

How to Write a Laboratory Report

DEPARTMENT of MOLECULAR BIOLOGY AND GENETIS

İstanbul AREL University

Prof. Dr. Ergül BERBER 2024

The ability to report technical information clearly and concisely is fundamental to the sciences. As such, science students are often required to prepare formal reports about experiments or investigations undertaken in the practical components of their courses. These reports must clearly communicate the aims, methods, findings and conclusions of an experiment. This Learning Guide shows you how to prepare a practical report and provides tips for ensuring a good grade.

Laboratory Report Structure Practical reports have a clear, linear structure. Table 1 shows the different sections of a practical report and states the function of each section. (Requirements for individual courses may be different.)

The lab report should be divided into clearly labeled sections as defined below. The headings must be included.

Table 1. Lab report sections and section functions

Section	Function
Cover Page	Clearly and concisely informs the reader of the report topic (a title may be provided to you), the performers, the date of the experiment, the submission date.
Aim	For every lab experiment, you must give an aim. <input type="checkbox"/> The aim should state the purpose of the experiment. <input type="checkbox"/> It may be written in the form of a question and shows what you hope to learn from the experiment.
Introduction (Approx. word count: 500)	Provides background information needed for the reader to understand the context and purpose of the experiment.
Materials	All materials used to complete the laboratory should be listed
Methods	Steps of the procedure should be numbered and listed or Steps should be written in complete sentences with a noun and a verb.
Results	Present your results in an organized way. Give the results you found, not what you think you should have found!
Discussion	Interprets and explains the findings, and places them in the context of background information. Summarises findings and interpretations.
References	Presents the sources of information used in the report.

COVER PAGE

[Title of the experiment]

[Your Name, Last name]

[Your Student Number]

[Date of the experiment:]

[Date of Submission:]

[Instructor's name:]

[Lab Assistants's name:]

Aim:

For every lab experiment, you must give an aim.

□ The aim should state the purpose of the experiment.

□ It may be written in the form of a question and shows what you hope to learn from the experiment

You can use:

“The aim of the experiment was to observe....”

“The aim of the experiment was to perform....”

“The aim of the experiment was to analyze....”

Example: the aim of the experiment was to observe physical characteristics of *D. Melanogaster* which is commonly used as a model organism in genetic experiments.

Introduction:

The *introduction* section is one of the parts that you should write. This is information you need to provide pertaining the experiment. You will need to refer to various sources to gain the knowledge necessary to write a hypothesis and carry out the experiment. The introduction gives background information on why your experiment is important and clearly states the issues that will be addressed in the rest of the report.

In biology lab reports, the introduction is like a framework for the whole text and it shows that you fully understood the topic and the purpose of the experiment. Your introduction should include:

- at least 2 paragraphs,
- a clear statement of the specific question or issue addressed, □ a logical argument as to why the question or issue was addressed, □ specific hypotheses and a rationale for those expectations.
- References or examples to support all statements of fact or opinion.

In this part, it is helpful to jot down facts and references and you can also use lecture notes. The introduction should not be too long and it has to contain the specified terminology related to the subject. It is usually not allowed to prove something in the introduction - you should only describe, not demonstrate the truth. You can also find a sample biology lab report to see how this section has to be written. An example is provided below.

Example:

It is a proven fact that enzymes are catalytic proteins whose function is to accelerate reactions by means of lowering activation energy (Campbell, 1996). In the experiment, we studied the rate of reaction between oxygen and catechol and their ability to form benzoquinone in a condition where the concentration of enzymes (catecholase) was different. We supposed that the concentration of enzymes directly influences reaction rates.

Materials and Methods

Students should write this section at the beginning and have it contain an explanation of the study that was conducted. In this part, you describe the whole procedure you did in order to help other students do this experiment in the future. It is allowed to use diagrams in this part. You need to write about the measurement methods and techniques, indicate all sizes, quantify things, etc.

Be accurate and careful in this section!

Also keep in mind the following guidelines:

- Experimental design is clear and complete.
- Rationale for each step is clearly indicated. □ Precision of all measurements is indicated.

Brief description is included of how data were analyzed (i.e. calculations made, statistical tests used).

Use the information you recorded in your lab notebook as a guide to write this section. Provide enough information so that the reader could repeat the experiment, but not so much that it distracts the reader from understanding the overall experiment.

Here is an example of having too much information:

First, we obtained a 10 mL beaker. We used a yellow p20 pipette to take out 12.0 μ L of the sample, which was then added to the beaker.

Here is an example with just enough information:

12.0 μ L of the sample was transferred to a 10 mL beaker.

Example:

Materials:

30 grams of potato

150 ml water

Beaker

Kitchen blender

Cheesecloth

Methods:

Preparing an extract of catecholase, we used a washed, skinned, and diced potato and we used a scale in order to get precisely 30 grams of potato. We also poured 150 ml of water into a beaker. We added water to the potato, removed the cover of a kitchen blender, and added both ingredients to a blender, we then put the cover back on and pressed the start button, noting the

time. Then we pushed the button again to stop the blender. We used four layers of cheesecloth to filter the result and then we stored the obtained extract in a clean, closed container.

Results

In paragraph format, write exactly what you observed. Lead the reader to your figures and cite them within your text. Present your data in the form of tables, graphs, and pictures. Be sure to include a descriptive title and legend or caption for each figure you include in the paper. Don't forget statistics and p-values, if calculated, for data.

Here you need to present the findings to your audience in a clear, orderly way. Don't use too many words - include only important information that should be concisely written. Organize all your facts in a logical fashion and do not interpret your results in this section. You also don't need to describe your methods here. Here you need to figure out the trends that follow your facts which you have learned during your experiment - try to call the reader's attention to trends or patterns.

