

The American Physiological Society: Instructions for Preparing Your Manuscript

This document will take you through all the major steps of preparing your manuscript for submission to the American Physiological Society Journals, from how best to format and organize the paper itself, to how to create digital images suitable for print and web publication, to advice on how to present supplemental data files such as video clips and long tables. The full, HTML version of these *Instructions* is located at www.the-aps.org/publications/i4a/prep_manuscript.htm, and is linked to additional information on PDFs, image file formats, etc.

These instructions pertain to all of the *American Journal of Physiology* sections, as well as the *Journal of Applied Physiology*, the *Journal of Neurophysiology*, and *Physiological Genomics*. Please note that *Advances in Physiology Education*, *News in Physiological Science* (invited only), and *Physiological Reviews* (invited only) have specific instructions that you should review if you are submitting to them.

General Information

The American Physiological Society (APS) Journals seek definitive papers that present the entire contents of a research project. In general, all data from a group of subjects, animals, or samples should be presented together in a single paper. If this cannot be done, then the manuscript should be cross-referenced. Identical subject, animal, and sample numbers should be used in the different manuscripts to identify their commonality.

Peer Review Policy

Manuscripts are refereed critically by two or more reviewers. Acceptance of manuscripts is based on scientific content and presentation of the material; membership in the Society is not a prerequisite for publication. The Editor/Associate Editor selects the reviewers, corresponds with the author, and makes the final decision on the acceptance or rejection of the manuscript.

If a manuscript is submitted by an Editor of the Journal, another Editor handles that manuscript. The APS Peer Review office helps ensure confidentiality by setting up blinded user records in the APS Central system to be used for this purpose.

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There is a one-time Mandatory Submission Fee of \$50 for each article submitted to most of the APS Journals. The Mandatory Submission Fee is waived only for invited authors and for those submitting to *Physiological Genomics* and *Advances in Physiology Education*.

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Forms customized to your manuscript will become available on completion of the submission process; check the Home Page of the journal you are submitting to for blank forms.

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Open Access choice for authors of Physiological Genomics

Starting July 1, 2003, authors can choose to pay a \$1,500 fee to have their article published online with Open Access from the first date of publication or choose to pay no author fees and leave their article under Subscription Access. Open Access means that those online articles are completely free to any person or any library. All online content associated with the article (text, figures, supplemental material) is freely accessible.

Upon acceptance, you will be asked to download a form, where you will choose author-fee-based Open Access or Subscription Access. If you choose Open Access, you will be asked to provide a credit card number, approved purchase order, or check for \$1,500. Once your payment or purchase order is processed, your online article will be made free to all. The print journal containing your article will still be available for a subscription fee, but your online article will be free.

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At your request, the APS can create a toll-free link from your online published article to a URL you specify. Readers accessing your article from this URL can do so without a subscription to the journal. The per-article cost is \$150 and can be noted on the Reprint Order Form. Payment for the link will be added to the invoice for publication fees.

See www.the-aps.org for current reprint prices.

Restrictions on Prepublication

Except in reviews and invited editorials, the APS Journals will not accept submissions in which, other than in abstracts of less than 400 words, a significant portion of the data in the form of figures and/or tables has been published elsewhere. For the APS guidelines regarding duplicate and/or prior publication, see the *APS Ethical Policies and Procedures*.

Authorship Changes

Changes to authorship are handled differently depending on when the error is noticed, i.e., on the stage of publication of the paper.

After Submission but Before Acceptance

If you realize that changes to authorship (e.g., altering the order of authorship or adding/removing a name) are needed, please follow these steps:

- Download the Change of Authorship Form (at www.the-aps.org/publications/journals/pub_author_form.pdf).
- Have ALL authors sign it.
- Fax, mail, or e-mail the signed form to the APS Peer Review office (301-634-7243).

After Publication in Articles in PresS

If you have realized that an author's name was misspelled in such way as to affect finding the article in PubMed or through other searches, notify the Peer Review office so that the article can be fixed by amending the Articles in PresS edition. Please note: this is the ONLY case when the Articles in PresS edition will be corrected. Follow the steps above when submitting the correction. Other authorship corrections can still be made for the final print and online editions (see paragraph below).

During Production of the Final Print and Online Editions

Changes to authorship (e.g., altering the order of authorship; adding/removing a name; adding or changing an initial) can still be made during production. You will need to follow these steps:

- Download the Change of Authorship Form (at www.the-aps.org/publications/journals/pub_author_form.pdf).
- Have ALL authors sign it.
- Fax, mail, or e-mail the signed form to the Journal Editorial office (301-634-7243).

After the Final Edition has been Published in Print and Online

Any changes to authorship can only be made through a corrigendum to the print edition. The online version will have a permanent link to the corrigendum. Follow the steps in the previous section (*During Production of the Final Print and Online Editions*) when submitting the changes.

Conflict of Interest

Authors of research articles are required at the time of submission to disclose to the APS Publications Office any potential conflict of interest (e.g., consultancies, stock ownership, equity

interests, patent-licensing arrangements, lack of access to data, or lack of control of the decision to publish). In such cases, the author(s) will be asked to fill out a Conflict of Interest Disclosure form. The information provided in the form, unless already disclosed in the submitted article, will be held in confidence while the paper is under review. If the article is accepted for publication, information on the potential conflict of interest—including a lack of control of the decision to publish—will be included in the Disclosures section, following the Acknowledgments section.

