UBC JOURNAL OF EXPERIMENTAL MICROBIOLOGY AND IMMUNOLOGY (JEMI)
INSTRUCTIONS TO AUTHORS

1. ACKNOWLEDGMENT

These instructions are adapted from the 2001 *Journal of Bacteriology Instructions to Authors*, copyright of the American Society for Microbiology.

2. HOW TO SUBMIT MANUSCRIPTS

The original draft should be submitted as a paper copy. All final versions of manuscripts **must be submitted electronically.** Files should be in Microsoft® Word format or converted (i.e.: *Save as*….) into a Wordcompatible (*.doc*) PC format. **All files (including MAC files) must be saved in a PC-compatible format.**

3. EDITORIAL POLICY

An **ARTICLE** is a full-length report on scientific data, containing all of the standard sections, tables, and figures. **All authors of a manuscript must have agreed to its submission and are responsible for its content,** including appropriate citations and acknowledgments, and must also have agreed that the corresponding author has the authority to act on their behalf in all matters pertaining to publication of the manuscript. The first author is responsible for obtaining such agreements. By submission of a manuscript to the journal, the authors guarantee that they have the authority to publish the works by JEMI. *By publishing in the journal, the authors agree that any plasmids, viruses, and living materials such as microbial strains and cell lines newly described in the article are available from the UBC collection or will be made available in a timely fashionto that culture collection.*

3.1 Authorship

An author is one who made a substantial contribution to the overall design and execution of the experiments; therefore, JEMI considers all authors responsible for the entire paper. Individuals who provided assistance, e.g., supplied strains or reagents or critiqued the paper, may be recognized in the Acknowledgments section. All authors must agree to the order in which their names are listed in the byline, typically alphabetically by last name or effort. Footnotes regarding attribution of work (e.g., X. Jones and Y. Smith contributed equally to . . .) are not permitted. If necessary, such statements may be included in the Acknowledgments section.

3.2 Editorial Style

The editorial style of ASM journals conforms to the *ASM Style Manual for Journals* (American Society for Microbiology, 2005, in-house document) and *How To Write and Publish a Scientific Paper*, 5th ed. (Oryx Press, 1998), as interpreted and modified by the editors. The editors reserve the privilege of editing manuscripts to conform with the stylistic conventions set forth in the aforesaid publications and in these Instructions.

3.3 Review Process

Once a manuscript is received, the hardcopy will be assessed by one, or more, of the JEMI editors (reviewers). The hardcopy will be returned to the

authors along with a review sheet noting any comments that the reviewers may have had. It is then the authors' responsibility to correct the manuscript, incorporating any changes / suggestions that the reviewers have made. The authors may contact the Editor-in-Chief regarding any disputes or problems with the changes. Once the manuscript has been corrected, the new version must be submitted electronically (see Section 2). The manuscript will be formatted for publication, and the paper will appear in that term's issue of the JEMI in public domain at www.microbiology.ubc.ca

4. ORGANIZATION AND FORMAT

Type every portion of the manuscript **single spaced ,** in **Times New Roman 11 pt font**, except for figure legends, table footnotes, and References (use single-spacing). Number all pages in sequence (using Arabic numerals on the bottom center) according to the following order:

Title page
Abstract
Introduction
Materials and Methods
Results Main Body
Discussion
Future Experiments
Acknowledgements
References

Place figures and tables within the *Results* section, right after the text in which they are first referred to. You may place figures and tables in the *Introduction* (rarely) and *Methods* if you so require (i.e.: a table of strains used, etc.), try to keep this to a minimum. Manuscript pages must be on standard sized paper (8.5"×11") with margins of 1.25 inch at the left and right but 1.0 inch at the top and bottom. The first line of each paragraph is indented 0.2".

4.1 Full-Length Papers (Articles)

Full-length papers must include all the elements described in this section. Each manuscript should present the results of an independent, cohesive study. On the first page, include the title, name of each author, and each author's affiliation (i.e.: their department and University, usually "Microbiology & Immunology, UBC").

