BRITISH JOURNAL OF PHARMACOLOGY

The British Journal of Pharmacology welcomes contributions in all fields of experimental pharmacology including neuroscience, biochemical, cellular and molecular pharmacology. The Board of Editors represents a wide range of expertise and ensures that well-presented work is published as promptly as possible, consistent with maintaining the overall quality of the journal.

Edited for the British Pharmacological Society by

A.T. Birmingham (Chairman)

R.W. Horton W.A. Large (Secretaries)

Editorial Board

P.I. Aaronson London C.J. Bailey Birmingham L. Belardinelli Gainesville, USA Maria G. Belvisi London G.W. Bennett Nottingham T.P. Blackburn Harlow M.R. Boarder Leicester N.G. Bowery Birmingham W.C. Bowman Glasgow R. Busse Frankfurt, Germany S.P. Butcher Edinburgh K.D. Butler Horsham M. Caulfield London R.A.J. Challiss Leicester R. Chess-Williams Sheffield T. Cocks Melbourne, Australia S.J. Coker Liverpool Helen M. Cox London V. Crunelli Cardiff A. Dickenson London J.R. Docherty Dublin L. Edvinsson Lund, Sweden G. Edwards Manchester R.M. Eglen Palo Alto, USA P.C. Emson Cambridge R.H. Evans Bristol A.W. Ford-Hutchinson Quebec, Canada A.C. Foster San Diego, USA J.R. Fozard Basle, Switzerland B.B. Fredholm Stockholm, Sweden Allison D. Fryer Baltimore, USA

Sheila M. Gardiner Nottingham C.J. Garland Bristol A. Gibson London M.A. Giembycz London W.R. Giles Calgary, Canada R.G. Goldie Perth, Australia R.J. Griffiths Groton, USA R.W. Gristwood Cambridge Judith M. Hall London D.W.P. Hay Philadelphia, USA D.J. Heal Nottingham P.G. Hellewell London K. Hillier Southampton P. Holzer Graz, Austria S.M.O. Hourani Guildford D. Hoyer Basle, Switzerland G.W. John Castres, France E.J. Johns Birmingham R.S.G. Jones Oxford
P.A.T. Kelly Edinburgh
D.A. Kendall Nottingham C. Kennedy Glasgow I. Kitchen Guildford N.R. Kitteringham Liverpool R.Z. Kozlowski Oxford S. Lazareno London R.A.J. Lefebvre Ghent, Belgium J. Llenas Barcelona, Spain A.T. McKnight Cambridge C.A. Maggi Florence, Italy I.G. Marshall Glasgow Janice M. Marshall Birmingham

G. Martin Beckenham A. Mathie London P.K. Moore London H. Nilsson Aarhus, Denmark H. Osswald Tübingen, Germany F.L. Pearce London J.D. Pearson London U. Quast Tübingen, Germany A.G. Ramage London P.J. Roberts Bristol W.C. Sessa New Haven, USA N. Shankley London N.L. Simmons Newcastle P.G. Skett Glasgow P. Sneddon Glasgow S. Clare Stanford London K. Starke Freiburg, Germany R.J. Summers Melbourne, Australia J. Tamargo Madrid, Spain C. Thiemermann London
M.D. Tricklebank Basle, Switzerland T.J. Verbeuren Suresnes, France R.R. Vollmer Pittsburgh, USA Cherry L. Wainwright Glasgow T.D. Warner London K.J. Watling Boston, USA J. Westwick Bath K.I. Williams Bath V.G. Wilson Nottingham E.H.F. Wong Milan, Italy S. Wonnacott Bath B. Woodward Bath

Corresponding Editors

P.R. Adams Stony Brook, U.S.A.
C. Bell Dublin
F.E. Bloom La Jolla, U.S.A.
A.L.A. Boura Newcastle, Australia
N.J. Dun Toledo, U.S.A.
R.F. Furchgott New York, U.S.A.
T. Godfraind Brussels, Belgium
S.Z. Langer Paris, France

