

Volume 234
JULY-SEPTEMBER
1985

The Journal of PHARMACOLOGY AND EXPERIMENTAL THERAPEUTICS

*A Publication of The American Society
for Pharmacology and Experimental Therapeutics*

Founded by John J. Abel 1909

EDITOR

Eva King Killam

ASSISTANT EDITOR

Mannfred A. Hollinger

EDITORS FOR SPECIFIC FIELDS

Analgesia and Drug Abuse
Joseph Cochlin

Autonomic Pharmacology
Joseph J. McPhillips
Robert E. Stitzel

Behavioral Pharmacology
John A. Harvey

Cardiovascular Pharmacology
Leslie E. Bailey
Henry R. Besch, Jr.
Theodore M. Brody
Sue Piper Duckles

Cell Pharmacology
Toshio Narahashi
George B. Weiss

Chemotherapy
H. George Mandel

Developmental Pharmacology
Bernard L. Mirkin

Drug Metabolism and Disposition
Edward Bresnick
Jordan L. Holtzman

Endocrine Pharmacology
Paula H. Stern

Gastrointestinal Pharmacology
Thomas F. Burks

Immunopharmacology
Sydney Spector

Neuropharmacology
Edmund G. Anderson
S. J. Enna
Charles O. Rutledge

Prostaglandins and Leukotrienes
John C. McGiff

Pulmonary Pharmacology
Mannfred A. Hollinger

Renal Pharmacology
William O. Berndt

Toxicology
Curtis D. Klaassen

EDITORIAL ADVISORY BOARD

Martin W. Adler
Edson X. Albuquerque
Lewis Aronow
Michael D. Bailie
Robert L. Balster
Paul Bass
Michael A. Beaven
John A. Bevan
C. Paul Bianchi
Ruth E. Billings
David A. Blake
Floyd E. Bloom
Gary Brooker
Carl K. Buckner
David B. Bylund
Theodore J. Cicero
Doris H. Clouet
Leonard Cook
Charles R. Craig
E. E. Daniel
William C. de Groat
Louis Diamond
Gerald F. DiBona
Robert J. Dinerstein
Walter R. Dixon
James S. Douglas
J. W. Downie
Sue Piper Duckles
Linda Dykstra
Hugh L. Evans

James A. Ferrendelli
Gregory D. Fink
Lawrence J. Fischer
Ray W. Fuller
Timothy S. Gaginella
Gerard L. Gebber
James W. Gibb
Shri N. Giri
Frank R. Goodman
Charles W. Gorodetzky
Theodore E. Gram
Thomas P. Green
Garrett J. Gross
A. James Hance
T. Kendall Harden
Harold F. Hardman
Louis S. Harris
R. Adron Harris
Richard J. Head
William R. Hewitt
Stephen G. Holtzman
Jerry B. Hook
David M. Jacobowitz
Barbara A. Jakschik
Donald R. Jasinski
E. H. Jeffery
Alain F. Junod
George J. Kaloyanides
Conan Kornetsky
Edwin A. Kroeger

Tony J.-F. Lee
Roberto Levi
Wayne Levin
Louis Levy
George E. Lindenmayer
Stephen L. Lipsius
Walter Lovenberg
Benedict R. Lucchesi
K. U. Malik
William D. Matthews
Thomas A. McCalden
Donald E. McMillan
Jerry Mitchell
Perry B. Molinoff
W. H. Morse
Kevin Mullane
Jose M. Musacchio
Mary J. Mycek
Robert A. Neal
Philip Needleman
Robert F. O'Dea
Achilles J. Pappano
William A. Pettinger
Larissa A. Pohorecky
Donald V. Priola
Russell A. Prough
James W. Putney, Jr.
Arthur Raines
Carl E. Rosow
C. R. Ross

