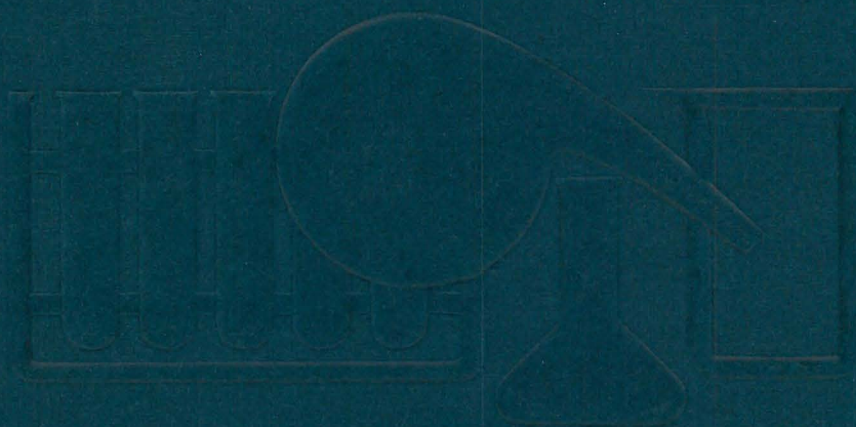


ANNUAL REPORT

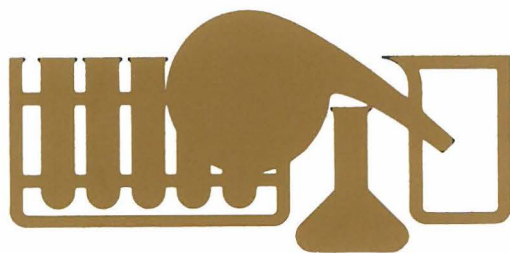
1989-1990



Pharmaceutical Manufacturers Association Foundation

ANNUAL REPORT

1989-1990

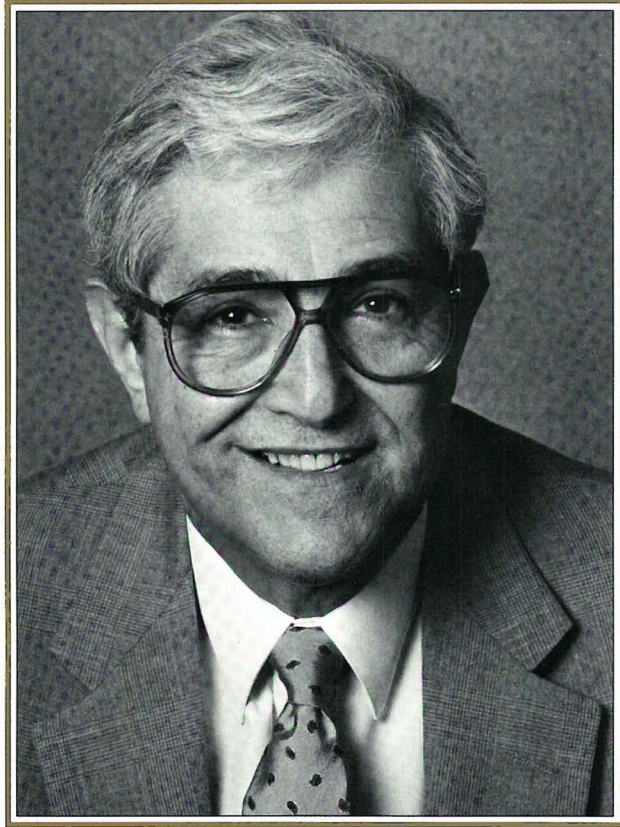


Pharmaceutical Manufacturers Association Foundation

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DEDICATED TO



LEON I. GOLDBERG

M.D., PH.D.

1926-1989

 Leon I. Goldberg, Chairman of the Foundation's Clinical Pharmacology Advisory Committee for fourteen years, died of cancer on May 8, 1989. Few people have had careers as dynamic and encompassing as Leon's.

His research disclosed that dopamine increases blood flow to the kidneys. This discovery presaged a new treatment for shock and refractory congestive heart failure, conditions in which urine flow and blood pressure are too low. Leon's spirited involvement in medical education, particularly the training of clinical pharmacologists, competed with his interest in research, and it was easy to foretell that he would savor the chance to lead the PMAF Clinical Pharmacology Advisory Committee.

He accepted the job without a quiver of concern about the time it would require. The result of his insightful leadership is conspicuous. After a decade and a half, the committee's programs not only serve budding clinical scientists and young faculty members but also help to develop Clinical Pharmacology Units in universities.

He is survived by his wife, Susanne, a son, Dr. Mark Goldberg, and a daughter, Claudia Otee.

The Board of Directors, Members of the Advisory Committees, President, and Staff of the Pharmaceutical Manufacturer's Association Foundation proudly dedicate this annual report to Leon I. Goldberg, M.D., Ph.D. We miss him.

REPORT OF THE CHAIRMAN



Harvey S. Sadow, Ph.D.

In this, my second Report as the Chairman of the Board of the Pharmaceutical Manufacturers Association Foundation, I am pleased and proud of the growth the Foundation has achieved during these past two years. This 1989-1990 Annual Report is also my final report as Chairman, since my term concluded with my retirement from the Board in April, 1990.

During this period, the Foundation has experienced:

- An increase in contributions of 18% or \$360,000 over the two-year period.
- A unanimous vote of confidence in the Foundation's programs and administration by the PMA Board of Directors, following a thorough review of PMAF activities.
- Two new Foundation grant programs were launched:
 1. "Undergraduate Research Fellowships Program in Pharmaceuticals"
 2. Opening of all eleven Foundation grant programs to applications for Research on Drugs for Rare Diseases.
- Amendment of the Foundation's By-laws to provide for an expanded Board of Directors and a system of rotation whereby more PMA Board members will have an opportunity to participate directly in the Foundation's governance.
- Launching of a new, high quality PMA Foundation publication entitled *Scholars*, dedicated exclusively to the Foundation's grant recipients.

In addition to the above accomplishments, I was pleased to report to the PMA Board of Directors, at their December, 1989 meeting, that:

- All of the PMA Foundation's advisory committees met during Fall, 1989 and Spring, 1990 to select awardees for the grant programs authorized for 1990.
- The number of meritorious applications, 294, set a new Foundation record.
- 82 awards were approved by Board action, based on recommendations of the Scientific Advisory Committee, and for a record total of \$2,310,700.

The above are hard facts—and we have a good reason to be proud of them. On a more philosophic note, however, we can also take pride in the increase in the number of graduate students in the area of pharmaceuticals, a field in which the Foundation recognized an imminent shortage several years ago. With PMAF

grant programs now assisting both undergraduate and graduate students, we believe there is a correlation between such programs and the increase from 597 graduate students in 1987 to 702 in 1989. Those are the kinds of statistics that underlie the fundamental values and objectives of the Foundation.

We can continue to improve on our past record only through the continued support of the more than 100 research-intensive pharmaceutical companies that comprise the Pharmaceutical Manufacturers Association. We are pleased to report that 30 of those firms increased their contributions to the PMA Foundation during 1989—to the tune of nearly \$200,000 over their 1988 contributions!

Those companies—and the PMA Foundation—recognize that the development of scientific capacity requires more than a one-year effort. A sustained commitment of resources—personnel, leadership, and finances—are what it takes.

Please join with me in recognizing that this type of sustained commitment is, in fact, generated by the Foundation's Officers and Board members, by President Bectel and the Foundation's staff, by the Advisory Committees and their many dedicated scientists, by the many grant applicants and awardees, and especially by the contributing members of PMA. To each and every one, I express my most sincere appreciation.

As I conclude my responsibilities as PMA Foundation Chairman, I am also pleased to pass the gavel along to my worthy colleague, Sheldon Gilgore, M.D., who will, I am confident, continue the positive momentum and direction of the Pharmaceutical Manufacturers Association Foundation.

Harvey S. Sadow, Ph.D.

Chairman

Board of Directors

REPORT OF THE PRESIDENT



Maurice Q. Bectel

As we enter the decade of the 1990's, we all recognize that time moves with increasing rapidity—or at least it seems so—and the ever-increasing pace of change continues. The Pharmaceutical Manufacturers Association Foundation is as much caught up in this rate of change as every other organization.

Because of the “time-hastening” factor, the PMA Foundation has decided to modify the timeframe of this—and future—“annual” reports. Beginning with this 1989-1990 Annual Report, we will report the financial data for the fixed, calendar year, the same basis on which we retain all financial records and file annual reports to the Internal Revenue Service, even though the Foundation is a tax exempt organization.

For non-financial activities, however, we will report on a slightly different “year”. Using such a revised format will allow us to report, as we do in this Annual Report, on the 1989 financial affairs of the Foundation, while in the same publication reporting on the 1990 Annual Awardees Banquet which was held January 31-February 1, 1990. In the old format, information on the 1990 Awardee Meeting would not have been published until mid-1991, when the 1990 Annual Report would have appeared.

We believe this revised format will present our readership with information in a more timely fashion.

Nineteen eighty-nine was a record-setting year of fiscal activity for the Foundation, with 58 scholars receiving over \$2,000,000 in grants, as reflected in the Treasurer's Report later in this Annual Report. Since the 1990 awards were applied for, reviewed, and selected during 1989, we need to differentiate between the fiscal activity for a given year and the decision-making activity, which is reflected in the following year's fiscal audit.

The 1989 award recipients were located in twenty states and awards were made in nine different categories. Details and descriptions of the awardees, their research, and the awards themselves are available in a PMA Foundation publication newly begun in 1989 and entitled *Scholars*. Copies of both the 1989 and 1990 issues of *Scholars* are available on request from PMA Foundation office.

While *Scholars* brings news of the award recipients, PMAF continues to send news of more general interest through our regular newsletter, *Tracking*. *Tracking* 23 was published during Winter 1989-90 and, along with last year's *Scholars*—the first—and this Annual Report, comprises a written record of the activities of the PMA Foundation.

I would like to add to this record, the record-setting accomplishments PMAF has enjoyed through the leadership of 1988-90

Chairman Harvey S. Sadow, Ph.D. Dr. Sadow has earned our most sincere appreciation through his service as a truly effective spokesman on behalf of the PMA Foundation. Through his dedicated efforts, programs have been expanded, bylaws have been changed, contributions have grown significantly, and, in general, the goals and objectives of the Foundation have been furthered.