Remember:

- Results are written in past tense.
- All general statements are supported with reference to data.
- Major results are presented in words, but meanings/implications are not discussed yet (saved for discussion section).
- Each figure or table has an informative caption or legend.
- Tables and figures are numbered in the same order as referred to in the paper.

Titles for Figures:

- Number & Title are necessary!

For example:

Figure 1. Mean number of nodules produced in each of three treatments: low light, moderate light and high light conditions **Example:**

Table 1. List of the experimental groups, protein concentration and absorbance used in the experiment

Experimental group	Protein concentration (micg/micl)	Absorbance (595nm)
Media	2,04	0,57

Media/LPS	2,16	0,60
Drug	2,50	0,69
Drug/LPS	2,22	0,61

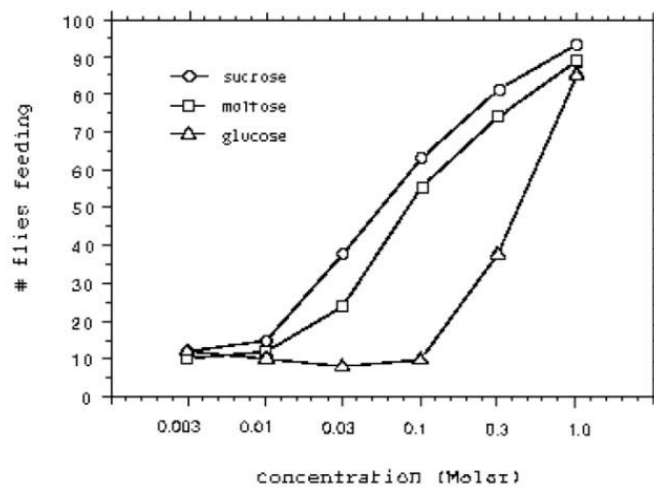


Fig. 1. Taste response curves of flies to different concentrations of the sugars glucose, maltose, and sucrose.

Discussion

After you have written the results, start to write a discussion. Here you have to write about your ideas after the experiment was conducted and inform your readers about your thoughts that are based on the results of the experiment. There should be a comparison of your results and your expected findings.

Write in this section some information about whether your results supported your thesis or there were variances. Your interpretation must be original and you can write from being specific to general and do not prove or disprove your hypothesis. Add some original ideas to your interpretation and end with a concluding statement.

The “Discussion” section differs from the “Results” section, where you simply report what you saw. In the “Discussion” section, you interpret your results in order to explain why and how you obtained those results. State whether the results support your hypothesis. Then, make

conclusions throughout your discussion, but always base your interpretation on evidence rather than feelings or guesses. Answer questions like the following:

- Why did you get the results you got? What happened? What could have caused your results?
- Not all experiments are perfectly conducted, so what are some experimental errors that could have skewed your results?
- What were the strengths and weaknesses of the experiment? How did each weakness possibly affect the results?
- What further experiments can be done to confirm your data? What additional questions should be posed? How should the present study be modified in the future?

Example

Proteins catalyze reactions by bringing down the activation energy of the reaction; catecholase, an enzyme discovered in potato, changes catechol to benzoquinone with the presence of oxygen. We expected that more benzoquinone would be shaped by the presence of a more noteworthy measure of catecholase. This theory was proven by the outcomes acquired.

Catalysts are influenced by the environment – the level of pH present in the environment is one factor that can modify chemicals while the rate at which the compound shape item is moderated or accelerated depending on how near to the standard the environment is.

Citing sources

The last part of your work is to cite the sourced that you have used in order to reference them in the future.

Give credit where credit is due. *In-text – (Author, year);*

For example, in the body of the lab report:

The sky is red at sunset due to the refraction of light off particles of pollution (Smith and Jones, 1945).

At the end of the report in the Literature Cited section, specific format and alphabetized by author:

Example

- Dethier, V.G., & E. Bowdan. 1989. The effect of alkaloids on sugar receptors and the feeding behaviour of the blowfly. *Physiological Entomology* 14:127-136.
- Pechenik, J. A. (2001). *.A Short Guide to Writing About Biology* (4th ed.). New York: Addison-Wesley.

- Wilcox, M. R. and G. S. Hoffman. 1987. Human Anatomy and Physiology. Third edition. Benjamin/Cummings, New York, New York. pp. 435- 440.

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Proofreading Your Biology Lab Report

After you have written your work, check it carefully to find any grammar or spelling mistakes in it. Ensure that you followed the required format and style and cited all the sources you had used. Do not forget to prepare your title page following any special requirements and use a reasonable font for your work. Ensure margins are also according to the formatting style that your instructor requires. Include page numbers, additional information, your full name, and the headings to your sections.

Don't let plagiarism ruin your grade

Lab reports are individual assignments - you may have a partner while you conduct experiments, but you always need to write the paper on your own. Do not plagiarize other's work. You need to understand your material well and you also must understand which format and style of work you need.

Other Science Writing Tips

□ Be clear, concise, and specific. Don't write about feelings. Avoid wordiness and unnecessary details. Focus on observations.

□ Avoid personal pronouns ("I" or "we").

□ When formulating your hypothesis, think of it as creating a thesis statement. It should be the guiding statement of your paper.

□ Write your entire paper with your hypothesis and objectives in mind. Your results and discussion sections should refer to those in order to maintain the focus of the paper.

□ Write your entire paper in the past tense (except when making suggestions for the future in your discussion section).

□ Visit the science tutors in the ARC for help with content and the writing tutors for help with writing concerns (i.e. clarity, grammar, formatting)