

The Journal of Experimental Biology

EDITED BY
J. E. TREHERNE

WITH W. A. FOSTER & P. K. SCHOFIELD

REVIEW VOLUME

Cellular Oscillators

A discussion meeting organized by
M. J. Berridge, P. E. Rapp & J. E. Treherne
presented at Titisee, 22-24 March 1979

EDITORIAL ADVISORY BOARD

R. MCNEILL ALEXANDER	C. R. HOUSE	R. M. PITMAN
M. BURROWS	S. B. KATER	K. SCHMIDT-NEILSEN
P. D. EVANS	M. J. LIGHTHILL	G. SHELTON
E. FLOREY	A. MICHELSEN	R. H. STOBART
C. H. FRASER ROWELL	J. PALKA	N. SUGA
G. A. HORRIDGE	Y. PICHON	J. W. TRUMAN

The Company of Biologists Limited is a non-profit-making organization whose members are active professional biologists. The Company, which was founded in 1925, is the owner of this and other journals which are printed and published by Cambridge University Press.

Copyright and Reproduction. Authors may make copies of their own papers in this journal without seeking permission from the Company of Biologists Limited, *provided that such copies are for free distribution only: they must not be sold.*

Authors may re-use their own illustrations in other publications appearing under their own name, without seeking permission.

For all other matters relating to the reproduction of copyright material written application must be made to Dr R. J. Skaer, Company Secretary, Company of Biologists Limited, Department of Zoology, Downing Street, Cambridge CB2 3EJ, U.K.

ISI Tear Service, 325 Chestnut Street, Philadelphia, Pennsylvania 19106, U.S.A. is authorized to supply single copies of separate articles for private use only.

Subscriptions. *The Journal of Experimental Biology* is published as six volumes a year in February, April, June, August, October and December. The subscription price of volumes 78-83 (1979) is £50.00 (U.S.A. and Canada US \$115.00) per annum, payable in advance; postage is included. Individual volumes may be purchased at £10.00 (U.S.A. and Canada US \$23.00) each, plus postage. Orders may be sent to any bookseller or subscription agent or direct to the publishers: Cambridge University Press, P.O. Box 110, Cambridge CB2 3RL, or in the U.S.A. and Canada, to Cambridge University Press, 32 East 57th Street, New York, N.Y. 10022. Copies of the journal for subscribers in the U.S.A. and Canada are sent by air to New York to arrive with minimum delay. Second class postage paid at New York, N.Y.

Claims for missing parts can only be considered if made immediately upon receipt of the subsequent issue.

Back Volumes. Vols. 1-21: Enquiries should be sent to Johnson Reprint Co. Ltd, 24-28 Oval Road, London N.W.1. Vols. 22 onwards are available from Cambridge University Press at £30.00 each for volumes 22-65 and £10.00 each for volumes 66-77.

Index. An annual index will appear in the last volume each year.

The Society for Experimental Biology has, since its foundation in 1924, been associated with the Company of Biologists Ltd. The Society holds Conferences four times a year at which the results of experimental investigations are presented and discussed. Enquiries about membership of the Society should be made to: The Secretary, Society for Experimental Biology, Harvest House, 62 London Road, Reading RG1 5AS, England.

All communications should be addressed to the Editor,
The Journal of Experimental Biology, Department of Zoology,
Downing Street, Cambridge CB2 3EJ, England.

MANUSCRIPTS

Authors are requested to present their work in as *concise* a form as possible. Two copies of MSS must be submitted, together with five copies of an abstract (see below). The text should be *typewritten* (double-spaced) on one side only of the paper, and the pages numbered. *Tables* and *Legends* should be numbered and on separate sheets: their position in the text should be indicated in the margin of the MS. Bibliography should be given under the heading of 'References' and in the following form: surname of authors (in alphabetical order), initials, date of publication, title of paper, title of journal (abbreviated according to the *World List of Scientific Periodicals*), volume and pages of references (*first and last*). In the text a reference must be quoted by the author's name and the date (in brackets). Every paper must contain a short and concise *Summary* of the chief results of the enquiry, to be placed before the *Introduction*. *Short Communications* may be accepted. These will not be preliminary reports and must contain, in not more than four published pages, an original contribution to the literature.

