

INSTRUCTIONS TO AUTHORS

SCOPE

mBio[®] is a broad-scope open access journal edited by active research scientists. It strives to publish the best research in microbiology and allied fields. *mBio* publishes outstanding papers in all disciplines that address microbiological problems, including, but not limited to, biochemistry and molecular biology, genetics and genomics, environmental science, evolution, immunology, infectious disease, and physiology. Topics covered include bacteria, viruses, parasites, fungi, and simple eukaryotic organisms, as well as all types of host-microbe interactions. We understand that there may be overlap in the scope statements of the ASM journals. Questions about these guidelines may be directed to the editor in chief of the journal being considered.

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As a member of the [Committee on Publication Ethics \(COPE\)](#), ASM adheres to COPE's Best Practice Guidelines and expects authors to observe the high standards of publication ethics set out by COPE.

ASM requirements for submitted manuscripts are consistent with the [Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals](#), as last updated by the International Committee of Medical Journal Editors in December 2014.

Authors are expected to adhere to the highest ethical standards. The following sections of these Instructions include detailed information about ASM's ethical standards. Failure to comply with the policies described in these Instructions may result in a letter of reprimand, a suspension of publishing privileges in ASM journals, and/or notification of the authors' institutions. Authors employed by companies whose policies do not permit them to comply with ASM policies may be sanctioned as individuals and/or ASM may refuse to consider manuscripts having authors from such companies.

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The Council on Microbial Sciences (COMS) of the American Society for Microbiology affirms the long-standing position of the Society that microbiologists will work for the proper and beneficent application of science and will call to the attention of the public or the appropriate authorities misuses of microbiology or of information derived from microbiology. ASM members are obligated to discourage any use of microbiology contrary to the welfare of humankind, including the use of microbes as biological weapons. Bioterrorism violates the fundamental principles expressed in the Code of Ethics of the Society and is abhorrent to ASM and its members.

ASM recognizes that there are valid concerns regarding the publication of information in scientific journals that could be put to inappropriate use as described in the COMS resolution

mentioned above. Members of the ASM Journals Board will evaluate the rare manuscript that might raise such issues during the review process. However, as indicated elsewhere in these Instructions, primary-research articles must contain sufficient detail, and material/information must be made available, to permit the work to be repeated by others. Supply of materials should be in accordance with laws and regulations governing the shipment, transfer, possession, and use of biological materials and must be for legitimate, bona fide research needs. We ask that authors pay particular attention to the [NSAR Select Agent/Toxin list](#) on the CDC website and the U.S. Government Policy for Oversight of Life Sciences Dual Use Research of Concern (March 2012; <http://www.phe.gov/s3/dualuse/Documents/us-policy-durc-032812.pdf>).

Use of Human Subjects or Animals in Research

Authors of manuscripts describing research involving human subjects or animal experimentation must obtain review and approval (or review and waiver) from their Institutional Review Board (IRB) or Institutional Animal Care and Use Committee (IACUC), as appropriate, prior to manuscript submission. Authors of manuscripts that describe multisite research must obtain approval from each institution's IRB or IACUC, as appropriate. Documentation of IRB or IACUC status must be made available upon request. In the event that institutional review boards or committees do not exist, the authors must ensure that their research is carried out in accordance with the Declaration of Helsinki, as revised in 2013 (<https://jamanetwork.com/journals/jama/fullarticle/1760318>), and/or the "International Guiding Principles for Biomedical Research Involving Animals," as revised by the International Council for Laboratory Animal Science (ICLAS) and the Councils for International Organizations of Medical Sciences (CIOMS) in 2012. A statement of IRB or IACUC approval or waiver (and reason for waiver) or a statement of adherence to the Declaration of Helsinki and/or Guiding Principles must be included in the Materials and Methods section. The sex of research subjects and animals, and of materials derived directly from them (e.g., primary cell lines and clinical samples), should be included in the Materials and Methods section or Results section if these data are available.

Patient Identification

Informed consent is not needed if the patient cannot be identified from any material in a manuscript. In the absence of informed consent, identifying details, such as patient initials, specific dates, specific geographic exposures, or other identifying features (including body features in figures), should be omitted, but this must not alter the scientific meaning. Impor-

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tant information that is relevant to the scientific meaning should be stated so that the patient cannot be identified, e.g., by stating a season instead of a date or a region instead of a city. If a patient can be identified from the material in a manuscript, all efforts should be made to obtain informed consent to publish from patients or parents/legal guardians of minors. Informed consent requires that the patient have the opportunity to see the manuscript prior to submission. The written consent must state either that the patient has seen the complete manuscript or that the patient declines to do so. Patient consent should be archived with the authors and be available upon request. A statement attesting the receipt and archiving of written patient consent should be included in the published article.

Publishing Ethics

Authorship. ASM journals follow the criteria for authorship as outlined in the International Committee of Medical Journal Editors (ICMJE) Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals (“[Defining the Role of Authors and Contributors](#)”). Briefly, an author is one who makes a substantial contribution to the design, execution, and/or analysis and interpretation of experiments in addition to drafting, revising, and/or approving the initial submission and any subsequent versions of the article. All authors of a manuscript must have agreed to its submission and are responsible for appropriate portions of its content. Submission of a paper before all coauthors have read and approved it is considered an ethical violation.

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Consortium authorship. A study group, surveillance team, working group, consortium, or the like (e.g., the Active Bacterial Core Surveillance Team) may be listed as a coauthor in the byline if its contributing members satisfy the requirements for authorship and accountability as described in these Instructions. The names (and institutional affiliations, if desired) of the contributing members only may be given as a separate paragraph in the Acknowledg-

ments section. If the contributing members of the group associated with the work do not fulfill the criteria of substantial contribution to and responsibility for the paper, the group may not be listed in the author byline. Instead, it and the names of its contributing members may be listed in the Acknowledgments section.

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- A conference report or symposium proceedings
- A technical bulletin or company white paper
- A public website (see "[Preprint policy](#)")
- Any other retrievable source

The following do not preclude submission to, or publication by, an ASM journal:

- Posting of a method/protocol on a public website
- Posting of a limited amount of original data on a personal/university/corporate website or websites of small collaborative groups working on a problem
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Data and Materials

Availability of data and materials. By publishing in the journal, the authors agree that, subject to requirements or limitations imposed by local and/or U.S. Government laws and regulations, any materials and data that are reasonably requested by others are available from a publicly accessible collection or will be made available in a timely fashion, at reasonable cost, and in limited quantities to members of the scientific community for noncommercial purposes. Similarly, the authors agree to make available computer programs and/or code, originating in the authors' laboratory, that is the only means of confirming the conclusions reported in the article but that is not available commercially. The program(s) and suitable documentation regarding its (their) use may be provided by any of the following means: (i) as a program transmitted via the Internet, (ii) as an Internet server-based tool, or (iii) as a compiled or assembled form on a suitable medium. The authors guarantee that they have the authority to comply with this policy either directly or by means of material transfer agreements through the owner. ASM asks authors to assert this in a "Data availability" paragraph, which should appear at the end of the Materials and Methods section (or at the end of the text) of their submitted manuscript.

Therefore, a condition of publication in *mBio* is that authors make data fully available and without restriction, except in rare circumstances. Data availability will be confirmed prior to publication and must be provided during the modification stage, if not before. Furthermore, data must be made available, upon request, for peer review. See our [Data Policy](#).

