OUTLINE

- Introduction
- Principles of Academic Writing
- Structure of a Journal Article
  - Title
  - Abstract
  - Introduction
  - Materials & Methods
  - Results
  - Discussion
  - Acknowledgments
  - References
OUTLINE

- Tables
- Graphs

- Writing in English
- Examples

- Useful websites
- Recommended reading
- Questions
PURPOSE OF ACADEMIC WRITING

Your work is not done until you publish.

Work that is not published might as well not exist.

As a scientist or researcher, your work will be judged primarily on the quality and quantity of your publications.
OBJECTIVE OF THIS WORKSHOP

Write better

Publish more often and in better journals

Get more readers

Be cited more often
PRINCIPLES OF ACADEMIC WRITING

• Start writing while you are doing the research:
  ○ Content is still fresh in memory.
  ○ Writing process will show any inconsistencies in results.
  ○ Co-authors are still available.

• Consider your audience while writing.
  ○ Not everyone who reads your article will be working in your exact discipline.
  ○ Writing must be accessible to maximum number of people.
PRINCIPLES OF ACADEMIC WRITING

- Use an economy of words:
  - Journal has word limits.
  - Easier to read.
  - Focus is on the work itself.

- Simple statements evoke the most wisdom.
-Verbose language and fancy technical words convey shallow thought.
PRINCIPLES OF ACADEMIC WRITING

Bad writing leads to a mark in the reject box.
If your English is not perfect, do not worry.
If your research is of high quality and wide interest, editors will want to publish it.

However, you will have to write informative, well-organized, clearly written papers for them to evaluate.

“Write well, edit better.”
-Maria Eugenia Merino
**Impact Factor**

- Impact factor: Average number of citations per article.

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**ISI Web of Knowledge**

**Journal Citation Reports**

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<thead>
<tr>
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<th>ISSN</th>
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<th>Eigenfactor™ Metrics</th>
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</table>

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**2011 Impact Factor:**

Citations in 2010 + Citations in 2009

Articles published in 2010 + Articles published in 2009
TITLES ARE TEXTS IN MINIATURE.
-M. HAGGAN

FIRST IMPRESSIONS ARE STRONG IMPRESSIONS.
-T. CLIFFORD ALLBUTT
Hundreds of articles are published every year in your discipline.

The title is a marketing tool.
- Clearly state subject and arouse interest, motivate reader.

Out of 500 people who read your title, one will read the article.
- A good title will increase the number of readers, thereby increasing the number of citations.
SPECIFICITY OF TITLES

• Titles must be short but specific.

Action of antibiotics on bacteria

Better:

Inhibition of growth of *Mycobacterium tuberculosis* by Streptomycin
Use the fewest words possible to describe the content of your work (usually 10-12).
Each word must be chosen with great care.

Three types of titles:
1. Declarative
2. Descriptive
3. Interrogative
TYPES OF TITLES

Declarative

• Includes subject of article AND main conclusions.
  • Ex.
    Adipose gene expression prior to weight loss can differentiate and weakly predict dietary responders

• Usually best type because it conveys the most information with the fewest words.
TYPES OF TITLES

Declarative

• Start with verbs rather than nouns for a more dynamic style.
  
  ○ Ex.

  “How to treat ....” rather than “Treatment of...”
TYPES OF TITLES

Descriptive (neutral)

- Describes only the subject, does not reveal conclusions.
  - Ex. Worldwide phylogeography for the human X chromosome

- Descriptive titles are usually best for review articles.
TYPES OF TITLES

Interrogative

- Descriptive title in the form of a question.
- Not usually recommended because readers will not be able to find the answer as quickly as with a declarative title.
- Best for review article with multiple viewpoints.

Are there rearrangement hotspots in the human genome?

Only title type to use punctuation.
Better to use a label (fragment) than a full sentence.

What is important is subjective and may change.

Shrews (Soricomorpha: Soricidae) as ecosystem components

Shrews (Soricomorpha: Soricidae) form an important component of ecosystems
TYPES OF TITLES

- Compound (series) titles are not recommended.

- Each paper should provide results of an independent study.
- Also, if 1, 2 and 4 get published but 3 does not, readers will forever search for your missing article.

Studies on Bacteria. IV. Cell Wall of *Staphylococcus aureus*
WASTE WORDS

- Some words may be removed without changing the meaning, e.g.:
  - Studies on
  - Investigations on
  - Observations on

- Grammatical articles are not indexed for search, and may usually be removed as well:
  - a
  - an
  - the
GRAMMAR ERRORS IN TITLES

- Pay close attention to word order:

**Antibiotic-Combination Drugs Used to Treat Colds Banned by FDA**

*Washington Post*

**FDA Bans Antibiotic-Combination Drugs Used to Treat Colds**

Sounds like the colds themselves are banned by the FDA!
COMMON ERRORS IN TITLES

- Word order (subject/verb disagreements)

**Mechanism of Suppression of Nontransmissible Pneumonia in Mice Induced by Newcastle Disease Virus**


**Mechanism of Suppression of Nontransmissible Pneumonia Induced in Mice by Newcastle Disease Virus**
Multiple Infections among Newborns Resulting from Colonization with *Staphylococcus aureus 502A*

American Journal of Clinical Pathology
volume 52, issue 1 pp 42-49.

