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Editorial correspondence: PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, 2101 Constitution Avenue, Washington, D.C. 20418.

Business correspondence: Printing and Publishing Office, National Academy of Sciences, 2101 Constitution Avenue, Washington, D.C. 20418.

Subscriptions are entered on a calendar-year basis only. The current subscription rate is \$35 (effective January 1, 1975, the subscription rate will be \$45). The price of a single issue is \$4. Volumes 1 through 61 are available from Walter J. Johnson, Inc., 111 Fifth Avenue, New York, N. Y. 10003; prices are available from that organization upon request.

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Second-class postage paid at Washington, D.C. and at additional mailing offices

PRINTED IN THE USA

THE PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA is published monthly by

THE NATIONAL ACADEMY OF SCIENCES, 2101 Constitution Avenue, Washington, D.C. 20418

SPECIAL NOTICE

Although our normal schedule permits papers that are in good form to be published 8–13 weeks after their receipt at the PROCEEDINGS Office, the submission of increased numbers of manuscripts and the turnover in editorial staff have caused considerable delays in publication. In order to facilitate publication, the present Managing Editors, after consultation with the Chairman of the Editorial Board, have attended only

to clarity of presentation and adherence to approved abbreviations and nomenclature. This issue of the PROCEEDINGS therefore lacks consistency in journal style. The restricted editing is a temporary expedient and begins with Part I of the December 1973 issue. Part II of the December issue will appear in about three weeks.

INFORMATION TO CONTRIBUTORS

Purpose and scope

The *Proc. Nat. Acad. Sci. USA* publishes brief reports (not previously published) of the results of original research by members of the Academy or by others if the communication is sponsored by an Academy member. Articles should be as brief as adequate presentation allows, and may not exceed five printed pages. Since the PROCEEDINGS publishes papers in all branches of science represented in the Academy, it is desirable, whenever possible, for articles to be written so as to be intelligible to a wide scientific audience. Both because of the space limitations and the broad scientific audience of the PROCEEDINGS, detailed scientific papers may often be more appropriately submitted to more specialized journals.

Sometimes, preliminary findings of major importance are published in the PROCEEDINGS without full documentation; authors must indicate that the paper is a preliminary one and that a detailed report will be published elsewhere.

Upon invitation from the Editorial Board, some papers presented at Academy symposia, special Academy lectures, or papers on subjects of general interest to scientists are also published in the PROCEEDINGS.

Conditions for submission

Manuscripts will be accepted only from members of the Academy, who will assume responsibility for their propriety and scientific standards. In communicating an article on behalf of a nonmember, an Academy member should explicitly state that it contains findings of more than ordinary importance to investigators working on related problems, or of particularly broad interest to diverse groups of scientists. No Academy member may sponsor more than 10 papers in any annual volume.

Before submitting an article on behalf of a nonmember, an Academy member must also obtain a written opinion on it by a qualified referee. For maximal objectivity in the reviewing process, it is highly desirable that the member select the referee himself and that he not divulge the referee's identity to the author, at least until the member receives the comments. Ordinarily, the referee should not be a close colleague or former mentor of the author or a member of the Academy member's department. Forms on which the referee's comments should be submitted are provided on request by the PROCEEDINGS Office. The Academy member must enclose a copy of the referee's report with his letter of transmittal. He retains the privilege of communicating the paper if the referee's report is unfavorable, but in that case he should state in his letter of transmittal his reasons for disagreeing with the referee.

Papers are generally processed rapidly for publication; however, the Editorial Board reserves the right to subject manuscripts to further review when this seems desirable and to reject papers if they do not meet the general criteria for publication, as defined by the By-Laws of the Academy.

No person may be author or coauthor of papers totaling more than five pages in any one issue.

Manuscripts reporting experiments with humans should be accompanied by a copy of the document authorizing the proposed research by the responsible institutional committee. Authors are referred to the Declaration of Helsinki for further guidance.

Page charges are assessed for all communicated papers. A member of the Academy who communicates an article on behalf of a nonmember author is responsible for the costs of publishing the paper; if a nonmember author is to be billed for the page charges, the member communicating the paper should make sure that there is a clear understanding to this effect with the author before the paper is communicated. Members may not use the annual publishing allowances extended them by the Academy for the payment of the costs of publishing papers by other authors. The standard charge is now \$75 per printed page; in addition, authors may be billed for the costs of extensive changes made in proof and for other items of special cost.

Manuscripts are to be submitted in duplicate to the PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, Room 253, 2101 Constitution Avenue, Washington, D.C. 20418. Those that are in good form can usually be published 8–13 weeks later. If articles are to be published on schedule, it is essential that communicated manuscripts are in the form in which authors wish their papers to appear and that their length be appropriate for the PROCEEDINGS. Authors are encouraged to submit their manuscripts typewritten on double-spaced manuscript paper with numbered lines whenever possible.

Length

Five printed pages will accommodate about 5500 words. The title and the heading material usually occupy space equivalent to about 600 words. Appropriate allowance should be made for the space occupied by references, footnotes, tables, and figures with their legends. Figures will be scaled to one- or two-column width according to the size of the lettering (see *Illustrations* below).

Articles estimated on first receipt as longer than five pages will be returned to authors for shortening without further editorial consideration.

Illustrations

Present only such illustrative material as is essential for the point being made. Drawings made for slide projection are rarely suitable for publication. Design line drawings to fit into one- or two-column width with minimum wasted space. *Thin-stroke* lettering should be used in sizes such that *after reduction* the smallest letter or numeral will not be less than 1.5 mm in height. Avoid extraneous detail in figures; use the legends for details as to cell type used, identification of symbols, etc.