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software informational page should be provided. **It is preferred that authors use established, publicly available data type-specific repositories.** If there is no appropriate repository available, general publicly available repositories should be used (e.g., [Dryad](#), [figshare](#), etc.). A list of public [data repositories](#) is available in the ASM Journals' Ethics Portal Compendium of Resources. Examples of proper data citation are included in the "References" section of these Instructions to Authors.

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Analyses should specify the database, and the date of each

analysis should be indicated as, e.g., 6 January 2018. If relevant, the version of the software used should be specified.

See “[Presentation of Nucleic Acid Sequences](#)” for nucleic acid sequence formatting instructions. Links to the databases mentioned above are found here: [DNA Data Bank of Japan \(DDBJ\)](#); [European Nucleotide Archive \(ENA\)](#); and [GenBank](#), National Center for Biotechnology Information.

Proper use of locus tags as systematic identifiers for genes.

To comply with recommendations from the International Nucleotide Sequence Database (INSD) Collaborators and to avoid conflicts in gene identification, researchers should implement the following two fundamental guidelines as standards for utilization of locus tags in genome analysis, annotation, submission, reporting, and publication. (i) Locus tag prefixes are systematic gene identifiers for all of the replicons of a genome and as such should be associated with a single genome project submission. (ii) New genome projects must be registered with the INSD, and new locus tag prefixes must be assigned in cooperation with the INSD to ensure that they conform to the agreed-upon criteria.

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Links to the databases mentioned above are found here: [Gene Expression Omnibus \(GEO\)](#), [ArrayExpress](#), and [Center for Information Biology Gene Expression Database \(CIBEX\)](#).

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SUBMISSION, REVIEW, AND PUBLICATION PROCESSES

Submission Process

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Review Process

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Copies of in-press and submitted manuscripts that are important for judgment of the present manuscript should be included as supplemental material for review only.

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The corresponding author is notified, generally within 4 weeks after submission, of the decision to accept, reject, or require modification. When modification is requested, the corresponding author must either submit the modified version within 30 days or withdraw the manuscript. A point-by-point response to the review(s) must be included (as a separate "Response to Reviewer Comments" file), and a compare copy of the revised manuscript showing the changes should be included as supplemental material for review only.

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mBio is published in association with the American Academy of Microbiology (AAM), and AAM Fellows are entitled to submit one paper per calendar year via a special, accelerated submission path. This path requires Fellows to obtain two reviews prior to submission (from reviewers who are not recent collaborators, trainees, etc.), make any necessary modifications in response to the reviewers' comments, and communicate the entire package to *mBio*: the initial reviews, point-by-point responses to the reviewer comments, the revised paper, and e-mail verification showing that each reviewer has seen and approved the final manuscript.

AAM Contributions should be formatted as either Research Articles or Observations and are subject to the same length requirements (13 printed pages for Research Articles and 7 printed pages with a maximum of 2 figures and 25 references for Observations). Reviewers for AAM Contributions are required to fill out an external review form (available at http://mbio.asm.org/site/misc/External_Review_Form.pdf). Detailed instructions for submitting an AAM Contribution can be found at <http://mbio.asm.org/site/misc/fellows.xhtml>.

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Manuscripts that were previously rejected from the standard peer review path are not eligible for resubmission through the AAM Contribution path.

Rejected Manuscripts

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Manuscripts that have been rejected, or withdrawn after being returned for modification, may be resubmitted to *mBio* (once; see below) if the major criticisms have been addressed.

Manuscripts rejected by *mBio* may be resubmitted to a more appropriate ASM journal without penalty; however, a manuscript rejected by another ASM journal is considered rejected by *mBio* and will not be reviewed.

The cover letter of every resubmitted manuscript must state that the manuscript is a resubmission, and the former manuscript control number must be provided. A point-by-point response to the review(s) must be included (as a separate "Response to Reviewer Comments" file), and a copy of the revised manuscript tracking the changes should be included as supplemental material for review only. Manuscripts resubmitted to the same journal are normally handled by the original editor. Rejected manuscripts may be resubmitted only once unless permission has been obtained from the original editor or from the editor in chief.

Notification of Acceptance

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mBio Publication Schedule

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ORGANIZATION AND FORMAT

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The editorial style of ASM journals conforms to the *ASM Style Manual for Journals* (American Society for Microbiology, 2018, in-house document [you may find the [ASM Word List](#) helpful]) and *How To Write and Publish a Scientific Paper*, 7th ed. (Greenwood, Santa Barbara, CA, 2011), as interpreted and modified by the editors and the ASM Journals Department.

The editors and the Journals Department reserve the privilege of editing manuscripts to conform with the stylistic conventions set forth in the aforesaid publications and in these Instructions. Please note that ASM uses the serial comma.

On receipt at ASM, an accepted manuscript undergoes an automated preediting, cleanup, and tagging process specific to the particular article type. To optimize this process, manuscripts must be supplied in the correct format and with the appropriate sections and headings.

Type every portion of the manuscript double-spaced (a minimum of 6 mm between lines), including figure legends, table footnotes, and References, and number all pages in sequence, including the abstract, figure legends, and tables. Place the last two items after the References section.

Manuscript pages should have continuous line numbers; manuscripts without line numbers may be editorially rejected by the editor, with a suggestion of resubmission after line numbers are added. The font size should be no smaller than 12 points. It is recommended that the following sets of characters be easily distinguishable in the manuscript: the numeral zero (0) and the letter “oh” (O); the numeral one (1), the letter “el” (l), and the letter “eye” (I); and a multiplication sign (×) and the letter “ex” (x). Do not create symbols as graphics or use special fonts that are external to your word processing program; use the “insert symbol” function. Set the page size to 8.5 by 11 inches (ca. 21.6 by 28 cm). Italicize any words that should appear in italics, and indicate paragraph lead-ins in boldface type.

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It is recommended that authors review the author checklist (<http://mbio.asm.org/site/misc/checklist.pdf>) prior to completing their submission. Manuscripts that are not properly formatted may be returned to the author before being reviewed.

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- Number lines continuously.
- Present statistical treatment of data where appropriate.
- Provide accession numbers for all newly published sequences in a dedicated paragraph, and if a sequence or sequence alignment important for evaluation of the manuscript is not yet available, provide the information as supplemental material (for review only) or make the material available on a website for access by the editor and reviewers.
- Format references in ASM style.
- Provide references for accession numbers and code (with URLs).
- Confirm that genetic and chemical nomenclature conforms to instructions.
- Include as supplemental material (for review only) in press and submitted manuscripts that are important for judgment of the present manuscript.
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mBio article word counts are based on the article type. Research Articles should be approximately 5,000 words. Minireviews should be approximately 6,000 words maximum (with up to two figures or tables). Opinions/Hypotheses should be approximately 2,500 words maximum. Perspectives should be approximately 2,000 words maximum. Observations should be approximately 1,200 words maximum. Commentaries should be approximately 1,000 words maximum. Letters to the Editor and Replies should each be approximately 500 words maximum. Word counts do not include references, tables, or figure legends.

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Research Articles are limited to 5,000 words (exclusive of references, tables, and figure legends) and should report a major advance in any area of microbiology or allied fields. These articles should include the elements described in this section.

