

**Pharmaceutical Manufacturers
Association Foundation, Inc.**

**1981
Annual
Report**

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THE PRIVATE SECTOR

Smaller amounts of federal funding for biomedical training and research have had the expected impact within the private sector. Increases in the number of applications received by the PMA Foundation ranged from 20% to 50% higher than the previous year in a number of programs, no doubt a situation shared by other funding groups. These increases in numbers of promising scientists turning to the PMA Foundation, unfortunately, were not able to be matched proportionately by increases in the number of awards in all of the programs. More important than the increasing numbers of individuals applying is the fact that the quality of the candidates remains quite high, making it difficult not to be able to assist more of these individuals.

One fact has become quite clear. In 1980, a rigorous review of the Foundation's various programs had been conducted to determine how relevant they continued to be, given the needs in the disciplines of interest to the Foundation. The conclusion was that virtually all of the programs seemed to be tailored in ways that their usefulness seemed assured for the near future. One of the programs, the fellowships in clinical pharmacology, about which there had been question, experienced a substantial increase in the number of applications this year. This year's experience has confirmed the wisdom of the decision to continue with the current programs.

It is unrealistic to consider the efforts of the PMA Foundation as a viable resource to fill the void which may result from changes in federal funding. But, given the intense competition for the few number of awards in many of the programs offered from the Foundation, every effort will be made in the coming years to increase the funds available to the Foundation. The Board of Directors of the Foundation is committed to this goal. The pharmaceutical industry has a large stake in maintaining and increasing the number of the academic scientists and physicians who participate directly and indirectly in the discovery of new drugs. This is the challenge the pharmaceutical industry must meet. The PMA Foundation, as one avenue through which the pharmaceutical industry can direct its philanthropic efforts, will continue to play an important role in fulfilling this obligation.

The combination of research support and support of education and training continues to appear to be the best way for the PMA Foundation to proceed. The diversity of research engaged in by the hundreds of individuals with grants from the Foundation over the past years and the continued career progression by those who have been supported by the training and educational programs support these program directions.

AN EVEN DOZEN



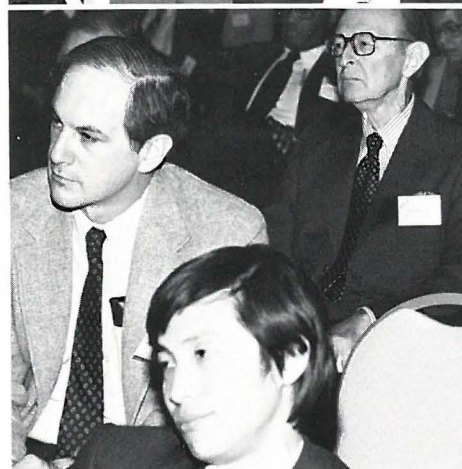
The December meetings, the twelfth this year, of advisory committee members and awardees, continue to be unique opportunities. As in prior years, an excellent keynote at the general session set the tone for the meeting. Dr. Arnold Katz, Head of the Division of Cardiology, University of Connecticut, spoke on "Ion Channels and Membranes". Dr. Herman Sokol, Chairman of the PMA Foundation Board of Directors, welcomed the awardees and committee members and gave an update on awards for 1982 which had been authorized the prior day. The general session concluded in mid-morning to enable the various subgroups of awardees to convene into special sessions to hear papers from current and past awardees.

In the afternoon, the three groups again met separately. The clinical pharmacologists subgroup heard Dr. Henry N. Wagner, Jr., Director, Division of Nuclear Medical and Radiation Health Sciences, The Johns Hopkins Medical Institutions, speak on "Current Research in In Vivo Brain Chemistry". The pharmacology-morphology subgroup divided the afternoon between a poster session and a presentation from Dr. Robert B. Jennings, Professor and Chairman, Department of Pathology, Duke University, on "Studies of Acute Myocar-

dial Ischemia Injury". The basic pharmacology subgroup heard a presentation by Dr. Theodore M. Brody, Professor and Chairman, Department of Pharmacology and Toxicology, Michigan State University, on the future of pharmacology, using some current survey data on the field.

In August, 1981, a meeting was held with the research starter grantees and advanced predoctoral fellows in pharmacology and toxicology during the fall meeting of the American Society for Pharmacology and Experimental Therapeutics. The speaker was Dr. Harriet Critchley, Program Director, Northern Political Studies, Arctic Institute of North America, University of Calgary, who spoke on the political, military and economic significance of the Arctic. This unique group at the University of Calgary, Alberta, Canada, is dedicated to a wide range, of studies.

These meetings continue to provide opportunities for the advisory committee members to gain perspectives on how well the various programs are achieving their goals. For the awardees, the meetings provide unique opportunities for exchange of information in an informal atmosphere. Many of the awardees have indicated that this characteristic is a big 'plus' of the meeting.



ACTIVITIES

Since its formation in 1965, more than \$12 million has been authorized by the PMA Foundation for a variety of workshops, conferences, research projects and educational programs. Of this amount, approximately \$3.5 million has been used to support research and more than \$8.0 million has gone into educational awards. The remaining \$500,000 has provided financial assistance for scientific meetings, along with a small portion for publications.

Virtually all of the 1981 grants and awards were made within programs sponsored by the Foundation. These include three faculty level programs and salary and fringe benefit support, four fellowship programs—two postdoctoral, one at the advanced predoctoral level and one at the medical student level—plus a program of research starter grants for beginning investigators wishing to move into areas of independent research. An award to assist in expediting the research efforts of new clinical pharmacology units or those with new directors is also available.

Through these programs in 1981 the Foundation assisted an additional 55 individuals. All of these individuals were helped at a crucial time in their career development. The Foundation has, in its slightly more than sixteen years of existence, helped about 700 individuals through its research and educational support programs.

EDUCATION AND TRAINING PROGRAMS

To further its objectives in the field of education, the PMA Foundation sponsors four programs of clinical pharmacology, one in the combined field of pharmacology-morphology, one in pharmacology or toxicology, one in basic pharmacology and one in toxicologic pathology.

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 two-year awards to medical schools for salary and fringe benefits support of full-time junior faculty members. The level of support varies, in keeping with the salary structure of the applicant university. However, the Foundation has set a ceiling of \$30,000 on the amount of its participation in

the total yearly salary and fringe benefit for any candidate.