It is the pledge of the new and continuing Foundation officials to build on that heritage.

Maurice Q. Bectel,
President



Harvey S. Sadow, Ph.D. (left), PMAF Chairman, had earlier introduced Arthur Hull Hayes, M.D., a former PMAF grant recipient, who served as speaker at the 1990 Awardee Meeting Banquet.

1989-1990 ON RECORD...

Established in 1965, the Pharmaceutical Manufacturers Association Foundation is now completing its first quarter century of activity. The Foundation's purpose is to promote public health through encouraging scientific and medical research.

Since its founding, the Foundation has accepted as contributions and disbursed in the form of grants over \$29 million. Approximately one fifth of that amount has been used to support research, with most of the remainder going into educational awards. Nearly 1,200 individuals—mostly budding young scientists just beginning their careers—have been assisted through this grant program.

Meetings and Other Activities

1989 ASPET Meeting

The American Society for Pharmacology and Experimental Therapeutics (ASPET) annual meeting presents an opportunity for the PMA Foundation to convene a number of Foundation participants—both awardees and committee members. Because of the areas of mutual interest, the Foundation sponsors a scientific symposium and reception, and has done so for some thirteen years.

On August 14, the 1989 PMA Foundation Program was held during the ASPET annual meeting, in Salt Lake City, Utah. Renowned surgeon, inventor, and author Willem J. Kolff, M.D., Ph.D., served as the guest lecturer. His presentation was entitled: "The History of the Artificial Heart and Kidney: Will They be Made Here or Abroad?" Over 100 were in attendance.

1989 PMA Foundation Board Changes

In April, 1989, the PMA Foundation Board met in conjunction with the Annual Meeting of the Pharmaceutical Manufacturers Association.

Retiring from the Foundation Board of Directors at the 1989 meeting were:

■ Albert Bowers, Ph.D., Chairman and Chief Executive Officer, Syntex Corporation, Palo Alto, California; Dr. Bowers had served as Foundation Vice Chairman.

■ Richard J. Kogan, President and Chief Executive Officer, Schering-Plough Corporation, Madison, New Jersey; Foundation Director.



Distinguished scientist Willem J. Kolff, M.D., Ph.D., was the principal speaker at the PMAF/ASPET gathering in Salt Lake City. Here he explains the workings of early model artificial organs to a PMAF awardee.

■ Joseph J. Ruvane, Chairman and Chief Executive Officer, Glaxo Inc., Research Triangle Park, North Carolina; Foundation Director.

Foundation Chairman of the Board Harvey S. Sadow, Ph.D., was re-elected Chairman to a second term in 1989. Dr. Sadow is Chairman of the Board of Boehringer Ingelheim Corporation and Boehringer Ingelheim Pharmaceuticals Inc., both of Ridgefield, Connecticut. Also continuing to serve as the Foundation's President is Maurice Q. Bectel of Washington, D.C.

Newly elected and installed at the 1989 April meeting were the following Foundation Directors:

■ Paul E. Frieman, President and Chief Executive Officer, Syntex Corporation, Palo Alto, California.

■ William F. Lalor, President, ICI Pharmaceuticals Group, Wilmington, Delaware.

■ Joseph A. Mollica, Ph.D., Vice President, Medical Products, E. I. du Pont de Nemours & Co., Wilmington, Delaware.

Re-elected Foundation Treasurer at the 1989 meeting was David B. Sharrock, President and Chief Operating Officer of Merrell Dow Pharmaceuticals Inc. Due to the merger of Marion Laboratories and Merrell Dow later in 1989, however, Mr. Sharrock resigned his post with the Foundation.

Elected at the December, 1989 Board meeting as the new Treasurer, succeeding Mr. Sharrock, is Joseph A. Mollica, Ph.D., elected to the Board of Directors earlier in the year.

Also at the December Board meeting, Charles A. Sanders, M.D., was elected to a three year term on the Board. Dr. Sanders is Chief Executive Officer of Glaxo, Inc., Research Triangle Park, North Carolina.

1989 and 1990 Awardee Meetings Held in Washington

The 1989 PMAF Awardee Meeting was held at the Vista Hotel in downtown Washington, D.C., February 8-9, 1989, with over 150 awardees, advisory committee members, and guests in attendance. Former PMA President and PMA Foundation Founder C. Joseph Stetler served as the banquet speaker, sharing his familiarity of the Foundation's early days in his humorous style. Leona Samson, Ph.D., of the Harvard University School of Public Health, was the keynote speaker at the scientific sessions.

The 1990 PMAF Awardee Meeting was held at the Capital Hilton Hotel in Washington, on January 31-February 1, 1990, with former FDA Commissioner Arthur Hull Hayes, M.D., serving as the banquet speaker. Dr. Hayes was an early recipient of a PMA Foundation grant and has always been an advocate for the Foundation's programs. M. Judah Folkman, M.D., presented the Thomas E. Hanrahan Memorial Lecture on "The Biology and Control of Angiogenesis—A New Therapeutic Approach."

Accompanying photographs provide additional information regarding the 1989 and 1990 Awardee Meetings.



Leona Samson, Ph.D., of Harvard University, presented the Thomas E. Hanrahan Memorial Lecture at the 1989 Annual Awardee Meeting.

Glenn Kiplinger, M.D., Ph.D. (left), former Chairman of the PMAF Scientific Advisory Committee, presents an award to Robert Moe, Ph.D., Vice President of Wyeth/Ayerst Research, in recognition of his service on the SAC during the period 1980-89.



Both videos, each approximately 10 minutes in length, are available by contacting the PMA Foundation office.



Foundation Goes on Video

Recognizing that high-technology, including video tape recordings, can be helpful to the PMA foundation, a second video tape was produced by the Foundation during 1989. The first tape, entitled "Coming of Age," was produced in 1988 and was designed to explain the workings of the PMA Foundation to a variety of audiences. The second tape, entitled "Our Hope for the Future," was developed to explain the Foundation's programs to pharmaceutical industry executives in an effort to increase their understanding and support of PMAF objectives.

In the photo, PMAF Awardee G. William Rebeck of Harvard University is doing an interview to be incorporated into the video tape, "Our Hope for the Future."

EDUCATION AND TRAINING PROGRAMS

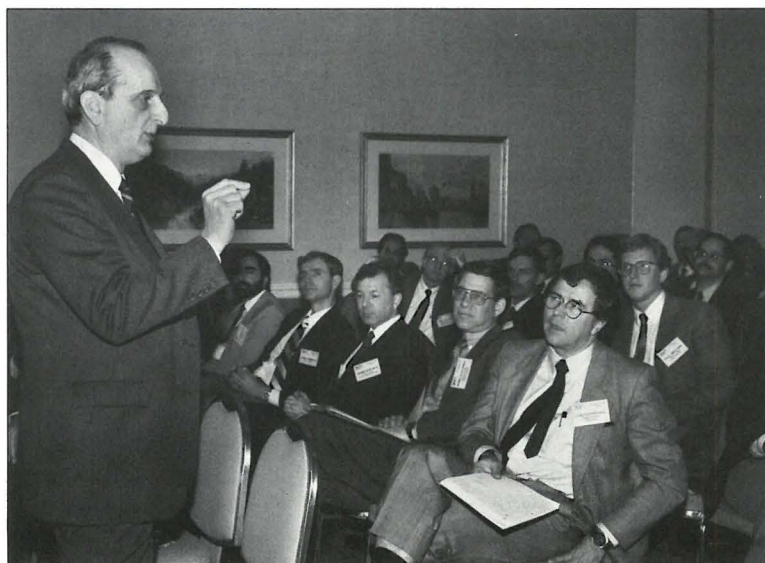
To further its objectives in the field of education, the PMA Foundation sponsors eleven programs—four in clinical pharmacology, one in the combined field of pharmacology-morphology, one in pharmacology or toxicology, one in basic pharmacology, one in toxicologic-pathology and two in pharmaceuticals. The Research Starter Grant provides starter funds in pharmacology, clinical pharmacology, drug toxicology and pharmaceuticals. The Foundation also accepts applications in all program areas for research on drugs for rare diseases.

CLINICAL PHARMACOLOGY

Faculty Awards in Clinical Pharmacology

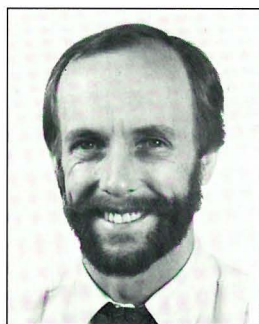
The four clinical pharmacology programs provide opportunities at the student, fellow and faculty levels. Through the Faculty Development Awards in Clinical Pharmacology program, the Foundation makes three-year awards to medical schools for salary and fringe benefits support of full-time junior faculty members. The Foundation has set a ceiling of \$40,000 on the amount of its participation in total yearly salary and fringe benefits for any candidate.

With the awards scheduled to begin July 1, 1990, 88 individuals have been supported under this program since 1967.



***M.** Judah Folkman, M.D., was the keynote speaker, presenting the Thomas E. Hanrahan Memorial Lecture at the 1990 Annual Awardee Meeting.*

Leo E. Hollister, M.D., member of the Clinical Pharmacology Advisory Committee, is shown discussing a poster presentation with former Awardee **Robert Swift, Ph.D.**, of Brown University.



Joseph J. Crowley, M.D.



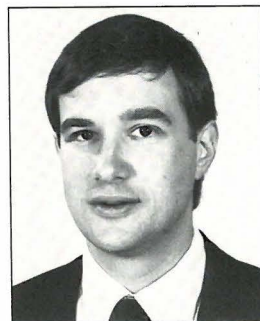
Paolo B. DePetrillo, M.D.

Recipients of the four awards beginning July 1, 1990 are:

Joseph J. Crowley, M.D., Assistant Professor, Division of Geriatric Medicine, University of Washington. Dr. Crowley's research is entitled, "Activation and Pharmacology of Polymorphonuclear Leukocytes in Chronic Obstructive Pulmonary Disease (COPD)." Dr. Crowley will examine the hypothesis that inflammatory cell activation occurs during the course of COPD and that resultant inflammation may contribute to airway hyperresponsiveness. One prime objective of this research will be to define the level of neutrophil (PMN) activation and priming in COPD patients which will be correlated with the state of bronchial responsiveness. Other objectives will be to document impaired regulation of PMN function in COPD and to determine the effects of therapeutic agents on PMN stimulus-response coupling after stimulation of a variety of cell activation pathways.