Ronald P. Rubin
Robert R. Ruffolo, Jr.
Betty I. Sasyniuk
Arnold Schwartz
Lewis S. Seiden
Eric J. Simon
Roger P. Smith
Roger D. Speakman
John L. Sutko
Boris Tabakoff
Robert I. Taber
A. E. Takemori
Robert E. Ten Eick
Thomas R. Tephly
Richard E. Tessel
C. D. Thron
U. Trendelenburg
Betty M. Twarog
Norman J. Uretsky
Ladislav Volicer
Martin A. Wasserman
I. M. Weiner
Benjamin Weiss
Richard M. Welch
David P. Westfall
Grant R. Wilkinson
Martin M. Winbury
Barry B. Wolfe
Ben G. Zimmerman

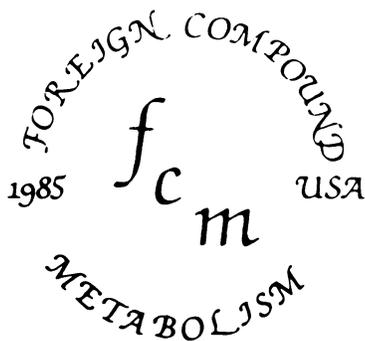
BOARD OF PUBLICATIONS TRUSTEES

William W. Fleming, *Chairman*: James A. Bain, Joseph R. Bianchine, Joel G. Hardman, Eva King Killam, Bettie Sue Masters, Jerry R. Mitchell, Marcus M. Reidenberg, Irving I. A. Tabachnick, Palmer W. Taylor, Vincent G. Zannoni

EXECUTIVE OFFICER OF THE SOCIETY

Kay A. Croker

COPYRIGHT © 1985 BY THE WILLIAMS & WILKINS COMPANY



II INTERNATIONAL SYMPOSIUM ON FOREIGN COMPOUND METABOLISM

Washington, DC

June 2-6 1985

Dedicated to: **Bernard B. Brodie**
Chairman: **Edward Bresnick**

Sponsored by
the American Society for Pharmacology and Experimental Therapeutics, the International Union of Pharmacology,
and the International Society for the Study of Xenobiotics

Secretariat: ASPET, 9650 Rockville Pike, Bethesda, MD 20814, USA. Phone: (301) 530-7060

ORGANIZING COMMITTEE

Edward Bresnick
Ronald W. Estabrook
James R. Gillette
H. George Mandel
Robert Snyder
Floie M. Vane
George J. Wright
Kay A. Croker, Secretary

OPENING CEREMONIES - SUNDAY, JUNE 2, 1985

SCIENTIFIC SESSIONS - MONDAY, JUNE 3 THROUGH THURSDAY JUNE 6, 1985

The scientific program will highlight the following topics:

Cellular and Subcellular Contributions to Xenobiotic Metabolism
Implications of Suicide Substrates
Applications of Principles of Molecular Biology
Multiplicity of Enzyme Systems
Sulfur Conjugation
Application of New Analytical Techniques
Metabolism of Endogenous Compounds
Oxygen and Foreign Compound Metabolism
Metabolism in Organs that Constitute Ports of Entry
Metabolism in Non-mammalian Species
The Role of Pharmacogenetics

For additional information describing details of the program, abstract forms, registration and housing, complete the form below and return it to Secretariat, II International Symposium on Foreign Compound Metabolism, 9650 Rockville Pike, Bethesda, MD 20814, USA.

