microbiology

'The more words there are, the more words there are about which doubts may be entertained'

JEREMY BENTHAM (1748–1832)

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4 Two copies of any papers cited as 'accepted for publication' or 'in press'.

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Authors in the USA and Canada can alternatively submit papers to:

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General

1 *Microbiology* publishes high-quality research papers, reviews and mini-reviews on all aspects of microbiology, with an emphasis on fundamental studies. Papers published must make an original and significant contribution to the field and should be of interest to a general readership. Theoretical and predictive papers are considered for publication provided that novel conclusions are drawn or hypotheses formulated.

Reviews and mini-reviews are normally invited. Authors interested in submitting one should write to the Reviews Editor at the Editorial Office in Reading.

Short Communications as such are not published, but there is in principle no lower limit on the length of papers, provided that they are of an appropriate scientific standard.

Microbiology Comment is a correspondence section where readers can briefly communicate personal observations and opinions more informally than in a conventional paper. See any recent *Comment* section for more detailed guidelines. Contributions for this section should be sent to the Editor-in-Chief at the Editorial Office in Reading.

2 Papers are considered for publication on the understanding that **(a)** they report work that has not been published (including publication on the World Wide Web) and is not under consideration for publication elsewhere; **(b)** all named authors have agreed to the submission; and **(c)** if the paper is accepted for publication in *Microbiology*, the authors (or other copyright holder) will transfer to the Society for General Microbiology the copyright (including electronic reproduction rights) of the paper, which will then not be published elsewhere in the same form, in any language or medium, without the consent of the Society. A PDF of the copyright assignment form is available at http://www.sgm.ac.uk/MIC/144/copyrightform.pdf.

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Submitted papers are sent by the Editorial Office to an Editor or Associate Editor (AE) with appropriate expertise, who is responsible for making the decision on acceptability. The Editor or AE may act as a referee him/herself, but will normally send the paper to at least one independent referee. The use of referees suggested by authors is at the discretion of the Editor or AE. AEs may additionally obtain an Editor's opinion before reaching a decision. If a paper is rejected, only the original figures will normally be returned to the author; all other

material will be destroyed unless its return was requested at the time of submission.

Papers returned for revision that have not been resubmitted within 28 days of the author receiving the request for revision are treated as new submissions.

Cover illustrations

The Editors welcome the submission of pictures for possible use on the front cover, and will pay £75 towards expenses for each one used. Pictures need not be linked with a paper in the journal. A picture that is linked with a paper must not be the same as a figure in the paper.

Form of papers submitted for publication

Online submission. The paper must be submitted as a single PDF file, including all the figures and tables. For more information, go to the online Guidelines for Authors at http://mic.sgmjournals.org and follow the links.

Postal submission. Manuscripts should be submitted in triplicate, and be double-spaced throughout. Three sets of each figure must be included for use by the reviewers (for halftone figures the copies should be photographic prints, not photocopies), and an additional set of figures should be provided for use by the printers.

The paper must be written in clear and concise English, normally in the past tense, and should normally comprise: **(a)** Title page, including keywords; **(b)** Summary; **(c)** Introduction; **(d)** Methods; **(e)** Results; **(f)** Discussion, with Conclusions if appropriate; **(g)** Acknowledgements; **(h)** References; **(i)** Tables; **(j)** Figure legends; **(k)** Figures. A Theory section and Appendices may be included. Where appropriate, the Results and Discussion may be combined. Figures and tables should only be used to illustrate points that cannot easily be described in the text.

Papers that do not meet acceptable standards of clarity and conciseness may be returned to the authors without editorial review.

Supplementary material. Material associated with a paper but not suitable for print publication (e.g. large data sets, extensive sequence alignments, 3D structures, videos) can be linked to the paper in *Microbiology Online*. This material must be submitted at the same time as the main paper and will be reviewed along with it; it will not be published unless it significantly enhances the paper. Authors should make clear at the time of submission that they are including supplementary material.

Electronic files for accepted papers. Authors must supply a word-processor file (preferably Word) of the final version of their paper for pre-press preparation. This should include tables and figure legends but not figures. See below for information on electronic files for figures.

General style and layout. Authors should consult a recent issue of the journal for the layout of headings, tables, etc. Guidance on the presentation of individual sections is given below.

Title page. This should carry the following information.

- The title of the paper. A good title is very important. It will attract readers and facilitate retrieval by online searches, thereby helping to maximize citations. The title should include topical keywords and allude to the interesting conclusions of the paper. A title that emphasizes the main conclusions, or poses a question, has more impact than one that just describes the nature of the study.
- A short 'running title', of not more than 50 characters (including spaces), for use as a headline.
- Keywords: a maximum of five words or short phrases. These should supplement, not repeat, words in the title, and should aim to maximize retrieval by online searches.
- The names of the authors. Each author may use one given name in full. The author for correspondence must be clearly indicated.
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- Telephone and fax numbers and an e-mail address for the corresponding author.
- If appropriate, a footnote defining any non-standard abbreviations. A list of abbreviations not requiring definition is given on p. x.

