

Extra points to mention:

GRF: ml/min Normal 120 ml/min to about 60ml/min

Use of Inulin.

<https://en.wikipedia.org/wiki/Inulin>

$$GFR = \frac{\text{Urine Concentration} \times \text{Urine Flow}}{\text{Plasma Concentration}}$$

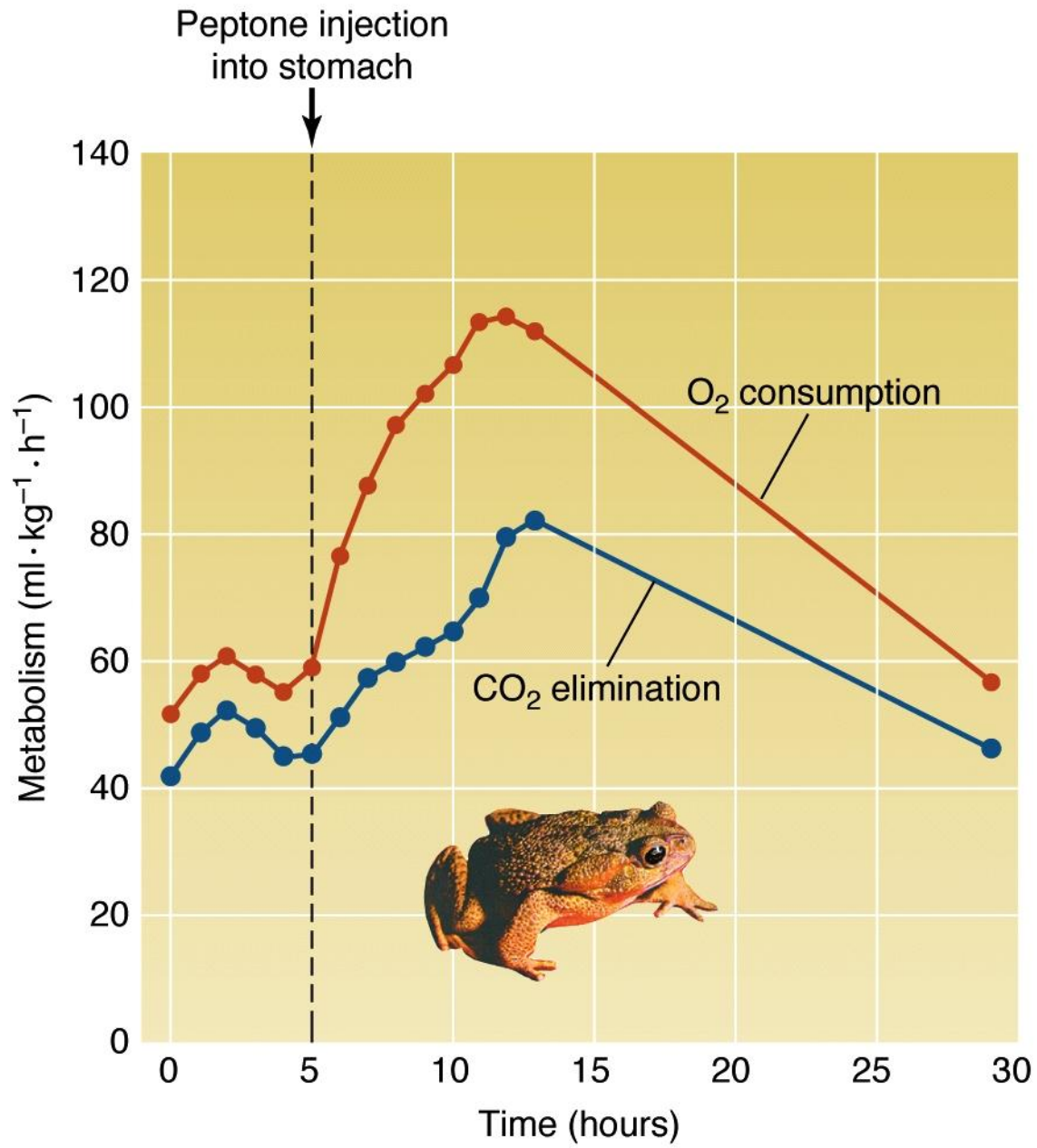
Hemodialysis Fatigue:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3429077/>

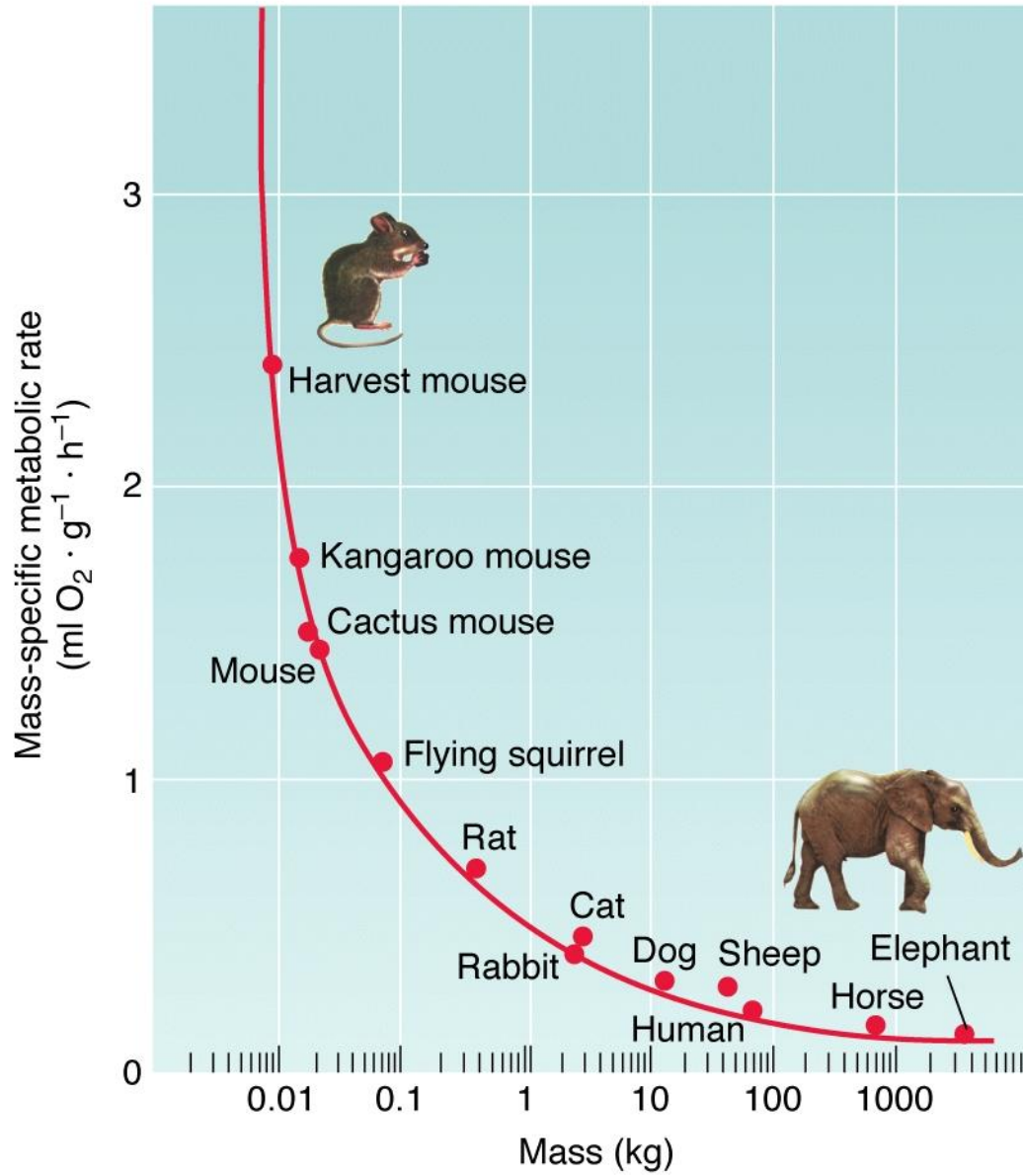
$$RQ = \text{CO}_2 \text{ eliminated} / \text{O}_2 \text{ consumed}$$

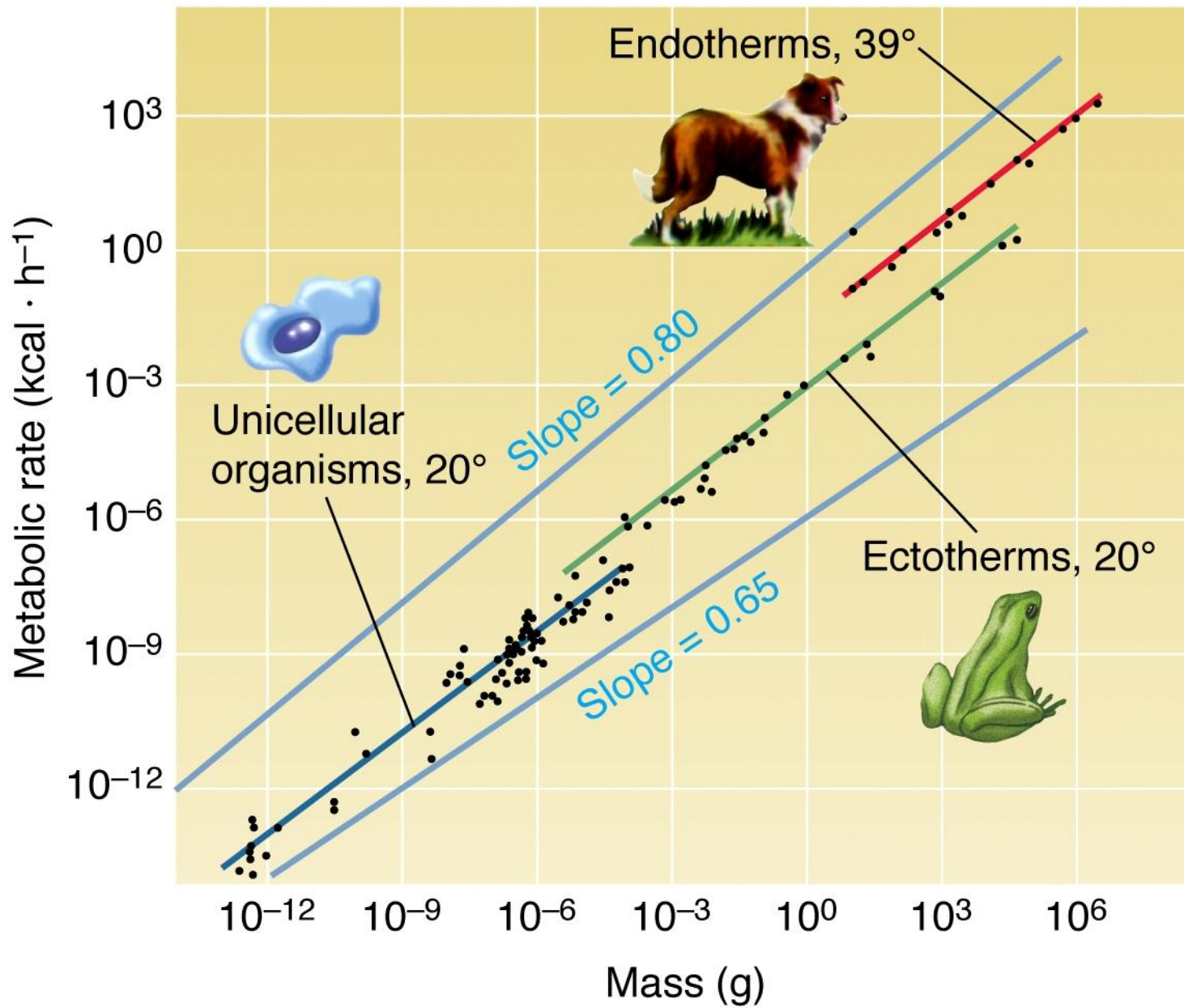
Table 16-1 Heat production and respiratory quotient for the three major food types

	Heat Production (kJ)			R_Q
	Per gram of food	Per liter of CO ₂ produced	Per liter of O ₂ consumed	
Carbohydrates	17.1	21.1	21.1	1.00
Fats	38.9	19.8	27.9	0.71
Proteins (to urea)	17.6	18.6	23.3	0.80



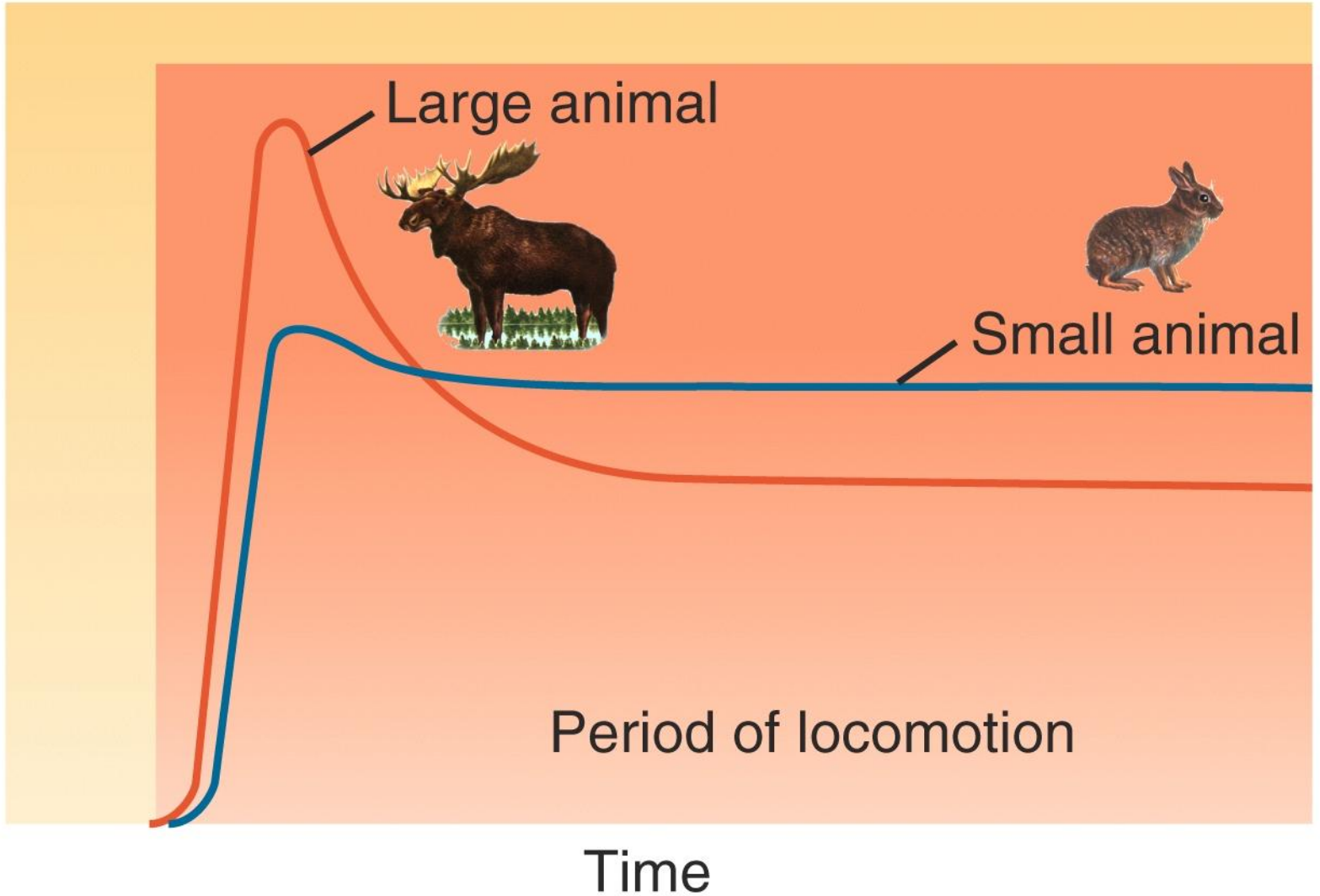
(a)