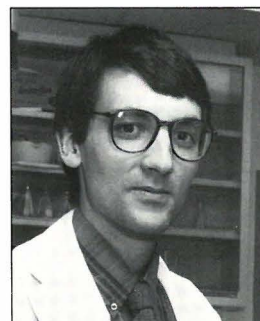
Paolo B. DePetrillo, M.D., Instructor, Department of Medicine, Brown University. Dr. DePetrillo will study the "Effects of Ethanol on Human Platelet Adenylate Cyclase Activity: Modulation by Protein Kinase C Activation." The effects of ethanol on protein kinase C activity will be measured and correlated with changes in adenylate cyclase activity. In a second set of experiments, the system will be characterized using platelets obtained from chronic alcoholics to matched controls. Various parameters of protein kinase C and adenylate cyclase activity will also be followed in the alcoholic population in order to assess what effects alcohol withdrawal has on the system.

Charles W. Flexner, M.D., Assistant Professor, Department of Medicine and Department of Pharmacology, The Johns Hopkins University School of Medicine. Dr. Flexner's research involves "Inhibitors of Lentivirus Envelope-Mediated Cell Fusion." Dr. Flexner will examine the molecular events involved and will establish a system for studying specific ways to inhibit fusion, which may ultimately contribute to the development of a new class of drugs to treat many viruses, including human immunodeficiency virus (HIV). Cell fusion, mediated by the envelope protein of visna virus, a prototypical lentivirus and close genetic relative of HIV, will be studied because of the broad range of cell types and conditions supporting visna-mediated fusion.



Charles W. Flexner, M.D.

Joseph F. Foss, M.D., Assistant Professor, Department of Anesthesia and Critical Care, Committee on Clinical Pharmacology, University of Chicago. Dr. Foss will investigate "Opioid Effects Outside the Central Nervous System." The difference in activity of opioid agonists at peripheral receptor sites as opposed to central receptor sites is not well understood. The quaternary narcotic antagonist methylnaltrexone, which does not penetrate the central nervous system, will be used to examine the function of peripheral opioid receptors. The control of emesis, sympathetic function and biliary spasm will be studied in animal models. Information from these studies regarding the mechanisms of several opioid effects that are not clearly documented, may assist in developing a new class of agents for treatment of these side effects.



Joseph F. Foss, M.D.

Individuals whose awards began July 1, 1989 are:

Patrick Taylor Horn, M.D., Ph.D., Assistant Professor, Committee on Clinical Pharmacology, University of Chicago.

Ralph A Kelly, M.D., Assistant Professor, Harvard Medical School.

Lawrence G. Miller, M.D., Assistant Professor, Tufts University School of Medicine.

Individuals who entered the second year of their award in July 1989 are:

Thomas C. Shea, M.D., Assistant Professor, Department of Medicine and Oncology, University of California, San Diego.

John Tangney Sullivan, M.D., Assistant Professor, Johns Hopkins University.

Concluding their awards in 1989:

William J. Elliott, M.D., Ph.D., Assistant Professor of Medicine, University of Chicago.

Matthew E. Knight, M.D., Assistant Professor, Pediatrics and Pharmacology, University of Florida.

Lyle Amos Siddoway, M.D., Assistant Professor, Georgetown University School of Medicine.

Theodore Wang, M.D., Assistant Professor of Medicine, Tulane Medical Hospital and Clinic.

Fellowships for Careers in Clinical Pharmacology

The second program provides Fellowships for Careers in Clinical Pharmacology. This award offers clinicians an opportunity for intensive study in any of the basic sciences that fall within the general field of pharmacology. The program is open to physicians, dentists, and veterinarians who are well into their clinical training and wish to pursue careers in clinical pharmacology. With the year or two of support offered by this fellowship program, depending on the particulars of the undertaking, the individual can pursue full-time study in the basic pharmacologic sciences needed to complement his clinical skills.

The program was amended in 1982 to allow an individual to apply for a fellowship two years in advance of the activation date of the award. For example, those applying for a fellowship in the Fall of 1990 may request that the fellowship begin July 1991 or July 1992.

The first awards under this program were made in 1973. Since that time, 47 fellowships have been awarded.

Recipients of the two fellowships beginning in 1990 are:

David Michael Kerins, M.R.C.P.I., Division of Clinical Pharmacology, Vanderbilt University. Dr. Kerins research involves, "Eicosanoids and Coronary Thrombolysis." Specifically, he will examine the deposition of platelets, the major source of TXA_2 , to locate the site of increased TXA_2 biosynthesis in an experimental model of coronary thrombolysis. Secondly, he will explore the interaction between platelets and endothelial cells in this setting by examining the biochemical and functional effects of a TXA_2 synthase inhibitor/receptor antagonist combination during coronary thrombolysis. This will address the hypothesis that the response to such a combination, which is dependent on endogenous PGI_2 formation, is limited by reperfusion injury to vascular endothelium.



*David Michael Kerins,
M.R.C.P.I.*

Therese K. Schmalbach, M.D., Ph.D., Department of Biology, Chemistry and Molecular Pharmacology, Harvard Medical School. Dr. Schmalbach will be studying "The Effect of Recombinant Human Macrophage Colony Stimulating Factor (rhM-CSF) on the Differentiation of White Blood Cells." The clinical effects of rhM-CSF on patients with myelodysplastic syndrome or acute myelogenous leukemia will be examined in a Phase I/II trial. The expression of M-CSF and its receptor in mature peripheral and blast cells will be assessed and correlated with the clinical response. These studies will help determine whether rhM-CSF has a direct or indirect action on the blast cell and may potentially identify the patient population most likely to benefit from such therapy. The effects of rhM-CSF, if any, on induction of leukemic cell differentiation *in vivo* will be determined using assays that measure the clonal origin of differentiated and blast cells. The results from these experiments hope to clarify the mechanism of action of rhM-CSF.



*Therese K.
Schmalbach, M.D., Ph.D.*

Recipients of the two fellowships for July 1989 are:

David W. Rudy, M.D., postdoctoral fellow, Indiana University.

Daniel Ward, D.V.M., postdoctoral fellow, University of Georgia.

Individuals who entered the second year of their awards in July of 1989 are:

Li Wang, M.D., Department of Pharmacology/Toxicology, Children's Hospital (Ohio State University).

Daniel David Gretler, M.D., Departments of Medicine and Pharmacology, University of Chicago.

Ending her award in 1989 is:

Dawn Merton Booth, D.V.M., Department of Veterinary Physiology and Pharmacology, College of Veterinary Medicine, Texas A&M University.

Medical Student Research Fellowships in Pharmacology-Clinical Pharmacology

The third program is the Medical Student Research Fellowships in Pharmacology-Clinical Pharmacology. This program, which began in 1974, offers students an opportunity to spend up to two years full-time conducting an investigative project in pharmacology-clinical pharmacology. The minimum period of the award is three months and maximum is two years. It is hoped that by having students become involved in investigative projects at a point when career choices are still relatively flexible, they will eventually choose research careers in clinical pharmacology. Ninety-three awards have been made since 1974.

Individuals whose awards begin in July, 1990, are:

Sarah F. Frampton, Department of Pharmacology, University of California, San Francisco (one year). Her principal advisor is Judith White, Ph.D., Assistant Professor in pharmacology.

Brent T. Harris, Department of Pharmacology, Georgetown University School of Medicine (one year). Mr. Harris' principal advisor is Dr. Erminio Costa, Professor of Pharmacology.

Peter Shen-Su Liao, Department of Clinical Pharmacology, Thomas Jefferson University (two years). Mr. Liao's principal advisor is Thorir D. Bjornsson, M.D., Ph.D.

Clinical Pharmacology Unit Support

This program assists directors of clinical pharmacology units established within a two-year period preceding the award, or units that have acquired a new director during that period. The grant provides a total of \$50,000 which may be used at any time over a

three-year period. The purpose of the program is to provide supplementary funds to assist the unit's research efforts until other research grants are obtained. The first grants were made in 1978. The total number of awards made to date is twenty. No awards were made for 1989. Three awards were made for 1990.

The awards beginning in 1990 were made to:



Michael F. Artman, M.D.

Michael F. Artman, M.D., Director, Clinical Pharmacology, Chief of the Division of Pediatric Cardiology, Associate Professor, Department of Pediatrics, and Department of Pharmacology, University of South Alabama, College of Medicine. Dr. Artman's program in clinical pharmacology will be extended not only to medical students, but to residents and practicing physicians—a unique aspect. Dr. Artman will also utilize a well established outreach program into a large area of physicians practicing in relatively isolated, rural areas—another unique feature. Because of their practice locations, it is difficult for these physicians to maintain good continuing education since they cannot easily leave their practices.

The unit's research is divided into three major areas: (1) Characterization of myocardial cyclic nucleotide phosphodiesterase activities during perinatal maturation; (2) Functional role of sarcolemmal sodium-calcium exchange activity in the developing heart; and (3) Experimental hemorrhagic shock: (a) induction of hepatic catalase activity; and (b) novel therapeutic interventions.



Eric P. Brass, M.D., Ph.D.

Eric P. Brass, M.D., Ph.D., Director, Clinical Pharmacology Unit, and Associate Professor of Medicine and Pharmacology, Division of Clinical Pharmacology, Case Western Reserve University. In addition to an active participation in teaching medical students and training graduate students and post-doctoral fellows, all professional staff affiliated with the Unit have active, nationally recognized research efforts. The major research programs are: (1) Interactions of carnitine with cellular metabolism; (2) The role of prostaglandins in the regulation of hepatic metabolism; (3) Carnitine metabolism during exercise; (4) Characterization of vasopressin receptors; (5) Regulation of receptor phosphorylation reactors; (6) Fatty oxidation in chronic renal failure and hepatic cirrhosis; (7) Pharmacokinetics of ibuprofen in cystic fibrosis; (8) Use of stable isotope methodologies for studying theophyllin pharmacokinetics; (9) Mechanism and significance of dicarboxylic acid generation in metabolic disease;

Jeffrey L. Blumer, M.D., Ph.D., Director, Division of Pediatric Pharmacology and Critical Care, and Professor of Pediatrics, Department of Pediatrics, The University of Virginia. Established in August of 1989, Dr. Blumer's Clinical Pharmacology Program is dedicated to teaching the principles of basic and clinical pharmacology to medical students, housestaff, fellows, and faculty. At present, the division's teaching activities primarily involve thrice-weekly clinical pharmacology service rounds of all pediatric wards and intensive care units, extensive in-depth written patient-specific teaching consults, participation in daily departmental morning report ("intake" rounds of patients admitted to

the hospital) and scheduled presentations at Departmental and extra-Departmental conferences.