J.P. Gallagher Galveston, USA

R.J. Miller Chicago, U.S.A.
R.C. Murphy Denver, U.S.A.
E. Muscholl Mainz, Germany
R.A. North Geneva, Switzerland
M. Otsuka Tokyo, Japan
M.J. Rand Melbourne, Australia
S. Rosell Södertalje, Sweden
P. Seeman Toronto, Canada

L. Szekeres Szeged, Hungary
B. Uvnas Stockholm, Sweden
P.A. Van Zwieten Amsterdam, Netherlands
V.M. Varagič Belgrade, Yugoslavia
G. Velo Verona, Italy
Wang Zhen Gang Beijing, China
M.B.H. Youdim Haifa, Israel

Submission of manuscripts: Manuscripts (two copies) should be sent to The Editorial Office, British Journal of Pharmacology, St. George's Hospital Medical School, Cranmer Terrace, London SW17 0RE.

Authors should consult the Instructions to Authors and the Nomenclature Guidelines for Authors in Vol. 114, 245-255. These Instructions and Guidelines also appear with the journal Index for Volumes 111-113, 1994. A checklist of the essential requirements is summarised in each issue of the journal, or as the last page of the issue.

Whilst every effort is made by the publishers and editorial committee to see that no inaccurate or misleading data, opinion or statement appears in this Journal, they and the *British Pharmacological Society* wish to make it clear that the data and opinions appearing in the articles and advertisements herein are the responsibility of the contributor or advertiser concerned. Accordingly, the *British Pharmacological Society*, the publishers and the editorial committee and their respective employees, officers and agents accept no liability whatsoever for the consequences of any such inaccurate or misleading data, opinion or statement.

C.P. Wayman, I. McFadzean, A. Gibson & J.F. Tucker. Two distinct membrane currents activated by cyclopiazonic acid-induced calcium store depletion in single smooth muscle cells of the mouse anococcygeus

566

G. Lees. The effects of anticonvulsants on 4-aminopyridine-induced bursting: *in vitro* studies on rat peripheral nerve and dorsal roots 573

A.K. Bahl, N.M. Clayton, J. Coates, D.P. Martin, I.G. Oakley, P. Strong & M.A. Trevethick. Comparison of the profiles of agonists as stimulants of the β_3 -adrenoceptor in vitro with their gastroprotective effects in the conscious rat

C. Vayssettes-Courchay, F. Bouysset, A.A. Cordi, M. Laubie & T.J. Veberuren. A comparative study of the reversal by different α_2 -adrenoceptor antagonists of the central sympatho-inhibitory effect of clonidine

The British Journal of Pharmacology is published by Stockton Press, a division of Macmillan Press Ltd. It is the official publication of the British Pharmacological Society.

Scope The British Journal of Pharmacology is published twice a month. It welcomes contributions in all fields of experimental pharmacology including neuroscience, biochemical, cellular and molecular pharmacology. The Board of Editors represents a wide range of expertise and ensures that well-presented work is published as promptly as possible, consistent with maintaining the overall quality of the journal.

This journal is covered by Current Contents, Excerpta Medica, BIOSIS, CABS, CINAHL and Index Medicus.

Editorial Manuscripts (plus two copies) and all editorial correspondence should be sent to: The Editorial Office, British Journal of Pharmacology, St George's Hospital Medical School, Cranmer Terrace, London SW17 ORE, UK. Tel: +44 (0)181 767 6765; Fax: +44 (0)181 767 5645.

Advertisements Enquiries concerning advertisements should be addressed to: Michael Rowley, Hasler House, High Street, Great Dunmow, Essex CM6 1AP, UK. Tel: +44 (0)1371 874613; Fax: +44 (0)1371 872273.

