nature biotechnology

GUIDE TO AUTHORS

About *Nature Biotechnology*

AIMS AND SCOPE OF JOURNAL

Nature Biotechnology is a monthly journal covering the science and business of biotechnology. It publishes new concepts in technology/methodology of relevance to the biological, biomedical, agricultural and environmental sciences as well as covers the commercial, political, ethical, legal and societal aspects of this research. The first function is fulfilled by the peer-reviewed research section, the second by the expository efforts in the front of the journal. We provide researchers with news about business; we provide the business community with news about research developments.

The core areas in which we are actively seeking research papers include: molecular engineering of nucleic acids and proteins; molecular therapy (therapeutics genes, antisense, siRNAs, aptamers, DNAzymes, ribozymes, peptides, proteins); large-scale biology (genomics, functional genomics, proteomics, structural genomics, metabolomics, etc.); computational biology (algorithms and modeling), regenerative medicine (stem cells, tissue engineering, biomaterials); imaging technology; analytical biotechnology (sensors/detectors for analytes/macromolecules), applied immunology (antibody engineering, xenotransplantation, T-cell therapies); food and agricultural biotechnology; and environmental biotechnology. A comprehensive list of areas of interest is shown below.

Genetic engineering
- Strategies for controlling gene expression
- Strategies for manipulating gene structure
- Strategies for gene containment

Large-scale approaches
- Technologies for analyzing gene function (e.g., arrays, SAGE)
- Technologies for analyzing gene structure/organization (e.g., molecular beacons)
- Chemogenomics or chemical genetics
- Pharmacogenomics/SNPs
- Computational analysis

Proteomics
- Technologies for analyzing/identifying protein structure/function (e.g., 2-D gels, mass spectrometry, yeast two-hybrid, SPR, NMR, arrays and chips)
- Structural genomics
- Computational analysis

Metabolomics
- Technologies for analyzing/profiling metabolites (chromatography, mass spectrometry)
- Computational analysis

Computational biology
- Bioinformatics; algorithms; data deconvolution
- Modeling and systems biology: kinetics-based models and constraints-based models

Molecular engineering
- Rational approaches for proteins/antibodies/enzymes/drugs
- Molecular evolution
- Molecular breeding approaches

Metabolic engineering
- Genetic manipulation of species of interest to modify or allow the production of a commercially or therapeutically relevant compound
- Computational analysis

Novel expression systems
- Mammalian cells
- Insect cells
- Bacteria
- Fungi
- Plant cells

Delivery of genes, drugs or cells
- Targeting strategies
- Viral and nonviral vector strategies

Imaging
- Reporter molecules
- Imaging approaches/technologies for visualizing whole animals cells or single molecules
- Computational analysis

Nucleic acid therapeutics and research tools
- Gene therapy (targeting, expression, integration, immunogenicity)
- Antisense
- RNAi
- DNAzymes and ribozymes
- Other (e.g., chimeric oligonucleotides/triple helix)

Nanobiotechnology
- Nanomaterials for use in drug delivery or as therapeutics
- Nanomaterials for use in industrial biotechnology
- Nanosensors
- Nanosystems for imaging molecules and cells

Vaccines and applied immunology
- Antibody engineering
- T-cell therapies
- Therapies exploiting innate immunity (e.g., complement)
- Antigen delivery vectors and approaches
- Nucleic acid vaccines
- Computational analysis

Regenerative medicine
- Stem cells
- Tissue engineering
- Therapeutic cloning (somatic cell nuclear transfer)
- Xenotransplantation
- Biomaterials

Biosensors
- Approaches for detecting biological molecules
- Use of biological systems in detecting analytes

Assay systems
- Approaches for multiplexing and increasing throughput
- Selection/screening strategies for gene/proteins/drugs
- Microfluidics

Biomaterials
- Engineering materials for biological application
- Molecular imprinting
- Biomimetics
- Nanotechnology

