AP Investigation 1: Artificial Selection and its Effects on Running Mice

Part One: In the box below, draw a hypothetical organism that is an excellent runner. Remember that this is independent work. You will get a chance to compare your drawings later!

Part Two: Now compare your drawing with those by other members of your team. List the common features on the lines below.

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

Part Three: Write a paragraph to explain how natural selection might act on a population of organisms that varied in the traits you listed.

Part Four: Artificial Selection – Automated Measurements

A. How might legs ***change*** in a way that would improve the ability for wheel running? In other words, what leg adaptations might evolve? Discuss with your lab partner and then circle the one you will choose to study.

_____ _____

_____ _____

_____ _____

B. You will have available digital photographs femurs of mice to take measurements. Our **guiding question is what adaptations evolve when mice are bred for high endurance running in a wheel?**

C. What will you ***measure*** on a femur bone to find the answer for your question? You can measure more than one item.

Hypothesis: Write your hypothesis and be sure to use the "**if... then"** format and include an explanation.

_____

_____

Method: With your lab partner, decide how you will measure the femurs of the control and selected lines of mice. Draw a line on the photograph that shows where you will measure. Be sure to be consistent with each photograph you measure.

The mice, from generation 11 of the selection experiment, have been studied previously, as reported in this paper:
Garland, T., Jr., and P. A. Freeman. 2005. Selective breeding for high endurance running increases hindlimb symmetry. Evolution 59:1851-1854.
You will be measuring the same bones they used.

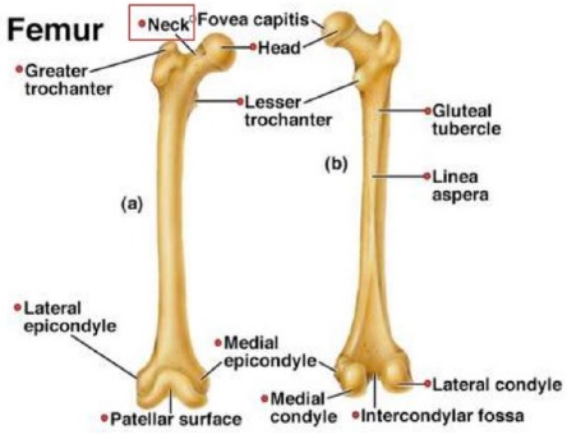
The folders that contain the images of the right and left femurs of several of the control mice and the selected mice can be found at:
http://www.biology.ucr.edu/people/faculty/Garland/G12_Split_for_STEM/

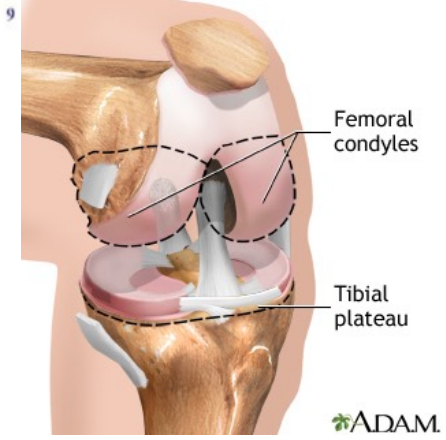
16 Folders are at the website above:

G12_Control_L1_Female_Femora
G12_Control_L2_Female_Femora
G12_Control_L4_Female_Femora
G12_Control_L5_Female_Femora

G12_Control_L1_Male_Femora
G12_Control_L2_Male_Femora
G12_Control_L4_Male_Femora
G12_Control_L5_Male_Femora

G12_Selected_L3_Female_Femora
G12_Selected_L6_Female_Femora
G12_Selected_L7_Female_Femora
G12_Selected_L8_Female_Femora





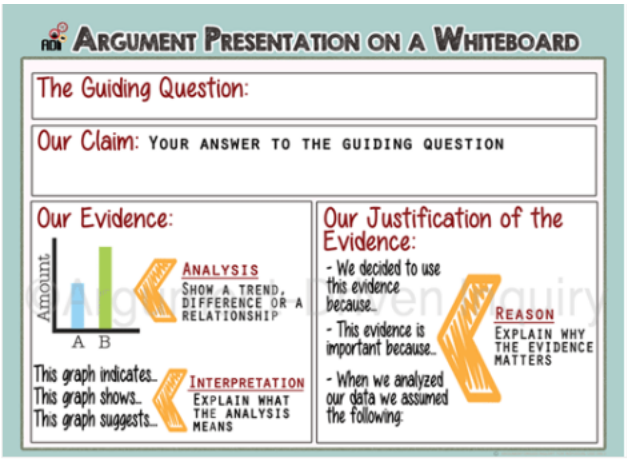
G12_Selected_L3_Male_Femora

G12_Selected_L6_Male_Femora
G12_Selected_L7_Male_Femora
G12_Selected_L8_Male_Femora

Data: Results for Femur Measurement

Sample number	Selected Measurement (cm)	Sample number	Control Measurement (cm)
Mean			

	Average Measurement (mm)	Total number of femurs measured
Selected		

Controls		

CER: Construct a claim, evidence, reasoning chart with evidence gathered from this lab. Follow the image below, making sure to cite your evidence.