Multiple Infections Resulting from Newborns Colonized with *Staphylococcus aureus 502A*
COMMON ERRORS IN TITLES

Preliminary Canine and Clinical Evaluation of a New Antitumor Agent, Streptovitacin


Preliminary Evaluation of a New Antitumor Agent, Streptovitacin, in Canines and Clinical Settings
COMMON ERRORS IN TITLES

- Hanging titles should be avoided (difficult to index).

*Sylvilagus nuttallii*: a semiarboreal lagomorph

Tree-climbing behavior by mountain cottontails: *(Sylvilagus nuttallii)*
COMMON ERRORS IN TITLES

- Do not use:
  - Jargon
  - Abbreviations
  - Chemical formulas
  - Proprietary names

- Exception is when the abbreviation is more common than the word, e.g. pH or DNA.

Ask yourself: How would I search for this article?
I HAVE THE STRONG IMPRESSION THAT SCIENTIFIC COMMUNICATION IS BEING SERIOUSLY HINDERED BY POOR QUALITY ABSTRACTS WRITTEN IN JARGON-RIDDEN MUMBO-JUMBO.

-SHEILA M. MCNAB
Abstract is a mini-version of your article.

Must include in 250 words (or less):

1. Principle objectives of the article and your investigation;
2. Describe methods used;
3. Summarize results;
4. Show the principal conclusions.

The reader should be able to understand the basic context of your work quickly and accurately, to know if your article is relevant to them and needs to be read.
2 types of abstracts:

1. Informative
2. Indicative (or Descriptive)

Write the article first and the abstract afterward.
Most common for research articles.

Includes the problem, method, data and conclusions.

Can be read alone, without the article.

Usually written in paragraph form, 250 words max.

- Use fewer words if possible.
Informative Abstract

Essential oils (EO) are well known for their antimicrobial properties. The engineering properties of the food packaging films are influenced after incorporation of antimicrobial substance. However, few researchers have combined the widely studied antimicrobial property of EO-incorporated material with the study of engineering properties of this packaging. In this work, low density polyethylene (LDPE) films containing cinnamon EO (0, 5, 10 wt%) were studied. Mechanical properties of developed films including tensile strength, puncture resistance and thickness were morphologically and chemically characterized by Atomic Force Microscopy (AFM) and Fourier Transform Infrared Spectroscopy (FTIR). Microbial activity of the films was tested against Escherichia coli. Film thickness was affected by the incorporation of EO, with 20%EO film being the thinnest (0.073mm) and 5% EO film being the thickest (0.106mm). The tensile strength at break did not present a significant difference between the treatments. The control film presented the lowest seal strength (15.395N) compared with the EO-incorporated films. The film incorporated with 5% EO presented the highest puncture resistance (20.87aN) and the 20% EO film the lowest value (14.43bN), while control and 10% EO films presented intermediary values (17.791ab and 15.756ab, respectively.) AFM images showed heterogeneous surfaces among the treatments. FTIR results showed the main peaks of LDPE (2937.58 cm$^{-1}$ CH$_2$ with asymmetric stretching; 1463.95 cm$^{-1}$ CH$_3$ with asymmetric angular deformation; 1377.06 cm$^{-1}$ CH$_3$ with symmetric angular deformation; [CH$_2$]$_n$ with swing type angular deformation out of plane) and aldehyde and aromatic peaks (1725.92 cm$^{-1}$ and 1673.04 cm$^{-1}$ C=O with stretching vibration; 1606.14 cm$^{-1}$ C=C with stretching vibration) probably as a result of EO in LDPE structure. Antimicrobial activity was observed, since control films showed a 4.2 Log UFC/mL while 5, 10 and 20% EO films presented 3.8, 3.5 and 3.4 Log UFC/mL respectively.

Keywords: antimicrobial film, cinnamon essential oil, mechanical strength.

ACKNOWLEDGEMENTS: CAPES and CNPq.
ENGINEERING PROPERTIES OF ACTIVE FOOD PACKAGING INCORPORATED WITH CINNAMON ESSENTIAL OIL

INTRODUCTION

Essential oils (EO) are well known for their antimicrobial properties. The engineering properties of the food packaging films are influenced by incorporation of antimicrobial substance. However, few researchers have combined the widely studied antimicrobial property of EO-incorporated material with the study of engineering properties of this packaging. In this work, low density polyethylene (LDPE) films containing cinnamon EO (0, 5, 10 and 20%) were developed. Mechanical properties of developed films including tensile strength at break, seal strength, puncture resistance and thickness were studied. The films were morphologically and chemically characterized by Atomic Force Microscope (AFM) and Fourier Transform Infrared Spectroscopy (FTIR). Also, the antimicrobial activity of the films was tested against two microorganisms. Film thickness was affected by the incorporation of EO, with 20% EO film being the thinnest (0.073mm) and 5% EO film being the thickest (0.106mm). The tensile strength at break did not present a significant difference between the treatments. The control film presented the lowest seal strength (15.395N) compared with the EO-incorporated films. The film incorporated with 5% EO presented the highest puncture resistance (20.87aN) and the 20% EO film the lowest value (14.43aN), while control and 10% EO films presented intermediary values (17.791ab and 15.756ab, respectively.) AFM images showed heterogeneous surfaces among the treatments. FTIR results showed the main peaks of LDPE (2937.58 cm⁻¹ CH₂ with asymmetric stretching; 1463.95 cm⁻¹ CH₃ with asymmetric angular deformation; 1377 cm⁻¹ CH₃ with symmetric angular deformation; [CH₂]n with swing type angular deformation out of plane) and aldehyde and aromatic peaks (1759.92 cm⁻¹ and 1673.04 cm⁻¹ C=O with stretching vibration; 1606.14 cm⁻¹ C=C with stretching vibration) probably as a result of EO in LDPE structure. Antimicrobial activity was observed, since control films showed a 4.2 Log UFC/mL while 5, 10 and 20% EO films presented 3.8, 3.5 and 3.4 Log UFC/mL respectively.