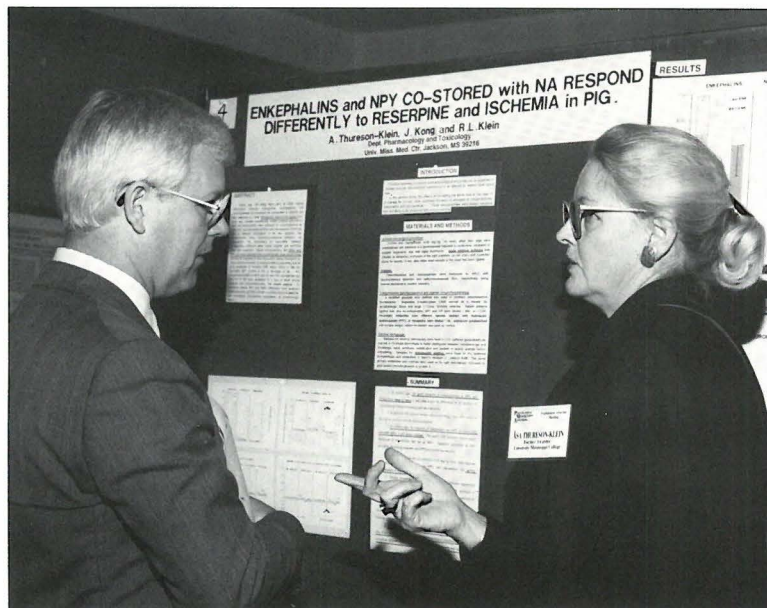
It is important to note that the division is involved in both basic and clinical research areas. The major areas of basic research are: (1) Mechanisms of anticonvulsant teratogenesis; and (2) Mechanism of benzene-induced DNA damage. The major clinical research interests are: (1) The role of exogenous catecholamine metabolism in the determination of their hemodynamic effects in children; and (2) pentoxifylline in postischemic acute renal failure.

BASIC PHARMACOLOGY

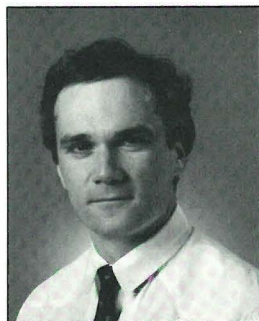
Faculty Development Awards in Basic Pharmacology

The purpose of the Faculty Development Awards is to strengthen basic pharmacology by helping to maintain existing academic capability and, ultimately, to expand the field by enlarging the faculty base. To accomplish these goals, support is provided to full-time junior faculty members who give promise of outstanding accomplishments.

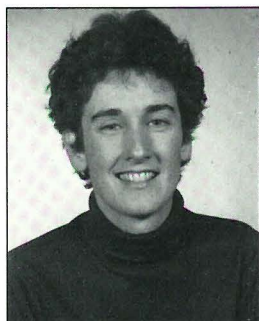
The first awards were made in 1973 and continue to be for a two-year period. The program provides salary and fringe benefits. The Foundation has set a ceiling of \$30,000 on the amount of its participation in the total yearly salary and fringe benefits for awardees. The total number of awards made to date is 49.



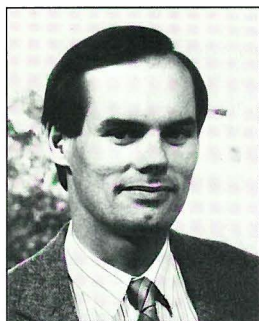
Hugh B. Lewis, B.V.M.S. (left), a member of the Pharmacology-Morphology Advisory Committee, makes a point in discussion with Gretchen Feussner, recipient of a PMAF Advanced Predoctoral Fellowship in Pharmacology/Toxicology, at the Poster Session.



James J. Galligan, Ph.D.



Anna Riegel, Ph.D.



Philip C. Smith, Ph.D.

Recipients of the 1990 Faculty Development Award in Pharmacology are:

James J. Galligan, Ph.D., Assistant Professor, Department of Pharmacology and Toxicology, Michigan State University. Dr. Galligan will study "Drug Receptors Code Synaptic Connections Between Enteric Neurons." The enteric nervous system resides within the wall of the gastrointestinal tract and controls all gut functions. The interaction between enteric nerves and between nerves and their effectors, such as gut smooth muscle, is poorly understood. Dr. Galligan aims to characterize the specific nerve pathways which provide excitatory synaptic input to excitatory and inhibitory motoneurons of the guinea-pig intestine *in vitro*. Intracellular inhibitory electrophysiological techniques will be used to study the actions of drugs selective for opioid, 5-hydroxytryptamine_{1a} and α_2 adrenergic receptors in the hope of developing nerve pathway specific drug therapies for disorders of bowel motility.

Anna Riegel, Ph.D., Assistant Professor, Department of Pharmacology, Georgetown University, School of Medicine. Dr. Riegel will study "A Potential Target for Pharmacological Management of Stress and Immunity: Transcriptional Regulation of the Pro-opiomelanocortin (POMC) Gene." The long-term objective of Dr. Riegel's project is to understand how a variety of immune and neuroendocrine regulators interact at the transcriptional level to effect concerted changes in POMC gene expression vital for the regulation of mammalian homeostasis. She will determine if immune regulators (viruses, interferon and interleukins) can directly regulate POMC gene expression in the pituitary and in lymphocyte cell lines and if these stimuli are transduced through the POB transcription factor. Through her research, Dr. Riegel will form the basis for future development of more specific therapeutic agents for treatment of the compromised immune system.

Philip C. Smith, Ph.D., Assistant Professor of Pharmacy, College of Pharmacy, University of Texas at Austin. Dr. Smith's research will address three areas: (1) Is covalent binding to proteins a general phenomenon for compounds that have acyl glucuronide metabolites present *in vivo*?; (2) What is the chemical mechanism for this covalent binding to proteins?; (3) Does formation of these covalent adducts alter the function of proteins?

Studies will be conducted *in vitro* and in animals using purified acyl glucuronides of model compounds (e.g. zomepirac, suprofen, clofibrilic acid) to determine whether they undergo acyl migration or form covalent adducts with proteins as albumin and hemoglobin. The effect of esterase inhibition on the stability of the acyl glucuronides will be evaluated first *in vitro* with various tissues from several animal species. The factors that may affect the exposure to acyl glucuronides *in vivo*, as esterase activity, biliary excretion, and UDP-GT activity, will be modified in animals and their effect on covalent binding will be determined. The disposition of protein adducts in animals will be examined from dosing zomepirac or adduct to autologous albumin, utilizing methods that distinguish the aglycone from the glucuronic acid portion of the adduct. The mechanism of covalent binding will be studied for several compounds to clarify whether "nucleophilic displace-

ment" or "imine formation" with Amadori rearrangement is the dominant process. Acyl migration and reversible protein binding of the acyl glucuronides will be studied empirically and theoretically and with regard to their role in covalent binding. Finally, the effect of covalent adduct formation on the function of proteins will be evaluated *in vitro* with albumin, hemoglobin and lens crystallin.

Those who received awards beginning July, 1989, are:

Peter J. R. Cobbett, Ph.D., Assistant Professor, Department of Pharmacology, Michigan State University.

Robert A. Nicholas, Ph.D., Assistant Professor, University of North Carolina at Chapel Hill.

K. Kee Wan, Ph.D., Assistant Professor, Northwestern University Medical School.

Those who entered the second and last year of their award in 1989 are:

Serrine S. Lau, Ph.D., Assistant Professor, Department of Pharmacology, University of Texas at Austin.

Paul H. Ratz, Ph.D., Assistant Professor, Eastern Virginia Medical School.

Jonathan G. Scammell, Ph.D., Assistant Professor, Department of Pharmacology, University of South Alabama, College of Medicine.

Those who ended their awards in 1989:

Edward T. Morgan, Ph.D., Assistant Professor, Department of Pharmacology, Emory University.

Rick G. Schnellmann, Ph.D., Assistant Professor, Department of Physiology and Pharmacology, The University of Georgia.

Rochelle D. Schwartz, Ph.D., Assistant Professor, Department of Pharmacology, Duke University.

Fellowships for Advanced Predoctoral Training in Pharmacology or Toxicology

This program, offered initially in 1977, is designed to assist those candidates who expect to complete the research for their doctoral dissertations.

For 1989-90, the fellowship program provided a stipend of \$10,000 a year and \$500 a year for incidentals directly associated with preparation of the dissertation. Twelve awards are budgeted by the Basic Pharmacology Advisory, however, in 1990, the committee elected to give two additional awards, totaling 14. The program, since its inception, has awarded a total of 151 fellowships.

Those who have been awarded 1990 fellowships beginning between January and July are:

Lori Ann Birder, Department of Pharmacology, University of Pittsburgh. Her advisor is William C. DeGroat, Professor of Pharmacology. Ms. Birder will perform a neurochemical and neuropharmacological analysis to study mechanisms underlying visceral pain in the lower urinary tract.

Newly appointed Chairman of the Scientific Advisory Committee, Frederick M. Radzialowski, Ph.D. (left), reviews past SAC activities with former Chairman Irwin C. Winter, M.D., Ph.D., who served on the SAC from 1966-75, as Chairman 1970-75, and as PMAF Consultant 1975-88.



Rebecca M. Brawley, Department of Pharmacology, Northwestern University Medical School. Her thesis advisor is M. Marlene Hosey, Ph.D., Professor of Pharmacology. Ms. Brawley will study the regulation of calcium channels by phosphorylation and G proteins.

Jin Chen, Laboratory of Toxicology, Harvard University. Her principal advisor is Dr. Leona Samson, Associate Professor. Ms. Chen will focus on the characterization of a yeast DNA alkylation repair gene and its product.

Marilyn N. Friedemann, Department of Pharmacology, University of Colorado Health Sciences Center. Ms. Friedemann's advisor is Greg A. Gerhardt, Ph.D., Assistant Professor. Ms. Friedemann's research will focus on age-related changes in dopaminergic nerve terminal function.

