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- (2) Title. The title should be informative and as short as is consistent with clarity. The title should not include chemical formulae or arbitrary abbreviations, but chemical symbols may be used to indicate the structures of isotopically labeled compounds. The numbering of parts in a series of papers is not permitted, but titles and subtitles may be used if necessary.
- (3) By-line. List full names of all authors. A footnote reference(s) to an author(s), indicating a change of address, should be given on the title-page.
- (4) From-line. List the institution(s) in which the work was carried out, and the Zip Code, if available.
- (5) Running title. Provide a short running title of less than 60 strokes. It should be as informative as possible.
- (6) The name, complete mailing address, telephone number, Fax number and Email address of the person to whom correspondence should be sent. To expedite the review, much of the journal's correspondence will be by Email.
- (7) Abbreviations. Non-standard abbreviations (see Section X-6, 7, and 8) should be defined, even if they are known to those familiar with the field. List all non-standard abbreviations used in the paper in alphabetical order in a footnote on the title page.

2. Summary

- (1) Every paper should have summary. The summary should be concisely written in less than 200 words. Summaries of Rapid Communications should be limited to 100 words. The summary should briefly present the problem, suggest the scope of the work and the plan of experiments, mention significant data and state major findings and conclusions. Avoid statements such as "The significance of these results is discussed" that do not help the reader. The summary should be intelligible to the non-specialist as well as the specialist in your field, and hence should avoid specialized terms and abbreviations.
- (2) Key words. Provide five key words identifying the nature of the subject matter **alphabetically** in the last part of the summary.

3. Introduction

The text of a **Regular Paper** should begin with a short introduction with no heading. This should state the reasons for performing the work, with brief reference to previous work on the subject. Avoid giving an extensive review of the literature.

4. Methods, Results, and Discussion

The arrangement of the paper after the introduction is not fixed. The author may separate sections with italicized subheadings.

The **Experimental Procedures** or **Materials and Methods** should give sufficient details to enable the reader to repeat your work exactly, if necessary. **The necessity for conciseness should not lead to omission of important experimental details.** Refer to previously published procedures employed by citation of both the original description and pertinent published modifications, and do not include extensive description unless they present substantially new modifications. Combination of the Results and Discussion in a single section sometimes gives a clearer and more compact presentation.

5. References

References cited in the text should be numbered in parentheses with italicized Arabic numerals in order of appearance. References to "unpublished experiments" and "personal communications" should appear parenthetically in the text following the name(s) of the source of information [(Yamada, T., personal communication), (Suzuki, M. and Yoshida, M., unpublished observations) *etc.*]. Be sure to verify the wording of any personal communication with the person who supplied the information and get his approval for the use of his name in connection with the quoted information. All references should be listed in numerical order typed double-spaced on a separate sheet under the heading REFERENCES. Please note the following examples.

(1) For a journal article:

7. Sanger, F., Nicklen, S., and Coulson, A.R. (1977) DNA sequencing with chain-terminating inhibitors. *Proc. Natl. Acad. Sci. USA* **74**, 5463–5467

(2) For a chapter in an edited book:

12. Messing, J. (1983) New M13 vectors for cloning in *Methods in Enzymology* (Wu, R., Grossman, L., and Moldave, K., eds.) Vol. 101, pp. 20–51, Academic Press, New York

(3) For a book by one or more authors:

15. Sambrook, J., Fritsch, E.F., and Maniatis, T. (1989) *Molecular Cloning. A Laboratory Manual* pp. 1339–1341, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY

Text citations to references written by more than two authors should be styled for example as, Smith *et al.* In the reference list, however, the names of all authors (with initials) must be given. If an article has been accepted for publication by a journal but has not yet appeared in print, the reference should be styled as follows:

29. Tanahashi, H. and Ito, T. (1994) Molecular characterization of a novel factor recognizing the interleukin-6 responsive element. *J. Biochem.* (in press)

The use of "in preparation" and "submitted for publication" is not allowed in the reference list.

Citation of the references written in a language which is usually unreadable for general readers and those published in a journal (or book) to which general reader could not easily access should be avoided.