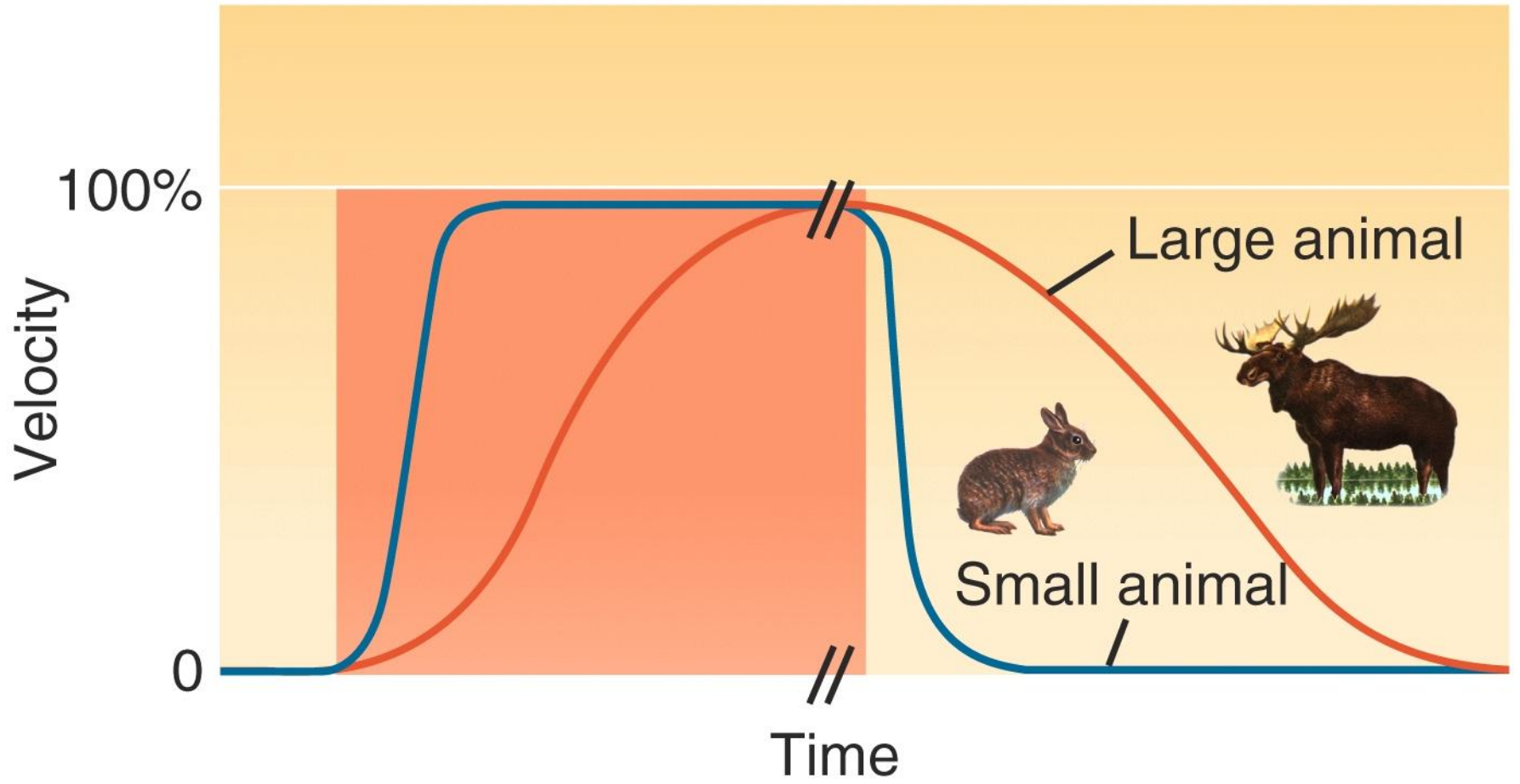


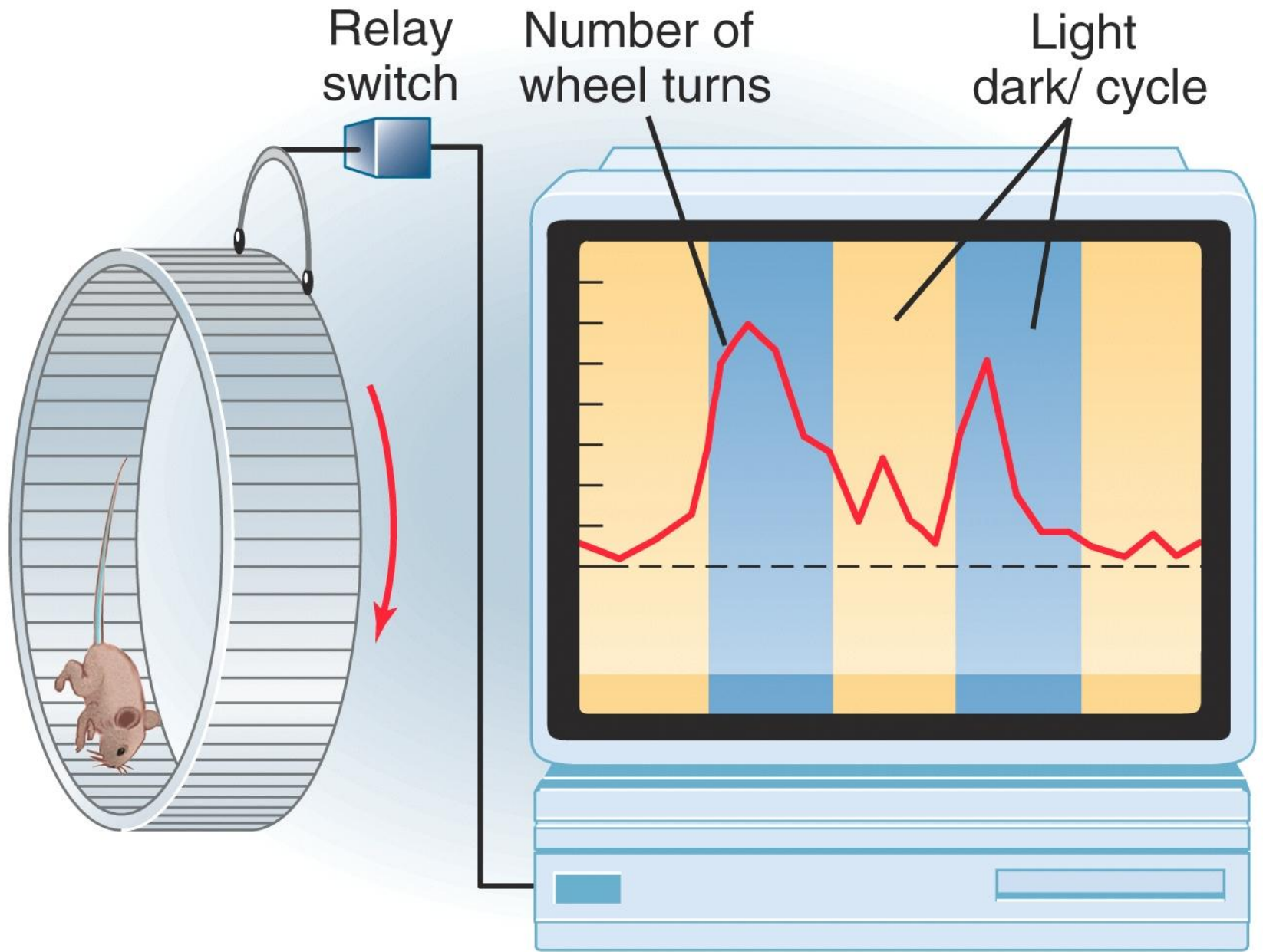
(a)

Rate of energy expenditure
per unit weight

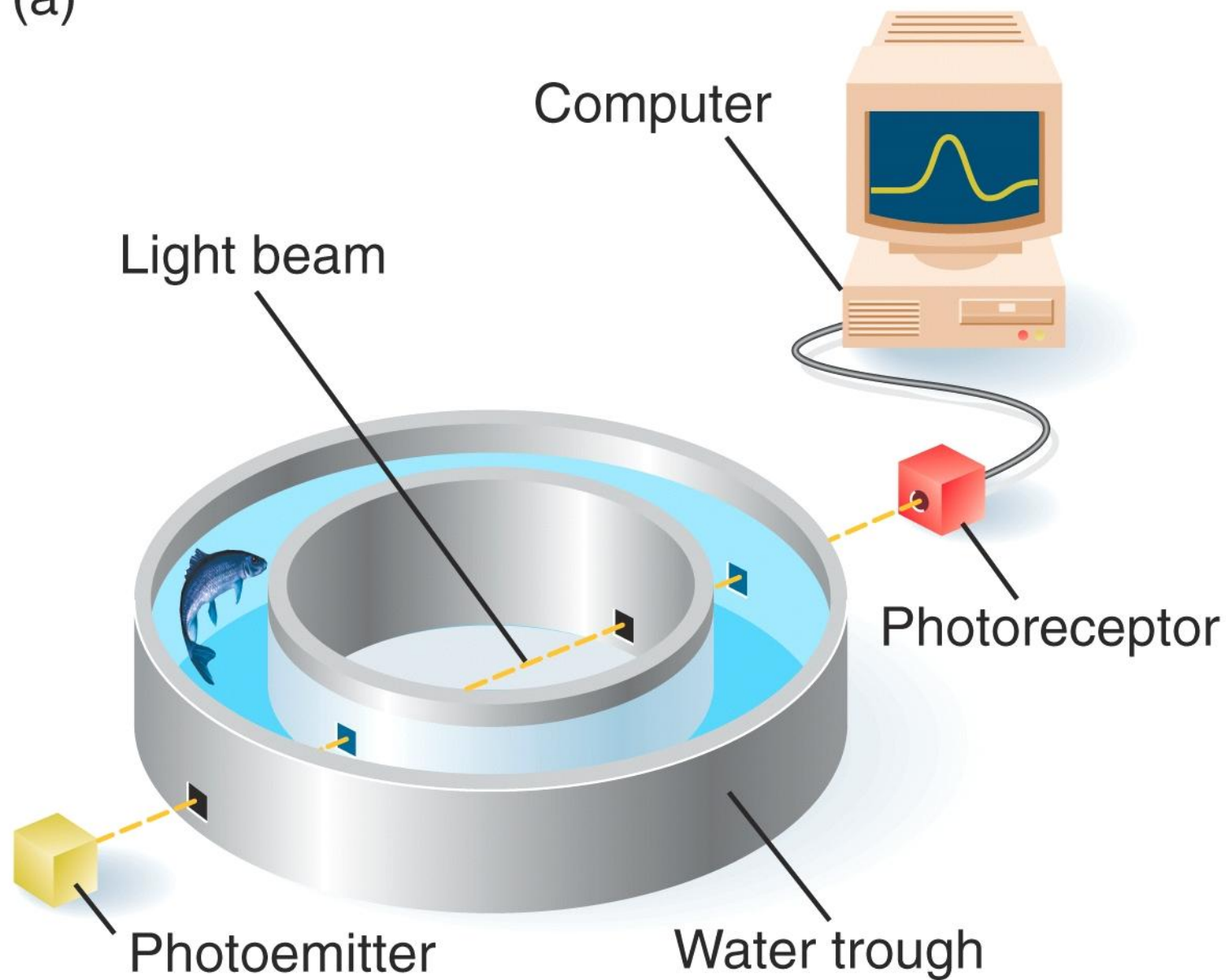


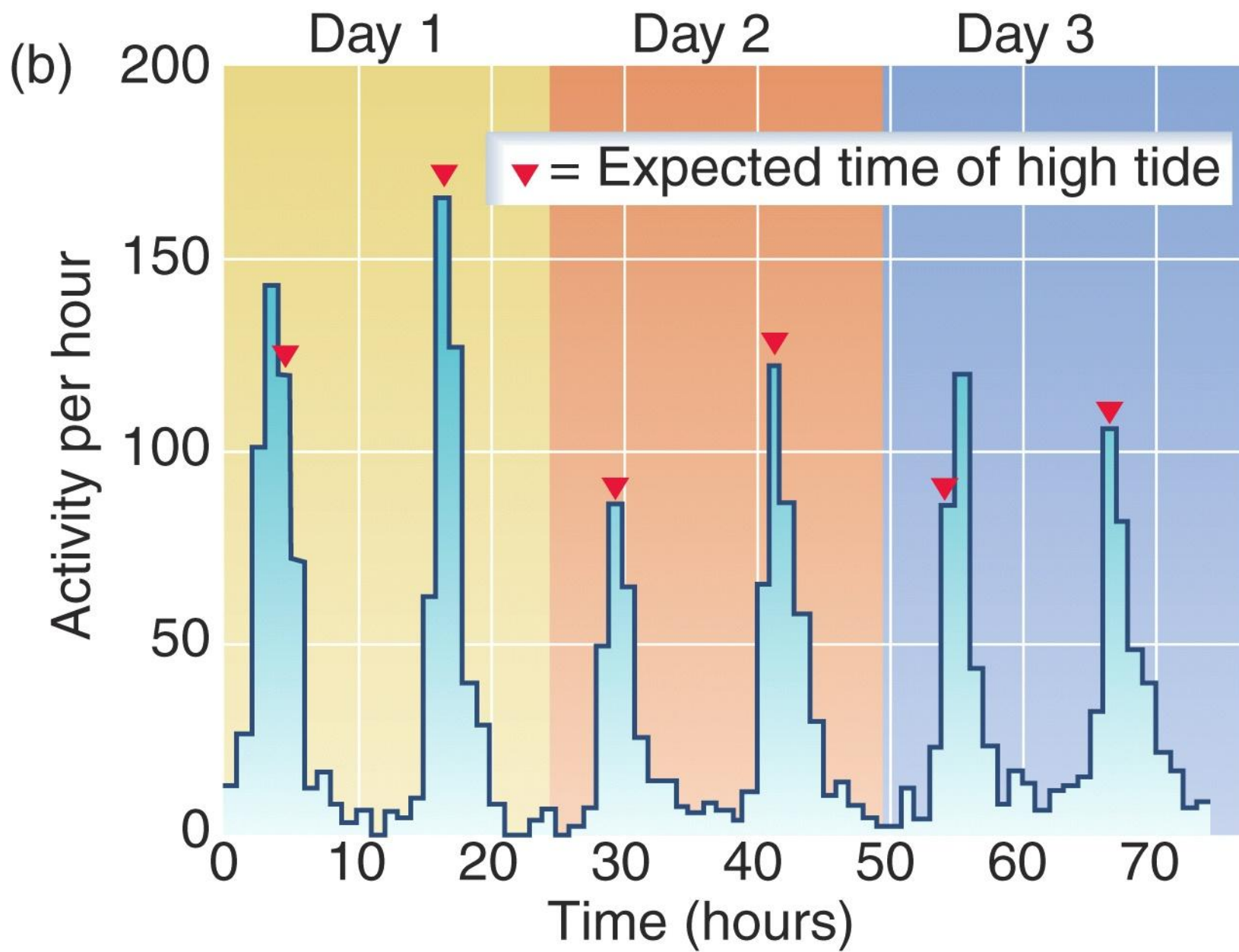
(b)