Laurie Ann Hanson, D.V.M., Department of Pharmacology, Toxicology and Therapeutics, University of Kansas Medical Center. Her advisor is David G. Beer, Ph.D., Assistant Professor. Dr. Hanson's research will examine glucocorticoid receptor gene structure and function in lung cells with kirsten-ras proto-oncogene activation.

Barbara A. Hill, Division of Pharmacology, College of Pharmacy, The University of Texas at Austin. Ms. Hill's principal advisor is Dr. Serrine S. Lau, Assistant Professor. The title of Ms. Hill's research is "Biochemical and Physiological Determinants of Quinol-Linked Thiol Conjugate Mediated Nephrotoxicity."

Jeffrey R. Huth, Department of Pharmacology, University of Michigan Medical School. Mr. Huth's advisor is Raymond W. Ruddon, M.D., Ph.D., Maurice H. Seevers Professor and Chairman, Department of Pharmacology. Mr. Huth will study the role of disulfide bond formation in the assembly of the glycoprotein hormone chorionic gonadotropin.

Patrick J. Pagano, Department of Pharmacology, New York Medical College. His advisor is Alberto Nasjletti, M.D., Professor. Mr. Pagano will research prostanoids as mediators of endothelium-dependent constriction of blood vessels.

John E. Pawlowski, Department of Pharmacology, University of Pennsylvania. His advisor is Dr. Trevor M. Penning, Associate Professor. Mr. Pawlowski's research involves hormonal regulation of 3 α -hydroxysteroid/dihydrodiol dehydrogenase gene expression.

Jennifer Pohl, Department of Pharmacology, University of Nevada, Reno, School of Medicine. Her advisor is W. T. Gerthoffer, Ph.D., Associate Professor. Ms. Pohl will study the regulation of smooth-muscle contraction by caldesmon phosphorylation.

Steven L. Roberds, Department of Pharmacology, Vanderbilt University School of Medicine. His advisor is Dr. Michael M. Tamkun, Assistant Professor. Mr. Robert's research will focus on the molecular pharmacology of voltage-sensitive potassium channels of the cardiovascular system.

Lynda Hamlington Spinolo, Department of Pharmacology, University of Tennessee, College of Medicine. Her advisor is William R. Crowley, Ph.D., Professor. Ms. Spinolo will investigate neurochemical regulation of oxytocin synthesis during lactation.

Teresa Wilson Wilborn, Department of Pharmacology and Biochemistry, University of Alabama at Birmingham. Her advisor is Dr. Elias Meezan, Professor and Chairman. Ms. Wilborn's research will focus on the molecular biology of the hepatic sulfotransferase enzymes.

Lena Wu, Department of Pharmacology, Stanford University Medical Center. Her advisor is James P. Whitlock, Jr., M.D., Professor. Ms. Wu's research involves the molecular and genetic analysis of cytochrome P450IA1 transcriptional Regulation.

Those who received fellowships in 1989 and continuing in 1990 are:

Joseph Affholter, Department of Pharmacology, Stanford University

Jeffrey H. Boatright, Department of Pharmacology, Emory University

Gretchen Feussner, State University of New York, Health Science Center, Syracuse.

Theresa M. Filtz, University of Pennsylvania, School of Medicine, Department of Pharmacology

Carlotta Eileen Groves, Department of Physiology and Pharmacology, College of Veterinary Medicine, University of Georgia.

Devorah Gurantz, Department of Pharmacology, University of California, San Diego

Nancy W. Kleckner, Department of Pharmacology, University of North Carolina at Chapel Hill

Joseph William Polli, M. S. Hershey Medical Center, Pennsylvania State University.

Julie Ann Poorman, Department of Pharmacology, Graduate School of Biomedical Sciences, University of Texas Health Science Center at Houston

G. William Rebeck, Laboratory of Toxicology, Harvard University

Michael S. Vincent, Indiana University School of Medicine.

Fellowship Awards in Pharmacology-Morphology

The aim of this program is to increase our knowledge about the actions of drugs by direct study of their effects on cells and tissues; to correlate the morphological changes; and, concurrently, to uncover associations observed with functional parameters of cells and tissues.

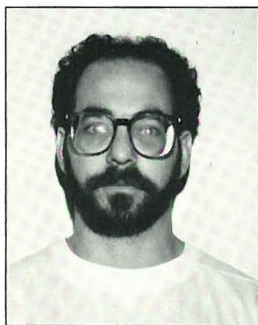
In order to be eligible for an award, the candidate must possess formal training in a morphologic specialty or in pharmacology. However, subsequent training in the complementary discipline, during the period of the fellowship, may be informal. On completion of the program, the fellow should be able to use the tools and concepts of both disciplines.

The awards are two years each. The level of support varies and is aimed at keeping within the existing stipends for similarly trained individuals within the applicant university. First offered in 1968, 78 awards have been made.

Recipients of the fellowships beginning July 1990 are:

Andrew Bean, Ph.D., Departments of Histology and Neurobiology, Karolinska Institute, Yale University. Dr. Bean's research will compare drug-induced activity changes on transmitter gene expression in colocalized and noncolocalized neurons. The anatomy and regulation of neural dopamine (DA) systems have been implicated in several major psychiatric and neurological disorders. Investigations on the mechanism of action of antipsychotic drugs and the pathophysiology of Parkinson's Disease have suggested that distinct subsets of mesencephalic DA neurons can be differentially affected. This heterogeneity in the regulation of subpopulations of mesencephalic DA neurons could be exploited in developing selective agonists and antagonists for the improved treatment of these disorders. Dr. Bean will examine the effects of drug-induced perturbations in neuronal activity on gene expression for NT, CCK and tyrosine hydroxylase (the rate limiting enzyme in DA biosynthesis) in identified mesencephalic neurons by combined retrograde tracing-*in situ* hybridization studies.

Ellen B. Cornbrooks, Ph.D., Department of Anatomy and Neurobiology, College of Medicine, University of Vermont. Dr. Cornbrooks' research addresses the regulation of the human gallbladder by a nervous plexus intrinsic to the organ. Morphologic and immunohistochemical techniques will be used to determine the structure and neurochemical organization of the ganglionated plexus in the wall of the gallbladder. Intracellular recording techniques will be used to characterize the membrane properties of neurons within the plexus and physiologic responses of the neurons to synaptic input, transmitters known to be present within the gallbladder, such as 5-HT and substance P, and hormones such as cholecystokinin. These structural and physiological studies will include comparisons of normal and abnormal gallbladder to discern whether gallbladder disease involves alterations of the intrinsic neural plexus. These studies will provide new information on the regulation of gallbladder function, and may open the way for new treatments of gallbladder disease.



Andrew Bean, Ph.D.



Ellen B. Cornbrooks, Ph.D.

Meredith Mason Garcia, Ph.D., Department of Anatomy, Tulane University School of Medicine. Dr. Garcia will be studying protein kinase C in brain: neuronal localization and interactions with morphine. The long-term objectives of the proposed research are twofold: to determine the localization of the four major isoforms of protein kinase C (PKC) in brain at the neuronal level, and to elucidate the role of PKC in mediating the actions of morphine in brain. Mapping these isoforms at the neuronal level with immunocytochemistry and in situ hybridization is one objective of this proposal. Investigating the relationship between morphine and PKC is the second objective. Preliminary studies will examine the effect of PKC inhibitors on morphine-induced gene expression in the SH-SY5Y neuroblastoma cell, and on morphine-induced changes in PKC, using Western blots (peptide) and slot-blots (mRNA). Further studies will be carried out in brain to determine the effects of chronic morphine on PKC-mediated gene expression, using the above techniques, and on the effects of chronic morphine on the expression of PKC itself. The involvement of the dopaminergic system in the actions of drugs of abuse is well documented but not thoroughly characterized at the molecular level. Further studies, similar to those outlined, will be conducted with the addition of dopamine antagonist, to evaluate the interrelationships of these three systems.



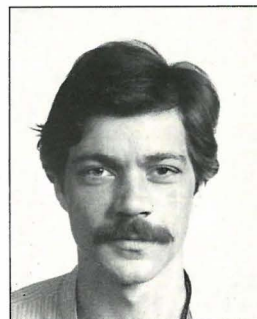
*Meredith Mason Garcia
Ph.D.*

Kathleen Gogas, Ph.D., Department of Anatomy, University of California, San Francisco. The title of Dr. Gogas' research is, "Neural Substrates of Opioid Analgesia." Recently, it has been shown that expression of the *fos* protein product of the protooncogene *c-fos*, can be used to map large populations of spinal cord neurons in response to long lasting noxious stimulation in the awake freely moving animal. Using this model, it is possible to study the effects of supraspinally or intraspinally administered analgesics on noxious-evoked *fos* so that the mechanisms which contribute to antinociception of the level of the spinal cord can be better understood. The purpose of this proposal, therefore, is to determine the effects of supra- and intra-spinally administered opioid receptor agonists on the spinal cord *fos* expression evoked by noxious stimulation; the effects of antagonists and spinal cord lesions will also be studied. Importantly, the behavioral response to noxious stimulation will also be assessed and correlated with spinal cord *fos* expression. Finally, double-labelling techniques will be used to test the hypothesis that inhibition of projection neurons in the marginal layer of the dorsal horn is sufficient to account for the antinociceptive effects of opioid receptor agonists.



Kathleen Gogas, Ph.D.

Bruno C. Jubelin, M.Sc., Ph.D., Department of Anatomy and Cell Biology, College of Physicians and Surgeons of Columbia University. Dr. Jubelin will study the innervation of the enteric nervous system from a developmental standpoint using a combination of anatomical (intra-cellular markers) and electrophysiological (microelectrodes) techniques. A deficient/absent Ca^{++} -dependent K^{+} channel detected in sympathetic neurons from genetic hypertensive neo-natal rats induces multiple firing in these neurons upon long-duration depolarizations. Type II/AH myenteric neurons show a large Ca^{++} -dependent K^{+} channel activity. Tran-



*Bruno C. Jubelin, M.Sc.,
Ph.D.*

sient Catecholaminergic cells (early migrating cell type in the gut wall) appear to be a precursor for enteric neurons and may be derived from the same progenitor and therefore related to sympathetic neurons. Using the above techniques Dr. Jubelin hopes to determine: (1) how early the abnormal firing pattern appears in the sympathetic neurons of genetically hypertensive rats; (2) if type II/AH enteric neurons are derived from Transient Catecholaminergic cells and; (3) if they are, do they show the same genetic deficiency as the sympathetic neurons.

