

Advances in Physiology Education

LABORATORY SOURCEBOOK

Instructions to Authors

Please read carefully as some of these instructions differ from the standard APS guidelines. A Word template based on these instructions can be downloaded from the *Advances* website to facilitate writing and submission. Explanations of the different elements in a Sourcebook activity are in italics.

- The headers in **BOLD** must be part of the manuscript.
- Use of the underlined subheaders in the manuscript is optional but all information indicated by the subheaders should be included if relevant.
- Text should be double-spaced and pages numbered sequentially.
- Figures and supplemental information should be uploaded in separate files. Indicate in the body of the manuscript the insertion place for each figure or table,

TITLE (*160 characters and spaces maximum*)

FIRST AUTHOR, ADDITIONAL AUTHORS

Department and Institution, City and State or Country affiliations for each author. (*If author affiliations have changed since the work was done, include current affiliations in the Acknowledgments section of the submission.*)

CONTACT INFORMATION FOR CORRESPONDING AUTHOR (*full mailing address, phone, fax, and email information for the author who will take responsibility for the submission*)

ABBREVIATED TITLE for the running head (*60 characters and spaces maximum*)

KEYWORDS (*3-5 words or short phrases that do not appear in the title or running head*)

ABSTRACT (250 WORD LIMIT).

INTRODUCTION: A descriptive review of the physiology underlying the activity

Objectives and overview: *A brief paragraph introducing the activity and what occurs during the activity.*

Background: *The Background should contain all information needed to educate the reader about the activity and it may need to be quite detailed. What phenomena does the activity explore? What physiological parameters are measured or observed? Relate these phenomena to physiological principles. If possible, include citations for the original research from which the activity derives. Do not simply cite previously published versions of the activity.*

Place the activity and its physiology in the broader context, with particular attention to factors that might interest students. Think of how you might answer a student who asks “Why are we doing this activity?”

The Background may include figures, graphs, and/or flow charts created by the author(s), or those for which the authors have obtained permission to reprint.

Users of Sourcebook activities should not have to consult outside references to understand the relevant physiology as they may not have access to appropriate resources. Because the Sourcebook targets high school teachers and instructors who teach introductory biology in addition to physiologists, you should assume that the reader has minimal background in physiology when explaining the background.

Where possible, select references that are freely available through the internet, such as publications more than a year old in the American Physiological Society journals.

Learning Objectives: *A numbered list that includes both content knowledge objectives and process skills.*

After completing this lesson, the student will be able to:

[**CONTENT KNOWLEDGE:** *Describe the key concepts students will learn from the activity. Objectives should begin with action verbs such as explain / describe / list / draw, etc.*]

[**PROCESS SKILLS:** *[Describe key skills to be learned from activity. Objectives should begin with action verbs such as measure / design / predict / analyze, etc.]*

Activity Level: *What level of student or what classes or courses might use this activity?*

Prerequisite Student Knowledge or Skills:

Students should have a basic understanding of: [*list of background content students should know to successfully complete this exercise*]

Students should know how to: [*list of skills or techniques students should have mastered prior to beginning this activity*]

Time Required: *How long will this activity take? Can it be done in one session or does it require several sessions?*

METHODS:

Equipment and Supplies

This section should contain all the information needed to set up and run the activity. Assume the reader has no experience in this subject and needs to set up the activity for the first time. For example, a local teacher calls you and asks for the instructions but has never done this type of activity before and cannot come see you for a demonstration. What would this teacher need to

know to buy the equipment and supplies, assemble them, make solutions, and run the activity successfully?

