

**Pharmaceutical Manufacturers
Association Foundation, Inc.
1979 Annual Report**

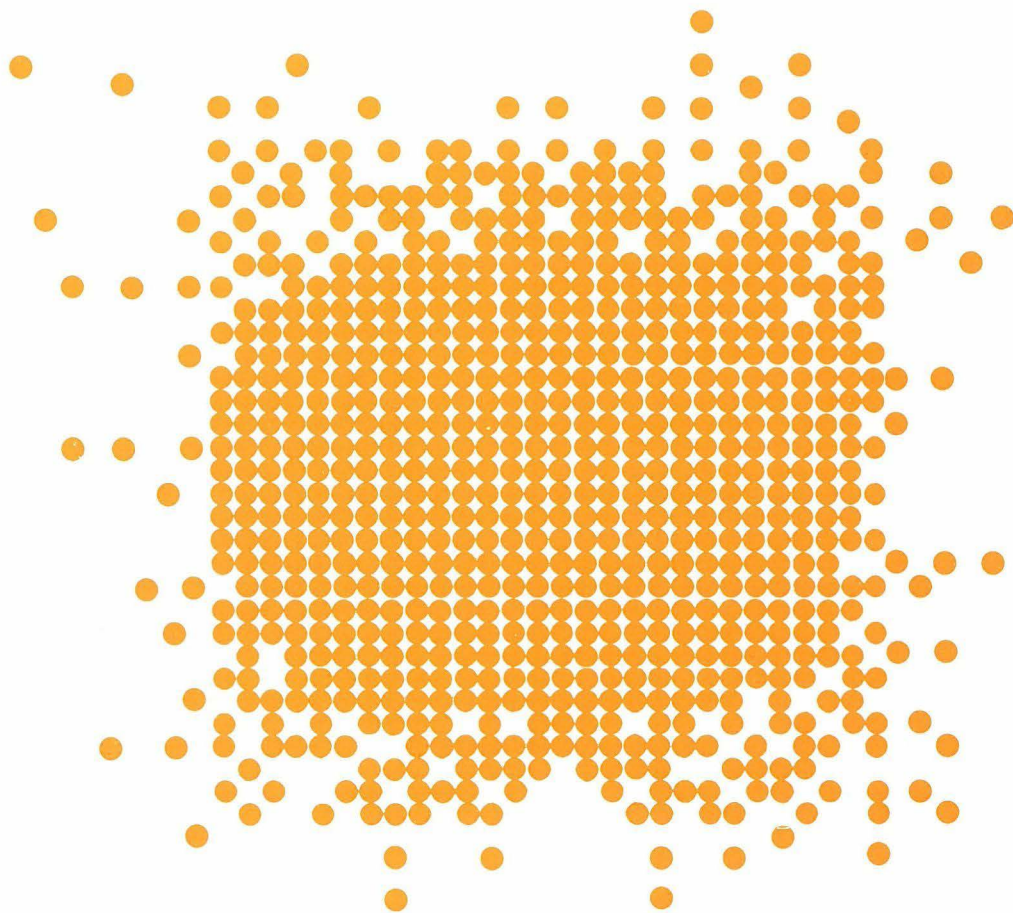


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Applications (inside back cover)

AS OTHERS SEE US

“**T**he wisdom of the PMAF in providing this program and the generosity in the execution of the program have been of immense help to young pharmacologists in the United States.”

That comment by a sponsor of an individual who had received a research starter grant captures, we believe, the spirit and substance of the PMA Foundation. For the Foundation, since 1965, has provided substantial and critical assistance to hundreds of students, fellows and faculty members in schools of medicine, pharmacy, veterinary medicine and dentistry throughout the United States. More than \$10 million, on behalf of the PMA Foundation's contributors, have been distributed through research, training and teaching programs essential to the knowledge base on which a vigorous pharmaceutical industry depends.

It has indeed been a notable contribution, perhaps little known outside the world of science, but well appreciated within it.

As we enter the 1980's, the PMA Foundation will continue, then, to offer those programs which best meet needs in disciplines that are basic to the progress of science. And we are constantly seeking new ways, exploring frontiers. For example, the Scientific Advisory Committee is now assessing needs that are likely to emerge in the next five years; we want to ensure that the Foundation's programs are in concert with the practical directions in which the disciplines are moving.

We are also looking at new ideas

and changing emphases within current programs. The Foundation's current toxicology workshop series, described in this report, is the result of an earlier reexamination of Foundation efforts, as was the decision to make research in the field of pharmaceuticals more explicit within the starter grant program.

The PMA Foundation has enjoyed the consistent and strong support of PMA members throughout its existence. Its four advisory committees deserve special mention for being instrumental in highlighting effective ways to assist the fields of pharmacology and clinical pharmacology. Because of this expert guidance, the Foundation has been able to channel the \$10 million into these fields in ways which have had substantial impact.

Now the Foundation looks toward another decade of assistance from the pharmaceutical industry. The effort will be made also to build even more financial support.

For the needs are still there, and, if anything, are growing because knowledge of the biochemical nature of disease and of the agents to fight it, is growing as well. As our industry scientists advance along these new frontiers, the roles of pharmacology and toxicology will expand in importance. More than ever, the work of the Foundation will be vital to the progress of medicine, and the foresight that led to its founding approximately fourteen years ago has been more than justified.

ONE OF THE BEST

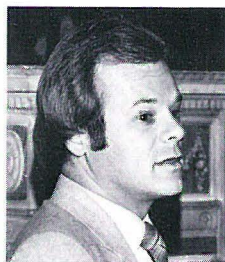
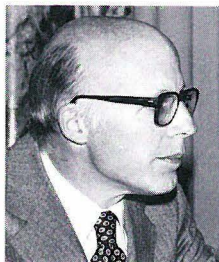
This year's December meeting, the tenth, of advisory committee members and awardees has been ranked by some of the attendees as the best meeting they have attended. A superb presentation by Dr. John Vane, Group Research and Development Director, The Wellcome Foundation Limited, England, on "Prostacyclin, Platelets and Vascular Disease" set the tone for the successful day. Donald van Roden, Chairman of the PMA Foundation Board of Directors, presented the audience with an update on the Foundation's activities. He reported that 1979 contributions had exceeded the \$1,000,000, a first. He expressed the confidence of the Board of Directors in bettering this contribution level in 1980.



Rather than dividing into morning subgroup sessions as has been the format in the past, the group remained in plenary session for the morning and the first session in the afternoon. Six of the awardees presented papers in the morning. Dr. Sara Gardner, Program Director, Pharmacology/Toxicology Program, National Institute of General Medical Sciences, spoke at the initial afternoon session discussing funding opportunities for basic and clinical pharmacologists through the Pharmacology/Toxicology Program.

