**Active Learning Exercise 12.1**

to accompany

*Vertebrate Life*, Tenth Edition

Pough • Janis

**B-Movie Monsters**

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**Source:** This activity is based on the following web article from the Fathom Archive, part of the University of Chicago Library’s digital collection.

LaBarbera, M. C. 2003. *The Biology of B-Movie Monsters*. <http://fathom.lib.uchicago.edu/2/21701757/>

**Level of Difficulty:** Easy

**Relevant Terminology:** surface area, cross-sectional area, volume force, mass, scaling, terminal velocity

**Introduction**

Changes in size and corresponding changes in weight, surface area, and volume make a big difference in the biology of vertebrates. The web article “The Biology of B-Movie Monsters” offers an interesting and maybe memorable way to see and understand this. Read the sections as noted and answer the questions.

**Activity**

**Part I**

Read “Session 1: Biology and Geometry Collide.” The information here is the basis for everything that follows about the biology of the “monsters.”

1. In your own words and/or pictures, describe the relationship between surface area and volume as they increase and decrease.

2. How do gravitational forces relate to volume?

3. Given your answer to Question 2, what would need to happen to a muscle to increase its force, or a bone to increase its strength?

**Part II**

Read the first section in Session 2 about shrinking humans. Answer the questions based on what you learned from Session 1.

1. Explain why our shrunken man would have to eat so much more.

2. It says that the man struggles to lift a sewing needle, but that would actually be easy for him. Why?

3. Our shrunken people had a hard time climbing onto and off of furniture. They could have just jumped! Explain why.

**Part III**

Skip down to “Session 3: The Bigger They are, the Harder They Fall” about King Kong.

1. Why don’t elephants walk right over the fences that typically surround their compounds in zoos? What keeps them in? How?

Obviously as animals get bigger, their bones must bear more weight. You saw in the first section that bone strength is proportional to cross-sectional area. So bigger vertebrates have bulkier bones, but this only works up to a point, so something else is going on, too.

2. Look at Biewener’s graph. What do you notice about overall peak bone stress for all the animals there? What does this imply about the strength of the different animals’ bones?

3. If something like a horse does not really have greatly stronger bones than a chipmunk, how do horses keep from breaking easily?

4. So from a biological standpoint, does King Kong work, bone-wise? Why or why not?