



## Ceiba Foundation for Tropical Conservation Educational Programs

### Scientific Paper or Research Project Report General Style and Format Guidelines

#### GENERAL NOTES ON STYLE

Recommended styles and formats vary widely between disciplines and between journals; however scientific writing generally is concise, objective and non-judgmental in tone. Below we provide a format that is generally standard among biological journals. Refer to major journals (e.g., *Ecology*, *Conservation Biology*, etc.) for examples.

Organize paragraphs with a strong opening sentence, followed by supporting statements. Write in the past tense, first person, active voice (e.g., “We conducted a study on...”). Be as concise and clear as possible: ask yourself at all times, “does this word need to be included?” Do not utilize flowery prose; take care with use of adjectives that are not supported by data and be specific (e.g., rather than “the insect ate very quickly,” state how quickly: “the insect ate 14 grams of leaf tissue per hour”). Avoid colloquial phrases such as “sort of” and “like.” Stick to the focus of your study, and your results, and make sure to use only relevant references and citations.

Be sure to spend the majority of the paper on what you actually studied; too many students excessively discuss only tangentially relevant literature in both Introduction and Discussion, at the expense of presenting their own work. Write as much as you can from your data; you worked hard to collect it!

**Spelling and typographical errors are unacceptable.** Always spell check and proofread your paper before turning it in! **Plagiarism is stealing:** the entire paper must be in your own words, except direct quotes which must be indicated with quotation marks and a citation (see below).

#### SPECIFIC GUIDELINES

##### Format

Papers must conform to the following formatting requirements:

- Maximum word counts as specified, **double-spaced** (excluding figures and Appendices)
- Minimum 10-point font size
- A4 paper size, with **1.0 inch** margins (this gives your instructors room to make comments)
- Number pages in bottom right-hand corner
- Submit your paper by email as a .doc, .docx, .rtf or .pdf file to the shared course online drive
- filename must be "**LASTNAME\_ShortTitle.docx**", not "my paper" or "research paper"

##### Title

All papers must begin with a title. The title should be brief but informative, clearly stating what the paper is about. Avoid “cute” or funny titles, or your reader will see you as unprofessional, and by extension your results as untrustworthy. Include author name(s).

##### I. Introduction (*max. 500 words*)

Start with a statement of your subject of interest (e.g., nutrient cycling or gap dynamics) or the broader questions that provoked your study. Cite scientific papers and books of prior work that provide the knowledge base underpinning this broad area of academic inquiry (see Citations section below for format). You may cite instructor-provided information as (Meisel, *pers. comm.*, 2007), but whenever possible use a textbook or journal reference. Do not include statements as facts that are unsupported by citations, here or elsewhere in your paper.

Narrow the focus from the general topic to your specific area of inquiry. Your introduction should explicitly provide the rationale or justification for your study: what is the larger area of interest that your research will illuminate? You must include your questions or hypotheses: spell these out very clearly, as they provide the framework for the rest of your paper. Consider the statistical tests you will apply to your data when wording your hypotheses, so they are congruent (e.g., “we predict that median insect abundance will be higher in gaps”).

## II. Methods (max. 500 words)

In the same order as the hypotheses laid out in your introduction, describe clearly and concisely the steps you took to test them. Specify where and when the study took place, and provide pertinent background information (ecosystem type, elevation, climate, etc.). Identify your treatments, numbers of replicates and sampling schedule precisely. Include the numerical analyses and statistical tests you used to test your hypotheses. Do not include a laundry list of your materials used, nor a step-by-step procedure (if specific laboratory protocols were followed, or behavioral ethograms employed, these may be attached as an Appendix). Ensure that your reader can determine if your methods were sufficient to test your hypotheses, and be detailed enough that your study could be repeated by somebody else. Do not present results in the Methods, unless absolutely necessary (e.g., to give some findings that forced you to alter your methods or analysis).

## III. Results (max. 250 words)

Start by providing the main result (i.e., the main finding that either led you to accept or reject your hypothesis).

**Provide the numerical results of the data collection described in your methods:** even if your *comparisons* are non-significant, your *data* are still real and worth reporting. You cannot simply refer to the graph of results, but rather must indicate the principal results (medians, percentages, frequencies, etc.) in the text. Do not give all data (i.e., from every replicate), but rather summary statistics (means, medians, ranges and/or variance) as appropriate. Give statistical results of all important data comparisons, including the test used, sample size, and level of significance {ex: “Median response in treatment A was 12 g/min, and in treatment B was 22 g/min, a significant difference (Mann-Whitney U test, n=20, p < 0.01).”}. Cite tables and figures (graphs) for your results {ex: “Median response in treatment A was nearly double that in treatment B (Figure 2).”}. Do not provide an in-depth explanation of the meaning of the results; save the interpretation for the discussion section. However, do state clearly whether the results confirm or refute each hypothesis. Do NOT say your results “proved” or “disproved” your hypothesis! Hypotheses are never proven, only supported or rejected.