Summary. The summary will be read by more people than the full paper. It must therefore be clear and comprehensible in its own right. References should not be cited, and any abbreviations used must be defined. The summary should if possible introduce the subject in the first sentence and present the main conclusion in the last sentence: when someone is skimming a block of text, the first and last sentences receive the most attention.

Introduction. This should state the objectives of the work, but should not contain a detailed summary of the results. Authors should not assume that all readers will know why an area is worth studying. They should briefly make this clear.

Methods. Sufficient detail should be provided to allow the work to be repeated. The suppliers of chemicals and equipment should be indicated if this may affect the results. Suppliers' addresses should not be given unless this is considered essential for a particular reason.

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to another, and perhaps what conclusions were reached. A reader should gain a clear picture of the work from the subheadings.

Reproducibility of results. This should be indicated. It should be stated how many times an experiment was repeated and whether means or representative results are shown. Variability should be indicated statistically wherever possible; when error terms are given, the measure of dispersion and the number of observations should be stated. Statistical techniques used must be specified, and where necessary they should be described fully or a reference given. If results are expressed as percentages, the absolute value corresponding to 100 % should be stated.

Discussion. This should not recapitulate the results, and should not be too long. Excessive discussion of few facts often gives an impression of poor science. Subheadings should be used where appropriate, to highlight the points under discussion. It may be helpful to list the main conclusions at the end. A combined Results and Discussion section is encouraged where appropriate.

References. References in the text should be cited as follows: two authors, Smith & Jones (1996) or (Smith & Jones, 1996); three or more authors, Smith *et al*. (1996) or (Smith *et al*., 1996). References to papers by the same author(s) in the same year should be distinguished in the text and the reference list by the letters a, b, etc. (e.g. 1996a or 1996a, b).

References at the end of the paper must be given in alphabetical order, except for papers with three or more authors, which should be listed in chronological order after any other papers by the first author. References must include the title of the paper as well as both initial and final page numbers. Titles of journals should be abbreviated according to the system used by MEDLINE (http://www.ncbi.nlm.nih.gov/PubMed/) No stops should be used after abbreviated words. References to books should include year of publication, title (in full), edition, editor(s) (if any), town of publication and publisher, in that order. When the reference is to a particular part of a book, the inclusive page numbers and, if appropriate, chapter title must be given. Examples of journal and book references are given on p. x.

Only papers *accepted* for publication but not yet published may be cited as 'in press' in the reference list and must be accompanied by the name of the journal. Two copies of relevant papers cited as 'in press' should be enclosed with the submitted manuscript. References to papers not yet accepted should be cited in the text as unpublished results, giving the surname(s) and initials of all the author(s). Such papers should not appear in the list of references.

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Tables. These should be broadly comprehensible without reference to the text, but it is not necessary to repeat detailed descriptions of methods, etc. The symbols * † ‡ § ‖ ¶ # should be used for footnotes, rather than superscript letters or numbers. When results are expressed as percentages, the absolute value(s) corresponding to 100 % must be stated. Statements of reproducibility should be included (see **Reproducibility of results,** above).

Figures. These must be *selected* to illustrate specific points. They should not be used to present results that can be described by a brief statement in the text. Legends should be on a separate sheet. The points outlined above for tables regarding comprehensibility, relative values and reproducibility also apply to figures and their legends.

Line drawings. These should be of a quality suitable for direct reproduction and approximately twice the size that they will appear. The maximum printed size, including lettering and legends, is 176 × 235 mm. Line thicknesses and symbol sizes should be sufficient to allow for reduction (normally about 0·4 mm and 2–3 mm, respectively). The preferred symbols for graphs are ○, ●, □, ■, △, ▲, ▽, ▼. Where possible, the same symbol should be used for the same quantity in different figures.

Tints (shading made up of fine dots) do not reproduce well when printed in the journal or on screen in the online version, and their use should preferably be avoided. If tints are used, they should have a screen value of 100 lines per inch or lower.

Three reviewers' copies of each line drawing must be supplied. A top set of figures must also be provided for use by the printers. Electronic files are not normally required for line drawings.

Bar diagrams. Simple bar diagrams reporting only a few values are normally unnecessary; the data should instead be given in a table or in the text. It is editorial policy not to publish bar diagrams with 'three-dimensional' bars unless there is a specific justification for their use. Tints should not be used as shading for bars (see above).

