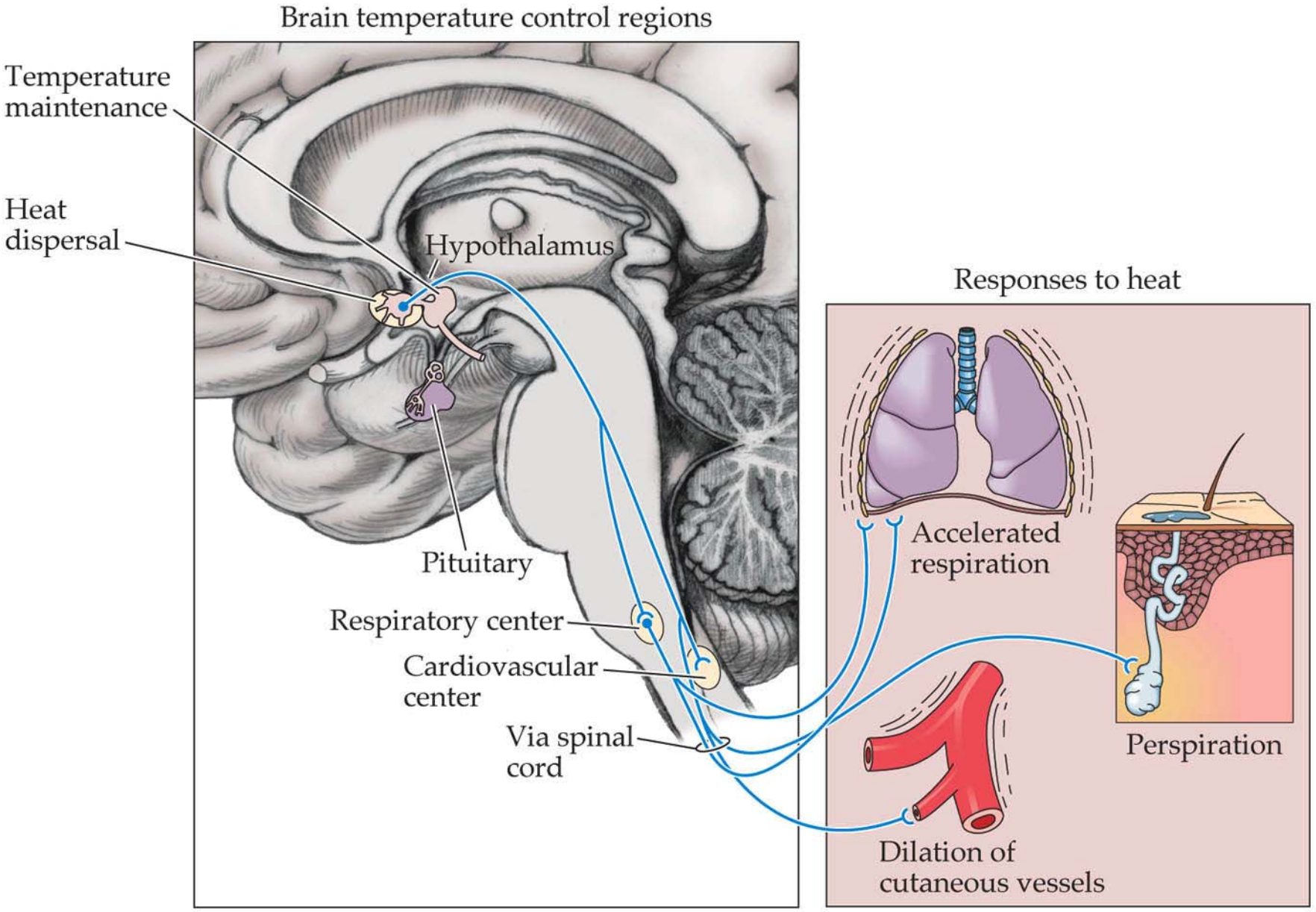


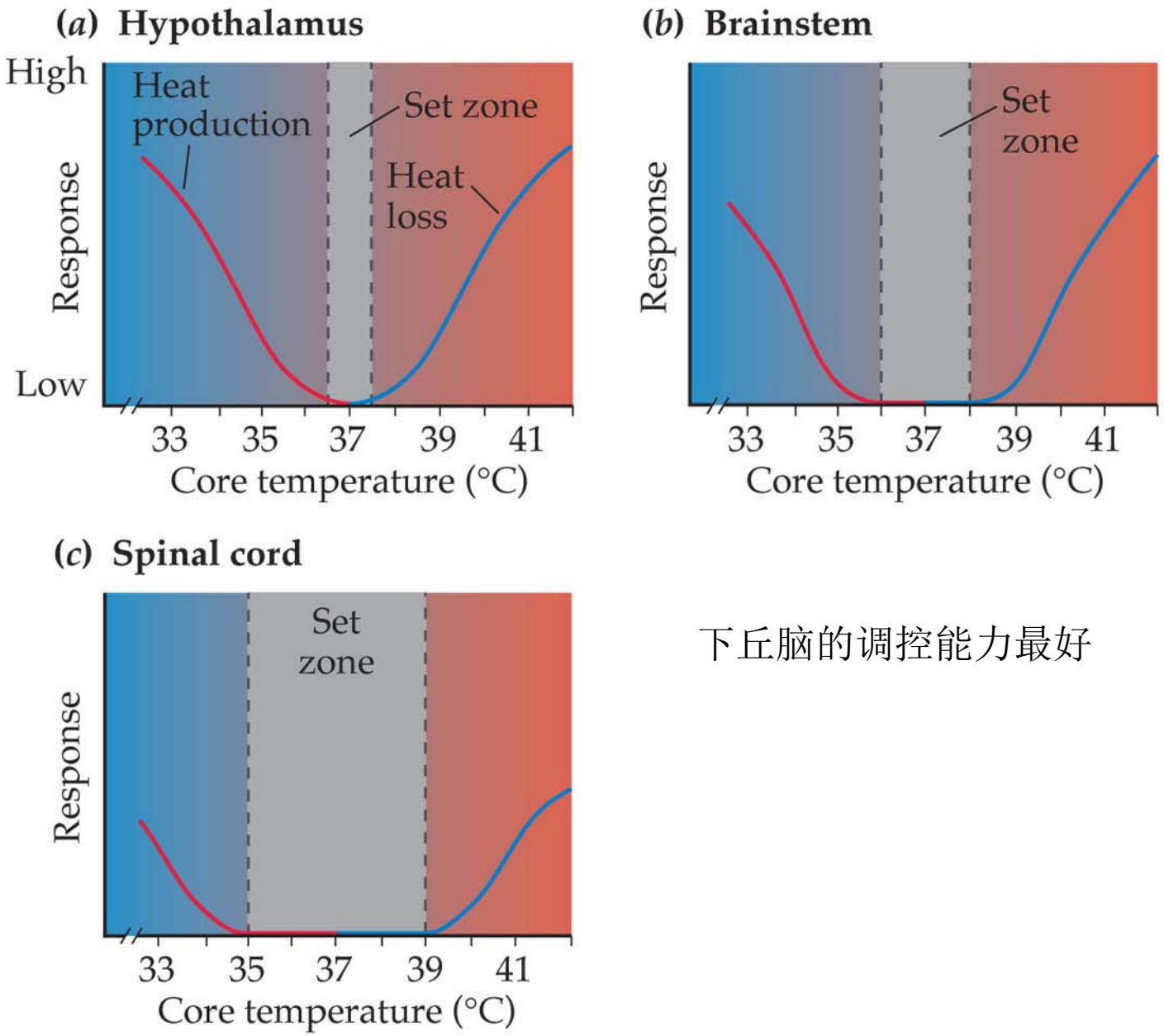




BIOLOGICAL PSYCHOLOGY, Fourth Edition, **Figure 5.14**

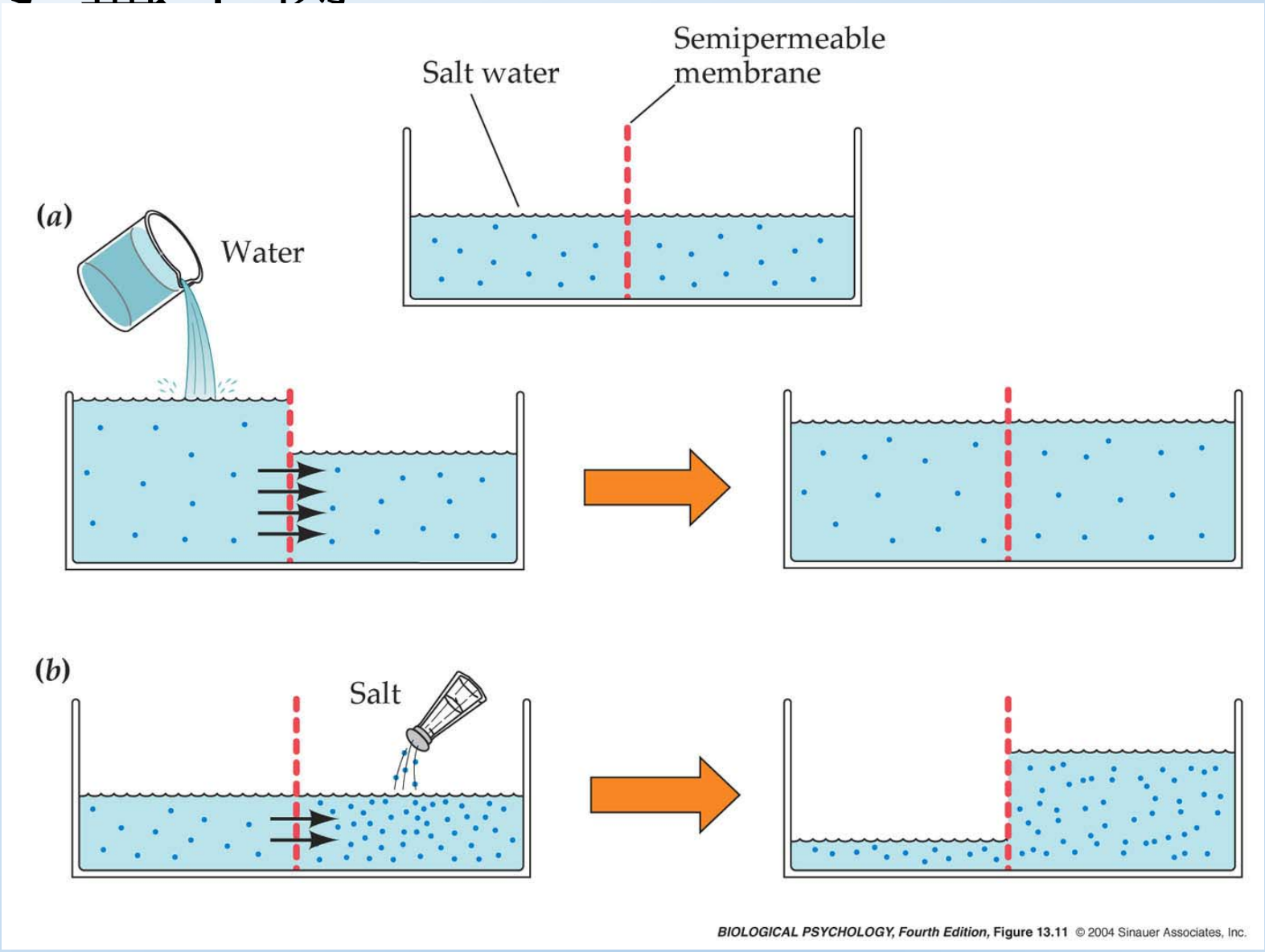




