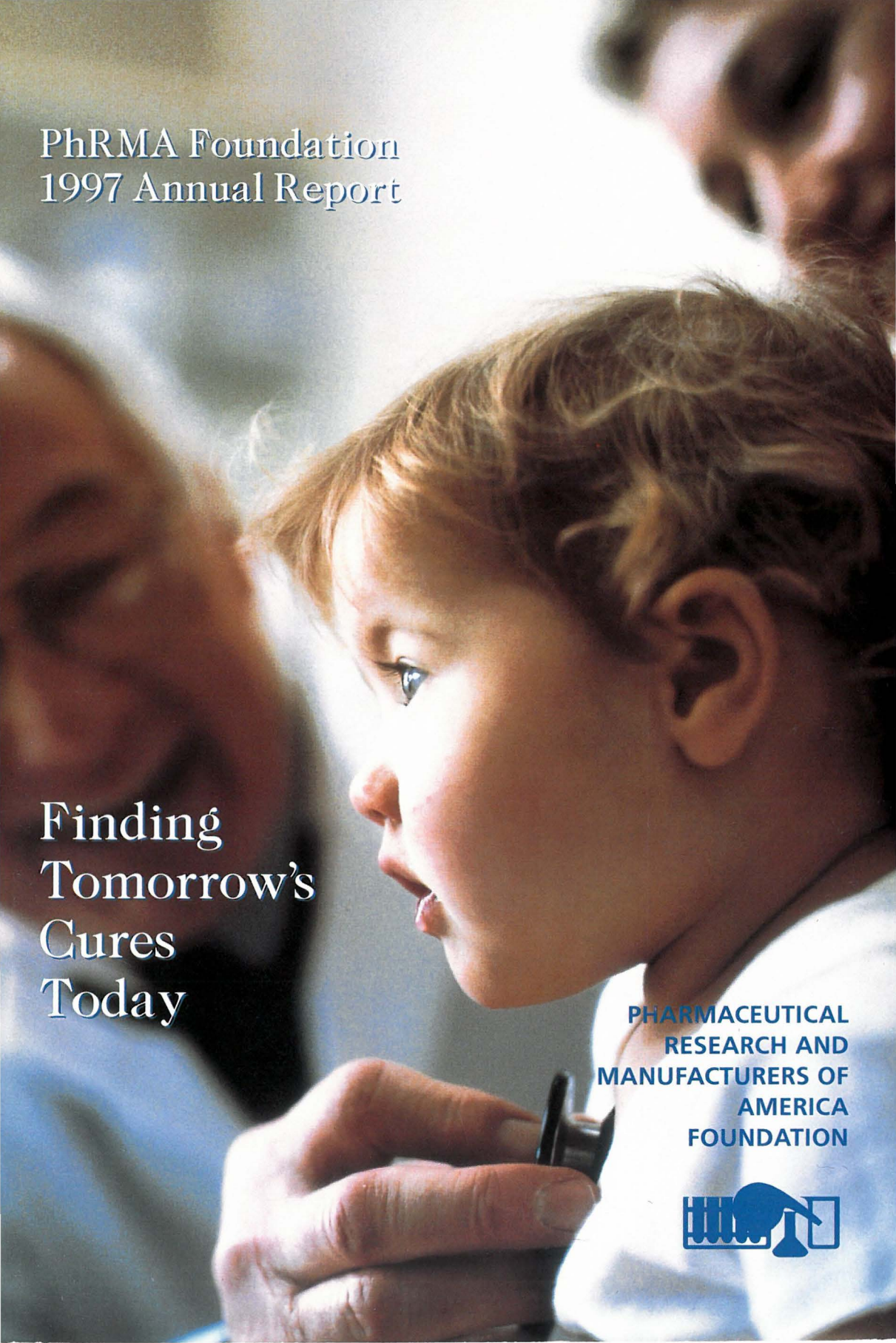
PhRMA Foundation 1997 Annual Report



Finding Tomorrow's Cures Today

PHARMACEUTICAL RESEARCH AND MANUFACTURERS OF AMERICA FOUNDATION

Mission Statement

The quality of health care world-wide depends in large measure on advances in drug therapy, including the discovery and development of new medicines. This requires a framework which would foster the broad range of research, as well as the measurement of outcomes. Therefore, it is to this end that the mission of the PhRMA Foundation is dedicated to enhancing public health through biomedical technology and scientific research. The result will be new and improved medicines to enhance the quality of life world-wide while containing the overall cost of health care, thus improving and promoting the impact of the research-intensive pharmaceutical industry.

This mission shall be accomplished by:

- Developing the careers of young scientists and researchers dedicated to improving quality of life through discoveries in biomedical technology, scientific research, and outcomes measurement. As a result, the valuable base of well trained, quality scientists created by these newly developed careers would serve as a resource to meet the current workforce needs of the scientific and academic community, government, and the research-intensive pharmaceutical industry.

- Establishing an infrastructure of expertise in biomedical technology, scientific research and outcomes measurement to produce leaders in industry, academia and government for the purposes of training the educational and scientific leaders of tomorrow.

- Building alliances between industry and academia to augment the research activities of scientists within both arenas. The purpose of this alliance would be to forge and strengthen the continuum of basic and clinical research by identifying and developing important therapeutic outcomes and significant therapeutic technology leading to the "medicines of tomorrow." This in turn, would serve to enhance clinical practice and foster the improvement of patient care in America.

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

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

Those areas not supported within the existing guidelines are:

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

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

(3) Funds for travel (except as otherwise indicated).

(4) Funds to cover entertainment costs.

While Foundation support of research continues, such support is currently primarily available in programs such as the Research Starter Grants as discussed on page 47 and under the "Education and Training Programs" Section on page 27.

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

Purpose

Contents

Robert C. Black
Chairman
PhRMA Foundation

This 1997 Annual Report of the Pharmaceutical Research and Manufacturers of America Foundation is my third as Foundation's Chairman of the Board. Through both the Report of the Treasurer and the listing of 1997 Awardees and their research, this Annual Report represents an historical perspective of grant programs, financial operations and other activities of the Foundation for the previous calendar year.

In recognition of the renewed vigor with which the Foundation has pursued its mission during the past year, and of the many changes which have come its way, this year's Chairman's message represents a departure from the traditionally retrospective nature of previous years' reports. Instead I will focus on several important events which have ushered in a new era at the Foundation.

Change may well be the single reliably defining characteristic of our industry. But for the Foundation, change has held a very special meaning during the past year. Dr. Maurice Q. Bectel, President and Chief Executive Officer of the Foundation, has elected to retire effective August 31, 1997. Morry has served the Foundation in exemplary fashion, and we thank him for his many years of outstanding service.

During Morry's tenure as President and CEO, he served a pivotal role as counselor to the Foundation in its deliberations on programs, policies, strategic planning and numerous additional areas. His counsel will be sorely missed. Under Morry's leadership, assets climbed to $5 million from $2.1 million. Annual grant and award funding increased from $1.1 million to $1.8 million. Four grant programs were added. During this laudable growth phase, a number of programs were eliminated, having achieved their goals as a result of prudent stewardship. As new programs emerged, the Foundation reevaluated and wisely redirected its program emphasis. Scarce resources were reallocated to meet new and pressing academic needs.

Report of the Chairman

It may well be that Morry's greatest legacy to the Foundation was to maintain the expanded scope of the Foundation during a period of major consolidation within the industry. Throughout the past several years, the Foundation has remained steadfast in its support of research. In addition to his highly effective management of the Foundation's affairs, Morry also enriched the Foundation with his insights from many years as a pharmacist. His perspective enhanced the Foundation's understanding of not only the practice of pharmacy, but also health care generally. This benefit was enjoyed by both the Foundation and the full PhRMA organization, for which he served in a separate capacity as Vice President of Pharmacy Relations.

