DEVELOPMENTAL BIOLOGY
An official journal of the Society for Developmental Biology

TABLE OF CONTENTS

- Description  p.1
- Audience  p.1
- Impact Factor  p.2
- Abstracting and Indexing  p.2
- Editorial Board  p.2
- Guide for Authors  p.5

DESCRIPTION

_Devolutional Biology_ (DB) publishes original research on mechanisms of _development_, _differentiation_, and _growth in animals and plants_ at the molecular, cellular, genetic and evolutionary levels. Areas of particular emphasis include transcriptional control mechanisms, embryonic patterning, cell-cell interactions, growth factors and signal transduction, and regulatory hierarchies in developing plants and animals.

Research Areas Include:

- Molecular genetics of development
- Control of gene expression
- Cell interactions and cell-matrix interactions
- Mechanisms of differentiation
- Growth factors and oncogenes
- Regulation of stem cell populations
- Evolution of developmental control
- Gametogenesis and fertilization

DB authors can choose among a selection of article types research papers, short communications, technical reports, resource papers, reviews and perspectives and benefit from academic editors who are practicing scientists, fast publication, no color figures or page charges, flexible publication (open access or subscription) and a vast readership with more than 3 million downloads a year.

Subscription articles published in _Developmental Biology_ will become accessible to non-subscribers 12 months after publication on _ScienceDirect_. SDB members benefit from immediate free online access to all published articles.

For queries please contact our editorial office at db@elsevier.com

AUDIENCE

Cell and Developmental biologists. Focuses on: mechanisms of development, differentiation, and growth in animals and plants.
IMPACT FACTOR

2016: 2.944 © Clarivate Analytics Journal Citation Reports 2017

ABSTRACTING AND INDEXING

Scopus
EMBiology
BIOBASE
Biological & Agricultural Index
Biological Abstracts
BIOSIS Previews
Chemical Abstracts
Current Awareness in Biological Sciences
Current Contents
Genetics Abstracts
MEDLINE®
Science Citation Index
EMBASE

EDITORIAL BOARD

Editor-in-Chief:
Marianne Bronner, California Institute of Technology, Pasadena, California, USA

Editors:
Blanche Capel, Duke University, Durham, North Carolina, USA
Claude Desplan, New York University, New York, New York, USA
Denis Duboule, University of Geneva and Federal Institute of Technology (EPFL), Lausanne, Switzerland
Matthew Gibson, Stowers Institute for Medical Research, Kansas City, Missouri, USA
Richard Harland, University of California at Berkeley, Berkeley, California, USA
Vivian Irish, Yale University, New Haven, USA
Philippe Soriano, Mount Sinai School of Medicine, New York, New York, USA
Deborah Yelon, University of California at San Diego (UCSD), La Jolla, California, USA

Past Editor:
E.H. Davidson †, California Institute of Technology, Pasadena, California, USA