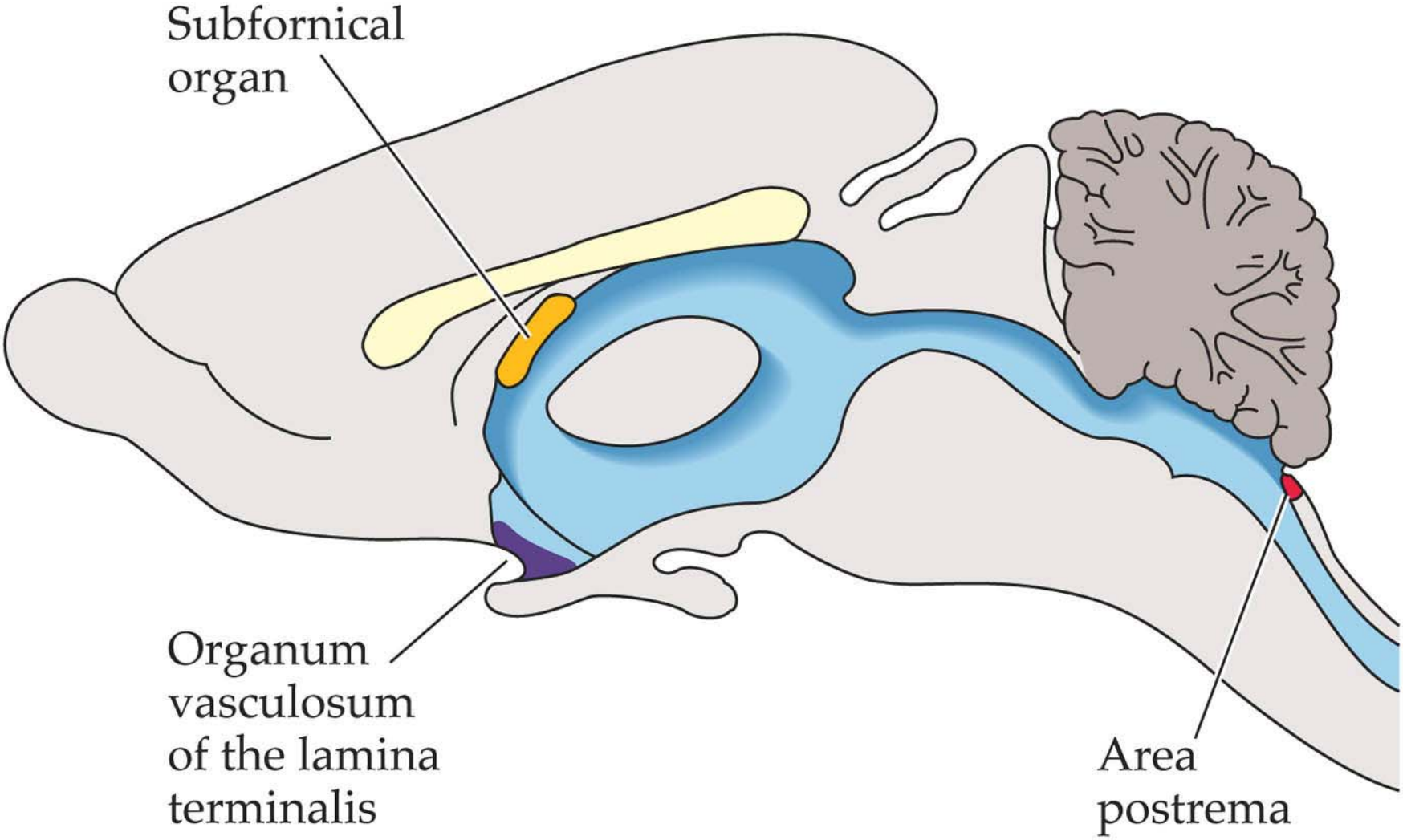


下丘脑的调控能力最好

水盐平衡



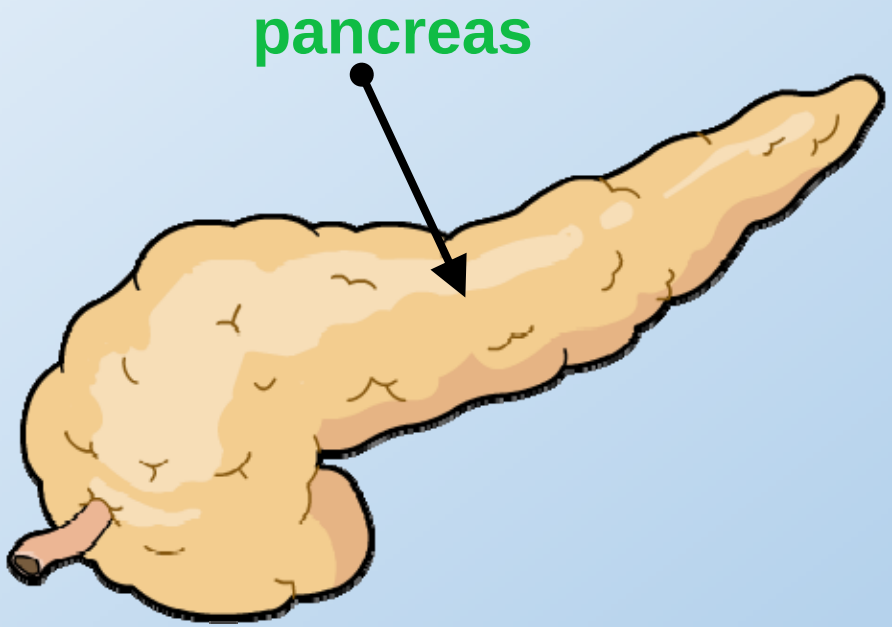
BIOLOGICAL PSYCHOLOGY, Fourth Edition, Figure 13.11 © 2004 Sinauer Associates, Inc.