Title, running title, byline, affiliation line(s), and corre-

sponding author. Each manuscript should present the results of an independent, cohesive study; thus, numbered series titles are not allowed. Avoid the main title/subtitle arrangement, complete sentences, and unnecessary articles. Indicate the specific organisms under study in the title or abstract as appropriate. On the title page, include the title, the running title (not to exceed 54 characters and spaces), the name of each author, all authors’ affiliations at the time the work was performed, the name(s) and e-mail address(es) of the corresponding author(s), and a footnote (*) indicating the present address of any author no longer at the institution where the work was performed. Place a number sign (#) in the byline after the affiliation letter(s) of the author to whom inquiries regarding the paper should be directed (see [“Correspondent footnote”](#)). Indicate each author’s affiliation with a superscript lowercase letter placed after the author’s surname in the byline (separate multiple affiliation letters with commas but no space). Each affiliation should have its own line and its own superscript affiliation letter preceding it. Do not consolidate different departments at one institution into one address with a single affiliation letter, even if all affected authors belong to all of those departments. Also include on the title page the word count for the abstract and the word count for the text (excluding the references, table footnotes, and figure legends). [Please review this sample title page for guidance.](#)

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The Abstract section should be no more than 250 words and should concisely summarize the basic content of the paper without presenting extensive experimental details.

The Importance section should be no more than 150 words and should provide a nontechnical explanation of the significance of the study to the field. Avoid abbreviations and references, and indicate the specific organism under study. When it is essential to include a reference, use the format shown under “References” below (see the [“Citations in abstracts”](#) section).

Introduction. The introduction should supply sufficient background information to allow the reader to understand and evaluate the results of the present study without referring to previous publications on the topic. The introduction should also provide the hypothesis that was addressed or the rationale

for the present study. Use only those references required to provide the most salient background rather than an exhaustive review of the topic.

Results. In the Results section, include the rationale or design of the experiments as well as the results; reserve extensive interpretation of the results for the Discussion section. Present the results as concisely as possible in one of the following: text, table(s), or figure(s). Avoid extensive use of graphs to present data that might be more concisely presented in the text or tables. Limit photographs (particularly photomicrographs and electron micrographs) to those that are absolutely necessary to show the experimental findings. Number figures and tables in the order in which they are cited in the text, and be sure to cite all figures and tables.

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Materials and Methods. The Materials and Methods section should include sufficient technical information to allow the experiments to be repeated. When centrifugation conditions are critical, give enough information to enable another investigator to repeat the procedure: make of centrifuge, model of rotor, temperature, time at maximum speed, and centrifugal force ($\times g$ rather than revolutions per minute). For commonly used materials and methods (e.g., media and protein concentration determinations), a simple reference is sufficient. If several alternative methods are commonly used, it is helpful to identify the method briefly as well as to cite the reference. For example, it is preferable to state “cells were broken by ultrasonic treatment as previously described (9)” rather than to state “cells were broken as previously described (9).” This allows the reader to assess the method without constant reference to previous publications. Describe new methods completely and give sources of unusual chemicals, equipment, or microbial strains. When large numbers of microbial strains or mutants are used in a study, include tables identifying the immediate sources (i.e., sources from whom the strains were obtained) and properties of the strains, mutants, bacteriophages, and plasmids, etc.

Enzyme purifications should be described in this section, but the results of such procedures should be described in the Results section. A method or strain, etc., used in only one of several experiments reported in the paper may be described in the Results section or very briefly (one or two sentences) in a table footnote or figure legend. It is expected that the sources from whom the strains were obtained will be identified.

As noted above, a paragraph dedicated to new accession numbers for nucleotide and amino acid sequences, microarray data, protein structures, gene expression data, and MycoBank data should appear at the end of Materials and Methods with the paragraph lead-in “Accession number(s).” Please also provide references (with URLs) for the accession numbers.

Acknowledgments. Statements regarding sources of direct financial support (e.g., grants, fellowships, and scholarships, etc.) should appear in the Acknowledgments. A funding statement indicating what role, if any, the funding agency had in your study (for example, “The funders had no role in study design, data collection and interpretation, or the decision to submit the work for publication.”) may be included. Funding agencies may have specific wording requirements, and compliance with such requirements is the responsibility of the author. In cases in which research is not funded by any specific project grant, funders need not be listed, and the following statement may be used: “This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.” Statements regarding indirect financial support (e.g., commercial affiliations, consultancies, stock or equity interests, and patent-licensing arrangements) are also allowed. It is the responsibility of authors to provide a general statement disclosing financial or other relationships that are relevant to the study. (See the “[Conflict of Interest](#)” section above.)

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Appendixes. Appendixes that contain additional material to aid the reader are permitted. Titles, authors, and reference sections that are distinct from those of the primary article are not allowed. If it is not feasible to list the author(s) of the appendix in the byline or the Acknowledgments section of the primary article, rewrite the appendix so that it can be considered for publication as an independent article. Equations, tables, and figures should be labeled with the letter “A” preceding the numeral to distinguish them from those cited in the main body of the text.

References. In the reference list, references are numbered in the order in which they are cited in the article (citation-sequence reference system). In the text, references are cited parenthetically by number in sequential order. Data that are not published or not peer reviewed are simply cited parenthetically in the text (see section ii [below](#)).

(i) **References listed in the References section.** The following types of references must be listed in the References section:

- Journal articles (both print and online)
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- Patents

- Theses and dissertations
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- Data sets
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Provide the names of all the authors and/or editors for each reference; long bylines should not be abbreviated with “et al.”

All listed references must be cited in the text. Abbreviate journal names according to the PubMed Journals Database (National Library of Medicine, National Institutes of Health; available at <https://www.ncbi.nlm.nih.gov/nlmcatalog/journals>), the primary source for ASM style (do not use periods with abbreviated words). The EndNote output style for ASM Journals’ current reference style can be found at http://journals.asm.org/site/misc/ASM_Journals.ens; click “Open” and then “Download and Install” to save it to your EndNote Styles folder (it should replace any earlier output styles for ASM journals [all ASM journals use the same reference style]). Note that DOIs are not needed for most references. ASM copy editors will automatically insert DOIs on all references in the CrossRef and PubMed databases during copyediting. URLs for government reports and other references not indexed in these databases should be provided if desired; URLs for citations of database accession numbers and code/software should be provided by you.

Follow the styles shown in the examples below.