All figures should be identified on the back with a soft pencil and the orientation should, if necessary, be indicated by means of an arrow and the word "top". Do not mount figures unless a composite figure is desired. Indicate the magnification of photomicrographs in the legend, or include a bar indicating scale in the figure (or both).

Legends to figures should be typed double-spaced, in numerical order, on a separate page.

Tables

Tables should be typed double-spaced *throughout*, numbered with arabic numerals, and provided with titles (above the table). A list of footnotes to a table must be typed *doubled-spaced*, on a separate page if necessary. Reference to the footnotes should be made by means of the symbols *, †, ‡, §, ¶, ||, in that order, followed by doubled symbols if necessary. A lengthy list of footnotes is better keyed with lower-case superscript letters or, in exceptional cases where this would be confusing, with superscript numbers.

Title page

Provide a separate title page, containing the following items:

Classification. Give any one of the sciences named in the titles of the sections of the Academy, or Biophysics, Cell Biology, Immunology, Pathology, or Statistics.

Title. This should be brief, specific, and rich in informative words. Add up to five *amplifying key terms* to alert readers, and computers, to subjects in the article *not* referred to in the title. The PROCEEDINGS discourages the use of uninformative serial titles such as *On Steroids*, XIX. If a paper is part of a series, indicate this by a symbolized footnote on the first page, and include a reference to the immediately preceding paper of the series.

By-line. If there are several authors with different affiliations, key authors to institutions by means of symbols *, †, ‡, §, ¶. If reprint requests are to be addressed to any but the first author, indicate this by a footnote.

From-line. List the institutions and provide Zip Codes.

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Footnotes. Give, as first unnumbered footnote, a list of non-standard abbreviations (see below, under *Abbreviations*), if any, that have been used in the paper. Other title-page footnotes may indicate present addresses of the authors or address(es) to which reprint requests are to be sent. Do *not* include acknowledgments of grant support here.

Abstract

Every paper must begin with an abstract, typed on a separate page. This should state the subject and main conclusions of the article in generally intelligible terms. Avoid abbreviations. The abstract must be intelligible to a reader before he reads the paper, and suitable for reproduction by abstracting services without rewriting. It should usually not exceed 250 words.

Nomenclature

The PROCEEDINGS strives for the greatest possible conformity with international standards on nomenclature. Guides and special considerations in different disciplines are listed below.

Mathematics. Notations that are expensive to typeset should be avoided by use of the devices given on p. 7 of the American Mathematical Society's *Manual for Authors* (1970):

for example, replace $\frac{a}{b}$ by a/b , e^{x^2} by $\exp(x^2)$, \vec{r} by \underline{r} (denoted

in manuscript by a wavy underline). Manuscripts in which this has not been done may be returned to the author.

Provide a list of special characters used in the paper for the printer's guidance, and identify all Greek, Hebrew, or script letters by means of marginal notes at their first appearance.

Physics. Use the American Institute of Physics' *Style Guide* (revised 1969).

Chemistry. Use the American Chemical Society's *Handbook for Authors* (1967).

Life Sciences. Use the Conference of Biology Editors' *Style Manual* (1972) (American Institute of Biological Sciences, Washington, D.C.). Some of their recommendations are expanded by the *Handbook of Biochemistry (with Selected Data for Molecular Biology)* (1970), ed. Sober, H. A. (Chemical Rubber Company, Cleveland, Ohio), 2nd ed. This book contains the International Union of Biochemistry rules of nomenclature for vitamins, enzymes, synthetic polypeptides, carbohydrates, lipids, and polynucleotides. Further guidance on nomenclature can be obtained from the NAS-NRC Office of Biochemical Nomenclature (Dr. Waldo E. Cohn), Oak Ridge National Laboratory, P.O. Box Y, Oak Ridge, Tennessee 37830. For bacterial genetics, follow the recommendations of Demerec, M., Adelberg, E. A., Clark, A. J. & Hartman, P. E. (1966) *Genetics* **54**, 61-76. For human immunoglobulins and their genetic factors, follow the World Health Organization rules (see, for example, section A of *Handbook of Biochemistry*).

Enzymes should be given their recommended names on first mention, together with the Enzyme Commission (EC) number when this has been assigned.

Abbreviations

Standard Abbreviations for units of measure and for certain substances (e.g., DNA) are listed in the style manuals and handbooks named above. These need not be spelled out. Some standard abbreviations and symbols whose correct form is not familiar to all authors are listed on the following pages. Rules of the IUPAC-IUB Commission on Biochemical Nomenclature are followed [see *J. Biol. Chem.* (1966) **241**, 527 and *J. Mol. Biol.* (1971) **55**, 299, for example, for guidance].

Nonstandard Abbreviations are defined as those not given in the handbooks' lists, even if they may be familiar to those in the field. (a) Keep them to a minimum, and only for cumbersome words that *must* be used more than five times in the paper. (b) Spell out nonstandard abbreviations at their first appearance in the text. (c) If possible, avoid them completely in the Abstract. (d) List them on the title page for inclusion as a footnote on the first printed page of the article.

References

Cite references in order throughout the text by means of arabic numerals (not superscript) between parentheses (in mathematical papers, square brackets may be used to avoid confusion with numbered equations, or the reference number may be preceded by "ref."). Citations are to be made in this

way *only* to papers already published or "in press" in a stated journal or other publication. Any reference to unpublished work should be made *in the text* or, rarely, in the form of a symbolized footnote. Reference to "personal communication" should also be made in the text; *written approval by the person cited should accompany the manuscript*.