In a signal tribute to his career in pharmacy, Morry was the recipient of the Remington Honor Medal, pharmacy's highest reward, presented in 1996 by the American Pharmaceutical Association. Bringing additional recognition to the Foundation, as well as to himself personally, he also was awarded two honorary doctoral degrees. In recognition of his achievements at PhRMA and at the Foundation, a reception was held in Morry's honor in July 1997. Over 100 guests, representing numerous Washington organizations and including many member firms' chief executive officers, attended. I was proud to have been among those in attendance and to have been able to wish Morry and his wife, Theresa, a healthy and happy retirement to enjoy golf, grandchildren, and whatever other activities they may wish to pursue.

During the transition in the Foundation's leadership, both the Board and the President-Designate are delighted that Morry has agreed to continue his services to the Foundation as a consultant.

It also is my honor to announce the appointment of Morry's successor, Donna Moore, Director of Programs for the Foundation and a former Pharmaceutical Manufacturers Association employee. From the founding executive, C. Joseph Stetler in 1965, to Tom Hanrahan, to Morry Beetel, and now to Donna, the torch is passed.

Donna Moore joined the Foundation in 1985 and has served as Morry's deputy for the past twelve years. She is capable, energetic and, most importantly for the responsibilities of her new position, knows the Foundation and its constituents. Donna has the full support of the Board of Directors. On behalf of the Board, I offer her our congratulations. We all are looking forward to working with Donna in her new position as we strive to advance the goals and objectives of the Foundation.

In addition to these personnel changes, the Foundation has undergone a transformation technologically. We now have a website on the Internet. Developing and using the Foundation's new website will streamline communications and related costs. For example, information traditionally mailed to constituent groups now is accessible online. Increased member usage of

information available electronically will help to reduce the number of printings and mailings the Foundation must conduct each year.

It seems only fitting that with such evolution taking place within the Foundation that change would be afoot among the membership of the Foundation's Board of Directors. Secretary-Treasurer
G. Gilbert Cloyd, was elected to the post of Vice Chairman at the Foundation's Board meeting in March. Gil has served the Foundation for five years and, as a result of new international responsibilities with Procter & Gamble in Japan, has resigned from the Foundation Board. His services will be missed, but we wish him well. Succeeding him as Secretary-Treasurer is Robert A. Ingram, President and Chief Executive Officer of Glaxo-Wellcome Inc.

I would also like to thank the Foundation Directors with whom I serve for their dedication and for their support in asking me to serve a third term as Chairman. They include: Jan Leschly, Chief Executive Officer, SmithKline Beecham; Robert N. Wilson, Vice Chairman, Board of Directors, Johnson & Johnson; and Patrick J. Zenner, President and Chief Executive Officer, Hoffmann-La Roche Inc. Also serving as an *ex officio* member of the Board is Alan F. Holmer, President of PhRMA.

Thanks are also due the Foundation's three core constituencies, without whom there would be no Foundation. The research-intensive pharmaceutical industry–PhRMA's member firms–associates and research affiliates, are the only source of revenues which make the grant programs possible. Additionally, I wish to thank the Foundation's advisory committee members who spend countless hours reviewing and selecting the top candidates to receive grants. And, finally, I wish to recognize this year's class of 47 grant recipients who represent the best in American research.

To all, I pledge my dedication to enhancing the quality and excellence of the Foundation and its programs in the year ahead. The Foundation is well positioned to capitalize on many exciting opportunities on the horizon, and I look forward to the coming year with optimism and confidence.

Robert C. Black
Chairman, PhRMA Foundation
and
President, Zeneca Pharmaceuticals

Maurice Q. Bectel
President
PhRMA Foundation

This will constitute my twelfth and final message as President of the PhRMA Foundation. I have viewed these annual corporate reporting requirements not as an obligation, but, rather, as an opportunity to communicate with the Foundation's many constituencies, as well as to document the Foundation's history.

This is a bittersweet time for me and for the Bectel family. Theresa and I are excited about having the time to enjoy traveling for leisure and personal enjoyment, rather than for business purposes. But relinquishing the challenges of the daily "hands-on" management of the Foundation and its resources and issues will leave a void that will be difficult to replace—such undertakings being such a major and consuming portion of my professional activities for the past decade-plus. Leaving the daily and monthly opportunities to interact with the Foundation officers, Board and staff, along with others—contributors, awardees, epresentatives, scientists—will create a larger void, which I hope to soften by continuing as a consultant.

Nonetheless, it is time to move on, a process we all face sooner or later. For me, it is particularly gratifying, then, to know that I am leaving the affairs of the Foundation in the hands of a truly competent Board of Directors who have agreed with my recommendation that Donna Moore, the Foundation's Director of Programs, be named to succeed me as President and Chief Executive Officer. Donna has been on the Foundation staff since 1985, following 15 years on the PMA staff.

In her capacity as Director of Programs, Donna has been responsible for administering the twelve research-funding programs—the core of the Foundation's *raison d'etre.* These programs, funded by contributions from the research-intensive pharmaceutical firms comprising the PhRMA membership, support a variety of academic research undertakings, to the tune of some $2 million per year. In addition, she has served as liaison to the Foundation's six advisory committees and to U.S. schools of medicine, pharmacy, and public health. She also has authored and coordinated Foundation publications and meetings.

Report of the President

PHRMA FOUNDATION

Donna's familiarity with the Foundation's programs, people, and priorities made her the obvious choice to be President. I offer my congratulations to both the Board and to Donna in the offering and acceptance of this challenge.

This is also a time for reflection.

This past decade has seen a significant restructuring of the entire pharmaceutical industry—not just within the United States but world-wide. The many mergers are merely symptomatic, and are not the cause itself, of the fact that the industry does business quite differently in 1997 than was done in 1987. As a consequence, two companies, prior to merging, may both have been Foundation contributors, but there was no assurance that the post-merger company would continue the level of support of the two combined. Indeed, the forces propelling the merger trend were aimed precisely to bring about efficiencies—arguably including such expenses as Foundation support.

During the recent past, Foundation leaders explored several ways in which to respond or adapt to these forces. A number of options were given careful scrutiny: from continuing on its course, to merging with other interests, to shutting down, among others. The outcome of this exercise was that the responsible industry leadership determined, with renewed vigor, to continue the Foundation on its course with redoubled energies and additional commitment to its mission and to efficiency in operation. The bottom line: the Foundation continues as the research-intensive pharmaceutical industry's philanthropic arm whose objective is to assist new researchers in selected fields in the biomedical sciences.

As a result, I believe the Foundation is now in a stronger position in dealing with the many pressures of the late 1990s and better prepared for the next millennium. Grant programs have now been refined, a commitment for industry support has been re-energized, and committee, Board and staff activities have been streamlined.

All of which gives me a strong sense of confidence that the Foundation is headed in the right direction with extremely capable and dedicated people in position as leaders, volunteers, and staff, as I make my departure. I look back with pride and a sense of accomplishment, and a prodigious amount of appreciation for those Chairmen, Board members, volunteers, industry contributors, and others who have helped in these many successes.

Maurice Q. Bectel, D.Sc.
President

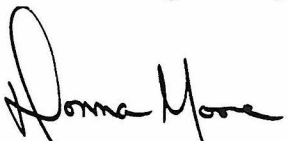
Donna Moore
President-Designate
PhRMA Foundation

As the baton passes between Morry Bectel and myself on August 31 of this year, I have reflected on the past twelve years in the Foundation, as has Morry. My sincerest appreciation and best wishes go with Morry as he begins this excellent new adventure in his life called "retirement." He has set a fine example and established a strong corner-stone in the PhRMA Foundation on which to build. The Foundation Board, our awardees, committee members and I are eternally grateful. He has been an able mentor, and I am confident the transition will be a smooth one.

Also, allow me to express my appreciation to the PhRMA Foundation Board of Directors for having such confidence in my abilities. I am humbled by the challenge presented to me, and committed to the continuing success of the Foundation as the industry's mechanism for supporting academic research, education and jumpstarting the careers of young scientists.

My vision for the future is to make the PhRMA Foundation, like our industry, the best—the most premier Foundation in Washington or anywhere. Over the past 32 years, the PhRMA Foundation has built the careers of over 2,200 awardees—through the generous support of PhRMA member firms, associates and research affiliates. I have witnessed first-hand the magnificent philanthropy for which this industry has become famous! It is absolutely exciting for me to step into the position as President of the PhRMA Foundation at a time such as this. The PhRMA Foundation will make great steps leading us into the new millennium—through our Board, through the generosity of the research-intensive members of PhRMA, through the expertise of its world-class advisory committee members who are dedicated to picking the "best and brightest," and through the innovative, young scientists who are so appreciative to receive our awards. These are the makings of a great Foundation.