Use of Previously Published Illustrations

APS Journals do not allow the use of previously published illustrations in regular research papers. If scientifically appropriate, previously published illustrations may be included only in reviews, invited editorials, or other invited papers, and only if permission is obtained from both the author and the original publisher. Authors are responsible for obtaining permission letters and must include them with their accepted manuscript in advance of publication. Authors are also responsible for providing publication-quality electronic files or laser prints of the previously published illustrations. These are best obtained from the original publisher or original author. **Previously published images downloaded from the Internet are not acceptable for publication.**

“Submitted” and “Accepted” Dates

The “submitted” date for a manuscript is the date when the manuscript was submitted to *APS Central* online peer review system (<http://www.apscentral.org>). The “accepted” date is the date when the official letter of acceptance is sent out (usually via e-mail) from the Review Editor.

“Advertisement” Note

The APS is required by US Postal regulations to affix the following note on the title page of all articles for which page charges are assessed: “The costs of publication of this article were defrayed in part by the payment of page charges. The article must therefore be hereby marked ‘advertisement’ in accordance with 18 U.S.C. Section 1734 solely to indicate this fact.”

Ethical Policies and Standards

Use of Humans and/or Animals in Experiments

The research described in papers submitted to any of the APS publications that involve the use of human beings, including healthy volunteers, must adhere to the principles of the Declaration of Helsinki, as well as in Title 45, US Code of Federal Regulations, Part 46, Protection of Human Subjects, Revised November 13, 2001, effective December 13, 2001 (see <http://ohrp.osoph.dhhs.gov/humansubjects/guidance/45cfr46.htm>). Research involving animals must adhere to APS's *Guiding Principles in the Care and Use of Animals*. APS insists that all investigations involving humans or animals reported in its publications be conducted in conformity with these principles, and that a statement of protocol approval from an IRB or IACUC or equivalent is included in the methods section of the paper. In describing surgical procedures, the type and dosage of the anesthetic agent should be specified. Curarizing agents are not anesthetics; if these were used, evidence must be provided that anesthesia of suitable grade and duration was employed. Manuscripts reporting the results of experiments on human subjects, including healthy volunteers, must include a statement that informed consent was obtained. Editors/Associate Editors are expected to refuse papers in which evidence of the adherence to these principles is not apparent. They reserve the right to judge the appropriateness of the use of animals and humans in experiments published in the journals. Differences of opinion will be adjudicated by the Publications Committee.

Fetal Tissue Research

The American Physiological Society Publications require all papers submitted to any of the APS Journals and involving the use of human fetuses, fetal tissue, embryos, and embryonic cells to adhere to the US Public Law 103-41, effective August 1991.

Please read the *APS Policy Regarding Publication of Research on Human Fetuses, Fetal Tissue, Embryos, and Embryonic Cells* and the criteria that must be met by all researchers submitting their work to the APS Journals.

MIAME Standard for Microarray Data

The American Physiological Society has adopted the microarray data standard developed by the Microarray Gene Expression Data society (MGED; www.mged.org) and requires that all authors using microarray data analysis in their research submit a complete data set to the National Center for Biotechnology Information's (NCBI) Gene Expression Omnibus (GEO; www.ncbi.nlm.nih.gov/geo/) database **prior to manuscript submission**.

It is mandatory that all papers using microarray data analysis and submitted after January 1, 2003, to any of the APS publications comply with the Minimum Information About Microarray Experiments (MIAME) standard. The access to the GEO database is free and open for all, and the database is maintained by NCBI.

HUGO Gene Nomenclature

In accordance with the HUGO Gene Nomenclature Committee (HGNC), the APS requests that authors obtain approval for new human and mouse gene symbols by contacting either Dr. Sue Povey for human genes (e-mail: nome@galton.ucl.ac.uk) or Lois Maltais for mouse genes (e-mail: nomen@informatics.jax.org). Additional information on gene nomenclature guidelines is available from the HGNC (www.gene.ucl.ac.uk/nomenclature/).

Technical Requirements

File Formats for Online Submission and Print

APS Journals accept only electronic submissions via the *APS Central* website (<http://www.apscentral.org>). You will be guided by the on-screen instructions and prompts throughout the online submission process.

All text and image files must be saved as a **single** PDF file, regardless of the original software used, for successful submission via *APS Central*. Later, when the paper is accepted, the text must be sent to APS preferably as a Microsoft Word file (version 6.0 or later), and the images must be prepared at publication-quality resolution, using software capable of generating high-resolution TIFF or EPS files. For detailed information on the preparation of graphics in TIFF and EPS formats, see the Cadmus website (<http://cjs.cadmus.com/da/guidelines.html>). See also *Special Symbols*.

Manuscript Checklist

The manuscript must be double-spaced with wide margins in an 8.5 × 11-in. document.

The pages should be numbered in the upper right-hand corner (beginning with the first page of text).