1. Caserta E, Haemig HAH, Manias DA, Tomsic J, Grundy FJ, Henkin TM, Dunny GM. 2012. *In vivo* and *in vitro* analyses of regulation of the pheromone-responsive *prgQ* promoter by the PrgX pheromone receptor protein. *J Bacteriol* 194: 3386–3394.
2. Bina XR, Taylor DL, Vikram A, Ante VM, Bina JE. 2013. *Vibrio cholerae* ToxR downregulates virulence factor production in response to cyclo(Phe-Pro). *mBio* 4:e00366-13.
3. Winnick S, Lucas DO, Hartman AL, Toll D. 2005. How do you improve compliance? *Pediatrics* 115:e718–e724.
4. Falagas ME, Kasiakou SK. 2006. Use of international units when dosing colistin will help decrease confusion related to various formulations of the drug around the world. *Antimicrob Agents Chemother* 50:2274–2275. (Letter.) {“Letter” or “Letter to the editor” is allowed but not required at the end of such an entry.}
5. Cox CS, Brown BR, Smith JC. *J Gen Genet*, in press.* {Article title is optional; journal title is mandatory.}
6. Forman MS, Valsamakis A. 2011. Specimen collection, transport, and processing: virology, p 1276–1288. *In* Versalovic J, Carroll KC, Jorgensen JH, Funke G, Landry ML, Warnock DW (ed), *Manual of clinical microbiology*, 10th ed, vol 2. ASM Press, Washington, DC.
7. da Costa MS, Nobre MF, Rainey FA. 2001. Genus I. *Thermus* Brock and Freeze 1969, 295, ^{AL} emend. Nobre, Trüper and da Costa 1996b, 605, p 404–414. *In* Boone DR, Castenholz RW, Garrity GM (ed), *Bergey’s manual of systematic bacteriology*, 2nd ed, vol 1. Springer, New York, NY.
8. Fitzgerald G, Shaw D. *In* Waters AE (ed), *Clinical microbiology*, in press. EFH Publishing Co, Boston, MA.* {Chapter title is optional.}
9. Green PN, Hood D, Dow CS. 1984. Taxonomic status of some methylotrophic bacteria, p 251–254. *In* Crawford RL, Hanson RS (ed), *Microbial growth on C₁ compounds*. Proceedings of the 4th International Symposium. American Society for Microbiology, Washington, DC.
10. Rotimi VO, Salako NO, Mohaddas EM, Philip LP. 2005. Abstr 45th Intersci Conf Antimicrob Agents Chemother, abstr D-1658. {Abstract title is optional.}
11. Smith D, Johnson C, Maier M, Maurer JJ. 2005. Distribution of fimbrial, phage and plasmid associated virulence genes among poultry *Salmonella enterica* serovars, abstr P-038, p 445. Abstr 105th Gen Meet Am Soc Microbiol. American Society for Microbiology, Washington, DC. {Abstract title is optional.}
12. García CO, Paira S, Burgos R, Molina J, Molina JF, Calvo C, Vega L, Jara LJ, García-Kutzbach A, Cuellar ML, Espinoza LR. 1996. Detection of *Salmonella* DNA in synovial membrane and synovial fluid from Latin American patients using the polymerase chain reaction. *Arthritis Rheum* 39(Suppl 9):S185. {Meeting abstract published in journal supplement.}
13. O’Malley DR. 1998. PhD thesis. University of California, Los Angeles, CA. {Title is optional.}
14. Stratagene. 2006. Yeast DNA isolation system: instruction manual. Stratagene, La Jolla, CA. {Use the company name as the author if none is provided for a company publication.}
15. Odell JC. April 1970. Process for batch culturing. US patent 484,363,770. {Include the name of the patented item/process if possible; the patent number is mandatory.}
16. Harrison F, Roberts AEL, Gabriliska R, Rumbaugh KP, Lee C, Diggle SP. 2015. A 1,000-year-old antimicrobial remedy with antistaphylococcal activity. *mBio* 6:e01129-15. {Original article that describes how data submitted to a database were generated.}
17. Harrison F, Roberts AEL, Gabriliska R, Rumbaugh KP, Lee C, Diggle SP. 2015. Data from “A 1,000-year-old antimicrobial remedy with antistaphylococcal activity.” Dryad Digital Repository <https://doi.org/10.5061/dryad.mn17p>. {Citation for the database where the data in the previous reference were deposited; the URL is necessary.}
18. Wang Y, Rozen D. 2016. Colonization and transmission of the gut microbiota of the burying beetle, *Nicrophorus vespilloides*, through development. *bioRxiv* <https://doi.org/10.1101/091702>.

*A reference to an in-press ASM publication should state the control number (e.g., mBio00123-18) if it is a journal article or the name of the publication if it is a book.

In some online journal articles, posting or revision dates may serve as the year of publication; a DOI (preferred) or URL is required for articles with nontraditional page numbers or electronic article identifiers.

Magalon A, Mendel RR. 15 June 2015, posting date. Biosynthesis and insertion of the molybdenum cofactor. *EcoSal Plus* 2015 doi:10.1128/ecosalplus.ESP-0006-2013.

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Wang GG, Pasillas MP, Kamps MP. 15 May 2006. Persistent transactivation by Meis1 replaces Hox function in myeloid leukemogenesis models: evidence for co-occupancy of Meis1-Pbx and Hox-Pbx complexes on promoters of leukemia-associated genes. *Mol Cell Biol* doi:10.1128/MCB.00586-06.

Other journals may use different styles for their publish-ahead-of-print manuscripts, but citation entries must include the following information: author name(s), posting date, title, journal title, and volume and page numbers and/or DOI. The following is an example:

Zhou FX, Merianos HJ, Brunger AT, Engelman DM. 13 February 2001. Polar residues drive association of polyleucine transmembrane helices. *Proc Natl Acad Sci U S A* doi:10.1073/pnas.041593698.

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- Persistent unique identifier(s) (e.g., URL[s] or accession number[s]).

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Author. Year. Description of study topic. Retrieved from Database URL (accession no. ●●●●●●). {*Unpublished raw data.*}

Author. Year. Description or title of software (version). Repository URL. Retrieved day month year. {*Software or code.*}

Examples follow.

Christian SL, McDonough J, Liu C-Y, Shaikh S, Vlamakis V, Badner JA, Chakravarti A, Gershon ES. 2002. Data from “An evaluation of the assembly of an approximately 15-Mb region on human chromosome 13q32-q33 linked to bipolar disorder and schizophrenia.” GenBank <https://www.ncbi.nlm.nih.gov/nucleotide/AF339794> (accession no. AF339794). {*Accession number.*}

Sun Z. 2013. Reprocessed: in-depth membrane proteomic study of breast cancer tissues. ProteomeXchange <http://proteomecentral.proteomexchange.org/cgi/GetDataset?ID=RPXD000665> (accession number requested). {*Unassigned accession number.*}

Hogle S. 2015. Supplemental material for Hogle et al. 2015 mBio. figshare <https://doi.org/10.6084/m9.figshare.1533034.v1>. Retrieved 16 March 2017. {*Code and/or software.*}

Nesbitt HK, Moore JW. 2016. Data from “Species and population diversity in Pacific salmon fisheries underpin indigenous food security.” Dryad Digital Repository <https://doi.org/10.5061/dryad.ng8pf>. {*Data set in repository.*}

Manuscript submissions that have appeared in preprint archives should cite the preprint in References, and the fact that a paper has appeared online before should be mentioned parenthetically at the end of the introductory section: (This article was submitted to an online preprint archive [1].) The reference should take the form noted above in reference 18.

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(ii) **References cited in the text.** References that should be cited in the text include the following:

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- ... similar results (R. B. Layton and C. C. Weathers, unpublished data).
- ... system was used (J. L. McInerney, A. F. Holden, and P. N. Brighton, submitted for publication).
- ... as described previously (M. G. Gordon and F. L. Rattner, presented at the Fourth Symposium on Food Microbiology, Overton, IL, 13 to 15 June 1989). {*For non-published abstracts and posters, etc.*}
- ... this new process (V. R. Smoll, 20 June 1999, Australian Patent Office). {*For non-U.S. patent applications, give the date of publication of the application.*}
- ... as suggested by the World Health Organization (<http://www.who.int/campaigns/immunization-week/2017/en/>).

URLs for companies that produce any of the products mentioned in your study or for products being sold may not be included in the article. However, company URLs that permit access to scientific data related to the study or to shareware used in the study are permitted.

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an abbreviated form of citation, omitting the article title, as follows.

- (P. S. Satheshkumar, A. S. Weisberg, and B. Moss, *J Virol* 87:10700–10709, 2013, doi:10.1128/JVI.01258-13)
 (J. H. Coggin, Jr., p. 93–114, in D. O. Fleming and D. L. Hunt, ed., *Biological Safety. Principles and Practices*, 4th ed., 2006)
 “. . . in a recent report by D. A. Hopwood (mBio 4:e00612-13, 2013, doi:10.1128/mBio00612-13) . . .”

When necessary, this style should also be used for references cited in legends for supplemental material and in Addenda in Proof.