Again, my special appreciation to Morry. To the benefactors, the Foundation Board, the advisory committee members, awardees and other constituents of the Foundation, thank you for your dedication and suggestions. I look forward to continuing our long and fruitful relationships!



Donna Moore
President-Designate

Report of the President-Designate

PHRMA FOUNDATION

Activities of the Foundation in its Thirty-Second Year

Twenty-sixth Annual Awardee Meeting

Washington, D.C.—The 1997 Annual Awardee Meeting of the PhRMA Foundation was attended by more than 100 current and former awardees, advisory committee members and staff on February 12 and 13. This yearly "gathering of the clan" allows current and former awardees—even advisory committee members—the opportunity to display their current research, and discuss with each other their newest findings—an integral part of staying on the cutting edge for our scientists.

Part of the Foundation's mission is mentoring the next generation of young scientists. In any field, this process is important. In biomedical science it is absolutely necessary, and because the fields of pharmacoeconomics and bioinformatics are so new, the Foundation considers it an honor to bring these new scientists together—not only to build their careers, but, at the same time, build the infrastructure for educating the future scientists in these very new disciplines.

The evening of February 12 marked a very special occasion in the life of the Foundation. Nine committee members were honored at the Foundation's annual banquet as they retired from many long, dedicated years of service to the Foundation. (See story "Retirement of Advisory Committee Members: A Salute to Dedication, Experience and Expertise").

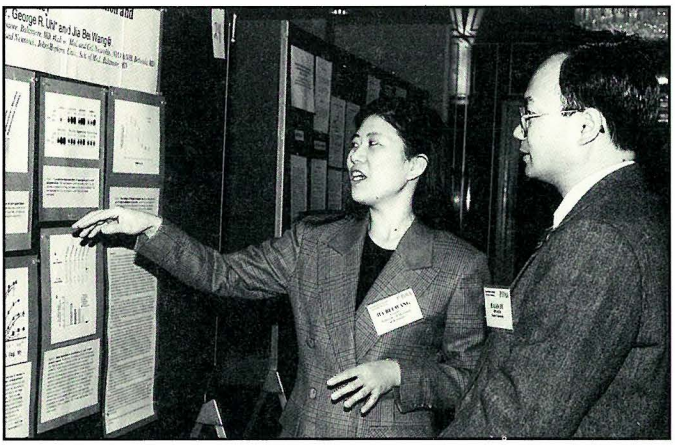
Sally Schroeter, Ph.D., '94 Postdoctoral Fellow in Pharmacology/ Morphology, Vanderbilt University, discusses her research with another awardee.

Edward J. Cafruny, M.D., Ph.D., introduced Ferid Murad, M.D., as the keynote speaker at the 1997 Annual Awardee Meeting General Session. Ed retires as Scientific Consultant to the PhRMA Foundation September 1997

The 1997 Annual Awardee Meeting itself was very special in that this was the last meeting for Morry Bectel as President and CEO of the Foundation. Morry was honored in his retirement at the Awardee banquet by G. Gilbert Cloyd, Vice Chairman of the PhRMA Foundation Board and Executive Vice President, Pharmaceutical, Proter & Gamble, as he paid tribute to Morry's years at the Foundation. (See "Bectel retires as President and CEO of the PhRMA Foundation" on page 16.)

POSTER SESSION

Close to thirty awardees displayed their research in a Poster Session on the morning of February 13. The awardees' enthusiasm was high as they shared their research finds with peers and mentors alike. Advisory committee members, staff and special guests all enjoyed the excitement as they discussed the research brought about by many long hours in the laboratory.



Jai Bei Wang, Ph.D. (left), a 1996 Faculty Development Awardee in Pharmacology/Toxicology, and Assistant Professor at the University of Maryland, Baltimore displays her research during the Poster Session, February 13, 1997. Haian Fu, Ph.D., Assistant Professor at Emory University, received the same award in 1995.

GENERAL SESSION

The Poster Session was followed by the Annual Awardee Meeting's General Session, at which time the Foundation was privileged to have as the Thomas E. Hanrahan Memorial Lecturer, Ferid Murad, M.D., Ph.D., 1996 Lasker Award Recipient. Dr. Murad's presentation was entitled "Nitric Oxide and Cyclic GMP Signalling." Thanks go to Dr. Murad for his excellent presentation and contribution to the success of the PhRMA Foundation.

As usual, on the afternoon of February 13, Subgroup sessions were held in order for second year awardees and other former awardees and advisory committee members to deliver progress reports on their research and for attendees to hear presentations in their particular disciplines.

(left) Ferid Murad, M.D., Ph.D., addresses the general session of the 26th PhRMA Foundation Annual Awardee Meeting. Dr. Murad was 1996 Lasker Award recipient and the Foundation's "Thomas E. Hanrahan" Memorial Lecturer.

(right) William R. Darrow, M.D., Ph.D. speaks during the luncheon on February 13. Dr. Darrow is Senior Medical Advisor, Schering-Plough Research Institute, Chairman of the Foundation's Scientific Advisory Committee and a PhRMA Foundation Scientific Advisor, newly created position.

Presenters at the Clinical Pharmacology Subgroup Session, moderated by Paul Calabresi, M.D., Professor and Chair Emeritus, School of Medicine, Brown University: Patrick T. Murray, M.D., Assistant Professor, Department of Anesthesia and Critical Care and Committee on Clinical Pharmacology, University of Chicago, Chicago, Illinois: Title, "Mechanisms of Endotoxin-induced Vascular and Renal Dysfunction"; C. Michael Stein, M.B.Ch.B., M.R.C.P., Assistant Professor, Division of Clinical Pharmacology, Vanderbilt University, School of Medicine, Nashville, Tennessee: Title, "Ethnic Differences in Vascular Response"; Lionel David Lewis, MB.Chir., M.D., Assistant Professor, Division of Clinical Pharmacology, Dartmouth Medical School, Lebanon, New Hampshire: Title, "The Role of CYP3A P4503A in Combination Chemotherapy with Paclitaxel and Ifosfamide"; James Francis Cleary, MB.Chir., FRACP, Assistant Professor, Department of Human Oncology, University of Wisconsin Medical School, Madison, Wisconsin: Title, "Therapeutics in the Treatment of Cancer Patients."

(left to right) Darrell Abernethy, M.D., Ph.D., Francis Cabell Brown Professor of Medicine and Pharmacology, Director of the Division of Clinical Pharmacology at Georgetown University, and Clinical Pharmacology Advisory Committee member, E. (Eddie) Leong Way, Ph.D., Professor Emeritus, Department of Pharmacology, University of California and retiring member of Basic Pharmacology Advisory Committee, Paul Calabresi, M.D., Chair Emeritus and Professor of Medicine, Brown University School of Medicine, and Gil Mannering, Ph.D., Professor Emeritus, Department of Pharmacology, University of Minnesota Medical School.

Presenters at the Basic Pharmacology Subgroup Session moderated by Irwin M. Weiner, M.D., Chairman of the PhRMA Foundation Basic Pharmacology Advisory Committee and Former Dean, College of Medicine, State University of New York, HSC, Brooklyn, New York: G. Allen Nickols, Ph.D., Research Fellow, Department of Molecular Pharmacology, Monsanto Corporate Research, Monsanto, St. Louis, Missouri: Title, "Inhibition of Angiogenesis and Tumor Growth by Antagonists of Integrinαβ", Haian Fu, Ph.D., Assistant Professor, Department of Pharmacology, Emory University, School of Medicine, Atlanta, Georgia: "Role of 14-3-3 Proteins in Cellular Signal Transduction." Emery H. Bresnick, Ph.D., Assistant Professor, Department of Pharmacology, University of Wisconsin Medical School, Madison, Wisconsin: Title, "Eukaryotic Transcriptional Regulation."