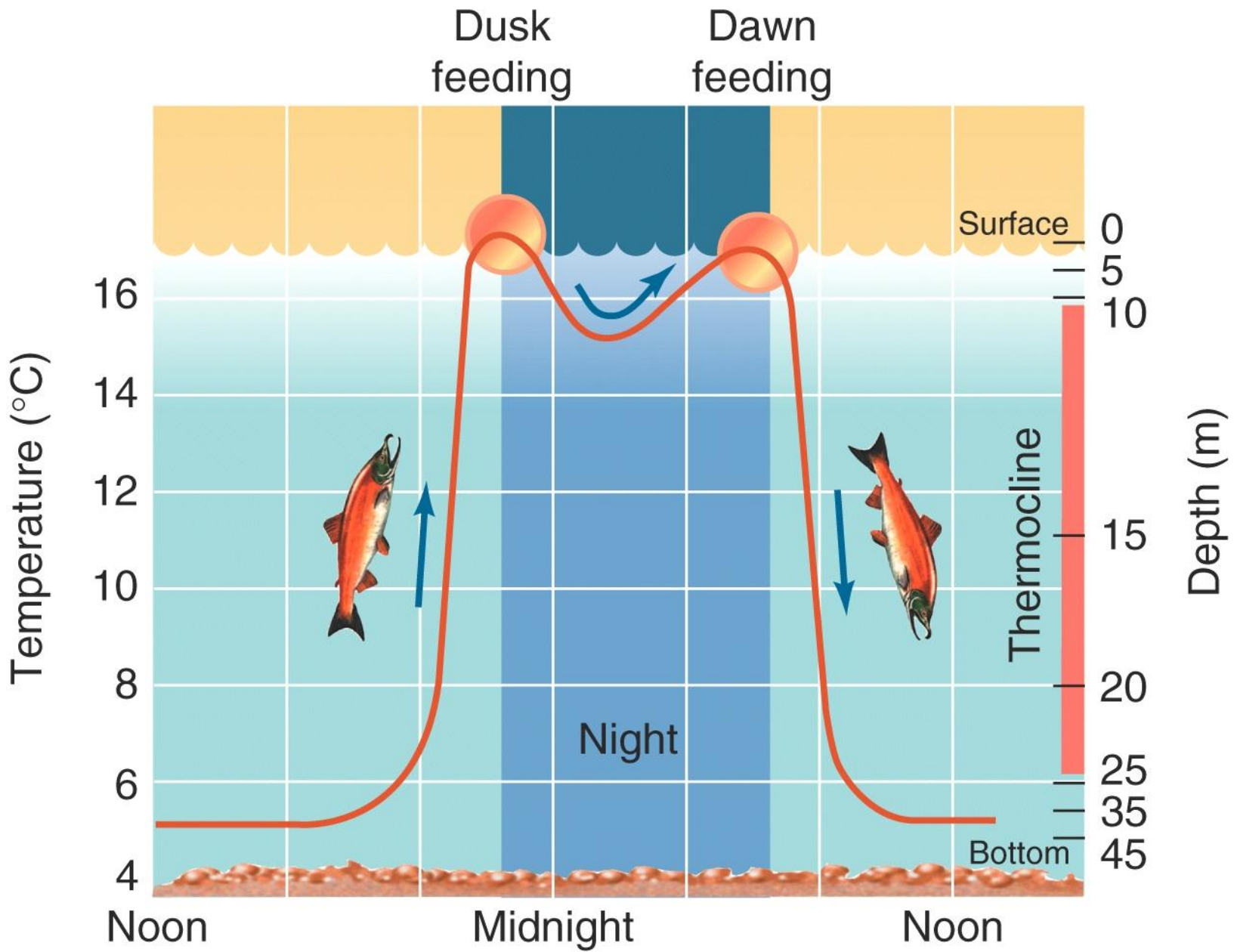




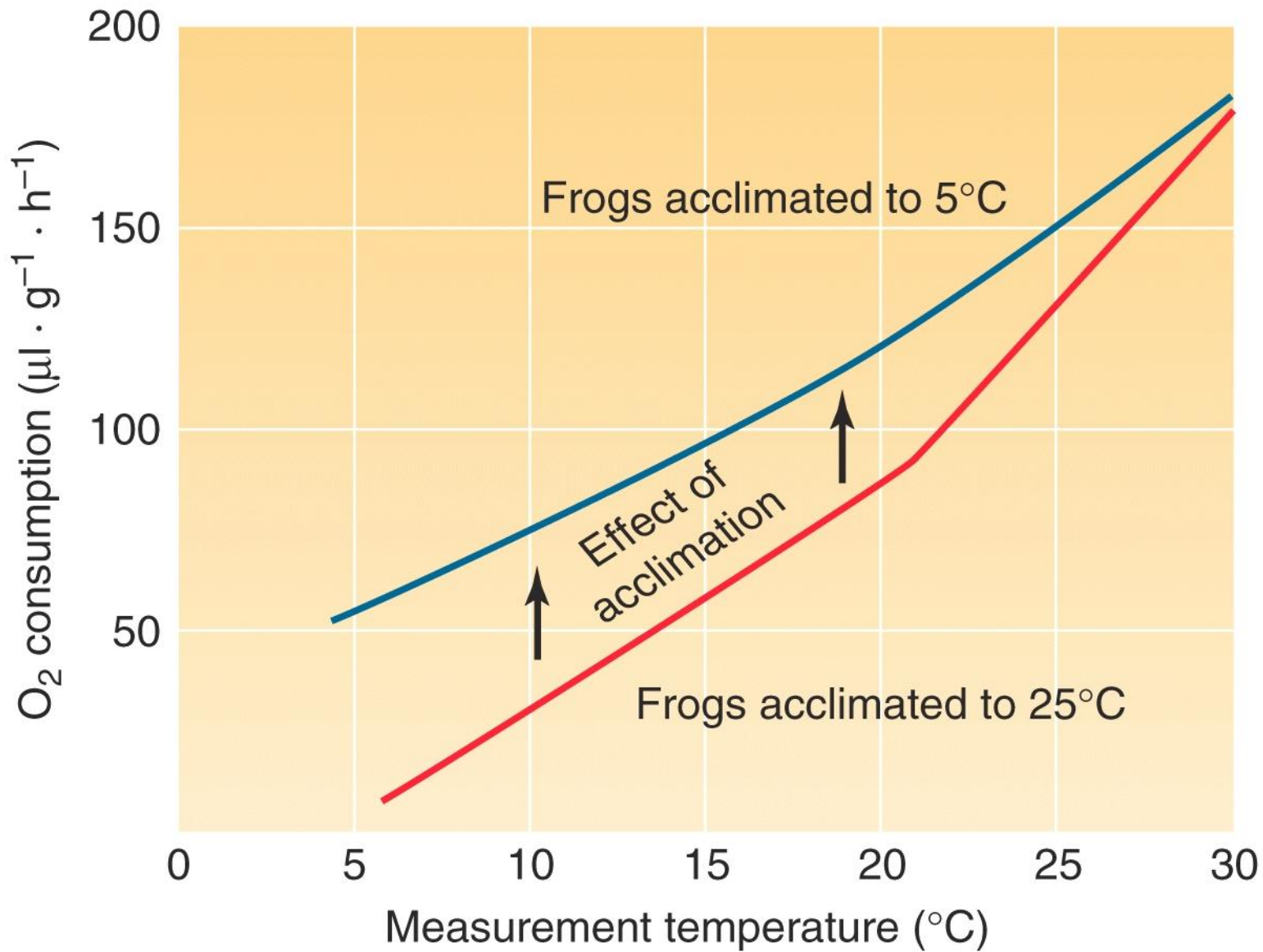
(a)



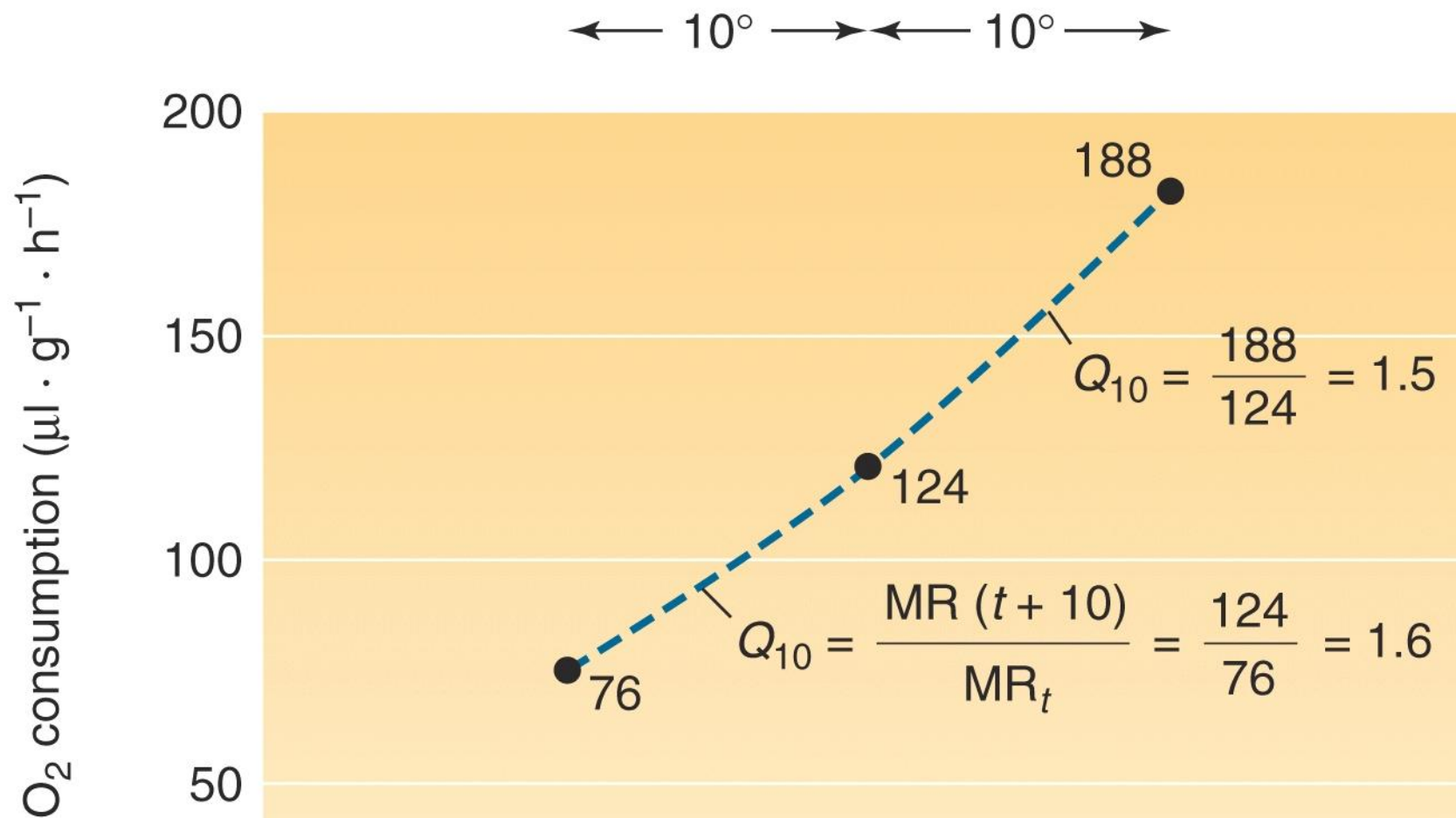


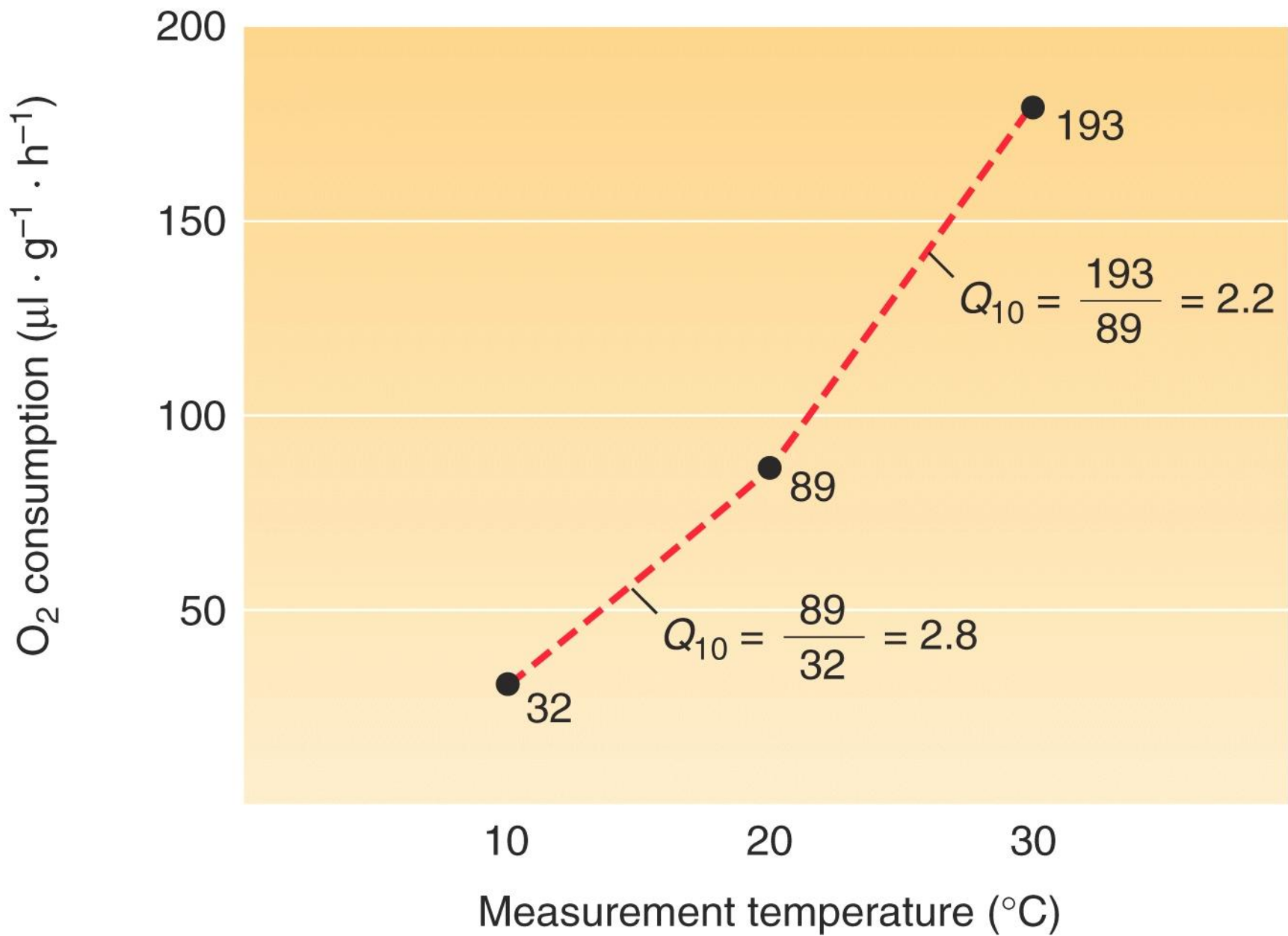


(a)