At the last session of the day, the awardees divided into subgroups: Dr. Gardner met with the clinical pharmacologists to extend her earlier re-

marks; and the basic pharmacologists and pharmacology-morphology fellows attended a workshop on mutagenesis testing conducted by Dr. Gregory S. Probst, Senior Toxicologist, Eli Lilly and Company.



The December meeting also presented the opportunity for an exchange of ideas between members of the PMA Board of Directors who joined the awardee group at lunch.

In August, 1979, a meeting was held with the research starter grantees and the advanced predoctoral fellows in pharmacology or toxicology during the fall meeting of the American Society for Pharmacology and Experimental Therapeutics. The speaker this year was Dr. William Montagna, Director, Oregon Regional Primate Center, who described the research capabilities of primate centers and the opportunities for collaborative pharmacological research.

The value of the decision to promote continuing contacts with the awardees through meetings of this type has demonstrated itself over the past ten years. Valuable critiques of the Foundation's efforts flow from these sessions. Other contacts with the awardees during the year provide information useful to the Foundation in reshaping present programs and shaping new ones. A feeling of camaraderie has developed among the participants at these meetings, a most desirable result.

ACTIVITIES

Since its formation in 1965, about \$10 million has been authorized by the PMA Foundation for a variety of workshops, conferences, research projects and educational programs. Of this amount approximately \$3.0 million has been used to support research and about \$6.6 million has gone into educational awards. The remaining \$478,000 has provided financial assistance for scientific meetings, along with a small portion for publications.

Virtually all of the 1979 grants and awards were made within programs sponsored by the Foundation. These include two faculty level programs of 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. A special 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 1979 the Foundation assisted an additional 57 individuals. All of these were helped at a crucial time in their career development. The Foundation has, in its slightly more than thirteen years of existence, helped about 580 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 in clinical pharmacology, one in the combined field of pharmacology-morphology, one in pharmacology or toxicology and one in basic pharmacology. Each program is intended to achieve a specific goal, each for a particular rung on an individual's career ladder.

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 scheduled to begin July 1, 1980 a total of 51 individuals have been supported under this program since 1967. They apply for a two-year period, with a third year option.

Recipients of the four awards to begin July 1, 1980 are:



Ka Kit Hui, M.D.

● Ka Kit Hui, M.D., to be named Assistant Professor, Department of Medicine, when award is activated, University of California, Los Angeles. Dr. Hui's primary research effort centers on the beta-adrenergic system in various diseases (bronchial asthma, thyrotoxicosis) and drug withdrawal states (narcotic, beta-blockers, etc.). Part of his research will relate to beta-endorphins. Another important component of his activities will be participation in the consultation service, which deals with drug interactions, drug toxicity, pharmacokinetics and pharmacogenetics and therapeutic failures.



Richard D.
Mamelok, M.D.

● Richard D. Mamelok, M.D., Assistant Professor, Department of Medicine, Stanford University. Dr. Mamelok's research is focused on the renal transport system for organic anions. Using isolated plasma membranes, he will study extensively the mechanisms responsible for movement of these compounds across luminal and pericapillary membranes. The contributions of electrical and chemical gradients to forces which drive this transport will be quantitated. The eventual goal of this work is to isolate, purify, and reconstitute the membrane-bound components which mediate the transport of organic anions. The molecular properties of these components will be examined.

Dr. Mamelok's teaching responsibilities include training fellows in clinical pharmacology and educating undergraduate medical students in therapeutics.



Christopher S.
Wilcox, M.D., Ph.D.

● Christopher S. Wilcox, M.D., Ph.D., Assistant Professor of Medicine, Harvard Medical School. Dr. Wilcox will be at the Peter Bent Brigham Hospital. He will investigate the renal response to diuretic drugs, using experimental kidney preparation he developed that permits sampling of renal venous blood, urine and renal lymph. This will allow a fuller assessment of the pharmacokinetics of the drugs studied and the factors which underlie the development of tolerance to diuretics. In additional studies, he plans to use hormone antagonists to determine the processes by which hormones might limit the effectiveness of a diuretic.

Dr. Wilcox will guide the teaching program in Clinical Pharmacology for medical students, interns and resident staff at the Peter Bent Brigham Hospital. In addition, he will serve as an Attending Physician and consultant in Clinical Pharmacology.



Alastair J. J. Wood,
M.B., Ch.B., M.R.C.P.

● Alastair J. J. Wood, M.B., Ch.B., M.R.C.P., Assistant Professor, Departments of Medicine and Pharmacology, Vanderbilt University. Dr. Wood's research will build upon his previous work on β -receptor function in man and age-related effects of smoking on drug metabolism. The postulate will be tested that

leukocyte β -receptor density correlates with *in vivo* response to isoproterenol and is controlled by the circulating levels of catecholamines.

In a second study, Dr. Wood proposes to compare the increase in drug metabolism produced by enzyme induction in groups of young and old smokers and non-smokers to determine if aging and/or smoking affect this increase.

Those individuals whose awards began in July, 1979 are:

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

The individuals who entered their second year of awards in July, 1979 are:

- Robert M. Graham, M.B., B.S., Assistant Professor, Departments of Pharmacology and Internal Medicine, University of Texas, Southwestern Medical School.
- Fred E. Karch, M.D., Assistant Professor, Department of Pharmacology and Toxicology, University of Rochester, School of Medicine and Dentistry.
- Juan J. L. Lertora, M.D., Ph.D., Assistant Professor, Departments of Medicine and Pharmacology, Northwestern University, Medical School.
- Aubrey R. Morrison, M.B., B.S., Assistant Professor, Departments of Medicine and Pharmacology, Washington University, School of Medicine.

The individual whose award continued for a third year beginning July 1, 1979 is:

- Raymond L. Woosley, Jr., M.D., Ph.D., Associate Professor, Departments of Medicine and Pharmacology, Vanderbilt University, School of Medicine.

The individuals who ended their awards in June, 1979 are:

- Werner A. Bleyer, M.D., Assistant Professor, Departments of Pediatrics and Medicine, University of Washington, School of Medicine.
- Robert C. Boerth, M.D., Ph.D., Associate Professor, Departments of Pediatrics and Pharmacology, Vanderbilt University, School of Medicine.

- Curt R. Freed, M.D., Assistant Professor, Departments of Medicine and Pharmacology, University of Colorado Medical Center.



Geographical distribution of Foundation awards under its "Faculty Development Awards in Clinical Pharmacology" program, 1967-1980

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

Recipients of the four fellowships beginning July 1, 1980 are:



Mark J. Goldberg, M.D.

