

## BIO 181 Mini Report

### General Information:

The mini-report must include the following sections, identified with subtitles: Title, Introduction, Methods, Results, Discussion and Conclusions, Literature Cited.

### Title

- Here you will state the main question: what are you investigating? The title must be specific and allow the reader to know exactly what you are studying. Underneath the title you should write the last names of all the members of your lab team (followed by the initial of their first name), the name of your instructor (bold text), lab section, and date. If you are the author of an individual report, your name should be listed first and must be underlined, followed by the names of your group members.
  - Example:

**Effect of light with three different wavelengths on photosynthetic rate**

Carrasco, M., Jones, P., Smith, H., Vu, T.,

**Rosell, R.** Lab Section LA: 09/15/09

- Write a descriptive title. Be specific. For example, “Choosing the best mouthwash” or “Which concentration kills more bacteria” are vague: they fail to describe what substances you used, what “best” means, how many different solutions or chemicals were tested, or what bacterial strains were used to conduct the experiment. A better title would be “The effect of three different brands of mouthwash on the growth of *S. aureus*.”
- The main conclusion of your research can also be used as a title, for example, “Listerine mouthwash inhibits growth of *S. aureus* more effectively than Scope.”
- Writing the names of all your group members (and spelling them correctly) shows respect. Whether you are handing in an individual or group mini-report, all the names of your research colleagues must be there. This shows a good work ethic.

### Introduction

- Select the two or three concepts related to your experiment (usually your dependent and independent variables) and briefly explain them. For example, if your experiment involves enzymatic reactions and temperature, you should briefly describe enzymes, how they work, and what can affect their function. Then explain the consequences of changing the environmental conditions of the reaction, and finally focus on the effect of temperature. You should use 6 to 10 succinct sentences to convey this information. Cite your information sources within the text by putting the last name of the first author and year of publication in parentheses, for example (Perez, 1996). In the last 2 or 3 sentences of your introduction, state your rationale and hypothesis, which should portray the relationship you expect to find between the independent and dependent variables.

- When you are conducting an experiment, pick the three or four topics you need to address in your introduction. For example, if your title is “Effect of mouthwash alcohol concentration on *E. coli* growth,” you should discuss mouthwashes and the effect of alcohol on bacterial growth and describe *E. coli*. You should also make use of relevant primary literature and avoid making your introduction sound like a Wikipedia entry by providing information that is as specific as possible to your subject.
- Have a rationale for your hypothesis. The rationale is usually included in the Introduction, written in one or two sentences after the background information and before the hypothesis. The rationale must be clearly stated and express the reasoning that led you to the proposal of your specific hypothesis. It should be grounded on your observations or background research from the scientific literature. The rationale must be followed by your hypothesis, which should state the relationship between your dependent and independent variables.

## Methods

- In this section, you will briefly describe how you conducted your experiment. In paragraph form, describe the experimental procedures performed to obtain your data. Use the past tense. You must be specific (give exact measurements, volumes, times, etc.), but at the same time be brief and include only details that are necessary if someone were to replicate the experiment. Remember to indicate the number of replicates.
- How you labeled your samples and the number of tubes you used are pieces of information that are not crucial for another researcher to be able to repeat your experiment. Mention the number of trials conducted (which usually is three in our experiments). Use your technical vocabulary and avoid using personal pronouns; for example, say “Paper disks soaked in the three test solutions were placed on bacterial lawns of *E. coli*” instead of “We used three paper circles for each solution, wet them and then put them on one of the quadrants of a Petri dish that had *E. coli* smeared all over.” Make sure to include a description of your control.

## Results

- This section should contain at least one paragraph (no more than 5 sentences) describing your most significant findings, followed by a graph or table that shows your data. Always refer to your table or graph in the text by citing it at the end of the sentence or using parentheses, for example “see Figure 1” or “see Table 3 below” or “(Figure 2).” Remember that your figures must have descriptive legends below them, and tables are to be identified by titles at the top. Never include raw data. Do not begin your sentences with “Figure 2 shows...” Keep in mind that you must describe the data—not the figure, graph, or table.
- Describe all your results in the Results section. If there is anything in particular about your standard deviation, mention it here. Mention exact values as sometimes they cannot be estimated by observing the graph. For example, “Dr. Tichenor’s mouthwash had the highest zone of inhibition ( $19.5 \pm 0.5$  mm), followed by....” Please remember that all numbers smaller than 1 should have a

zero before the decimal point. Always use relevant units when mentioning data points.

- The graph (table or figure) should be presented AFTER the written description of your results. Understanding which are your dependent and independent variables allows you to decide which one goes on each axis, and whether you should use a column or line graph. DO NOT graph your raw data. DO graph your averages. Be critical (smart) about your error bars. Remember that tables have a title (above the table), and figures and graphs have a legend (detailed short paragraph under the graph or figure). Your title or legend must be descriptive and should not include the results of your experiment.

### **Discussion and Conclusion**

- In your first sentence, state whether or not the data support your hypothesis. Then interpret your results in relation to the background information. Do not repeat what you stated in the Results section; instead compare your findings to those published in the scientific literature. These may support (or not) your findings. For example, if you were testing salt concentration and its relationship to product formation in an enzymatic reaction, you should search publications in which the authors describe the effects of different salt concentrations on the enzymatic activity of similar enzymes. This should be the longest section of your report, and you use up to 12 sentences for your data interpretation.
- Begin this section by stating whether your data support your hypothesis. Since this is a short format, you do not need to restate the hypothesis. The main point of your discussion is to explain the effect of the independent variable on your dependent variable. What is the underlying mechanism? Why is product A more effective than product B? Do not repeat your results in this section. Discuss your findings in light of the findings of others who have conducted similar experiments, and remember to cite those primary references correctly because of the space limitation, please refrain from explaining what could have gone wrong or where your research could go in the future.

### **Literature Cited**

- List the references and the sources you cited in your text following the author-year format. Include a list of your references at the end of the document. You must use the proper format for in-text citations and references. In-text citations should appear as (Smith 2015). The reference at the end of the paper should appear as follows:

Potts, S.G., J.C. Biesmeijer, C. Kremen, P. Neumann, O. Schweiger, and W.E. Kunin. 2010. Global pollinator declines: trends, impacts, and drivers. *Trends in Ecology and Evolution* 25:345-353.

- At minimum, you should have three references: one for your background information and two for your discussion. At least two of those, typically the one you use in your discussion, should be primary references from peer-reviewed journals. In many cases, your textbook will be useful for the background information.

### **Miscellaneous Directions for Your Mini-report**

- Use Arial font (size 11). The Literature Cited may be presented in a smaller font if extra space is required (size 9). Margins 2 cm on every side.
- The maximum length of your mini-report is ONE page.
- Make sure the font type, font size, margins, and maximum length (one page) of your document are correct.
- Make your report consistent. If your title reads “Effect of mouthwash alcohol concentration on *E. coli* growth,” you are stating your dependent (growth) and independent (alcohol concentration) variables. Your hypothesis should reflect that you expect these variables to interact. Your graph must have “Average diameter of growth inhibition” on the y-axis and “Alcohol concentration” on the x-axis, along with the corresponding units for these measurements or calculations in parentheses. Since concentrations is a continuous variable, you should have a line graph. This is what it means to be consistent. Your narrative and research of the literature should also relate directly to these general themes.