With the awards schedule to begin July 1, 1982, a total of 59 individuals has been supported under this program since 1967.



Brian B. Hoffman, M.D.



Janice B. Schwartz, M.D.



Jack P. Uetrecht,
M.D., Ph.D.

Recipients of the three awards to begin July 1, 1982 are:

- Brian B. Hoffman, M.D., Assistant Professor, Departments of Medicine and Pharmacology, Stanford University School of Medicine. Dr. Hoffman's research interests relate mainly to problems concerning adrenergic receptors. A major area of investigation will be an effort to determine the molecular mechanism by which α_2 receptors in platelets inhibit adenylate cyclase activity. These studies will involve partial purification of the receptor and an examination of its interaction with its effector protein. Dr. Hoffman also has interests in the regulation of adrenergic receptors in the smooth muscle cells of arteries, particularly in disease states such as hypertension.

- Janice Blumenthal Schwartz, M.D., Instructor, Section of Cardiology and Section of Hypertension and Clinical Pharmacology, Baylor College of Medicine. Dr. Schwartz' efforts during the award will be a combination of formal education with courses in biometry and pharmacologic principles and methodology, the extension of her clinical investigations of drug kinetics and metabolism and development of assays for new antiarrhythmic agents. Her specific research will study the influence of verapamil on cardiac automaticity in an attempt to demonstrate that verapamil has a differing effect on various cardiac pacemaker tissues which is concentration-dependent.

- Jack P. Uetrecht, M.D., Ph.D., Assistant Professor, Departments of Pharmacology and Medicine, Vanderbilt University School of Medicine. Dr. Uetrecht's research effort will be the study of procainamide metabolism and its relationship to procainamide-induced lupus. The major elements will consist of a study of the toxicity of the hydroxylamine metabolite and a clinical study of procainamide metabolism by a patient's lymphocytes and that patient's subsequent development of procainamide-induced lupus. Another project which will be carried out during this time will be a study of cardiac function using stressed radionuclide ventriculograms in patients who are receiving doxorubicin therapy.

Those individuals whose awards began July 1, 1981 are:

- Brian Leyland-Jones, M.B., M.S., Assistant Professor, Department of Pharmacology and Medicine, Cornell University Medical College.

- John R. Luderer, M.D., Assistant Professor, Department of Medicine and Pharmacology, Pennsylvania State University College of Medicine.

- James A. Nathanson, M.D., Ph.D., Assistant Professor, Departments of Neurology and Pharmacology, Harvard Medical School.
- Juerg Reichen, M.D., Assistant Professor, Department of Medicine, University of Colorado School of Medicine.
- Branimir I. Sikic, M.D., Assistant Professor, Divisions of Oncology and Clinical Pharmacology, Stanford University School of Medicine.

Those individuals who entered their second year of awards in July, 1981 are:

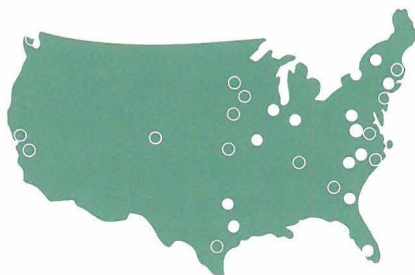
- Ka Kit Hui, M.D., Assistant Professor, Department of Medicine, University of California, Los Angeles, School of Medicine.
- Richard D. Mamelok, M.D., Assistant Professor, Department of Medicine, Stanford University School of Medicine.
- Christopher S. Wilcox, M.D., Ph.D., Assistant Professor, Department of Medicine, Harvard Medical School.
- Alastair J. J. Wood, M.B., Ch.B., M.R.C.P., Assistant Professor, Departments of Medicine and Pharmacology, Vanderbilt University School of Medicine.

The individual whose award continued for a third year beginning July 1, 1981 is:

- Thorir D. Bjornsson, M.D., Assistant Professor, Department of Pharmacology, Duke University Medical Center.

The individuals who concluded their awards in 1981 are:

- Bernhard H. Lauterburg, M.D., Assistant Professor, Department of Internal Medicine, Baylor College of Medicine.
- Stephen P. Spielberg, M.D., Ph.D., Assistant Professor, Departments of Pediatrics and Pharmacology and Experimental Therapeutics, The Johns Hopkins University, School of Medicine at the time of the award. He presently is Associate Professor, Division of Clinical Pharmacology, at the Hospital for Sick Children in Toronto, Canada.



Geographical distribution of Foundation awards under its "Faculty Development Awards in Clinical Pharmacology" program, 1967-1982.

- One
- More than One

Fellowships for Careers in Clinical Pharmacology

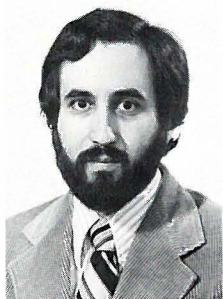
The second program provides Fellowships for Careers in Clinical Pharmacology. This award offers clinicians an opportunity for intensive study in any of the basic sciences that fall within the general field of pharmacology. The program is open to physicians, dentists and veterinarians who are well into 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 the basic pharmacologic sciences needed to complement his clinical skills.

The program was amended for 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 1982 may elect to ask that the fellowship be for July 1983 or July 1984.

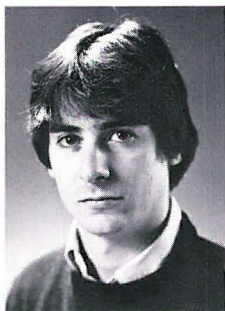
The first awards under this program were made in 1973. Since that time, twenty-six fellowships have been awarded.

Recipients of the four fellowships beginning July 1, 1982 are:

- Eric P. Brass, M.D., Fellow, Division of Clinical Pharmacology, University of Washington School of Medicine. Dr. Brass plans to investigate the role that arachidonic acid metabolites may play in the regulation of glucose production by the liver in health and in disease. The purpose of these studies will be to ascertain whether drugs that inhibit endogenous prostaglandin synthesis or therapy with arachidonic acid metabolites can be used to treat disorders of glucose homeostasis. Studies in normal humans will be conducted to assess the effects or arachidonic acid metabolites on glucose production and glucagon secretion *in vivo*. The *in vitro* studies will involve the use of hepatocytes and pancreatic cultures to more rigorously examine the effects of arachidonic acid metabolites and of drugs that inhibit their synthesis. These studies will be coupled with monitoring of arachidonic acid metabolism by these tissues through the use of high performance liquid chromatography. The data from these studies will be used to assess whether



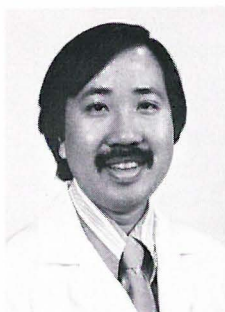
Eric P. Brass, M.D.