Publisher All business correspondence, supplement enquiries and reprint requests should be addressed to British Journal of Pharmacology, Stockton Press, Houndmills, Basingstoke, Hampshire RG21 6XS, UK. Tel: +44 (0)1256 29242; Fax: +44 (0)1256 810526. Publisher: Marija Vukovojac. Production Controller: Nicci Crawley. Supplement Production Controller: Simone Larché

Subscriptions – EU/Rest of World Subscription price per annum (3 volumes, 24 issues) £655, rest of world £735 (Surface mail) £880 (Airmail), or equivalent in any other currency. Orders must be accompanied by remittance. Cheques should be made payable to Macmillan Magazines and sent to: The Subscription Department, Macmillan Press Ltd, Houndmills, Basingstoke, Hampshire RG21 6XS, UK. Where appropriate, subscribers may make payments into UK Post Office Giro Account No. 519 2455. Full details must accompany the payment. Subscribers from EC territories should add sales tax at the local rate.

Subscriptions – USA USA subscribers call toll free 1-800-221-2123 or send check/money order/credit card details to: Stockton Press, 345 Park Avenue South, 10th Floor, New York, NY 10010-1707; Tel: +1 212 689 9200, Fax: +1 212 689 9711. USA annual subscription rates (institutional/corporate): \$1170 (surface) \$1400 (airmail). Individual making personal payment: \$240.

British Journal of Pharmacology (ISSN 0007-1188) is published twice a month by Macmillan Press Ltd, c/o Mercury Airfreight International Ltd, 2323 Randolph Avenue, Avenel, NJ 07001, USA. Subscription price for institutions is \$1170 per annum (surface). 2nd class postage is paid at Rahway NJ. Postmaster: send address corrections to Macmillan Press Ltd, c/o Mercury Airfreight International Ltd, 2323 Randolph Avenue, Avenel NJ 07001

Reprints of any article in this journal are available from Stockton Press, Houndmills, Basingstoke, Hampshire RG21 6XS, UK. Tel: +44 (0)1256 29242; Fax: +44 (0)1256 810526.

Copyright © 1996 Stockton Press ISSN 0007-1188

All rights of reproduction are reserved in respect of all papers, articles, illustrations, etc., published in this journal in all countries of the world.

All material published in this journal is protected by copyright, which covers exclusive rights to reproduce and distribute the material. No material published in this journal may be reproduced or stored on microfilm or in electronic, optical or magnetic form without the written authorisation of the Publisher.

Authorisation to photocopy items for internal or personal use of specific clients, is granted by Stockton Press for libraries and other users registered with the Copyright Clearance Center (CCC) Transaction Reporting Service, provided that the base fee of \$12.00 per copy is paid directly to CCC, 21 Congress St., Salem, MA 01970, USA. 0007-1188/96 \$12.00 + \$0.00.

Apart from any fair dealing for the purposes of research or private study, or criticism or review, as permitted under the Copyright, Designs and Patent Act 1988, this publication may be reproduced, stored or transmitted, in any form or by any means, only with the prior permission in writing of the publishers, or in the case of reprographic reproduction, in accordance with the terms of licences issued by the Copyright Licensing Agency.

June 20-21 1996

London UK

Festschrift in honour of Professor Sir Colin Dollery

International symposium – Clinical Pharmacology:
Inflammation–Hypertension–Metabolism &
Toxicity–Drug Regulation–Drug Development & Discovery.

Further information from D Boland, Department of Clinical Pharmacology, Royal Postgraduate Medical School, London W12 0NN.

Tel: 0181 740 3220 Fax: 0181 749 3439

1996 Keystone Symposia

on Molecular and Cellular Biology

The Molecular Biology of the Cardiovascular System

Organizers: Jeffrey M. Leiden, Victor J. Dzau, Richard Lawn, Christine Seidman,
Robert Rosenberg and R. SandersWilliams
January 29-February 4, 1996; Keystone, Colorado
Sponsored by SmithKline Beecham Pharmaceuticals

Ion Channels as Therapeutic Targets

Organizers: Michael Cahalan, K. George Chandy, Doug Hanson and Alan North February 4-10, 1996; Tamarron, Colorado Sponsored by Pfizer Inc.

