

# **British Journal of Pharmacology**

**Instructions to Authors  
Nomenclature Guidelines  
Index**

**Volumes 99–101  
1990**

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# INSTRUCTIONS TO AUTHORS

With effect from 1 January 1991

The *British Journal of Pharmacology* welcomes contributions in all fields of pharmacology for publication as full papers or as high priority Special Reports.

Papers should normally be based on new results obtained experimentally and should constitute a significant contribution to pharmacological knowledge. Papers which reassess pharmacological concepts based on earlier results will also be considered as will purely theoretical papers. Papers dealing only with descriptions of methods are acceptable if new principles are involved.

Contributions that have already been published, or accepted or are under consideration for publication, with essentially the same content will not be considered. This restriction does not apply to results published as abstracts of communications, letters to editors, or as contributions to symposia, provided that the submission adds significantly to the information available in the previously published contribution.

Papers are only accepted if accompanied by a Declaration which must be signed by all Authors. This Declaration concerns the originality of the submitted paper and assigns the copyright of all papers accepted for publication to Macmillan Press Ltd. on behalf of the British Pharmacological Society. See pages 6 and 7 for details.

The Journal will not consider papers which describe experiments on animals which do not fall clearly within the current laws governing animal experimentation in the United Kingdom. Authors must make it clear that the procedures they use were as humane as possible and the doses (initial and subsequent) of anaesthetics and analgesics should be clearly stated; the method of assessing anaesthesia, particularly after the administration of skeletal muscle relaxants (neuro-muscular blocking drugs), must be well defined. The Society has an Ethics Committee which can be consulted by authors through the Secretaries to the Editorial Board.

When investigations on normal human subjects are reported, evidence of approval by a local Ethics Committee must be given. Papers concerned with clinical trials or investigations of the effects of drugs on patients are not appropriate for this Journal.

Authors are strongly urged to keep their manuscripts as short as they reasonably can. An effective way is to reduce the Discussion and the number of figures to a minimum and to avoid repetition of information that has already been published. Authors should remember that a reader may be influenced by literary style and will appreciate simple but accurate prose.

It is important to note that failure to comply with 'Instructions to Authors' may lead to considerable editorial delays.

## FULL PAPERS

Manuscripts must be typed on one side of A4 paper. Words at the end of lines should not be divided because they may become incorrectly hyphenated. Handwritten characters or symbols (e.g. Greek letters) should be spelled out in full in the margin. Papers in recent issues of the *British Journal of Pharmacology* should be consulted for the general layout of the paper and also for details. The following subsections are used:

1. Title page
2. Summary
3. Introduction
4. Methods
5. Results

6. Discussion and conclusions

7. Acknowledgements

8. List of references

9. Tables

10. Figures and captions

The type must not be smaller than 12 pitch or 10 point. Each section must be typed in double spacing with margins of not less than 2.5 cm all round and each page should be numbered. **The original and one copy of the typescript should be supplied.**

## Title page

The title should normally contain no more than 150 characters and should not consist of a sentence (statement or conclusion) or be interrogative. A short running title containing not more than 50 characters and spaces is also required. The title page should include the names of authors and their appropriate addresses. It should be made clear which address relates to which author. Authors' present addresses differing from those at which the work was carried out should be given as footnotes on the title page and referenced at the appropriate place in the author list by superscript numbers. A footnote may also be used to indicate the author to whom correspondence should be sent. The use of footnotes for any other reason is not allowed. If the address to which proofs should be sent is not that of the first mentioned author, clear instructions should be given in a covering note and not on the title page. The title page should be paginated as page 1 of the paper.

## Summary

The summary will be printed at the beginning of the paper. It should not exceed 5% of the length of the paper and should contain a brief account of the problem, the methods, results and the conclusions. It should be arranged in numbered and concise paragraphs. Up to ten **key words** or phrases of two to three words (including names and terms used in the title) should be displayed at the end of the summary. These may be selected from 'Medical Subject Headings' issued by *Index Medicus*. Key words will be used to compile the annual index. The quality of the index will thus be determined by the appropriateness of the key words. Avoid unhelpful or unqualified terms such as 'rat', 'drug' etc.

## Introduction

The introduction should give a short and clear account of the background of the problem and the rationale of the investigation. Only previous work that has a direct bearing on the present problem should be cited.

## Methods

The methods must be described in sufficient detail to allow the experiment to be interpreted and repeated by the reader. However, detailed repetition of methods which have been adequately described previously should be avoided and references given, although a brief outline is often helpful.

Drugs should be listed in a separate paragraph. Their names should be 'approved names' as published previously in British Approved Names, 1990 (HMSO). If a drug has no 'approved name' its chemical name must be used and the rules set out in the current *Handbook for Chemical Society Authors*

(London, Chemical Society) observed, or its structural formula given. Cumbersome chemical names should be suitably abbreviated for later reference in the paper.

The doses of drugs should be given as unit weight per body weight, e.g.  $\text{mmol kg}^{-1}$  or  $\text{mg kg}^{-1}$ ; concentrations should be given in terms of molarity, e.g.  $\text{nM}$  or  $\mu\text{M}$ .

Reference should be made to any statistical analyses that have been performed on the results in order, for example, to determine the significance of differences between results obtained under different experimental conditions.

## Results

The description of the experimental results should be succinct but, nevertheless, in sufficient detail to allow the experiments to be repeated by others. Typical single experiments may be presented with a clear statement that  $n$  number of similar experiments had similar results. Where appropriate, however, the mean results with confidence limits or with standard errors of the means and the number of observations should be given. Statistical tests of significance should be performed where appropriate. The results of such tests should be stated as the numerical value of the probability ( $P$ ) that is calculated, with any necessary clarification (e.g. one-tail or two-tail test).

Every effort should be made to avoid unnecessary repetition of data in the text, tables and figures. Conclusions and theoretical considerations should not be elaborated in this section.

## Discussion

The purpose of the discussion is to present a brief and pertinent interpretation of the results against the background of existing knowledge. Any assumptions on which conclusions are based must be stated clearly. A mere recapitulation of the results is not acceptable. A review-like treatment, which reduces the impact on the reader, should also be avoided. The main conclusion should be conveyed in a final paragraph.

## Acknowledgements

Acknowledgements should be brief but should include reference to sources of support. Sources of drugs not widely available commercially should be acknowledged.

## References

In the text, references to other work should take the form: (Bolton & Kitamura, 1983) or, 'Bolton & Kitamura (1983) showed that ...'. If there are more than two authors, the first author's name should be given followed by *et al.* (Bülbring *et al.*, 1981).

References to 'unpublished observations' or 'personal communications' should be mentioned in the text only, and not included in the list of references. Papers which have been **submitted and accepted** for publication, should be included in the list of references with the names of the periodicals and 'in press'. A **photocopy should normally be submitted with the manuscript**. If this is not possible, authors should indicate whether the work cited is an abstract or a full paper. **Papers in preparation or which have been submitted but not yet finally accepted for publication must not be included in the list of references.**

The reference list at the end of the manuscript must be arranged alphabetically according to the surname of the first author. When the surnames of authors are identical, the alphabetical order of their initials takes precedence over the year of publication. The **AUTHORS'** names are followed by the year of publication in brackets. If more than one paper by the same authors in one year are cited, a, b, c, etc. are placed after the year of publication, both in the text and in the list of references. The title of the article is given in full, followed by the *abbreviated title of the periodical*, volume **number** and first and last page numbers. The abbreviations used for periodicals are

those of the most recent edition of the International List of Periodical Title Word Abbreviations. References to articles in books should consist of names of authors, year of publication, title of article followed by the *title of the book*, the editors, volume number, if any, and page numbers, the place of publication and the names of the publishers. For example:

BOLTON, T.B. & KITAMURA, K. (1983). Evidence that ionic channels associated with the muscarinic receptor of smooth muscle may admit calcium. *Br. J. Pharmacol.*, **78**, 405–416.

BRADING, A.F. (1981). Ionic distribution and mechanisms of transmembrane ion movements in smooth muscle. In *Smooth Muscle: An Assessment of Current Knowledge*. ed. Bülbring, E., Brading, A.F., Jones, A.W. & Tomita, T. pp. 65–92. London: Edward Arnold.

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Each table should be given on a separate page, paginated as part of the paper. Tables should be numbered consecutively with arabic numerals and the number should be followed by a brief descriptive caption, occupying not more than two lines, at the head of the table. The proportions of the text area should be borne in mind when designing the layout of tables. For the sake of clarity, tables should not have more than 120 characters to a line, with spaces between columns counted as four characters. The absolute maximum is 180 characters to a line. Each column should have a heading and the units of measurement should be given in parentheses in the heading. Except in special circumstances, tables should be self-explanatory; the necessary descriptions should be at the bottom of the table.

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To avoid unnecessary Figures, particularly those requiring half-tone reproduction, only critical points of the text should be illustrated. If coloured Figures are desired, the Authors should discuss their requirements with the Secretaries, preferable before submission.

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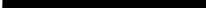

## Submission Requirements

- (a) The Authors' names and the Figure number must be indicated lightly *in pencil* on the back of each Figure; if necessary, use an adhesive label to avoid damage to the Figure.
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## Line Figures

It is best to submit an original drawing (black ink on heavy white paper or faint blue graph paper) which has been prepared to conform with the style and convention of the



Line width (axes)	Line width (graphs)	Symbol size	Figure will reduce to this percentage of the original size
			100 (No reduction)
			80
			70
			60
			50
			40

Journal, because redrawing is expensive. The original drawing should be lettered in pencil and should be larger (up to two times as large) than the intended size in the Journal.

It is important that the printed symbols and lines should retain their clarity. To achieve this the symbols and lines in original drawings should be sharply defined and of an even density and breadth. When graphs are generated by computer, lines must not show noticeable stepping. Heavier (broader) lines should be used for curves than for the axes of graphs. The table above illustrates line widths and symbol sizes to be used together on a figure and the appropriate reductions in the final printed form.

Symbols should be chosen from the following set

○ ● □ ■ △ ▲ ▽ ▼ ◇ ◆ + ×

The preferred order to shading of histogram columns is: open (clear), closed (solid), cross-hatched, heavily stippled and other (if required).

The explanation of the symbols and column headings should be given in the Figure legend and not as a key in the Figure itself.

Where the Figure is a composite of more than one graph, experimental record, etc., particular care is needed to minimise the spaces between each part, without over-crowding the entire Figure.

Figure 1 illustrates a simple properly-drawn graph in its original form (a) and in its reduced form (b) as it would appear in the Journal.

Photographs and photomicrographs

These should be submitted, twice as large as their intended published size, as good quality prints of high contrast especially where traces and records are illustrated. The originals must not contain arrows, lettering or numbering; these must be accurately located on a duplicate print (or photocopy). When submitting half-tone illustrations for publication authors should remember that it is not possible to reproduce Figures to a finer quality than the original photographs/photomicrographs provided. Critical areas should be marked on a second copy or on an overlay, so that the Printer can choose the correct exposure. Maximum trim areas should be marked on a second copy of the photograph/photomicrograph or on a tracing overlay, i.e. authors should

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The purpose of *Special Reports*, which have superseded ‘Short Communications’, 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 Publisher 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, a Summary consisting of a single short paragraph, followed by key words (maximum of 10), Introduction, Methods, Results, Discussion and References (maximum of 10). In all other respects, the requirements are the same as for Full Papers.

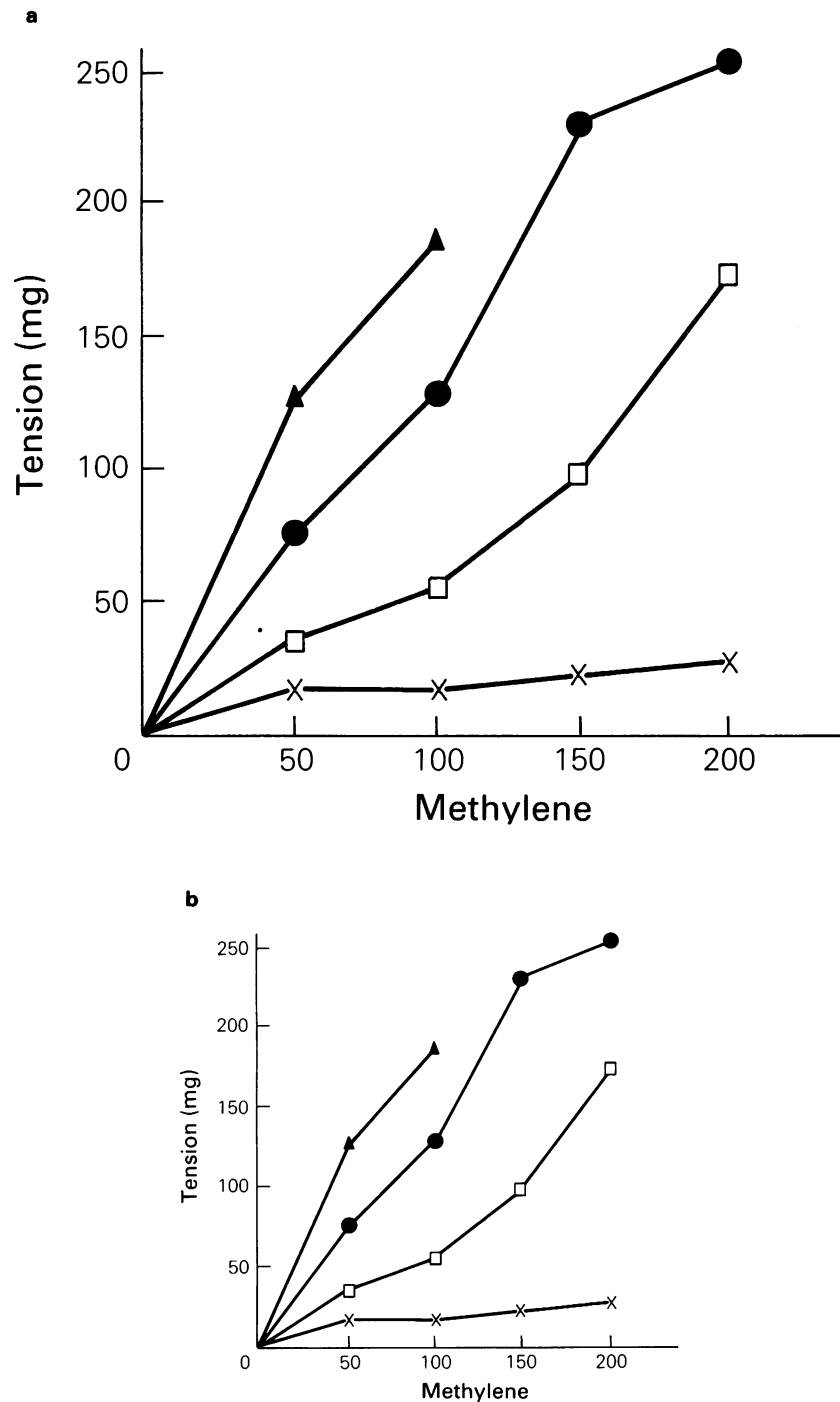


Figure 1. (a) Artwork as drawn. (b) Artwork reduced to 60 per cent of its original size for publication in the Journal.

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ABBREVIATIONS AND SYMBOLS

Physico-chemical quantities

The *British Journal of Pharmacology* uses the SI symbols for units. The following prefixes for multiples of units should be used:

Multiplier	Prefix	Symbol
10 <sup>-1</sup>	deci	d
10 <sup>-2</sup>	centi	c
10 <sup>-3</sup>	milli	m
10 <sup>-6</sup>	micro	μ
10 <sup>-9</sup>	nano	n
10 <sup>-12</sup>	pico	p
10 <sup>-15</sup>	femto	f
10 <sup>-18</sup>	atto	a
Multiplier	Prefix	Symbol
10 <sup>3</sup>	kilo	k
10 <sup>6</sup>	mega	M
10 <sup>9</sup>	giga	G
10 <sup>12</sup>	tera	T

Thus, micron = μm; ångstrom = 0.1 nm. Mixed prefixes are not permissible, thus mμg should be ng. The symbols d (10<sup>-1</sup>) and c (10<sup>-2</sup>) should be restricted to those occasions on which there is a strongly felt need for them (e.g. cm).

Use of the solidus

The solidus should be avoided as far as possible and the negative index substituted, e.g. mg kg<sup>-1</sup> rather than mg/kg; pmol mm<sup>-2</sup> min<sup>-1</sup> rather than pmol/mm<sup>2</sup>/min.

SYMBOLS

Symbols denoting physical quantities are usually printed as italic capitals (indicated by single underline in typescript). A dash over the symbol indicates a mean value; a dot over the symbol indicates a time derivative. Suffixes may be used to indicate 'where' and 'what'. They are printed as inferiors on the line. Multiple suffixes should be avoided if a simpler symbol adequately defined is unambiguous, but if necessary should be separated by commas e.g. P<sub>A, CO<sub>2</sub></sub> denotes partial pressure of CO<sub>2</sub> alveolar air.

CHEMICAL AND BIOLOGICAL ABBREVIATIONS

Authors should also consult *Nomenclature Guidelines for Authors* contained in this issue of the Journal. The abbreviations listed may be used without definition *except* those for chemicals, drugs and enzymes which must be written in full at first mention in the title, summary and again in the text. At first mention they should be followed by the abbreviation in brackets. Subsequently, the abbreviation alone may be used.

The list of abbreviations for chemical, drug and enzyme names is clearly not comprehensive and includes only a few commonly used examples.

Use abbreviations sparingly as extensive use can make the text hard to follow.



Physico-chemical quantities

Quantity	Preferred unit	Symbol
Amount (of substance)	mole	mol
Capacitance	farad	F
Concentration	moles per litre	M or mol l <sup>-1</sup>
Current	ampere	A
Electrical conductance	siemens	S
Electromotive force	volt	V
Flow (blood or other liquid)	litres per second (or min)	1 s <sup>-1</sup> or 1 min <sup>-1</sup>
Flow (air or other gas)	litres per second (or min)	1 s <sup>-1</sup> or 1 min <sup>-1</sup>
Force	newton	N
Frequency of regular event	hertz	Hz
Length	metre	m
Mass	gram	g
Power	watt	W
Pressure (or partial pressure)	pascal*	Pa
Radioactivity	becquerel or curie	Bq (60 d.p.m.) or Ci (3.7 × 10 <sup>10</sup> Bq)
Resistance (electrical)	ohm	Ω
Temperature	degree celsius	°C
Time	second (preferred) minute hour	s min h
Volume (blood or other liquid)	litre	l
Volume (air or other gas)	litre	l
Work	joule	J

\* mm of mercury (mmHg) are allowed if conventional, and if mercury manometer is used for calibration.

Chemical and biological abbreviations

acetylcholine	ACh	dextro-(absolute configuration)	D-
acetylcholinesterase	AChE	dextro-(optical rotation)	(+)-
adenosine 3' : 5'-cyclic monophosphate	cyclic AMP	diameter	diam.
adenosine 5'-phosphate	AMP	diameter, inside	i.d.
adenosine triphosphatase	ATPase	diameter, outside	o.d.
γ-aminobutyric acid	GABA	diffusion coefficient	<i>D</i>
analysis of variants	F	3,4-dihydroxyphenylalanine	DOPA
adrenaline	Ad	3,4-dihydroxyphenylethylamine	dopamine
analytical standard of reagent purity	A.R.	direct current	d.c.
anhydrous	anhyd.	disintegration per minute	d.p.m.
approximate(ly)	approx.	dissociation constant	<i>K</i> <sub>D</sub>
approximately equals	≈	dissociation constant, negative logarithm of	p <i>K</i>
aqueous	aq.	distilled	dist.
arg-vasopressin	AVP	dry ice	solid CO <sub>2</sub>
boiling point	b.p.	edition	edn
bovine serum albumin	BSA	editor(s)	ed.
cardiovascular system	CVS	effective concentration	EC <sub>50</sub>
catechol- <i>O</i> -methyl transferase	COMT	effective dose, median	ED <sub>50</sub>
central nervous system	CNS	electrocardiogram	ECG
cerebrospinal fluid	CSF	electrocorticogram	ECoG
chi-squared (statistics)	χ <sup>2</sup>	electroconvulsive therapy	ECT
clearance	<i>c</i>	electroencephalogram	EEG
coenzyme A	CoA	electromyogram	EMG
concentrated	conc.	electron spin resonance	e.s.r
correlation coefficient	<i>r</i>	endothelial-derived relaxing factor	EDRF
cubic	cu.	epithelial-derived relaxing factor	EpDRF
degree of freedom (statistics)	d.f.	equilibrium constant	<i>K</i>
deoxyribonucleic acid	DNA	equivalent (general use)	equiv.
deoxyribonuclease	DNase	erythrocyte	r.b.c.
		erythrocyte sedimentation rate	ESR
		ethylenediaminetetracetic acid	EDTA
		excitatory postsynaptic potential	e.p.s.p.
		experiment	expt
		experimental	exptl

fatty acids, nonesterified	NEFA	page/pages	p./pp.
figure(s) (with reference number)	Figure(s)	para-	<i>p</i> -
figure (diagram)	figure	paragraph	para. or ¶
gas-liquid chromatography	g.l.c.	parts per million	p.p.m.
glomerular filtration rate	GFR	per cent	%
haemoglobin	Hb	platelet activating factor	PAF
half-life	$t_{1/2}$	posterior	post.
high-frequency	h.f.	probability (significance level in a statistical test)	P
high performance liquid chromatography	h.p.l.c.	radioimmunoassay	RIA
human serum albumin	HSA	rectus (configuration by the sequence rule)	R
hydrogen-ion concentration	[H <sup>+</sup> ]	red blood corpuscle	RBC
hydrogen-ion activity, negative logarithm of (hydrogen-ion exponent)	pH	relative band speed to front (chromatography)	$R_F$
6-hydroxydopamine	6-OHDA	relative molecular mass	$M_r$
5-hydroxyindoleacetic acid	5-HIAA	relative retention time (gas chromatography)	$t_r$
5-hydroxytryptamine	5-HT	renal plasma flow	RPF
immunoglobulins	IgA, IgD, IgE, IgG, IgM	resistance (respiratory)	R
inhibitor constant	$K_i$	respiratory conductance	Sgaw
inhibitory concentration	IC <sub>50</sub>	revolutions per minute	r.p.m.
inhibitory postsynaptic potential	i.p.s.p.	ribonucleic acid	RNA
insoluble	insol.	section	§
international unit	iu	sedimentation coefficient (ultracentrifugation)	<i>s</i>
intra-arterial	i.a.	sinister (configuration by the sequence rule)	S
intracellular fluid	ICF	soluble	sol.
intradermal	i.d.	solution	soln.
intramuscular	i.m.	Spearman rank coefficient	$r_s$
intraperitoneal	i.p.	standard deviation:	s.d.
intracerebroventricular	i.c.v.	(of observed sample)	
intravenous	i.v.	standard error (of estimate mean value)	s.e.mean
isotope (atomic mass)	<sup>131</sup> I	standard error (of sampling)	s.e.
e.g. iodine-131		standard temperature and pressure	STP
isotopically substituted compounds e.g.	[ <sup>14</sup> C]-ethanol	subcutaneous	s.c.
laevo-(absolute configuration)	L-	sum (statistical):	
laevo-(optical rotation)	(-)-	of hypothetical population	Σ
lethal dose, median	LD <sub>50</sub>	of observed sample	S or Σ
leukotriene	LT	temperature	temp.
logarithm to base e	log <sub>e</sub> or ln	thin layer chromatography	t.l.c.
logarithm to base 10	log <sub>10</sub>	time clock—24 h clock used e.g. 18 h 30 min	<i>t</i>
maximum	max.	time constant	τ
mean arterial pressure	MAP	2-amino-2-hydroxymethyl- propan-1,3-diol	Tris
mean value of (statistics)	$\bar{x}$	ultraviolet	u.v.
melting point	m.p.	unit	u
meta	<i>m</i> -	vacuum	vac.
Michaelis constant	$K_M$	valency	e.g. Fe <sup>2+</sup> ; Fe(II)
minimum	min.		protoporphyrin
mobility (electrophoresis)	<i>m</i>		
monoamine oxidase	MAO		
noradrenaline	NA		
nuclear magnetic resonance	n.m.r.		
number	no. or No.		
number of observations (statistics)	<i>n</i>	volume by volume	v/v
ortho	<i>o</i> -	wavelength	λ
packed cell volume	PCV	weight	wt.
		weight by volume	w/v

# NOMENCLATURE GUIDELINES FOR AUTHORS

With effect from 1 January 1991

The Nomenclature Working Party (NWP) of the Editorial Board of the *British Journal of Pharmacology* has consulted many acknowledged experts in an effort to clarify and standardize receptor and other nomenclature systems for use by Editors until the recommendations of the IUPHAR Commission on Receptor Nomenclature and Classification are made known.

NWP is unanimous in its view that, with rare exceptions, the Journal should use spellings, names and abbreviations that had been chosen by international bodies or specialist Groups specially convened for the purpose.

## 1 Definition of receptors and subtypes

In functional studies, pharmacological receptors are to be defined in terms of the relative potencies of agonists and selectivities of antagonists, also by the binding of such ligands, without reference to Second (or other) Messenger Systems.

## 2 Format of receptor names\*

It was agreed that, until the IUPHAR Commission on Receptor Nomenclature and Classification make their recommendations:

- (a) Editors will permit with reluctance new nomenclature systems in papers accepted for publication if and only if there are compelling reasons to introduce a new terminology (or modify an accepted one). The criteria upon which the new receptor type or subtype is defined must be given, together with adequate explanations of the relationship between the previous nomenclature (fully referenced) and the proposed one.

N.B. The new nomenclature should not appear in the Title, Short Title or Key-words, unless qualified by the adjective putative, where appropriate (e.g. ... mediated by the putative  $\beta_3$ -adrenoceptor).

- (b) Only well-established and universally accepted subtype names (e.g. muscarinic and nicotinic cholinceptors;  $\alpha$ - and  $\beta$ -adrenoceptors) will be acceptable without any reference to the originator of these terms. In cases of controversy concerning further subdivision of the subtype, full referencing must be given.
- (c) Receptor subtypes should be designated by means of a subscript numeral or capital letter. Some double subscripts (i.e. numeral plus letter) have been introduced but, where possible, further introductions should be avoided and must be fully referenced.

\* Note on abbreviations: the preferred style is *capital letters* to designate (a) the first letter of the word (e.g. V, Vasopressin); (b) the first letter of each main syllable or additional word (e.g. NK, neurokinin; GABA,  $\gamma$ -aminobutyric acid; NMDA, N-methyl-D-aspartate). Otherwise, upper and lower case letters should be used (e.g. Enk-IR, enkephalin-like immunoreactivity).

## 3 Types of receptor

- (a) *Acetylcholine receptors* (see Cholinceptors).
- (b) *Adrenoceptors* At present, the only adrenoceptor subtypes that should be accepted without a need for very clear definition and full referencing are  $\alpha_1$ -,  $\alpha_2$ -,  $\beta_1$ - and  $\beta_2$ -adrenoceptors. Reference to either 'atypical' adrenoceptor or the putative  $\beta_3$ -adrenoceptor would be permitted, provided fully referenced.

- (c) *Bradykinin receptors* For consistency of style with NK receptors, these should be designated BK<sub>1</sub>, BK<sub>2</sub>. For the present, possible additional types and subtypes of BK receptors should not be designated, except as discussion points.

- (d) *Cholecystokinin (CCK) receptors* The principal subtypes are CCK<sub>A</sub> and CCK<sub>B</sub> receptors, CCK<sub>B</sub> receptors being also known as gastrin receptors.

- (e) *Cholinceptors* The two principal subtypes are muscarinic and nicotinic cholinceptors (the term acetylcholine receptors is acceptable).

*Muscarinic cholinceptors* Until further evidence is forthcoming, the nomenclature should be confined to only three subtypes, namely M<sub>1</sub>, M<sub>2</sub> and M<sub>3</sub> cholinceptors, where M<sub>2</sub> refers to the cardiac subtype and M<sub>3</sub> includes both smooth muscle and glandular subtypes. When the term is used repetitively, muscarinic receptor would be acceptable.

Note that the style m1, m2, etc. refers to nomenclature for molecular structure based on cDNA/genomic cloning.

The abbreviation mAChR and variants are not acceptable.

*Nicotinic cholinceptors* The principal subtypes currently accepted are muscle-type and neuronal-type receptors. The abbreviation nAChR and variants are not acceptable.

- (f) *Dopamine receptors* Only D<sub>1</sub> and D<sub>2</sub> dopamine receptors are currently recognised. For the present, the possible D<sub>3</sub> subtype must be very clearly defined and fully referenced. There is no need to use DA<sub>1</sub> and DA<sub>2</sub> for peripheral dopamine receptors.

- (g) *Excitatory amino acid receptors* At present, no subdivisions of the receptor for N-methyl-D-aspartate (NMDA; see 5 (c) below) are permitted except as discussion points.

Three non-NMDA receptors have been established and are named: (i) Quisqualate- and AMPA-preferring non-NMDA receptors that control cationic channels, to be abbreviated AMPA receptors. (ii) Kainate-preferring non-NMDA receptors, to be abbreviated Kai receptors. (iii) 2-Amino-4-phosphobutyrate receptors (also sometimes known as ABP or AP<sub>4</sub> receptors) to be abbreviated L-AP<sub>4</sub> receptors.

Acceptance of the occurrence of another receptor, described as regulating phosphatidyl inositol pathways, is considered to be premature. The term 'metabotropic receptor' is therefore to be used only as a discussion point.

Otherwise, where appropriate, the term glutamate receptors should be used.

- (h)  *$\gamma$ -Aminobutyric acid (GABA) receptors* The principal subtypes are GABA<sub>A</sub> and GABA<sub>B</sub> receptors. Any other is to be used only as discussion point.

- (i) *Histamine receptors* At present, the only histamine receptor subtypes that are acceptable without a need for very clear definition and full referencing are H<sub>1</sub>-, H<sub>2</sub> and H<sub>3</sub>- although in the latter case, a definition and references are desirable.



- (j) *Receptors for 5-hydroxytryptamine* The name 5-hydroxytryptamine (5-HT) is preferred to serotonin (see 4 (b) below). The principal subtypes recognised are 5-HT<sub>1A,1B,1C,1D</sub>, 5-HT<sub>1</sub>-like, 5-HT<sub>2</sub> and 5-HT<sub>3</sub>. All three should be defined and referenced.

Further putative subtypes may be debated in the Discussion section but, until there is international agreement on the nomenclature, names, such as 5-HT<sub>1E</sub>, 5-HT<sub>4</sub>, are not acceptable, except as discussion points.

- (k) *Leukotriene receptors* When first mentioned, the style leukotriene (LT) receptor should be used, thereafter LT receptor. Receptors should be designated according to the leukotriene that selectively or preferentially binds to them.

Editors should be aware that the interpretation of [<sup>3</sup>H]-LTC<sub>4</sub>-binding is hampered by the presence of a binding site for LTC<sub>4</sub> on glutathione S-transferase.

- (l) *Neuropeptide Y receptors* Despite some attempts to create subtypes, the view of experts was that no subtypes should be recognised except as discussion points. Full explanations of the basis for proposed subtypes would be required.

- (m) *Opioid receptors* The principal subtypes are  $\mu$ -,  $\delta$ - and  $\kappa$ -opioid receptors. Other possible subtypes (e.g.  $\epsilon$ ) are acceptable only as discussion points.

- (n) *Oxytocin receptors* (see Vasopressin and oxytocin receptors).

- (o) *Prostanoid receptors* The principal types are DP, EP, FP, IP and TP receptors. These should be introduced as prostanoid XP receptors, thereafter simply as XP receptors (where X denotes the type). If subtypes exist, they would be referred to as XP<sub>n</sub>, (e.g. EP<sub>1</sub>, EP<sub>2</sub>, EP<sub>3</sub>) receptors.

In the event of possible confusion between a subtype of receptors for prostacyclin IP<sub>3</sub> and a 'receptor' for one of the phosphatidyl inositols (inositol trisphosphate; InsP<sub>3</sub>), the term prostanoid IP<sub>3</sub> receptor should be used.

- (p) *Purinoceptors* The main subtypes permissible are P<sub>1</sub> and P<sub>2</sub>. Subdivisions of P<sub>1</sub> into A<sub>1</sub> and A<sub>2</sub> types and of P<sub>2</sub> into P<sub>2X</sub> and P<sub>2Y</sub> types are acceptable with appropriate supporting references, provided they are based on agonist potencies and results with antagonists but *not* on activation of particular Second Messenger Systems.

- (q) *Tachykinin receptors* Except as discussion points, only the following tachykinin (NK) receptor subtypes are acceptable at present: NK<sub>1</sub>, NK<sub>2</sub> and NK<sub>3</sub> and must be fully referenced.

- (r) *Vasoactive intestinal peptide (VIP) receptors* Despite some attempts to create subtypes, the view of experts was that no subtypes should be recognised except as discussion points. Full explanations of the basis for proposed subtypes would be required.

- (s) *Vasopressin and oxytocin receptors* The principal subtypes are to be designated V<sub>1</sub>, V<sub>2</sub>, V<sub>3</sub> and OT receptors; V<sub>3</sub> has sometimes been known as V<sub>1B</sub> but the original term V<sub>3</sub> is preferred (see 2(c)).

#### 4 Naming of nerve fibres

Many nerve fibres are now known to release more than one transmitter, and future work may show that this is in fact the general rule. In that case, the concept of the same transmitter being released either at different developmental stages or under various experimental conditions would no longer hold, and single adjectives that imply this (e.g. cholinergic, noradrenergic) would become inappropriate when applied to nerve fibres, as distinct from transmitter functions. For the present, those nerve fibres that are known to

function by releasing more than one identified transmitter may be described accordingly; for example, noradrenergic-purinergetic, cholinergic-peptidergic (in alphabetical order, the order implying no priority of function).

N.B. The suffix 'ergic' should continue to be applied only to nerve fibres and to the transmission event, in accordance with Dale's intentions. For example, 'cholinergic' indicates that the nerve fibre, or the transmission, functions under particular conditions through the release of a choline-like substance. The suffix should not be used loosely to mean 'pertaining to'. Hence, for example, the expression 'cholinergic receptor' (rather than cholinceptor) is an inappropriate use of the term.

- (a) *Catecholamine releasing nerve fibres* The adjective to be applied to nerve fibres that release dopamine as a transmitter is dopaminergic (not DAergic, even in a title).

Nerve fibres that are known to function by releasing noradrenaline are to be described as noradrenergic. The term adrenergic should be reserved for either a nerve fibre that functions by releasing a catecholamine, the identity of which is unknown, or one known to release adrenaline.

- (b) *Some other adjectives describing nerve fibre function* NANC is an acceptable abbreviation of non-adrenergic, non-cholinergic for peripheral efferent nerve fibres when the identity of the transmitter(s) is unknown other than the fact that neither (nor)adrenaline nor acetylcholine is involved. It should be defined when introduced. NANCergic, e-NANC (or NANC-e) and i-NANC (or NANC-i) are not acceptable terms.

Glutamatergic, not glutaminergic, should be used to describe nerve fibres releasing glutamate. In referring to peptide-releasing nerve fibres, (e.g. those that may release substance P or vasoactive intestinal peptide), the nomenclature to be used is peptidergic (X), e.g. peptidergic (SP), peptidergic (VIP), not SPergic, VIPergic.

The terms 5-hydroxytryptamine (5-HT) and 5-hydroxytryptaminergic (i.e. nerves releasing 5-hydroxytryptamine) are preferred to those of serotonin and serotonergic. The term 5-HTergic is not acceptable, except to avoid frequent repetition of 5-hydroxytryptaminergic.

Likewise, the terms purinergetic (ATP) and purinergetic (adenosine) are preferred.

#### 5 Other nomenclature requirements

- (a) *Racemates* Authors must state unambiguously in the Methods section of papers which isomers were used, e.g. (+)- or (−)-propranolol, and must bring to the attention of the reader the composite character of drugs that are mixtures of stereo-isomers. Furthermore, the implications of the composite nature of such drugs studied for the interpretation of the data measured and the conclusions drawn must be made explicit. Note that the terms d- or l- for dextro- and laevo-rotatory are now obsolete, and the prefixes (+)- or (−)- respectively should be used. Capital D and L refer to the absolute configurations and of course remain acceptable when appropriate.

- (b) *Platelet activating factor (acetyl-glycerol-ether-phosphorylcholine)* The acronym to be used is PAF (not AGEPC, Paf, Paf-acether or other variant).

- (c) *Ligands for NMDA receptors* N-methyl-D-aspartate (NMDA) and N-methyl-DL-aspartate (NMDLA) are to be given in full when introduced in the text.

- (d) *Purines* This term should not be used as a synonym for purine nucleotides or nucleosides.

## INDEX TO VOLUMES 99, 100 AND 101

## AUTHOR INDEX

## A

- AAS, P. & MACLAGAN, J. Evidence for prejunctional M<sub>2</sub> muscarinic receptors in pulmonary cholinergic nerves in the rat, **101**, 73
- ABE, S., KANAIDE, H. & NAKAMURA, M. Front-surface fluorimetry with fura-2 and effects of nitroglycerin on cytosolic calcium concentrations and on tension in the coronary artery of the pig, **101**, 545
- ABE, S. *see* HIRANO, K., **101**, 273
- ABEBE, W. & MACLEOD, K.M. Protein kinase C-mediated contractile responses of arteries from diabetic rats, **101**, 465
- ABRAHAMSSON, T. *see* WAHLUND, G., **99**, 592
- ACHIKE, F.I. & DAI, S. Cardiovascular responses to verapamil and nifedipine in hypoventilated and hyperventilated rats, **100**, 102
- ADAM, A. *see* DAMAS, J., **101**, 418
- ADEAGBO, A.S.O. & MALIK, K.U. Endothelium-dependent and BRL 34915-induced vasodilatation in rat isolated perfused mesenteric arteries: role of G-proteins, K<sup>+</sup> and calcium channels, **100**, 427
- ADGEY, A.A.J. *see* CARLISLE, E.J.F., **100**, 530
- ADVENIER, C., SARRIA, B., NALINE, E., PUYBASSET, L. & LAGENTE, V. Contractile activity of three endothelins (ET-1, ET-2 and ET-3) on the human isolated bronchus, **100**, 168
- AGBANYO, M. *see* NAVARATHNAM, S., **101**, 370
- AIKAWA, T., SEKIZAWA, K., ITABASHI, S., SASAKI, H. & TAKISHIMA, T. Inhibitory actions of prostaglandin E<sub>1</sub> on non-adrenergic non-cholinergic contraction in guinea-pig bronchi, **101**, 13
- AIZENMAN, E. *see* REYNOLDS, I.J., **101**, 178
- AKAIKE, N. *see* TAKAHASHI, K., **100**, 705
- AKASU, T. *see* TOKIMASA, T., **101**, 190
- AKSOY, M.O., HAKAL, C., SMITH, J.B., STEWART, G.J. & ZERWICK, C.R. Mediation of bradykinin-induced contraction in canine veins via thromboxane/prostaglandin endoperoxide receptor activation, **99**, 461
- ALARANTA, S., KLINGE, E., PÄTISI, T. & SJÖSTRAND, N.O. Inhibition of nicotine-induced relaxation of the bovine retractor penis muscle by compounds known to have ganglion-blocking properties, **101**, 472
- ALBRIGHTSON-WINSLOW, C.R. *see* BROOKS, D.P., **99**, 750
- ALDASORO, M. *see* de AGUILERA, E.M., **99**, 439
- ALEXANDER, B. *see* MATHIE, R.T., **100**, 626
- ALFARO, M.J., COLADO, M.I., LÓPEZ, F. & MARTIN, M.I. Effect of clonidine, nimodipine and diltiazem on the *in vitro* opioid withdrawal response in the guinea-pig ileum, **101**, 958
- ALLELY, M.C. & ALPS, B.J. Prevention of myocardial enzyme release by ranolazine in a primate model of ischaemia with reperfusion, **99**, 5
- ALLEN, J.D. *see* CARLISLE, E.J.F., **100**, 530
- ALLEN, T.G.J. & BURNSTOCK, G. GABA<sub>A</sub> receptor-mediated increase in membrane chloride conductance in rat paratracheal neurones, **100**, 261
- , The actions of adenosine 5'-triphosphate on guinea-pig intracardiac neurones in culture, **100**, 269
- ALLGEIER, H. *see* FAGG, G.E., **99**, 791
- ALPS, B.J. *see* ALLELY, M.C., **99**, 5
- AL-SWAYEH, O.A. *see* MOORE, P.K., **99**, 408
- , *see* MOORE, P.K., **101**, 865
- ALVING, K. *see* MATRAN, R., **100**, 535
- AMERINI, S. *see* MANTELLI, L., **99**, 717
- ANDERSON, A.J. *see* PATMORE, L., **99**, 687
- ANDERSSON, R.G.G. *see* GRUNDEMAR, L., **99**, 473
- ANDINÉ, P., RUDOLPHI, K.A., FREDHOLM, B.B. & HAGBERG, H. Effect of propentofylline (HWA 285) on extracellular purines and excitatory amino acids in CA1 of rat hippocampus during transient ischaemia, **100**, 814
- ANDRIANTSITOHAINA, R. & STOCLET, J.C. Enhancement by neuropeptide Y (NPY) of the dihydropyridine-sensitive component of the response to  $\alpha_1$ -adrenoceptor stimulation in rat isolated mesenteric arterioles, **99**, 389
- ANGST, C. *see* FAGG, G.E., **99**, 791
- ANGUS, J.A. *see* COCKS, T.M., **100**, 375
- , *see* McPHERSON, G.A., **100**, 201
- , *see* PRUNEAU, D., **100**, 180

- ANIS, N.A. *see* JONES, M.G., **101**, 968
- ANTHONY, B.L. *see* CATRAVAS, J.D., **101**, 121
- ANTUNES, E., MARIANO, M., CIRINO, G., LEVI, S. & DE NUCCI, G. Pharmacological characterization of polycation-induced rat hind-paw oedema, **101**, 986
- ANWYL, R. *see* O'CONNOR, J.J., **101**, 171
- AOKI, S. *see* SANJAR, S., **99**, 267
- , *see* SANJAR, S., **99**, 679
- APPLEYARD, M.E., TAYLOR, S.C. & LITTLE, H.J. Acetylcholinesterase activity in regions of mouse brain following acute and chronic treatment with a benzodiazepine inverse agonist, **101**, 599
- ARMSTRONG, P.W. *see* FORSTER, C., **101**, 109
- ASANO, M. *see* MASUZAWA, K., **100**, 143
- ASHFORD, M.L.J., BODEN, P.R. & TREHERNE, J.M. Tolbutamide excites rat glucoreceptive ventromedial hypothalamic neurones by indirect inhibition of ATP-K<sup>+</sup> channels, **101**, 531
- ASPINALL, R.J. *see* DUNNE, M.J., **99**, 169
- ASHTON, N., BALMENT, R.J. & BLACKBURN, T.P.  $\kappa$ -Opioid-receptor agonists modulate the renal excretion of water and electrolytes in anaesthetised rats, **99**, 181

## B

- BABA, A. *see* ETOH, S., **100**, 564
- BACKUS, L.I., SHARP, T. & GRAHAME-SMITH, D.G. Behavioural evidence for a functional interaction between central 5-HT<sub>2</sub> and 5-HT<sub>1A</sub> receptors, **100**, 793
- BAEBLICH, S.E. *see* SCHMIDT, H.H.H.W., **101**, 145
- BAGETTA, G., DE SARRO, G.B., SAKURADA, S., RISPOLI, V. & NISTICÒ, G. Different profile of electrocortical power spectrum changes after micro-infusion into the locus coeruleus of selective agonists at various opioid receptor subtypes in rats, **101**, 655
- BAGETTA, G., NISTICÒ, G. & BOWERY, N.G. Prevention by the NMDA receptor antagonist, MK801 of neuronal loss produced by tetanus toxin in the rat hippocampus, **101**, 776
- BAILEY, S.J. & HOURANI, S.M.O. A study of the purinoceptors mediating contraction in the rat colon, **100**, 753
- BAIN, P. *see* PALMER, R.M., **101**, 835
- BAIRD, A.A. & MUIR, T.C. Membrane hyperpolarization, cyclic nucleotide levels and relaxation in the guinea-pig internal anal sphincter, **100**, 329
- BAKER, R. *see* FREEDMAN, S.B., **101**, 575
- , *see* SPICER, B.A., **101**, 821
- BAKHLE, Y.S. *see* YEATS, D.A., **100**, 447
- BALDWIN, B.A. *see* EBENEZER, I.S., **101**, 559
- BALLATI, L. *see* MANZINI, S., **100**, 251
- BALLERINI, L. *see* PUGLIESE, A.M., **99**, 189
- BALLESTA, J.J., GARCIA, A.G., GUTIERREZ, L.M., HIDALGO, M.J., PALMERO, M., REIG, J.A. & VINIEGRA, S. Separate [<sup>3</sup>H]-nitrendipine binding sites of mitochondria and plasma membranes of bovine adrenal medulla, **101**, 21
- BALMENT, R.J. *see* ASHTON, N., **99**, 181
- BAMFORTH, J.P. *see* KELLY, S.S., **99**, 721
- BANKS, B.E.C., DEMPSEY, C.E., VERNON, C.A., WARNER, J.A. & YAMEY, J. Anti-inflammatory activity of bee venom peptide 401 (mast cell degranulating peptide) and compound 48/80 results from mast cell degranulation *in vivo*, **99**, 350
- BARABÉ, J. *see* CADIEUX, A., **101**, 193
- BARAJAS-LOPEZ, C. *see* SHEN, K.-Z., **101**, 925
- BARBANTI, G. *see* MAGGI, C.A., **99**, 186
- BARBER, D.J. *see* COOPER, S.J., **99**, 65
- BARBER, H.E. *see* BOATENG, Y.A., **101**, 301
- BARLOW, R.B., HOLDUP, D.W., HARRIS, G., VEALE, M.A. & WILLIAMS, A. Effects of chain-length and unsaturation on affinity and selectivity at muscarinic receptors, **99**, 622
- BARNES, P.J. *see* BELVISI, M.G., **100**, 131
- , *see* CHILVERS, E.R., **99**, 297
- , *see* CRAWLEY, D.E., **101**, 166
- , *see* ICHINOSE, M., **101**, 77
- , *see* LÖTVALL, J.O., **100**, 69
- , *see* ROGERS, D.F., **101**, 739
- BARNES, S. *see* MARSHALL, F.H., **99**, 845

- BARNETT, D.B. *see* KOWALSKI, M.T., **99**, 27  
 BARTOLINI, A. *see* GHELARDINI, C., **101**, 49  
 BARTRUP, J.T. & STONE, T.W. Dihydropyridines alter adenosine sensitivity in the rat hippocampal slice, **101**, 97  
 BAST, A. *see* LEURS, R., **101**, 881  
 BAUD, J. *see* FAGG, G.E., **99**, 791  
 BAUMANN, P. *see* FAGG, G.E., **99**, 791  
 BAYDOUN, A.R., MARKHAM, A., MORGAN, R.M. & SWEETMAN, A.J. Bay K 8644, modifier of calcium transport and energy metabolism in rat heart mitochondria: a new intracellular site of action, **101**, 15  
 BEANI, L. *see* BIANCHI, C., **101**, 448  
 BEAVER, T.H. *see* DOHERTY, N.S., **101**, 869  
 BEECH, D.J., MACKENZIE, I., BOLTON, T.B. & CHRISTEN, M.O. Effects of pinaverium on voltage-activated calcium channel currents of single smooth muscle cells isolated from the longitudinal muscle of the rabbit jejunum, **99**, 374  
 BEETENS, J. *see* DE CLERCK, F., **99**, 631  
 BEFUS, A.D. *see* MATHISON, R., **101**, 93  
 BELCOURT, A. *see* FELDMAN, J., **100**, 600  
 BELL, C. *see* SUNN, N., **99**, 655  
 BELVISI, M.G., STRETTON, C.D. & BARNES, P.J. Modulation of cholinergic neurotransmission in guinea-pig airways by opioids, **100**, 131  
 BENNETT, A. *see* D'AMATO, M., **100**, 126  
 —, *see* GOEL, R.K., **99**, 289  
 BENNETT, T. *see* GARDINER, S.M., **99**, 107  
 —, *see* GARDINER, S.M., **99**, 830  
 —, *see* GARDINER, S.M., **100**, 158  
 —, *see* GARDINER, S.M., **101**, 10  
 —, *see* GARDINER, S.M., **101**, 625  
 —, *see* GARDINER, S.M., **101**, 632  
 BERENDSEN, H.H.G. & BROEKKAMP, C.L.E. Behavioural evidence for functional interactions between 5-HT-receptor subtypes in rats and mice, **101**, 667  
 BERLAN, M. *see* ESTAN, L., **101**, 329  
 —, *see* GALITZKY, J., **100**, 862  
 BERNARDI, G. *see* MERCURI, N.B., **100**, 257  
 BERNE, R.M. *see* GIDDAY, J.M., **100**, 95  
 BERTHELSEN, H.C. *see* KNUDSEN, T., **100**, 453  
 BETTANEY, J. *see* DRAY, A., **99**, 323  
 —, *see* DRAY, A., **101**, 727  
 —, *see* JAMES, I.F., **99**, 503  
 BIANCHETTI, A. & MANARA, L. *In vitro* inhibition of intestinal motility by phenylethanolaminotetralines: evidence of atypical  $\beta$ -adrenoceptors in rat colon, **100**, 831  
 BIANCHI, C., SINISCALCHI, A. & BEANI, L. 5-HT<sub>1A</sub> agonists increase and 5-HT<sub>3</sub> agonists decrease acetylcholine efflux from the cerebral cortex of freely-moving guinea-pigs, **101**, 448  
 BIGAUD, M. *see* DAINITY, I.A., **100**, 241  
 BIRCH, P.J. *see* HAYES, A.G., **101**, 944  
 BIRD, I.M. *see* LIGHTLY, E.R.T., **99**, 709  
 BIRRELL, G.J., McQUEEN, D.S., IGGO, A. & GRUBB, B.D. The effects of 5-HT on articular sensory receptors in normal and arthritic rats, **101**, 715  
 BISSET, G.W., CHOWDREY, H.S., FAIRHALL, K.M. & GUNN, L.K. Central inhibition by  $\gamma$ -aminobutyric acid and muscimol of the release of vasopressin and oxytocin by an osmotic stimulus in the rat, **99**, 529  
 BITTIGER, H. *see* FAGG, G.E., **99**, 791  
 BLACKBURN, T.P. *see* ASHTON, N., **99**, 181  
 BLEAKMAN, D., BRORSON, J.R. & MILLER, R.J. The effect of capsaicin on voltage-gated calcium currents and calcium signals in cultured dorsal root ganglion cells, **101**, 423  
 BO, X. & BURNSTOCK, G. High- and low-affinity binding sites for [<sup>3</sup>H]- $\alpha$ ,  $\beta$ -methylene ATP in rat urinary bladder membranes, **101**, 291  
 BO, X. & BURNSTOCK, G. The effects of Bay K 8644 and nifedipine on the responses of rat urinary bladder to electrical field stimulation,  $\beta$ ,  $\alpha$ -methylene ATP and acetylcholine, **101**, 494  
 BOARDER, M.R. *see* JONES, J.A., **101**, 521  
 BOATENG, Y.A., BARBER, H.E., MACDONALD, T.M., PETRIE, J.C., LEE, M.R. & WHITING, P.H. The pharmacokinetics of  $\gamma$ -glutamyl-L-dopa in normal and anephric rats and rats with glycerol-induced acute renal failure, **101**, 301  
 BODDEKE, H.W.G.M. & KALKMAN, H.O. Zacopride and BRL 24924 induce an increase in EEG-energy in rats, **101**, 281  
 BODEN, P.R. *see* ASHFORD, M.L.J., **101**, 531  
 BOECKSTAENS, G.E., PELCKMANS, P.A., RAMPART, M., RUYTJENS, I.F., VERBEUREN, T.J., HERMAN, A.G. & VAN MAERCKE, Y.M. GABA<sub>A</sub> receptor-mediated stimulation of non-adrenergic non-cholinergic neurones in the dog ileocolonic junction, **101**, 460  
 BOEHM, C. *see* TUMER, N., **99**, 87  
 BOEYNAEMS, J.-M., BOUTHERIN-FALSON, O., LAGNEAU, C. & GALAND, N. Enhancement of the endothelial production of prostacyclin by inhibitors of protein synthesis, **101**, 799  
 BOGLE, R.G., PIRES, J.G.P. & RAMAGE, A.G. Evidence that central 5-HT<sub>1A</sub>-receptors play a role in the von Bezold-Jarisch reflex in the rat, **100**, 757  
 BÖHME, E. *see* SCHMIDT, H.H.H.W., **101**, 145  
 BOLTON, T.B. *see* BEECH, D.J., **99**, 374  
 —, *see* HUGHES, A.D., **101**, 3  
 BOOBIS, A.R. *see* NEWMAN, C.M., **99**, 825  
 BORGEAT, P. *see* MÉNARD, L., **100**, 15  
 BORST, S.E. & SCARPACE, P.J. Reduced high-affinity  $\alpha_1$ -adrenoceptors in liver of senescent rats: implications of assessment at various temperatures, **101**, 650  
 BOSE, D. *see* NAVARATNAM, S., **101**, 370  
 BOUBEKEUR, A.K. *see* SANJAR, S., **99**, 267  
 BOUGHTON-SMITH, N.K. *see* HUTCHESON, I.R., **101**, 815  
 BOULANGER, C., SCHINI, V.B., MONCADA, S. & VAN-HOUTTE, P.M. Chronic exposure of cultured endothelial cells to eicosapentaenoic acid potentiates the release of endothelium-derived relaxing factor(s), **99**, 176  
 BOULANGER, C., SCHINI, V.B., MONCADA, S. & VAN-HOUTTE, P.M. Stimulation of cyclic GMP production in cultured endothelial cells of the pig by bradykinin, adenosine diphosphate, calcium ionophore A23187 and nitric oxide, **101**, 152  
 BOUHELAL, R., LOUBATIÈRES-MARIANI, M.-M. & MIR, A.K. Investigation of the mechanism(s) of 8-OH-DPAT-mediated inhibition of plasma insulin in spontaneously hypertensive rats, **100**, 173  
 BOURA, A.L.A. *see* LAU, W.A.K., **101**, 394  
 —, *see* RECHTMAN, M.P., **101**, 269  
 BOURDON, V. *see* DAMAS, J., **101**, 418  
 BOUSQUET, P. *see* FELDMAN, J., **100**, 600  
 BOUTHERIN-FALSON, O. *see* BOEYNAEMS, J.-M., **101**, 799  
 BOWERY, N.G. *see* BAGETTA, G., **101**, 776  
 BOWHAY, A.R. *see* DOLIN, S.J., **101**, 691  
 BOYLE, S. *see* HUNTER, J.C., **101**, 183  
 BRADING, A.F. & WILLIAMS, J.H. Contractile responses of smooth muscle strips from rat and guinea-pig urinary bladder to transmural stimulation: effects of atropine and  $\alpha$ ,  $\beta$ -methylene ATP, **99**, 493  
 BRADING, A.F. *see* FUJII, K., **99**, 779  
 —, *see* INOUE, R., **100**, 619  
 BRAIN, S.D. *see* BUCKLEY, T.L., **99**, 7  
 —, *see* CROSSMAN, D.C., **99**, 71  
 BRAMLEY, A.M., SAMHOUN, M.N. & PIPER, P.J. The role of the epithelium in modulating the responses of guinea-pig trachea induced by bradykinin *in vitro*, **99**, 762  
 BRAMMER, M.J. *see* XIANG, J.-Z., **101**, 140  
 BRAQUET, P. *see* SIROIS, M.G., **101**, 896  
 BRASCH, H. *see* VON POEHL, C., **101**, 406  
 BRAVE, S.R. *see* TUCKER, J.F., **100**, 661  
 BRAY, K.M. *see* NEWGREEN, D.T., **100**, 605  
 BREIMER, D.D. *see* DINGEMANSE, J., **99**, 53  
 BRICCA, G. *see* FELDMAN, J., **100**, 600  
 BRIZZOLARA, A.L. & BURNSTOCK, G. Evidence for noradrenergic-purinergeric cotransmission in the hepatic artery of the rabbit, **99**, 835  
 BRODDE, O.-E. *see* MOTOMURA, S., **101**, 363  
 BROEKKAMP, C.L.E. *see* BERENDSEN, H.H.G., **101**, 667  
 BROOKS, D.P., CALDWELL, N.C., KOSTER, P.F., ALBRIGHTSON-WINSLOW, C.R. & KINTER, L.B. Effect of cyclo-oxygenase blockade on the renal actions of vasopressin and SK&F 105494 in the rhesus monkey, **99**, 750  
 BROOKS, D.P., SOLLEVELD, H.A. & CONTINO, L.C. Vasopressin and the pathogenesis of chronic renal failure, **100**, 79  
 BRORSON, J.R. *see* BLEAKMAN, D., **101**, 423  
 BROWN, A.M. *see* KAUMANN, A.J., **100**, 879  
 BROWN, B.S. *see* NEWGREEN, D.T., **100**, 605  
 BROWN, C.M., MACKINNON, A.C., McGRATH, J.C., SPEDDING, M. & KILPATRICK, A.T.  $\alpha_2$ -Adrenoceptor subtypes and imidazoline-like binding sites in the rat brain, **99**, 803  
 —, Heterogeneity of  $\alpha_2$ -adrenoceptors in rat cortex but not human platelets can be identified by 8-OH-DPAT, RU 24969 and methysergide, **99**, 481  
 BROWN, L.A., HUMPHREY, S.M. & HARDING, S.E. The anti-adrenergic effect of adenosine and its blockade by pertussis toxin:



