

## INSTRUCTIONS TO AUTHORS

**SEE AUTHOR CHECKLIST**

### SCOPE

*mSystems*® is a multidisciplinary open-access journal publishing preeminent work that achieves insights into metabolic and regulatory systems at the scale of both the single cell and microbial communities. The scope of *mSystems* encompasses all important biological and biochemical findings in microbial systems biology, including those drawn from analyses of large data sets, as well as new technical and computational methodologies for deriving these insights. *mSystems* welcomes submissions from researchers who focus on the microbiome, genomics, metagenomics, transcriptomics, metabolomics, proteomics, glycomics, bioinformatics, and computational microbiology. *mSystems* provides streamlined decisions, while carrying on ASM's tradition of rigorous peer review.

### EDITORIAL POLICY AND ETHICAL GUIDELINES

As a member of the [Committee on Publication Ethics \(COPE\)](#), ASM adheres to its 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.

### Use of Microbiological Information

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 dur-

ing 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).

### 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, 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), can be omitted, but this must not alter the scientific meaning. Important 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

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Instructions to Authors are updated throughout the year. The current version is available on the journal website.

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 if the data have not been de-identified. The written consent must state either that the patient has seen the complete manuscript or that the patient is declining 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.

**Author contribution statements.** As explained in the ICMJE recommendations, all persons designated as authors should qualify for authorship, and all those who qualify should be listed. ASM encourages transparency in authorship by publishing author contribution statements. Authors are strongly encouraged to include such statements in the Acknowledgments section.

**Corresponding author.** The corresponding author takes primary responsibility for communicating with the journal and coauthors throughout the submission, peer review, and publication processes. The corresponding author is responsible for ensuring that all coauthors have read and approved submissions, including appropriate citations, acknowledgments, and byline order. Additionally, the corresponding author and the study’s primary investigator(s), if different, are required to have examined the raw data represented in the manuscript, affirm that such representations accurately reflect the original data, and ensure that the original data are preserved and retrievable.

**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 Acknowledgments 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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**Nonauthor contributions.** Contributions from individuals who do not meet the ICMJE criteria for authorship should be acknowledged in the Acknowledgments section. Those who provided assistance, e.g., supplied strains or reagents or critiqued the paper, should not be listed as authors. Acquisition of funding, data collection, or general supervision of the research group does not qualify a person or persons for authorship. As mentioned above, professional writers do not meet authorship criteria and should be mentioned in the Acknowledgments section. Specific contributions for each nonauthor contributor should be included.

**Byline order and changes.** All authors must agree to the order in which their names are listed in the byline. Statements regarding equal contributions by two or more authors (e.g., “C.J. and Y.S. contributed equally to . . .”) are permitted as footnotes to bylines and must be agreed to by all of the authors. A change in authorship (order of listing, addition or deletion of a name, or corresponding author designation) after submission of the manuscript will be implemented only after receipt of signed statements of agreement from all parties involved.

**Authorship disputes.** Disputes about authorship may delay or prevent review and/or publication of the manuscript. Should the individuals involved be unable to reach an accord, review and/or publication of the manuscript can proceed only after the matter is investigated and resolved by the authors’ institution(s) and an official report provided to ASM. ASM does not itself investigate or attempt to resolve authorship disputes but will follow institutional recommendations, as appropriate.

**ORCID.** ASM Journals is a member of Open Researcher and Contributor ID (ORCID) and publishes author ORCID numbers in articles. ORCID is an open, nonprofit, community-driven effort to create and maintain a registry of unique researcher identifiers; it is a transparent method of linking research activities and output to these identifiers. In the eJournalPress (eJP) submission system, authors are encouraged to use or create an ORCID number, which can be linked to manuscripts and publications for which a researcher serves as an author. This can be helpful in distinguishing authors with common names. Additional information about ORCID is available on ORCID’s [website](#).

**Plagiarism.** Misappropriating another person’s intellectual property constitutes plagiarism. This includes copying sentences or paragraphs verbatim (or almost verbatim) from someone else’s work, even if the original work is cited in the references. The NIH Office of Research Integrity publication “[Avoiding Plagiarism, Self-Plagiarism, and Other Questionable Writing Practices: a Guide to Ethical Writing](#)” can help authors identify questionable writing practices.

Plagiarism is not limited to the text; it can involve any part of

the manuscript, including figures and tables, in which material is copied from another publication without permission and attribution. An author may not reuse his or her own previously published work without attribution; this is considered text recycling (also known as self-plagiarism).

ASM has incorporated plagiarism detection software into its journal-wide submission system in order to help editors verify the originality of submitted manuscripts. Selected manuscripts are scanned and compared with databases. If plagiarism is detected, COPE [guidelines on plagiarism](#) will be followed.

**Image manipulation.** Submitted figures must reflect original data. Please refer to the “[Image manipulation](#)” section in “[Illustrations and Tables](#)” for an overview of permissible manipulations, unacceptable adjustments, and required information to disclose in the figure legends of images.

ASM applies forensic imaging tools to screen selected manuscripts for inappropriate manipulation of figures. If unacknowledged and/or inappropriate image manipulations are detected, the matter will be referred to the journal’s ethics panel for consideration.