- Mark J. Goldberg, M.D., Fellow, Department of Internal Medicine, The University of Iowa. Dr. Goldberg's one year fellowship will involve the continuation of studies in drug metabolism among social groups. By means of a controlled trial, he will be examining whether there are differences among Blacks, Caucasians and Orientals in the pharmacokinetics of lidocaine. If differences are found, further research to elucidate the mechanisms by which any differences occur will be considered.

Dr. Goldberg will also take course work leading to an M.S. in pharmacology. He will continue his activities with the Clinical Pharmacology Consult Service during the year.



Cheryl Mahony,
M.D.

- Cheryl Mahony, M.D., Fellow, Division of Clinical Pharmacology, Duke University Medical Center. Dr. Mahony's research activities will be two-fold: to develop an assay for nitroprusside and its metabolites in biologic fluids; and to apply the assay to patients receiving nitroprusside in the setting of acute myocardial infarction to delineate the pharmacokinetics and pharmacodynamics of the drug. The research efforts during the first year will not involve human subjects.



Theodore Wang,
M.D.

- Theodore Wang, M.D., Research Fellow, Division of Clinical Pharmacology, Vanderbilt University. Dr. Wang's research training will be in the broad area of drug metabolism with specific focus on factors affecting drug responsiveness. Of interest will be aging and liver disease and the mechanisms whereby these states alter the sensitivity of patients to the central activity of the benzodiazepines, e.g., diazepam and chlordiazepoxide. Additionally, Dr. Wang will investigate the metabolism and pharmacokinetics of a new anti-arrhythmic drug, encainide, in man. Again the focus will be upon the relationship between disposition and clinical effects especially the potential role that genetic constitution may play in this, with respect to the ability of a patient to biotransform the drug along specific pathways.

In addition, Dr. Wang will attend graduate courses available within the University appropriate to his career development. Participation in the weekly Department and Division research seminars and Clinical Research Rounds will also be part of his training.



Jeffrey R. Wilcke,
D.V.M.

- Jeffrey R. Wilcke, D.V.M., Fellow, Department of Veterinary Clinical Medicine and Veterinary Biosciences (Pharmacology), University of Illinois, College of Veterinary Medicine. Dr. Wilcke's research program will deal with the development and evaluation of a rational therapeutic approach to the control of ventricular dysrhythmias in canine patients. He plans first to study the pharmacokinetics of lidocaine and its active metabolites in experimental dogs following intravenous and intramuscular administration. He then will define minimal effective and toxic concentrations in dogs with experimentally-induced dysrhythmias. Lastly, he will confirm the safety and efficacy of dosage regimens determined above in canine patients with ventricular dysrhythmias which are presented to the Intensive Care Unit of the Veterinary Medical Teaching Hospital.

Those individuals whose fellowships began July, 1979 are:

- Richard C. Ahrens, M.D., Fellow, Departments of Pediatrics and Pharmacology, University of Iowa, College of Medicine. This is a one year fellowship.
- Claes M. Nilsson, M.D., Postdoctoral Fellow in Hematology-Oncology, Cancer Research Institute, University of California,

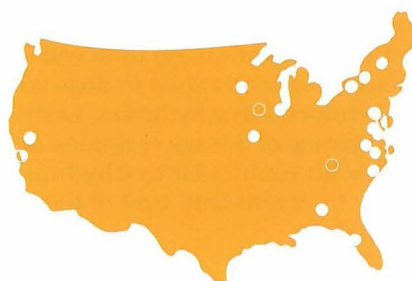
School of Medicine, San Francisco. Initially a one-year fellowship, a second year was awarded.

Those individuals whose fellowships entered the second year of awards in July, 1979 are:

- Robert L. Blum, M.D., Postdoctoral Fellow, Division of Clinical Pharmacology and the Department of Computer Science, Stanford University, School of Medicine.
- James R. Matson, M.D., Fellow, Pediatric Clinical Pharmacology/Nephrology, Departments of Pediatrics and Pharmacology, University of Iowa, College of Medicine.
- Douglas K. Reilly, M.D., Fellow in Clinical Pharmacology, Department of Pharmacology and Toxicology, University of Rochester, School of Medicine and Dentistry.

Those individuals who ended their awards in June, 1979 are:

- Thomas P. Green, M.D., Postdoctoral Fellow, Department of Pharmacology, and Medical Fellow, Department of Pediatrics, University of Minnesota, Medical School.
- Brian A. Jones, M.B., B.S., Postdoctoral Fellow in Departments of Medicine and Pharmacology, Cornell University Medical College.
- Stanley J. Szefer, Assistant Professor, Department of Pharmacology, State University of New York, School of Medicine.
- Walter M. Williams, M.D., Ph.D., Fellow in Clinical Pharmacology, Departments of Pharmacology and Medicine at the University of Chicago during the time of the fellowship. Currently he is an Assistant Professor at the University of Louisville, Department of Pharmacology and Toxicology.



Geographical distribution of Foundation "Fellowships for Careers in Clinical Pharmacology" program. 1973-1980

- 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 one year full-time in an investigative project in pharmacology-clinical pharmacology. To meet the full-time requirement, the student must interrupt his formal medical training, but he must also intend to continue his schooling at the conclusion of the fellowship. It is hoped that by having students become involved extensively in investigative projects at a point when career choices are still relatively flexible, that they will opt for research careers in clinical pharmacology. Thirty-four awards have been made since 1974. Changes in medical school curricula since 1974 have made it more difficult for individuals to apply for this grant. This program is being reviewed for its continued pertinence.

The PMA Foundation has had a medical student support program since 1968. The earlier program offered three-month traineeships to enable students to become acquainted with techniques used in clinical pharmacology.

The six students who received fellowships which began July 1, 1979 are:

- Stephen J. Brandt, a third year medical student at the time of the award at Emory University School of Medicine. His principal advisors are David Glass, Ph.D., Assistant Professor, Department of Pharmacology and Joseph M. Kinkade, Jr., Ph.D., Associate Professor, Department of Biochemistry. Mr. Brandt is examining the biochemical pharmacology of the Chediak-Higashi Syndrome (CHS). He is attempting to identify the biochemical lesions which underly the disease state; and knowing these, he will examine how best to select a drug that will effectively treat the disorder. A major area of the research will examine oxidative metabolism in the beige mouse peripheral blood polymorphonuclear leukocytes and how it might be affected by ascorbate.
- Evan Kharasch, a second year medical student at the time of the award at Northwestern University, School of Medicine. His principal advisor is Raymond F. Novak, Ph.D., Assistant Professor, Department of Pharmacology. Mr. Kharasch is involved in a research project attempting to determine the mechanism(s) by which Adriamycin causes cardiotoxicity *in vivo*. Adriamycin-induced alteration in cardiac energy metabolism *in vivo* will be undertaken with the specific objective of investigating the degree of Adriamycin-induced alterations in cellular energy metabolism as an indicator of Adriamycin-mediated cardiotoxicity. The effects of *in vivo* manipulation of drug metabolizing enzyme levels using established enzyme inducers and inhibitors upon

Adriamycin-induced changes in heart energy metabolism *in vivo* will be determined and used to characterize the role of Adriamycin metabolites in cardiotoxicity.

