Writing a Scientific Paper:
Basics of Content and Organization

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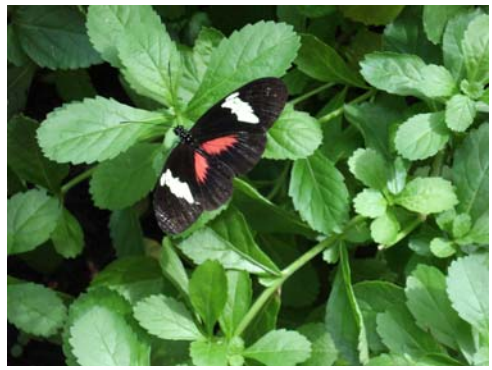

Main Source

How to Write and Publish a Scientific Paper, 6th edition, by Robert A. Day and Barbara Gastel (Greenwood Press/Cambridge University Press, 2006)

Overview

- Definition of a scientific paper
- The IMRAD format
- Front matter: title, author(s), abstract
- Core of the paper: introduction, methods, results, discussion
- Tables and figures
- End matter: acknowledgments, references
- A suggestion
- Sources of further guidance

Definition of a Scientific Paper

(Council of Biology Editors, as adapted by Day)

- The first publication of original research results
- In a form whereby peers of the author can repeat the experiments and test the conclusions
- In a journal or other source document readily available in the scientific community

Some Types of Journal Content Other Than Scientific Papers

- Review articles (summarize the literature on a topic)
- Case reports
- Editorials
- Book reviews
- Essays
- Letters to the editor

Comment

Writing a scientific paper: largely a matter of organization

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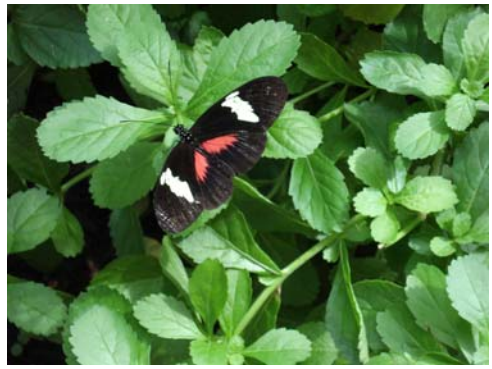

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The IMRAD Format for Scientific Papers

- **I**ntroduction: What was the question?
- **M**ethods: How did you try to answer it?
- **R**esults What did you find?
- **D**iscussion What does it mean?

- A format used in some journals: IRDaM
- People read sections in various orders.

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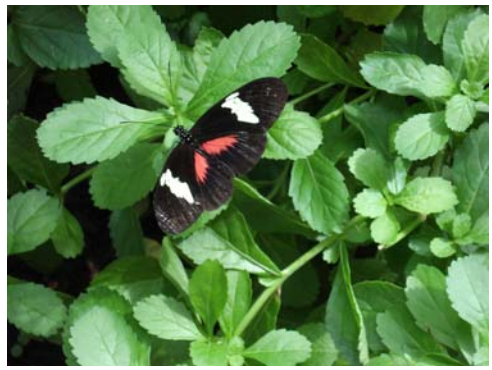

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The Front Matter

- Title
- Authors
- Abstract

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Title

- The fewest possible words that adequately indicate the contents of the paper
- Important in literature searching
- Should not include extra words, such as “a study of”
- Should be specific enough but not overly narrow

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Authors

- Those with important intellectual contributions to the work
- Often listed largely from greatest contributions to least
- Head of research group often is listed last
- Important to list one's name the same way from paper to paper

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Abstract

- Summarizes the paper
- Widely read and therefore important
- Commonly organized in IMRAD format (may be structured abstract, with headings corresponding to the various sections)
- Content must be consistent with that in the paper
- Normally should not include figures, tables, references

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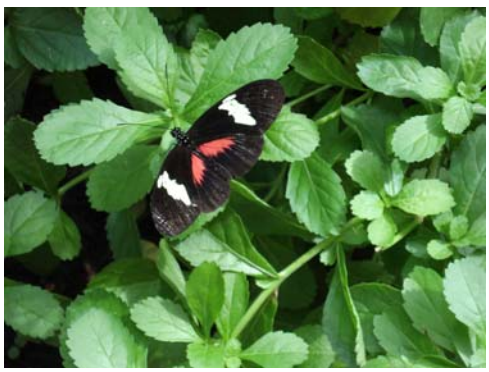

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The Core of the Paper

- Introduction
- Methods
- Results
- Discussion

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Introduction

- Provides background needed to understand the paper and appreciate its importance
- Identifies the question the research addressed
- In general, should be fairly short
- Typically should be funnel-shaped, moving from general to specific.