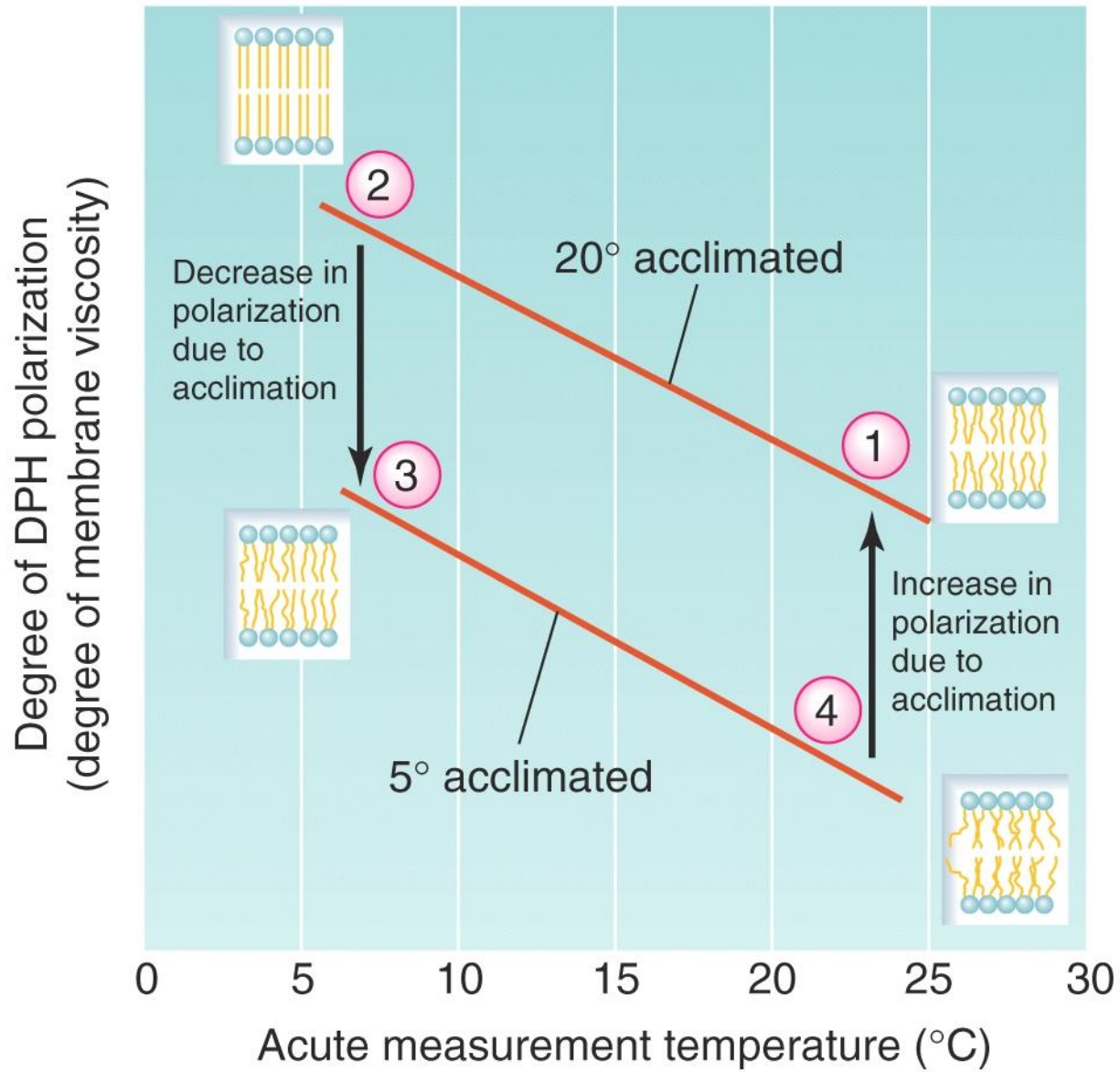


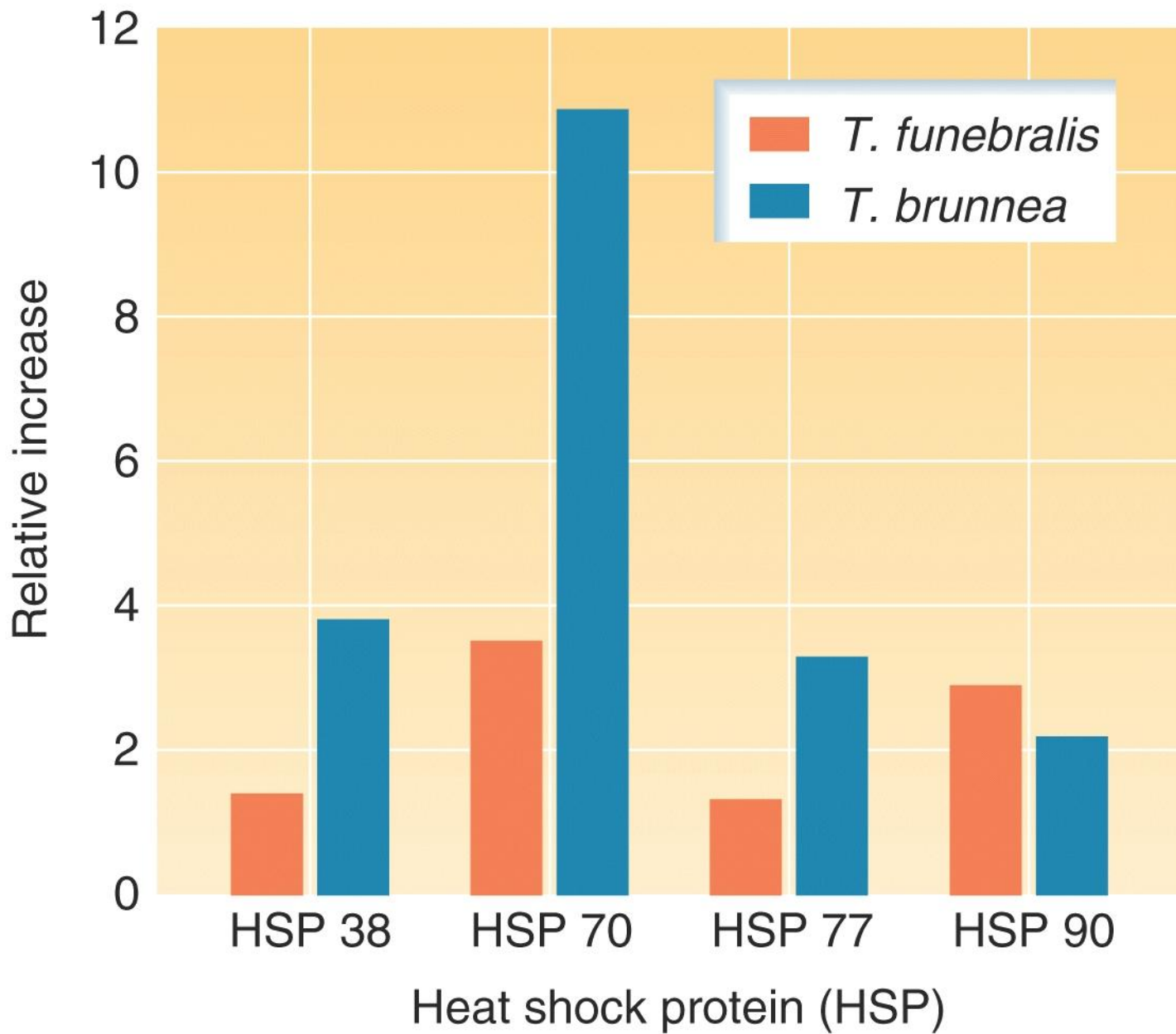
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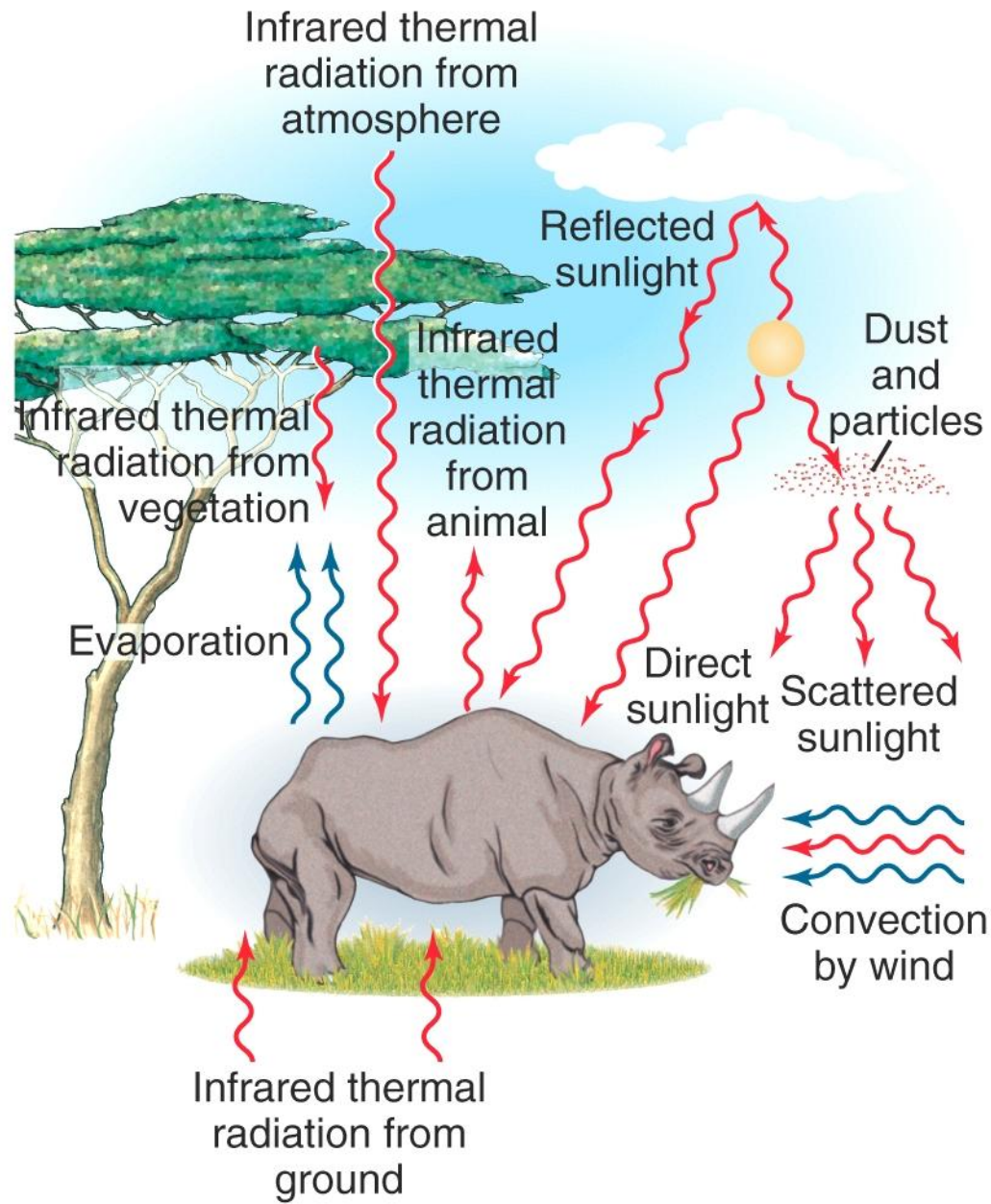




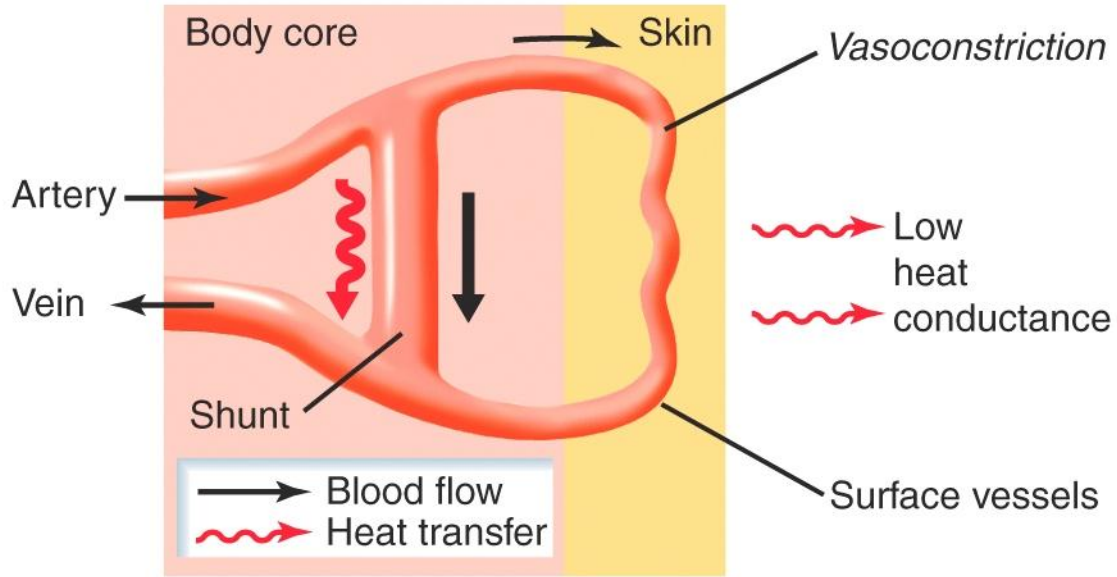
(a)



