

# 3. Temperature

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## Pre-class materials

**i** Read ahead

**Before class, you can prepare by reading the following materials:**

1. Withers chapter 5. Look over the homework, handout, and discussion questions and skim the chapter, reading anything that you need to know.
2. [Discussion Questions]
3. [Slide Deck] - for your reference as we go through the material

## Announcements/Reminders

- Monday is Labor Day. No class

## Week 3 Discussion Groups

| Group | Partner 1 | Partner 2 | Partner 3 |
|-------|-----------|-----------|-----------|
| 1     | Justin    | Morgan    | Richard   |
| 2     | Adry      | Matthew   | Logan B   |
| 3     | Mayuka    | Krystal   | Logan M   |
| 4     | Anna      | Garrett   | Sasha     |
| 5     | Kirsten   | Christina | Kylie     |
| 6     | Maisie    | Alvin     |           |

### 💡 Thought for the day

Physiology is the story of evolution's struggle to maintain an appropriate SA/D ratio in relation to the volume of an animal – *Haldane*

## 3. Temperature

### Modes of Heat Transfer

- Conduction
- Convection
- Evaporative
- Radiative

Animals also generate heat through **Metabolism**.

<https://youtu.be/BHchDrboqEo>

Flux =  $C * \nabla$  (Mass or Energy)

$Q = C * M \nabla T$

Where: - Flux is the transfer of mass or energy -  $\nabla$  is the gradient symbol - Q is heat - C is a material property (resistance or insulation value) - T is temperature

### Heat Balance

Metabolic heat production is balanced by all mechanisms for heat exchange:

$$\Delta H_s = H_m \pm H_c \pm H_r \pm H_e$$

Where:

$\Delta H_s$  = heat of storage

$H_m$  = heat of metabolism

$H_c$  = heat of conduction and convection

$H_r$  = heat of radiation

$H_e$  = heat of evaporation

If an animal is in heat balance,  $T_b$  (body temperature) is stable.

If  $\Delta H_s$  is positive, (Gains > Losses), then  $T_b$  increases.

If  $\Delta H_s$  is negative, (Gains < Losses), then  $T_b$  decreases.

## Body Temperature

### Q10

[https://youtu.be/T5O9UvSZ\\_-g](https://youtu.be/T5O9UvSZ_-g)

## Iterative Method

<https://youtu.be/pEzcZCTYPyE>

## For Next Time

 Reminders and materials