- *Directions should be detailed and should take the form of a numbered, annotated list.*
- *Descriptions must be specific and should include acceptable ranges of dimensions. For example, “rubber tubing” is not specific. A better description is “3-5’ of 1 cm I.D. rubber or plastic tubing.”*
- *Provide alternatives when possible. For example: “handheld or computer-linked sphygmomanometer.” (Adopters in some teaching situations may not have access to computers or specialized equipment.)*
- *Include manufacturers and model numbers for equipment.*
- *Include*
 - *where to purchase unusual items*
 - *instructions for building simple equipment*
 - *lists of chemical needed and source if unusual*
 - *recipes for solutions and concentrations of solutions*
 - *Photographs or illustrations showing equipment and how it is arranged or used. This section may include original diagrams and photographs or those used with permission. Photographs with identifiable people over the age of 18 require permission to use from the subjects.*
- *For animal activities, please include any information needed on their purchase, care while being held for the activity and appropriate disposal of the animals at the conclusion of the activity.*

Human and Animal Subjects

- *If the activity uses humans or vertebrate animals, please include a statement about protocol approval or exemption by the author’s institutional review board or animal care and use committee.*

*All activities using vertebrate animals or students as human subjects **must** include the following statement:*

Adopters of an activity are responsible for obtaining permission for human or animal research from their home institution. For a summary of Guiding Principles for Research Involving Animals and Human Beings, please see www.the-aps.org/mm/Publications/Ethical-Policies/Animal-and-Human-Research

Appropriate anesthesia or analgesia should be described for all animal activities, including those using invertebrates. Experiments using students as human subjects should be noninvasive or minimally invasive.

Instructions

This section must provide enough detail so that the process can be duplicated easily.

- *It should be written in the form of a numbered list of steps that may include annotations. Numbered steps allow you to reference a particular step later in the discussion.*
- *This section should also include samples of data collection forms or report forms if appropriate.*
- *This section should include diagrams or photographs if appropriate.*

Troubleshooting

Use this section to describe common student mistakes and what can go wrong. Explain how to correct or prevent technical problems. List sources of possible artifacts or erroneous results.

Safety Considerations:

Please indicate if students should be excluded as experimental subjects. If animals are used, are there any precautions needed in handling them?

If chemicals are used, include a summary of the critical Material Safety Data Sheet (MSDS) information for each one. What precautions are needed in handling or disposing of chemicals? List protective gear required (gloves, goggles, etc.). For example:

Diazoxide has the following MSDS warnings: may be harmful if swallowed, causes skin irritation, causes serious eye irritation, may cause respiratory irritation. Students should wear appropriate personal protection equipment, including gloves, goggles, and mask if handling the dry powder.

RESULTS

This section is critical for adopters who have never done this activity before.

Expected Results: *This should begin with an explanation of what you would expect students to observe or measure. Relate the results to the physiology. Provide sample data or graphs if possible. Explain what the results will look like when students make common mistakes.*

If sample data sets for an entire class are available, these could be useful as preparatory work or for a 'dry lab' activity. Please consider including these data sets as supplemental information (see later section on SUPPLEMENTAL MATERIAL.)

Misconceptions: *Any there any misconceptions that might be corrected by doing this activity?*

Evaluation of Student Work

This section should include

- *how students might present their data*

- *examples of questions to be answered*
 - *If answers to questions are not found elsewhere in this submission (for example, in the Introduction), they should be included here, in brackets immediately after the question.*
- *prompts for a lab report or other written work*

Inquiry Applications

What is the inquiry level of the lesson? (see list below) Consider the following points:

- *Who decides the question to be explored?*
- *Who plans the procedure to be used? Sometimes this is a combination of a basic protocol provided by the teacher and variations on that protocol developed by the students.*
- *Who carries out the experiment and analyzes the data?*

“Methods” level: Teacher generates the question(s) and teacher designs the experiment.

“Facilitated Inquiry”: Teacher provides guidelines for the research questions and experimental design. Students expand on the question and methods.

“Guided inquiry”: Teacher generates the question(s) and students design the experiment. Students may modify the teacher-generated question.

“Open inquiry”: Students generate the question and students design the experiment.

How can the activity be made more student-centered and/or used at a higher inquiry level? Please describe some examples of how this could be done.