Keywords: antimicrobial film, cinnamon essential oil, mechanical strength.

ACKNOWLEDGEMENTS: CAPES and CNPq.
Informative abstract may also be structured in four paragraphs.

1. Introduction
2. Methods
3. Results
4. Conclusion
Effects of Scientific-Writing Training on Knowledge and Publication Output

Introduction
Scientists must write to be successful, but few receive training in scientific writing. We studied the effects of a scientific-communication lecture series, alone and combined with feedback on writing, on scientific-communication knowledge and publication performance.

Materials and Methods
During the Spring 2011 semester, 50 graduate students at the Federal University of Viçosa were randomly assigned to receive no instruction in scientific writing, attend four 2-hour lectures on the topic, or attended these lectures and receive feedback from classmates and an instructor on successive parts of a scientific paper they drafted. Members of each group then took a test of scientific-communication knowledge, and the publication output of each group was monitored for 5 years.

Results
Members of the groups receiving instruction scored between 80 and 98 percent on the test of scientific-communication knowledge, whereas all but two members of the control group scored below 65 percent. Although on average the group receiving lectures and feedback scored higher than the lecture-only group, the difference was not significant (P>). During the 5-year follow-up, on average the control-group members submitted 6.1 papers to journals and had 4.1 accepted. The corresponding figures for the lecture group were 6.5 and 4.8, and those for the lecture-plus feedback group were 8.3 and 6.7. Higher proportions of the latter two groups had papers accepted by the first journal to which they were submitted.

Discussion
These findings suggest that instruction in scientific writing, especially if it includes practice and feedback, can increase knowledge of scientific communication and promote publication success.
STRUCTURED ABSTRACTS

Advantages

- Information is transmitted efficiently and accurately.
- Abstract can be read alone, without the article.

Disadvantages

- It is longer.
- More difficult for the author.
- Uniformity may be boring for the reader.

For these reasons the structured form is not used often.
Indicative Abstract

- Describes only the subject of the article.
- Does not include conclusion.
- Cannot be used published alone.
- Not used for research articles.
  - But may be used for review articles, conference reports, etc.
American Opinion on Middle Eastern Politics

Telephone interviews were conducted in 1985 with 655 Americans sampled probabilistically. Opinions are expressed on whether: (1) the establishment of a Palestinian state is essential for peace in the region; (2) U.S. aid to Israel and to Egypt should be reduced; (3) the U.S. should (a) participate in a peace conference that includes the PLO, (b) favor neither Israel nor the Arab nations, (c) maintain friendly relations with both. Respondents indicated whether or not they had sufficient information concerning various national groups in the region.
Telephone interviews were conducted in 1985 with 655 Americans sampled probabilistically. Opinions are expressed on whether: (1) the establishment of a Palestinian state is essential for peace in the region; (2) U.S. aid to Israel and to Egypt should be reduced; (3) the U.S. should (a) participate in a peace conference that includes the PLO, (b) favor neither Israel nor the Arab nations, (c) maintain friendly relations with both. Respondents indicated whether or not they had sufficient information concerning various national groups in the region.
ABSTRACT

Tips

- Use past tense, because work is already done.
- No references.
  - Unless you are modifying an already-existing method.
- Language must be familiar to the reader.
  - People from outside of your area will read.
  - No abbreviations unless very common and used many times.

Remember, abstract cannot reference any tables, figures, or other sources of information!
INTRODUCTION

A BAD BEGINNING MAKES A BAD ENDING.

-EURIPIDES
INTRODUCTION

• State clearly and briefly the purpose of your article.
  ○ Need to have a clear purpose in mind.

• Supply sufficient background information so reader can understand your study without other articles.
  ○ Must carefully summarize the most important previous information on this subject.

• Use present tense most of the time.
INTRODUCTION

How To Write a Good Introduction

1. Present nature and scope of problem investigated.
   - Introduce the problem to the reader.

2. Briefly review pertinent literature to orient reader.
   - Provide logical sequence to show the main problem to be solved.
INTRODUCTION

Logical sequence of an introduction

- What is the main problem?
- How does it affect science?
- Why is it important to be solved?
- How will you solve it?

First sentence is a gate to be opened and a path to be walked.
INTRODUCTION

- First line of introduction should get reader’s attention:

  Why did you choose that subject?

  Why is it important?

First paragraph puts the subject in the context of a theory or a model or a pattern that is very important to that area of knowledge, to catch the reader.
INTRODUCTION

The first paragraph must show the essential problem of the work.