6. Figure Legends

Figure legends and brief titles should be prepared for each figure. The figure legends should be provided after the reference list, with sufficient experimental detail to make the figure intelligible without reference to the text (unless the same material has been given with a previous figure, or in the Experimental Procedures section). The title should be provided along with the respective figure legend in bold script.

7. Nucleotide Sequence

New nucleotide data must be submitted and deposited in the DDBJ/EMBL/GenBank databases and an accession number obtained before the paper can be accepted for publication. Submission to any one of the three collaborating databanks is sufficient to ensure data entry in all. The accession number should be included in the manuscript *e.g.*, as a footnote on the title page: "Note: Nucleotide sequence data reported are available in the DDBJ/EMBL/GenBank data-bases under the accession number(s) . . .". If requested, the database will withhold release of data until publication. The most convenient method for submitting sequence data is by World Wide Web:

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EMBL via WEBIN: <http://www.ebi.ac.uk/embl/Submission/webin.html>

GenBank™ via BankIt: <http://www.ncbi.nlm.nih.gov/BankIt/>
or stand-alone submission tool

Sequin: <http://www.ncbi.nlm.nih.gov/Sequin/>

For special types of submissions (e.g., genomes, bulk submissions, etc.) additional submission protocols are available from the above sites.

Database Contact Information

DDBJ: Center for Information Biology and DNA Data Bank of Japan
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JAPAN; telephone: +81 559 81 6853; fax: +81 559 81 6849; e-mail:
ddbj@ddbj.nig.ac.jp; web URL: <http://www.ddbj.nig.ac.jp/>

EMBL: EMBL Nucleotide Sequence Submissions, European
Bioinformatics Institute, Wellcome Trust Genome Campus, Hinxton,
Cambridge DB10 1SD U.K.; telephone: +44 1223 494499; fax: +44
1223 494472; e-mail: datasubs@ebi.ac.uk; web URL: <http://www.ebi.ac.uk>

GenBank: National Center for Biotechnology Information, National
Library of Medicine, Bldg. 38A, Rm 8N-803, Bethesda, MD 20894,
U.S.A.; telephone: +1 301 496 2475; fax: +1 301 480 9241; e-mail:
info@ncbi.nlm.nih.gov; web URL: <http://www.ncbi.nlm.nih.gov>

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1. Tables should be drawn on separate pages and numbered consecutively in Roman numerals. For aid in designing tables in acceptable style, refer to current issues of the Journal.
2. Each table should have an explanatory title (in bold) and sufficient experimental detail, usually in a paragraph immediately following the title, to be intelligible without reference to the text (unless the procedure is given in the Experimental Procedures section, or under another table or figure).
3. Indicate units of measure clearly.
4. Footnotes to tables should be kept to a minimum and should be indicated by superscript lower cases, at the bottom of the table.
5. **Table must be submitted as .DOC, .RTF, Excel or PowerPoint files.**

VI. PREPARATION OF ILLUSTRATIONS

1. Each figure (Scheme, Diagram) should be given on a separate file numbered with an Arabic numeral (Fig. 1, Fig. 2, etc.). Figures will be reduced to fit into the type area of the printed page (17.5 × 23.5 cm).
2. Indicate the magnification of photomicrographs in the legend or include a bar indicating the scale in the figure.
3. Flow diagrams and amino acid or nucleotide sequences should always be presented as direct photographic reproduction.
4. **Color figures will be printed at the expense of the authors. The cost will be GBP 350 per figure. Please also note that a set of figures with same tag is counted as one figure, i.e. Figure 1A, 1B, 1C are counted as one (Figure 1). Papers submitted with colored photographs will be reviewed on the assumption that the authors will pay for color costs. Switching a color figure to black and white figures after acceptance may require Editorial approval. If the figures should be reproduced as black and white, the author must provide black and white version of figure files when submitting the manuscript. Black and white figures will be printed without additional cost, but should be well prepared with high contrast.**
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Supporting material that cannot be included, and which is not essential for inclusion in the full text of the manuscript, but would nevertheless benefit the reader can be published online. Authors are encouraged to take advantage of the opportunity to submit Supplementary data whenever appropriate; for example, when the amount of material is too great to warrant inclusion in the main body of the paper, or when the material is in a format that cannot be represented in print (i.e. video clips or animated graphics). All material to be considered as Supplementary data must be submitted at the same time as the main manuscript for peer review. Please indicate clearly the material intended as Supplementary data upon submission. Also ensure that the Supplementary data is referred to in the manuscript at an appropriate point in the text. Supplementary data should be submitted in a separate file(s), in its final form. Please note that Supplementary data will not be edited, so ensure that it is clearly and

