

Writing a Scientific Research Proposal

A research proposal has three main points:

- 1) Explanation of proposed research (*what* will be done)
- 2) Methods and techniques to be employed (*how* it will be done)
- 3) Novelty and/or importance of the study (*why* it should be done)

I. Title

This should provide a specific summary of the proposed work

Example 1:

NO (too much detail)

A three-year study of population decline in the spotted salamander (*Ambystoma maculata*) following logging, road building and wetland mitigation near vernal pools in a hardwood forest of northeastern Connecticut

YES

A study of population decline in the spotted salamander (*Ambystoma maculata*) following logging in northeastern Connecticut

Example 2:

NO (not enough detail)

Habitat models for use in rivers

YES

Validation of in-stream habitat models for the Fenton River, Storrs, Connecticut

II. Abstract (one paragraph)

This is a brief description of the hypothesis and the goals of the experiment. It should indicate what questions you, as a researcher, will be seeking to answer. An abstract provides a summary that allows readers to quickly assess the basic premise of your proposal.

III. Introduction and Literature Review

You should begin with the basics of your research topic and then narrow the focus of those details that are especially pertinent to the proposed work. Present what is currently known by plant biologists, and how these discoveries were made. This is the place to show what is interesting and cutting-edge in the field that led to your research idea. You are laying the groundwork for your proposal with the material that you present. Use a plethora of sources especially primary sources such as journal articles. Textbooks, web sites (with great caution) and personal communications with professors can also be useful sources. Make sure to cite appropriately in the text (more to follow on citation)

This is the heart of your assignment and will probably be the lengthiest piece of it. Your sentence structure should look something like this:

- “According to Thullen *et al.* (1999), nitrate removal rates were highest in those wetlands that contained a diverse number of plant species.”
- “Within organisms cellular nitrogen generally exists as either ammonia-nitrogen or amino-nitrogen, which are the most reduced forms of nitrogen (Delwiche, 1981).”

Never leave your reader in doubt as to the source of your information! Cite thoroughly and cite properly.

***A note on sources, paraphrasing, and citations:

Unlike the style you might use in English expository writing, technical science writing is terse, clear cut, and lacking in artistic enhancements. When using information from a source avoid quoting directly. Read the piece, put the article down, and then put the important points into your own words. By setting the article aside you are allowing yourself to process the information, instead of just spitting the idea back out in a slightly altered sentence.

Citations tend to be (**author, year**). If you refer to the author in the sentence, immediately follow the name with (**year**) (see examples above).

IV. Research Hypothesis

What is the hypothesis that you are testing? What are the questions that you seek to answer? Based on what is known in this field, explain what you expect to see and hope to show through your result? This is where you share your thoughts.

V. Material and Methods

Describe your proposed experiment in depth. What processes are you going to use? What kind of equipment and supplies will be necessary for the project? What will you use for a control, and what will be your replicate? Be thorough, but not excessive. It might be useful to construct an outline before completing this section, as this will give you an idea of what should be occurring when, and if your goals are attainable in the given time.

VI. Conclusion and Justification

Your literature review will have already helped to lead the reader to an understanding of why your topic is of importance. This is where you will explicitly state how your proposed research will advance knowledge. What are the far-reaching effects? Will your study potentially change practices or policies? Why is it that your research deserves funding?

VII. Bibliography

Include all the resources that were used in the writing of the paper. Follow your instructor's guidelines for formatting, which will resemble the styles that you would find in a plant biology journal.

Example:

Caspar T, Huber SC, Somerville C (1985) Alternation in growth, photosynthesis, and respiration in a starchless mutant of *Arabidopsis thaliana* (L.) deficient in chloroplast pyrophosphoglucosyltransferase activity. *Plant Physiol* **79**: 11-17

*****A note on Voice:**

There is no one format for voice in scientific writing. Active voice is usually encouraged (use of "I" or "We"), but in practice many writers switch between active and passive voice to keep the writing from becoming too repetitive.

Important Points to Remember

- An organized, well-written, concise, complete proposal = an easier to conduct experiment
- A good proposal is like a good sales pitch. In the world of graduate studies and scientific research a proposal is the means by which funding is secured.
- Good writing when paired with a thorough understanding of the subject matter is a valuable skill to possess.

References:

Hailman, JP, and KB Strier. 1997. Planning Proposing and Presenting Science Effectively: A Guide for Graduate Students and Researchers in the Behavioral Sciences and Biology. Cambridge University Press, Cambridge, UK. 128pp

Pechenik, JA. 2004. A Short Guide to Writing About Biology. Pearson Education Inc., Boston, MA. 302pp

Smith, RV. 1990. Graduate Research: A Guide for Students in the Sciences. Plenum Press, New York, NY. 292pp

Created by a UConn Writing Center Science Liaison