Lab 3: Peripheral Circulation and The Dive Response

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Before Lab

Prepare for lab by:

- Watch Peripheral Circulation Podcast.
- Read [Protocol 2] on measuring blood pressure.
- Read the lab manual below.

- Write the [Prelab] in your lab notebook.
- Do Quiz on Laulima (open 24 hrs before lab).

https://youtu.be/h47oQH-w6F8

Exercises

- Measuring blood pressure
- Peripheral circulation experiment
  - Develop a simple experiment to demonstrate a principle of peripheral circulation of choice.
- Dive response experiment
  - Develop a hypothesis for a potential trigger for

the dive response.

Background: Blood pressure and peripheral circulation

Vertebrates have a **closed circulatory system** where the blood is always enclosed within blood vessels or the heart. Blood is pumped from the **heart** (the central pump) to the **vasculature**: the **arteries**, **capillary beds** (sites of delivery to tissues), **the veins**, and back to heart. There are several important consequences of this design: (1) blood pressure varies across species according to oxygen demand and morphology (especially animal height), (2) **blood pressure varies along the circuit**, (3) **blood pressure can be regulated at points along the circuit**, and (4) **blood pressure can be modified situationally** depending the state of the animal.

Blood pressure varies across species

For **very active** animals (e.g., mammals and birds) or **very large animals** (especially very tall animals that have more gravity to resist), the ability to regulate blood pressure is critical — active animals will *need more oxygen delivered at a faster rate*, especially to the most metabolically active tissues, and *larger animals will require much more pressure* to reach all of their tissues.

Blood pressure varies during the cardiac cycle.

The **cardiac cycle** is a complete cycle of the heart beat, comprised of **systole** (Figure **??**; the phase involving contraction and ejection) and **diastole** (Figure **??**; relaxation and filling) of the atria and ventricles. We will learn more about the cardiac cycle in the EKG lab. In this lab we are focusing on the blood pressure changes. The largest muscles of the heart are in the **ventricles**. Blood pressure is at its highest immediately after