Presenters at the Pharmacology-Morphology Subgroup Session moderated by Michael D. Gershon, M.D., Chairman, PhRMA Foundation Pharmacology Morphology Advisory Committee and Professor and Chairman, Department of Anatomy & Cell Biology, Columbia University, College of Physicians & Surgeons, New York, New York: Christine Saunders, Ph.D., Postdoctoral Fellow, Vanderbilt University, School of Medicine Nashville, Tennessee: Title, "Mechanisms Conferring Targeting and Localization of G-Protein Receptors in MDCK II Cells"; Hui Pan, M.D., Postdoctoral Fellow, Columbia University, College of Physicians and Surgeons, New York, New York: Title, "5-HT, 5-HT Receptors and the Peristaltic Reflex"; Cheryl F. Dreyfus, Ph.D., Associate Professor, Department of Neuroscience and Cell Biology, University of Medicine and Dentistry of New Jersey, Piscataway, New Jersey: Title: "Neuron-glia Interactions Regulate Basal Forebrain Function." Dr. Dreyfus also serves as an Advisory Committee Reviewer.

Presenters at the Pharmaceutics Subgroup Session moderated by James Swarbrick, D.Sc., Ph.D.,Vice President, Research & Development Division, AAI, Wilmington, North Carolina: Jeffrey A. Hughes, Ph.D., Assistant Professor, Department of Pharmaceutics, University of Florida, College of Pharmacy, Gainesville, Florida: "Evaluation of Non-Viral Gene Delivery Systems"; David J. W. Grant, D.Sc., Professor, Department of Pharmaceutics, University of Minnesota, College of Pharmacy Minneapolis, Minnesota: "Physical Properties and Crystal Structures of Some Pharmaceutical Hydrates"; Lawrence Ng, Ph.D., Assistant Professor, Department of Pharmaceutics, University of California, College of Pharmacy, Denver, Colorado: "Nanoparticle Uptake by Alveolar Macrophages: A Potential Approach for Treatment of Tuberculosis."

Board Keeps Foundation on Steady Course

The Foundation held its spring Board meeting in conjunction with the PhRMA Annual Meeting, this year held in Boca Raton, Florida. Robert C. Black, President of Zeneca Pharmaceuticals, was re-elected Chairman; Mr. G. Gilbert Cloyd, Vice President, Pharmaceutical, Procter & Gamble USA, Procter & Gamble Company, was elected Vice Chairman, and Robert A. Ingram, President and Chief Executive Officer of Glaxo Wellcome Inc. was elected Secretary-Treasurer, filling the position left by Mr. Cloyd. In July, 1997, Gil Cloyd retired from the PhRMA Foundation Board to take new responsibilities with Procter & Gamble in Japan. Our thanks and best wishes go with Gil.

In addition to Black, Cloyd and Ingram, Board members serving for 1997-98 are: Mr. Jan Leschly, Chief Executive Officer, SmithKline Beecham; Mr. Robert N. Wilson, Vice Chairman, Board of Directors, Johnson & Johnson; Mr. Patrick J. Zenner, President and Chief Executive Officer, Hoffmann-La Roche Inc.; and PhRMA President Alan F. Holmer *(Ex-Officio)*.

The Foundation Board of Directors has been diligent in their efforts to position the Foundation on solid ground and streamline the operations of the Foundation, so that we enter the new millennium at full power. Thanks go to all Board members for their dedication to the PhRMA Foundation.

Gil Cloyd and Donna Moore discuss the upcoming events to celebrate and honor nine retiring advisory committee members —Annual Awardee Meeting banquet, February 12, 1997.

Ed Cafruny receives Board recognition and plaque commemorating his 32-year involvement with the PhRMA Foundation. Delivering plaque is retiring President Morry Bectel.

Bectel Retires after Twelve Years with the Foundation

"For everything there is a season," (Ecclesiastes 3:1). It is with mixed emotions that the PhRMA Foundation bids farewell to Maurice Q. Bectel. Morry has looked forward to retiring as President and CEO of the PhRMA Foundation, and after twelve years with the PhRMA Foundation, this adventure for him will be a reality beginning August 31. His good nature and expertise will be sorely missed by Board members, advisory committee members, awardees and staff. We are pleased to say that Morry will stay on as a consultant to the Foundation.

During his tenure as President, Morry initiated Foundation support for students and faculty at schools of pharmacy in the area of pharmaceutics. He also expanded the visibility of the Foundation, especially within the academic and scientific communities. Assets have grown from $2.1 million to over $5 million and four new programs have been added to the Foundation's repertoire.

As Bob Black has mentioned, Morry has brought the insights of his years of practice as a pharmacist, coupled with his political wisdom of the health care system. Morry, in addition to his role as President of the Foundation, was also Vice President of PhRMA Pharmacy Relations. During this time, he received two honorary Doctor of Science Degrees and was awarded the profession of pharmacy's highest award, "The Remington Honor Medal."

Donna Moore, who will succeed Morry, says "Morry has set a fine example and established a strong corner-stone on which to build. The Foundation Board, committee members, awardees and I are eternally grateful."

Again, we at the Foundation are delighted for Morry and his lovely wife Theresa. Our sincere best wishes go with them in whatever endeavors await!

Donna Moore Takes the Helm

On September 1 of this year, Donna Moore steps into the position as President and CEO of the PhRMA Foundation. Donna has been Morry's chief deputy for the past twelve. Robert C. Black, Chairman of the PhRMA Foundation Board, says "Donna is capable, energetic and, most importantly for the responsibilities of her new position, knows the Foundation and its constituents. Donna has the full support of the Foundation Board."

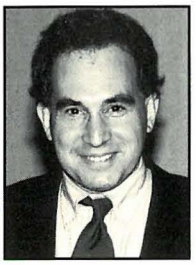
Donna's previous position with PhRMA was in the capacity of Consumer Assistant, working closely with consumer advocate Sue Boe, and Vice Presidents of Communications. She has worked as AA in the Washington office of Bristol-Myers Squibb, served as Office Manager for the health-related law firm of White, Fine and Verville, and Assistant to the Director of the James Graham Brown Cancer Center in Louisville, Kentucky.

In her tenure with the PhRMA Foundation, Donna has had responsibility for managing the twelve PhRMA Foundation funding programs in distributing the $1.7 million given annually to awardees in the areas of basic and clinical pharmacology, toxicology, morphology, pharmaceutics, pharmacoeconomics and bioinformatics—programs solely supported by contributions from PhRMA member firms. Donna also has served as liaison to the six advisory committees of the PhRMA Foundation as well as liaison to the major U.S. medical and pharmacy schools and schools of public health.

During her tenure with the Foundation, Donna has been instrumental in the development and implementation of the Foundation's vision, mission and tactical plan.

Donna resides in Aquia Harbour, Virginia with her husband—Lt. Col. William M. Moore—and their four children.

(left) Each retiring committee member received a salute from Gil Cloyd, a traditional Foundation crystal apple and a hug from incoming President Donna Moore. Jim Gillette, Ph.D., (top to bottom) E. Leong Way, Ph.D., Larry Pinkus, Ph.D., Lou Lemberger, M.D., Ph.D., and Gil Mannering, Ph.D.



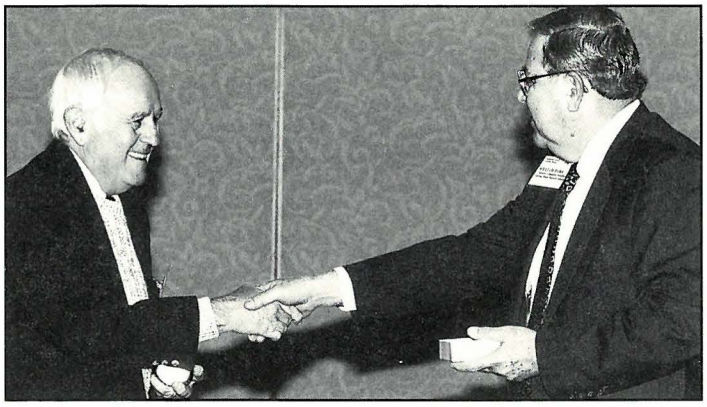
Edward J. Cafruny, M.D., Ph.D., Foundation Scientific Consultant and one of the Originators of the PhRMA Foundation

Edward J. Cafruny, M.D., Ph.D., longtime friend and scientific consultant to the PhRMA Foundation, retired September 1997. The Foundation Board honored Ed at its Board meeting in March by presenting him with a plaque commemorating his dedication.