**Fabrication, manipulation, and falsification of data.** ASM encourages authors to consult COPE’s “[Code of Conduct and Best Practice Guidelines for Journal Editors](#).” Fabrication, manipulation, and falsification of data constitute misconduct. As defined by the U.S. Department of Health and Human Services, fabrication is “making up data or results and recording or reporting them,” and falsification is “manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record” (42 Code of Federal Regulations, §93.103). All sources and methods used to obtain and analyze data, including any electronic preprocessing, should be fully disclosed; detailed explanations should be provided for any exclusions.

**Primary publication.** Manuscripts submitted to the journal must represent reports of original research, and the original data must be available for review by the editor if necessary. By submitting a manuscript to the journal, the authors guarantee that they have the authority to publish the work and that the manuscript, or one with substantially the same content, was not published previously, is not being considered or published elsewhere, and was not rejected on scientific grounds or on the basis of its general suitability for publication by another ASM journal, with the exception of *mBio*®. A rejection from *mBio* does not disqualify a manuscript from being newly submitted to another ASM journal (the rejection by *mBio* need not be mentioned in the cover letter). It is incumbent upon the author to acknowledge any prior publication, including his/her own articles, of the data contained in a manuscript submitted to an ASM journal. A copy of the relevant work should be submitted with the paper as supplemental material for review only. Whether the material constitutes the substance of a paper and therefore renders the manuscript unacceptable for publication is an editorial decision.

In the event that the authors’ previously published figures and/or data are included in a submitted manuscript, it is incumbent upon the corresponding author to (i) acknowledge the source of the duplication on the submission form; (ii) ob-

tain permission from the original publisher (i.e., copyright owner); (iii) acknowledge the previous duplication in the figure legend; and (iv) cite the original manuscript.

A paper is not acceptable for submission to an ASM journal if, or its substance, has been made publicly available in the following:

- A serial, periodical, or book
- A conference report or symposium proceedings
- A technical bulletin or company white paper
- A public website (but see “[Preprint policy](#),” below)
- 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
- Deposit of unpublished sequence data in a public database
- Preliminary disclosures of research findings as meeting posters, webcast as meeting presentations, or published in abstract form as adjuncts to a meeting, e.g., part of a program
- Posting of theses and dissertations on a personal/university-hosted website

**Preprint policy.** ASM Journals will consider for publication manuscripts that have been posted in a recognized not-for-profit preprint archive provided that upon acceptance of the manuscript for publication, the author is still able to agree to the terms of an Open Access license and pay the associated fee. It is the responsibility of authors to inform the journal at the time of submission if and where their article has been previously posted, and if the manuscript is accepted for publication in an ASM journal, authors are required to update the preprint with a citation to the final published article that includes the URL along with a link.

## Conflict of Interest

All authors are expected to disclose, in the cover letter and in the appropriate field on the submission form, any commercial affiliations as well as consultancies, stock or equity interests, and patent-licensing arrangements that could be considered to pose a conflict of interest regarding the submitted manuscript. (Inclusion of a company name in the author address lines of the manuscript does not constitute disclosure.) Details of the disclosure to the editor will remain confidential. However, it is the responsibility of authors to provide, in the Acknowledgments section, a general statement disclosing financial or other relationships that are relevant to the study. Examples of potentially conflicting interests that should be disclosed include relationships that might detract from an author’s objectivity in presentation of study results and interests whose value would be enhanced by the results presented. All funding sources for the project, institutional and corporate, should be credited in the Acknowledgments section, as described [below](#). In addition, if a manuscript concerns a commercial product, the manufacturer’s name must be indicated in the Materials and Methods section or elsewhere in the text, as appropriate, in an obvious manner.

## Data and Materials

**Availability of data and materials.** By publishing in *mSystems*, 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 *mSystems* 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](#).

**Data citation.** To promote reproducibility, ASM expects researchers to identify and cite data sets and/or code used in their experiments and studies. These may be large or complex data sets that can include, but are not limited to, data from microarray, genomic, structural, proteomic, or video imaging analyses. **Authors should cite both the data set repository and the published article in which the data set and/or code was originally described.** Citations of data should be included in the reference list with persistent unique identifiers (e.g., active URLs, accession numbers, etc.). If computer code or software was created to generate results or interpret data, then a statement to that effect should be included in the "Data availability" paragraph. For cases in which the software is publicly available (e.g., [FigTree](#) to generate phylogenetic trees), the URL of the 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.

**Culture deposition.** *mSystems* expects authors to deposit strains used in therapeutic-activity assessments and studies of mechanisms of action, resistance, and cross-resistance in publicly accessible culture collections and to refer to the collections and strain numbers in the text. Since the authenticity of subcultures of culture collection specimens that are distributed by

individuals cannot be ensured, authors should indicate laboratory strain designations and donor sources as well as original culture collection identification numbers.

**Authentication of cell lines.** Cell line misidentification or contamination can adversely impact the validity of research findings. Authors should describe the source along with the date and method used for authentication of any cell lines used in manuscripts submitted to this journal. Cell lines used less than 6 months after receipt from a cell bank that performs authentication do not require reauthentication, but the source and method of authentication should be reported in the Materials and Methods section.