Name _____ Title _____

Address _____

AUTHOR INDEX

- Allen, T. M., 250
Artursson, P., 255
Aucoin, D. P., 13
Banziger, V., 166
Barone, S., 184
Barrett, J. E., 106
Bartolome, M. B., 204
Bennett, B. M., 228
Benowitz, N. L., 153
Berti, F., 217
Bhardwaj, D., 250
Boorman, G. A., 57
Bowman, K. F., 90
Brady, L. S., 106
Brien, J. F., 228
Broadley, K. J., 222
Caporali, M. G., 274
Cassis, L. A., 280
Cone, E. J., 113
Conn, P. J., 195
Crivellari, M. T., 217
de Couët, G., 239
de la Lande, I. S., 184
Drayer, D. E., 13
Dumont, M., 239
Edman, P., 255
Endoh, M., 267
Erlinger, S., 239
Flaim, S. F., 63
Fleming, W. W., 280
Folco, G., 217
France, C. P., 81
Frank, G. B., 233
Frazer, A., 30
Gale, K., 45
Galli, M. T., 217
Garant, D. S., 45
Gatta, F., 274
Gibson, T. P., 190
Gleason, M. M., 63
Goldberg, S. R., 113
Gosselin, R. E., 19
Goto, K., 280
Grassi, E., 217
Griffiths, R. R., 120
Gross, M., 25
Head, R. J., 280, 184
Henningfield, J. E., 1
Hisaoaka, M., 180
Hoffman, B. B., 147
Hong, L., 57
Hume, J. R., 134
Humphrey, S. J., 288
Hurvitz, A. I., 13
Irvine, R. J., 184
Jacob, P., III, 153
Jasinski, D. R., 1
Jim, K. F., 161
Kiil, F., 261
Kost, S. B., 25
Kostyniak, P. J., 156
Kuhn, C. M., 204
Kumar, R., 25
Labler, L., 25
Lahita, R. G., 13
Le Bigot, J-F., 239
Lee, E. H. Y., 141
Levy, G., 180
Londowski, J. M., 25
Longhurst, P. A., 280
Lucantoni, D., 274
Lucchesi, B. R., 72
Lucchesi, K. J., 19
Luneau, C. J., 19
Lurie, K. G., 147
Luster, M. I., 57
Luthin, G. R., 37
Lynch, J. J., 72
Macdonald, R. L., 49
MacLeod, K. M., 222
Mandell, A. J., 141
Marks, G. S., 228
Massotti, M., 274
Matthews, W. D., 161
McCall, R. B., 288
McGiff, J. C., 211
McNeill, J. H., 222
Meier, W., 25
Mele, L., 274
Mezzetti, M., 217
Miyasato, K., 1
Montgomery, D. G., 72
Morita, T., 267
Mulder, K. M., 156
Murray, L., 250
Nakatsu, K., 228
Nielsen, E. B., 244
Northrup, N., 166
O'Brien, M. S., 190
O'Donnell, J. M., 30
Patel, S., 166
Peterson, M. E., 13
Poznansky, M. J., 250
Prada, J. A., 113
Pung, O., 57
Quilley, J., 211
Quimby, F. W., 13
Ratz, P. H., 63
Reidenberg, M. M., 13
Rice, P. J., 280
Risner, M. E., 113
Riviere, J. E., 90
Roache, J. D., 120
Rodgers, R. L., 222
Rogers, R. A., 90
Salamone, L. F., 190
Sanders-Bush, E., 195
Satoh, H., 172
Sautebin, L., 217
Sejersted, O. M., 261
Shetty, S. S., 233
Simpson, L. L., 100
Sjöholm, I., 255
Smith, J. B., 94
Stitzel, R. E., 184
Swigart, S. C., 63
Taira, N., 267
Taylor, D. A., 280
Tsujiimoto, G., 147
Tucker, A. N., 57
Tuttle, R. S., 166
Vassalle, M., 172
Ventura, A., 72
Viganò, T., 217
Vikse, A., 261
Werz, M. A., 49
Weselcouch, E. O., 19
Wolfe, B. B., 37
Woods, J. H., 81
Yanagisawa, T., 267

Notice to Contributors

(Revised July 1, 1983)

Scope of Submitted Manuscripts

The Journal invites for review original papers dealing with the interactions of chemicals with biological systems. Any aspect of pharmacology and therapeutics is included, but descriptive case reports without dose response or mechanism studies are usually not accepted. Manuscripts dealing primarily with new methods will be reviewed only if data are presented showing new or more reliable pharmacological information has been obtained by use of the methods or the methods are shown to lead to new or more reliable data than were previously attained.