Agbiotech and transgenic plants
- Crop improvement (resistance to stress, disease, pests)
- Nutraceuticals
- Forest biotechnology
- Plant vaccines
- Plants as bioreactors
- Gene-containment strategies

Pharming
- Transgenic animals
- Knockouts
- Reproductive cloning
- Biopharmaceutical and enzyme production
- Transgene targeting and expression strategies

Environmental
- Bioremediation
- Biomining
- Phytoremediation
- Monitoring

EDITORIAL PROCESS

The overview of the journal's manuscript decision process includes submission, editorial decision on whether the paper should be reviewed, peer review, decisions after review, revision, acceptance in principle, final submission and acceptance, proofs, advance online publication and print publication. Before submitting a paper, authors should consult our editorial policies as well as technical tips for using our online submission system.

Please also consult our general guide for manuscript preparation and submission, which includes information on article formats, journal style and figure preparation tips. Note that procedures for initial submission, revision and final submission are slightly different, so please consult the directions before proceeding to the online submission system.

Presubmission inquiries are not a prerequisite for the regular submission process, but are intended as a mechanism for authors to receive rapid feedback on whether a manuscript in preparation is likely to be of interest to the journal. We encourage authors who have already prepared their manuscripts to bypass the presubmission inquiry process and upload their papers as a regular submission to the journal.

Journals in the Nature family no longer take copyright on the primary research articles we publish. Instead we ask authors to sign a license for us to publish their work. US government employees sign a different license.

EDITORS AND CONTACT INFORMATION

Like the other Nature titles, *Nature Biotechnology* has no external editorial board. Instead, all editorial decisions are made by a team of full-time professional editors. For information on their scientific and publishing backgrounds/interests, see About the Editors.

Full contact information for the journal can be found here.

RELATIONSHIP TO OTHER NATURE JOURNALS

Nature Biotechnology is editorially independent, and its editors make their own decisions, independent of the other Nature journals. If a paper is rejected from one Nature journal, the authors can use an automated manuscript transfer service to submit the paper to another Nature journal via a link sent to them by the editor handling the manuscript. Authors should note that referees' comments (including any confidential comments to the editor) and identities are transferred to the editor of the second journal along with the manuscript. In that case, the journal editors will take the previous reviews into account when making their decision, although in some cases the editors may choose to take advice from additional or alternative referees. Alternatively, authors may choose to request a fresh review, in which case they should not use the automated transfer link, and the editors will evaluate the paper without reference to the previous review process. More details are available on the manuscript transfer service and on the relationships between Nature titles.

EDITORIAL AND PUBLISHING POLICIES

Please see authors & referees for detailed information about author and referee services and publication policies at the Nature family of journals. These journals, including *Nature Biotechnology*, share a number of common policies including the following:

- Author responsibilities
- License agreement and author copyright
- Compliance with open access mandates
- Embargo policy and press releases
- Use of experimental animals and human subjects
- Competing financial interests
- Availability of materials and data
- Reporting requirements for life sciences articles
- Digital image integrity and standards
- Security concerns
- Refutations, complaints and corrections
- Duplicate publication
- Confidentiality and pre-publicity
- Plagiarism and fabrication

IMPACT FACTOR

The 2012 impact factor for *Nature Biotechnology* is 32.438, according to the 2012 *Journal Citation Reports*® (Thomson Reuters, 2013). This places *Nature Biotechnology* first among primary research journals in the field of biotechnology.

The 2012 impact factor represents the number of citations in 2012 to papers published in 2010 and 2011, divided by the total number of papers published in 2010 and 2011. A more detailed explanation of impact factors appears on the Thomson Reuters web site. For more information on the interpretation and use of impact factors, see the Editorials in the August 2003 issues of *Nature Neuroscience* and *Nature Immunology*.