We encourage the provision of titles and require inclusive pagination for articles cited. References must be typed *double-spaced* in the style used by the PROCEEDINGS, thus (for journal articles):

10. Smith, A. B., Jones, C. D. & Robinson, E. F. (1969) "Conformational changes in ribosomes during protein synthesis," *Proc. Nat. Acad. Sci. USA* **64**, 191-195.

Titles of journals should be abbreviated according to the American National Standard for the Abbreviation of Titles of Periodicals (see *ACCESS* or *BIOSIS List of Periodicals*).

SOME STANDARD AND RECOMMENDED ABBREVIATIONS AND SYMBOLS

For simplicity, one preferred abbreviation or symbol has been adopted in most cases, even though the handbooks listed below may give equally favored alternatives.

absorbance	<i>A</i> (not OD)	isoleucyl	Ile
<i>N</i> -acetylglucosamine	GlcNAc	methemoglobin	MetHb
asparaginyl	Asn	methionyl	Met
aspartyl	Asp	micromicro	<i>use</i> pico (p)
asparaginyl or aspartyl	Asx	micron	<i>use</i> micrometer (μm)
5-bromodeoxyuridine	BrdU (not BUdR)*	millimicro	<i>use</i> nano (n)
5-bromouracil	BrUra (not BU)	millimicron	<i>use</i> nanometer (nm)
cyclic AMP (3':5')	cAMP	mole(s)	mol
cysteinyl	Cys	mitochondrial DNA	mtDNA
deoxy (carbohydrates and nucleotides)	d	myoglobin	Mb
deoxyribonuclease	DNase	nucleotide (unknown)	N (not X)
deoxyribonucleic acids	DNAs	optical density	OD §
2,4-dinitrophenyl	Dnp- or N ₂ ph †	phosphate (in compounds)	P or p
formylmethionyl	fMet	phosphate, inorganic	P _i
glucose	G or Glc †	plaque-forming units	PFU
guanosine	G or Guo †	ribonuclease	RNase
gluconic acid	GlcA	ribonucleic acids	RNAs
glucosamine	GlcN	ribosomal RNA	rRNA
glucuronic acid	GlcUA	ribosyl	r (only if needed to distinguish from d)
glutamyl	Glu	ribosylthymine	T or Thd
glutaminy	Gln	thymidine	dT
glutamyl or glutaminy	Glx	2,4,6-trinitrophenyl	Tnp or N ₂ ph †
hemoglobin	Hb	tryptophanyl	Trp
immunoglobulin G(M)	IgG(IgM)	uracil	Ura (not U)
		uridine	U or Urd

* Similarly for other halogenated nucleosides.

† Preferred by IUPAC-IUB.

‡ Use 3-letter abbreviation when G can be ambiguous.

Isotopes. The mass number of an atom should be written as a superior prefix: ¹⁴C, not C¹⁴; ³⁵S, not S³⁵. Enclose the symbol for the isotope in *square brackets* placed immediately before the name or abbreviation of the compound: [³²P]CMP (not CM³²P); [¹⁴C]urea; [α -¹⁴C]leucine; [*carboxy*-¹⁴C]leucine; [α , β -¹⁴C]maleic anhydride; L-[*methyl*-¹⁴C]methionine. The symbol *U* denotes uniform labeling, e.g., [¹⁴C]glucose. With chemical formulas, use ¹⁴CO₂, H₂³⁵S¹⁸O₄, etc. (no square brackets). For fully deuterated solvents use, for example, [²H]pyridine or C₅²H₅N.

Peptide Symbols. For peptides of known sequence, represent the CO-NH bonds by hyphens, as in Gly-Tyr-Ala. Groups of residues of unknown sequence are enclosed in parentheses and separated by commas (see *J. Biol. Chem.* **247**, 977 and 323).

Nucleoside Symbols. Use A, C, G, I, ψ , T, U, X for *residues* of adenosine, cytidine, guanine, inosine, pseudouridine,

For references to articles in books, the following sequence should be maintained: author(s), year of publication in *complete title of book*, names of editors (if applicable), (name of publishers, place of publication), page numbers if necessary, thus:

11. Jones, C. D. & Shapiro, L. M. (1966) in *Enzyme Reactions in Protozoa*, ed. Smith, T. G. & Williams, H. I. (Universal Press, New Brunswick, N.J.), pp. 646-672.

It is extremely important that the final typed list of references be checked for accuracy against the original articles or photocopies of them.

Acknowledgments

Keep acknowledgments brief. Acknowledgments to persons usually precede those for grant support. They should be typed double-spaced.

§ Use only for reduced light (or UV) transmission through turbid suspensions; for light (or UV) absorption by solutions, use absorbance, *A*.

ribosylthymine, uridine, or xanthosine (N, *not* X, for unknown nucleotide) in 3'-5' linkages; dA, dC, etc., for corresponding deoxy compounds. End phosphoric residues are specified by p, internal (phosphodiester) phosphoric residues by a hyphen. Synthetic polynucleotides: poly is *always* to be followed by parentheses, without intervening space, *thus* poly(A). Phosphodiester bonds are denoted by hyphens, *thus* poly(dA-dT) for a polymer of alternating adenosine and thymidine residues. Random or unknown order is denoted by commas, *thus* poly(dA, dT). Indicate noncovalent associations by a center dot, *thus* poly(I)·poly(C), RNA·DNA hybrids.

Transfer RNAs that accept specific amino acids are designated thus: tRNA^{Ala} ("alanine tRNA"). When the tRNA is bound to an amino-acid residue, use alanyl-tRNA (alanyl-tRNA^{Ala} if necessary) or, e.g., fMet-tRNA_f.

