GUIDELINES FOR WRITING A SCIENTIFIC PAPER

Information gathered in the laboratory is useless unless it is presented to the scientific community for review. The goal of this assignment is to introduce you to the scientific paper. The research paper will use the format adopted by scientific journals. You are encouraged to go to the library and inspect several journals. Choose one dealing with a topic that interests you. You will find that most articles are divided into six distinct sections. These are the Abstract or Summary, Introduction, Materials and Methods, Results, Discussion, and Bibliography or References. On the following pages you will find descriptions of each section.

Organization of a Scientific Paper

Title

Every paper must have a title. Here are some helpful hints to consider when writing a title. Be informative, concise and avoid vague generalizations. The title should be self- explanatory.

Abstract or Summary

The abstract summarizes the major points of the paper and should be understandable without reading the entire paper. The abstract should be no longer than a paragraph. Therefore, you must be concise and brief; the reader should be able to grasp what you did, why you did it, how you did it, what you found and what you conclude.

Introduction

The introduction orients the reader to your research topic. In general, the background information necessary for the reader to understand the significance of your research is provided in the first part of the Introduction. The rational for performing the experiments is then given in the second. The hypothesis is usually also presented in this second part.

Materials and Methods

In this section, you should provide enough detail so that the reader could perform the experiments. However, do not repeat information about standard procedures that are cited from another source. Any revisions that you make in a published procedure must be noted. For example, you need to include important details such as temperatures, pH, procedures, etc but you can assume your audience knows their way around a laboratory. It is unacceptable to write the Materials and Methods in list form and to write it in active voice. This section is always written in passive voice; i.e., "Six test tubes were filled with serum albumin."

Results

The evidence used to defend your hypothesis is found here. The easiest way to present results is to use tables or figures. Use text to describe your results and refer the reader to the tables and figures. Be careful not to draw conclusions or make interpretations about the data.

Tables and Figures

Numerical values are presented in a table, as is verbal information that would be difficult to describe in the text. Trends, patterns, and relationships are better illustrated by figures. All tables

and figures must bear a title and a number. Each figure or table should be able to convey its information without explanations in the text. Here are some key points to remember. Each table and figure must be numbered consecutively, have a title, and referred to in the body of the text.

Discussion

The discussion pulls the paper together. This section is devoted to analyzing the results. The discussion frequently begins with a restatement of the hypothesis. Then, it continues with a discussion of whether the data presented in the "Results Section" is consistent with or supports the hypothesis. Work carried out by others that relate to the hypothesis is also presented here. You should also indicate any inconsistencies and provide an explanation for these. Explain any mistakes that were made and how these affected the results. How might the experiment be done differently to improve the results?

Bibliography

It is extremely important to give credit where credit is due. You cannot claim that the experimental procedure is yours unless of course you were the first to use it. Likewise, you cannot claim that an idea is yours if it is not. Therefore, you must provide appropriate citations for all material that is not yours. This includes background information that may have been presented in the text and by your instructor. Information can be obtained at your library. College /university libraries usually receive numerous scientific journals and many of these journals are also on-line. In addition, the Internet can provide a wealth of information. For example, you can recover many useful papers by typing in words such as "peroxidase" and "carrot" using a standard search engine. Even better, try search engines that search the scientific literature such as the "Google Scholar."

Hints on Writing Your Paper

Now that you know the structure of a format paper, you are ready for a few helpful hints to help you complete the assignment.

1. You may find it easier to write the paper out of order. For instance, you can do the materials and methods right now. Later, you will make minor corrections to reflect the steps that you did differently

2. It is also helpful to prepare an outline before you write. The outline will be the 'skeleton" of your paper. The outline will allow you to think about what subtopics neat to be included in each section and will serve as a 'memory jogger" so you will not omit an important part.

3. When writing, it is important to pay attention to your grammar, sentence structure, punctuation, and spelling. Select your words with care. Be precise and accurate.

4. Define new terms; acronyms and abbreviations when you first use them. Abbreviations and acronyms are handled by spelling out all words the first time you use them and placing the abbreviations in parenthesis.

5. Be accurate in reporting your facts. Incorrect information is misleading and sloppy on your part. In addition, proofread you paper carefully.