BIOLOGICAL PSYCHOLOGY, Fourth Edition, **Figure 13.15**

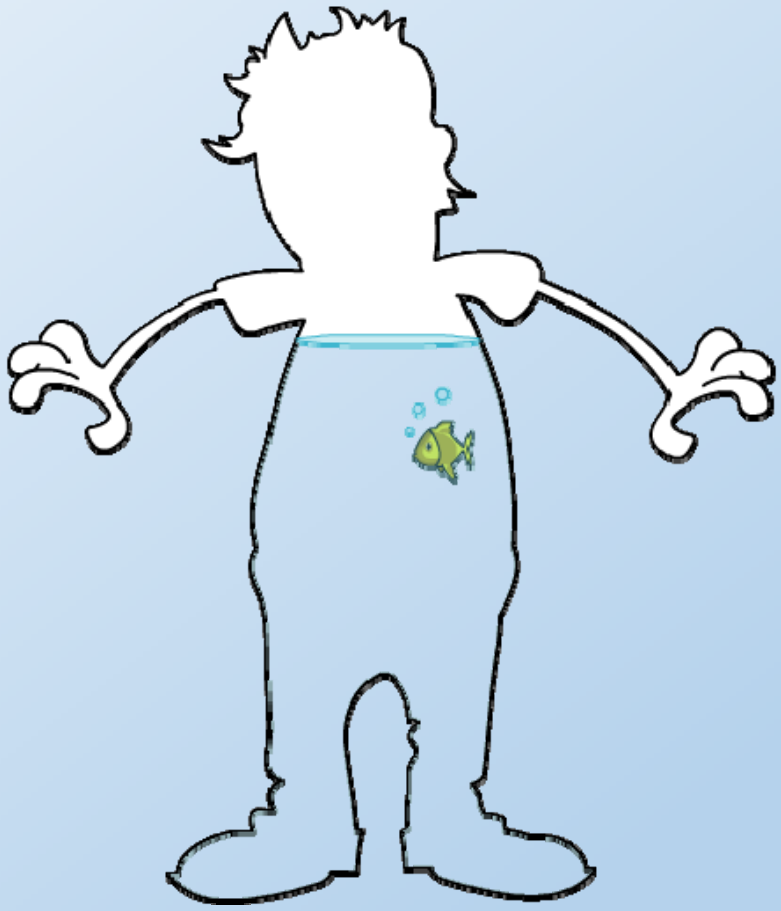
The pancreas and blood glucose

Blood glucose levels are monitored and controlled by the **pancreas**.



The pancreas produces and releases different hormones depending on the blood glucose level.

- **Insulin** is released when blood glucose levels are **high** – the liver stores excess glucose as glycogen.
- **Glucagon** is released when blood glucose levels are **low** – the liver converts stored glycogen into glucose and releases it into the blood.