Dr. Cafruny, an internationally renown pharmacologist, was on the ground floor and instrumental in the original development of the PhRMA (then-PMA) Foundation programs. Ed has remained active with the PhRMA Foundation since its inception in 1965. His first position was on the Scientific Advisory Committee (1968-1987)—then later, in addition, he became Chairman of the Basic Pharmacology Advisory Committee (1973-1987). In 1988, with the retirement of another stalwart in the Foundation—I.C. Winter, M.D.—Ed became the PhRMA Foundation Scientific Consultant (1988-1997).

Ed received his Ph.D. from Syracuse University in 1955, and his M.D. from the University of Michigan in 1960. He began as instructor and quickly climbed to Professor of Pharmacology at the Medical School of the University of Minnesota (1965-68). In 1968, Ed became Professor and Chairman of the Department of Pharmacology and Experimental Therapeutics at the Medical College of Ohio. In 1973, he joined our industry as President of the Sterling-Winthrop Research Institute—a position he held until 1977. He then left industry to return to academe in the capacity of Professor of Pharmacology at the Medical College of Wisconsin. In 1978, recognizing Ed's many talents, the UMDNJ brought him on as Professor of Pharmacology and Dean of the Graduate School of Biomedical Sciences, a post he held for nine years. In a salute to Ed's career, he was given the lifetime title of Distinguished Professor, University of Medicine and Dentistry of New Jersey in 1987.

In the early years, along with E. Leong Way, Ph.D., and Walter F. Riker, Jr., M.D., Ed was integral to cultivating the vision and mission of the Foundation. To the great benefit of the PhRMA Foundation, he generously gave of his talents, experience, wisdom and expertise. We are all very grateful to Ed for the many years of service he has devoted to building excellence into every facet of the Foundation's programs. Ed has been a valued mentor and wonderful friend to all associated with the PhRMA Foundation and we will miss him. We do not say goodbye to Ed, because good friends are forever. Best wishes to you Ed.



Bob Parks, receives his crystal apple from Scientific Advisory Committee Chairman, William R. Darrow, M.D., Ph.D.

Retirement of Advisory Committee Members: A Salute to Dedication, Experience and Expertise

One-hundred and fifty years! That figure represents the aggregate number of years these nine dedicated men and women of science have devoted to the PhRMA Foundation.

We pay tribute here to these professors, scientists and researchers who have given so much to the Foundation. It has been said that "an institution is the lengthened shadow of the man." This statement could not be more true than in the Foundation. The high integrity the Foundation enjoys this day is due to the fervor with which these stalwarts of science set about the task of selecting the best and the brightest to be recipients of PhRMA Foundation awards. They are the true backbone of the Foundation.

The banquet night of the 1997 Annual Awardee Meeting was dedicated to honoring these retiring committee members. Although all could not be present, we honored them in absentia. Here, too, we would like to salute these retiring members of our advisory committees:

THE PHARMACEUTICS ADVISORY COMMITTEE (PAC)

The PAC began in 1987 and has responsibility for reviewing the "Undergraduate Training Program in Pharmaceutics," the "Advanced Predoctoral Fellowship in Pharmaceutics," and the "Postdoctoral Fellowship in Pharmaceutics." It is chaired by Jim Swarbrick.

Retiring from the PAC is:
Lynda M. Sanders, Ph.D. **('94-'97) Two Years**
Consultant
Palo Alto, California
Lynda graduated with honors from the Welsh School of Pharmacy in Cardiff, Great Britain with a B. Pharm. and her Ph.D. in Physical Pharmaceutics. Her areas of expertise and interest are in drug development, delivery, bioavailability and formulation design. She formerly was with Syntex and now is a consultant. Our thanks and best wishes go to Lynda!

THE BASIC PHARMACOLOGY ADVISORY COMMITTEE (BPAC)

The BPAC began in 1972 and has responsibility for reviewing four program applications—(1) "Research Starter Grants"; (2) "Faculty Development Award in Pharmacology/Toxicology"; (3) "Advanced Predoctoral Fellowships in Pharmacology/ Toxicology"; and (4) our newest award program "Faculty Development Award in Bioinformatics." These programs together usually receive at least 200 applications annually. The Chairman is Dr. Irwin Weiner.

Retiring are:

James (Jim) Gillette, Ph.D. **('73-'97) 24 Years**
Former Chief, Laboratory of Chemical Pharmacology
National Heart, Lung & Blood Institute of NIH

Jim has been with the NHLBI since 1954 and just recently retired. He obtained his Ph.D. in biochemistry from the State University of Iowa. He has been with the Foundation for 24 years and performed reviews in the area of drug metabolism and associated enzymes, pharmacokinetics and chemical reactive metabolites of drugs associated with drug toxicity.

Since Jim lived in Bethesda, Maryland, he has really hit the Foundation hard for expenses. His expenses may have totaled $100 for the entire 24 years. Thanks, Jim, for your dedication!

E. Leong Way, Ph.D. **('73-'97) 24 Years**
Professor Emeritus of Pharmacology, Toxicology and Pharmaceutical Chemistry
Schools of Medicine & Pharmacy
University of California

"Eddie" has served on the BPAC since 1973—24 years—however, his service with PhRMA Foundation began well before that. Eddie was one of the chief architects. Along with Wally Riker Ed Cafruny and , of the PhRMA Foundation programs. In 1969 he was appointed to the Scientific Advisory Committee. Eddie received both his undergraduate and graduate degree from the University of California at Berkeley. His area of interest and expertise lies in drug metabolism and mechanisms in opiate tolerance and dependence development. His early interest was in the area of synthesis and testing of organic arsenicals.

He is a ballroom dancer from way back and, by now, is able to participate in BPAC reviews and other meetings WITH HIS EYES CLOSED!! Eddie, thank you for your dedication to the Foundation!

Enjoying a few moments at the banquet on February 12 are (l to r) Frederick M. Radzialowski, Ph.D., President, FMR Research Associates and BPAC member, Mrs. Barbara Hayes, Gil Cloyd, Vice Chairman, Foundation Board and Vice President, Pharmaceutical, Procter & Gamble, and Art Hayes, President, MediScience Associates, M.D., former Foundation awardee, former FDA Commissioner and member of the SAC.

Robert E. Parks, Jr., M.D., Ph.D. **('76-'97) 21 Years**
E.E. Brintzenhoff Professor of Science
Division of Biology and Medicine
Brown University
School of Medicine

Bob has been with the BPAC for over 21 years and received his M.D. degree from Harvard and his Ph.D. in Biochemistry from the University of Wisconsin. His areas of interest and expertise are: (1) Cancer chemotherapy and chemotherapy in general; (2) Purine and pyrimidine biochemistry/pharmacology; (3) Cancer biology and carcinogens; and (4) Enzymology, etabolism in general, including drug metabolism.

Bob puts great credence in "The Gordon Conference" and refers to it, some committee members tell us, at least 40 times during a review session. We will certainly miss his expertise and his input on the "Gordon Conference." Thank you, Bob, for your service over the years!

THE PHARMACOLOGY/MORPHOLOGY ADVISORY COMMITTEE (PMAC)

The PMAC began in 1968 with its current program—"Fellowships in Pharmacology/Morphology Including Cell Biology," Michael D. Gershon, M.D. serves as Chairman.

Retiring from the PMAC are:

Lawrence M. Pinkus, Ph.D. **('88-'97) 9 Years**
Scientific Review Administrator
Pathology A Study Section
National Institutes of Health

Larry began his tenure on the Pharmacology/Morphology Advisory Committee when he was with A. H. Robins. Shortly after he left Robins, he joined the National Institutes of Health. He received his Ph.D. in enzymology/protein chemistry and has been reviewing applications for the PMAC since 1988. One of Larry's real loves is fencing (second only to his twin daughters). He has been a national competitor since 1972 in the Olympic Festival and was a finalist and Gold Medalist on the sabre team in 1987. Larry, thank you for serving on the Pharmacology/Morphology Advisory Committee!