Toward a Metabolic Theory of Ecology

The complex, spatially and temporally varying structures and dynamics of ecological systems are largely consequences of biological metabolism. Wherever they occur, organisms transform energy to power their own activities, convert materials into unique organic forms, and thereby create a distinctive biological, chemical and physical environment.

Numerous observational and experimental studies have shown that terrestrial plant distribution, abundance, dynamics and diversity are affected by the availability of limited resources. Thus, there has been strong interest in determining the effects of resource availability on the growth, morphology, and life history of plant species.
INTRODUCTION

- Next explain *what* the problem was and *how* you tried to resolve it.

- OK to repeat some information from abstract.

- End of introduction must show why your approach is important in solving this problem.
  - Need to show your question, hypothesis, and/or objective.
INTRODUCTION

- Introduction format may vary from journal to journal.
- Some journals do not allow inclusion of methods, results or conclusions in the introduction.
- Others expect a summary of the method(s) chosen, principal results and conclusion in the last paragraph.

Always read instructions to authors!
Some journals use the inverted pyramid format.
INTRODUCTION

- If you have previously published an abstract of your work, include and cite it here.
- If similar papers have been published recently, cite at the end of the introduction.

Remember, your article may be read by people outside of your area.

- Define any specialized terms or abbreviations.
THE GREATEST INVENTION OF THE NINETEENTH CENTURY WAS THE INVENTION OF THE METHOD OF INVENTION.

-A.N. WHITEHEAD
MATERIALS AND METHODS

The base of the scientific method.

- Most important section of article, even though most readers will skip it.
- Must provide enough detail for a competent researcher to repeat your experiments.
MATERIALS AND METHODS

- Methodology was already mentioned in introduction.
  - In this section, provide all details.
  - Describe (and if necessary, defend) the experimental design.

- For consistency, section titles must match those of results section:
  - 2. Materials and Methods
    - 2.1 Collection Area
    - 2.2 Cytogenetic Techniques
    - 2.3 Karyotyping
MATERIALS AND METHODS

Materials

- Must include the exact technical specifications.
- Quantities, sources, methods of preparation, sometimes chemical/physical properties.
- When possible, use generic, not commercial names, because generic is usually better known.
  - Exception is when generic name refers to different product in some countries.
MATERIALS AND METHODS

- For studies of organisms, include genus, species, and strain (except for domestic livestock).
  - Usually necessary to include voucher specimens deposited in an accredited systematics collection.
  - If necessary include the type of permits needed to collect organisms and the agency from which you obtained it.

- All measures and analysis must be precise:
  - If a mixture was heated, give the temperature.
  - The reader should never have to think about “how” or “how much”.

Always include geographic area of study, including city and state.

- When appropriate, include GPS coordinates, habitat, climate, hydrology, geology, etc.

Individuals were captured from a lake of the São Bartolomeu Creek at the Federal University of Viçosa, in Viçosa, Minas Gerais State, Brazil (20°45'32.81"S 45°52'22.54"W).
MATERIALS AND METHODS

Methods

- Usually presented in chronological order, ex:

  Cell growth was stopped with colchicine after incubation for 65-70 hours at 37 °C.

  After incubation of cells for 65-70 hours at 37 °C, cell growth was stopped with colchicine.

- Other option is to group related methods together.
MATERIALS AND METHODS

- If the used method is new, must give all details.
- If it has already been published, just cite it.

Detection of nucleolar organizer regions (NOR) was performed (Howell and Black, 1980).

Exception: If the method has been published only once, or in a very obscure journal, it is best to briefly explain it in your article.
MATERIALS AND METHODS

- Do not include any results with your methods.

This section is only to provide sufficient information for a competent colleague to repeat your work.

- A good test is to give your manuscript to a colleague and see if they can follow your method.
- Grammar and punctuation are essential in this section.
MATERIALS AND METHODS

Statistics

- Discuss data, not methods.
  - Lots of information about the method makes it sound like you just discovered it yourself.
- Unusual or advanced methods may require a citation.
- All software must be cited.
- Whenever you manipulate data (e.g. normalization, standardization), this must be reported and explained.
- If a study is randomized, indicate how.
RESULTS

THE FOOL COLLECTS FACTS; THE WISE MAN SELECTS THEM.

-JOHN WESLEY POWELL, GEOLOGIST
RESULTS

Need to present two things:

1. An overall description of experiments.
2. The data.

- Data is the core of the paper.
- Do not include any methods or citations.
  - These belong in the previous section.
RESULTS

- Often the shortest part of the paper.

- Constitutes new knowledge you are bringing to the world.

- Writing must be crystal-clear in this section.

Results are presented in past tense.
RESULTS

- Some journals allow supplementary material (data) online:
  - Always verify the instructions to authors.
  - See what similar papers have done in this journal.

- Representative data, not repetitive data.
  - If you performed an experiment 100 times without significant differences in the results, do not include each trial.
RESULTS

- If only a few numbers, describe them using text.
- For lots of numerical data use tables or graphs.
  - Do not be verbose in citing your tables:

  It is clearly shown in Table 1 that nocillin inhibited the growth of *N. gonorrhoeae* (Table 1).