- Michael N. Pierce, a second year medical student at the time of the award at the University of Vermont. His principal advisor is Lester Soyka, M.D., Ph.D., Chairman, Department of Pharmacology. Mr. Pierce is investigating the effect of *Corynebacterium parvum* on the metabolism and toxicity of cyclophosphamide in mice. Observations have been made which show that *C. parvum* vaccine administered to mice results in inhibition of hepatic-drug metabolizing enzyme activity. This response is mediated by the reticuloendothelial system. Mr. Pierce will attempt to obtain more precise identification of the mediators involved. Also, he will be involved in studies designed to evaluate the relationship of immunotherapy to chemotherapy.

- Steven M. Pincus, a second year student at the time of the award at Tulane University. His principal advisor is William J. George, Ph.D., Professor, Department of Pharmacology. Mr. Pincus is involved in research to evaluate the relationships between cyclic nucleotides, nucleic acid synthesis and malignant transformation in two model erythroid cell systems. The fetal liver erythroid cell (FLC) and the malignant Friend erythroleukemic cell will comprise the two model systems. The synthesis and cellular localization of cyclic nucleotides will be monitored in control and carcinogen treated FLC. Synthesis of RNA and DNA will also be monitored in these cells.

- A. Oliver Sartor, a second year student at the time of the award at Tulane University (Veterans Administration Hospital). His principal advisor is Morris H. Spirtes, M.D., Chief, Neurobiology Laboratories, Veterans Administration Hospital. Mr. Sartor noted that there have been many particularly suggestive experiments which have shown that pituitary and hypothalamic hormones have extra-endocrine actions. These actions include a direct effect on the central nervous system as demonstrated by behavioral effects. Although some of these behavioral effects have been well characterized, there has not always been a correlation between these effects and neurochemistry and neurophysiology. Mr. Sartor is attempting to correlate such effects for a pituitary hormone and a hypothalamic peptide. The compounds being examined are —melanocyte stimulating hormone from the pituitary and a MSH-releasing inhibiting factor (MIF-I) from the hypothalamus. MIF-I has promised both as an antidepressant and as an anti-Parkinsonian agent while MSH has an effect on visual attention. An attempt will be made to correlate these activities with effects on the enzyme adenylate cyclase in various regions of the rat brain.

- William F. Simonds, a junior medical student at the time of the award at the University of Pittsburgh. His principal advisor is

Werner Klee, Ph.D., Laboratory of General and Comparative Biochemistry, National Institute of Mental Health. Mr. Simonds is undertaking his research at the NIMH. The major aims of the research project are: to compare biophysical parameters of solubilized opiate receptors from different tissue sources. By comparing receptors from different brain regions, from brains of normal and pathological specimens, from smooth muscle sources and from experimental cell lines, it may be possible to show the existence of natural subclasses of opiate receptors or for receptor lesions associated with psychiatric or other diseases.

If solubilization of a functional receptor is possible, then the second major aim is to purify this receptor while maintaining its capacity to bind reversibly with opiate agonists and antagonists.



Geographical distribution of Foundation "Medical Student Research Fellowships in Pharmacology-Clinical Pharmacology" program, 1974-1979

- One
- More than One

Clinical Pharmacology Unit Support

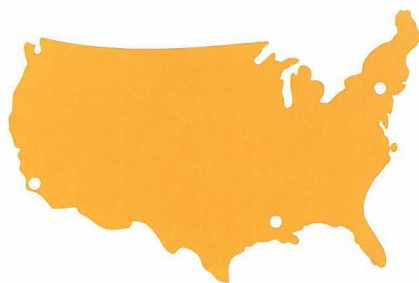
This program is designed to assist directors of clinical pharmacology units established within the prior two years of the award and for units with a change in directorship during that period. The grant provides a total of \$50,000 which may be used at any time during a three year period. The program 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 three.

The award beginning July 1, 1979 was made to:

- Division of Clinical Pharmacology, Louisiana State University Medical Center. The division was formed within the Department of Pharmacology and Therapeutics in January, 1978. The chief of the division is John T. Wilson, M.D., Professor, Department of Clinical Pharmacology and Pediatrics. Current research interests include a study of the pharmacological basis for aspirin hepatotoxicity; a study of alcohol potentiation of adriamycin toxicity; study of carbamazepine 10,11-epoxide formation in animals and man; and the effect of growth hormone on drug metabolism in man.

The awards which began July, 1978 were made to:

- Division of Clinical Pharmacology, University of California, Los Angeles. The division was formed within the Departments of Medicine and Pharmacology in August, 1977. The chief of the unit is Matthew E. Conolly, M.D. Dr. Conolly is also an Associate Professor in Medicine and Pharmacology. The research efforts are directed towards bronchial asthma, ischemic heart disease, liver disease of various types, hypertension and drug abuse.
- Division of Clinical Pharmacology, State University of New York at Stony Brook. This division was created within the Department of Pharmacological Sciences in September, 1976. The director is Ilene Raisfeld, M.D., Associate Professor of Clinical Pharmacology and Medicine. The present areas deal with the study of the mechanisms by which drug-induced pulmonary fibrosis can be minimized. She has also initiated a clinical project on the pharmacokinetics of haloperidol. Plans have been made for a clinical project involving narcotic antagonists.



Geographical distribution of
Foundation Clinical
Pharmacology Unit Grants,
1978-79

● 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.

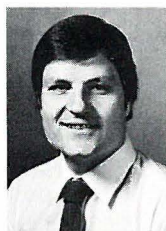
The first awards, which are for a two-year period, were made in 1973. The program provides salary and fringe benefits. The Foundation has set a ceiling of \$25,000 on the amount of its participation in the total yearly salary and fringe benefits for any candidate beginning with the 1980 awards. The total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

Those who received awards beginning July 1, 1980 are:



Ted H. Chiu, Ph.D.

