

Guidelines for protocol writing within biological practical courses

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Some general remarks

In this text you are provided with basic guidelines for protocol writing. Following these guidelines is obligatory. Ignoring them may lead to rejection of your text. The course leader can modify these rules. Such modifications have to be respected.

Protocols have to be written in your own words. Copying ideas or whole sentences without paying credit to their author is against good scientific practice and is regarded as plagiarism which will have serious consequences.

General protocol structure

A protocol consists of

- 1) Table of contents (generated automatically),
- 2) Summary/Abstract,
- 3) Introduction,
- 4) Material and methods,
- 5) Results,

- 6) Discussion and,
- 7) Cited literature.

Every group member attaches a signed cover sheet to the protocol. Every group member is responsible for the content of the whole protocol.

Special instructions for protocol chapters

- **Summary/abstract**

Summarizing overview of the whole experimental unit (about 10 lines).

- **Contents**

The table of contents should be generated automatically with a windows style sheet or similar.

- **Introduction**

The introduction should be written for the whole experimental unit. Every experiment has to be mentioned in the introduction, and you can subdivide the introduction into paragraphs. The introduction should start with a short overview of the current knowledge and lead to the questions or hypotheses relevant for the experiments. Therefore, the content should be chosen carefully and it should fit to the experiments.

- **Material and methods**

The experimental procedure should be described in detail and in your own words. You may not copy the material and methods part from the script. Calculation procedures and pipetting schemes are to be stated in this part. A third person should be able to repeat your experiment after reading your material and methods part.

- **Results**

The results should be described in a running text. References to figures and tables demonstrating the results appear in brackets within this running text. A mere list of all measured values is not acceptable. A figure is no replacement for the description of results in the running text. Scientific results should be expressed in neutral language without interpretation or judgement.

- **Discussion**

The discussion should contain the following topics:

- a brief and comprehensive summary of the results
- interpretation of results
- answers to the questions raised in the introduction
- discussion of the results with relation to current knowledge and literature

Expectations should be explained in detail. It is not sufficient to reference them as „in the literature“. Knowledge resources, foreign ideas or texts have to be quoted according to the rules of good scientific practice. Only major mistakes in performing the experiments are briefly discussed. The aim of the discussion is not merely to find mistakes in the own experimental procedure. You cannot leave major errors unmentioned but the main content of the discussion should consist of the topics listed above. Like the other chapters you may subdivide the discussion into paragraphs. Every experiment of the experimental unit has to be mentioned in the discussion.

- **Literature**

The protocol closes with a list of all used sources. Sources have to be referenced in a way that a third person is able to find them and should appear in a consistent style. Acceptable sources are: textbooks and scientific papers. There are various styles how to cite literature in scientific writing. An easy way is to number the articles in the reference list and quote their numbers in the text. Most word processing programs have built-in-functions to automatize quoting. Use them!

Figures and tables

Figures and tables should be numbered. Also here, using a built-in function to work with references is helpful. Every table and every figure should get a short comprehensive title and a caption. The caption briefly explains the content and the relevance of the figure or table. It contains all abbreviations and should be understandable without reading the running text. Captions and titles do not replace the running text. In figures, the title appears below the figure, in tables it appears above the table as a headline. Illustrations

of results appear within the results. Pay attention to correct labelling when generating diagrams!

Quotes and references

Every piece of knowledge exceeding the horizon of an average high school graduate should be accounted for with a quote. This is independent from where it appears (introduction, material and methods, results, discussion). In the running text you may quote with bracketed numbers clearly referring to an item in the table of references. Literal quotes (although very uncommon in the natural sciences) have to appear in quotation marks and are followed by a detailed reference showing page and lines of the quote.

Every table and every figure has to be referenced in the running text. Use the built-in functions of your word processing software.

Protocol submission and revision

The complete protocol has to be submitted at the supervisor 7 days after the experimental unit, at the latest. Also revisions have to be submitted 7 days after reception of the corrected protocol. Protocols should be submitted as hard copy in case of a revision, the previous version has to be attached. Every protocol can be revised once. In a revision, every text passage marked by the supervisor has to be corrected. It is not acceptable to merely delete sentences that are wrong with regard to content or formulation without correcting them.