**Accessibility of mass spectrometry data.** Proteomics, metabolomics, or imaging mass spectrometry and related data must be accessible through hyperlinks so that reviewers can rapidly assess accessibility. Currently accepted data repositories are MassIVE, which is a part of ProteomeXchange, at <http://massive.ucsd.edu/ProteoSAFe/static/massive.jsp> (proteomics), GNPS at <http://gnps.ucsd.edu> (metabolomics, natural products, and imaging mass spectrometry data), MetaboLights at <https://www.ebi.ac.uk/metabolights/>, and OpenMSI at <https://openmsi.nersc.gov/openmsi/client/> (imaging mass spectrometry data). For reference spectra, we encourage deposition into GNPS (<http://gnps.ucsd.edu>), MassBank of Japan at <http://www.massbank.jp/?lang=en>, or MassBank of North America at <http://mona.fiehnlab.ucdavis.edu>. Other available data repositories may be acceptable, and we encourage database repository administrators or authors of papers to contact the journal for additional appropriate databases that should be listed. Only databases that make all the data accessible via hyperlinks and are downloadable, including reference libraries, are considered acceptable repositories.

**Nucleotide and amino acid sequences.** Newly determined nucleotide and/or amino acid sequence data must be deposited and GenBank/ENA/DDBJ accession numbers must be included in the manuscript no later than the modification stage of the review process. It is expected that the sequence data will be released to the public no later than the publication (online posting) date of the article. Authors are encouraged to comply with community metadata standards, such as the "Minimal Information about any (X) Sequence" (MIXS) checklist (<http://gensc.org/projects/mixs-gsc-project/>), when submitting to GenBank, ENA, or DDBJ.

The accession numbers should be included in a separate paragraph with the lead-in "Accession number(s)" at the end of the Materials and Methods section (for Research Articles) or at the end of the text (for other formats). If conclusions in a manuscript are based on the analysis of sequences and a GenBank/ENA/DDBJ accession number is not provided at the time of the review, authors should provide the annotated sequence data as supplemental material for review only.

It is expected that, when previously published sequence accession numbers are cited in a manuscript, the original published article(s), as well as a citation of the database where the accession number is deposited, will be included in the References section when possible or reasonable. Authors are also expected to do elementary searches and comparisons of nucle-

otide and amino acid sequences against the sequences in standard databases (e.g., GenBank) immediately before manuscripts are submitted and again at the proof stage.

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 INSD to ensure that they conform to the agreed-upon criteria.

**Structural determinations.** Coordinates for new structures of macromolecules must be deposited in the Protein Data Bank and assigned identification codes must be included in the manuscript no later than the modification stage of the review process. It is expected that the coordinates will be released to the public no later than the publication (online posting) date of the article.

Authors are encouraged to send coordinates with their original submission so that reviewers can examine them along with the manuscript. The accession number(s) should be listed in a separate paragraph with the lead-in “Accession number(s)” at the end of the Materials and Methods section for Research Articles and at the end of the text for other formats.

The URLs for coordinate deposition are <https://deposit-1.wpdb.org/deposition/> and <http://www.rcsd.org/pdb/home/home.do#Category-deposit>.

**Gene expression data.** The entire set of supporting gene expression data, as well as genomic or metagenomic data sets, must be deposited in the appropriate public database (e.g., GEO, ArrayExpress, or CIBEX) and the assigned accession number(s) must be included in the manuscript no later than the modification stage of the review process. It is expected that the data will be released to the public no later than the publication (online posting) date of the article.

Authors are encouraged to send the relevant data with their original submission so that reviewers can examine them along with the manuscript. The accession number(s) should be listed in a separate paragraph with the lead-in “Accession number(s)” at the end of the Materials and Methods section for Research Articles and at the end of the text for other formats.

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

**MycoBank.** New scientific names of fungi along with key nomenclatural and descriptive material must be deposited in [MycoBank](#) and the assigned accession number(s) must be included in the manuscript no later than the modification stage of the review process. It is expected that the data will be released to the public no later than the publication (online posting) date of the article. Authors are encouraged to send the relevant data with their original submission, however, so that reviewers can examine them along with the manuscript. The accession number(s) should be listed in a separate paragraph with the lead-in “Accession number(s)” at the end of the Materials and Methods section for Research Articles and at the end of the text for other formats.

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## SUBMISSION, REVIEW, AND PUBLICATION PROCESSES

### Submission Process

All submissions to *mSystems* must be made electronically via the *mSystems* [online submission and peer review system](#). First-time users must create an Author account.

### Review Process

All manuscripts are considered to be confidential and are reviewed by members of the *mSystems* Board of Editors.

To expedite the review process, authors must recommend at least two senior editors from the *mSystems* Board of Editors who would be able to handle the review of their manuscript. Authors also must suggest at least five reviewers who have expertise in the field, who are not members of their institution(s), who have not been recently associated with their laboratory(ies), and who could not otherwise be considered to have a conflict of interest regarding the submitted manuscript. Impersonation of another individual during the review process is considered serious misconduct.

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

When a manuscript is submitted to the journal, it is given a manuscript control number (e.g., mSystems00001-18) and assigned to a member of the Board of Editors. (Always refer to this control number in communications with the editor and the Journals Department.) From there it is assigned to at least two independent experts for peer review. A single-blind review, where authors' identities are known to reviewers, is applied. It is the responsibility of the corresponding author to inform the co-authors of the manuscript's status throughout the submission, review, and publication processes. The reviewers operate under strict guidelines set forth in "[Guidelines for Reviewers](#)" and are expected to complete their reviews expeditiously.

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 60 days or withdraw the manuscript. A point-by-point response to the reviews must be provided in a separate file, and a compare copy of the manuscript (without figures) should be included as a "Marked Up Manuscript" file.

### Rejected Manuscripts

Authors who believe that their manuscript has been unfairly rejected because an important aspect was misunderstood or overlooked by the reviewers may submit an appeal via e-mail to [mSystems@asmusa.org](mailto:mSystems@asmusa.org). The appeal will be processed by the editor in chief, who may consult with the editor(s) of the manuscript. Please note that it is uncommon for editorial decisions to be reversed.