EDITORIAL BLOGS

We encourage community participation in all Nature journal blogs. Nautilus is a blog for authors and aspiring authors of Nature Publishing Group journals. Peer-to-Peer is a blog for reviewers and is about peer review. Other Nature Publishing Group blogs can be found on the blog index page.

ABBREVIATION

The correct abbreviation for abstracting and indexing purposes is *Nat. Biotechnol.*

ISSN AND EISSN

The international standard serial number (ISSN) for *Nature Biotechnology* is 1087-0156, and the electronic international standard serial number (EISSN) is 1546-1696.

FURTHER EDITORIAL INFORMATION

Please see the following editorials for more information on various aspects of journal policy:

Beaten out of submission (December 2001)
Business as usual (October 2001)
Democratizing proteomics data (March 2007)

Content Types

PRIMARY RESEARCH FORMATS

An **Article** is a substantial novel research study, with a complex story often involving several techniques or approaches. The main text (excluding abstract, online Methods, references and figure legends) is 3,000 words. The abstract is typically 150 words, unreferenced. Articles have 6 display items (figures and/or tables). An introduction (without heading) is followed by sections headed Results, Discussion and online Methods. The Results and online Methods should be divided by topical subheadings; the Discussion does not contain subheadings. References are limited to 50.

Articles include received/accepted dates. They may be accompanied by supplementary information. Articles are peer reviewed, and authors must provide a competing financial interests statement before publication.

A **Letter** reports an important novel research result, but is less substantial than an Article. This format begins with an introductory paragraph (not abstract) of approximately 150 words, summarizing the background, rationale, main results and implications. This paragraph should be referenced, as in Nature style, and should be considered part of main text, so that any subsequent introductory material avoids too much redundancy with the introductory paragraph. The text is limited to 2,000 words, excluding the introductory paragraph, online Methods, references and figure legends. References are limited to 30. Letters should have no more than 2–3 display items (figures and/or tables). Letters are not divided by headings, except for the online Methods headings.

Letters include received/accepted dates. They may be accompanied by supplementary information. Letters are peer reviewed, and authors must provide a competing financial interests statement before publication.

A **Brief Communication** reports a concise study of high quality and broad interest. This format may not exceed 3 printed pages. Brief Communications begin with a brief unreferenced abstract (3 sentences, no more than 70 words), which will appear on Medline. The title is limited to 10 words (or 90 characters). The main text is typically 1,000–1,500 words, including abstract, references and figure legends, and contains no headings. Brief Communications normally have no more than 2 display items, although this may be flexible at the discretion of the editor, provided the page limit is observed. Brief Communications include an online Methods section. References are limited to 20. Article titles are omitted from the reference list.

Brief Communications include received/accepted dates. They may be accompanied by supplementary information. Brief Communications are peer reviewed, and authors must provide a competing financial interests statement before publication.

A **Resource** presents a large data set (such as a comprehensive list of proteins in an organelle or tissue, a genome-wide antibody library, coordinated analysis of cells or reagents by several different laboratories) of broad utility, interest and significance to the community. The main text (excluding abstract, online Methods, references and figure legends) is approximately 3,000 words. The abstract is typically 100–150 words, unreferenced. Resources have no more than 6 display items (figures and/or tables). An introduction (without heading) is followed by sections headed Results, Discussion and online Methods. The Results and online Methods should be divided by topical subheadings; the Discussion does not contain subheadings. References are limited to 50.

Resources include received/accepted dates. They may be accompanied by supplementary information. Resources are peer reviewed, and authors must provide a competing financial interests statement before publication.

An **Analysis** is a new analysis of existing data (typically large genomic, transcriptomic or proteomic data sets from arrays or other high-throughput platforms) or describe new data obtained in a comparative analysis of technologies that lead to novel and arresting conclusions of importance to a broad audience. The main text (excluding abstract, online Methods, references and figure legends) is approximately 3,000 words. The abstract is typically 100–150 words, unreferenced. Analyses have no more than 6 display items (figures and/or tables). An introduction (without heading) is followed by sections headed Results, Discussion and online Methods. The Results and online Methods should be divided by topical subheadings; the Discussion does not contain subheadings. References are limited to 50.

