

UPDATED 15 JANUARY 2009

Term Paper Instructions: NSF “DDREAM” Proposals
Vertebrate Physiology ECOL 437 (a Writing Emphasis Course)
Bonine & Oh, Spring 2009

The term paper will be in the format of a research proposal for a (fictitious) National Science Foundation program—the “DDREAM grant” (**D**octoral **D**issertation **R**esearch **E**nrichment and **A**dvancement **M**oney). The proposal should focus on an aspect of *non-human* vertebrate physiology, preferably at the level of major physiological systems, the whole organism, or a comparative study across taxa. This is your opportunity to thoroughly research a topic in vertebrate physiology of interest to you, ask a novel and interesting question, present a well-reasoned hypothesis, and propose an experiment (or series of experiments) to test your hypothesis.

Evaluation:

Final submitted proposals will be evaluated by your instructors with respect to the following criteria:

1. Research Question: *Why is the question interesting? Why should anyone care (apart from any medical application)?*
2. Background & Hypothesis: *Does the proposal reflect an adequate understanding of the topic? Is the hypothesis well-supported? Are alternative hypotheses presented? Are the predictions clear?*
3. Proposed Research: *Will the proposed research provide an adequate test of the hypothesis? Are the methods appropriate and clearly presented? Are the experiments feasible? Is requested budget clearly justified?*
4. Editing & Formatting: *Was the proposal thoroughly edited for spelling, grammar, and clarity? Does the format adhere to the guidelines described in the instructions? Are there at least 10 appropriate peer-reviewed scientific sources? Is the bibliography properly formatted?*
5. Writing/Revision Process: *Was feedback from peers/instructors incorporated? Was there marked improvement over successive drafts?*

Your proposal will also be reviewed (anonymously) by your peers in a mock review panel at the end of the term. Bonus points will be awarded to the final paper grade of proposals that were recommended to be “funded”. Each student will also be responsible for orally presenting at least one other person’s proposal to the panel.

Important Deadlines: Your term paper grade is partitioned into 4 mandatory assignments:

- 06 February** A topic/title along with 5 annotated references (**20 points**). ‘Annotated’ means a sentence or two about each reference with respect to findings and relevance. We urge you to come to us with an outline as well. Although not required, this will allow us to help you before you invest too much time in writing.
- 06 March** A first draft of your proposal with 10+ references (**40 points**). Budget and cover sheet not necessary at this time. We will return this draft to you within about a week for you to edit and *improve*.
- 15 April** A second draft (**40 points**) for a randomly chosen peer to edit. Please **DO NOT** include your name on this draft (as to keep the author anonymous to the editor), but instead use a codename and tell the instructors your codename. Your review of your peers’ proposals is worth an additional **20 points (from your pool of 300 lab points)**. See ‘*Critical Evaluation of a Published Paper*’ handout for suggestions.
- 22 April** Final complete proposal is due (**75 points**).

Below are the instructions for preparing your NSF DDREAM proposal (adapted from www.nsf.gov). Please note that proposals that do not adhere to the guidelines below will be penalized and may be deemed ineligible for review.

I. INTRODUCTION

The National Science Foundation awards DDREAM Grants in selected areas of the biological sciences. These grants provide support of doctoral dissertation research to improve the overall quality of research.

II. PROGRAM DESCRIPTION

The duration and grant amount are flexible but must be justified by the scope of work and documented in the proposal. Grants are typically awarded for **periods up to 36 months and for amounts up to \$50,000**.

These awards are intended to provide funds for research expenses including: travel to specialized facilities or field research locations and professional meetings, use of specialized research equipment, purchase of supplies and services not otherwise available, fees for computerized or other forms of data, and rental of environmental chambers or other research facilities. Funds may be also requested for research assistants/technicians, but may not be used for stipends for the PI (i.e. you can't pay yourself). The budget justification must explain how the requested funds are to be utilized.

For purposes of this competition, NSF will not support research on the etiology, diagnosis, treatment of physical or mental disease, abnormality, or malfunction. Studies of animal models for such conditions, the design and testing of drugs or other procedures for their treatment are also not eligible for support. For this competition, NSF does not support technical assistance, pilot plant efforts, research requiring security classification, the development of products for commercial marketing, or market research for a particular project or invention.

III. PROPOSAL PREPARATION INSTRUCTIONS

Full Proposal Instructions: Proposals should explicitly include the following elements (it is highly recommended to use **subheadings** to organize your thoughts and help guide your reviewers):

- 1. Cover Page** (download template .pdf from ECOL437 course website): Add project title, your name, and total funds requested to title page. Title should be concise but explain the main focus. Please do not reveal your name anywhere else in the proposal.
- 2. Project Summary** (at least half a page, but not more than 1 page): Summarize the main question addressed in your proposal. Briefly present your hypothesis and proposed research. This summary should allow a reader (e.g., panel reviewer) to quickly understand what you plan to do and why the results will be important.
- 3. Project Description** (8-10 double-spaced pages, 1 inch margins, 10-12 pt. Times New Roman, pages must be numbered).

A. Introduction & Background – Explain the physiological problem at hand and identify the main question you will address. Present background on what previous research has found, and what remains to be discovered (i.e., what is known and what is not known). Include any relevant figures or tables.

B. Hypothesis – Clearly state your main hypothesis that relates to the research problem presented. Explain the logic behind your hypothesis (this is a good place to cite previous studies in the field). Be sure to also include null and alternative hypotheses. A convenient way to notate this is “ H_1 ” (i.e., hypothesis 1), “ H_0 ” (i.e., null hypothesis).