Leonard L. Ross, Ph.D. **('83-'97) 14 Years**
President, Chief Executive Officer and Annenberg Dean
The Medical College of Pennsylvania
Leonard L. Ross, Ph.D. has been with the PMAC since 1978. His area of expertise is neurological diseases and broadly serotonin synthesis. He received his Ph.D. from New York University. Over the years, due to his expertise and experience, Leonard has been promoted to President, Chief Executive Officer and Annenberg Dean of the Medical College of Pennsylvania—a great honor. We have been very fortunate to have had him review on our committee. Thank you Leonard!

THE CLINICAL PHARMACOLOGY ADVISORY COMMITTEE (CPAC)

The Clinical Pharmacology Advisory Committee began in 1967. It has responsibility for reviewing program applications for the "Faculty Development Award in Clinical Pharmacology," and the "Fellowships for Careers in Clinical Pharmacology," and the "Medical Student Award." The CPAC has recently phased out one program due to its success in accomplishing its goals—the "Unit Development Award." The CPAC is chaired by Dr. Paul Calabresi.

Retiring from this committee are:
Edward A. Carr, Jr., M.D. **('76-'97) 21 Years**
Emeritus Professor
SUNY at Buffalo
School of Medicine and Biomedical Sciences
Ted has been with the CPAC since 1976—21 years. His undergraduate training was at Brown and he received his M.D. from Harvard Medical School, Summa Cum Laude. Ted's areas of expertise in reviewing for the Clinical Pharmacology program are: (1) Development and use of diagnostic drugs, especially radio-active agents; (2) Research that places special emphasis on radio-isotopic techniques; (3) Research in the general area of endocrinology; and (4) Investigations to further our knowledge of the applicability of animal models to results in man. Ted, it has been an honor having you on the committee. Thank you for your dedication!

Louis Lemberger, M.D., Ph.D. **('86-'97) 11 Years**
Professor of Pharmacology
Medicine and Psychiatry
Indiana University
School of Medicine

Lou has been with the CPAC for 11 years. He received his undergraduate degree in pharmacy from the Brooklyn College of Pharmacy followed by both an M.D. degree and a Ph.D. degree in Pharmacology from the Albert Einstein College of Medicine. His rich career includes being Director of the Clinical Pharmacology Division at Eli Lilly Research Institute as well as teaching pharmacology at Indiana University. His area of expertise includes studies on the active ingredient of marijuana—tetrahydrocannabinol. His work was later instrumental in the development of drugs which have proven useful in the control of nausea. He also played a large role in the development of Lilly's Prozac.

While attending college he lived in the shadows of Ebbets Field & Yankee Stadium. Despite being hampered by injuries, he won the coveted Mr. Potato Head Award in his rookie season as a Dodger Camper (true story). Lou, thank you for your dedication in serving the Foundation.

Gilbert Mannering, Ph.D. **('74-'97) 23 Years**
Professor Emeritus
Department of Pharmacology
Minnesota Medical School

Gil has served on the committee since 1974—23 years. His areas of interest and expertise are: (1) Drug disposition; (2) Drug interactions; and (3) Toxicology.

To say that Gil has been a colorful member of the committee is probably an understatement. We will not only miss Gil, but we will surely miss his crazy anecdotes. For example, word has it that Gil actually stuffed a graduate student in a safe and refused to let him out until he promised to do better work!!!!! It must have been a very large safe. Or another equally unbelievable story was when he placed some white mice in another graduate student's briefcase before he boarded a plane. The end of the story is best left to your imagination. Gil, thank you for your humor and your dedication to this committee!

Our sincere gratitude and best wishes go with all these committee members!

PhRMA Foundation Current and Former Awardees in Clinical Pharmacology Gather To Discuss the Future Needs

On the morning of February 13—during the Annual Awardee Meeting—20 current and former PhRMA Foundation clinical pharmacology awardees met to discuss the future of clinical pharmacology and the current shortage of experts in the field of clinical pharmacology to fill necessary positions. The meeting was chaired by Dr. Paul Calabresi, Chairman of the PhRMA Foundation Clinical Pharmacology Advisory Committee. The discussion centered around the decline in available clinical pharmacologists to meet the current needs in academia, industry and government. After much discussion, several areas of concern were identified, as well as several avenues of action:

(1) Increase the visibility of clinical pharmacology in the academic medical settings by increasing the number of clinical pharmacology training programs at academic institutions.

(2) Increase the number of mentors and role models in the area of clinical pharmacology, thereby taking a more active role in recruitment, thus increasing the number of trainees available to fill the demand by universities, FDA and industry.

(4) Institute debt forgiveness as an incentive to recruit.

(5) As a means of more visibility, create a brochure outlining career opportunities that exist for clinical pharmacologists.

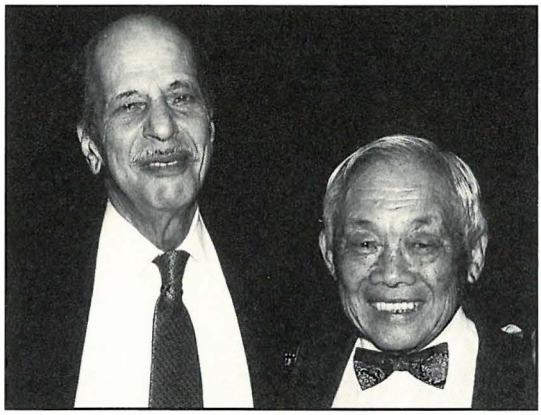
In summary, concentration should take place on greater awareness of the discipline among medical students, M.D./ Ph.D. students, and other fellows trained in related subspecialties of medicine. The end result hoped for would be increased recruitment of individuals into clinical pharmacology, thereby building the workforce pool to assist in meeting the current demands by academia, industry and government.

Also, as a direct result of the February 13 meeting, the PhRMA Foundation reinstituted its Medical Student Training Fellowship which will be offered in 1998.

Arthur J. Atkinson, Jr., M.D., Selected for Study

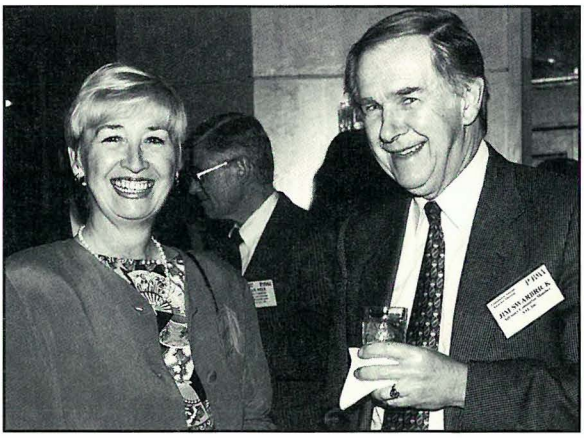
The National Institute of General Medicine (NIGMS) held a similar meeting on February 14. After the two meetings, the PhRMA Foundation joined NIGMS to recruit Arthur J. Atkinson, Jr., M.D.—a 1970 PhRMA Foundation Faculty Development Awardee in Clinical Pharmacology—to develop and identify strategy for achieving these goals as outlined in our similar yet separate meetings.

Dr. Atkinson received his M.D. from Cornell University Medical College and, when he received his 1970 Faculty Development Award, was Assistant Professor—leading to full Professor—at Northwestern University Medical College. At that time, he was also attending physician at Northwestern Memorial Hospital. From 1994-1995, Art was Corporate Vice President of Clinical Development and Medical Affairs for Pharmacia & Upjohn. Most recently, he has worked with Dr. Carl C. Peck, Director, Center for Drug Development Science, Department of Pharmacology, Georgetown University School of Medicine. The results of Art's study will be available later in 1997.



Ed Cafruny and Eddie Way enjoy a few moments during the Annual Awardee Meeting. Both Ed's were instrumental in the initial mission of the PhRMA Foundation programs.