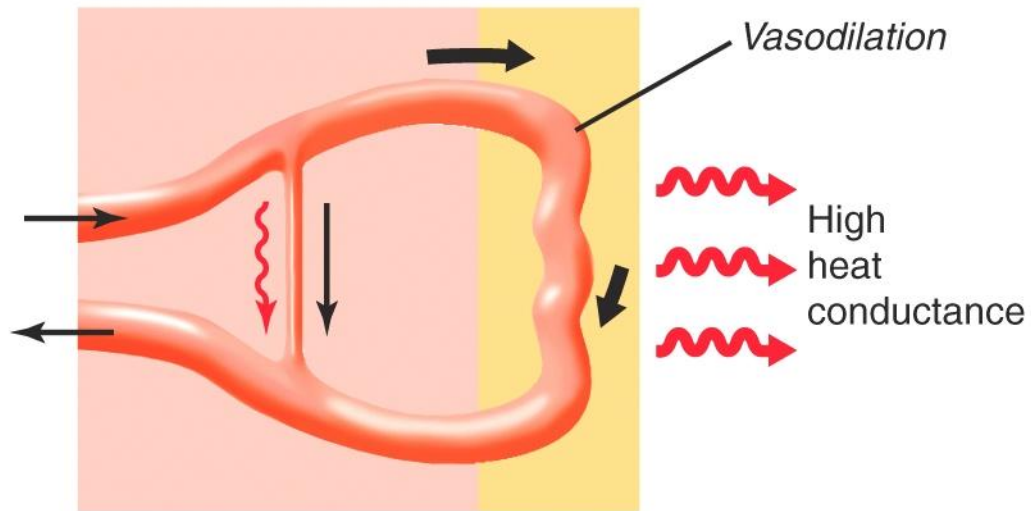


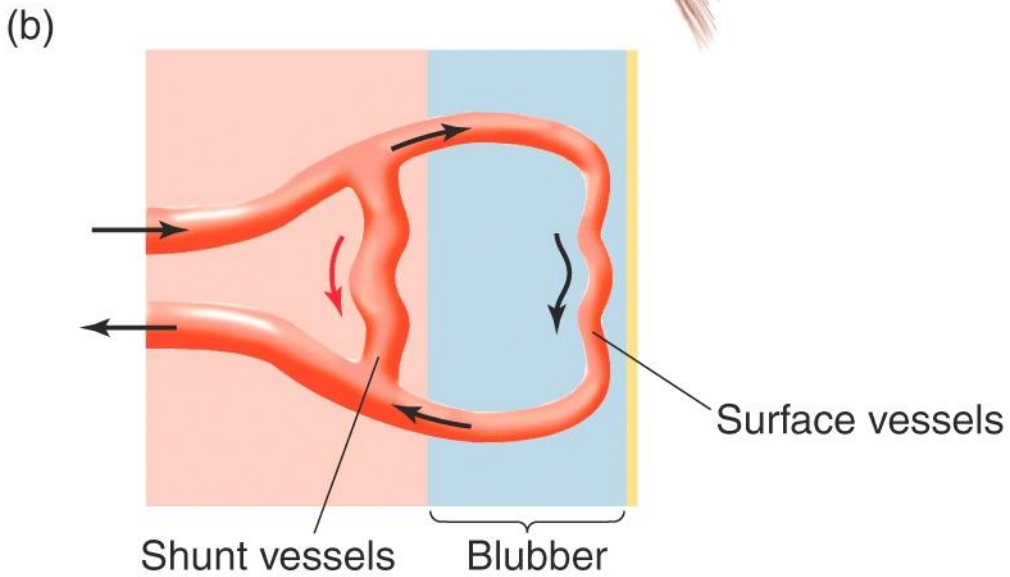
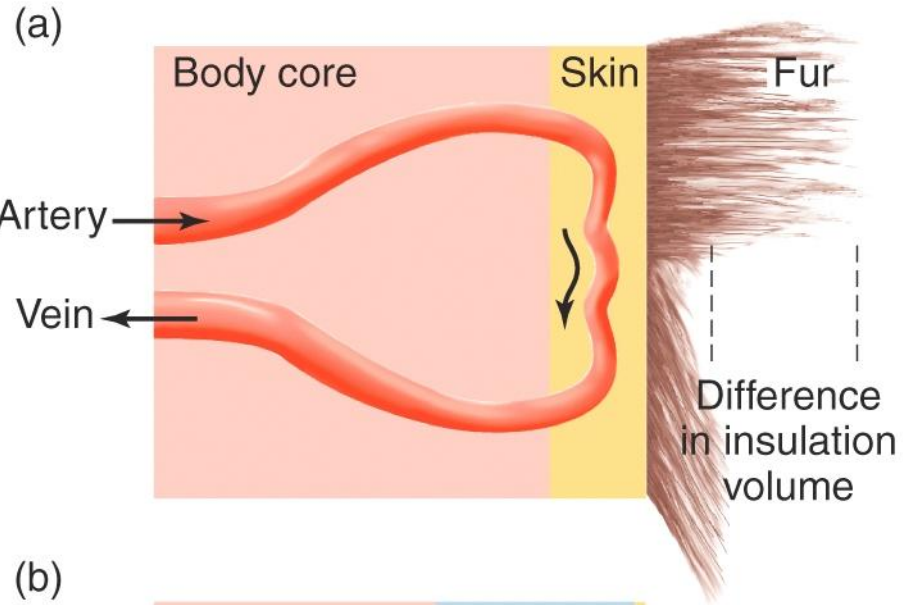


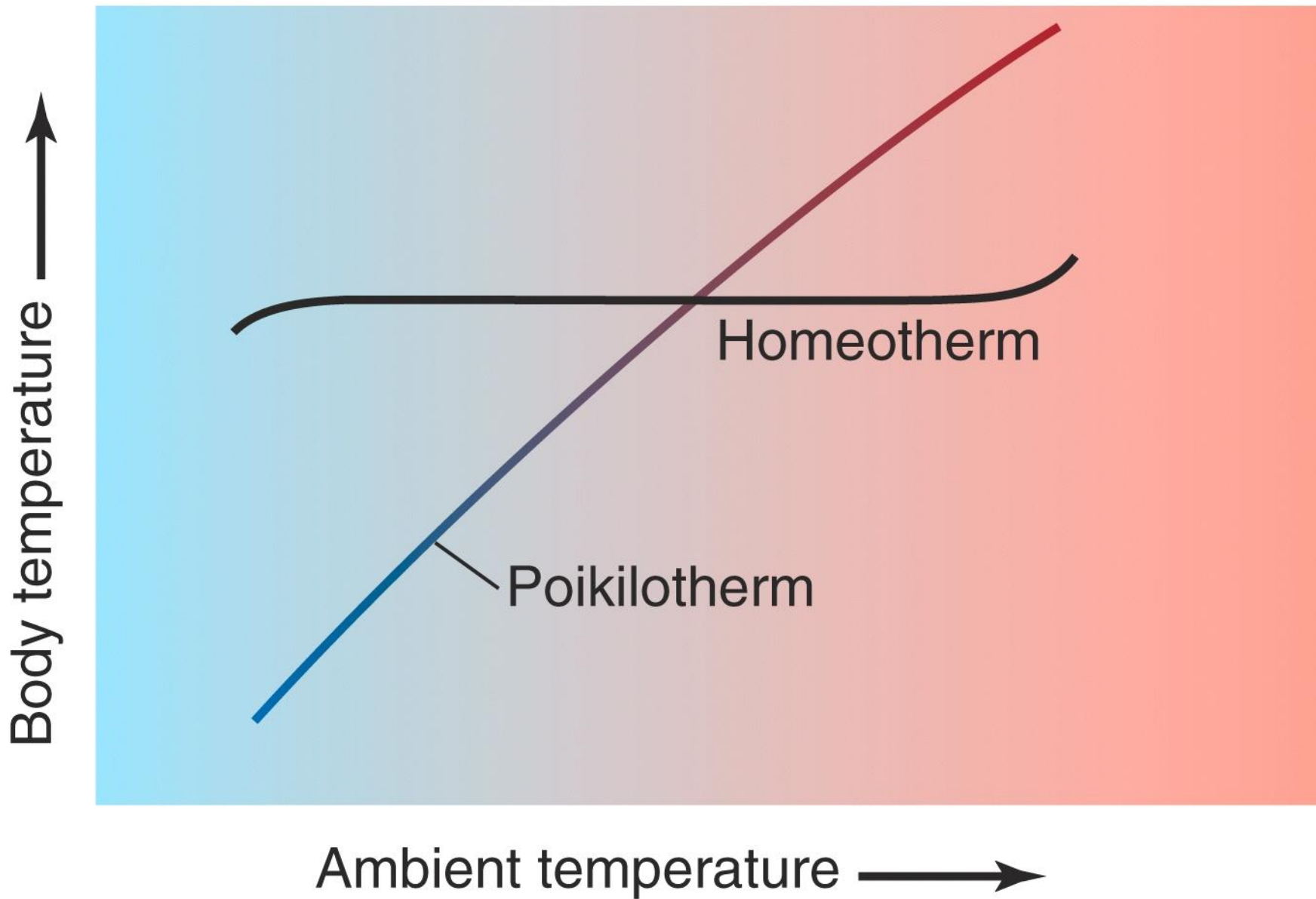
(a) Response to cold temperature

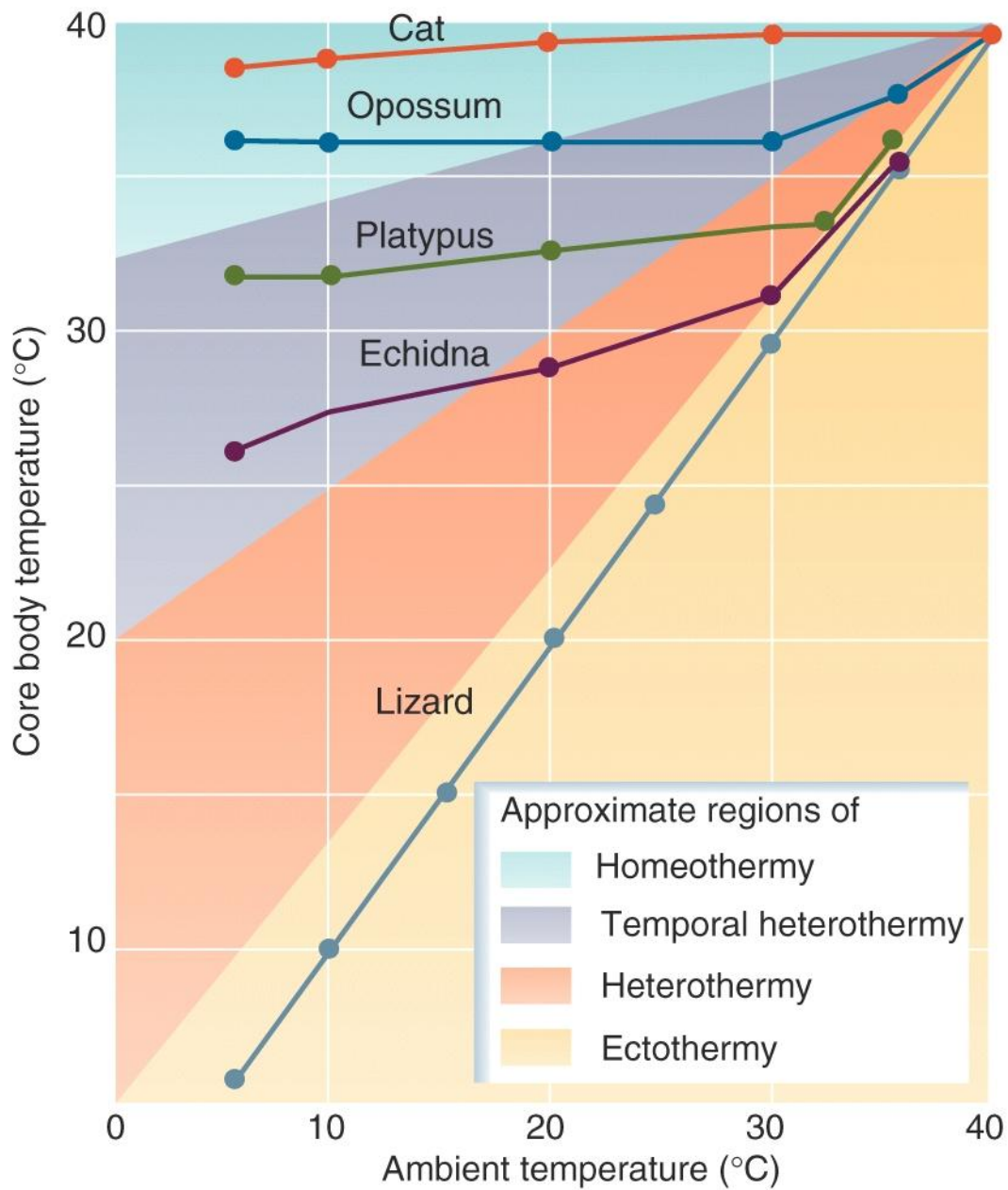


(b) Response to high temperature









(a)

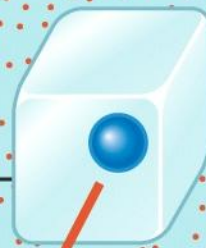
Extracellular compartment

Intracellular compartment

Intracellular organelle

$T < 0^{\circ}\text{C}$

Formation of ice crystals are stimulated by nucleating agent.



Solutes excluded from forming ice; solute concentration increases.

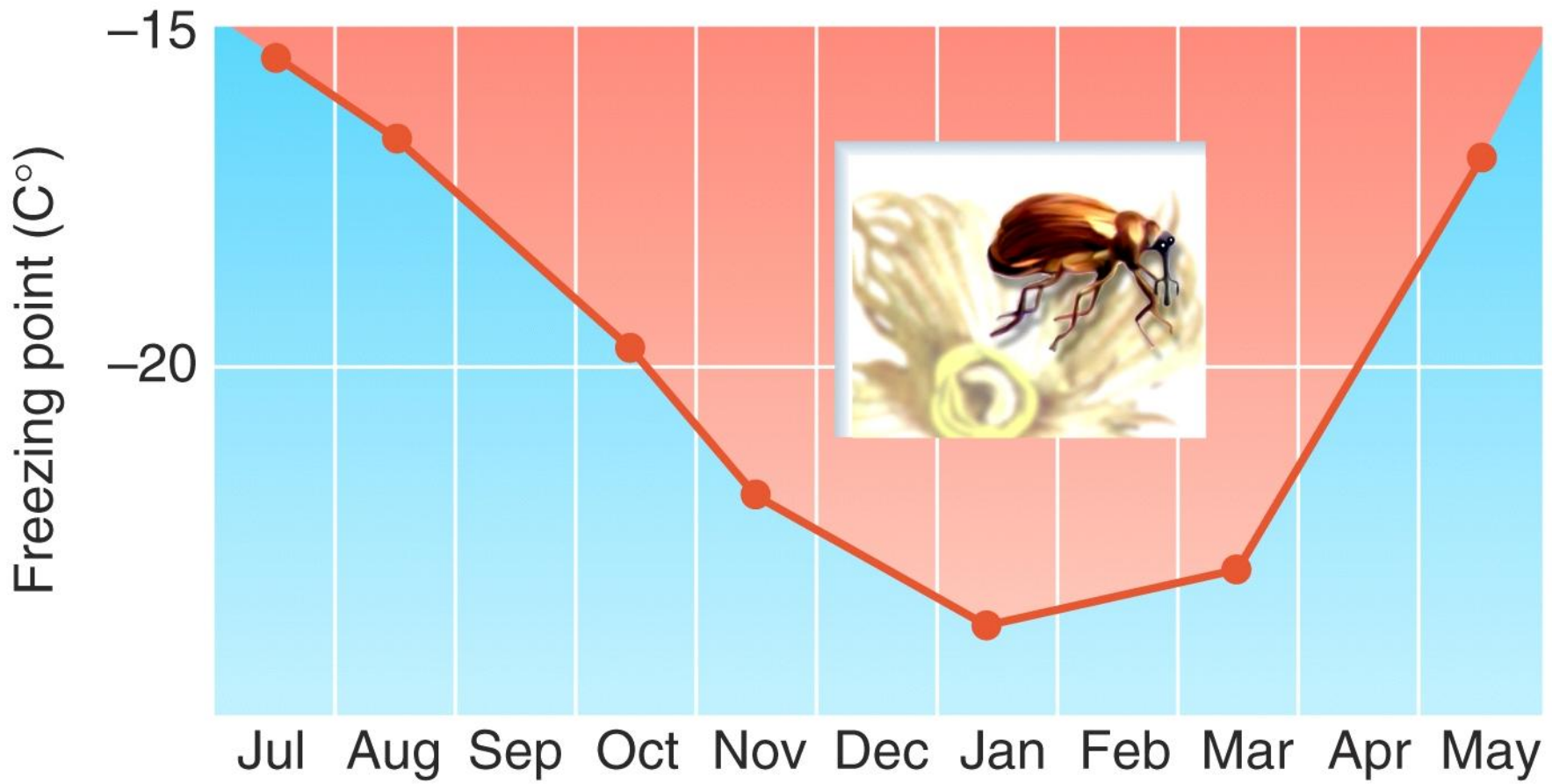
H_2O

Osmotic loss of water increases solute concentration, preventing ice crystals from forming.