● Ted H. Chiu, Ph.D., Assistant Professor, Department of Pharmacology, Medical College of Ohio. Dr. Chiu's research program is directed toward a better understanding of the mechanisms of action of benzodiazepines (BZs). Specific aims of the present research efforts are: 1) to establish quantitatively if BZ receptors are pharmacological receptors for anticonvulsant activity; 2) to study the turnover of BZ receptors in vivo; 3) to study the time course of the recovery of BZ receptors following chronic BZ treatment; and 4) to purify BZ receptors and BZ binding inhibitor and to characterize their biochemical properties.



Paul H. Fischer,
Ph.D.

● Paul H. Fischer, Ph.D., Assistant Professor, Department of Pharmacology, University of Missouri, School of Medicine. Dr. Fisher's research interests include the development and the biochemical and pharmacological characterization of new drug treatments for virally-induced diseases. His major effort is in the area of synergistic drug combinations, particularly in the therapy of herpes simplex virus (types 1 and 2) infections. A critical part of his approach is the elucidation of the biochemical parameters which determine differential drug sensitivity in single agent therapy. Analysis of chemotherapeutic interactions at the cellular and subcellular level in normal and virally infected tissues constitutes a primary aim of the research program.



Lindsay B. Hough,
Ph.D.

● Lindsay B. Hough, Ph.D., to be appointed Assistant Professor at the time of the award, Department of Pharmacology, Mount Sinai School of Medicine. Dr. Hough's research will examine histamine in the central nervous system. He intends to complete the development of methods to measure brain histamine and its metabolites; clarify the actions of centrally-acting drugs on this neurochemical system; identify neuronal pathways which may utilize histaminergic transmission; and characterize the histamine receptors of brain slices and their relationship to purine nucleotide synthesis.



Guy Le Breton,
Ph.D.

● Guy Le Breton, Ph.D., Assistant Professor, Department of Pharmacology, University of Illinois, College of Medicine. Dr. Le Breton will investigate the mechanism(s) by which metabolites of arachidonic acid, notably thromboxane A_2 (TXA₂) stimulate human blood platelet function and vascular smooth muscle. A series of selective TXA₂ receptor blockers will be evaluated relative to their ability to inhibit the normal processes of platelet aggregation and secretion, as well as modify smooth muscle tone. Binding studies using radiolabeled TXA₂ antagonists, will be performed in order to more fully characterize the nature of the platelet and vascular TXA₂ receptors. Since it has been suggested that calcium functions as the final mediator of TXA₂ stimulation, a parallel series of experiments will be conducted to determine the relative ability of TXA₂ to alter intracellular calcium fluxes. These studies should in turn provide

information concerning the transduction mechanism by which TXA_2 initiates cellular activation.

Those who began their awards in July 1979 are:

- Joan Heller Brown, Ph.D., Assistant Professor in Residence, Department of Medicine, University of California, School of Medicine, La Jolla.
- Karen N. Gale, Ph.D., Assistant Professor, Department of Pharmacology, Georgetown University, School of Medicine.
- Hazel H. Szeto, Ph.D., M.D., Assistant Professor, Department of Pharmacology, Cornell University Medical College.

Those who entered the second year of their awards in July, 1979 are:

- Yvonne C. Clement-Cormier, Ph.D., Assistant Professor, Departments of Pharmacology and Neurobiology, University of Texas Medical School, Houston
- Linda F. Quenzer, Ph.D., Assistant Professor, Department of Pharmacology, University of Connecticut Health Center

Those who ended their awards by June, 1979 are:

- R. Adron Harris, Ph.D., Assistant Professor, Department of Pharmacology, University of Missouri, School of Medicine. Dr. Harris terminated his award early to accept a long-term award from the Veterans Administration.
- Michael E. Maguire, Ph.D., Assistant Professor, Department of Pharmacology, Case Western Reserve University, School of Medicine.



Geographical distribution of Foundation "Faculty Development Awards in Pharmacology." 1973-1980

- 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, during the time they are engaged in their thesis research.

The fellowship program provides a stipend of \$3,900 a year, payment of tuition and \$500 for incidentals directly associated with the thesis research preparation. Beginning with the 1981 awards, the stipend will be increased to \$5,040. The program has been funded to provide seven fellowships each year. However, three extra fellowships were authorized for 1980. A total of thirty fellowships has been made.

Those who received fellowships which begin between January-August, 1980 are:

- Melvin F. Billingsley, Department of Pharmacology, George Washington University, School of Medicine. His thesis advisor is Dr. Amin Suria, Associate Professor of Pharmacology. The thesis is concerned with the pharmacological prevention of glial cell scar formation by selective antimetabolites.
- Ronald M. Burch, Department of Pharmacology, Medical University of South Carolina. His thesis advisor is Perry Halushka, M.D., Ph.D., Associate Professor of Pharmacology and Medicine. His thesis will investigate the role of thromboxane in vasopression-stimulated water permeability in the isolated toad urinary bladder.
- Kelvin W. Gee, Department of Pharmacology, University of California, Davis. His thesis advisor is Eva K. Killam, Ph.D., Professor of Pharmacology. The thesis is concerned with the relationship between dopamine receptor sensitivity and seizure susceptibility in three experimental models of epilepsy.
- Janet L. Marian, Department of Pharmacology, Duke University. Her thesis advisor is P. Michael Conn, Ph.D., Assistant Professor of Pharmacology. She will study the development of a radioligand-receptor assay for the gonadophin releasing hormone (GnRH). The intent is to determine whether GnRH receptor number or affinity varies with known changes in pituitary sensitivity and gonadotrophin secretion.
- Peter J. Rice, Division of Pharmacology, Ohio State University, School of Pharmacy. His thesis advisor is Popat N. Patil, Ph.D., Professor, Division of Pharmacology. His thesis concerns itself with different forms of hypertension (genetic, renal, neurogenic and mineralocorticoid-induced) and the role of calcium. The relationship of calcium to the membrane alteration will be studied in aortic strips and in isolated subcellular fractions from vascular smooth muscle.

- Joseph L. Romson, Department of Pharmacology, University of Michigan. His thesis advisor is Benedict R. Lucchesi, Ph.D., M.D., Professor of Pharmacology. The thesis research is concerned with an integrated approach to the investigation of the mechanisms by which drugs capable of influencing coronary thrombosis formation provide their beneficial effects.
- Judith A. Roy, Department of Pharmacology, University of Kentucky. Her thesis advisor is Edgar T. Iwamoto, Ph.D., Assistant Professor of Pharmacology. She is involved in studies in opiate peptide modulation of dopamine action in the rat nigrostriatal pathway.
- David A. Wiersma, Department of Pharmacology and Toxicology, Michigan State University. His thesis advisor is Robert A. Roth, Assistant Professor of Pharmacology. The thesis research is examining the relative roles of lung and liver in drug disposition for conditions of normal and altered tissue perfusion as well as for conditions of enzyme induction.
- Jerwin Wu, Department of Pharmacology, University of California, San Francisco. His thesis advisor is Horace H. Loh, Ph.D., Professor of Pharmacology. The thesis research is examining further the role of lipids in muscarinic receptor function using neuroblastoma x glioma hybrid NG108-15 as a model system.
- Diane M. Yahn, Department of Pharmacology, University of Connecticut Health Center. Her thesis advisor is Maurice B. Feinstein, Ph.D., Professor of Pharmacology. The thesis research is concerned with the effect of agents which induce microsomal enzyme systems on prostacyclin production by vascular endothelium.