Abstract. Limit the *abstract* to **250 words or fewer** to concisely summarize the basic content of the paper without presenting extensive experimental details. Avoid abbreviations and references and do not include diagrams or tables. The abstract must cover the purpose, the main observations and the main conclusion. It must be complete and understandable without reference to the text.

Introduction. The *Introduction* should supply sufficient background information to allow the reader to understand and evaluate the results of the present study without needing to read previous publications on the topic. The *Introduction* should also provide the hypothesis that was addressed or the rationale for the present study. Use only those references required to provide the most salient background rather than and exhaustive review of the topic.

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 or rotor, temperature, time at maximum speed, and centrifugal force (× 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)". The reader should be allowed 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 sources and properties of the strains, mutants, bacteriophages, plasmids, etc. For example, enzyme purifications should be described in this section, but the results of such procedures should be described in the *Results* section. A method, 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.

Results. The *Results* section should include the results of the experiments. Reserve extensive interpretation of the results for the *Discussion* section. Present each part of your data as concisely

as possible in **one** of the following: text, table(s), or figure(s). Avoid extensive use of graphs to present data that might be more concisely presented in the text or tables. For example, except in unusual cases, double reciprocal plots used to determine apparent K_m values should not be presented as graphs; instead, the values should be stated in the text. Similarly, graphs illustrating other methods commonly used (e.g., calibration plots for molecular weight by gel filtration or electrophoresis) need not be shown except in unusual circumstances. Limit photographs (particularly photomicrographs and electron micrographs) to those that are absolutely necessary to show the experimental findings. Number figures and tables in the order in which they are cited in the text, and be sure to cite all figures and tables.

Discussion. The *Discussion* 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*. Generally, a conclusion statement/paragraph which summarizes the important finding(s) of the paper is presented at the end of the *Discussion*.

Future Experiments. Use this section to indicate (to future students) what you think is the appropriate next step(s) to be taken in your research. Highlight what you believe should be the next experiment, what new information you might need to know now, and/or what the main problems of your previous research were (i.e.: what should be avoided or changed the next time).

Acknowledgments. The source of any financial support received for the work being published must be indicated in the Acknowledgments section. (It will be assumed that the absence of such an acknowledgment is a statement by the authors that no support as received). The usual format is as follows: "This work was supported by the Department of Microbiology and Immunology, UBC." Recognition of personal assistance should be given as a separate paragraph.

References. (i) Works listed in References. The *References* section must include all journal articles (both print and online), books and book chapters (both print and online), patents, theses and dissertations, and published conference proceedings (not abstracts; see below), as well as in-press journal articles, book chapters, and books (publication title must be given). All listed references **must** be cited in the text. Arrange the citations in **alphabetical order** (letter by letter, ignoring spaces and punctuation) by first author and **number consecutively**. Abbreviate journal names according to *BIOSIS Serial Sources* (BIOSIS, Philadelphia, Pa., 2000). Cite each listed reference by number in the text. Follow the styles shown in the examples below.