Recipients of the fellowships which began July 1989 are:

Karen J. Axt, Ph.D., Department of Neuroscience, The Johns Hopkins University

Melissa Rogers, Ph.D., Dana-Farber Cancer Institute, Harvard University

Paul R. Wade, Ph.D., Department of Anatomy and Cell Biology, Columbia University, College of Physicians and Surgeons

Individuals who entered the second year of their awards in 1989 are:

Dennis J. Paul, Ph.D., Department of Neurology, Memorial Sloan-Kettering Cancer Center

Jean-Jacques Soghomonian, D.E.A., Medical College of Pennsylvania

David W. Schulz, Ph.D., Harvard Medical School, Department of Biological Chemistry and Molecular Pharmacology

Individuals who ended their fellowships in 1989 are:

Barbara Christie-Pope, Ph.D., Department of Pathology, Vanderbilt University

Britta A. Mattson, Ph.D., Department of Anatomy and Cell Biology, Tufts University

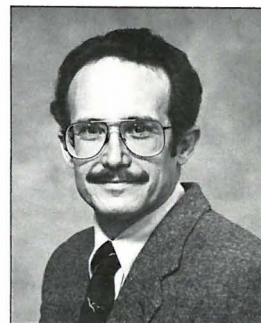
Lisa A. Won, Ph.D., Department of Pharmacology and Physiological Sciences, The University of Chicago.

Faculty Awards in Toxicologic Pathology

With first awards given in 1983, this award was developed to attract scientists interested in analyzing, reviewing and questioning, where appropriate, the present state of the art in the field of toxicology. The goal of the program is to support veterinary and comparative pathologists who will devote two years to research with drugs. The PMA Foundation has set a ceiling of \$30,000 on the amount of its contribution to total yearly salary and fringe benefits for any candidate. Two awards were made for 1990, bringing the total number of awards made to 15.

Beginning their awards in July 1990 are:

Dale C. Baker, D.V.M., Ph.D., Assistant Professor, Department of Pathology, Colorado State University. Dr. Baker's research will focus on "Monocrotalamine Induced Pulmonary Hypertension in the Rat." The aims of the proposed investigation of monocrotalamine induced pulmonary hypertension are twofold. The first is to examine the possible role of decreased pulmonary endothelial prostacyclin production in pulmonary hypertension. The second aim is to investigate the role of altered protein synthesis after exposure to monocrotalamine pyrrole, as endothelial cells synthesize several important proteins that either stimulate arterial smooth-muscle cell proliferation or inhibit coagulation.



*Dale C. Baker, D.V.M.,
Ph.D.*

Mary K. Reinhard, M.S., D.V.M., Assistant Professor, and Director of Clinical Medicine, Department of Comparative Medicine, Medical University of South Carolina. Dr. Reinhard's research is entitled, "Aminoglycoside Nephrotoxicity - Validation of the Rat Model." Although aminoglycosides are life-saving antibiotics, they are nephrotoxic. The nephrotoxicity has been explored thoroughly in rats, but concerns exist concerning the animal data. Correlations involving age, sex and toxic potential have been established in rats between *in vitro* binding to proximal tubal brush border membranes (BBM) and *in vivo* nephrotoxicity of aminoglycosides. A potential fourth correlation is possible with the recent *in vivo* demonstration of the greater sensitivity of Fischer versus Sprague-Dawley rats to this nephrotoxicity. To augment the evidence of the appropriateness of the rat as a human nephrotoxic surrogate, Dr. Reinhard plans to: (1) examine the correlations of the degree of binding of tobramycin to BBM of Fischer and Sprague-Dawley rats; and (2) determine the comparative quantitative binding kinetics and qualitative binding characteristics of tobramycin to human BBM.



*Mary K. Reinhard, M.S.,
D.V.M.*

Individuals who began their awards July, 1989 are:

Deborah Gillette, D.V.M., Ph.D., Assistant Professor of Pathology, School of Veterinary Medicine, University of Pennsylvania.

Matthew A. Wallig, D.V.M., Ph.D., Assistant Professor of Pathology, Department of Pathobiology, College of Veterinary Medicine, University of Illinois at Urbana-Champaign.

Entering the second year of their awards in 1989 are:

Evelyn Anne Kazacos, D.V.M., Ph.D., Department of Veterinary Microbiology, Pathology and Public Health, Purdue University School of Veterinary Medicine.

James Arthur Render, D.V.M., Ph.D., Assistant Professor, Department of Pathology, Michigan State University.

PMA Foundation Current Programs for 1991

Name of Program/ Year of First Awards	Number of Awards Budgeted Yearly/ Length of Award	Program Budget	Deadline Announcement Date Starting Time
Clinical Pharmacology Advisory Committee			
(1) Faculty Awards in Clinical Pharmacology (1967)	3 Budgeted/ 3 years	\$360,000 total \$40,000 per award per year	October 1 December 15 July 1
(2) Fellowships for Careers in Clinical Pharmacology (1973)	4 budgeted/ 2 years	\$192,000 total \$ 24,000 per award per year	October 1 December 15 July 1
(3) Medical Student Research Fellowships (1974-Amended 1982)	6 budgeted/ 3 months to 24 months	\$ 60,000 \$ 833 per month maximum \$10,000	January 15 March 15 July 1
(4) Development Grants for Clinical Pharmacology Units (1978)	1 budgeted/ 3 years to use funds	\$ 50,000 per award	January 15 March 15 July 1
Basic Pharmacology Advisory Committee			
(5) Faculty Awards in Basic Pharmacology/Toxicology (1973)	3 budgeted/ 2 years	\$180,000 total \$ 30,000 per award per year	September 15 December 15 July 1
(6) Research Starter Grants (1972)	20 budgeted/ 2 years	\$400,000 total \$ 10,000 per award per year	September 1 November 15 January 1
(7) Advanced Predoctoral Fellowships in Pharmacology/Toxicology (1978)	12 budgeted/ 2 years	\$240,000 total \$ 10,000 per award per year	September 15 December 15 January-July 1
Pharmacology-Morphology Advisory Committee			
(8) Fellowships in Pharmacology-Morphology including Cell Biology (1968)	3 budgeted/ 2 years	\$126,000 total \$ 21,000 per award per year	January 15 March 15 July 1
Toxicologic-Pathology Advisory Subcommittee			
(9) Faculty Development Awards in Toxicologic-Pathology (1982)	2 budgeted/ 2 years	\$120,000 total \$ 30,000 per award per year	September 1 November 15 July 1
Pharmaceutics Advisory Committee			
(10) Advanced Predoctoral Fellowships in Pharmaceutics (1987)	8 budgeted/ 2 years	\$160,000 total \$ 10,000 per award per year	September 1 November 15 January-July
(11) Undergraduate Research Fellowships in Pharmaceutics (1990)	12 budgeted/ 1 year	\$ 60,000 total \$ 5,000 per award	September 1 November 15 January-July

All of the above programs will accept applications
for research on drugs for rare diseases



Former PMA President C. Joseph Stetler shares his insights into the Foundation's activities following the 1989 Awardee Meeting Banquet.

Fellowship for Advanced Predoctoral Training in Pharmaceutics

The program was initiated in 1987 as a permanent program to assist candidates who have one or two years remaining in their predoctoral training in pharmaceutics, the time during which they are engaged in dissertation research.

The fellowship program provides a stipend of \$10,000 a year and \$500 a year for incidentals directly associated with the preparation of the dissertation. The program has been funded to provide eight, two-year fellowships each year. Because of several one-year awards, the committee was able to give ten fellowships in 1990 bringing the total number of awards given to 24.

Those who received fellowships beginning between January and July 1990 are:

Janice L. Cacace, Department of Pharmaceutics, University of Florida College of Pharmacy. Her advisor is Hans Schreier, Ph.D., Assistant Professor. Ms. Cacace's research involves macrophage-aimed pulmonary drug delivery: recognition and uptake of phospholipid vesicles (liposomes) by alveolar macrophages.

James K. Drennen III, Department of Pharmaceutics, University of Kentucky College of Pharmacy. His advisor is Dr. Robert A. Lodder, Assistant Professor. Mr. Drennen's research is entitled, "A 'Noise' in Pharmaceutical Science: Near-Infrared Outside/Inside-Space Evaluation."

Francis J. Nowaczyk, Jr., Department of Pharmacy, Philadelphia College of Pharmacy and Science. His advisor is Roger L. Schnaare, Ph.D. Mr. Nowaczyk will study oxygen kinetics in perfluorocarbon emulsions.

Cynthia A. Oksanen, Department of Pharmacy, University of Wisconsin-Madison. Her advisor is George Zografi, Professor. Ms. Oksanen will study the mechanisms of water-polymer interactions.

Marcelo O. Omelczuk, Department of Pharmaceutics, The University of Texas at Austin, College of Pharmacy. His advisor is James W. McGinity, Ph.D., Professor and Division Head. Mr. Omelczuk's research involves the influence of temperature on the physical-mechanical properties of tablets and compacts containing biodegradable polymers.

Elaine M. Phillips, Department of Pharmaceutics, Virginia Commonwealth University School of Pharmacy. Her advisor is Peter R. Byron, Ph.D., Associate Professor. Ms. Phillips will investigate the effects of water and other formulation variables upon drug solubility in inhalation aerosol propellants: relationship to crystal growth and suspension stability in MDIs.

Stephen B. Ruddy, Department of Pharmaceutics, University of North Carolina at Chapel Hill, School of Pharmacy. Her advisor is Boka W. Hadzija, Ph.D., Associate Professor of Pharmaceutics. Mr. Ruddy will research the role of aqueous channels in the iontophoretic transdermal delivery of drugs.

Steven P. Schwendeman, Department of Pharmaceutics and Pediatric Cardiology, College of Pharmacy, University of Michigan. His advisor is Robert J. Levy, M.D., Associate Professor of Pediatrics and Communicable Diseases. Mr. Schwendeman's research will look at strategies for iontophoretic drug delivery to the brain.

Scott W. Smith, Department of Pharmaceutics, College of Pharmacy, University of Utah. His advisor is Dr. Bradley Anderson. Mr. Smith will investigate permeability-enhancement mechanisms of long-chain carboxylic acids in human stratum corneum.

Gary H. Ward, Department of Pharmaceutical Sciences, University of Arizona. His advisor is Samuel Yalkowsky, Ph.D., Professor of Pharmaceutics. Mr. Ward will be researching early detection and treatment of phlebitis.