  Nocillin inhibited the growth of *N. gonorrhoeae* (Table 1).
DISCUSSION

IT IS THE FAULT OF OUR RHETORIC THAT WE CANNOT STRONGLY STATE ONE FACT WITHOUT SEEMING TO BELIEVE SOME OTHER.

-RALPH WALDO EMERSON
DISCUSSION

Primary purpose is to show the relationship among observed facts.

- Often the hardest section to write.
- Bad discussion may obscure meaning of results.

Many papers rejected because of discussion -- even when data is of scientific interest.
DISCUSSION

- Discussion is a consequence of introduction.
  - Must be aligned in the same logical path.

- If you introduce a problem with a type of logical sequence using a specific theory, model or pattern, you must follow the same logical sequence in the discussion.

You cannot write the introduction and discussion in different directions.
Questions asked in introduction are answered here:

- Main findings.
- How they relate to other works.
- Implications and applications.
- Unanswered questions.
DISCUSSION

- If your research had substantial strengths or limitations, list them.
  - E.g. superior experimental techniques, larger sample size, longer follow-up.
- This can help persuade reviewers that your work should be published.
- If your work had limitations, include these also – otherwise reviewers may think you were unaware of them.
Components of a Good Discussion

1. Present principles, relationships, generalizations of results.

2. Show any exceptions, lack of correlation, or unsettled points.

3. Show how your results/interpretations compare to those of previous authors.
Components of a Good Discussion

4. Discuss theoretical implications of your work and possible applications.

5. State conclusions as clearly as possible.

6. Summarize evidence for each conclusion.
DISCUSSION

What Not To Do

- Do not repeat results – discuss them.
- Never try to cover up data that does not fit.

- Do not overwrite:

An author who writes too much because they are unsure of the facts looks like an octopus trying to hide behind a cloud of ink.
DISCUSSION

• What is the significance of your paper?

If the reviewer can’t figure this out, why would they publish it?

• End discussion with a short conclusion of the significance of your work.

• Conclusions are a direct consequence of the hypothesis, objectives and questions at the end of the introduction.

• Some journals provide a separate section for this.
DISCUSSION

- If the journal allows writing in the first person, do so to conserve words:
  - I found that ...
  - We conclude that ...
  - It was found in the present investigation that ...
  - It is concluded that ...

- However, be aware that not every journal allows this!
ACKNOWLEDGMENTS

LIFE IS NOT SO SHORT BUT THAT THERE IS ALWAYS TIME ENOUGH FOR COURTESY.

-RALPH WALDO EMERSON
ACKNOWLEDGMENTS

- Acknowledge all significant technical help from any individual.
- Acknowledge source of equipment, samples, or other materials.

We thank J. Jones for assistance with the experiments, and R. Smith for valuable discussion.

- Also include all financial assistance – grants, contracts, fellowships, scholarships, etc.
ACKNOWLEDGMENTS

- Obtain permission before including someone’s name.
  - Can usually show them your proposed wording.

- Be very specific in your acknowledgment.
  - Idea, suggestion, interpretation, equipment, etc.

- Do not wish:

  We wish to thank John Jones  
  We thank John Jones
REFERENCES

MANUSCRIPTS CONTAINING INNUMERABLE REFERENCES ARE MORE LIKELY A SIGN OF INSECURITY THAN A MARK OF SCHOLARSHIP.

-WILLIAM C. ROBERTS
Depending on where you publish, your reviewers may be some of the authors cited in your references.

- Make sure all references are accurate.
  - You may have to check each one again before submitting your manuscript.
- Verify all references cited in the text are listed, and all references listed are cited in the text.
REFERENCES

- List only significant published references.
  - Unpublished data, abstracts, theses, etc. should be added with parenthesis or a footnote.

- Papers accepted for publication can be listed, followed by “in press”.

Many software programs can help with this process, e.g. EndNote, Reference Manager, RefWorks, Zotero, etc.
References do not necessarily have to be at the end of the sentence.

- Use the reference where it applies:

We have examined a modulation method for use with Smith’s development of multiple-access communication (Smith, 2010) and Brown’s technique of digital radiotelephony (Brown, 2008).
Each journal has a specific format for references.

Some journals include article titles, page numbers and abbreviated journal names.

- Abbreviations for many journal titles can be found at [www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov)

Reference software can often format the references automatically for each journal.
REFERENCES

Endnote templates.
When preparing your manuscript, save all information about every item that may be cited.

Otherwise you may have to track down each article again before you can submit your manuscript.

Also the first journal may reject your work and then you need to re-do this section.
Each journal will have specific ways of citing references:

- Smith and Jones (2010)
- Smith and Jones (2010a)
- Chen, Hernandez and Higginbotham (2010)

Easier to read when lots of references are cited together.
A TABULAR PRESENTATION OF DATA IS OFTEN THE HEART, OR BETTER, THE BRAIN, OF A SCIENTIFIC PAPER.

-PETER MORGAN
Should you use a table?

- Not necessary to publish all data.
- Table is only for repetitive data that cannot be described in text.
- Tables also more expensive for publisher.
  - Though with Internet publishing this is changing.
Table 1. Effect of aeration on growth of *Streptomyces coelicolor*.