1. **Arendsen, A. F., M. Q. Solimar, and S. W. Ragsdale.** 1999. Nitrate-dependent regulation of acetate biosynthesis and nitrate respiration by *Clostridium thermoaceticum*. J. Bacteriol. **181:**1489– 1495.
2. **Cox, C. S., B. R. Brown, and J. C. Smith.** J. Gen. Genet., in press.* {*Article title is optional; journal title is mandatory.*}
3. **De Ley, J., M. Gillis, and J. Swings.** 1984. Family VI. *Acetobacteraceae* Gillis and De Ley 1980, 23*VP*, p. 267–278. *In* N. R. Krieg and J. G. Holt (ed.), Bergey's manual of systematic bacteriology, vol. 1. Williams & Wilkins, Baltimore, Md.
4. **Dunne, W. M., Jr., F. S. Nolte, and M. L. Wilson.** 1997. Cumitech 1B, Blood cultures III. Coordinating ed., J. A. Hindler. American Society for Microbiology, Washington, D.C.
5. **Fitzgerald, G., and D. Shaw.** *In* A. E. Waters (ed.), Clinical microbiology, in press. EFH Publishing Co., Boston, Mass.* {*Chapter title is optional.*}
6. **Gershon, A. A., P. LaRussa, and S. P. Steinberg.** 1999. Varicella-zoster virus, p. 900–911. *In* P. R. Murray, E. J. Baron, M. A. Pfaller, F. C. Tenover, and R. H. Yolken (ed.), Manual of clinical microbiology, 7th ed. American Society for Microbiology, Washington, D.C.
7. **Green, P. N., D. Hood, and C. S. Dow.** 1984. Taxonomic status of some methylotrophic bacteria, p. 251–254. *In* R. L. Crawford and R. S. Hanson (ed.), Microbial growth on C_1 compounds. Proceedings of the 4th International Symposium. American Society for Microbiology, Washington, D.C.
8. **Odell, J. C.** April 1970. Process for batch culturing. U.S. patent 484,363,770. {*Include the name of the patented item/process if possible.*}
9. **O'Malley, D. R.** 1998. Ph.D. thesis. University of California, Los Angeles. {*Title is optional.*}
10. **Ramey, W. D.** 2002. Effect of chromosomal DNA from *E. coli* HB101, *E. coli* B23 and *B. subtilis* on the transformation of *E. coli* HB101 by the plasmid p328.5 (a pBR322 derivative). *In* Microbiology 421 Laboratory Manual. University of British Columbia, Vancouver, BC.

11. **Zellnitz, F., and P. M. Foley.** 2 October 1998, posting {*or* revision} date. History of virology. Am. Virol. J. **1:**30–50. [Online.] http://www.avj.html. {*For online only journals; page numbers may not be available.*}

(ii) Items cited in the text. References to unpublished data, articles submitted for publication, meeting abstracts, personal communications, letters, company publications, patent applications and patents pending, computer software, databases, and websites 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).
. . . in mitochondria (S. De Wit, C. Thioux, and N. Clumeck, Abstr. 34th Intersci. Conf. Antimicrob. Agents Chemother., abstr. 114, 1994).
. . . for other bacteria (A. X. Jones, personal communication.)
. . . discussed previously (L. B. Jensen, A. M. Hammerum, R. L. Poulsen, and H. Westh, Letter, Antimicrob. Agents Chemother. **43:**724–725, 1999).
. . . discussed previously (S. L. W. On and P. A. R. Vandamme, Authors' Reply to Letter, J. Clin. Microbiol. **39:**2751–2752, 2001).
. . . the manufacturer (Sigma manual, Sigma Chemical Co., St. Louis, Mo.).
. . . this process (V. R. Smoll, 20 June 1999, Australian
Patent Office). {*For non-U.S. patent applications, give the date of publication of the application.*}
. . . information found at the XYZ website (http://cbx_iou.pgr).
. . . the ABC program (version 2.2; Department of Microbiology, State University [http://www.stu.micro]).

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.

Appendixes. Appendixes, which contain supplementary material to aid the reader, are only permitted if absolutely essential but in general are discouraged. Titles, authors, and *References* sections that are distinct from those of the primary article are not allowed. Equations, tables, and figures should be labeled with the letter "A" preceding the numeral to distinguish them from those cited in the main body of the text.

4.2 Numbers and Units

In figure ordinate and abscissa scales (as well as table column headings), **avoid ambiguous use of numbers with exponents.** Usually, it is preferable to use the appropriate Système International d'Unités (SI) symbols (u for 10^{-6}, m for 10^{-3}, k for 10^{3}, M for 10^{6}, etc.) A complete listing of SI symbols can be found in the International Union of Pure and Applied Chemistry (IUPAC) "Manual of Symbols and Terminology for Physicochemical Quantities and Units" (Pure Appl. Chem. **21**:3-44, 1970). Thus, representation of 20,000 cpm on a figure ordinate should be made by the number 20, accompanied by the label kcpm. When powers of 10 must be used, the journal requires that the **exponent power be associated with the number shown.** In representing 20,000 cells per ml, the numeral on the ordinate would be "2" and the label would be "10^4 cells per ml" (not "cells per ml × 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).