Thomas A. Kent, M.D.

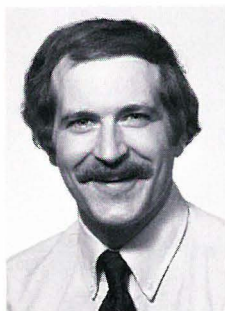
drugs designed to inhibit arachidonic acid metabolism or the arachidonic acid metabolites themselves can be used to correct defective regulation of glucose production in diabetic subjects, particularly those predisposed to hypoglycemia.

- Thomas A. Kent, M.D., Fellow, Department of Psychiatry, University of Kansas College of Health Sciences and Hospital. Dr. Kent will study the effects of psychoactive drugs upon the blood/brain barrier, with the goal of determining whether a drug's effects of brain permeability can predict its effects upon mood. In addition, he will participate in two human subjects studies: (1) a study of the comparative efficacy of propranolol and amitriptyline in migraine prophylaxis; and (2) a study of the pharmacokinetic interaction between amitriptyline and neuroleptic drugs.



Howard R. Lee, M.D.

- Howard R. Lee, M.D., Fellow, Department of Pharmacology, University of Arizona College of Medicine. Dr. Lee will study the pharmacokinetics of the narcotic analgesic fentanyl and the effects of that drug on histamine H₂-receptor blockage and hepatic blood flow. The pharmacokinetics of intravenous lidocaine on human volunteers will be studied with cimetidine, ranitidine and control.



Mark S. Smith, M.D.

- Mark S. Smith, M.D., Fellow, Clinical Pharmacology Division, Duke University School of Medicine. Dr. Smith's research will be directed towards the comparative clinical pharmacology of the calcium antagonist drugs. The pharmacokinetics and pharmacodynamics of diltiazem will be compared to verapamil. One of the major purposes of the research is to define the pharmacokinetics of diltiazem and its concentration effect relationships to see if the route dependent discrepancy applies as it does between intravenous versus oral administration. These studies should provide a comparison and a contrast of the effects of these calcium antagonists on supraventricular and ventricular arrhythmias and as vasodilator agents.

Those individuals whose fellowships began July, 1981 are:

- Richard P. Day, M.D., Fellow, Department of Medicine, University of Washington School of Medicine.
- Linda A. Linday, M.D., Fellow, Departments of Pharmacology and Pediatrics, Cornell University Medical College.

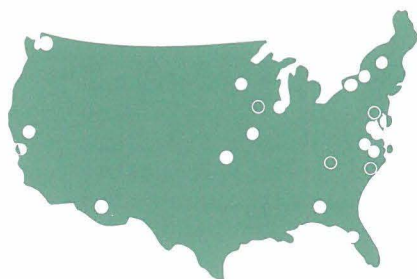
Those individuals whose fellowships entered the second year of award on July 1, 1981 are:

- Mark J. Goldberg, M.D., Fellow, Department of Internal Medicine, The University of Iowa College of Medicine.

- Cheryl Mahony, M.D., Fellow, Division of Clinical Pharmacology, Duke University Medical Center.
- Theodore Wang, M.D., Research Fellow, Division of Clinical Pharmacology, Vanderbilt University School of Medicine.
- Jeffrey R. Wilcke, D.V.M., Fellow, Department of Veterinary Clinical Medicine and Veterinary Biosciences (Pharmacology), University of Illinois, College of Veterinary Medicine.

The individual whose award concluded on July 1, 1981 is:

- Claes M. Nilsson, M.D., Postdoctoral Fellow in Hematology-Oncology, Cancer Research Institute, University of California, San Francisco, School of Medicine.



Geographical distribution of Foundation "Fellowships for Careers in Clinical Pharmacology" program, 1973-1982.

- One
- More than One

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, provides students an opportunity to spend up to one year full-time in an investigative project in pharmacology-clinical pharmacology. The minimum period of the award is three months. It is hoped that by having students become involved in investigative projects at a point when career choices are still relatively flexible, that they will opt for research careers in clinical pharmacology. Forty-three awards have been made since 1974.

The six students whose fellowships began July 1, 1981 are:

- Martin M. Bednar, second year medical student, New York Medical School. His principal advisor is Dr. John McGiff, Pro-

fessor and Chairman, Department of Pharmacology. Based on some earlier studies undertaken by Mr. Bednar with Dr. McGiff, Mr. Bednar is studying some of the factors affecting the release of products of the lipoxigenase pathway, such as hydroxy-eicosatetraenoic acids and leukotrienes in the rat kidney. After preliminary experiments, an extension of the early findings into a more intact preparation will be attempted to permit examination of the effects of lipoxigenase products on renal function.

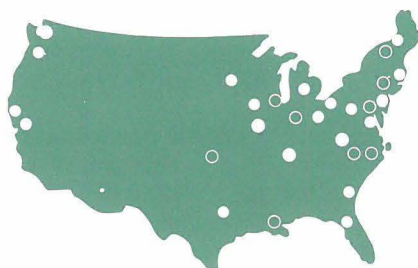
- Karl C. Csaky, third year medical student, University of Louisville School of Medicine. His principal advisor is Dr. Walter M. Williams, Assistant Professor, Department of Pharmacology and Toxicology. Mr. Csaky is investigating the kinetics of catabolism and anabolism of 5-fluorouracil and the naturally occurring substrates (uridine, thymidine and deoxyuridine). The object of the work is to develop a comprehensive model system for examining both anabolic and catabolic pyrimidine nucleoside metabolism in the liver.