时间调控

多足虫与潮汐

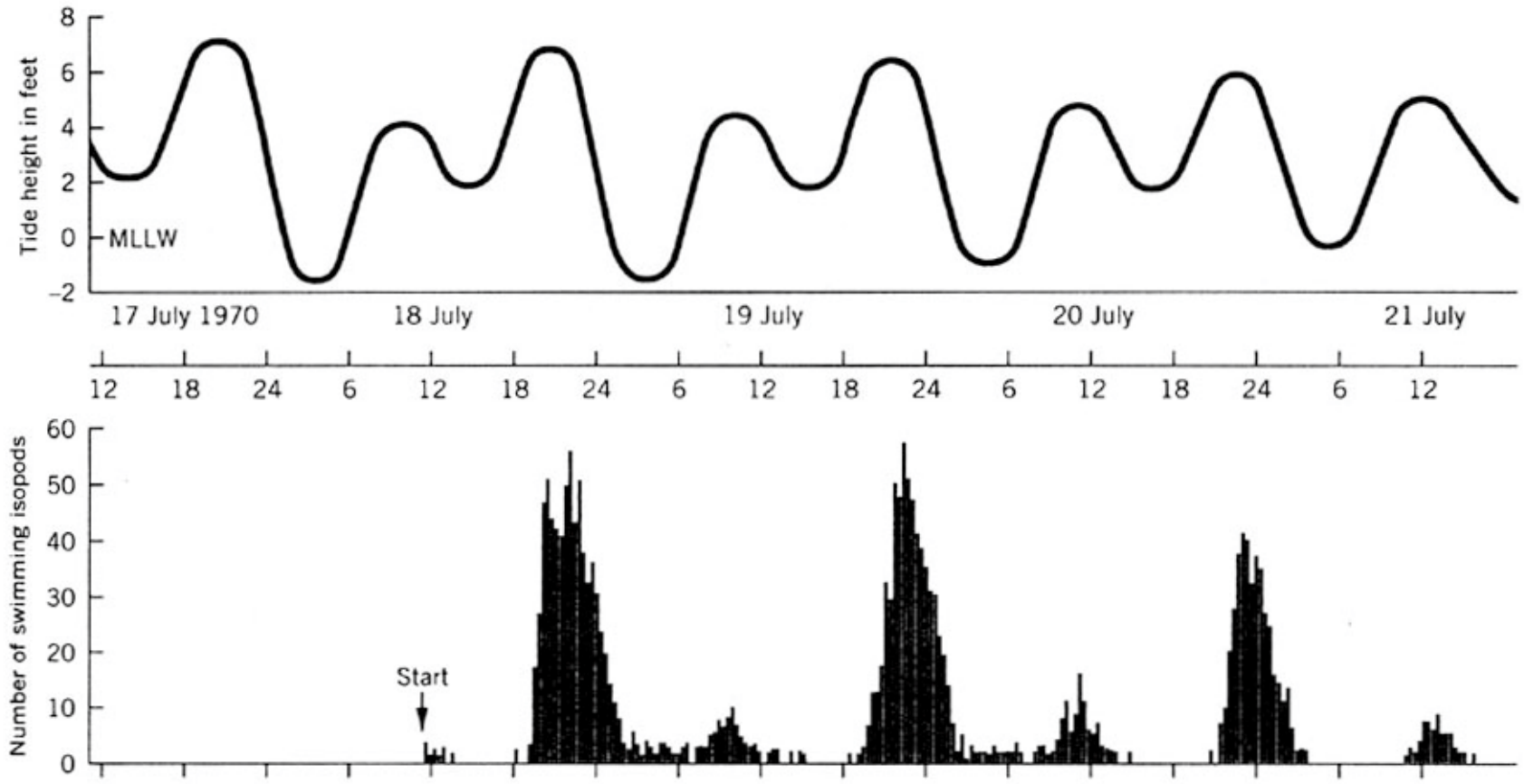
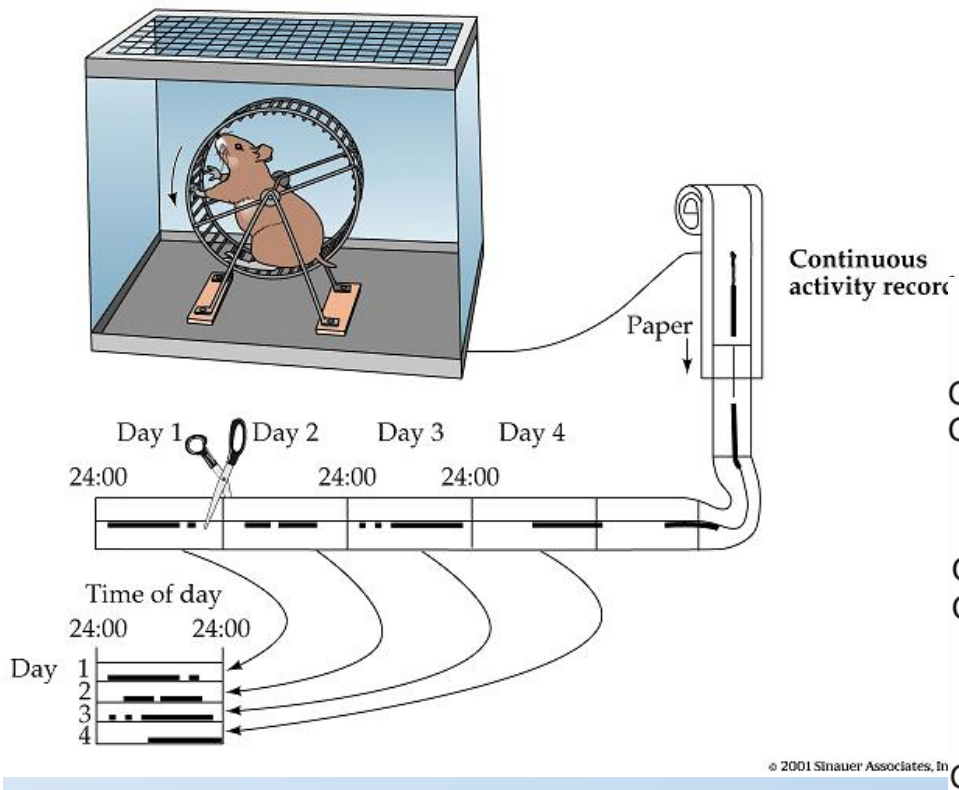
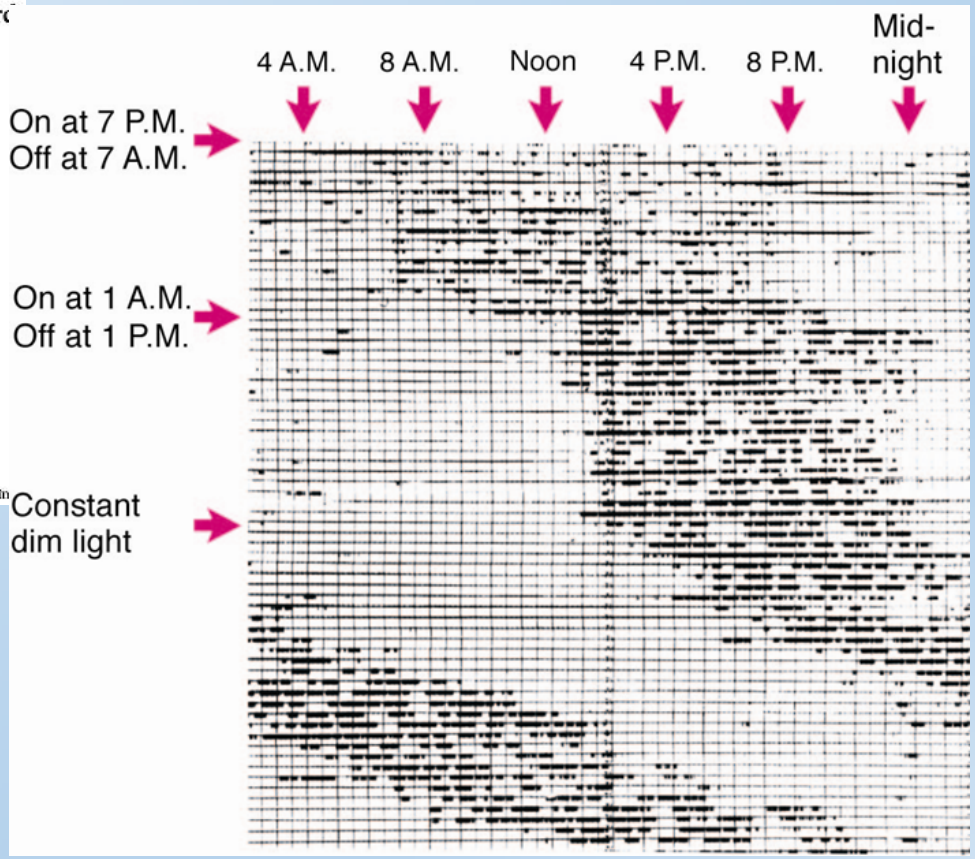


Figure 9.8 The activity pattern of isopods (*Excirolana chiltoni*) maintained in the laboratory. The pattern of activity mimics that of the height of the tide in the area of collection. (Modified from Klapow, 1972.)

Isopods are usually covered with water at high tide. They retain this activity even when kept in the lab with no tidal fluctuation.

自由状态下的活动

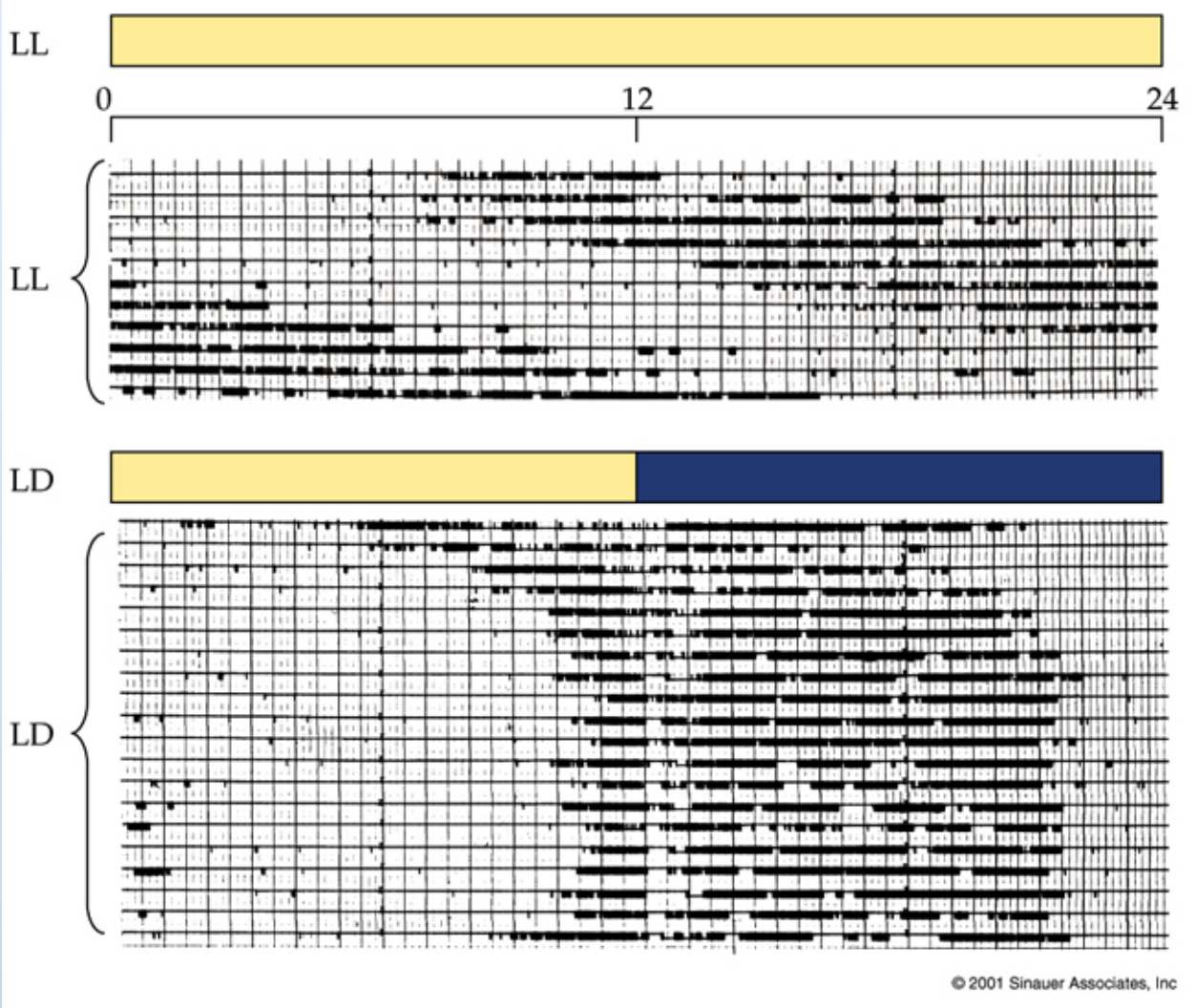

Continuous activity recor
Paper
Day 1
Day 2
Day 3
Day 4
24:00
24:00
24:00
Time of day
24:00
24:00
Day
1
2
3
4
© 2001 Sinauer Associates, In