Arrange as follows (all should begin on separate pages):

- title page
- abstract and keywords on the same page
- main text (introduction; Materials and/or Methods, or Experimental Procedures; Results; Discussion, with conclusions)
- text footnotes
- acknowledgments
- references
- figure legends
- tables

Enclose figures in a separate envelope or on a disk: 1 set of digital files and 1 set of paper copies.

Be sure the text is clear and concise, conforming to accepted standards of American English style and usage. Avoid jargon, clichés, and laboratory slang.

See *Manuscript Sections*, below, for further description.

Abbreviations, Symbols, and Terminology

All abbreviations must be explicitly defined at first usage. However, internationally accepted biochemical abbreviations such as ADP, NADH, and P_i do not need to be defined; other abbreviations need only be defined at first mention. Please consult the list of accepted abbreviations for our journals (www.the-aps.org/publications/journals/abbrv99.pdf). Other abbreviations need only be defined at first mention. For word usage, symbols, etc., authors are referred to *Scientific Style and Format: The CBE Manual for Authors, Editors, and Publishers* (6th ed., 1994). For chemical and biochemical terms and abbreviations, consult the recommendations of the IUPAC-IUB Combined Commission on Biochemical Nomenclature. Isotope specification must conform to the IUPAC system. Authors are referred to the following articles for style in specialized fields: "Glossary on respiration and gas exchange" (*J Appl Physiol* 34: 549–558, 1973); and "Glossary of terms for thermal physiology" (*J Appl Physiol* 35: 941–961, 1973).

Special Symbols

For special characters not available on the standard 104-key keyboard (e.g., Greek characters, mathematical symbols, figure symbols), use the Symbol font or use the "Insert Symbol" function in Microsoft Word; do **not** use math font or image files (e.g., GIF) within the text for special characters or text constructions. Please also note that we cannot process files prepared in LaTeX.

Spelling and Compounding

Authors should follow *Webster's Third New International Dictionary* or *Merriam Webster's Collegiate Dictionary*, 10th edition, for spelling and compounding. The APS Journals use American English rules for spelling.

Citing Unpublished Observations and Personal Communications

Citations of submitted papers still in preparation, in peer review, or of other unpublished materials cannot be included in the reference list, which may only list published work. Such citations can, however, be provided in parentheses in text as "unpublished observations" (e.g., "JMK Smith, unpublished observations"). The APS Journals discourage the use of personal communications. However, if they are used, the author(s) must have in their file a letter granting permission from the communicant and stating that the person whose opinion is cited has seen and approved the actual wording of the citation. If requested, the author will send the letter to the APS Publications office. For both unpublished observations and personal communications provide the cited person's last name and all initials.

Drugs, Chemicals, and Trade Names

Proprietary (trademarked) names should be capitalized, with the spelling carefully checked. The chemical or generic name should precede the trade name or abbreviation of a drug the first time it appears.

Cell Lines and Reagents

The source of cells utilized (species, sex, strain, race, age of donor, whether primary or established) should be clearly indicated. The source of reagents should be stated (name, city, and state within parentheses) when first cited. If tests to rule out the presence of mycoplasmal contamination were not performed, this fact should be clearly stated. Other data relating to unique biological, biochemical, and/or immunological markers should also be included if available, with their source identified. Publication of results is based on the principle that results must be independently verifiable. Authors are expected to make unique reagents available to qualified investigators either directly or through a recognized distributor. See also *Unique Materials and Data Banks* (below) and *Ethical Policies and Standards* (above) for other requirements.

Unique Materials and Data Banks

Work published in the APS Journals must necessarily be independently verifiable. Authors describing results derived from

the use of antibodies, recombinant plasmids and cloned DNAs, mutant cell lines or viruses, and other similarly unique materials are expected to make such materials available to qualified investigators on request. Authors should also submit published nucleic acid/amino acid sequences to a widely accessible data bank. Sequence data submission forms for the National Biomedical Research Foundation-Protein Information Resource (NBRF-PIR) database (pirmail@nbrf.georgetown.edu) are available from the APS Publications Office (publicat@the-aps.org). Also, for other special types of submissions (e.g., genomes, bulk submissions), additional submission protocols are available from the following organizations:

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ddb@ddbj.nig.ac.jp

EMBL: EMBL Nucleotide Sequence Submissions
European Bioinformatics Institute
Wellcome Trust Genome Campus
Hinxton, Cambridge CB10 1SD
UK
Tel: +44 1223 494499
Fax: +44 1223 494472
datasubs@ebi.ac.uk

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National Library of Medicine
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Bethesda, MD 20894
Tel: 301-496-2475
Fax: 301-480-9241
info@ncbi.nlm.nih.gov
See also *MIAME Standard for Microarray Data* (above) and *Data Supplements* (below).

Manuscript Sections

Title Page

The title page must contain the title of the article; author(s) name(s); all departments and institutions in which the work was done; an abbreviated title for the running head; the name and address for correspondence; and keywords.

Title

Make the title informative. Avoid unnecessary words like "Studies in . . ." The title must not exceed 160 characters, including spaces between words.

Authors

List all authors' names and their first names or initials exactly as they should be known, **in the order of importance of their contribution to the study**. Do not include any specific titles (e.g., PhD, MD, and Prof. are not needed).