Editorial Board:
Markus Affolter, Universität Basel, Basel, Switzerland
Detlev Arendt, European Molecular Biology Laboratory (EMBL), Heidelberg, Germany
Kristin Artinger, University of Colorado Denver, Aurora, Colorado, USA
Hans Bode, University of California at Irvine, Irvine, California, USA
Bruce Bowerman, University of Oregon, Eugene, Oregon, USA
Sarah Bray, University of Cambridge, Cambridge, England, UK
Alan Burns, UCL Great Ormond Street Institute of Child Health, London, England, UK
Samantha Butler, University of California at Los Angeles (UCLA), Los Angeles, USA
Yang Chai, University of Southern California, Los Angeles, California, USA
Ajay Chitnis, National Institute of Child Health and Human Development (NICHD), Bethesda, Maryland, USA
Ken Cho, University of California at Irvine, Irvine, California, USA
Cheng Ming Chuong, University of Southern California, Los Angeles, California, USA
David Clouthier, University of Colorado Denver, Aurora, Colorado, USA
Frank Conlon, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA
Simon Conway, Indiana University School of Medicine, Indianapolis, Indiana, USA
Frank Costantini, Columbia University Medical Center, New York, New York, USA
Karen Crawford, St. Mary's College of Maryland, St. Mary's City
Peter Currie, Monash University, Clayton, Victoria, Australia
Jacqueline Deschamps, Hubrecht Institute, Utrecht, Netherlands
Mary Dickinson, Baylor College of Medicine, Houston, Texas, USA
Susanne Dietrich, King's College London, London, UK
Andrew Dingwall, Loyola University Chicago, Maywood, Illinois, USA
Karen Downs, University of Wisconsin at Madison, Madison, Wisconsin, USA
Wolfgang Driever, Albert-Ludwigs-Universität Freiburg, Freiburg, Germany
Gregg Duester, Sanford Burnham Prebys, La Jolla, California, USA
Jonathan Epstein, University of Pennsylvania, Philadelphia, Pennsylvania, USA
Donna Fekete, Purdue University, West Lafayette, Indiana, USA
Richard Firtel, University of California at San Diego (UCSD), La Jolla, California, USA
Scott Fraser, University of Southern California, Los Angeles, California, USA
Laura Gammill, University of Minnesota, Minneapolis, Minnesota, USA
Andrew Groves, House Ear Institute, Los Angeles, California, USA
Anna Katerina Hadjantonakis, Memorial Sloan-Kettering Cancer Center, New York, New York, USA
Christine Hartmann, Westfälische Wilhelms-Universität Münster, Münster, Germany
Richard Harvey, Victor Chang Cardiac Research Institute, Sydney, New South Wales, Australia
Carl-Philipp Heisenberg, IST Austria, Klosterneuburg, Austria
Ali Hemmati-Brivanlou, Rockefeller University, New York, USA
Lothar Hennighausen, National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), Bethesda, Maryland, USA
Oliver Hobert, Columbia University, New York, New York, USA
Simon Hughes, King's College London, London, UK
Laurinda Jaffe, University of Connecticut Health Center, Farmington, Connecticut, USA
Rulang Jiang, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA
Jane Johnson, University of Texas Southwestern Medical Center, Dallas, Texas, USA
Randy Johnson, University of Texas, Houston, Texas, USA
Keith Thomas Jones, University of Southampton, Southampton, UK
Alexandra Joyner, Memorial Sloan-Kettering Cancer Center, New York, New York, USA
Vesa Kaartinen, University of Michigan, Ann Arbor, Michigan, USA
Ryoichiro Kageyama, Kyoto University, Kyoto, Japan
David Kimmelman, University of Washington, Seattle, Washington, USA
Hisato Kondoh, Osaka University, Osaka, Japan
Paul Krieg, University of Arizona College of Medicine, Tucson, Arizona, USA
Robb Krumlauf, Stowers Institute for Medical Research, Kansas City, Missouri, USA
Paul Kulesa, Institute for Medical Research, Kansas City, Missouri, USA
Justin Kumar, Indiana University, Bloomington, Indiana, USA
Kenro Kusumi, Arizona State University, Tempe, Arizona, USA
Carole LaBonne, Northwestern University, Evanston, Illinois, USA
Patrick Lemaire, Centre National de la Recherche Scientifique (CNRS), Montpellier cedex 5, France
Brian Link, Medical College of Wisconsin, Milwaukee, Wisconsin, USA
Melissa Little, Royal Children's Hospital Melbourne, Parkville, Victoria, Australia
Karen Liu, King’s College London, London, England, UK
Malcolm Logan, King’s College London, London, UK
Suzanne Mansour, The University of Utah, Salt Lake City, Utah, USA
Christophe Marcelle, Monash University, Clayton, Victoria, Australia
Ralph Marcucio, University of California at San Francisco (UCSF), San Francisco, California, USA
Benjamin Martin, Stony Brook University, Stony Brook, New York, USA
James Martin, Texas A&M Health Sciences Center, Houston, Texas, USA
Mark Martindale, University of Florida, St. Augustine, Florida, USA
Robert Maxson, University of Southern California, Los Angeles, California, USA
Roberto Mayor, University College London (UCL), London, UK
David McClay, Duke University, Durham, North Carolina, USA
Daniel Medeiros, University of Colorado Boulder, Boulder, Colorado, USA
Cathy Mendelsohn, Columbia University, New York, New York, USA
Alan Michelson, Harvard Medical School, Cambridge, Massachusetts, USA
Randall Moon, University of Washington, Seattle, Washington, USA
Xavier Neto, LNBio-Laboratório Nacional de Biociências, Campinas-SP, Brazil
Jennifer Nichols, University of Cambridge, Cambridge, UK
Lee Niswander, University of Colorado Health Sciences Center, Aurora, Colorado, USA
Elke Ober, University of Copenhagen, Copenhagen, Denmark
Michael O'Connor, University of Minnesota, Minneapolis, Minnesota, USA
Guillermo Oliver, Northwestern University Feinberg School of Medicine, Chicago, Illinois, USA
David Ornitz, Washington University School of Medicine, St Louis, Missouri, USA
Nipam Patel, University of California at Berkeley, Berkeley, California, USA
Tatjana Piotrowski, Stowers Institute for Medical Research, Kansas City, Missouri, USA
Steven Potter, Children’s Hospital Medical Center, Cincinnati, Ohio, USA
Olivier Pourquié, Harvard University, Cambridge, Massachusetts, USA
Victoria Prince, University of Chicago, Chicago, Illinois, USA
David Raible, University of Washington, Seattle, Washington, USA
Yi Rao, School of Life Sciences, Peking University, Beijing, China
Elizabeth Robertson, University of Oxford, Oxford, UK
Michael Rudnicki, OHRI, Ottawa, Canada
Gary Ruvkun, Massachusetts General Hospital, Boston, Massachusetts, USA
Alejandro Sánchez Alvarado, Stowers Institute for Medical Research, Kansas City, Missouri, USA
Makoto Sato, Kanazawa University, Ishikawa, Japan
Nori Satoh, Okinawa Inst. of Science & Tech., Okinawa, Japan
Andreas Schedl, Universite Nice-Sophia Antipolis, Nice, France
Alexander Schier, Harvard University, Cambridge, Massachusetts, USA
Thomas Schilling, University of California at Irvine, Irvine, California, USA
Gerhard Schlosser, National University of Ireland, Galway, Ireland
Robert Schulz, University of Notre Dame, Notre Dame, Indiana, USA
Lila Solnica-Krezel, Washington University School of Medicine, St Louis, Missouri, USA
Beatriz Sosa-Pineda, Northwestern University Feinberg School of Medicine, Chicago, Illinois, USA
Michelle Southard-Smith, Vanderbilt University Medical Center, Nashville, Tennessee, USA
Derek Stemple, The Sanger Institute, Hinxton, Cambridge, UK
Claudio Stern, University College London (UCL), London, UK
Andrea Streit, King's College London, London, UK
Xin Sun, University of Wisconsin at Madison, Madison, Wisconsin, USA
Lori Sussel, Columbia University
Cliff Tabin, Harvard Medical School, Boston, USA
Yoshiko Takahashi, Kyoto University, Kyoto, Japan
Patrick Tam, The University of Sydney, Wentworthville, New South Wales, Australia
Miguel Torres, Centro Nacional de Investigaciones Cardiovasculares (CNIC), Madrid, Spain
Paul Trainor, Stowers Institute for Medical Research, Kansas City, Missouri, USA
Mark Van Doren, Johns Hopkins University, Baltimore, Maryland, USA
Jean-Paul Vincent, The Francis Crick Institute, London, England, UK
Tailia Volk, Weizmann Institute of Science, Rehovot, Israel
John Wallingford, University of Texas at Austin, Austin, Texas, USA
Deneen Wellik, University of Michigan Medical School, Ann Arbor, Michigan, USA
Carol Wicking, University of Queensland, St Lucia, Queensland, Australia
Christopher Wright, Vanderbilt University School of Medicine, Nashville, Tennessee, USA
Joseph Yost, The University of Utah, Salt Lake City, Utah, USA
Katherine Yutzey, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA
Yimin Zou, UC San Diego, La Jolla, California, USA
GUIDE FOR AUTHORS