C. Proposed Study – This is where you explain the experiments you plan on carrying out. You should provide justification for the study organism you chose, as well as the particular methods. It is not necessary to be super-detailed on your methods here—only provide enough so that a reviewer could get a general understanding of what you are planning. It is very important here to state how the results from the experiments will either support or not support the hypothesis. Feel free to include diagrams of your experimental setups, or any other necessary figures or tables.

4. References: Your proposal must include at least 10 appropriate sources. Half of your references, or more, should be from peer-reviewed literature (many review articles are peer reviewed, and some books are as well). Try to find recent references (within the last 5 years) so that your analysis is up to date. Use the format of *Journal of Physiology* for your list of references, as well as for the parenthetical citation throughout your paper.

Bibliography: The paper should conclude with a list of the papers and books cited in the text. The order of references is strictly alphabetical, regardless of chronology. The format for references to papers and books, and to chapters in books, is as follows:

Journal Article:

Lipp P, Egger M & Niggli E (2002). Spatial characteristics of sarcoplasmic reticulum Ca²⁺ release events triggered by L-type Ca²⁺ current and Na⁺ current in guinea-pig cardiac myocytes. *J Physiol* 542, 383-393.

Book:

Adrian ED (1932). *The Mechanism of Nervous Action*. Humphrey Milford, London.

Chapter in an Edited Book:

Buchan AMJ, Bryant MG, Polak JM, Gregor M, Ghatei MA & Bloom SR (1981). Development of regulatory peptides in the human fetal intestine. In *Gut Hormones*, 2nd edn, ed. Bloom SR & Polak JM, pp. 119-124. Churchill Livingstone, Edinburgh.

In the text, references should be made by giving the author and the year of publication in parentheses, e.g. (Lamb, 1986), except when the author's name is part of the sentence, e.g. 'Lamb (1986) showed that . . .'. Where several references are given together they are in chronological order, separated by semicolons. When a paper written by two authors is cited, both names are given; for three or more authors only the first name is given, followed by 'et al.'.

5. Budget Justification (not more than 2 pages): List items for which funding is request. Under each line, briefly (1-3 sentences) explain the need for each budget item requested.

A few helpful hints:

Writing is a *time-consuming* and difficult task. More time and practice always help. Outline before you write. Define your terms. Be accurate, concise, and to the point. Avoid the passive voice. Proofread and spell check. Have a friend read a draft. Write about something interesting to you. Use your instructors as a resource for advice on both the assignment *per se* and the physiology. These references may also be useful (personal copies are available for consultation in lab):

Strunk and White, 1979. *The Elements of Style*, 3rd Edition. Macmillan Publishing Co., Inc., New York, NY. 92+xvii pages.

Gibaldi and Achtert, 1988. *MLA Handbook for Writers of Research Papers*, 3rd Edition. The Modern Language Association of America, New York, NY. 248+viii pages.

Knisely, 2002. *A Student Handbook for Writing in Biology*. Sinauer Associates, Inc., Sunderland, MA 205+xvi pages.

Hailman and Strier, 1997. *Planning, Proposing, and Presenting Science Effectively*. Cambridge University Press, Cambridge, UK. 182+viii pages.

The librarians in the UA Science Library are excellent sources of information on performing effective and efficient literature searches. Set up an appointment to meet with one soon!

Potential List of General Topics: This is by no means an exhaustive list. Instead, consider these general areas in which to start your research. The main question in your proposal should be far more focused than the topics listed here. Feel free to come up with your own ideas.

- cold tolerance and/or freeze tolerance
- caloric restriction and aging
- digestive tract upregulation with feeding, atrophy with fasting
- diving adaptations
- altitude acclimatization/adaptation
- Bergman's rule
- thyroid disorders
- herbivory (or any dietary specialization) and resultant adaptations
- evolutionary rates of physiological systems
- symmorphosis
- heat shock or stress proteins
- speciation or recent rapid evolution
- environmental changes (human caused?) and physiological effects
- amphibian declines
- physiology in outer space/ physiological effects of zero gravity
- genetic engineering
- model organisms (e.g. zebra fish, squid, kangaroo rats)
- bat echolocation
- locomotor specializations (e.g. 'Jesus Christ' lizards, gecko adhesion)
- physiological aspects of sexual selection
- anadromy

Additional Journals that you may want to consult:

(Refer initially to the helpful list from Eckert's Chapter 1 –presented in one of the first lectures.)

American Zoologist	Journal of Endocrinology
Assiut Vet. Medical Journal	Journal of Experimental Marine Biology
Avian Diseases	Journal of Experimental Zoology
Australian Journal of Zoology	Journal of General and Comparative Endocrinology
Biochemie Biophysica Acta	Journal of the Marine Biological Association, UK
Biological Bulletin	Journal of Neurophysiology
Biological Reviews	Journal of Reproduction and Fertility
Canadian Journal of Zoology	Journal of Wildlife Disease
Clinical Endocrinology	Journal of Zoology
Conservation Biology	Marine Biology
Development	Molecular Endocrinology
Endocrinology	Neuroendocrinology
General and Comparative Endocrinology	Philosophical Transactions of the Royal Society of London
Growth	Physiology and Behavior
Hormone Research	Physiological Zoology
Hormones and Behavior	Proceedings of the National Academy of Sciences, USA
Immunology	Proceedings of the Royal Society of London
International Journal of Developmental Biology	Proceedings of the Zoological Society of London
International Reviews of Biochemistry	(The) Quarterly Review of Biology
International Reviews of Physiology	Respiration Physiology
Japanese Journal of Physiology	Trends in Endocrinology and Metabolism
Journal of Applied Physiology	Zoological Journal of Linnean Society
Journal of Clinical Endocrinology and Metabolism	