Manuscripts that have been rejected, or withdrawn after being returned for modification, may be resubmitted to *mSystems* (once; see below) if the major criticisms have been addressed. Manuscripts rejected by *mSystems* on the basis of scope may be resubmitted to a more appropriate ASM journal without penalty; however, a manuscript rejected by another ASM journal is considered rejected by *mSystems* 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 in the appropriate field on the submission form. A point-by-point response to the review(s) must be included ("Response to Reviewer Comments" file), and a copy of the revised manuscript tracking the changes (as a "Marked Up Manuscript" file) should be included as well. 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

When an editor has decided that a manuscript is acceptable for publication on the basis of scientific merit, the author and the Journals Department are notified. The text files undergo an automated proofreading, cleanup, and tagging process specific to the particular article type, and the illustrations are examined. If all files have been prepared according to the criteria set forth in these Instructions and those in the manuscript submission system, the acceptance procedure will be completed successfully. If there are problems that would cause extensive corrections to be made at the copyediting stage or if the files are not acceptable for production, ASM Journals staff will contact the corresponding author. Once all the material intended for publication has been determined to be adequate, the editorial staff of the ASM Journals Department completes the editing of the manuscript to bring it into conformity with prescribed standards.

### *mSystems* Publication Schedule

*mSystems* articles are released in an article-based workflow. Articles are not held until an issue is released. The articles published over the preceding weeks are collected into a bimonthly issue and moved into the *mSystems* archive.

### Page Proofs

Page proofs, together with a query sheet and instructions for handling proofs, will be made available to the corresponding author electronically. Queries must be answered on the query page, and any changes related to the queries, as well as any additional changes, must be indicated on the proofs. Note that the copy editor does not query at every instance where a change has been made. Queries are written only to request necessary information or clarification of an unclear passage or to draw attention to edits that may have altered the sense. It is the author's responsibility to read the entire text, tables, and figure legends, not just items queried. Corrected proofs must be returned within two business days after notification of availability.

The proof stage is not the time to make extensive corrections, additions, or deletions. Figures as they appear in the proofs are for

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Questions about proofs should be directed to the ASM Journals Department (e-mail, [eghatineh@asmusa.org](mailto:eghatineh@asmusa.org)).

### Funding Agency Repositories

ASM allows *mSystems* authors whose work was supported by the National Institutes of Health (NIH) and other funding agencies that have public access requirements (e.g., the Wellcome Trust) to post their accepted manuscripts in publicly accessible electronic repositories maintained by those funding agencies. If a funding agency does not itself maintain such a site, then ASM allows the author to fulfill that requirement by depositing the article in an appropriate institutional or subject-based open repository established by a government or noncommercial entity. ASM requests that when submitting an accepted manuscript to PMC or a similar public access site, the author specify that the **posting release date for the manuscript be no earlier than the date of publication on the *mSystems* website.**

### PUBLICATION FEES

Authors whose research was supported by grants, special funds (including departmental and institutional), or contracts (including governmental) or whose research was done as part of their official duties (government or corporate, etc.) are required to pay an article processing charge (APC).

For a corresponding author who is an active member of ASM at any level except the Supporting member level, the *mSystems* APCs (subject to change without notice) are \$2,300 for Research Articles, Resource Reports, and Methods and Protocols and \$1,200 for the shorter Observation and Opinion/Hypothesis formats. For a corresponding author who is a nonmember or Supporting member, the *mSystems* APCs (subject to change without notice) are \$3,150 for Research Articles, Resource Reports, and Methods and Protocols and \$1,800 for the shorter Observation and Opinion/Hypothesis formats. Nonmember corresponding authors may [join ASM](#) to obtain discounts on APCs. Former members who wish to renew their membership at the same level may do so [online](#). However, to change your membership level, please contact customer service at [Service@asmusa.org](mailto:Service@asmusa.org).

If the research was not supported by any of the means described above, a request to waive the fee may be made through the online submission form or submitted via e-mail to

[mSystems@asmusa.org](mailto:mSystems@asmusa.org). The request must include the manuscript control number assigned by ASM and indicate how the work was supported.

Minireviews, Commentaries, Perspectives, Editorials, and Letters to the Editor are not subject to APCs.

### Supplemental Material Fee

Authors are charged a flat fee for posting supplemental material as an adjunct to their published article. For a corresponding author who is an active member of ASM at any level except the Supporting member level, the supplemental material fee is \$210 (subject to change without notice). For a nonmember or Supporting member corresponding author, the supplemental material fee is \$320 (subject to change without notice). Nonmember corresponding authors may [join ASM](#) to obtain discounts on supplemental material fees. Former members who wish to renew their membership at the same level may do so [online](#). However, to change your membership level, please contact customer service at [Service@asmusa.org](mailto:Service@asmusa.org).

### Author Reprints

Authors of accepted manuscripts will be directed to the Author Billing System, where they (or any of their coauthors) can purchase reprints (in multiples of 100).

## ORGANIZATION AND FORMAT

### Editorial Style

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.

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 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. Authors who are unsure of proper English usage should have their manuscripts checked by someone proficient in the English language.