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VIII. CHEMICAL AND MATHEMATICAL FORMULAE

1. Refer in the text to simple chemical compounds by their formulae when these can be printed in simple horizontal lines of type. Do not use structural formulae in the running text.
2. Ionic charge should be shown as a superscript following the chemical symbol, e.g. Fe³⁺, SO₄²⁻.
3. Prepare large structural formulae and long mathematical equations in a form suitable for direct photographic reproduction and include them as a Diagram at the end of the paper.
4. **Isotopically Labeled Compounds**—The symbol for an isotope is shown in square brackets directly before the name (word), as in [¹⁴C]urea, [α -¹⁴C]leucine, DL-[methyl¹⁴C]methionine. When more than one position in a substance is labeled with the same isotope and the positions are not indicated, the number of labeled atoms should be indicated as a right-hand subscript; as in [¹⁴C₂]glycolic acid. The symbol *U* indicates uniform, e.g. [*U*-¹⁴C]glucose (where the ¹⁴C is uniformly distributed among all six positions). The isotopic prefix precedes that part of the name to which it refers, as in sodium [¹⁴C]formate, thiamine [β -³²P]diphosphate. Terms such as ¹³¹I-labeled albumin should not be contracted to [¹³¹I]albumin. When isotopes of more than one element are introduced, their symbols should be arranged in alphabetical order: e.g. L-[³⁻¹⁴C, 2,3-²H, ¹⁵N]serine. The symbols ²H and ³H or D and T may be used for deuterium and tritium, respectively.

For simple molecules, the labeling is indicated by writing the chemical formulae with the prefix superscripts attached to the correct atomic symbols in the formulae: e.g. ¹⁴CO₂, H₂¹⁸O, ²H₂O. Square brackets should not be used for them, or when the isotopic symbol is attached to a word that is not a specific chemical name, abbreviation or symbol: e.g. ¹³¹I-labeled, ¹⁴C-sugar, ¹⁴C-steroids, ³²P₄³⁻, but [³²P]-phosphate.

5. **Spectrophotometric Data**—Beer's law may be stated as

$$A = -\log T = \epsilon lc$$

Where *A* is the absorbance; *T*, the transmittance ($-I/I_0$); ϵ , the molar absorption coefficient; *c*, the concentration of the absorbing substances in moles per liter; and *l*, the length of the optical path in centimeters. Under these conditions ϵ has the dimensions liter·mol⁻¹·cm⁻¹ or more briefly M⁻¹·cm⁻¹ (not cm⁻¹·mol⁻¹). Do not use "O.D." and "E."

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In scientific investigations involving human subjects, experiments should be performed in accordance with the ethical standards formulated in the Helsinki Declaration of 1964 (revised in 1989, cf. <http://ohsr.od.nih.gov/>). Similarly, animal experiments should follow the ethical standards formulated in the Helsinki Declaration, and measures taken to protect animals from pain or discomfort should be mentioned. All authors must read and sign the JB Authors' Responsibility and Conflict of Interest Form. This form can be downloaded from http://www.oxfordjournals.org/our_journals/jbchem/for_authors/jbcoiform.pdf. When your manuscript is accepted for publication in Journal of Biochemistry, all of the disclosures will appear in your article.

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An example is given here: 'National Institutes of Health (CB5453961 to C.S., DB645473 to M.H.); Funding Agency (hfygr667789).'