Submission of Manuscripts

Manuscripts should be submitted in *four* copies to Dr. Eva King Killam, Editor in Chief, Journal of Pharmacology and Experimental Therapeutics, Department of Pharmacology, School of Medicine, University of California, Davis, California 95616, and accompanied by a check or purchase order for \$30.00 *manuscript handling fee* (in U.S. funds payable to ASPET). If submission of the manuscript handling fee entails personal financial hardship to the author, the fee will be waived. In that event the authors should submit a request for waiver of the fee at the time the manuscript is submitted.

Manuscripts should be typewritten double spaced in the English language using one side only of approximately 21.6 by 28 cm paper. One original drawing or photograph of each line figure and three (3) clear copies will be sufficient, 4 original drawings or photographs are required of each halftone figure. Pages should not be stapled together.

It is understood that neither the manuscript nor the data it contains have been previously published nor are being submitted elsewhere for publication. Manuscripts are accepted for review with the understanding that all authors listed have approved submission of the paper and that persons cited for unpublished work have approved such citation.

Authors submitting a manuscript do so with the understanding that if it is accepted for publication, copyright in the article, including the right to reproduce the article in all forms and media, shall be assigned exclusively to the Society for Pharmacology and Experimental Therapeutics. No reasonable request by the author for permission to reproduce any of his or her contributions to the journal will be refused. It will be necessary for *all* authors to sign an assignment of copyright form which will be mailed from the Editorial Office on acceptance of the manuscript. The only exceptions will be manuscripts on work done by employees of the U.S. Federal Government.

Organization of the Manuscript

In most cases manuscripts should contain the following sections in the order listed: 1) title page; 2) running title page; 3) abstract; 4) introduction; 5) methods; 6) results; 7) discussion; 8) acknowledgments; 9) references; 10) footnotes; 11) tables; 12) legends for figures; 13) figures; and 14) index terms. Each section should begin on a new page and all pages should be numbered consecutively.

1. Title page. This should contain the complete title of the manuscript, the names of all authors and the laboratory of origin.

2. Running title page. 1) Each published paper needs a running title to appear at the top of each page in the Journal. The running title should contain no more than 35 spaces, including punctuation. It should convey the sense of the full title. Commonly used abbreviations (such as "ATP," "ACh," etc.) may be used in the running title. 2) This page should also contain the name, address and telephone number of the person to whom page proof should be sent. 3) A list of abbreviations used in the paper should appear on this page. Additionally, each abbreviation should be defined the first time it is used in the text.

3. Abstract. The abstract should present in a concise form the purpose, the general methods, the findings and the conclusions of the manuscript. Abstracts should be limited to 200 words; abstracts of more than 250 words will not be accepted.

4. Introduction. This section should not be labeled, but should begin on a new page. It should contain a clear statement

of the aims of the reported work or of the hypotheses which the work was designed to test. A brief account of the background of the reported work may also be given in this section.

5. Methods. This section should contain explicit, concise descriptions of all new methods or procedures employed. Modifications of previously published methods should be described. Commonly used methods require only a citation of the original source. When methods are described, the description should be such as to enable the reader to judge their accuracy, reproducibility and reliability and to repeat the experiment. Very extended descriptions of methods may be submitted for deposit with the American Society for Information Science National Auxiliary Publications Service (NAPS) c/o Microfiche Publications, P.O. Box 3513, Grand Central Station, New York, NY 10017. A text reference or footnote stating that the full description is available from NAPS permits interested readers to obtain the information, and does not occupy an inordinate amount of Journal space. There is a nominal charge to authors for this procedure; those who request the complete information from NAPS pay a small fee.

6. Results. This section ordinarily contains the experimental data to be presented but not extended discussions of their significance. Results should usually be presented in graphic or tabular form, rather than discursively. Graphic presentation of data is often preferred but there should not be duplication in text, tables and figures. Sufficient data must be given to allow readers to judge the variability and reliability of the results. Statistical tests used and the data analyzed should be explained so that the findings can be interpreted and evaluated.