Affiliation

List all departments and institutions in which the work was done, with city, state or country, and zip code. Identify each author's affiliation by superscript numbers matched to the appropriate institution. Affiliation must reflect the organization(s) supporting the author(s) while the work was done. This may differ from the current affiliations of the author(s), which will be listed in such cases in the Acknowledgments section as the present addresses of the authors.

Running head

The running head is an abbreviated version of the title, which will appear at the top of every page subsequent to the first page. Running heads must not exceed 55 characters including spaces between words.

Contact information

A full address for correspondence will be published and must be included, **with a current, valid e-mail address** for the corresponding author. This address will be published on the title page. Please note that a valid e-mail address is essential to participate in the APS electronic proofing service called "Rapid Proof." Also, provide phone and fax numbers for use while your article is in production. If the contact information to be used during production differs from that to be included in the final article, indicate this explicitly. To contact APS during the submission and peer review and/or during production after acceptance, go to the APS website (www.the-aps.org) and choose the appropriate journal's web page.

Abstract

An informative one-paragraph abstract of not more than 250 words must accompany each manuscript. It must state concisely what was done and why (including species and state of anesthesia), what was found (in terms of data, if space allows), and what was concluded.

Keywords

Include three to five words or short phrases, relevant to the article, that do not appear in the title or running head. (**NOTE:** Authors submitting to the *Journal of Neurophysiology* are not required to provide keywords.)

Introduction

Provide a brief overview of the scope and relevance of the study, especially with regard to previous advancements in related fields.

Materials and Methods

(Sometimes called "Experimental Procedures"). Describe techniques, cell/animal models used, and lists of reagents, chemicals, and equipment, as well as the names of manufacturers and suppliers, so that your study can be most easily replicated by others. Also in this section, describe the statistical methods that were used to evaluate the data. See *Abbreviations, Symbols, and Terminology* (above) for style information.

Results

Provide the experimental data and results as well as the particular statistical significance of the data.

Discussion

(Sometimes combined with the results in a section called "Results and Discussion"). Explain your interpretation of the data, especially compared with previously published material cited in the References.

Acknowledgments

List the people indirectly involved with the research whom you may wish to thank. Also, current addresses of authors (which may differ from those in the affiliation line) may be included here.

Do not include "promissory notes." APS Journal policy is against inclusion of implicit or explicit promises that future work will be published.

Do not include dedications. Dedications of articles are not permitted.

Grants

List the grants, fellowships, and donations that funded (partially or completely) the research. However, industry sponsored grants should be listed under *Disclosures*.

Disclosures

Any potential conflict of interest (e.g., consultancies, stock ownership, equity interests, patent-licensing arrangements, lack of access to data, or lack of control of the decision to publish) must be disclosed at the time of submission, and a Conflict of Interest Disclosure form must be filled out and sent to the APS Publications

Office. A statement describing the nature of the potential conflict of interest must be provided in this section, which will be placed below the Acknowledgments section.

References

Authors are responsible for accuracy of citations. References must be limited to directly pertinent **published** works or papers that have been **accepted for publication**. An abstract, properly identified as “Abstract”, may be cited only when it is the sole source.

References should be double-spaced, arranged alphabetically by author, and numbered serially. The reference number should be placed in parentheses at the appropriate place in the text.

Important Note: The reference list should not include citations of submitted papers still in preparation, in peer review, or of other unpublished materials. Such information may be provided in parentheses in the text as “unpublished observations” (e.g., “JMK Smith, unpublished observations”).

The APS Journals discourage the use of “personal communications.” However, if they are used, the author(s) must have in their file a letter granting permission from the communicant and send it to the APS Publications Office if requested.

For both unpublished observations and personal communications provide the cited person’s last name and all initials.

The reference list should *not* include citations of submitted papers still in preparation, in peer review, or other unpublished materials. Such information may be provided in parentheses in the text as “personal communication” or “unpublished observations” (e.g., “JMK Smith, unpublished observations”).

Note for references in the Journal of Neurophysiology

References for the *Journal of Neurophysiology* should be double-spaced and arranged alphabetically by author. The appropriate author name and year for each reference should be included in parentheses at the proper point in the text using the following style:

- One author (Brown 1982).
- Two authors (Brown and Smith 1982).
- Three or more authors (Brown et al. 1982).

If more than two references are cited by different authors, separate entries with a semicolon (Brown 1982; Smith 1983). If more than two references are cited by the same first author (or single author), use “et al.” where appropriate plus the date, even if the subsequent authors are not the same in all the references (Brown et al. 1982, 1983, 1986–1988). Note the use of commas between two consecutive years or nonconsecutive years and dashes for ranges (Brown et al. 1982, 1983, 1986–1988). If more than two references with the same year and author(s) are cited, use lowercase letters after the year (Brown 1982a,b). Lowercase letters will be inserted in the same-year references in the reference list.

Although the *Journal of Neurophysiology* does not require that the reference list be numbered, the examples given below are shown with numbers because that is the style for most APS Journals. In all other respects, the reference style used in the example below is the same across all journals.

The style of citation should be as follows, with journal name abbreviated as in Medline, PubMed, and Index Medicus. APS offers a selection of output styles available for a variety of citation management software (<http://www.the-aps.org/publications/journals/styles.htm>).