Individuals who entered the second year of their award in 1990 are:

Cynthia Ann Goates, Department of Pharmaceutics, College of Pharmacy, University of Utah

Kathleen M. Lee, Department of Pharmaceutics, College of Pharmacy, University of Michigan.

William J. McLaughlin, Industrial and Physical Pharmacy, Purdue University.

Inke Nathke, Department of Pharmaceutical Chemistry, University of California, San Francisco.

Gail L. Zipp, Department of Pharmaceutics, College of Pharmacy, University of Michigan.

Undergraduate Research Fellowships in Pharmaceutics

For the first time in 1990, the PMA Foundation offered support to undergraduate students in pharmaceutics. This program gives the undergraduate student an opportunity to participate in a meaningful research project with a motivated, inspiring and research-active pharmaceutics faculty member. The award provides a selected pharmaceutics faculty member with a one-year fellowship for \$5,000 which the faculty member can provide to a selected, qualified undergraduate. Twelve awards are budgeted per year and twelve awards were made for 1990.

The first faculty and their undergraduate students who will receive fellowships between January and July 1990 are:

Kenneth A. Connors, Ph.D., University of Wisconsin-Madison, School of Pharmacy.

Student: Marie H. Pietruszka. Ms. Pietruszka will be studying the nature of the colored products in the reaction of carbon suboxide with aliphatic tertiary amines.

Hartmut Derendorf, Ph.D., University of Florida, College of Pharmacy.

Student: Ms. Sarah L. Freyer. Ms. Freyer's research will focus on pharmacokinetic interactions of diltiazem and propranolol.

David Fleisher, Ph.D., University of Michigan College of Pharmacy.

Student: Neel Sheth. Mr. Sheth will investigate calcium sequestrant effects on intestinal drug uptake.

James N. Herron, Ph.D., University of Utah College of Pharmacy.

Student: Gary Rae. Mr. Ray will research interfacial behavior of protein drugs.

Neil E. MacKenzie, Ph.D., University of Arizona, College of Pharmacy.

Student: Lori A. Hardaway. Ms. Hardaway will perform a NMR analyses of the effect of formulation on peptide drug conformation.

Clyde M. Ofner III, Ph.D., Philadelphia College of Pharmacy and Science.

Student: Lori Passio. Ms. Passio will study hydrogels of self-crosslinked gelatin as controlled release systems.

Roger L. Schnaare, Ph.D., Philadelphia College of Pharmacy and Science.

Student: Nadine M. Maduro. Ms. Maduro will research polymerized hemoglobin spheres as artificial red blood cells.

Raj Suryanarayanan, Ph.D., University of Minnesota College of Pharmacy.

Student: Craig Herman. Mr. Herman will perform a quantitative analysis of tablet ingredients by X-ray diffractometry.

Francis C. Szoka, Jr., Ph.D., University of California, San Francisco, School of Pharmacy.

Student: Kathy Birnbaum. Ms. Birnbaum will research the stabilization and solubilization of hormones and recombinant macromolecule by synthetic peptides.

Raman Venkataramanan, Ph.D., University of Pittsburgh School of Pharmacy.

Student: John E. Patsy. Mr. Patsy's research involves hepatic first pass metabolism in liver transplant patients.

Timothy Wiedmann, Ph.D., University of Minnesota College of Pharmacy.

Student: Vincent Wong. Mr. Wong will perform a thermal analysis of the interaction of alveolar apolipoproteins with phospholipids.

Samuel Yalkowsky, Ph.D., University of Arizona College of Pharmacy.

Student: Milissa Ann White. Ms. White will examine the early detection and treatment of phlebitis.

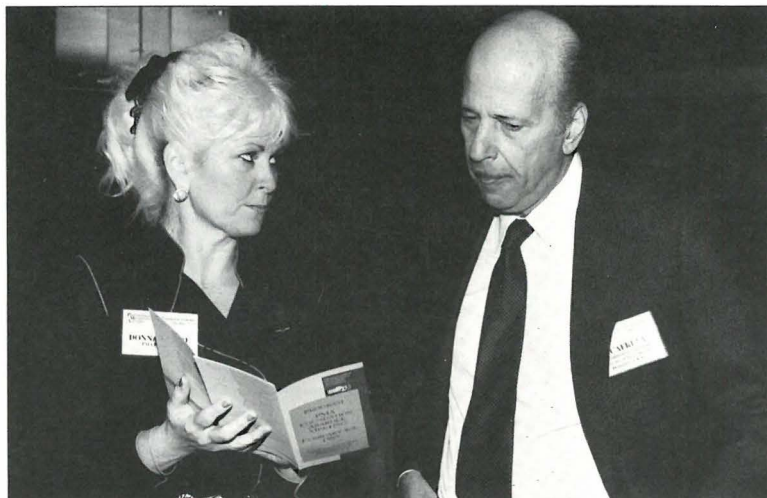
Research Grants

An important aspect of the PMA Foundation effort has been the support of fundamental research in drug toxicology. Between 1966 and 1971, 26 research grants of relatively large amounts for two to five years were made, principally to established investigators, either to extend existing research or to provide "seed" monies to follow a promising lead. In 1971 a change in emphasis within the Foundation shifted the bulk of the funds into educational support programs and, consequently, less into research. It is understood, however, that these educational programs place high emphasis on the research programs of the applicants for each award. In this sense, educational support programs are in fact also supporting research. The Foundation continues to accept requests for research support and suggestions for pertinent research projects since it is important that the potential within the Foundation for helping that particularly promising effort be maintained.

The Foundation will continue to review research applications that do not fall within the scope of its formal programs, but will not fund them unless they are deemed to be exceptional and novel approaches that have not generated support from conventional sources.

Ethical Considerations

The Scientific Advisory Committee as well as the program advisory committees of the PMA Foundation are sensitive to the appropriate use of experimental subjects, animals and humans, in research. In their deliberations, they consider all aspects of a proposal and may deny support for many reasons. Careful consideration is given to humane use and care of animal subjects. For human and animal research, the project review committee requires, in writing, a statement of adherence to prevailing standards of ethical research practices, including Institutional Review Board approval before initiation of any research project. In addition, for human research, assurance of informed consent will be required.



*PMAF Associate
Donna Moore and
Consultant Edward J.
Cafruny, M.D., Ph.D.,
discuss the 1989
Awardee Meeting
program.*

Research Starter Grants

As part of the change of emphasis in 1971 which sought to direct monies more toward the training of individuals, a program of Research Starter Grants was initiated. These grants are intended to provide financial support for beginning investigators. The program allows for approximately 20 research starter grants each year. The first awards were made in 1972. A total of 428 research starter grants have been made, including the 25 awards beginning January 1, 1990.

The recipients of the grants beginning January 1990 are:

Dale L. Birkle, Ph.D.
West Virginia University

**Scott Alan Brown, V.M.D.,
Ph.D.**
University of Georgia
College of Veterinary Medicine

Arthur R. Buckley, Ph.D.
Kirksville College of
Osteopathic Medicine

Margaret Clagett-Dame, Ph.D.
University of Wisconsin-
Madison
School of Pharmacy

David R. Compton, Ph.D.
Medical College of Virginia
Virginia Commonwealth
University

Philip G. Dunbar, Ph.D.
University of Toledo
College of Pharmacy

Jonathan E. Freedman, Ph.D.
Northeastern University
College of Pharmacy

Colin D. Funk, Ph.D.
Vanderbilt University
School of Medicine

James J. Galligan, Ph.D.
Michigan State University

Cathy Marie Klech, Ph.D.
University of North Carolina at
Chapel Hill,
School of Pharmacy

Sharon H. Jones, Ph.D.
University of Oklahoma
College of Medicine

Deborah L. Lewis, Ph.D.
Medical College of Georgia

Leonard Lothstein, Ph.D.
University of Tennessee,
Memphis
School of Medicine

Michael P. McCarthy, Ph.D.
Robert Wood Johnson Medical
School
University of Medicine and
Dentistry of New Jersey

Donald J. Messner, Ph.D.
Washington University
School of Medicine

Todd D. Porter, Ph.D.
University of Michigan
Medical School

John W. Regan, Ph.D.
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Medical Center

Marina E. Wolf, Ph.D.
Wayne State University
School of Medicine

Based on need for funds, a review of the 22 research starter grantees whose awards began January 1, 1989, for a second year of the award resulted in 16 awards being continued. They are:

Aaron Barchowsky, Ph.D.
Thomas Jefferson University
Jefferson Medical College

Eric Hon-Cheong Lai, Ph.D.
University of North Carolina at
Chapel Hill

John L. Bixby, Ph.D.
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School of Medicine

Steven R. Patierno, Ph.D.
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Mark D. Johnson, Ph.D.
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Pennsylvania

Catherine A. White, Ph.D.
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School of Pharmacy

PURPOSE

The PMA Foundation was established to promote the betterment of public health through scientific and medical research, with particular reference to the study and development of the science of therapeutics. In achieving this goal, the Foundation plans and initiates scientific and medical research activities, collects and disseminates the results of these activities, and provides financial support and aid to individuals or institutions whose purposes are scientific, educational or charitable.

Certain guidelines have been developed to promote the wise and proper use of the limited resources available. The areas of interest which govern the distribution of funds are in support of fundamental research on drugs and programs for training personnel in basic and clinical pharmacology, toxicology and pharmaceuticals.

Throughout the year, programs have been supported and developed which provide the means of achieving the goals of the Foundation. Many worthwhile proposals have been submitted. It has been necessary to limit support to those who hold the highest promise of advancing the purposes of the Foundation.

Those areas not supported within the existing guidelines are:

(1) Research on specific drugs, unless the drug is for an orphan disease. This exclusion is not meant to preclude support of projects which, of necessity use a number of drugs to establish a methodology or screening program of potential general applicability. It does exclude those efforts primarily aimed at learning more about specific drugs or classes of drugs.

(2) Funds for construction. The Foundation is not unmindful of the needs and the tremendous pressures for private funds for construction projects. However, it is believed that the scientific community can be better served by channeling the Foundation's available resources into other areas.

(3) Funds to cover entertainment costs.

In 1971, the Board of Directors authorized a major shift in program emphasis. While Foundation support of research continues, such support is to be primarily available in a redirected fashion, such as the Research Starter Grants program discussed on page 30.

In line with this change of emphasis, the Foundation is expanding support within its current educational programs as outlined in the Education and Training Programs Section on page 9.