4 A.M.
8 A.M.
Noon
4 P.M.
8 P.M.
Mid-night
On at 7 P.M.
Off at 7 A.M.
On at 1 A.M.
Off at 1 P.M.
Constant dim light

自发变化

持续光照

半天光照

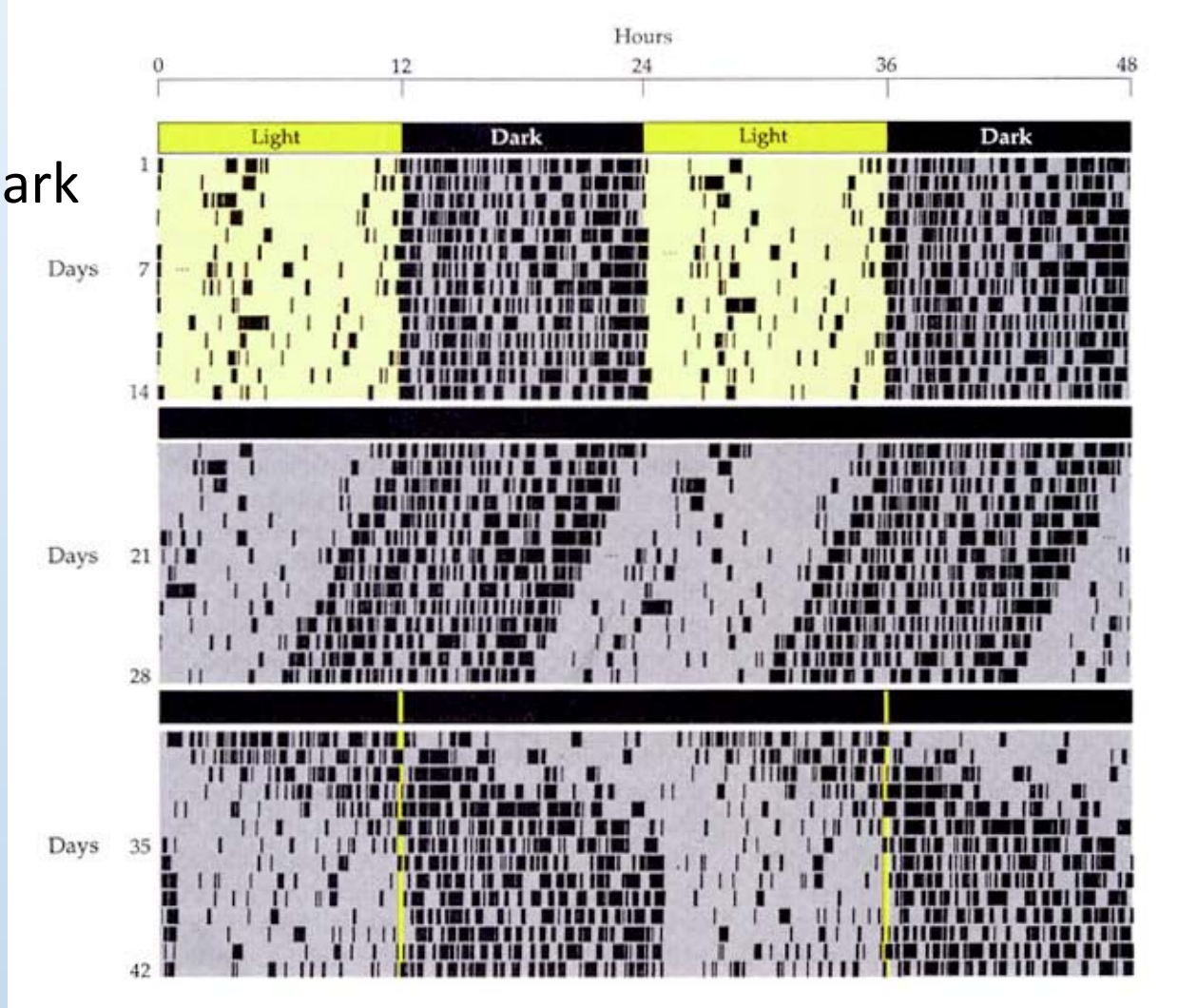


Mouse activity entrains to light

12h light:12h dark

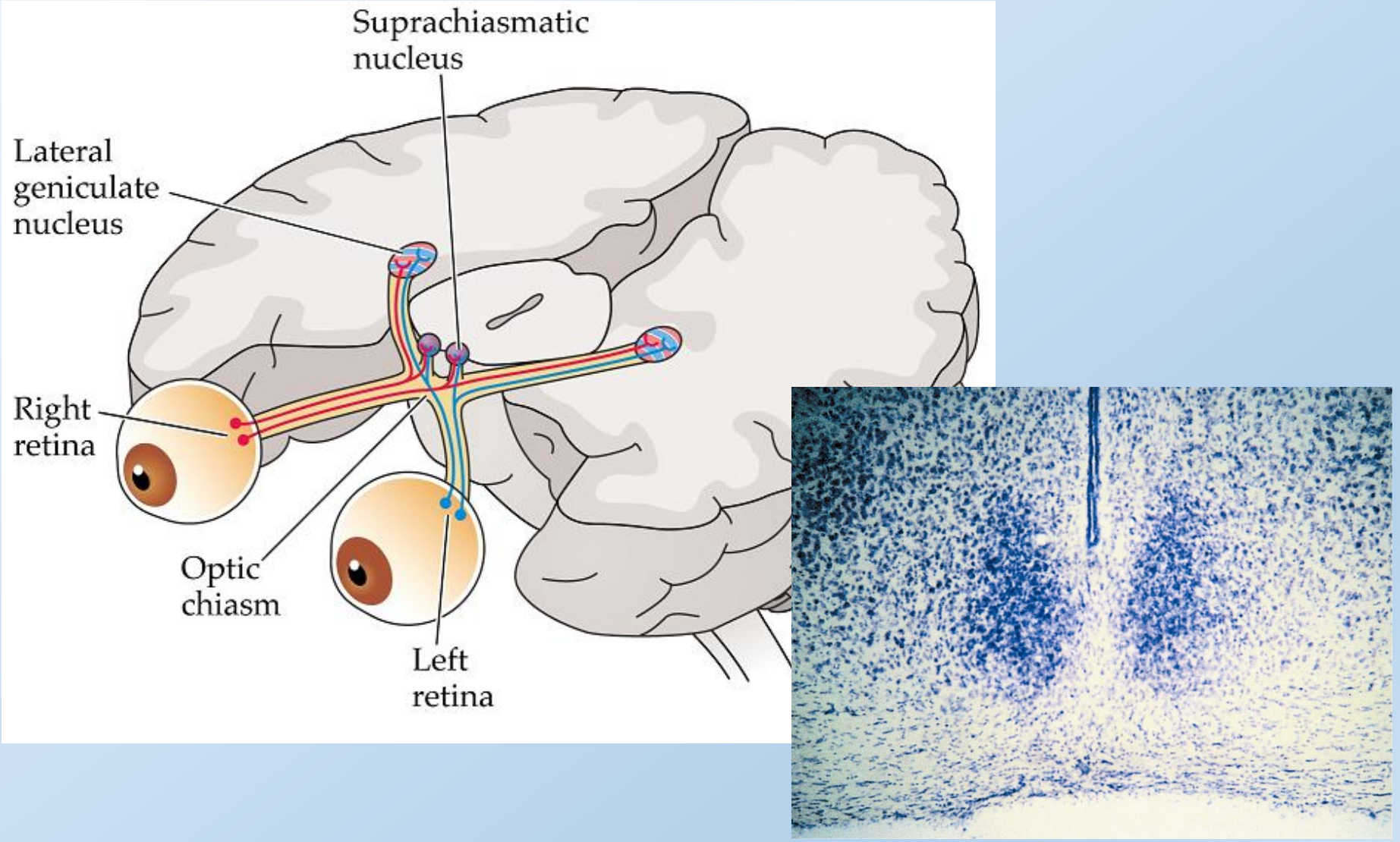
24 h dark

10 min light