Sequence data. Figures showing full gene sequences are not normally published (see p. ix). If included, figures representing nucleotide or amino acid sequences should be in high-quality camera-ready form with numbering of nucleotides or amino acid residues at appropriate intervals. Tints should not be used to highlight parts of sequences. The layout should be designed to fit either the full width of the page (176 mm) or a single column (84 mm). For adequate legibility, the height of the characters should be not less than 1·5–2 mm (or 6–8 point). For printing at full page width with this size of type, a layout with 80–100 nucleotides per line is appropriate (or 60–70 if there are spaces between the codons). For a single-column layout, 50–60 nucleotides

per line is about right. The spacing between the lines of sequence should be as close as is consistent with clarity. Note that sequence data must be submitted to GenBank, EMBL or DDBJ (see p. ix).

Photographs. These should be well-contrasted prints and approximately final size (maximum width 176 mm). For photomicrographs, magnification should be shown by a bar marker. Photographs may be grouped to form a composite picture (maximum final size 176 × 235 mm, including space for legend); to avoid loss of definition the component parts should be submitted as separate prints, rather than being rephotographed in the composite arrangement.

Three reviewers' copies of each photograph must be supplied; these should be photographic prints, *not* photocopies. A top set of prints must also be provided for use by the printers.

Digitally generated photographs. Authors' printed output from digitally generated halftone images often reproduces poorly in the journal. The 'screening' process used by the journal's printers to produce halftone illustrations converts the image into a pattern of dots. When this process is applied to an image that already consists of dots, as for digital images, the two dot patterns often interfere and produce unacceptable results.

To avoid these problems, authors may submit their digital halftones as TIFF or EPS files. The resolution should be at least 300 d.p.i. The files should be supplied on a separate disk(s) from the text of the paper, with the filename(s) clearly indicated. Four hard-copy printouts of each figure must also be supplied. The printers will attempt to use all graphics sent to them on disk, but they cannot guarantee to do this. If the graphics files cannot be used, the printers will use the hard copies; the printouts should therefore be of the highest possible resolution (> 300 d.p.i.).

Colour photographs. These are published at no cost to the author, *if the Editors believe they are essential for an understanding of the work described*. The printers can produce black-and-white photographs from colour prints if necessary, but this is not recommended. Digital colour figures should be saved as CMYK, not RGB, files, with a resolution of at least 300 d.p.i.

Quantities, units and symbols

The recommended SI units should be used. For guidance, see *Quantities, Units and Symbols* (London: Royal Society) and *Units, Symbols and Abbreviations* (London: Royal Society of Medicine).

Chemical and biochemical nomenclature

Authors should follow the recommendations of IUPAC for chemical nomenclature, and those of the Nomenclature Committee of IUBMB and the IUPAC–IUBMB Joint Commission on Biochemical Nomenclature for biochemical nomenclature (see www.chem.qmw.ac.uk/iupac/jcbn). A summary of nomenclatural recommendations, with references, is given in the *Biochem J* Instructions to Authors (see www.biochemj.org). The recommendations are given in full in *Compendium of Biochemical Nomenclature and Related Documents*, 2nd edn (1992), London: Portland Press.

Absorbance, optical density, and attenuance

The term absorbance, A, should be used for the quantity $\log(I_0/I)$ in UV and visible absorption spectrophotometry of samples in which there is negligible scattering or reflection of light. If scattering is considerable, as in spectrophotometric measurements of microbial biomass, the term optical density, OD (or attenuance, D), should be used; the path length of the cell or cuvette, and the make and model of the spectrophotometer, must be specified, because optical design dramatically influences such measurements. If a sample is diluted prior to measuring optical density, the dilution and the diluent should be stated. Readings obtained with instruments designed for turbid samples, such as nephelometers or Klett meters, should be reported in appropriate units. Whenever A, OD or D is used, the wavelength (in nm) of the incident light must be specified (e.g. A_{280}, OD_{600}).

Enzyme nomenclature

The system published in *Enzyme Nomenclature* (1992), London & New York: Academic Press, and its supplements, is used (see www.chem.qmw.ac.uk/iubmb/enzyme). Enzyme Commission numbers should be given where appropriate.

Description of strains

A source (name and brief address) or reference should be given for each strain used. Authors are encouraged to deposit important strains in a recognized culture collection and to refer to the collection and strain number in the paper.

Nomenclature of micro-organisms

The correct name of the organism, conforming with international rules of nomenclature, must be used; if desired, synonyms may be added in parentheses when the name is first mentioned. Names of bacteria must conform with the current Bacteriological Code and the opinions issued by the International Committee on Systematic Bacteriology. Names of algae and fungi must conform with the current International Code of Botanical Nomenclature. Names of protozoa must conform with the current International Code of Zoological Nomenclature. Descriptions of new species should not be submitted unless a specimen (normally a live culture) has been deposited in a recognized culture collection and it is designated as a type strain in the paper.