HANDBOOKS AND STYLE MANUALS

American Mathematical Society. *A Manual for Authors of Mathematical Papers* (1970). AMS, 321 South Main Street, P.O. Box 6248, Providence, R.I. 02904.

American Chemical Society. *Handbook for Authors of Papers in the Journals of the American Chemical Society* (1967). ACS Publications, 1155 Sixteenth Street, N.W., Washington, D.C. 20036.

American Institute of Physics, Publication Board. *Style Manual for Guidance in the Preparation of Papers Published by the American Institute of Physics* (1959, rev. 1969). AIP, 335 East 45th Street, New York, N.Y. 10017.

Conference of Biological Editors, Committee on Form and Style. *Style Manual for Biological Journals* (1972), 3rd ed. American Institute of Biological Sciences, 3900 Wisconsin Avenue, N.W., Washington, D.C. 20016.

Handbook of Biochemistry (with Selected Data for Molecular Biology) (1970), ed. Sober, H. A. (Chemical Rubber Company, Cleveland, Ohio), 2nd ed.

American Psychological Association. *Publication Manual of the American Psychological Association* (1967). APA, 1200 Seventeenth Street, N.W., Washington, D.C. 20036.

Abbreviations of Units of Measurement and of Physical and Chemical Quantities

(These abbreviations may be used without definition. They are not normally followed by periods except as shown.)

Prefixes to the Names of Units

giga	10 ⁹	G	micro	10 ⁻⁶	μ
mega	10 ⁶	M	nano	10 ⁻⁹	n
kilo	10 ³	k	pico	10 ⁻¹²	p
centi	10 ⁻²	c	femto	10 ⁻¹⁵	f
milli	10 ⁻³	m	atto	10 ⁻¹⁸	a

Units of Concentration*

molar (mol/liter)	M†
millimolar (mmol/liter)	mM (rather than 10 ⁻³ M)
micromolar (μmol/liter)	μM (rather than 10 ⁻⁶ M)
nanomolar	nM (not mμM)
picomolar	pM (not μμM)

Other Words

logarithm (Briggsian)	log
logarithm (natural)	ln
standard deviation of series	SD
standard error of mean	SEM

Physical and Chemical Quantities

meter	m
centimeter	cm
millimeter	mm
micrometer (not micron)	μm (not μ)
nanometer	nm (not mμ)
picometer	pm
Angstrom (0.1 nm)‡	Å
square centimeter	cm ²
cubic centimeter	cm ³

Physical and Chemical Quantities—Continued

milliliter	ml
microliter	μl (not λ)
gram	g
milligram	mg
microgram	μg (not γ)
second	sec
minute	min
counts per minute	cpm
revolutions per minute	rpm
curie(s)	Ci
equivalent	eq
Svedberg unit of sedimentation coefficient (10 ⁻¹³ S) with numeral	S
mol	not abbreviated further
cycle per second (Hertz)	Hz
retardation factor	<i>R_F</i>
acceleration of gravity	<i>g</i>
specific rotation	[α] _D ^t
sedimentation coefficient	<i>s</i>
sedimentation coefficient in water at 20°, extrapolated to zero concentration	<i>s</i> _{20,w} ⁰
diffusion coefficient (usually given in cm ² s ⁻¹)	<i>D</i>
degree Centigrade or Celsius	°C
degree absolute (Kelvin)	°K
equilibrium constant	<i>K</i>
Michaelis constant	<i>K_m</i>
calorie¶	cal
kilocalorie¶	kcal
joule¶	J

* Terms such as milligram percent (mg%) should not be used. Weight concentrations should be given as g per ml, g per 100 ml, g per liter, etc.

† The letter M is not an abbreviation for mole; it is reserved for molar. Use mM for 10⁻³ M and μM for 10⁻⁶. Avoid designating concentrations as μmol per ml, for example. The designation should, in this case, properly be mM (i.e., millimolar). Maintain consistency in the use of units in situations where they are to be compared (e.g., do not juxtapose 10⁻⁴ M and 10⁻⁶ M).

‡ The PROCEEDINGS will continue to accept certain units as listed (e.g., Angstrom, calorie, minute) even though they are not part of the *Système Internationale*. Note that nanometer is preferred instead of millimicron or Angstrom units.

§ Use °C abbreviation if ° could be ambiguous.

¶ The *Système Internationale* (SI) recommends joules. When calories are used the equivalent value in joules should be given (1 calorie = 4.184 joules).

Selected New and Recent Titles from

NATIONAL ACADEMY OF SCIENCES
NATIONAL ACADEMY OF ENGINEERING
NATIONAL RESEARCH COUNCIL

Asbestos: The Need for and Feasibility of Air Pollution Controls, Committee on Biologic Effects of Atmospheric Pollutants

ISBN 0-309-01927-3; 1971, vii + 40 pp., paper, \$1.75

This monograph discusses the pathogenicity of asbestos in man and animals, human nonoccupational exposure to asbestos, and health risks associated with various degrees and types of exposure. It also identifies sources of environmental contamination by asbestos and indicates high-priority areas where research is needed.

An Assessment of Industrial Activity in the Field of Biomedical Engineering, Committee on the Interplay of Engineering with Biology and Medicine

ISBN 0-309-01925-7; 1971, xvi + 146 pp., paper, \$5.25

Current attitudes and activities in the biomedical engineering industry are analyzed in this report, which also offers a profile of the industry, identifies major areas that have an effect on industrial contributions to the health care system, and recommends action to meet current and future needs in health care.