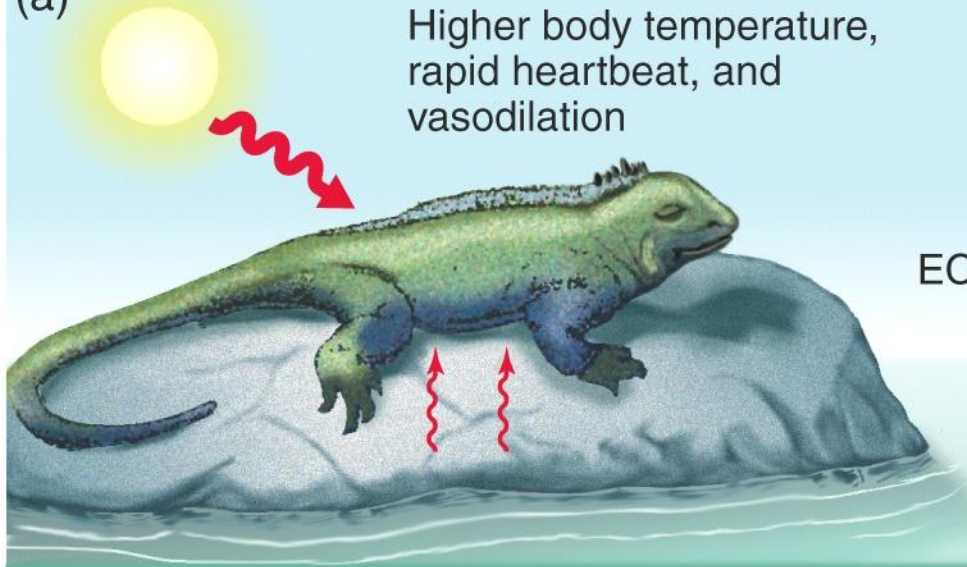


3 various approaches for insects in KY to deal with winter:

1. Antifreeze proteins
2. Production of glycerol
3. Osm gradient to raise ECF, pulls water out of cell rises OSM
decreases freezing point



(a)

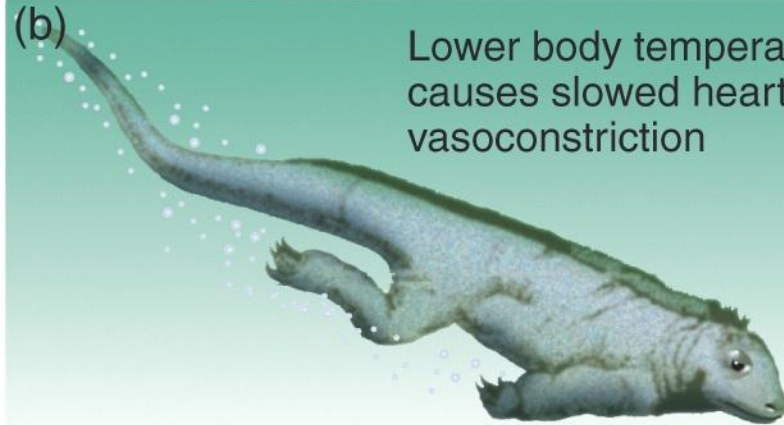


Higher body temperature,
rapid heartbeat, and
vasodilation

ECG



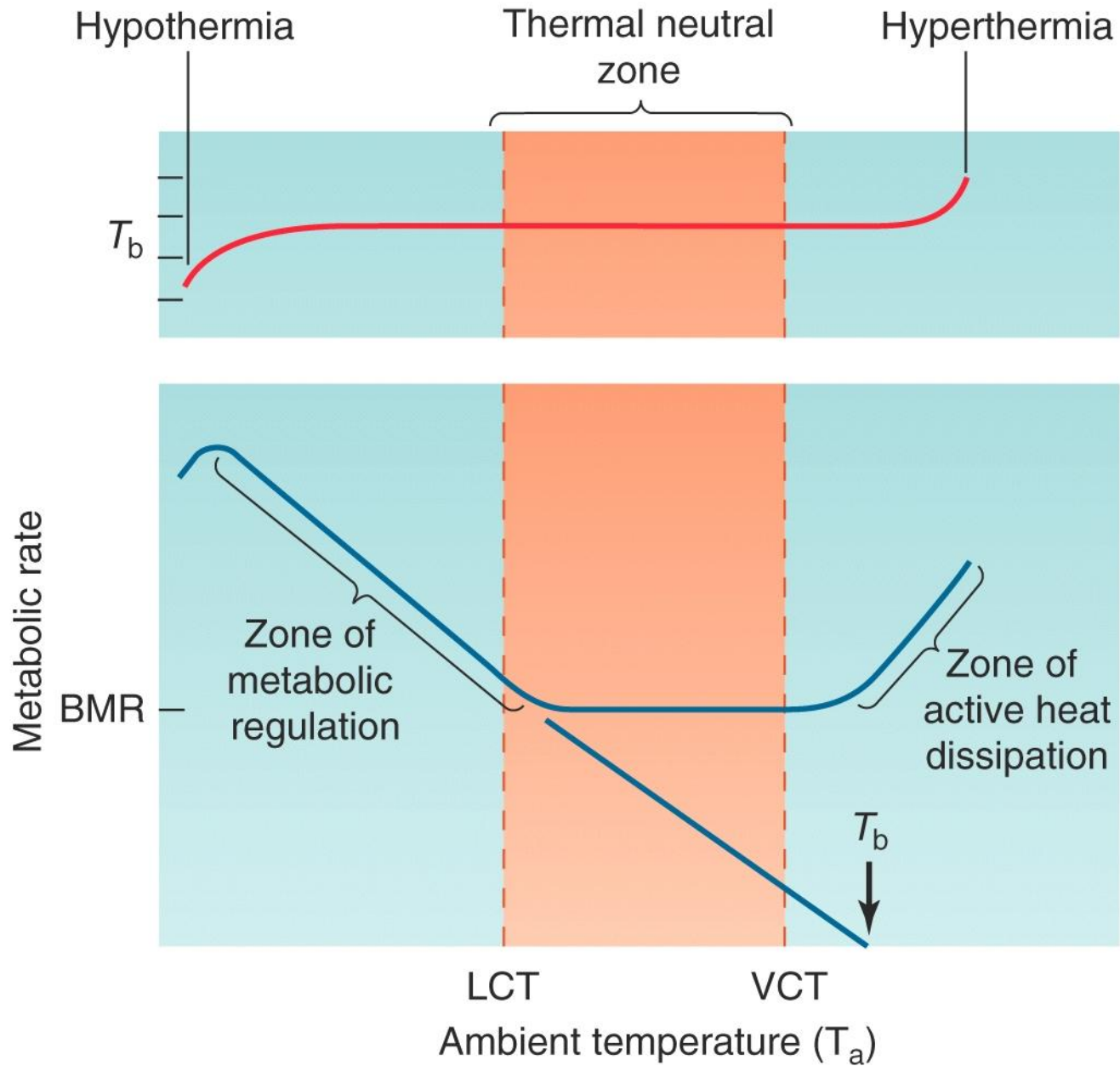
(b)

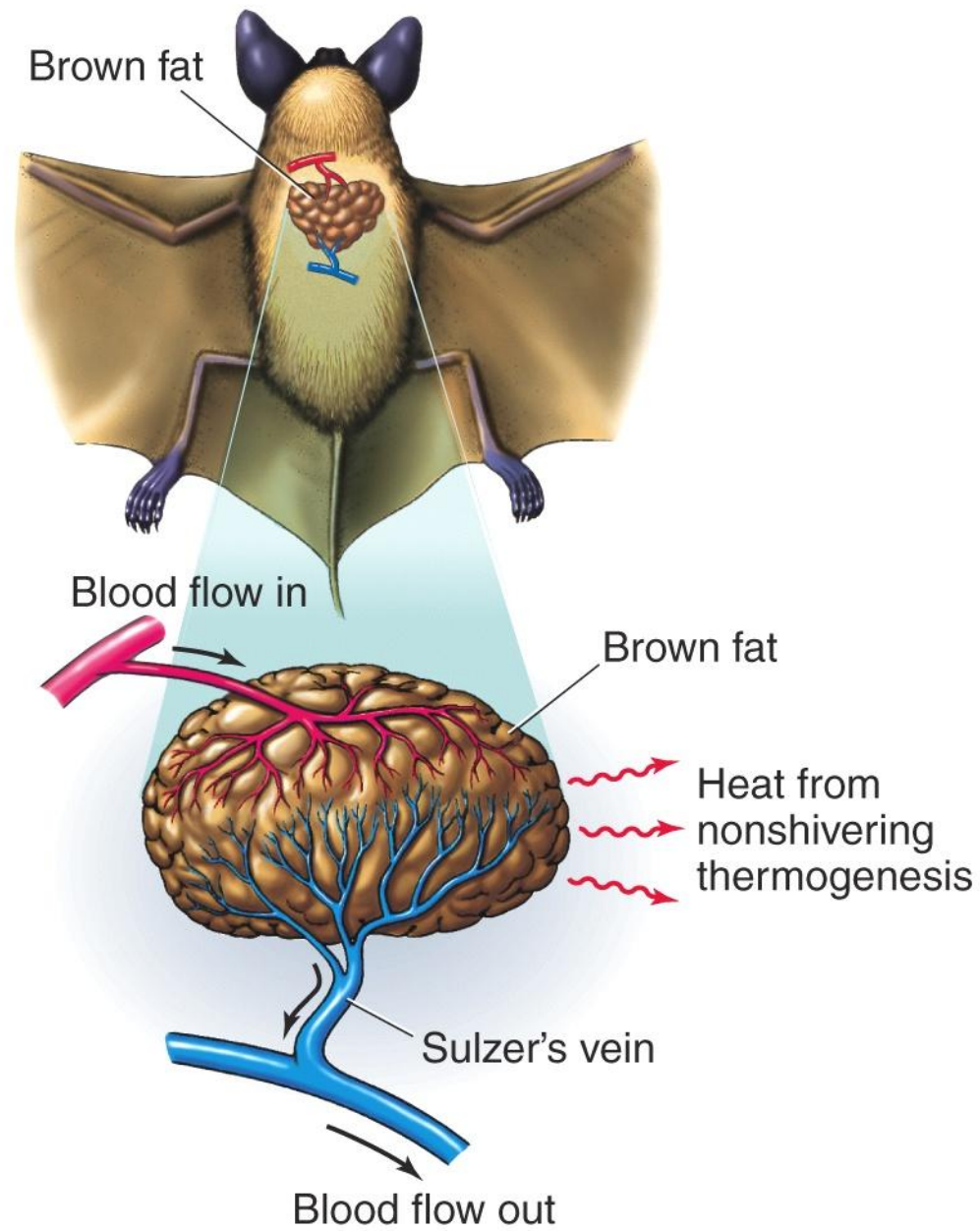


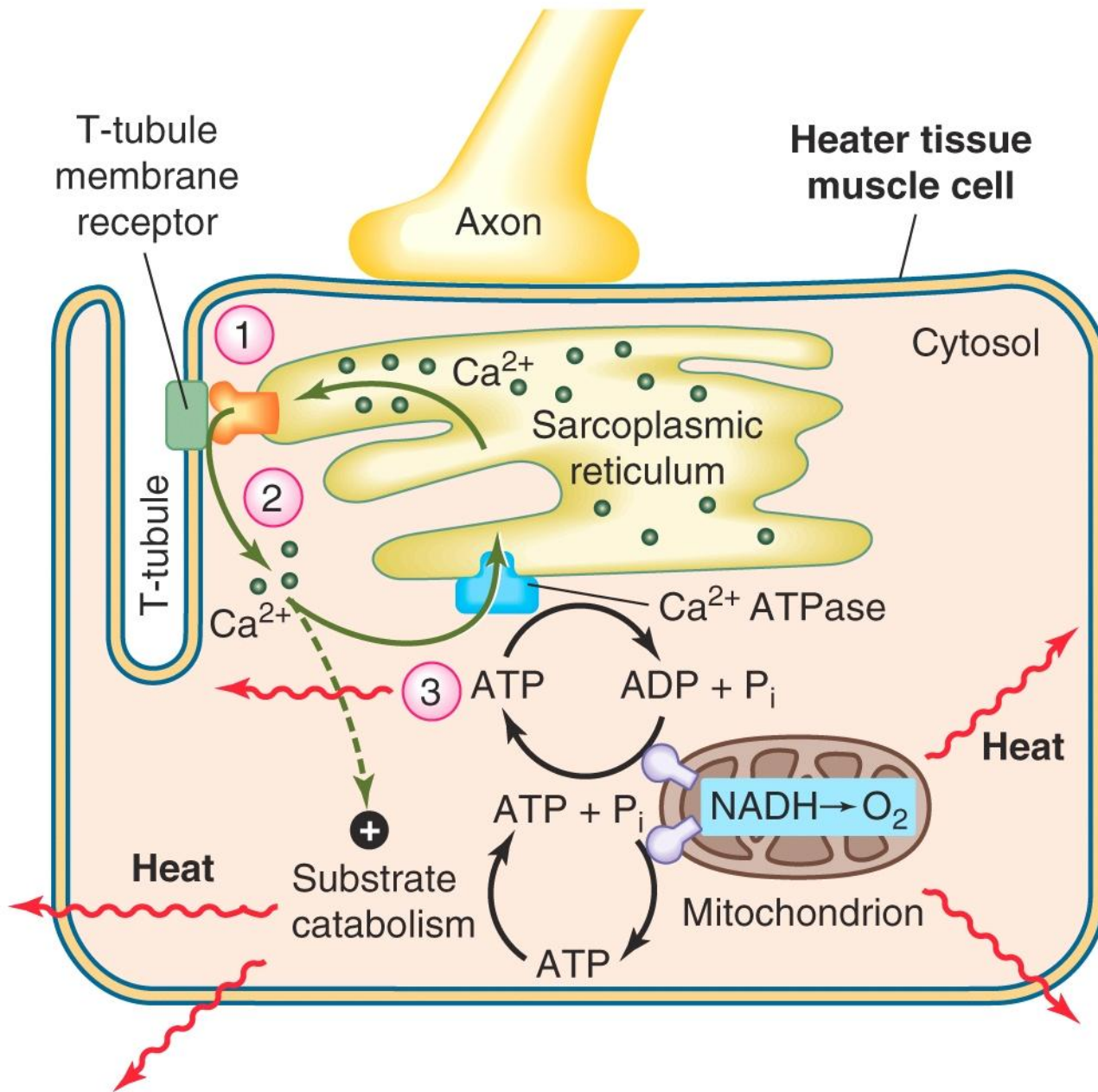
Lower body temperature
causes slowed heartbeat and
vasoconstriction