**Manuscripts may be editorially rejected, without review, on the basis of poor English or lack of conformity to the standards set forth in these Instructions.**

## Article Word Count

*mSystems* article word counts are based on the article type. Research Articles, Resource Reports, and Methods and Protocols should be approximately 5,000 words maximum. Minireviews should be approximately 3,000 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 Materials and Methods, References, tables, or figure legends.**

Authors will be asked to shorten overlong papers.

## Supplemental Material

Authors should use discretion regarding supplemental material. Data that directly support the main conclusions of the manuscript should be part of the body of the manuscript to the greatest extent possible: both reviewers and readers prefer this practice.

Large or complex data sets or results that cannot readily be displayed in printed form because of space or technical limitations, such as data from gene expression, genomic, metagenomic, structural, proteomic, or video imaging analyses, can be included as supplemental material. In such cases, the manuscript submitted for review should include a distillation of the results so that the principal conclusions are fully supported without referral to the supplemental material.

Supplemental material can be posted by *mSystems* or, if authors prefer, can be submitted by the authors for posting by a third-party service such as Dryad, figshare, or a similar repository. In the latter case, the assigned accession number(s) must be included in the manuscript submitted for review.

Supplemental material will be peer reviewed along with the manuscript and must be uploaded to the eJournalPress (eJP) peer review system at initial manuscript submission. For initial submission, this material must be uploaded **as a single PDF**. At the modification stage, however, each item in the supplemental material must be submitted as a separate file; e.g., multiple figures and/or tables should not be zipped together or combined in a single PDF. Legends should not be included in the supplemental files; rather, they should appear at the end of the main manuscript text (see the next paragraph). ASM will post no more than 10 individual supplemental items. The maximum size permitted for an individual file is 3 MB (20 MB for movie or Excel data set files).

To ensure broad access, we ask that supplemental files be submitted in the following standard formats:

- **Text:** Word, RTF, or PDF files.
- **Figures:** TIFF, EPS, PPT, high-resolution PDF, JPEG, or GIF format.
- **Tables:** Word, RTF, or PDF files.
- **Data sets:** Excel (.xls), RTF, TXT, or PDF files.
- **Movies:** Audio Video Interleave (.avi), Quicktime (.mov), or MPEG files.

At the end of the manuscript text file, include a legend for each item in the supplemental material. **If it is necessary to cite references that are relevant only to these supplemental legends, use the style described for “Citations in abstracts”; do not include these references in the References section of the manuscript.** Supplemental material should be numbered with an “S” (e.g., Movie S1, Fig. S1, Fig. S2, etc.), and each item should be cited at least once in the text.

Supplemental material posted by *mSystems* will not be edited by the ASM Journals staff, and proofs will not be made available. Supplemental material posted by *mSystems* will always remain associated with the article and is not subject to any modifications after publication.

Material that has been published previously (in print or online) is not acceptable for posting as supplemental material. Instead, the appropriate reference(s) to the original publication should be made in the manuscript text.

Supplemental material is covered by the *mSystems* Author Warranty and Provisional License to Publish; copyright for supplemental material remains with the author. If you are not the copyright owner, you must provide to ASM signed permission from the owner that allows ASM to post the material as a supplement to your article. You are responsible for including in the supplemental material any copyright notices required by the owner.

For information about supplemental material posting fees, see “[Publication Fees](#).”

## Research Articles

Research Articles are limited to 5,000 words and should make fundamental contributions to our understanding in all areas of microbial research that use high-throughput and systems approaches. These articles should include the elements described in this section.

**Title, running title, byline, affiliation line(s), and corresponding 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 addressed (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. Please review this [sample title page](#) for guidance.

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).

**Correspondent footnote.** A single e-mail address for the corresponding author should be included on the title page of the manuscript. This information will be published with the article to facilitate communication, and the e-mail address will be used to notify the corresponding author of the availability of proofs and, later, of the PDF file of the published article.

**Two-part abstract.** Research Articles have structured abstracts consisting of two sections with their own headings: "Abstract" and "Importance." Because the structured abstract will be published separately by abstracting services, it must be complete and understandable without reference to the text. Please refer to the [sample structured abstract](#) for guidance. For a discussion of how to evaluate the importance of a piece of research, see the essay by A. Casadevall and F. C. Fang ([Important Science—It's All About the SPIN](#), *Infect Immun* 77:4177–4180).

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. Choose references carefully 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 or more of the following: text, table(s), or figure(s). Data in tables (e.g., cpm of radioactivity) should not contain more significant figures than the precision of the measurement allows. Illustrations (particularly photomicrographs and electron micrographs) should be limited 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.

**Discussion.** The Discussion section should provide an interpretation of the results in relation to previously published work and to the experimental system at hand and should not contain extensive repetition of the Results section or reiteration of the introduction. In short papers, the Results and Discussion sections may be combined.

**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.

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.)

Recognition of personal assistance should be given as a separate paragraph, as should any statements disclaiming endorsement or approval of the views reflected in the paper or of a product mentioned therein.

In addition to acknowledging sources of financial support in the manuscript, authors should list any sources of funding in response to the Funding Sources question on the online submission form, providing relevant grant numbers where possible, and the authors associated with the specific funding sources. In the event that your submission is accepted, the funding source information provided in the submission form may be published, so please ensure that all information is entered accurately and completely. (It will be assumed that the absence of any information in the Funding Sources fields is a statement by the authors that no support was received.)

