

# THE DO'S AND DON'TS OF WRITING A LABORATORY REPORT FOR BIO 318

Originally compiled by Dave Nykamp and modified over the years by various TAs  
([http://www.utm.utoronto.ca/~w3bio/bio204/lab\\_files/how\\_to\\_write\\_labs\\_revised.pdf](http://www.utm.utoronto.ca/~w3bio/bio204/lab_files/how_to_write_labs_revised.pdf))

The purpose of writing lab reports at the undergraduate level is to teach you how to prepare a scientific research article. This is not an end-all list, but a starting reference point to familiarize you with a general idea of what is expected.

**To further help you learn how to write good laboratory reports please pay special attention to [journal articles in the library](#). By reading original articles you will quickly learn the “Do’s and Don’ts” of writing a good laboratory report.**

Although your lab report is expected to be **thorough** and **detailed**, you need to be able to present your results, discussion, etc. in a **WELL-ORGANIZED** and **CONCISE** manner.

<b>TITLE</b>	
The title should be descriptive and tell the reader what the paper is about	
<b>DO:</b> - make it specific - use a title that includes the organism and tissue being worked on - if the study consists of multiple parts, include each in the title in the order of importance	<b>DON'T:</b> - use “Lab Report #1” as the title - use the title on the website - use abbreviations

<b>ABSTRACT</b>	
Abstracts are necessary for quick scanning of scientific literature when researching a topic. An abstract should summarize the experiment and should contain (1) <b>the purpose</b> , (2) <b>all the major results of the experiment</b> , and (3) <b>the main conclusions arrived at from the data</b> . Assume that the reader has not read the rest of your paper and just wants to understand the main points. It is usually easier to write the abstract after you have finished writing the rest of the paper.	
<b>DO:</b> -include values (include statistical values where applicable) -draw conclusions (supported by your data), this can include observed trends	<b>DON'T:</b> -use references in the abstract - refer to figures or tables - describe materials and methods -use abbreviations -give explanations for data

## INTRODUCTION

An introduction should let the reader know what you are doing in the experiment and why you are doing it. You will need to review what is known about the subject area and how your experiment will contribute to what is known.

A well-written introduction, while reviewing the literature, should draw the reader's attention to the purpose of the experiment, resulting in a specific statement of the hypothesis.

### DO:

-use references (reference properly – see “Reference Section” below)

- 1) **Include general background information** – Introduce and explain the **concepts** and **terms** being studied in the experiment using references to the literature. –  
**Hint:** If you are unsure of which terms and concepts you need to explain, most of them are introduced on the website.
- 2) **Briefly review similar experiments from the literature.** – What were they trying to demonstrate? – What did they see?
- 3) **Clearly state the objectives/purpose** of your experiment(s)
- 4) **Include an hypothesis** which is supported by the literature.

### DON'T:

- introduce unrelated (irrelevant) topics
- explain materials and methods
- state any results or conclusions
- use the website as a reference

## MATERIALS AND METHODS

- For BIO318 you are sometimes not required to give a detailed description of experimental design and procedures used. However, you should state that experiments were performed as described on the BIO318 website and state if any part of the experiment deviated from the one described.

- **If you used data other than your own, you should** make a note of which data it is and the names of the person/people you obtained it from.

## RESULTS: TEXT

A written description of your data explaining the figures and tables. This should be done objectively without considering what the data means. **The text should include numerical data and describe important trends, comparisons and relationships.**

If you are only handing in a results section for a particular lab, we expect to see a results section precisely as if it were lifted from a full paper **including text, and figures and tables with full captions.**

### DO:

- you must refer to every table and figure in the results text
- include units whenever you state a value
- wherever possible use **quantitative** rather than qualitative descriptions
- answer/address all results related questions, if you are having trouble identifying these questions, ask your TA.

### DON'T:

- make any type of interpretation, speculation or conclusion about your results
- describe results from another source (or use references)
- include any materials and methods
- include example calculations, these are included in an Appendix section at the end of your report
- describe what you think the results should have been
- do not use the term "significant" in describing your data unless a statistical test was performed.

## RESULTS: FIGURES

The tables and figures should summarize the important data and should be **clearly separated from the text portion** of your results.

### Captions

Figures and Table **captions should include the figure number** (e.g., Figure 1., or Table 1.), a **title**, and enough of a **description** to understand the figure without referring back to the text.

Captions usually go **above tables** and **below figures**.

### DO:

- Number and title every table and figure (separate numbering is used for tables and figures)
- label axes and include units
- use **different symbols** (squares, circles, triangles, etc.) for different plots on the same graph rather than numbers or colours
- the **symbols should be explained in the caption** rather than on the graph itself
- if working with **means**, show the **standard deviations** and **note the sample size** in the caption

### DON'T:

- put a title above the graph
- use a title such as "blood glucose level vs. time"
- write the coordinates of a point or the standard deviation on the plot beside the point on a figure
- omit data that does not fit your expected result
- repeat any data in a table and a figure**, this is redundant and makes the paper confusing and lengthy

## DISCUSSION

The discussion is the portion of the paper where the data is analyzed for scientific meaning and the significance, if any, to the body of knowledge in the area of study. You should be able to **relate everything** in your discussion (e.g., terms, concepts, previously published results) **to your own results**.

**-Clearly and directly state what you think the data show and explain why.** To do this you will have to refer extensively to the literature.

