How to write & publish your research results

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A well-written scientific paper

explains the scientist's motivation for doing an experiment, the experimental design and execution, and the meaning of the results that is written

Purpose

- Inform others what you have done
- Report for the financial supporter
- Show your (your institution) existence
- Get a point (CV, level, etc)
- Become popular in the society
- Know the respond of others to your work

Basic purpose

To inform other scientists about an important issue and to document the particular approach used to investigate that issue.

How to write?

Style

- Write in correct English
- Use correct genetic nomenclature for both genotype and phenotype
- Abbreviations

  - standard (hr, min, sec, etc)

  - Define all other abbreviations the first time they are used, then subsequently use the abbreviation (if it use >3x)
- Present tense: If the statement is generally accepted
- Past: For the result you & others have done present but your conclusion should be in present
- Future tense: for the work you are going to do

Style

- Most text should be written in the third person to avoid sounding like an autobiographical account penned by a narcissistic

  “It is possible to ..”

  “One could ...”.
- Avoid double parentheses

  “Three gene products catalyze reactions in

  the pathway for proline biosynthesis (Figure 1) (3)”

  “Figure 1 shows the three reactions of the pathway for proline biosynthesis (3)
- Always spell check before submission

General organization

separating the body of a paper into sections

- Title
- Authors
- Abstract
- Introduction
- Methods
- Results
- Discussion
- Acknowledgement
- Literature Cited
- Appendices

Title

- Should be put in the first page
- Omit all waste words:

  "A study of ...", "Investigations of ...", "Observations on ...", etc.
- Specific in describing the experiment you performed.

  "Effects of a Variety of Anti-microbial Agents on Four Bacterial Cultures"

  "Anti-microbial Agents".

Authors

- All person involve in the work
- First, second and last authors
- Name of institution & address (mail, email, phone & fax)

Abstract

- A shortened version of the paper
- Frequently, readers of a scientific journal will only read the abstract
- Available to scientists by various computer abstracting services

Abstract should:

- be written carefully and succinctly to have the greatest impact in as few words as possible
- enable the reader to identify the basic content of a document quickly and accurately, to determine its relevance to their interests, and thus to decide whether to read the document in its entirety.
- contain all information necessary for the reader to determine:
    (1) what the objectives of the study were
    (2) how the study was done
    (3) what results were obtained
    (4) and the significance of the results
- it is easiest to write the abstract after the paper is completed.

Introduction

Why is this study of scientific interest and what is your objective?

- Discusses the results and conclusions of previously published studies, to help explain why the current study is of scientific interest.
- Move from general information to specific information.
- Limit to studies that relate directly to the present study
- Summarize succinctly, but it should not be itemized.
- Emphasize your specific contribution to the topic.
- The last sentences should be a statement of objectives and a statement of hypotheses.

Cite Sources (in the Introduction)

- as evidence of the claims you are making.
- 1 or 2 authors are always cited in the text using their last names
- if there are more than two authors, the last name of the 1st author is given followed by the abbreviation **et al.**
- it is acceptable, and encouraged, to cite more than one source for a particular statement (gives the statement more validity in its context & suggests that your research was thorough
- the sources are ordered by publication date (the earliest comes first)

Materials & Methods

- provides all the methodological details necessary for another scientist to duplicate your work (population, sample size, lab methods, statistic, etc)
- thorough without being too descriptive or wordy

  "I took up 1 ml of bacterial broth from a 5 ml tube with a 2 ml plastic pipet and expelled it onto the surface of one agar plate"

  "One agar plate was inoculated with 1 ml of bacterial broth"
- includes detailed information but not things that typical scientists would find unnecessary

Materials & Methods

- should be a narrative of the steps you took in your experiment or study
- should assume that the other scientist has the same basic skills that you have, but does not know the specific details of your experiment
- If any of your methods is fully described in a previous publication (yours or someone else's), you can cite that
- Equipment and materials available off the shelf should be described exactly (Licor underwater quantum sensor, Model LI 192SB)
- Show to a colleague. Ask if they would have difficulty in repeating your study.

Result

- Presents the results of the experiment but does not attempt to interpret their meaning.
- The trick: knowing what information to include or exclude.
- Use the text to state the results of your study, then refer the reader to a table/figure
- Summarize the data with text, tables and/or figures if it more efficient to use it.

- Do not include the same data in both a table and a figure.
- Do not attempt to evaluate the results in this section.
- Refer in the text to each figure or table you include in your paper.
- Number tables and figures separately beginning with 1 (i.e. Table 1, Table 2, Figure 1, etc.).
- Include table/figure with several lines of text in the legend (or caption) that explain the information that is being presented

Tables

- It is best to present the data in a table unless there is visual information that can be gained by using a figure.
- Not present the raw data
- Generally should report summary-level data, such as means ± standard deviations,
- A table's legend appears above the table

Figures

- Only use when the data lend themselves to a good visual representation.
- a figure is useful for reporting a regression analysis (line graph), or comparing the several treatment levels (bar graph with error bars)
- useful if the reader gains additional information from seeing the data in a graphic display.
- the legend appears below the figure and describes the important points of the figure
- Avoid to use color if it not necessary

Discussion

- Explain what the results mean or why they differ from what other workers have found.
- Interpret the results in light of other published results, by adding additional information from sources you cited in the introduction section as well as by introducing new sources.
- Make sure to provide accurate citations.
- Relate your discussion back to the objectives and questions you raised in the introduction section.
- Do not simply re-state the objectives. Make statements that synthesize all the evidence (including previous work and the current work).