Your Paper Your Way
We now differentiate between the requirements for new and revised submissions. You may choose to submit your manuscript as a single Word or PDF file to be used in the refereeing process. Only when your paper is at the revision stage, will you be requested to put your paper in to a 'correct format' for acceptance and provide the items required for the publication of your article.
To find out more, please visit the Preparation section below.

Introduction and article types
Scientific Guidelines for Authors submitting to Developmental Biology

Developmental Biology’s goal is to publish high quality papers providing causal insight into the cellular and molecular mechanisms that govern developmental processes.

Studies which simply confirm an established functional role for a developmental component by presenting analysis in a new species lack sufficient novelty for consideration. Descriptive studies will only be considered if/when they represent a timely and novel insights or resources to the field.

The following article types are available for authors:

Original Research Papers

Developmental Biology seeks to publish only the very best papers that contribute new information to our understanding of developmental mechanisms. We require that manuscripts specifically address biological relevance and conform to the following guidelines:

Expression profiling and gene expression studies must contain supporting functional data. Studies solely based on analysis of expression by microarray, northern blots, PCR or in situ hybridization that are too descriptive or preliminary would not justify full review.

Developmental Biology is pleased to publish classical experimental embryology papers that provide unusual new insights.

Experiments using interfering DNA or proteins to address gene function are expected to be highly controlled. In particular, experiments with Morpholino, RNAi, siRNA or dominant negative constructs are expected to contain very precise controls to address the specificity of the effects observed.

Studies in which the expression, structure or function of a gene/protein is altered but leads to no phenotypic consequences are not appropriate. Furthermore, studies of mutants which simply show that a gene/protein is required for development will be discouraged unless attempts are made to address the mechanistic basis, causal roles or tissues and processes affected.

Experiments using stem cells must advance our understanding of biological functioning. Studies that simply grow/isolate stem cells from a tissue and show what markers they express are not appropriate.

Studies using cell culture must show direct (in vivo) relevance in a developmental context.

Resource Papers

Resource papers are original research papers which provide important and timely information that will have an impact on the work of developmental biologists. Examples of such papers are studies describing novel spatial gene expression patterns and gene phylogeny, new model systems or containing a usable collection of data of particular value to the field. This would not include, for example, a description of the expression pattern of a gene in one species that has already been described in another species, or an expression pattern with no obvious link to a developmental process.
Please note, authors submitting a Resource Paper should select "Research Paper" article type and designate "Resource" under Manuscript Category in Additional Information (step 3 of submission). No specific formatting restrictions are applied to Resource papers; however, we encourage authors to prepare succinct descriptions, so to have Resource papers as readily usable references for scientists.

**Short Communications**

Short communications are intended to provide quick publication of good impact results, thus portraying current advances in the field of Developmental Biology. This new format of paper in DB should contain approximately four figures and a single scientific conclusion. Although there is no specific word limit, typical short communications are in the range of 2,000-3,000 words.

**Review Articles**

Review articles are intended to reach a broad audience of readers from investigators in the field to new graduate students learning the material for the first time. We encourage submissions of review articles on established topics in the field but also on timely and provocative areas of research. Review Articles are by invitation; scientists who wish to contribute a review should send a pre-submission inquiry to one of the editors.