- a comparative study in myocytes isolated from guinea-pig, rat and failing human hearts, **101**, 484
- BROWN, M.J. *see* KAUMANN, A.J., **100**, 879
- BROWN, R. *see* MOUSA, S.A., **99**, 233
- , *see* MOUSA, S.A., **100**, 379
- BRUCKDORFER, K.R. *see* JACOBS, M., **100**, 21
- BRUIJNZEEL, P.L.B., WARRINGA, R.A.J., KOK, P.T.M. & KREUKNIET, J. Inhibition of neutrophil and eosinophil induced chemotaxis by nedocromil sodium and sodium cromoglycate, **99**, 798
- BRUNDISH, D. *see* FAGG, G.E., **99**, 791
- BRUNEAU, P. *see* FOSTER, S.J., **99**, 113
- BRUNELLESCHI, S., VANNI, L., LEDDA, F., GIOTTI, A., MAGGI, C.A. & FANTOZZI, R. Tachykinins activate guinea-pig alveolar macrophages: involvement of NK<sub>2</sub> and NK<sub>1</sub> receptors, **100**, 417
- BUCKLEY, T.L., BRAIN, S.D. & WILLIAMS, T.J. Ruthenium red selectively inhibits oedema formation and increased blood flow induced by capsaicin in rabbit skin, **99**, 77
- BULL, H.A. & DOWD, P.M. Interleukin-1 potentiates histamine-induced release of prostacyclin from human endothelial cells, **101**, 703
- BULLOCH, J.M. & STARKE, K. Presynaptic  $\alpha_2$ -autoinhibition in a vascular neuroeffector junction where ATP and noradrenaline act as co-transmitters, **99**, 279
- BUNCE, K.T. & SPRAGGS, C.F. Prostanoid stimulation of anion secretion in guinea-pig gastric and ileal mucosa is mediated by different receptors, **101**, 889
- BUNCE, K.T. *see* BUTLER, A., **101**, 591
- BURDET, R. *see* CRISCIONE, L., **100**, 31
- BURNSTOCK, G. *see* ALLEN, T.G.L., **100**, 261
- , *see* ALLEN, T.G.L., **100**, 269
- , *see* BO, X., **101**, 291
- , *see* BO, X., **101**, 494
- , *see* BRIZZOLARA, A.L., **99**, 835
- , *see* ELLIS, J.L., **100**, 457
- , *see* HOYLE, C.H.V., **99**, 617
- BURRIDGE, J. *see* BUTLER, A., **101**, 591
- BURTON, G.A., MACNEIL, S., DE JONGE, A. & HAYLOR, J. Cyclic GMP release and vasodilation induced by EDRF and atrial natriuretic factor in the isolated perfused kidney of the rat, **99**, 364
- BUTLER, A., ELSEWOOD, C.J., BURRIDGE, J., IRELAND, S.J., BUNCE, K.T., KILPATRICK, G.J. & TYERS, M.B. The pharmacological characterization of 5-HT<sub>3</sub> receptors in three isolated preparations derived from guinea-pig tissues, **101**, 591
- BUTTERFIELD, M.C. & CHESS-WILLIAMS, R. Enhanced  $\alpha$ -adrenoceptor responsiveness and receptor number during global ischaemia in the Langendorff perfused rat heart, **100**, 641
- BUZZI, M.G. & MOSKOWITZ, M.A. The antimigraine drug, sumatriptan (GR43175), selectively blocks neurogenic plasma extravasation from blood vessels in dura mater, **99**, 202

# C

- CADIEUX, A., LANOUE, C., SIROIS, P. & BARABÉ, J. Carbamylcholine and 5-hydroxytryptamine-induced contraction in rat isolated airways: inhibition by calcitonin gene-related peptide, **101**, 193
- CALABRESI, P. *see* MERCURI, N.B., **100**, 257
- CALDWELL, N.C. *see* BROOKS, D.P., **99**, 750
- CAMPBELL, I.C. *see* XIANG, J.-Z., **101**, 140
- CAREY, F. *see* MORONEY, M.A., **101**, 128
- CARLISLE, E.J.F., ALLEN, J.D., KERNOHAN, W.G., LEAHEY, W. & ADGEY, A.A.J. Pharmacological analysis of established ventricular fibrillation, **100**, 530
- CARR, R.D., COOPER, A.E., HUTCHINSON, R., MANN, J., O'CONNOR, S.E., ROBINSON, D.H. & WELLS, E. Preferential biliary elimination of FPL 63547, a novel inhibitor of angiotensin-converting enzyme, in the rat, **100**, 90
- CARR, R.D., HIGGS, L., KILLINGBACK, P.G., NICOL, A.K., O'CONNOR, S.E., ROBINSON, A., WELLS, E. & SIMPSON, W.T. Pharmacological properties of FPL 63547, a novel inhibitor of angiotensin-converting enzyme, **100**, 83
- CARSWELL, H. *see* CRAWFORD, M.L.A., **100**, 867
- CASTRO, E., TORRES, M., MIRAS-PORTUGAL, M.T. & GONZALEZ, M.P. Effect of diadenosine polyphosphates on catecholamine secretion from isolated chromaffin cells, **100**, 360
- CATRAVAS, J.D., RYAN, J.W., CHUNG, A.Y.K., QUINN, N.E. & ANTHONY, B.L. Inhibition of endothelial-bound angiotensin converting enzyme, *in vivo*, **101**, 121
- CAVERO, I. *see* FLOCH, A., **100**, 163
- CREDA, E. *see* MICHELETTI, R., **100**, 150
- CHAHN, L.A. Effects of putative neurotransmitters and related drugs on withdrawal contractures of guinea-pig isolated ileum following brief contact with [Met<sup>5</sup>]enkephalin, **101**, 908
- CHALLISS, R.A.J. *see* CHILVERS, E.R., **99**, 297
- CHALLISS, R.A.J. & NICHOLSON, C.D. Effects of selective phosphodiesterase inhibition on cyclic AMP hydrolysis in rat cerebral cortical slices, **99**, 47
- CHAN, K.Y. *see* DOHERTY, N.S., **101**, 869
- CHAN, Y. *see* MOUSA, S.A., **99**, 233
- CHAND, N., DIAMANTIS, W. & SOFIA, R.D. Induction of non-specific airway hyperreactivity by potassium channel blockade in rat isolated trachea, **101**, 541
- CHANDLER, C.J., ONG, B.Y. & SITAR, D.S. Haemodynamic alterations in anaesthetized and acutely intoxicated newborn piglets, **101**, 227
- CHANG, C.C. *see* HONG, S.J., **101**, 793
- CHAPMAN, I.D. *see* SANJAR, S., **99**, 267
- CHARALAMBOUS, L. *see* TUCKER, J.F., **100**, 661
- CHAU, T. *see* NAVARATNAM, S., **101**, 370
- CHEN, H.-I. Evidence for the presynaptic action of 5-hydroxytryptamine and the involvement of purinergic innervation in the rabbit lower urinary tract, **101**, 212
- CHESS-WILLIAMS, R. *see* BUTTERFIELD, M.C., **100**, 641
- CHILVERS, E.R., CHALLISS, R.A.J., WILLCOCKS, A.L., POTTER, B.V.L., BARNES, P.J. & NAHORSKI, S.R. Characterization of stereospecific binding sites for inositol 1,4,5-trisphosphate in airway smooth muscle, **99**, 297
- CHITANO, P. *see* MAPP, C.E., **100**, 886
- CHONG, N.W.S. *see* MOORE, P.K., **99**, 408
- CHOWDREY, H.S. *see* BISSET, G.W., **99**, 529
- CHRIST, D., GOEBEL, M. & SAZ, H.J. Actions of acetylcholine and GABA on spontaneous contractions of the filariid, *Dipetalonema vitea*, **101**, 971
- CHRIST, G.J., MAAYANI, S., VALCIC, M. & MELMAN, A. Pharmacological studies of human erectile tissue: characteristics of spontaneous contractions and alterations in  $\alpha$ -adrenoceptor responsiveness with age and disease in isolated tissues, **101**, 375
- CHRISTEN, M.O. *see* BEECH, D.J., **99**, 374
- CHRISTOPHE, J. *see* FEIFEL, R., **99**, 445
- CHUNG, A.Y.K. *see* CATRAVAS, J.D., **101**, 121
- CHUNG, K.F. *see* LÖTVALL, J.O., **100**, 69
- CIRINO, G. *see* ANTUNES, E., **101**, 986
- CLARKE, B. *see* PATMORE, G., **99**, 687
- CLARKE, P.B.S., WYDER, K.J., JAKUBOVIC, A. & FIBIGER, H.C. Effects of B-HT 920 on nigrostriatal and mesolimbic dopamine systems in normosensitive and supersensitive rats, **99**, 509
- CLELLAND, C. *see* DINH XUAN, A.T., **99**, 9
- COCKS, T.M., KING, S.J. & ANGUS, J.A. Glibenclamide is a competitive antagonist of the thromboxane A<sub>2</sub> receptor in dog coronary artery *in vitro*, **100**, 375
- COLADO, M.I. *see* ALFARO, M.J., **101**, 958
- COLLARD, K.J. *see* WILKINSON, L.S., **101**, 981
- COLLINS, P.D. *see* WILLIAMS, F.M., **100**, 729
- COMELLA, J.X. *see* MOLGÓ, J., **99**, 695
- COMMISSIONG, J.W., SLIMOVITCH, C. & TOFFANO, G. Regulation of the synthesis and metabolism of striatal dopamine after disruption of nerve conduction in the medial forebrain bundle, **99**, 741
- COMPTON, A.M. *see* GARDINER, S.M., **99**, 107
- , *see* GARDINER, S.M., **99**, 830
- , *see* GARDINER, S.M., **100**, 158
- , *see* GARDINER, S.M., **101**, 10
- , *see* GARDINER, S.M., **101**, 625
- , *see* GARDINER, S.M., **101**, 632
- CONNAUGHTON, S. & DOHERTY, J.R. Functional evidence for heterogeneity of peripheral prejunctional  $\alpha_2$ -adrenoceptors, **101**, 285
- CONNAUGHTON, S. & DOHERTY, J.R. No evidence for differences between pre- and post-junction  $\alpha_2$ -adrenoceptors in the periphery, **99**, 97
- CONSTANTI, A. *see* SMART, T.G., **99**, 643
- CONTINO, L.C. *see* BROOKS, D.P., **99**, 790
- COOPER, A.E. *see* CARR, R.D., **100**, 90
- COOPER, S.J., DOURISH, C.T. & BARBER, D.J. Reversal of the anorectic effect of (+)-fenfluramine in the rat by the selective cholecystokinin receptor antagonist MK-329, **99**, 65
- COOTE, J.H. *see* LEWIS, D.I., **99**, 667
- COPPE, R.P. *see* REMIE, R., **99**, 223
- CORDEIRO, R.S.B. *see* HENRIQUES, M.G.M.O., **99**, 164

- CORRADETTI, R. *see* PUGLIESE, A.M., **99**, 189  
 CORTIJO, J. *see* IRIARTE, C.F., **101**, 257  
 COTTNEY, J.E. *see* SHAHID, M., **100**, 735  
 COULTER, D.A., HUGUENARD, J.R. & PRINCE, D.A. Differential effects of petit mal anticonvulsants and convulsants on thalamic neurones: calcium current reduction, **100**, 800  
 COULTER, D.A., HUGUENARD, J.R. & PRINCE, D.A. Differential effects of petit mal anticonvulsants and convulsants on thalamic neurones: GABA current blockade, **100**, 807  
 COWLRICK, I.S. *see* PACIOREK, P.M., **100**, 289  
 COX, H.M. & CUTHBERT, A.W. The effects of neuropeptide Y and its fragments upon basal and electrically stimulated ion secretion in rat jejunum mucosa, **101**, 247  
 COYLE, A.J., SPINA, D. & PAGE, C.P. PAF-induced bronchial hyperresponsiveness in the rabbit: contribution of platelets and airway smooth muscle, **101**, 31  
 CRAGOE, JR., E.J. *see* OTANI, H., **100**, 207  
 CRAWFORD, M.L.A., CARSWELL, H. & YOUNG, J.M.  $\gamma$ -Aminobutyric acid inhibition of histamine-induced inositol phosphate formation in guinea-pig cerebellum; comparison with guinea-pig and rat cerebral cortex, **100**, 867  
 CRAWLEY, D.E., LIU, S.F., EVANS, T.W. & BARNES, P.J. Inhibitory role of endothelium-derived relaxing factor in rat and human pulmonary arteries, **101**, 166  
 CREMONA, G. *see* DINH XUAN, A.T., **99**, 9  
 CRESSIER, F. *see* EGLÉME, C., **100**, 237  
 CREUTZELDT, W. *see* KATSOULIS, S., **101**, 297  
 CRIDDLE, D.N., DEWAR, G.H., WATHEY, W.B. & WOODWARD, B. The effects of novel vasodilator long chain acyl carnitine esters in the isolated perfused heart of the rat, **99**, 477  
 CRISCIONE, L., NELLIS, P., RINIKER, B., THOMANN, H. & BURDET, R. Reactivity and sensitivity of mesenteric vascular beds and aortic rings of spontaneously hypertensive rats to endothelin: effects of calcium entry blockers, **100**, 31  
 CRISCUOLI, M. *see* SUBISSI, A., **100**, 502  
 CROSET, M. *see* FONLUPT, P., **101**, 920  
 CROSS, A.J. *see* GREEN, A.R., **99**, 41  
 CROSSMAN, D.C., DASHWOOD, M.R., BRAIN, S.D., McEWAN, J. & PEARSON, J.D. Action of calcitonin gene-related peptide upon bovine vascular endothelial and smooth muscle cells grown in isolation and co-culture, **99**, 71  
 CROXTON, R. *see* WITHRINGTON, P.G., **99**, 810  
 CRUWYS, S.C., DAVIES, D.E. & PETTIPHER, E.R. Co-operation between interleukin-1 and the fibrinolytic system in the degradation of collagen by articular chondrocytes, **100**, 631  
 CUBELA, R. *see* FABRIS, B., **100**, 651  
 CUTHBERT, A.W. *see* COX, H.M., **101**, 247
- D**
- DACQUET, C. *see* MIRONNEAU, J., **101**, 6  
 DAI, S. *see* LEUNG, C.M.K., **99**, 247  
 DAINITY, I.A., BIGAUD, M., McGRATH, J.C. & SPEDDING, M. Interactions of palmitoyl carnitine with the endothelium in rat aorta, **100**, 241  
 DAINITY, I.A., McGRATH, J.C. & TEMPLETON, A.G.B. The influence of the initial stretch and the agonist-induced tone on the effect of basal and stimulated release of EDRF, **100**, 767  
 DAINITY, I.A. *see* LEFF, P., **101**, 55  
 DALE, M.M. *see* TWOMEY, B., **100**, 819  
 DALY, C.J., DUNN, W.R., McGRATH, J.C., MILLER, D.J. & WILSON, V.G. An examination of the sources of calcium for contractions mediated by postjunctional  $\alpha_1$ - and  $\alpha_2$ -adrenoceptors in several blood vessels isolated from the rabbit, **99**, 253  
 DALZIEL, H.H., GRAY, G.A., DRUMMOND, R.M., FURMAN, B.L. & SNEDDON, P. Investigation of the selectivity of  $\alpha$ ,  $\beta$ -methylene ATP in inhibiting vascular responses of the rat *in vivo* and *in vitro*, **99**, 820  
 DAMAS, J., BOURDON, V., REMACLE-VOLON, G. & ADAM, A. Kinins and peritoneal exudates induced by carrageenin and zymosan in rats, **101**, 418  
 D'AMATO, M., STAMFORD, I.F. & BENNETT, A. The effects of cholecystokinin octapeptide on human isolated alimentary muscle, **100**, 126  
 DANHOF, M. *see* DINGEMANSE, J., **99**, 53  
 DASHWOOD, M.R. *see* CROSSMAN, D.C., **99**, 71  
 DAVIDSON, J., MILTON, A.S. & ROTONDO, D. A study of the pyrogenic actions of interleukin-1 $\alpha$  and interleukin 1 $\beta$ : interactions with a steroidal and a non-steroidal anti-inflammatory agent, **100**, 542  
 DAVIES, D.E. *see* CRUWYS, S.C., **100**, 631  
 DAVIES, D.S. *see* NEWMAN, C.M., **99**, 825  
 DAVIES, E.M. *see* GREEN, A.R., **99**, 41  
 DAVIES, J.A. *see* DICKIE, B.G.M., **101**, 8  
 DAVIES, M. *see* FLETCHER, P.J., **99**, 519  
 DAVISON, J.S. *see* MATHISON, R., **101**, 93  
 DE AGUILERA, E.M., IRURZUN, A., VILA, J.M., ALDASORO, M., GALEOTE, M.S. & LLUCH, S. Role of endothelium and calcium channels in endothelin-induced contraction of human cerebral arteries, **99**, 439  
 DE CLERK, F., LOOTS, W., SOMERS, Y., BEETENS, J., WOUTERS, L., WYNANTS, J. & JANSSEN, P.A.J. 5-Hydroxytryptamine and arachidonic acid metabolites modulate extensive platelet activation induced by collagen in cats *in vivo*, **99**, 631  
 DEIGHTON, N.M. *see* MOTOMURA, S., **101**, 363  
 DE JONG, W. *see* VAN GIEERSBERGEN, P.L.M., **99**, 467  
 DE JONGE, A. *see* BURTON, G.A., **99**, 364  
 DELDAY, M.I. *see* PALMER, R.M., **101**, 835  
 DEL MONTE, M., OMINI, C. & SUBISSI, A. Mechanism of the potentiation of neurally-induced bronchoconstriction by gallamine in the guinea-pig, **99**, 582  
 DELPÓN, E. *see* DIEZ, J., **100**, 305  
 DE LUCA, A., LI, C.G., RAND, M.J., REID, J.J., THAINA, P. & WONG-DUSTING, H.K. Effects of  $\omega$ -conotoxin GVIA on autonomic neuroeffector transmission in various tissues, **101**, 437  
 DE MEY, J.G.R. *see* HEESSEN, B.-J., **101**, 859  
 DEMPSEY, C.E. *see* BANKS, B.E.C., **99**, 350  
 DEN BOER, M.O. *see* VILLALÓN, C.M., **100**, 665  
 DE NUCCI, G. *see* ANTUNES, E., **101**, 986  
 DE SARRO, G.B. *see* BAGETTA, G., **101**, 655  
 DESQUAND, S., LEFORT, J., DUMAREY, C. & VARGAFTIG, B.B. The booster injection of antigen during active sensitization of guinea-pig modifies the anti-anaphylactic activity of the PAF antagonist, WEB 2086, **100**, 217  
 DESOUSA, R.J. *see* GREEN, A.R., **99**, 41  
 DEWAR, G.H. *see* CRIDDLE, D.N., **99**, 477  
 DHUME, V.G. *see* WITHRINGTON, P.G., **99**, 810  
 DIA, S. *see* ACHIKE, F.I., **100**, 102  
 DIAMANTIS, W. *see* CHAND, N., **101**, 541  
 DICKIE, B.G.M., LEWIS, M.J. & DAVIES, J.A. Potassium-stimulated release of nitric oxide from cerebellar slices, **101**, 8  
 DICKINSON, S.L. *see* McDERMOTT, A.M., **101**, 615  
 DIEKEMA, K.A. *see* DOHERTY, N.S., **101**, 869  
 DIEKMANN, H.W. *see* SASSEN, L.M.A., **101**, 605  
 DIEZ, J., DELPÓN, E. & TAMARGO, J. Effects of platelet activating factor on contractile force and  $^{45}\text{Ca}$  fluxes in guinea-pig isolated atria, **100**, 305  
 DIJK, S. *see* ROGERS, D.F., **101**, 739  
 DINERSTEIN, R.J. *see* DOHERTY, N.S., **101**, 869  
 DINGEMANSE, J., VOSKUYL, R.A., LANGEMEIJER, M.W.E., POSTEL-WESTRA, I., BREIMER, D.D., MEINARDI, H. & DANHOF, M. Pharmacokinetic-pharmacodynamic modelling of the anticonvulsant effect on oxazepam in individual rats, **99**, 53  
 DINGWALL, J.G. *see* FAGG, G.E., **99**, 791  
 DINH XUAN, A.T., HIGENBOTTAM, T.W., CLELLAND, C., PEPKE-ZABA, J., CREMONA, G. & WALLWORK, J. Impairment of pulmonary endothelium-dependent relaxation in patients with Eisenmenger's syndrome, **99**, 9  
 DION, S. *see* MAGGI, C.A., **100**, 588  
 —, *see* RHALEB, N.-E., **99**, 445  
 DIXON, D.M. & TRAYNOR, J.R. Evidence that the agonist action of dynorphin A(1-8) in the guinea-pig myenteric-plexus may be mediated partly through conversion to [Leu<sup>5</sup>]enkephalin, **101**, 674  
 DIXON, J.S. *see* SMALL, R.C., **100**, 516  
 DOCHERTY, J.R. No effect of pertussis toxin on peripheral prejunctional  $\alpha_2$ -adrenoceptor-mediated responses and on endothelium-dependent relaxations in the rat, **100**, 348  
 —, *see* CONNAUGHTON, S., **99**, 97  
 —, *see* CONNAUGHTON, S., **101**, 285  
 DODSON, B.A., URH, R.R. & MILLER, K.W. Relative potencies for barbiturate binding to the *Torpedo* acetylcholine receptor, **101**, 710  
 DOETSCH, N. *see* MOTOMURA, S., **101**, 363  
 DOHERTY, N.S., BEAVER, T.H., CHAN, K.Y., DINERSTEIN, R.J. & DIEKEMA, K.A. The antinociceptive activity of paracetamol in zymosan-induced peritonitis in mice: the role of prostacyclin and reactive oxygen species, **101**, 869  
 DOHI, Y. & LÜSCHER, T.F. Aging differentially affects direct and indirect actions of endothelin-1 in perfused mesenteric arteries of the rat, **100**, 889

- DOLARA, P. *see* ZICHE, M., 100, 11
- DOLIN, S.J., PATCH, T.L., RABBANI, M., SIAREY, R.J., BOWHAY, A.R. & LITTLE, H.J. Nitrendipine decreases benzo-diazepine withdrawal seizures but not the development of benzo-diazepine tolerance or withdrawal signs, 101, 691
- DOLPHIN, A.C. *see* SCOTT, R.H., 99, 629
- DONALDSON, J. *see* HALL, I.P., 100, 646
- DONETTI, A. *see* MICHELETTI, R., 100, 150
- , *see* MICHELETTI, R., 100, 395
- DONTENWILL, M. *see* FELDMAN, J., 100, 600
- DORSZEWSKI, A., BECKMANN-MÜLLER, B., KLING, L. & SPONER, G. Haemodynamic profile of an inhibitor of phosphodiesterase III, dibendan (BM 14.478): comparison with nitroprusside and dobutamine in conscious dogs, 101, 686
- DOUGALL, I.G. *see* LEFF, P., 101, 55
- DOUGLAS, S.A. & HILEY, C.R. Endothelium-dependent vascular activities of endothelin-like peptides in the isolated superior mesenteric arterial bed of the rat, 101, 81
- DOURISH, C.T. *see* COOPER, S.J., 99, 65
- DOUSSAU, M.-P. *see* RICHER, C., 100, 557
- DOWD, P.M. *see* BULL, H.A., 101, 703
- DOWNING, S.J. *see* PIPER, I., 101, 901
- DOXEY, J.-C. *see* JOHN, G.W., 100, 699
- DRAPEAU, G. *see* RHALEB, N.-E., 99, 445
- DRAY, A., BETTANEY, J. & FORSTER, P. Actions of capsaicin on peripheral nociceptors of the neonatal rat spinal cord-tail *in vitro*: dependence of extracellular ions and independence of second messengers, 101, 727
- DRAY, A., BETTANEY, J. & FORSTER, P. Resiniferatoxin, a potent capsaicin-like stimulator of peripheral nociceptors in the neonatal rat tail *in vitro*, 99, 323
- DRAY, A. *see* JAMES, I.F., 99, 503
- DRIEMAN, J.C., THIJSEN, H.H.W., ZEEGERS, H.H.M., SMITS, J.F.M. & STRUYKER BOUDIER, H.A.J. Renal selective N-acetyl- $\gamma$ -glutamyl prodrugs: a study on the mechanism of activation of the renal vasodilator prodrug CGP22979, 99, 15
- DRUMMOND, R.M. *see* DALZIEL, H.H., 99, 820
- DUMAREY, C. *see* DESQUAND, S., 100, 217
- DUN, N.J. *see* WANG, M.Y., 99, 413
- DUNCAN, G.P. *see* PATMORE, L., 99, 687
- DUNCKER, D.J. *see* VAN DER GIESSEN, W.J., 100, 277
- DUNCKER, D.J.G.M. *see* SASSEN, L.M.A., 101, 605
- DUNN, P.M. & RANG, H.P. Bradykinin-induced depolarization of primary afferent nerve terminals in the neonatal rat spinal cord *in vitro*, 100, 656
- DUNN, W.R. *see* DALY, C.J., 99, 253
- DUNNE, M.J., ASPINALL, R.J. & PETERSEN, O.H. The effects of cromakalim on ATP-sensitive potassium channels in insulin-secreting cells, 99, 169
- DUNNE, M.J. Effects of pinacidil, RP 49356 and nicorandil on ATP-sensitive potassium channels in insulin-secreting cells, 99, 487
- DUTY, S. *see* NEWGREEN, D.T., 100, 605
- E**
- EBENEZER, I.S. & BALDWIN, B.A. Effect of intracerebroventricular administration of the GABA<sub>B</sub>-receptor agonist baclofen on operant feeding in satiated pigs, 101, 559
- EBNER, F. Factors influencing the onset of ouabain inhibition of Na,K-ATPase from guinea-pig myocardium, 101, 337
- ECKHARDT, M. *see* LEMBECK, F., 100, 49
- ECKHARDT, R.D. *see* SMITH III, E.F., 100, 195
- EDVINSSON, L., JANSEN, I., KINGMAN, T.A. & McCULLOCH, J. Cerebrovascular responses to capsaicin *in vitro* and *in situ*, 100, 312
- EDWARDS, D.H. *see* RANDALL, M.D., 101, 781
- EDWARDS, G. *see* NEWGREEN, D.T., 100, 605
- EGAN, J.W. *see* SMITH III, E.F., 100, 195
- EGLÈME, C., CRESSIER, F. & WOOD, J.M. Local formation of angiotensin II in the rat aorta: effect of endothelium, 100, 237
- EGLÉN, R.M., MICHEL, A.D., MONTGOMERY, W.W., KUNYSZ, E.A., MACHADO, C.A. & WHITING, R.L. The interaction of parafluorohexahydrosiladiphenidol at muscarinic receptors *in vitro*, 99, 637
- EGLÉN, R.M., SWANK, S.R., WALSH, L.K.M. & WHITING, R.L. Characterization of 5-HT<sub>2</sub> and 'atypical' 5-HT receptors mediating guinea-pig ileal contractions *in vitro*, 101, 513
- EKSTRÖM, J. *see* MÅNSSON, B., 101, 853
- EKWURU, M. *see* HITCHCOTT, P.K., 99, 11
- EL-BEHEIRY, H. & PUIL, E. Effects of hypomagnesia on transmitter actions in neocortical slices, 101, 1006
- EL-BEHEIRY, H. *see* PUIL, E., 101, 61
- ELLIS, J.L. & BURNSTOCK, G. Neuropeptide Y neuromodulation of sympathetic co-transmission in the guinea-pig vas deferens, 100, 457
- ELLIS, J.L. & UNDEM, B.J. Non-adrenergic, non-cholinergic contractions in the electrically field stimulated guinea-pig trachea, 101, 875
- EL-MAS, M. & HUGHES, I.E. Effect of blockade of noradrenaline re-uptake on evoked tritium overflow from mouse vasa deferentia and rat cortex slices, 101, 762
- ELSWOOD, C.J. *see* BUTLER, A., 101, 591
- ELY, S.W. *see* GIDDAY, J.M., 100, 95
- ELZINGA, C.R.S. *see* ROFFEL, A.F., 99, 293
- ENDOU, M. *see* TOHSE, N., 99, 437
- ENGLAND, P.J. *see* MURRAY, K.J., 99, 612
- , *see* SMITH, S.J., 100, 779
- ESPLUGUES, J. *see* ESPLUGUES, J.V., 100, 491
- ESPLUGUES, J.V., RAMOS, E.G., GIL, L. & ESPLUGUES, J. Influence of capsaicin-sensitive afferent neurones on the acid secretory responses of the rat stomach *in vivo*, 100, 491
- ESTAN, L., SENARD, J.-M., TRAN, M.-A., MONTASTRUC, J.-L. & BERLAN, M. Reserpine induces vascular  $\alpha_2$ -adrenergic supersensitivity and platelet  $\alpha_2$ -adrenoceptor up-regulation in dog, 101, 329
- ESTHER, J.W. *see* GIDDAY, J.M., 100, 95
- ETOH, S., OHASHI, M., BABA, A. & IWATA, H. Inhibition by ibudilast of leukotriene D<sub>4</sub>-induced formation of inositol phosphates in guinea-pig lung, 100, 564
- EVANS, A.M. & GREEN, K.L. Characterization of the dopamine receptor mediating the hyperpolarization of cockroach salivary gland acinar cells *in vitro*, 101, 103
- EVANS, R. *see* MOORE, P.K., 101, 865
- EVANS, R.A. *see* MOORE, P.K., 99, 408
- EVANS, R.H. *see* LONG, S.K., 100, 850
- EVANS, R.G. & LUDBROOK, J. Effects of  $\mu$ -opioid receptor agonists on circulatory responses to stimulated haemorrhage in conscious rabbits, 100, 421
- EVANS, T.W. *see* CRAWLEY, D.E., 101, 166
- F**
- FABBRI, L.M. *see* MAPP, C.E., 100, 886
- FABRIS, B., YAMADA, H., CUBELA, R., JACKSON, B., MENDELSON, F.A.O. & JOHNSTON, C.I. Characterization of cardiac angiotensin converting enzyme (ACE) and *in vivo* inhibition following oral quinapril to rats, 100, 651
- FAGG, G.E., OLPE, H.-R., POZZA, M.F., BAUD, J., STEINMANN, M., SCHMUTZ, M., PORTET, C., BAUMANN, P., THEDINGA, K., BITTIGER, H., ALLGEIER, H., HECKENDORF, R., ANGST, C., BRUNDISH, D. & DINGWALL, J.G. CGP 37849 and CGP 39551: novel and potent competitive N-methyl-D-aspartate receptor antagonists with oral activity, 99, 791
- FAIRHALL, K.M. *see* BISSET, G.W., 99, 529
- FANN, M.L., SOUCCAR, C. & LAPA, A.J. Phentonium, quaternary derivative of (–)-hyoscyamine, enhances the spontaneous release of acetylcholine at rat motor nerve terminals, 100, 441
- FANTOZZI, R. *see* BRUNELLESCHI, S., 100, 417
- FARMER, J.B. *see* SMITH, G.W., 100, 295
- FARMER, S.G. & TOGO, J. Effects of epithelium removal on relaxation of airway smooth muscle induced by vasoactive intestinal peptide and electrical field stimulation, 100, 73
- FASCILOLO, J., VARGUS, L., LAMA, M.C. & NOLLY, H. Bradykinin-induced vasoconstriction of rat mesenteric arteries precontracted with noradrenaline, 101, 344
- FEDAN, J.S. *see* LAMPORT, S.J., 99, 369
- FEIFEL, R., WAGNER-RÖDER, M., STROHMANN, C., TACKE, R., WELBROECK, M., CHRISTOPHE, J., MUTSCHLER, E. & LAMBRECHT, G. Stereoselective inhibition of muscarinic receptor subtypes by the enantiomers of hexahydro-difenidol and acetylenic analogues, 99, 455
- FELDMAN, J., TIBIRICA, E., BRICÇA, G., DONTENWILL, M., BELCOURT, A. & BOUSQUET, P. Evidence for the involvement of imidazoline receptors in the central hypotensive effect of rilmenidine in the rabbit, 100, 600
- FERNANDES, L.B. & GOLDIE, R.G. Pharmacological evaluation of a guinea-pig tracheal epithelium-derived inhibitory factor (EpDIF), 100, 614
- FERNANDES, P.D. *see* HENRIQUES, M.G.M.O., 99, 164
- FERRELL, W.R. & KHOSHBATEN, A. The role of the endothelium in mediating the actions of ATP, adenosine and acetylcholine on



- flow through blood vessels in the rabbit knee joint, **99**, 379  
 FERRY, C.B. *see* KELLY, S.S., **99**, 721  
 FIBIGER, H.C. *see* CLARKE, P.B.S., **99**, 509  
 FILE, S.E. *see* HITCHCOTT, P.K., **99**, 11  
 FINBERG, J.P.M. & VARDI, Y. Inhibitory effect of 5-hydroxytryptamine on penile erectile function in the rat, **101**, 698  
 FIRTH, J.L. *see* KENDALL, D.A., **100**, 37  
 FLEETWOOD-WALKER, S.M. *see* HOPE, P.J., **101**, 477  
 FLETCHER, P.J. & DAVIES, M. The involvement of 5-hydroxytryptaminergic and dopaminergic mechanisms in the eating induced by buspirone, gepirone and ipsapirone, **99**, 519  
 FLOCH, A. & CAVERO, I. Influence of plasma protein content and platelet number on the potency of PAF and its antagonist RP 59227 in rabbit platelet preparations, **100**, 163  
 FLORES, N.A. & SHERIDAN, D.J. Electrophysiological and arrhythmogenic effects of platelet activating factor during normal perfusion, myocardial ischaemia and reperfusion in the guinea-pig, **101**, 734  
 FONLUPT, P., CROSET, M. & LAGARDE, M. Benzodiazepine analogues inhibit arachidonate-induced aggregation and thromboxane synthesis in human platelets, **101**, 920  
 FONTELA, T., HERMIDA, O.G. & GÓMEZ-ACEBO, J. Role of adrenoreceptors *in vitro* and *in vivo* in the effects of lithium on blood glucose levels and insulin secretion in the rat, **100**, 283  
 FORDER, R.A. *see* MORONEY, M.A., **101**, 128  
 FORSTER, C., MAIN, J.S. & ARMSTRONG, P.W. Endothelium modulation of the effects of nitroglycerin on blood vessels from dogs with pacing-induced heart failure, **101**, 109  
 FORSTER, P. *see* DRAY, A., **99**, 323  
 —, *see* DRAY, A., **101**, 727  
 FOSTER, C.D. *see* FUJII, K., **99**, 779  
 FOSTER, S.J., BRUNEAU, P., WALKER, E.R.H. & McMILLAN, R.M. 2-Substituted indazolinones: orally active and selective 5-lipoxygenase inhibitors with anti-inflammatory activity, **99**, 113  
 FOSTER, S.J. *see* McMILLAN, R.M., **101**, 501  
 FOX, A.J. & MORTON, I.K.M. An examination of the 5-HT<sub>3</sub> receptor mediating contraction and evoked [<sup>3</sup>H]-acetylcholine release in the guinea-pig ileum, **101**, 553  
 FOZARD, J.R. *see* MOSER, P.C., **99**, 343  
 FOZARD, J.R. *see* WRIGHT, C.E., **100**, 107  
 FRASER, S. *see* KENNY, B.A., **100**, 211  
 FREDHOLM, B.B. *see* ANDINÉ, P., **100**, 814  
 FREEDMAN, S.B., HARLEY, E.A., PATEL, S., NEWBERRY, N.R., GILBERT, M.J., MCKNIGHT, A.T., TANG, J.K., MAGUIRE, J.J., MUDUNKOTUWA, N.T., BAKER, R., STREET, L.J., MACLEOD, A.M., SAUNDERS, J. & IVERSEN, L.L. A novel series of non-quaternary oxadiazoles acting as full agonists at muscarinic receptors, **101**, 575  
 FREISSMUTH, M. *see* NANOFF, C., **100**, 63  
 FUJII, K., FOSTER, C.D., BRADING, A.F. & PAREKH, A.B. Potassium channel blockers and the effects of cromakalim on the smooth muscle of the guinea-pig bladder, **99**, 779  
 FUJIMORI, K. *see* NAKAZAWA, K., **101**, 224  
 FUKUMITSU, T., HAYASHI, H., TOKUNO, H. & TOMITA, T. Increase in calcium channel current by  $\beta$ -adrenoceptor agonists in single smooth muscle cells isolated from porcine coronary artery, **100**, 593  
 FURMAN, B.L. *see* DALZIEL, H.H., **99**, 820  
 —, *see* GUC, M.O., **101**, 913  
 FURUKAWA, T. *see* KATSURAGI, T., **100**, 370
- G**
- GAGE, P.W., McARDLE, J.J. & SAINT, D.A. Effects of butanedione monoxime on neuromuscular transmission, **100**, 467  
 GALAND, N. *see* BOEYNAEMS, J.-M., **101**, 799  
 GALEOTE, M.S. *see* DE AGUILERA, E.M., **99**, 439  
 GALITZKY, J., SENARD, J.M., LAFONTAN, M., STILLINGS, M., MONTASTRUC, J.L. & BERLAN, M. Identification of human platelet  $\alpha_2$ -adrenoceptors with a new antagonist [<sup>3</sup>H]-RX821002, 2-methoxy derivative of idazoxan, **100**, 862  
 GALPERN, W.R., MILLER, L.G., GREENBLATT, D.J. & SHADER, R.I. Differential effects of chronic lorazepam and alprazolam on benzodiazepine binding and GABA<sub>A</sub>-receptor function, **101**, 839  
 GARCIA, A.G. *see* BALLESTA, J.J., **101**, 21  
 GARDINER, S.M., COMPTON, A.M. & BENNETT, T. Effects of indomethacin on the regional haemodynamic responses to low doses of endothelins and sarafotoxin, **100**, 158  
 —, Regional haemodynamic effects of endothelin-1 and endothelin-3 in conscious Long Evans and Brattleboro rats, **99**, 107  
 GARDINER, S.M., COMPTON, A.M., BENNETT, T., KEMP, P.A. & NEY, U. Synergistic internal carotid vasodilator effects of human  $\alpha$ -calcitonin gene-related peptide and nimodipine in conscious rats, **99**, 830  
 GARDINER, S.M., COMPTON, A.M., BENNETT, T., PALMER, R.M.J. & MONCADA, S. Regional haemodynamic changes during oral ingestion of N<sup>G</sup>-monomethyl-L-arginine or N<sup>G</sup>-nitro-L-arginine methyl ester in conscious Brattleboro rats, **101**, 10  
 GARDINER, S.M., COMPTON, A.M., KEMP, P.A. & BENNETT, T. Regional and cardiac haemodynamic effects of N<sup>G</sup>-nitro-L-arginine methyl ester in conscious Long Evans rats, **101**, 625  
 —, Regional and cardiac haemodynamic responses to glyceryl trinitrate, acetylcholine, bradykinin and endothelin-1 in conscious rats: effects of N<sup>G</sup>-nitro-L-arginine methyl ester, **101**, 632  
 GARRATT, J.C. *see* WRIGHT, I.K., **99**, 221  
 GAUQUELIN, G. *see* RASCOL, O., **100**, 471  
 GAUTHERON, P. *see* SUGRUE, M.F., **99**, 59  
 GAUTIER, P. *see* RICHER, C., **100**, 557  
 GEELEN, G. *see* RASCOL, O., **100**, 471  
 GEFFNER, J.R. *see* SCHATTNER, M.A., **101**, 253  
 GERBES, A.L. *see* WITHRINGTON, P.G., **99**, 810  
 GETTINS, D. *see* STANFORD, S.C., **99**, 441  
 GHARIB, C. *see* RASCOL, O., **100**, 471  
 GHELARDINI, C., MALMBERG-AIELLO, P., GIOTTI, A., MALLCANGIO, M. & BARTOLINI, A. Investigation into atropine-induced antinociception, **101**, 49  
 GHOSH, B.C.G. *see* SASSEN, L.M.A., **101**, 605  
 GHYSEL-BURTON, J. & GODFRAIND, T. Role of Na-H exchange in the inotropic action of Bay K 8644 and of ouabain in guinea-pig isolated atria, **100**, 717  
 GIACHETTI, A. *see* MAGGI, C.A., **100**, 588  
 —, *see* MAGGI, C.A., **101**, 996  
 GIBSON, A., MIRZAZADEH, S., HOBBS, A.J. & MOORE, P.K. L-N<sup>G</sup>-monomethyl arginine and L-N<sup>G</sup>-nitro arginine inhibit non-adrenergic, non-cholinergic relaxation of the mouse anococcygeus muscle, **99**, 602  
 GIBSON, A. *see* HOBBS, A.J., **100**, 749  
 —, *see* MOORE, P.K., **99**, 408  
 —, *see* TUCKER, J.F., **100**, 661  
 GIDDAY, J.M., ESTHER, J.W., ELY, S.W., RUBIO, R. & BERNE, R.M. Time-dependent effects of theophylline on myocardial reactive hyperaemias in the anaesthetized dog, **100**, 95  
 GIL, L. *see* ESPLUGUES, J.V., **100**, 491  
 GILBERT, M.J. *see* FREEDMAN, S.B., **101**, 575  
 GILLESPIE, J.S. & SHENG, H. The effects of pyrogallol and hydroquinone on the response to NANC nerve stimulation in the rat anococcygeus and the bovine retractor penis muscles, **99**, 194  
 GIOTTI, A. *see* BRUNELLESCHI, S., **100**, 417  
 —, *see* GHELARDINI, C., **101**, 49  
 GIRODEAU, J.-M. *see* McMILLAN, R.M., **101**, 501  
 GIULIANI, S. *see* MAGGI, C.A., **99**, 186  
 GIUDICELLI, J.-F. *see* RICHER, C., **100**, 557  
 GIUDICI, L. *see* MICHELETTI, R., **100**, 395  
 GIULIANI, S. *see* MAGGI, C.A., **100**, 588  
 GLAVINOVIC, M.I. *see* TANG, R., **99**, 548  
 GODFRAIND, J.-M. Microionophoretic study with milacemide, a glycine precursor, on mammalian central nervous system cells, **100**, 119  
 GODFRAIND, T. *see* GHYSEL-BURTON, J., **100**, 717  
 GOEBEL, M. *see* CHRIST, D., **101**, 971  
 GOEL, R.K., TAVARES, I.A. & BENNETT, A. Effect of ethanol on eicosanoid synthesis by human gastric and colonic mucosal pieces, **99**, 289  
 GOLDIE, R.G. *see* FERNANDES, L.B., **100**, 614  
 —, *see* HENRY, P.J., **99**, 131  
 —, *see* HENRY, P.J., **99**, 136  
 —, *see* HENRY, P.J., **100**, 786  
 GÓMEZ-ACEBO, J. *see* FONTELA, T., **100**, 283  
 GONZALEZ, M.C. *see* LOPEZ-JARAMILLO, P., **101**, 489  
 GONZALEZ, M.P. *see* CASTRO, E., **100**, 360  
 GONZALES, R. *see* RIBEIRO, J.M.C., **101**, 932  
 GOOD, D.M. *see* SMALL, R.C., **100**, 516  
 GOPALAKRISHNAN, V., *see* WANG, H., **100**, 5  
 GOTOH, Y. *see* YAMAMOTO, M., **100**, 669  
 GRAHAM, S.L. *see* SUGRUE, M.F., **99**, 59  
 GRAHAME-SMITH, D.G. *see* BACKUS, L.I., **100**, 793  
 GRAY, G.A. *see* DALZIEL, H.H., **99**, 820  
 GREEN, A.R., DeSOUSA, R.J., DAVIES, E.M. & CROSS, A.J. The effects of Ca<sup>2+</sup> antagonists and hydralazine on central 5-hydroxytryptamine biochemistry and function in rats and mice, **99**, 41