- Thomas L. Eggerman, University of Washington, School of Medicine, Seattle. His principal advisor is Dr. R. Paul Robertson, Head, Division of Clinical Pharmacology. Mr. Eggerman is attempting to develop a specific direct measurement of PGI_2 in the human platelet, since the lack of this greatly limits advancement in the prostaglandin field. The studies will hopefully advance the understanding of the regulation of receptors. The experiments should provide new insights into receptor regulation since they involve an anuclear cell. On the clinical side, Mr. Eggerman believes that the studies will be relevant since they will involve the commonly used drug aspirin.

- John P. Fruehauf, Rush Medical College. His principal advisor is Dr. Henri Frischer, Professor, Department of Pharmacology. Mr. Fruehauf is investigating the site and mechanism of interaction of phytohemagglutinin, concanavalin A, phorbol myristic acetate, lentinan and lipopolysaccharide with the red cell membrane. Particular attention is being paid to changes in membrane transport and alterations in enzyme activity.

- Francis X. McGowan, Jr., Duke University School of Medicine. His principal advisor is Dr. David G. Shand, Professor and Chief, Division of Clinical Pharmacology. The one year program has been designed to provide Mr. McGowan with a general experience in the design, conduct and evaluation of drug studies in man. He is involved in ongoing research in the unit concerned with verapamil. The major thrust of the research is to test the hypothesis that the active metabolite, nor-verapamil, may act as partial agonist as it has only 20% of the potency of verapamil and thereby antagonises the effect of the parent drug.

- Joan Rubinstein, University of Chicago, The Pritzker School of Medicine. Her principal advisor is Dr. Ghanshyam Pandey, Assistant Professor, Department of Psychiatry. Ms. Rubinstein's research involves the study of antidepressant drugs and psychoactive drugs which are not antidepressants. The work is being done in three phases: (1) the determination (or confirmation) of the pharmacological profiles of the test drugs with respect to monoamine uptake inhibition and down regulation of adrenergic receptors; (2) the development and application of a direct, *in vitro* method for studying monoamine release; and (3) additional receptor studies as indicated by the results of the release studies.



Geographical distribution of Foundation "Medical Student Research Fellowships in Pharmacology-Clinical Pharmacology" program, 1974-1981.

● One
○ More than One

Clinical Pharmacology Unit Support

This program is designed to assist directors of clinical pharmacology units established within the prior two years of the award year and for units with a change in directorship during that period. The grant provides a total of \$50,000 which may be used at any time during a three-year period. The program is aimed at providing some initial funds to enable the unit's research efforts to be maintained until other research grants are obtained. The first grants were made in 1978. The total number of awards made to date is six.

The award beginning July 1, 1981 was made to:

- Clinical Pharmacology Division, Department of Medicine, Howard University College of Medicine. The unit was established in 1974. Robert E. Taylor, M.D., Ph.D., Assistant Professor of Medicine and Pharmacology, was appointed the new director July 1, 1980. The central direction of the research program concentrates on the cardiovascular system with emphasis on hypertension, sickle cell disease and thrombotic mechanisms.



Geographical distribution of Foundation Clinical Pharmacology Unit Grants, 1978-1981

- One
- More than One

BASIC PHARMACOLOGY

Faculty Development Awards in Basic Pharmacology

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

The first awards, which are for a two-year period, were made in 1973. The program provides salary and fringe benefits. The Foundation has set a ceiling of \$25,000 on the amount of its participation in the total yearly salary and fringe benefits for any candidate beginning with the 1980 awards. The total number of awards made to date is twenty-eight.

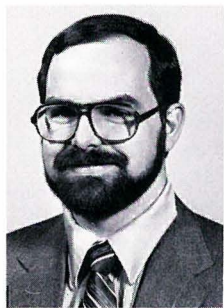
Those who received the awards beginning July 1, 1982 are:

- Walter R. Dixon, Ph.D., Assistant Professor, University of Kansas School of Pharmacy. Dr. Dixon's research is directed toward elucidating the mechanism by which endogenous opiate peptides modulate sympathetic nerve activity. This study will mainly involve the effects of opiate peptides on the spontaneous and nerve stimulation-mediated release of the adrenergic transmitter, norepinephrine, from adrenergically innervated organ systems. Recently, studies indicate that the opiate receptor populations are heterogeneous. A major aim of the research program will be to assign physiological functions to the various opiate receptors. By comparing presynaptic and post-synaptic end organ responses to various opiate agonists and antagonists in perfused organ systems, it is hoped that these studies will result in the identification of physiological functions for the various opiate receptors, and elucidate a physiological role for the endogenous opiates.

- Jerry M. Farley, Ph.D., Assistant Professor, Department of Pharmacology and Toxicology, University of Mississippi Medical Center. Dr. Farley's research interests are directed towards analyses of peripheral neural and neuromuscular function. A variety of chemicals have been identified to alter neuromuscular and/or synaptic transmission with some of the effects being

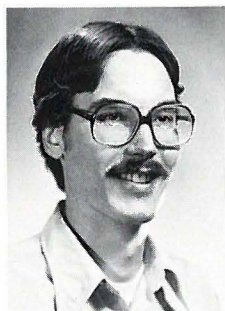


Walter R. Dixon, Ph.D.



Jerry M. Farley, Ph.D.

deemed desirable and other deleterious. Dr. Farley will study n-alkylguanidines which vary in structure to provide compounds of different bulkiness and hydrophobicity. It will be possible to correlate the interactions of these various substances with the pores or channels which are opened in response to acetylcholine. Since these actions are similar to those produced by other drugs, information will be obtained concerning general pharmacological effects on the neuromuscular function.



Gregory A. Weiland,
Ph.D.

- Gregory A. Weiland, Ph.D., Assistant Professor, Department of Pharmacology, New York State College of Veterinary Medicine. Dr. Weiland will be studying nicotinic acetylcholine receptors and substance P receptors and their interactions within the nervous system. *In vitro* biochemical assays for receptor function as well as receptor binding will be developed using model neuronal systems. The binding assays will be utilized to identify and characterize these receptors throughout the nervous system. Substance P modulation of nicotinic responsiveness will also be examined to determine the biochemical mechanism of this receptor interaction.

Those who began their awards in July 1, 1981 are:

- Allyn C. Howlett, Ph.D., Assistant Professor, Department of Pharmacology, St. Louis University School of Medicine.
- Edwin K. Jackson, Ph.D., Assistant Professor, Department of Pharmacology, Vanderbilt University School of Medicine.
- Kenneth P. Minneman, Ph.D., Assistant Professor, Department of Pharmacology, Emory University School of Medicine.

