First Research Write-up Reminders ANGELL*BIO 150*Spring 2025

Consider checking out the resources in the Wordpress site on the Lab tab.

Remember: Learning how to write effectively in the sciences is just as important as making observations, learning facts, collecting data, mastering techniques, and proposing hypotheses. In fact, writing a complete research paper can be a challenge. There are so many little things to remember to include! By the time you are a senior in the biology department and in your upper-level courses we expect you to be able to efficiently approach this process and be able to cruise through a write up relatively easily. Writing about what you have learned is both a way to communicate your results to others and to clarify your own understanding about your results. Keep you paper simple, concise and clear to keep it memorable. Of course, you also want to persuade the reader that your findings are important. In most cases, results need an ardent and articulate advocate--you!

Overview: In order to manage this complex task, your first write-up will consist of only a subset of the typical parts of a research paper. For this assignment you will leave out a very important section-<u>the Discussion</u> (or in some journals it is called the Conclusion) and you will also not include an <u>Abstract</u>. You will, therefore, end up with....an informative **Title**, **Introduction** (with in-text citations embedded within a nice introduction), **Methods, Results, Citations** (Try to use Zotero) and AT THE VERY END your **Graphs (figures)**!

For this short write-up you will work with the maple fruit or maple samara data. We actually have **way more data** than we need so we will focus ONLY on a subset of our results. Look up my specific suggestions for Figure Making on the Wordpress site "Lab" tab.

FYI: Wing loading is calculated as the mass (g) divided by the area of the wing or in our case the estimated area of the entire fruit (length x width) so units would be g/mm^2 . You might try researching this calculation. It is handy because it combines several of our variables into a single relevant measure.

Title

You need one! It should give us a sense of what you actually did in this lab.

Introduction

Do begin generally but quickly get to the point of your research. What do we know about this system? Maybe some general info on seeds and seed dispersal. Why is this important? Put our wind dispersed maple seeds in context....but do not give us an encyclopedia entry on your topic! Describe previous research and what those researchers found and give us some background. Some citations perhaps? Remember your in text (within your paragraphs) citations are most effectively and concisely placed at the end of the sentence where you describe, **in your own words**, the research (Gonzalez et al. 2022). No quotes, ever in research papers.

Remember the Introduction should take the reader from the general-to specific and provide enough background information so that a reader will understand the purpose of your experiments. Finish the end of the intro by describing what we did in a general way (keep important details for Methods). Consider adding a hypothesis if you had one, "We/I hypothesized that samaras.... " Obviously, you don't need to have a hypothesis about every relationship you might be going to show in your figures but feel free to share one or two if you had a specific expectation.

- Italicize species names with the Genus name capitalized and the species name lower-case (*Homo sapiens*). After the first use, it is OK to abbreviate the genus name (*H. sapiens*). Do you have the species name for our samara?
- Generally, no results here (some medical journals will have a snapshot of results in intro but more often there is no mention of what you found)

Methods

What did we do, where did we do it and how did we do it? A knowledgeable scientist should be able to repeat your experiments after reading this section. There is often a fine balance between too much and too little information so don't tell me about the tape and markers you used or that you recorded your data (we hope so). This should not read like a recipe (who taught some of you that practice?). Do not add tons of unnecessary details. We can assume for example that

you got to your study site and back to the lab, that you labeled items, that you worked with your partner etc. Standard good practices do not need to be shared!

- Summarize the procedure that we (feel free to say we-since we did it as a lab) performed in <u>your own</u> words using active past tense (this should make sense since you already did it!).
- Details are important-sample size-how many samaras did we drop (how many rows of data), where did we drop them? (just note that we did it inside-not important where inside)
- Date, time, and location may be relevant for a field study and perhaps a greenhouse study, but are **not** usually needed for a lab or indoor experiment.

