

# 11. Respiration-Osmoreguation

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## Pre-class materials

**i** Read ahead

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

1. Tuesday we will finish respiration and Thursday 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 Thursday at the start of class– Homework 5 Q1,2,5 [\[schedule\]](#)
- Due Monday 11/25 at midnight - Design 3 draft
- Please do your peer review for design 3 by Wednesday and send to colleagues and myself
- Do discussion TEAMMATES eval, released each Friday, due by Monday.

## Week 13 Discussion Groups

Group	Partner 1	Partner 2	Partner 3
1	Abby	Ashton	Adam
2	Hao	Kylee	Vivian
3	Ilan	Mohamad	Veronica
4	James	Sean	Christian

## Tuesday -

### Aquatic Respiration, Fish Gills

- **Reading assignment:** Withers Aquatic respiration: skim 565-72, read 573-4, 585-99, supplement 12-2. ALTERNATIVELY, read HWA chapter 22 + HWA 586-587 (counter-curr) + HWA 590-594 (fish).
- [discussion pg 3, Q4-5] [slide deck] [slide deck2]
- **Topics:**
  - Partial pressures of gasses and pO<sub>2</sub> at sea level - the starting point.
    - \* Influences of relative humidity
    - \* Altitude (total pressure)
    - \* Henry's Law - dissolved O<sub>2</sub> in water
  - Flow patterns: Countercurrent vs. Concurrent
  - Fish Gills
    - \* Ventilatory pumps in fish (breathing patterns)
  - Root Effect

Respiratory Pumps

<https://youtu.be/2GPfu8ebZac>

### Finish aerial respiration questions 2, 3, 4

- **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

Respiration the Movie

<https://youtu.be/clyu9h810n4>

## Thursday - 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

## 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>

### **i** Coming up Next Week

- We will have class on Tuesday.
- No class on Thursday, no labs.
- Submit your group labs to your TA by email at the regular time.
- Happy Thanksgiving!