Those who entered the second year of their awards in July, 1981 are:

- Ted H. Chiu, Ph.D., Assistant Professor, Department of Pharmacology, Medical College of Ohio.
- Paul H. Fischer, Ph.D., Assistant Professor, Department of Human Oncology, University of Wisconsin.
- Lindsay B. Hough, Ph.D., Assistant Professor, Department of Pharmacology, Mount Sinai School of Medicine
- Guy Le Breton, Ph.D., Assistant Professor, Department of Pharmacology, University of Illinois College of Medicine.



Geographical distribution of Foundation "Faculty Development Awards in Pharmacology" program, 1978-1982.

- One
- More than One

Fellowships for Advanced Predoctoral Training in Pharmacology or Toxicology

The program, offered initially in 1977, is designed to assist those candidates who have one or two years remaining in their predoctoral training, the time during which they are engaged in their thesis research.

The fellowship program provides a stipend of \$5,040 a year, payment of tuition and \$500 a year for incidentals directly associated with the thesis research preparation. The program has been funded to provide eight fellowships each year. However, four extra fellowships were authorized for 1982. A total of fifty-two fellowships have been made.

Those who received fellowships which begin between January-August, 1982 are:

- Kurt A. Black, Department of Pharmacology, University of Iowa School of Medicine. His advisor is Dr. Thomas T. Rephly, Professor of Pharmacology. The research deals with the regulation of folate-dependent formate oxidation in the rat and monkey.
- Robert N. Cory, Department of Pharmacology, Mount Sinai School of Medicine. His advisor is Dr. Harel Weinstein, Professor of Pharmacology. His research is aimed at characterizing the adaptation of receptor mechanisms to the chronic treatment with drugs active at the receptor site.
- Linda M. DeWitt, Department of Pharmacology, Medical College of Virginia. Her advisor is Dr. James W. Putney, Jr., Associate Professor of Pharmacology. Her research deals with the mobilization of calcium by glucose-releasing agents in the liver.
- Roy A. Frye, Department of Pharmacology, University of Michigan School of Medicine. His advisor is Dr. Ronald Holz, Associate Professor of Pharmacology. He is investigating a possible role for phospholipase-A² in catecholamine secretion and in Ca²⁺ metabolism in cultured bovine chromaffin cells.

- James J. Galligan, Department of Pharmacology, University of Arizona School of Medicine. His advisor is Dr. Thomas F. Burks, Chairman of the Pharmacology Department. His research is a study of the central nervous system control of gastrointestinal motility, examining the role of opioid peptides and their relationship to the irritable bowel syndrome.

- Nick E. Goeders, Departments of Pharmacology and Psychiatry, Louisiana State University Medical Center at Shreveport. His advisor is Dr. James E. Smith, Associate Professor of Psychiatry and Pharmacology. His research involves a study of the neurobiology of stimulant reward systems.

- David Gordon, Department of Pharmaceutical Sciences, State University of New York, Stony Brook. His advisor is Dr. Paul Brynes, Assistant Professor, Pharmaceutical Sciences. His research involves the development of a new assay for environmental toxins.

- Miranda J. Hughes, Department of Pharmacology, Cornell University Medical College. Her advisor is Dr. Arleen B. Rifkind, Associate Professor, Departments of Pharmacology and Medicine. Her research involves a study of the relationship between induction of mixed function oxidase activity by PCB's and arachidonic acid metabolism.

- Michelle W. Kloss, Department of Pharmacology, Duke University School of Medicine. Her advisor is Dr. Gerald Rosen, Department of Pharmacology. Her research is concerned with the role of drug metabolism and protective mechanisms of cocaine-induced hepatic injury.

- James J. Manfredi, Department of Molecular Pharmacology, Albert Einstein College of Medicine. His advisor is Dr. Susan B. Horwitz, Professor of Molecular Pharmacology. His research is involved with using the experimental antitumor drug, Taxol, as a unique probe for studying microtubules.

- Michael W. Newton, Department of Pharmacology, University of California, Los Angeles. His advisor is Dr. Donald J. Jenden, Professor and Chairman, Department of Pharmacology. His research is a study of the metabolism and pharmacology of N-aminodeanol (NADe) and acetyl N-aminodeanol (AcNADe) using a gas chromatographic mass spectrometric method for simultaneous quantification of acetylcholine, choline, and of NADe and AcNADe.

- Frank E. Palmieri, Department of Pharmacology, New York Medical College. His advisor is Dr. Patrick E. Ward, Associate Professor of Pharmacology. His research is aimed at identifying, characterizing and localizing specific enzymes in the vasculature which metabolize vasoactive peptides such as angiotensins, kinins and substance P.

Those awardees whose fellowships continued into 1981 are:

DAVID AHARONY
Thomas Jefferson University
School of Medicine

RONALD W. BARRETT
Rutgers University
College of Pharmacy

MELVIN F. BILLINGSLEY
George Washington University
School of Medicine

DONALD C. BODE
University of Pennsylvania
School of Medicine

RONALD M. BURCH
Medical University of
South Carolina

VINCENT A. FLORIO
University of Texas
Health Science Center at Dallas

ROBERTA L. FRIEDMAN
Vanderbilt University
School of Medicine

KELVIN W. GEE
University of California (Davis)
School of Medicine

J. RUSSELL GROVE
Stanford University
School of Medicine

KATHERINE S. HILLIKER
Michigan State University
College of Human Medicine

STEPHEN M. LANIER
University of Tennessee
College of Medicine

JANET L. MARIAN
Duke University
School of Medicine

DANIEL C. MEDYNSKI
Harvard Medical School

JAMES B. REESE
University of California (San Diego)
School of Medicine

PETER J. RICE
Ohio State University
College of Pharmacy

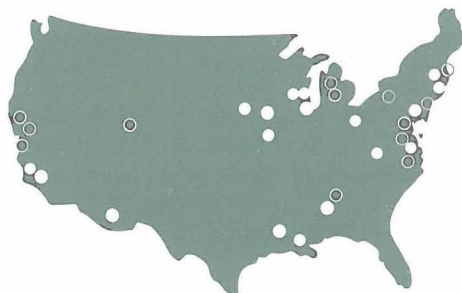
JOSEPH L. ROMSON
University of Michigan
Medical School

JUDITH A. ROY
University of Kentucky
College of Medicine

JACQUELINE SAGEN
University of Illinois
Medical Center

DAVID A. WIERSMA
Michigan State University
College of Human Medicine

JERWIN WU
University of California (San Francisco)
School of Medicine



Geographical distribution of
Foundation "Fellowships for
Advanced Predoctoral Training
in Pharmacology/Toxicology"
program, 1972-1982.