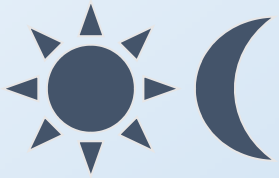


10 mins of light per day are sufficient to reset the clock

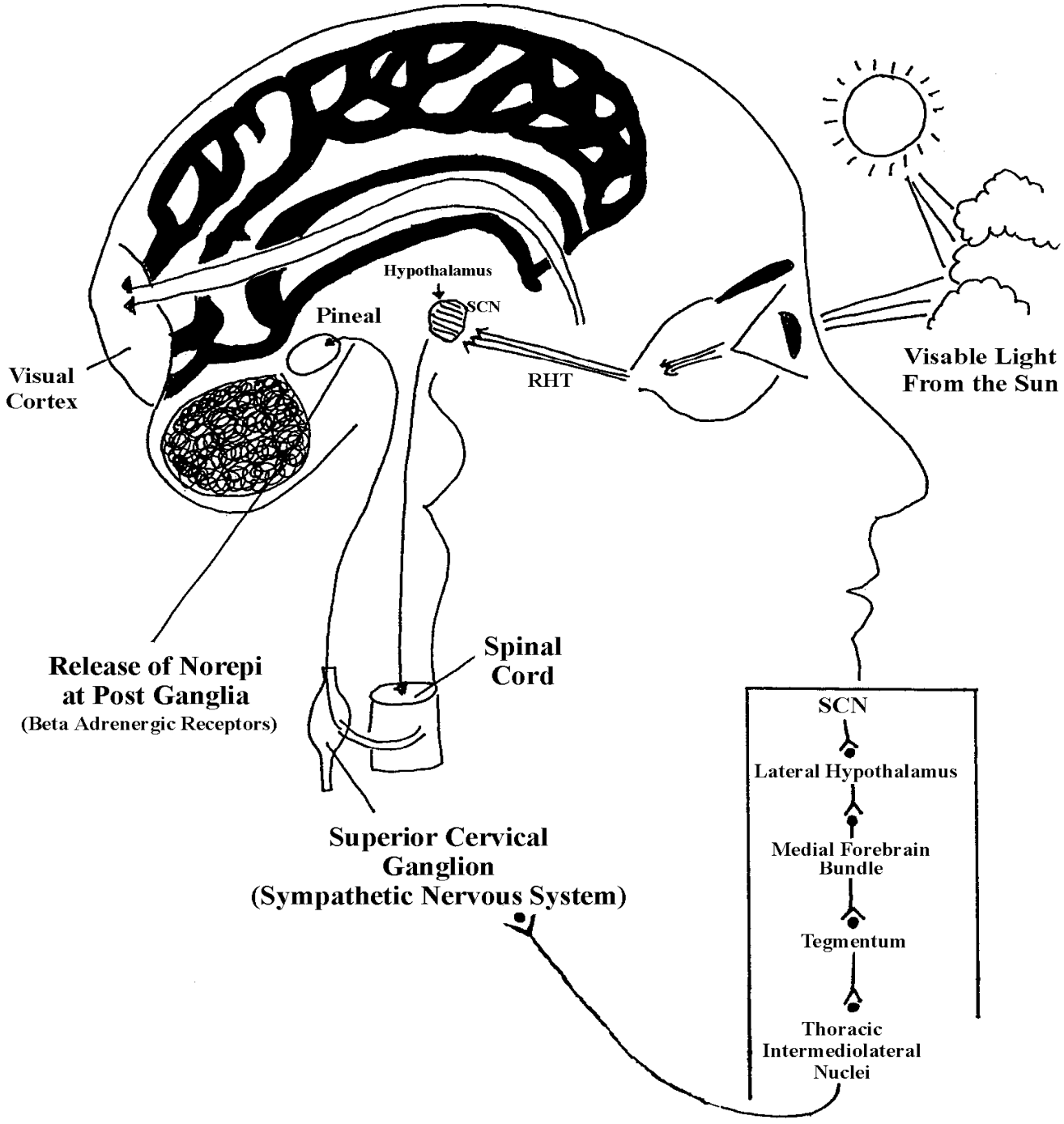
昼夜控制


Suprachiasmatic nucleus
Lateral geniculate nucleus
Right retina
Optic chiasm
Left retina

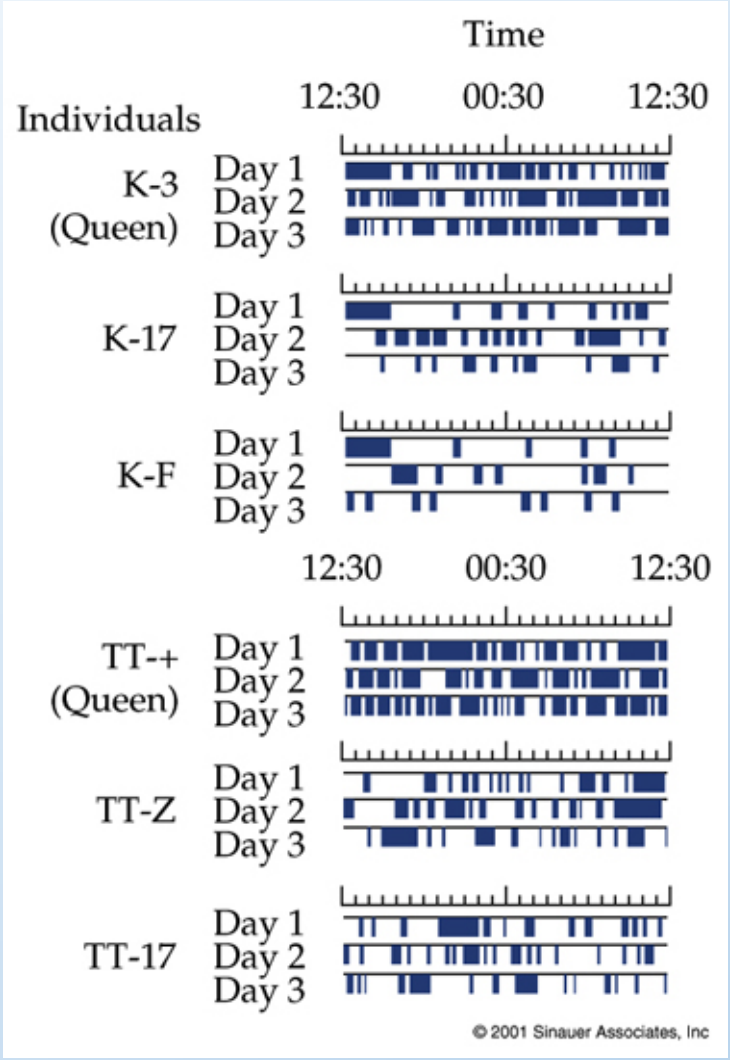
Innervation of the Pineal Gland in Humans – needs SCN