Evaluating the Safety of Food Chemicals, Food Protection Committee

ISBN 0-309-01859-5; 1970, v + 55 pp., paper, \$2.50

This report directs attention to recently proposed or adopted procedures for evaluation of the safety of food chemicals and considers the new methods against a background of experience with conventional procedures.

Fluorides, Committee on Biologic Effects of Atmospheric Pollutants

ISBN 0-309-01922-2; 1971, xi + 295 pp., paper, \$6.50

For those concerned with the biologic effects of atmospheric pollutants, this volume evaluates the

world literature on fluorides and summarizes the best scientific knowledge available on their biologic effects. Topics discussed include environmental sources and forms of fluorides and their relative hazards to plants, animals, and humans, with particular emphasis on the susceptibility of special population groups.

Jamaica Bay and Kennedy Airport: A Multidisciplinary Environmental Study, Environmental Studies Board

ISBN 0-309-01874-4; 1971, 178 pp. in 2 volumes + 13 foldout 3-color maps, paper, \$8.95 per set

This report identifies and evaluates the effects of various plans for expansion of New York's Kennedy Airport on the physical environment and on human ecology in the Jamaica Bay area, suggests alternative courses of action, and examines their implications.

Immunoglobulins: Biologic Aspects and Clinical Uses, Ed. by Ezio Merler, Division of Medical Sciences
ISBN 0-309-01850-1; 1971, xii + 404 pp., illus., cloth, \$9.50

The papers presented in this volume review the fundamental, technological, and clinical aspects of immunoglobulins and suggest lines of investigation that may further increase their value in preventing and alleviating human disease.

Reference Methods for the Microbiological Examination of Foods, Food Protection Committee

ISBN 0-309-01863-3; 1971, 40 pp., paper, \$2.25

In an effort to simplify laboratory practice and minimize variability of results, this report suggests reference methods for establishing microbiological criteria for classes of foods susceptible to microbiological contamination.

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Business correspondence: Printing and Publishing Office, National Academy of Sciences, 2101 Constitution Avenue, Washington, D.C. 20418.

Subscriptions are entered on a calendar-year basis only. The current subscription rate is \$35 (effective January 1, 1975, the subscription rate will be \$45). The price of a single issue is \$4. Volumes 1 through 58 are available from Walter J. Johnson, Inc., 111 Fifth Avenue, New York, N.Y. 10003; prices are available from that organization upon request.

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PRINTED IN THE USA

THE PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA is published monthly by

THE NATIONAL ACADEMY OF SCIENCES, 2101 Constitution Avenue, Washington, D.C. 20418

SPECIAL NOTICE

Although our normal schedule permits papers that are in good form to be published 8–13 weeks after their receipt at the PROCEEDINGS Office, the submission of increased numbers of manuscripts and the turnover in editorial staff have caused considerable delays in publication. In order to facilitate publication, the present Managing Editors, after consultation

with the Chairman of the Editorial Board, have attended only to clarity of presentation and adherence to approved abbreviations and nomenclature. This issue of the PROCEEDINGS therefore lacks consistency in journal style. The restricted editing is a temporary expedient and began with Part I of the December 1973 issue.

INFORMATION TO CONTRIBUTORS

(December Part II, 1973)

Purpose and scope

The *Proc. Nat. Acad. Sci. USA* publishes brief reports (not previously published) of the results of original research by members of the Academy or by others if the communication is sponsored by an Academy member. Articles should be as brief as adequate presentation allows, and may not exceed five printed pages. Since the PROCEEDINGS publishes papers in all branches of science represented in the Academy, it is desirable, whenever possible, for articles to be written so as to be intelligible to a wide scientific audience. Both because of the space limitations and the broad scientific audience of the PROCEEDINGS, detailed scientific papers may often be more appropriately submitted to more specialized journals.

Sometimes, preliminary findings of major importance are published in the PROCEEDINGS without full documentation; authors must indicate that the paper is a preliminary one and that a detailed report will be published elsewhere.

Upon invitation from the Editorial Board, some papers presented at Academy symposia, special Academy lectures, or papers on subjects of general interest to scientists are also published in the PROCEEDINGS.

Conditions for submission

Manuscripts will be accepted only from members of the Academy, who will assume responsibility for their propriety and scientific standards. In communicating an article on behalf of a nonmember, an Academy member should explicitly state that it contains findings of more than ordinary importance to investigators working on related problems, or of particularly broad interest to diverse groups of scientists. No Academy member may sponsor more than 10 papers in any annual volume.

Before submitting an article on behalf of a nonmember, an Academy member must also obtain a written opinion on it by a qualified referee. For maximal objectivity in the reviewing process, it is highly desirable that the member select the referee himself and that he not divulge the referee's identity to the author, at least until the member receives the comments. Ordinarily, the referee should not be a close colleague or former mentor of the author or a member of the Academy member's department. Forms on which the referee's comments should be submitted are provided on request by the PROCEEDINGS Office. The Academy member must enclose a copy of the referee's report with his letter of transmittal. He retains the privilege of communicating the paper if the referee's report is unfavorable, but in that case he should state in his letter of transmittal his reasons for disagreeing with the referee.

Papers are generally processed rapidly for publication; however, the Editorial Board reserves the right to subject manuscripts to further review when this seems desirable and to reject papers if they do not meet the general criteria for publication, as defined by the By-Laws of the Academy.

No person may be author or coauthor of papers totaling more than five pages in any one issue.

Manuscripts reporting experiments with humans should be accompanied by a copy of the document authorizing the proposed research by the responsible institutional committee. Authors are referred to the Declaration of Helsinki for further guidance.