4.3 Presentation of Nucleic Acid Sequences

Nucleic acid sequences of limited length which are the primary subject of a study may be presented freestyle in the most effective format. Longer 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 **Times New Roman 10 pt font**. 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 structure, transcribed regions, etc. 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, 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.

4.4 Figures

Figures include all graphs and other visual images , as opposed to textual/numerical info that is presented in the format of a Table. Since submission to JEMI is electronic, all figures must be in **digital format, embedded into text boxes in the manuscript file.** The accepted format for photographic images (equipment, gel photos, hybridizations, etc.) is **JPEG format** (.jpg on PCs), at a maximum resolution of **600 dpi** and a maximum size of one full page (6.5" × 9" on standard size paper with a 1" margin all around). For images and figures that will not suffer greatly from size reduction (ie: are still clearly legible and sharp), it is recommended that they be reduced to fit the vertical size of one-column of a page (6.5" × 4.5") so that text may be placed above or below the item in the final format of the journal. Figure legends are placed in a text box **below** the actual figures (as part of the embedded figure file). Legends should provide enough information so that the figure is understandable without frequent reference to the text. However, detailed experimental methods or routine methods that apply to most of the study 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 description 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. Figures are labeled beginning with "1". Figures that are presented using two panes can be labeled with numerals and letters such as "Figure 2a" and "Figure 2b").

4.6 Tables

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 the abbreviations 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 should be incorporated into the text.

5. NOMENCLATURE

5.1 Chemicals and Biochemicals

The recognized authority for the names of chemical compounds is *Chemical Abstracts* (Chemical Abstract Service, Ohio State University, Columbus) and its indexes. *The Merck Index*, 13th ed. (Merck & Co., Inc., Whitehouse Station, N.J., 2001), is also an excellent source. For biochemical terminology, including abbreviations and symbols, consult *Biochemical Nomenclature and Related Documents* (1978; reprinted for The Biochemical Society, London, England) and the instructions to authors of the *Journal of Biological Chemistry* and the *Archives of Biochemistry and Biophysics* (first issues of each year). 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, N.Y., 1992). 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, and express enzyme activity either in katals (preferred) or in the older system of micromoles per minute. For nomenclature of restriction enzymes, DNA methyltransferases, homing endonucleases, and their genes, refer to the article by Roberts et al. (Nucleic Acids Res. **31:**1805–1812, 2003).

5.2 Microorganisms

Binary names, consisting of a generic name and a specific epithet (e.g., *Escherichia coli*), must be used for all microorganisms. 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 and should be underlined (or italicized) in the manuscript; strain designations and numbers are not underlined or italicized. Vernacular (common) names should be in lowercase roman type (e.g., streptococcus, brucella). The spelling of bacterial names should follow the *Approved Lists of Bacterial Names* (amended edition) (V. B. D. Skerman, V. McGowan, and P. H. A. Sneath, ed., American Society for Microbiology, 1989) and the two sites on the World Wide Web list current approved bacterial names: Bacterial Nomenclature Up-to-Date (http://www.dsmz.de/bactnom/bactname.htm) and

List of Bacterial Names with Standing in Nomenclature (http://www.bacterio.cict.fr). Newly constructed microorganisms, viruses, and plasmids should be given designations consisting of the first initial of each surname arranged in alphabetical order followed by the session (ie 09w) followed by a unique sequential number. This designation should be distinct from those of the genotype and phenotype, and italicized genotypic and phenotypic symbols should not be included. Plasmids are named with a lowercase "p"followed by the designation in uppercase letters and numbers. To avoid the use of the same designation as that of a widely used strain or plasmid, check the designation against a publication database such as Medline.

5.3 Genes, Plasmids and Mutations

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 editors so that they may be reviewed. Before submission of manuscripts, authors may direct questions on genetic nomenclature to the Editor-in-Chief.