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- Abbreviations with specific meanings may be used for convenience for complex chemical substances, particularly in equations, tables, or figures. Avoid using abbreviations in titles and summaries except the standard ones listed in Table II of Section X-8.
- Use abbreviations and symbols sparingly in the text. In chemical equations, which traditionally depend upon symbols, an abbreviation or symbol may be used for a term that appears in full in the neighboring text. Trivial names are usually sufficiently short not to require abbreviations.
- An abbreviated name or symbol in a column heading in a table, figure, or photograph must either be taken from the "accepted" list given in Section X-8 or formulated in accordance with the principles of Section X-6.
- For spelling of chemical names consult current issues of the Journal. For chemical terms follow essentially the usages and rules recommended by International Scientific Union, especially Nomenclature Committee of IUBMB (NC-IUBMB, IUBMB: International Union of Biochemistry and Molecular Biology) and IUPAC-IUBMB Joint Commission on Biochemical Nomenclature (JCBN, IUPAC: International Union of Pure and Applied Chemistry): see the recommendations in *Biochemical Nomenclature and Related Documents* (1978), available from The Biochemical Society, 7 Warwick Court, London WC1R 5DP, U.K. and in *Biochemical Nomenclature and Related Documents. A Compendium*, 2nd edn (Liébecq, C., ed.), Portland Press Ltd, London (1992). (see *Eur. J. Biochem.* **213**, 1-3 (1993)).
Refer also to <http://www.chem.qmw.ac.uk/iupac/jcbtn/>
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—Supplement *Eur. J. Biochem.* **223**, 1-5 (1994).

—Supplement 2 *Eur. J. Biochem.* **232**, 1-6 (1995).

—Supplement 3 *Eur. J. Biochem.* **237**, 1-5 (1996).

—Supplement 4 *Eur. J. Biochem.* **250**, 1-6 (1997).

When an enzyme is the main subject of a paper, its source, trivial name, systematic name (or the reaction that it catalyzes) and code number (preceded by "EC") should be included.

- Non-Standard Abbreviations**—Use of abbreviations other than the standard ones listed in X-7 and X-8 should be kept to a minimum. Such abbreviations should be introduced only when absolutely necessary, as in tables, figures, and other illustrations where space is particularly limited. Abbreviations are usually not needed in the text of a paper where repeated use of long names can be avoided by judicious use of pronouns, or by paraphrasing with words such as "the substrate," "the inhibitor," "the methyl derivative," etc. **All non-standard abbreviations used in the text should be defined in alphabetical order in a single footnote on the title page.**
- Abbreviations of Units of Measurement and Physical and Chemical Quantities**—These abbreviations listed in Table I may be used without definition.

TABLE I

(1) Prefixes to the names of units					
tera	10 ¹²	T	milli	10 ⁻³	m
giga	10 ⁹	G	micro	10 ⁻⁶	μ
mega	10 ⁶	M	nano	10 ⁻⁹	n
kilo	10 ³	k	pico	10 ⁻¹²	p
Deci	10 ⁻¹	deci (not d)	femto	10 ⁻¹⁵	f
centi	10 ⁻²	c ¹⁾	atto	10 ⁻¹⁸	a
(2) Units of Concentration ²⁾					
molar (moles/liter)			M		
millimolar (millimoles/liter)			mM (not 10 ⁻³ M)		
micromolar (micromoles/liter)			μM (or 10 ⁻⁶ M)		
nanomolar (nanomoles/liter)			nM (or ×10 ⁻⁹ M)		
picomolar (picomoles/liter)			pM (or ×10 ⁻¹² M)		
(3) Units of Length					
meter			m		
centimeter			cm		
millimeter			mm		
micrometer (not micron)			μm (not μ)		
nanometer			nm (not μ)		
Ångstrom (0.1 nm)			Å		
(4) Units of Area and Volume					
square centimeter			cm ²		
cubic centimeter			cm ³		
liter			l (in tables only)		
milliliter			ml		
microliter			μl (not λ)		
(5) Units of Mass					
gram			g (kg, mg, μg [not γ], ng, pg)		
dalton ³⁾			Da		
(6) Units of Time					
hour	h	year	yr		
minute	min	month	mo		
second	s	week	wk		
		day	d		
(7) Units of Radioactivity					
becquerel			Bq (= 1 dps or 60 dpm)		
counts per minute			cpm		
curie(s)			Ci (= 3.7 × 10 ¹⁰ Bq)		
disintegrations per minute			dpm		
(8) Other Units					
mole			mol (mmol, μmol, nmol, pmol)		
degree Celsius			°C		
degree absolute (kelvin)			K		
joule			J		
kilojoule			kJ		
calorie			cal		
kilocalorie			kcal		
parts per billion			ppb		
parts per million			ppm		
cycles per second (hertz)			Hz (not cps)		
equivalent			eq		
ampere			A (mA)		
ohm			Ω		

