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MOLECULAR AND CELLULAR BIOLOGY
INSTRUCTIONS TO AUTHORS

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ASM strongly urges that the primary nucleotide sequence data contained in a paper be deposited with GenBank. The necessary form, provided by GenBank, will be sent with the acceptance letter to the corresponding author. Authors may also contact GenBank directly by writing to GenBank, Mail Stop K-710, Los Alamos National Laboratory, Los Alamos, NM 87545, or by calling 505-667-7510.

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When an editor has decided that a manuscript is acceptable for publication on the basis of scientific merit, it is sent to the Publications Department, where it is checked by the production editor. If the manuscript has been prepared according to the criteria set forth in these Instructions, it is scheduled for the next available issue and an acceptance letter that indicates the month of publication and approximate page proof dates is mailed to the corresponding author. The editorial staff of the ASM Publications Department completes the editing of the manuscript to bring it into conformity with prescribed standards.

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ORGANIZATION AND FORMAT

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Title. 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. On the title page, include the title, running title (not to exceed 54 characters and spaces), name of each author, address(es) of the institution(s) at which the work was performed, and each author's affiliation or a footnote indicating the present address of any author no longer at the institution where the work was performed. Place an asterisk after the name of the author to whom inquiries regarding the paper should be directed, and give that author's telephone number.

Abstract. Limit the abstract to 250 words or fewer, and concisely summarize the basic content of the paper without presenting extensive experimental details. Avoid abbreviations and do not include diagrams. When it is essential to include a reference, use the full literature citation but omit the article title. Because the abstract will be published separately by abstracting services, 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 referring to previous publications on the topic. The introduction should also provide the rationale for the present study. Use only those references required to provide the most salient background rather than an exhaustive review of the topic.

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 (×g, rather than revolutions per minute). For commonly used materials and methods (e.g., media and protein 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.

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 the results as concisely as possible in one of the following: text, table(s), or figure(s). Avoid extensive use of graphs to present data that might be more concisely presented in the text or tables. For example, except in unusual cases, double-reciprocal plots used to determine apparent Kₘ values should not be presented as graphs; instead, the values should be stated in the text. Similarly, graphs illustrating other methods commonly used to derive kinetic or physical constants (e.g., reduced viscosity plots, plots used to determine sedimentation velocity) 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. In short papers, the Results and Discussion sections may be combined.

Acknowledgments. Acknowledgments of financial assistance and of personal assistance are given in separate paragraphs. The usual format for acknowledgments is to list the names of the contributors in the order of their contribution.
edgment of grant support is as follows: “This work was supported by Public Health Service grant CA-01234 from the National Cancer Institute.”

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Literature Cited. The Literature Cited section must include all relevant published work, and all listed references must be cited in the text. Arrange the Literature Cited section in alphabetical order by first author and number consecutively. Abbreviate journal names according to Serial Sources for the BIOSIS Data Base (BioSciences Information Service, 1987). Cite each listed reference in the text by number.

The following types of references are not valid for listing: unpublished data, personal communications, manuscripts in preparation, manuscripts submitted, “in press” references, pamphlets, abstracts, patents, theses, dissertations, newsletters, letters to the editor, and material that has not been subjected to peer review. References to such sources should be made parenthetically in the text. An “in press” reference to an ASM journal included in Literature Cited should state the control number (e.g., MCB 976-88) or the month of publication, so that the copy editor can verify the reference and include it in the listed references.

Follow the styles shown in the examples below.


Parenthetical references in the text should be cited as follows:

... and protects the organisms against oxygen toxicity (H. P. Misra and I. Fridovich, Fed. Proc. 35:1686, 1976).

... system was used (W. E. Scowcroft, A. H. Gibson, and J. D. Pagan, Biochem. Biophys. Res. Commun., in press).


Notes

The Note format is intended for the presentation of brief observations that do not warrant full-length papers. Submit Notes in the same way as full-length papers. They receive the same review, and they are not considered preliminary communications.