Bacteria. The genetic properties of bacteria are described in terms of phenotypes and genotypes. The phenotype describes the observable properties of an organism. The genotype refers to the genetic constitution of an organism, usually in reference to some standard wild type. Use the recommendations of Demerec *et al*. (Genetics **54:**61–64, 1966) as a guide to the use of these terms.
(i) Phenotypic designations must be used when mutant loci have not been identified or mapped. They can also be used to identify the protein product of a gene, ie: the OmpA protein. Phenotypic designations generally consist of three-letter symbols; these are **not** italicized, and the first letter of the symbol is capitalized. It is preferable to use roman or Arabic numerals (instead of letters) to identify a series of related phenotypes. Thus, nucleic acid polymerase mutants might be designated Pol1, Pol2, Pol3, etc. Wild-type characteristics can be designated with a superscript plus (Pol^{+}), and, when necessary for clarity, negative superscripts (Pol^{-}) can be used to designate mutant characteristics. Lower case superscript letters may be used to further delineate phenotypes (ie: Str^{s}) for streptomycin sensitivity). Phenotypic designations should be defined.
(ii) Genotypic designations are also indicated by three-letter locus symbols. In contrast to phenotypic designations, these are lowercase italic (ie: *ara, his, rps*). If several loci govern related functions, these are distinguished by italicized capital letters following the locus symbol (ie: *araA araB araC*). Promoter, terminator, and operator sites should be indicated as described by Bachmann and Low (Microbiol. Rev. 44:1 – 56, 1980) (ie: *lacZp lacAt lacZo*).
(iii) Wild-type alleles are indicated with a superscript plus (*ara*$^{+}$, *his*$^{+}$). A superscript minus is not used to indicate a mutant locus; thus, one refers to an *ara* mutant rather than an *ara*$^{-}$ strain.
(iv) Mutation sites are designated by placing serial isolation numbers (allele numbers) after the locus symbol (ie: *araA1 araA2*). If only a single such locus exists or if it is not known in which of several related loci the mutation has occurred, a hyphen is used instead of the capital letter (ie: *ara-23*). It is essential in papers reporting the isolation of new mutants that allele numbers be given to the mutations. For *Escherichia coli*, there is a registry of such numbers: *E. coli* Genetic Stock Center, Department of Biology, Yale University, New Haven, CT 06511-5188. For the genus *Salmonella*, the registry is *Salmonella* Genetic Stock Center, Department of Biology, University of Calgary, Calgary, Alberta T2N 1N4, Canada. For the genus *Bacillus*, the registry is the *Bacillus* Genetic Stock Center, Ohio State University, Columbus, OH 43210.
(v) The use of superscripts with genotypes (other than + to indicate wild-type alleles) should be avoided. Designations indicating amber mutations (Am), temperature-sensitive mutations (Ts), constitutive mutations (Con), cold-sensitive mutations (Cs), production of a hybrid protein (Hyb), and other important phenotypic properties should follow the allele number [ie: *araA230*(Am), *hisD21*(Ts)]. All other such designations of phenotype must be defined at the first occurrence. If superscripts **must** be used, they must be approved by the editor and they must be defined at the first occurrence. Subscripts may be used in two situations. Subscripts may be used to distinguish between genes (having the same name) from different organisms or strains, ie: $his_{E.\ coli}$ or his_{K12} for the *his* genes of *E. coli* or strain K12 in another species or strain, respectively. An abbreviation may also be used if it is explained. Similarly, a subscript is also used to distinguish between genetic elements that have the same name. For example, the promoters of the *gln* operon can be