**-Whenever you explain a concept you should refer to a piece of data from your experiments to illustrate the point.** If you can't, you probably should not be discussing this concept.

**-\*\*Note: Do not use your entire discussion to explain the limitations of the experiment or to explain why your data may be wrong because of experimental error.** Although a **brief** discussion about the limitations of the experiment may be relevant (you should be able to judge if it is relevant or not), spending too much time on this sort of discussion indicates to the reader (**i.e., the person marking your report**) that you did not understand the purpose of the lab and did not read or understand the appropriate background literature.

### DO:

- use references (reference properly)
- briefly summarize** your results
- compare your values** to those found in the literature
- explain why your values may be different** from **your hypothesis** or those **previously published**
- if you are explaining differences in terms of limitations of the experiment, refer to specific data and **briefly** suggest how improvements may be made\*\*
- try to think of **physiologically relevant explanations** for your data (**using references**)
- expand** on topics covered in the **introduction** and relate them directly to your own results with references to support any conclusions/statements

### DON'T:

- simply repeat concepts explained in the introduction.** You may expand on some concepts and relate them to your own results.
- draw conclusions not directly supported by your data
- explain the materials and methods
- explain data simply by stating "experimental error", this implies a lack of thought on your part

## REFERENCES

**References must be relevant** and you must reference the article properly within the text of your formal report.

### HOW TO CITE REFERENCES:

If you make a statement that is not general knowledge, that isn't based on your data, or that isn't a result of your original thinking, you must reference it. You must also not submit another person's work or ideas as your own

References **in the text** should be in the following format.

Brown (1967) found that ... - at the beginning or middle of a sentence

... (Brown, 1967). - at the end of a sentence

... (Brown and Jones, 1967). - if there are two authors

... (Brown *et al.*, 1967). - if there are more than two authors

... (Brown *et al.*, 1967; Smith, 1995). - if there are two papers or more or

Both Brown *et al.* (1967) and Smith (1995)... - at the beginning of a sentence

(*et al.* means "and others" in Latin - and signifies "and the other authors of the article" and **should always be italicized**)

#### DO

- reference every statement in a paragraph if necessary
- use last name of author and year only when referencing a statement in the text of your lab report

#### DON'T

- ever use quotation marks in science
- use one reference at the end of a paragraph to reference the whole paragraph
- indent a paragraph and reference it (as in English essays)
- use numbers (which is sometimes done) instead of author and year
- give the first name or initials of the author(s)
- reference anything that is not published (such as lecture notes)

## HOW TO FORMAT YOUR CITED REFERECES IN THE REFERENCE SECTION:

The order for references within parentheses in the text should be alphabetical. For works by the same author(s) in the same year, append a lowercase a, b, c, etc. to the year of publication. The reference list should conform to the following styles:

### *Journal article*

Author AB, Author CD, Author EF, 2001a. Title of article. J Hered 60:128-132.

### *Paper in a conference proceedings*

Author AB, Author IJ, Author KL, 2001b. Title of conference paper. In: Unabbreviated Title of Symposium or Conference, Location, Date (Able ST, ed). City and state or country of publication: Publisher's name; 137-180.

### *Book*

Author GH, Author IJ, 1999a. Title of book. City of publication: Publisher's name.

### *Chapter in a book*

Author GH, Author IJ, 1999b. Title of a chapter: a subtitle. In: Title of book, 2nd ed (Able MN, Baker OP, eds). City of publication: Publisher's name; 200-235.

### *Thesis or dissertation*

Author MN, 2002. Title of thesis or dissertation (PhD dissertation). Location of university: Name of university.

Only published material or material accepted for publication should be listed in the references; personal communications, unpublished data, manuscripts in preparation, etc., should be incorporated in the text in parentheses with the surname and initials of the source, e.g., (Able OP, personal communication).

### **DO**

- include full citation of all references used in the text
- put in alphabetical order in terms of last name of the first author of the articles or books
- include all authors in a citation
- reference at least five original journal articles

### **DON'T**

- reference websites or lecture notes (these are not published).
- include any citation not used in the text
- use *et al.* in reference section
- use footnotes or endnotes (as in English essays)

## APPENDICES

The appendix or appendices are included in the lab report **after** the Reference section.

### **DO**

- include raw data
- include one example of a sample calculation when necessary

### **DON'T**

- include any Results figures

## **OTHER THINGS YOU SHOULD KNOW:**

- The text should be in the past tense, third person perspective.

E.g., Instead of writing “My results indicate that...” you should write, “The results indicated that...”

- proofread for spelling (use a spell check) and grammar mistakes
- do not put quotes around, bold, or underline a word or phrase to emphasize it
- do not use the term "significant" in describing your data unless a statistical test was performed
- use only very common abbreviations (DNA is ok, TRI for triglycerides is not) and the first time you use an abbreviation, include a full description in brackets beside it. eg .....triglycerides (TRI).....
- do not use a duotang, booklet or binding (one staple makes it easier to read and write comments)

### **TO MAKE YOUR PAPER REALLY PROFESSIONAL** (and impress your T.A.)

- make sure your text is logical and well thought out and flows from one paragraph to the next
- be scientifically rigorous in your arguments
- use statistical tests on your data to determine their significance
- draw deeper comparisons of the data than was asked for and give a thorough comparison to the literature.