

# The Structure, Format, Content, and Style of a Journal-Style Scientific Paper

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## Why a Scientific Format?

The scientific format may seem confusing for the beginning science writer due to its rigid structure which is so different from writing in the humanities. One reason for using this format is that it is a means of efficiently communicating scientific findings to the broad community of scientists in a uniform manner. Another reason, perhaps more important than the first, is that this format allows the paper to be read at several different levels. For example, many people skim Titles to find out what information is available on a subject. Others may read only titles and Abstracts. Those wanting to go deeper may look at the Tables and Figures in the Results, and so on. The take home point here is that the scientific format helps to insure that at whatever level a person reads your paper (beyond title skimming), they will likely get the key results and conclusions.

## The Sections of the Paper

Most journal-style scientific papers are subdivided into the following sections: Title, Authors, Abstract, Introduction, Methods, Results, Discussion, Acknowledgments, and Literature Cited, which parallel the experimental process. This document describes each section.

The sections appear in a journal style paper in the following prescribed order:

Experimental process	Section of Paper
What did I do in a nutshell?	Abstract
What is the problem?	Introduction
How did I solve the problem?	Materials and Methods
What did I find out?	Results
What does it mean?	Discussion
Who helped me out?	Acknowledgments (optional)
Whose work did I refer to?	Literature Cited

## Title & Authors' Names

A title succinctly describes the contents of the paper. Use descriptive words that you would associate strongly with the content of your paper: the molecule studied, the organism used, the treatment, the response measured, etc. A general rule-of-thumb is that the title should contain the key words describing the work presented

### Format:

The title should be centered at the top of page 1; **the title is NOT underlined or italicized.** the authors' names are double-spaced from and centered below the title.

For example:

Ducks Over-Winter in Colorado Barley Fields in Response to  
Increased Daily Mean Temperature

Ima Mallard

## Section Headings

Main Section Headings: Each main section of the paper begins with a heading which should be capitalized, centered at the beginning of the section, and double spaced from the lines above and below. Do **not underline the section heading OR put a colon at the end.**

Example of a main section heading:

### INTRODUCTION

## ABSTRACT

An abstract summarizes, in **one paragraph**, the major aspects of the entire paper in the following prescribed sequence:

- Question(s) investigated (or purpose), (from **Introduction**)
  - state the purpose very clearly in the first sentence.
- Experimental design and methods used, (from **Methods**)
  - clearly express the basic design of the study.
- Major findings including key quantitative results, or trends (from **Results & Analysis**)
  - report the results which answer the questions asked
  - identify trends, relative change or differences, etc.
- Brief summary of your interpretations and conclusions. (from **Discussion**)
  - clearly state the implications of the answers the results gave you.

Limit statements concerning each segment of the paper (i.e. purpose, methods, results, etc.) to two or three sentences. How do you know when you have enough information in your Abstract? If your Abstract was the only part of the paper you could share, would you be happy with the information presented there?

## INTRODUCTION

The function is to establish the context of the work being reported. This is accomplished by discussing the relevant research & literature (with [citations](#)) and summarizing the current understanding of the problem being investigated;

State the purpose of the work in the form of a question, and state the hypothesis.

Briefly explain the possible outcomes the study could reveal.

Quite literally, the Introduction must answer the questions, "What was I studying? Why was it an important question? What did we know about it before I did this study? How will this study advance our knowledge?"

## MATERIALS AND METHODS

Clearly explain how you carried out the study. It should read as if you were verbally describing the conduct of the experiment. Be sure to describe control variables (ie. where conducted, how measured...)

## RESULTS

Objectively present the key results, **without** interpretation, in an orderly and logical sequence using both text and illustrative materials (Tables and Figures). The results section always begins with text, reporting the key results and referring to your figures and tables as it proceeds.

**Tables** and **Figures** are assigned numbers separately and in the sequence that you will refer to them from the text.

- o The first Table you refer to is Table 1, the next Table 2 and so forth.
- o Similarly, the first Figure is Figure 1, the next Figure 2, etc.

Each Table or Figure must include a **brief description** of the results being presented and other necessary information in a legend.

- o Table legends go above the Table; tables are read from top to bottom.
- o Figure legends go below the figure; figures are usually viewed from bottom to top.

When referring to a Figure from the text, "Figure" is abbreviated as Fig., for example, Fig. 1. Table is never abbreviated, e.g., Table 1.

The text should guide the reader through your results stressing the key results which provide the answers to the question(s) investigated. The text is to provide clarifying information. You must refer to each Table and/or Figure individually and in sequence (ie. 1, 2, 3...). Key results depend on your questions, they might include obvious trends, important differences, similarities, correlations, maximums, minimums, etc.

## DISCUSSION

Interpret the results in light of what was already known about the subject of the investigation, and to explain our **new understanding** of the problem after taking your results into consideration. The Discussion will always connect to the Introduction by way of the question(s) or hypotheses posed. It does not simply repeat or rearrange the Introduction. Instead, it tells how your study has moved us forward from the place you left us at the end of the Introduction.

### Fundamental questions to answer here include:

Do your results provide answers to your testable hypotheses? If so, how do you interpret your findings?

Do your findings agree with what others have shown? If not, do they suggest an alternative explanation or perhaps an unforeseen design flaw in your experiment?

Given your conclusions, what is our new understanding of the problem you investigated and outlined in the Introduction?

If warranted, what would be the next step in your study, e.g., what experiments would you do next?

## **ACKNOWLEDGMENTS** (include as needed)

If, in your experiment, you received any significant help in thinking up, designing, or carrying out the work, or received materials from someone who did you a favor by supplying them, you must acknowledge their assistance and the service or material provided. Acknowledgments are always brief and never flowery.

## **LITERATURE CITED**

An alphabetical listing (by first author's last name) of the references that you **actually cited** in the body of your paper. **Do not label this section "Bibliography"**. A bibliography contains references that you may have read but have not specifically cited in the text. Bibliography sections are found in books and other literary writing, but not scientific journal-style papers.