designated gln_{Ap1} and gln_{Ap2}. this form departs slightly from that recommended by Bachmann and Low (ie: *desC1p*).
(vi) Deletions are indicated b the symbol Δ placed before the deleted gene or region, ie*: Δ(trpA432, Δ(aroP-aceE)419,* or *Δhis(dhuA hisJ hisQ)1256.* Similarly, other symbols can be used (with appropriate definition). Thus, a fusion of the *ara* and *lac* operons can be shown as Φ(ara-lac)95. Likewise, Φ(*araB'- lacZ+)96* indicates that the fusion results in a truncated *araB* gene fused to an intact *lacZ* gene, and Φ*(malE – lacZ)97(Hyb)* shows that a hybrid protein is synthesized. An inversion is shown as IN*(rrnDrrnE) 1*. An insertion of an *E. coli his* gene into plasmid pSC101 at zero kilobases (0 kb) is shown as pSC101 Ω(0kb::K-12*hisB*)4. An alternative designation of an insertion can be used in simple cases, ie: *galT*236::Tn5. The number 236 refers to the locus of the insertion, and if the strain carries an additional *gal* mutation, it is listed separately. It is important in reporting the construction of strains in which a mobile element was inserted and subsequently deleted that this fact be noted in the strain table. This can be done by listing the genotype of the strain used as an intermediate in a table footnote or by making a direct or parenthetical remark in the genotype, ie (F-), *Δ*Mu *cts*, or *mal*::ΔMu *cts::lac*. In setting parenthetical remarks within the genotype or dividing the genotype into constituent elements, parentheses and brackets are used without special meaning; brackets are used outside parentheses. To indicate the presence of an episome, parentheses (or brackets) are used (λ, F+). Reference to an integrated episome is indicated as described for inserted elements, and an exogenote is shown as, for example, W3110/F'8(*gal*+). Any deviations from standard genetic nomenclature should be explained in the *Materials and Methods* or in a table of strains. For information about the symbols in current use, consult Berlyn (Microbiol. Mol. Biol. Rev. **62**:814-984, 1998) for *E. coli* K-12, Sanderson and Roth (Microbiol. Rev. **52**:485-532, 1988) for *Salmonella* serovar *Typhimurium*, Holloway *et al*. (Microbiol. Rev. **43**:73-102, 1979) for the genus *Pseudomonas*, Piggot and Hoch (Microbiol. Rev. **49**:158-179, 1985) for *Bacillus subtilis*, and Mortimer and Schild (Microbiol. Rev. **49**:181-213, 1985) for *Saccharomyces cerevisiae*.

Conventions for naming genes. It is recommended that (entirely) new genes be given names that are mnemonics of their function, avoiding names that are already assigned and earlier or alternative gene names, irrespective of the bacterium for which such assignments have been made. Similarly, it is recommended that, whenever possible, homologous genes present in different organisms receive the same name. When homology is not apparent or the function of a new gene has not been established, a provisional name may be given by one of the following methods. (i) The gene may be named on the basis of its map location in the style *yaaA*, analogous to the style used for recording transposon insertions *(zef*) as discussed below. A list of such names in use for *E. coli* has been published by Rudd (Microbiol. Mol. Biol. Rev. **62**:985-1019, 1998). (ii) A provisional name may be given in the style described by Demeric *et al*. (ie: *usg*, gene upstream of *folC*). Such names should be unique, and names such as *orf* or *genX* should not be used. For reference, the *E. coli* Genetic Stock Center's database includes an updated listing of *E. coli* gene names. It is accessible on the Internet (http://cgsc.biology.yale.edu/cgsc.html). The Center's relational database can also be searched via Telnet (contact berlyn@cgsc.biology.yale.edu). A list can also be found in the work of Riley (Microbiol. Rev. **57**:862-952, 1993). For the genes of other bacteria, consult the references given above.

''Mutant'' vs. ''mutation.'' Keep in mind the distinction between a *mutation* (an alteration of the primary sequence of the genetic material) and a *mutant* (a strain carrying one or more mutations). One may speak about the mapping of a mutation, but one cannot map a mutant. Likewise, a mutant has no genetic locus, only a phenotype.

"Homology" versus "similarity." For use of terms that describe relationships between genes, consult the articles by Theissen (Nature **415:**741, 2002) and Fitch (Trends Genet. **16:**227–231, 2000). "Homology" implies a relationship between genes that share a common evolutionary origin; partial homology is not recognized. When sequence comparisons are discussed, it is more appropriate to use the term "percent sequence similarity" or "percent sequence identity," as appropriate.

Bacteriophages. The genetic nomenclature for phages differs from that for bacteria and tends to have separate conventions for each phage. Genetic symbols may be one, two or three letters and are italicized. For example, a mutant strain of λ might be designated *Aam*11 *int*2 *red*114 *cI*857; this strain carries mutations in genes *cI, int* and *red* and an amber-suppressible (am) mutation in gene *A*.