- GREEN, K.L. *see* EVANS, A.M., 101, 103  
 GREENBLATT, D.J. *see* GALPERN, W.R., 101, 839  
 —, *see* KAPLAN, G.B., 100, 435  
 GREENHOUSE, R. *see* PATMORE, L., 99, 687  
 GRIESBACHER, T. *see* LEMBECK, F., 100, 49  
 GRIFFITH, T.M. *see* RANDALL, M.D., 101, 781  
 GRUBB, B.D. *see* BIRRELL, G.J., 101, 715  
 GRUNDEMAR, L., GRUNDSTRÖM, N., JOHANSSON, G.M., ANDERSSON, R.G.G. & HÅKANSON, R. Suppression by neuropeptide Y of capsaicin-sensitive sensory nerve-mediated contraction in guinea-pig airways, 99, 473  
 GRUNDEMAR, L. & HÅKANSON, R. Effects of various neuropeptide Y/peptide YY fragments on electrically-evoked contractions of the rat vas deferens, 100, 190  
 GRUNDEMAR, L. & HÖGESTÄTT, E.D. Vascular effects of helodermin, helospectin I and helospectin II: a comparison with vasoactive intestinal peptide (VIP), 99, 526  
 GRUNDSTRÖM, N. *see* GRUNDEMAR, L., 99, 473  
 GUARD, S., WATSON, S.P., MAGGIO, J.E., TOO, H.P. & WATLING, K.J. Pharmacological analysis of [<sup>3</sup>H]-senktide binding to NK<sub>3</sub> tachykinin receptors in guinea-pig ileum longitudinal muscle-myenteric plexus and cerebral cortex membranes, 99, 767  
 GUARD, S. *see* SUMAN-CHAUHAN, N., 101, 1001  
 GUC, M.O., FURMAN, B.L. & PARRATT, R.J. Endotoxin-induced impairment of vasopressor and vasodepressor responses in the pithed rat, 101, 913  
 GUELF, M. *see* SUBISSI, A., 100, 502  
 GUIMARAES, S. & NUNES, J.P. The effectiveness of  $\alpha_2$ -adrenoceptor activation increases from the distal to the proximal part of the veins of canine limbs, 101, 387  
 GUNASEKERA, R.D. & KURIYAMA, H. The influence of thyroid states upon responses of the rat aorta to catecholamines, 99, 541  
 GUNN, L.K. *see* BISSET, G.W., 99, 529  
 GUSTAFSSON, L.E. *see* PERSSON, M.G., 100, 463  
 GUTIERREZ, L.M. *see* BALLESTA, J.J., 101, 21
- H
- HAGAN, R.M., JONES, B.J., JORDAN, C.C. & TYERS, M.B. Effect of 5-HT<sub>3</sub> receptor antagonists on responses to selective activation of mesolimbic dopaminergic pathways in the rat, 99, 227  
 HAGBERG, H. *see* ANDINÉ, P., 100, 814  
 HAGUE, N.L. *see* PERREAULT, C.L., 101, 679  
 HÅKANSON, R. *see* GRUNDEMAR, L., 99, 473  
 —, *see* GRUNDEMAR, L., 100, 190  
 HALL, I.P., DONALDSON, J. & HILL, S.J. Modulation of fluoroaluminate-induced inositol phosphate formation by increases in tissue cyclic AMP content in bovine tracheal smooth muscle, 100, 646  
 HALLAM, T.J. *see* MURRAY, K.J., 99, 612  
 HAMID-BLOOMFIELD, S., PAYNE, A.N., PETROVIC, A.A. & WHITTLE, B.J.R. The role of prostanoid TP- and DP-receptors in the bronchoconstrictor effect of inhaled PGD<sub>2</sub> in anaesthetized guinea-pigs: effect of the DP-antagonist BW A868C, 100, 761  
 HANAKI, Y. *see* SANO, T., 99, 577  
 HANDLEY, D.A. *see* HAVILL, A.M., 99, 396  
 HARA, M. *see* OTANI, H., 100, 207  
 HARAKAL, C. *see* AKSOY, M.O., 99, 461  
 HARDING, S.E. *see* BROWN, L.A., 101, 484  
 HARLEY, E.A. *see* FREEDMAN, S.B., 101, 575  
 HARPER, D. *see* LEFF, P., 101, 55  
 HARRIS, G. *see* BARLOW, R.B., 99, 622  
 HARRIS, P.J. *see* SUNN, N., 99, 655  
 HART, S.L. & OLUYOMI, A.O. Vasopressin and stress-induced antinociception in the mouse, 99, 243  
 HARTELL, N.A. & HEADLEY, P.M. Spinal effects of four injectable anaesthetics on nociceptive reflexes in rats: a comparison of electrophysiological and behavioural measurements, 101, 563  
 HARVEY, A.L. *see* ROWAN, E.G., 100, 301  
 HASEGAWA, J., HIRAI, S., NOGUCHI, N., HISTOME, I., KOTAKE, H. & MASHIBA, H. Use-dependent effects of pirlmionol on  $\dot{V}_{max}$  and conduction in guinea-pig ventricular myocardium, 99, 815  
 HASHIMOTO, H. *see* ITAYA, T., 99, 572  
 HASHIMOTO, S. *see* MURAMATSU, I., 99, 197  
 HATA, F., KATAOKA, T., TAKEUCHI, T., YAGASAKI, O. & YAMANO, N. Differences in control of descending inhibition in the proximal and distal regions of rat colon, 101, 1011  
 HATT, P.A. *see* SPICER, B.A., 101, 821  
 HATTORI, Y. *see* TOHSE, N., 99, 437  
 HAVILL, A.M., VAN VALEN, R.G. & HANDLEY, D.A. Prevention of non-specific airway hyperreactivity after allergen challenge in guinea-pigs by the PAF receptor antagonist SDZ 64-412, 99, 396  
 HAWORTH, D. *see* KOWALSKI, M.T., 99, 27  
 HAY, D.W.P. Mechanism of endothelin-induced contraction in guinea-pig trachea: comparison with rat aorta, 100, 383  
 HAYAISHI, O. *see* ITO, S., 99, 13  
 HAYASHI, H. *see* FUKUMITSU, T., 100, 593  
 HAYES, A.G., BIRCH, P.J., HAYWARD, N.J., SHEEHAN, M.J., ROGERS, H., TYERS, M.B., JUDD, D.B., SCOPES, D.I.C. & NAYLOR, A. A series of novel, highly potent and selective agonists for the  $\kappa$ -opioid receptor, 101, 944  
 HAYLOR, J. *see* BURTON, G.A., 99, 364  
 HAYWARD, N.J. *see* HAYES, A.G., 101, 944  
 HEADLEY, P.M. *see* HARTELL, N.A., 101, 563  
 HEAL, D.J. *see* WHITWORTH, P., 101, 39  
 HECKENDORN, R. *see* FAGG, G.E., 99, 791  
 HECKER, M., MITCHELL, J.A., SWIERKOSZ, T.A., SESSA, W.C. & VANE, J.R. Inhibition by L-glutamate of the release of endothelium-derived relaxing factor from cultured endothelial cells, 101, 237  
 HEDQVIST, P. *see* PERSSON, M.G., 100, 463  
 HEESEN, B.-J. & DE MEY, J.G.R. Effects of cyclic AMP-affecting agents on contractile reactivity of isolated mesenteric and renal resistance arteries of the rat, 101, 859  
 HEILIGERS, J.P.C. *see* VILLALÓN, C.M., 100, 665  
 HENDERSON, G. *see* ROGERS, H., 101, 505  
 HENDRICKSON, H. *see* BOULANGER, C., 99, 176  
 HENQUIN, J.C. *see* PLANT, T.D., 101, 115  
 HENRIQUES, M.G.M.O., WEG, V.B., MARTINS, M.A., SILVA, P.M.R., FERNANDES, P.D., CORDEIRO, R.S.B. & VARGAF-TIG, B.B. Differential inhibition by two tetraazepine PAF antagonists of acute inflammation in the mouse, 99, 164  
 HENRY, P.J. & GOLDIE, R.G.  $\beta_1$ -Adrenoceptors mediate smooth muscle relaxation in mouse isolated trachea, 99, 131  
 HENRY, P.J., RIGBY, P.J. & GOLDIE, R.G. Distribution of  $\beta_1$ - and  $\beta_2$ -adrenoceptors in mouse trachea and lung: a quantitative autoradiographic study, 99, 136  
 HENRY, P.J., RIGBY, P.J., SELF, G.J., PREUSS, J.M. & GOLDIE, R.G. Relationship between endothelin-1 binding site densities and constrictor activities in human and animal airway smooth muscle, 100, 786  
 HERING, S. *see* HUGHES, A.D., 101, 3  
 HERMAN, A.G. *see* BOECKXSTAENS, G.E., 101, 460  
 HERMIDA, O.G. *see* FONTELA, T., 100, 283  
 HEW, R.W.S., HODGKINSON, C.R. & HILL, S.J. Characterization of histamine H<sub>3</sub>-receptors in guinea-pig ileum with H<sub>3</sub>-selective ligands, 101, 621  
 HIBERT, M.F. *see* MOSER, P.C., 99, 343  
 HICKS, T.P. *see* KANEKO, T., 100, 689  
 HIDALGO, M.J. *see* BALLESTA, J.J., 101, 21  
 HIGENBOTTAM, T.W. *see* DINH XUAN, A.T., 99, 9  
 HIGG, L. *see* CARR, R.D., 100, 83  
 HILEY, C.R., JONES, C.R., PELTON, J.T. & MILLER, R.C. Binding of [<sup>125</sup>I]-endothelin-1 to rat cerebellar homogenates and its interactions with some analogues, 101, 319  
 HILEY, C.R. *see* DOUGLAS, S.A., 101, 81  
 —, *see* MACLEAN, M.R., 99, 340  
 HILL, R.G. *see* TRAYNOR, J.R., 100, 319  
 HILL, S.J. *see* HALL, I.P., 100, 646  
 —, *see* HEW, R.W.S., 101, 621  
 HIRAI, S. *see* HASEGAWA, J., 99, 815  
 HIRANO, K., KANAIDE, H., ABE, S. & NAKAMURA, M. Effects of diltiazem on calcium concentrations in the cytosol and on force of contractions in porcine coronary arterial strips, 101, 273  
 HIRSH, J.K., SILINSKY, E.M. & SOLSONA, C.S. The role of cyclic AMP and its protein kinase in mediating acetylcholine release and the action of adenosine at frog motor nerve endings, 101, 311  
 HISATOME, I. *see* HASEGAWA, J., 99, 815  
 HISAYAMA, T., TAKAYANAGI, I. & OKAMOTO, Y. Ryanodine reveals multiple contractile and relaxant mechanisms in vascular smooth muscle: simultaneous measurements of mechanical activity and of cytoplasmic free Ca<sup>2+</sup> level with fura-2, 100, 677  
 HITCHCOTT, P.K., FILE, S.E., EKWURU, M. & NEAL, M.J. Chronic diazepam treatment in rats causes long-lasting changes in central [<sup>3</sup>H]-5-hydroxytryptamine and [<sup>14</sup>C]- $\gamma$ -aminobutyric acid release, 99, 11  
 HOBBS, A.J. & GIBSON, A. L-N<sup>G</sup>-nitro-arginine and its methyl ester are potent inhibitors of non-adrenergic, non-cholinergic

- transmission in the rat anococcygeus, **100**, 749  
HOBBS, A.J. *see* GIBSON, A., **99**, 602  
—, *see* TUCKER, J.F., **100**, 661  
HODGKINSON, C.R. *see* HEW, R.W.S., **101**, 621  
HODSON, H.F. *see* REES, D.D., **101**, 746  
HÖGESTÄTT, E.D. *see* GRUNDEMAR, L., **99**, 526  
—, *see* SKÄRBY, T.V.Ch., **101**, 961  
HOLDUP, D.W. *see* BARLOW, R.B., **99**, 622  
HOLLINGSWORTH, M. *see* PIPER, I., **101**, 901  
HONEGGER, U. *see* PIROVINO, M., **99**, 35  
HONG, S.J. & CHANG, C.C. Facilitation by 3,4-diaminopyridine of regenerative acetylcholine release from mouse motor nerve, **101**, 793  
HONORÉ, T. *see* TRICKLEBANK, M.D., **101**, 753  
HOPE, P.J., FLEETWOOD-WALKER, S.M. & MITCHELL, R. Distinct antinociceptive actions mediated by different opioid receptors in the region of lamina I and laminae III-V of the dorsal horn of the rat, **101**, 477  
HOPE, W. *see* MEYER, R.B.R., **100**, 576  
HORIO, S., NAKAMURA, S. & ISHIDA, Y. Alterations in histamine receptors of guinea-pig ileal smooth muscle produced during agonist-induced desensitization, **101**, 587  
HORIO, S., SHIMA, M., UEDA, H. & ISHIDA, Y. Temperature-dependence of desensitization induced by acetylcholine and histamine in guinea-pig ileal longitudinal muscle, **100**, 636  
HORWELL, D.C. *see* HUNTER, J.C., **101**, 183  
HOUCK, W.T. *see* TUMER, N., **99**, 87  
HOULT, J.R.S. *see* MORONEY, M.A., **101**, 128  
HOURANI, S.M.O. *see* BAILEY, S.J., **100**, 753  
—, *see* NICHOLLS, J., **100**, 874  
HOWSON, W. *see* SEABROOK, G.R., **101**, 949  
HOYLE, C.H.V., KNIGHT, G.E. & BURNSTOCK, G. Suramin antagonizes responses to P<sub>2</sub>-purinoreceptor agonists and purinergic nerve stimulation in the guinea-pig urinary bladder and taenia coli, **99**, 617  
HSIEH, J. *see* MOUSA, S.A., **99**, 233  
HUANG, J.-H. & JOHNSTON, G.A.R. (+)-Hydrastine, a potent competitive antagonist at mammalian GABA<sub>A</sub> receptors, **99**, 727  
HUDLICKÁ, O. & PRICE, S. Effects of torbafylline, pentoxifylline and buflomedil on vascularisation and fibre type of rat skeletal muscles subjected to limited blood supply, **99**, 786  
HUGHES, A.D., HERING, S. & BOLTON, T.B. Evidence that agonist and antagonist enantiomers of the dihydropyridine PN 202-791 act at different sites on the voltage-dependent calcium channel of vascular muscle, **101**, 3  
HUGHES, I.E. *see* EL-MAS, M., **101**, 762  
HUGHES, J. *see* HUNTER, J.C., **101**, 183  
—, *see* MARSHALL, F.H., **99**, 845  
—, *see* TRAYNOR, J.R., **100**, 319  
HUGUENARD, J.R. *see* COULTER, D.A., **100**, 800  
—, *see* COULTER, D.A., **100**, 807  
HUMPHREY, P.P.A. *see* SUMNER, M.J., **99**, 219  
HUMPHREY, S.M. *see* BROWN, L.A., **101**, 484  
HUNTER, J.C., LEIGHTON, G.E., MEECHAM, K.G., BOYLE, S., HORWELL, D.C., REES, D.C. & HUGHES, J. CI-977, a novel and selective agonist for the  $\kappa$ -opioid receptor, **101**, 183  
HUNTER, J.C. *see* TRAYNOR, J.R., **100**, 319  
HUTCHESON, I.R., WHITTLE, B.J.R. & BOUGHTON-SMITH, N.K. Role of nitric oxide in maintaining vascular integrity in endotoxin-induced intestinal damage in the rat, **101**, 815  
HUTCHINSON, R. *see* CARR, R.D., **100**, 90  
HUTTUNEN, P. *see* KORTELAJAINEN, M.-L., **99**, 673
- I**
- ICHINOSE, M. & BARNES, P.J. The effect of peptidase inhibitors on bradykinin-induced bronchoconstriction in guinea-pigs *in vivo*, **101**, 77  
IGGO, A. *see* BIRRELL, G.J., **101**, 715  
IMAIZUMI, I. *see* RYANG, S., **100**, 401  
IMAIZUMI, Y. *see* MURAKI, K., **100**, 507  
—, *see* YAMAMOTO, M., **100**, 669  
INAGAKI, C. *see* OTANI, H., **100**, 207  
INCE, F. *see* SMITH, G.W., **100**, 295  
INOUE, R. & BRADING, A.F. The properties of the ATP-induced depolarization and current in single cells isolated from the guinea-pig urinary bladder, **100**, 619  
INOUE, K. *see* NAKAZAWA, K., **101**, 224  
INOUE, M. *see* OTANI, H., **100**, 207  
INVERNIZZI, R., MORALI, F., POZZI, L. & SAMANIN, R. Effects of acute and chronic clozapine on dopamine release and metabolism in the striatum and nucleus accumbens of conscious rats, **100**, 774  
IRELAND, S.J. *see* BUTLER, A., **101**, 591  
IRIARTE, C.F., PASCUAL, R., VILLANUEVA, M.M., ROMÁN, M., CORTIJO, J. & MORCILLO, E.J. Role of epithelium in agonist-induced contractile responses of guinea-pig trachealis: influence of the surface through which drug enters the tissue, **101**, 257  
IRURZUN, A. *see* DE AGUILERA, E.M., **99**, 439  
ISHIDA, Y. *see* HORIO, S., **100**, 636  
—, *see* HORIO, S., **101**, 587  
ISHIMA, T. *see* KOJIMA, M., **99**, 334  
ISTURIZ, M.A. *see* SCHATTNER, M.A., **101**, 253  
ITABASHI, S. *see* AIKAKA, T., **101**, 13  
ITAYA, T., HASHIMOTO, H., UEMATSU, T. & NAKASHIMA, M. Alterations of responsiveness to adrenoceptor agonists and calcium of non-infarcted hypertrophied muscles from rats with chronic myocardial infarction, **99**, 572  
ITO, K. *see* NASHIMURA, M., **100**, 114  
ITO, S., OKUDA, E., SUGAMA, K., NEGISHI, M. & HAYAISHI, O. Evaluation of ZK110841 and AH6809, an agonist and an antagonist of prostaglandin DP-receptors on human platelets, with a PGD<sub>2</sub>-responsive cell line from bovine embryonic trachea, **99**, 13  
ITO, S. *see* OHTA, T., **100**, 231  
IVEN, H. *see* von POEHL, C., **101**, 406  
IVERSEN, L.L. *see* FREEDMAN, S.B., **101**, 575  
IVERSEN, S.D. *see* TRICKLEBANK, M.D., **101**, 753  
IWATA, H. *see* ETOH, S., **100**, 564
- J**
- JACKSON, B. *see* FABRIS, B., **100**, 651  
JACOBS, M., PLANE, F. & BRUCKDORFER, K.R. Native and oxidized low-density lipoproteins have different inhibitory effects on endothelium-derived relaxing factor in the rabbit aorta, **100**, 21  
JAHNSEN, H. *see* REKLING, J.C., **99**, 103  
JAKUBOVIC, A. *see* CLARKE, P.B.S., **99**, 509  
JAMES, I.F., BETTANEY, J., PERKINS, M.N., KETCHUM, S.B. & DRAY, A. Opioid receptor ligands in the neonatal rat spinal cord: binding and *in vitro* depression of the nociceptive responses, **99**, 508  
JANSEN, I. *see* EDVINSSON, L., **100**, 312  
JANSSEN, P.A.J. *see* DE CLERK, F., **99**, 631  
JOHANSSON, I.G.M. *see* GRUNDEMAR, L., **99**, 473  
JOHANSEN, T. *see* KNUDSEN, T., **100**, 453  
JOHN, G.W., DOXEY, J.-C., WALTER, D.S. & REID, J.L. The role of  $\alpha$ - and  $\beta$ -adrenoceptor subtypes in mediating the effects of catecholamines on fasting glucose and insulin concentrations in the rat, **100**, 699  
JOHNS, E.J. & RUTKOWSKI, B. The action of atriopeptin III on renal function in two models of chronic renal failure in the rat, **99**, 317  
JOHNSTON, C.I. *see* FABRIS, B., **100**, 651  
JOHNSTON, G.A.R. *see* HUANG, J.-H., **99**, 727  
JONES, B.J. *see* HAGAN, R.M., **99**, 227  
JONES, C.R. *see* HILEY, C.R., **101**, 319  
JONES, J.A., OWEN, P.J. & BOARDER, M.R. Influence of phorbol esters, and diacylglycerol kinase and lipase inhibitors on noradrenaline release and phosphoinositide hydrolysis in chromaffin cells, **101**, 521  
JONES, M.G., ANIS, N.A. & LODGE, D. Philanthotoxin blocks quisqualate-, AMPA- and kainate-, but not NMDA-, induced excitation of rat brainstem neurones *in vivo*, **101**, 968  
JORDAN, C.C. *see* HAGAN, R.M., **99**, 227  
JUDD, D.B. *see* HAYES, A.G., **101**, 944  
JUKIC, D. *see* RHALEB, N.E., **99**, 445
- K**
- KAJIKURI, J. & KURIYAMA, H. Inhibitory action of  $\alpha$ -human atrial natriuretic peptide on noradrenaline-induced synthesis of myo-inositol 1,4,5-trisphosphate in the smooth muscle cells of rabbit aorta, **99**, 536  
KALKMAN, H.O. *see* BODDEKE, H.W.G.M., **101**, 281  
KAMIYA, K. *see* KODAMA, I., **101**, 803  
KANAIDE, H. *see* ABE, S., **101**, 545  
—, *see* HIRANO, K., **101**, 273  
KANE, K.A. *see* KWAN, Y.W., **100**, 407  
—, *see* WADSWORTH, R.M., **99**, 774

- KANEKO, T. & HICKS, T.P. GABA<sub>B</sub>-related activity involved in synaptic processing of somatosensory information in S1 cortex of the anaesthetized cat, **100**, 689
- KANNO, M. *see* TOHSE, N., **99**, 437
- KANTELIP, J.-P. *see* MAZOIT, J.X., **101**, 843
- KAPLAN, G.B., TAI, N.T., GREENBLATT, D.J. & SHADER, R.I. Caffeine-induced behavioural stimulation is dose- and concentration-dependent, **100**, 435
- KARMAZYN, M., WATSON, J.E. & MOFFAT, M.P. Mechanisms for cardiac depression induced by phorbol myristate acetate in working rat hearts, **100**, 826
- KATAOKA, T. *see* HATA, F., **101**, 1011
- KATO, H. *see* KURIHARA, J., **99**, 91
- KATSOLIS, S., SCHMIDT, W.E., SCHWÖRER, H. & CREUTZFELDT, W. Effects of galanin, its analogues and fragments on rat isolated fundus strips, **101**, 297
- KATSURAGI, T., USUNE, S. & FURUKAWA, T. Antagonism by nifedipine of contraction and Ca<sup>2+</sup>-influx evoked by ATP in guinea-pig urinary bladder, **100**, 370
- KATSUYAMA, H., SUZUKI, S. & NISHIYE, E. Actions of second messengers synthesized by various spasmogenic agents and their relation to mechanical responses in dog tracheal smooth muscle, **100**, 41
- KAUMANN, A.J., SANDERS, L., BROWN, A.M., MURRAY, K.J. & BROWN, M.J. A 5-hydroxytryptamine receptor in human atrium, **100**, 879
- KAWAI, T. *see* MURAKI, K., **100**, 507
- , *see* RYANG, S., **100**, 401
- KAWAI, Y. *see* SHIRAI, K., **101**, 200
- KAWAMURA, T. *see* KODAMA, I., **101**, 803
- KAY, P.B. *see* NEWGREEN, D.T., **100**, 605
- KEEN, M. *see* KELLY, E., **99**, 309
- , *see* KELLY, E., **100**, 223
- KELLY, E., KEEN, M., NOBBS, P. & MACDERMOT, J. NaF and guanine nucleotides modulate adenylate cyclase activity in NG108-15 cells by interacting with both G<sub>s</sub> and G<sub>i</sub>, **100**, 223
- , Segregation of discrete G<sub>s</sub>-mediated responses that accompany homologous or heterologous desensitization in two related somatic hybrids, **99**, 309
- KELLY, S.S., FERRY, C.B. & BAMFORTH, J.P. The effects of anticholinesterases on the latencies of action potentials in mouse skeletal muscles, **99**, 721
- KEMP, J.A. *see* TRICKLEBANK, M.D., **101**, 753
- KEMP, P.A. *see* GARDINER, S.M., **99**, 830
- , *see* GARDINER, S.M., **101**, 625
- , *see* GARDINER, S.M., **101**, 632
- KENDALL, D.A. & FIRTH, J.L. Inositol phospholipid hydrolysis in human brain: adenosine inhibition of the response to histamine, **100**, 37
- KENDALL, D.A. & WHITWORTH, P. Lithium amplifies inhibitions of inositol phospholipid hydrolysis in mammalian brain slices, **100**, 723
- KENDALL, D.A. *see* ROBINSON, J.P. **100**, 3
- , *see* WHITWORTH, P., **101**, 39
- KENNEDY, I. *see* SMALL, R.C., **100**, 516
- KENNY, B.A., FRASER, S., KILPATRICK, A.T. & SPEDDING, M. Selective antagonism of calcium channel activators by flupirilene, **100**, 211
- KENT, A.P., STERN, G.M. & WEBSTER, R.A. The effect of benzerazide on the peripheral and central distribution and metabolism of levodopa after acute and chronic administration in the rat, **100**, 743
- KERNOHAN, W.G. *see* CARLISLE, E.J.F., **100**, 530
- KERR, D.I.B., ONG, J. & PRAGER, R.H. Antagonism of GABA<sub>B</sub>-receptor-mediated responses in the guinea-pig isolated ileum and vas deferens by phosphono-analogues of GABA, **99**, 422
- KESINGLAND, A.C. *see* SINGH, L., **99**, 145
- KETCHUM, S.B. *see* JAMES, I.F., **99**, 503
- KHATTER, J.C. *see* NAVARATNAM, S., **101**, 370
- KHOSHBATEN, A. *see* FERRELL, W.R., **99**, 379
- KIGOSHI, S. *see* MURAMATSU, I., **99**, 197
- , *see* MURAMATSU, I., **101**, 662
- , *see* OHMURA, T., **99**, 587
- , *see* OHMURA, T., **100**, 27
- KIHARA, M., MATSUZAWA, K., TOKUNO, H. & TOMITA, T. Effects of calmodulin antagonists on calcium-activated potassium channels, in pregnant rat myometrium, **100**, 353
- KILLINGBACK, P.G. *see* CARR, R.D., **100**, 83
- KILPATRICK, A.T. *see* BROWN, C.M., **99**, 481
- , *see* BROWN, C.M., **99**, 803
- KILPATRICK, G.J. *see* BUTLER, A., **101**, 591
- KILPATRICK, T. *see* KENNY, B.A., **100**, 211
- KIMURA, K. *see* KOJIMA, M., **99**, 334
- KING, A.D., MILAVEC-KRIZMAN, M. & MÜLLER-SCHWEINITZER, E. Characterization of the adenosine receptor in porcine coronary arteries, **100**, 483
- KING, R.G. *see* LAU, W.A.K., **101**, 394
- , *see* RECHTMAN, M.P., **101**, 269
- KING, S.J. *see* COCKS, T.M., **100**, 375
- KINGMAN, T.A. *see* EDVINSSON, L., **100**, 312
- KINGS, M.A. *see* SANJAR, S., **99**, 267
- , *see* SANJAR, S., **100**, 399
- KINNUNEN, P., TASKINEN, T., LEPPÄLUOTO, J. & RUSKO-OAHO, H. Release of atrial natriuretic peptide from rat myocardium *in vitro*: effect of minoxidil-induced hypertrophy, **99**, 701
- KINTER, L.B. *see* BROOKS, D.P., **99**, 750
- KIRSTERSSON, A. *see* SANJAR, S., **99**, 679
- KISARA, K. *see* SAKURADA, T., **101**, 307
- KITCHEN, I. & PINKER, S.R. Antagonism of swim-stress-induced antinociception by the  $\delta$ -opioid receptor antagonist naltrindole in adult and young rats, **100**, 685
- KITCHEN, I. *see* NICHOLS, J., **100**, 874
- KLEIN, M.M. *see* SCHMIDT, H.H.H.W., **101**, 145
- KLING, L. *see* DORSZEWSKI, A. **101**, 686
- KLINGE, E. *see* ALRANTA, S., **101**, 472
- KNIGHT, A.R. *see* TRICKLEBANK, M.D., **101**, 753
- KNIGHT, G. *see* HOYLE, C.H.V., **99**, 617
- KNUDSEN, T., BERTHESEN, H.C. & JOHANSEN, T. Inhibition of Na<sup>+</sup>-K<sup>+</sup> pump activity by divalent cations in intact peritoneal mast cells of the rat, **100**, 453
- KODAMA, I., KAMIYA, K., KAWAMURA, T., SUZUKI, R. & TOYAMA, J. Electrophysiological effects of AFD-21 and AFD-19, new antiarrhythmic compounds on papillary muscles and single ventricular myocytes isolated from guinea-pig hearts, **101**, 803
- KODAMA, I. *see* KONDO, N., **101**, 241
- KOHL, C., LINCK, B., SCHMITZ, W., SCHOLZ, H., SCHOLZ, J. & TÓTH, M. Effects of carbachol and (–)-N<sup>6</sup>-phenylisopropyladenosine on myocardial inositol phosphate content and force of contraction, **101**, 829
- KOHLNBACH, A. & SCHLICKE, E. GABA<sub>B</sub> receptor-mediated inhibition of the neurogenic vasopressor response in the pithed rat, **100**, 365
- KOJIMA, M., ISHIMA, T., TANIGUCHI, N., KIMURA, K., SADA, H. & SPERELAKIS, N. Developmental changes in  $\beta$ -adrenoceptors, muscarinic cholinergic receptors and Ca<sup>2+</sup> channels in rat ventricular muscles, **99**, 334
- KOJIMA, M., SADA, H. & SPERELAKIS, N. Developmental changes in  $\beta$ -adrenergic and cholinergic interactions on calcium-dependent slow action potentials in rat ventricular muscles, **99**, 327
- KOJIMA, T. *see* MURAKI, K., **100**, 507
- KOK, P.T.M. *see* BRUIJNZEEL, P.L.B., **99**, 798
- KONDO, N., KODAMA, I., KOTAKE, H. & SHIBATA, S. Electrical effects of okadaic acid extracted from black sponge on rabbit sinus node, **101**, 241
- KONDO, N., MIZUKAMI, M. & SHIBATA, S. Negative inotropic effects of disopyramide on guinea-pig papillary muscles, **101**, 789
- KONING, M.M.G. *see* SASSEN, L.M.A., **99**, 355
- KORBUT, R. *see* LIDBURY, P.S., **101**, 527
- , *see* SALVEMINI, D., **101**, 991
- KORTELAINEN, M.-L., HUTTUNEN, P. & LAPINLAMPI, T. Influence of two  $\beta$ -adrenoceptor antagonists, propranolol and pindolol, on cold adaptation in the rat, **99**, 673
- KORTH, M. *see* SCHMIED, R., **99**, 401
- KOSTER, P.F. *see* BROOKS, D.P., **99**, 750
- KOSTER, P.F. *see* NICHOLS, A.J., **99**, 597
- KOTAKE, H. *see* HASEGAWA, J., **99**, 815
- , *see* KONDO, N., **101**, 241
- KOWALSKI, M.T., HAWORTH, D., LU, X., THOMSON, D.S. & BARNETT, D.B. Comparison of the effects of xamoterol and isoprenaline on rat cardiac  $\beta$ -adrenoceptors: studies of function and regulation, **99**, 27
- KREJCY, K. *see* KRUMPL, G., **100**, 855
- KREUKNIET, J. *see* BRUIJNZEEL, P.L.B., **99**, 798
- KRUMPL, G., TODT, H., KREJCY, K. & RABERGER, G. Antiarrhythmic efficacy of labetalol as assessed by programmed electrical stimulation, **100**, 855
- KUMAMOTO, E. & SHINNICK-GALLAGHER, P. Action of an irreversible acetylcholine esterase inhibitor, soman, on muscarinic hyperpolarization in cat bladder parasympathetic ganglia, **99**,

157

- KUNOS, G. *see* VARGA, K., **101**, 773  
 KUNYSZ, E.A. *see* EGLEN, R.M., **99**, 637  
 KÜPFER, A. *see* PRIOVINO, M., **99**, 35  
 KURIHARA, J., SAHARA, T. & KATO, H. Protective effect of beraprost sodium, a new chemically stable prostacyclin analogue, against the deterioration of baroreceptor reflex following transient global cerebral ischaemia in dogs, **99**, 91  
 KURIYAMA, H. *see* GUNASEKERA, R.D., **99**, 541  
 —, *see* KAJIKURI, J., **99**, 536  
 —, *see* NAKASHIMA, M., **101**, 581  
 KWAN, Y.W., WADSWORTH, R.M. & KANE, K.A. Effects of neuropeptide Y and calcitonin gene-related peptide on sheep coronary artery rings under oxygenated, hypoxic and simulated myocardial ischaemic conditions, **99**, 774  
 KWAN, Y.W., WADSWORTH, R.M. & KANE, K.A. Modification of the ischaemic-induced contraction in the sheep circumflex coronary artery by various pharmacological antagonists, **100**, 407
- L**
- LACEY, M.G., MERCURI, N.B. & NORTH, R.A. Actions of cocaine on rat dopaminergic neurones *in vitro*, **99**, 731  
 LACEY, M.G. *see* SEABROOK, G.R., **101**, 949  
 LAFONTAN, M. *see* GALITZKY, J., **100**, 862  
 LAGARDE, M. *see* FONLUPT, P., **101**, 920  
 LAGARDE, M. *see* FONLUPT, P., **101**, 920  
 LAGLENTE, V. *see* ADVENIER, C., **99**, 168  
 LAGNEAU, C. *see* BOEYNAEMS, J.-M., **101**, 799  
 LAI, J. *see* WATSON, S.P., **99**, 216  
 LAMA, M.C. *see* FASCILOLO, J., **101**, 344  
 LAMBRECHT, G. *see* FEIFEL, R., **99**, 445  
 LAMPORT, S.J. & FEDAN, J.S. Modulation of the reactivity of the guinea-pig isolated trachealis by respiratory epithelium: effects of cooling, **99**, 369  
 LANG, D. *see* SMITH, J.A., **99**, 565  
 LANGEMEIJER, M.W.E. *see* DINGEMANSE, J., **99**, 53  
 LANOUE, C. *see* CADIEUX, A., **101**, 193  
 LAPA, A.J. *see* FANN, M.L., **100**, 441  
 LAPINLAMPI, T. *see* KORTELAJINEN, M.-L., **99**, 673  
 LATHROP, D.A., NÄNÄSI, P.P. & VARRÖ, A. *In vitro* cardiac models of dog Purkinje fibre triggered and spontaneous electrical activity: effects of nicorandil, **99**, 119  
 LATHROP, D.A. & VARRÖ, A. The combined electrophysiological effects of lignocaine and sotalol in canine isolated cardiac Purkinje fibres are rate-dependent, **99**, 124  
 LAU, W.A.K., KING, R.G. & BOURA, A.L.A. Methoxyphanamine inhibits basal and histamine-induced nasal congestion in anaesthetized rats, **101**, 394  
 LAURESEN, A.M. *see* REKLING, J.C., **99**, 103  
 LAVIOLETTE, M. *see* MÉNARD, L., **100**, 15  
 LAYCOCK, S.M. *see* SPICER, B.A., **101**, 821  
 LAZZARI, M.A. *see* SCHATTNER, M.A., **101**, 253  
 LEAHEY, W. *see* CARLISLE, E.J.F., **100**, 530  
 LEALTHARD, H.L. *see* NORMAN, B.J., **101**, 27  
 LEDDA, F. *see* BRUNELLESCHI, S., **100**, 417  
 —, *see* MANTELLI, L., **99**, 717  
 LEE, M.R. *see* BOATENG, Y.A., **101**, 301  
 LEFF, P., HARPER, D., DAINITY, I.A. & DOUGALL, I.G. Pharmacological estimation of agonist affinity: detection of errors that may be caused by the operation of receptor isomerisation or ternary complex mechanisms, **101**, 55  
 LEFF, P., WOOD, B.E. & O'CONNOR, S.E. Suramin is a slowly-equilibrating but competitive antagonist at P<sub>2x</sub>-receptors in the rabbit isolated ear artery, **101**, 645  
 LEFF, P. *see* O'CONNOR, S.E., **101**, 640  
 LEFORT, J. *see* DESQUAND, S., **100**, 217  
 LEGRAND, A.M. *see* MOLGÓ, J., **99**, 695  
 LEIGHTON, G.E. *see* HUNTER, J.C., **101**, 183  
 LEMBECK, F., GRIESBACHER, T. & ECKHARDT, M. Demonstration of extrapulmonary activity of angiotensin converting enzyme in intact tissue preparations, **100**, 49  
 LEPPÄLUOTO, J. *see* KINNUNEN, P., **99**, 701  
 LEUNG, C.M.K., DAI, S. & OGLE, C.W. Changes in preganglionic sympathetic nerve function following chronic morphine treatment in rats, **99**, 247  
 LEURS, R., SMIT, M.J., BAST, A. & TIMMERMAN, H. Different profiles of desensitization dynamics in guinea-pig jejunal longitudinal smooth muscle after stimulation with histamine and methacholine, **101**, 881
- LEVI, S. *see* ANTUNES, E., **101**, 986  
 LEWIS, D.I. & COOTE, J.H. The influence of 5-hydroxytryptamine agonists and antagonists on identified sympathetic preganglionic neurones in the rat, *in vivo*, **99**, 672  
 LEWIS, M.J. *see* DICKIE, B.G.M., **101**, 8  
 LI, C.G. *see* DE LUCA, A., **101**, 437  
 LI, Y. *see* NAKASHIMA, M., **101**, 581  
 LIDBURY, P.S., KORBUT, R. & VANE, J. Sodium nitroprusside modulates the fibrinolytic system in the rabbit, **101**, 527  
 LIGHTLY, E.R.T., WALKER, S.W., BIRD, I.M. & WILLIAMS, B.C. Subclassification of  $\beta$ -adrenoceptors responsible for steroidogenesis in primary cultures of bovine adrenocortical zona fasciculata/reticularis cells, **99**, 709  
 LINCK, B. *see* KOHL, C., **101**, 829  
 LITTLE, H.J. *see* APPLEYARD, M.E., **101**, 599  
 —, *see* STANFORD, S.C., **99**, 441  
 —, *see* DOLIN, S.J., **101**, 691  
 LIU, G.Q. *see* LU, Y.M., **101**, 45  
 LIU, S.F. *see* CRAWLEY, D.E., **101**, 166  
 LIVETT, B.G. *see* ZHOU, X.-F., **100**, 523  
 LLUCH, S. *see* DE AGUILERA, E.M., **99**, 439  
 LODGE, D. *see* JONES, M.G., **101**, 968  
 LONG, S.K., SMITH, D.A.S., SIAREY, R.J. & EVANS, R.H. Effect of 6-cyano-2,3-dihydroxy-7-nitro-quinoline (CNQX) on dorsal root-, NMDA-, kainate- and quisqualate-mediated depolarization of rat motoneurones *in vitro*, **100**, 850  
 LONGMORE, J. *see* NEWGREEN, D.T., **100**, 605  
 LOOTS, W. *see* DE CLERCK, F., **99**, 631  
 LÓPEZ, F. *see* ALFARO, M.J., **101**, 958  
 LOPEZ-BELMONTE, J. *see* WHITTLE, B.J.R., **99**, 607  
 LOPEZ-JARAMILLO, P., GONZALEZ, M.C., PALMER, R.M.J. & MONCADA, S. The crucial role of physiological Ca<sup>2+</sup> concentrations in the production of endothelial nitric oxide and the control of vascular tone, **101**, 489  
 LORING, R.H. Agmatine acts as an antagonist of neuronal nicotinic receptors, **99**, 207  
 LÖTVALL, J.O., SKOOGH, B.-E., BARNES, P.J. & CHUNG, K.F. Effects of aerosolised substance P in lung resistance in guinea-pigs: a comparison between inhibition of neutral endopeptidase and angiotensin-converting enzyme, **100**, 69  
 LOUBATIERES-MARIANI, M.-M. *see* BOUHELAL, R., **100**, 173  
 LOURY, D.N. *see* MICHEL, A.D., **99**, 560  
 LU, X. *see* KOWALSKI, M.T., **99**, 27  
 LU, Y.M. & LIU, G.Q. The effects of (–)-daurisorline on Ca<sup>2+</sup> influx in presynaptic nerve terminals, **101**, 45  
 LUCAS, M.L. *see* McEWAN, G.T.A., **101**, 937  
 LUDBROOK, J. *see* EVANS, R.G., **100**, 421  
 LUHESHI, G.N. & ZAR, M.A. Inhibitory effect of streptozotocin-induced diabetes on non-cholinergic motor transmission in rat detrusor and its prevention by sorbinil, **101**, 411  
 LUNDBERG, J.M. *see* MATRAN, R., **100**, 535  
 LÜSCHER, T.F. *see* DOHI, Y., **100**, 889
- M**
- MAAYANI, S. *see* CHRIST, G.J., **101**, 375  
 MACDERMOT, J. *see* KELLY, E., **99**, 309  
 —, *see* KELLY, E., **100**, 223  
 MACDONALD, A. *see* McLAUGHLIN, D.P., **101**, 569  
 MACDONALD, T.M. *see* BOATENG, Y.A., **101**, 301  
 MACHADO, C.A. *see* EGLEN, R.M., **99**, 637  
 MACKENZIE, I. *see* BEECH, D.J., **99**, 374  
 MACKINNON, A.C. *see* BROWN, C.M., **99**, 481  
 —, *see* BROWN, C.M., **99**, 803  
 MACLAGAN, J. *see* AAS, P., **100**, 73  
 MACLEAN, M.R. & HILEY, C.R. Effect of neuropeptide Y on cardiac output, its distribution, regional blood flow and organ vascular resistances in the pithed rat, **99**, 340  
 MACLEAN, M. & McGRATH, J.C. Effects of pre-contraction with endothelin-1 on  $\alpha_2$ -adrenoceptor- and (endothelium-dependent) neuropeptide Y-mediated contractions in the isolated vascular bed of the rat tail, **101**, 205  
 MACLEOD, A.M. *see* FREEDMAN, S.B., **101**, 575  
 MACLEOD, K.M. *see* ABEBE, W., **101**, 465  
 —, *see* RAY, A., **99**, 661  
 MACNEIL, S. *see* BURTON, G.A., **99**, 364  
 MACRAE, I.M. *see* VILA, E., **100**, 840  
 MAGGI, C.A., PATACCHINI, R., GIACHETTI, A. & MELI, A. Tachykinin receptors in the circular muscle of the guinea-pig ileum, **101**, 996  
 MAGGI, C.A., PATACCHINI, R., GIULIANI, S., ROVERO, P.,



- DION, S., REGOLI, D., GIACHETTI, A. & MELI, A. Competitive antagonists discriminate between NK<sub>2</sub> tachykinin receptor subtypes, **100**, 588
- MAGGI, C.A., PATACCHINI, R., GIULIANI, S., TURINI, D., BARBANTI, G., REVERO, P. & MELI, A. Motor response of the human isolated small intestine and urinary bladder to porcine neuromedin U-8, **99**, 186
- MAGGI, C.A. *see* BRUNELLESCHI, S., **100**, 417
- , *see* MAPP, C.E., **100**, 886
- , *see* ROVERO, P., **101**, 232
- , *see* ZICHE, M., **100**, 11
- MAGGIO, J.E. *see* GUARD, S., **99**, 767
- MAGUIRE, J. *see* MURRAY, K.J., **99**, 612
- MAGUIRE, J.J. *see* FREEDMAN, S.B., **101**, 575
- MAIN, J.S. *see* FORSTER, C., **101**, 109
- MALCANGIO, M. *see* GHELARDINI, C., **101**, 49
- MALIK, K.U. *see* ADEAGBO, A.S.O., **100**, 427
- MALLORGA, P. *see* SUGRUE, M.F., **99**, 59
- MALMBERG-AIELLO, P. *see* GHELARDINI, C., **101**, 49
- MALTIN, C.A. *see* PALMER, R.M., **101**, 835
- MANARA, L. *see* BIANCHETTI, A., **100**, 831
- MANN, J. *see* CARR, R.D., **100**, 90
- MANOME, Y. *see* SAKURADA, T., **101**, 307
- MÄNSSON, B., NILSSON, B.-O. & EKSTRÖM, J. Effects of repeated infusions of substance P and vasoactive intestinal peptide on the weights of salivary glands subjected to atrophying influences in rats, **101**, 853
- MANTELLI, L., AMERINI, S. & LEDDA, F. Different effects of prostaglandins on adrenergic neurotransmission in atrial and ventricular preparations, **99**, 717
- MANTIONE, C.R. & RODRIGUEZ, R. A bradykinin (BK)<sub>1</sub> receptor antagonist blocks capsaicin-induced ear inflammation in mice, **99**, 516
- MANZINI, S. & BALLATI, L. 2-Chloroadenosine induction of vagally-mediated and atropine-resistant bronchomotor responses in anaesthetized guinea-pigs, **100**, 251
- MAPP, C.E., CHITANO, P., FABBRI, L.M., PATACCHINI, R. & MAGGI, C.A. Pharmacological modulation of the contractile response to toluene diisocyanate in the rat isolated urinary bladder, **100**, 886
- MARIANO, M. *see* ANTUNES, E., **101**, 986
- MARINOTTI, O. *see* RIBEIRO, J.M.C., **101**, 932
- MARKHAM, A. *see* BAYDOUN, A.R., **101**, 15
- MARSDEN, C.A. *see* WRIGHT, I.K., **99**, 221
- MARSHALL, F.H., BARNES, S., PINNOCK, R.D. & HUGHES, J. Characterization of cholecystokinin octapeptide-stimulated endogenous dopamine release from rat nucleus accumbens *in vitro*, **99**, 845
- MARSHALL, G.R. *see* TRICKLEBANK, M.D., **101**, 753
- MARSHALL, R.J. *see* SHAHID, M., **100**, 735
- MARTIN, M.I. *see* ALFARO, M.J., **101**, 958
- MARTINS, M.A. *see* HENRIQUES, M.G.M.O., **99**, 164
- MARTORANA, M.G. *see* SHAHID, M., **100**, 735
- MARTYN, J.A.J. *see* TOMERA, J.F., **101**, 263
- MASHIBA, H. *see* HASEGAWA, J., **99**, 815
- MASUDA, Y. *see* MOLLACE, V., **100**, 547
- MASUZAWA, K., MATSUDA, T. & ASANO, M. Evidence that pinacidil may promote the opening of ATP-sensitive K<sup>+</sup> channels yet inhibit the opening of Ca<sup>2+</sup>-activated K<sup>+</sup>-contracted canine mesenteric artery, **100**, 143
- MATHIE, R.T. & ALEXANDER, B. The role of adenosine in the hyperaemic response of the hepatic artery to portal vein occlusion (the 'buffer response'), **100**, 626
- MATHISON, R., RIMMER, C., DAVISON, J.S., WALLACE, J.L. & BEFUS, A.D. Alterations in regional blood flow in rats following sensitization to the nematode *Nippostrongylus brasiliensis*: effects of PAF antagonists, **101**, 93
- MATRAN, R., ALVING, K. & LUNDBERG, J.M. Cigarette smoke, nicotine and capsaicin aerosol-induced vasodilatation in pig respiratory mucosa, **100**, 535
- MATSUDA, T. *see* MASUZAWA, K., **100**, 143
- MATSUGI, T. *see* MORITOKI, H., **100**, 569
- MASUZAWA, K. *see* KIHARA, M., **100**, 353
- MATU, K. *see* SMITH, G.W., **100**, 295
- MAY, G.R. *see* THIEMERMANN, C., **99**, 303
- MAZOIT, J.X., KANTHELIP, J.-P., ORHANT, E.E. & TALMANT, J.-M. Myocardial uptake of lignocaine, pharmacokinetics and pharmacodynamics in the isolated perfused heart of the rabbit, **101**, 843
- McARDLE, J.J. *see* GAGE, P.W., **100**, 467
- McCULLOCH, J. *see* EDVINSSON, L., **100**, 311
- McDERMOTT, A.M., WILKIN, G.P. & DICKINSON, S.L. Pharmacological and biochemical comparison of thyrotropin releasing hormone (TRH) and di-methyl proline-TRH on pituitary GH<sub>3</sub> cells, **101**, 615
- McEWAN, G.T.A. & LUCAS, M.L. The effect of *E. coli* STa enterotoxin on the absorption of weakly dissociable drugs from rat proximal jejunum *in vivo*, **101**, 937
- McEWAN, J. *see* CROSSMAN, D.C., **99**, 71
- McGIFF, J.C. *see* QUILLEY, J., **100**, 336
- McGIVERN, J. & SCHOLFIELD, C.N. General anaesthetics and field currents in unclamped, unmyelinated axons of rat olfactory cortex, **101**, 217
- McGRATH, J.C., MONAGHAN, S., TEMPLETON, A.G.B. & WILSON, V.G. Effects of basal and acetylcholine-induced release of endothelium-derived relaxing factor on contraction to  $\alpha$ -adrenoceptor agonists in a rabbit artery and corresponding veins, **99**, 77
- McGRATH, J.C. *see* BROWN, C.M., **99**, 481
- , *see* BROWN, C.M., **99**, 803
- , *see* DAINTY, I.A., **100**, 241
- , *see* DAINTY, I.A., **100**, 767
- , *see* DALY, C.J., **99**, 253
- , *see* MACLEAN, M.R., **101**, 205
- McHARG, A.D. *see* NEWGREEN, D.T., **100**, 605
- McKNIGHT, A.T. *see* FREEDMAN, S.B., **101**, 575
- McLAUGHLIN, D.P. & MACDONALD, A. Evidence for the existence of 'atypical'  $\beta$ -adrenoceptors ( $\beta_3$ -adrenoceptors) mediating relaxation in the rat distal colon *in vitro*, **101**, 569
- McLEAN, W.G. *see* PEKINER, C., **101**, 978
- McMILLAN, D.N. *see* PALMER, R.M., **101**, 835
- McMILLAN, R.M., GIRODEAU, J.-M. & FOSTER, S.J. Selective chiral inhibitors of 5-lipoxygenase with anti-inflammatory activity, **101**, 501
- McMILLAN, R.M. *see* FOSTER, S.J., **99**, 113
- McNEILL, J.R. *see* WANG, H., **100**, 5
- McPHERSON, G.A. & ANGUS, J.A. Characterization of responses to cromakalim and pinacidil in smooth and cardiac muscle by use of selective antagonists, **100**, 201
- McQUEEN, D.S. *see* BIRRELL, G.J., **101**, 715
- MEECHAM, K.G. *see* HUNTER, J.C., **101**, 183
- MEINARDI, H. *see* DINGEMANSE, J., **99**, 53
- MELI, A. *see* MAGGI, C.A., **99**, 186
- , *see* MAGGI, C.A., **100**, 588
- , *see* MAGGI, C.A., **100**, 996
- MELMAN, A. *see* CHRIST, G.J., **101**, 375
- MÉNARD, L., PILOTE, S., NACCACHE, P.H., LAVIOLETTE, M. & BORGEAT, P. Inhibitory effects of MK-886 on arachidonic acid metabolism in human phagocytes, **100**, 15
- MENDELSON, F.A.O. *see* FABRIS, B., **100**, 651
- MERCURI, N.B., CALABRESI, P. & BERNARDI, G. Responses of rat substantia nigra compacta neurones to L-DOPA, **100**, 257
- MERCURI, N.B. *see* LACEY, M.G., **99**, 731
- MEURS, H. *see* REMIE, R., **99**, 223
- , *see* ROFFEL, A.F., **99**, 293
- MEYER, R.B.R. & HOPE, W. Evidence that A<sub>2</sub>-purinoceptors are involved in endothelium-dependent relaxation of the rat thoracic aorta, **100**, 576
- MICHEL, A.D., LOURY, D.N. & WHITING, R.L. Assessment of imiloxan as a selective  $\alpha_{2B}$ -adrenoceptor antagonist, **99**, 560
- MICHEL, A.D. *see* EGLEN, R.M., **99**, 637
- MICHEL, M.C. *see* MOTOMURA, S., **101**, 363
- MICHELETTI, R., GIUDICI, L., TURCONI, M. & DONETTI, A. 4-DAMP analogues reveal heterogeneity of M<sub>1</sub> muscarinic receptors, **100**, 395
- MICHELETTI, R., SCHIAVONE, A., CEREDA, E. & DONETTI, A. Hexocyclium derivatives with a high selectivity for smooth muscle muscarinic receptors, **100**, 150
- MIDDLEMISS, D.N. *see* MOSER, P.C., **99**, 343
- MILAVEC-KRIZMAN, M. *see* KING, A.D., **100**, 483
- MILLER, D.J. & STEELE, D.S. The 'calcium sensitising' effects of ORG30029 in saponin- or Triton-skinned rat cardiac muscle, **100**, 843
- MILLER, D.J. *see* DALY, C.J., **99**, 253
- MILLER, K.W. *see* DODSON, B.A., **101**, 710
- MILLER, L.G. *see* GALPERN, W.R., **101**, 839
- MILLER, R.C. *see* HILEY, C.R., **101**, 319
- MILLER, R.J. *see* BLEAKMAN, D., **101**, 423
- MILTON, A.S. *see* DAVIDSON, J., **100**, 542
- MINSHALL, E. *see* PIPER, I., **101**, 901
- MIR, A.K. *see* BOUHELAL, R., **100**, 173
- MIR, A.K. *see* MOSER, P.C., **99**, 343

- MIRAS-PORTUGAL, M.T. *see* CASTRO, E., **100**, 360
- MIRONNEAU, C. *see* MIRONNEAU, J., **101**, 6
- MIRONNEAU, J., SAYET, I., RAKOTOARISOA, L., DACQUET, C. & MIRONNEAU, C., Interaction of spironolactone with (+)-[<sup>3</sup>H]-isradipine and (−)-[<sup>3</sup>H]-desmethoxyverapamil binding sites in vascular smooth muscle, **101**, 6
- MIRZAZADEH, S. *see* GIBSON, A., **99**, 602
- MITCHELL, J.A. *see* HECKER, M., **101**, 237
- MITCHELL, P.D. *see* SMITH, G.W., **100**, 295
- MITCHELL, R. *see* HOPE, P.J., **101**, 477
- MIZUKAMI, M. *see* KONDO, N., **101**, 789
- MOFFAT, M.P. *see* KARMAZYN, M., **100**, 826
- MOLGÓ, J., COMELLA, J.X. & LEGRAND, A.M. Ciguatoxin enhances quantal transmitter release from frog motor nerve terminals, **99**, 695
- MOLLACE, V., MASUDA, Y., PELAGGI, T. & NISTICÒ, G. The effects of phosphatidylserine on the decreased cardiovascular response to clonidine microinfused into the nucleus tractus solitarius of old rats, **100**, 547
- MONAGHAN, S. *see* McGRATH, J.C. **99**, 77
- MONCADA, S. *see* BOULANGER, C., **101**, 152
- , S. *see* GARDINER, S.M., **101**, 10
- , *see* LOPEZ-JARAMILLO, P., **101**, 489
- , *see* PERSSON, M.G., **100**, 463
- , *see* RADOMSKI, M.W., **101**, 325
- , *see* REES, D.D., **101**, 746
- , *see* WHITTLE, B.J.R., **99**, 607
- MONTASTRUC, J.-L. *see* ESTAN, L., **101**, 329
- , *see* GALITZKY, J., **100**, 862
- , *see* RASCOL, O., **100**, 471
- MONTASTRUC, P. *see* RASCOL, O., **100**, 471
- MONTGOMERY, W.W. *see* EGLEN, R.M., **99**, 637
- MOORE, P.K., AL-SWAYEH, O.A., CHONG, N.W.S., EVANS, R.A. & GIBSON, A., L-N<sup>G</sup>-nitro-arginine (L-NOARG), a novel L-arginine-reversible inhibitor of endothelium-dependent vasodilation *in vitro*, **99**, 408
- MOORE, P.K., AL-SWAYEH, O.A. & EVANS, R. Rabbit brain contains an endogenous inhibitor of endothelium-dependent relaxation, **101**, 865
- MOORE, P.K. *see* GIBSON, A., **99**, 602
- MOORES, K. *see* MURRAY, K.J., **99**, 612
- MORALI, F. *see* INVERNIZZI, R., **100**, 774
- MORBIDELLI, L. *see* ZICHE, M., **100**, 11
- MORCILLO, E.J. *see* IRIARTE, C.F., **101**, 257
- MORGAN, J.P. *see* PERREAULT, C.L., **101**, 679
- MORGAN, R.M. *see* MAYDOUN, A.R., **101**, 15
- MORITOKI, H., MATSUGI, T., TAKASE, H., UEDA, H. & TANIOKA, A. Evidence for the involvement of cyclic GMP in adenosine-induced, age-dependent, vasodilatation, **100**, 569
- MORITOKI, H., TAKASE, H. & TANIOKA, A. Dual effects of capsaicin on responses of the rabbit ear artery to field stimulation, **99**, 152
- MORLEY, J. *see* SANJAR, S., **99**, 267
- , *see* SANJAR, S., **99**, 679
- , J. *see* SANJAR, S., **100**, 399
- MORONEY, M.A., FORDER, R.A., CAREY, F. & HOULT, J.R.S. Differential regulation of 5-lipoxygenase and cyclo-oxygenase pathways of arachidonate metabolism in rat peritoneal leukocytes, **101**, 128
- MORONNEAU, J. *see* SAVINEAU, J.-P., **99**, 261
- MORRISON, K.J. & POLLOCK, D. Impairment of relaxations to acetylcholine and nitric oxide by a phorbol ester in rat isolated aorta, **101**, 432
- MORTENSEN, F.V. *see* NIELSEN, H., **99**, 31
- MORTON, I.K.M. *see* FOX, A.J., **101**, 553
- MOSKOWITZ, M.A. *see* BUZZI, M.G., **99**, 202
- MOSER, P.C., TRICKLEBANK, M.D., MIDDLEMISS, D.N., MIR, A.K., HIBERT, M.F. & FOZARD, J.R. Characterization of MDL 73005EF as a 5-HT<sub>1A</sub> selective ligand and its effects in animal models of anxiety: comparison with buspirone, 8-OH-DPAT and diazepam, **99**, 343
- MOSS, H.E. & SANGER, G.J. The effects of granisetron, ICS205-930 and ondansetron on the visceral pain reflex induced by duodenal distension, **100**, 497
- MOTOMURA, S., DEIGHTON, N.M., ZERKOWSKI, H.-R., DOETSCH, N., MICHEL, M.C. & BRODDE, O.-E. Chronic  $\beta$ -adrenoceptor antagonist treatment sensitizes  $\beta_2$ -adrenoceptors, but desensitizes M<sub>2</sub>-muscarinic receptors in the human right atrium, **101**, 363
- MOUSA, S.A., BROWN, R., CHAN, Y., HSIEH, J. & SMITH, R.D. Evaluation of the effect of azapropazone on neutrophil migration in anaesthetized swine using a multichamber blister suction technique, **99**, 233
- MOUSA, S.A., BROWN, R., THOOLEN, M.J.M. & SMITH, R.D. Evaluation of the effect of azapropazone on neutrophil migration in regional myocardial ischaemia/reperfusion injury in rabbits, **100**, 379
- MUDUNKOTUWA, N.T. *see* FREEDMAN, S.B., **101**, 575
- MUID, R.E. *see* TWOMEY, B., **100**, 819
- MUIR, T.C. *see* BAIRD, A.A., **100**, 329
- MULDER, P. *see* RICHER, C., **100**, 557
- MULLANE, K.M. *see* SESSA, W.C., **99**, 553
- MÜLLER, O. *see* PIROVINO, M., **99**, 35
- MÜLLER-BECKMANN, B. *see* DORSZEWSKI, A., **101**, 686
- MÜLLER-SCHWEINITZER, E. & OLEA-BAZA, I. Pharmacological evidence for the existence of a local renin-angiotensin system in porcine interlobar renal arteries, **101**, 89
- MÜLLER-SCHWEINITZER, E. *see* KING, A.D., **100**, 483
- MULVANY, M.J. *see* NIELSEN, H., **99**, 31
- MURAKI, K., IMAIZUMI, Y., KOJIMA, T., KAWAI, T. & WATANABE, M. Effects of tetraethylammonium and 4-aminopyridine on outward currents and excitability in canine tracheal smooth muscle cells, **100**, 507
- MURAMATSU, I., KIGOSHI, S. & OSHITA, M. Two distinct  $\alpha_1$ -adrenoceptor subtypes involved in noradrenaline contraction of the rabbit thoracic aorta, **101**, 662
- MURAMATSU, I., OHMURA, T., KIGOSHI, S., HASHIMOTO, S. & OSHITA, M. Pharmacological subclassification of  $\alpha_1$ -adrenoceptors in vascular smooth muscle, **99**, 197
- MURAMATSU, I. *see* OHMURA, T., **99**, 587
- , *see* OHMURA, T., **100**, 27
- MURRAY, K.J., ENGLAND, P.J., HALLAM, T.J., MAGUIRE, J., MOORES, K., REEVES, M.L., SIMPSON, A.W.M. & RINK, T.J. The effects of siguazodan, a selective phosphodiesterase inhibitor, on human platelet function, **99**, 612
- MURRAY, K.J. *see* KAUMANN, A.J., **100**, 879
- MUTEKI, T. *see* TOKIMASA, T., **101**, 190
- MUTSCHLER, E. *see* FEIFEL, R., **99**, 445
- MYERS, A.K., ROBEY, J.W. & PRICE, R.M. Relationships between tumour necrosis factor, eicosanoids and platelet-activating factor as mediators of endotoxin-induced shock in mice, **99**, 499