**Opinion papers (DB Perspectives)**

This article type is intended to raise new ideas and challenge current dogma. An abstract is still required but the format is flexible. Perspectives are subject to the same review process as original papers, but may receive expedited consideration.

**Technical Notes (DB Methods)**

Technical notes provide a space for protocols and technologies that advance the field of Developmental Biology. Novel solutions and applications of technologies at the frontier with other areas of science will be considered of particular importance. No specific formatting requirements are applied to these articles, protocols are encouraged as long as an appropriate introductory background and aim of the technique and representative images are included.

**Commentary**

DB accepts commentaries on newly published articles of particular relevance to the developmental biology field. Commentaries should provide an insightful perspective on a topic just published in a journal by discussing the context, existing problems and/or implications of a new finding. A commentary may also speculate on future directions of a certain topic and may include a personal opinion. Commentaries should be no longer than 2000 words and should not contain an abstract.

**Key resources table**

We encourage authors to submit a key resources table during submission. The Key Resources Table serves to highlight materials and resources (including genetically modified organisms and strains, cell lines, reagents, software, experimental models, and original source data for computational studies) essential to reproduce results presented in the manuscript. Literature listed in the Key Resources Table must be included in the References list. We highly recommend using RRIDs (see https://scicrunch.org/resources) as the identifier for antibodies and model organisms in the Key Resources Table. Please do not add custom headings or subheadings to the Key Resources Table. Please download and fill out this [template](#). The Key Resources Table should be referenced at the end of the Materials & Methods section and uploaded as a separate file in the submission process.

**Supplementary data**

Developmental Biology supports the presentation of all experimental data in its final published articles online and in print. For this reason word length and figure numbers are not restricted (except for Short Communications) and supplementary data are generally not supported.
For large datasets such as microarrays, RNA-seq, ChIP-seq, proteomic analysis, etc. whose publication would be impossible within a regular article, Developmental Biology offers its authors the possibility to submit these data and their description as a companion paper to Data in Brief. See appropriate paragraph below for explanation.

**Contact details for submission**
Articles for Developmental Biology should be submitted via the journal online submission system

Customer support is available 24/7:

Please use our help site at: http://service.elsevier.com/. Here you will be able to learn more about the online submission system via interactive tutorials, explore a range of problem solutions via our knowledgebase, and find answers to frequently asked questions. You will also find our 24/7 support contact details should you need any assistance from one of our customer service representatives.

For questions on the reviewing and submission process please contact the Developmental Biology Editorial Office at: DB@elsevier.com

For publishing queries please contact Dr. Valentina Sasselli, Publisher for Cell Biology at Elsevier: v.sasselli@elsevier.com

**BEFORE YOU BEGIN**

**Ethics in publishing**
Please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.

**Declaration of interest**
All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work. Examples of potential conflicts of interest include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding. Authors must disclose any interests in two places: 1. A summary declaration of interest statement in the title page file (if double-blind) or the manuscript file (if single-blind). If there are no interests to declare then please state this: 'Declarations of interest: none'. This summary statement will be ultimately published if the article is accepted. 2. Detailed disclosures as part of a separate Declaration of Interest form, which forms part of the journal's official records. It is important for potential interests to be declared in both places and that the information matches. More information.

**Submission declaration and verification**
Submission of an article implies that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis, see 'Multiple, redundant or concurrent publication' for more information), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, your article may be checked by the originality detection service Crossref Similarity Check.

**Preprints**
Please note that preprints can be shared anywhere at any time, in line with Elsevier's sharing policy. Sharing your preprints e.g. on a preprint server will not count as prior publication (see 'Multiple, redundant or concurrent publication' for more information).

**Changes to authorship**
Authors are expected to consider carefully the list and order of authors before submitting their manuscript and provide the definitive list of authors at the time of the original submission. Any addition, deletion or rearrangement of author names in the authorship list should be made only before the manuscript has been accepted and only if approved by the journal Editor. To request such a change, the Editor must receive the following from the corresponding author: (a) the reason for the change in author list and (b) written confirmation (e-mail, letter) from all authors that they agree with the addition, removal or rearrangement. In the case of addition or removal of authors, this includes confirmation from the author being added or removed.
Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors **after** the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum.

**Article transfer service**
This journal is part of our Article Transfer Service. This means that if the Editor feels your article is more suitable in one of our other participating journals, then you may be asked to consider transferring the article to one of those. If you agree, your article will be transferred automatically on your behalf with no need to reformat. Please note that your article will be reviewed again by the new journal. [More information.]

**Copyright**
Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' ([see more information](#)) on this. An e-mail will be sent to the corresponding author confirming receipt of the manuscript together with a 'Journal Publishing Agreement' form or a link to the online version of this agreement.

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. **Permission** of the Publisher is required for resale or distribution outside the institution and for all other derivative works, including compilations and translations. If excerpts from other copyrighted works are included, the author(s) must obtain written permission from the copyright owners and credit the source(s) in the article. Elsevier has [preprinted forms](#) for use by authors in these cases.

For gold open access articles: Upon acceptance of an article, authors will be asked to complete an 'Exclusive License Agreement' ([more information](#)). Permitted third party reuse of gold open access articles is determined by the author's choice of [user license](#).