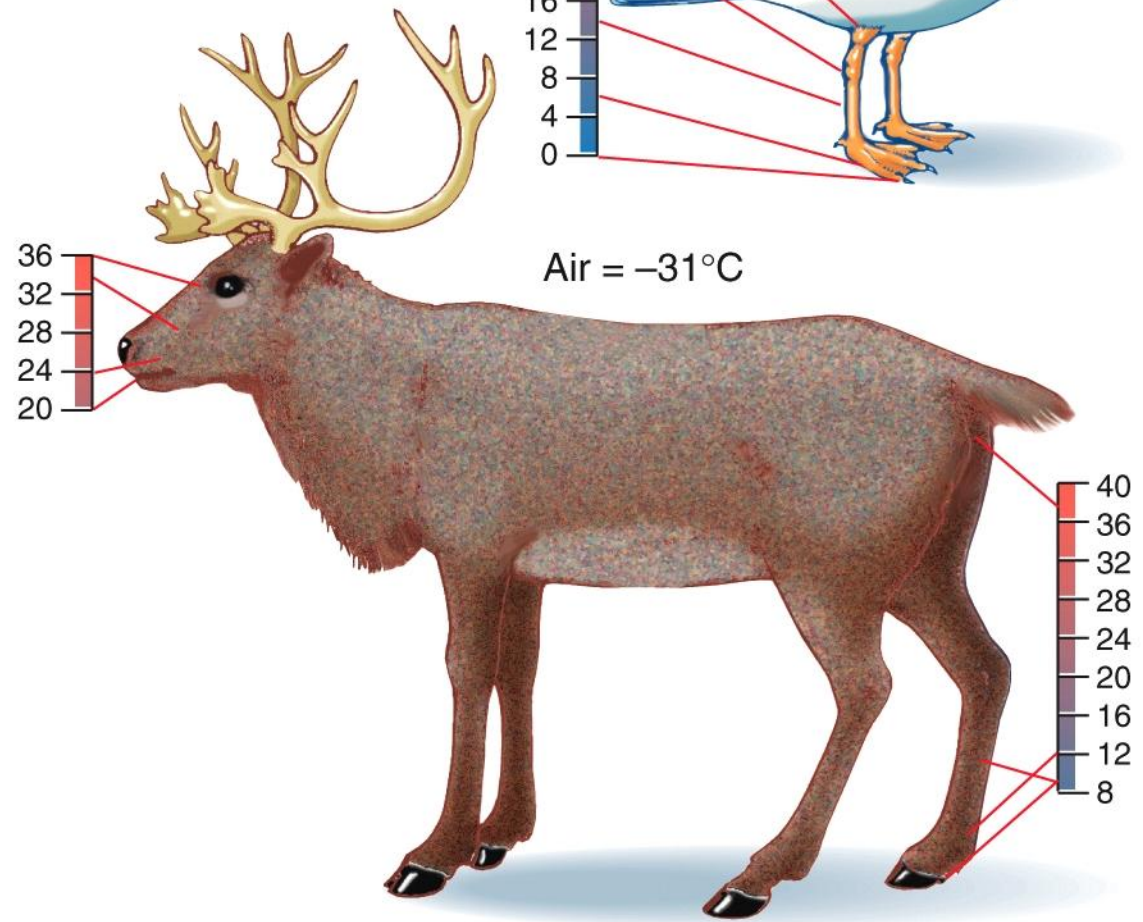
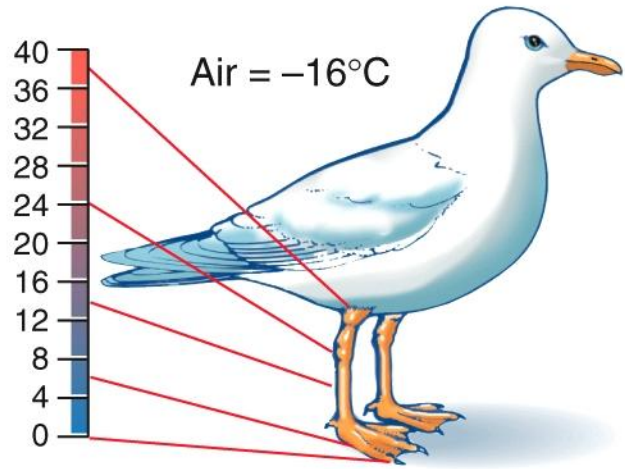
ECG