Can the lesson serve as an introduction to a method that can then be used in higher level inquiry investigations? Provide suggestions for follow-up activities when appropriate.

Wider Applications:

Can the activity be used in a problem-based learning context or case-based learning context? Provide detailed examples when appropriate.

Additional Information:

This section may include a description of how to handle the class discussion once the activity is done. It may also include additional interesting background information about the activity or about the physiology behind the activity. This section can also be used to relate the physiology to real-world applications, such as medical uses for the techniques.

ADDITIONAL RESOURCES:

Should include original source citations, textbooks, and such that have not been previously cited in the submission.

- *Add additional resources to your REFERENCES list and add their reference list numbers to the following statement:*

For additional information on this topic, please see (reference list citation numbers for the items).

Resources should be easily accessible so that adopters without extensive library resources can find them.

Search the APS journals website (www.the-aps.org/mm/Publications/Journals) for reviews and other related articles.

- *As with any paper that cites the work of others, please do not include references that you have not personally read.*
- *Please limit the use of web sites whose URLs might not be stable.*
- *Papers that are published in print journals but accessed online should have the print volume citation, not the access URL.*

Search the APS Archive of Teaching Resources at www.apsarchive.org for related items, such as other labs, Advances in Physiology Education articles, Legacy articles, etc. Add these to the REFERENCES list and add their reference list numbers to the following statement:

For additional resources related to this experiment, please see (reference list citation numbers for the items).

ACKNOWLEDGMENTS:

Use this section to acknowledge others who have been involved in the development of this activity. Thank people who have given permission for use of figures. Include current author address information here if it has changed from title page address.

REFERENCES

This section follows the standard citation format for APS journals. Reference lists should be arranged alphabetically by author and numbered serially. The reference number should be placed in parentheses at the appropriate place in the text.

The examples given below are for the most common source types. For a complete list of examples, see www.the-aps.org/mm/Publications/Preparing-Your-Manuscript#references

Journal article: Author AB. Title of article. *Journal Title Abbreviated* vol: pp-pp, year.

Book: Author AA, Author B, and Author CC. *Title* (x ed.). City: Publisher, date.

Chapter in a book: Author AA and Author CC. Title of the chapter. In: *Book Title*, edited by Editor AA, Editor BB. City: Publisher, date, p. 00-00.

Web article: Author/editor (if known). (Revision or copyright date, if available). Title of page [Publication medium]. Page publisher. URL (Protocol://Site/Path/File) [Access date].

Access date may be general (year only) or to the day. If a reference is available both in print and online in electronic format, always cite the print reference.

FIGURES:

Figures should be submitted as pdf files. For complete and detailed instructions, including guidelines and rules for the use of animals and humans in photographs, please see <http://www.the-aps.org/mm/Publications/Preparing-Your-Manuscript/Preparing-Figures>

SUPPLEMENTAL MATERIAL

Video and audio files, long data sets, and similarly cumbersome material that cannot be feasibly published in a PDF page may be submitted for inclusion in the online journal (without charge to the author) as supplemental material. Such material must be submitted for peer review along with the manuscript and must meet the approval of the journal Editor. For all supplemental materials, authors should include a caption for each file, explaining the purpose and content of the file.

Electronic publication of the Sourcebook activities allows authors the flexibility to include video and audio files or large sample data sets that could be used by students to analyze results if they do not have the equipment needed to carry out the activity.

Material that can be set into an article in standard APS house style, such as figures, tables, equations, and other material that can be easily copyedited and typeset into our final-published PDF page, may NOT be submitted as supplemental data. Such material must be incorporated into the article as standard figures or tables.

Audio/Video: Authors are responsible for compiling their own digital audio or video. Each file should be no more than 10 megs in size. Authors may be required to resubmit video files with shorter running time, smaller frame size, or lower resolution in order to conform to the recommended file size.

Long Data Sets: Long data sets should be submitted in Microsoft Excel or in Microsoft Word table format. Authors should include a title and legend explaining the content and purpose of each data set.