

HOW TO WRITE A SCIENTIFIC ARTICLE FOR PUBLICATION

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Manuscripts that are successfully submitted to a journal for publication have three main components:

- 1. The overall idea**
- 2. The execution of the work and**
- 3. The presentation of the work**

A poor idea or a poorly designed investigation cannot be saved by an excellent presentation of the work.

An equally excellent idea that is well investigated can still be doomed by a poor presentation.

STRUCTURE AND APPROACH

Scientific research begins with a defined research question. This foundation should lead to a set of data from which the manuscript can be constructed.

Manuscript submitted to journals for consideration for publication typically have the following components:

1. Title Page

2. Abstract

3. Introduction

4. Methods (Materials)

5. Results

6. Discussion

7. Conclusions

8. Acknowledgements

9. References

10. Tables and Table captions

11. Figures and Figure captions

A reasonable approach to writing a scientific manuscript may be the following:

1. Write **Methods Section** - This is derived from the initial research protocol.
2. Construct all the **Figures** and **Tables** that contain the data included in the work.
3. Write the **Results Section**.

4. Reconsider the scientific questions the manuscript will address and then write the **Introduction**.
5. Use the **Introduction** and **Results** to guide the writing of the **Discussion**.
6. Summarize everything in an **Abstract**.
7. Condense and refocus the **Abstract** into **Conclusions Section**.

These are only suggestions on how a scientific paper may be written. The important thing is the

GUIDING PRINCIPLE

In general, the purpose of a scientific paper is to construct a clearly written document that

- describes a **question** and then
- logically presents an **answer** to this question that is based upon
theoretical or experimental results.

TITLE PAGE

- 1. Title of the manuscript (short – simple),**
- 2. Authors and their affiliations,**
- 3. Journal to which manuscript is being submitted,**
- 4. 5 key words or short title (Running Title?)**
- 5. Complete contact information for the Corresponding author**

ABSTRACT

- 1. This is considered an independent document,**
- 2. It is typically a single paragraph,**
- 3. The first sentence should clearly state the objective of the experiment,**
- 4. If the experiment is based upon a hypothesis, the hypothesis should be stated and followed with statements describing its basis and evaluation.**

ABSTRACT Cont'd

- 5. Subsequent sentences describe how the investigation was carried out,**
- 6. Then followed by the results of the experiment**
- 7. Final sentence describe the significance of the results and the impact of the work on the general field of study**

INTRODUCTION

- 1. Requires a short review of the literature pertaining to the research topic.**
- 2. Usually between 3 to 4 paragraphs. The final paragraph is critical. It clearly states what (most likely in the first sentence of the paragraph) experimental question will be answered by the present study.**
- 3. The hypothesis is stated followed by a brief description of the approach that was taken to test the hypothesis.**
- 4. Finally, a summary sentence may be added stating how the answer of your question will contribute to the overall field of study.**

METHODS

- 1. A straightforward description of methods used in the study.**
- 2. Describe each method in a separate section.**
- 3. Mention the vendor and vendor contact information for each material.**
- 4. Keep explanation brief and concise.**

METHODS Cont'd

- 5. If a specific experimental design is utilized, describe the design in the second section of the methods after the materials section.**
- 6. Also describe the statistical analysis methods utilized to analyze the results, if any.**

RESULTS

1. This section presents the experimental data to the reader. (**Note – it is not a place for discussion or interpretation of data**)
2. Introduce each group of tables and figures in a separate paragraph where the overall trends and data points of particular interest are noted.
3. For experimental studies, key statistics such as the number of samples (n), the index of dispersion (SD, SEM) and the index of central tendency (mean, median or mode) must be stated.

Don't forget Mr. "P" (p – values) here

4. Be succinct.

DISCUSSION

1. This is often the most difficult to write for most 'GREEN HORNS' but should be relatively easy if previous suggestions above are followed.
2. A well-defined study that is described in the **introduction**, along with supporting **results** that are presented in the **Results Section** should ease the construction of the **Discussion Section**.
3. Begin the Discussion section with a brief paragraph that again gives an overview of the work.
4. Summarize the most important findings

DISCUSSION Cont'd

- 5. If applicable, accept or reject the proposal hypothesis.**
- 6. Identify the most interesting , significant, renewable findings that were presented in the Results section and contrast these findings in light of other studies reported s in the literature.**
- 7. You may want to discuss the potential weakness of the interpretation here.**
- 8. At the end of the discussion consider the other works in the Literature and address this topic and how your work contributes to the overall field of study.**

CONCLUSIONS

AGAIN !!!

- 1. Introduce the work and then briefly state the major results.**
- 2. State the major points of the discussion.**
- 3. Finally, end with a statement of how the work contributes to the overall field of study.**

ACKNOWLEDGEMENTS

- 1. Acknowledge the effort of any participants or consultants who are included as authors of the manuscript.**
- 2. State all findings, sources for the work ensuring that the statement adheres to the guidelines provided by the funding Institution.**

REFERENCES

- 1. Include all references that have been cited in the text.**
- 2. References should be considered such that they contain all key sources in the field as well as previous studies that support or motive in the present work.**
- 3. DO NOT INCLUDE extraneous references in an effort to simply cite particular authors or journals. But you may cite previous publications from your own laboratory.**
- 4. The mandated reference format by the Journal must be used.**

TABLES AND TABLE CAPTIONS

Tables are:

1. Generally included in a separate section after the references section.
2. Headed with a caption and title in bold
i.e **Table I: Material Properties** (bold)

This is followed by a sentence or two that describes the impact of the data included in the table.

FIGURES AND FIGURE CAPTIONS

- 1. As with tables, clarity is the key factor especially with images and graphs.**
- 2. All images should be as large as possible and include accurate scale bars.**
- 3. The graphs should be large, with data points and axis label in a large font.**
- 4. All figures need a caption which should identify the figure in bold, state a brief title to the figure, succinctly present the significant result or interpretation that may be made from the figure and finally state the number of repetitions within the experiment (i.e. $n = 5$).**

AUTHORSHIP AND ORIGINALITY

- 1. Plagiarism**
- 2. Authorship in the precise and mutually agreed order.**