Neural Peptides

Organizers: Richard E. Mains, James F. Battey and RobertA. Steiner February 8-14, 1996; Lake Tahoe, California

Molecular Basis for Drug Resistance in Bacteria, Parasites and Fungi

Organizers: Stuart B. Levy and Thomas E. Wellems March 11-17, 1996; Park City, Utah

Write to: Keystone Symposia • Drawer 1630 • Silverthorne, CO 80498 Phone: (970) 262-1230 • Fax: (970) 262-1525 • E-mail: symposia@keystone.org

PREPARATION OF MANUSCRIPTS

Authors are strongly recommended to read the full *Instructions to Authors* and *Nomenclature Guidelines for Authors* (Br. J. Pharmacol. 1996, 117, 389-399) before submitting a manuscript for publication in the *British Journal of Pharmacology*. The manuscript and cover letter should be checked against the following list before mailing.

The original and one copy of the manuscript must be supplied. Manuscripts must be typed in double-line spacing on one side of A4 paper, in type not smaller than 12 characters per inch or 10 point. Both copies to include Tables and a set of labelled Figures. One set of Figures without numbers or letters is also to be included. The text to be arranged in the following subsections:

- 1. Title—To have no more than 150 characters on a separate page, which should also include a Short Title (50 characters maximum) and the name and address of the author for correspondence.
- Summary To be arranged in numbered paragraphs (Full Papers) or a single paragraph (Special Reports).
 —to include aims, principal results and conclusions.
 —to include Key words (10 maximum) at end of summary.
- 3. **Introduction**—To contain concise statements of the problem and the aims of the investigation.
- 4. Methods—To have brief but adequate account of the procedures; full names of drugs (including those referred to by manufacturer's code), sources of drugs and statistical tests to be stated.
- Results To have no repetition of data in Figures, Tables and text.
- Discussion Findings and conclusions to be placed in context of other relevant work.
 NB Simple repetition of results and unwarranted speculation are not acceptable.
- 7. Acknowledgements Sources of support. Sources of drugs not widely available commercially.
- 8. **References**—All references in the text to be included in the Reference List and *vice versa*. References in alphabetical order with complete citations; Journals publishing 'in press' papers identified.

References to manuscripts submitted to other journals but not yet accepted are not allowed.

- 9. Tables—Each on a separate page and prepared in accordance with current requirements of the Journal.
- 10. Figures Both labelled and non-labelled Figures to be prepared in accordance with current requirements of the Journal (see *Instructions to Authors*, 1996, 117, 389-396) and provided with Figure Number and Authors' names on back (in pencil).
 - —each legend to be typed on a separate page and carrying keys to symbols.
 - —keys to symbols and histograms must not appear on the figures themselves, but in the respective legends.
 - —'box style' figures are not in keeping with the Journal style; line drawings etc must have only left-hand and bottom axes.
- 11. Manuscripts—To be accompanied by a declaration signed by each author that
 - (a) results are original
 - (b) approval of all persons concerned has been given to submit manuscripts for consideration (see also 12b)
 - (c) the same material is neither 'in press' (i.e. is in proof or has definitely been accepted for publication) nor under consideration elsewhere. Furthermore it will not be submitted or published elsewhere before a decision has been reached by the Editorial Board of the British Journal of Pharmacology and will not be submitted elsewhere if accepted by the British Journal of Pharmacology.
 - (d) Copyright assignment is included.
- 12. Cover letter—To state clearly
 - (a) Corresponding author's full postal address, telephone, telex or Fax number
 - (b) where appropriate, that *either* ethical approval has been given for investigation or Company or Institutional permission to publish work has been received.
- 13. **Reminder**—Packaging to be sufficiently robust to protect Figures and to withstand mailing.

Failure to comply with *Instructions to Authors* may lead to substantial delays in processing, review and publication and may even jeopardize acceptance of the manuscript.

NOMENCLATURE

Authors are reminded that accepted receptor and associated terminology is laid out in *Nomenclature Guidelines for Authors*, as published in the *British Journal of Pharmacology*, Br. J. Pharmacol., 1996, 117, 397-399.

