

Subcommittee on Genetic Modification  
Orientation for Staffers  
**Problem Set 2: Strategies of Life**

*Part of every answer (now and always) should be the reasoning that led to it.*

- 2.1. Which of the following are hydrophobic? Hydrophilic? Amphipathic?
- |                |               |
|----------------|---------------|
| A. vinegar     | D. sugar      |
| B. skin        | E. wax        |
| C. tooth paste | F. rabid dogs |

*(The following problems require drawing. You might use Paint, PowerPoint or similar, or you can draw something and scan it somehow. Establish your own graphical conventions or – why not? – use those that appear in the Notes.)*

- 2.2. Consider that at an air-water interface, amphipathic molecules expose their hydrophobic surface to air. Draw a picture of what a soap bubble might look like at the molecular level, using a long-sticked popsicle to represent a molecule of soap.
- 2.3. Phospholipase A2 is an enzyme commonly found in snake venom that acts by cutting off one of the two fatty acids on phospholipids. Draw a picture that shows how extensive action of the enzyme might detrimentally affect the structure of a cell membrane (including its overall shape). At the scale of your model, how big would a cell be?
- 2.4. In countless science fiction movies, some alien species comes to Earth with the intent of eating humans. Maybe they're just being mean, but let's suppose instead that they really get some nutritional benefit from us. If so, what conditions have to be true?

**Extra – in case you have the time and inclination**

Suppose you are an editor at a respected scientific journal, and you are considering the following submission for publication:

*Mary had a little lamb, whose fleece was white as snow,  
And everywhere that Mary went, the lamb was sure to go.  
It followed her to school one day, which was against the rules.  
It made the children laugh and play, to see a lamb in school.*

You're inclined to reject the manuscript out of hand. It is shorter than the usual submission to your journal, but the main objection is the lack of what you perceive to be the rigor required by a scientific article. Your heart softens, however, and you resolve to fulfill your calling as an editor by editing, rewriting the submission to meet your specifications. What follows is the first paragraph of what came of your effort, the **Results** section of an article in which *every assertion is connected to an observation*, either yours or someone else's, and *every observation is connected to the means by which it was produced*.

## Cultural Impact of Human-Ovine Mutualism

### Results

An adolescent human female (code-named "Mary") was tagged with a fluorescent protein for subsequent identification and then released. In random observations (n=7) over the course of a day, she was repeatedly observed within 2 meters of an animal with morphological characteristics typical of sheep [1]. The length of the animal's ischium (pelvis bone) to the scapula (shoulder bone) was measured repeatedly to be 18.7 cm, to be expected if the measurements were performed on a single specimen. This value places the animal in the smallest 5% of lambs in the 2010 U.S. lamb census [2].

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### References

1. Reece WO (2009). Functional Anatomy and Physiology of Domesticated Animals. Fourth edition. Wiley-Blackwell, Danvers MA.
2. U.S. Bureau of Agronomic Statistics (2010). Morphological Assessment of Livestock. p.47. U.S. Government Printing Office, Washington DC.

Your task now is to complete the **Results** section of the manuscript, following the original as closely as possible but adhering to your high standards regarding evidence. Strangely, those high standards for some reason do not prevent you from making up any facts you may need and any references to justify those facts. So feel free.

*Provide the Results and References sections.*