Those 1977 and 1978 awardees whose fellowships continue into 1980 are:

ARLEEN CHASE	MICHAEL R. PALMER
Boston University	University of Colorado
School of Medicine	School of Medicine
GALE L. CRAVISO	LINDA M. PARSONS
New York University	Stanford University
School of Medicine	School of Medicine
ELAINE M. FAUSTMAN	STEVEN L. PETERSON
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School of Medicine	Jefferson Medical College
STANLEY R. JOLLY	SUSAN TRIESER
Medical College of Wisconsin	Georgetown University
RICHARD H. KENNEDY	School of Medicine
University of Nebraska	
College of Medicine	

Those awardees who concluded their fellowships in 1979 are:

PAUL E. DRIEDGER
Harvard Medical School
CLIFFORD C. HALL
University of Wisconsin
School of Medicine
DENNIS M. HIGGINS
University of Connecticut
School of Medicine

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Geographical distribution of
Foundation awards under the
"Fellowships for Advanced
Predoctoral Training in
Pharmacology/Toxicology,"
1978-80

- One
- More than One

Fellowship Awards in Pharmacology-Morphology

The aim of this program of fellowship awards 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 tissues 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, 43 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, 1979 are:



Suzanne Haber,
Ph.D.

• Suzanne Haber, Ph.D., Postdoctoral Fellow, Department of Anatomy, University of Minnesota Medical School. Dr. Haber's training is aimed at elucidating possible effects of maternal morphine administration upon the development of neurons containing the opiod peptides—the enkephalins and endorphins. This will be accomplished, in part, using immunohistochemical techniques which allow precise localization and determination of the architecture of enkephalin—and endorphin-containing neurons. Quantitative analysis of the opiod peptides will be accomplished by radioimmunoassay of brain extracts. The possible effects of maternal morphine upon fetal development of opiate receptors will be analyzed by autoradiographic techniques.



Gary E. Pickard,
Ph.D.

• Gary E. Pickard, Ph.D., Postdoctoral Fellow, Department of Anatomy, Columbia University, College of Physicians and Surgeons. Dr. Pickard is investigating questions regarding neural luteinizing hormone releasing hormone (LHRH), peptidergic neurosecretory terminals in the median eminence of the hypothalamus. Although the hypothalamic arcuate nucleus has been repeatedly implicated in the control of gonadotropin secretion, recent reports of monosodium glutamate (MSG) lesioning of this nucleus have been contradictory. MSG is being administered to male and female hamsters and the fate of arcuate LHRH neurons is being examined using immunocytochemical methods.



Janet K. Stephens,
Ph.D.

• Janet K. Stephens, Ph.D., Postdoctoral Fellow, Departments of Pharmacology and Pathology, University of Colorado. Dr. Stephens is attempting to further the understanding of the anatomical and functional relationships among the intrinsic neuronal systems of the basal ganglia and the interactions of these systems with remote systems in the brain. By means of immunohistochemical techniques, along with light and electron microscopy, coupled with neurochemical and neuropharmacological studies of transmitter turnover, it is hoped that further insights into the pathogenesis of extrapyramidal motor dysfunctions will result.

Those individuals who entered the second year of their fellowships in July, 1979 are:

• Virginia S. Seybold, Ph.D., Postdoctoral Fellow, Department of Anatomy, University of Minnesota, Medical School.

• Peter G. Smith, Ph.D., Research Associate, Department of Pharmacology, Duke University, School of Medicine.



Geographical distribution of
Foundation "Fellowship
Awards in Pharmacology-
Morphology" 1968-1979

- One
- More than One

Those individuals whose fellowships concluded in June, 1979 are:

- Douglas E. Chandler, Ph.D., Postdoctoral Fellow, Department of Physiology, at the University of California, School of Medicine, San Francisco, during the time of the award. Currently at the University College Hospital Medical School, England, Department of Experimental Pathology.
- Carole L. Jelsema, Ph.D., Assistant Professor, Department of Pediatrics, Medical College of Wisconsin.
- Michael P. Marietta, Ph.D., Postdoctoral Fellow, Department of Pharmacology, Pennsylvania State University, Milton S. Hershey Medical Center.
- Mark F. Nelson, Ph.D., Postdoctoral Fellow, Department of Pharmacology, at The Johns Hopkins University, School of Medicine during the time of the award. Currently at the Kellogg Company, Research Department.
- James A. Weyhenmeyer, Ph.D., Postdoctoral Fellow, Department of Physiology and Biophysics, at the University of Iowa, College of Medicine during the time of the award. Currently Assistant Professor, University of Illinois, Schools of Basic Medical Sciences and Clinical Medicine.

Special Fellowship

A special postdoctoral fellowship, on a pilot basis, was authorized to be undertaken at the International Institute for Cellular and Molecular Pathology (ICP), Brussels, Belgium. The ICP is under the direction of Nobel-prize winner, Dr. Christian de Duve. ICP's aim is to apply the discoveries and techniques of modern biology to medicine and therapeutics. It endeavors to achieve this aim through a close association of mission-oriented research units, devoted to a wide variety of medical problems.

The recipient of this fellowship is J. Thomas Hjelle, Ph.D. He

is in the second year of the fellowship. Dr. Hjelle is involved in testing the various published methods for the isolation and growth of endothelial cells. He has learned the fluorescence assay and experimental procedure for the determination of accumulation of the anthracycline antitumor drugs by culture cells. He has also studied the metabolism of these cells and their amino acid derivatives by the cultured vascular cells.

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, 1966-1980

- 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 currently offers \$6,000 a year for two years, with the second year contingent upon a continuing need for the funds. The grant will be increased to \$6,500 per year beginning with the 1981 awards. The research areas of interest within this program are in 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 217 research starter grants have been made, including the 25 awards beginning January 1, 1980.