7. Discussion. This section should present conclusions to be drawn from the results. Speculative discussion is not discouraged, but the speculation should be based on the data presented and identified as such. The discussion should be as concise as possible, within the limits of the ideas which the authors wish to propose and adequate discussion of related work by others.

8. Acknowledgments. These may be included at the end of the text of the manuscript, but should have a separate heading. Gifts and assistance can be acknowledged here but financial support should appear in a footnote to the title.

9. References. In text citations, give the author's name and the year of publication (e.g., McCarthy, 1952; Ruth and Gehrig, 1929). With more than two authors, the text citation should contain the name of the first author, followed by "*et al.*" and the date (e.g., Kennedy *et al.*, 1960). In the list of references, entries should be arranged alphabetically by author, and not numbered. All authors' names should be given. If reference is made to more than one publication by the same authors in the same year, suffixes (a, b, c, etc.) should be added to the year in the text citation and in the list of references.

The list of references should contain, in sequence, the following information; authors' names and initials, title of the cited article, title of the journal in which the article appeared (abbreviated; see below), volume number of the journal, inclusive pagination and year of publication. Abbreviations for journals should conform to the Biosis List of Serials (BioSciences Information Services of Biological Abstracts, Philadelphia, PA 19103). Citations of personal communications or of unpublished observations should be given in parentheses at the appropriate place in the text not in the list of references. A paper may not be cited as "in press" unless it has been accepted for publication. In such cases the name of the journal must be given.

Except in extraordinary circumstances, no more than four references should be cited in support of any given point. The authors are responsible for the accuracy of such citations and are urged to take the utmost care in proofreading citations and reference list.

10. Footnotes. All footnotes to the title, authors' names or text should be indicated by arabic numeral superscripts, not by letters or other symbols. The footnotes should be typed in sequence on a separate page not a text page. Footnotes to tables are discussed under Tables, below.

11. Tables. Each table should be on a separate page. Tables should be numbered consecutively with arabic numerals, and should be designed to fit the column or page size of the Journal. A brief descriptive title should be given at the top of each table. The table number should be given in capital letters, the title in boldface upper and lower case letters (e.g., TABLE 3. **Uptake of labeled drug by rat liver slices**). The footnotes to the tables should be referenced by italicized lower case superscript letters (a, b, c, etc.) and should appear beneath the table involved, not on a separate page of the manuscript. Extensive tabular material not absolutely essential to the manuscript will be accepted for deposit with the ASIS/NAPS (see "Methods," above). In such instances a footnote in the published paper will refer the interested readers to NAPS from which copies may be obtained. Note *Statistics* below for expressions of probability.

12. Legends for figures. These should be numbered consecutively in arabic numerals and should appear on a separate page of the manuscript. Legends should explain the figures in sufficient detail so that frequent referral to the text is unnecessary, but efforts should be made to avoid unnecessary length. Abbreviations in the legends should conform to those in the text (see "Abbreviations," below).

13. Figures. Illustrations should be submitted as unmounted glossy photographic prints, no larger than 8 by 10 inches. The authors' name and address and the number of the figure should be placed on the back of each print. A typed label is usually most satisfactory. Ball type pen should *not* be used. Note *Statistics* below for expression of probability. Illustrations must be clear enough to permit reproduction without retouching and legibility after reduction to single-column size (approximately 3½ inches in width). Uniform symbolism should be used for all illustrations in a manuscript. Symbols, numbers and letters in the illustrations must be at least 1.5 mm in height after reduction to single column size. The title of each figure should appear in the legend rather than on the figure itself. Photomicrographs and electron micrographs should be labeled with a magnification calibration in micro or Angstrom units. A statement of the magnification should appear in the figure legend.

14. Index Terms. A list of index terms useful in constructing the annual index should be included as the last page of the manuscript.

Statistics.

Wherever possible statistical probability (P) in tables, figures, and figure legends should be expressed as * P < .05, ** P < .01 and *** P < .001. For second comparisons the symbols † may be used similarly. Authors are urged to avoid unnecessary complexity and to be consistent within the manuscript. In the event of multiple comparisons within a table, footnotes, a, b, c, etc. should be used.