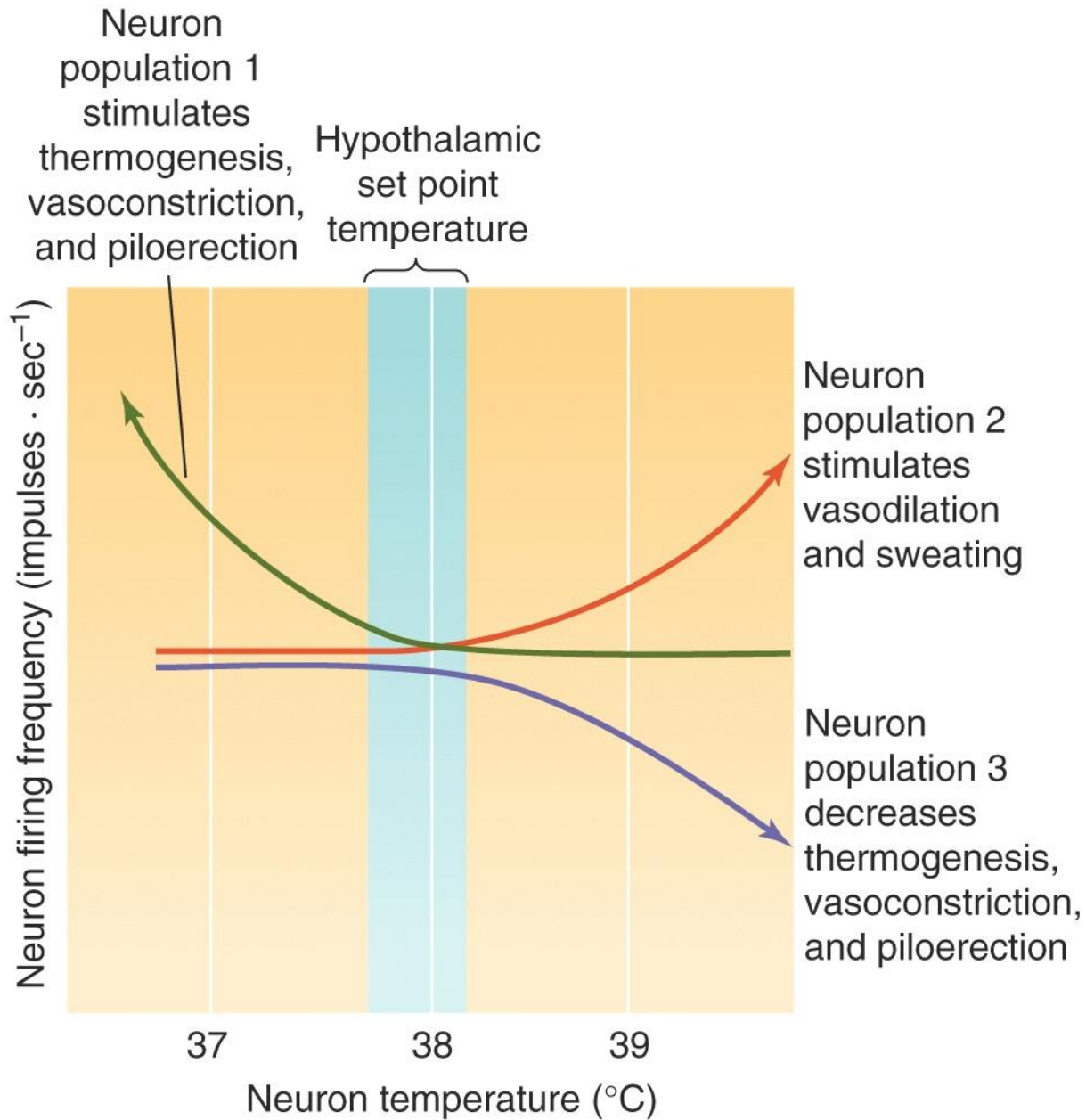


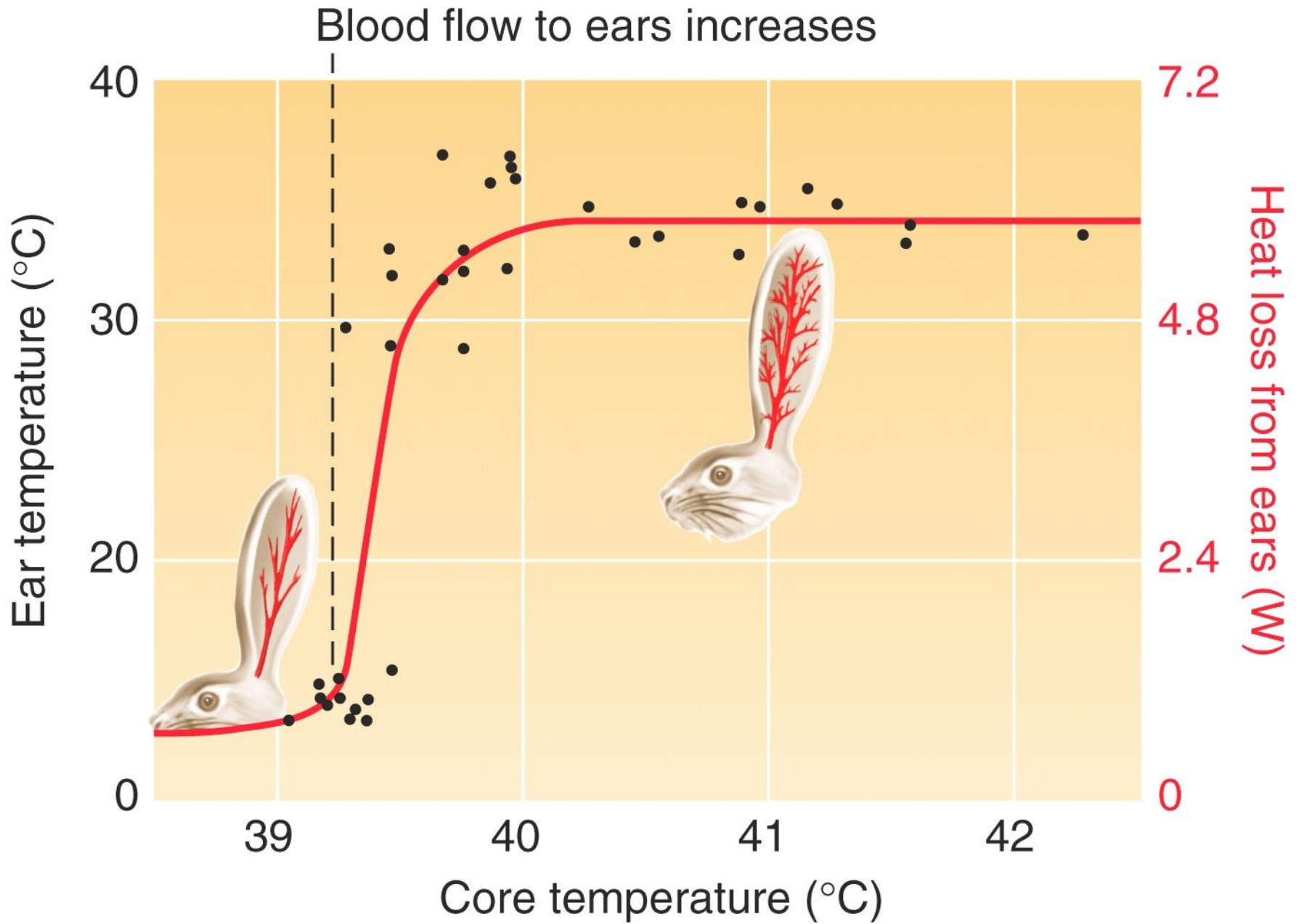


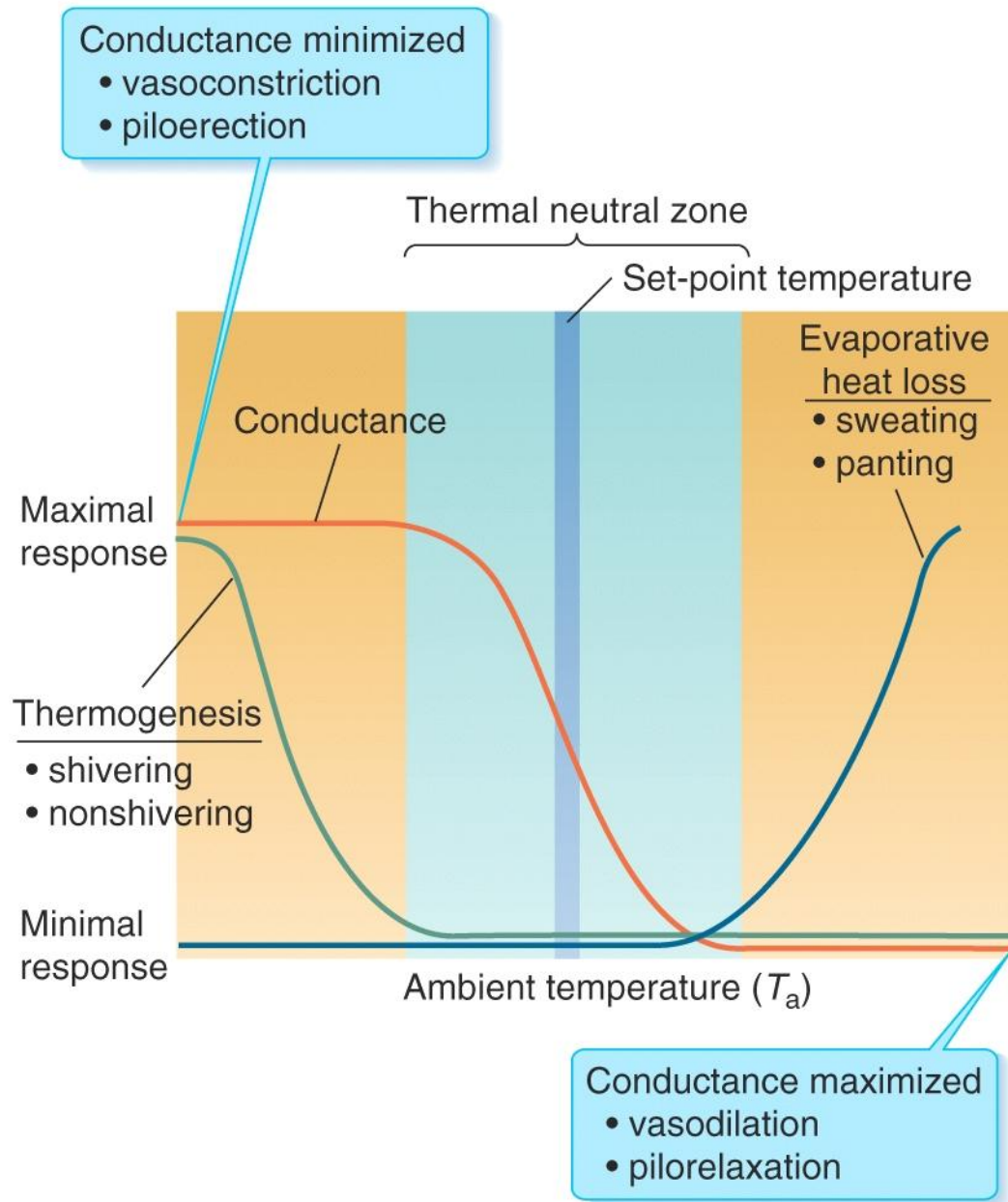


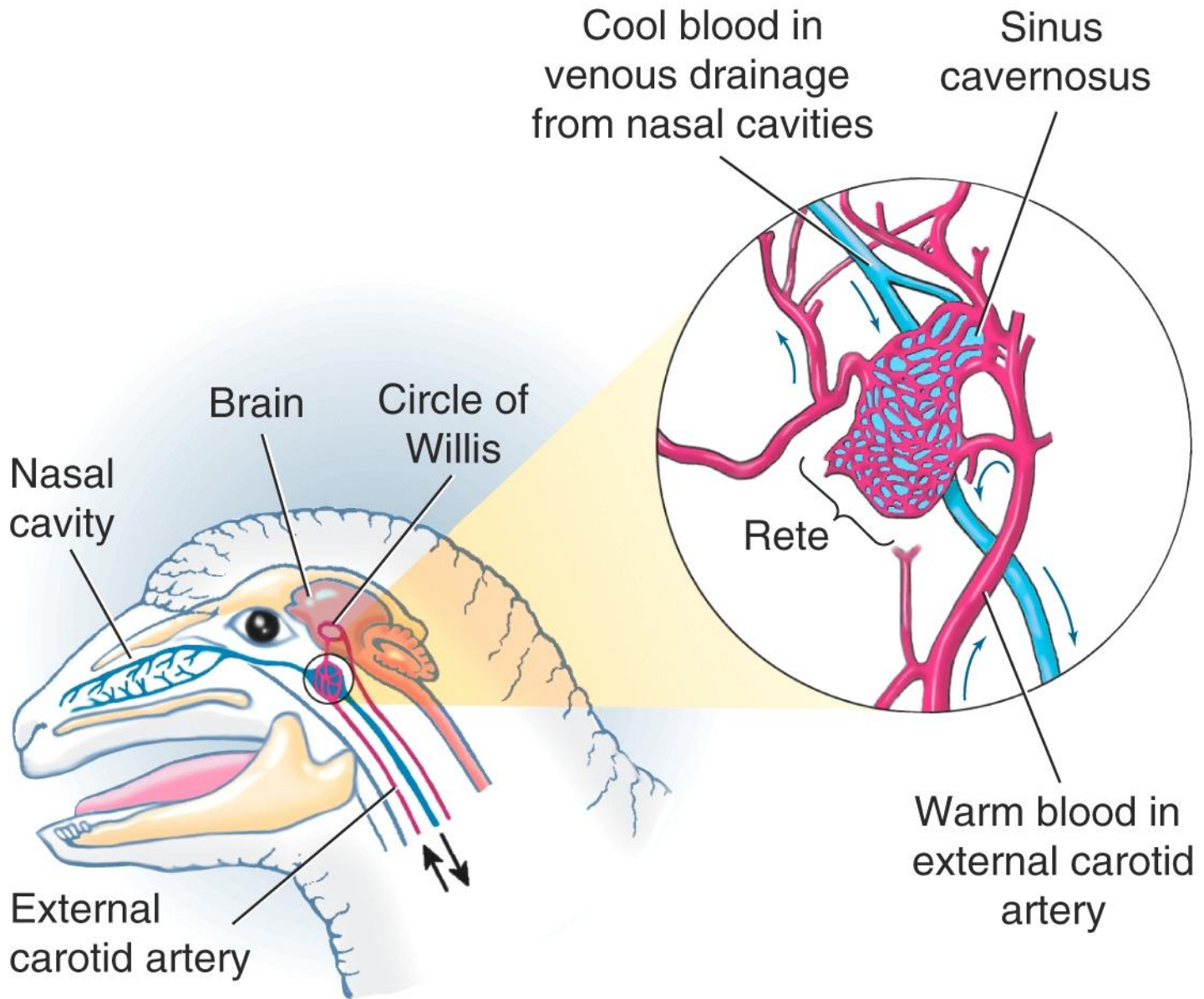


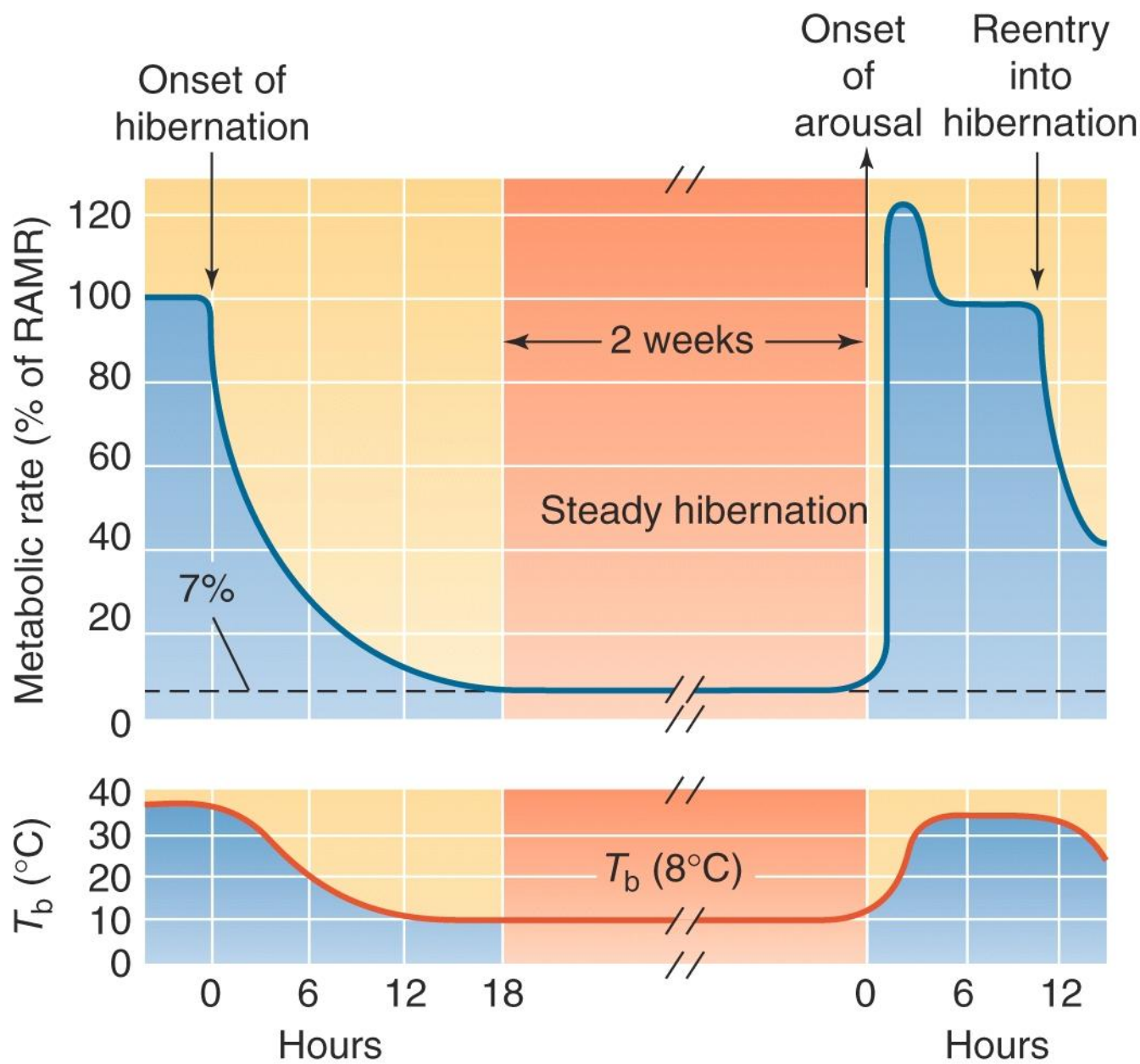


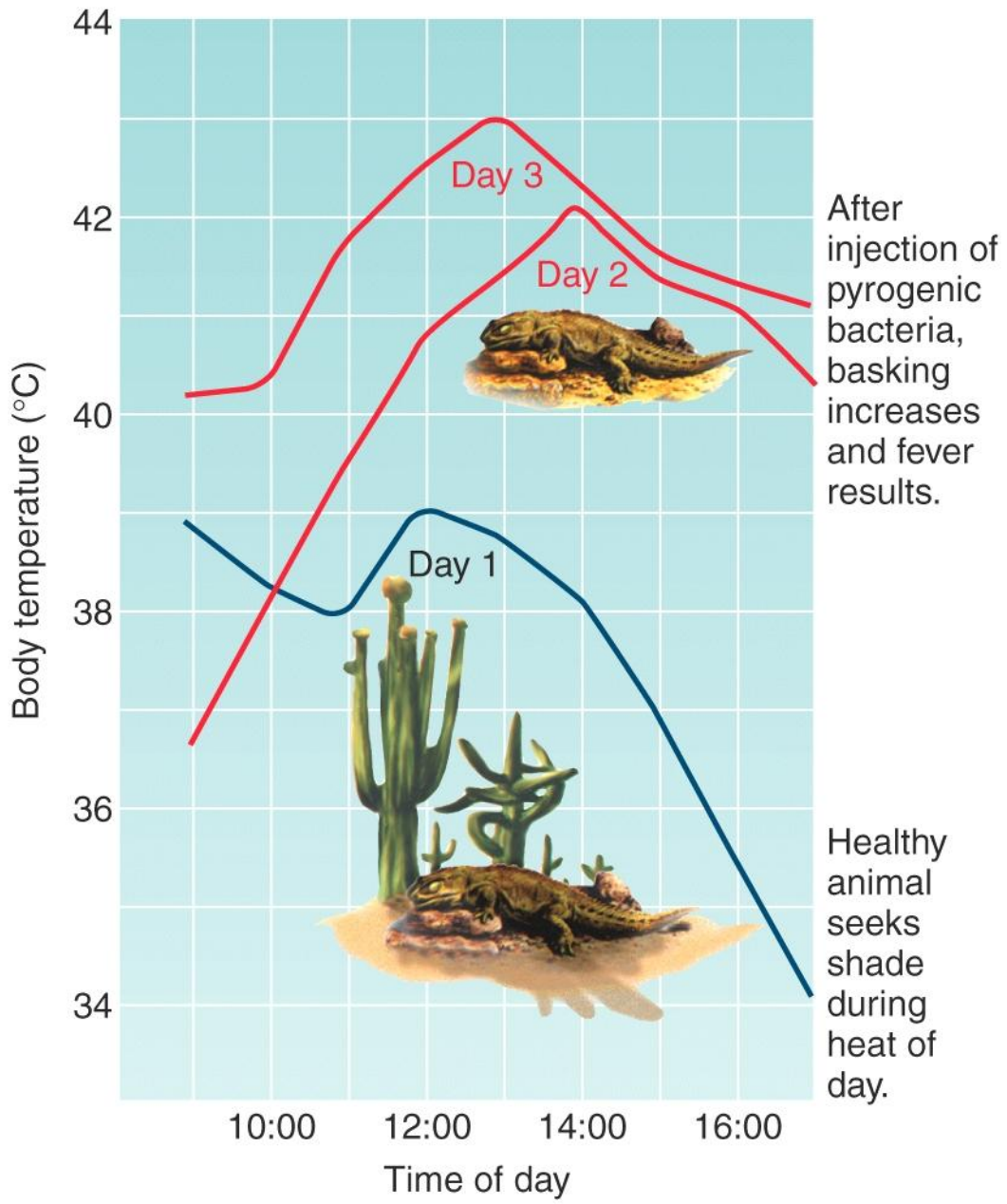












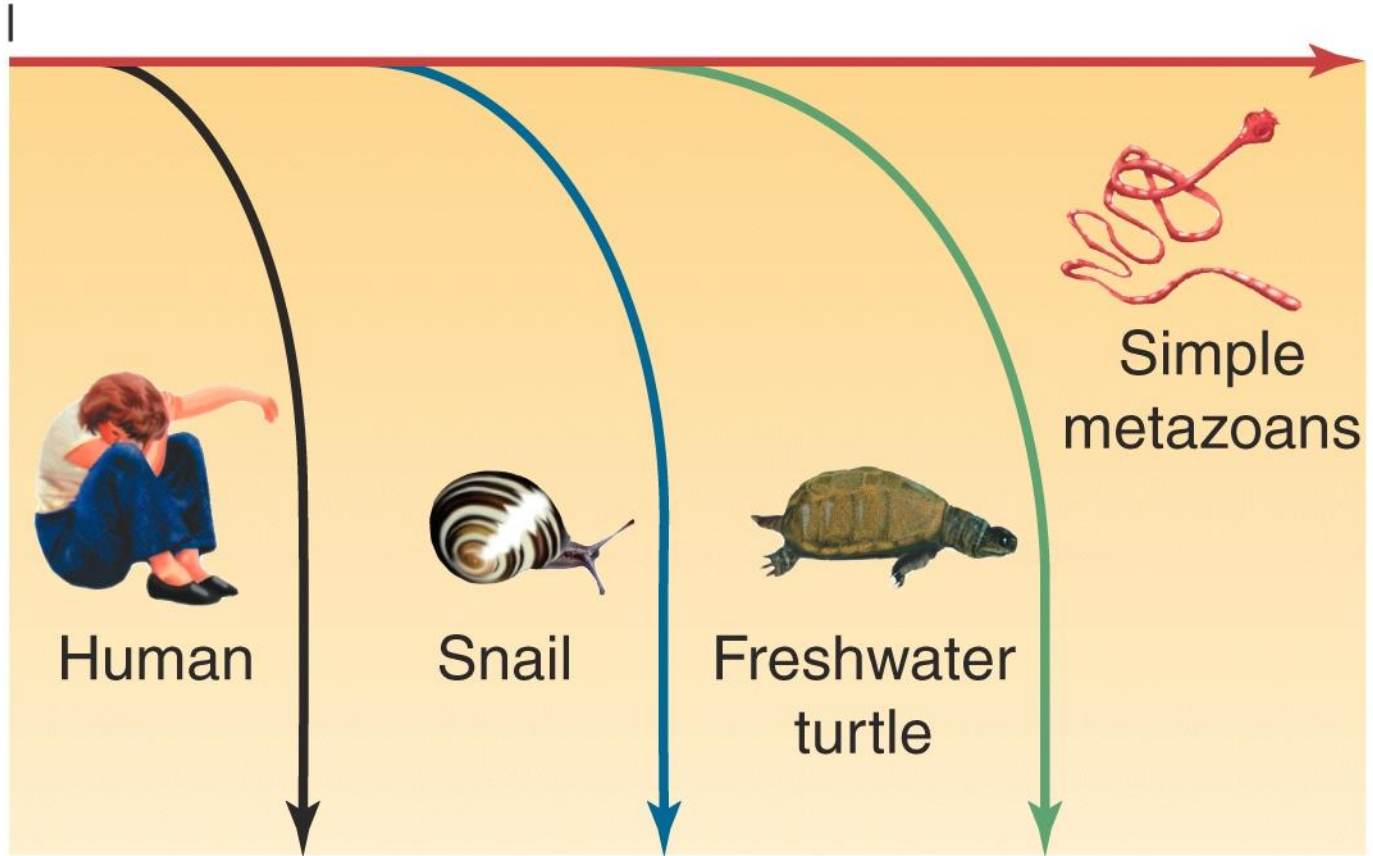
(b)

Onset of oxygen deprivation

Normal

Metabolic rate

Lethal



Human

Snail

Freshwater turtle

Simple metazoans

Time until death