**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)
- Books (both print and online)
- Book chapters (publication title is required)
- Patents
- Theses and dissertations
- Published conference proceedings
- Meeting abstracts (from published abstract books or journal supplements)
- Letters (to the editor)
- Company publications
- In-press journal articles, books, and book chapters
- Data sets
- Code

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), 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](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. Johnson J, Robinson VR. 2016. Cleavage of JPS-1 in cells infected with human rhinovirus. *mSystems* 1:e00001-15.
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. 2003. Specimen collection, transport, and processing: virology, p 1227–1241. *In Murray PR, Baron EJ, Pfaller MA, Tenover JC, Tenover FC (eds), Manual of clinical microbiology*, 8th ed. ASM Press, Washington, DC.
7. da Costa MS, Nobre MF, Rainey FA. 2001. Genus I. *Thermus* Brock and Freeze 1969, 295, <sup>AL</sup> emend. Nobre, Trüper and da Costa 1996b, 605, p 404–414. *In Boone DR, Castenholz RW, Garrity GM (eds), 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 (eds), Microbial growth on C<sub>1</sub> 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. Garcia CO, Paira P, Burgos R, Molina J, Molina JF, Calvo C. 1996. Detection of salmonella DNA in synovial membrane and synovial fluid from Latin American patients. *Arthritis Rheum* 39(Suppl):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., mSystems00001-18) 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, and 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.

Note: a posting or accession date is required for any online reference that is periodically updated or changed.

Citations of **ASM Accepts** manuscripts (articles from other, issue-based ASM journals that are published ahead of the issue) should look like the following example.

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, posting date. Polar residues drive association of polyleucine transmembrane helices. *Proc Natl Acad Sci U S A* doi:10.1073/pnas.041593698.

To encourage data sharing and reuse, ASM recommends reporting data sets and/or code both in a dedicated “Data availability” paragraph and in References. The components of a complete data citation include the following:

- Responsible party (senior author, collector, agency),
- Publication year,
- Complete name of a data set, including the name of the

- database or repository and its URL, **or** the name of the analysis software (if appropriate), including the version and project,
- Publisher (if appropriate), and
- Persistent unique identifier(s) (e.g., URL[s] or accession number[s]).

The following templates may be helpful.

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/nuccore/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). {*Unsigned 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.ng8pt>. {*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.

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

- Unpublished data
- Manuscripts submitted for publication
- Unpublished conference presentations (e.g., a report or poster that has not appeared in published conference proceedings)
- Personal communications
- Patent applications and patents pending
- Websites

These references should be made parenthetically in the text as follows:

- ... 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 nonpublished 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.

**(iii) Citations in abstracts.** Since the abstract must be able to stand apart from the article, references cited in it should be clear without recourse to the References section. Use an abbreviated form of citation, omitting the article title, as follows.

- (M. J. Fraser, G. E. Smith, and M. D. Summers, *J Virol* 47:287–300, 1983)
- (J. Scholefield, R. Manson, R. J. Johnston, R. Scott, and M. Spinell, p. 179–183, in R. C. Tilton, ed., *Rapid Methods and Automation in Microbiology*, 1981)
- “... the recent report of A. K. Datta and J. S. Pagano (*Antimicrob Agents Chemother* 24:10–14, 1983) ...”

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

**(iv) References related to supplemental material.** If references must be cited in the supplemental material, list them in a **separate** References section within the supplemental material and cite them by those numbers; do not simply include citations of numbers from the reference list of the associated article. If the same reference(s) is to be cited in both the article itself and the supplemental material, then that reference would be listed in both References sections.

## Resource Reports

Resource Reports (5,000 word limit) describe major technical advances and/or major informational databases that would be of interest in microbiology or allied fields. The manuscripts should include detailed methods and illustration of proof-of-principle so that the new methodology can be replicated and/or utilized by others. Resource Reports follow the same formatting guidelines as [Research Articles](#).

## Methods and Protocols

Methods and Protocols (5,000 word limit) describe major technical and methodological developments in systems biology. These can be bioinformatic or laboratory techniques or

any protocols that practically advance the field of systems microbiology. The description of each method or protocol must include validation of, or application to, a relevant and important question in microbial cell biology or ecology and provide results demonstrating its performance in comparison to existing state-of-the-art techniques. Articles will be selected on the basis of importance to the field, methodological performance, and detailed description to enable application to the field immediately. Methods and Protocols follow the same formatting guidelines as [Research Articles](#).

## Observations

Observations are short descriptions (maximum 1,200 words, with a maximum of 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).”

## Minireviews

Minireviews are brief (maximum 3,000 words, with a maximum of 2 figures or tables) summaries of important developments in microbiology research. They must be based on published articles and may address any subject within the scope of the journal.

**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.

## Opinions/Hypotheses

Opinions/Hypotheses are short articles (maximum 2,500 words, with a maximum of 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 (maximum 1,000 words) that discuss *mSystems* papers or issues 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 (maximum 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 (maximum 500 words) communicated by members of the *mSystems* 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, AUTHOR CORRECTIONS, RETRACTIONS

### 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 *mSystems* [online submission and peer review system](#). 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.

### 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 portion [noncritical] 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 *mSystems* [online submission and peer review system](#). In the submission form, select Author Correction as the manuscript type. 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. Signed letters of agreement from all authors must be included as supplemental material not for publication (scanned PDF files).

### 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. Submit Retractions via the eJP [online manuscript submission and peer review system](#) (see "Submission, Review, and Publication Processes"). In the Abstract section of the submission form (a required field), put "Not Applicable." Upload the text of your Retraction as a Microsoft Word file. Letters of agreement signed by all of the authors must be supplied as supplemental material not for publication (scanned PDF files). 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 all parties agree to the publication and content of the Retraction, it will be sent to the Journals Department for publication.