## N

- NACCACHE, P.H. *see* MÉNARD, L., **100**, 15
- NAHORSKI, S.R. *see* CHILVERS, E.R., **99**, 297
- NAKAMURA, M. *see* ABE, S., **101**, 545
- , *see* HIRANO, K., **101**, 273
- NAKAMURA, S. *see* HORIO, S., **101**, 587
- NAKANO, M. *see* YAMADA, K., **99**, 384
- NAKASHIMA, M., LI, Y., SEKI, N. & KURIYAMA, H. Pinacidil inhibits neuromuscular transmission indirectly in the guinea-pig and rabbit mesenteric arteries, **101**, 581
- NAKASHIMA, M. *see* ITAYA, T., **99**, 572
- NAKAYA, H. *see* TOHSE, N., **99**, 437
- NAKAZAWA, K., FUJIMORI, K., TAKANAKA, A. & INOUE, K. Reversible and selective antagonism by suramin of ATP-activated inward current in PC12 pheochromocytoma cells, **101**, 224
- NAKAZATO, Y. *see* TERAOKA, H., **101**, 67
- NALINE, E. *see* ADVENIER, C., **100**, 168
- NÂNÁSI, P.P. *see* LATHROP, D.A., **99**, 119
- NANOFF, C., FREISSMUTH, M., TUISL, E. & SCHÜTZ, W. P<sub>2</sub>-, but not P<sub>1</sub>-purinoceptors mediate formation of 1,4,5-inositol triphosphate and its metabolites via a pertussis toxin-insensitive pathway in the rat renal cortex, **100**, 63
- NAPIER, F.E., SHEARER, M.A. & TEMPLE, D.M. Nedocromil sodium inhibits antigen-induced contraction of human lung parenchymal and bronchial strips, and the release of sulphidopeptide-leukotrienes and histamine from human lung fragments, **100**, 247
- NAVARTNAM, S., CHAU, T., AGBANYO, M., BOSE, D. & KHATTER, J.C. Positive inotropic effect of porcine left ventricular extract on canine ventricular muscle, **101**, 370
- NAYA, I. *see* SMITH, G.W., **100**, 295
- NAYLOR, A. *see* HAYES, A.G., **101**, 944
- NEAL, M.J. & SHAH, M.A. Development of tolerance to the effects of vigabatrin ( $\gamma$ -vinyl-GABA) on GABA release from rat cerebral cortex, spinal cord and retina, **100**, 324
- NEAL, M.J. *see* HITCHCOTT, P.K., **99**, 11
- NEGISHI, M. *see* ITO, S., **99**, 13
- NELLIS, P. *see* CRISCIONE, L., **100**, 31

- NERME, V. *see* WAHLUND, G., **99**, 592  
 NEWBERRY, N.R. *see* FREEDMAN, S.B., **101**, 575  
 NEWGREEN, D.T., BRAY, K.M., MCHARG, A.D., WESTON, A.H., DUTY, S., BROWN, B.S., KAY, P.B., EDWARDS, G., LONGMORE, J. & SOUTHERTON, J.S. The action of diazoxide and minoxidil sulphate on rat blood vessels: a comparison with cromakalim, **100**, 605  
 NEWMAN, C.M., WARREN, J.B., TAYLOR, G.W., BOOBIS, A.R. & DAVIES, D.S. Rapid tolerance to the hypotensive effects of glyceryl trinitrate in the rat: prevention by N-acetyl-L- but not N-acetyl-D-cysteine, **99**, 825  
 NEWTON, J.F. *see* SMITH III, E.F., **100**, 195  
 NEY, U. *see* GARDINER, S.M., **99**, 830  
 NICOL, A.K. *see* CARR, R.D., **100**, 83  
 NICHOLLS, J., HOURANI, S.M.O. & KITCHEN, I. The ontogeny of purinoceptors in rat urinary bladder and duodenum, **100**, 874  
 NICHOLS, A.J., KOSTER, P.F. & OHLSTEIN, E.H. The effect of diltiazem on the coronary haemodynamic and cardiac functional effects produced by intracoronary administration of endothelin-1 in the anaesthetized dog, **99**, 597  
 NICHOLSON, C.D. *see* CHALLISS, R.A.J., **99**, 47  
 NIELSEN, H., MORTENSEN, F.V. & MULVANY, M.J. Responses to noradrenaline in human subcutaneous resistance arteries are mediated by both  $\alpha_1$ - and  $\alpha_2$ -adrenoceptors, **99**, 31  
 NILSSON, B.-O. *see* MÅNSSON, B., **101**, 853  
 NISHIMURA, M., TSUBAKI, K., YAGASAKI, O. & ITO, K. Ryanodine facilitates calcium-dependent release of transmitter at mouse neuromuscular junctions, **100**, 114  
 NISHIO, M. *see* OHMURA, T., **99**, 587  
 —, *see* OHMURA, T., **100**, 27  
 NISHIYE, E. *see* KATSUYAMA, H., **100**, 41  
 NISTICÒ, G. *see* BAGETTA, G., **101**, 655  
 —, *see* BAGETTA, G., **101**, 776  
 —, *see* MOLLACE, V., **100**, 547  
 NOBBS, P. *see* KELLY, E., **99**, 309  
 —, *see* KELLY, E., **100**, 223  
 NOBLE, B.S. *see* PALMER, R.M., **101**, 835  
 NOGUCHI, N. *see* HASEGAWA, J., **99**, 815  
 NOLAN, T.E. *see* SUGRUE, M.F., **99**, 59  
 NOLLY, H. *see* FASCIUOLO, J.C., **101**, 344  
 NORMAN, B.J. & LEATHARD, H.L. Evidence that an atypical  $\beta$ -adrenoceptor mediates the inhibition of spontaneous rhythmical contractions of rabbit isolated jejunum induced by ritrodine and salbutamol, **101**, 27  
 NORTH, R.A. *see* LACEY, M.G., **99**, 731  
 —, *see* UCHIMURA, N., **99**, 736  
 NORTHOVER, B.J. Continuous fluorimetric assessment of the changes in cytoplasmic calcium concentration during exposure of rat isolated myocardium to conditions of simulated ischaemia, **100**, 477  
 NOVAS, M.L. *see* TANG, R., **99**, 548  
 NUNES, J.P. *see* GUIMARAES, S., **101**, 387  
 NYBORG, N.C.B. Action of noradrenaline on isolated proximal and distal coronary arteries of rat: selective release of endothelium-derived relaxing factor in proximal arteries, **100**, 552
- O**
- O'CONNOR, J.J., ROWAN, K.J. & ANWYL, R. Actions of 5-HT<sub>1</sub> ligands on excitatory synaptic transmission in the hippocampus of alert rats, **101**, 171  
 O'CONNOR, S.E., WOOD, B.E. & LEFF, P. Characterization of P<sub>2x</sub>-receptors in rabbit isolated ear artery, **101**, 640  
 O'CONNOR, S.E. *see* CARR, R.D., **100**, 83  
 —, *see* CARR, R.D., **100**, 90  
 —, *see* LEFF, P., **101**, 645  
 OGLE, C.W. *see* LEUNG, C.M.K., **99**, 247  
 OHASHI, M. *see* ETOH, S., **100**, 564  
 OHGA, A. *see* OHTA, T., **100**, 231  
 —, *see* TERAOKA, H., **101**, 67  
 OHHASHI, T. *see* SHIRAI, K., **100**, 200  
 OHLSTEIN, E.H. *see* NICHOLS, A.J., **99**, 597  
 OHMURA, T., NISHIO, M., KIGOSHI, S. & MURAMATSU, I. Electrophysiological and mechanical effects of calcitonin gene-related peptide on guinea-pig atria, **100**, 27  
 —, Somatostatin decreases the calcium inward current in guinea-pig atria, **99**, 587  
 OHMURA, T. *see* MURAMATSU, I., **99**, 197  
 OHTA, T., ITO, S. & OHGA, A. Co-release of PHI and VIP in dog stomach by peripheral and central vagal stimulation, **100**, 231  
 OKAMOTO, Y. *see* HISAYAMA, T., **100**, 677  
 OKUDA, E. *see* ITO, S., **99**, 13  
 OKWUASABA, F.K., OTUBU, J.A.M. & UDOH, F.V. Mode of inhibitory actions of acute and chronic chloroquine administration on the electrically stimulated mouse diaphragm *in vitro*, **101**, 133  
 OLEA-BAZA, I. *see* MÜLLER-SCHWEINITZER, E., **101**, 89  
 OLES, R.J. *see* SINGH, L., **99**, 285  
 OLLEY, J.E. *see* RECHTMAN, M.P., **101**, 269  
 OLPE, H.-R. *see* FAGG, G.E., **99**, 791  
 OLUYOMI, A.O. *see* HART, S.L., **99**, 243  
 OMINI, C. *see* DEL MONTE, M., **99**, 582  
 OMORI, K. *see* OTANI, H., **100**, 207  
 ONG, B.Y. *see* CHANDLER, C.J., **101**, 227  
 ONG, L.J. *see* KERR, D.I.B., **99**, 422  
 ORHANT, E.E. *see* MAZOIT, J.X., **101**, 843  
 OSHITA, M. *see* MURAMATSU, I., **99**, 197  
 —, *see* MURAMATSU, I., **101**, 662  
 OTANI, H., OTANI, H., URIU, T., HARA, M., INOUE, M., OMORI, K., CRAGOE, JR. & INAGAKI, C. Effects of inhibitors of protein kinase C and Na<sup>+</sup>/H<sup>+</sup> exchange on  $\alpha_1$ -adrenoceptor-mediated inotropic responses in the rat left ventricular papillary muscle, **100**, 207  
 OTANI, H. *see* OTANI, H., **100**, 207  
 OZAWA, T. *see* SANO, T., **99**, 577  
 OTSUKA, M. *see* YANAGISAWA, M., **100**, 711  
 OTUBU, J.A.M. *see* OKWUASABA, F.K., **101**, 133  
 OWEN, P.J. *see* JONES, J.A., **101**, 521
- P**
- PACINI, M. *see* ZICHE, M., **100**, 11  
 PACIOREK, P.M., COWLRICK, I.S., PERKINS, R.S., TAYLOR, J.C., WILKINSON, G.F. & WATERFALL, J.F. Evaluation of the bronchodilator properties of Ro 31-6930, a novel potassium channel opener, in the guinea-pig, **100**, 289  
 PAGE, C.P. *see* COYLE, A.J., **101**, 31  
 —, *see* THIEMERMANN, C., **99**, 303  
 PALMER, R.M., DELDAY, M.I., McMILLAN, D.N., NOBLE, B.S., BAIN, P. & MALTIN, C.A. Effects of the cyclo-oxygenase inhibitor, fenbufen, on clenbuterol-induced hypertrophy of cardiac and skeletal muscle of rats, **101**, 835  
 PALMER, R.M.J. *see* GARDINER, S.M., **101**, 10  
 —, *see* LOPEZ-JARAMILLO, P., **101**, 489  
 —, *see* RADOMSKI, M.W., **101**, 325  
 —, *see* REES, D.D., **101**, 746  
 PALMERO, M. *see* BALLESTA, J.J., **101**, 21  
 PANG, C.C.Y. *see* TABRIZCHI, R., **101**, 358  
 PAREKH, A.B. *see* FUJII, K., **99**, 779  
 —, *see* SYED, M.M., **101**, 809  
 PARRATT, J.R. *see* GUC, M.O., **101**, 913  
 PASCUAL, R. *see* IRIARTE, C.F., **101**, 257  
 PATACCHINI, R. *see* MAGGI, C.A., **99**, 186  
 —, *see* MAGGI, C.A., **100**, 588  
 —, *see* MAGGI, C.A., **101**, 996  
 —, *see* MAPP, C.E., **100**, 886  
 —, *see*, ROVERO, P., **101**, 232  
 PATCH, T.L. *see* DOLIN, S.J., **101**, 691  
 PATEL, S. *see* FREEDMAN, S.B., **101**, 575  
 PATMORE, L., DUNCAN, G.P., CLARKE, B., ANDERSON, A.J., GREENHOUSE, R. & PFISTER, J.R. RS30026: a potent and effective calcium channel agonist, **99**, 687  
 PÄTSL, T. *see* ALARANTA, S., **101**, 472  
 PAYNE, A.N. *see* HAMID-BLOOMFIELD, S., **100**, 761  
 PEARSON, J.D. *see* CROSSMAN, D.C., **99**, 71  
 PEKINER, C. & McLEAN, W.G. Impaired induction of nerve ornithine decarboxylase activity in the streptozotocin-diabetic rat is prevented by the aldose reductase inhibitor ponalrestat, **101**, 978  
 PELAGGI, T. *see* MOLLACE, V., **100**, 547  
 PELCKMANS, P.A. *see* BOECKXSTAENS, G.E., **101**, 460  
 PELTON, J.T. *see* HILEY, C.R., **101**, 319  
 PEMBERTON, K.E. *see* ROWAN, E.G., **100**, 301  
 PEPEU, G. *see* PUGLIESE, A.M., **99**, 189  
 PEPKE-ZABA, J. *see* DINH XUAN, A.T., **99**, 9  
 PERKINS, M.N. *see* JAMES, I.F., **99**, 503  
 PERKINS, R.S. *see* PACIOREK, P.M., **100**, 289  
 PERREAULT, C.L., HAGUE, N.L., RANSIL, B.J. & MORGAN, J.P. The effects of cocaine on intracellular Ca<sup>2+</sup> handling and myofilament Ca<sup>2+</sup> responsiveness of ferret ventricular myocardium, **101**, 679  
 PERSSON, M.G., GUSTAFSSON, L.E., WIKLUND, N.P., HADQVIST, P. & MONCADA, S. Endogenous nitric oxide as a modu-

- lator of rabbit skeletal muscle microcirculation *in vivo*, **100**, 463  
 PESSAYRE, D. *see* PIROVINO, M., **99**, 35  
 PETERSEN, O.H. *see* DUNNE, M.J., **99**, 169  
 PETRIE, J.C. *see* BOATENG, Y.A., **101**, 301  
 PETROVIC, A.A. *see* HAMID-BLOOMFIELD, S., **100**, 761  
 PETTIPHER, E.R. *see* CRUWYS, S.C., **100**, 631  
 PFISTER, J.R. *see* PATMORE, L., **99**, 687  
 PILOTE, S. *see* MÉNARD, L., **100**, 15  
 PILSUDSKI, R., ROUGIER, O. & TOURNEUR, Y. Action of cromakalim on potassium membrane conductance in isolated heart myocytes of frog, **100**, 581  
 PINKER, S.R. *see* KITCHEN, I., **100**, 685  
 PINNOCK, R.D. *see* MARSHALL, F.H., **99**, 845  
 PIPER, I., MINSHALL, E., DOWNING, S.J., HOLLINGSWORTH, M. & SADRAEL, H. Effects of several potassium channel openers and glibenclamide on the uterus of the rat, **101**, 901  
 PIPER, P.J. *see* BRAMLEY, A.M., **99**, 762  
 PIRES, J.G.P. *see* BOGLE, R.G., **100**, 757  
 PIROVINO, M., HONEGGER, U., MÜLLER, O., ZYSSET, Th., KÜPFER, A., TINEL, M. & PESSAYRE, D. Differences in hepatic drug accumulation and enzyme induction after chronic amiodarone feeding of two rat strains: role of the hydroxylator phenotype?, **99**, 35  
 PLANE, F. *see* JACOBS, M., **100**, 21  
 PLANT, T.D. & HENQUIN, J.C. Phentolamine and yohimbine inhibit ATP-sensitive K<sup>+</sup> channels in mouse pancreatic  $\beta$ -cells, **101**, 115  
 PLANTE, G.E. *see* SIROIS, M.G., **101**, 896  
 POLLOCK, D. *see* MORRISON, K.J., **101**, 432  
 PORTET, C. *see* FAGG, G.E., **99**, 791  
 POSTEL-WESTRA, I. *see* DINGEMANSE, J., **99**, 53  
 POTTER, B.V.L. *see* CHILVERS, E.R., **99**, 297  
 POTVIN, W. & VARMA, D.R. Refractoriness of the gravid rat uterus to tocolytic and biochemical effects of atrial natriuretic peptide, **100**, 341  
 POZZA, M.F. *see* FAGG, G.E., **99**, 791  
 POZZI, L. *see* INVERNIZZI, R., **100**, 774  
 PRAGER, R.H. *see* KERR, D.I.B., **99**, 422  
 PRETOLANI, M., RANDON, J. & VARGAFTIG, B.B. Antigen induces leucopenia in non-immunised guinea-pigs injected with platelets from actively sensitized animals, **100**, 185  
 PREUSS, J.M. *see* HENRY, P.J., **100**, 786  
 PRICE, R.M. *see* MYERS, A.K., **99**, 499  
 PRICE, S. *see* HUDLICKÁ, O., **99**, 786  
 PRINCE, D.A. *see* COULTER, D.A., **100**, 800  
 —, *see* COULTER, D.A., **100**, 807  
 PRUNEAU, D. & ANGUS, J.A.  $\omega$ -Conotoxin GVIA is a potent inhibitor of sympathetic neurogenic responses in rat small mesenteric arteries, **100**, 180  
 PUGLIESE, A.M., CORRADETTI, R., BALLERINI, L. & PAPEU, G. Effect of the nootropic drug oxiracetam on field potentials of rat hippocampal slices, **99**, 189  
 PUIL, E. & EL-BEHEIRY, H. Anaesthetic suppression of transmitter actions in neocortex, **101**, 61  
 PUIL, E. *see* EL-BEHEIRY, H., **101**, 1006  
 PUYBASSET, L. *see* ADVENIER, C., **100**, 168

## Q

- QUILLEY, J. & MCGIFF, J.C. Renal vascular responsiveness to arachidonic acid in experimental diabetes, **100**, 336  
 QUINN, N.E. *see* CATRAVAS, J.D., **101**, 121

## R

- RABBANI, M. *see* DOLIN, S.J., **101**, 691  
 RABERGER, G. *see* KRUMPL, G., **100**, 855  
 RADOMSKI, M.W., PALMER, R.M.J. & MONCADA, S. Characterization of the L-arginine:nitric oxide pathway in human platelets, **101**, 325  
 RADZISZEWSKI, W. *see* SALVEMINI, D., **101**, 991  
 RAKOTOARISOA, L. *see* MIRONNEAU, J., **101**, 6  
 RAMAGE, A.G. *see* BOGLE, R.G., **100**, 757  
 RAMOS, E.G. *see* ESPLUGUES, J.V., **100**, 491  
 RAMPART, M. *see* BOECKXSTAENS, G.E., **101**, 460  
 RAND, M.J. *see* DE LUCA, A., **101**, 437  
 RANDON, J. *see* PRETOLANI, M., **100**, 185  
 RANDALL, M.D., EDWARDS, D.H. & GRIFFITH, T.M. Activities of endothelin-1 in the vascular network of the rabbit ear: a microangiographic study, **101**, 781  
 RANG, H.P. *see* DUNN, P.M., **100**, 656  
 RANSIL, B.J. *see* PERREAULT, C.L., **101**, 679

- RASCOL, O., MONTASTRUC, J.-L., GAUQUELIN, G., TRAN, M.-A., GEELLEN, G., GHARIB, C. & MONTASTRUC, P. Cardiovascular effects of central injection of acetylcholine in anaesthetized dogs: a role for vasopressin release, **100**, 471  
 RAUD, J. Vasodilatation and inhibition of mediator release represent two distinct mechanisms for prostaglandin modulation of acute mast cell-dependent inflammation, **99**, 449  
 RAY, A. & MACLEOD, K.M. Adrenergic-cholinergic interactions in left atria: a study using K<sup>+</sup> channel agonists, antagonist and pertussis toxin, **99**, 661  
 REAVILL, C. & STOLERMAN, L.P. Locomotor activity in rats after administration of nicotinic agonists intracerebrally, **99**, 273  
 RECHTMAN, M.P., BOURA, A.L.A., KING, R.G., OLLEY, J.E. & SCHILLER, P.W. Effects of morphine, H-Tyr-D-Arg-Phe-Lys-NH<sub>2</sub> (DALDA) and B-HT920 on non-cholinergic nerve-mediated bronchoconstriction in pithed guinea-pigs, **101**, 269  
 REES, D.C. *see* HUNTER, J.C., **101**, 183  
 REES, D.D., PALMER, R.M.J., SCHULZ, R., HODSON, H.F. & MONCADA, S. Characterization of three inhibitors of endothelial nitric oxide synthase *in vitro* and *in vivo*, **101**, 746  
 REEVES, M.L. *see* MURRAY, K.J., **99**, 612  
 REGOLI, D. *see* MAGGI, C.A., **100**, 588  
 —, *see* RHALEB, N-E., **99**, 445  
 REID, J.J. *see* DE LUCA, A., **101**, 437  
 REID, J.L. *see* JOHN, G.W., **100**, 699  
 REIG, J.A. *see* BALLESTA, J.J., **101**, 21  
 REISER, G. Endothelin and a Ca<sup>2+</sup> inophore raise cyclic GMP levels of a neuronal cell line via formation of nitric oxide, **101**, 722  
 REKLING, J.C., JAHNSEN, H. & LAURSEN, A.M. The effect of two lipophilic  $\gamma$ -aminobutyric acid uptake blockers in CA1 of the rat hippocampal slice, **99**, 103  
 REMACLE-VOLON, G. *see* DAMAS, J., **101**, 418  
 REMIE, R., COPPES, R.P., MEURS, H., ROFFEL, A.F. & ZAAGSMA, J. Characterization of presynaptic vascular muscarinic receptors inhibiting endogenous noradrenaline overflow in the portal vein of the freely moving rat, **99**, 223  
 REYNOLDS, I.J., RUSH, E.A. & AIZENMAN, E. Reduction of NMDA receptors with dithiothreitol increases [<sup>3</sup>H]-MK-801 binding and NMDA-induced Ca<sup>2+</sup> fluxes, **101**, 178  
 RHALEB, N-E, DRAPEAU, G., DION, S., JUKIC, D., ROUISSI, N. & REGOLI, D. Structure-activity studies on bradykinin and related peptides: agonists, **99**, 445  
 RIBEIRO, J.A. *see* SEBASTIÃO, A.M., **100**, 55  
 —, *see* SEBASTIÃO, A.M., **101**, 453  
 RIBEIRO, J.M.C., MARINOTTI, O. & GONZALES, R. A salivary vasodilator in the blood-sucking bug, *Rhodnius prolixus*, **101**, 932  
 RICHARDS, M.H. Rat hippocampal muscarinic autoreceptors are similar to the M<sub>2</sub> (cardiac) subtype: comparison with hippocampal M<sub>1</sub>, atrial M<sub>2</sub> and ileal M<sub>3</sub> receptors, **99**, 753  
 RICHER, C., MULDER, P., DOUSSAU, M.-P., GAUTIER, P. & GIUDICELLI, J.-F. Systemic and regional haemodynamic interactions between K<sup>+</sup> channel openers and the sympathetic nervous system in the pithed SHR, **100**, 557  
 RIGBY, P.J. *see* HENRY, P.J., **99**, 136  
 —, *see* HENRY, P.J., **100**, 786  
 RIMMER, C. *see* MATHISON, R., **101**, 93  
 RINIKER, B. *see* CRISCIONE, L., **100**, 31  
 RINK, T.J. *see* MURRAY, K.J., **99**, 612  
 RISPOLI, V. *see* BAGETTA, G., **101**, 655  
 ROBERTS, J. *see* TUMER, N., **99**, 87  
 ROBEY, J.W. *see* MYERS, A.K., **99**, 499  
 ROBINSON, D.H. *see* CARR, R.D., **100**, 90  
 ROBINSON, J.P. & KENDALL, D.A. Niguldipine discriminates between  $\alpha_1$ -adrenoceptor-mediated second messenger responses in rat cerebral cortex slices, **100**, 3  
 ROBSON, A. *see* CARR, R.D., **100**, 83  
 RODRIGUEZ, R. *see* MANTIONE, C.R., **99**, 516  
 RODRIGUEZ, R.E. *see* TRAYNOR, J.R., **100**, 319  
 ROFFEL, A.F., MEURS, H., ELZINGA, C.R.S. & ZAAGSMA, J. Characterization of the muscarinic receptor subtype involved in phosphoinositide metabolism in bovine tracheal smooth muscle, **99**, 293  
 ROFFEL, A.F. *see* REMIE, R., **99**, 223  
 ROGERS, D.F., DIJK, S. & BARNES, P.J. Bradykinin-induced plasma exudation in guinea-pig airways: involvement of platelet activating factor, **101**, 739  
 ROGERS, H. & HENDERSON, G. Activation of  $\mu$ - and  $\delta$ -opioid receptors present on the same nerve terminals depresses transmitter release in the mouse hypogastric ganglion, **101**, 505  
 ROGERS, H. *see* HAYES, A.G., **101**, 944  
 ROMÁN, M. *see* IRIARTE, C.F., **101**, 257

- ROTONDO, D. *see* DAVIDSON, J., 100, 542  
 ROUGIER, O. *see* PILSUDSKI, R., 100, 581  
 ROUISSI, N. *see* RHALEB, N.-E., 99, 445  
 ROVERO, P., PATACCHINI, R. & MAGGI, C.A. Structure-activity studies on endothelin (16-21), the C-terminal hexapeptide of the endothelins, in the guinea-pig bronchus, 101, 232  
 ROVERO, P. *see* MAGGI, C.A., 99, 186  
 —, *see* MAGGI, C.A., 100, 588  
 ROWAN, E.G., PEMBERTON, K.E. & HARVEY, A.L. On the blockade of acetylcholine release at mouse motor nerve terminals by  $\beta$ -bungarotoxin and crotoxin, 100, 301  
 ROWAN, M.J. *see* O'CONNOR, J.J., 101, 171  
 RUBIO, R. *see* GIDDAY, J.M., 100, 95  
 RUDOLPHI, K.A. *see* ANDINÉ, P., 100, 814  
 RUPNIAK, N.M.J. *see* TRICKLEBANK, M.D., 101, 753  
 RUSH, E.A. *see* REYNOLDS, I.J., 101, 178  
 RUSKOAHO, H. *see* KINNUNEN, P., 99, 701  
 RUTKOWSKI, B. *see* JOHNS, E.J., 99, 317  
 RUYTJENS, I.F. *see* BOECKXSTAENS, G.E., 101, 460  
 RYAN, J.W. *see* CATRAVAS, J.D., 101, 121  
 RYANG, S., TAKEI, S., KAWAI, T., IMAIZUMI, Y. & WATANABE, M. Atropine-resistant relaxation induced by high  $K^+$  in iris dilator muscle of the rat and pig, 100, 401
- S
- SADA, H. *see* KOJIMA, M., 99, 327  
 —, *see* KOJIMA, M., 99, 334  
 SANDRAEI, H. *see* PIPER, I., 101, 901  
 SAHARA, T. *see* KURIHARA, J., 99, 91  
 SAINT, D.A. *see* GAGE, P.W., 100, 467  
 SAKURADA, T., MANOME, Y., TAN-NO, K., SAKURADA, S. & KISARA, K. The effects of substance P analogues on the scratching, biting and licking response induced by intrathecal injection of N-methyl-D-aspartate in mice, 101, 307  
 SAKURADA, S. *see* BAGETTA, G., 101, 655  
 —, *see* SAKURADA, T., 101, 307  
 SALONEN, R.O. *see* WEBBER, S.E., 99, 21  
 SALVEMINI, D., RADZISZEWSKI, W., KORBUT, R. & VANE, J. The use of oxyhaemoglobin to explore the events underlying inhibition of platelet aggregation induced by NO or NO-donors, 101, 991  
 SAMANIN, R. *see* INVERNIZZI, R., 100, 774  
 SAMHOUN, M.N. *see* BRAMLEY, A.M., 99, 762  
 SANDERS, L. *see* KAUMANN, A.J., 100, 879  
 SANGER, G.J. *see* MOSS, H.E., 100, 497  
 SANJAR, S., AOKI, S., BOUBEKEUR, A.K., CHAPMAN, I.D., SMITH, D., KINGS, M.A. & MORLEY, J. Eosinophil accumulation in pulmonary airways of guinea-pigs induced by exposure to an aerosol of platelet-activating factor: effect of anti-asthma drugs, 99, 267  
 SANJAR, S., AOKI, S., KRISTERSSON, A., SMITH, D. & MORLEY, J. Antigen challenge induces pulmonary airway eosinophil accumulation and airway hyperreactivity in sensitized guinea-pigs: the effect of anti asthma drugs, 99, 679  
 SANJAR, S., SMITH, D., KINGS, M.A. & MORLEY, J. Pretreatment with rh-GMCSF, but not rh-IL3, enhances PAF-induced eosinophil accumulation in guinea-pig airways, 100, 399  
 SANO, T., SUGIYAMA, S., TAKI, K., HANAKI, Y., SHIMADA, Y. & OZAWA, T. Effects of antiarrhythmic agents classified as class III group on ischaemia-induced myocardial damage in canine hearts, 99, 577  
 SARRIA, B. *see* ADVENIER, C., 100, 168  
 SASAGURI, T. & WATSON, S.P. Phorbol esters inhibit smooth muscle contractions through activation of  $Na^+ - K^+ - ATPase$ , 99, 237  
 SASAGURI, T. *see* WATSON, S.P., 99, 216  
 SASAKI, H. *see* AIKAWA, T., 100, 13  
 SASSEN, L.M.A., DUNCKER, D.J.G.M., GHO, B.C.G., DIEKMANN, H.W. & VERDOUW, P.D. Haemodynamic profile of the potassium channel activator EMD 52692 in anaesthetized pigs, 101, 605  
 SASSEN, L.M.A., SOEI, L.K., KONING, M.M.G. & VERDOUW, P.D. The central and regional cardiovascular responses to intravenous and intracoronary administration of the phenylidihydropyridine elgodipine in anaesthetized pigs, 99, 355  
 SATOH, K. *see* YAMADA, H., 100, 413  
 SAUNDERS, J. *see* FREEDMAN, S.B., 101, 575  
 SAVINEAU, J.-P. & MIRONNEAU, J. Caffeine acting on pregnant rat myometrium: analysis of its relaxant action and its failure to release  $Ca^{2+}$  from intracellular stores, 99, 261
- SAXENA, P.R. *see* VAN DER GIESSEN, W.J., 100, 277  
 —, *see* VILLALÓN, C.M., 100, 655  
 SAYET, I. *see* MIRONNEAU, J., 101, 6  
 SAZ, H.J. *see* CHRIST, D., 101, 971  
 SCARPACE, P.J. *see* BORST, S.E., 101, 650  
 SCHATTNER, M.A., GEFFNER, J.R., ISTURIZ, M.A. & LAZZARI, M.A. Inhibition of human platelet activation by polymorphonuclear leukocytes, 101, 253  
 SCHIAVONE, A. *see* MICHELETTI, R., 100, 150  
 SCHILLER, P.W. *see* RECHTMAN, M.P., 101, 269  
 SCHINI, V.B. *see* BOULANGER, C., 99, 176  
 —, *see* BOULANGER, C., 101, 152  
 SCHLICKER, E. *see* KOHLENBACH, A., 100, 365  
 SCHMIDT, H.H.H.W., BAEBLICH, S.E., ZERNIKOW, B.C., KLEIN, M.M. & BÖHME, E. L-Arginine and arginine analogues: effects on isolated blood vessels and cultured endothelial cells, 101, 145  
 SCHMIDT, W.E. *see* KATSOUULIS, S., 101, 297  
 SCHMIED, R. & KORTH, M. Muscarinic receptor stimulation and cyclic AMP-dependent effects in guinea-pig ventricular myocardium, 99, 401  
 SCHMITZ, W. *see* KOHL, C., 101, 829  
 SCHMUTZ, M. *see* FAGG, G.E., 99, 791  
 SCHOLFIELD, C.N. *see* MCGIVERN, J., 101, 217  
 SCHOLZ, H. *see* KOHL, C., 101, 829  
 SCHOLZ, J. *see* KOHL, C., 101, 829  
 SCHULZ, R. *see* REES, D.D., 101, 746  
 SCHÜTZ, W. *see* NANOFF, C., 100, 63  
 SCHWAM, H. *see* SUGRUE, M.F., 99, 59  
 SCHWÖRER, H. *see* KATSOUULIS, S., 101, 297  
 SCOPES, D.I.C. *see* HAYES, A.G., 101, 944  
 SCOTT, R.H. & DOLPHIN, A.C. Voltage-dependent modulation of rat sensory neurone calcium channel currents by G protein activation: effect of a dihydropyridine antagonist, 99, 629  
 SEABROOK, G.R., HOWSON, W. & LACEY, M.G. Electrophysiological characterization of potent agonists and antagonists at pre- and postsynaptic GABA<sub>A</sub> receptors on neurones in rat brain slices, 101, 949  
 SEBASTIÃO, A.M. & RIBEIRO, J.A. Interactions between adenosine and phorbol esters or lithium at the frog neuromuscular junction, 100, 55  
 SEBASTIÃO, A.M., STONE, T.W. & RIBEIRO, J.A. The inhibitory adenosine receptor at the neuromuscular junction and hippocampus of the rat: antagonism by 1,3,8-substituted xanthines, 101, 453  
 SEKI, N. *see* NAKASHIMA, M., 101, 581  
 SEKIZAWA, K. *see* AIKAWA, T., 101, 13  
 SELF, G.J. *see* HENRY, P.J., 100, 786  
 SELLIN, L.C. *see* THESLEFF, S., 100, 487  
 SENARD, J.-M. *see* ESTAN, L., 101, 329  
 SENARD, J.-M. *see* GALITZKY, J., 100, 862  
 SESSA, W.C. & MULLANE, K.M. Release of a neutrophil-derived vasoconstrictor agent which augments platelet-induced contractions of blood vessels *in vitro*, 99, 553  
 SESSA, W.C. *see* HECKER, M., 101, 237  
 SHADER, R.I. *see* GALPERN, W.R., 101, 839  
 —, *see* KAPLAN, G.B., 100, 435  
 SHAH, M.A. *see* NEAL, M.J., 100, 324  
 SHAHID, M., MARTORANA, M.G., COTTNEY, J.E. & MARSHALL, R.J. Pharmacological and biochemical effects of the cardiotonic agent Org10325 in isolated cardiac and vascular tissue preparations, 100, 735  
 SHARP, T. *see* BACKUS, L.I., 100, 793  
 SHEARER, M.A. *see* NAPIER, F.E., 100, 247  
 SHEEHAN, M.J. *see* HAYES, A.G., 101, 944  
 SHEN, K.-Z., BARAJAS-LOPEZ, C. & SURPRENANT, A. Functional characterization of neuronal pre- and postsynaptic  $\alpha_2$ -adrenoceptor subtypes in guinea-pig submucosal plexus, 101, 925  
 SHENG, H. *see* GILLESPIE, J.S., 99, 194  
 SHEPARD, K.L. *see* SUGRUE, M.F., 99, 59  
 SHERIDAN, D.J. *see* FLORES, N.A., 101, 734  
 SHIBATA, S. *see* KONDO, N., 101, 241  
 —, *see* KONDO, N., 101, 789  
 SHIGENOBU, K. *see* TANAKA, H., 100, 138  
 SHIMA, M. *see* HORIO, S., 100, 636  
 SHIMADA, Y. *see* SANO, T., 99, 577  
 SHINNICK-GALLAGHER, P. *see* KUMAMOTO, E., 99, 157  
 SHIRAI, K., KAWAI, Y. & OHHASHI, T. Contractile and relaxant responses of the canine isolated spinal artery to vasoactive substances, 101, 200



- SIAREY, R.J. *see* DOLIN, S.J., 101, 691  
 —, *see* LONG, S.K., 100, 850  
 SILINSKY, E.M. *see* HIRSH, J.K., 101, 311  
 SILVA, P.M.R. *see* HENRIQUES, M.G.M.O., 99, 164  
 SIMPSON, A.W.M. *see* MURRAY, K.J., 99, 612  
 SIMPSON, W.T. *see* CARR, R.D., 100, 83  
 SINGER, E.A. *see* VALENTA, B., 99, 713  
 SINGH, L., OLES, R.J. & TRICKLEBANK, M.D. Modulation of seizure susceptibility in the mouse by the strychnine-insensitive glycine recognition site of NMDA receptor/ion channel complex, 99, 285  
 SINGH, L., WONG, E.H.F., KESINGLAND, A.C. & TRICKLEBANK, M.D. Evidence against an involvement of the haloperidol-sensitive  $\sigma$  recognition site in the discriminative stimulus properties of (+)-N-allylnormetazocine ((+)-SKF 10,047), 99, 145  
 SINGH, L. *see* TRICKLEBANK, M.D., 101, 753  
 SINISCALCHI, A. *see* BIANCHI, C., 101, 448  
 SIROIS, M.G., PLANTE, G.E., BRAQUET, P. & SIROIS, P. Role of eicosanoids in PAF-induced increases of the vascular permeability in rat airways, 101, 896  
 SIROIS, P. *see* CADIEUX, A., 101, 193  
 —, *see* SIROIS, M.G., 101, 896  
 SITAR, D.S. *see* CHANDLER, C.J., 101, 227  
 SJÖQUIST, P.-O. *see* WAHLUND, G., 99, 592  
 SJÖSTRAND, N.O. *see* ALARANTA, S., 101, 472  
 SKÄRBY, T.V.Ch., HÖGESTÄTT, E.D. Differential effects of calcium antagonists and Bay K 8644 on contractile responses to exogenous noradrenaline and adrenergic nerve stimulation in the rabbit ear artery, 101, 961  
 SKOOGH, B.-E. *see* LÖTVALL, J.O., 100, 69  
 SLIMOVITCH, C. *see* COMMISSIONG, J.W., 99, 741  
 SLIVJAK, M.J. *see* SMITH III, E.F., 100, 195  
 SMALL, R.C., GOOD, D.M., DIXON, J.S. & KENNEDY, I. The effects of epithelium removal on the actions of cholinomimetic drugs in opened segments and perfused tubular preparations of guinea-pig trachea, 100, 516  
 SMART, T.G. & CONSTANTIN, A. Differential effect of zinc on the vertebrate GABA<sub>A</sub>-receptor complex, 99, 643  
 SMITH, M.J. *see* LEURS, R., 101, 881  
 SMITH, D. *see* SANJAR, S., 99, 267  
 —, *see* SANJAR, S., 99, 679  
 —, *see* SANJAR, S., 100, 399  
 SMITH, D.A.S. *see* LONG, S.K., 100, 850  
 SMITH III, E.F., SLIVJAK, M.J., EGAN, J.W., ECKARDT, R.D. & NEWTON, J.F. SK & F S-106203 inhibits leukotriene C<sub>4</sub>, leukotriene D<sub>4</sub> and leukotriene E<sub>4</sub> vasopressor responses in the conscious rat, 100, 195  
 SMITH, G.W., FARMER, J.B., INCE, F., MATU, K., MITCHELL, P.D., NAYA, I. & SPRINGTHORPE, B. FPL 63012AR: a potent D<sub>1</sub>-receptor agonist, 100, 295  
 SMITH, H. *see* SPICER, B.A., 101, 821  
 SMITH, J.A. & LANG, D. Release of endothelium-derived relaxing factor from pig cultured aortic endothelial cells, as assessed by changes in endothelial cell cycle GMP content, is inhibited by a phorbol ester, 99, 565  
 SMITH, J.B. *see* AKSOY, M.O., 99, 461  
 SMITH, R.D. *see* MOUSA, S.A., 99, 233  
 —, *see* MOUSA, S.A., 100, 379  
 SMITH, R.L. *see* SUGRUE, M.F., 99, 59  
 SMITH, S.J. & ENGLAND, P.J. The effects of Ca<sup>2+</sup> sensitizers on the rates of Ca<sup>2+</sup> release from cardiac troponin C and the troponin-tropomyosin complex, 100, 779  
 SMITS, J.F.M. *see* DRIEMAN, J.C., 99, 15  
 SNEDDON, P. *see* DALZIEL, H.H., 99, 820  
 SOEI, L.K. *see* SASSEN, L.M.A., 99, 355  
 SOFIA, R.D. *see* CHAND, N., 101, 541  
 SOLLEVELD, H.A. *see* BROOKS, D.P., 100, 79  
 SOLSONA, C.S. *see* HIRSH, J.K., 100, 311  
 SOMERS, Y. *see* DE CLERCK, F., 99, 631  
 SOUCCAR, C. *see* FANN, M.L., 100, 441  
 SOUTHERTON, J.S. *see* NEWGREEN, D.T., 100, 605  
 SPEDDING, M. *see* BROWN, C.M., 99, 481  
 —, *see* BROWN, C.M., 99, 803  
 —, *see* DAINITY, I.A., 100, 241  
 —, *see* KENNY, B.A., 100, 211  
 SPERELAKIS, N. *see* KOJIMA, M., 99, 327  
 —, *see* KOJIMA, M., 99, 334  
 SPICER, B.A., BAKER, R.C., HATT, P.A., LAYCOCK, S.M. & SMITH, H. The effects of drugs on Sephadex-induced eosinophilia and lung hyper-responsiveness in the rat, 101, 821  
 SPINA, D. *see* COYLE, A.J., 101, 31  
 SPONER, G. *see* DORSZEWSKI, A., 101, 686  
 SPRAGGS, C.F. *see* BUNCE, K.T., 101, 889  
 SPRINGTHORPE, B. *see* SMITH, G.W., 100, 295  
 STAMFORD, I.F. *see* D'AMATO, M., 100, 126  
 STANFORD, S.C., GETTINS, D. & LITTLE, H.J. Adverse effects on rat cardiac function *ex vivo* after repeated administration of the benzodiazepine partial inverse agonist, FG7142, 99, 441  
 STARKE, K. *see* BULLOCH, J.M., 99, 279  
 STEELE, D.S. *see* MILLER, D.J., 100, 843  
 STEINMANN, M. *see* FAGG, G.E., 99, 791  
 STERN, G.M. *see* KENT, A.P., 100, 743  
 STEWART, G.J. *see* AKSOY, M.O., 99, 461  
 STILLINGS, M. *see* GALITZKY, J., 100, 862  
 STOCLET, J.C. *see* ANDRIANTSITOHAINA, R., 99, 389  
 STOLERMAN, I.P. *see* REAVILL, C., 99, 273  
 STONE, T.W. Sensitivity of hippocampal neurones to kainic acid, and antagonism by kynurenate, 100, 847  
 —, *see* BARTRUP, J.T., 101, 97  
 —, *see* SEBASTIÃO, A.M., 101, 453  
 STREET, L.J. *see* FREEDMAN, S.B., 101, 575  
 STRETTON, C.D. *see* BELVISI, M.G., 100, 131  
 STROHAMMN, C. *see* FEIFEL, R., 99, 445  
 STRUYKER BOUDIER, H.A.J. *see* DRIEMAN, J.C., 99, 15  
 SUBISSI, A., GUELF, M. & CRISCUOLI, M. Angiotensin converting enzyme inhibitors potentiate the bronchoconstriction induced by substance P in the guinea-pig, 100, 502  
 SUBISSI, A. *see* DEL MONTE, M., 55, 582  
 SUGAMA, K. *see* ITO, S., 99, 13  
 SUGIYAMA, K. *see* TOKIMASA, T., 101, 190  
 SUGIYAMA, S. *see* SANO, T., 99, 577  
 SUGRUE, M.F., GAUTHERON, P., MALLORGA, P., NOLAN, T.E., GRAHAM, S.L., SCHWAM, H., SHEPARD, K.L. & SMITH, R.L. L-662,583 is a topically effective ocular hypotensive carbonic anhydrase inhibitor in experimental animals, 99, 59  
 SULAKHE, P.V. *see* WANG, H., 100, 5  
 SUMAN-CHAUHAN, N., GUARD, S., WILLIAMS, B.J. & WATLING, K.J. Pharmacological characterization of tachykinin-stimulated inositol phospholipid hydrolysis in peripheral tissues, 101, 1001  
 SUMNER, M.J. & HUMPHREY, P.P.A. Sumatriptan (GR43175) inhibits cyclic-AMP accumulation in dog isolated saphenous vein, 99, 219  
 SUNN, N., HARRIS, P.J. & BELL, C. Effects on renal sympathetic axons in dog of acute 6-hydroxydopamine treatment in combination with selective neuronal uptake inhibitors, 99, 655  
 SUPRENANT, A. *see* SHEN, K.-Z., 101, 925  
 —, *see* VANNER, S., 99, 840  
 SUZUKI, R. *see* KODAMA, I., 101, 803  
 SUZUKI, S. *see* KATSUYAMA, H., 100, 41  
 SWANK, S.R. *see* EGLER, R.M., 101, 513  
 SWEEP, C.G.J. *see* VAN GIEERSBERGEN, P.L.M., 99, 467  
 SWEETMAN, A.J. *see* BAYDOUN, A.R., 101, 15  
 SWIERKOSZ, T.A. *see* HECKER, M., 101, 237  
 SYED, M.M., PAREKH, A.B. & TOMITA, T. Receptors involved in mechanical responses to catecholamines in the circular muscle of guinea-pig stomach treated with meclofenamate, 101, 809

## T

- TABRIZCHI, R. & PANG, C.Y.Y. Adrenalectomy abolishes antagonism of  $\alpha$ -adrenoceptor-mediated hypotension by a  $\beta$ -blocker in conscious rats, 101, 358  
 TACKE, R. *see* FEIFEL, R., 99, 445  
 TÅGERUD, S. *see* THESLEFF, S., 100, 487  
 TAI, N.T. *see* KAPLAN, G.B., 100, 435  
 TAIRA, N. *see* YAMADA, H., 100, 413  
 —, *see* YANAGISAWA, T., 101, 157  
 TAKAHASHI, K. & AKAIKE, N. Nicergoline inhibits T-type Ca<sup>2+</sup> channels in rat isolated hippocampal CA1 pyramidal neurones, 100, 705  
 TAKANAKA, A. *see* NAKAZAWA, K., 101, 224  
 TAKASE, H. *see* MORITOKI, H., 99, 152  
 —, *see* MORITOKI, H., 100, 569  
 TAKAYANAGI, I. *see* HISAYAMA, T., 100, 677  
 TAKEI, S. *see* RYANG, S., 100, 401  
 TAKEUCHI, T. *see* HATA, F., 101, 1011  
 TAKI, K. *see* SANO, T., 99, 577  
 TAKISHIMA, T. *see* AIKAWA, T., 101, 13  
 TALMANT, J.-M. *see* MAZOIT, J.X., 101, 843  
 TAMARGO, J. *see* DIEZ, J., 100, 305