Phenotypic symbols and designations of gene products are not italicized (ie: "the Spi phenotype" or "Int protein"), and superscript plus and minus symbols can be used to indicate wildtype and mutant phenotypes, respectively. Host DNA insertions into phages should be delineated by square brackets, and the genetic symbols and designations for such inserted DNA should conform to those used for the host genome. Lists of gene symbols for several phages can be found in *Genetic Maps*, 5th ed. (S. J. O'Brien, ed., Cold Spring Harbor Laboratory, Cold Spring Harbor, N. Y., 1990). Relevant references for some of the more widely studied phages are as follows: for phage λ, Daniels *et al*. (p. 469-515, in R. W. Hendrix, J. W. Roberts, F. W. Stahl, and R. A. Weisberg, ed., *Lambda II*, Cold Spring Harbor Laboratory, Cold Spring Harbor, N. Y., 1983); for phage T4, Kutter *et al*. (p. 491-519, in J. D. Karam, ed., *Molecular Biology of Bacteriophage T4*, American Society for Microbiology, Washington, D. C., 1994); and for phage T7, Dunn and Studier (J. Mol. Biol. 166:477-535, 1983).

Transposable elements, plasmids and restriction enzymes. Nomenclature of transposable elements (insertion sequences, transposons, phage Mu, etc.) should follow the recommendations of Campbell et al. (Gene 5:19-206, 1979), with the modifications given in section **vi** of **Genetic Nomenclature**, above. The Internet site where insertion sequences of eubacteria and archaebacteria are described and new sequences can be recorded is: http://www.is.biotoul.fr/is.html. The system of designating transposon insertions at sites where there are no known loci, ie: *zef-123*::Tn5, has been described by Chumley *et al*. (Genetics **91**:639-655, 1979). The nomenclature recommendations of Novick *et al*. (Bacteriol Rev. 40:168-189, 1976) for plasmids and plasmid-specified activities, of Low (Bacteriol. Rev. **36**:587-607, 1972) for F-prime facors, and of Roberts (Nucleic Acids Res. **17**:r347-r387, 1989) for restriction enzymes and their isoschizomers should be used. The nomenclature for recombinant DNA molecules constructed *in vitro* follows the nomenclature for insertions in general. DNA inserted into recombinant DNA molecules should be described by using the gene symbols and conventions for the organism from which the DNA was obtained.

Tetracycline resistance determinants. The nomenclature for tetracycline resistance determinants is based on the proposal of Levy et al. (Antimicrob. Agents Chemother. **43:**1523–1524, 1999). The style for such determinants is, e.g., Tet B; the space helps distinguish the determinant designation from that for phenotypes and proteins (TetB). The above-referenced article also gives the correct format for genes, proteins, and determinants in this family.

6. ABBREVIATIONS AND CONVENTIONS

6.1 Verb Tense

JEMI 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) demonstrat*ed* that XYZ cells *grow* at pH 6.8,'' ''Figure 2 show*s* that ABC cells fail*ed* 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 inhibit*ed*. . . .'' For an in depth discussion of tense in scientific writing, see p. 207–209 in *How To Write and Publish a Scientific Paper*, 5th ed.

6.2 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*, 1978) 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, Leu, etc.) may also be used. It is strongly recommended that all abbreviations except those listed below be introduced in the first paragraph in Materials and Methods. Alternatively, 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).