Each Note must have an abstract of no more than 50 words. Do not use section headings in the body of the Note; report methods, results, and discussion in a single section. Paragraph lead-ins are permissible. The text is not to exceed 1,000 words, and the number of figures and tables should be kept to a minimum.

Materials and methods should be described in the text, not in figure legends or table footnotes. Present acknowledgments as in full-length papers, but do not use a heading. The Literature Cited section is identical to that of full-length papers.

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The figure number and authors’ names should be written on all figures, either in the margin or on the back (marked lightly with a soft pencil). For micrographs especially, the top should be indicated as well.

Do not clasp figures to each other or to the manuscript with paper clips. Insert small figures in an envelope.

Continuous-Tone and Composite Photographs

When submitting continuous-tone photographs (e.g., polyacrylamide gels), keep in mind the journal page size: 3½ inches for a single column and 6½ inches for a double column (maximum). Include only the significant portion of an illustration. Photos must be of sufficient contrast to withstand the inevitable loss
of contrast and detail inherent in the printing process. Submit one photograph of each continuous-tone figure for each copy of the manuscript; photocopies are not acceptable. If possible, the figures submitted should be the size they will appear when published so that no reduction is necessary. If they must be reduced, make sure that all elements, including labeling, can withstand reduction and remain legible.

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Color photographs are discouraged. However, if they are necessary, include an extra copy so that a cost estimate for printing may be obtained. The cost of printing color photographs must be borne by the author.

Drawings
Submit graphs, charts, sequences, complicated chemical or mathematical formulas, diagrams, and other drawings as glossy photographs made from finished drawings not requiring additional artwork or typesetting. No part of the graph or drawing should be handwritten. Both axes of a graph must be labeled. Most graphs will be reduced to one-column width (3 1/16 inches), and all elements in the drawing should be large enough to withstand this reduction. Avoid heavy letters, which tend to close up when reduced, and unusual symbols, which the printer may not be able to reproduce in the legend. Two of the three sets of drawings may consist of photocopies; the other, however, must consist of photographs.

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 SI symbols (µ for 10⁻⁶, m for 10⁻², k for 10³, M for 10⁶, etc.). A complete listing of SI symbols can be found in the 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.

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 would be “2” and the label would be “10⁴ 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).

Figure Legends
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 and abbreviations used in the figure that have not been defined elsewhere.

Tables
Type each table on a separate page. 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 will be understandable without reference to the text. See Abbreviations in 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. A well-constructed table is shown below.

<p>| TABLE 1. Effect of glucose on levels of catabolic enzymes and morphology in M. rouxii |
|---------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|</p>
<table>
<thead>
<tr>
<th>Cell type</th>
<th>Pyruvate kinase²</th>
<th>Phosphofructokinase¹</th>
<th>Glutamate dehydrogenase²</th>
<th>Pyruvate decarboxylase²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mycelium</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>−Glucose</td>
<td>1.056</td>
<td>2.930</td>
<td>4.380</td>
<td>1.056</td>
</tr>
<tr>
<td>+Glucose</td>
<td>1.056</td>
<td>2.930</td>
<td>4.380</td>
<td>1.056</td>
</tr>
<tr>
<td>Yeast</td>
<td>4.380</td>
<td>30</td>
<td>63.6</td>
<td>0.03</td>
</tr>
<tr>
<td>+Glucose</td>
<td>4.380</td>
<td>30</td>
<td>63.6</td>
<td>0.03</td>
</tr>
</tbody>
</table>

¹ Nanomoles of pyruvate formed per milligram of protein in time shown (3, 9).
² Millimoles of fructose 1,6-diphosphate produced per minute per milligram of protein (7).
³ Micromoles of NADH oxidized per minute per milligram of protein (10).

Tables that can be photographically reproduced for publication without further typesetting or artwork are referred to as “camera ready.” They should not be hand lettered and must be carefully prepared to conform with the style of the journal. The advantage of submitting camera-ready copy is that the material will appear exactly as envisioned by the author, and no second proofreading is necessary. This is particularly advantageous when there are long, complicated tables and when the division of material and spacing are important.