ILLUSTRATIONS

Line blocks should be used wherever possible. Text half-tone blocks should only be used when it is essential to show depth of shading. Plates will only be accepted for essential illustrations in which the most accurate reproduction of fine detail is called for, such as photomicrographs.

Illustrations, including half-tones and plates, should be assigned figure numbers. Their desired position in the text should be indicated in the MS.

Authors are asked not to submit sheets of illustrations which are of more than foolscap size or, if this cannot be avoided, to include photographic reductions to be sent to referees.

(i) *Line blocks*. Pen drawings should be in Indian ink (*jet black and waterproof*) on smooth white Bristol board, heavy drawing paper or good quality tracing paper. Drawings must not be folded or creased. Where a drawing is labelled, *the label lines should be drawn in black but the lettering should be put in lightly with a soft blue pencil*. Where considerable reduction is required it is essential that the drawing be able to bear such reduction. *All brush work, tinting or pencil shading is to be avoided*. Mechanical stipple, if too fine, may not stand reduction in size when the block is made.

Charts and curves can often be drawn to best advantage on *graph paper ruled in pale blue*. Whenever possible, oscilloscope recordings, with white background, should be submitted in a form suitable for reproduction with line blocks.

(ii) *Half-tone blocks*. Photographs can be produced in this way if a good glossy bromide print is supplied. Illustrations should be gummed on *white card*, grouped and numbered as they are to appear in print. All lettering should be drawn in position on a covering sheet of transparent paper.

(iii) *Plates*. Plates are expensive and the Editor may require an author to defray the cost of plates which in his opinion are not essential. The photographs making up the plate should be gummed on *white card*, grouped and numbered, as they are to appear in print. Plates should be of the size as to appear in print, i.e., exclusive of margin, no greater than 19.1 cm in length \times 12.7 cm in width for a single plate, or 19.1 \times 29.2 cm for a double plate. All lettering should be shown in position on a covering sheet of transparent paper.

ABSTRACTS

Five copies of an abstract are required for biological abstracting journals. The abstract will not appear in *The Journal of Experimental Biology* but will be scrutinized by the Editor before being passed for publication. The text of the summary may serve as an abstract provided that it conforms to the following requirements. The abstract should outline as briefly as possible the results and the definite conclusions of the work. Details of method are generally not required. A paper of average length should be abstracted in about 100 words and the abstract should never exceed 3% of the original. Each copy of the abstract should bear the title of the paper, the name(s) of the author(s) and an address to which applications for offprints should be sent. The abstract should be typewritten (double-spaced).

PROOFSHEETS AND OFFPRINTS

Authors will receive one set of slip proofs for correction and return to the Editor. A page proof will also be sent if the slip proof is marked by the author 'Revise'. An allowance of 50p per sheet of sixteen pages will be made for alteration errors not made by the printers. Authors may be charged for any excess over this average. They will receive 200 complimentary copies of their papers: additional copies may be purchased at modest cost, from Cambridge University Press, and should be ordered when the proofs are returned to the Editor.

THE JOURNAL OF EXPERIMENTAL BIOLOGY

CELLULAR OSCILLATORS

EDITED BY

M. J. BERRIDGE, P. E. RAPP & J. E. TREHERNE

VOLUME 81

1979

Based on a discussion meeting, arranged by the Company of Biologists Ltd,
in collaboration with Dr Karl Thomae, GmbH, of Stuttgart, at Titisee
22-24 March 1979

CAMBRIDGE UNIVERSITY PRESS

CAMBRIDGE

LONDON NEW YORK NEW ROCHELLE

MELBOURNE SYDNEY

PUBLISHED BY
THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE

The Pitt Building, Trumpington Street, Cambridge CB2 1RP
32 East 57th Street, New York, N.Y. 10022

© Company of Biologists Ltd 1979

Printed in Great Britain at the University Press, Cambridge