Page charges are assessed for all communicated papers. A member of the Academy who communicates an article on behalf of a nonmember author is responsible for the costs of publishing the paper; if a nonmember author is to be billed for the page charges, the member communicating the paper should make sure that there is a clear understanding to this effect with the author before the paper is communicated. Members may not use the annual publishing allowances extended them by the Academy for the payment of the costs of publishing papers by other authors. The standard charge is now \$75 per printed page; in addition, authors may be billed for the costs of extensive changes made in proof and for other items of special cost.

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Length

Five printed pages will accommodate about 5500 words. The title and the heading material usually occupy space equivalent to about 600 words. Appropriate allowance should be made for the space occupied by references, footnotes, tables, and figures with their legends. Figures will be scaled to one- or two-column width according to the size of the lettering (see *Illustrations* below).

Articles estimated on first receipt as longer than five pages will be returned to authors for shortening without further editorial consideration.

Illustrations

Present only such illustrative material as is essential for the point being made. Drawings made for slide projection are rarely suitable for publication. Design line drawings to fit into one- or two-column width with minimum wasted space. *Thin-stroke* lettering should be used in sizes such that *after reduction* the smallest letter or numeral will not be less than 1.5 mm in height. Avoid extraneous detail in figures; use the legends for details as to cell type used, identification of symbols, etc.

All figures should be identified on the back with a soft pencil and the orientation should, if necessary, be indicated by means of an arrow and the word "top". Do not mount figures unless a composite figure is desired. Indicate the magnification of photomicrographs in the legend, or include a bar indicating scale in the figure (or both).

Legends to figures should be typed double-spaced, in numerical order, on a separate page.

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Tables should be typed double-spaced *throughout*, numbered with arabic numerals, and provided with titles (above the table). A list of footnotes to a table must be typed *doubled-spaced*, on a separate page if necessary. Reference to the footnotes should be made by means of the symbols *, †, ‡, §, ¶, ||, in that order, followed by doubled symbols if necessary. A lengthy list of footnotes is better keyed with lower-case superscript letters or, in exceptional cases where this would be confusing, with superscript numbers.

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Provide a separate title page, containing the following items:

Classification. Give any one of the sciences named in the titles of the sections of the Academy, or Biophysics, Cell Biology, Immunology, Pathology, or Statistics.

Title. This should be brief, specific, and rich in informative words. Add up to five *amplifying key terms* to alert readers, and computers, to subjects in the article *not* referred to in the title. The PROCEEDINGS discourages the use of uninformative serial titles such as *On Steroids*, XIX. If a paper is part of a series, indicate this by a symbolized footnote on the first page, and include a reference to the immediately preceding paper of the series.

By-line. If there are several authors with different affiliations, key authors to institutions by means of symbols *, †, ‡, §, ¶. If reprint requests are to be addressed to any but the first author, indicate this by a footnote.

From-line. List the institutions and provide Zip Codes.

Running Title. Provide a running title of not more than 50 characters, including spaces.

Footnotes. Give, as first unsymbolized footnote, a list of non-standard abbreviations (see below, under *Abbreviations*), if any, that have been used in the paper. Other title-page footnotes may indicate present addresses of the authors or address(es) to which reprint requests are to be sent. Do *not* include acknowledgments of grant support here.

Abstract

Every paper must begin with an abstract, typed on a separate page. This should state the subject and main conclusions of the article in generally intelligible terms. Avoid abbreviations. The abstract must be intelligible to a reader before he reads the paper, and suitable for reproduction by abstracting services without rewriting. It should usually not exceed 250 words.

Nomenclature

The PROCEEDINGS strives for the greatest possible conformity with international standards on nomenclature. Guides and special considerations in different disciplines are listed below.

Mathematics. Notations that are expensive to typeset should be avoided by use of the devices given on p. 7 of the American Mathematical Society's *Manual for Authors* (1970):

for example, replace $\frac{a}{b}$ by a/b , e^{x^2} by $\exp(x^2)$, \vec{r} by r (denoted

in manuscript by a wavy underline). Manuscripts in which this has not been done may be returned to the author.

Provide a list of special characters used in the paper for the printer's guidance, and identify all Greek, Hebrew, or script letters by means of marginal notes at their first appearance.

Physics. Use the American Institute of Physics' *Style Guide* (revised 1969).

Chemistry. Use the American Chemical Society's *Handbook for Authors* (1967).

Life Sciences. Use the Conference of Biology Editors' *Style Manual* (1972) (American Institute of Biological Sciences, Washington, D.C.). Some of their recommendations are expanded by the *Handbook of Biochemistry (with Selected Data for Molecular Biology)* (1970), ed. Sober, H. A. (Chemical Rubber Company, Cleveland, Ohio), 2nd ed. This book contains the International Union of Biochemistry rules of nomenclature for vitamins, enzymes, synthetic polypeptides, carbohydrates, lipids, and polynucleotides. Further guidance on nomenclature can be obtained from the NAS-NRC Office of Biochemical Nomenclature (Dr. Waldo E. Cohn), Oak Ridge National Laboratory, P.O. Box Y, Oak Ridge, Tennessee 37830. For bacterial genetics, follow the recommendations of Demerec, M., Adelberg, E. A., Clark, A. J. & Hartman, P. E. (1966) *Genetics* 54, 61-76. For human immunoglobulins and their genetic factors, follow the World Health Organization rules (see, for example, section A of *Handbook of Biochemistry*).

Enzymes should be given their recommended names on first mention, together with the Enzyme Commission (EC) number when this has been assigned.

