

# Writing a Scientific Article

## Introduction

- Answer the questions: what?; why?; and how?
- Teach the reader about your subject
- Define the subject and create characteristics
- Describe the controversy that requires this experiment
- State your purpose
- Finish with the major finding of your report

# Materials and Methods

- Describe the stages of procedure to reproduce the experiment
- Explain the source of chemicals and/or animals
- Explain your “experimental design”: numbers, quantities, etc.
- Explain procedures used to measure effects

# Results

- Tell the reader what you found
- Open each results paragraph with a sentence stating the procedure used to see the result
- State relevant results seen in this procedure
- Many results include so many numbers, so present this data in table or graph form

# Discussion

- Explain what the result shows or means
- Restate the question addressed by your experiment
- Match each paragraph in Results with a paragraph in Discussion
- Final paragraph speculates on how your study relates to a general issue

# The Scientific Paper: Abstract

- Shortened version of the paper, but contains all the information necessary:
  - what the objectives of the study were
  - how the study was done
  - what results were obtained
  - the significance of the results

# Introduction

- Organized to move from general information to specific information
- Must be summarized, not itemized
- Emphasize your specific contribution to the topic
- Last sentence should be a statement of objectives and hypothesis

# Citing Sources in the Introduction

- Evidence of the claims you are making
- Different ways:

“Urist<sup>2</sup> discovered BMP in his landmark study on bone inductivity.”

“Adell et al (1981) reported their fifteen year study on titanium root forms and osseointegration.”

# Methods

- Provides methodological details necessary to duplicate your work
- Narrative of the steps you took in your experiment
- Assume that other scientists do not know the specific details of your experiment
- Last paragraph: provide a brief description of statistical tests you used

# Results

- Presents the results, but does not interpret their meaning
- **Summarize** the raw data with text, tables, and/or figures
- A figure is useful for reporting a regression analysis (line graph)
- It is best to present **data** in a table
- A table's legend appears above it
- The legend for a figure appears below it

# Tips on the Results Section

- Number tables and figures separately
- Do not evaluate the results, report what you found
- Do not describe every step of the statistical analysis
- Refer in the text to each figure or table you include
- Tables report summary-level data
- Use a figure when the data needs visual representation

# Discussion

- You are free to explain what the results mean
- Interpret your results in light of other published results
- Relate your discussion back to the questions you raised
- Do not make too-broad statements
- Suggest future directions for research, new methods, etc.
- explain anomalies in the data
- Write in present tense

# Citing Sources in the Discussion Section

- Evidence of the claims you are making
- Different ways:

“Smith (1983) found that N-fixing plants could be infected by several different species of *Rhizobium*.”

“Walnut trees are known to be allelopathic (Smith 1949, Bond et al. 1955, Jones and Green 1963).”

“Although the presence of *Rhizobium* normally increases the growth of legumes (Nguyen 1987), the opposite effect has been observed (Washington 1999).”

# Conclusion

- Limit the conclusion to the outcome of the study
- Do not generalize the findings beyond the limits of the study
- The Conclusion should reflect the study design and support the objectives