While meetings have never received a large portion of the support dollar, only in very exceptional circumstances will meetings receive support in the future.

REPORT OF THE TREASURER



*Joseph A. Mollica, Ph.D.
Secretary-Treasurer*

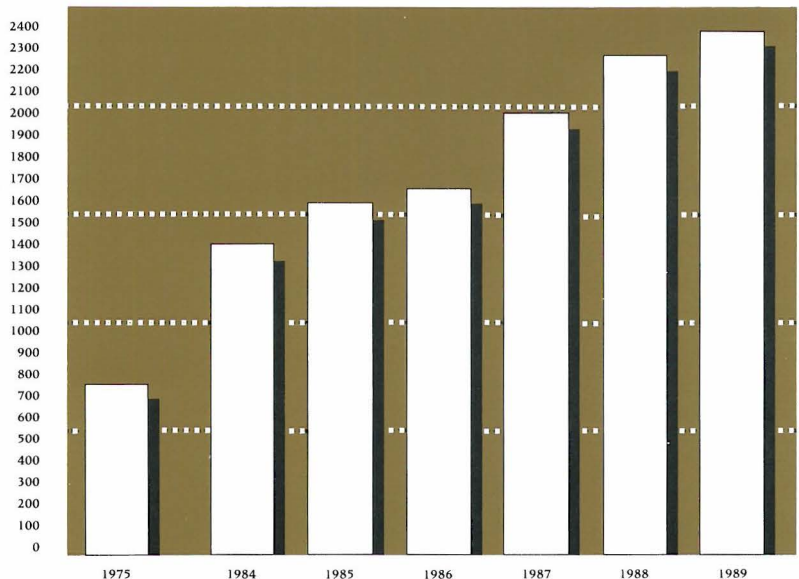
The total income of the Foundation in 1989 was \$2,418,181. Of this amount, \$2,242,000 came from contributions. The balance of \$176,181 came from investments, gain on sale of stock, and refunds of unexpended balances from grants.

Contributions were received from approximately four out of every five PMA Members Firms. Contributions were also received during 1989 from PMA Associates and Research Affiliates.

Grants, Foundation-sponsored programs, special meetings and other expenses for 1989 amounted to \$1,920,257. Of this total, \$1,424,525 represents expenditures for grants. The total fund balance as of December 31, 1989 was \$4,637,339. This figure, however, does not reflect the tentatively authorized, undisbursed funds for some of the grants and programs described earlier. The Foundation reports these amounts as expenditures when the funds are disbursed. As of December 31, 1989, the contingency liability for 1990-93 was approximately \$3,007,643.

The Foundation's financial position as of December 31, 1989, has been audited by the Washington D. C. accounting firm of Buchanan & Company.

PMA Foundation Income 1975-1989 (thousands)



Statement of Income and Expenditures For the Year Ended December 31, 1989

Income

Contributions	2,242,000
Income from investments	150,457
Miscellaneous Income	25,724
	<hr/>
Total Income	<u>2,418,181</u>

Expenditures

Grants—Note A	
Clinical Pharmacology Faculty Awards	214,569
Clinical Pharmacology Fellowships	101,693
Clinical Pharmacology Unit Support	43,435
Basic Pharmacology Faculty Awards	157,488
Medical Student Research Fellowships	16,500
Pharmacology-Morphology Fellowships	128,781
Research Starter Grants	330,000
Advanced Predoctoral Fellowships	244,103
Toxicologic Pathology Faculty Awards	98,750
Advanced Predoctoral Fellowships in Pharmaceutics	89,206
	<hr/>
	1,424,525
Administrative, February Awardee Meeting and Other Expenses	504,732
	<hr/>

Total Expenditures	<u>1,929,257</u>
---------------------------	-------------------------

Excess of income over expenditures	497,924
Operating fund balance at January 1, 1989	1,992,575
Operating fund balance December 31, 1989	2,755,691
Future Commitment Fund (Reserve Fund) (Note B)	1,942,707
Total fund balance at December 31, 1989	<u>4,637,339</u>

Note A—In addition to the amounts shown, the Foundation is committed, subject to annual review, to make certain grants. At December 31, 1989, the amounts still to be disbursed with respect to these grants amounted to approximately \$3,007,643 with approximately \$1,780,229 of this to be disbursed during 1990; \$912,869 in 1991; \$235,030 in 1992; and \$79,515 in 1993.

Note B—The Future Commitment Fund is a reserve fund established by the Foundation to ensure the continuation of existing grants.

Income from Investments	146,261
Gain on Sale of Stock	109,928
	<hr/>
	256,189
Less: Trust Commission Expense	20,436
	<hr/>
	235,753
Future Commitment Fund Balance at January 1, 1989	1,911,087
	<hr/>
Future Commitment Fund Balance at December 31, 1989	<u>1,942,707</u>

ORGANIZATION AND ADMINISTRATION

1989-90 Officers



¹Harvey S. Sadow, Ph.D.
Chairman, PMA Foundation
Chairman of the Board
Boehringer Ingelheim
Corporation
Ridgefield, Connecticut

The PMA Foundation operates through its officers, Board of Directors and six advisory committees. In April, 1989, Harvey S. Sadow, Ph.D., Chairman of the Board of Boehringer Ingelheim was again elected Chairman of the Board. Sheldon G. Gilgore, M.D., was elected Vice Chairman. David B. Sharrock, President and Chief Operating Officer of Merrell Dow Pharmaceuticals Inc. (now Marion-Merrell Dow Inc.) was re-elected Secretary-Treasurer. Mr. Sharrock had been elected to fill the unexpired term of Hazen Richardson as Secretary Treasurer in December 1988.

In April of 1990, Sheldon Gilgore, M.D., was elected Chairman, William F. Lalor was elected Vice Chairman and Joseph A. Mollica, Ph.D., was elected Secretary-Treasurer.

Mr. Maurice Q. Bectel again served as the Foundation's President. In May of 1989, Donna Moore, was promoted to Associate for the Foundation. Edward J. Cafruny, M.D., Ph.D., and C. Joseph Stetler continue to serve as Foundation consultants—Dr. Cafruny as scientific consultant and Mr. Stetler as staff counsel.



²David B. Sharrock
Secretary-Treasurer, PMA Foundation
President and Chief Operating
Officer
Merrell Dow Pharmaceuticals
Inc.
(now Marion Merrell Dow
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Sheldon G. Gilgore, M.D.
Vice - Chairman, PMA Foundation
Chairman of the Board,
President
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Searle
Skokie, Illinois



Maurice Q. Bectel
President
PMA Foundation

¹Resigned from Board April 1990

²Resigned from Board December 1989

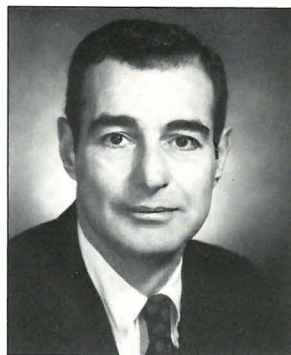
1990-91 Officers



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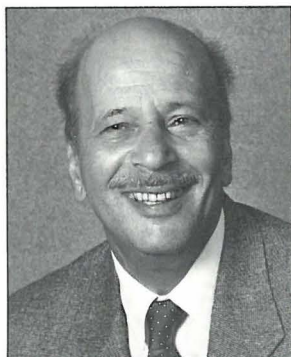


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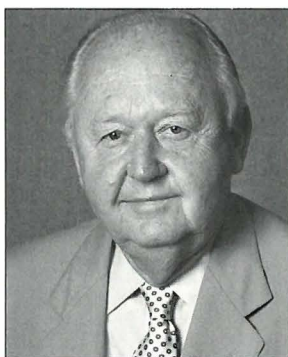


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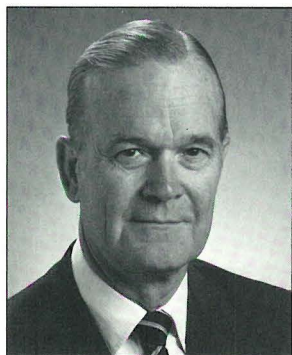
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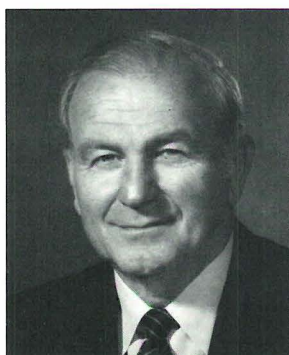
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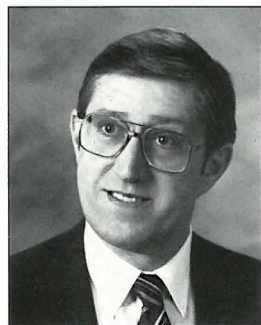
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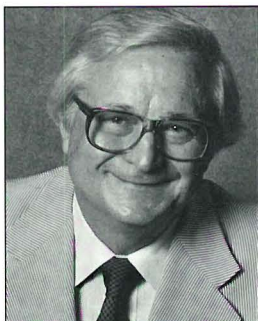
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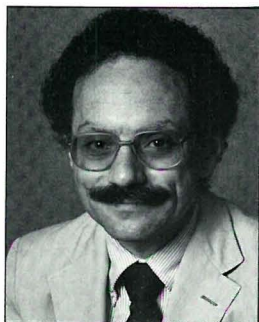
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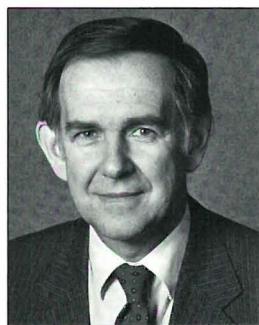
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APPLICATIONS

The Foundation accepts requests for support and suggestions for pertinent research projects from qualified institutions and individuals. However, in 1971 the Foundation underwent a major shift in program direction, now emphasizing education and training support.

To expedite the handling of requests for research support, it is suggested that a brief one or two-page letter be directed to the Foundation, outlining the intended project and an estimate of the funds involved. After review of this more informal request by members of the Scientific Advisory Committee to determine the degree of likelihood of the project falling within Foundation guidelines, a decision can be made as to whether a formal proposal is warranted.

Inquiries should be addressed to:

Mr. Maurice Q. Bectel
President Pharmaceutical Manufacturers
Association Foundation, Inc.
1100 Fifteenth Street, N. W.
Washington, D. C. 20005

Pharmaceutical Manufacturers Association Foundation
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