Examples

Journal Articles

1. Villalobos AR, Parmelee JT, and Renfro JL. Choline uptake across the ventricular membrane of neonate rat choroid plexus. *Am J Physiol Cell Physiol* 276: C1288–C1296, 1999.

Book References

1. Pollock DM. Endothelin receptor subtypes and tissue distribution. In: *Endothelin Molecular Biology, Physiology, and Pathology*, edited by Highsmith RF. Totowa, NJ: Humana, 1998.

APS Handbook of Physiology Series

Large textbooks require very specific citation information. For example, the APS Handbooks series contains a huge amount of information, and the inclusion in the citation of the section, vol-

ume, part, and chapter is essential to aid the reader in finding the information quickly (please note that the APS chooses not to list editors for the APS Handbooks).

1. Kaufman MP and Forster HV. Reflexes controlling circulatory, ventilatory, and airway responses to exercise. In: *Handbook of Physiology. Exercise: Regulation and Integration of Multiple Systems. Control of Respiratory and Cardiovascular Systems*. Bethesda, MD: Am. Physiol. Soc., 1996, sect. 12, pt. II, chapt. 10, p. 381–447.

Articles Published on the Web

Many reports are being published primarily, if not exclusively, on the World Wide Web. Such articles should be cited in the “online” style as shown below.

Format:

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

1. Dudoit S, Yang YH, Callow MJ, and Speed TJ. Statistical methods for identifying differentially expressed genes in replicated cDNA microarray experiments [Online]. Dept. of Statistics, Univ. of California at Berkeley. <http://www.stat.berkeley.edu/users/terry/zarray/Html/matt.html> [3 Sept. 2000].

Note that the date may be general or specific, to the day.

Some citations may have portions published in print and other relevant portions reposted online. However, if directions to the online portions are available in the printed work, this sort of citation should be avoided.

1. Joachims T. Making large-scale SVM learning practical. In: *Advances in Kernel Methods: Support Vector Learning*, edited by Schölkopf B, Burges C, and Smola A. MIT Press, 1999. [The software is available at http://www.-ai.cs.uni-dortmund.de/SOFTWARE/SVM_LIGHT/svm_light.eng.html]

2. Spellman PT, Sherlock G, Zhang MQ, Iyer VR, Anders K, Eisen MB, Brown PO, Botstein D, and Futcher B. Comprehensive identification of cell cycle-regulated genes of the yeast *Saccharomyces cerevisiae* by microarray hybridization. *Mol Biol Cell* 9: 3273–3297, 1998. [The data are available at <http://cellcycle-www.stanford.edu>]

DOIs and Articles in PresS

A new trend in scholarly publishing is to publish an article in several editions. For example, the final, citable draft of an accepted article may be posted to a web site, pending final copyediting and page layout/design. This initial post to the web qualifies as publication, but eventually the article will reach the readership in a final, polished form.

The APS publishes peer-reviewed articles upon acceptance, as Articles in PresS. These articles may be cited and establish publication’s priority before they appear in final print and online forms. (Please note the required use of a “digital object identifier”—DOI—in this citation.)

1. Scarafia LE, Winter A, and Swinney DC. Quantitative expression analysis of the cellular specificity of HECT-domain ubiquitin E3 ligases. *Physiol Genomics* April 26, 2001; 10.1152/physiolgenomics.00075.2001.

However, once this article has reached its final stage of publication, it will be cited with its new publication data, as follows:

1. Scarafia LE, Winter A, and Swinney DC. Quantitative expression analysis of the cellular specificity of HECT-domain ubiquitin E3 ligases. *Physiol Genomics* 4: 147–153, 2001. First published April 26, 2001; 10.1152/physiolgenomics.00075.2001.

Technical Documents, Congress Proceedings, etc.

Technical documents, congress proceedings, and some other sorts of material may often be published by the specific institution that sponsored the research.

1. Efron R, Tibshirani B, Goss V, and Chu G. *Microarrays and Their Use in a Comparative Experiment* (Technical Report). Palo Alto, CA: Department of Statistics, Stanford University, 2000.

Corrigenda/Errata

If an article required a correction, after first publication, this should be noted in the citation of the original article.

1. **Hallows KR, Packman CH, and Knauf PA.** Acute cell volume changes in anisotonic media affect F-actin content of HL-60 cells. *Am J Physiol Cell Physiol* 261: C1154–C1161, 1991. (Corrigenda. *Am J Physiol Cell Physiol* 268: March 1995, following table of contents)

Translations

1. **Gavrilov KA and Perel TS.** Earthworms and other invertebrates in the soil under...[in Russian]. *Pochovedenia* 8: 133–140, 1958.

2. **Gavrilov KA and Perel TS.** Earthworms and other invertebrates in the soil under...[in Russian, English summary]. *Pochovedenia* 8: 133–140, 1958.

3. **Fritsch G and Hitzig E.** Über die Elektrische. In: *Some Papers on the Cerebral Cortex*, translated and edited by von Bomin G. Springfield, IL: Thomas, 1960, p. 73–96.