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Observations are short descriptions (with a maximum of 1,200 words and no more than 2 figures and 25 references) of research results of exceptional importance and unusual interest to the broad microbiology community, e.g., reports of a new type of organism, a new organelle, a new association of microbes and disease, etc.

The body of an Observation may have paragraph lead-ins. As with Research Articles, authors should include an abstract of 250 words or fewer as well as an Importance section of 150 words or fewer providing a nontechnical explanation of why the work was undertaken.

As noted above under “[Data and Materials](#),” a paragraph dedicated to new accession numbers for nucleotide and amino acid sequences, microarray data, protein structures, gene expression data, and MycoBank data should appear at the end of the text with the paragraph lead-in “Accession number(s).”

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Minireviews are brief summaries (with a maximum of 6,000 words and up to two figures or tables) of important developments in microbiology research. They must be based on published articles, and they may address any subject within the scope of the journal.

Minireviews may be either solicited or proffered by authors

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Minireviews must have abstracts. Limit the abstract to 250 words or fewer. The body of the Minireview may have section headings and/or paragraph lead-ins.

Author bios. At the editor’s invitation, corresponding authors of minireviews may submit a short biographical sketch and photo for each author for publication with the article. Biographical information should be submitted at the modification stage.

- The text limit is 150 words for each author and should include WHO you are (your name), WHERE you received your education, WHAT positions you have held and at WHICH institutions, WHERE you are now (your current institution), WHY you have this interest, and HOW LONG you have been in this field.
- The photo should be a black-and-white head shot of passport size. Photos will be reduced to approximately 1.125 inches wide by 1.375 inches high. Photos must meet the production criteria for regular figures and should be checked for production quality by using Rapid Inspector, provided at the following URL: <http://rapidinspector.cadmus.com/RapidInspector/zmw/index.jsp>.
- To submit, upload the text and photos with your modified manuscript in the eJP online manuscript submission and peer review system. Include the biographical text after the References section of your manuscript, in the same file. Upload the head shots in the submission system as a “Minireview Bio Photo”; **include the author’s name or enough of it for identification in each photo’s file name.** Contact the *mBio* staff if you have questions about what to write or if you have questions about submitting your files.

Opinions/Hypotheses

Opinions/Hypotheses are short articles (with a maximum of 2,500 words and no more than 25 references) that present original and well-developed insights without complete supporting data. Although microbiology and allied fields are primarily experimental sciences, this article type places equal importance on new thought that is formulated in a manner that summarizes a problem, provides a new synthesis, and/or is suitable for subsequent experimental testing.

In this category, the journal provides a highly visible venue for the publication of ideas that have the potential to move fields and to challenge the status quo.

Authors should provide an abstract of 150 words or fewer. The body of an Opinion/Hypothesis article may have section headings and/or paragraph lead-ins.

Commentaries

Commentaries are short invited articles (with a maximum of 1,000 words) that discuss *mBio* papers of special interest. These are solicited by editors from reviewers or experts in the field.

Authors should provide an abstract of 150 words or fewer. The body of a Commentary may have section headings and/or paragraph lead-ins.

Perspectives

Perspectives are brief reviews (limited to 2,000 words) that offer a succinct overview of a specific topic with an emphasis on opinion and synthesis.

Authors should provide an abstract of 150 words or fewer. The body of a Perspectives article may have section headings and/or paragraph lead-ins.

Editorials

Editorials communicated by members of the *mBio* Board of Editors address issues of science, politics, or policy.

Editorials should include an abstract of 150 words or fewer.

Letters to the Editor

Letters to the Editor are intended for comments on articles published in the journal and must cite published references to support the writer's argument.

Letters may be **no more than 500 words long and must be typed double-spaced**. All Letters to the Editor must be submitted electronically. The cover letter should refer to the article in question by its title and the last name of the first author. In addition, the volume and issue and/or DOI should be indicated. Letters to the Editor do not have abstracts. The Letter must have a distinct title, which must appear on the manuscript and on the submission form. Figures and tables should be kept to a minimum.

The Letter will be sent to the editor who handled the article in question. If the editor believes that publication is warranted, he/she will solicit a reply from the corresponding author of the article and make a recommendation to the editor in chief. Final approval for publication rests with the editor in chief.

Please note that some indexing/abstracting services do not include Letters to the Editor in their databases.

Errata

Errata provide a means of correcting errors that occurred during the writing, typing, editing, or publication (e.g., a misspelling, a dropped word or line, or mislabeling in a figure) of a published article. Submit Errata via the *mBio* online submission and peer review system at <https://mbio.msubmit.net/cgi-bin/main.plex>. In the Abstract section of the submission form (a required field), put "Not Applicable." Upload the text of your Erratum as a Microsoft Word file. Please see a recent issue for correct formatting.

Author Corrections

Author Corrections provide a means of correcting errors of omission (e.g., author names or citations) and errors of a scientific nature that do not alter the overall basic results or conclusions of a published article (e.g., an incorrect unit of measurement or order of magnitude used throughout, contamination of one of numerous cultures, or misidentification of a mutant strain, causing erroneous data for only a [noncritical] portion of the study). Note that the addition of new data is not permitted.

For corrections of a scientific nature or issues involving authorship, including contributions and use or ownership of data and/or materials, all disputing parties must agree, in writing, to publication of the Correction. For omission of an author's name, letters must be signed by the authors of the article and the author whose name was omitted. The editor who handled the article will be consulted if necessary.

Submit an Author Correction via the online manuscript submission and peer review system at <https://mbio.msubmit.net/cgi-bin/main.plex>. In the submission form, select Erratum as the manuscript type; there is no separate selection in the submission system for an Author Correction, but your Correction will be published as such if appropriate. In the Abstract section of the submission form (a required field), put "Not Applicable." Upload the text of your Author Correction as a Microsoft Word file. Please see a recent issue for correct formatting.

Retractions

Retractions are reserved for major errors or breaches of ethics that, for example, may call into question the source of the data or the validity of the results and conclusions of an article. If you feel that a Retraction may be necessary for an article that you have authored, you should contact the *mBio* staff at mBio@asmusa.org. The *mBio* staff will submit a Retraction on your behalf. The Retraction will be assigned to the editor in chief of the journal, and the editor who handled the paper and the chairperson of the ASM Journals Board will be consulted. If the Retraction is approved, all authors will be asked to sign a letter of agreement before the Retraction is processed for publication. If all parties agree to the publication and content of the Retraction, it will be sent to the Journals Department for publication.

CrossMark

mBio has implemented CrossMark. CrossMark is a multi-publisher initiative to provide a standard way for readers to locate the current version of an article. Clicking on the CrossMark logo will indicate whether an article is current or whether updates have been published. Additional information about CrossMark can be found on CrossMark's [website](#) and on ASM's CrossMark [policy page](#).

ILLUSTRATIONS AND TABLES

Illustrations

Image manipulation. Digital images submitted for publication may be inspected by ASM production specialists for

any manipulations or electronic enhancements that may be considered to be the result of scientific misconduct based on the guidelines provided below. Any images/data found to contain manipulations of concern will be referred to the editor in chief, and authors may then be requested to provide their primary data for comparison with the submitted image file. Investigation of the concerns may delay publication and may result in revocation of acceptance and/or additional action by ASM.

Linear adjustments to contrast, brightness, and/or color are generally acceptable, as long as the measures taken are necessary to view elements that are already present in the data and the adjustments are applied to the entire image and not just specific areas. Unacceptable adjustments to images include, but are not limited to, the removal or deletion, concealment, duplication (copying and pasting), addition, selective enhancement, or repositioning of elements within the image.