Abbreviations

Magnitudes of variables reported should be expressed in numerals. Most abbreviations are used without punctuation, with no distinction between singular and plural forms (e.g., 1 mg, 25 mg; 1 sec, 25 sec). The usual prefixes are to be used for multiples or submultiples of the basic units (e.g., kg, g, mg, µg, ng, pg). The following abbreviations, or their properly prefixed multiples or submultiples, may be used without definition in the text, tables and figures:

Units of mass

gram	g
mole	mol
equivalent	Eq
microatom	µat

Units of concentration

molar (moles/liter)	M
normal (Eq/liter)	N
percent	%

Units of electricity

volt	V
ampere	A
cycles/sec	Hz

Units of radioactivity

curie	Ci
counts per min	cpm
disintegrations per min	dpm
roentgen	r

Units of length or volume

meter	m
micron	µ
Angstrom	Å
liter (spell out in text)	l

Units of time

hour	hr or h
minute	min or m
second	sec or s

Kinetics

dissociation constant	K_d
-----------------------	-------

Dissociation constant of

enzyme substrate complex	K_e
enzyme inhibitor complex	K_i
Michaelis constant	K_m
maximum initial velocity	V_{max}

Miscellaneous

degrees of temperature	°C
gravity	g
median doses	LD ₅₀ , ED ₅₀ , etc.
optically isometric forms	d-, l-, dl-
routes of drug administration	i.v., i.p., s.c., i.m.
standard deviation	S.D.
standard error	S.E.

Whenever an abbreviation other than those above is to be used in a manuscript, it is to be defined in the text or in a footnote thereto, the first time it is used. Abbreviations for commonly used substances should be those recommended by the Journal of Biological Chemistry. Abbreviations for drugs may be used if properly defined on first use and if the chemical or generic name of the drug is given when the abbreviation is first used. Abbreviations may be used in the running title but not in the full title of the manuscript.

Drugs

Generic names should be used in text, tables and figures. Trade names may be mentioned in parentheses in the first text reference to the drug but should not appear in titles, figures or tables. When a trade name is used, it should be capitalized; generic or chemical names are not capitalized. The chemical nature of new drugs must be given when it is known. The form of drug used in calculations of doses (e.g., base or salt) should be indicated. When several drugs are used, it may save space to include a separate paragraph in "Methods," or a separate table or footnote, listing the relevant information about all drugs employed.

Page Charges

Authors are assessed page charges at the rate of \$30 per printed page. With the page proof, authors will receive a request for information concerning such charges. These charges will be assessed only if they involve no personal expense to the authors. Request for waiver should be addressed to the ASPET Executive Officer at the time billing is received.

The cost of a limited number of illustrations will be borne by the Journal: the cost of excessive numbers of illustrations and of colored illustrations will have to be defrayed by the authors.

You can't ignore the new psychopharmacology

JOURNAL OF CLINICAL PSYCHOPHARMACOLOGY

Editors: **RICHARD I. SHADER, MD**, Professor and Chairman, Department of Psychiatry, Tufts University School of Medicine and Psychiatrist-in-Chief, New England Medical Center Hospital, and **DAVID J. GREENBLATT, MD**, Professor of Psychiatry and Associate Professor of Medicine, Tufts University School of Medicine, and Chief, Division of Clinical Pharmacology, Department of Psychiatry, New England Medical Center Hospital

Psychotropics are here to stay — and your practice demands that you stay informed about the newest developments. Now you can keep yourself up-to-date with one convenient bimonthly publication: the **Journal of Clinical Psychopharmacology**.

Pharmacology as it applies to your practice

The focus of **Journal of Clinical Psychopharmacology** is wholly clinical. Respected authorities survey the latest news about clinical trials and studies...side effects...drug interactions...overdose management...pharmacogenetics...pharmacokinetics...and the psychiatric effects of nonpsychiatric drugs.