4. **Vol'Kenshtein MV.** *Molecules and Life: An Introduction to Molecular Biology*. New York: Plenum, 1970. [Transl. from the Russian.]

Many Authors

It is APS Publications policy to list all authors in a research group. That is, the use of only the first author's name, followed by "et al." is unacceptable.

However, if there is an inclusive name for the research group as a whole (for example, the "International Human Genome Sequencing Consortium," which comprises some 250 researchers), it should be used rather than listing hundreds of authors.

So, the following format is acceptable:

1. **International Human Genome Sequencing Consortium.** Initial sequencing and analysis of the human genome. *Nature* 409: 860–921, 2001.

Consult recent issues of the APS Journals for more examples.

Citing Personal Communications or Unpublished Observations

Do not include such citations in the Reference list (see Important Note, in References section above, for more information). Instead, place this sort of citation in parentheses in the body of the article where it logically belongs, following the format below. Make sure to include all initials and, for personal communications, obtain a signed letter of permission from the person(s) cited.

(ABC Jones and Z Smith, personal communication)

(J Jones, unpublished observations)

Consult recent issues of the APS Journals for more examples.

Footnotes

Text footnotes should be numbered consecutively throughout. They should be double-spaced and assembled on a separate page.

Types of Articles

The APS Journals publish a variety of article types in addition to the regular research papers. For descriptions of the types of articles published in a particular journal, go to that journal's page at the APS website (www.the-aps.org). A full listing of article types is also available on the Mandatory Submission Form at APS Central, during submission to the Journal of your interest.

If your research paper is submitted in response to a Call for Papers, please make sure to mark it as such during submission to APS Central.

Figures

APS uses digital publishing methods throughout the journal production process. Your article will be published both in the print journal and online. We have several specific requirements for digital graphics formats to ensure the best possible reproduction in both media.

Important: Computer screens, laser printers, and offset presses are significantly different devices. The ability to print your graphics well on a desktop laser printer does not mean the image can be printed successfully, or at all, on an offset press. These guidelines are intended to help you prepare image files that will provide high-quality reproductions in the APS Journals, both in print and online.

Preparing Original Graphics

Always prepare original graphics at print publication-quality resolution. From these high-resolution versions you will be able to create low-resolution versions for online submission. When your manuscript is accepted for publication, APS will require the high-resolution files for print output.

Acceptable File Formats

Use applications capable of creating high-resolution TIFF or EPS files. These file formats ensure the highest success rate for printing and are supported by both Mac and Windows platforms and applications.

Supported Applications

The Cadmus website (<http://cjs.cadmus.com/da/>) lists several graphics applications that support TIFF and EPS file formats for both Mac and Windows.

- Choose your platform (Mac/Win).
- Choose the application used to create original images.
- Follow step-by-step instructions for saving or exporting files as TIFF or EPS.
- If you do not see the application used to create your original figures, you may be able to create high-resolution PDF files using Adobe Acrobat Distiller. From these files, you can create TIFF or EPS files using Adobe Photoshop or Illustrator.

Applications use software "drivers" to convert their native-format files into the TIFF or EPS formats that we require. Each application uses its own driver to make these conversions. So, the quality and usability of the TIFF and EPS files depends on the quality of the driver used to create them. A graphic that looks and prints fine on your computer may not be usable by our graphic software such as Adobe Photoshop, Adobe Illustrator, Corel Draw, or Corel PhotoPaint. **Please Note:** If you are not using one of these major graphics authoring programs, your TIFF and EPS files may require extra processing or even be unusable.

Figure Style Guidelines

Size

Figures should be generated at the size they are to appear in the journal (printed 1:1). Figures may be printed in one of three formats:

- single column (3.5 in., or 21 picas)
- double column w/ side legend (4–5 in., or 25–30 picas)
- full page width (7 in., or 43 picas)

The maximum depth allowable is 9 in. (54 picas). If it is necessary to submit figures that require reduction, the indicated size characteristics must be achievable after resizing. Multi-paneled figures should be assembled in a layout that leaves the least amount of blank space and does not exceed 7×9 in.

Type

For serif fonts, use Times Roman or Times New Roman. For sans-serif, use Helvetica or Arial. Fonts should be used consistently throughout all figure(s). Freehand, typewritten, and dot-matrix lettering are not acceptable.

Font Sizes:

- Primary (axis labels): 8–10 points
- Secondary (key information): 7–8 points
- Tertiary (numeric values): 5–7 points
- Panel Labels (i.e., A, B, C): 12–14 points

All lettering and key information should be within the framework of the illustration, unless the figure is so filled that symbols need to be explained in the legend.

Resolution

- Line drawings: 600–1200 dpi
- Halftones: no text, 300 dpi; with text, 600 dpi
- Color graphics: 600 dpi

Line Drawings

Line art uses only black and white to convey its information. These images are typically produced in a vector-based drawing program. Save or export graphics as EPS or TIFF files at 600–1200 dpi in resolution. If figures require reduction to fit into a particular column width, all lettering, line weights, and symbols must be of a size and weight that will meet the guidelines for final size.