**Author rights**
As an author you (or your employer or institution) have certain rights to reuse your work. [More information.]

[Elsevier supports responsible sharing](#)
Find out how you can [share your research](#) published in Elsevier journals.

**Role of the funding source**
You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s), if any, in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. If the funding source(s) had no such involvement then this should be stated.

**Funding body agreements and policies**
Elsevier has established a number of agreements with funding bodies which allow authors to comply with their funder's open access policies. Some funding bodies will reimburse the author for the gold open access publication fee. Details of [existing agreements](#) are available online.

**Open access**
This journal offers authors a choice in publishing their research:

**Subscription**
- Articles are made available to subscribers as well as developing countries and patient groups through our [universal access programs](#).
- No open access publication fee payable by authors.
- The Author is entitled to post the [accepted manuscript](#) in their institution’s repository and make this public after an embargo period (known as green Open Access). The [published journal article](#) cannot be shared publicly, for example on ResearchGate or Academia.edu, to ensure the sustainability of peer-reviewed research in journal publications. The embargo period for this journal can be found below.

**Gold open access**
- Articles are freely available to both subscribers and the wider public with permitted reuse.
- A gold open access publication fee is payable by authors or on their behalf, e.g. by their research funder or institution.
Regardless of how you choose to publish your article, the journal will apply the same peer review criteria and acceptance standards.

For gold open access articles, permitted third party (re)use is defined by the following Creative Commons user licenses:

**Creative Commons Attribution (CC BY)**
Let others distribute and copy the article, create extracts, abstracts, and other revised versions, adaptations or derivative works of or from an article (such as a translation), include in a collective work (such as an anthology), text or data mine the article, even for commercial purposes, as long as they credit the author(s), do not represent the author as endorsing their adaptation of the article, and do not modify the article in such a way as to damage the author's honor or reputation.

**Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)**
For non-commercial purposes, lets others distribute and copy the article, and to include in a collective work (such as an anthology), as long as they credit the author(s) and provided they do not alter or modify the article.

The gold open access publication fee for this journal is **USD 2350**, excluding taxes. Learn more about Elsevier's pricing policy: [https://www.elsevier.com/openaccesspricing](https://www.elsevier.com/openaccesspricing).

**Green open access**
Authors can share their research in a variety of different ways and Elsevier has a number of green open access options available. We recommend authors see our [green open access page for further information](https://www.elsevier.com/about/open-access-and-sustainability/open-access-philosophy-and-principles). Authors can also self-archive their manuscripts immediately and enable public access from their institution's repository after an embargo period. This is the version that has been accepted for publication and which typically includes author-incorporated changes suggested during submission, peer review and in editor-author communications. Embargo period: For subscription articles, an appropriate amount of time is needed for journals to deliver value to subscribing customers before an article becomes freely available to the public. This is the embargo period and it begins from the date the article is formally published online in its final and fully citable form. [Find out more.](https://www.elsevier.com/about/open-access-and-sustainability/open-access-principles)

This journal has an embargo period of 12 months.

**Language (usage and editing services)**
Please write your text in good English (American or British usage is accepted, but not a mixture of these). Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English may wish to use the English Language Editing service available from Elsevier's WebShop.

**Referees**
Please submit the names and institutional e-mail addresses of several potential referees. For more details, visit our [Support site](https://www.elsevier.com/locate/ydbio). Note that the editor retains the sole right to decide whether or not the suggested reviewers are used.

**Additional information**

**Cover Submissions**
Color figures for exclusive use as cover illustrations are invited from all the authors of accepted manuscripts. Such illustrations do not need to relate to the manuscript but should relate to the larger scope and focus of Developmental Biology and can be high quality reproductions of figures as well as modified images of aesthetic value. The editors may decide on the best cover image based on image quality and content of the study.

Cover image-related articles will be provided with free promotional access for 3 months and showcased in the journal home page and social media. In addition, a high resolution image (.tiff) of the cover will also be available for download on the Developmental Biology [Cover of the week page](https://www.elsevier.com/locate/ydbio).

Cover images can be provided in either of the following formats: TIFF image, in RGB mode, with a minimum resolution of 300 dpi. JPEG image, in RGB mode, with a minimum resolution of 500 dpi.

A legend of 100 or fewer words should accompany each image and appropriate credits and copyright permission indicated.
Please submit cover images for consideration directly to the journal mailbox db@elsevier.com. For large size files please use a web-based file hosting service.

Copyright of the cover image will remain with the author/creator, who will be asked to complete a nonexclusive license to re-use the image. A copy of this license can be downloaded here.

Materials
Publication of a research article in Developmental Biology is taken to imply that the authors are prepared to distribute all non-commercially obtained materials used in the experiments (e.g. cells, DNA, antibodies, primary data), to other academic researchers for their own use or for verification. All nucleic acid and protein sequences must have been deposited in the appropriate databases and the Accession Numbers cited in the paper.