The only source you need...

for current information in all phases of psychopharmacology. Every issue contains:

- Lots of original articles... the latest information on antipsychotics, anti-anxiety agents, antidepressants, and stimulants
- Detailed state-of-the-art reviews that sift through conflicting or confusing results to give you a working perspective on new developments
- Provocative case reports you can use in evaluating your own practice
- Timely reviews of the new books you want to hear about
- Concise abstracts of articles relevant to your practice
- A "Question the Experts" column to help you answer tough questions
- A "Forensic Update" column that keeps you informed about the legal scene as it affects your practice

5-star editorial board

Names you'll recognize, like Magda Campbell, John David, Daniel X. Freedman, Donald Klein, Louis Lasagna, and many more specialists of equal stature that we haven't space to mention here.

Williams & Wilkins

P.O. Box 1496 Baltimore, Maryland 21203

266 Fulham Road London SW10 9EL England

Please enter my subscription to the **Journal of Clinical Psychopharmacology** beginning with:

January 1985 July 1985

I want to avoid future rate increases. Enter my subscription for

3 years 2 years 1 year at the current rate.

Individual \$42/year Institutional \$55/year

In-training \$25/year

New subscription Renewal

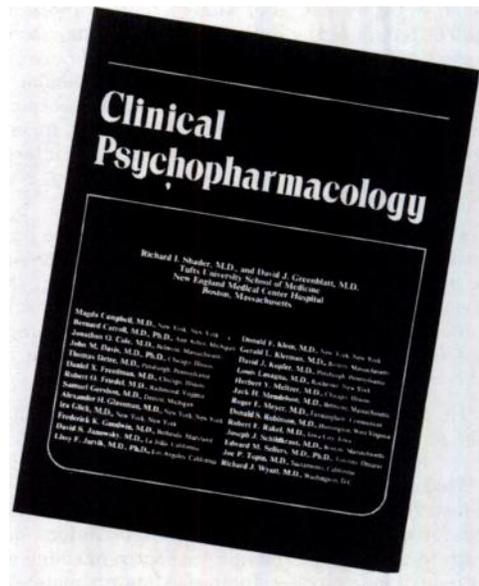
(add \$10.00 outside the US)

- Also send me the **1985 Bound Volume** at \$45.00 (\$50.00 outside the US). \$2.00 discount for all orders received by October 1, 1985. \$2.00 off listed rates for all prepaid orders. (Bound volumes are available to subscribers only, and the cost is in addition to the regular subscription price. To be shipped in early 1986. Sorry, bound volumes from past years are not available. All orders must be received before December 31, 1985.)

Name _____

Address _____

City/State/Zip _____



Let us take the risks

Use the attached coupon to subscribe to **Journal of Clinical Psychopharmacology** at the low base rate of \$42.00 /year. Only \$25.00 if you're in training or \$55.00 for institutions. (\$10.00 higher outside the US.) We pay postage, we'll bill you later if you like, and we guarantee a full refund on all unmailed issues—no questions asked—if you decide to cancel at any time.

If having everything you need to know about the rapidly changing world of clinical psychopharmacology delivered directly to you every month—all with a money-back guarantee—sounds good to you, then give us a try. Order your subscription to **JCPS** today.

published bimonthly

Individual \$42/year Institutional \$55/year In-training \$25/year
add \$10.00 outside the US

CALL TOLL FREE: 1-800-638-6423 from anywhere in the US except Alaska and Hawaii. In Maryland, call 528-4105 collect.

- My check or money order is enclosed
 Bill me
 VISA MasterCard American Express

card number _____

expires _____

signature/P.O. # _____

All rates subject to change without notice. Subscriptions outside the US and Canada must be prepaid, in US dollars only. Maryland residents, add 5% sales tax.

The in-training rate applies to residents, fellows, students, and interns. When requesting this special rate — which is limited to three years — please give training status and name of institution.

Williams & Wilkins

P.O. Box 1496
Baltimore, Maryland 21203

266 Fulham Road
London SW10 9EL
England



Printed in USA

JCPHAD 93178 85