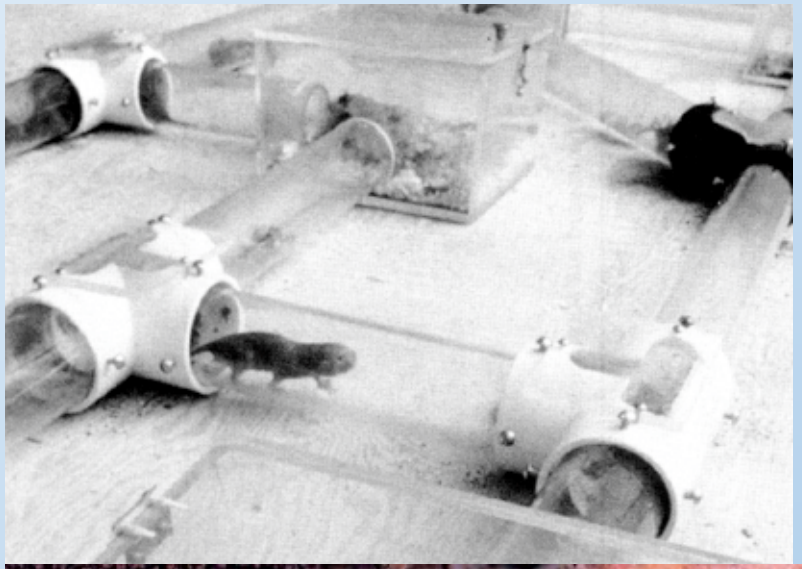


Dependent on the Light/Dark Cycle



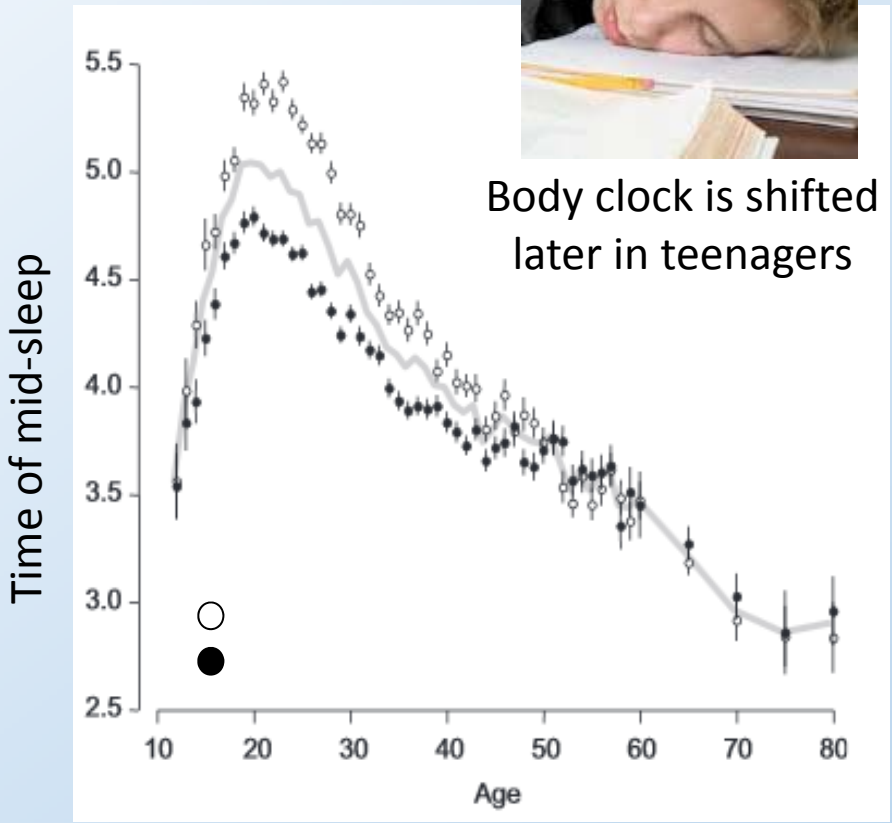
不是所有动物都有


Time
12:30
00:30
12:30
Individuals
K-3 (Queen)
Day 1
Day 2
Day 3
K-17
Day 1
Day 2
Day 3
K-F
Day 1
Day 2
Day 3
12:30
00:30
12:30
TT-+ (Queen)
Day 1
Day 2
Day 3
TT-Z
Day 1
Day 2
Day 3
TT-17
Day 1
Day 2
Day 3
© 2001 Sinauer Associates, Inc