Data from microarray and other similar screens:
Please see the MGED open letter specifying microarray standards at http://www.mged.org/Workgroups/MIAME/miame_checklist.html. Authors submitting manuscripts relying on microarray or similar screens must supply the data as Supplementary data (see below) at the time of submission, along with the completed MIAME checklist. The data must be MIAME-compliant and supplied in a form that is widely accessible. The microarray data must also be submitted to either the GEO (http://www.ncbi.nlm.nih.gov/geo/) or ArrayExpress (http://www.ebi.ac.uk/arrayexpress/) databases, with accession numbers at or before acceptance of the paper for publication. The editors understand that on occasion authors may not feel it appropriate to deposit the entire data set at the time of publication of this paper. We are therefore willing to consider exceptions to this requirement in response to a request from the authors, which must be made at the time of initial submission or as part of an informal pre-submission enquiry.

Mouse Gene Expression Data
Upon acceptance of the manuscript for publication in DB, authors reporting mouse gene expression data from RNA in situ hybridization, immunohistochemistry, Northern blot, Western blot and RT-PCR experiments are requested to submit pertinent data to the Mouse Gene Expression Database (GXD). These data submissions will receive accession numbers that may then be inserted into the manuscript. Please see GXD’s guidelines for electronic data submission at http://www.informatics.jax.org/mgihome//GXD/GEN/gxd_submission_guidelines.shtml.

Gene and protein nomenclature
The journal supports the use of the official nomenclature for genes and proteins and discourages the use of outdated and incorrectly formatted names and symbols. To this end, we encourage authors before submission to confirm the current official name and/or symbol for all genes and proteins mentioned in their articles following the guidelines listed in the following online resources:

Arabidopsis: The Arabidopsis Information Resource (TAIR) - nomenclature guidelines
Chicken: Chicken Gene Nomenclature Consortium (CGNC)
Drosophila: FlyBase - nomenclature guidelines
Human: Human Gene Nomenclature Committee (HUGO)
Mouse: Mouse Genome Informatics (MGI) - Mouse nomenclature guidelines
Nematodes: WormBase - nomenclature guidelines
Rat: Rat Genome Database (RGD) - Rat nomenclature guidelines
Xenopus: Xenbase - Xenopus nomenclature guidelines
Yeast: Saccharomyces Genome Database (SGD) - nomenclature guidelines
Zebrafish: ZFIN - Zebrafish nomenclature guidelines

US National Institutes of Health (NIH) posting ("Public Access") policy
As a service to our authors, Elsevier will deposit to PubMed Central (PMC) author manuscripts on behalf of Elsevier authors reporting NIH funded research. This service is a continuation of Elsevier's 2005 agreement with the NIH when the NIH introduced their voluntary 'Public Access Policy'. See http://www.elsevier.com/about/open-science/open-access/agreements/elsevier-nih-policy-statement.

Access to non-subscribers 12 months after publication
Elsevier is pleased to announce that all articles published in Developmental Biology are accessible to non-subscribers 12 months after publication via ScienceDirect (http://www.sciencedirect.com/science/journal/00121606).

Policy for Wellcome Trust funded authors

PREPARATION

NEW SUBMISSIONS
Submission to this journal proceeds totally online and you will be guided stepwise through the creation and uploading of your files. The system automatically converts your files to a single PDF file, which is used in the peer-review process.
As part of the Your Paper Your Way service, you may choose to submit your manuscript as a single file to be used in the refereeing process. This can be a PDF file or a Word document, in any format or layout that can be used by referees to evaluate your manuscript. It should contain high enough quality figures for refereeing. If you prefer to do so, you may still provide all or some of the source files at the initial submission. Please note that individual figure files larger than 10 MB must be uploaded separately.

References
There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct.

Formatting Requirements
There are no strict formatting requirements but all manuscripts must contain the essential elements needed to convey your manuscript, for example Abstract, Keywords, Introduction, Materials and Methods, Results, Conclusions, Artwork and Tables with Captions.
If your article includes any Videos and/or other Supplementary material, this should be included in your initial submission for peer review purposes.
Divide the article into clearly defined sections. It is not necessary to format your manuscript in double column layout, even if the journal has a double column layout. Please note that the instructions related to Abstract, Graphical abstract & Keywords still apply to all new submissions.

Peer review
This journal operates a single blind review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of two independent expert reviewers to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. More information on types of peer review.

REVISED SUBMISSIONS
Use of word processing software
Regardless of the file format of the original submission, at revision you must provide us with an editable file of the entire article. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier). See also the section on Electronic artwork.
To avoid unnecessary errors you are strongly advised to use the 'spell-check' and 'grammar-check' functions of your word processor.

**Article structure**

**Introduction**
State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

**Material and methods**
Provide sufficient details to allow the work to be reproduced by an independent researcher. Methods that are already published should be summarized, and indicated by a reference. If quoting directly from a previously published method, use quotation marks and also cite the source. Any modifications to existing methods should also be described.