Abbreviations that do NOT require introduction. In addition to abbreviations for Systeme International d'Unites (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); cDNA (complementary DNA); RNA (ribonucleic acid); cRNA (complementary RNA); RNase (ribonuclease); DNase (deoxyribonuclease); rRNA (ribosomal RNA); mRNA (messenger RNA); tRNA (transfer RNA); AMP, ADP, ATP, dAMP, ddATP, GTP, etc. (for the respective 5_ phosphates of adenosine and other nucleosides) (add 2_-, 3_-, or 5_- when needed for contrast); ATPase, dGTPase, etc. (adenosine triphosphatase, deoxyguanosine triphosphatase, etc.); NAD (nicotinamide adenine dinucleotide); NAD_ (nicotinamide adenine dinucleotide, oxidized); NADH (nicotinamide adenine dinucleotide, reduced); NADP (nicotinamide adenine dinucleotide phosphate); NADPH (nicotinamide adenine dinucleotide phosphate, reduced); NADP_ (nicotinamide adenine dinucleotide phosphate, oxidized); poly(A), poly(dT), etc. (polyadenylic acid, polydeoxythymidylic acid, etc.); oligo(dT), etc. (oligodeoxythymidylic acid, etc.); UV (ultraviolet); PFU (plaque-forming units); CFU (colony-forming units); MIC (minimal inhibitory concentration); Tris [tris(hydroxymethyl) aminomethane]; DEAE (diethylaminoethyl); EDTA (ethylenediaminetetraacetic acid); EGTA [ethylene glycol-bis(_-aminoethyl ether)-*N,N,N_,N_*-tetraacetic acid]; HEPES (*N*-2-hydroxyethylpiperazine-*N*_-2- ethanesulfonic acid); PCR (polymerase chain reaction); and 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)
SE (standard error)
approx (approximately)
SEM (standard error of the avg (average) mean)
concn (concentration)
sp act (specific activity)
diam (diameter)
sp gr (specific gravity)
expt (experiment)
temp (temperature)
exptl (experimental)
tr (trace)
ht (height)
vol (volume)
mo (month)
vs (versus)
mol wt (molecular weight)
wk (week)
no. (number)
wt (weight)
prepn (preparation)
yr (year)
SD (standard deviation)

6.3 Reporting Numerical Data

Standard metric units are used for reporting length, weight, and volume. For these units and for molarity, use the prefixes m, u, n, and p for 10^{-3}, 10^{-6}, 10^{-9}, and 10^{-12}, respectively. Likewise, use the prefix k for 103. Avoid compound prefixes such as mu. Use ug/ml or ug/g in place of the ambiguous ppm. Units of temperature are presented as follows: 37°C or 324 K. When fractions are used to express units such as enzymatic activities, it is preferable to use whole units, such as ''g'' or ''min,'' in the denominator instead of fractional or multiple units, such as ug or 10 min. For example, ''pmol/ min'' is preferable to ''nmol/10 min,'' and ''mmol/g'' is preferable to ''nmol/mg.'' It is also preferable that an unambiguous form such as exponential notation be used; for example, ''umol g^{-1} min^{-1}'' is preferable to ''umol/g/ min.'' Always report numerical data in the appropriate SI units. Representation of data as accurate to more than two significant figures must be justified by presentation of appropriate statistical analyses. For review of some common errors associated with statistical analyses and reports, plus guidelines on how to avoid them, see the article by C. Olsen (Infect. Immun. **71:**6689–6692, 2003).

6.4 Isotopically Labeled Compounds

For simple molecules, labeling is indicated in the chemical formula (e.g., $^{14}CO_2$, $^{3}H_2O$, and $H_2{}^{35}SO_4$). Brackets are not used when the isotopic symbol is attached to the name of a compound that in its natural state does not contain the element (e.g., ^{32}S-ATP) or to a word that is not a specific chemical name (e.g., ^{131}I-labeled protein, ^{14}C-amino acids, and ^{3}H-ligands).
For specific chemicals, the symbol for the isotope introduced is placed in square brackets directly preceding the part of the name that describes the labeled entity. Note that configuration symbols and modifiers precede the isotopic symbol. The following examples illustrate correct usage:
[^{14}C]urea
UDP-[U-^{14}C]glucose
L-[*methyl*-^{14}C]methionine
E. coli [^{32}P]DNA

[2,3-^{3}H]serine
fructose 1,6-[1-^{32}P]bisphosphate
[-^{14}C]lysine
[-^{32}P]ATP
This journal follows the same conventions for isotopic labeling as the *Journal of Biological Chemistry*, and more-detailed information can be found in the instructions to authors of that journal (first issue of each year).