SPECIAL REPORTS

The purpose of *Special Reports* is to provide rapid publication for **new** and **important** results which the Editorial Board considers are likely to be of special pharmacological significance. *Special Reports* will have publication priority over all other material and so authors are asked to consider carefully the status of their work before submission.

In order to speed publication there is normally no revision allowed beyond very minor typographical or grammatical corrections. If significant revision is required, the Board may either invite rapid re-submission or, more probably, propose that it be re-written as a Full Paper and be re-submitted for consideration. In order to reduce delays, proofs of *Special Reports* will be sent to authors but **essential corrections must reach the Production Office within 48 hours of receipt**. Authors should ensure that their submitted material conforms exactly to the following requirements.

Special Reports should normally occupy no more than two printed pages of the Journal; two illustrations (Figures or Tables, with legends) are permitted. As a guideline, with type face of 12 pitch and double-line spacing, a page of A4 paper could contain about 400 words. The absolute maximum length of the Special Report is 1700 words. For each Figure or Table, please deduct 200 words. The manuscript should comprise a Title page with key words (maximum of 10), a Summary consisting of a single short paragraph, followed by Introduction, Methods, Results, Discussion and References (maximum of 10). In all other respects, the requirements are the same as for Full Papers (see current 'Instructions to Authors').

PAPERS

- H. Kankaanranta, E. Rydell, A.-S. Petersson, P. Holm, E. Moilanen,
 T. Corell, G. Karup, P. Vuorinen, S.B. Pedersen, Å. Wennmalm &
 T. Metsä-Ketelä. Nitric oxide-donating properties of mesoionic 3-aryl substituted oxatriazole-5-imine derivatives
- A. Nakamura, M. Fujita & H. Shiomi. Involvement of endogenous nitric oxide in the mechanism of bradykinin-induced peripheral hyperalgesia
 407
- J-V. Mombouli, M. Nakashima, M. Hamra & P.M. Vanhoutte. Endothelium-dependent relaxation and hyperpolarization evoked by bradykinin in canine coronary arteries: enhancement by exercise-training
- B.H. Hoiting, H. Meurs, M. Schuiling, R. Knipers, C.R.S. Elzinga & J. Zaagsma. Modulation of agonist-induced phosphoinositide metabolism, Ca²⁺ signalling and contraction of airway smooth muscle by cyclic AMP-dependent mechanisms
- G.A. Kennett, M.D. Wood, F. Bright, J. Cilia, D.C. Piper, T. Gager, D. Thomas, G.S. Baxter, I.T. Forbes, P. Ham & T.P. Blackburn. *In vitro* and *in vivo* profile of SB 206553, a potent 5-HT_{2C}/5-HT_{2B} receptor antagonist with anxiolytic-like properties
- L. Manara, D. Badone, M. Baroni, G. Boccardi, R. Cecchi, T. Croci, A. Giudice, U. Guzzi, M. Landi & G. Le Fur. Functional identification of rat atypical β -adrenoceptors by the first β_3 -selective antagonists, aryloxypropanolaminotetralins
- M. Mizuguchi, M. Fujimura, T. Amemiya, K. Nishi, T. Ohka & T. Matsuda. Involvement of NK_2 receptors rather than NK_1 receptors in bronchial hyperresponsiveness induced by allergic reaction in guineapigs 443
- Y-H. Lei, P.J. Barnes & D.F. Rogers. Involvement of hydroxyl radicals in neurogenic airway plasma exudation and bronchoconstriction in guinea-pigs in vivo 449
- M.G. Peter & A.P. Davenport. Characterization of the endothelin receptor selective agonist, BQ3020 and antagonists BQ123, FR139317, BQ788, 50235, Ro462005 and bosentan in the heart