<table>
<thead>
<tr>
<th>Temp (°C)</th>
<th>No. of expt.</th>
<th>Aeration of growth medium</th>
<th>Growth*</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>5</td>
<td>+†</td>
<td>78</td>
</tr>
<tr>
<td>24</td>
<td>5</td>
<td>-</td>
<td>0</td>
</tr>
</tbody>
</table>

* As determined by optical density (Klett units).
† Symbols: +, 50-ml Erlenmeyer flasks were aerated by having a graduate student blow into the bottles for 15 min out of each hour; -, identical test conditions, except that aeration was provided by an elderly professor.
Table 1. Effect of aeration on growth of *Streptomyces coelicolor*.

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</table>

* As determined by optical density (Klett units).
† Symbols: +, 50-ml Erlenmeyer flasks were aerated by having a graduate student blow into the bottles for 15 min out of each hour; -, identical test conditions, except that aeration was provided by an elderly professor.

Columns 1 and 2 are standard conditions, not variables or data.

If temperature changes, it can have its own column – otherwise leave it out.
Aeration of the growth medium was essential for the growth of *Streptomyces coelicolor*. At room temperature (24 °C), no growth was evident in stationary (unaerated) cultures, whereas substantial growth (OD, 78 Klett units) occurred in shaken cultures.
### Table 2. Effect of temperature on growth of oak (*Quercus*) seedlings*

<table>
<thead>
<tr>
<th>Temp (°C)</th>
<th>Growth in 48 h (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50</td>
<td>0</td>
</tr>
<tr>
<td>-40</td>
<td>0</td>
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<tr>
<td>-30</td>
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<td>-10</td>
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<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>30</td>
<td>8</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>60</td>
<td>0</td>
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<tr>
<td>70</td>
<td>0</td>
</tr>
<tr>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>90</td>
<td>0</td>
</tr>
<tr>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>

* Each individual seedling was maintained in an individual round pot, 10 cm in diameter and 100 cm high, in a rich growth medium containing 50% Michigan peat and 50% dried horse manure. Actually, it wasn’t “50% Michigan”; the peat was 100% “Michigan”, all of it coming from that state. And the manure wasn’t half-dried (50%); it was all dried. And come to think of it, I should have said “50% dried manure (horse)”; I didn’t dry the horse at all.
Table 2. Effect of temperature on growth of oak (*Quercus*) seedlings*

<table>
<thead>
<tr>
<th>Temp (°C)</th>
<th>Growth in 48 h (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50</td>
<td>0</td>
</tr>
<tr>
<td>-40</td>
<td>0</td>
</tr>
<tr>
<td>-30</td>
<td>0</td>
</tr>
<tr>
<td>-20</td>
<td>0</td>
</tr>
<tr>
<td>-10</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>0</td>
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<td>35</td>
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<td>45</td>
<td>0</td>
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<td>50</td>
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<td>55</td>
<td>0</td>
</tr>
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<td>60</td>
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<td>65</td>
<td>0</td>
</tr>
<tr>
<td>70</td>
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<td>75</td>
<td>0</td>
</tr>
<tr>
<td>80</td>
<td>0</td>
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<td>85</td>
<td>0</td>
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<td>0</td>
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<td>0</td>
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</table>

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The oak seedlings grew at temperatures between 20 and 40 °C; no measurable growth occurred at temperatures below 20 °C or above 40 °C.
Table 3. Bacteriological failure rates

<table>
<thead>
<tr>
<th>Nocillin</th>
<th>K Penicillin</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/35 (14)*</td>
<td>9/34 (26)</td>
</tr>
</tbody>
</table>

* Results expressed as a number of failures/total, which is then converted to a percentage (within parentheses). $P = 0.21$. 
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</table>

* Results expressed as a number of failures/total, which is then converted to a percentage (within parentheses). $P = 0.21$.

Could have been written as:

The difference between the failure rates – 14 percent (5 of 35) for nocillin and 26 percent (9 of 34) for potassium penicillin V – was not significant ($P = 0.21$).
Table 4. Characteristics of antibiotic-producing *Streptomyces*

<table>
<thead>
<tr>
<th>Determination</th>
<th><em>S. flouricolor</em></th>
<th><em>S. griseus</em></th>
<th><em>S. coelicolor</em></th>
<th><em>S. nocolor</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal growth temp (°C)</td>
<td>-10</td>
<td>24</td>
<td>28</td>
<td>92</td>
</tr>
<tr>
<td>Color of mycelium</td>
<td>Tan</td>
<td>Gray</td>
<td>Red</td>
<td>Purple</td>
</tr>
<tr>
<td>Antibiotic produced</td>
<td>Flouricillinmycin</td>
<td>Streptomycin</td>
<td>Rholmondelay</td>
<td>Nomycin</td>
</tr>
<tr>
<td>Yield of antibiotic (mg/ml)</td>
<td>4.108</td>
<td>78</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Organism</th>
<th>Optimal growth temp (°C)</th>
<th>Color of mycelium</th>
<th>Antibiotic produced</th>
<th>Yield of antibiotic (mg/ml)</th>
</tr>
</thead>
<tbody>
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</tr>
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<td>92</td>
<td>Purple</td>
<td>Nomycin</td>
<td>0</td>
</tr>
</tbody>
</table>
Both tables contained the same information. But one is much easier to read – because the elements read *down*, not *across*.