- TANAKA, H. & SHIGENOBU, K. Role of  $\beta$ -adrenoceptor-adenylate cyclase system in the developmental decrease in sensitivity to isoprenaline in foetal and neonatal rat heart, **100**, 138
- TANG, J.K. *see* FREEDMAN, S.B., **101**, 575
- TANG, R., NOVAS, M.L., GLAVINOVIĆ, M.I. & TRIFARÓ, J.-M. Effect of quinine on the release of catecholamines from bovine cultured chromaffin cells, **99**, 548
- TANIGUCHI, N. *see* KOJIMA, M., **99**, 334
- TANIOKA, A. *see* MORITOKI, H., **99**, 152
- , *see* MORITOKI, H., **100**, 569
- TANNIERE-ZELLER, M. *see* WILLIAMS, F.M., **100**, 729
- TAN-NO, K. *see* SAKURADA, T., **101**, 307
- TASKINEN, T. *see* KINNUNEN, P., **99**, 701
- TATTERSALL, J.E.H. Effects of organophosphorus anticholinesterases on nicotinic receptor ion channels at adult mouse muscle endplates, **101**, 349
- TAVARES, I.A. *see* GOEL, R.K., **99**, 289
- TAYLOR, G.W. *see* NEWMAN, C.M., **99**, 825
- TAYLOR, J.C. *see* PACIOREK, P.M., **100**, 289
- TAYLOR, M.E. *see* APPELYARD, M.E., **101**, 599
- TEMPLE, D.M. *see* NAPIER, F.E., **100**, 247
- TEMPLETON, A.G.B. *see* DAINITY, I.A., **100**, 767
- , *see* McGRATH, J.C., **99**, 77
- TERAOKA, H., YAMADA, Y., NADAZATO, Y. & OHGA, A. The role of  $\text{Na}^+$  in muscarinic receptor-mediated catecholamine secretion in the absence of extracellular  $\text{Ca}^{2+}$  in cat perfused adrenal glands, **101**, 67
- TERRAR, D.A. *see* WHITE, E., **101**, 399
- TESHIGAWARA, T. *see* YANAGISAWA, T., **101**, 157
- THAINA, P. *see* DE LUCA, A., **101**, 437
- THEDINGA, K. *see* FAGG, G.E., **99**, 791
- THESLEFF, S., SELLIN, L.C. & TÅGERUD, S. Tetrahydroaminoacridine (tacrine) stimulates neurosecretion at mammalian motor endplates, **100**, 487
- THIEMERMANN, C., MAY, G.R., PAGE, C.P. & VANE, J.R. Endothelin-1 inhibits platelet aggregation *in vivo*: a study with  $^{111}\text{In}$ -labelled platelets, **99**, 303
- THIJSEN, H.H.W. *see* DRIEMAN, J.C., **99**, 15
- THOMANN, H. *see* CRISCIONE, L., **100**, 31
- THOMSON, D.S. *see* KOWALSKI, M.T., **99**, 27
- THOOLEN, M.J.M. *see* MOUSA, S.A., **100**, 379
- TIBIRIÇA, E. *see* FELDMAN, J., **100**, 600
- TIMMERMAN, H. *see* LEURS, R., **101**, 881
- TINEL, M. *see* PIROVINO, M., **99**, 35
- TODT, H. *see* KRUMPL, G., **100**, 855
- TOFFANO, G. *see* COMMISSIONG, J.W., **99**, 741
- TOGO, J. *see* FARMER, S.G., **100**, 73
- TOHSE, N., HATTORI, Y., NAKAYA, H., ENDOU, M. & KANNO, M. Inability of endothelin to increase  $\text{Ca}^{2+}$  current in guinea-pig heart cells, **99**, 437
- TOKIMASA, T., SUGIYAMA, K., AKASU, T. & MUTEKI, T. Volatile anaesthetics inhibit a cyclic AMP-dependent sodium-potassium current in cultured sensory neurones of bullfrog, **101**, 190
- TOKUNO, H. *see* FUKUMITSU, T., **100**, 593
- , *see* KIHARA, M., **100**, 353
- TOMERA, J.F. & MARTYN, J.A.J. Thermal trauma alters myocardial cyclic nucleotides and protein content in mice, **101**, 263
- TOMITA, T. *see* FUKUMITSU, T., **100**, 593
- , *see* KIHARA, M., **100**, 353
- , *see* SYED, M.M., **100**, 809
- TOO, H.P. *see* GUARD, S., **99**, 767
- TORRES, M. *see* CASTRO, E., **100**, 360
- TOTH, M. *see* KOHL, C., **101**, 829
- TOURNEUR, Y. *see* PILSUDSKI, R., **100**, 581
- TOYAMA, J. *see* KODAMA, I., **101**, 803
- TRAN, M.-A. *see* ESTAN, L., **101**, 329
- , *see* RASCOL, O., **100**, 471
- TRAYNOR, J.R., HUNTER, J.C., RODRIGUEZ, R.E., HILL, R.G. & HUGHES, J.  $\delta$ -Opioid receptor binding sites in rodent spinal cord, **100**, 319
- TRAYNOR, J.R. *see* DIXON, D.M., **101**, 674
- TREHERNE, J.M. *see* ASHFORD, M.L.J., **101**, 531
- TRICKLEBANK, M.D., HONORÉ, T., IVERSEN, S.D., KEMP, J.A., KNIGHT, A.R., MARSHALL, G.R., RUPNIAK, N.M.J., SINGH, L., TYE, S., SATJEN, F. & WONG, E.H.G. The pharmacological properties of the imidazobenzodiazepine, FG 8205, a novel partial agonist at the benzodiazepine receptor, **101**, 753
- TRICKLEBANK, M.D. *see* MOSER, P.C., **99**, 343
- , *see* SINGH, L., **99**, 145
- , *see* SINGH, L., **99**, 285
- TRIGGLE, C.R. *see* WANG, H., **100**, 5
- TRIFARÓ, J.-M. *see* TANG, R., **99**, 548
- TSUBAKI, K. *see* NISHIMURA, M., **100**, 114
- TUCKER, J.F., BRAVE, S.R., CHARALAMBOUS, L., HOBBS, A.J. & GIBSON, A. L- $\text{N}^G$ -nitro arginine inhibits non-adrenergic, non-cholinergic relaxations of guinea-pig isolated tracheal smooth muscle, **100**, 661
- TUISL, E. *see* NANOFF, C., **100**, 63
- TUMER, N., HOUCK, W.T., BOEHM, C. & ROBERTS, J. Cardiac  $\beta$ -adrenoceptor binding characteristics with age following adrenal demedullation, **99**, 87
- TURCONI, M. *see* MICHELETTI, R., **100**, 395
- TURINI, D. *see* MAGGI, C.A., **99**, 186
- TWOMEY, B., MUID, R.E. & DALE, M.M. The effect of putative protein kinase C inhibitors, K252a and staurosporine, on the human neutrophil respiratory burst activated by both receptor stimulation and post-receptor mechanisms, **100**, 819
- TYE, S. *see* TRICKLEBANK, M.D., **101**, 753
- TYERS, M.B. *see* BUTLER, A., **101**, 591
- , *see* HAGAN, R.M., **99**, 227
- , *see* HAYES, A.G., **101**, 944

## U

- UCHIMURA, N. & NORTH, R.A. Actions of cocaine on rat nucleus accumbens neurones *in vitro*, **99**, 736
- UDOH, F.V. *see* OKWUSABA, F.K., **101**, 133
- UEDA, H. *see* HORIO, S., **100**, 636
- , *see* MORITOKI, H., **100**, 569
- UEMATSU, T. *see* ITAYA, T., **99**, 572
- UNDEM, B.J. *see* ELLIS, J.L., **101**, 875
- URH, R.R. *see* DODSON, B.A., **101**, 710
- USUNE, S. *see* KATSURAGI, T., **100**, 370
- URIU, T. *see* OTANI, H., **100**, 207

## V

- VALCIC, M. *see* CHRIST, G.J., **101**, 375
- VALENTA, B. & SINGER, E.A. Hypotensive effects of 8-hydroxy-2-(di-n-propylamino)tetralin and 5-methylurapidil following stereotaxic microinjection into the ventral medulla of the rat, **99**, 713
- VAN DER GIESSEN, W.J., DUNCKER, D.J., SAXENA, P.R. & VERDOUW, P.D. Nimodipine has no effect on the cerebral circulation in conscious pigs, despite an increase in cardiac output, **100**, 277
- VAN DUINKERKEN, E. *see* VAN GIEERSBERGEN, P.L.M., **99**, 467
- VANE, J. *see* LIDBURY, P.S., **101**, 527
- , *see* SALVEMINI, D., **101**, 991
- VANE, J.R. *see* HECKER, M., **101**, 237
- , *see* THIEMERMANN, C., **99**, 303
- VAN GEIERSBERGEN, P.L.M., VAN DUINKERKEN, E., SWEEP, C.G.J., WIEGANT, V.M., VAN REE, J.M. & DE JONG, W.  $\alpha$ -Methyldopa induces a naltraxone-insensitive antinociception and hypomotility in rats, **99**, 467
- VANHOUTTE, P.M. *see* BOULANGER, C., **99**, 176
- , *see* BOULANGER, C., **101**, 152
- VAN MAERCKE, Y.M. *see* BOECKXSTAENS, G.E., **101**, 460
- VANNER, S. & SUPRENANT, A. Effects of 5-HT<sub>3</sub> receptor antagonists on 5-HT and nicotinic depolarizations in guinea-pig submucosal neurones, **99**, 840
- VANNI, L. *see* BRUNELLESCHI, S., **100**, 417
- VAN REE, J.M. *see* VAN GIEERSBERGEN, P.L.M., **99**, 467
- VAN VALEN, G. *see* HAVILL, A.M., **99**, 396
- VARDI, Y. *see* FINBERG, J.P.M., **101**, 698
- VARGA, K. & KUNOS, G.K. Ethanol inhibition of baroreflex bradycardia: role of brainstem GABA receptors, **101**, 773
- VARGAFTIG, B.B. *see* DESQUAND, S., **100**, 217
- , *see* HENRIQUES, M.G.M.O., **99**, 164
- , *see* PRETOLANI, M., **100**, 185
- VARGAS, L. *see* FASCILOLO, J.C., **101**, 344
- VARMA, D.R., *see* POTVIN, W., **100**, 341
- VARRÓ, A. *see* LATHROP, D.A., **99**, 119
- VARRÓ, A. *see* LATHROP, D.A., **99**, 124
- VEALE, M.A. *see* BARLOW, R.B., **99**, 622
- VERBEUREN, T.J. *see* BOECKXSTAENS, G.E., **101**, 460
- VERDOUW, P.D. *see* SASSEN, L.M.A., **99**, 355
- , *see* SASSEN, L.M.A., **101**, 605
- , *see* VAN DER GIESSEN, W.J., **100**, 277
- VERNON, C.A. *see* BANKS, B.E.C., **99**, 350
- VILA, E. & MACRAE, I.M. Effect of neuropeptide Y on  $\alpha$ -adrenoceptor-mediated cardiovascular responses in the pithed rat, **100**, 840

- VILA, J.M. *see* DE AGUILERA, E.M., **99**, 439  
 VILLALÓN, C.M., DEN BOER, M.O., HEILIGERS, J.P.C. & SAXENA, P.R. Mediation of 5-hydroxytryptamine-induced tachycardia in the pig by the putative 5-HT<sub>4</sub> receptor, **100**, 665  
 VILLANUEVA, M.M. *see* IRIARTE, C.F., **101**, 257  
 VINIEGRA, S. *see* BALLESTA, J.J., **101**, 21  
 VON POEHL, C., IVEN, H. & BRASCH, H. Influence of N-ethylmaleimide on action potential and force of contraction of guinea-pig papillary muscles, **101**, 406  
 VOSKUYL, R.A. *see* DINGEMANSE, J., **99**, 53

## W

- WADSWORTH, R.M. *see* KWAN, Y.W., **99**, 774  
 —, *see* KWAN, Y.W., **100**, 407  
 WAELBROECK, M. *see* FEIFEL, R., **99**, 445  
 WAGNER-RODER, M. *see* FEIFEL, R., **99**, 445  
 WAHLUND, G., NERME, V., ABRAHAMSSON, T. & SJÖQUIST, P.-O. The  $\beta_1$ - and  $\beta_2$ -adrenoceptor affinity and  $\beta_1$ -blocking potency of S- and R-metoprolol, **99**, 592  
 WALKER, E.R.H. *see* FOSTER, S.J., **99**, 113  
 WALKER, S.W. *see* LIGHTLY, E.R.T., **99**, 709  
 WALLACE, J.L. *see* MATHISON, R., **101**, 93  
 WALLWORK, J. *see* DINH XUAN, A.T., **99**, 9  
 WALSH, L.K.M. *see* EGLIN, R.M., **101**, 513  
 WALTER, D.S. *see* JOHN, G.W., **100**, 699  
 WANG, H., GOPALAKRISHNAN, V., McNEILL, J.R., SULAKHE, P.V. & TRIGGLE, C.R. Calcium antagonizes the magnesium-induced high affinity state of the hepatic vasopressin receptor for the agonist interaction, **100**, 5  
 WANG, M.Y. & DUN, N.J. Phaclofen-insensitive presynaptic inhibitory action of ( $\pm$ )-baclofen in neonatal rat motoneurons *in vitro*, **99**, 413  
 WARNER, J.A. *see* BANKS, B.E.C., **99**, 350  
 WARNER, T.D. Simultaneous perfusion of rat isolated superior mesenteric arterial and venous beds: comparison of their vasoconstrictor and vasodilator responses to agonists, **99**, 427  
 WARREN, J.B. *see* NEWMAN, C.M., **99**, 825  
 WARRINGA, R.A.J. *see* BRUIJNZEEL, P.L.B., **99**, 798  
 WATANABE, M. *see* KAWAI, T., **100**, 507  
 —, *see* RYANG, S., **100**, 401  
 WATERFALL, J.F. *see* PACIOREK, P.M., **100**, 289  
 WATHEY, W.B. *see* CRIDDLE, D.N., **99**, 477  
 WATJEN, F. *see* TRICKLEBANK, M.D., **101**, 753  
 WATLING, K.J. *see* GUARD, S., **99**, 767  
 —, *see* SUMAN-CHAUHAN, N., **101**, 1001  
 WATSON, J.E. *see* KARMAZYN, M., **100**, 826  
 WATSON, S.P., LAI, J. & SASAGURI, T. K<sup>+</sup>-stimulation of the phosphoinositide pathway in guinea-pig ileum longitudinal smooth muscle is predominantly neuronal in origin and mediated by the entry of extracellular Ca<sup>2+</sup>, **99**, 216  
 WATSON, S.P. *see* GUARD, S., **99**, 767  
 —, *see* SASAGURI, T., **99**, 237  
 WEBBER, S.E., SALONEN, R.O. & WIDDICOMBE, J.G. Receptors mediating the effects of 5-hydroxytryptamine on the tracheal vasculature and smooth muscle of sheep, **99**, 21  
 WEBSTER, R.A. *see* KENT, A.P., **100**, 743  
 WEG, V.B. *see* HENRIQUES, M.G.M.O., **99**, 164  
 WELLS, E. *see* CARR, R.D., **100**, 83  
 —, *see* CARR, R.D., **100**, 90  
 WESTON, A.H. *see* NEWGREEN, D.T., **100**, 605  
 WHITE, E. & TERRAR, D.A. The effects of ryanodine and caffeine on Ca-activated current in guinea-pig ventricular myocytes, **101**, 399  
 WHITING, P.H. *see* BOATENG, Y.A., **101**, 301  
 WHITING, R.L. *see* EGLIN, R.M., **99**, 637  
 —, *see* EGLIN, R.M., **101**, 513  
 —, *see* MICHEL, A.D., **99**, 560  
 WHITTLE, B.J.R., LOPEZ-BELMONTE, J. & MONCADA, S. Regulation of gastric mucosal integrity by endogenous nitric oxide: interactions with prostanoids and sensory neuropeptides in the rat, **99**, 607  
 WHITTLE, B.J.R. *see* HAMID-BLOOMFIELD, S., **100**, 761  
 —, *see* HUTCHESON, I.R., **101**, 815  
 WHITWORTH, P., HEAL, D.J. & KENDALL, D.A. The effects of acute and chronic lithium treatment on pilocarpine-stimulated phosphoinositide hydrolysis in mouse brain *in vivo*, **101**, 39  
 WHITWORTH, P. *see* KENDALL, D.A., **100**, 723  
 WIDDICOMBE, J.G. *see* WEBBER, S.E., **99**, 21  
 WIEGANT, V.M. *see* VAN GIEERSBERGEN, P.L.M., **99**, 467  
 WIKLUND, N.P. *see* PERSSON, M.G., **100**, 463

- WILKIN, G.P. *see* McDERMOTT, A.M., **101**, 615  
 WILKINSON, G.F. *see* PACIOREK, P.M., **100**, 289  
 WILKINSON, L.S. & COLLARD, K.J. Synaptosomal tryptophan uptake and efflux following lesion of central 5-hydroxytryptaminergic neurones, **101**, 981  
 WILLCOCKS, A.L. *see* CHILVERS, E.R., **99**, 297  
 WILLIAMS, A. *see* BARLOW, R.B., **99**, 622  
 WILLIAMS, B.C. *see* LIGHTLY, E.R.T., **99**, 709  
 WILLIAMS, B.J. *see* SUMAN-CHAUHAN, N., **101**, 1001  
 WILLIAMS, F.M., COLLINS, P.D., TANNIERE-ZELLER, M. & WILLIAMS, T.J. The relationship between neutrophils and increased microvascular permeability in a model of myocardial ischaemia and reperfusion in the rabbit, **100**, 729  
 WILLIAMS, J.H. *see* BRADING, A.F., **99**, 493  
 WILLIAMS, T.J. *see* BUCKLEY, T.L., **99**, 7  
 —, *see* WILLIAMS, F.M., **100**, 729  
 WILSON, V.G. *see* DALY, C.J., **99**, 253  
 —, *see* McGRATH, J.C., **99**, 77  
 WITHRINGTON, P.G., DHUME, V.G., CROXTON, R. & GERBES, A.L. The actions of human atrial natriuretic factor on hepatic arterial and portal vascular beds of the anaesthetized dog, **99**, 810  
 WONG, E.H.F. *see* SINGH, L., **99**, 145  
 —, *see* TRICKLEBANK, M.D., **101**, 753  
 WONG-DUSTING, H.K. *see* DE LUCA, A., **101**, 437  
 WOOD, B.E. *see* LEFF, P., **101**, 645  
 —, *see* O'CONNOR, S.E., **101**, 640  
 WOOD, J.M. *see* EGLÈME, C., **100**, 237  
 WOODMAN, O.L. Enhanced coronary vasoconstrictor responses to 5-hydroxytryptamine in the presence of a coronary artery stenosis in anaesthetized dogs, **100**, 153  
 WOODWARD, B. *see* CRIDDLE, D.N., **99**, 477  
 WOUTERS, L. *see* DE CLERCK, F., **99**, 631  
 WRIGHT, C.E. & FOZARD, J.R. Differences in regional vascular sensitivity to endothelin-1 between spontaneously hypertensive and normotensive Wistar-Kyoto rats, **100**, 107  
 WRIGHT, I.K., GARRATT, J.C. & MARSDEN, C.A. Effects of a selective 5-HT<sub>2</sub> agonist, DOI, on 5-HT neuronal firing in the dorsal raphe nucleus and 5-HT release and metabolism in the frontal cortex, **99**, 221  
 WYANTS, J. *see* DE CLERCK, F., **99**, 631  
 WYDER, K.J. *see* CLARKE, P.B.S., **99**, 509

## X

- XIANG, J.-Z., BRAMMER, M.J. & CAMPBELL, I.C. Studies of receptor-mediated inhibition of <sup>45</sup>Ca accumulation into synaptosomes, **101**, 140

## Y

- YAGASAKI, O. *see* HATA, F., **101**, 1011  
 —, *see* NASHIMURA, M., **100**, 114  
 YAMADA, K., NAKANO, M. & YOSHIDA, S. Inhibition of elevated arginine vasopressin secretion in response to osmotic stimulation and acute haemorrhage by U-62066E, a  $\kappa$ -opioid receptor agonist, **99**, 384  
 YAMADA, H., YONEYAMA, F., SATOH, K. & TAIRA, N. Specific but differential antagonism by glibenclamide of the vasodepressor effects of cromakalim and nicorandil in spinally-anaesthetized dogs, **100**, 413  
 YAMADA, H. *see* FABRIS, B., **100**, 651  
 YAMADA, Y. *see* TERAOKA, H., **101**, 67  
 YAMAMOTO, M., GOTOH, Y., IMAIZUMI, Y. & WATANABE, M. Mechanisms of long-lasting effects of benidipine on Ca current in guinea-pig ventricular cells, **100**, 669  
 YAMANO, N. *see* HATA, F., **101**, 1011  
 YAMEY, J. *see* BANKS, B.E.C., **99**, 350  
 YANAGISAWA, M. & OTSUKA, M. Pharmacological profile of a tachykinin antagonist, spantide, as examined on rat spinal motoneurons, **100**, 711  
 YANAGISAWA, T., TESHIGAWARA, T. & TAIRA, N. Cytoplasmic calcium and the relaxation of canine coronary arterial smooth muscle produced by cromakalim, pinacidil and nicorandil, **101**, 157  
 YEATS, D.A. & BAKHLE, Y.S. Cationic factors affecting phospholipase activities from human lung, **100**, 447  
 YONEYAMA, F. *see* YAMADA, H., **100**, 413  
 YOSHIDA, S. *see* YAMADA, K., **99**, 384  
 YOUNG, J.M. *see* CRAWFORD, M.L.A., **100**, 867

## Z

ZAAGSMA, J. *see* REMIE, R., **99**, 223

—, *see* ROFFEL, A.F., **99**, 293

ZAR, M.A. *see* LUHESHI, G.N., **101**, 411

ZEEGER, H.H.M. *see* DRIEMAN, J.C., **99**, 15

ZERKOWSKI, H-R. *see* MOTOMURA, S., **101**, 363

ZERNIKOW, B.C. *see* SCHMIDT, H.H.H.W., **101**, 145

ZERWECK, C.R. *see* AKSOY, M.O., **99**, 461

ZHOU, X-F., LIVETT, B.G. Effect of capsaicin-sensitive sensory nerves on plasma glucose and catecholamine levels during 2-deoxyglucose-induced stress in conscious rats, **100**, 523

ZICHE, M., MORBIDELLI, L., PACINI, M., DOLARA, P. & MAGGI, C.A. NK<sub>1</sub>-receptors mediate the proliferative response of human fibroblasts to tachykinins, **100**, 11

ZYSSET, TH. *see* PIROVINO, M., **99**, 35

## SUBJECT INDEX

## A

- A23187**, stimulation of cyclic GMP production in endothelial cells by, in pig, **101, 152**
- Absorption**, effect of *E. coli* STa enterotoxin on of weakly dissociable drugs, rat jejunum, *in vivo*, **101, 937**
- Acanthocheilonema viteae***, actions of ACh and GABA on, **101, 971**
- ACE**, characterization of and *in vivo* inhibition after quinapril, rat, **100, 651**
- ACE inhibitor**, FPL 63547: pharmacological properties of, **100, 83**
- , FPL 63547, preferential biliary elimination of, **100, 90**
- Acetorphan**, effect on response to aerosolised ACh, lung, guinea-pig, **100, 69**
- N-Acetyl-L-glutamic acid-N-[N<sup>2</sup>-(5-n-butyl-2-pyridyl) hydrazide**, see CGP22979
- Acetylcholine**, cardiovascular effects of injection of, role of vasopressin release, **100, 471**
- , catecholamine secretion evoked by, enhanced by veratridine in absence of extracellular Ca<sup>2+</sup>, cat, **101, 67**
- , effect of Bay K 8644 and nifedipine on responses to, rat urinary bladder, **101, 494**
- , effects of depressed by Mg<sup>2+</sup>, neocortex, **101, 1006**
- , effect of pertussis toxin on negative inotropic actions of, rat, **100, 348**
- , enhancement of synthesis of cyclic GMP in presence but not in absence of endothelium, rabbit aorta, **99, 536**
- , haemodynamic responses to, effects of L-NAME, rat, **101, 632**
- , impairment of relaxations to by phorbol ester, rat aorta, **101, 432**
- , induces EDRF-mediated vasodilation, rat kidney, **99, 364**
- , inhibition of endothelium-dependent relaxations, effect on endothelin-1 contractions in aging, **100, 889**
- , inhibition of vasodilatation by L-NMMA, rabbit skeletal muscle, **100, 463**
- , modulation of responses to by mucosal and adventitial surface of epithelium, guinea-pig trachealis, **101, 257**
- , phosphorylation in release of, frog motor nerve endings, **101, 311**
- , response of spinal artery to, **101, 200**
- , role of cyclic AMP and protein kinase A in release of, frog, **101, 311**
- , sensitivities and relaxations induced by in relation to degree of stretch or tone, rat aorta, **100, 767**
- , temperature-dependence of desensitization induced by, guinea-pig, **100, 636**
- , actions on spontaneous contractions of *Dipetalonema viteae*, **101, 971**
- Acetylcholinesterase**, activity following acute and chronic treatment with a benzodiazepine inverse agonist, mouse brain, **101, 599**
- Acetylcholine release**, blockade of by  $\beta$ -bungarotoxin and crotoxin at mouse motor nerve terminals, **100, 301**
- , facilitation of regenerative by 3,4-diaminopyridine, mouse motor nerve, **101, 793**
- , opposite effects of 5-HT agonists on, guinea-pig, **101, 448**
- N-Acetylcysteine**, effect on tolerance to glyceryl trinitrate, rat, **99, 825**
- Acetylenic muscarinic receptor antagonists**, stereoselective inhibition of by enantiomers and hexahydro-difenidol and acetylenic analogues, **99, 445**
- [<sup>3</sup>H]-ACh release**, 5-HT<sub>3</sub> evoked release, guinea-pig ileum, **101, 553**
- ACh release**, spontaneous, enhanced by phenonium at motor nerve terminals, rat, **100, 441**
- Acid esters of choline**, potentiation of, lack of effect of epithelial cholinesterase activity or nervous reflex arc activity, trachea, guinea-pig, **100, 516**
- Actin polymerization**, effect of MK-886 on, human phagocytes, **100, 15**
- Action potentials**, effect of anticholinesterases on, skeletal muscle, mouse, **99, 721**
- Acyl carnitine esters**, effect in isolated perfused heart of rat, **99, 477**
- Adenosine**, anti-adrenergic effect of and blockade by pertussis toxin, comparative study in guinea-pig, rat and human heart, **101, 484**
- , assessment of action *in vivo* by use of theophylline on myocardial reactive hyperaemias, dog, **100, 95**
- , effect of compared with ATP and ADP, rat thoracic aorta, **100, 576**
- , effect on withdrawal contractures, guinea-pig ileum, **101, 908**
- , effects of cyclic AMP-dependent phosphorylation on action of receptor agonists of, **101, 311**
- , enhancement by propentofylline during ischaemia, rat hippocampus, **100, 814**
- , inhibition due to antagonized by theophylline but not 8-cyclopropyltheophylline, **100, 37**
- , interactions with phorbol esters or lithium at neuromuscular junctions, frog, **100, 55**
- , involvement of cyclic GMP in adenosine-induced vasodilatation, **100, 569**
- , responsible for hepatic arterial 'buffer response', **100, 626**
- , role in asthma, model for further study of, **100, 251**
- , variation in responses to with age, urinary bladder and duodenum, rat, **100, 874**
- , vasodilatation by, effect of L-NMMA, rabbit skeletal muscle, **100, 463**
- Adenosine analogues**, action at uptake site by dihydropyridines enhances inhibition, **101, 97**
- Adenosine diphosphate**, stimulation of cyclic GMP production in endothelial cells by pig, **101, 152**
- Adenosine receptor**, agonists in mediation of formation of 1,4,5-inositol trisphosphate and metabolites, renal cortex, rat, **100, 63**
- , in phrenic-diaphragm and hippocampus of rat, similar and of A<sub>1</sub>-adenosine type, **101, 453**
- Adenosine A<sub>2</sub> receptors**, activation of adenylate cyclase in cell lines NG108-15 and NCB-20, **99, 309**
- Adenosine receptors**, blocked by theophylline, consistency with time-dependent pattern of response attenuation for adenosine-induced hyperaemias, **100, 95**
- , effects of cyclic AMP-dependent protein phosphorylation on, **101, 311**
- , in coronary arteries, pig, **100, 487**
- Adenosine 5'-triphosphate**, action on intracardiac neurones, guinea-pig, **100, 269**
- Adenylate cyclase**, activation of by prostacyclin and adenosine A<sub>2</sub> receptors in cell lines NG108-15 and NCB-20, **99, 309**
- , activity modified by NaF and guanine nucleotides interacting with G<sub>s</sub> and G<sub>i</sub>, NG108-15 cells, **100, 223**
- , developmental decrease in sensitivity of to Iso in myocardial membrane fractions, rat heart, **100, 138**
- , effect on contractile reactivity of mesenteric and renal arteries, rat, **101, 859**
- , human, effect of chronic  $\beta_1$ -adrenoceptor antagonist treatment on, **101, 363**
- , presence in endothelial and smooth muscle cells coupled to CGRP receptors, bovine, **99, 71**
- Adibendan** (BM 14.478), haemodynamic profile of, **101, 686**
- Adrenal cortex**, mediation of catecholamine-stimulated hydrocortisone secretion by  $\beta_1$ -adrenoceptors in, **99, 709**
- Adrenal medulla**, [<sup>3</sup>H]-nitrendipine binding sites in mitochondria and plasma membranes of, bovine, **101, 21**
- Adrenaline**, involvement in antagonism of  $\alpha$ -adrenoceptor-induced hypotension by  $\beta$ -blocker, rat, **101, 358**
- Adrenergic transmission**, effect of prostaglandins on, atrial and ventricular preparations, guinea-pig, **99, 717**
- , effects of Ca antagonists and Bay K 8644 on contractile responses to, **101, 961**
- Adrenoceptor**, in circular muscle of guinea-pig stomach, **101, 809**
- $\alpha$ -Adrenoceptor**, in mediation of contraction of spinal artery, **101, 200**
- , mediating IP accumulation differs from those mediating cyclic AMP potentiation, **100, 3**
- $\alpha_1$ -Adrenoceptor**, alterations in responsiveness with age and disease, human erectile tissue, **101, 375**
- $\alpha_2$ -Adrenoceptor**, lack of effect of actions by pertussis toxin, rat, **100, 348**
- $\beta$ -Adrenoceptor**, in steroidogenesis in primary cultures of bovine adrenocortical zona fasciculata/reticularis cells, subclassification of, **99, 709**
- , potentiation of  $\alpha$ -stimulated cyclic AMP by noradrenaline partially inhibited by isomers of niguldipine, **100, 3**
- , role in developmental decrease in sensitivity to isoprenaline in

- foetal and neonatal heart, rat, **100**, 138
- , increase in calcium channel current by, single smooth muscle cell, coronary artery, pig, **100**, 593
- Adrenoceptor agonists**, effect on non-infarcted hypertrophied muscles from rats with chronic myocardial infarction, **99**, 572
- $\alpha$ -Adrenoceptor antagonist**, role of adrenaline and adrenocortical steroids on, **101**, 358
- $\beta$ -Adrenoceptor antagonist**, effect of adrenalectomy in antagonism of  $\alpha$ -adrenoceptor-mediated hypotension by, rat, **101**, 358
- $\beta$ -Adrenoceptor antagonists**, influence on cold adaptation, rat, **99**, 673
- $\beta$ -Adrenoceptor, cardiac**, binding characteristics with age after adrenal demedullation, **99**, 87
- $\beta$ -Adrenoceptor stimulants**, effect on Sephadex-induced eosinophilia and lung hyperresponsiveness, rat, **101**, 821
- $\alpha$ - and  $\beta$ -Adrenoceptor blocking agent**, in antiarrhythmic activity of labetalol, **100**, 855
- $\alpha_2$ -Adrenoceptor heterogeneity**, defined by 8-OH-DPAT, RU 24969 and methysergide, in rat cortex but not in human platelets, **99**, 481
- $\alpha_1$ -Adrenoceptor-mediated inotropic responses**, effect of inhibitors of protein kinase C and  $\text{Na}^+/\text{H}^+$  exchange on, ventricular papillary muscle, rat, **100**, 207
- $\beta$ -Adrenoceptor-mediated relaxations**, occurrence through activation of  $\beta_1$ -adrenoceptors, trachea, mouse, **99**, 131
- $\alpha_1$ -Adrenoceptor subtypes**, in noradrenaline contraction of thoracic aorta, rabbit, **101**, 662
- $\alpha$ - and  $\beta$ -Adrenoceptor subtypes**, in mediation effects of catecholamines on fasting glucose and insulin concentrations, rat, **100**, 699
- Adrenoceptors**, functional characterization of, submucosal plexus, guinea-pig, **101**, 925
- , responsiveness and number in global ischaemia, rat heart, **100**, 641
- , role in effects of lithium on blood glucose levels and insulin secretion, rat, **100**, 283
- $\alpha$ -Adrenoceptors**, contractions in human subcutaneous arteries produced by activation of, **99**, 31
- , effect of  $\text{K}^+$  channel openers on, in systemic pressor and regional vasoconstrictor responses, rat, **100**, 557
- , neuronal noradrenaline acts on, in inhibition of histamine-induced nasal congestion by methoxyphenamine, rat, **101**, 394
- , responses to noradrenaline in human subcutaneous arteries, **99**, 31
- $\alpha_1$ -Adrenoceptors**, effectiveness of activation of, in canine limb veins, **101**, 387
- , enhancement by neuropeptide Y of dihydropyridine-sensitive component in response to, rat mesenteric arterioles, **99**, 389
- , in influence of basal EDRF, rabbit, **99**, 77
- , in smooth muscle, sub-classification, **99**, 197
- , reduction of function in liver in senescence, rat, **101**, 650
- $\alpha_2$ -Adrenoceptors**, activation of inhibits non-cholinergic nerve stimulation induced bronchoconstriction, guinea-pig, **101**, 269
- , effect of neuropeptide Y on cardiovascular responses mediated by, rat, **100**, 840
- , effect on  $^{45}\text{Ca}$  influx into synaptosomes, **101**, 140
- , effectiveness of activation of in canine limb veins, **101**, 387
- , identification with new antagonist [ $^3\text{H}$ ]-RX821002, **100**, 862
- , imiloxan as a tool in classification of, **99**, 560
- , lack of evidence for differences between pre- and post junctional in periphery, **99**, 97
- $\alpha_{2A}$ -Adrenoceptors**, evidence for heterogeneity of peripheral prejunctional, **101**, 285
- $\alpha_{2B}$ -Adrenoceptors**, evidence for heterogeneity of peripheral prejunctional, **101**, 285
- $\alpha$ - and  $\beta$ -Adrenoceptors**, in hypo- and hyper-thyroidism, rat aorta, **99**, 541
- $\beta$ -Adrenoceptors, cardiac**, effect of xamoterol on, rat, **99**, 27
- , developmental changes in effects of on  $\text{Ca}^{2+}$  channels, rat ventricular muscles, **99**, 327
- , developmental changes in, rat ventricular muscle, **99**, 334
- , in mediation of inhibition of spontaneous rhythmical contractions induced by ritodrine and salbutamol, rabbit jejunum, **101**, 27
- , increase of function in liver in senescence, rat, **101**, 650
- $\beta_1$ -Adrenoceptors**, in mediation of smooth muscle relaxation, trachea, mouse, **99**, 131
- $\beta_1$ - and  $\beta_2$ -Adrenoceptors**, binding of metoprolol to, **99**, 592
- , quantitative autoradiographic study in trachea and lung, mouse, **99**, 136
- $\beta$ -Adrenoceptors, atypical**, evidence of in rat colon, **100**, 831
- , existence in rat distal colon, **101**, 569
- $\beta_1$ -Adrenoceptors, cardiac, human**, and cardiac muscarinic and  $\beta$ -adrenoceptors, **101**, 363
- , effect of chronic  $\beta_1$ -adrenoceptor antagonist on, **101**, 363
- $\beta_3$ -Adrenoceptors**, evidence for in mediation of relaxation, distal colon, rat, **101**, 569
- Adrenocortical steroids**, involvement in antagonism of  $\alpha$ -adrenoceptor-induced hypotension by  $\beta$ -blocker, rat, **101**, 358
- AFD-19**, effects on cardiac muscle, guinea-pig, **101**, 803
- AFD-21**, effects on cardiac muscle, guinea-pig, **101**, 803
- Aging**, decreased sensitivity of  $\alpha_2$ -adrenoceptors in, rat, **100**, 547
- Agmatine**, antagonist of neuronal nicotinic receptors, **99**, 207
- Agonist affinity**, detection of errors in estimation of, **101**, 55
- AH 21-132**, inhibition of pulmonary airway eosinophil accumulation due to inhaled PAF by, guinea-pig, **99**, 267
- AH6809**, in characterization of DP-receptors, **99**, 13
- Airway hyperreactivity**, antigen challenge induces, sensitized guinea-pig, **99**, 679
- Alamethicin**, effect on  $\text{Na}, \text{K}, \text{ATPase}$  activity, myocardium, guinea-pig, **101**, 337
- [D-Ala<sup>2</sup>, N-MePhe<sup>4</sup>, Gly-ol<sup>5</sup>]enkephalin**, effect on single fibre, nicotinic, excitatory synaptic potential, hypogastric ganglion, mouse, **101**, 505
- Aldose reductase**, effect on contractile response of detrusor to electrical field stimulation in streptozotocin-induced diabetes, rat, **101**, 411
- , impaired induction of ornithine decarboxylase activity in streptozotocin-diabetic rat prevented by, **101**, 978
- Alfentanil**, antinociception induced by antagonized by naloxone and unaffected by naltrindole, rat, **100**, 685
- Alimentary muscle**, effects of cholecystokinin octapeptide on, human, **100**, 126
- Alimidine**, responses to cromakalim and pinacidil in smooth and cardiac muscle by use of, **100**, 201
- 6-Allyl-2-amino-5,6,7,8-tetrahydro-4H-thiazolo-[4,5-d]azepine**, see B-HT 920
- (+)-N-Allylnormetazocine**, discriminative stimulus properties not mediated by haloperidol-sensitive recognition site, **99**, 145
- Alpha-chloralose**, spinal contribution to depression of reflexes, rat, **101**, 563
- Alphaxalone**, effect on axonal currents, olfactory cortex, rat, **101**, 217
- , spinal contribution to depression of reflexes, rat, **101**, 563
- Alprazolam**, differential effects on benzodiazepine binding and  $\text{GABA}_A$ -receptor function, **101**, 839
- Althesin**, in anaesthetic suppression of transmitter actions in neocortex, **101**, 61
- Alveolar macrophages**, involvement of neurokinin receptors in activation of, guinea-pig, **100**, 417
- Amiloride**, effect on inotropic responses, ventricular papillary muscle, rat, **100**, 207
- DL-(E)-2-Amino-4-methyl-5-phosphono-3-pentenoic acid**, see CGP 37849
- D-2-Amino-5-phosphonopentanoic acid**, inhibits action of oxiracetam on field potentials, hippocampus, rat, **99**, 189
- Aminophylline**, effect on Sephadex-induced eosinophilia and lung hyper-responsiveness, rat, **101**, 821
- , inhibition of pulmonary airway eosinophil accumulation due to inhaled PAF by, guinea-pig, **99**, 267
- , facilitation of regenerative ACh release by, motor nerve, mouse, **101**, 793
- 4-Aminopyridine**, and effects of cromakalim on smooth muscle, guinea-pig bladder, **99**, 779
- , effect on tracheal smooth muscle cells, dog, **100**, 507
- , study of adrenergic-cholinergic interactions in left atria using, rabbit, **99**, 661
- 4-Aminoquinoline**, in neurosecretion at motor endplates, mammal, **100**, 487
- $\delta$ -Aminovaleric acid**, inactive as blocker of (—)-baclofen-induced effects in synaptic processing of somatosensory information in S1 cortex, cat, **100**, 689
- Amiodarone**, effect on ischaemia-induced myocardial damage, canine heart, **99**, 577
- Anaesthetics**, comparison of spinal effects of injectable on nociceptive reflexes, rat, **101**, 563
- , inhibit  $\text{Na}^+ - \text{K}^+$  current in sensory neurones, **101**, 190
- Anaphylaxis**, active, blockage by WEB 2086, **100**, 217
- Angiotensin**, comparison of vasoconstrictor and vasodilator responses to, superior mesenteric vascular bed, rat, **99**, 427
- Angiotensin I**, in local formation of angiotensin II, rat aorta, **100**, 237
- Angiotensin II**, local formation of, effect of endothelium, rat aorta, **100**, 237
- Angiotensin converting enzyme**, effect on bradykinin-induced bronchoconstriction, guinea-pig, **101**, 77
- , extrapulmonary activity of, intact tissue preparations, **100**, 49
- , inhibitors of, **101**, 121
- , inhibitors potentiate bronchoconstriction induced by substance P, guinea-pig, **100**, 502



- , negative role in regulation of response to aerosolised substance P on lung resistance, guinea-pig, **100**, 69
- Anion secretion**, mediation by different receptors of prostanoid stimulation of, stomach and ileum, guinea-pig, **101**, 889
- ANP**, contribution of ventricles to circulating level of, **99**, 701
- , refractoriness of gravid uterus to tocolytic and biochemical effects of, rat, **100**, 341
- Anti-arrhythmia**, electrophysiological alterations of combination of lidocaine and sotalol, benefits of, **99**, 124
- Antiarrhythmic actions**, effect of nicorandil on, Purkinje fibre, dog, **99**, 119
- Antiarrhythmic agents**, class III group, effect on ischaemia-induced myocardial damage, canine heart, **99**, 577
- Antiarrhythmic drug**, pirmenol, **99**, 815
- Anti-arrhythmic drugs**, effects on established ventricular fibrillation, **100**, 530
- Anticholinesterase**, effect on latencies of action potentials in skeletal muscle, mouse, **99**, 721
- Anticholinesterases**, effect on nicotinic receptor ion channels, muscle endplate, mouse, **101**, 349
- Anti-convulsant**, block of GABA currents in thalamic neurones, **100**, 807
- Anticonvulsants**, differential effects of convulsants and on thalamic neurones, **100**, 800
- Antigen challenge**, induces pulmonary airway eosinophil accumulation and airway hyperreactivity, sensitized guinea-pig, **99**, 679
- Anti-inflammatory agents**, chiral inhibitors of 5-lipoxygenase, **101**, 501
- , interaction with pyrogenic actions of interleukin-1, **100**, 542
- , resulting from mast cell degranulation, rat, *in vivo*, **99**, 350
- Antinociception**, antagonism of swim-stress-induced by naltrindole, rat, **100**, 685
- , atropine-induced, **101**, 49
- , naltrexone-insensitive, induced by  $\alpha$ -methyldopa, rat, **99**, 467
- , stress-induced, role of vasopressin in, **99**, 243
- Antinociceptive actions**, mediated by opioid receptors, dorsal horn, rat, **101**, 477
- Anxiety**, characterization of MDL 73005EF as a 5-HT<sub>1A</sub> ligand and effects on animal models of, **99**, 343
- , connection between adverse effects on function of inverse agonist, FG7142, on rat cardiac function, **99**, 441
- Apomorphine**, behavioural supersensitivity to, by withdrawal of chronic haloperidol treatment, rat, **99**, 509
- Arachidonic acid**, renal vascular responsiveness to, in experimental diabetes, **100**, 336
- Arginine**, effects on vascular tone of isolated blood vessels and endothelial cells, **101**, 145
- , prevention of generation of, by glutamine inhibition of EDRF release, endothelial cells, **101**, 237
- L-Arginine**, administered to inhibit endothelium-derived NO formation effect on mucosa, rat, **99**, 607
- , effect on NANC relaxations of mouse anococcygeus, **99**, 602
- L-Arginine methyl ester**, effect on vascular tone of isolated blood vessels and endothelial cells, **101**, 145
- L-Arginine:nitric oxide pathway**, characterization of, human platelets, **101**, 325
- Arrhythmias**, effects of PAF during, guinea-pig, **101**, 734
- Arteriovenous anastomoses**, effect of elgodipine on, pig, **99**, 355
- Arthritis**, adjuvant, effect of 5-HT on articular sensory receptors in, rat, **101**, 715
- Arthropod saliva**, as a resource of novel pharmacological activities, **101**, 932
- Aspirin**, in collagen-induced platelet adhesion/aggregation response and release of 5-HT, cat, **99**, 631
- Asthma**, bradykinin generation in, guinea-pig, **101**, 739
- , inhibition of by prophylactic drugs and specific PAF receptor antagonists, guinea-pig, **99**, 396
- , therapeutic effects of nedocromil sodium by inhibition of antigen-induced release of leukotrienes and histamine, human lung, **100**, 247
- AT-125**, effect of renal haemodynamic responses to CGP 22979, rat, **99**, 15
- Atherosclerosis**, attenuation of responses to EDRF by low-density lipoproteins, **100**, 21
- ATP**, as co-transmitter with noradrenaline at vascular neuroeffector junction, **99**, 279
- , antagonism by nifedipine of contraction and Ca<sup>2+</sup>-influx evoked by, bladder, guinea-pig, **100**, 370
- , cotransmitter with noradrenaline in sympathetic nerves to hepatic artery, rabbit, **99**, 835
- , effect of suramin on in PC12 pheochromocytoma cells, **101**, 224
- , effect of suramin on responses of in urinary bladder and taenia coli, guinea-pig, **99**, 617
- , effect on thoracic aorta compared with adenosine and ADP, rat, **100**, 576
- , in onset of ouabain inhibition of Na,K-ATPase, guinea-pig myocardium, **101**, 337
- , in response to 5-HT, urinary tract, rabbit, **101**, 212
- , ontogeny of responses to, rat urinary bladder and duodenum, **100**, 874
- , role as fast excitatory transmitter, guinea-pig urinary bladder, **100**, 619
- ATP analogues**, mediation by stimulation of P<sub>2X</sub>-receptors, rabbit ear artery, **101**, 640
- ATP release**, neuropeptide Y neuromodulates co-transmission by inhibition of, vas deferens, guinea-pig, **100**, 457
- ATP-sensitive K<sup>+</sup> channels**, similarity of ability of pinacidil to increase <sup>86</sup>Rb efflux via to cromakalim, canine mesenteric artery, **100**, 143
- ATP-sensitive potassium channels**, effects of pinacidil, RP 49356 and nicorandil on, **99**, 487
- Atria**, isolated, changes in contractile rate and force in response to noradrenaline or field stimulation, influence by acute or chronic morphine treatment, **99**, 247
- Atrial natriuretic factor**, actions on hepatic arterial and portal vascular beds, dog, **99**, 810
- , cyclic GMP and vasodilatation induced by, rat kidney, **99**, 364
- , effect of intracisternal injection of ACh on, **100**, 471
- Atriopeptin III**, action on renal function in chronic renal failure, rat, **99**, 317
- Atropine**, effect on nociceptive system, **101**, 49
- , -resistant relaxation induced by high K<sup>+</sup>, iris dilator muscle, rat and pig, **100**, 401
- Autoinhibition**, in vascular neuroeffector junction, ATP and noradrenaline as co-transmitters, **99**, 279
- Azapropazone**, as an effective inhibitor of neutrophil migration, swine, **99**, 233
- , effect on neutrophil migration in regional myocardial ischaemia/reperfusion injury, rabbit, **100**, 379

## B

- Baclofen**, effect of intracerebroventricular administration on operant feeding in satiated pig, **101**, 559
- , effect on histamine-induced inositol phosphate formation, guinea-pig cerebellum, rat and guinea-pig cortex, **100**, 867
- , effect on transmission in neonatal rat motoneurons, **99**, 413
- , electrophysiological characterization of at GABA<sub>B</sub> receptors on neurones, rat brain, **101**, 949
- , in synaptic processing of somatosensory information, cortex, cat, **100**, 689
- R(-)- and S-(+)-Baclofen**, effect on neurogenic vasopressor response, rat, **100**, 365
- Barbiturates**, potency for binding to *Torpedo* acetylcholine receptor, **101**, 710
- Barium**, in inhibition of Na<sup>+</sup>-K<sup>+</sup> pump activity, peritoneal mast cells, rat, **100**, 453
- Baroreceptor reflex**, protective effect of beraprost sodium against deterioration of, dog, **99**, 91
- Baroreflex**, ethanol inhibition of, role of brainstem GABA receptors, **101**, 773
- Bay K 8644**, a new intracellular site of action, **101**, 15
- , effect on responses to electrical field stimulation,  $\beta$ ,  $\gamma$ -methylene ATP and ACh, urinary bladder, rat, **101**, 494
- , interactions with endothelium: comparison with palmitoyl carnitine, rat aorta, **100**, 241
- , role of Na-H exchange in inotropic action of, guinea-pig atria, **100**, 717
- Bee venom**, anti-inflammatory activity of, results from mast cell degradation *in vivo*, **99**, 350
- Benidipine**, mechanisms of effects on Ca current, ventricular cells, guinea-pig, **100**, 669
- Benserazide**, effect on distribution and metabolism of levodopa, rat, **100**, 743
- Benzeneacetamidopiperidine analogues**, as novel agonists for  $\kappa$ -opioid receptor, **101**, 944
- Benzodiazepine**, properties of imidazobenzodiazepine, a partial agonist of, **101**, 753
- Benzodiazepine inverse agonist**, adverse effects on rat cardiac function *ex vivo*, **99**, 441
- Benzodiazepine inverse agonists**, effect of acute and chronic treatment with on acetylcholinesterase activity, mouse brain, **101**, 599
- Benzodiazepines**, and thromboxane synthesis in human platelets, **101**, 920

- , effect of nitrendipine on seizures during withdrawal from chronic treatment with and development of tolerance to, mouse, **101**, 691
- Benzotropine**, effects on renal sympathetic axons of acute 6-hydroxydopamine treatment in combination with, dog, **99**, 655
- N- $\alpha$ -Benzoyl-L-arginine ethyl ester**, effect on vascular tone of blood vessels and endothelial cells, **101**, 145
- Bepraprost sodium**, effect against deterioration of baroreceptor reflex after transient global cerebral ischaemia, dog, **99**, 91
- , effect on nigrostriatal and mesolimbic dopamine systems, rat, **99**, 509
- B-HT920**, effect on non-cholinergic nerve-mediated bronchoconstriction, guinea-pig, **101**, 269
- B-HT 933**, elicits contractions in human subcutaneous arteries in presence of prazosin, **99**, 31
- , in endotoxin-induced impairment of vascular responses, rat, **101**, 913
- Bicuculline**, comparison with (+)-hydrastine as a potent antagonist at mammalian GABA<sub>A</sub> receptors, **99**, 727
- , in synaptic processing of somatosensory information in S1 cortex, cat, **100**, 689
- Biliary elimination**, preferential, of FPL 63547, a novel inhibitor of angiotensin-converting enzyme, rat, **100**, 90
- Binding sites**, characterization of for inositol 1,4,5-trisphosphate, airway smooth muscle, **99**, 297
- Binding sites, cerebellar**, requirements for binding to, **101**, 319
- BK<sub>2</sub>, BK<sub>1</sub> receptors**, effect of various peptides on, dog carotid and renal arteries, **99**, 445
- Blood flow**, regional, effect of neuropeptide Y on, **99**, 340
- Blood flow, regional**, effect of EMD 52692 on, pig, **101**, 605
- , effect of nimodipine on, pig, **100**, 277
- Blood pressure**, effect of endothelin on, **100**, 107
- BM 13.177**, effect on bronchoconstrictor effect of inhaled PGD<sub>2</sub>, guinea-pig, **100**, 761
- BM 14.478**, see adibendan
- BMV 7378**, effect on e.p.s.p., rat hippocampus, **101**, 171
- BN 52021**, attenuates plasma leakage in guinea-pig airways, **101**, 739
- , effect on changes induced by endotoxin, mice, **99**, 499
- Body weight**, connections between  $\beta$ -adrenoceptor antagonists, cold acclimatization and, rat, **99**, 673
- Bradykinin**, angiotensin converting enzyme and neutral endopeptidase degrade, airway lumen, guinea-pig, **101**, 77
- , changes in tension in response to additions of, interlobar renal arteries, **101**, 89
- , dependence on cyclo-oxygenase pathway to produce PGH<sub>2</sub> in elicitation of vasoconstriction, canine veins, **99**, 461
- , haemodynamic responses to, effects of L-NAME, rat, **101**, 632
- , in depolarization of primary afferent nerves, rat spinal cord, **100**, 656
- , inactivation of by angiotensin converting enzyme in endothelium, **100**, 49
- , induced vasoconstriction of mesenteric arteries, rat, **101**, 344
- , role of epithelium in modulating responses of trachea induced by, guinea-pig, **99**, 762
- , stimulation of cyclic GMP production in endothelial cells by, pig, **101**, 152
- , structure-activity studies on, **99**, 445
- Bradykinin antagonist**, in blockage of capsaicin-induced ear inflammation, mice, **99**, 516
- Brain**, endogenous inhibitor of endothelium-dependent relaxation in, rabbit, **101**, 865
- Brainstem neurones**, non-NMDA antagonism by pirlanthotoxin *in vivo*, brainstem, rat, **101**, 968
- Bretylium**, effect on established ventricular fibrillation, **100**, 530
- BRL 24924**, induces increase in EEG-energy, rat, **101**, 281
- Bronchoalveolar lavage fluid**, eosinophil accumulation from exposure to PAF in, guinea-pig, **99**, 267
- Bronchoconstriction**, effects of morphine DALDA and B-HT920 on non-cholinergic nerve-mediated, guinea-pig, **101**, 269
- , mechanism of potentiation by gallamine, guinea-pig, **99**, 582
- , role of prostanoid receptors in, guinea-pig, **100**, 761
- , substance P induced, potentiated by angiotensin converting enzyme inhibitors, guinea-pig, **100**, 502
- , suppression by neuropeptide Y of capsaicin-sensitive sensory nerve-mediated, guinea pig, **99**, 473
- Bronchus, human**, contractile activity of endothelin on, **100**, 168
- Brown adipose tissue**, effect of pindolol on, rat, **99**, 673
- Buflomedil**, effect on vascularisation and fibre type of skeletal muscle subjected to limited blood supply, rat, **99**, 786
- Bülbring, E., FRS**, obituary, **101**, 771
- $\beta$ -Bungarotoxin**, blockade of acetylcholine release by, motor nerve terminals, mouse, **100**, 301
- Buspiron**, comparison with MDL 73005EF as a 5-HT<sub>1A</sub> selective ligand, effect on models of anxiety, **99**, 343
- , effect of 5-HT<sub>1A</sub> receptor antagonist action of in von Bezold-Jarisch reflex, rat, **100**, 757
- , effect on hippocampus, rat, **101**, 171
- , role of 5-HT and dopamine systems in eating induced by, **99**, 519
- Butanedione monoxime**, effect on neuromuscular transmission, **100**, 467
- Buthionine sulfoximine**, effect on renal haemodynamic responses to CGP 22979, rat, **99**, 15
- BW 245C**, hypotensive actions inhibited by BW A868C in bronchoconstriction, **100**, 761
- BW755C**, effect on toxicity and vasopermeability induced by endotoxin, mice, **99**, 499
- BW A4C**, in bronchoconstrictor effect of inhaled PGD<sub>2</sub>, guinea-pig, **100**, 761
- BW A868C**, effect on bronchoconstrictor effect of inhaled PGD<sub>2</sub>, guinea-pig, **100**, 761