Analyses include received/accepted dates. They may be accompanied by supplementary information. Analyses are peer reviewed, and authors must provide a competing financial interests statement before publication.

OTHER FORMATS

Correspondence is a flexible format that may include anything of interest to the journal's readers, from policy debates to announcements to 'matters arising' from research papers. A Correspondence may describe primary research data, but only in summary form; this format is not intended for full presentation of data. Correspondence should never be more than one printed page, and usually much less. The number of references should not exceed 10 for either the Correspondence or its Reply, and article titles are omitted from the reference list. Titles for correspondence are supplied by the editors.

Authors must submit a competing financial interests statement, which is printed only if they declare that they have competing interests. In cases where a correspondence is critical of a previous research paper, the authors are normally given the option of publishing a brief reply. Criticism of opinions or other secondary matter does not involve an automatic right of reply.

Refutations are always peer reviewed. Other types of Correspondence may be peer reviewed at the editors' discretion. Authors must provide a competing financial interests statement before publication.

News and Views are by prior arrangement only. They may be linked to articles in *Nature Biotechnology*, or they may focus on papers of exceptional significance that are published elsewhere. Unsolicited contributions will not normally be considered, although prospective authors are welcome to make proposals. News and Views are not peer reviewed.

Authors must submit a competing financial interests statement, which is printed only if they declare that they have competing interests.

Book Reviews are by prior arrangement only, although suggestions are welcome. Book reviews are not peer reviewed.

Authors must submit a competing financial interests, which is printed only if they declare that they have competing interests.

A **Review** is an authoritative, balanced and scholarly survey of recent developments in a research field. The requirement for balance need not prevent authors from proposing a specific viewpoint, but if there are controversies in the field, the authors must treat them in an even-handed way. Reviews are normally 3,000–4,000 words, and illustrations are strongly encouraged. References are limited to 100, with exceptions

possible in special cases. Citations should be selective and, in the case of particularly important studies (≤10% of all the references), we encourage authors to provide short annotations explaining why these are key contributions. The scope of a Review should be broad enough that it is not dominated by the work of a single laboratory, and particularly not by the authors' own work.

Review authors must provide a competing financial interests statement before publication. Reviews include received/accepted dates. Reviews are always peer reviewed to ensure factual accuracy, appropriate citations and scholarly balance.

Commentary is a very flexible format, focusing on the scientific, commercial, ethical, legal, societal or political issues surrounding biotechnology research. Commentary articles should be topical, readable, provocative and introduce new concepts/points of view, providing a personal perspective on a biotechnology-based matter of public or scientific importance. The main criteria are that they should be of immediate interest to a broad readership and should be written in an accessible, non-technical style. Their length is typically 1–4 pages, although some may be longer. Because the content is variable, the format is also flexible. Commentaries do not normally contain primary research data, although they may present 'sociological' data (funding trends, demographics, bibliographic data, etc.). References should be used sparingly (10–25), and article titles are omitted from the reference list.

The related format **Historical Commentary** is a journalistic treatment of the history of a particular discovery or technical development. These pieces may be a personal account by one of the participants or may present strong personal opinions. This format does not necessarily seek scholarly balance, and it should be journalistic and accessible rather than scholarly in style.

Commentary authors must submit a competing financial interests statement, which is printed only if they declare that they have competing interests. Commentaries may be peer reviewed at the editors' discretion.

Perspective is a format for scholarly reviews and discussions of the primary research literature that are too technical for a Commentary but do not meet the criteria for a Review—either because the scope is too narrow, or because the author is advocating a controversial position or a speculative hypothesis or discussing work primarily from one group. Two reviews advocating opposite sides in a research controversy are normally published as Perspectives. The text should not normally exceed 3,000 words. References are limited to 50.

