

# Instructions: How to write a lab report

**You need to use these guidelines to write the report. Really, it will help!**

**Refer to: A Short Guide to Writing about Biology J.A. Pechenik.**

## **Purpose:**

- The purpose of a lab report is to communicate the findings of your scientific study.
- Your question, hypothesis, prediction, methods, results, and conclusions are presented within the context of a bigger scientific topic.
- Writing a lab report helps prepare you for writing scientific journal articles. You will write the equivalent of a scientific journal article in BI 456, an upper level research course required for the biology major.

## **General notes about a lab report:**

- No title page
- Paper should be STAPLED, with pages NUMBERED in right corner (double-sided copy preferred by some professors; ask your professor).
- Include in upper right corner, single spaced: Name, Lab Section, Lab Professor
- Informative title that begins near the top of the page, not 1/3 of the way down the page.
- Paper divided into sections that are labelled: Introduction, Material and Methods, Results, Discussion, and Literature Cited
- All sources cited in paper should be listed in Literature Cited section.
- All sources cited in Literature Cited section should be found in body of paper (ACTUALLY CHECK THIS).
- Available on my.wartburg is the Wartburg Biology Writing Style Guide, which includes examples of citations, numbers, and units.

## **General notes about writing style: Pechnik, Ch. 1, 6**

- Majority of papers are written in PAST TENSE, including findings from other studies, your methods, results, and conclusions.
  - An example of something that is not written in past tense would include statements that are common knowledge,
  - such as “dogs are mammals”
- “Data” is ALWAYS a plural word.
- Pechenik, p. 115
  - “Affect” is only used as a verb or action (if you can substitute the word “influence”, use affect).
  - “Effect” is often used as a noun or thing (if you can substitute the word “result”, use effect).
- ALWAYS italicize the entire scientific name (both genus and species).
- Don’t capitalize the species in the scientific name.
- Don’t bullet point anything in the paper.

- No quotes: PUT EVERYTHING IN YOUR OWN WORDS!
- Use the word “significant” ONLY when referring to something that was statistically significant ( $p < 0.05$ ). Otherwise, you can talk about “trends” in the data.
- Do not use the words “success” or “failure” to describe your hypothesis or experiment.

### **Introduction: Pechnik, Ch. 6, 9**

- Think of the introduction as a “conceptual funnel” moving from large concepts (background information and previous studies) to specific details (your question, hypothesis, prediction).
- Begin with several sentences of background information (not a statement describing your specific experiment).
  - You should have at least one appropriate citation (lab manual, textbook, etc.) for your background information.
  - Some professors require more depending on your experiment
- Describe at least one scientific study that relates to your study. This study should be found in a scientific journal. In a few sentences, describe the study conducted, results, and conclusions. CITE THE STUDY.
- Provide a brief justification for your project. The previously published scientific study that you just cited should be similar to your study and will help you refine the significance of your project.
- State your specific research question.
- State your hypothesis (first) and prediction (second)
  - Hypothesis format example:
    - XXX will influence YYY
    - We hypothesize that sugar content will influence choice of foods fed upon.
  - Predication format examples:
    - IF, THEN statement: If sugar content influences food choice, then high sugar foods will be fed upon more frequently than low sugar foods.
    - We predict that foods with higher sugar contents will be fed upon more frequently than foods with lower sugar contents.
  - When you make a prediction that involves a comparison, remember to add the second part of the comparison.
    - We predict that foods with higher sugar contents will be fed upon more frequently than foods with lower sugar contents.

### **Materials and Methods: Pechnik, Ch. 6, 9**

- Do not list materials (they will appear as you write how you performed your experiment or study)
- Write in PAST TENSE
- Include how you performed experiment, what you measured, length of study, sample size, type of statistical test you used to analyze your data, etc.

- Someone should be able to replicate your study after reading the details of your description.
- However, do not include techniques that EVERY biologist should know.
- See the statistics appendix for help in determining the appropriate statistical test to use in analyzing your data.

**Results: Pechnik, Ch. 6, 9**

- This section presents your research findings.
- State overall trends and patterns; DO NOT compare every single number with other numbers unless they do not follow a certain trend.
- Write a least one paragraph prior to your figures and/or tables. This paragraph should serve as a roadmap that walks the reader through the data (figures and/or tables).
- Refer to your specific figures/tables within the text of your results section. Your figures/texts should be arranged in the order in which you refer to them in the text of your paper.
- In this paragraph you should include:
  - Averages for each of your conditions (with some measure of variation)
  - Figure legends should include the following: identifications of study subjects, sample size and description of what the figure depicts.
  - Your figures should include all data, even if you recorded 0 as a measurement
  - Graph axes should be labelled, with units of measurement
  - Line graphs: are often useful for one time counts of something. Averages (not individual data points) are presented on bar graphs.
  - You should include error bars on your bar graphs and indicate what they represent (standard deviation [SD], standard error or mean [SEM], or confidence interval [CI]).
  - Once again, you should not include standard deviation (or standard error) bars when your data represent **total** counts of things. You should include bars when your data represent **averages** of things.

**Discussion: Pechnik, Ch. 6 and 9**

- You should give a background statement, followed by your question, hypothesis, and prediction.
- Compare your experimental results with those of other studies; cited these studies (they may have already been mentioned in your introduction).
- End with:
  - Stating possible sources of error, even if your study turned out as predicted (ex. small sample size, short duration of study, etc.). You should not state a source of error, however, without describing how that would influence your results. Do not say, “We measured incorrectly.” Instead, say, “Because people measured different lengths, there could have been some variation in how lengths were interpreted. However, person A and person B both collected data for the control and

experimental groups. Therefore, variation in how lengths were measured would probably not have influenced the statistical differences seen.”

- In a few sentences, explain at least one future study that you could conduct. Make sure that you include enough information about this study so that the reader understands what you are talking about.
  - Make sure to include the rationale for doing this specific study. This future study should logically flow from the results of the study that you just conducted.
- **NEVER** say your study **PROVED**