● One
○ More than One

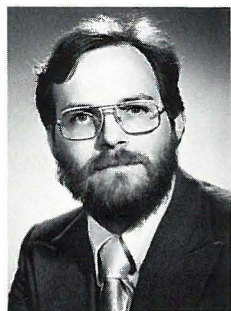
Fellowship Awards in Pharmacology-Morphology

The aim of this program is to advance understanding of drug action through the discovery of specifically related cellular and tissue changes; and, concurrently, to uncover associations between normal and abnormal function in particular tissue and cellular structure.

The awards are for 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. Since 1968 when the first fellowships were offered, forty-nine awards have been made.

The program requires that a candidate be qualified primarily either in a morphologic speciality or in pharmacology. However, training to be achieved under the fellowship in the complementary discipline need not be formal. The candidate's program should result in a familiarity with a new discipline approach by using his primary discipline as a medium for acquiring the second.

The recipients of fellowships which began in July, 1981 are:



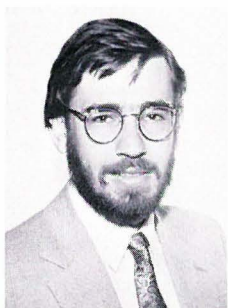
Stanley R. Jolly, Ph.D.

● Stanley R. Jolly, Ph.D., Postdoctoral Fellow, Department of Pharmacology, University of Michigan Medical School. Dr. Jolly's research is directed towards the study of the effects of ibuprofen and lodoxamide as to their ability to protect the heart against ischemic injury. Physiological, biochemical and morphologic assessments will be made upon a number of parameters in an attempt to quantitate the degree of irreversible myocardial injury resulting from a standardized ischemic insult involving either regional or global ischemia in non-treated and treated animals. The ultimate goal of the research is to determine if ischemic myocardial tissue can be salvaged as a result of pharmacologic interventions and to determine if correlations exist among the ultrastructural, biochemical and functional parameters being measured.



Iris Nemhauser, Ph.D.

● Iris Nemhauser, Ph.D., Postdoctoral Fellow, Department of Pharmacology, Columbia University College of Physicians and Surgeons. Her research involves an ultrastructural study of the axon of the giant cerebral neuron of the sea hare in an attempt to identify the cellular structure(s) engendering the motive force for axonal fast transport. The objectives of the research are the elucidation of and disposition of actin and myosin in the axon and the relation of these filaments to identifiable serotonin containing membrane-bound vesicles which are transported from the soma to the nerve terminals. Subsequently, she plans to employ actin depolymerizing agents and examine their effect on fast transport in conjunction with ultrastructural changes in micro-filament structure and/or relation to transported organelles.



Howard Ratech, M.D.

- Howard Ratech, M.D., Fellow, Departments of Pathology and Medicine, New York University Medical Center. By analogy with the genetic deletion of the enzyme adenosine deaminase (ADA) in humans, resulting in severe combined immunodeficiency disease, it has been proposed that one can use ADA inhibitors either to produce immunosuppression or to treat malignant lymphoid conditions. Dr. Ratech is studying the effects of 2'-deoxycoformycin on immunosuppression and nucleoside metabolism in normal mice and on tumor growth, animal survival and nucleoside metabolism in mice bearing T-cell or B-cell derived transplantable lymphoid malignancies.



Geographical distribution of Foundation "Fellowship Awards in Pharmacology-Morphology" program, 1968-1981.

● One
○ More than One

Those individuals who entered the second year of their fellowships in 1981 are:

- Paulette Bernd, Ph.D., Fellow, Department of Pharmacology, New York University School of Medicine.
- Shew Chan, Ph.D., Fellow, Department of Pharmacology, Harvard Medical School
- Jay R. Knutson, Ph.D., Research Associate, Department of Biology, The Johns Hopkins University, School of Arts and Sciences

Those individuals whose fellowships concluded in June, 1981 were:

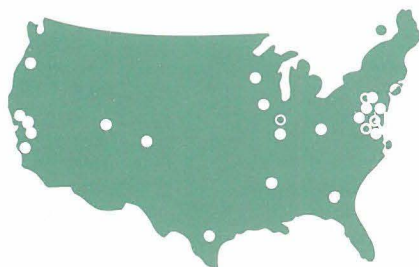
- Suzanne N. Haber, Ph.D., Postdoctoral Fellow, Department of Psychology, Massachusetts Institute of Technology.
- Gary E. Pickard, Ph.D., Postdoctoral Fellow, Department of Anatomy, Columbia University, College of Physicians and Surgeons.
- Janet K. Stephens, Ph.D., Postdoctoral Fellow, Departments of Pharmacology and Pathology, University of Colorado Medical Center during the time of the award.

Faculty Awards in Toxicologic Pathology

There is a need to attract academic scientists interested in analyzing, reviewing and questioning where appropriate the present state of the art in the field of toxicology. To examine the degree of interest the academic community may have, a junior faculty program was authorized for a three year period. The goal of the program is to attract veterinary and comparative pathologists who are interested in spending two years in drug toxicology research. During the pilot period, a total of three awards are anticipated.

RESEARCH GRANTS

An important aspect of PMA Foundation effort has been the support of fundamental research in drug toxicology. Between 1966 and the end of 1971, 26 research grants of relatively large amounts for two to five years were awarded, principally to established investigators to either extend existing research or to provide "seed" monies to follow a promising lead. In 1971 a change in emphasis within the Foundation's programs shifted the bulk of the funds into educational support programs, and, therefore, less into research. The Foundation does, however, continue to accept requests for 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.



Geographical distribution of Foundation general research grants, 1966-1982.

- One
- More than One
- ⊙ Outside U.S.

