A. Introduction

B. Publishing a Scientific Paper: The Big Picture

1. Gathering and analysis of information
   a. proposing the research (already with publication in mind)
   b. doing the research (also with publication in mind)
   c. considering possible target journals
   d. obtaining a journal's instructions to authors (a resource: "Instructions to Authors in the Health Sciences": \[http://mulford.meduohio.edu/instr/\])

2. Preparation of the paper
   a. drafting the paper (you can draft the sections in any order)
   b. revising, revising, revising
   c. getting some feedback and revising some more

3. Evaluation by the journal
   a. initial screening
   b. peer review (evaluation by experts in the same field)
   c. editorial decision

4. Further steps if a paper is accepted
   a. revision by the author (usually)
   b. manuscript editing by the journal
   c. preparation and review of proofs
   d. publication
   e. celebration

C. The Basic Structure of a Scientific Paper: "IMRAD"

<table>
<thead>
<tr>
<th>Introduction</th>
<th>What was the question?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods</td>
<td>How did you try to answer it?</td>
</tr>
<tr>
<td>Results</td>
<td>What did you find?</td>
</tr>
<tr>
<td>Discussion</td>
<td>What does it mean?</td>
</tr>
</tbody>
</table>
D. Writing a Scientific Paper: A Section-by-Section View

1. Title
   a. definition: "the fewest possible words that adequately describe the contents of the paper"
   b. important in literature searching
   c. shouldn't include extra words, such as "a study of"
   d. should be specific enough

2. Authors
   a. those with important intellectual contributions to the work
   b. often listed largely from greatest contributions to least
   c. head of lab often listed at end
   d. important to list one's name the same way from paper to paper

3. Abstract
   a. summarizes the paper
   b. widely read and therefore important
   c. organized in IMRAD format (may be a structured abstract, with headings corresponding to the various sections)

   Required headings—abstract for summer research fellowship:
   • Objective
   • Animals or Sample Population
   • Procedure
   • Results
   • Conclusions and Clinical Relevance
   • Impact for Human Medicine (if appropriate)

   d. content must be consistent with that in the paper
   e. normally should not include figures, tables, references

4. Introduction
   a. provides background needed to understand the paper and appreciate its importance
   b. identifies the question(s) the research addressed
   c. typically should be fairly short
   d. generally should be funnel-shaped, moving from general to specific

5. Methods
   a. purposes: to allow others to replicate and to evaluate what you did
   b. should describe the study design
c. should identify (if applicable):
   • organisms, reagents, equipment, etc used (and sources thereof)
   • approval of animal or human research by an appropriate committee
   • statistical methods
d. may include tables and figures
e. an issue: levels of detail in which to describe well-known methods, methods
   that have been previously described but are not widely known, and methods
   that you yourself devised
f. usefulness (as in other sections) of using other papers in the journal as models

6. Results
   a. the core of the paper
   b. often includes tables, figures, or both (an issue: how much the information in
      the text should overlap with that in the tables and figures)
   c. should present results but not comment on them

7. Discussion
   a. often should begin with a brief summary of main findings
   b. should answer the question(s) stated in the introduction
   c. commonly should note strengths and limitations of the study
   d. should relate the findings to those of other research
   e. may identify other research needed
   f. typically should move from specific to general (opposite of introduction)

8. Acknowledgments
   1. a place to thank people who helped with the work but did not make
      contributions deserving authorship
   2. permission should be obtained before listing
   3. often the place where sources of financial support are stated

9. References
   1. functions: to give credit, to provide credibility, to aid readers in finding
      further information
   2. importance of accuracy
   3. existence of various reference formats
   4. availability of citation management software (examples: EndNote, RefWorks)

E. Some Pointers on Language (overall message: Write to communicate, not to impress.)

1. Write readably.
   a. Use short, common words if possible.
      demonstrate→
      fundamental→
      utilize→
b. Avoid windy phrases.
   at this point in time→
   in the event that→
   red in color→

c. Use verbs rather than nouns made from them.
   take into consideration→
   make reference to→
   provide an explanation→

d. Avoid long, convoluted sentences.

e. Avoid very long paragraphs.

2. Limit use of abbreviations.

3. Remember: Many readers might not be native speakers of English.

F. Some Additional Resources

   How to Write and Publish a Scientific Paper, 6th edition, by Robert A. Day and Barbara
   Gastel. Westport, CT: Greenwood Press, 2006. (Note: 7th edition is scheduled for
   publication in June 2011.)

   How to Write, Publish, & Present in the Health Sciences: A Guide for Clinicians &
   Laboratory Researchers, by Thomas A. Lang. Philadelphia: American College of


   Uniform Requirements for Manuscripts Submitted to Biomedical Journals,


G. Closing Comments

   Wishing you all the best in your scientific writing!