Halftones

Many graphics include shades of gray. These grays may be simple fills (screened dot patterns to simulate grays) or they may be subtle and complex tones in digitized photographs or intricate drawings. Save or export halftone graphics that **do not contain text** as EPS or TIFF files at 300 dpi in resolution. Halftone graphics that **contain text and symbols** should be saved or exported as EPS or TIFF files at 600 dpi in resolution.

When necessary, include an internal scale marker to account for any needed reduction. Special features on photomicrographs should be designated by letters, numerals, arrows, and other symbols that contrast with the background.

Photographs of equipment should be used sparingly; good line drawings are usually more informative.

Photographs of animals or humans are acceptable if they are the only way to show results and only with the approval of the Editor.

For a photograph of a human, you will need to provide a signed permission from the photographed subject, agreeing to the publication of his or her image.

Color Graphics

APS encourages the use of scientifically necessary color images in its publications. To ensure that your files are prepared appropriately for offset printing, please follow these guidelines:

- **Use an illustration or graphics software program such as Adobe Photoshop or Illustrator** for creating or scanning images.
- **Avoid using Microsoft PowerPoint or other slide presentation software for your figures.** APS will accept Microsoft Powerpoint files as a last resort. We will not guarantee the quality of these images, since presentation graphics do not contain sufficient information for offset printing. Presentation graphics are designed for on-screen viewing only.
- **Save each image in EPS or TIFF format.** If the program that you are using to generate your image does not offer an EPS or TIFF format for saving or exporting, we will be unable to use your digital image.
- **Create and send all color images for print in CMYK separation format.** This is the industry standard for color printing and is a requirement. Files in RGB format will not separate properly. RGB files will either be rejected or converted to CMYK.

The information contained within a submitted color graphic file is the responsibility of the author. APS will not alter the information contained in a submitted file. Extensive author corrections and changes at proof stage will incur additional charges.

Color figures are subsidized by APS at a cost to authors of only \$300 per figure, assuming that color is scientifically warranted and page charges are paid. **Unnecessary color figures are not permitted in the Journals**, and in such cases authors will be required to provide a black and white version suitable for print publication. Color figures that are scientifically necessary are free of charge if the first or last author is an APS member in good standing when the paper is accepted. For more information, see *Cost of Publication*.

Graphs

Electrocardiograms, kymograms, and oscillograms should be prepared so that the crosshatched background is eliminated. To avoid problems in processing, use non-photo blue-ruled instead of black-ruled recording paper for the originals.

Online Submission for Peer Review

For initial online submission via *APS Central*, illustrations must be in electronic format and of sufficient quality for peer review. (See *Preparing Original Graphics* for preparation guidelines.) Using Adobe Acrobat, save graphics in low-resolution PDF format for the purposes of online submission. The PDF files should be reviewed before final online submission; with attention given to special characters and symbols.

Each image should be less than 1 megabyte, and the entire file should not exceed 5 MB.

Figure numbers must be clearly indicated with the electronic submission.

After Manuscript Is Accepted for Publication

After a manuscript is accepted for publication, authors must supply the original high-resolution images on an acceptable transportable medium:

- ZIP Disk 100/250 (Win/Mac)
- CD-ROM
- FTP (File Transfer Protocol)—available on an individual basis. Please address requests for FTP information to art@the-aps.org.

Acceptable compression methods:

- WinZip
- PKZip
- Stuffit

Electronic submission of illustrations is strongly encouraged; however, laser-printed, camera-ready artwork is also necessary in the event that submitted electronic files fail to meet criteria for print publishing. Hard-copy versions of figures for accepted manuscripts should be computer-generated laser prints (600 dpi) on high-quality laser printer paper not larger than 8.5×11 in. Photographic prints, glossies, or dye-sublimation prints must be sent for photomicrographs, gels, and other halftones. **Photocopies are unacceptable for publication.** Authors may be asked to prepare new figures if those submitted are not suitable for reproduction; this will most likely delay publication of the paper.

The reverse of each figure should have the following: figure number, first author's last name, and an indication of the top of the figure.

Each figure must have a legend. Legends should be grouped in numerical order and typed double-spaced.

For further help in preparing figures, see the Cadmus website guidelines (<http://cjs.cadmus.com/da/guidelines.html>), or contact the APS Art Department:

APS Art Department
9650 Rockville Pike
Bethesda, MD 20814-3991

or e-mail questions to art@the-aps.org.

Tables

Whenever possible, authors are encouraged to submit figures rather than tables. Statistical summary tables should be submitted when possible, rather than tables with many lines of individual values. Lengthy tables of data, on the Editor's recommendation and with the approval of the author, will be deposited by the APS Publications (see *Data Supplements*, below).

Submitted tables should adhere to the following guidelines:

- Each table should appear on a separate page of the manuscript.
- Tables must not duplicate material in text or figures.
- Tables should be numbered consecutively with Arabic nu-

merals and prepared with the size of the journal page in mind: 3.5 in. wide, single column; 7 in. wide, double column.

- Each table should be double-spaced.
- Each table should have a brief title; explanatory notes should be in the legend, not in the title.
- Horizontal and vertical rules should be omitted.
- Nonsignificant decimal places in tabular data should be omitted.
- Short or abbreviated column heads should be used and explained if necessary in the legend.
- Statistical measures of variations, SD, SE, etc., must be identified. (Example: "Values are means \pm SE.")
- Table footnotes should be listed in order of their appearance and identified by standard symbols: *, †, ‡, § for four or fewer; for five or more, consecutive superior lowercase letters should be used.