## C

- Ca<sup>2+</sup>**, changes in trans-sarcolemmal entry mediated by PAF receptors, guinea-pig atria, **100**, 305
- , reduction by nitroglycerin, coronary artery, pig, **101**, 545
- , role in release of endothelial nitric oxide and control of vascular tone, **101**, 489
- , increased activation of protein kinase C contractile responses in presence of, diabetic rat, **101**, 465
- <sup>45</sup>Ca accumulation**, receptor-mediated inhibition of into synaptosomes, **101**, 140
- Ca-activated current**, effect of ryanodine and caffeine on, ventricular myocytes, guinea-pig, **101**, 399
- Ca-activated K channel**, affected by tetraethylammonium and 4-aminopyridine, trachea, dog, **100**, 507
- , effects of calmodulin on, pregnant rat myometrium, **100**, 353
- Ca<sup>2+</sup>-activated K<sup>+</sup> channels**, inhibition of Ca<sup>2+</sup> influx by pinacidil reduces the opening of, canine mesenteric artery, **100**, 143
- Ca<sup>2+</sup>-antagonist**, inhibits T-type Ca<sup>2+</sup> channels in hippocampal CA1 pyramidal neurones, rat, **100**, 705
- Ca<sup>2+</sup> antagonists**, effects on central 5-HT function, rat, **99**, 41
- , alteration of in presence of blood gas abnormalities, **100**, 102
- , effect on contractile responses to adrenergic responses to adrenergic responses, rabbit ear, **101**, 961
- Ca<sup>2+</sup> channel antagonist**, (–)-daurisolone, **101**, 45
- , effect on benzodiazepine withdrawal and tolerance development, **101**, 691
- , interaction of spironolactone at binding site of, **101**, 6
- Ca<sup>2+</sup> channels**, activation by ATP eliciting contraction, bladder, guinea-pig, **100**, 370
- , developmental changes in modulatory effects of  $\beta$ -adrenoceptor and cholinergic agonists on, rat ventricular muscle, **99**, 327
- , developmental changes in rat ventricular muscle, **99**, 334
- , effect of endothelin on in guinea-pig cardiac cells, **99**, 437
- , in mediation of endothelium-dependent vasodilatation, mesenteric artery, rat, **100**, 427
- Ca current**, mechanisms of effects of benidipine on, ventricular cells, guinea-pig, **100**, 669
- , interaction with activated G proteins, rat, **99**, 629
- <sup>45</sup>Ca fluxes**, effects of PAF on, atria, guinea-pig, **100**, 305
- Ca<sup>2+</sup> ionophore**, nitric oxide formation by in neural cells, **101**, 722
- Ca<sup>2+</sup> mobilization, intracellular**, effect of chloroquine, **101**, 133
- Ca transient**, increased by carbachol, dog tracheal muscle, **100**, 41
- Ca<sup>2+</sup> uptake**, effects of (–)-daurisolone on, presynaptic nerve terminals, **101**, 45
- Caffeine**, effects on Ca-activated current, ventricular myocytes, guinea-pig, **101**, 399
- , relaxant action and failure to release Ca<sup>2+</sup>, pregnant rat myometrium, **99**, 261
- , stimulation by, is dose- and concentration-dependent, **100**, 435
- Calcium**, antagonism of magnesium-induced high affinity state of hepatic vasopressin receptor for agonist interaction, **100**, 5
- , effect of cocaine on intracellular, ventricular myocardium, ferret, **101**, 679
- , effect of isoprenaline on cytoplasmic level, **100**, 677
- , failure of caffeine to release, pregnant rat myometrium, **99**, 261
- , in inhibition of Na<sup>+</sup>-K<sup>+</sup> pump activity, peritoneal mast cells, rat, **100**, 453
- , in phospholipase activities in human lung, **100**, 447
- Calcium agonist**, RS 30026, **99**, 687
- Calcium channel**, agonist and antagonist enantiomers of dihydropyridine act a different sites on, vascular muscle, **101**, 3

- , role in excitatory mechanical action of purinergic responses, urinary bladder, rat, **101**, 494
- , regenerative ACh release recruited by, modulated by nicotinic receptors and  $K^+$  channels, motor nerve, mouse, **101**, 793
- , RS 30026 as potent and effective agonist of, **99**, 687
- Calcium channel currents**, effect of RS 30026 on, embryonic chick myocytes, **99**, 687
- , effects of pinaverium on, smooth muscle cells, rabbit jejunum, **99**, 374
- , increase by stimulation by  $\beta$ -adrenoceptor agonists, single cell, coronary artery, pig, **100**, 593
- Calcium channel (N-type)**, effect of conotoxin on, **101**, 437
- Calcium currents**, differential effects of succinimide derivatives on, thalamus, **100**, 800
- , effect of capsaicin on, dorsal root ganglion cells, rat, **101**, 423
- Calcium entry blockers**, potentiation by neuropeptide Y induced stimulation of  $\alpha_1$ -adrenoceptors, rat mesenteric arterioles, **99**, 389
- Calcium inward current**, effect of somatostatin on, guinea-pig atria, **99**, 587
- , increase of positive inotropic and chronotropic effects by CGRP by increase of, **100**, 27
- Calcium mobilization**, effect of MK-886 on, **100**, 15
- Calcium responsiveness**, effect of cocaine on, ventricular myocardium, ferret, **101**, 679
- Calcium sensitising effect**, of ORG30029 in skinned cardiac muscle, **100**, 843
- Calcium transport**, Bay K 8644 as modifier of, site of action **101**, 15
- Calcitonin gene-related peptide**, action on vascular endothelial and smooth muscle cells, bovine, **99**, 71
- , electrophysiological and mechanical effects of, guinea-pig atria, **100**, 27
- , inhibition of carbamylcholine and 5-HT-induced contraction in airways, rat, **101**, 193
- , responsiveness of coronary artery rings to modified by hypoxia or simulated myocardial ischaemia, sheep, **99**, 774
- ,  $\alpha$ -, human, synergistic internal carotid vasodilator effects of, conscious rat, **99**, 830
- Calmodulin**, effects of antagonists of on calcium-activated potassium channels in pregnant rat myometrium, **100**, 353
- L-Canavanine**, effect on vascular tone of blood vessels and endothelial cells, **101**, 145
- Capsaicin**, action on peripheral nociceptors in neonatal rat tail, **99**, 323
- , action on peripheral nociceptors, neonatal spinal cord-tail, rat, **101**, 727
- , bronchoconstriction induced by, enhanced by captopril, guinea-pig, **100**, 502
- , cerebrovascular responses to *in vitro* and *in situ*, **100**, 312
- , dual effects on responses to field stimulation, ear artery, rabbit, **99**, 152
- , effect of ruthenium red on oedema formation in blood flow induced by, **99**, 7
- , effect on plasma glucose and catecholamine levels during stress, rat, **100**, 523
- , effect on voltage-gated Ca currents and Ca signals in dorsal root ganglion cells, rat, **101**, 423
- , in pre-treatment to deplete sensory neuropeptides, effect on mucosa, rat, **99**, 607
- , influence of -sensitive afferent neurones on acid secretory responses, stomach, rat, **100**, 491
- , inhibitory effect of DAMGO on cholinergic constriction in main bronchii after pretreatment by, guinea-pig, **100**, 131
- , modulation of neurogenic inflammation by  $BK_1$  and  $BK_2$  receptors, **99**, 516
- , vascular responses to, **100**, 535
- Captopril**, as binding inhibitor of lung angiotensin converting enzyme, **101**, 121
- , effect on bradykinin-induced bronchoconstriction, guinea-pig, **101**, 77
- , effect on pulmonary inflation pressure induced by bronchoconstrictor agents, guinea-pig, **100**, 502
- , in inhibition of angiotensin-converting enzyme in response to aerosolised substance P, lung, guinea-pig, **100**, 69
- , inhibitor of angiotensin converting enzyme, effects of in intact tissue preparations, **100**, 49
- , lack of effect on sensitivity to vasoactive intestinal peptide following epithelium removal, airway smooth muscle, guinea-pig, **100**, 73
- Carbachol**, effect of stimulation of oxyntic cell with after systemic neonatal pretreatment with capsaicin, stomach, rat, **100**, 491
- , enhancement of [ $^3H$ ]-inositol phosphates in presence of, human, **100**, 37
- , role of activation of potassium conductance in antagonism of positive inotropic responses to  $\alpha$ - and  $\beta$ -adrenoceptor stimulation, **99**, 661
- Carbamylcholine**, contraction induced by, inhibited by calcitonin gene-related peptide, **101**, 193
- Cardiac depression**, mechanisms induced by phorbol myristate acetate, heart, rat, **100**, 826
- Cardiac hypertrophy**, release of ANP in, rat myocardium, **99**, 701
- Cardiac muscarinic receptors**, affinity of hexocyclium derivatives for, **100**, 150
- Cardiac muscle**, effect of fenbufen on clenbuterol-induced hypertrophy of, rat, **101**, 835
- Cardiac output distribution**, effect of neuropeptide Y on, pithed rat, **99**, 340
- Cardiac tension**, effect of benzodiazepine inverse agonist, FG7142, rat, **99**, 441
- Cardiac vagal motoneurons**, role of 5-HT $_{1A}$ -receptors in von Bezold-Jarisch reflex, rat, **100**, 757
- Cardiovascular responses**, to verapamil and nifedipine in hypoventilated and hyperventilated rat, **100**, 102
- Carrageenin**, kinins in inflammatory exudates induced by, **101**, 418
- , role of PAF in inflammatory responses to, mouse, **99**, 168
- Catecholamine**, adrenal, effect of capsaicin-sensitive sensory fibres on response of, rat, **100**, 523
- , mediation by  $\beta_1$ -adrenoceptors of hydrocortisone secretion stimulated by, bovine adrenal cortex, **99**, 709
- , receptors involved in mechanical responses to in circular muscle treated with meclofenamate, guinea-pig, **101**, 809
- Catecholamines**, action on membrane currents in single cells, coronary artery, pig, **100**, 593
- , adrenal medullary, effect on cardiac  $\beta$ -receptor binding characteristics unaffected by age, **99**, 87
- , effect of capsaicin-sensitive sensory nerves on levels of during 2-DG stress, rat, **100**, 523
- , in cold adaptation, rat, **99**, 673
- , role of  $\alpha$ - and  $\beta$ -adrenoceptors in mediation of effects of in glucose homeostasis, rat, **100**, 699
- Catecholamine secretion**, effect of diadenosine polyphosphates on, chromaffin cells, **100**, 360
- , effect of quinine on, bovine cultured chromaffin cells, **99**, 548
- Cephalic vein**, effectiveness of  $\alpha_1$ - and  $\alpha_2$ -adrenoceptor activation, dog, **101**, 387
- Cerebellum**, GABA inhibition of histamine-induced IP formation in, **100**, 867
- , rat, [ $^{125}I$ ]-endothelin-1 binding sites in, **101**, 319
- Cerebral cortex**, development of tolerance to effects of vagabatratin on GABA release from, rat, **100**, 324
- , GABA inhibition of histamine-induced IP formation in, **100**, 867
- Cerebral ischaemia**, effect of propentofylline on extracellular purines and excitatory amino acids during, rat hippocampus, **100**, 814
- Cerebrovascular responses**, to capsaicin *in vitro* and *in situ*, **100**, 312
- CGP 18137**, accumulation in renal tissue following administration of prodrug CGP 22979, **99**, 15
- CGP 37849**, novel and potent competitive NMDA receptor antagonist with oral activity, **99**, 791
- CGP 39551**, novel and potent competitive NMDA receptor antagonist with oral activity, **99**, 791
- Chemotaxis**, inhibition of neutrophil and eosinophil induced by nedocromil sodium and sodium cromoglycate, **99**, 798
- Chiral inhibitors**, of 5-lipoxygenase with anti-inflammatory activity, **101**, 501
- Chloride conductance, membrane**, mediated by GABA $_A$  receptors in paratracheal neurones, rat, **100**, 261
- 2-Chloroadenosine**, induction of vagally-mediated and atropine-resistant bronchomotor responses, guinea-pig, **100**, 251
- Chloroethylclonidine**, in classification of  $\alpha_1$ -adrenoceptors in smooth muscle, **99**, 197
- Chloroquine**, inhibitor actions on mouse diaphragm, **101**, 133
- Cholecystokinin-octapeptide (CCK)**, effect on depressant effect of (+)-fenfluramine on food intake depends on activity of, rat, **99**, 65
- Cholecystokinin octapeptide**, effect on isolated alimentary muscle, human, **100**, 216
- Cholecystokinin receptors**, cholecystokinin 8S-evoked release of dopamine mediated by, nucleus accumbens, rat, **99**, 845
- Cholinergic nerves**, effect of opioids on, guinea-pig, **100**, 131
- Cholinergic nerves, pulmonary**, prejunctional M $_2$  muscarinic receptors in, rat, **101**, 73
- Cholinergically-mediated responses**, inhibition by conotoxin, **101**, 437
- M-Cholinoceptor**, mediates inositol phosphate content in papillary muscle, **101**, 829
- Cholinoceptors, prejunctional**, ACh release at neuromuscular junction

- affected by phentonium, **100**, 441
- , spontaneous release of acetylcholine, motor nerve terminals, rat, **100**, 441
- Chondrocytes**, co-operation between interleukin-1 and fibrinolytic system in degradation of collagen by articular, **100**, 631
- Chromaffin cell**, lack of specific binding sites for [ $^3\text{H}$ ]-nitrendipine in, adrenal medulla, bovine, **101**, 21
- Chromaffin cells**, effect of diadenosine polyphosphates on catecholamine secretion from, **100**, 360
- , effect of quinine on release of catecholamines from, **99**, 548
- , protein kinase C related compounds and, **101**, 521
- Chronic amiodarone feeding**, differences in hepatic drug accumulation and enzyme induction after, rat, **99**, 35
- Chronic renal failure**, action of atriopeptin III on, rat, **99**, 317
- CI-977**, novel agonist for  $\kappa$ -opioid receptor, **101**, 183
- Cigarette smoke**, vascular responses to, **100**, 535
- Ciguatoxin**, enhancement of quantal transmitter release, frog motor nerve terminals, **99**, 695
- Cirazoline**, endotoxin impaired responsiveness to, **101**, 913
- CL242,817**, as binding inhibitor of lung angiotensin converting enzyme, **101**, 121
- Clenbuterol**, prostaglandin inhibition and muscle hypertrophy, **101**, 835
- Clonidine**, effect on contractile reactivity of mesenteric and renal arteries, rat, **101**, 859
- , effect on opioid withdrawal response, ileum, guinea-pig, **101**, 958
- , in endotoxin-induced impairment of vascular responses, **101**, 913
- Clozapine**, effects of dopamine release and metabolism, nucleus accumbens and striatum, rat, **100**, 774
- CNQX**, effect of dorsal root-, NMDA-, kainate- and quisqualate-mediated depolarization of motoneurons, rat, **100**, 850
- Cocaine**, actions on dopaminergic neurones, rat, **99**, 731
- , actions on nucleus accumbens, neurones, rat, **99**, 736
- , differential effect of on tritium overflow from mouse vasa deferentia, and rat cortex slices, **101**, 762
- , effects on intracellular  $\text{Ca}^{2+}$  handling and myofilament  $\text{Ca}^{2+}$  responsiveness, ventricular myocardium, ferret, **101**, 679
- Cold adaptation**, influence of  $\beta$ -adrenoceptor antagonists on, rat, **99**, 673
- Collagen**, interaction between interleukin-1 and fibrinolytic system in degradation of by articular chondrocytes, **100**, 631
- Colon**, differences in control of descending inhibition in, **101**, 1011
- , purinoceptors mediating contraction in, rat, **100**, 753
- , species-related differences in characterization of 5-HT $_3$  receptors in, **101**, 591
- Colonic mucosa**, effect of ethanol on eicosanoid synthesis by, human, **99**, 289
- Colony-stimulating factor**, inhibition by MK-886 on neutrophils primed with and stimulated with PAF, **100**, 15
- Compound 48/80**, anti-inflammatory activity resulting from mast cell degranulation *in vivo*, rat, **99**, 350
- $\omega$ -Conotoxin**, potent inhibitor of sympathetic neurogenic responses, mesenteric artery, rat, **100**, 180
- $\omega$ -Conotoxin GVIA**, effect on automatic neuroeffector transmission, **101**, 437
- Convulsants**, differential effects of anticonvulsants and, on thalamic neurones, **100**, 800
- Coronary artery**, action of noradrenaline on, rat, **100**, 552
- , adenosine receptors in, pig, **100**, 483
- , contribution of 5-HT to reductions in flow leading to myocardial ischaemia in presence of disease, **100**, 153
- , effects of CGRP and NPY on, sheep, **99**, 774
- Coronary arteries**, sheep, modification of ischaemic-induced contraction in, **100**, 407
- Coronary blood flow**, effect of theophylline on hyperaemias resulting from, dog, **100**, 95
- Corpus cavernosum**, changes in  $\alpha$ -adrenoceptor responsiveness with age and disease, **101**, 375
- Corpus striatum**, electrophysiological characterization of agonists at GABA $_B$  receptors in, **101**, 949
- Cotransmission**, noradrenergic-purinergeric, hepatic artery, rabbit, **99**, 835
- , presynaptic  $\alpha_2$ -autoinhibition in vascular neuroeffector junction by ATP and noradrenaline, **99**, 279
- Cromakalim**, action of in comparison with action of diazoxide and minoxidil sulphate, blood vessels, rat, **100**, 605
- , action on potassium membrane conductance, heart myocytes, frog, **100**, 581
- , antagonism by glibenclamide in rat uterus, **101**, 901
- , antagonism by glibenclamide of vasodepressor effects of, dog, **100**, 413
- , bronchodilator properties of, guinea-pig, **100**, 289
- , characterization of responses to in smooth and cardiac muscle by use of selective antagonists, **100**, 201
- , cytoplasmic calcium and relaxation of coronary arterial smooth muscle by, **101**, 157
- , effect of ATP-sensitive potassium channels in insulin-secreting cells, **99**, 169
- , effects on contraction and  $^{86}\text{Rb}$  efflux, canine mesenteric artery, **100**, 143
- ,  $\text{K}^+$  channel blockers and effects of on smooth muscle, guinea-pig bladder, **99**, 779
- Cromoglycate**, inhibition of pulmonary airway eosinophil accumulation due to inhaled PAF by, guinea-pig, **99**, 267
- Crotoxin**, blockade of acetylcholine release by, at motor nerve terminals, mouse, **100**, 301
- CV-6209**, as competitive antagonist against PAF-evoked platelet aggregation in plasma, rabbit, **100**, 163
- Cyclic AMP**, effect of thermal trauma on, mouse myocardium, **101**, 263
- , effects of phosphodiesterase inhibition on hydrolysis of, rat cerebral cortex, **99**, 47
- , effect on muscarinic antagonism, guinea-pig ventricular myocardium, **99**, 401
- , in evidence for 5-HT receptor in human atrium, **100**, 879
- , inhibition of accumulation by sumatriptan, dog saphenous vein, **99**, 219
- , inhibition of agonist-induced inositol phospholipid turnover by, **100**, 646
- , potentiation of  $\alpha$ -adrenoceptor-stimulated by noradrenaline partially inhibited by isomers of niguldipine, **100**, 3
- , production in receptor-mediated inhibition of  $^{45}\text{Ca}$  accumulation into synaptosomes, **101**, 140
- , quantity synthesized compared with density of  $\beta$ -adrenoceptors in thyroid states, **99**, 541
- , role in mediation of ACh release, motor nerve endings, frog, **101**, 311
- Cyclic AMP/cyclic GMP ratio**, effect of thermal trauma on, myocardium, mouse, **101**, 263
- Cyclic AMP-dependent protein kinase** activity ratio, role of Org10325, **100**, 735
- , effect on ACh release and action of adenosine, motor nerve endings, frog, **101**, 311
- Cyclic endoperoxides**, in bradykinin-induced vasoconstriction, mesenteric artery, rat, **101**, 344
- Cyclic GMP**, action synthesized by spasmogenic agents and relation to mechanical responses, dog tracheal smooth muscle, **100**, 41
- , effect of eicosapentaenoic acid treatment on agonist-stimulated, **99**, 176
- , effect of thermal trauma on, myocardium, mouse, **101**, 263
- , effect on synthesis of  $\text{IP}_3$ , rabbit aorta, **99**, 536
- , increase in endothelial cells in response to EDRF, inhibition by a phorbol ester, **99**, 565
- , involvement in adenosine-induced age dependent vasodilatation, **100**, 569
- , potassium-stimulated release of, cerebellar cortex, **101**, 8
- , stimulation of production in endothelial cells, pig, **101**, 152
- Cyclic nucleotide phosphodiesterase inhibitor**, Org10325, cardiac and vascular tissue, **100**, 735
- Cyclic nucleotides**, changes in in response to inhibitory NANC field stimulation, smooth muscle, guinea-pig, **100**, 329
- Cycloheximide**, pretreatment with, enhances release of prostacyclin in response to ATP and bradykinin, endothelium, bovine, **101**, 799
- Cyclo-oxygenase**, differential regulation of pathways of arachidonate metabolism in leukocytes, rat, **101**, 128
- , in modulation of bradykinin-induced responses of trachea, guinea-pig, **99**, 762
- Cyclo-oxygenase inhibitors**, abolish vasoconstrictor effect of bradykinin, mesenteric arteries, of rat, **101**, 344
- Cysteine**, effect on rapid tolerance to hypotensive effects of glyceryl trinitrate, rat, **99**, 825
- Cytisine**, effect of infusion into nucleus accumbens, striatum, dorsal hippocampal formation or motor thalamus on locomotor activity, **99**, 273
- Cytochrome oxidase**, in influence of  $\beta$ -adrenoceptors on cold adaptation, rat, **99**, 673
- Cytoplasmic calcium concentration**, changes in during exposure to simulated ischaemia, myocardium, rat, **100**, 477

## D

**DAMGO**, effect of circulatory response to simulated haemorrhage,

- rabbit, 100, 421
- 4-DAMP**, analogues reveal heterogeneity of  $M_1$  muscarinic receptors, 100, 395
- 4-DAMP methobromide**, as a selective muscarinic antagonist, 99, 622
- Dapsone**, effect on Sephadex-induced eosinophilia, rat, 101, 821
- (-)-**Daurisoline**, effect on  $Ca^{2+}$  channels, presynaptic nerve terminals, 101, 45
- Debrisoquine hydroxylation**, association with increased susceptibility to amiodarone side effects, 99, 35
- Denbufylline**, cyclic AMP phosphodiesterase isozyme inhibited by, cerebral cortex, rat, 99, 47
- Deprenyl**, depressant effect in animals pretreated with, 100, 119
- 2-Deoxyglucose**, effect of capsaicin-sensitive sensory nerves on plasma glucose and catecholamine levels during stress induced by, 100, 523
- Desensitization**, temperature-dependence of, induced by ACh and histamine, guinea-pig, 100, 636
- Desensitization, jejunum**, profiles of after stimulation with histamine and methacholine, guinea-pig, 101, 881
- Desmethylinipramine**, effects on renal sympathetic axons of acute 6-hydroxydopamine in combination with, dog, 99, 655
- Dexamethasone**, effect on poly-L-arginine-induced oedema, hind paw, rat, 101, 986
- , inhibition of pulmonary airway eosinophil accumulation due to inhaled PAF by, guinea-pig, 99, 267
- Diabetes**, bladder dysfunction in, 101, 411
- , experimental, renal vascular responsiveness to arachidonic acid in, 100, 336
- , prevention of impaired induction of ornithine decarboxylase by ponalrestat in, 101, 978
- , protein kinase C-mediated responses of arteries in rats with, 101, 465
- Diacylglycerol kinase**, influence on noradrenaline release and phosphoinositide hydrolysis in chromaffin cells, 101, 521
- Diacylglycerol lipase**, influence on noradrenaline release and phosphoinositide hydrolysis in chromaffin cells, 101, 521
- Diadenosine polyphosphates**, effect on catecholamine secretion from isolated chromaffin cells, 100, 360
- Diazepam**, comparison with MDL 73005EF as a 5-HT<sub>1A</sub> selective ligand, effect on models of anxiety, 99, 343
- , effects on release of [<sup>3</sup>H]-5-HT and [<sup>14</sup>C]-GABA by chronic administration of, 99, 11
- Diazoxide**, action on blood vessels compared with cromakalim, rat, 100, 605
- , effect on ATP-sensitive  $K^+$  channels in insulin-secreting cells, 99, 487
- Digitalis-like substance**, from porcine left ventricular extract, effect on canine ventricular muscle, 101, 370
- 8-[2-(2,3-Dihydro-1,4-benzodioxin-2-yl-methylamino)ethyl]-8-azaspiro [4,5]decane-7,9-dione methyl sulphate**, see MDL 73005EF
- Dihydropyridine**, effect on voltage-dependent modulation of rat sensory neurone Ca channel currents by G protein activation, 99, 629
- , enantiomers of act at different sites on voltage-dependent Ca channel of vascular muscle, 101, 3
- Dihydropyridine receptors**, separate binding sites in mitochondria and plasma membranes, bovine adrenal medulla, 101, 21
- Dihydropyridines**, effect on adenosine sensitivity, rat hippocampus, 101, 97
- Diisopropylphenol**, anaesthetic effect on axonal currents, olfactory cortex, rat, 101, 217
- Diltiazem**, antagonism by glibenclamide of vasodepressor effects of, dog, 100, 413
- , effect on coronary haemodynamic and cardiac functional effects produced by intracoronary administration of endothelin-1, dog, 99, 597
- , effect on opioid withdrawal response, guinea-pig ileum, 101, 958
- , effects on Ca concentrations in cytosol and on contraction force, coronary artery, pig, 101, 273
- DiMe-C7**, in dopamine and 5-HT metabolism, effect of ondansetron on, rat, 99, 227
- (±)-**N-(2,6-Dimethyl-phenyl)-4-[2-hydroxy-3-(2-methoxyphenoxy)-propyl]-1-piperazine acetamide dihydrochloride**, see ranolazine
- Dipetalonema viteae**, actions of ACh and GABA on, 101, 971
- Disopyramide**, negative inotropic effects on papillary muscles, guinea-pig, 101, 789
- Distal colon, rat**, existence of 'atypical'  $\beta$ -adrenoceptors ( $\beta_3$ -adrenoceptors) in, 101, 569
- Dithiothreitol**, in modulation of NMDA receptors, 101, 178
- Dobutamine**, comparison of haemodynamic profile with adibendan (BM 14.478), dog, 101, 686
- DOI**, effect on 5-HT neuronal firing in dorsal raphe nucleus and 5-HT release and metabolism in frontal cortex, rat, 99, 221
- L-DOPA**, gludopa as pro-drug for, 101, 301
- , responses of rat substantia nigra compacta neurones to, 100, 257
- Dopamine**, blockade of uptake by cocaine, substantia nigra zona compacta, rat, 99, 731
- , conversion from L-DOPA and release from substantia nigra zona compacta, 100, 257
- , effect of B-HT 920 on mesolimbic systems in normosensitive and supersensitive rats, 99, 509
- , inhibition of uptake by cocaine, nucleus accumbens, rat, 99, 736
- , involvement in mediation of feeding induced by buspirone, gepirone and ipsapirone, 99, 519
- , regulation of synthesis and metabolism of after disruption of nerve conduction, medial forebrain bundle, 99, 741
- Dopamine metabolism**, effects of acute and chronic clozapine on, striatum and nucleus accumbens, rat, 100, 774
- Dopamine D<sub>1</sub> receptor agonists**, FPL 63012AR, 100, 295
- , characterization of, cockroach salivary gland acinar cells, 101, 103
- Dopamine release**, cholecystokinin 8S-evoked mediated by cholecystokinin<sub>A</sub>-receptor, nucleus accumbens, rat, 99, 845
- , effects of acute and chronic clozapine on, striatum and nucleus accumbens, rat, 100, 774
- Dorsal horn**, selective actions of opioids in, 101, 477
- DP-Receptor antagonist**, BW A868C, in bronchoconstrictor effect of inhaled PGD<sub>2</sub>, guinea-pig, 100, 761
- DP-Receptors**, role in bronchoconstrictor effect of inhaled PGD<sub>2</sub>, guinea-pig, 100, 761
- Duodenal distension**, effect of granisetron and ondansetron on visceral pain reflex induced by, 100, 497
- Dynorphin A(1-8)**, mediation of agonist action through conversion to [Leu<sup>5</sup>]enkephalin, myenteric plexus, guinea-pig, 101, 674

## E

- E-4031**, effect on ischaemia-induced myocardial damage, canine heart, 99, 577
- Ecotoipate**, effect on latencies of action potentials, skeletal muscle, mouse, 99, 721
- EDRF, A<sub>2</sub>**, purinoceptors involved with, thoracic aorta, rat, 100, 576
- , as a modulator of skeletal muscle microcirculation, rabbit, 100, 463
- , effect of endothelium-dependent and endothelium-independent on contraction to  $\alpha$ -adrenoceptor agonists, rabbit, 99, 77
- , effect of inhibition of activity on vascular responses to endothelin-1, rabbit ear, 101, 781
- , effect on release of cyclic GMP, rat kidney, 99, 364
- , effects of palmitoyl carnitine on, rat aorta, 100, 241
- , endogenous inhibitor or, rabbit brain, 101, 865
- , impairment of endothelium-dependent relaxation of pulmonary arteries in Eisenmenger's syndrome patients, 99, 9
- , in modulation of gastric mucosal integrity, rat, 99, 607
- , inhibition by L-glutamate of release of, endothelial cells, 101, 237
- , inhibitory effects of native and low-density lipoproteins on, rabbit aorta, 100, 21
- , inhibitory role, pulmonary artery, human and rat, 101, 166
- , release from cultured aortic cells, inhibition by a phorbol ester, 99, 565
- , release potentiated by chronic exposure to eicosapentaenoic acid, endothelial cells, 99, 176
- , response of spinal artery to, 101, 200
- , selective release in proximal arteries, rat, 100, 552
- , tone affects release of, 100, 767
- EEG-energy**, increase by zacopride, rat, 101, 281
- Eicosanoids**, relationship between tumour necrosis factor, Paf and, as mediators of endotoxin-induced shock, mice, 99, 499
- , synthesis of in bradykinin-induced vasoconstriction, mesenteric arteries, rat, 101, 344
- Eicosapentaenoic acid**, chronic exposure of endothelial cells to, potentiates release of EDRF, 99, 176
- EIPA**, ionotropic effects of ouabain and Bay K 8644, effect of on, guinea-pig atria, 100, 717
- Eisenmenger's syndrome**, impairment of pulmonary endothelium-dependent relaxation in, human, 99, 9
- Electrocortical activity**, effects of opioid receptor agonists, locus coeruleus, rat, 101, 655
- Electrolyte excretion**, effect of  $\kappa$ -opioid-receptor agonists on, rat, 99, 181
- Elgodipine**, potent systemic and coronary vasodilator actions of, pig, 99, 355

- EMD 52692**, haemodynamic effect of, pig, **101**, 605
- Enalaprilic acid**, effect on pulmonary inflation pressure induced by bronchoconstrictor agents, **100**, 502
- Endogenous inhibitor**, of endothelium-dependent relaxation, rabbit brain, **101**, 865
- Endogenous opioid peptides**, involvement in hypotensive action of  $\alpha$ -methyldopa and non-involvement in  $\alpha$ -methyldopa-induced hypomotility and antinociception, rat, **99**, 467
- Endogenous positive ionotrope**, effect on canine ventricular muscle, **101**, 370
- Endopeptidase**, in formation of [Leu<sup>5</sup>]enkephalin from dynorphin A(1-8), myenteric plexus, guinea-pig, **101**, 674
- Endothelial cells**, chronic exposure to eicosapentaenoic acid potentiates release of EDRF, **99**, 176
- , inhibition by L-glutamine of release of EDRF from, **101**, 237
- Endothelial receptors**, interaction of pFHHSiD at, *in vitro*, **99**, 637
- Endothelin**, comparison of vasoconstrictor and vasodilator responses to, superior mesenteric vascular bed, rat, **99**, 427
- , contractile activity of, human isolated bronchus, **100**, 168
- , contractile effects by action on voltage-dependent Ca channels, human cerebral arteries, **99**, 439
- , differences in regional vascular sensitivity to, between spontaneously hypertensive and normotensive Wistar-Kyoto rats, **100**, 107
- , effect on cardiac contractility and membrane currents, guinea-pig, **99**, 437
- , endothelin-dependent vascular activities of, superior mesenteric arterial bed, rat, **101**, 81
- , induced contraction in guinea-pig trachea; comparison with rat aorta, **100**, 383
- , inhibition of platelet aggregation, **99**, 303
- , nitric oxide formation by in neural cells, **101**, 722
- , reactivity and sensitivity of mesenteric vascular beds and aortic rings of spontaneously hypertensive rats to: effects of Ca entry blockers, **100**, 31
- Endothelin (16-21)**, structure-activity of, guinea-pig bronchus, **101**, 232
- Endothelin-1**, activities in vascular network, rabbit ear, **101**, 781
- , effect of aging on direct and indirect actions of, mesenteric arteries, rat, **100**, 889
- , effect of diltiazem on coronary haemodynamic and cardiac functional effects of, dog, **99**, 597
- , effects of pre-contraction on  $\alpha_2$ -adrenoceptor- and neuropeptide Y-mediated contractions, rat tail vascular bed, **101**, 205
- , haemodynamic responses to, effects of L-NAME, rat, **101**, 632
- , inhibition of [<sup>3</sup>H]-IP formation induced by by GABA, **100**, 867
- , regional haemodynamic effects in Long Evans and Brattleboro rat, **99**, 107
- , relationship between binding and site densities and constrictor activities of, tracheal smooth muscle, human and animal, **100**, 786
- , structural requirements for binding to cerebellar sites, **101**, 319
- Endothelin-1, -2 and -3**, regional responses to i.v. bolus injections of, in presence and absence of indomethacin, **100**, 158
- Endothelin-3**, regional haemodynamic effects in Long Evans and Brattleboro rat, **99**, 107
- Endothelin analogues**, interactions with binding of [<sup>125</sup>I]-endothelin-1 to cerebellar homogenates, rat, **101**, 319
- Endothelin-1 constrictor activity**, relationship between [<sup>125</sup>I]-ET-1 binding site density and, human and animal airway smooth muscle, **100**, 786
- Endothelium**, effect of aging on inhibitory effects of, against contractile effects of endothelin-1, **100**, 889
- , effect of noradrenaline on, proximal and distal coronary arteries, rat, **100**, 552
- , effect on local formation of angiotensin II, rat aorta, **100**, 237
- , effects of pre-contraction with endothelin-1 on  $\alpha_2$ -adrenoceptor- and neuropeptide Y-mediated contractions in, rat, **101**, 205
- , enhancement of production of prostacyclin by inhibitors of protein synthesis, **101**, 799
- , impairment of relaxations to ACh and NO by a phorbol ester in, **101**, 432
- , inhibition by a phorbol ester of release of EDRF in, pig aorta, **99**, 565
- , inhibition of angiotensin converting enzyme in, **101**, 121
- , inhibitory role of EDRF, pulmonary arteries, human and rat, **101**, 166
- , interactions of palmitoyl carnitine with, rat aorta, **100**, 241
- , modulates the effects of nitroglycerin on vascular endothelium, dog with pacing-induced heart failure, **101**, 109
- , modulation of vasoconstrictor activity of endothelin-like peptides, superior mesenteric arterial bed, rat, **101**, 81
- , possible site of ANF stimulation of cyclic GMP production, **99**, 364
- , responses to vasoactive substances, **101**, 200
- , role in endothelin-induced contraction, human cerebral arteries, **99**, 439
- , role in mediation of actions of ATP, ACh and adenosine on joint blood vessels, rabbit knee, **99**, 379
- Endothelium-dependent relaxation**, pulmonary artery, mediated by EDRF is impaired in Eisenmenger's syndrome patients, **99**, 9
- Endothelium-dependent relaxations**, lack of effect of pertussis toxin on, rat, **100**, 348
- Endothelial cells**, stimulation of cyclic GMP production in, pig, **101**, 152
- , use of oxyhaemoglobin in investigation of platelet aggregation in, **101**, 991
- Endotoxin**, and vascular reactivity, rat, **101**, 913
- , nitric oxide and intestinal integrity, **101**, 815
- Endotoxin-induced shock**, relationships between tumour necrosis factor, eicosanoids and platelet-activating factor as mediators of, **99**, 499
- Endplate potentials**, effect of adenosine or CADO and of substances interfering with phosphoinositides/protein kinase C transducing system or adenylate cyclase transducing system on, **100**, 55
- Enteric neurones**, 5-HT<sub>3</sub> receptor forms distinct receptor subtype, guinea-pig, **99**, 840
- Eosinophil**, pulmonary airway, accumulation due to inhaled PAF, effect of anti-asthma drugs, **99**, 267
- , rh-GMCSF enhances PAF-induced accumulation, guinea-pig, **100**, 399
- Eosinophilia**, effects of drugs on lung hyper-responsiveness and, rat, **101**, 821
- Eosinophils**, effect of MK-886 on 15-lipoxygenase product synthesis in, human phagocytes, **100**, 15
- , induced pulmonary airway accumulation of by antigen challenge, guinea-pig, **99**, 679
- , inhibition of induced chemotaxis by nedocromil sodium and sodium cromoglycate, **99**, 798
- Epilepsy**, action of anticonvulsant succinimides, action by low-threshold calcium currents on, thalamic neurones, **100**, 800
- , CGP 37848 and CGP 39551 as potential therapeutic agents for, **99**, 791
- Epithelium**, role in agonist-induced contractile responses of trachealis, guinea-pig, **101**, 257
- , role in modulating the responses of guinea-pig trachea induced by bradykinin, **99**, 762
- , tracheal, distribution of  $\beta_1$ - and  $\beta_2$ -adrenoceptors in, mouse, **99**, 136
- Epithelium-derived inhibitory factor (EpDIF)**, pharmacological evaluation of, guinea-pig trachea, **100**, 614
- Epithelium removal**, effect on actions of cholinomimetic drugs, trachea, guinea-pig, **100**, 516
- , effect on reactivity of trachealis, guinea-pig, **99**, 369
- , effects of on relaxation of airway smooth muscle, guinea-pig, **100**, 73
- Erectile tissue**, human, pharmacology of, **101**, 375
- Ethanol**, in inhibition of baroreflex bradycardia, role of brainstem GABA receptors, **101**, 733
- Ethanol intoxication**, haemodynamic alterations in, piglets, **101**, 227
- Ether**, effect on axonal currents, olfactory cortex, rat, **101**, 217
- Ethosuximide**, effect on thalamic neurones, **100**, 800
- , mechanism of anticonvulsant action of, **100**, 807
- Ethylisopropylamiloride**, see EIPA
- N-Ethylmaleimide**, inotropic effect of, papillary muscle, guinea-pig, **101**, 406
- Excitatory amino acids**, effect of propentofylline on during ischaemia, rat hippocampus, **100**, 814
- Excitatory postsynaptic potential**, effects of 5-HT<sub>1</sub> on, hippocampus, rat, **101**, 171
- Extracellular Ca<sup>2+</sup>**, role in formation of inositol phosphates, ileum, guinea-pig, **99**, 217

## F

- Fenbufen**, effect on clenbuterol-induced hypertrophy of cardiac and skeletal muscle, rat, **101**, 835
- (+)-Fenfluramine**, dependence of depressant effect on food intake on activity of endogenous CCK, **99**, 65
- FG7142**, adverse effects on cardiac function, *ex vivo*, rat, **99**, 441
- , effect on acetylcholinesterase activity following treatment with, mouse brain, **101**, 599
- FG 8205**, properties of as partial agonist at benzodiazepine receptor, **101**, 753



**Fibrinolysis**, modulation by sodium nitroprusside, rabbit, **101**, 527

**Fibroblast proliferation**, effect of substance P on mediated by interaction with NK<sub>1</sub>-receptor type, **100**, 11

**Filaria**, actions of ACh and GABA on spontaneous contractions in, **101**, 971

**Flufenamate**, in inhibition of effects of lactate in simulated ischaemia, myocardium, rat, **100**, 477

**Fluoroaluminate**, -induced inositol phosphate formation by increases in tissue cyclic AMP, bovine trachea, **100**, 646

**p-Fluoro-hexahydrosila-diphenidol**, as a highly selective ligand at muscarinic receptors, **99**, 622

**p-Fluoro-hexbutinol enantiomers**, stereoselectivity ratios of, **99**, 445

**Fluspirilene**, selective antagonism of calcium channel activators by, **100**, 211

**Forepaw treading**, induced by 8-OH-DPAT attenuated by 5-HT<sub>1C</sub> agonists, **101**, 667

**Forskolin**, effect on contractile reactivity of mesenteric and renal arteries, rat, **101**, 859

—, effect on endplate potential, neuromuscular junction, frog, **100**, 55

—, enhances I<sub>H</sub>, **101**, 190

**FPL 63012AR**, a potent D<sub>1</sub>-receptor agonist, **100**, 295

**FPL 63547**, inhibitor of angiotensin-converting enzyme – pharmacological properties of, **100**, 83

—, preferential biliary elimination of, rat, **100**, 90

**Fundus**, rat, effects of galanin, its analogues and fragments on, **101**, 297

**Fura-2**, measurements of mechanical activity and cytoplasmic free Ca<sup>2+</sup> level with, **100**, 677

## G

**G<sub>s</sub> and G<sub>i</sub>**, modulation of adenylate cyclase activity in NG108-15 cells by NaF and guanine nucleotides by interaction with, **100**, 223

**GABA**, action via GABA<sub>A</sub> receptors on soma of paratracheal neurones produces an increase in membrane chloride conductance, rat, **100**, 261

—, actions on spontaneous contractions in filariid, *Dipetalonema viteae*, **101**, 971

—, blocked by petit mal convulsants and anticonvulsants, **100**, 807

—, central inhibition by of release of vasopressin and oxytocin by osmotic stimulus, rat, **99**, 529

—, differential effects of chronic lorazepam and alprazolam on receptor function, **101**, 839

—, effect of NO-0500328 and NO-05-0329 on uptake of, rat hippocampal slice, **99**, 103

—, effect of zinc on receptor complex, **99**, 643

—, effects of depressed by Mg<sup>2+</sup>, neocortex, **101**, 1006

—, in synaptic processing of somatosensory information, cat, **100**, 689

—, inhibition of baroreflex bradycardia by potentiation of action of, by ethanol, **101**, 733

—, modulation of histamine-induced IP formation, **100**, 867

—, phosphono-analogues of, antagonism of GABA<sub>2</sub>-receptor-mediated responses in ileum and vas deferens, guinea-pig, **99**, 422

—, pre- and postsynaptic receptors on neurones, rat brain, **101**, 949

—, stimulates GABA<sub>A</sub> receptors on NANC neurones, ileocolonic junction, dog, **101**, 460

**[<sup>14</sup>C]-GABA**, effect of chronic diazepam treatment on release of, **99**, 11

**[<sup>3</sup>H]-GABA**, effects of (–)-daurisolone on, presynaptic nerve terminals, **101**, 45

**GABA antagonists**, at mammalian GABA<sub>A</sub> receptors, **99**, 727

**GABA<sub>B</sub> receptor**, antagonism of responses of, by phosphono-analogues of GABA, ileum and vas deferens, guinea-pig, **99**, 422

—, effect of intracerebroventricular administration on operant feeding in satiated pig, **101**, 559

—, in synaptic processing of somatosensory information, S1 cortex, cat, **100**, 689

—, inhibition of catecholamine release in resistance vessels by, rat, **100**, 365

**GABA<sub>A</sub> receptors**, role in inhibition of baroreflex bradycardia by ethanol, **101**, 733

**GABA release**, development of tolerance to effects of vigabatrin on, cerebral cortex, spinal cord and retina, rat, **100**, 324

**Galanin**, rat and porcine, in contraction of fundus strips, rat, **101**, 297

**Galanin analogues**, effects on isolated fundus strips, rat, **101**, 297

**Galanin receptor**, on surface of smooth muscle cells of fundus, rat, **101**, 297

**Gallamine**, in mechanism of potentiation of neurally-induced bronchoconstriction, guinea-pig, **99**, 582

**Ganglion blocking activity**, blockade of nicotinic relaxation as method for quantitative assessment of, bovine retractor penis muscle, **101**, 472

—, relative potency of various drugs in, retractor penis muscle, bovine, **101**, 472

**Ganglionic stimulation or blockade**, changes following chronic morphine treatment, rat, **99**, 247

**Gastric acid secretion**, influence of capsaicin-sensitive afferent neurones on, stomach, rat, **100**, 491

**Gastric motility**, role of PHI in regulation of, dog, **100**, 231

**Gastric mucosa**, effect of ethanol on eicosanoid synthesis by, human, **99**, 289

—, prostanoid stimulation of anion secretion in, mediation by different receptors, **101**, 889

**Gepirone**, effect on hippocampus, rat, **101**, 171

—, role of 5-HT and dopamine systems in eating induced by, **99**, 519

**GH<sub>3</sub> Pituitary cells**, comparison of thyrotropin releasing hormone and di-methyl proline-TRH on, **101**, 615

**Glaucoma**, effect of L-662,583 on intraocular pressure, **99**, 59

**Glibenclamide**, antagonism of vasodepressor effects of cromakalim and nicorandil by, dog, **100**, 413

—, effects of potassium channel openers and on uterus, rat, **101**, 901

—, excites glucoreceptive ventromedial hypothalamic neurones by indirect inhibition of ATP-K<sup>+</sup> channels, **101**, 531

—, in blocking of K<sup>+</sup> by ATP-sensitive channel openers, **101**, 157

—, inhibits relaxant actions of cromakalim, diazoxide and minoxidil sulphate, rat blood vessels, **100**, 605

—, is competitive antagonist of thromboxane A<sub>2</sub> receptor, coronary artery, dog, **100**, 375

—, responses to cromakalim and pinacidil in smooth and cardiac muscle by use of, **100**, 201

**Glucocorticosteroids**, effect on blood eosinophilia, rat, **101**, 821

**Glucose blood levels**, role of adrenoceptors in effects of lithium on, rat, **100**, 283

**Glucose, plasma**, role of α- and β-adrenoceptor subtypes in mediation of effects of catecholamines on fasting, rat, **100**, 699

**Glutamate**, potassium-stimulated release in mediation of release of nitric oxide, **101**, 8

**Glutamide**, effects of hypomagnesia on neuronal responses induced by neocortex, **101**, 1006

**Glutamine**, inhibition of release of EDRF, endothelial cells, **101**, 237

**γ-Glutamyl-L-dopa**, (gludopa), pharmacokinetics in normal and anephric rats and rats with glycerol-induced acute renal failure, **101**, 301

**γ-Glutamyl transpeptidase**, effect on renal haemodynamic responses to CGP 22979, **99**, 15

**Glutathione**, effect on renal haemodynamic responses to CGP 22979, rat, **99**, 15

**Glyceryl trinitrate**, haemodynamic responses to, effects of L-NAME, rat, **101**, 632

**Glycine**, effect on NMDA receptor/ion channel complex in pathophysiology of epilepsy, **99**, 285

**Glycinamide**, no consistent depression of glutamate-induced neurone firing by ionophoresis of, **100**, 119

**Glycine precursor**, milacemide, depressant and stimulator effects, **100**, 119

**Glycolytic fibres**, effect of ligation and of torbafylline on percentage of, rat, **99**, 786

**GMP**, release and vasodilatation induced by EDRF and atrial natriuretic factor, rat kidney, **99**, 364

**Gossypol**, effect on basal release of cyclic GMP, rat kidney, **99**, 364

**G-Proteins**, in mediation of endothelium-dependent vasodilatation, mesenteric artery, rat, **100**, 427

**GR43175**, blocks neurogenic oedema in dura mater, **99**, 202

—, see sumatriptan

**Graham, J.D.P.**, obituary, **99**, 3

**Granisetron**, effect on visceral pain reflex induced by duodenal distension, rat, **100**, 497

**GTP binding protein**, effect of a dihydropyridine antagonist on voltage-dependent modulation of sensory neurone Ca channel currents by, rat, **99**, 629

**Guanylate cyclase**, Ca<sup>2+</sup> activity stimulates nitric oxide forming enzyme which synthesizes the activator of, **101**, 722

—, lack of coupling of CGRP receptors to release of agents activating, **99**, 71

**Guanine nucleotides**, in modulation of adenylate cyclase activity in NG108-15 cell membranes by interaction with G<sub>s</sub> and G<sub>i</sub>, **100**, 223

## H

**H-7**, effect on endplate potentials, neuromuscular junction, frog, **100**, 55

- Haemodynamic effect**, of  $N^G$ -nitro-L-arginine methyl ester, rat, **101**, 625
- Haemodynamics**, effect of indomethacin on responses to endothelins and sarafotoxin, **100**, 1518
- Haemoglobin**, effect on basal release of cyclic GMP, rat kidney, **99**, 364
- Haemorrhage**, effects of  $\mu$ -opioid receptor agonists on circulatory responses to, rabbit, **100**, 421
- Haloperidol**, induction of increase in DOPAC and HVA after disruption of nerve conduction, striatum, **99**, 741
- Haloperidol-sensitive  $\sigma$  recognition site**, lack of involvement in discriminative stimulus properties of (+)-N-allylnormetazocine, **99**, 145
- Halothane**, effect on nerve terminal Na- and K-mediated currents, olfactory cortex, rat, **101**, 217
- Heart**, actions of ATP on intracardiac neurones in, **100**, 269
- Heart, developing**, rat, role of  $\beta$ -adrenoceptor-adenylate cyclase system in developmental decrease in sensitivity to isoprenaline in, **100**, 138
- Heart failure, congestive**, endothelium modulation of effects of nitroglycerin on blood vessels from dogs with, **101**, 109
- Heart muscle**, effect of RS 30026 on, pig, **99**, 687
- Helodermin**, vascular effects compared with VIP, **99**, 526
- Helospectin I**, vascular effects compared with VIP, **99**, 526
- Helospectin II**, vascular effects compared with VIP, **99**, 526
- Heparin**, effect on polycation-induced oedema, hind paw, rat, **101**, 986
- Hepatic arterial vasodilatation**, effect of ANF on, dog, **99**, 810
- Hepatic artery**, noradrenergic-purinergeric cotransmission in, rabbit, **99**, 835
- , role of adenosine in hyperaemic response of to portal vein occlusion, **100**, 626
- Hepatic portal haemodynamics**, alteration by alteration by ANF, effects of, **99**, 810
- Heterogeneity of  $\alpha_2$ -adrenoceptors**, evidenced by clonidine and p-aminoclonidine in human, rat and bovine brain stem, **99**, 803
- Hexahydro-difenidol analogues**, stereoselective inhibition of muscarinic receptor subtypes by, **99**, 445
- Hexamethonium**, lack of effect on ability of epithelium removal to potentiate ACh, trachea, guinea-pig, **100**, 516
- Hexocyclium derivatives**, selectivity for smooth muscle muscarinic receptors from a greater decrease in affinity towards cardiac as compared to ileal receptors, **100**, 150
- Histamine**, acid responses to hypoglycaemia induced by, influence of systemic capsaicin pretreatment, stomach, rat, **100**, 491
- , adenosine inhibition of response to, human, **100**, 37
- , effect on  $Ca^{2+}$  elevations in presence of extracellular  $Ca^{2+}$ , coronary artery, pig, **101**, 273
- , in relaxation of aorta via release of EpDIF, rat, **100**, 614
- , in release of prostacyclin potentiated by interleukin-1, endothelium, human, **101**, 703
- , inhibition of release of by nedocromil sodium, human lung, **100**, 247
- , methoxyphenamine inhibits congestion induced by, rat, **101**, 394
- , modulation of responses to by mucosal and adventitial surface of epithelium, guinea-pig trachealis, **101**, 257
- , temperature-dependence of desensitization induced by, guinea-pig, **100**, 636
- Histamine  $H_1$ -receptor**, contractions mediated by, reduced after histamine, jejunum, guinea-pig, **101**, 881
- Histamine receptors**, alterations produced during desensitization, guinea-pig ileal smooth muscle, **101**, 587
- Histamine  $H_3$ -receptors**, characterization with  $H_3$ -selective ligands, guinea-pig ileum, **101**, 621
- Hippocampus**, effect of propentofylline during ischaemia, **100**, 814
- Hippocampal neurone**, inhibition of T-type  $Ca^{2+}$  channels by niger-goline in, **100**, 705
- Hippocampus**, inhibitory adenosine receptor at, antagonism by 1,3,8-substituted xanthines, **101**, 453
- , prevention of neuronal loss produced by tetanus toxin by NMDA receptor antagonist MK801, rat, **101**, 776
- , sensitivity to kainic acid, and antagonism by kynurenate, **101**, 847
- [ $^3H$ ]-5-HT**, effect of chronic diazepam treatment on release of, **99**, 11
- 5-HT**, in endotoxin-induced impairment of vascular responses, rat, **101**, 913
- , inhibitory effect on penile erectile function, rat, **101**, 698
- 5-HT agonists**, influence on sympathetic preganglionic neurones, rat, **99**, 667
- 5-HT $_{1A}$  agonists**, effect on ACh efflux, cerebral cortex, guinea-pig, **101**, 448
- 5-HT $_3$  agonists**, effect of ACh efflux from cerebral cortex, of 5-HT $_{1A}$  agonists, guinea-pig, **101**, 448
- 5-HT antagonists**, influence on sympathetic preganglionic neurones, rat, **99**, 667
- 5-HT $_3$ -antagonists**, effect on mechanoreceptor responsiveness produced by 5-HT, normal and arthritic rat, **101**, 715
- 5-HT $_1$ -like receptors**, contraction of venous rings by action of sumatriptan at, dog, **99**, 219
- , effect of stimulation by 5-HT on tracheal vascular bed and smooth muscle, sheep, **99**, 21
- 5-HT-mediated behaviour**, effect of ritanserin, ICI 170,809 and ketanserin on, **100**, 793
- 5-HT neuronal firing**, effect of DOI on, rat, **99**, 221
- 5-HT $_{1A}$  receptors**, effect on blood pressure and heart rate by somatodendritic, located on 5-HT neurones in ventral medulla, rat, **99**, 713
- 5-HT $_{1A}$  receptors**, effects on glycaemia and insulinaemia on spontaneously hypertensive rat, **100**, 173
- , evidence for interaction between central 5-HT $_2$  receptors and, **100**, 793
- , role in von Bezold-Jarisch reflex, rat, **100**, 757
- 5-HT $_2$  receptors**, contribution to contractile action, guinea-pig ileum, **101**, 553
- , effect on tracheal vascular bed of stimulation by 5-HT, sheep, **99**, 21
- , evidence for interaction between 5-HT $_{1A}$  receptors and, **100**, 793
- , involvement in action of 5-HT on articular sensory receptors in normal and arthritic rats, **101**, 715
- 5-HT $_3$  receptors**, involvement of purinergic innervation and action of, urinary tract, rabbit, **101**, 212
- , action on articular sensory receptors, normal and arthritic rat, **101**, 715
- , characterization of, ileum, guinea-pig, **101**, 513
- , characterization in isolated preparations, guinea pig, **101**, 591
- , in contraction and evoked [ $^3H$ ]-acetylcholine release, guinea-pig ileum, **101**, 553
- , pharmacological characterization of, guinea-pig tissues, **101**, 591
- 5-HT $_4$  receptors**, in action of zacopride and BRL 24924 in colliculi neurones, mouse, **101**, 281
- 5-HT receptor subtypes**, behavioural evidence for functional interactions between, rats and mice, **101**, 667
- 5-HT release**, effects of DOI on, rat, **99**, 221
- H-Tyr-D-Arg-Phe-Lys-NH $_2$  (DALDA)**, effect of non-cholinergic nerve-mediated bronchoconstriction, guinea-pig, **101**, 269
- $\alpha$ -Human atrial natriuretic peptide**, inhibitory action on noradrenaline-induced synthesis of IP $_3$ , rabbit aorta, **99**, 536
- Human proendothelin $_{1-38}$** , vasoconstrictor activities of, mesenteric arterial bed, rat, **101**, 81
- Hydralazine**, effect on central 5-HT function, rat, **99**, 41
- , effects on central 5-HT biochemistry and functions, rats and mice, **99**, 41
- (+)-Hydrastine**, potent competitive antagonist at mammalian GABA $_A$  receptors, **99**, 727
- Hydroquinone**, effect on response to NANC stimulation, rat anococcygeus and bovine retractor penis muscle, **99**, 194
- 6-Hydroxydopamine**, effect on renal sympathetic axons in combination with selective neuronal uptake inhibitors, dog, **99**, 655
- Hydroxylator phenotype**, role in hepatic drug accumulation and enzyme induction after chronic amiodarone feeding, rat, **99**, 35
- 2-Hydroxysaclofen**, effect on inhibitory effect of R(-)-baclofen on vasopressor response, rat, **100**, 365
- 5-Hydroxytryptamine**, characterization of receptors mediating ileal contractions, guinea-pig, **101**, 513
- , contraction induced by, inhibited by calcitonin gene-related peptide, **101**, 193
- , effect of B-HT 920 in normosensitive rat, **99**, 509
- , effects of 5-HT $_3$  receptor antagonists on, submucosal neurones, guinea-pig, **99**, 840
- , effects on articular sensory receptors in normal and arthritic rat, **101**, 715
- , enhancement of [ $^3H$ ]-inositol phosphates accumulation in presence of, human, **100**, 37
- , induced tachycardia mediation by 5-HT $_4$  receptor, pig, **100**, 665
- , influence of agonists and antagonists of, on sympathetic preganglionic neurones, rat, *in vivo* **99**, 667
- , inhibition of uptake by cocaine, nucleus accumbens, rat, **99**, 736
- , involvement in mediation of feeding induced by busipirone, gepirone and ipsapirone, **99**, 519
- , mediation of effects on tracheal vasculature and smooth muscle by stimulation of 5-HT $_{1A}$ -like and 5-HT $_2$  receptors, **99**, 21
- , presynaptic action of and involvement of purinergic innervation, lower urinary tract, rabbit, **101**, 212
- , receptor in human atrium, **100**, 879