Discussion

- Do not make statements that are too broad:
- Limit your conclusions to those that your data can actually support
- You can then proceed to speculate on why this occurred and whether you expected this to occur, based on other workers' findings.
- Suggest future directions for research, new methods, explanations for deviations from previously published results, etc.
- If necessary, note problems with the methods and explain anomalies in the data.
- Do not simply list the problems but provide thoughtful discussion about the implications of the errors in terms of your conclusions.

Acknowledgement

- Financial support
- Technical support
- Writing support
- Material support
- Participant support
- Not family support

“ *a sign that you respect to others that contribute to your work and that you are a team player”*

Litature Cited

- Papers are not referred to by footnotes as in literature papers but are cited within the body of the text
- No reference is listed in this section unless it was cited somewhere in the text.

Litature Cited

- **For scientific papers:**
  Monod, J. 1949. The growth of bacterial cultures. *Annu. Rev. Microbiol.* 3:371-394.
- **For a book:**
  Neidhardt, F.C, Ingraham, J.L. and. Schaechter, M. 1990. *Physiology of the Bacterial Cell*. Sinauer Associates, Sunderland, MA.
- **For a newspaper article:**
- McKay, D. 2000. Arsenic: how much is safe? *Albuquerque Journal.* July 30, 2000, p. A1.
- **For a web site:**
  National Research Council. 1999. Arsenic in drinking water. Subcommittee on Arsenic in Drinking Water. http://www4.nationalacademies.org/news.nsf/isbn/030906337?OpenDocument.
- **For a personal communication:**
  Sanchez, R. 1993. City of Socorro, Water Utilities Division, Socorro, NM. Personal communication.

Appendices

- Contain information in greater detail than can be presented in the main body of the paper, but which may be of interest to a few people working specifically in your field.
- Only appendices referred to in the text should be included.

How to publish

What to publish

- Full-length contributed articles are around 5000 words.
- Short notes are around 2000 words.
- General rule: its better to publish one solid contributed paper than it is to split the same work into two or three short notes!
- Articles in edited books are usually less prestigious than journal articles.
- First publish your data in a journal then consider publishing in a book. But do publish a review article of a research topic in an edited book.

Where to publish

- Spend time to select the right journal!
- Seek advice from an experienced publisher in your field.
- Scan current contents for journals matching the paper topic.
- Read articles from recent issues of potential journals.
- Examine the "References" section of your paper for common journals.

Submitting the paper

- Follow instructions to authors (usually given on last page of journal).
- Format paper accordingly.
- Provide correct number of copies of paper.
- Include all required information in a cover letter with the paper
- The players:
  - *Managing Editor (deals with administration)*
  - *Editor (selects reviewers; makes final decision on acceptance)*
  - *Reviewers (experts in the paper topic; editors choose reviewers whose work is cited in paper and who are not mentioned in the acknowledgments).*

Review of paper (check list)

- Example :
- Is the paper too long?
- Is the paper well organised?
- Are the design and analysis sound?
- Do the conclusions follow from the results?
- Has the author cited all relevant references?
- Are all the tables and figures necessary?
- Are the title and abstract fully descriptive of the text?
- Any ethical concerns with the paper?
- Are the statistics satisfactory?

Review of paper (Possible recommendations)

- Acceptance with little or no revisions
- Acceptance provided that revisions are carried out according to the reviews specific comments
- Rejection but allow re-submission after major revision
- Rejection

Revising the paper

- Check the time limit given for re-submission.
- Wait at least a few days before revising the paper.
- Write a cover letter to the editor addressing ALL reviewers' comments.
- Don't attack the reviewer.
- Don't be intimidated by the reviewer.
- Address criticisms and refute them if you think you are right.
- Be polite and indicate that you are doing everything possible and more.

Re-submitting the paper

- Follow instructions from Editor.
- Proof-read carefully.
- Include good laser copies of figures and tables.
- Indicate current date on cover page.

Proofs

- Galley proofs will arrive shortly before publishing paper.
- Cross-check with original version carefully.
- Respond within 24 hours of receiving proofs.
- Indicate precise changes in a cover letter.

Dealing with rejection

- Everyone must deal with having a paper rejected.
- Wait before revising paper in line with reviewers comments.
- Sometimes it may be appropriate to challenge the reviewer's decision.
- Don't be discouraged!
- Re-submit to another journal within a month of rejection.

General advice

- Keep a log book of all paper and the various stages they are at.
- Ask your supervisor to review papers on your research topic or write to journal editors asking to review papers.
- Do a book review!
- Don't give up!
- Start publishing now!