### CrossMark

*mSystems* has implemented CrossMark. CrossMark is a multipublisher 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. Investiga-

tion 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, illustrations may be supplied as PDF files, with the legend on the same page, to assist review. At the modification stage, production quality digital files must be provided, along with text files for the legends. The legends are copyedited and typeset for final publication, not included as part of the figure itself. All graphics submitted with modified manuscripts should be grayscale or in the RGB color mode. See “[Color illustrations](#).” Halftone images (those with various densities or shades) must be grayscale, not bitmap. *mSystems* 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](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**, an easy-to-use, Web-based application that identifies file characteristics that may render the image unusable for production.

If you require additional information, please send an e-mail inquiry to [digitalart@cadmus.com](mailto:digitalart@cadmus.com).

**Minimum resolution.** Minimum resolution is 300 dpi for all file types. All images imported into a figure file must be at the correct resolution before they are placed in the file. (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 that publication quality will not be improved by using a resolution higher than the minimum.

**Size.** All graphics should be submitted at their intended publication size; that is, the image uploaded should be 100% of its print dimensions 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 should contain sufficient contrast to be viewed easily on a monitor or on the printed page (for reprints).

**Labeling and assembly.** All final lettering and labeling must be incorporated into the figures. 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 supplied as a separate file, and any multipanel figures must be assembled into one file; i.e., rather than uploading a separate file for each panel in a figure, assemble all panels in one piece and supply them as 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). 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 exactly 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.

**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 fill patterns are not imported from another application. If you must use images containing screens,
  - Generate the image at line screens of 85 lines per inch or lower.
  - When applying multiple shades of gray, differentiate the gray levels by at least 20%.
  - 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 ( $\mu$  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* (RSC Publishing, Cambridge, United Kingdom, 2007), and at <https://www.nist.gov/physical-measurement-laboratory/special-publication-811/>.

Where 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 “ $10^4$  cells per ml” (not “cells per ml  $\times 10^{-4}$ ”). Likewise, an enzyme activity of 0.06 U/ml would be shown as 6 accompanied by the label  $10^{-2}$  U/ml. The preferred designation would be 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 (e.g., Courier) 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, to assist review, figure legends may be incorporated in the image files and appear beneath the figures.

At the modification stage, figure legends must be provided within the main text, after the References section.

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 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 *mSystems* 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.

Invitations to submit a featured image are issued to authors whose manuscripts are returned for modification or whose manuscripts have been accepted for publication in *mSystems*; material should be related to the work presented in the manuscript. Unsolicited art will also be considered. No material submitted for consideration will be returned to the author. Authors will be notified only if their image is selected. A license for the chosen material must be granted to ASM. Questions or suggestions regarding the featured image can be sent to the editor in chief, Jack Gilbert ([gilbertjack@gmail.com](mailto:gilbertjack@gmail.com)).

## NOMENCLATURE

### Chemical and Biochemical Nomenclature

The recognized authority for the names of chemical compounds is *Chemical Abstracts* (CAS) and its indexes. *The Merck Index Online* (<https://www.rsc.org/merck-index>) is also an ex-

cellent source. For guidelines on the use of biochemical terminology, consult *Biochemical Nomenclature and Related Documents* (Portland Press, London, United Kingdom, 1992) 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.

For nomenclature of restriction enzymes, DNA methyltransferases, homing endonucleases, and their genes, refer to the [article](#) by Roberts et al.

## Drug Nomenclature

Chemical or generic names of drugs should be used; the use of code numbers or trade names is generally not permitted. When code names or corporate proprietary numbers are to be used, either the chemical structure of the compound or a published literature reference illustrating the chemical structure, if known, must be provided at the first occurrence of the code name or number. For compounds not identified by generic nomenclature, all previous or concurrent identification numbers or appellations should be listed in the manuscript.

## 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 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 website](#). 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 taxa (kingdoms, phyla, classes, orders, families, genera, species, and subspecies) are printed in italics; strain designations and numbers are not. Two sites on the World Wide Web list current approved bacterial names: [Prokaryotic Nomenclature Up-to-Date](#) and [List of Prokaryotic Names with Standing in Nomenclature](#). For guidelines regarding new names and descriptions [Tindall](#) and [Stackebrandt et al.](#) 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 far from 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 for 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)	reduced
cDNA (complementary DNA)	NADP <sup>+</sup> (nicotinamide adenine dinucleotide phosphate, oxidized)
RNA (ribonucleic acid)	poly(A) and poly(dT), etc.
cRNA (complementary RNA)	(polyadenylic acid and polydeoxythymidylic acid, etc.)
RNase (ribonuclease)	oligo(dT), etc.
DNase (deoxyribonuclease)	(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 <sup>+</sup> (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)	SD (standard deviation)
approx (approximately)	SE (standard error)
avg (average)	SEM (standard error of the mean)
concn (concentration)	sp act (specific activity)
diam (diameter)	sp gr (specific gravity)
expt (experiment)	temp (temperature)
exptl (experimental)	vol (volume)
ht (height)	vs (versus)
mo (month)	wk (week)
mol wt (molecular weight)	wt (weight)
no. (number)	yr (year)
prepn (preparation)	

## Reporting Numerical Data

Standard metric units are used for reporting length, weight, and volume. For these units and for molarity, use the prefixes m,  $\mu$ , n, and p for  $10^{-3}$ ,  $10^{-6}$ ,  $10^{-9}$ , and  $10^{-12}$ , respectively. Likewise, use the prefixes c for  $10^{-2}$  and k for  $10^3$ . Avoid compound prefixes such as m $\mu$  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 quantities 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  $\mu\text{g}$  or 10 min. For example, “pmol/min” is preferable to “nmol/10 min,” and “ $\mu\text{mol/g}$ ” is preferable to “nmol/ $\mu\text{g}$ .” 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 these 2003 and 2014 articles by Olsen. For a review of basic statistical considerations for virology experiments, see the article by Richardson and Overbaugh.