Results

- Describe just your results and each of your graphs in words (without any discussion of the ramifications of your results, but do point out trends or important features). You should highlight major patterns of each of your graphs. What do the boxplots show about how medians and the variation or spread in the data differ from treatment to treatment. Maybe there are no differences, but maybe there are interesting patterns. How about your scatter plots? Do you see clear relationships or not so much? Always report the <u>direction</u> of any difference or relationship when you are referring to scatterplots and have fitted a line. Was it a positive or negative slope? Do feel free to provide any other comments here such as comments on the range of the data (is it huge?) Or any other things that stand out. In this write-up you will only report on the data that you are graphing!
- Refer to all figures and tables by putting the figure reference at the end of appropriate sentences. "There were fewer galls on larger leaves (Figure 1)." We typically avoid saying things like "Figure 1 shows...." It is just a little less concise although we certainly do see this in some papers.

Discussion/Conclusion (None needed-yay!)

Citations (Literature Cited)

How are your Zotero skills??? Remember to insert citations into your paragraphs and Choose APA style as your citation style (as Audrey showed you in our session). We like APA because it is super simple. The GIGO rule applies here (Garbage in, Garbage out). Sometimes citations are not imported correctly and so you will need to change them manually, especially the **titles** and **scientific names**. Those species names need to be in **italics like this**- *Homo sapiens*. Remember you can edit your citations in Zotero itself. To get scientific names in italics you need to correct the code so that it looks like this: <i> Acer saccharinum <i> Titles of journal articles should use sentence punctuation-do you know what that means? You may need to go in and remove capitals from the titles of papers!!!!

These should be "real" primary literature sources from peer reviewed science journals-not newspapers or magazines or websites, or encyclopedias. Be sure you know how to recognize a primary literature paper. Use the library research databases that you learned about. But many of us also use Google Scholar. You can compare and contrast what you get searching using the same search terms in multiple databases. How many citations is a "good number"? What is your "feeling"?

Refer to your citations in the body of your text, no quotes are ever needed. No first names should be in your "in text" citations (this means those in the body of your paper). Zotero should put the last name and year in parentheses at the end of the sentence as we did in our training. Remember to reword the idea from the paper you are referring to, obviously do not copy and paste from the original paper (can you say plagiarism).

Avoid websites since they are not primary literature. In general websites can be a good way to initially explore your topic but they are not considered PRIMARY PEER REVIEWED LITERATURE! Never, ever, cite an encyclopedia in this class. Although books can sometimes be useful-real primary research articles are best since books take a long time to publish and so are not up to date. Note that some of your literature papers may not actually be immediately related to what we did. Share with your reader a sampling of research papers you found on the topic.

Figures (Graphs)

Remember figure legends or "titles" or "captions" should go below the figure. While in lab we may practice adding a figure legend in after you paste your graph into your google doc. The format for that figure legend is very specific! It needs to

have "Sentence punctuation"! Generally we do not put a title above our figures/graphs. For example you might write something like this under your graph: Fig. 1. Wing loading in blaa, blaa, blaa" ...with a period at the end! FYI: Table legends do go above the Table (but you likely do not need a table for this paper). Do not repeat the same data in both a table and a graph if you use a table in the future.

- A graph is preferable to a table and never simply list your raw data. Sometimes journals will have an appendix with raw data if data are meant to be shared with others.
- <u>Label</u> the axes or columns and define all treatments and <u>include units</u>. When you have two words labeling an axis the second word is very typically lower case.
- Write informative Figure legends so that it is not necessary to refer back to the report to understand the Figure. Hint-**Do not write "vs" in your figure legend**. Figures should stand alone.

OTHER TIPS....Do not write it the night before, it always shows! Read and reread your paper. Writing Center may be useful for proofreading! Feel free to use the active voice..many journals encourage this. You should check every sentence to make sure it is written concisely. Always ask yourself if there is a quicker/shorter/clearer way of making your point. Do spend time making your graphs look good. **Above all strive to be direct and clear!**

Phew....anything I am missing????