NOMENCLATURE
Chemical and Biochemical Nomenclature
The recognized authority for the names of chemical compounds is Chemical Abstracts (Chemical Abstracts Service, Ohio State University, Columbus) and
INSTRUCTIONS TO AUTHORS


Do not express molecular weights 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 as described in Enzyme Nomenclature (Academic Press, Inc., 1984). If a nonrecommended 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 katalas (preferred) or in the older system of micromoles per minute.

Nomenclature of Microorganisms

Binary names, consisting of a generic name and a specific epithet (e.g., Escherichia coli), must be used for all microorganisms. Names of higher categories may be used alone, but specific and subspecific epithets may not. A specific epithet must be preceded by a generic name 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 (phyla [for fungi, divisions], classes, orders, families, genera, species, subspecies) are printed in italics and should be underlined in the manuscript; strain designations and numbers are not.

The spelling of bacterial names should follow the Approved Lists of Bacterial Names (American Society for Microbiology, 1980) and the validation lists and relevant articles published in the International Journal of Systematic Bacteriology since 1980. If there is reason to use a name that does not have standing in nomenclature, the name should be enclosed in quotation marks and an appropriate statement concerning the nomenclatural status of the name should be made in the text (for an example, see Int. J. Syst. Bacteriol. 30:547–556, 1980).

Since the classification of fungi is far from complete, it is the responsibility of the author to determine the accepted binomial for a given yeast or mold. Some sources for the spelling of these names include The Yeasts: a Taxonomic Study (3rd ed., N. J. W. Kregger-van Rij, ed., Elsevier Science Publishers B.V., 1984) and Ainsworth and Bisby's Dictionary of the Fungi, Including the Lichens, 6th ed. (Commonwealth Mycological Institute, Kew, Surrey, England, 1971).

Names used for viruses should be those approved by the International Committee on Taxonomy of Viruses (ICTV) and published in the 4th Report of the ICTV, Classification and Nomenclature of Viruses (Intervirology 17:23–199, 1982). If desired, synonyms may be added parenthetically when the name is first mentioned. Approved generic (or group) and family names may also be used.

Microorganisms, viruses, and plasmids should be given designations consisting of letters and serial numbers. It is generally advisable to include a worker's initials or a descriptive symbol of locale, laboratory, etc., in the designation. Each new strain, mutant, isolate, or derivative should be given a new (serial) designation. This designation should be distinct from those of the genotype and phenotype, and genotypic and phenotypic symbols should not be included.

Genetic Nomenclature

Prokaryotes. The genetic properties of prokaryotes are described in terms of phenotypes and genotypes. The phenotype designation 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. In preparing a manuscript, follow the recommendations of Demerec et al. (Genetics 54:61–76, 1966) and the practices currently in use in the Journal of Bacteriology.

(i) Phenotype designations must be employed when mutant loci have not been identified or mapped. Phenotype designations generally consist of three-letter symbols; these are not italicized, and the first letter of the symbol is capitalized (e.g., Pol). 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 (e.g., Str4 for streptomycin sensitivity). Phenotype designations should be defined.

(ii) Genotype designations are similarly indicated by a three-letter symbol. In contrast to phenotype designations, genotype designations are lowercase italic (e.g., ara his rps). If several loci govern related functions, these are distinguished by an italicized capital letter following the locus symbol (e.g., araA araB). Mutation sites are distinguished by placing serial isolation numbers (allele numbers) after the locus symbol (e.g., ara-1 hisB5). Promoter, terminator, and operator sites should be indicated as described by Bachmann and Low (Microbiol. Rev. 44:1–56, 1980): e.g., lacZp, lacAt, and lacZo. 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 Human Genetics, Yale University School of Medicine, P.O. Box 3333, New Haven, CT 06510. For Salmonella, the registry is: Salmonella Genetic Stock Center, Department of Biology, University of Calgary, Calgary, Alberta, Canada T2N 1N4.