The related format **Historical Perspective** is a more technical account of a particular scientific development. Like other Perspectives, and in contrast to Historical Commentary, Historical Perspectives are scholarly reviews, including citation of key references, aiming to present a balanced account of the historical events, not merely personal opinions or reminiscences.

Perspective authors must provide a competing financial interests statement before publication. Perspectives are always peer reviewed and include received/accepted dates.

Analysis articles are reports that include a new analysis of new or existing data (typically large biological datasets such as genomes, microarrays and proteomics) that lead to a novel, exciting and arresting conclusion. They are peer-reviewed and include a competing financial interests statement.

A **Feature** encompasses both the technical and commercial aspects of biotechnology. This format is intended not only to complement the emerging scientific developments reported in the research section, but also to provide a forum for regulatory and business topics that would otherwise not be covered in the journal. Features are generally no more than 3,000 words, should be well illustrated with tables and figures and are written in a journalistic style accessible to a wide range of nonspecialist readers. *Nature Biotechnology* welcomes submissions of ideas for future feature topics.

Authors (with the exception of freelance writers) must submit a competing financial interests statement, which is printed only if they declare that they have competing interests.

A **Patent Article** offers *Nature Biotechnology*'s readership an expert insight and analysis of the legal issues that pertain to biotechnology, including patenting, licensing and technology transfer. Written by specialists in the field, patent articles are an informative guide to the legal aspects of biotechnology research and industry. *Nature Biotechnology* welcomes submissions of ideas for future article topics.

Authors must submit a competing financial interests statement, which is printed only if they declare that they have competing interests.

A **Careers and Recruitment** article provides a view on training, career development or hiring issues and information on the biotechnology job market. *Nature Biotechnology* welcomes submissions of ideas for future article topics.

Authors must submit a competing financial interests statement, which is printed only if they declare that they have competing interests.

A **Primer** describes an approach to computational analysis in simple terms for a biological researcher. The article briefly describes the approach in a historical context and in the context of other computational approaches, the principles underlying the analysis and how it can be applied to contemporary problems in biology.

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How to Submit

ONLINE SUBMISSION

We strongly prefer to receive manuscripts via our online submission system. Using this system, authors can upload manuscript files (text, figures and supplementary information, including video) directly to our office and check on the status of their manuscripts during the review process. In addition, reviewers can access the manuscript (in a highly secure fashion that maintains referee anonymity) over a direct internet link, which speeds the review process. Please consult our technical information on file formats and tips for using the system effectively. Revisions, including manuscripts submitted after a presubmission inquiry, should be uploaded via the link provided in the editor's decision letter. Please do not submit revisions as new manuscripts.

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Submission to *Nature Biotechnology* is taken to imply that there is no significant overlap between the submitted manuscript and any other papers from the same authors under consideration or in press elsewhere. (Abstracts or unrefereed web preprints do not compromise novelty.) The authors must include copies of all related manuscripts with any overlap in authorship that are under consideration or in press elsewhere. If a related manuscript is submitted elsewhere while the manuscript is under consideration at *Nature Biotechnology*, a copy of the related manuscript should be sent to the editor.

The primary affiliation for each author should be the institution where the majority of their work was done. If an author has subsequently moved, the current address may also be stated.

If the manuscript includes personal communications, please provide a written statement of permission from any person who is quoted. E-mail permission messages are acceptable.

For bioinformatics manuscripts, please send four copies of a CD containing any new algorithms for data analysis along with other resources necessary to use the algorithm, such as the user manual or spreadsheets.

The CDs should be mailed to *Nature Biotechnology*, 75 Varick Street, 9th Floor, New York, NY 10013-1917, USA.

For further information on the review process and how editors make decisions, please see the manuscript decisions page.