- 5-Hydroxytryptamine, biochemistry**, effects of  $\text{Ca}^{2+}$  antagonists and hydralazine on, rats and mice, **99**, 41
- 5-Hydroxytryptamine ligands**, effects on excitatory synaptic transmission, hippocampus, rat, **101**, 171
- 5-Hydroxytryptamine receptors**, distinct receptor subtype of, **99**, 840
- , interaction with MDL73005EF as basis of anxiolytic-like activity, **99**, 343
- , mediation of 5-HT-induced tachycardia by, pig, **100**, 665
- 5-Hydroxytryptaminergic neurones**, synaptosomal tryptophan carrier not located exclusively on, **101**, 981
- Hyperaemia**, effect of endogenous nitric oxide as modulator, skeletal muscle, rabbit, **100**, 463
- Hyperreactivity, non-specific airway**, induction by  $\text{K}^+$  channel blockade, rat trachea, **101**, 541
- Hyperresponsiveness**, contribution of platelets and airway smooth muscle in PAF-induced, **101**, 31
- Hypertension**, increased reactivity of mesenteric vascular bed of spontaneously hypertensive rat to endothelin-1 as result of change in vascular structure, **100**, 31
- Hypo- and hyper-thyroid states**, influence on responses to catecholamines, rat aorta, **99**, 541
- Hypogastric ganglion**, activation of opioid receptors on nerve terminals depresses transmitter release in, mouse, **101**, 505
- Hypomotility**,  $\alpha$ -methyl-dopa-induced, rat, **99**, 467
- Hypothermia**, induced by 8-OH-DPAT, rats and mice, **101**, 667
- Hypoxia**, in constriction of large veins by endothelin-1, rabbit ear, **101**, 781
- , response of coronary artery rings isolated from sheep to CGRP or NPY modified by, **99**, 774

# I

- Ibutilast**, inhibition of leukotriene  $\text{D}_4$ -induced formation of inositol phosphates, guinea-pig lung, **100**, 564
- ICI1207968**, an orally active and selective inhibitor of 5-lipoxygenase, pharmacological profile, **99**, 113
- Ileal mucosa**, mediation of prostanoid stimulation of anion secretion in, guinea-pig, **101**, 889
- Ileocolonic junction**, GABA $_A$  receptor-mediated stimulation of NANC neurones in, dog, **101**, 460
- Ileum**, alterations in histamine receptors during agonist-induced desensitization, guinea-pig, **101**, 587
- , characterization of 5-HT receptors in, guinea-pig, **101**, 513
- , guinea-pig, tachykinin receptors in, **101**, 996
- , species related difference in characterization of 5-HT $_3$  receptors, **101**, 591
- Iloprost**, effect on cardiac response to adrenergic nerve stimulation, guinea-pig, **99**, 717
- , pretreatment induces different forms of desensitization in NG108-15 and NCB-20 cell lines, **99**, 309
- Imidazoline**, involvement in central hypotensive effect of rilmenidine, rabbit, **100**, 600
- Imidazoline-like binding site**, pharmacologically distinct from  $\alpha_2$ -adrenoceptors, rat brain, **99**, 803
- Imiloxan**, as selective  $\alpha_{2B}$ -adrenoceptor antagonist, **99**, 560
- N-Iminoethyl-L-arginine**, inhibitor of endothelial nitric oxide synthase, **101**, 746
- Impotence**, prediction of ganglion-blocking activity causing bovine retractor penis muscle, **101**, 472
- $^{111}\text{Indium}$ -platelet scintigraphy**, in platelet aggregation inhibited by endothelin-1, **99**, 303
- Indomethacin**, effect of antidiuretic activity of vasopressin, rhesus monkey, **99**, 750
- , effect on bradykinin-induced responses of trachea, guinea-pig, **99**, 762
- , effect on changes induced by endotoxin, mice, **99**, 499
- , effect on effects of capsaicin on responses to field stimulation, ear artery rabbit, **99**, 152
- , effect on mucosa in inhibition of prostanoid biosynthesis, rat, **99**, 607
- , effect on poly-L-arginine-induced oedema, hind paw, rat, **101**, 986
- , in abolition of ET-1-induced inhibition of ADP-stimulated platelet aggregation and potentiation of pressor response, **99**, 303
- , in bronchoconstrictor effect of inhaled PGD $_2$ , guinea-pig, **100**, 761
- , inhibits toluene diisocyanate-induced contractions, urinary bladder, rat, **100**, 886
- Inhibitor, endogenous**, of endothelium-dependent relaxation, presence of in brain, rabbit, **101**, 865
- Inositol phosphate**, formation stimulated by  $\text{P}_2$ -purinoceptors via pertussis toxin-insensitive pathway, renal cortex, rat, **100**, 63

- Inositol phosphates**, effect of carbachol and PIA on myocardial content of, **101**, 829
- , formation by increases in tissue cyclic AMP, bovine trachea, **100**, 646
- , GABA inhibition of histamine-induced formation of, guinea-pig cerebellum, rat cerebellum and cerebral cortex, **100**, 867
- , influence of phorbol esters and diacylglycerol kinase and lipase inhibitors on, chromaffin cells, **101**, 521
- Inositol phospholipid hydrolysis**, adenosine inhibition of response to histamine, human, **100**, 37
- , characterization of in peripheral tissue, **101**, 1001
- Inositol phospholipids**, amplification of inhibitions by lithium in hydrolysis of, brain, mammalian, **100**, 723
- Inositol 1,4,5-trisphosphate**, characterization of stereospecific binding sites for, airway smooth muscle, **99**, 297
- , formation of via pertussis toxin-insensitive pathway by  $\text{P}_2$ -purinoceptors, renal cortex, rat, **100**, 63
- Inositol trisphosphate contraction**, effect of caffeine during loading of  $\text{Ca}^{2+}$ -store, rat myometrium, **99**, 261
- Inositol trisphosphate**, effect of noradrenaline on in thyroid states, **99**, 541
- Inotropic effect**, of carbachol and PIA in heart, **101**, 821
- , of N-ethylmaleimide on papillary muscles, guinea-pig, **101**, 406
- Inotropic effects**, of isoprenaline and IBMX on cellular cyclic AMP, guinea-pig ventricular myocardium, **99**, 401
- Insulin**, effect of capsaicin pretreatment on acid responses to hypoglycaemia induced by, **100**, 491
- , mechanism of 8-OH-DPAT-mediated inhibition of, spontaneously hypertensive rat, **100**, 173
- , role of adrenoceptors in effects of lithium on secretion of, rat, **100**, 283
- Insulin, plasma**, role of  $\alpha$ - and  $\beta$ -adrenoceptor subtypes in mediation of effects of catecholamines on concentrations of, rat, **100**, 699
- Insulin-secreting cell**, effects of pinacidil, RP 49356 and nicorandil on ATP-sensitive  $\text{K}^+$  channels on, **99**, 487
- Interleukin-1**, interaction between and fibrinolytic system in degradation of collagen by chondrocytes, rabbit, **100**, 631
- , potentiation of histamine-induced release of prostacyclin, endothelium, human, **101**, 703
- Interleukin-1 $\alpha$** , pyrogenic actions of, **100**, 542
- Interleukin-1 $\beta$** , pyrogenic actions of, **100**, 542
- Interleukin-3**, effect on blood neutrophils, bone marrow and pulmonary airway eosinophils, guinea-pig, **100**, 399
- Intracardiac neurones**, actions of ATP on, guinea-pig, **100**, 269
- Intracellular  $\text{Ca}^{2+}$** , reduction of NMDA receptors with dithiothreitol increases, **101**, 178
- , significance of coupling of postjunctional  $\alpha$ -adrenoceptor subtypes to dual sources of, isolated blood vessels, rabbit, **99**, 253
- , effect of capsaicin on, dorsal root ganglion, rat, **101**, 423
- Intracellular calcium concentration**, and  $\text{K}^+$  channel openers, coronary artery, **101**, 157
- Ion transport, intestinal**, antisecretory effects of neuropeptide Y fragments on, jejunum mucosa, rat, **101**, 247
- IP $_3$** , 5-HT and histamine, synthesized cyclic nucleotides interact with action of for regulation of contraction, dog tracheal smooth muscle, **100**, 41
- Isapirone**, effect on hippocampus, rat, **101**, 171
- , role of 5-HT and dopamine systems in eating induced by, **99**, 519
- Ischaemia**, effects of PAF during, guinea-pig, **101**, 734
- , simulated, modification of contraction by mediators released by endothelium, coronary artery, sheep, **100**, 407
- , simulated, assessment of changes in cytoplasmic calcium concentration during exposure of myocardium to, rat, **100**, 477
- Ischaemia, simulated**, response of coronary artery rings isolated from sheep to CGRP or NPY modified by, **99**, 774
- Isoflurane**, in anaesthetic suppression of transmitter actions in neocortex, **101**, 61
- Isoprenaline**, effect of carbachol on contraction, intracellular  $\text{Na}^+$  activity and cyclic AMP, papillary muscles exposed to, guinea-pig, **99**, 401
- , effect on cardiac  $\beta$ -adrenoceptors, rat, **99**, 27
- , effect on contractile reactivity of mesenteric and renal resistance arteries, rat, **101**, 859

# K

- K252a**, effect on neutrophil respiratory burst activated by receptor stimulation and post-receptor mechanisms, **100**, 819
- $\text{K}^+$** , in formation of inositol phosphates, ileum, guinea pig, **99**, 217
- $\text{K}^+$  channel**, opening properties of diazoxide and minoxidil sulphate, rat blood vessels, **100**, 605

**K<sup>+</sup> channels**, in mediation of endothelium-dependent vasodilatation, mesenteric artery, rat, **100**, 427  
 —, inhibition by phentolamine and yohimbine, pancreatic  $\beta$ -cells, mouse, **101**, 115  
 —, opened by cromakalim in vascular and non-vascular smooth muscle, **100**, 201  
**K<sup>+</sup> channels, ATP-sensitive**, effect of cromakalim in insulin-secreting cells, **99**, 169  
**K<sup>+</sup>-channel openers**, antagonism by glibenclamide of vasodepressor effects of, dog, **100**, 413  
 —, haemodynamic interactions between and sympathetic nervous system, rat, **100**, 557  
 —, promotion of opening of ATP-sensitive and inhibition of Ca<sup>2+</sup>-activated by pinacidil in K<sup>+</sup>-contracted mesenteric artery, dog, **100**, 143  
 —, role in cytoplasmic calcium and relaxation of smooth muscle by, **101**, 157  
**K<sup>+</sup>, high**, induction of atropine-resistant relaxation by, in iris dilator muscle, rat and pig, **100**, 401  
**Kainate**, excitation by, blocked by philanthotoxin, brainstem, rat, **101**, 968  
**Kainic acid**, sensitivity of hippocampal neurones to, **101**, 847  
**Ketamine**, effect on axonal currents, olfactory cortex, rat, **101**, 217  
 —, spinal contribution to depression of reflexes, rat, **101**, 563  
**Ketanserin**, attenuation of 5-HT<sub>2</sub>-receptors with, in presence of stenosis, attenuates the 5-HT-induced decreases in coronary artery and coronary blood flow, **100**, 153  
 —, blocking of vasoconstriction of tracheal smooth muscle by 5-HT, sheep, **99**, 21  
 —, in collagen-induced platelet adhesion/aggregation response and release of 5-HT, cat, **99**, 631  
**Ketoprofen**, effect on interleukin-1 pyrogenicity, **100**, 542  
**Ketotifen**, in prevention of development of airway hyperreactivity, guinea-pig, **99**, 396  
 —, inhibition of pulmonary airway eosinophil accumulation due to inhaled PAF by, guinea-pig, **99**, 267  
**Kininase I**, effect on bradykinin-induced bronchoconstriction, guinea-pig, **101**, 77  
**Kinins**, induced by carrageenin and zymosan, rat, **101**, 418  
**Kynurenic acid**, post-synaptic kainate receptors sensitive to antagonism by, **101**, 847

**L**

**L-662,583**, an effective ocular hypotensive carbonic anhydrase inhibitor, experimental animals, **99**, 59  
**Labetalol**, antiarrhythmic efficacy of, **100**, 855  
**Lanthanum**, in inhibition of Na<sup>+</sup>-K<sup>+</sup> pump activity, peritoneal mast cells, rat, **100**, 453  
**Leucocytes**, decrease in after ovalbumin to animals injected with platelets from actively sensitized animals, **100**, 185  
**[Leu<sup>5</sup>]enkephalin**, dynorphin A(1-8) conversion to, myenteric plexus, guinea-pig, **101**, 674  
**Leukotriene D<sub>4</sub>**, effect of ibudilast on D<sub>4</sub>-induced formation of inositol phosphates, guinea-pig lung, **100**, 564  
**Leukotriene C<sub>4</sub>, D<sub>4</sub> and E<sub>4</sub>**, effect of SK&F S-106203 on vasopressor responses of, rat, **100**, 195  
**Leukotriene**, lack of role in changes of airway permeability induced by PAF, rat, **101**, 896  
**Leukotrienes**, increase in in human gastric and colonic mucosa by ethanol, **99**, 289  
 —, MK-886 inhibitor of, in synthesis of human phagocytes, **100**, 15  
**Levodopa metabolism**, effect of benserazide on metabolism of, rat, **100**, 743  
**Lidocaine**, rate-dependence of electrophysiological effects of in cardiac Purkinje fibres, dog, **99**, 124  
**Lignocaine**, effect of axonal currents, olfactory cortex, rat, **101**, 217  
 —, effect on established ventricular fibrillation, **100**, 503  
 —, myocardial uptake of, rabbit, **101**, 843  
**Lipid peroxides**, in antinociceptive activity of paracetamol in inflammatory pain, **101**, 869  
**Lipoproteins, low-density**, effect on EDRF, rabbit aorta, **100**, 21  
**5-Lipoxygenase**, chiral inhibitors of with anti-inflammatory activity, **101**, 501  
 —, inhibition by ICI1207968, **99**, 113  
 —, differential regulation of pathways in peritoneal leukocytes, rat, **101**, 128  
**5-Lipoxygenase inhibition**, by MK-886 in human phagocytes, **100**, 15  
**5-Lipoxygenase inhibitor**, in bronchoconstrictor effect of inhaled PGD<sub>2</sub>, guinea-pig, **100**, 761  
**Lithium**, amplifies inhibitions of inositol phospholipid hydrolysis,

brain, mammalian, **100**, 723  
 —, effects of acute and chronic treatment on pilocarpine-stimulated phosphoinositide hydrolysis, mouse brain, **101**, 39  
 —, interactions between adenosine and phorbol esters or, at neuromuscular junction, frog, **100**, 55  
 —, role of adrenoceptors in effects on blood glucose levels and insulin secretion, *in vivo* and *in vitro*, rat, **100**, 283  
**Liver**, reduced high affinity of  $\alpha_1$ -adrenoceptors in senescent rat, **101**, 650  
**Locomotor activity**, effect of administration of nicotinic agonists intracerebrally, **99**, 273  
**Locus coeruleus**, effects of selective agonists at opioid receptor subtypes, rat, **101**, 655  
**Lorazepam**, differential effects on benzodiazepine binding and GABA<sub>A</sub>-receptor function, **101**, 839  
**Lung hyper-responsiveness**, association between and blood eosinophilia, rat, **101**, 821  
**Lung resistance**, effects of aerosolised substance P on, guinea-pig, **100**, 69

## M

**Magnesium**, effect on transmitter actions in neocortex, **101**, 1006  
 —, in inhibition of Na<sup>+</sup>-K<sup>+</sup> pump activity, peritoneal mast cells, rat, **100**, 453  
 —, modulation of divalent metal ion binding sites accessible to calcium, **100**, 5  
**Mast cells**, degranulation of anti-inflammatory effect, rat, **99**, 350  
 —, inhibition of Na<sup>+</sup>-K<sup>+</sup> pump activity by divalent cations in peritoneum, rat, **100**, 453  
**Mast cell-dependent inflammation**, pro- and anti-inflammatory effects of PGE<sub>2</sub> and PGI<sub>2</sub>, hamster cheek pouch, **99**, 449  
**MDL 73005EF**, characterization of as 5-HT<sub>1A</sub> selective ligand, effect of anxiety, **99**, 343  
**MDL 12,330A**, effect on endplate potentials, neuromuscular junction, frog, **100**, 55  
**Mecamylamine**, blocks increase in locomotor activity produced by nicotine or cytosine into ventral tegmental area, rat, **99**, 273  
**Meclofenamate**, receptors in circular muscle treated with, guinea-pig stomach, **101**, 809  
**Medial forebrain bundle**, regulation of synthesis and metabolism of striatal dopamine after disruption of nerve conduction in, **99**, 741  
**Mepyramine**, binding to ileal muscle unaltered by histamine, guinea-pig, **101**, 587  
**Mesenteric arteries**, actions of pinacidil at neuromuscular junctions in, guinea-pig and rabbit, **101**, 581  
 —, bradykinin-induced vasoconstriction of, rat, **101**, 344  
 —, G-proteins, K<sup>+</sup> and Ca channels in endothelium-dependent and BRL-induced vasodilatation of, rat, **100**, 427  
 —, opposing effects of pinacidil on K<sup>+</sup> channels in, dog, **100**, 143  
**Mesenteric vascular bed**, reactivity and sensitivity of to endothelin: effects of Ca entry blockers, **100**, 31  
**Mesolimbic dopamine**, facilitatory role of 5-HT<sub>3</sub> receptor activation on, rat, **99**, 277  
**Mesolimbic dopamine system**, effect of B-HT 920 on in normosensitive and supersensitive rat, **99**, 509  
**Methacholine**, sensitivity of isolated tracheal strips at 37° after removal of epithelium, guinea-pig isolated trachealis, **99**, 369  
**Methiothepin**, effect of 5-HT<sub>1A</sub> receptor antagonist action of in von Bezold-Jarisch reflex, rat, **100**, 757  
 —, modification of ischaemic-induced contraction in circumflex coronary artery by, sheep, **100**, 407  
**Methohexitone**, spinal contribution to depression of reflexes, rat, **101**, 563  
**Methoxy alkyl thiazoles**, chiral interaction with 5-lipoxygenase, **101**, 501  
**Methoxyphenamine**, inhibits basal and histamine-induced nasal congestion, rat, **101**, 394  
 **$\alpha$ -Methyldopa**, in induction of naltrexone-insensitive antinociception and hypomotility, rat, **99**, 467  
**[<sup>3</sup>H]- $\alpha$ -,  $\beta$ -Methylene ATP**, affinity binding sites for, urinary bladder, rat, **101**, 291  
 **$\alpha$ -,  $\beta$ -Methylene ATP**, effect of suramin in detrusor muscle, guinea-pig bladder, **99**, 617  
 —, effect on hepatic artery, rabbit, **69**, 835  
 —, selectivity of in inhibiting vascular responses, *in vivo*, and *in vitro*, rat, **99**, 820  
 **$\beta$ -,  $\gamma$ -Methylene ATP**, effect of Bay K 8644 and nifedipine on responses to urinary bladder, rat, **101**, 494  
**R-( $\alpha$ )-Methylhistamine**, histamine receptor mediating inhibition of cholinergic neurotransmission by in guinea-pig ileum is same as

- H<sub>3</sub>-receptor in rat cerebral cortex, **101**, 621
- Methysergide**, antagonism of contractions elicited by neutrophils and supernates derived from, rabbit thoracic aorta, **99**, 553
- , in definition of heterogeneity of  $\alpha_2$ -adrenoceptors in rat cortex by, not in human platelets, **99**, 481
- , attenuation of 5-HT-induced increases in coronary blood flow unaffected by blockade of 5-HT<sub>2</sub>-receptors with, **100**, 153
- 5-Methylurapidil**, hypotensive effects of following stereotaxic micro-injection into ventral medulla, **99**, 713
- Metoprolol**, cardio-depressive effect of, **99**, 592
- ,  $\beta_1$ - and  $\beta_2$ -adrenoceptor binding of, **99**, 592
- Microclimate pH**, and weak electrolyte absorption, **101**, 937
- Microvascular permeability**, and neutrophils in myocardial reperfusion, rabbit, **100**, 729
- Migraine**, effect of sumatriptan, dura mater, **99**, 202
- Milacemide**, depressant agent not requiring its metabolism into glycine or its stimulator effect on the production of GABA, **100**, 119
- Minoxidil sulphate**, effect on rat uterus, **101**, 901
- , action on blood vessels compared with cromakalim, rat, **100**, 605
- Mitochondria**, heart, Bay K 8644 modifies Ca transport and energy metabolism in, **101**, 15
- MK-329**, reversal of anorectic effect of (+)-fenfluramine by, rat, **99**, 65
- MK801**, prevention of neuronal loss produced by tetanus toxin by, hippocampus, rat, **101**, 776
- [<sup>3</sup>H]-**MK-801**, reduction of NMDA receptors with dithiothreitol increases binding, **101**, 178
- Monocytes**, inhibition of 5-lipoxygenase product synthesis by MK-866 in, **100**, 15
- N<sup>G</sup>-Monomethyl-L-arginine**, effect on polycation-induced oedema, hind paw, rat, **101**, 986
- , effect on vascular tone of blood vessels and endothelial cells, **101**, 145
- L-N<sup>G</sup>-Monomethyl arginine**, (L-NMMA), effect on anococcygeus muscle, mouse, **99**, 602
- , effects on NANC transmission, anococcygeus, rat, **100**, 749
- N<sup>G</sup>-Monomethyl-L-arginine**, induces mucosal damage, rat, **99**, 607
- , inhibitor of endothelial nitric oxide synthase, **101**, 746
- , regional haemodynamic changes during oral ingestion of, Brattleboro rat, **101**, 10
- Morphine**, effect of prolonged exposure to on preganglionic sympathetic nerve function, rat, **99**, 247
- Morphine**, effect on circulatory responses to simulated haemorrhage, rabbit, **100**, 421
- , effect on non-cholinergic nerve-mediated bronchoconstriction, guinea-pig, **101**, 269
- Motoneurone, spinal**, effect of spantide (tachykinin antagonist) on, rat, **100**, 711
- Motor nerve terminal**, effect of ryanodine on calcium-dependent release of transmitter at, mouse, **100**, 114
- Motor nerve terminals**, enhancement of quantal transmitter release by ciguatoxin, frog, **99**, 695
- MR2266**, inhibition of elevated arginine vasopressin secretion in response to osmotic stimulation and acute haemorrhage by, **99**, 384
- Muscarinic agonist**, oxadiazole, potent and efficacious non-quaternary, **101**, 575
- Muscarinic autoreceptors**, role in cholinergic analgesia, **101**, 49
- Muscarinic cholinceptors**, developmental changes in effects of on Ca<sup>2+</sup> channels, rat ventricular muscles, **99**, 327
- , developmental changes in, rat ventricular muscle, **99**, 334
- Muscarinic hyperpolarization**, action of soman on in parasympathetic ganglia, cat bladder, **99**, 157
- Muscarinic M<sub>2</sub>-receptors**, human, effect of chronic  $\beta_1$ -adrenoceptor antagonist on, **101**, 363
- , neuronal, evidence for in pulmonary cholinergic nerves, rat, **101**, 73
- Muscarinic receptors**, non-quaternary oxadiazoles acting as full agonists at, **101**, 575
- , effects of chain-length and unsaturation on affinity and selectivity at, **99**, 622
- , stimulation and cyclic AMP-dependent effects, guinea-pig ventricular myocardium, **99**, 401
- Muscarinic receptor subtypes**, characterization of in phosphoinositide metabolism, bovine tracheal smooth muscle, **99**, 293
- , exhibit high selectivity for smooth muscle muscarinic receptors, **100**, 150
- , interaction of parafluorohexahydrosiladiphenidol at, *in vitro*, **99**, 637
- Muscarinic receptor subtypes**, similarity to M<sub>2</sub> subtypes, rat hippocampus, **99**, 753
- , stereoselective inhibition of by enantiomers of hexahydro-difenidol and acetylenic analogues, **99**, 445
- M<sub>1</sub> muscarinic receptor subtypes**, heterogeneity of shown by 4-DAMP analogues, **100**, 395
- Muscimol**, central inhibition by of release of vasopressin and oxytocin by osmotic stimulus, rat, **99**, 529
- , mimics action of GABA in synaptic processing of somatosensory information in S1 cortex, cat, **100**, 689
- Muscle, skeletal**, endogenous nitric oxide as modulator of, rabbit, **100**, 463
- Myeloperoxidase**, in evaluation of effect of azapropazone on neutrophil migration, swine, **99**, 233
- Myenteric plexus**, agonist action of dynorphin A(1-8) mediated through conversion to [Leu<sup>5</sup>]enkephalin in, guinea-pig, **101**, 674
- Myocardial damage**, effects of antiarrhythmic agents (group III) on, canine heart, **99**, 577
- Myocardial enzyme release**, prevention by ranolazine, baboon, **99**, 5
- Myocardial infarction**, responsiveness to adrenoceptor agonists and calcium of non-infarcted hypertrophied muscles, rat, **99**, 572
- Myocardial infarction/reperfusion**, antiarrhythmic activity of labetalol in, **100**, 855
- Myocardial ischaemia**, adrenoceptors during, **100**, 636
- , neutrophils, oedema and, rabbit, **100**, 729
- Myocardial ischaemia/reperfusion**, effect of azapropazone on neutrophil migration in, rabbit, **100**, 379
- Myocardium**, effects of PAF during perfusion, ischaemia and reperfusion of, guinea-pig, **101**, 734
- Myocytes, cardiac**, blockade of the anti-adrenergic effect by pertussis toxin in, **101**, 484
- Myofilaments**, effect of cocaine on responsiveness of, ventricular myocardium, ferret, **101**, 679
- Myo-inositol 1,4,5-triphosphate**, noradrenaline-induced, action of  $\alpha$ -human natriuretic peptide on, rabbit aorta, **99**, 536
- Myometrial guanylate cyclase**, effects of ANP on, rat, **100**, 341
- Myometrium**, effects of calmodulin antagonists on Ca-activated K-channels of, rat, **100**, 353
- Myotonic oscillations, spontaneous**, in human erectile tissue mediated by generation and release of a cyclo-oxygenase product, **101**, 375

## N

- Na<sup>+</sup> activity**, effect of isoprenaline and IBMX on, guinea-pig ventricular myocardium, **99**, 401
- Na deprivation**, in muscarinic receptor-mediated catecholamine secretion in absence of extracellular Ca<sup>2+</sup>, cat, **101**, 67
- Na<sup>+</sup>:Ca<sup>+</sup> exchange**, effects of ryanodine and caffeine on Ca-activated current carried by, ventricular myocytes, guinea-pig, **101**, 399
- , **mechanism**, effect of disopyramide on, papillary muscle, guinea-pig, **101**, 789
- NaF**, in modulation of adenylate cyclase activity in NG108-15 cell membranes by interaction with G<sub>i</sub> and G<sub>s</sub>, **100**, 223
- Na<sup>+</sup>-H<sup>+</sup> exchange**, in inotropic action of Bay K 8644 and of ouabain, guinea-pig atria, **100**, 717
- , receptor-linked stimulation through protein kinase C activation as a mechanism for  $\alpha_1$ -adrenoceptor-mediated sustained positive inotropic effect, **100**, 207
- Na<sup>+</sup>,K<sup>+</sup>-ATPase**, factors influencing onset of ouabain inhibition of, myocardium, guinea-pig, **101**, 337
- , in inhibition of smooth muscle contractions by phorbol esters, **99**, 237
- Na<sup>+</sup>-K<sup>+</sup> current**, inhibition by anaesthetics, **101**, 190
- Na<sup>+</sup>/K<sup>+</sup>-pump**, activation by abrupt temperature increase, guinea-pig trachealis, **99**, 369
- , inhibition of activity by divalent cations, intact peritoneal mast cells, rat, **100**, 453
- Naloxone**, effect on circulatory responses to simulated haemorrhage, rabbit, **100**, 421
- Naltrexone**, in inhibition of  $\alpha$ -methyl dopa-induced hypotension, rat, **99**, 467
- NANC**, changes in membrane potentiation and cyclic nucleotide levels in response to inhibitory field stimulation of, guinea-pig, **100**, 329
- , reduction of cholinergic neural responses in airways by opioids via inhibitory action on, guinea-pig, **100**, 131
- NANC contraction**, in electrically field stimulated trachea, guinea-pig, **101**, 875
- , inhibitory actions of prostaglandin E<sub>1</sub> on, guinea-pig bronchus, **101**, 13
- NANC-mediated responses**, inhibition by conotoxin, **101**, 437
- NANC neurones**, GABA<sub>A</sub> receptor-stimulation of, ileocolonic junction, dog, **101**, 460
- NANC stimulation**, effects of pyrogallol and hydroquinone on, rat

- anococcygeus and bovine retractor penis muscles, **99**, 194
- NANC transmission**, effect of arginine analogues on, anococcygeus, rat, **100**, 749
- Nasal congestion**, inhibited by methoxyphenamine, rat, **101**, 394
- Natrindole**, antagonism of swim-stress-induced antinociception by, rat, **100**, 685
- Nedocromil sodium**, inhibition of antigen-induced release of leukotrienes and histamine, human lung, **100**, 247
- , inhibits chemotaxis of eosinophils induced by PAF and LTB<sub>4</sub>, **99**, 798
- Negative inotropic effects**, of disopyramide on papillary muscles, guinea-pig, **101**, 789
- Nematodes**, actions of ACh and GABA on spontaneous contractions in, **101**, 971
- Neocortex**, effects of hypomagnesia on transmitter actions in, **101**, 1006
- Neocortical activation**, interference with subsynaptic mechanisms of in anaesthesia, **101**, 61
- Neonatal haemodynamics**, effect of ethanol intoxication on, piglet, **101**, 227
- Nerve regeneration**, impaired ornithine decarboxylase induction and diabetes-induced defects in, insensitive to ponalrestat, **101**, 978
- Neuroblastoma × glioma hybrid cells**, endothelin and a Ca<sup>2+</sup> ionophore raise cyclic GMP levels in, **101**, 722
- Neuroblastoma cells**, NaF and guanine nucleotides modulate adenylylate cyclase activity in by interaction with G<sub>s</sub> and G<sub>i</sub>, **100**, 223
- Neurodegeneration**, by tetanus toxin, prevention by MK801, hippocampus, rat, **101**, 776
- Neuroeffector transmission**, effect of  $\omega$ -conotoxin GVIA on, **101**, 437
- Neurogenic vasopressor response**, GABA<sub>B</sub> receptor-mediated inhibition of, pithed rat, **100**, 365
- Neurokinin A**, binding with tachykinin receptors, rat spinal motoneurons, **100**, 711
- Neurokinin receptors**, involvement in activation of alveolar macrophages, guinea-pig, **100**, 417
- Neuromedin U-8**, porcine, motor response of human isolated small intestine and urinary bladder to, **99**, 186
- Neuromodulation**, of sympathetic co-transmission by neuropeptide Y, vas deferens, guinea-pig, **100**, 457
- Neuromuscular junction**, blockade of acetylcholine release at by  $\beta$ -bungarotoxin and crotoxin, mouse, **100**, 301
- , effect of butanedione monoxime on, **100**, 467
- , effect of ciguatoxin on, frog, **99**, 695
- , inhibitory adenosine receptor at, antagonism by 1,3,8-substituted xanthines, **101**, 453
- , interactions between adenosine and phorbol esters or lithium at, frog, **100**, 55
- Neuronal development**, sensitivity of GABA<sub>A</sub>-receptor complex to zinc, **99**, 643
- Neuropeptide Y**, effect on  $\alpha_2$ -adrenoceptor-mediated cardiovascular responses, rat, **100**, 840
- , effect on cardiac output, its distribution, regional blood flow and organ vascular resistances, pithed rat, **99**, 340
- , effect on electrically-evoked contractions, vas deferens, rat, **100**, 190
- , effects on basal and electrically stimulated ion secretion, jejunum mucosa, rat, **101**, 247
- , effects of pre-contraction with endothelin-1 on -mediated contractions, vascular bed of rat tail, **101**, 205
- , enhancement of dihydropyridine-sensitive component of response to  $\alpha_1$ -adrenoceptor stimulation by, rat mesenteric arterioles, **99**, 389
- , neuromodulation of sympathetic co-transmission, vas deferens, guinea-pig, **100**, 457
- , suppression of capsaicin-sensitive sensory nerve-mediated contraction by, guinea-pig airways, **99**, 473
- Neuropeptide Y fragments**, effects on basal and electrically stimulated ion secretion, jejunum mucosa, rat, **101**, 247
- Neuropeptides**, regulation of gastric mucosal integrity by endogenous NO, interactions with, rat, **99**, 607
- Neurosecretion**, stimulation by tetrahydroaminoacridine at motor endplates, mammal, **100**, 487
- Neutral endopeptidase**, effect of bradykinin-induced bronchoconstriction, guinea-pig, **101**, 77
- , effects of inhibitors of, on relaxation of airway smooth muscle after epithelium removal, guinea-pig, **100**, 73
- , in regulation of response to aerosolised substance P on lung resistance, guinea-pig, **100**, 69
- Neutrophil migration**, effect of azapropazone on, swine, **99**, 233
- , effect of azapropazone on, myocardial ischaemia/reperfusion injury, rabbit, **100**, 379
- Neutrophil-derived products**, effect on vascular tone, rabbit thoracic aorta, **99**, 553
- Neutrophils**, and oedema in myocardial ischaemia and reperfusion, rabbit, **100**, 729
- , chemotaxis induced by inhibition by nedocromil sodium and sodium cromoglycate, **99**, 798
- , inhibitory action of MK-886 on, **100**, 15
- , sensitization with ovalbumin increases in response to aerosol of ovalbumin, guinea-pig pulmonary airway, **99**, 679
- Nicardipine**, antagonist of Ca<sup>2+</sup>-induced contractions in K<sup>+</sup>-depolarized taenia preparations, guinea-pig, **100**, 211
- , comparison of impaired vascular reactivity with endotoxin, **101**, 913
- , effect on endothelin concentration-response, guinea-pig trachea and rat aorta, **100**, 383
- Nicergoline**, inhibits T-type Ca<sup>2+</sup> channels in hippocampal CA1 pyramidal neurones, rat, **100**, 705
- Nicorandil**, antagonism by glibenclamide of vasodepressor effects of, **100**, 413
- , cytoplasmic calcium and relaxation of coronary arterial smooth muscle by, **101**, 157
- , effect on ATP-sensitive potassium channels in insulin-secreting cells, **99**, 487
- , effects on triggered and spontaneous electrical activity, Purkinje fibres, dog, **99**, 119
- Nicotine**, mediation of locomotor activity of, by intracerebral nicotinic receptors, **99**, 273
- , vascular responses to, **100**, 535
- Nicotinic acetylcholine receptor**, potencies for barbiturate binding to, *Torpedo*, **101**, 710
- Nicotinic receptor ion channels**, effect of organophosphorus anticholinesterases on, muscle endplate, mouse, **101**, 349
- Nicotinic receptors**, effect of agmatine on, **99**, 207
- Nifedipine**, antagonism of contraction and Ca<sup>2+</sup>-influx evoked by ATP, bladder, guinea-pig, **100**, 370
- , blocks K-induced contractions in mesenteric vascular beds and aortic rings of spontaneously hypertensive rat, **100**, 31
- , cardiovascular responses to, in presence of blood gas abnormalities, **100**, 102
- , effect of disopyramide on papillary muscle pretreated with, guinea-pig, **101**, 789
- , effect on responses to electrical field stimulation,  $\beta$ ,  $\gamma$ -methylene ATP and ACh, urinary bladder, rat, **101**, 494
- , in classification of  $\alpha_1$ -adrenoceptors in smooth muscle, **99**, 197
- Nigrostriatal system**, effect of B-HT on, in normosensitive and super-sensitive rat, **99**, 509
- Niguldipine**, discriminates between  $\alpha$ -adrenoceptor-mediated second messenger responses, cerebral cortex, rat, **100**, 3
- Nimodipine**, antagonist of Ca<sup>2+</sup>-induced contractions in K<sup>+</sup>-depolarized taenia preparations, guinea-pig, **100**, 211
- , effect on opioid withdrawal response, guinea-pig ileum, **101**, 958
- , lack of effect of cerebral circulation despite increase in cardiac output, pig, **100**, 277
- , synergistic internal carotid vasodilator effects of, conscious rat, **99**, 830
- Nipecotic acid**, effect on histamine-induced inositol phosphate formation, guinea-pig cerebellum, rat and guinea-pig cortex, **100**, 867
- Nippostrongylus brasiliensis**, effect of regional blood flow in rat following sensitization to, **101**, 93
- Nitrate tolerance**, prevention by N-acetyl-L- but not N-acetyl-D-cysteine, rat, **99**, 825
- Nitrendipine**, antagonist of Ca<sup>2+</sup>-induced contractions in K<sup>+</sup>-depolarized taenia preparations, guinea-pig, **100**, 211
- , blocks K-induced contractions in mesenteric vascular beds and aortic rings of spontaneously hypertensive rat, **100**, 31
- , effect on benzodiazepine withdrawal and tolerance, **101**, 691
- Nitric oxide**, as a modulator of skeletal muscle microcirculation *in vivo*, rabbit, **100**, 463
- , endothelin and a Ca<sup>2+</sup> ionophors raise cyclic GMP levels of neuronal cell line via formation of, **101**, 722
- , impairment of relaxations to by phorbol ester, rat aorta, **101**, 432
- , in modulation of gastric mucosal integrity, rat, **99**, 607
- , inhibition by L-glutamine of release of, endothelial cells, **101**, 237
- , inhibitors of synthesis of, **101**, 746
- , potassium-stimulated release of, cerebellar cortex, **101**, 8
- , role in maintaining vascular integrity in endotoxin-induced intestinal damage, rat, **101**, 815
- , role in NANC neurotransmission, **99**, 194
- , role of Ca<sup>2+</sup> concentrations in production of, **101**, 489
- , stimulation of cyclic GMP in endothelial cells by, pig, **101**, 152
- , use of oxyhaemoglobin in investigation of platelet aggregation



- induced by, **101**, 991
- Nitric oxide synthase**, inhibition by L-NMMA, L-NAME and L-NIO in platelet cytosol, **101**, 325
- L-N<sup>G</sup>-Nitro arginine**, (L-NOARG), effect on anococcygeus muscle, mouse, **99**, 602
- , effects on NANC transmission, anococcygeus, rat, **100**, 749
- , inhibits NANC relaxations, trachea, guinea-pig, **100**, 661
- N-Nitro-L-arginine methyl ester**, effect on activities of endothelin-1 in presence of, rabbit ear, **101**, 781
- L-N<sup>G</sup>-Nitro-arginine-methyl-ester**, effects on NANC transmission, anococcygeus, rat, **100**, 749
- N<sup>G</sup>-Nitro-L-arginine methyl ester**, haemodynamic effects of, rat, **101**, 625
- , inhibitor of endothelial nitric oxide synthase, **101**, 746
- , regional haemodynamic changes during oral ingestion of, Brattleboro rat, **101**, 10
- Nitrogen oxides**, endothelium-derived, role of L-arginine in formation of, **101**, 145
- Nitroglycerin**, antagonism by glibenclamide of vasodepressor effects of, dog, **100**, 413
- , effect on cytosolic calcium concentrations and on tension, coronary artery, pig, **101**, 545
- , endothelium modulation of effects of on blood vessels, dog with pacing-induced heart failure, **101**, 109
- Nitroprusside**, comparison with adibendan (BM 14.478), dog, **101**, 686
- , non-specific cross-tolerance between and glyceryl trinitrate, rat, **99**, 825
- , use of oxyhaemoglobin in investigation of platelet aggregation induced by, **101**, 991
- Nitrovasodilator**, in *Rhodnius prolixus*, **101**, 932
- Nitrovasodilator drugs**, effect on NANC relaxation of anococcygeus muscle, mouse, **99**, 602
- , effect on NANC transmission, anococcygeus, rat, **100**, 749
- NK<sub>1</sub>-receptor**, mediates proliferative response of human fibroblasts to tachykinins, **100**, 11
- NK<sub>2</sub> receptors**, evidence for heterogeneity of in pulmonary artery and trachea, **100**, 588
- NMDA**, effects of hypomagnesia on neuronal responses induced by, neocortex, **101**, 1006
- , effects of substance P analogues on responses to intrathecal injection of, mouse, **101**, 307
- , interoceptive stimulus involvement in mediation of discriminative stimulus properties of (+)-N-allylnormetazocine, **99**, 145
- NMDA-induced behavioural responses**, mediated through NMDA receptors with no effect on NK<sub>1</sub> receptors in spinal cord, **101**, 307
- NMDA receptor antagonists**, CGP 37849 and CGP 39551, potent and novel, **99**, 791
- NMDA receptors**, modulation by dithiothreitol, **101**, 178
- , potentiation by endogenous glycine, **99**, 285
- L-NMMA**, in role of NO in vascular integrity maintenance, intestinal endotoxin-induced damage, **101**, 815
- , inhibitor of endothelium-dependent vasodilatation *in vitro*, **99**, 408
- , mimics effect of endothelium removal on vasoconstriction, pulmonary artery, human and rat, **101**, 166
- NO-05-0328**, a lipophilic GABA uptake blocker, effect in CA1, rat hippocampal slice, **99**, 103
- NO-05-0329**, a lipophilic GABA uptake blocker, effect in CA1, rat hippocampal slice, **99**, 103
- L-NOARG**, L-arginine-reversible inhibitor of endothelium-dependent vasodilatation *in vitro*, **99**, 408
- Nociceptors**, actions of capsaicin on, neonatal spinal cord-tail, rat, **101**, 727
- , effect of 5-HT on mechanical responsiveness of in normal and arthritic rats, **101**, 715
- Nociceptive fibres**, action of resiniferatoxin on, neonatal rat tail, **99**, 3213
- Nociceptive reflexes**, spinal effects of injectable anaesthetics on, rat, **101**, 563
- Non-adrenergic, non-cholinergic inhibitory nerves**, effect of epithelium removal on relaxation of tracheal smooth muscle induced by stimulation of, guinea-pig, **100**, 73
- Non-adrenergic, non-cholinergic relaxation**, effect of nitrovasodilator drugs on, mouse anococcygeus muscle, **99**, 602
- Non-adrenergic, non-cholinergic relaxations**, inhibition by L-N<sup>G</sup>-nitro-arginine, tracheal smooth muscle, guinea-pig, **100**, 661
- Non-cholinergic innervation**, effects of atropine and  $\alpha,\beta$ -methylene ATP on, urinary bladder, rat and guinea-pig, **99**, 493
- Non-cholinergic neurotransmission**, inhibitory effect of streptozotocin-induced diabetes on, rat, **101**, 411
- Non-infarcted muscle**, responsiveness to adrenoceptor agonists and calcium, rats with chronic myocardial infarction, b99b, 572
- Noradrenaline**, action on coronary arteries: selective release of EDRF, rat, **100**, 552
- , as co-transmitter with ATP at vascular neuroeffector junction, **99**, 279
- , blockade of re-uptake on evoked tritium overflow, mouse vasa deferentia and rat cortex slices, **101**, 762
- , cardiovascular effects of central injection of ACh in plasma levels of, **100**, 471
- , cotransmitter with ATP in sympathetic nerves to hepatic artery, rabbit, **99**, 835
- , effect of aging on contractions to, vascular smooth muscle, **100**, 889
- , effect of  $\omega$ -conotoxin GIVA on, small mesenteric artery, rat, **100**, 180
- , endogenous overflow, characterization of presynaptic vascular muscarinic receptors inhibiting, rat, **99**, 223
- , in bradykinin-induced vasoconstriction of mesenteric artery, rat, **101**, 344
- , in classification of  $\alpha_1$ -adrenoceptors in smooth muscle, **99**, 197
- , response of protein kinase C-mediated contractile responses to, diabetic rat, **101**, 465
- , response of spinal artery to, **101**, 200
- , in synthesis of IP<sub>3</sub>, inhibitory action of  $\alpha$ -human atrial natriuretic peptide on, rabbit aorta, **99**, 536
- , responses to mediated by  $\alpha$ -adrenoceptors *in vitro*, subcutaneous resistance arteries, human, **99**, 31
- , roles of intracellular and extracellular-derived Ca<sup>2+</sup> in  $\alpha$ -adrenoceptor-mediated contractions to, blood vessels, rabbit, **99**, 253
- Noradrenaline contraction**,  $\alpha_1$ -adrenoceptor subtypes involved in, **101**, 662
- Noradrenaline outflow**, effects of pinacidil actions on neuromuscular junction by bioassay of, **101**, 581
- Noradrenaline, plasma**, role in regulation of platelet and vascular  $\alpha_2$ -adrenoceptors, **101**, 329
- Noradrenaline release**, inhibited by  $\omega$ -conotoxin in rabbit ear artery and rat and mouse atria, **101**, 437
- , neuropeptide Y neuromodulates co-transmission by inhibition of, vas deferens, guinea-pig, **100**, 457
- Noradrenergically-mediated responses**, inhibition by conotoxin, **101**, 437
- NPY fragments**, effect on electrically-evoked contractions, vas deferens, rat, **100**, 190
- NPY**, responsiveness of coronary artery rings to modified by hypoxia or simulated myocardial ischaemia, sheep, **99**, 774
- Nucleus accumbens**, actions of cocaine on, rat, **99**, 736
- , effect of cholecystokinin sulphated octapeptide on endogenous dopamine release in, rat, **99**, 845
- , effects of acute and chronic clozapine on dopamine release and metabolism in, rat, **100**, 774
- Nucleus tractus solitarii**, cardiovascular effects of clonidine in range of ages, rat, **100**, 547
- , role of GABA receptors in ethanol inhibition of baroreflex bradycardia, **101**, 733

## O

- Ocular hypotension**, effect of L-662,583 on, experimental animals, **99**, 59
- Oedema**, contribution of bradykinin to, **101**, 739
- Oedema, paw**, polycation-induced, characteristics of, **101**, 986
- 8-OH-DPAT**, comparison with MDL 73005EF as a 5-HT<sub>1A</sub> selective ligand, effect on models of anxiety, **99**, 343
- , effect on effect of 5-HT, hippocampus, rat, **101**, 171
- , hypotensive effects of, following stereotaxic microinjection into ventral medulla, rat, **99**, 713
- , in definition of heterogeneity of  $\alpha_2$ -adrenoceptors, rat cortex but not human platelets, **99**, 481
- , mechanism in mediation of inhibition of plasma insulin in spontaneously hypertensive rat, **100**, 173
- Okadaic acid**, electrical effects of on sinus node, rabbit, **101**, 241
- Ondansetron**, effect on visceral pain reflex induced by duodenal distension, **100**, 497
- , (GR38032), effect on DiMe-C7-induced changes in dopamine and 5-HT metabolism, rat forebrain, **99**, 227
- $\kappa$ -Opiate receptors**, effect on <sup>45</sup>Ca influx into synaptosomes, **101**, 140
- $\kappa$ -Opioid**, receptor activation reduces increase in AVP secretion evoked by osmotic stimulation and acute haemorrhage, **99**, 384
- $\kappa$ -Opioid agonists**, effect on renal excretion of water and electrolytes, rat, **99**, 181
- $\kappa$ -Opioid antinociception**, CI-977, **101**, 183

**$\kappa$ -Opioid receptor**, novel potent and selective agonists for, **101**, 944  
**Opioid receptor agonists**, effect on circulatory responses to haemorrhage rabbit, **100**, 421  
 **$\delta$ -Opioid receptor binding sites**, rat spinal cord, **100**, 319  
**Opioid receptors**, activation of inhibits non-cholinergic nerve stimulation induced bronchoconstriction, guinea-pig, **101**, 269  
 **$\delta$ -Opioid receptors**, antagonism of swim-stress-induced antinociception by, rat, **100**, 685  
**Opioid receptors**, binding and *in vitro* depression of nociceptive responses, rat, **99**, 503  
 —, modulation of cholinergic neurotransmission in airways by, guinea-pig, **100**, 131  
**Opioid receptors subtypes**, behavioural and ECoG effects of selective agonists at, locus coeruleus, rat, **101**, 655  
**Opioid withdrawal**, effect of clonidine, nimodipine and diltiazem on, guinea-pig ileum, **101**, 958  
 —, enteric neurones recruited during, guinea-pig ileum, **101**, 908  
**Opioids**, and ganglionic transmission, **101**, 505  
 —, antinociceptive actions mediated by, dorsal horn, rat, **101**, 477  
**Org10325**, effects on cardiac and vascular tissue, **100**, 735  
**ORG30029**, calcium sensitising effects of in skinned fibres, rat, **100**, 843  
**Organ vascular resistance**, effect of neuropeptide Y on, **99**, 340  
**Organophosphates**, effect of nicotinic receptor ion channels, muscle endplate, mouse, **101**, 349  
**Organophosphorus**, effect on latencies of action potentials in skeletal muscle, mouse, **99**, 721  
**Ornithine decarboxylase**, impaired induction of activity in streptozotocin-diabetic rat prevented by ponalrestat, **101**, 978  
**Osmotic damage**, sensitivity to, colonic mucosa, human, **99**, 289  
**Ouabain**, effect in perfused adrenal glands, role of  $\text{Na}^+$  in muscarinic receptor-mediated catecholamine secretion, cat, **101**, 67  
 —, effect on guinea-pig isolated trachealis, effect of cooling, **99**, 369  
 —, inhibition of  $\text{Na,K-ATPase}$  by factors influencing, **101**, 337  
**Ouabain inotropic effect**, role of  $\text{Na-H}$  exchange in, guinea-pig atria, **100**, 717  
**Oxadiazoles**, acting as full agonists at muscarinic receptors, **101**, 575  
**Oxazepam**, pharmacokinetic-pharmacodynamic modelling of anticonvulsant effect of, rat, **99**, 53  
**Oxyhaemoglobin**, in platelet inhibition, **101**, 991  
**Oxiracetam**, effect on field potentials of hippocampus, rat, **99**, 189  
**Oxotremorine**, effect of epithelium removal on actions of, trachea, guinea-pig, **100**, 516  
**Oxytocin**, central inhibition by  $\gamma$ -aminobutyric acid and muscimol of release of, rat, **99**, 529