(iii) Wild-type alleles are indicated with a superscript plus (ara+ his+).
organism is being specified (e.g., in a table), a superscript minus is not used to indicate a mutant locus. Elsewhere, a superscript minus may be used to distinguish between the symbol of a mutant allele and that of a genetic locus. However, this distinction is best made in context, and thus one refers to an ara mutant rather than an ara- strain.

(iv) 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), and production of a hybrid protein (Hyb) should follow the allele number [e.g., 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.

(v) Avoid the use of a genotype as a name (e.g., "subsequent use of leuC6 for transduction"). If a strain designation has not been chosen, select an appropriate word combination (e.g., "either strain PA3092 or another strain containing the leuC6 mutation").

Viruses. In most cases, viruses have no phenotype, since they have no metabolism outside host cells. Therefore, distinctions between phenotype and genotype are not made. Superscripts are used to indicate hybrid genomes. Genetic symbols may be one, two, or three letters. For example, a mutant strain of lambda may be designated as λ c1857 int2 red114 Aam1; this strain carries mutations in genes c1, int, and red and an amber-suppressible (am) mutation in gene A. Host DNA insertions into viruses 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.

Eucaryotes. The nomenclature used in the genetics of lower eucaryotic microorganisms has not been as well formalized as that for bacteria and bacteriophages. Generally, authors should conform to current practices in identifying mutants and their genotypes. It is advisable to consult the Handbook of Microbiology (A. I. Laskin and H. A. Lechevalier, ed., CRC Press, 1974) or the Handbook of Genetics, vol. 1, Bacteria, Bacteriophages, and Fungi (R. C. King, ed., Plenum Publishing Corp., 1974) for designations currently in use for Aspergillus nidulans, Schizosaccharomyces pombe, Podospora anserina, Ustilago sp., Schizothyrium commune, Coprinus sp., and Chlamydomonas reinhardi.

Genetic designations for Saccharomyces cerevisiae should generally follow the recommendations of Sherman and Lawrence (Handbook of Genetics, vol. 1). (i) The two mating-type alleles are designated by a boldface roman "a" and a Greek "α." (ii) As with bacteria, gene symbols are usually designated by three italicized letters. In general, the genetic locus is identified by an arabic numeral following the gene symbol (e.g., arg2), whereas alleles are designated by an arabic numeral separated from the locus number by a hyphen (e.g., arg2-6). (iii) Complementation groups of a gene are identified by capital letters following the locus number (e.g., his4A). (iv) Dominant and recessive genes are denoted by upper- and lowercase letters, respectively (e.g., SUP4 and arg2). (v) When there is no confusion, wild-type genes are designated simply as +; the + may follow the locus number to designate a specific wild-type gene, e.g., sup6+ and ARG2+. (vi) Although superscripts should be avoided, it is sometimes expedient to distinguish genes conferring resistance and sensitivity by the superscripts r and s, respectively (e.g., can1 CUP1). (vii) Mitochondrial and non-Mendelian genotypes can be distinguished from chromosomal genotypes by enclosure in square brackets. Whenever applicable, use the above rules for designating non-Mendelian genes. It is advisable to avoid the use of Greek letters and to use instead their transliterations (e.g., [rho]+, [rho]−, [psi]+, and [psi]−).


As indicated in the CBE Style Manual, symbols for Drosophila mutants and chromosome aberrations are italicized; they should not contain Greek letters, subscripts, or spaces. The spelled-out names of the mutants are not italicized. "Symbols for mutant types are abbreviations of their characterizing names. Usually a symbol begins with the first letter of its name; the convention designates an initial capital letter for a dominant (R for roughened) and an initial lowercase letter for a recessive (r for rudimentary [or ry] for rosy)."

"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.

Strain designations. Do not use a genotype as a name (e.g., "spe4-0-2 was used for . . . "). If a strain designation has not been chosen, select an appropriate word combination (e.g., "another strain containing the spe4-0-2 mutation"). For a discussion of the use of patients' initials in strain designations, see "Patient Identification" (below).