A high priority of *Nature Biotechnology* is that all papers be accessible to nonspecialists. Manuscripts are subject to substantial editing to achieve this goal. After acceptance, a copy editor may make further changes so that the text and figures are readable and clear to those outside the field, and so that papers conform to our style. Contributors are sent proofs and are welcome to discuss proposed changes with the editors, but *Nature Biotechnology* reserves the right to make the final decision about matters of style and the size of figures.

The editors also reserve the right to reject a paper even after it has been accepted if it becomes apparent that there are serious problems with the scientific content or with violations of our publishing policies.

Additional editorial policies can be found on the Nature journals joint policies page. This page includes information on manuscripts reviewed at other Nature journals, competing financial interests declarations, prepublication publicity, deposition of data as a condition of publication, availability of data and reagents after publication, human and animal subjects, digital image integrity, biosecurity, refutations, complaints and correction of mistakes in the journal, duplicate publication, confidentiality and plagiarism.

Submission of a signed competing financial interests statement is required for all content of the journal. This statement will be published at the end of all papers, whether or not a competing financial interest is reported. In cases where the authors declare a competing financial interest, a short statement to that effect is published at the end of article, which is linked to a more detailed version available online.

COSTS

There is a charge of $1,135.58 for the first color figure and $283.90 for each additional color figure. Extra pages are $332.20, beginning with the 6th page.

ADVANCE ONLINE PUBLICATION

Nature Biotechnology provides Advance Online Publication (AOP) of research articles, which benefits authors with an earlier publication date and allows our readers access to accepted papers several weeks before they appear in print. Note that papers published online are definitive and may be altered only through the publication of a print corrigendum or erratum, so authors should make every effort to ensure that the page proofs are correct. All AOP articles are given a unique digital object identifier (DOI) number, which can be used to cite the paper before print publication. For details, please see about advanced online publication.

COVERS AND OTHER ARTWORK

Authors of accepted papers are encouraged to submit images for consideration as a cover. Cover images are normally linked to a specific paper in that issue, but we may also be able to use other images elsewhere in the journal, such as on the table of contents. Illustrations are selected for their scientific interest and aesthetic appeal. Please send prints or electronic files (rather than slides) in the first instance. Please also include a clear and concise legend explaining the image.

PREPARING THE MANUSCRIPT

Nature Biotechnology is read by scientists from diverse backgrounds. In addition, many are not native English speakers. Authors should therefore give careful thought to how their findings may be communicated clearly. Although a shared basic knowledge of biology may be assumed, please bear in mind that the language and concepts that are standard in one subfield may be unfamiliar to nonspecialists. Thus, technical jargon should be avoided as far as possible and clearly explained where its use is unavoidable. Abbreviations, particularly those that are not standard, should also be kept to a minimum. The background, rationale and main conclusions of the study should be clearly explained. Titles and abstracts in particular should be written in language that will be readily intelligible to any scientist. We strongly recommend that authors ask a colleague with different expertise to review the manuscript before submission, in order to identify concepts and terminology that may present difficulties to nonspecialist readers.

The content types page describes the types of contributions that may be submitted to the journal, along with their length and figure limits. The journal's format requirements are described below.

Manuscripts reporting new structures should contain a table summarizing structural and refinement statistics. Templates for such tables describing NMR and X-ray crystallography data are available here. To facilitate assessment of the quality of the structural data, a stereo image of a portion of the electron density map (for crystallography papers) or of the superimposed lowest energy structures (>10; for NMR papers) should be provided with the submitted manuscript. If the reported structure represents a novel overall fold, a stereo image of the entire structure (as a backbone trace) should also be provided.

Please use American English spelling throughout.

Acknowledgments should be brief, and should not include thanks to anonymous referees and editors, or effusive comments. Grant or contribution numbers may be acknowledged. *Nature Biotechnology* requires an Author Contribution statement as described in the Authorship section of our joint editorial policies.

The Methods section should be written as concisely as possible but should contain all elements necessary to allow interpretation and replication of the results. As a guideline, Methods sections typically do not exceed 3,000 words. The Methods sections of all original research papers will appear in all online versions of the article.