The following may be found useful:

Bergey's Manual of Systematic Bacteriology, 1st edn. Baltimore: Williams & Wilkins. Vol. 1 (1984), edited by N. R. Krieg & J. G. Holt; vol. 2 (1986), edited by P. H. A. Sneath, N. S. Mair, M. E. Sharpe & J. G. Holt; vol. 3 (1989), edited by J. T. Staley, M. P. Bryant, N. Pfennig & J. G. Holt; vol. 4 (1989), edited by S. T. Williams, M. E. Sharpe & J. G. Holt.

Bergey's Manual of Systematic Bacteriology, 2nd edn, vol. 1 (2001) *The Archaea and Deeply Branching and Phototrophic Bacteria*. Edited by D. R. Boone, R. W. Castenholz & G. M. Garrity. New York: Springer.

A List of Bacterial Names with Standing in Nomenclature, which is regularly updated, is available at http://www.bacterio.cict.fr; see *Int J Syst Bacteriol* **47**, 590–592.

Yeasts: Characteristics and Identification, 3rd edn (2000). By J. A. Barnett, R. W. Payne & D. Yarrow. Cambridge: Cambridge University Press.

The Yeasts, a Taxonomic Study, 4th edn (1998). Edited by C. P. Kurtzman & J. W. Fell. Amsterdam: Elsevier.

Genetic nomenclature

The following proposals should be adhered to wherever possible. Bacteria: Demerec, M. *et al.* (1966) *Genetics* **54**, 61–76 [also *J Gen Microbiol* (1968), **50**, 1–14]. Plasmids: Novick, R. P. *et al.* (1976) *Bacteriol Rev* **40**, 168–189. Yeasts: Sherman, F. (1981) In *The Molecular Biology of the Yeast Saccharomyces. I. Life Cycle and Inheritance*, pp. 639–640 (edited by J. N. Strathern *et al.* New York: Cold Spring Harbor Laboratory). *Aspergillus nidulans*: Clutterbuck, A. J. (1973) *Genet Res* **21**, 291–296. *Neurospora crassa*: *Neurospora Newsl* (1978), **25**, 29.

Ethics of human and animal experimentation

Papers describing any experimental work with humans should include a statement that the Ethical Committee of the institution in which the work was done has approved it, and that the subjects gave informed consent to the work.

Experiments with animals should be done in accordance with the legal requirements of the relevant local or national authority. Procedures should be such that experimental animals do not suffer unnecessarily. Papers should include details of the procedures and of anaesthetics used.

The Editors will not accept papers where the ethical aspects are, in their opinion, open to doubt.

Papers describing solely the purification and/or characterization of enzymes

It is editorial policy not to publish papers on the above subject(s) unless they describe some particular aspect that is of significant novelty and of clear relevance to microbiology. Examples of the types of work that would be considered appropriate for publication in *Microbiology* are: the purification of a previously uncharacterized enzyme; a description of unique properties of an established class of enzyme; the development of a new and broadly applicable purification technique; or a report of properties of direct relevance to the functions or application of the producing micro-organism.

Descriptions of well-known enzymes that are already known to be produced by a number of micro-organisms are not appropriate for *Microbiology*.

Physical maps

In papers reporting physical maps of microbial genomes, results for at least two restriction enzymes must be presented. The number and location of the rRNA genes (or operons), and the number of DNA fragments in each ethidium-bromide-stained band, must also be given.

Papers reporting original nucleotide or amino acid sequence data

Such papers should be accompanied by substantial additional experimentation to characterize the gene(s) and products(s) concerned, and substantial computer analysis. *Microbiology* will not normally publish DNA sequences from double-stranded genomes unless both strands have been sequenced independently.

Descriptions of new examples of genes already characterized from various micro-organisms are also inappropriate for *Microbiology* unless the new gene has unusual features or the description is part of a wider study.

Microbiology no longer publishes figures whose principal function is to present primary sequence data, since the data can be accessed through the databases. To merit publication, sequence figures must be justified by the additional annotation they present; they should normally be limited to regions of particular interest. Limited sequence alignments of nucleic acids and proteins are acceptable provided they make a significant point. To assist the reviewers, authors must send, at the time of submission, an electronic copy (preferably a copy of the database submission form, including annotations) plus three hard copies of the complete sequence(s) covered by their paper.

Papers reporting new sequence data will not be published unless the sequence has an accession number from one of the public databases:
GenBank (http://www.ncbi.nlm.nih.gov)
EMBL (http://www.ebi.ac.uk)
DDBJ (http://www.ddbj.nig.ac.jp) or
PIR (http://www-nbrf.georgetown.edu/pir/).
The database accession number(s) must be given as a footnote on the title page of the paper, normally in the form: 'The GenBank accession number for the sequence reported in this paper is X00000'.