Tables should provide the meaning of the data, but not the detail needed to repeat the experiment itself.

\[
\begin{array}{c}
324 \\
+ 6345 \\
\hline
324 + 6345 = \\
\end{array}
\]
### Table 5. Induction of creatinine deaminase in *Clostridium* sp. strains XP 32 and XP 56

<table>
<thead>
<tr>
<th>N source</th>
<th><em>Clostridium</em> sp. strain XP32</th>
<th></th>
<th><em>Clostridium</em> sp. strain XP56</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total enzyme</td>
<td>Sp act (U/mg of protein)</td>
<td>Total enzyme</td>
<td>Sp act (U/mg of protein)</td>
</tr>
<tr>
<td>Ammonia</td>
<td>0.58</td>
<td>0.32</td>
<td>0.50</td>
<td>0.28</td>
</tr>
<tr>
<td>Glutamic acid</td>
<td>5.36</td>
<td>1.48</td>
<td>2.18</td>
<td>0.61</td>
</tr>
<tr>
<td>Aspartic acid</td>
<td>2.72</td>
<td>0.15</td>
<td>1.47</td>
<td>0.06</td>
</tr>
<tr>
<td>Arganine</td>
<td>3.58</td>
<td>2.18</td>
<td>3.38</td>
<td>2.19</td>
</tr>
<tr>
<td>Creatinine</td>
<td>97.30</td>
<td>58.40</td>
<td>104.00</td>
<td>58.30</td>
</tr>
</tbody>
</table>

Instructions to authors may include specific dimensions, symbols, or footnotes for tables.

Some journals may want all tables on a separate page or separate document.
- Others want them embedded in the text where they are first mentioned.

Use other articles in the same journal as examples.
Eliminate all unnecessary words in table footnotes.
  - Just like writing the title.
Define all abbreviations for the first table.
Next table can include “Abbreviations as in Table 1.”
If you have several similar tables, use the same format for each.
Use wording that can be understood without the text:

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>High-Dose Group</th>
<th>Low-Dose Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>27</td>
<td>32</td>
<td>98</td>
</tr>
</tbody>
</table>
A GOOD ILLUSTRATION HELPS THE SCIENTIST TO BE HEARD WHEN SPEAKING, TO BE READ WHEN WRITING. IT ALSO HELPS IN THE SHARING OF INFORMATION AND THE TEACHING OF STUDENTS.

-MARY HELEN BRISCO
**Use of graphs:**

- Similar to tables – only include what will be of service to the reader.

  **Do not illustrate sparse or repetitive data.**

- If there is only one curve, or one value of significance, could you describe it in words?
Among the test group of 56 patients who were hospitalized for an average of 14 days, 6 acquired infections.
Do not waste space:

- Average no. of days in hospital
- Number of infections
- Total no. of patients

Ordinate does not need to extend to 100.
If you are choosing between a graph and a table:

Do you want the readers to know the exact numerical values?

Or is it more important to see a picture of a trend, or shape of the data?

If the data shows a trend, the graph is usually better.

Rarely, you might present the data in both forms.
Which is easier to understand visually? This table?

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Percentage of negative cultures at:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 wk</td>
</tr>
<tr>
<td>Streptomycin</td>
<td>5</td>
</tr>
<tr>
<td>Isoniazid</td>
<td>8</td>
</tr>
<tr>
<td>Streptomycin + isoniazid</td>
<td>30</td>
</tr>
</tbody>
</table>
GRAPHS VS. TABLES

• Or this graph?
GRAPHS

- Consider the size of the printed graph (1-column width) when choosing font sizes.
- Graphs should be as simple as possible – most common error is to include too much data.
- Be consistent.
  - If your graphs are comparing the same things, use the same symbols on each graph.
  - Use $\Delta$, ●, □, ■, ▲.
- If you need more, you probably have too many curves for one graph!
Design graphs to be meaningful without text.
Include graph as soon as your readers will need it.
Most journals process legends separately from graphs, so provide them on a separate page.
Make sure your graph presents the data accurately.
  - Do not adjust axes to make data appear more striking than it is.
  - Most axes should start at zero.
BIG THINGS HAVE LITTLE NAMES, SUCH AS LIFE AND DEATH, PEACE AND WAR, OR DAWN, DAY, NIGHT, LOVE HOME. LEARN TO USE LITTLE WORDS IN A BIG WAY – IT IS HARD TO DO. BUT THEY SAY WHAT YOU MEAN. WHEN YOU DON’T KNOW WHAT YOU MEAN, USE BIG WORDS: THEY OFTEN FOOL LITTLE PEOPLE.

-ARTHUR KUDNER
**#1 Rule: Keep it Simple**

- One thought per sentence.
- Use the “Subject – Verb – Object” formula for sentences:

  *The book is on the table.*
  *The table has a book on it.*
WRITING IN ENGLISH

- No metaphors (do not translate well).
- Pronouns must agree with antecedents.
  - When in doubt, restate the noun again.

- Write in active voice:

  Do not use passive voice.

  The passive voice should not be used.

- Active voice almost always uses fewer words!
WRITING IN ENGLISH

- Do not start sentences with verbs.

Foram analisados três amostras.

It were analyzed three specimens.

Sentences that start with “it” must refer to pronouns.

Three specimens were analyzed.

