

# 11. Respiration-Osmoreguation

Marguerite Butler

2023-11-13

## Pre-class materials

### ! Important Homework announcements

Due at the beginning of class, written by hand (paper and pencil or pen).

### i Read ahead

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

1. Monday and Wednesday we will finish respiration and Friday begin osmoregulation.
2. The Symmorphosis paper is a very interesting and important paper. It will be useful for design3 respiration.
3. In Lab this week you will measure your own brain waves using EEG. Have fun! [\[manual\]](#)!

## Announcements/Reminders

- Due Monday at the start of class– Homework 5 [\[schedule\]](#)
- Due Friday at midnight - Design 3 draft
- Please do your peer review for design 3 over the weekend
- Do discussion TEAMMATES eval, released each Friday, due by Monday.

## Week 13 Discussion Groups

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

## Monday - Finish aerial respiration questions 2, 3, 5

- **Reading assignment:** Withers pp. 609-631 OR HWA chapter 23 + Withers 626-632, skip invertebrates
- [discussion pg 4:2,3,5] [slide deck2]
- **Aerial Respiration Topics:**
  - Air flow patterns of vertebrates
  - Lung Volumes
    - \* Lung Volume (VL or VT)
    - \* tidal volume (Vt)
    - \* Dead space volume (VD)
    - \* Alveolar ventilation volume (VA or Va)
    - \* Alveolar Minute Volume (VAE)
  - Breath Rate (BR)
  - Oxygen Extraction and Pulmonary Diffusing Capacity

Respiration the Movie

<https://youtu.be/clyu9h810n4>

## Wednesday - Symmorphosis

- **Reading assignment:** Symmorphosis: Weibel, Taylor, and Hoppeler (1991) The concept of symmorphosis: A testable hypothesis of structure-function relationship. PNAS 88:10357-61 [Respiration Papers folder](#)
- In class discussion

## Friday - Begin Osmoregulation

- **Reading assignment:** Withers skim beginning Ch. 16 for definitions in list below, also read Water & Ion Budgets pp. 788-790, Vertebrates pp. 798-803, Terrestrial Environments pp. 806-812, Terr. Verts. 822-827. Withers is actually very readable on this topic, and some of it will be familiar to you already:).
- [discussion] [slide deck] [slide deck 2]
- definitions:
  - solutes,
  - osmosis,
  - osmolarity/osmolality,
  - ionoregulation,
  - osmoregulation/osmoconforming,
  - compatible solutes,
  - perturbing solutes,
  - counteracting solutes,
  - osmotic permeability (& formulae)
- The components of **Water Budgets** (input/output) as well as **Ion Budgets**
- The water and ion challenges of **freshwater**, **marine**, and **terrestrial** environments

Osmoregulation Podcast

<https://youtu.be/1vQxLFoPCmM>

## For Next Time

**i** Reminders and materials