## 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.,  $^{32}\text{S-ATP}$ ) or to a word that is not a specific chemical name (e.g.,  $^{131}\text{I}$ -labeled protein,  $^{14}\text{C}$ -amino acids, and  $^3\text{H}$ -ligands).

For specific chemicals, the symbol for the isotope introduced is placed in 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:

$[^{14}\text{C}]$ urea	$[\gamma\text{-}^{32}\text{P}]$ ATP
L-[methyl- $^{14}\text{C}$ ]methionine	UDP-[U- $^{14}\text{C}$ ]glucose
[2,3- $^3\text{H}$ ]serine	SV40 [ $^{32}\text{P}$ ]DNA
$[\alpha\text{-}^{14}\text{C}]$ lysine	fructose 1,6-[1- $^{32}\text{P}$ ]bisphosphate

*mSystems* follows the same conventions for isotopic labeling as the *Journal of Biological Chemistry*, and more-detailed information can be found in their [Instructions to Authors](#).

Below is a quick checklist of formatting issues that we commonly ask authors to address. This list is not all inclusive. Authors are encouraged to review the Instructions to Authors for more guidelines and details. If this is a revision/resubmission, specific issues identified by the editor, reviewers, and/or ASM staff are listed in your decision letter; be sure to review and address these issues.

<b>Cover Letter</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Address the cover letter to the journal, the editor in chief, or your suggested senior editor.</li> <li><input type="checkbox"/> You may list suggested senior editors, editors, and/or reviewers in the cover letter. Do not list these in the manuscript itself.</li> </ul>
<b>Page Format/Length</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Double-space and left-justify the manuscript; use 12-point type and 1-inch margins; use portrait layout for 8.5" × 11" paper. Add continuous line numbers to assist editors/reviewers.</li> <li><input type="checkbox"/> All article types have word limits (which do not include Materials and Methods, References, tables, or figure legends), and some have limits on the numbers of figures and/or references. See the Instructions to Authors.</li> <li><input type="checkbox"/> On the title page (first page of your manuscript), include the full working title, author byline with all authors' full names and affiliations, and the corresponding author's contact information.</li> </ul>
<b>Abstract/Importance</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Most article types require an abstract (see the Instructions to Authors for exceptions and for specific word limits). The abstract should concisely summarize the content of the paper without presenting extensive experimental details.</li> <li><input type="checkbox"/> For Research Articles, Observations, Resource Reports, and Methods and Protocols, include a separate Importance paragraph of ≤150 words. This is a nontechnical explanation of why the work was undertaken.</li> </ul>
<b>Acknowledgments</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The source(s) of any direct financial support (funding) received for the work being published must be indicated on the submission form; any other form(s) of assistance that you received may be noted in an Acknowledgments section.</li> <li><input type="checkbox"/> Recognition of personal assistance should be given as a separate paragraph, as should any statements disclaiming endorsement or approval of the views reflected in the paper or of a product mentioned therein.</li> </ul>
<b>References</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The numbered citation (citation-sequence) reference method should be used. List and number references in the References section in the order in which they are cited in the text. Include the names of all authors for each work cited (instead of "et al.&gt;").</li> <li><input type="checkbox"/> Include References for accessions numbers and code (with URLs).</li> <li><input type="checkbox"/> Refer to the Instructions to Authors for specific formatting instructions.</li> </ul>
<b>Tables</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Place all tables after the References section.</li> <li><input type="checkbox"/> Refer to each table at the appropriate place in the body of the text.</li> <li><input type="checkbox"/> Create tables using the Table function of Microsoft Word (preferably without using the spacing and tabbing features). Arrange the data so that columns of like material read down, not across.</li> <li><input type="checkbox"/> Create fully descriptive table captions and place them above the body of the table. Create footnotes for content that does not conveniently fit in the title or in data cells. Use superscript lowercase italic letters in alphabetical order as the footnote symbols (<i>a, b, c</i>, etc.).</li> </ul>
<b>Figures</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Place all figures after the References section and after tables, if any.</li> <li><input type="checkbox"/> On initial submission, figures may be supplied as PDF files. For revisions, they must be supplied as individual TIFF or EPS files. PowerPoint files are NOT accepted.</li> <li><input type="checkbox"/> Multipanel figures must be assembled onto one page if at all possible.</li> <li><input type="checkbox"/> Refer to each figure at the appropriate place in the body of the text.</li> <li><input type="checkbox"/> On initial submission, set each figure legend directly beneath the corresponding figure. For revisions, the legend(s) should be provided in the manuscript file, separate from the figure file(s).</li> <li><input type="checkbox"/> If any figure is being adapted or reproduced from a previously published version, secure all necessary permissions from the original authors and publishers and forward these to the <i>mSystems</i> production editor at the manuscript revision stage.</li> </ul>
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