volt	V	Flavin-adenine dinucleotide and its fully reduced form	FAD and FADH ₂
gauss	G	Flavin mononucleotide and its fully reduced form	FMN and FMNH ₂
pascal	Pa	Fourier transform	FT
revolutions per minute	rpm	Gas chromatography-mass spectrometry	GC-MS
Svedberg unit of sedimentation coefficient (10 ⁻¹³ s)	S	Gas liquid chromatography	GLC
(9) Physical and Chemical Quantities		Glutathione and its oxidized form	GSH and GSSG
absorbance	<i>A</i>	Guanosine 3':5'-cyclic monophosphate	cGMP
equilibrium constant	<i>K</i>	Guanosine 5'-mono-, di-, and triphosphates	GMP, GDP, and GTP
rate constant	<i>k</i>	Guanosine triphosphatase	GTPase
maximum velocity	<i>V</i> _{max}	Hemoglobin	Hb
Michaelis constant	<i>K</i> _m	Heterogenous nuclear RNA	hnRNA
equilibrium dissociation constant	<i>K</i> _d	High performance (pressure) liquid chromatography	HPLC
isoelectric point	pI	4-(2-Hydroxyethyl)-1-piperazineethane-sulfonic acid	HEPES
molecular weight ⁽³⁾	<i>M</i> _r	Immunoglobulin	Ig (IgG, IgM, etc.)
retardation factor	<i>R</i> _f	Infrared	IR
acceleration of gravity	<i>g</i>	Inorganic orthophosphate	P _i
specific rotation	[α] _λ ^t	Inorganic pyrophosphate	PP _i
partial specific volume	\bar{v}	Inosine 5'-mono-, di-, and triphosphates	IMP, IDP, and ITP
diffusion constant	<i>D</i>	Kilobases	kb
sedimentation coefficient	<i>s</i>	Kilobase pairs	kbp
density	ρ	Lethal dose, 50%	LD ₅₀
sedimentation coefficient in water at 20°C, extrapolated to zero concentration	<i>s</i> _{20,w} ⁰	Messenger RNA	mRNA
Gibbs energy change	ΔG	Nicotinamide adenine dinucleotide and its reduced form	NAD ⁺ and NADH ⁽²⁾
entropy change	ΔS	Nicotinamide adenine dinucleotide phosphate and its reduced form	NADP ⁺ and NADPH ⁽²⁾
enthalpy change	ΔH	Nuclear magnetic resonance	NMR
melting temperature	<i>T</i> _m	Nuclear RNA	nRNA
(10) Other Terms		Optical rotatory dispersion	ORD
logarithm	log	Phosphoric acid residue	P- or -P
logarithm (natural)	ln	Pseudouridine and pseudouridine mono-nucleotide	ψ and ψMP
standard deviation of a series	SD	Polyacrylamide gel electrophoresis	PAGE
standard error of mean of series	SE	Poly(adenylic acid), polyadenylate ⁽³⁾	Poly(A) ⁽³⁾

¹⁾ To be avoided where possible (except for cm).

²⁾ Terms such as milligram percent (mg%) should not be used. Weight concentrations should be given as g/ml, g/100 ml, etc.

³⁾ Molecular weight is dimensionless. Only molecular mass is expressed by daltons.