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Methods

- Purposes: to allow others to replicate and to evaluate what you did
- Should describe the study design
- Should identify (if applicable)
  - Equipment, organisms, reagents, etc used (and sources thereof)
  - Approval of human or animal research by an appropriate committee
  - Statistical methods

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Methods (cont)

- May include tables and figures
- An issue: level of detail in which to describe
  - Well-known methods
  - Methods previously described but not well known
  - Methods that you yourself devised
- Helpful to use papers published in the same journal as models

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Results

- The core of the paper
- Often includes tables, figures, or both
- An issue: how much the information in the text should overlap with that in the tables and figures
- Should present results but not comment on them

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Discussion

- Often should begin with a brief summary of the main findings
- Should answer the question stated in the introduction
- Some other items commonly addressed:
  - Limitations of the study
  - Relationship to findings of other research
  - Applications or implications
  - Other research needed

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Discussion (cont)

- Typically should move from specific to general (opposite of introduction)

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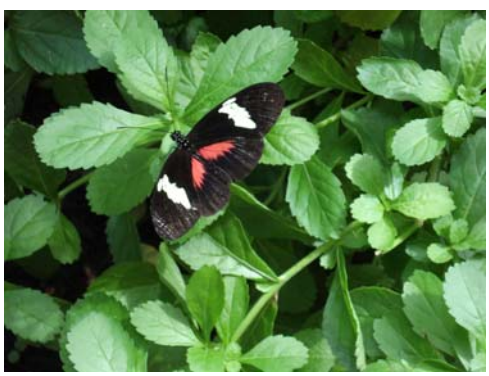

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Tables: A Few Suggestions

- Use tables only if text will not suffice.
- Design tables to be understandable without the text.
- If a paper includes a series of tables, use the same format for each.
- Be sure to follow the instructions to authors.

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Figures: A Few Suggestions

- Use figures (graphs, diagrams, maps, photographs, etc) only if they will help convey your information.
- Avoid including too much information in one figure.
- Make sure any lettering will be large enough once published.
- Follow the journal's instructions.

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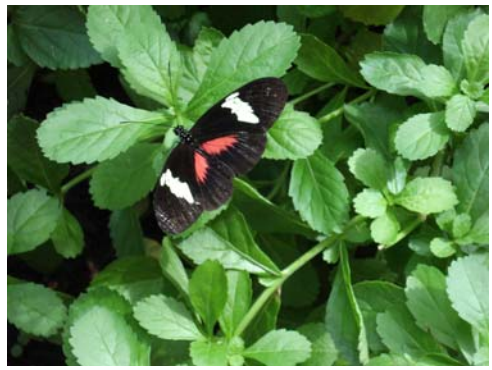

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End Matter

- Acknowledgments
- References

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Acknowledgments

- A place to thank people who helped with the work but did not make contributions deserving authorship
- Permission should be obtained from people you wish to list
- Sometimes the place where sources of financial support are stated

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References

- Functions:
  - To give credit
  - To add credibility
  - To help readers find further information
- Importance of accuracy
- Existence of various reference formats
- Availability of citation management software (examples: EndNote, Reference Manager)

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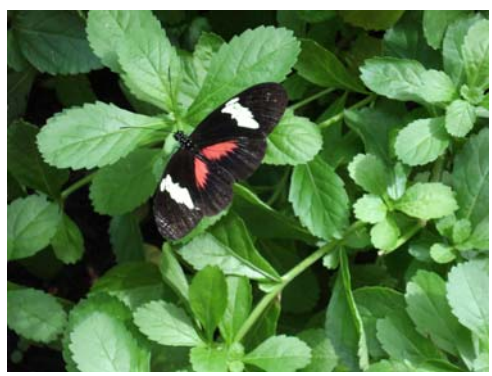

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A Suggestion

Start by drafting whatever part of the paper you find easiest to prepare. (Many people find it easiest to start with the methods section.)

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Sources of Further Guidance

- *How to Write and Publish a Scientific Paper,* 6th edition, by Robert A. Day and Barbara Gastel (Greenwood Press and Cambridge University Press, 2006)
- *Fundamentals of Writing Biomedical Research Papers,* 2nd edition, by Mimi Zeiger (McGraw-Hill, 2000)
- *Preparing Scientific Illustrations: A Guide to Better Posters, Presentations, and Publications,* 2nd edition, by Mary Helen Briscoe (Springer, 1996)

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Wishing you much success!

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