Research Starter Grants

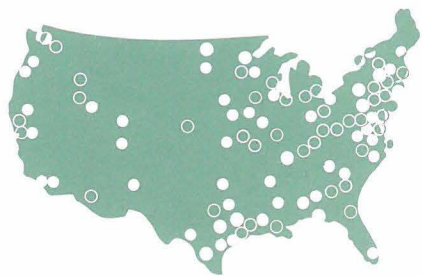
As part of the change of emphasis in 1971 which sought to direct monies more toward the development of the individual, a program of Research Starter Grants was initiated. These grants are intended to provide financial support for beginning investigators. The program offers \$6,500 a year for two years, with the second year contingent upon a continuing need for the funds. The research areas of interest within this program are pharmacology, clinical pharmacology and drug toxicology; research into the general principles of pharmaceuticals is also included in the program. The program allows for approximately 20 research starter grants each year. The first awards were made in 1972. A total of 267 research starter grants has been made, including the twenty-three awards beginning January 1, 1982.

The recipients of the grants beginning January 1, 1982 are:

PETER W. ABEL, Ph.D. Emory University School of Medicine	PHILIP R. VULLIET, Ph.D., D.V.M. Texas A & M University College of Veterinary Medicine
CHRISTOPHER C. BENZ, M.D. Yale University School of Medicine	KENDALL B. WALLACE, Ph.D. University of Minnesota, Duluth College of Medicine
JEAN M. BIDLACK, Ph.D. University of Rochester Center for Brain Research	LARRY P. GONZALEZ, Ph.D. University of Illinois College of Medicine
JOHN D. CATRAVAS, Ph.D. Medical College of Georgia School of Medicine	CARL A. GRUETTER, Ph.D. Marshall University Medical School
JOHN Y. L. CHIANG, Ph.D. Northeastern Ohio Universities College of Medicine	EDWARD HAWROT, Ph.D. Yale University School of Medicine
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JACK P. UETRECHT, Ph.D., M.D. Vanderbilt University School of Medicine	

Review of the need of the 27 research starter grantees whose awards began January 1, 1981 for a second year of the awards resulted in 17 of them having their awards continued. These are:

PATRICK J. BYRNE, M.D. Georgetown University School of Medicine	JONATHAN L. MILLER, Ph.D., M.D. State University of New York (Syracuse) College of Medicine
CRAIG W. DAVIS, Ph.D. University of South Carolina School of Medicine	KENNETH P. MINNEMAN, Ph.D. Emory University Medical School
GEETHA GHIA, Ph.D. University of South Alabama College of Medicine	BYRON NOORDEWIER, Ph.D. University of North Dakota School of Medicine
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KENNETH E. McMARTIN, Ph.D. Louisiana State University School of Medicine	



Geographical distribution of Foundation "Research Starter Grants" program, 1972-1982.

● One
○ More than One

OTHER SUPPORT

Toxicology Workshop

A workshop on the immunological aspects of toxicology was held May 17-20, 1981. The co-chairmen were Edgar Haber, M.D., Chief, Cardiac Unit of the Medical Services, Massachusetts General Hospital, and Emil A. Pfitzer, Sc.D., Director, Department of Toxicology, Hoffmann-La Roche Inc. The proceedings of the workshop will be published as the March, 1982 issue of *Pharmacological Reviews*.

This was the second of the three workshops budgeted. The first workshop held October 8-11, 1978 dealt with the topic of the cellular and molecular basis of toxicology. Copies of these proceedings may be obtained from the publisher, Williams & Wilkins, Baltimore, Maryland. Their toll free number is #1-800-638-0672.

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 support of fundamental research on drugs and programs for training personnel in basic and clinical pharmacology and toxicology.

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. 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 for travel.

(4) 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 20.

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

FOUNDATION FINANCES

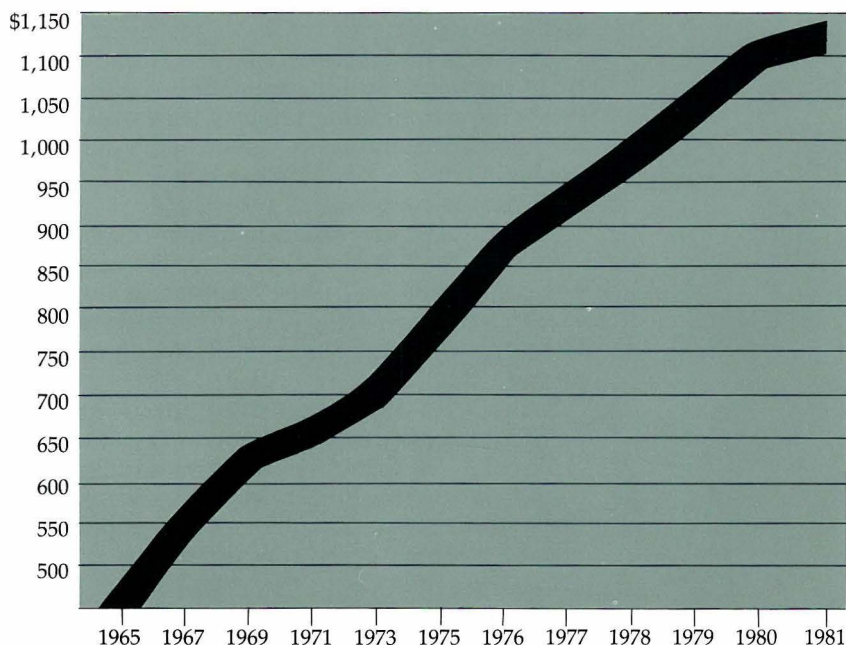
The total income of the Foundation in 1981 was \$1,443,545. Of this amount, \$1,097,970 came from contributions. The balance of \$345,575 came from investments and refunds of unexpected balances from grants.

Contributions were received from approximately four out of every five PMA Member Firms. Contributions were also received during 1981 from individuals and other groups in the health field.

Grants, Foundation-sponsored programs and other expenses for 1981 amounted to \$1,368,479. Of this total, \$1,106,861 represented expenditures for grants. There was a fund balance of \$1,736,267 as of December 31, 1981. 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 distributed. As of December 31, 1981, the contingency liability for 1982 was approximately \$1,091,707.

The Foundation's financial position as of December 31, 1981 has been audited by the Washington, D.C. accounting firm of Buchann & Company.