The recipients of the grants beginning January 1, 1980 are:

<p>GEOFFREY ALLAN, Ph.D. Cornell University Medical College</p> <p>NICHOLAS G. BACOPOULOS, Ph.D. Dartmouth College Medical School</p> <p>RUTH ELLEN BILLINGS, Ph.D. University of Texas (Houston) Medical School</p> <p>NIGEL A. BROWN, Ph.D. George Washington University School of Medicine</p> <p>STEVEN R. CHILDERS, Ph.D. University of Florida College of Medicine</p> <p>ANDRE DRAY, Ph.D. University of Arizona College of Medicine</p> <p>DAVID L. EATON, Ph.D. University of Washington School of Public Health</p> <p>PAUL H. FISCHER, Ph.D. University of Missouri School of Medicine</p> <p>BLISS FORBUSH, III, Ph.D. Yale University School of Medicine</p> <p>THOMAS P. GREEN, M.D. University of Minnesota Medical School</p> <p>ALLYN C. HOWLETT, Ph.D. St. Louis University School of Medicine</p> <p>ERIC W. LOTHMAN, M.D., Ph.D. Washington University School of Medicine</p> <p>RICHARD D. MAMELOK, M.D. Stanford University School of Medicine</p>	<p>KEN D. MCCARTHY Ph.D. University of North Carolina School of Medicine</p> <p>CHARLES F. MEIER, JR., Ph.D. University of Oklahoma College of Medicine</p> <p>WILLIAM S. MELLON, Ph.D. University of Wisconsin School of Pharmacy</p> <p>JAMES A. NATHANSON, M.D., Ph.D. Harvard Medical School</p> <p>NEIL M. NATHANSON, Ph.D. University of Washington School of Medicine</p> <p>ROBERT F. O'DEA, Ph.D., M.D. University of Minnesota Medical School</p> <p>JAMES W. SIEG, Ph.D. University of Kentucky College of Pharmacy</p> <p>KOSTAS P. VATSIS, Ph.D. Northwestern University Medical and Dental Schools</p> <p>JOSEPH A. WALDER, M.D., Ph.D. University of Iowa College of Medicine</p> <p>REX Y. WANG, Ph.D. St. Louis University School of Medicine</p> <p>WENDY L. WASHTIEN, Ph.D. Northwestern University Medical and Dental Schools</p> <p>DOUGLAS R. YINGST, Ph.D. Wayne State University School of Medicine</p>
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Review of the need of the 24 research starter grantees whose awards began January 1, 1979 for a second year of the awards resulted in 13 of them having their awards continued. These are:

<p>FREDDIE K. CARR, Ph.D. Philadelphia College of Osteopathic Medicine</p> <p>WALTER R. DIXON, Ph.D. University of Kansas School of Pharmacy</p> <p>PAUL M. EPSTEIN, Ph.D. University of Connecticut School of Medicine</p> <p>JOHN G. GERBER, M.D. University of Colorado Medical Center</p> <p>DAVID B. GLASS, Ph.D. Emory University School of Medicine</p> <p>PAUL M. IUVONE, Ph.D. Emory University School of Medicine</p> <p>DAVID D. KU, Ph.D. University of Alabama School of Medicine</p>	<p>ALICE A. LARSON, Ph.D. University of Minnesota School of Veterinary Medicine</p> <p>TERRY T. MARTINEZ, Ph.D. Northeast Louisiana University College of Pharmacy and Health Sciences</p> <p>GARY O. RANKIN, Ph.D. Marshall University School of Medicine</p> <p>DAVID A. SAELENS, Ph.D. Eastern Virginia Medical School</p> <p>PAUL H. SATO, Ph.D. Michigan State University School of Veterinary Medicine</p> <p>JOHN E. THORNBURG, Ph.D. Michigan State University College of Osteopathic Medicine</p>
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Geographical distribution of Foundation awards under the "Research Starter Grants" program, 1972-1980

- One
- More than One

OTHER SUPPORT

Toxicology Workshops

The PMA Foundation sponsored an invitational Workshop on Cellular and Molecular Toxicology October 8-11, 1978. This unique workshop is the first of a series of three planned in the broad field of toxicology. The science of toxicology derives its impetus from the rational and theoretical body of information provided by molecular and cellular biologists. The workshop examined and updated this information and considered if and how it might be applied in the development of new and better methods for assessing the safety and potential toxicity of drugs. Further, the meeting sought to identify specific areas of research in such methodology and through publication, encourage such research.

A summary of the workshop is available from the Foundation. The proceedings of the workshop were published as a regular issue of *Pharmacological Reviews*. Copies of the proceedings can be purchased from the publisher, Williams & Wilkins, Baltimore, Maryland. The toll free number to order is #1-800-638-0672.

A second toxicology workshop has been planned for October, 1980. The subject area will deal with the immunological aspects of toxicology with goals similar as those mentioned above.

Interferon Workshop

A grant of \$3,000 was awarded to the Memorial Sloan-Kettering Cancer Center to assist in the publication of the proceedings of the second *International Workshop on Interferons*, held at the Center April 22-24, 1979. The value of making possible an early and wide distribution of the proceedings of this timely workshop resulted in this relatively uncommon type of award being made by the Foundation.

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 agreed to initially, and which still govern the distribution of funds, are support of fundamental research in drug toxicology, and the support of programs of research and training for personnel in clinical pharmacology and drug evaluation.

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 3. 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 1979 was \$1,205,022. Of this amount, \$1,026,753 came from contributions. The balance of \$178,269 came from investments and refunds of unexpended balances from grants.

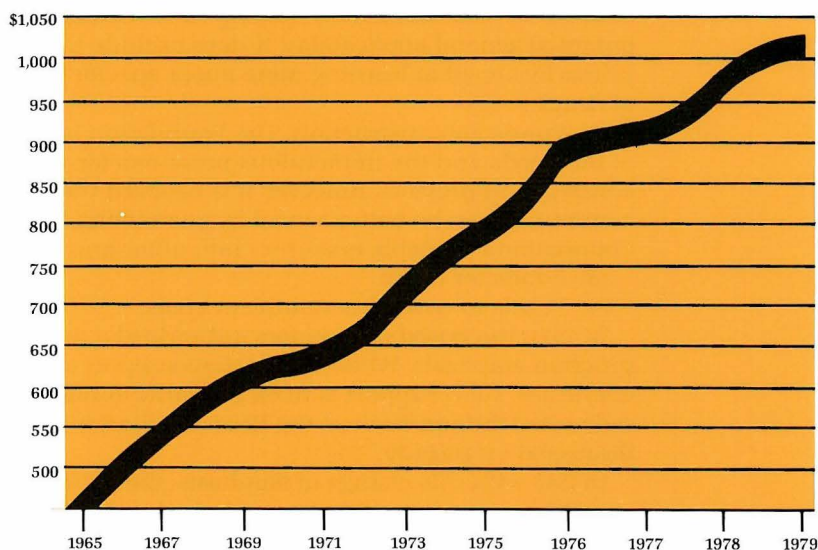
Contributions were received from approximately four out of every five PMA Member Firms. Contributions were also received during 1979 from individuals and other groups in the health field.