Nonlinear adjustments made to images, such as changes to gamma settings, should be fully disclosed in the figure legends at the time of submission. In addition, images created by compiling multiple files, including noncontiguous portions of the same image, should clearly convey that these multiple files are not a single image. This can be done by “tooling,” or inserting thin lines, between the individual images.

File types and formats. Illustrations may be continuous-tone images, line drawings, or composites. On initial submission, figures may be uploaded as individual PDF files or combined and uploaded as a single PDF file. Place each legend in the text file, as well as on the same page with the figure to assist review. At the modification stage, production-quality digital files must be provided. The legends will be copyedited and typeset for final publication and should not be included as part of the figure itself at this stage. All graphics submitted with modified manuscripts must be bitmap, grayscale, or in the RGB (preferred) or CMYK color mode. See “Color illustrations.” Halftone images (those with various densities or shades) must be grayscale, not bitmap. *mBio* accepts only TIFF or EPS files; PowerPoint files will not be accepted.

Instructions for converting PowerPoint files may be found at http://art.cadmus.com/da/howto/creating_ai_eps_excell.jsp. General instructions for creating acceptable EPS and TIFF files may be found at <http://art.cadmus.com/da/index.jsp>.

We strongly recommend that before returning their modified manuscripts, authors check the acceptability of their digital images for production by running their files through Rapid Inspector, a tool provided at the following URL: <http://rapidinspector.cadmus.com/RapidInspector/zmw/index.jsp>. Rapid Inspector is an easy-to-use, Web-based application that identifies file characteristics that may render the image unusable for production.

If you have additional questions about using the Rapid Inspector preflighting tool, please send an e-mail inquiry to helpdesk.digitalartsupport@cenveo.com.

Minimum resolution. It is extremely important that a high enough file resolution is used. All separate images that you import into a figure file must be at the correct resolution before

they are placed. (For instance, placing a 72-dpi image in a 300-dpi EPS file will not result in the placed image meeting the minimum requirements for file resolution.) Note, however, that the higher the resolution, the larger the file and the longer the upload time. Publication quality will not be improved by using a resolution higher than the minimum. Minimum resolutions are as follows:

- 300 dpi for grayscale and color
- 600 dpi for combination art (lettering and images)
- 1,200 dpi for line art

Size. All graphics must be submitted at their intended publication size so that no reduction or enlargement is necessary. Resolution must be at the required level at the submitted size. Include only the significant portion of an illustration. White space must be cropped from the image, and excess space between panel labels and the image must be eliminated.

- Maximum figure width: 6.875 inches (ca. 17.4 cm)
- Maximum figure height: 9.0625 inches (23.0 cm)

Contrast. Illustrations must contain sufficient contrast to be viewed easily on a monitor or on the printed page.

Labeling and assembly. All final lettering and labeling must be incorporated into the figures. On initial submission, illustrations should be provided as PDF files, with the legends in the text file and with a legend beneath each image to assist review. At the modification stage, production-quality digital figure files (without legends) must be provided. Put the figure number well outside the boundaries of the image itself. (Numbering may need to be changed at the copyediting stage.) Each figure must be uploaded as a separate file, and any multipanel figures must be assembled into one file.

Fonts. To avoid font problems, set all type in one of the following fonts: Arial, Helvetica, Times Roman, European PI, Mathematical PI, or Symbol. Courier may be used but should be limited to nucleotide or amino acid sequences, where a non-proportional (monospace) font is required. All fonts other than these must be converted to paths (or outlines) in the application with which they were created.

Compression. Images created with Macintosh applications may be compressed with Stuffit. Images created with Windows applications may be compressed with WinZip or PKZIP.

Color illustrations. All figures submitted in color will be processed as color. Adherence to the following guidelines will help to ensure color reproduction that is as accurate as possible.

Color illustrations should be supplied in the RGB color mode as either (i) RGB TIFF images with a resolution of at least 300 pixels per inch (raster files, consisting of pixels) or (ii) Illustrator-compatible EPS files with RGB color elements (vector files, consisting of lines, fonts, fills, and images). CMYK files are also accepted. Other than in color space, CMYK files must meet the same production criteria as RGB files. The RGB color space is the native color space of computer monitors and

of most of the equipment and software used to capture scientific data, and it can display a wider range of colors (especially bright fluorescent hues) than the CMYK (cyan, magenta, yellow, black) color space used by print devices that put ink (or toner) on paper. For reprints, ASM's print provider will automatically create CMYK versions of color illustrations from the supplied RGB versions. Color in the reprints may not match that in the online journal of record because of the smaller range of colors capable of being reproduced by CMYK inks on a printing press. For additional information on RGB versus CMYK color, refer to the Cadmus digital art site, http://art.cadmus.com/da/guidelines_rgb.jsp.

Drawings

Submit graphs, charts, complicated chemical or mathematical formulas, diagrams, and other drawings as finished products not requiring additional artwork or typesetting. All elements, including letters, numbers, and symbols, must be easily readable, and both axes of a graph must be labeled.

When creating line art, please use the following guidelines.

(i) All art must be submitted at its intended publication size. For acceptable dimensions, see "Size."

(ii) Avoid using screens (i.e., shading) in line art. It can be difficult and time-consuming to reproduce these images without moiré patterns. Various pattern backgrounds are preferable to screens as long as the patterns are not imported from another application. If you must use images containing screens,

(a) Generate the image at line screens of 85 lines per inch or less.

(b) When applying multiple shades of gray, differentiate the gray levels by at least 20%.

(c) Never use levels of gray below 5% or above 95% as they are likely to fade out or become totally black when output.

(iii) Use thick, solid lines that are no finer than 1 point in thickness.

(iv) Use type that is no smaller than 6 points at the final publication size.

(v) Avoid layering type directly over shaded or textured areas.

(vi) Avoid the use of reversed type (white lettering on a black background).

(vii) Avoid heavy letters, which tend to close up, and unusual symbols, which the printer may not be able to reproduce in the legend.

(viii) If colors are used, avoid using similar shades of the same color and avoid very light colors.

In figure ordinate and abscissa scales (as well as table column headings), avoid the ambiguous use of numbers with exponents. Usually, it is preferable to use the appropriate Système International d'Unités (SI) symbols (μ for 10^{-6} , m for 10^{-3} , k

for 10^3 , and M for 10^6 , etc.). Thus, representation of 20,000 cpm on a figure ordinate should be made by the number 20 accompanied by the label kcpm. A complete listing of SI symbols can be found in the International Union of Pure and Applied Chemistry (IUPAC) publication *Quantities, Units and Symbols in Physical Chemistry*, 3rd ed. (RSC Publishing, Cambridge, United Kingdom, 2007), and at <https://www.nist.gov/physical-measurement-laboratory/special-publication-811>.

When powers of 10 must be used, the journal requires that the exponent power be associated with the number shown. In representing 20,000 cells per ml, the numeral on the ordinate should be "2" and the label should be "10⁴ cells per ml" (not "cells per ml $\times 10^{-4}$ "). Likewise, an enzyme activity of 0.06 U/ml might be shown as 6 accompanied by the label 10⁻² U/ml. The preferred designation is 60 mU/ml (milliunits per milliliter).