Renate Reimschussel, Ph.D., Director, Aquatic Pathobiology Center, University of Maryland and 1991 Faculty Development Award in Toxicology/ Pathology awardee, talks about her research with another former awardee, Ullrich Schwertschlag, Ph.D., Genetics Institute. Ullrich is a former Faculty Development Award in Clinical Pharmacology in 1987.



Pamela and Jim Swarbrick enjoy visiting with the other attendees at the Annual Awardee Meeting reception/ banquet February 12, 1997. Jim is Vice President, Research & Development at AAI and serves as Chairman of our Pharmaceutics Advisory Committee.

G. Gilbert Cloyd, Vice Chairman of the Foundation Board and Vice President, Pharmaceutical, Procter & Gamble, salutes the nine retiring members of the Foundation Advisory Committees.

The PhRMA Foundation Now "Up" on the Web: www.phrmaf.org

Another exciting event for the Foundation in this past year has been a technological one. The PhRMA Foundation now has established its very own website. This site has not only streamlined the application process but has brought worldwide visibility to the Foundation and the generous benefactors of the Foundation who are the research-intensive members of PhRMA.

The entrance onto the Web has improved the communication abilities by allowing applicants to access program and application information directly from the Web. This translates to savings for the Foundation in time and money.

When you enter our website, you will find the same colorful brochures on the twelve programs of the PhRMA Foundation. All programs are available for downloading in "text only" form. In addition, you are guided to our benefactors with hyperlinks to their very own websites, a listing of our Board of Directors, and our mission statement.

We are very proud of our website! Please visit us soon: www.phrmaf.org.

The PhRMA Foundation's primary mission is to promote the betterment of public health through scientific and medical research by providing funding to university-based scientists, researchers and educators. Foundation goals in education and research are accomplished through its twelve funding programs —three clinical pharmacology, two in pharmacology/toxicology, one in the combined field of pharmacology-morphology, three in pharmaceutics, and one in pharmacoeconomics, and bioinformatics. The Research Starter Grant provides starter funds in pharmacology, clinical pharmacology, drug toxicology and pharmaceutics. The Foundation also accepts applications in all program areas for research on drugs for rare diseases.

Clinical Pharmacology

The clinical pharmacology program provides funding at three levels—students, postdocs, and faculty.

In 1997, for the first time since 1974, the PhRMA Foundation did not give awards to Medical Students, however, by popular demand the award has been reinstated for 1998 fellowships.

FACULTY AWARDS IN CLINICAL PHARMACOLOGY

The Foundation Faculty Development Awards in Clinical Pharmacology program makes three-year awards to medical schools for salary and fringe benefits support of full-time junior faculty members. A ceiling of $40,000 has been set on the amount of Foundation participation in total yearly salary and fringe benefits for any candidate.

With the awards beginning July 1, 1997, 108 individuals have been supported under this program since 1967.

Education and Training Programs

Recipients of the awards which began July 1997:

Craig W. Hendrix, M.D., Department of Medicine, The Johns Hopkins University School of Medicine: "Antiretroviral Pharmacodynamics in the Semen." Human immunodeficiency virus (HIV) infects men and women most commonly through sexual exposure to infected semen. Within the several compartments, which contribute to the production of semen, the magnitude and location of HIV and the effect of antiviral drugs are largely unknown. Further, there are several reasons to believe this is not a simple reflection of similar effects in the blood. Elucidation of drug concentration-antiviral effect relationships in the seminal compartment could be used to describe viral dynamics within the compartment and may suggest more rational pharmacologic antiretroviral strategies for the purpose of preventing sexual transmission of HIV. Dr. Hendrix proposes a series of clinical investigations to meet five objectives: (1) standardize assay methodologies (virologic and pharmacologic) and establish frequency limitations for repeated sampling of semen over time; (2) determine the rate of clearance of HIV from the cellular and acellular fractions of semen and blood with antiretroviral therapy; (3) describe the pharmacokinetics of antiretroviral drugs in the seminal compartment relative to the blood; (4) correlate changes in compartmental viral load with antiretroviral drug exposure; (5) establish the long-term durability of antiviral-mediated reductions of HIV in the semen.

Mark S. Wallace, M.D., Assistant Clinical Professor, Department of Anesthesiology, University of California, San Diego, School of Medicine: "Pharmacology of Human Experimental and Neuropathic Pain." Animal models on pain emphasize that small afferent input leads to a facilitated state of hyperalgesia and allodynia. Parallel experimental models in humans have been developed using quantitative sensory testing (QST) and models using electrical stimulation and subdermal capsaicin to evoke a state of hyperalgesia and allodynia. These experimental pain states are believed to reflect mechanisms underlying components of the post nerve injury pain state. Based on hypotheses derived from our understanding of the pharmacology of afferent processing derived from preclinical work, this proposal seeks to define whether: (1) certain receptor and channel mechanisms influence the experimental human pain; (2) models; and, (3) that certain clinical pain states are mediated by mechanisms which have a comparable pharmacology to experimental human pain models and the corresponding animal model. Using QST for thermal and mechanical thresholds, the generation of a painful state with electrical stimuli and intradermal capsaicin, and delivery of sodium channel blocker, mu opioid agonists, alpha-2-agonist, NSAIDS, NMDA antagonists, and some miscellaneous analgesic drugs by the oral, intravenous, and spinal route, the hypotheses presented will be tested in humans. These studies will provide support for the premise that there is a correlation of mechanisms between experimental and clinical states and that the experimental models can predict clinical efficacy of agents in anomalous human pain states.

Entering their second year in 1997 are:

Nabil S. Andrawis, M.D., Ph.D., Assistant Professor, Division of Clinical Pharmacology, Department of Medicine and Pharmacology, Georgetown University School of Medicine: "Endothelin-1 Regulation of Vascular Growth."

Barbara D. Haehner, M.D., Ph.D., Clinical Lecturer, Department of Medicine, Indiana University, School of Medicine: "Investigation of the Bimodal Distribution of Cytochrome P450 3A5 (CYP3A5) Activity and Protein Content in Human Kidney."

Those awardees who entered the third year of their award in 1997 are:

James Francis Cleary, M.B., B.S., F.R.A.C.P., Research Associate/Clinical Instructor, Department of Human Oncology, University of Wisconsin - Madison, School of Medicine: "Therapeutics in the Treatment of Cancer Patients."

Lionel David Lewis, M.B. Chir., M.R.C.P., M.D., Assistant Professor, Division of Clinical Pharmacology, Dartmouth Medical School: "Project 1: The relationship between mitochondrial DNA replication and the pancreatic toxicity of anti-HIV nucleoside analogs."

Charles Michael Stein, M.B.Ch.B., M.R.C.P., Assistant Professor, Division of Clinical Pharmacology, Vanderbilt University School of Medicine: "Ethnicity and Vascular Reactivity."

Awardees who ended their awards in 1997 are:

Richard D. Huhn, M.D., Assistant Professor, Clinical Pharmacology Program, Robert Wood Johnson Medical Center, University of Medicine and Dentistry of New Jersey and The Cancer Institute of New Jersey: "Clinical Pharmacology of Hematopoietic Cytokines."

Richard B. Kim, M.D., Assistant Professor, Division of Clinical Pharmacology, Vanderbilt University School of Medicine: "Characterization of Hepatic Carrier-Mediated Processes Involved in the Uptake and Biliary Excretion of Oligopeptides and Identification of the Individual Protein Transporters by Cloning Approaches."

Andre Terzic, M.D., Assistant Professor of Medicine and Pharmacology, Mayo Clinic, Mayo Medical School (Mayo Foundation): "Molecular Pharmacology of Cardiotonic and Cardioprotective Regulation."

Fellowships for Careers in Clinical Pharmacology

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

The program allows an individual to apply for a fellowship three years in advance of the activation date of the award. For example, those applying for a fellowship in the fall of 1997 may request that the fellowship begin July 1998 or July 1999 or 2000.

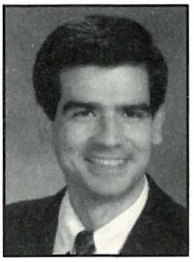
First awards under this program were made in 1973. Since that time, 64 fellowships have been awarded.