PMA Foundation
Contribution Income
1965-1981 (Thousands)



Statement of Income and Expenditures For the Year Ended December 31, 1981

Income

Contributions—Note a	\$1,097,970
Income from Investments	210,816
Gain on Sale of Stock	121,457
Miscellaneous Income.....	<u>13,301</u>
TOTAL INCOME.....	\$1,443,545

Expenditures

Grants—Note b	
Clinical Pharmacology Faculty Awards	\$ 247,887
Clinical Pharmacology Fellowships	86,410
Clinical Pharmacology Unit Support	114,750
Basic Pharmacology Faculty Awards.....	183,104
Medical Student Research Fellowships.....	40,000
Pharmacology-Morphology Fellowships.....	82,370
Research Starter Grants.....	235,500
Advanced Predoctoral Fellowships	<u>116,840</u>
	\$1,106,861

Administrative, December Awardee Meeting and Special Toxicology Workshop Expenses.....	\$ 261,618
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TOTAL EXPENDITURES.....	\$1,368,479
Excess of income over expenditures	\$ 75,066
General fund balance at January 1, 1981	\$1,661,201
General fund balance at December 31, 1981.....	\$1,736,267

Note a—The Foundation received contributions of \$75,100 prior to December 31, 1981 which the Foundation considered applicable to 1982, and, therefore, are not recorded as income in 1981.

Note b—In addition to the amounts shown, the Foundation has committed itself, subject to annual review, to make certain grants. At December 31, 1981, the amounts still to be disbursed with respect to these grants during 1982 amounted to approximately \$1,091,707.

ORGANIZATION AND ADMINISTRATION

The PMA Foundation operates through its officers and four advisory committees. In July, 1981, Herman Sokol, Ph.D., President, Bristol-Myers Company, was elected as Chairman of the Board. Irwin Lerner, President and Chief Executive Officer, Hoffmann-La Roche Inc., was elected Vice Chairman, and Verne M. Willaman, Executive Committee Member and Member of the Board of Directors, Johnson & Johnson, was elected Secretary, Treasurer. Thomas E. Hanrahan is President and Irwin C. Winter, M.D., Ph.D., serves as staff consultant.

In reaching decisions of the most worthwhile activities for support, the Board of Directors has had the advice of extremely knowledgeable individuals serving on four advisory committees.



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¹Terms Expired April, 1981

²Named to the Board of Directors April, 1981

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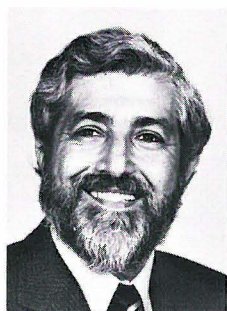
³Became Chairman December, 1980

⁴New Members April, 1981

⁵Terms Expired April, 1981

⁶New Member December, 1981

⁷Term Expired December, 1981



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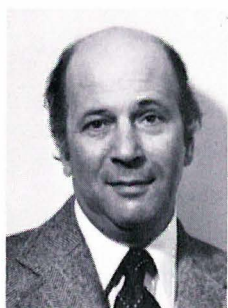
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⁸Term Expired December, 1981

⁹New Member December, 1981



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School of Medicine
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¹⁰Term Expired December, 1981

¹¹New Member April, 1981

¹²New Member December, 1981

CONTRIBUTORS

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- Analytab Products
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- Ames Company
- Miles Pharmaceuticals
- Norwich-Eaton Pharmaceuticals
- Division of MortonNorwich
- Organon Inc.
- Pennwalt Corporation
- Pharmaceutical Division
- The Pfizer Foundation
- Howmedica, Inc.
- Shiley Incorporated
- Wm. P. Poythress & Company, Inc.
- Purdue Frederick Company
- Revlon Foundation
- Armour Pharmaceutical Company
- Barnes-Hind Pharmaceuticals, Inc.
- Meloy Laboratories, Inc.
- USV Pharmaceutical Corporation
- Richardson-Vicks, Inc.
- Baker Instruments Corporation
- J. T. Baker Chemical Company

A. H. Robins Company
 Rorer Group, Inc.
 William H. Rorer, Inc.
 Rorer Group Surgical Products Division
 Rorer International Corporation
 Sandoz, Inc.
 Dorsey Laboratories
 Sandoz Pharmaceuticals
 R. P. Scherer Corporation
 Schering-Plough Foundation
 G. D. Searle & Co.
 Searle Medical Products Group
 Searle Pharmaceutical/Consumer
 Products Group
 SmithKline Corporation
 Allergan Pharmaceuticals, Inc.
 Smith Kline & French Laboratories
 SmithKline Medical Diagnostics
 E. R. Squibb & Sons, Inc.
 Surgicot, Inc.
 Edward Weck & Company, Inc.
 Sterling Drug Inc.
 Breon Laboratories
 Sterling-Winthrop Research Institute
 Winthrop Laboratories
 Stuart Pharmaceuticals
 Division of ICI Americas, Inc.
 Syntex Laboratories, Inc.
 The Upjohn Company
 Warner-Lambert Foundation
 Parke-Davis

PMA Associates and Others

Clark-O'Neill, Inc.
 C.M.E. Communications, Inc.
 Frank J. Corbett, Inc.
 Thomas G. Ferguson Associates, Inc.
 Steven K. Herlitz, Inc.
 The Huisking Foundation, Inc.
 Kallir, Philips, Ross, Inc.
 Klemtner Advertising Inc.
 Lavey/Wolff/Swift, Inc.
 William Douglas McAdams, Inc.
 Medical Economics Company
 Medicus Intercon
 Owens-Illinois, Inc.
 Closure Division
 Glass Container Division
 Kimble Division
 Plastic Products Division
 Rolf Werner Rosenthal, Inc. Advertising
 Scientific Protein Laboratories, Inc.
 Sieber & McIntyre, Inc.
 Sudler & Hennessey Incorporated
 Taylor Pharmacal Company
 Wesson/Cohen/Neglia Inc. Advertising

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.

Letters should be addressed to:

**Thomas E. Hanrahan
President
Pharmaceutical Manufacturers
Association Foundation, Inc.
1155 15th Street, N.W.*
Washington, D.C. 20005**

***After July 1, 1982, the address will be:**

**1100 15th Street, N.W.
Washington, D.C. 20005**

**Pharmaceutical Manufacturers
Association Foundation, Inc.
1155 15th Street, N.W.
Washington, D.C. 20005**