Abbreviations

Standard Abbreviations for units of measure and for certain substances (e.g., DNA) are listed in the style manuals and handbooks named above. These need not be spelled out. Some standard abbreviations and symbols whose correct form is not familiar to all authors are listed on the following pages. Rules of the IUPAC-IUB Commission on Biochemical Nomenclature are followed [see *J. Biol. Chem.* (1966) 241, 527 and *J. Mol. Biol.* (1971) 55, 299, for example, for guidance].

Nonstandard Abbreviations are defined as those not given in the handbooks' lists, even if they may be familiar to those in the field. (a) Keep them to a minimum, and only for cumbersome words that *must* be used more than five times in the paper. (b) Spell out nonstandard abbreviations at their first appearance in the text. (c) If possible, avoid them completely in the Abstract. (d) List them on the title page for inclusion as a footnote on the first printed page of the article.

References

Cite references in order throughout the text by means of arabic numerals (not superscript) between parentheses (in mathematical papers, square brackets may be used to avoid confusion with numbered equations, or the reference number may be preceded by "ref.>"). Citations are to be made in this

way *only* to papers already published or "in press" in a stated journal or other publication. Any reference to unpublished work should be made *in the text* or, rarely, in the form of a symbolized footnote. Reference to "personal communication" should also be made in the text; *written approval by the person cited should accompany the manuscript.*

We encourage the provision of titles and require inclusive pagination for articles cited. References must be typed *double-spaced* in the style used by the PROCEEDINGS, thus (for journal articles):

10. Smith, A. B., Jones, C. D. & Robinson, E. F. (1969) "Conformational changes in ribosomes during protein synthesis," *Proc. Nat. Acad. Sci. USA* **64**, 191-195.

Titles of journals should be abbreviated according to the American National Standard for the Abbreviation of Titles of Periodicals (see *ACCESS* or *BIOSIS List of Periodicals*).

For references to articles in books, the following sequence should be maintained: author(s), year of publication in *complete title of book*, names of editors (if applicable), (name of publishers, place of publication), page numbers if necessary, thus:

11. Jones, C. D. & Shapiro, L. M. (1966) in *Enzyme Reactions in Protozoa*, ed. Smith, T. G. & Williams, H. I. (Universal Press, New Brunswick, N.J.), pp. 646-672.

It is extremely important that the final typed list of references be checked for accuracy against the original articles or photocopies of them.

Acknowledgments

Keep acknowledgments brief. Acknowledgments to persons usually precede those for grant support. They should be typed double-spaced.

SOME STANDARD AND RECOMMENDED ABBREVIATIONS AND SYMBOLS

For simplicity, one preferred abbreviation or symbol has been adopted in most cases, even though the handbooks listed below may give equally favored alternatives.

absorbance	<i>A</i> (not OD)	isoleucyl	Ile
<i>N</i> -acetylglucosamine	GlcNAc	methemoglobin	MetHb
asparaginyl	Asn	methionyl	Met
aspartyl	Asp	micromicro	<i>use</i> pico (p)
asparaginyl or aspartyl	Asx	micron	<i>use</i> micrometer (μ m)
5-bromodeoxyuridine	BrdU (not BUdR)*	millimicro	<i>use</i> nano (n)
5-bromouracil	BrUra (not BU)	millimicron	<i>use</i> nanometer (nm)
cyclic AMP (3':5')	cAMP	mole(s)	mol
cysteinyl	Cys	mitochondrial DNA	mtDNA
deoxy (carbohydrates and nucleotides)	d	myoglobin	Mb
deoxyribonuclease	DNase	nucleotide (unknown)	N (not X)
deoxyribonucleic acids	DNAs	optical density	OD§
2,4-dinitrophenyl	Dnp- or N ₂ ph†	phosphate (in compounds)	P or p
formylmethionyl	fMet	phosphate, inorganic	P _i
glucose	G or Glc‡	plaque-forming units	PFU
guanosine	G or Guo‡	ribonuclease	RNase
gluconic acid	GlcA	ribonucleic acids	RNAs
glucosamine	GlcN	ribosomal RNA	rRNA
glucuronic acid	GlcUA	ribosyl	r (only if needed to distinguish from d)
glutamyl	Glu	ribosylthymine	T or Thd
glutaminyll	Gln	thymidine	dT
glutamyl or glutaminyll	Glx	2,4,6-trinitrophenyl	Tnp or N ₂ ph†
hemoglobin	Hb	tryptophanyl	Trp
immunoglobulin G(M)	IgG(IgM)	uracil	Ura (not U)
		uridine	U or Urd

* Similarly for other halogenated nucleosides.

† Preferred by IUPAC-IUB.

‡ Use 3-letter abbreviation when G can be ambiguous.

Isotopes. The mass number of an atom should be written as a superior prefix: ¹⁴C, not C¹⁴; ³⁵S, not S³⁵. Enclose the symbol for the isotope in *square brackets* placed immediately before the name or abbreviation of the compound: [³²P]CMP (not CM³²P); [¹⁴C]urea; [α -¹⁴C]leucine; [*carboxy*-¹⁴C]leucine; [α , β -¹⁴C]maleic anhydride; L-[*methyl*-¹⁴C]methionine. The symbol *U* denotes uniform labeling, e.g., [¹⁴C]glucose. With chemical formulas, use ¹⁴CO₂, H₂³⁵S¹⁸O₄, etc. (no square brackets). For fully deuterated solvents use, for example, [²H]pyridine or C₆²H₆N.

Peptide Symbols. For peptides of known sequence, represent the CO-NH bonds by hyphens, as in Gly-Tyr-Ala. Groups of residues of unknown sequence are enclosed in parentheses and separated by commas (see *J. Biol. Chem.* **247**, 977 and 323).