## IV. Discussion (max. 500 words)

Begin by discussing how your results reflect back on your initial questions/hypotheses. Avoid saying “the results were interesting” -- let your reader decide if they are interesting or not! Discuss the ecological, evolutionary, or conservation significance of your principal findings (whether hypotheses were supported or not). Expand to interpret your results within the broader area of inquiry you described in your introduction. What is the larger relevance of your findings? Do they concur or contradict prior research done on the subject? Give possible explanations of the results you found, based on the literature available. You may include anecdotal information if it is pertinent: observations or data not suitable for statistical analysis, but of use in interpreting your results (avoid, however, a barrage of unrelated observations). Describe new hypotheses or future research that is suggested by your results: what would be the next logical series of experiments?

**Always assume your results are valid;** if you don't believe they are, you would not publish the paper. Give plausible explanations for the results you did obtain, even if they were negative (i.e., null hypothesis not rejected). If you doubt the validity of your results, put those ideas later; a laundry list of sources of error, or reasons your experiment “failed,” is counter-productive, and generally not included. Again, *believe your research or don't publish it*. Clearly, we faced many unique constraints during these projects, but avoid focusing on those problems, and allow the reader to assess problems by clearly indicating your sample size, study period length, etc., in the methods section.

## V. Acknowledgments

If you received special assistance from one or more people, thank them here. Do not thank everyone under the sun, but rather those that deserve mention. Field assistants that helped for one day should not be included, those that helped for many days or contributed to the idea, design, analysis or editing should. In formal research projects, this is where you thank your funding sources, which always deserve public recognition.

## VI. Citations and Literature Cited

In the text, just provide the author (or authors) and year: “Sloths are primarily folivores (Eisenberg 2001, Jackson and Dodson 2000, Davies et al. 2003)”; or “According to Eisenberg (2001) sloths are primarily folivores”. Citations should not include page numbers unless it is a direct quote. **Every factual statement not derived from your own results** should be supported with a citation. If multiple sentences in your paper cite the same reference, either cite that reference after the first sentence only, or insert “(ibid)” after each subsequent sentence.

In the "Literature Cited" section provide author names, year, article title, journal name, issue, volume, page numbers, the URL from which it was downloaded, and the date of download; for books, include publisher and city of publication. Follow standard scientific format such as in the journals mentioned above; formats vary somewhat from journal to journal but contain the same information. **Use at least four non-lecture and non-web citations** to support your paper. Examples:

Lawrence, D., P. D'Odorico, L. Diekmann, M. DeLonge, R. Das, and J. Eaton. 2007. Ecological feedbacks following deforestation create the potential for a catastrophic ecosystem shift in tropical dry forest. *PNAS* 104(52): 20696-20701.

Sea Turtle Restoration Project. 2006. Threats to sea turtles. Retrieved on 10/28/2013 from <http://seaturtles.org/section.php?id=104>

Arking, R. 2006. *The biology of aging: Observations and principles* (3rd ed.). Oxford University Press. New York, NY.

## VIII. Tables & Figures

For our purposes, tables and figures can be inline with the text or compiled at the end of the document. Tables and figures DO NOT replace a written results section! Each table or figure (i.e., picture, graph, chart) must be accompanied by a caption (ex: "Figure 1. Median harvest rate of leaf biomass by *Atta* ants during high-light and low-light treatments"). Captions need not be in complete sentences, but must provide the reader with sufficient information to interpret the figure. In tables, make sure columns are clearly labeled, or explained (if you use abbreviations, codes, etc.) in the caption. In graphs, make sure that axes are labeled, including units of measure. Define any symbols in a legend, or in the caption itself. All figures **must be in black and white**, on white backgrounds (it is valuable to work on informative use of black-and-white figures, as most journals charge up to \$500 per color figure!). Do not include a graph "title", the caption is sufficient.

## IX. Appendix

If your project produced materials that are better included as an appendix, such as a list of all bird species observed, an ethogram of all behaviors scored, or the uses of all medicinal plants encountered, then it is best to present such lengthy collections of information in an appendix or appendices.