Authors can deposit the step-by-step protocols used in their study to Protocol Exchange, an open resource maintained by NPG. Protocols deposited by the authors will be linked to the Online Methods section upon publication.

The Methods section should be subdivided by short bold headings referring to methods used and we encourage the inclusion of specific subsections for statistics, reagents and animal models. If further references are included in this section, the numbering should continue from the end of the last reference number in the rest of the paper and the list should accompany the additional Methods at the end of the paper.

The combined reference number in the main text, figure legends, tables and online Methods should not exceed 50.

References are numbered sequentially as they appear in the text, tables, figure legends and online Methods. Only one publication is given for each number, and footnotes are not used. Only papers that have been published or accepted by a named publication should be in the numbered list; meeting abstracts that are not published and papers in preparation should be mentioned in the text with a list of authors (or initials if any of the authors are co-authors of the present contribution). URLs for web sites should be cited parenthetically in the text, not in the reference list. Grant details and acknowledgments are not permitted as numbered references.

All authors should be included in reference lists unless there are more than five, in which case only the first author should be given, followed by '*et al.*'. Authors should be listed last name first, followed by a comma and initials of given names. Titles of cited articles are required for Articles,

Letters, Perspectives, Reviews and Features, but not for Commentaries, Brief Communications, News and Views, Patent Articles or Careers & Recruitment articles. Titles of articles should be in Roman text and titles of books in italics; the first word of the title is capitalized, the title written exactly as it appears in the work cited, ending with a period. Journal names are italicized and abbreviated (with periods) according to common usage; refer to Index Medicus for details. Volume numbers appear in bold. For book citations, the publisher and city of publication are required (e.g., John Wiley & Sons, Hoboken, New Jersey, USA, 2003).

Figure legends for Articles begin with a brief title for the whole figure and continue with a short description of each panel and the symbols used, focusing on describing what is shown in the figure and de-emphasizing methodological details. Each legend should total no more than 250 words. Brief Communications have short figure legends (generally less than 100 words), which may include details of methods.

GENE NOMENCLATURE

Authors should use approved nomenclature for gene symbols, and use symbols rather than italicized full names (*Ttn*, not *titin*). Please consult the appropriate nomenclature databases for correct gene names and symbols. A useful resource is Entrez Gene. Approved human gene symbols are provided by HUGO Gene Nomenclature Committee (HGNC), e-mail: hgnc@genenames.org; see also http://www.genenames.org/. Approved mouse symbols are provided by The Jackson Laboratory, e-mail: nomen@informatics.jax.org; see also http://www.informatics.jax.org/mgihome/nomen.

For proposed gene names that are not already approved, please submit the gene symbols to the appropriate nomenclature committees as soon as possible, as these must be deposited and approved before publication of an article.

Avoid listing multiple names of genes (or proteins) separated by a slash, as in '*Oct4/Pou5f1*', as this is ambiguous (it could mean a ratio, a complex, alternative names or different subunits). Use one name throughout and include the other at first mention: '*Oct4* (also known as *Pou5f1*)'.

LIFE SCIENCES REPORTING GUIDELINES

Authors of life sciences research papers that are sent for external review must include in their manuscripts relevant details about several elements of experimental and analytical design. These requirements aim to improve the transparency of reporting and the reproducibility of published results. They focus on elements of methodological information that are frequently poorly reported (see more details on these elements here). During peer review, authors will be asked to confirm that these elements are included in the manuscript by filling out a checklist that will be made available to the editors and reviewers.

PREPARING THE FIGURES

Authors are responsible for obtaining permission to publish any figures or illustrations that are protected by copyright, including figures published elsewhere and pictures taken by professional photographers. The journal cannot publish images downloaded from the internet without appropriate permission.

Figures should be uploaded upon submission via our online submission system, in one of our preferred formats, if possible. Please use the smallest file size that provides sufficient resolution, preferably less than 1 MB, so that referees do not have to download extremely large files. When a paper is accepted, the editors will request high-resolution files suitable for publication.