Were analyzed three specimens.
Be careful with singular/plural verb forms:

- 10 g was added.
- 10 g were added.

- Singular is used because it refers to **one amount**.
- Plural would be correct if you added 1 g at a time until 10 g.
Avoid abstract nouns:

Separation of the compounds was accomplished

Transformation of the equations was achieved

The compounds were separated

The equations were transformed

Very common with automatic translation software.
Use simple vocabulary.

Your article is not the place to show off what you learned studying for the TOEFL or GRE.

Use the same word for the same thing.

Do not try to vary your vocabulary – this is not literature.

E.g.:
- Astyanax scabripinnis
- Silver minnow
- The fish
To get better at writing in English, try reading more in English.

Read lots of articles and good books in your area.
- But remember, many articles may have been written by people who know much less English than you do.
- Try reading the news, or literature in English for variety.
Stages and duration of the cycle of the seminiferous epithelium in oncilla (Leopardus tigrinus, Schreber, 1775)

Maytê Koch Balarini\textsuperscript{a}, Tarcízio Antônio Rego de Paula\textsuperscript{a,*}, S.L. Pinto da Matta\textsuperscript{b}, J. Vogas Peixoto\textsuperscript{c}, F. Lima Guião-Leite\textsuperscript{d}, J.L. Rossi Júnior\textsuperscript{d}, A.C. Czermak Junior\textsuperscript{a}, N.J. Walker\textsuperscript{e}

\textsuperscript{a} Veterinary Department, Federal University of Viçosa, Minas Gerais 36571–000, Brazil
\textsuperscript{b} General Biology Department, Federal University of Viçosa, Minas Gerais 36571–000, Brazil
\textsuperscript{c} Department of Veterinary Medicine, Federal University of Lavras, Campus UFLA, Minas Gerais 37200–000, Brazil
\textsuperscript{d} Department of Veterinary Medicine, Vila Velha University, Campus UVV, Espírito Santo, 29102–770, Brazil
\textsuperscript{e} Department of Animal Biology, Federal University of Viçosa, Minas Gerais, 36571–000, Brazil

Received 16 October 2010; received in revised form 29 August 2011; accepted 8 September 2011

Abstract

Six adult Leopardus tigrinus (oncilla) were studied to characterize stages of the seminiferous epithelium cycle and its relative frequency and duration, as well as morphometric parameters of the testes. Testicular fragments were obtained (incisional biopsy),
Six adult *Leopardus tigrinus* (oncilla) were used in this research to determine morphometric parameters of testes in addition to the characterization of stages of the seminiferous epithelium cycle and its relative frequency and duration of the seminiferous epithelium cycle in this species. Through conservative incision biopsy, testicular fragments were obtained and after histological processing for inclusion in glycol methacrylate, the material was analyzed by light microscopy. Immunohistochemistry was used to identify previously marked cells with bromodeoxyuridine in the begging of the spermatogenic process, to determine the cycle duration. The mean body weight of the animals was 2.589 kg where 0.06% is allocated in gonad and 0.04% specifically in seminiferous tubules. The average diameter of the seminiferous tubules was 228.29 μm, and the epithelium height was 78.86 μm. The oncilla presents 16.99 meters of testicular tubules per gram of testis. The cycle of the seminiferous epithelium in oncilla was didactically described into eight stages by the tubular morphology method. The total duration of one seminiferous epithelium cycle in oncilla was calculated to be 9.19 days, and approximately 41.37 days are required for development of spermatozoon from spermatogonia. In conclusion, morphometric data on testicular and somatic indices of the oncilla are similar to those of other carnivores of similar size. It observed eight distinct stages in the seminiferous epithelium and the length of the seminiferous epithelium cycle is close to that observed in domestic cats and cougar.
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Eight distinct stages were observed in the seminiferous epithelium and the length of the seminiferous epithelium cycle is close to that observed in domestic cats.
Stages and duration of the cycle of the seminiferous epithelium in oncilla (*Leopardus tigrinus*, Schreber, 1775)

Table 1 – Biometric parameters, volumetric proportion and gonadosomatic index of the adult oncilla kept in captivity.

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<th>Parameters</th>
<th>Mean ± standard deviation</th>
<th>Variation Coefficient (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (g)</td>
<td>2589 ± 362</td>
<td>14</td>
</tr>
<tr>
<td>Volume of both testis (ml)</td>
<td>1.53 ± 0.386</td>
<td>25.22</td>
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<tr>
<td>Gonadosomatic index (%)</td>
<td>0.06 ± 0.0188</td>
<td>31.32</td>
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<tr>
<td>Testicular albuginea thickness (µm)</td>
<td>250 ± 16.7</td>
<td>6.68</td>
</tr>
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<td>Volume of both albugineas (ml)</td>
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<td>27.25</td>
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(Leopardus tigrinus, Schreber, 1775)

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HELPFUL WEBSITES

- Academic Phrasebank
  www.phrasebank.manchester.ac.uk
- Advice on Designing Scientific Posters
  http://colinpurrington.com/tips/academic/posterdesign
- Author AID
  www.authoraid.info
- Grammar Girl
  http://grammar.quickanddirtytips.com
- OneLook Dictionary Search
  www.onelook.com
- Zotero
  www.zotero.org/download
QUESTIONS?
REFERENCES