 455
- L. Gandía, M. Villarroya, B. Lara, V. Olmos, J-A. Gilabert, M.G. López, R. Martínez-Sierra, R. Borges & A.G. García. Otilonium: a potent blocker of neuronal nicotinic ACh receptors in bovine chromaffin cells 463
- K.E. Norman, T.J. Williams, M. Feldmann & A.G. Rossi. Effect of soluble P55 tumour-necrosis factor binding fusion protein on the local Shwartzman and Arthus reactions
- F.A. de-Allie, S.R. Bolsover, A.V. Nowicky & P.N. Strong. Characterization of ${\rm Ca}^{2+}$ -activated $^{86}{\rm Rb}^+$ fluxes in rat C6 glioma cells: a system for identifying novel ${\rm IK_{Ca}}$ -channel toxins
- F. Mulè, R. Serio, A. Postorino, T. Vetri & F. Bonvissuto Antagonism by SR 48692 of mechanical responses to neurotensin in rat intestine 488

- C. Gouardères, K. Jhamandas, M. Sutak & J-M. Zajac. Role of opioid receptors in the spinal antinociceptive effects of neuropeptide FF analogues

 493
- A. Matton, S. Engelborghs, F. Bollengier, E. Finné & L. Vanhaeist. Modulating effect of the nootropic drug, piracetam on stress- and subsequent morphine-induced prolactin secretion in male rats 502
- S.M. Gardiner, P.A. Kemp, J.E. March, B. Fallgren & T. Bennett. Effects of glibenclamide on the regional haemodynamic actions of α -trinositol and its influence on responses to vasodilators in conscious rats
- M.A. Vieira-Coelho & P. Soares-da-Silva. Ontogenic aspects of liver and kidney catechol-O-methyltransferase sensitivity to tolcapone 516
- S.A. Thompson, P.J. Whiting & K.A. Wafford. Barbiturate interactions at the human GABA_A receptor: dependence on receptor subunit combination 521
- N.B. Mercuri, A. Bonci, A. Siniscalchi, A. Stefani, P. Calabresi & G. Bernardi. Electrophysiological effects of monoamine oxidase inhibition on rat midbrain dopaminergic neurones: an *in vitro* study 528
- Y. Huang. Inhibitory effect of noradrenaline uptake inhibitors on contractions of rat aortic smooth muscle 533
- H.J. Leis, D.Zach, E. Huber, L. Ziermann, H. Gleispach & W. Windischhofer. Inhibition of prostanoid formation in intact cells by 2,5-di-(tert-butyl)-1,4-benzohydroquinone, a blocker of Ca²⁺-ATPases 540
- D.-E. Hu, C.R. Hiley & T.-P.D. Fan. Comparative studies of the angiogenic activity of vasoactive intestinal peptide, endothelins-1 and -3 and angiotensin II in a rat sponge model 545
- C.R. Corrêa, D.J. Kyle, S. Chakraverty & J.B. Calixto. Antinociceptive profile of the pseudopeptide B₂ bradykinin receptor antagonist NPC 18688 in mice 552
- L. Miao, B.D. Núñez, V. Susulic, S. Wheeler, J.P. Carrozza, J.N. Ross & J.P. Morgan. Cocaine-induced microvascular vasoconstriction but differential systemic haemodynamic responses in Yucatan versus Yorkshire varieties of swine 559
- C.P. Wayman, I. McFadzean, A. Gibson & J.F. Tucker. Two distinct membrane currents activated by cyclopiazonic acid-induced calcium store depletion in single smooth muscle cells of the mouse anococcygeus

 566
- G. Lees. The effects of anticonvulsants on 4-aminopyridine-induced bursting: *in vitro* studies on rat peripheral nerve and dorsal roots 573
- A.K. Bahl, N.M. Clayton, J. Coates, D.P. Martin, I.G. Oakley, P. Strong & M.A. Trevethick. Comparison of the profiles of agonists as stimulants of the β_3 -adrenoceptor *in vitro* with their gastroprotective effects in the conscious rat
- C. Vayssettes-Courchay, F. Bouysset, A.A. Cordi, M. Laubie & T.J. Veberuren. A comparative study of the reversal by different α_2 -adrenoceptor antagonists of the central sympatho-inhibitory effect of clonidine 587