8. **Accepted Abbreviations and Symbols**—Authors may use, without definition, the abbreviations given in Table II and the symbols and abbreviations for amino acid or nucleotide residues in polymers or sequences. Define other abbreviations in a single footnote on the title page.

TABLE II

(1) General			
Adenosine 3':5'-cyclic monophosphate	cAMP	Uridine diphosphate glucose, etc.	UDP-glucose, etc.
Adenosine 5'-mono-, di-, and triphosphates ⁽¹⁾	AMP, ADP, and ATP	Uridine 5'-mono-, di-, and triphosphates	UMP, UDP, and UTP
Adenosine triphosphatase	ATPase	(2) Amino acids	
Base pair(s)	bp	Alanine	Ala (A)
Bovine serum albumin	BSA	Arginine	Arg (R)
O-(Carboxymethyl)	CM-	Asparagine	Asn (N)
Circular dichroism	CD	Aspartic acid	Asp (D)
Coenzyme A and its acyl derivatives	CoA (or CoASH) and acyl-CoA	Aspartic acid or asparagine	Asx (B)
Complementary DNA	cDNA	Cysteine	Cys (C)
Cyclic AMP	cAMP	Glutamic acid	Glu (E)
Cyclic GMP	cGMP	Glutamine	Gln (Q)
Cytidine diphosphate choline, etc.	CDP-choline, etc.	Glutamic acid or glutamine	Glx (Z)
Cytidine 5'-mono-, di-, and triphosphates	CMP, CDP, and CTP	Glycine	Gly (G)
Deoxyribonuclease	DNase	Histidine	His (H)
Deoxyribonucleic acid	DNA	Isoleucine	Ile (I)
O-(Diethylaminoethyl)	DEAE-	Leucine	Leu (L)
Dithiothreitol	DTT	Lysine	Lys (K)
Electron paramagnetic resonance	EPR	Methionine	Met (M)
Electron spin resonance	ESR	Phenylalanine	Phe (F)
Ethylenediaminetetraacetic acid	EDTA	Proline	Pro (P)
[Ethylenebis(oxyethylenenitrilo)]-tetraacetic acid	EGTA	Serine	Ser (S)
		Threonine	Thr (T)
		Tryptophan	Trp (W)

Tyrosine	Tyr (Y)
Valine	Val (V)
(3) Nucleic acids	
Adenosine	A
Bromouridine	BrUrd or B
Cytidine	C
Dihydrouridine	D or hU
Guanosine	G
Inosine	I
6-Mercaptopurine ribonucleoside (6-thioinosine)	M or sI
'a nucleoside'	Nuc or N
Pseudouridine	ψ or Q ^a
'a purine nucleoside'	R
'a pyrimidine nucleoside'	Y
Thiouridine	S or sU
Thymidine (2'-deoxyribosylthymine)	dT
Uridine	U
Xanthosine	X
Phosphoric residue	-P or p

¹⁾ The various isomers of adenosine monophosphate may be written 2'-AMP, 3'-AMP, or 5'-AMP (in case of possible ambiguity). A similar procedure may be applied to other nucleoside or deoxyribonucleoside monophosphates.

²⁾ NAD(P)⁺ and NAD(P)H indicate either NAD⁺ or NADP⁺ and either NADH or NADPH, respectively.

³⁾ Similarly abbreviate oligo- and polynucleotides composed of repeating sequences or of unknown sequence of given purine or pyrimidine bases, *e.g.* oligothymidylate, oligo(dT); alternating copolymer of A and U, poly(A-U); random copolymer of A and U, poly(A,U).

⁴⁾ The d prefix may be used to represent the corresponding deoxyribonucleoside phosphates, *e.g.* dADP.

9. **Names of Animals, Plants, and Microorganisms**—The scientific names are Latin binomials and should be given in full in the title and summary and on first mention in the text (*e.g.* *Escherichia coli*). Subsequently, the generic name may be contracted (usually to the first letter), *e.g.*, *E. coli*. The strain of laboratory animals and if possible the source should be stated.
10. The cytochromes should be designated by a small italicized letter, *e.g.* cytochrome *a*, *b*₂, *c*₁, *etc.*

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