Mathematical Equations and Modeling

Mathematical aspects of articles normally should be addressed to the many readers of the Journal who are not mathematicians. The presentation should include the mathematical strategy, the assumptions on which the mathematics are based, and a summary of the meaning of the final mathematical statement and its limitations.

Equations

Mathematical equations should be simplified as much as possible and carefully checked. The APS Journals do not use punctuation with equations, per *Council of Biology Editors (CBE) Scientific Style and Format* (6th ed.).

Use the slant line (/) for simple fractions $(a + b)/(x + y)$ in the text rather than the built-up fraction $\frac{a + b}{x + y}$, which should only be used if the equation is offset from the text.

Use subscripts or superscripts wherever feasible and appropriate, because they often simplify the equations by eliminating the need for extraneous operations: R_A/R_D instead of $RA \cdot RD$ or $(RA)(RD)$.

Use circles for pools in compartmental or flow-type models and whole arrows for interconnections or flows (not arrows with half-heads, as in reversible chemical equations).

Do not use nonstandard mathematical notations; e.g., do not use computer symbols in equations (* for multiplication or ** for exponentiation).

Use lowercase letters for time-varying symbols in compartmental model equations, preferably $q(t)$ for masses, $c(t)$ for concentrations, with subscripts as needed.

Our convention for numerical subscripts for rate constants (k_{21}) is the same as that used in most life sciences but opposite to that currently used in pharmacokinetics; i.e., our k_{ij} is the fractional rate of transfer from compartment j to compartment i (or to compartment i from compartment j , if you prefer). Our notation is consistent with standard nomenclature in applied mathematics for matrices and matrix manipulation algorithms in commercial software packages for scientific/mathematical computations involving matrices. However, the author(s) may use a different convention if it is clearly defined in the manuscript.

Symbols should be defined as they first appear in the text, and a Glossary should also be included in articles with many different symbols, specifying the units (dimensions) as well as each definition. The Glossary will usually precede the Methods section.

Mathematical Models

Presentation of the model(s) must be sufficiently clear to allow physiologists with limited experience in modeling to follow the model development, limitations, and physiological relevance. Assumptions concerning the importance of physiological processes included in the model should be clearly stated.

If the model equation(s) require solution, the method of solution should be described in sufficient detail to permit readers to duplicate the solution in their own laboratories. Algorithms from commercial software libraries should be so identified. Details of the solution strategy may be summarized in an Appendix.

For simulations, sources or estimation methods for all param-

eter values should be presented and the numerical values given in the text or a table. A sensitivity analysis must be performed for important parameters (covering ranges of values relevant to the manuscript) to determine how the model predictions are affected by numerical parameter values.

If the model is used to estimate parameter values, measures of the uncertainties associated with the estimated parameter values should be presented.

For models intended for use in a predictive setting, validation of the model with a data set not used for model parameter estimation (i.e., cross-validation) is recommended. Sensitivity analysis or parameter uncertainty determination is an important component of modern modeling practice that allows assessment of the validity of a model.

Results obtained with the model(s) should be compared with appropriate physiological data, either from literature or from new experiments. Simulation results may be examined for prediction of changes or trends in physiological variables similar to those reported for in vitro or in vivo studies. The discussion should include information on the physiological significance of the model study, limitations of the model, and suggestions for new modeling and/or experimental studies.

Data Supplements

Video files, extensive tables of data, and other supplemental material that cannot be feasibly published in the printed journal may be submitted for inclusion in the online journal (without charge to the author). Such material must be submitted for peer review along with the finished manuscript and must meet the approval of the journal Editor.

After the manuscript is accepted for publication, submit the files via ZIP disk along with the manuscript or make special arrangements with the Web Copy Editor (mgentry@the-aps.org). For microarray data deposits, see above (*MIAME Standard for Microarray Data*).

Video

Authors are responsible for compiling their own digital video. Files should be in MPEG or Quicktime format and should be no more than 10 megs in size. Authors should include a written caption with each video file, explaining what is happening in the video.

There are many different factors that can affect the file size of a video. Authors are advised to keep the following general guidelines in mind:

- Length of videos should be no more than 30 seconds.
- Frame size should be no more than 320×240 pixels.
- Do not include sound unless scientifically necessary. Do not use voice-over narration to explain what is happening in the video; this information should be written in the caption, which will be displayed on the web page that contains the video.

Contact the Web Copy Editor (mgentry@the-aps.org) for further assistance or questions.

Long Data Tables

Long data tables should be submitted in Microsoft Excel or in Microsoft Word table format. Each table should include a title explaining what the table shows. Tables published online may look different than how they were originally submitted due to the limits of the HTML format.

Microfiche

At the author's request, supplemental material may be submitted for deposition at:

National Auxiliary Publications Service (NAPS)
c/o Microfiche Publications
P. O. Box 3513, Grand Central Station
New York, NY 10017

A footnote will be inserted noting the availability of the material on microfiche and giving the NAPS Document Number.