Presentation of Nucleic Acid Sequences

Long nucleic acid sequences must be presented as figures in the following format to conserve space. Print the sequence in lines of approximately 100 to 120 nucleotides in a nonproportional (monospace) font that is easily legible when published with a line length of 6 inches (ca. 15.2 cm). If possible, lines of nucleic acid sequence should be further subdivided into blocks of 10 or 20 nucleotides by spaces within the sequence or by marks above it. Uppercase and lowercase letters may be used to designate the exon-intron structure or transcribed regions, etc., if the lowercase letters remain legible at a 6-inch (ca. 15.2-cm) line length. Number the sequence line by line; place numerals representing the first base of each line to the left of the lines. Minimize spacing between lines of sequence, leaving room only for annotation of the sequence. Annotation may include boldface, underlining, brackets, and boxes, etc. Encoded amino acid sequences may be presented, if necessary, immediately above or below the first nucleotide of each codon, by using the single-letter amino acid symbols. Comparisons of multiple nucleic acid sequences should conform as nearly as possible to the same format.

Figure Legends

On initial submission, each legend should be placed in the text file *and* be incorporated into the image file beneath the figure to assist review.

Legends should provide enough information so that the figure is understandable without frequent reference to the text. However, detailed experimental methods must be described in the Materials and Methods section, not in a figure legend. A method that is unique to one of several experiments may be reported in a legend only if the discussion is very brief (one or two sentences). Define all symbols used in the figure and define all abbreviations that are not used in the text.

The main text file should also contain a legend for each item in the supplemental material (see "Supplemental Material").

Tables

Tables that contain artwork, chemical structures, or complex shading must be submitted as illustrations in an acceptable format at the modification stage. The preferred format for

TABLE 1 Distribution of protein and ATPase in fractions of dialyzed membranes^a

Membrane	Fraction	ATPase	
		U/mg of protein	Total U
Control	Depleted membrane	0.036	2.3
	Concentrated supernatant	0.134	4.82
E1 treated	Depleted membrane	0.034	1.98
	Concentrated supernatant	0.11	4.6

^a Specific activities of ATPase of nondepleted membranes from control and treated bacteria were 0.21 and 0.20, respectively.

regular tables is Microsoft Word; however, WordPerfect and Acrobat PDF are also acceptable. Note that a straight Excel file is not currently an acceptable format. Excel files must be either embedded in a Word or WordPerfect document or converted to PDF before being uploaded.

Tables should be formatted as follows. Arrange the data so that columns of like material read down, not across. The headings should be sufficiently clear so that the meaning of the data is understandable without reference to the text. See the “Abbreviations” section of these Instructions for those that should be used in tables. Explanatory footnotes are acceptable, but more-extensive table “legends” are not. Footnotes should not include detailed descriptions of the experiment. Tables must include enough information to warrant table format; those with fewer than six pieces of data will be incorporated into the text by the copy editor. Table 1 is an example of a well-constructed table.

Featured Image

Each collected bimonthly issue of *mBio* is represented by a featured image, derived from an article in the issue. These featured images are used to represent the issues in the online archives.

Authors may receive an invitation to submit a featured image, or they may submit an unsolicited potential image (to mBio@asmusa.org), after their manuscript has been accepted.

The image should be related to the work presented in the manuscript, and it should meet the following specifications:

- TIF or EPS format.
- Resolution of at least 300 dpi.
- Square dimensions.

The image should be free of figure elements, e.g., arrows or panel labels. The image should be accompanied by a short legend. A legend of just a few sentences works best (for an example, see <http://mbio.asm.org/content/1/5.cover-expansion>).

No material submitted for consideration will be returned to the author. Authors will be notified only if their image is selected.

NOMENCLATURE

Chemical and Biochemical Nomenclature

The recognized authority for the names of chemical compounds is *Chemical Abstracts* (CAS; <http://www.cas.org/>) and

its indexes. *The Merck Index Online* (<https://www.rsc.org/merck-index>) is also an excellent source.

For guidelines to the use of biochemical terminology, consult *Biochemical Nomenclature and Related Documents* (Portland Press, London, United Kingdom, 1992), available at <http://www.sbcs.qmul.ac.uk/iupac/bibliog/white.html>, and the Instructions to Authors of the *Journal of Biological Chemistry* and the *Archives of Biochemistry and Biophysics*.

Do not express molecular weight in daltons; molecular weight is a unitless ratio. Molecular mass is expressed in daltons.

For enzymes, use the recommended (trivial) name assigned by the Nomenclature Committee of the International Union of Biochemistry (IUB) as described in *Enzyme Nomenclature* (Academic Press, Inc., New York, NY, 1992) and its supplements and at <http://www.sbcs.qmul.ac.uk/iubmb/enzyme/>. If a non-recommended name is used, place the proper (trivial) name in parentheses at first use in the abstract and text. Use the EC number when one has been assigned. Authors of papers describing enzymological studies should review the standards of the STRENDA Commission for information required for adequate description of experimental conditions and for reporting enzyme activity data (<http://www.beilstein-institut.de/en/projects/strenda/guidelines>).

Nomenclature of Organisms

Mice. For mouse strain and genetic nomenclature, ASM encourages authors to refer to the guidelines set forth by the International Committee on Standardized Genetic Nomenclature for Mice, available on the Mouse Genome Informatics home page at <http://www.informatics.jax.org/> and in *Genetic Variants and Strains of the Laboratory Mouse*, 3rd ed. (M. F. Lyon et al., ed., Oxford University Press, Oxford, England, 1996).

Viruses. Names used for viruses should be those approved by the International Committee on Taxonomy of Viruses (ICTV) and reported on the ICTV Virus Taxonomy website (<https://talk.ictvonline.org/>). In addition, the recommendations of the ICTV regarding the use of species names should generally be followed: when the entire species is discussed as a taxonomic entity, the species name, as with other taxa, is italic and has the first letter and any proper nouns capitalized (e.g., *Tobacco mosaic virus*, *Murray Valley encephalitis virus*). When the behavior or manipulation of individual viruses is discussed, the vernacular (e.g., tobacco mosaic virus, Murray Valley encephalitis virus) should be used. If desired, synonyms may be added parenthetically when the name is first mentioned. Approved generic (or group) and family names may also be used.

Bacteria. Binary names, consisting of a generic name and a specific epithet (e.g., *Escherichia coli*), should be used for all bacteria. Names of categories at or above the genus level may be used alone, but specific and subspecific epithets may not. A specific epithet must be preceded by a generic name, written out in full the first time it is used in a paper. Thereafter, the generic name should be abbreviated to the initial capital letter (e.g., *E. coli*), provided there can be no confusion with other genera used in the paper. Names of all bacterial taxa (kingdoms,

phyla, classes, orders, families, genera, species, and subspecies) are printed in italics; strain designations and numbers are not.

Two websites list current approved bacterial names: Prokaryotic Nomenclature Up-to-Date (<https://www.dsmz.de/bacterial-diversity/prokaryotic-nomenclature-up-to-date.html>) and List of Prokaryotic Names with Standing in Nomenclature (<http://www.bacterio.net/>). If there is reason to use a name that does not have standing in nomenclature, the name should be enclosed in quotation marks in the title and at its first use in the abstract and the text and an appropriate statement concerning the nomenclatural status of the name should be made in the text. “*Candidatus*” species should always be set in quotation marks.

Fungi. Since the classification of fungi is not complete, it is the responsibility of the author to determine the accepted binomial for a given organism. Sources for these names include *The Yeasts: a Taxonomic Study*, 5th ed. (C. P. Kurtzman, J. W. Fell, and T. Boekhout, ed., Elsevier Science, Amsterdam, Netherlands, 2011), and *Ainsworth and Bisby’s Dictionary of the Fungi*, 10th ed. (P. M. Kirk, P. F. Cannon, D. W. Minter, and J. A. Stalpers, ed., CABI International, Wallingford, Oxfordshire, United Kingdom, 2008); see also <http://www.speciesfungorum.org/Names/Fundic.asp>.