Grants, Foundation-sponsored programs and other expenses for 1979 amounted to \$1,195,674. Of this total \$974,302 represented expenditures for grants and Foundation-sponsored programs. There was a fund balance of \$1,570,771 as of December 31, 1979. 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, 1979, the contingency liability for 1980 was approximately \$966,325.

The Foundation's financial position as of December 31, 1979 has been audited by the accounting firm of Ernst & Whinney. Copies of this statement will be supplied upon request.

Financial statements have been issued to contributors quarterly during 1979. These reports are prepared by Washington, D.C. accounting firm of Buchanan & Company.

PMA Foundation
Contribution Income
1965-1979 (Thousands)



Statement of Income and Expenditures For the Year Ended December 31, 1979

Income

Contributions—Note a	\$1,026,753
Income from Investments	130,651
Gain on Sale of Stock	20,860
Miscellaneous Income	26,758
TOTAL INCOME	\$1,205,022

Expenditures

Grants—Note b	
Clinical Pharmacology Faculty Awards	\$ 239,500
Clinical Pharmacology Fellowships	102,125
Clinical Pharmacology Unit Support	36,250
Basic Pharmacology Faculty Awards	123,493
Medical Student Research Fellowships	33,000
Pharmacology-Morphology Fellowships	81,436
Research Starter Grants	234,000
Advanced Predoctoral Fellowships	100,498
Special Fellowship—Brussels	21,000
Memorial Sloan—Kettering Grant	3,000
	\$ 974,302

Administrative, December Awardee Meeting and Toxicology Workshop Expenses	\$ 221,372
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TOTAL EXPENDITURES	\$1,195,674
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Excess of income over expenditures	\$ 9,348
Fund balance at January 1, 1979	\$1,561,423
Fund balance at December 31, 1979	\$1,570,771

Note a—The Foundation received contributions of \$138,050 prior to December 31, 1979 which the Foundation considered applicable to 1980, and, therefore, are not recorded as income in 1979.

Note b—In addition to the amounts shown, the Foundation has committed itself, subject to annual review, to make certain grants. At December 31, 1979 the amounts still to be disbursed with respect to these grants during 1980 amounted to approximately \$966,325.

ORGANIZATION AND ADMINISTRATION

The PMA Foundation operates through its officers and four advisory committees. In April, 1979 Donald van Roden, Vice Chairman of the Board, SmithKline Corporation, was elected Chairman of the Board. William G. Hendrickson, Ph.D., Vice President, American Home Products Corporation was elected Vice Chairman and Herman Sokol, Ph.D., President, Bristol-Myers Company was elected Secretary, Treasurer. Thomas E. Hanrahan is President and Irwin C. Winter, M.D., Ph.D. serves as staff consultant.

In reaching decisions on 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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William G. Hendrickson, Ph.D., Vice Chairman
Herman Sokol, Ph.D., Secretary, Treasurer
Thomas E. Hanrahan, President

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Philadelphia, Pennsylvania

¹Named to the Board of Directors July, 1979

²Retired from the Board of Directors June, 1979
at the time of his retirement from the PMA.

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³Term Expired April, 1979

⁴New Member October, 1979

⁵New Member April, 1979

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⁶Terms Expired December, 1979

⁷New Member November, 1979

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Burroughs Wellcome Co.
Byk-Gulden, Inc.
E. Fougera & Company
Savage Laboratories
Carter-Wallace, Inc.
Wallace Laboratories
Wampole Laboratories
The Central Pharmacal Company
CIBA-GEIGY Corporation
Cooper Laboratories, Inc.
Cooper Laboratories International,
Inc.
Cooper Medical Devices Corp.
CooperVision Optics
CooperVision Pharmaceuticals Inc.
KLI, Inc.
Cutter Foundation
Hollister-Stier
Difco Laboratories
Endo Laboratories, Inc.
E. I. du Pont de Nemours & Company
C. B. Fleet Co., Inc.
Hoechst-Roussel Pharmaceutical
Incorporated
(American Hoechst Corporation)
Hoffmann-La Roche Foundation
Inolex Corporation
Johnson & Johnson Associated
Industries Fund
Arbrook, Inc.
Codman & Shurtleff, Inc.
Ethicon, Inc.
Jelco Laboratories
Johnson & Johnson Products, Inc.
McNeil Laboratories
Ortho Diagnostics Inc.
Ortho Pharmaceutical Corporation
Stimtech, Inc.
Surgikos
Knoll Pharmaceutical Company
Kremers-Urban Company
Lederle Laboratories
(American Cyanamid Company)
Eli Lilly and Company
Mallinckrodt, Inc.
Marion Laboratories, Inc.
Merck & Co., Inc.
Merck Chemical Division
Merck Sharp & Dohme
Miles Laboratories Foundation
Ames Company
Dome Laboratories
Norwich-Eaton Pharmaceuticals
Morton-Norwich
Organon Inc.
The S. B. Penick Foundation
Pennwalt Prescription Products
Pharmaceutical Division,
Pennwalt Corporation

The Pfizer Foundation, Inc.
 Howmedica, Inc.
 Shiley Incorporated
 Wm. P. Poythress & Company, Inc.
 Richardson-Merrell Inc.
 J. T. Baker Chemical Company
 Merrell International
 Merrell-National Laboratories
 Riker Laboratories, Inc.
 A. H. Robins Company
 William H. Rorer, Inc.
 Sandoz, Inc.
 Dorsey Laboratories
 Sandoz Pharmaceuticals
 Schering-Plough Foundation, Inc.
 R. P. Scherer Corporation
 Scherer Laboratories, Inc.
 G. D. Searle & Co.
 Searle Medical Products Group
 Searle Pharmaceuticals/Consumer
 Products Group
 SmithKline Foundation
 E. R. Squibb & Sons, Inc.
 Edward Weck & Company
 Sterling Drug Inc.
 Breon Laboratories
 Winthrop Laboratories
 Syntex Laboratories, Inc.
 The Upjohn Company
 The Warner-Lambert Foundation
 American Optical Corporation
 Diagnostics Division
 Nuclear-Medical Laboratories, Inc.
 Parke-Davis
 Warner Lambert Company Hospital
 Products Division

PMA Associates and Others

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 Frank J. Corbett, Inc.
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 Health Care Publications
 Steven K. Herlitz, Inc.
 The Huisking Foundation, Inc.
 Kallir, Philips, Ross, Inc.
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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.

Letters should be addressed to:

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