Unnecessary figures and parts (panels) of figures and tables should be avoided: data presented in small tables or histograms, for instance, can generally be stated briefly in the text instead. Figures should not contain more than one panel unless the parts are logically connected; each panel of a multipart figure should be sized so that the whole figure can be reduced by the same amount and reproduced on the printed page at the smallest size at which essential details are visible. When a manuscript is accepted for publication, we will ask for high-resolution figure files, possibly in a different electronic format. This information will be included in the acceptance letter.

Lettering on figures should be in Helvetica or Arial; if possible, the same typeface in approximately the same font size should be used for all figures in a paper. Use symbol font for Greek letters. Figures should be on a white background, and should avoid excessive boxing, unnecessary color, spurious decorative effects (such as three-dimensional 'skyscraper' histograms) and highly pixelated computer drawings. The vertical axis of histograms should not be truncated to exaggerate small differences. Labeling must be of sufficient size and contrast to be readable after appropriate reduction. The thinnest lines in the final figure should be no smaller than one point wide. Authors will see a proof of figures. Reasonable requests to enlarge figures will be considered, but editors will make the final decision on figure size.

Figures divided into parts should be labeled with a lower-case, bold a, b and so on, in the same typesize as used elsewhere in the figure. Lettering in figures should be in lower-case type, with only the first letter of each label capitalized. Units should have a single space between the number and the unit, and follow SI nomenclature (for example, ms rather than msec) or the nomenclature common to a particular field. Thousands should be separated by commas (1,000). Unusual units or abbreviations should be spelled out in full or defined in the legend. Scale bars should be used rather than magnification factors, with the length of the bar defined in the legend rather than on the bar itself. In general, please use visual cues rather than verbal explanations, such as "open red triangles," in the legend.

Authors are encouraged to consider the needs of colorblind readers (a substantial minority of the male population) when choosing colors for figures. Many colorblind readers cannot interpret visuals that rely on discrimination of green and red, for example. Thus, we ask authors to recolor green-and-red heatmaps, graphs and schematics for which colors are chosen arbitrarily. Recoloring primary data, such as fluorescence or rainbow pseudo-colored images, to color-safe combinations such as green and magenta, turquoise and red, yellow and blue or other accessible color palettes is strongly encouraged.

DIGITAL FIGURE GUIDELINES

Please read the digital images integrity and standards policy before preparing your figures. When possible, we prefer to use original digital figures to ensure the highest quality reproduction in the journal. When creating and submitting digital files, please follow the guidelines below.

Formats

For publication, we can only use .tif, .eps, .ai, .psd or PostScript (.ps) files in PC or Macintosh format, preferably from PhotoShop or Illustrator software. We cannot accept Freehand, Canvas, PowerPoint, CorelDRAW or MacDrawPro files; these files must be converted to PostScript (.ps) format. Note that .tif files created in Powerpoint have poor resolution (~96 d.p.i.) and cannot be used.

Chemical Structure Display Items

Figures that contain chemical structures should be produced using ChemDraw or a similar program. Authors using ChemDraw should use the preferences below, submitting the final files at 100% as.cdx and .eps files. For more information, please also review our Chemical Style Guide.

- Drawing settings: chain angle, 120° bond spacing, 18% of width; fixed length, 14.4 pt; bold width, 2.0 pt; line width, 0.6 pt; margin width 1.6 pt; hash spacing 2.5 pt.
- Atom Label settings; font, Arial; size 8 pt. "Show labels on Terminal Carbons" and "Hide Implicit Hydrogens" should be unchecked.

Resolution and figure quality

Figure files must be supplied at an appropriate resolution for publication:

- Color, 300 d.p.i. minimum; we prefer RGB for optimal rendering online
- Grayscale, 600 d.p.i. minimum for blots and black & white photographs
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