

## Part Two: Research Question Development

Monday, May 10, 2021 6:48 AM

So far in class, we have spent time exploring the microbiome of mosquitos using data from a genomics student minION sequencing run. **Exploration** is a really important part of science; it allows us to observe new and exciting observations, and it spurs further curiosity about the world.

After that, I asked you to decide on an area you thought was interesting and further explore that using peer reviewed literature. Now that you have an idea of what your research interest is, and have done some background research to dive a little deeper into it, it is time to write an experimental question.

The most important thing to remember about writing an experimental question is that it has to be TESTABLE. Take a look at the examples below to see the difference between testable and untestable questions:

Examples:

Not testable	Testable
Does Wolbachia affect the microbiome?	How does the quantity of <i>Wolbachia sp.</i> affect the quantity of <i>Rickettsia sp.</i> ?
Are there phages in mosquito guts?	What is the relationship between Aeromonas phage and Aeromonas bacteria?
What makes the mosquito gut diverse?	How does microbial diversity differ between larvae and adult mosquitoes?

As you can see, testable questions have specific variables they isolate in order to make measurable, quantifiable observations about the area you are curious about.

**1. Based on your area of interest, identify one quantifiable variable that might change between samples. For example, "Number of Aeromonas phage reads" or "Shannon's diversity index" or "Presence/absence of Clostridium" are quantifiable variables. (This will become your responding variable)**

Shannon's diversity index

We have chosen samples to sequence based on the variables they introduce into our research. Specifically, our samples differ by the time of year they were collected, the location they were collected and their life stage.

**2. Which variable(s) might affect your area of interest the most? (This will become your manipulated variable)**

Life stage

**3. Below, write a draft of your testable question using both of the variables you identified above. (Please get this checked by Mr. Shay or Ms. Eggleston before moving on to the next question.)**

How does the shannon's diversity index of the microbiome change between larvae and adult mosquitoes?

**4. What is your hypothesis for this testable question?**

Once you have developed a testable question, it is important to realize that other scientists may have already had the same question. Before you move on, I would like you to read another article based on your specific question.

**5. Using the most important search terms from your question, plug it into Google Scholar and find an article written by scientists who asked a similar question as you. Read it and create another annotated bibliography entry below:**

Citation:

Summary:

**6. After reading and summarizing the article, review your experimental question and answer the following:**

- a. Have other scientists already answered your question?
- b. If so, how can we revise yours to be unique?

How does the shannon's diversity index of the microbiome change between larvae and adult Culex mosquitoes in Spokane WA