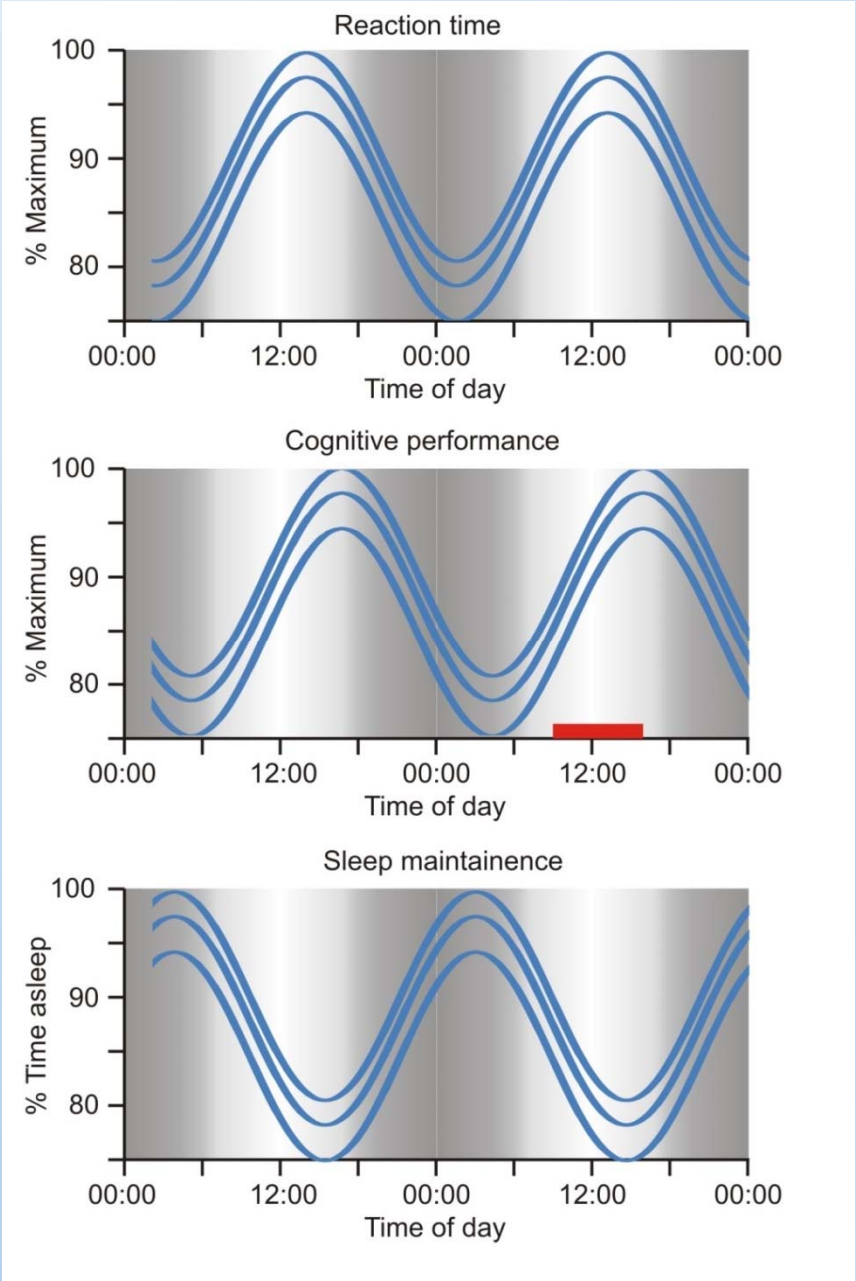


年齢

Body clock is shifted later in teenagers

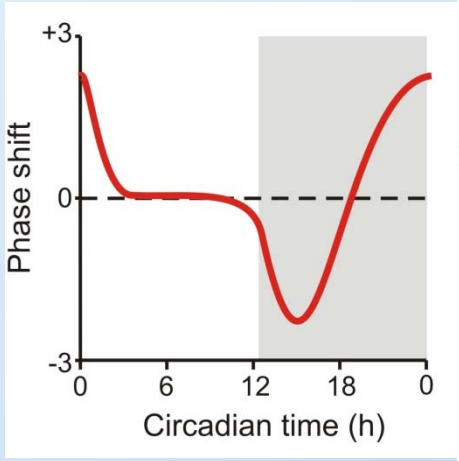


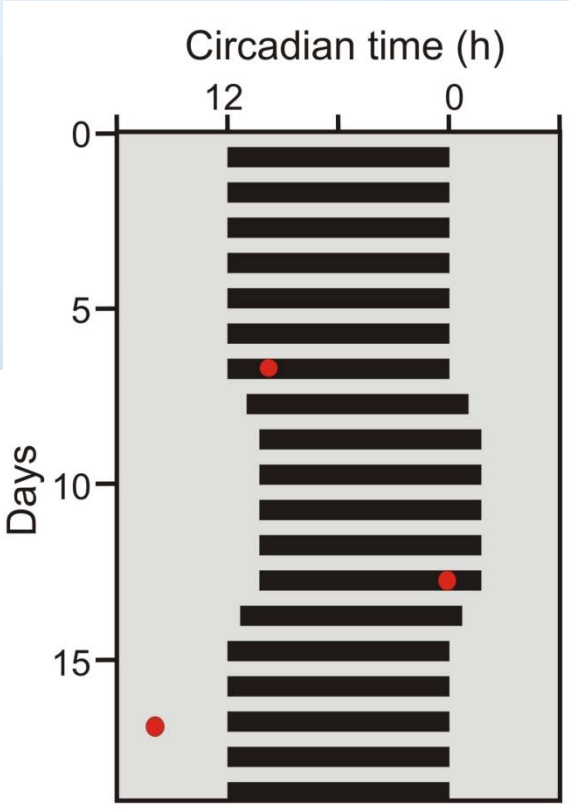
10% lower university grades during morning tests

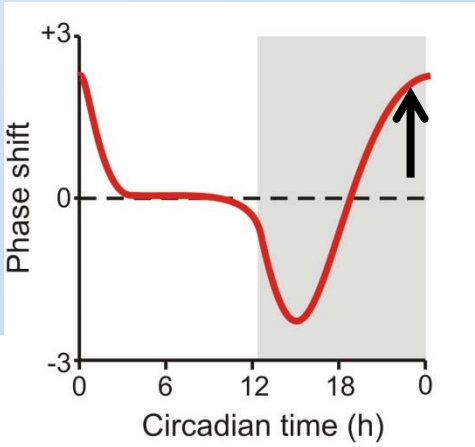


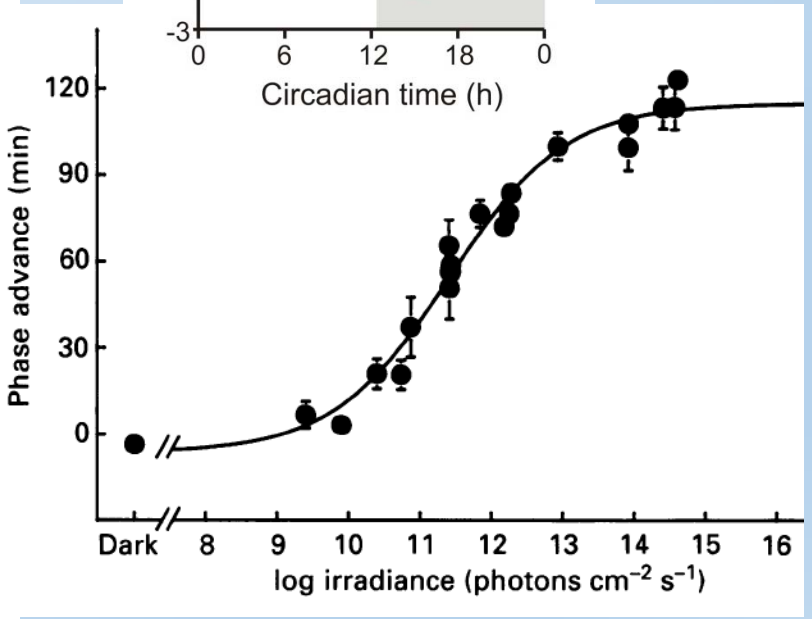
Roenneberg et al. 2003; 2007; Harazsti et al 2014

生物钟





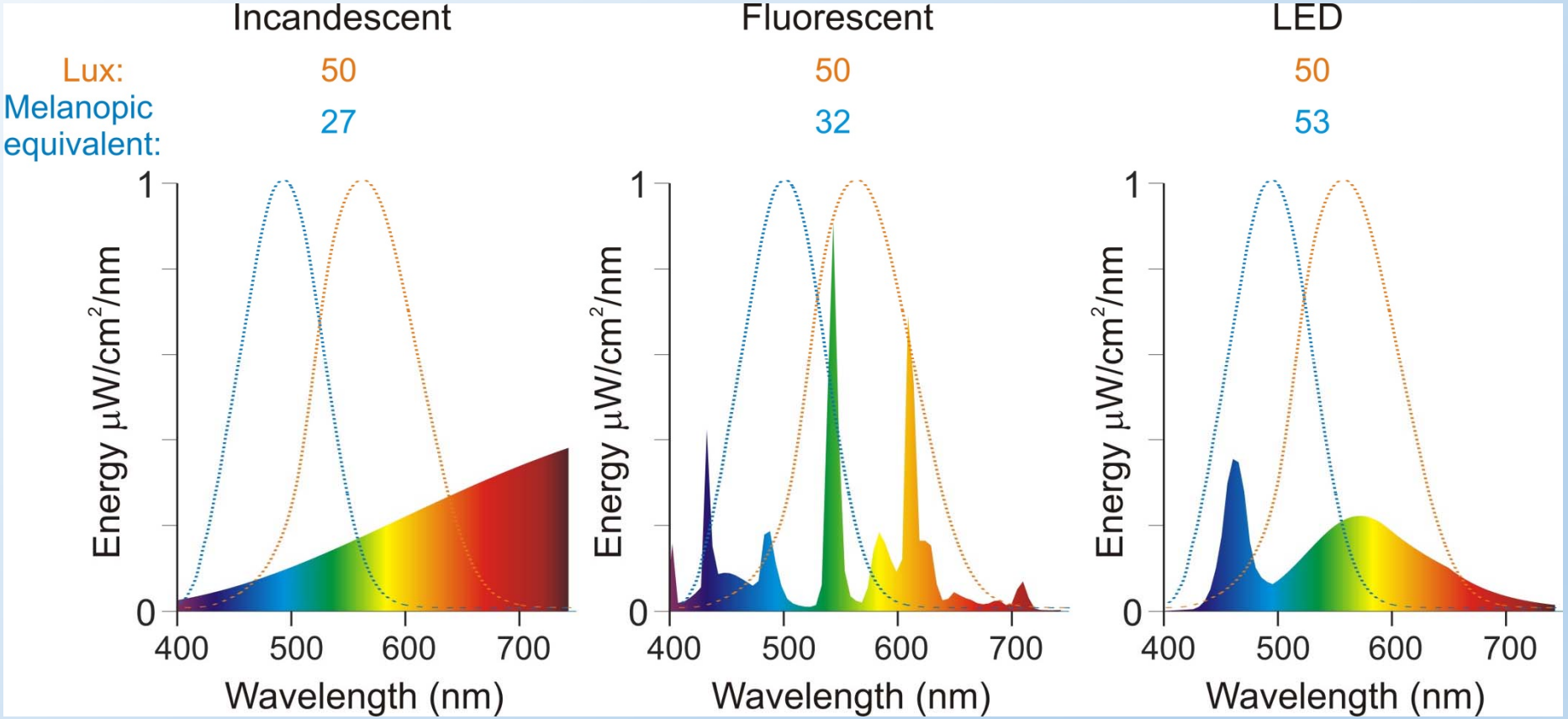




1. The clock is maximally sensitive to light at dawn and dusk

2. The clock's response to light is proportional to the amount detected

光的种类



New smart LED lighting systems allow for much greater control over the circadian effects of light without compromising perceived colour or brightness

自然节律

Depends on the Species

Mus musculus (mouse) = 23.5
Homo Sapiens (Humans) = 25?→24.18
Mesocricetus auratus (Hamster) = 24.1

改变节律的利器-咖啡因和糖

- 不能节律活动的后果