**Results**
Results should be clear and concise.

**Discussion**
This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

**Conclusions**
The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

**Essential title page information**
- **Title.** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
- **Author names and affiliations.** Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.
- **Corresponding author.** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.
- **Present/permanent address.** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

**Abstract**
A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

**Graphical abstract**
Although a graphical abstract is optional, its use is encouraged as it draws more attention to the online article. The graphical abstract should summarize the contents of the article in a concise, pictorial form designed to capture the attention of a wide readership. Graphical abstracts should be submitted as a separate file in the online submission system. Image size: Please provide an image with a minimum of 531 × 1328 pixels (h × w) or proportionally more. The image should be readable at a size of 5 × 13 cm using a regular screen resolution of 96 dpi. Preferred file types: TIFF, EPS, PDF or MS Office files. You can view Example Graphical Abstracts on our information site. Authors can make use of Elsevier's Illustration Services to ensure the best presentation of their images and in accordance with all technical requirements.
**Highlights**  
Highlights are mandatory for this journal. They consist of a short collection of bullet points that convey the core findings of the article and should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point). You can view example Highlights on our information site.

**Keywords**  
Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

**Acknowledgements**  
Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

**Formatting of funding sources**  
List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, please include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Artwork**  

**Image manipulation**  
Whilst it is accepted that authors sometimes need to manipulate images for clarity, manipulation for purposes of deception or fraud will be seen as scientific ethical abuse and will be dealt with accordingly. For graphical images, this journal is applying the following policy: no specific feature within an image may be enhanced, obscured, moved, removed, or introduced. Adjustments of brightness, contrast, or color balance are acceptable if and as long as they do not obscure or eliminate any information present in the original. Nonlinear adjustments (e.g. changes to gamma settings) must be disclosed in the figure legend.

**Electronic artwork**  

**General points**  
• Make sure you use uniform lettering and sizing of your original artwork.  
• Preferred fonts: Arial (or Helvetica), Times New Roman (or Times), Symbol, Courier.  
• Number the illustrations according to their sequence in the text.  
• Use a logical naming convention for your artwork files.  
• Indicate per figure if it is a single, 1.5 or 2-column fitting image.  
• For Word submissions only, you may still provide figures and their captions, and tables within a single file at the revision stage.  
• Please note that individual figure files larger than 10 MB must be provided in separate source files.  
A detailed guide on electronic artwork is available.

**You are urged to visit this site; some excerpts from the detailed information are given here.**  

**Formats**  
Regardless of the application used, when your electronic artwork is finalized, please 'save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):

- EPS (or PDF): Vector drawings. Embed the font or save the text as 'graphics'.
- TIFF (or JPG): Color or grayscale photographs (halftones): always use a minimum of 300 dpi.
TIFF (or JPG): Bitmapped line drawings: use a minimum of 1000 dpi.
TIFF (or JPG): Combinations bitmapped line/half-tone (color or grayscale): a minimum of 500 dpi is required.

**Please do not:**
- Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); the resolution is too low.
- Supply files that are too low in resolution.
- Submit graphics that are disproportionately large for the content.

**Color artwork**
Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF) or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) in addition to color reproduction in print. [Further information on the preparation of electronic artwork.](#)

**Figure captions**
Ensure that each illustration has a caption. A caption should comprise a brief title (**not** on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

**References**

**Citation in text**
Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

**Web references**
As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

**Data references**
This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

**References in a special issue**
Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

**Reference management software**
Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles, such as Mendeley and Zotero, as well as EndNote. Using the word processor plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide.

Users of Mendeley Desktop can easily install the reference style for this journal by clicking the following link:

When preparing your manuscript, you will then be able to select this style using the Mendeley plug-ins for Microsoft Word or LibreOffice.
Reference

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. If you do wish to format the references yourself they should be arranged according to the following examples:

For reference style 1 numbered:


For reference style 1a numbered without article and chapter titles:


For reference style 2 Harvard:


For reference style 3 Vancouver Numbered:


For reference style 4 Vancouver Name and Year:


For reference style 5 APA:


For reference style 6 AMA:


Journal abbreviations source
Journal names should be abbreviated according to the List of Title Word Abbreviations.

Video

Elsevier accepts video material and animation sequences to support and enhance your scientific research. Authors who have video or animation files that they wish to submit with their article are strongly encouraged to include links to these within the body of the article. This can be done in the same way as a figure or table by referring to the video or animation content and noting in the body text where it should be placed. All submitted files should be properly labeled so that they directly relate to the video file's content. In order to ensure that your video or animation material is directly usable, please provide the file in one of our recommended file formats with a preferred maximum size of 150 MB per file, 1 GB in total. Video and animation files supplied will be published online in
the electronic version of your article in Elsevier Web products, including ScienceDirect. Please supply 'stills' with your files: you can choose any frame from the video or animation or make a separate image. These will be used instead of standard icons and will personalize the link to your video data. For more detailed instructions please visit our video instruction pages. Note: since video and animation cannot be embedded in the print version of the journal, please provide text for both the electronic and the print version for the portions of the article that refer to this content.

AudioSlides
The journal encourages authors to create an AudioSlides presentation with their published article. AudioSlides are brief, webinar-style presentations that are shown next to the online article on ScienceDirect. This gives authors the opportunity to summarize their research in their own words and to help readers understand what the paper is about. More information and examples are available. Authors of this journal will automatically receive an invitation e-mail to create an AudioSlides presentation after acceptance of their paper.