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 5:197–206, 1979), with the modifications referred to in
the instructions to authors in the *Journal of Bacteriology*. The system of designating transposon insertions at sites where there are no known loci, e.g., *zef*-123::Tn5, has been described by Chumley et al. (Genetics 91:639–655, 1979). Use 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 factors, and of Roberts (Nucleic Acids Res. 9:r75–r96, 1981) for restriction enzymes and DNA fragments derived from treatment with these enzymes. Recombinant DNA molecules constructed in vitro follow 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. The Plasmid Reference Center, Stanford University School of Medicine, Stanford, CA 94305, assigns Tn and IS numbers to avoid conflicting and repetitive use and also clears nonconflicting plasmid prefix designations.

**ABBREVIATIONS AND CONVENTIONS**

**Patient Identification**

When isolates are derived from patients in clinical studies, do not identify them by using the patients' initials, even as part of a strain designation. Change the initials to arabic numerals or use randomly chosen letters. Do not give hospital unit numbers; if a designation is needed, use only the last two digits of the unit. (Note: Established designations of some viruses and cell lines, although they consist of initials, are acceptable [e.g., JC virus, BK virus, HeLa cells].)

Do not identify patients by race, country or region of origin, or occupation unless the relevance of this information is readily apparent or demonstrated in the text.

**Verb Tense**

Use the past tense to narrate particular events in the past, including the procedures, observations, and data of the study you are reporting. Use the present tense for general statements, including your own general conclusions, the conclusions of previous researchers, and generally accepted facts. In addition, the present tense should be used for discourse having an immediate effect on the reader ("the data indicate"; "Fig. 1 shows").

**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," "the substrate"). Standard chemical symbols and trivial names or their symbols (folate, Ala, Leu, etc.) may be used for terms that appear in full in the neighboring text.

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 five times in the text (including tables and figure legends).

**Not requiring introduction.** In addition to abbreviations for standard units of measurement and chemical symbols of 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 or 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); P, (orthophosphate); PP, (pyrophosphate); UV (ultraviolet); PFU (plaque-forming units); CFU (colony-forming units); MIC (minimal inhibitory concentration); MBC (minimal bactericidal concentration); Tris [tris(hydroxymethyl)aminomethane]; DEAE (diethylaminoethyl); A<sub>260</sub> (absorbance at 260 nm); and EDTA (ethylenediaminetetraacetic acid). Abbreviations for cell lines (e.g., HeLa) also need not be defined.

The following abbreviations should be used without definition in tables:

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<td>SD</td>
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INSTRUCTIONS TO AUTHORS

Reporting Numerical Data

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

When fractions are used to express units such as enzymatic activities, it is preferable to use whole units, such as "g" or "min," in the denominator instead of fractional or multiple units such as µg or 10 min. For example, "pmol/min" would be preferable to "nmol/10 min," and "µmol/g" would be preferable to "µmol/µg."

It is also preferable that an unambiguous form such as the exponential notation be used instead of multiple slashes; for example, "µmol g\(^{-1}\) min\(^{-1}\)" is preferable to "µmol/g per min."

See the CBE Style Manual, 5th edition, for more detailed information about reporting numbers. Also contained in this source is information on SI units for the reporting of illumination, energy, frequency, pressure, and other physical terms. Always report numerical data in the appropriate SI unit.

Isotopically Labeled Compounds

For simple molecules, isotopic labeling is indicated in the chemical formula (e.g., $^{14}$CO\(_2\), $^{3}$H\(_2\)O, $^{2}$H\(_2^{35}$SO\(_4\)). Brackets are not used when the isotopic symbol is attached to a word which is not a specific chemical name (e.g., $^{13}$I-labeled protein, $^{14}$C-amino acids, $^{3}$H-ligands, etc.).

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\(_2\)urea
- $^{[1-32]}$P\(_2\)ATP
- L-\([\text{methyl-}^{14}\text{C}]\)methionine
- UDP-\([\text{U-}^{14}\text{C}]\)glucose
- [2,3-\(^{3}$H\)]serine
- E. coli $^{[32]}$P\(_2\)DNA
- [\(\alpha-^{14}\text{C}\)]lysine
- fructose 1,6-\([1-32]\text{P}]\)bisphosphate

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).
1988
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