## P

**$\text{P}_{2u}$ -receptors**, characterization of, ear artery, rabbit, **101**, 640  
 —, suramin as antagonist at, rabbit ear artery, **101**, 645  
**PAF**, contribution of platelets and airway smooth muscle in -induced bronchial hyperresponsiveness, rabbit, **101**, 31  
 —, effect of anti-asthma drugs on eosinophil accumulation induced by PAF, pulmonary airways, guinea-pig, **99**, 267  
 —, effect on contractile force and  $^{45}\text{Ca}$  fluxes, atria, guinea-pig, **100**, 305  
 —, effects of during perfusion, myocardial ischaemia and reperfusion, guinea-pig, **101**, 734  
 —, enhancement of effect of in rh-GMCSF-treated guinea-pigs, **100**, 399  
 —, from nematode-sensitized rats, alters blood flow to stomach and small bowel, **101**, 93  
 —, influence of plasma protein content and platelet number of potency of, rabbit, **100**, 163  
 —, inhibitory effects of MK-886 on metabolism in human phagocytes, **100**, 15  
 —, involvement in bradykinin-induced plasma exudation, guinea-pig airways, **101**, 739  
 —, relationship between tumour necrosis factor, eicosanoids and, as mediators of endotoxin-induced shock, mice, **99**, 499  
 —, role of eicosanoids in increases of vascular permeability induced by, airway, rat, **101**, 896  
**PAF antagonist**, influence of plasma protein content and platelet number on potency of, rabbit, **100**, 163  
**PAF sites**, for *in vivo* interaction of PAF species- and drug-dependent, **99**, 164  
**Pain reflex, visceral**, effect of granisetron and ondansetron on, **100**, 497  
**Palmitoyl carnitine**, interactions with endothelium, rat aorta, **100**, 241  
**Pancreatic  $\beta$ -cells**, inhibition by phentolamine and yohimbine of ATP-sensitive  $\text{K}^+$  channels in, mouse, **101**, 115

**Papillary muscle**, influence of N-ethylmaleimide on action potential and force of contraction of, guinea-pig, **101**, 406  
**Paracetamol**, prostacyclin and inflammatory pain, **101**, 869  
**Parafuorohexahydrosiladiphenidol**, interaction at muscarinic receptors *in vitro*, **99**, 637  
**Parasympathetic ganglia**, action of soman on muscarinic hyperpolarization in, cat bladder, **99**, 157  
**[D-Pen<sup>2</sup>,D-Pen<sup>5</sup>]enkephalin**, binding sites in rodent spinal cord, **100**, 319  
**[<sup>3</sup>H]-[D-Pen<sup>2</sup>,D-Pen<sup>5</sup>]enkephalin**, high affinity, saturable binding of, rodent spinal cord, **100**, 319  
**Penile erection**, inhibitory effect on 5-HT on, rat, **101**, 698  
**Pentagastrin**, effect of stimulation of oxyntic cell with after systemic neonatal pretreatment with capsaicin, stomach, rat, **100**, 491  
**Pentobarbitone**, effect on axonal currents, olfactory cortex, rat, **101**, 217  
**Pentoxifylline**, effect on vascularisation and fibre type of rat skeletal muscle subjected to limited blood supply, rat, **99**, 786  
**Pentylentetrazol**, effects on calcium currents of thalamic neurones, **100**, 800  
 —, mechanism of anticonvulsant actions of succinimides against seizures induced by, **100**, 800  
**Peptidase inhibitors**, role in conversion of dynorphin A(1-8) to [Leu<sup>5</sup>]enkephalin, myenteric plexus, guinea-pig, **101**, 674  
**Peptide 401**, anti-inflammatory activity resulting from mast cell degranulation *in vivo*, rat, **99**, 350  
**Peptide histidine isoleucine (PHI)**, co-release with VIP by peripheral and central vagal stimulation, dog stomach, **100**, 231  
**Peptide YY**, effect on electrically-evoked contractions, vas deferens, rat, **100**, 190  
**Pertussis toxin**, blockade of the anti-adrenergic effect by, guinea-pig, rat and human heart, **101**, 484  
 —, effect on contractile reactivity of mesenteric and renal arteries, rat, **101**, 859  
 —, in mediation of endothelium-dependent vasodilatation, mesenteric artery, rat, **100**, 427  
 —, no effect on peripheral prejunctional  $\alpha_2$ -adrenoceptor-mediated responses and on endothelium-dependent relaxations, rat, **100**, 348  
**Petit mal**, GABA current blockade in effects of anticonvulsants and convulsants on thalamic neurones, **100**, 807  
 —, low-threshold calcium current as a mechanism of action in, **100**, 800  
**PGD<sub>2</sub>**, role of prostanoid receptors in bronchoconstrictor effect of, guinea-pig, **100**, 761  
**PGE<sub>2</sub>**, effect on adrenergic neurotransmission in atrial and ventricular preparations, guinea-pig, **99**, 717  
**Phaclofen**, effect on isolated vas deferens and ileum, guinea-pig, **99**, 422  
 —, inactive as blocker of (–)-baclofen-induced effects in synaptic processing of somatosensory information in S1 cortex, cat, **100**, 689  
**Phaeochromocytoma PC12 cells**, effect of suramin on ATP-activated current in, **101**, 224  
**Pharmacokinetics**, of theophylline on myocardial reactive hyperaemias, dog, **100**, 95  
**Phenidone**, effect of Sephadex-induced eosinophilia, rat, **101**, 821  
**Phenoxybenzamine**, effects of, indicate role of  $\alpha_1$ -adrenoceptors for influence of basal EDRF, **99**, 77  
**Phentonium**, enhances spontaneous release of ACh, motor nerve terminals, rat, **100**, 441  
**Phentolamine**, in inhibition of ATP-sensitive  $\text{K}^+$  channels, pancreatic  $\beta$ -cells, mouse, **101**, 115  
 —, responses to cromakalim and pinacidil in smooth and cardiac muscle by use of, **100**, 201  
**Phenylephrine**, effect of activation of potassium conductance in inhibition by carbachol of positive inotropic responses to, rabbit, **99**, 661  
 —, elicits contractions in human subcutaneous arteries in presence of yohimbine, **99**, 31  
**Pilocarpine**, effects of acute and chronic lithium treatment on phosphoinositide hydrolysis stimulated by, mouse brain, **101**, 39  
**Pinacidil**, characterization of responses to in smooth and cardiac muscle by use of selective antagonists, **100**, 201  
 —, cytoplasmic calcium and relaxation of coronary arterial smooth muscle by, **101**, 157  
 —, effect on ATP-sensitive potassium channels in insulin-secreting cells, **99**, 487  
 —, effect on rat uterus, **101**, 901  
 —, inhibits neuromuscular transmission, mesenteric arteries, rabbit and guinea-pig, **101**, 581  
 —, opposing effects on  $\text{K}^+$  channels, **100**, 143  
 —, study of adrenergic-cholinergic interactions in left atria using,

- rabbit, **99**, 661
- Pinaverium**, effect on voltage-activated Ca channel currents, single smooth muscle cells, rabbit jejunum, **99**, 374
- (±)-**Pindolol**, effect of 5-HT<sub>1A</sub> receptor antagonist action of in von Bezold-Jarisch reflex, rat, **100**, 757
- Pindolol**, influence on cold adaptation, rat, **99**, 673
- Pirmenol**, use-dependent effects on  $\dot{V}_{\max}$  and conduction, ventricular myocardium, guinea-pig, **99**, 815
- Phenylephrine**, endotoxin impaired responsiveness to, rat, **101**, 913
- , in classification of  $\alpha_1$ -adrenoceptors in smooth muscle, **99**, 197
- Phenylethanolaminotetralines**, inhibition of intestinal motility by: new class of  $\beta$ -adrenoceptor, **100**, 831
- (-)-N<sup>6</sup>-**Phenylisopropyladenosine**, effect on myocardial inositol phosphate content and force of contraction, **101**, 829
- Philanthotoxin**, non-NMDA antagonism by, *in vivo*, **101**, 968
- Phorbol**, in role of protein kinase C-mediated contractile responses of arteries, diabetic rat, **101**, 465
- Phorbol ester**, impairment of relaxations to ACh and NO by, rat aorta, **101**, 432
- Phorbol esters**, in depolarization of dorsal root of primary afferent nerves, rat spinal cord, **100**, 656
- , in inhibition of smooth muscle contractions through activation of Na<sup>+</sup>-K<sup>+</sup>-ATPase, **99**, 237
- , inhibitory effect on release of EDRF, pig aortic endothelial cells, **99**, 565
- , interactions between adenosine and or lithium at neuromuscular junction, frog, **100**, 55
- Phorbol myristate acetate**, mechanisms for cardiac depression induced by, rat heart, **100**, 826
- Phosphatidylinositol turnover**, effect of endothelin on stimulation of, guinea-pig trachea, **100**, 383
- , turnover, stimulated by azanorbornane derivatives, **101**, 575
- Phosphatidylserine**, effects on decreased cardiovascular response to clonidine, nucleus tractus solitarius, old rat, **100**, 547
- Phosphodiesterase**, effect on contractile reactivity of mesenteric and renal arteries, rat, **101**, 859
- , effects of selective inhibition by on cyclic AMP hydrolysis, cerebrum, rat, **99**, 47
- Phosphodiesterase inhibition**, effect of carbachol on contraction, intracellular Na<sup>+</sup> activity and cyclic AMP, papillary muscles exposed to, guinea-pig, **99**, 401
- Phosphodiesterase III inhibitor**, haemodynamic profile of, **101**, 686
- Phosphoinositide hydrolysis**, stimulation by thyrotropin releasing hormone and di-methyl proline-TRH, GH<sub>3</sub> pituitary cells, **101**, 615
- Phosphoinositide metabolism**, characterization of muscarinic receptor subtype in, bovine tracheal smooth muscle, **99**, 293
- Phosphoinositides**, effects of lithium treatment on pilocarpine-stimulated hydrolysis of, mouse brain, **101**, 39
- Phospholipase**, activities affected by cationic factors, human lung, **100**, 447
- Phospholipase A<sub>2</sub>**, blockade of acetylcholine release by at motor nerve terminals, mouse, **100**, 301
- Phospholipase C**, effect of ibudilast on, guinea-pig lung, **100**, 564
- Phosphono-analogues of GABA**, antagonism of GABA<sub>B</sub>-receptor-mediated responses by, ileum and vas deferens, guinea-pig, **99**, 422
- Phosphoramidon**, effect on bradykinin-induced bronchoconstriction, guinea-pig, **101**, 77
- Phosphorylation of myosin**, effect of Ca in spasmogenic responses, dog tracheal muscle, **100**, 41
- Plasma renin activity**, effect of intracisternal injection of ACh on, dog, **100**, 471
- Platelet-activating factor**, inhibition of allergen-induced airway hyper-reactivity, guinea-pig, **99**, 396
- Platelet  $\alpha_2$ -adrenoceptors**, up-regulation induced by reserpine, dog, **101**, 329
- Platelet aggregation**, benzodiazepine analogues inhibit arachidonate-induced, human, **101**, 920
- , inhibition of by endothelin-1, **99**, 303
- , role of L-arginine:nitric oxide pathway in, **101**, 325
- Platelet inhibition**, by polymorphonuclear leukocytes, human, **101**, 253
- Platelets**, augmentation of induced contractions of blood vessels by release of neutrophil-derived agents, **99**, 553
- , effect of siguazodan on, human, **99**, 612
- , endogenous NO from L-arginine as modulator of platelet and white cell-vessel wall interaction, rabbit, **100**, 463
- , from actively sensitized guinea-pig transferred to normal animals respond to specific antigen with activation of circulating leucocytes, **100**, 185
- , human, identification of  $\alpha_2$ -adrenoceptors with [<sup>3</sup>H]-RX821002, **100**, 862
- , human, lack of heterogeneity of  $\alpha_2$ -adrenoceptors in, as defined by 8-OH-DPAT, RU 24969 and methysergide, **99**, 481
- , influence of plasma protein content and platelet number on potency of PAF and RP 59227, rabbit, **100**, 163
- , PAF-induced hyperresponsiveness, contribution of in, rabbit, **101**, 31
- , use of oxyhaemoglobin in investigation of inhibition of, **101**, 991
- Poly-L-arginine**, oedema induced by, rat hind paw, **101**, 986
- Polymixin B**, effect on endplate potentials, neuromuscular junction, frog, **100**, 55
- Polymorphonuclear leukocytes**, inhibition of platelet activation by, human, **101**, 253
- Ponalrestat**, impaired induction of ornithine decarboxylase activity in streptozotocin-induced rat prevented by, **101**, 978
- Portal vein**, role of adenosine in hyperaemic response of hepatic artery to occlusion of, **100**, 626
- Positive inotropic effect**, by CGRP by increase of calcium inward current, guinea-pig atria, **100**, 27
- Postjunctional  $\alpha_1$ -adrenoceptors**, in mediation of initial transient contraction in isolated blood vessels, rabbit, **99**, 253
- Postjunctional  $\alpha_2$ -adrenoceptors**, in mediation of initial transient contraction in isolated blood vessels, rabbit, coupling to dual sources of Ca<sup>2+</sup>, **99**, 253
- Potassium channel activator**, haemodynamic effect of, pig, **101**, 509
- Potassium channel blockade**, induction of non-specific airway hyper-reactivity by, rat, **101**, 541
- Potassium channel blockers**, and effects of cromakalim on smooth muscle guinea-pig bladder, **99**, 779
- Potassium channel openers**, effects of rat uterus, **101**, 901
- Potassium chloride**, effect of  $\omega$ -conotoxin GIVA on, small mesenteric artery, rat, **100**, 180
- , effect of epithelium removal on actions of, trachea, guinea-pig, **100**, 516
- , role of epithelium in modulation of tracheal responses to, **101**, 257
- Potassium current**, low excitability of tracheal smooth muscle cell upon depolarization due to, dog, **200**, 507
- Potassium membrane conductance**, action of cromakalim on, heart myocytes, frog, **100**, 581
- Prazosin**, antagonises contractions to noradrenaline, thoracic aorta, rabbit, **101**, 662
- , ineffectiveness in blocking of lithium-induced effects on blood glucose levels and insulin secretion, rat, **100**, 283
- Prejunctional  $\alpha_2$ -adrenoceptors**, differ in rat vas deferens and atrium, comparison with  $\alpha_{2A}$ - and  $\alpha_{2B}$ -ligand binding sites, **101**, 285
- Prejunctional muscarinic receptors**, effect of gallamine on ACh at, guinea-pig, **99**, 582
- Presynaptic inhibition**, action of (±)-baclofen, rat motoneurons, **99**, 413
- Presynaptic receptors**, characterization of, submucosal plexus, guinea-pig, **101**, 925
- , inhibit endogenous noradrenaline overflow in portal vein, rat, **99**, 223
- Procaine**, and effects of cromakalim on smooth muscle, guinea-pig bladder, **99**, 779
- Prodrug CGP22979**, mechanism of activation of, rat, **99**, 15
- Progesterone**, exposure of myometrium to responsible for pregnancy-induced decrease in effects of ANP, rat, **100**, 341
- Propentofylline (HWA 285)**, effect of extracellular purines and excitatory amino acids in CA1 of rat hippocampus during ischaemia, **100**, 814
- Propranolol**, antagonist at atypical  $\beta$ -adrenoceptor, jejunum, rabbit, **101**, 27
- , effect on established ventricular fibrillation, **100**, 503
- , ineffectiveness in blocking of lithium-induced effects on blood glucose levels and insulin secretion, rat, **100**, 283
- , influence on cold adaptation, rat, **99**, 673
- , modification of ischaemic-induced contraction in circumflex coronary artery by, sheep, **100**, 407
- Prostacyclin**, enhancement of endothelial production of by inhibitors of protein synthesis, **101**, 799
- , histamine induced release of potentiated by interleukin-1, **101**, 703
- , release of by ET-1 inhibits platelet aggregation, rabbit, **99**, 303
- , role in antinociceptive activity of paracetamol in inflammatory pain, **101**, 869
- Prostacyclin receptors**, activation of adenylate cyclase in cell lines NG108-15 and NCB-20, **99**, 309
- Prostaglandin**, in maintenance of muscle tone in fundic region of guinea-pig stomach, **101**, 809
- Prostaglandin E<sub>1</sub>**, inhibitor actions of on NANC contraction, guinea-pig bronchus, **101**, 13

- Prostaglandin endoperoxide**, receptor activation mediation of bradykinin-induced contraction by, **99**, 461
- Prostaglandin endoperoxides**, in mediation of arachidonic acid-induced vasoconstriction in diabetic and control kidney, rat, **100**, 336
- Prostaglandins**, competition between pro- and anti-inflammatory effects in reactions involving release of endogenous inflammatory mediators *in vivo*, hamster cheek pouch, **99**, 449
- , effect of fenbufen on clenbuterol-induced hypertrophy of cardiac muscle, effect on plasma, **101**, 835
- , in regulation of gastric mucosal integrity by endogenous nitric oxide, interaction with, rat, **99**, 607
- , increase in by ethanol, gastric and colonic mucosa, human, **99**, 289
- , modulation of acute mast cell-dependent inflammation, **99**, 449
- Prostanoid receptors**, stimulate gastric and ileal anion secretion, guinea-pig, **101**, 889
- Prostanoids**, stimulant effect of capsaicin on responses to field stimulation mediated by, **99**, 152
- Protein kinase C**, action of resiniferatoxin and capsaicin on peripheral nociceptors via phorbol ester-like stimulation of, neonatal rat tail, **99**, 323
- Protein kinase C**, effects of inhibitors on  $\alpha_1$ -adrenoceptor-mediated inotropic responses, ventricular papillary muscle, rat, **100**, 207
- , in contractile responses of arteries, diabetic rat, **101**, 465
- , in depolarization of primary afferent nerves, rat spinal cord, **100**, 656
- , in phorbol ester-induced cardiac dysfunction, **100**, 826
- , influence on noradrenaline release and phosphoinositide hydrolysis in chromaffin cells, **101**, 521
- , role in stimulus-activation coupling in superoxide generation with a variety of stimuli, **100**, 819
- Protein phosphorylation**, contractile, role of Org10325, **100**, 735
- G-Proteins**, pretreatment with pertussis toxin causes reduction of functional, renal cortex, rat, **100**, 63
- [D-Pro<sup>2</sup>,D-Trp<sup>7,9</sup>]SP**, attenuates oedema when co-administered with capsaicin, mouse ear, **99**, 516
- Pulmonary anaphylaxis**, potentiation by gallamine, guinea-pig, **99**, 582
- Purine catabolites**, effect of propentofylline on during ischaemia, rat hippocampus, **100**, 814
- Purineric nerves**, antagonism by suramin, guinea-pig urinary bladder and taenia coli, **99**, 617
- Purineric transmission**, in lower urinary tract, rabbit, **101**, 212
- , role of Ca channels in excitatory mechanical action of, urinary bladder, rat, **101**, 494
- Purines**, mediating contraction in colon, rat, **100**, 753
- P<sub>2</sub>-Purinoceptor**, [<sup>3</sup>H]- $\alpha,\beta$ -methylene ATP as radioligand for, urinary bladder, rat, **101**, 291
- Purinoceptors**, action of in articular blood vessels, rabbit knee joint, **99**, 379
- , antagonism by suramin, guinea-pig, **99**, 617
- , in noradrenergic-purineric co-transmission, hepatic artery, rabbit, **99**, 835
- , ontogeny of, urinary bladder and duodenum, rat, **100**, 874
- A<sub>2</sub> Purinoceptors**, in endothelium-dependent relaxation, thoracic aorta, rat, **100**, 576
- , transient vagally-mediated bronchospasm induced by stimulation of, **100**, 251
- P<sub>2</sub>-Purinoceptors**, mediate formation of 1,4,5-inositol trisphosphate via a pertussis toxin-sensitive pathway, renal cortex, rat, **100**, 63
- , mediation of response to single nerve stimulus by non-cholinergic transmitter through activation by, **99**, 493
- P<sub>2x</sub>-Purinoceptors**, desensitization by mATP, *in vivo* and *in vitro*, rat, **99**, 820
- Purkinje fibre**, cardiac, rate-dependence of combined electrophysiological effects of lidocaine and sotalol in, dog, **99**, 124
- , effects of nicorandil on by abolition of spontaneous and triggered electrical activity, **99**, 119
- Puromycin**, enhancement of prostacyclin release by inhibition of protein synthesis, **101**, 799
- Pyrimidine complex**, effect of zinc on GABA response, guinea-pig, **99**, 643
- Pyrogallol**, effect on response to NANC stimulation, rat anococcygeus and bovine retractor penis muscle, **99**, 194
- PYY fragments**, effect on electrically-evoked contractions, vas deferens, rat, **100**, 190

## Q

- Quinapril**, *in vivo* inhibition following, rat, **100**, 651
- Quinidine**, and effects of cromakalim on smooth muscle, guinea-pig bladder, **99**, 779

- Quinine**, effect on release of catecholamines, bovine cultured chromaffin cells, **99**, 548
- Quisqualate**, excitation by, blocked by philanthotoxin, brainstem, rat, **101**, 968
- Quisqualate receptor**, in mediation of monosynaptic transmission from myelinated primary afferents to motoneurons, rat spinal cord, **100**, 850

## R

- Radioligand binding**, of P<sub>2</sub>-purinoceptors, urinary bladder, rat, **101**, 291
- Ranolazine**, prevention of myocardial enzyme release by in model of ischaemia with reperfusion, baboon, **99**, 5
- <sup>86</sup>Rb efflux**, increase by pinacidil via ATP-sensitive K<sup>+</sup> channel opening and effect of cromakalim on, canine mesenteric artery, **100**, 143
- Receptor binding**, assessment of imiloxan as, **99**, 560
- Regional myocardial function**, effect of elgodipine on, pig, **99**, 355
- , effect of EMD 52692 on, pig, **101**, 605
- Regional myocardial oxygen consumption**, effect of elgodipine on, pig, **99**, 355
- Renal failure, acute**, renal specificity of gludopa in, **101**, 301
- Renal failure, chronic**, vasopressin and the pathogenesis of, **100**, 79
- Renal vascular responsiveness**, to arachidonic acid in experimental diabetes, **100**, 336
- Renin-angiotensin system**, evidence for in interlobar renal arteries, pig, **101**, 89
- Reperfusion**, microvascular permeability dependent on circulating neutrophils, **100**, 729
- Reserpine**, induces vascular  $\alpha_2$ -adrenergic supersensitivity and platelet  $\alpha_2$ -adrenoceptor up-regulation, dog, **101**, 329
- Resiniferatoxin**, in stimulation of peripheral nociceptors in neonatal rat tail, *in vitro*, **99**, 323
- Retina**, development of tolerance to effects of vagabatratin on GABA release from, rat, **100**, 324
- Rhodnius prolixus**, salivary vasodilator in, **101**, 932
- Ridogrel**, effect on collagen-induced platelet activation, cat, **99**, 631
- Rilmenidine**, involvement of imidazoline receptors in central hypotensive effect of, rabbit, **100**, 600
- Ritodrine**, acting at atypical  $\beta$ -adrenoceptor, jejunum, rabbit, **101**, 27
- , in inhibition of intestinal motility, **100**, 831
- Ro20 1724**, effect on cyclic AMP hydrolysis, rat cerebral cortex, **99**, 47
- Ro 31-6930**, bronchodilator properties of, guinea-pig, **100**, 289
- Rolpram**, effect on cyclic AMP hydrolysis rat cerebral cortex, **99**, 47
- RP 49356**, antagonism by glibenclamide involves ATP-sensitive K<sup>+</sup> channel, rat uterus, **101**, 901
- , effect on ATP-sensitive potassium channels in insulin-secreting cells, **99**, 487
- RP 59227**, influence of plasma protein content and platelet number on potency of rabbit, **100**, 163
- RS 30026**, potent and effective calcium channel agonist, **99**, 687
- RU 24969**, effect on e.p.s.p., rat hippocampus, **101**, 171
- , in definition of heterogeneity of  $\alpha_2$ -adrenoceptors in rat cortex but not in human platelets, **99**, 481
- Ruthenium red**, inhibition of effects of capsaicin on dorsal root ganglion cells, rat, **101**, 423
- , inhibition of oedema formation and increased blood flow induced by capsaicin, rabbit skin, **99**, 7
- , inhibits toluene diisocyanate-induced contractions, urinary bladder, rat, **100**, 886
- RX77368**, comparison with thyrotropin releasing hormone on pituitary GH<sub>3</sub> cells, **101**, 615
- [<sup>3</sup>H]-RX821002**, new antagonist for platelets, **100**, 862
- Ryanodine**, effect of disopyramide on papillary muscle pretreated with, guinea-pig, **101**, 789
- , effect of endothelin on I<sub>Ca</sub> in presence of, guinea-pig heart cells, **99**, 437
- , effects on Ca-activated current, ventricular myocytes, guinea-pig, **101**, 399
- , effect on endothelin concentration response, guinea-pig trachea, **100**, 383
- , facilitation of calcium-dependent release of transmitter by, neuromuscular junction, mouse, **100**, 114
- , reveals multiple contractile and relaxant mechanisms in vascular smooth muscle, **100**, 677

## S

- Salbutamol**, acting at atypical  $\beta$ -adrenoceptor, jejunum, rabbit, **101**, 27

- , bronchodilator properties of, guinea-pig, **100**, 289
- , in inhibition of intestinal motility, **100**, 831
- Salivary gland**, dopamine receptor mediates the hyperpolarization of acinar cells in, cockroach, **101**, 103
- , trophic effects of substance P and vasoactive intestinal peptide on, **101**, 853
- Saphenous vein**, effectiveness of  $\alpha_1$ - and  $\alpha_2$ -adrenoceptor activation, dog, **101**, 387
- Saponin-treated muscle**, calcium sensitising effects of ORG30029 on, rat, **100**, 843
- Sarafotoxin**, structure-activity of, guinea-pig bronchus, **101**, 232
- Sarafotoxin-S6b**, regional responses to i.v. bolus injections of, in presence and absence of indomethacin, **100**, 158
- , vasoconstrictor activities of, mesenteric arterial bed, rat, **101**, 81
- Sarcoplasmic reticulum**, effect of endothelin on, guinea-pig cardiac cells, **99**, 437
- Scorpion toxin**, in formation of inositol phosphates, ileum, guinea-pig, **99**, 217
- SDZ 64-412**, PAF receptor antagonist, in prevention of non-specific airway hyperreactivity, guinea-pig, **99**, 396
- Second messengers**, independence of in action of capsaicin on peripheral nociceptors of neonatal spinal cord-tail, rat, **101**, 727
- Seizures**, modulation of susceptibility by strychnine-insensitive glycine recognition site of NMDA receptor/ion channel complex, **99**, 285
- Senescence**, reduced high affinity  $\alpha_1$ -adrenoceptors in liver in, rat, **101**, 650
- Senktide**, pharmacological analysis of binding to NK<sub>3</sub> tachykinin receptors, ileum longitudinal muscle-myenteric plexus and cerebral cortex, guinea-pig, **99**, 767
- Sensory nerves**, suppression by neuropeptide Y in, guinea-pig airways, **99**, 473
- Sensory nerves, peripheral**, physiological role in acid secretory responses to gastric distension, gastric mucosa and coeliac ganglion, **100**, 491
- Sephadex**, effects of drugs on eosinophilia induced by, rat, **101**, 821
- Septide**, in effect of spantide on rat spinal motoneurons, **100**, 711
- D-Serine**, in increase of potency of NMDLA in seizure induction, mouse, **99**, 285
- [D-Ser<sup>2</sup>,Leu<sup>6</sup>,Thr<sup>6</sup>]enkephalin**, effect on single fibre, nicotinic, excitatory synaptic potential, hypogastric ganglion, mouse, **101**, 505
- Siguzodan**, effect on human platelet function, **99**, 612
- SIN-1**, use of oxyhaemoglobin in investigation of platelet aggregation induced by, **101**, 991
- Sinus node cells**, electrical effects of okadaic acid on, rabbit, **101**, 241
- SK7F 100330-A**, potent histamine H<sub>1</sub>-receptor antagonist, cerebellum and cerebral cortex, rat and guinea-pig, **100**, 867
- SK7F S-106203**, as a potent, selective and competitive antagonist of leukotriene C<sub>4</sub>, leukotriene D<sub>4</sub> and leukotriene E<sub>4</sub> vascular responses, rat, **100**, 195
- Skeletal muscle**, effect of fenbufen on, rat, **101**, 835
- Skeletal muscle inhibition**, by chloroquine, **101**, 133
- Sleep**, role of opioid mechanisms in locus coeruleus in mediation of soporific effects of agonists at opioid receptors, **101**, 655
- Slow inward current**, increase in spontaneous activity of sinus node pacemaker cells by okadaic acid enhances, **101**, 241
- Small intestine**, human, motor response to porcine neuromedin U-8, **99**, 186
- Smooth muscle**, adrenoceptors involved in, stomach, **101**, 809
- , airway, characterization of stereospecific binding sites for inositol 1,4,5-trisphosphate in, **99**, 297
- , airway, distribution of  $\beta_1$ - and  $\beta_2$ -adrenoceptors in, mouse, **99**, 136
- , antagonism of purinoceptors by suramin in, **99**, 617
- , aorta, inhibitory action of  $\alpha$ -human atrial natriuretic peptide on noradrenaline-induced synthesis of IP<sub>3</sub>, rabbit, **99**, 536
- , atropine-resistant relaxation induced by high K<sup>+</sup> in, rat and pig, **100**, 401
- , effects of calmodulin antagonists on, rat myometrium, **100**, 353
- , human small intestine and urinary bladder, effect of porcine neuromedin U-8 on, **99**, 186
- , inhibition by phorbol esters through activation of Na<sup>+</sup>-K<sup>+</sup>-ATPase, **99**, 237
- , membrane hyperpolarization, cyclic nucleotide levels and relaxation in, guinea-pig, **100**, 329
- , multiple contractile and dilator mechanisms in, **100**, 677
- , L-N<sup>G</sup>-nitro arginine inhibits NANC relaxations, guinea-pig, **100**, 661
- , papillary, effect of RS 30026 on, guinea-pig, **99**, 687
- , role of endothelium and Ca channels in endothelin-induced contraction, human cerebral arteries, **99**, 439
- , tracheal, induction of hyperreactivity by K<sup>+</sup> channel blockade, rat, **101**, 541
- , vascular, interactions of spironolactone with (+)-[<sup>3</sup>H]-isradipine and (–)-[<sup>3</sup>H]-desmethoxyverapamil binding sites in, **101**, 6
- , vascular, sources of calcium for contractions mediated by  $\alpha$ -adrenoceptor subtypes in, **99**, 253
- Smooth muscle, airway**, PAF-induced hyperresponsiveness, contribution of platelets in, rabbit, **101**, 31
- , relationship between endothelin-1 binding site densities and constrictor activities in, **100**, 786
- Smooth muscle (bovine tracheal)**, characterization of muscarinic receptor subtype in phosphoinositide metabolism in, **99**, 293
- Smooth muscle cell**, effects of tetraethylammonium and 4-aminopyridine on outward currents and excitability of, dog, **100**, 507
- Smooth muscle muscarinic derivatives**, selectivity of hexocyclium derivatives for, **100**, 150
- Smooth muscle, tracheal**, actions of second messengers synthesized by spasmogenic agents and their relation to mechanical responses in, dog, **100**, 41
- , modulation of fluoroaluminate-induced inositol phosphate formation by increases in tissue cyclic AMP, in bovine, **100**, 646
- Smooth muscle, vascular**, action of enantiomers of dihydropyridine on different sites on voltage-dependent Ca channel of, **101**, 3
- , effects of diltiazem on Ca concentrations in cytosol and on force of contractions in, pig, **101**, 273
- , pathophysiology of impotence related to, male corpus cavernosum, **101**, 375
- , responses to vasoactive substances, **101**, 200
- Sodium channel**, effect of AFD-21 and AFD-19 on, cardiac muscle, **101**, 803
- Sodium channels**, action of ciguatoxin on, frog, **99**, 695
- Sodium cromoglycate**, effect on Sephadex-induced eosinophilia, rat, **101**, 821
- , in inhibition of neutrophil and eosinophil induced chemotaxis, **99**, 798
- Sodium excretion**, effect of atriopeptin III on, rat, **99**, 317
- Sodium nitroprusside**, effect on renal release of cyclic GMP and vascular tone, rat, **99**, 364
- , modulates fibrinolytic system, rabbit, **101**, 527
- , vasodilatation by acetylcholine, effect of L-NMMA on, skeletal muscle, rabbit, **100**, 463
- Soman**, action on muscarinic hyperpolarization in parasympathetic ganglia, cat, **99**, 157
- Somatosensory cortex**, GABA<sub>B</sub>-related activity involved in synaptic processing in, **100**, 689
- Somatostatin**, effect on calcium inward current, guinea-pig atria, **99**, 587
- , effect on withdrawal contractures, guinea-pig ileum, **101**, 908
- Sorbinil**, in prevention of inhibitory effect of streptozotocin-induced diabetes on motor transmission, rat detrusor, **101**, 411
- Sotalol**, rate-dependence of electrophysiological effects of in combination with lidocaine in cardiac Purkinje fibres, dog, **99**, 124
- Sotalol**, effect on ischaemia-induced myocardial damage, canine heart, **99**, 577
- Spantide**, pharmacological profile of, **100**, 711
- Spasmogenic agent-induced contraction**, on application of carbachol, 5-HT, histamine and STA<sub>2</sub>, dog tracheal smooth muscle, **100**, 41
- Spinal cord**, development of tolerance to effects of vagabatrion on GABA release from rat, **100**, 324
- Spinal transmission**, effect of CNQX on, rat, **100**, 850
- Spiperone**, effect of 5-HT<sub>1A</sub> receptor antagonist action of in von Bezold-Jarisch reflex, rat, **100**, 575
- Spontaneously hypertensive rat**, effect of endothelin on vascular sensitivity, **100**, 107
- , mechanism of 8-OH-DPAT-mediated inhibition of plasma insulin in, **100**, 173
- , reactivity and sensitivity of mesenteric vascular beds and aortic rings of to endothelin: effects of Ca entry blockers, **100**, 31
- Spironolactone**, interactions with (+)-[<sup>3</sup>H]-isradipine and (–)-[<sup>3</sup>H]-desmethoxyverapamil binding sites, vascular smooth muscle, **101**, 6
- Spiroxatrine**, effect on e.p.s.p., rat hippocampus, **101**, 171
- Staurosporine**, attenuates effect of PDBu and bradykinin but not of RTX or capsaicin, neonatal rat tail, **99**, 323
- , effect on endothelin- and carbachol-induced contraction, guinea-pig trachea and rat aorta, **100**, 383
- , effect on inotropic responses, ventricular papillary muscle, rat, **100**, 207
- , effect on neutrophil respiratory burst activated by receptor stimulation and post-receptor mechanisms, human, **100**, 819

- Stenosis**, enhanced coronary vasoconstrictor responses to 5-HT in presence of coronary artery, dog, **100**, 153
- Streptozotocin-diabetes**, prevention of impaired induction of ornithine decarboxylase activity by ponalrestat in, **101**, 978
- , inhibitory effect on non-cholinergic motor transmission in detrusor and its prevention by sorbinil, rat, **101**, 411
- Stress**, effect of capsaicin-sensitive sensory nerves on plasma glucose and catecholamine levels during 2-deoxyglucose-induced, rat, **100**, 523
- , prevention by FG 7142, **101**, 599
- Striatum**, effect of cholecystokinin sulphated octapeptide on endogenous dopamine release in, rat, **99**, 845
- , effects of acute and chronic clozapine on dopamine release and metabolism in, rat, **100**, 774
- , regulation of synthesis and metabolism of dopamine after disruption of nerve conduction in, **99**, 741
- Strontium**, in inhibition of  $\text{Na}^+$ - $\text{K}^+$  pump activity, peritoneal mast cells, rat, **100**, 453
- Substance P**, aerosolised, effects of on lung resistance, guinea-pig, **100**, 69
- , angiotensin converting enzyme inhibitors potentiate bronchoconstriction induced by, guinea-pig, **100**, 502
- , effect on superoxide anion production, alveolar macrophages, guinea-pig, **100**, 417
- , pharmacological profile of, rat spinal motoneurons, **100**, 711
- , trophic effect on parotid glands, **101**, 853
- Substance P analogues**, and NMDA-induced response, mouse, **101**, 307
- Substantia nigra**, actions of cocaine on, rat, **99**, 731
- , electrophysiological characterization of agonists at  $\text{GABA}_B$  receptors in, **101**, 949
- Substantia nigra zona compacta**, inhibition by L-DOPA, rat, **100**, 257
- 2-Substituted indazolinones**, inhibition of leukotriene  $\text{B}_4$  synthesis by, **99**, 113
- Succinate dehydrogenase**, in influence of  $\beta$ -adrenoceptors on cold adaptation, rat, **99**, 673
- Sulphidopeptide-leukotrienes**, inhibition of release of by nedocromil sodium, human lung, **100**, 247
- Sulphinpyrazone**, in inhibition of effects of lactate in simulated ischaemia, **100**, 477
- Sulphonylureas**, excite glucoreceptive ventromedial hypothalamic neurones by indirect inhibition of  $\text{ATP-K}^+$  channels, **101**, 531
- Sumatriptan**, blocks neurogenic oedema in dura mater, **99**, 202
- , (GR43175), inhibition of cyclic-AMP accumulation by, dog isolated saphenous vein, **99**, 219
- Superoxide**, neutrophil, K252a, staurosporine and, **1001**, 819
- Superoxide production**, effect of MK-886 on, human phagocytes, **100**, 15
- Suramin**, antagonism of ATP-receptor-operated membrane current in PC12 pheochromocytoma cells, **101**, 224
- , antagonism to responses to  $\text{P}_2$ -purinoceptor agonists and purinergic nerve stimulation, guinea-pig urinary bladder and taenia coli, **99**, 617
- , antagonist at  $\text{P}_{2x}$ -receptors, rabbit ear artery, **101**, 645
- Swim stress**, antagonism of by naltrindole, rat, **100**, 685
- Sympathetic preganglionic neurones**, influence of 5-HT agonist and antagonists on, rat, **99**, 667
- Sympathoinhibitory effects**, of  $\text{K}^+$  channel openers in spontaneously hypertensive rat, **100**, 557
- Synaptic transmission**, opioid receptors in, mouse, **101**, 505
- , sensitivity to agonist and antagonist properties of 5-HT $_1$  ligands, rat, **101**, 171
- Synaptosomes**, receptor-mediated inhibition of  $^{45}\text{Ca}$  accumulation into, **101**, 140
- , tryptophan uptake and efflux following central 5-HT neurone lesion, **101**, 981
- Systemic blood pressure**, effects of helodermin, helospectin I and helospectin II compared with VIP, **99**, 526
- Systemic haemodynamics**, effect of EMD 52692, pig, **101**, 605
- , effect of nimodipine on, pig, **100**, 277
- T**
- Tachycardia**, 5-HT-induced mediated by 5-HT $_4$  receptor, pig, **100**, 665
- Tachykinin antagonist**, spantide, pharmacological profile of, **100**, 711
- Tachykinin receptors**, analysis of [ $^3\text{H}$ ]-senktide binding to, guinea-pig ileum and cerebral cortex, **99**, 767
- , in inositol phospholipid hydrolysis in peripheral tissue, **101**, 1001
- , mediate contractile response of circular muscle, ileum, guinea-pig, **101**, 996
- , on alveolar macrophages, guinea-pig, **100**, 417
- Tachykinins**, ability to induce contraction of endothelium-denuded pulmonary artery, rabbit, and trachea, hamster, **100**, 588
- , in ileum, guinea-pig, **101**, 996
- , response of human fibroblasts to, mediated by NK $_1$ -receptors, **100**, 11
- Tacrine**, stimulation of neurosecretion at motor endplates by, mammal, **100**, 487
- Taenia coli**, antagonism of purinoceptors by suramin in, **99**, 617
- TEA**, induction of non-specific airway hyperreactivity to cooling, 5-HT and ACh in blockade of  $\text{K}^+$  channels, rat trachea, **101**, 541
- Temperature dependence**, of desensitization induced by ACh and histamine, guinea-pig, **100**, 636
- Tension**, resting, on effect of basal and stimulated EDRF release, **100**, 767
- Ternary complex mechanism**, detection of errors in agonist affinity estimation by operation of, **101**, 55
- Tetanus toxin**, prevention of neuronal loss produced by, by NMDA receptor antagonist MK801, hippocampus, rat, **101**, 776
- Tetradecapeptide renin substrate**, in local formation of angiotensin II, effect of endothelium, rat aorta, **100**, 237
- Tetraethylammonium**, effect on outward currents and excitability in tracheal smooth muscle cells, dog, **100**, 507
- , and effects of cromakalim on smooth muscle, guinea-pig bladder, **99**, 779
- Tetrahydroaminoacridine**, stimulation of neurosecretion at motor endplates by, mammal, **100**, 487
- Tetrodotoxin**, antagonism of effect of ciguatoxin in quantal transmitter release, frog motor nerve terminals, **99**, 695
- , blocks effect of veratridine on ACh-induced catecholamine secretion in absence of  $\text{Ca}^{2+}$ , **101**, 67
- , lack of effect on ability of epithelium removal to potentiate ACh, trachea, guinea-pig, **100**, 516
- Thalamus**, calcium current reduction by anticonvulsant succinimides in, **100**, 800
- Theophylline**, effect on myocardial reactive hyperaemias, dog, **100**, 95
- Thiols**, role in tolerance to hypotensive effects of glyceryl trinitrate, rat, **99**, 825
- Thiorphan**, effect on sensitivity to vasoactive intestinal peptide following epithelium removal, airway smooth muscle, guinea-pig, **100**, 73
- THIP**, in synaptic processing of somatosensory information, S1 cortex, cat, **100**, 689
- Thromboxane**, action of bradykinin dependence on stimulation of cyclo-oxygenase pathway to produce, in elicitation of vasoconstriction, canine veins, **99**, 461
- , effect on vasoconstrictor response to arachidonic acid, kidney, rat, **100**, 336
- , increase in by ethanol, gastric and colonic mucosa, human, **99**, 289
- , role in effect of PAF on vascular permeability, airways, rat, **101**, 896
- Thromboxane A $_2$** , competitive antagonism of glibenclamide of, coronary artery, dog, **100**, 375
- Thromboxane synthase inhibitors**, effect on bradykinin-induced tension canine veins, **99**, 461
- Thromboxane synthesis**, benzodiazepine analogues inhibit, human platelets, **101**, 920
- Thyrotropin releasing hormone**, comparison with di-methyl proline TRH on pituitary GH $_3$  cells, **101**, 615
- Tifluadom**, effect on renal excretion, rat, **99**, 181
- Tolbutamide**, inhibition of  $\text{ATP-K}^+$  channels, rat, **101**, 531
- Toluene diisocyanate**, modulation of contractile response to, urinary bladder, rat, **100**, 886
- Torbafylline**, effect of vascularisation and fibre type of skeletal muscle subjected to limited blood supply, rat, **99**, 786
- Torpedo electroplaques**, relative potencies for barbiturate binding to acetylcholine receptor in, **101**, 710
- N- $\alpha$ -Tosyl-L-arginine methyl ester**, effect of vascular tone of blood vessels and endothelial cells, **101**, 145
- TP-Receptors**, role in bronchoconstrictor effect of inhaled PGD $_2$ , guinea-pig, **100**, 761
- Trachea**, guinea-pig, mechanism of endothelin-induced contraction in, comparison with rat aorta, **100**, 383
- Trachea and bronchi**, guinea-pig, modulation of cholinergic neurotransmission in by opioids, **100**, 131
- Tracheal and bronchial vasodilatation**, in response to cigarette smoke, nicotine and capsaicin, **100**, 535
- Trachealis**, modulation of reactivity by respiratory epithelium, guinea-pig, **99**, 369
- Trachealis muscle**, effects of epithelium removal on relaxation of, induced by vasoactive intestinal peptide and electrical field stimulation, **100**, 73
- Transmitter release**, effect of butanedione monoxime on, **100**, 467



- , facilitation by ryanodine, neuromuscular junction, mouse, **100**, 114
- Tropomyosin**, effects of reported  $\text{Ca}^{2+}$  sensitizers on rates of  $\text{Ca}^{2+}$  release from, **100**, 779
- Troponin C**, effects of  $\text{Ca}^{2+}$  sensitizers on rates of  $\text{Ca}^{2+}$  release from cardiac, **100**, 779
- Tryptophan**, synaptosomal transport following 5-HT neurone lesion, **101**, 981
- Tumour necrosis factor**, relationships between eicosanoids, platelet-activating factor and, as mediators of endotoxin-induced shock, mice, **99**, 499
- T-Type  $\text{Ca}^{2+}$  current**, nicergoline inhibits in hippocampal CA1 pyramidal neurones, rat, **100**, 705

## U

- U50,488**, effect on renal excretion of water and electrolytes, rat, **99**, 181
- U-62066E**, inhibition of elevated arginine vasopressin secretion in response to osmotic stimulation and acute haemorrhage by, **99**, 384
- Up-regulation**, induced by reserpine, dog, **101**, 329
- Urethane**, effect on axonal currents, olfactory cortex, rat, **101**, 217
- Urinary bladder**, antagonism of purinoceptors by suramin in, **99**, 617
- , human, motor response to neuromedin U-8, **99**, 186
- , inhibitory effect of streptozotocin-induced diabetes on non-cholinergic motor transmission in, rat, **101**, 411
- Use-dependent block**, induced by pirlenol on  $V_{\text{max}}$  and conduction, ventricular myocardium, guinea-pig, **99**, 815
- Uterus**, refractoriness of to tocolytic and biochemical effects of ANP, rat, **100**, 341

## V

- Vagus nerve**, species related differences in characterization of 5-HT<sub>3</sub> receptors, **101**, 591
- Vas deferens**, effects of neuropeptide Y/peptide YY fragments on electrically-evoked contractions of, rat, **100**, 190
- , rabbit, rat, hamster and mouse,  $\kappa$ -opioid agonists in, **101**, 944
- Vascular injury**, role of NO in maintaining vascular integrity in endotoxin-induced intestinal damage, rat, **101**, 815
- Vascular reactivity**, endotoxin and, **101**, 913
- Vascular resistance**, change in potentiates increased reactivity of the mesenteric vascular bed of spontaneously hypertensive rat to endothelin-1, **100**, 31
- Vascular sensitivity**, induced by reserpine, dog, **101**, 329
- Vascular smooth muscle**, inhibitory effect of pinacidil in, rabbit and guinea-pig, **101**, 581
- , mechanism of nitroglycerin-induced relaxation, pig, **101**, 545
- Vasoactive intestinal peptide**, effects of epithelium removal on relaxation of airway smooth muscle induced by, **100**, 73
- , comparison with vascular effects of helodermin, helospectin I and II, **99**, 526
- , co-release with PHI by peripheral and central vagal stimulation, dog stomach, **100**, 231
- , trophic effect on parotid glands and sublingual glands, rat, **101**, 853
- Vasoconstriction**, enhanced 5-HT-induced of coronary arteris after stenosis, dog, **100**, 153
- , mediation by  $\text{P}_2$ -purinoceptors on vascular smooth muscle, rabbit knee, **99**, 379
- , thromboxanes and prostaglandin endoperoxides in mediation of bradykinin-induced, canine jugular and femoral veins, **99**, 461
- Vasodilatation**, induced by EDRF and ANF, rat kidney, **99**, 364
- , mediation by  $\text{P}_1$  purinoceptors on vascular smooth muscle, rabbit knee, **99**, 379
- , produced by acyl carnitine esters in isolated perfused heart of rat, **99**, 477
- Vasodilatation, endothelium-dependent**, role of G-proteins,  $\text{K}^+$  and Ca channels in, rat, **100**, 427
- Vasopressin**, central inhibition by  $\gamma$ -aminobutyric acid and muscimol of release of, rat, **99**, 529
- , comparison of vasoconstrictor and vasodilator responses to, superior mesenteric vascular bed, rat, **99**, 427
- , effect of cyclo-oxygenase blockade on renal actions of, rhesus monkey, **99**, 750

- , effect of  $\kappa$ -opioid receptor activation on secretion of, in response to osmotic stimulation and acute haemorrhage by U-62066E, **99**, 384
- , endotoxin impaired responsiveness to, rat, **101**, 913
- , in pathogenesis of chronic renal failure, **100**, 79
- , hepatic receptor of, antagonism by calcium of, for agonist interaction, **100**, 5
- , non-mediation in stress-induced antinociception, mouse, **99**, 243
- , role in cardiovascular effects of central injection of ACh, dog, **100**, 471
- Vasopressin antagonist**, SK&F 105494, effect of cyclo-oxygenase blockade on renal actions of, rhesus monkey, **99**, 750
- Ventral medulla**, hypotensive effects of 8-OH-DPAT and 5-methylurapidil after stereotaxic microinjection, rat, **99**, 713
- Ventral tegmental area**, actions of cocaine on, rat, **99**, 731
- Ventricular fibrillation**, pharmacological analysis of, **100**, 530
- Ventricular myocytes**, effect of ryanodine and caffeine on Ca-activated current in, guinea-pig, **101**, 399
- Ventricular myocytes, single**, effects of AFD-21 and AFD-19 on, guinea-pig, **101**, 803
- Ventromedial hypothalamus**, tolbutamide inhibition of ATP- $\text{K}^+$  channels in, **101**, 531
- Verapamil**, cardiovascular responses to in presence of blood gas abnormalities, **100**, 102
- , effect on established ventricular fibrillation, **100**, 503
- Veratridine**, in role of  $\text{Na}^+$  in muscarinic receptor-mediated catecholamine secretion in absence of  $\text{Ca}^{2+}$ , adrenal glands, cat, **101**, 67
- Vigabatrin**, development of tolerance to effects on GABA release from cerebral cortex, spinal cord and retina, rat, **100**, 324
- $\gamma$ -Vinyl-GABA**, development of tolerance to effects of on GABA release, cerebral cortex, spinal cord and retina, rat, **100**, 324
- $\text{V}_1$ -subtype receptors**, regulation of affinity and capacity characteristics of by calcium, **100**, 5
- von Bezold-Jarisch reflex**, role of central 5-HT<sub>1A</sub> receptors in, rat, **100**, 757

## W

- WEB 2086**, anti-anaphylactic activity of, modified by booster injection of antigen during active sensitization, guinea-pig, **100**, 217
- , as competitive antagonist against PAF-evoked platelet aggregation in plasma, rabbit, **100**, 163
- , attenuation of leakage in airways of guinea-pig, **101**, 739
- , differential inhibition of acute inflammation by, mouse, **99**, 164
- WEB 2170**, differential inhibition of acute inflammation by, mouse, **99**, 164

## X

- Xamoterol**, effect on cardiac  $\beta$ -adrenoceptors, rat, **99**, 27
- Xanthines**, antagonism of inhibitory adenosine receptor at neuromuscular junction and hippocampus by, rat, **101**, 453

## Y

- $\text{Y}_2$ -receptor**, 12 C-terminal amino acid residues of NPY and PYY minimum length required to activate, **100**, 190
- Yohimbine**, effect on noradrenaline-induced contractions, thoracic aorta, rabbit, **101**, 662
- , in inhibition of ATP-sensitive  $\text{K}^+$  channels, pancreatic  $\beta$ -cells, mouse, **101**, 115
- , reversal of lithium-induced effects blocked by pretreatment with, rat, **100**, 283
- [ $^3\text{H}$ ]-Yohimbine**, labels  $\alpha_{2A}$ - and  $\alpha_{2B}$ -adrenoceptors, rat brain, **99**, 803

## Z

- Zacopride**, induces increase in EEG-energy, rat, **101**, 281
- Zinc**, differential effect on vertebrate GABA<sub>A</sub>-receptor complex, **99**, 643
- , in inhibition of phospholipase activities in human lung, **100**, 447
- ZK110841**, in characterization of DP-receptors, **99**, 13
- Zymosan**, kinins in inflammatory exudates induced by, rat, **101**, 418
- Zymosan-induced peritonitis**, antinociceptive activity of paracetamol in, role of prostacyclin and reactive oxygen species, **101**, 869

# British Journal of Pharmacology

Instructions to Authors	3
Nomenclature Guidelines for Authors	11
Index to Volumes 99, 100 and 101	13