Genetic Nomenclature

To facilitate accurate communication, it is important that standard genetic nomenclature be used whenever possible and that deviations or proposals for new naming systems be endorsed by an appropriate authoritative body. Review and/or publication of submitted manuscripts that contain new or nonstandard nomenclature may be delayed by the editor or the Journals Department so that they may be reviewed.

ABBREVIATIONS AND CONVENTIONS

Verb Tense

ASM strongly recommends that for clarity you use the past tense to narrate particular events in the past, including the procedures, observations, and data of the study that you are reporting. Use the present tense for your own general conclusions, the conclusions of previous researchers, and generally accepted facts. Thus, most of the abstract, Materials and Methods, and Results will be in the past tense, and most of the introduction and some of the Discussion will be in the present tense.

Be aware that it may be necessary to vary the tense in a single sentence. For example, it is correct to say “White (30) demonstrated that XYZ cells grow at pH 6.8,” “Figure 2 shows that ABC cells failed to grow at room temperature,” and “Air was removed from the chamber and the mice died, which proves that mice require air.” In reporting statistics and calculations, it is correct to say “The values for the ABC cells are statistically significant, indicating that the drug inhibited. . . .”

For an in-depth discussion of tense in scientific writing, see *How To Write and Publish a Scientific Paper*, 7th ed.

Abbreviations

General. Abbreviations should be used as an aid to the reader, rather than as a convenience to the author, and therefore their use should be limited. Abbreviations other than those recommended by the IUPAC-IUB (*Biochemical Nomenclature and Related Documents*, 1992) should be used only when a case can be made for necessity, such as in tables and figures.

It is often possible to use pronouns or to paraphrase a long word after its first use (e.g., “the drug” or “the substrate”). Standard chemical symbols and trivial names or their symbols (folate, Ala, and Leu, etc.) may also be used.

Define each abbreviation and introduce it in parentheses the first time it is used; e.g., “cultures were grown in Eagle minimal essential medium (MEM).” Generally, eliminate abbreviations that are not used at least three times in the text (including tables and figure legends).

Not requiring introduction. In addition to abbreviations for Système International d’Unités (SI) units of measurement, other common units (e.g., bp, kb, and Da), and chemical symbols for the elements, the following should be used without definition in the title, abstract, text, figure legends, and tables.

DNA (deoxyribonucleic acid)	dinucleotide phosphate, reduced)
cDNA (complementary DNA)	
rRNA (ribonucleic acid)	NADP ⁺ (nicotinamide adenine dinucleotide phosphate, oxidized)
cRNA (complementary RNA)	
RNase (ribonuclease)	poly(A) and poly(dT), etc. (polyadenylic acid and polydeoxythymidylic acid, etc.)
DNase (deoxyribonuclease)	oligo(dT), etc. (oligodeoxythymidylic acid, etc.)
rRNA (ribosomal RNA)	UV (ultraviolet)
mRNA (messenger RNA)	PFU (plaque-forming units)
tRNA (transfer RNA)	CFU (colony-forming units)
AMP, ADP, ATP, dAMP, ddATP, and GTP, etc. (for the respective 5’ phosphates of adenosine and other nucleosides) (add 2’, 3’, or 5’- when needed for contrast)	MIC (minimal inhibitory concentration)
ATPase and dGTPase, etc. (adenosine triphosphatase and deoxyguanosine triphosphatase, etc.)	Tris (tris[hydroxymethyl]aminomethane)
NAD (nicotinamide adenine dinucleotide)	DEAE (diethylaminoethyl)
NAD ⁺ (nicotinamide adenine dinucleotide, oxidized)	EDTA (ethylenediaminetetraacetic acid)
NADH (nicotinamide adenine dinucleotide, reduced)	EGTA (ethylene glycol-bis[β-aminoethyl ether]-N,N,N’,N’-tetraacetic acid)
NADP (nicotinamide adenine dinucleotide phosphate)	HEPES (N-2-hydroxyethylpiperazine-N’-2-ethanesulfonic acid)
NADPH (nicotinamide adenine dinucleotide phosphate)	PCR (polymerase chain reaction)
	AIDS (acquired immunodeficiency syndrome)

Abbreviations for cell lines (e.g., HeLa) also need not be defined.

The following abbreviations should be used without definition in tables.

amt (amount)	concn (concentration)
approx (approximately)	diam (diameter)
avg (average)	expt (experiment)

exptl (experimental)	mean
ht (height)	sp act (specific activity)
mo (month)	sp gr (specific gravity)
mol wt (molecular weight)	temp (temperature)
no. (number)	vol (volume)
prepn (preparation)	vs (versus)
SD (standard deviation)	wk (week)
SE (standard error)	wt (weight)
SEM (standard error of the	yr (year)

Reporting Numerical Data

Standard metric units are used for reporting length, weight, and volume. For these units and for molarity, use the prefixes m, μ , n, and p for 10^{-3} , 10^{-6} , 10^{-9} , and 10^{-12} , respectively. Likewise, use the prefix k for 10^3 . Avoid compound prefixes such as m μ or $\mu\mu$. Use $\mu\text{g/ml}$ or $\mu\text{g/g}$ in place of the ambiguous ppm. Units of temperature are presented as follows: 37°C or 324 K.

When fractions are used to express units such as enzymatic activities, it is preferable to use whole units, such as “g” or “min,” in the denominator instead of fractional or multiple units, such as μg or 10 min. For example, “pmol/min” is preferable to “nmol/10 min,” and “ $\mu\text{mol/g}$ ” is preferable to “nmol/ μg .” It is also preferable that an unambiguous form, such as exponential notation, be used; for example, “ $\mu\text{mol g}^{-1} \text{min}^{-1}$ ” is preferable to “ $\mu\text{mol/g/min}$.” Always report numerical data in the appropriate SI units.

For a review of some common errors associated with statistical analyses and reports, plus guidelines on how to avoid

them, see the articles by Olsen (*Infect Immun* 71:6689–6692, 2003; *Infect Immun* 82:916–920, 2014).

For a review of basic statistical considerations for virology experiments, see the article by Richardson and Overbaugh (*J Virol* 79:669–676, 2005).

Isotopically Labeled Compounds

For simple molecules, isotopic labeling is indicated in the chemical formula (e.g., $^{14}\text{CO}_2$, $^3\text{H}_2\text{O}$, and $\text{H}_2^{35}\text{SO}_4$). Brackets are not used when the isotopic symbol is attached to the name of a compound that in its natural state does not contain the element (e.g., ^{32}S -ATP) or to a word that is not a specific chemical name (e.g., ^{131}I -labeled protein, ^{14}C -amino acids, and ^3H ligands).

For specific chemicals, the symbol for the isotope introduced is placed in square brackets directly preceding the part of the name that describes the labeled entity. Note that configuration symbols and modifiers precede the isotopic symbol. The following examples illustrate correct usage:

^{14}C urea	$[\gamma\text{-}^{32}\text{P}]\text{ATP}$
L-[methyl- ^{14}C]methionine	UDP-[U- ^{14}C]glucose
[2,3- ^3H]serine	<i>E. coli</i> [^{32}P]DNA
$[\alpha\text{-}^{14}\text{C}]\text{lysine}$	fructose 1,6-[1- ^{32}P]bisphosphate

mBio follows the same conventions for isotopic labeling as the *Journal of Biological Chemistry*, and more-detailed information can be found in the Instructions to Authors of that journal.