Data visualization
Include interactive data visualizations in your publication and let your readers interact and engage more closely with your research. Follow the instructions here to find out about available data visualization options and how to include them with your article.

Supplementary material
Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.

Research data
This journal encourages and enables you to share data that supports your research publication where appropriate, and enables you to interlink the data with your published articles. Research data refers to the results of observations or experimentation that validate research findings. To facilitate reproducibility and data reuse, this journal also encourages you to share your software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Below are a number of ways in which you can associate data with your article or make a statement about the availability of your data when submitting your manuscript. If you are sharing data in one of these ways, you are encouraged to cite the data in your manuscript and reference list. Please refer to the "References" section for more information about data citation. For more information on depositing, sharing and using research data and other relevant research materials, visit the research data page.

Data linking
If you have made your research data available in a data repository, you can link your article directly to the dataset. Elsevier collaborates with a number of repositories to link articles on ScienceDirect with relevant repositories, giving readers access to underlying data that gives them a better understanding of the research described.

There are different ways to link your datasets to your article. When available, you can directly link your dataset to your article by providing the relevant information in the submission system. For more information, visit the database linking page.

For supported data repositories a repository banner will automatically appear next to your published article on ScienceDirect.

In addition, you can link to relevant data or entities through identifiers within the text of your manuscript, using the following format: Database: xxxx (e.g., TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).
Mendeley Data
This journal supports Mendeley Data, enabling you to deposit any research data (including raw and processed data, video, code, software, algorithms, protocols, and methods) associated with your manuscript in a free-to-use, open access repository. During the submission process, after uploading your manuscript, you will have the opportunity to upload your relevant datasets directly to Mendeley Data. The datasets will be listed and directly accessible to readers next to your published article online.

For more information, visit the Mendeley Data for journals page.

Data in Brief
You have the option of converting any or all parts of your supplementary or additional raw data into one or multiple data articles, a new kind of article that houses and describes your data. Data articles ensure that your data is actively reviewed, curated, formatted, indexed, given a DOI and publicly available to all upon publication. You are encouraged to submit your article for Data in Brief as an additional item directly alongside the revised version of your manuscript. If your research article is accepted, your data article will automatically be transferred over to Data in Brief where it will be editorially reviewed and published in the open access data journal, Data in Brief. Please note an open access fee of 500 USD is payable for publication in Data in Brief. Full details can be found on the Data in Brief website. Please use this template to write your Data in Brief.

Data statement
To foster transparency, we encourage you to state the availability of your data in your submission. This may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you will have the opportunity to indicate why during the submission process, for example by stating that the research data is confidential. The statement will appear with your published article on ScienceDirect. For more information, visit the Data Statement page.

Submission checklist
The following list will be useful during the final checking of an article prior to sending it to the journal for review. Please consult this Guide for Authors for further details of any item.

Ensure that the following items are present:
One author has been designated as the corresponding author with contact details:
• E-mail address
• Full postal address
• Telephone
All necessary files have been uploaded, and contain:
• Keywords
• All figure captions
• All tables (including title, description, footnotes)
Further considerations
• Manuscript has been 'spell-checked' and 'grammar-checked'
• All references mentioned in the Reference list are cited in the text, and vice versa
• Permission has been obtained for use of copyrighted material from other sources (including the Web)
• If only color on the Web is required, black-and-white versions of the figures are also supplied for printing purposes
For any further information please visit our customer support site at http://support.elsevier.com.

AFTER ACCEPTANCE
Online proof correction
Corresponding authors will receive an e-mail with a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to MS Word: in addition to editing text, you can also comment on figures/tables and answer questions from the Copy Editor. Web-based proofing provides a faster and less error-prone process by allowing you to directly type your corrections, eliminating the potential introduction of errors.
If preferred, you can still choose to annotate and upload your edits on the PDF version. All instructions for proofing will be given in the e-mail we send to authors, including alternative methods to the online version and PDF.
We will do everything possible to get your article published quickly and accurately. Please use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables and figures. Significant changes to the article as accepted for publication will only be considered at this
stage with permission from the Editor. It is important to ensure that all corrections are sent back to us in one communication. Please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility.

**Offprints**
The corresponding author will, at no cost, receive a customized Share Link providing 50 days free access to the final published version of the article on ScienceDirect. The Share Link can be used for sharing the article via any communication channel, including email and social media. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Both corresponding and co-authors may order offprints at any time via Elsevier's Webshop. Corresponding authors who have published their article gold open access do not receive a Share Link as their final published version of the article is available open access on ScienceDirect and can be shared through the article DOI link.

**Distribution of Material**
Authors who publish a research article in *Developmental Biology* must be prepared to freely distribute to academic researchers for their own use any cell lines, DNA clones, monoclonal antibodies, or genetically engineered mice described in the article. All genetic-sequence information published in *Developmental Biology* must also be deposited with GenBank or the EMBL Database Library.

**AUTHOR INQUIRIES**
Visit the Elsevier Support Center to find the answers you need. Here you will find everything from Frequently Asked Questions to ways to get in touch. You can also check the status of your submitted article or find out when your accepted article will be published.

© Copyright 2018 Elsevier | https://www.elsevier.com