Nucleoside Symbols. Use A, C, G, I, ψ , T, U, X for *residues* of adenosine, cytidine, guanine, inosine, pseudouridine,

§ Use only for reduced light (or UV) transmission through turbid suspensions; for light (or UV) absorption by solutions, use absorbance, *A*.

ribosylthymine, uridine, or xanthosine (N, *not* X, for unknown nucleotide) in 3'-5' linkages; dA, dC, etc., for corresponding deoxy compounds. End phosphoric residues are specified by p, internal (phosphodiester) phosphoric residues by a hyphen. Synthetic polynucleotides: poly is *always* to be followed by parentheses, without intervening space, *thus* poly(A). Phosphodiester bonds are denoted by hyphens, *thus* poly(dA-dT) for a polymer of alternating adenosine and thymidine residues. Random or unknown order is denoted by commas, *thus* poly-(dA, dT). Indicate noncovalent associations by a center dot, *thus* poly(I)·poly(C), RNA·DNA hybrids.

Transfer RNAs that accept specific amino acids are designated thus: tRNA^{Ala} ("alanine tRNA"). When the tRNA is bound to an amino-acid residue, use alanyl-tRNA (alanyl-tRNA^{Ala} if necessary) or, e.g., fMet-tRNA_f.

HANDBOOKS AND STYLE MANUALS

American Mathematical Society. *A Manual for Authors of Mathematical Papers* (1970). AMS, 321 South Main Street, P.O. Box 6248, Providence, R.I. 02904.

American Chemical Society. *Handbook for Authors of Papers in the Journals of the American Chemical Society* (1967). ACS Publications, 1155 Sixteenth Street, N.W., Washington, D.C. 20036.

American Institute of Physics, Publication Board. *Style Manual for Guidance in the Preparation of Papers Published by the American Institute of Physics* (1959, rev. 1969). AIP, 335 East 45th Street, New York, N.Y. 10017.

Conference of Biological Editors, Committee on Form and Style. *Style Manual for Biological Journals* (1972), 3rd ed. American Institute of Biological Sciences, 3900 Wisconsin Avenue, N.W., Washington, D.C. 20016.

Handbook of Biochemistry (with Selected Data for Molecular Biology) (1970), ed. Sober, H. A. (Chemical Rubber Company, Cleveland, Ohio), 2nd ed.

American Psychological Association. *Publication Manual of the American Psychological Association* (1967). APA, 1200 Seventeenth Street, N.W., Washington, D.C. 20036.

Abbreviations of Units of Measurement and of Physical and Chemical Quantities

(These abbreviations may be used without definition. They are not normally followed by periods except as shown.)

Prefixed to the Names of Units

giga	10 ⁹	G	micro	10 ⁻⁶	μ
mega	10 ⁶	M	nano	10 ⁻⁹	n
kilo	10 ³	k	pico	10 ⁻¹²	p
centi	10 ⁻²	c	femto	10 ⁻¹⁵	f
milli	10 ⁻³	m	atto	10 ⁻¹⁸	a

Units of Concentration*

molar (mol/liter)	M†
millimolar (mmol/liter)	mM (rather than 10 ⁻³ M)
micromolar (μmol/liter)	μM (rather than 10 ⁻⁶ M)
nanomolar	nM (not nμM)
picomolar	pM (not μμM)

Other Words

logarithm (Briggsian)	log
logarithm (natural)	ln
standard deviation of series	SD
standard error of mean	SEM

Physical and Chemical Quantities

meter	m
centimeter	cm
millimeter	mm
micrometer (not micron)	μm (not μ)
nanometer	nm (not mμ)
picometer	pm
Angstrom (0.1 nm)‡	Å
square centimeter	cm ²
cubic centimeter	cm ³

Physical and Chemical Quantities—Continued

milliliter	ml
microliter	μl (not λ)
gram	g
milligram	mg
microgram	μg (not γ)
second	sec
minute	min
counts per minute	cpm
revolutions per minute	rpm
curie(s)	Ci
equivalent	eq
Svedberg unit of sedimentation coefficient (10 ⁻¹³ S) with numeral	S
mol	not abbreviated further
cycle per second (Hertz)	Hz
retardation factor	R _F
acceleration of gravity	g
specific rotation	[α] _D ^t
sedimentation coefficient	s
sedimentation coefficient in water at 20°, extrapolated to zero concentration	S _{20,w} ⁰
diffusion coefficient (usually given in cm ² s ⁻¹)	D
degree Centigrade or Celsius	°C
degree absolute (Kelvin)	°K
equilibrium constant	K
Michaelis constant	K _m
calorie¶	cal
kilocalorie¶	kcal
joule¶	J

* Terms such as milligram percent (mg%) should not be used. Weight concentrations should be given as g per ml, g per 100 ml, g per liter, etc.

† The letter M is not an abbreviation for mole; it is reserved for molar. Use mM for 10⁻³ M and μM for 10⁻⁶. Avoid designating concentrations as μmol per ml, for example. The designation should, in this case, properly be mM (i.e., millimolar). Maintain consistency in the use of units in situations where they are to be compared (e.g., do not juxtapose 10⁻⁴ M and 10⁻⁵ M).

‡ The PROCEEDINGS will continue to accept certain units as listed (e.g., Angstrom, calorie, minute) even though they are not part of the *Système Internationale*. Note that nanometer is preferred instead of millimicron or Angstrom units.

§ Use °C abbreviation if ° could be ambiguous.

¶ The *Système Internationale* (SI) recommends joules. When calories are used the equivalent value in joules should be given (1 calorie = 4.184 joules).

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