Recipients who began their award in July 1997:

Karen C. Johnson, M.D., University of Virginia School of Medicine (One Year): "Clinical Trial Methodology in Stroke." Stroke remains the third leading cause of death and the leading cause of adult disability in the United States. Development of pharmacological treatments for this frequently devastating condition has become a national priority. Several approaches have shown promise in the laboratory, but must still prove their worth in rigorous randomized, controlled trial. Dr. Johnson will: (1) develop and validate improved outcome measures; (2) develop and test novel randomizatoin and analysis methods; (3) refine and standardize a neurologic lexicon for safety evaluations; and, (4) develop models for phase IV outcomes research in stroke.

Gerald P. Linette, M.D., Ph.D., Harvard University, Massachusetts General Hospital: "Dendritic Cell Therapy of Human Malignant Melanoma." Recent experimental evidence suggests that therapeutic immunization for certain malignancies is a realistic approach. Pre-clinical models based upon immunization of tumor-bearing hosts with antigen pulsed dendritic cells demonstrate that regression of established tumors can be induced. Tumor regression is dependent upon an intact immune system and is mediated by tumor antigen specific CD8+ cytolytic T lymphocytes. Dr. Linette proposes to build upon the current observation in two ways. First, optimal conditions for the ex vivo expansion of human dendritic cells will be defined. Second, Dr. Linette will attempt to improve the immunogenicity of melanoma antigens by creating peptides modified in crucial regions

which dictate binding to class I human leukocyte antigen (HLA) molecules. These anchor modified peptides will be assessed for their ability to induce immunity as measured by the *in vitro* generation of cytolytic T lymphocytes from volunteer donors.



Spencer Z. Rosero, M.D., University of Rochester School of Medicine: "Gene-Specific Pharmaco-therapy in the Hereditary Long QT Syndrome Caused by the SCN5A Gene Mutation." The long QT syndrome (LQTS) is a hereditary cardiac disorder associated with prolonged ventricular repolarization, recurrent syncope from polymorphous ventricular tachycardia (torsades de pointes), and sudden arrhythmic death. Affected families may have multiple sudden deaths that affect infants, children as well as adults. Specific electrocardiographic patterns of repolarization have been demonstrated in patients with LQTS linked to genetic loci on chromosomes 3, 7, and 11.

Three forms of LQTS have been shown to result from mutations affecting the function of specific myocardial sodium and potassium channels. The SCN5A gene encodes the human cardiac sodium channel, and mutations of this gene have been identified in patients with the LQT3 form of LQTS. These mutations are associated with abnormal sodium channel inactivation and persistent leakage of sodium into the myocardial cell producing prolonged repolarization. These abnormalities present clinically as a long QT interval on the surface electrocardiogram. Sodium channel blocking drugs bind to a site within the sodium channel pore, and it was hypothesized that these agents might improve ventricular repolarization in patients with LQT3. We have implemented a clinical trial to evaluate the potential role of the Type I anti-arrhythmic agents lidocaine, mexilitine, and tocainide in treating this rare and potentially fatal disease.

Recipients who ended their awards in 1997:

Sara Browne, M.D., Division of Clinical Pharmacology, Stanford University Medical Center: "Temporal Regulation of Ca2+/ Calmodulin Dependent Protein Kinase (CaM kinase) by Intracellular Ca2+ Oscillaitons."

Patrick Thomas Murray, M.D., Section of Nephrology, Pritzker School of Medicine, University of Chicago: "Mechanism of Endotoxin-induced Vascular Dysfunction."

Basic Pharmacology

FACULTY DEVELOPMENT AWARDS IN BASIC PHARMACOLOGY

Begun in 1973 the Faculty Development Award in Pharmacology has served to meet its goal to strengthen basic pharmacology by helping to maintain existing academic capability and, ultimately, expanding the field by enlarging the faculty base. To fulfill this goal, support has been provided, on a nationally competitive basis, to full-time junior faculty members who give promise of outstanding accomplishments.

The program provides stipend and fringe benefits of $30,000 per year for two years. To date the total number of awards made is 69.

Recipients of the 1997 Faculty Development Awards in Pharmacology which began in July are:

John R. Hepler, Ph.D., Assistant Professor, Department of Pharmacology, Emory University School of Medicine: "The Gq Family of G Proteins: Functional Roles for Amino Terminal Diversity and Interactions with RGS Proteins." Heterotrimeric GTP-binding proteins (G proteins) serve an essential role in cell physiology by transducing signals from many cell surface receptors to specific effector proteins, and their dysfunction is the direct cause of a growing list of human diseases. The subunits of the Gqα class of G proteins (Gqα, G11, G14 and G16) couple receptors to activation of β isoforms of phospholipase C (PLCβ), their physiological effector. Although Gqα, G14 , and G16 share a capacity to regulate PLCβ, they differ greatly in their tissue distribution and overall amino acid identities, particularly at their amino (N-) termini. This domain is critically important for many G protein functions. The N-terminus of Gqα is important for activation of PLCβ, heterotrimer formation, cellular localization and receptor coupling. Fatty acylation of proteins is essential for many cellular functions. Gqα contains a novel lipid modification near its N-terminus. Initial studies will attempt to identify this lipid, its role(s) in Gqα functions, and whether it exists on G14α and G16α . Gqα, G14α and G16α each contain multiple cysteines at their N-termini. These cysteines on Gqα are critical for activation of PLCβ and can be palmitolyated. Of interest, they are important for Gqα functions *per se*, independent of their palmitoylation state. Further experiments will define precise roles for these cysteines in Gqα activation of PLCβ, roles for palmitoylated cysteines, and whether the analogous cysteines on G14α and G16α are similarly palmitoylated and important for function. Signaling by some G proteins are negatively regulated by a new class of proteins called RGS proteins; certain RGS proteins can interact with Gqα. Dr. Helpler will determine whether RGS proteins regulate signaling by Gqα and G14α and G16α, which RGS proteins are involved, and whether Gqα signaling regulates the cellular levels, phosphorylation state and functions of RGS proteins.

MORRY'S MOMENTS

On July 17, over 100 of Morry and Theresa's friends gathered to wish them both a fond farewell. Morry humbly listens as Bob Black unveils Morry's portrait which will hang in the Foundation Suite.

Alan Holmer, PhRMA President welcomes Joe Stetler, former PhRMA (then PMA) President, to the podium.

Henri Manasse, (left), Executive Vice President, American Association of Health System Pharmacists, Joe Stetler, and Donna Moore join others in honoring Morry.

Robert C. Black, Chairman of the PhRMA Foundation Board and President of Zeneca, gives tribute to Morry's years at the Foundation.

MORRY'S MOMENTS

Timothy Webster, Executive Vice President, American Society of Consultant Pharmacists (left), Ernie Mario, Co-Chairman and CEO, Alza; and Leonard DeMino, Vice President, National Association of Chain Drug Stores, recall events surrounding their friendships with Morry.

Alan Holmer honors Morry with kudos on his work as Vice President of Pharmacy Relations.

Joe Stetler and Ernie Mario discuss Stetler's remarks regarding Morry's illustrious career.

Morry Beetel, Donna Moore and C. Joseph Stetler recap the evening's events.

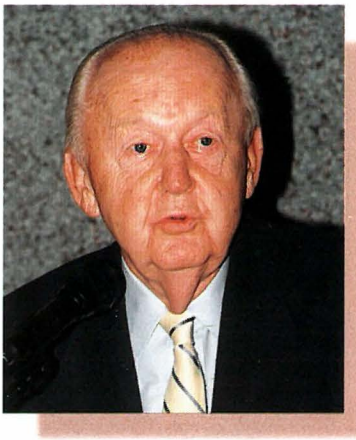
Morry enjoys the festivities of the evening with Marlene Povich (left of Morry), President of Povich Design, and Marsha Friedman, National Wholesale Druggists Association (left).

Morry remininisces (left to right) with good friends: Louis Sesti, Vice President, PCS Systems; Gloria Sabatini, Pharmaceutical Consultant; and Richard Cotherman, Director, State Government Affairs, Zeneca Pharmaceuticals.

MORRY'S MOMENTS

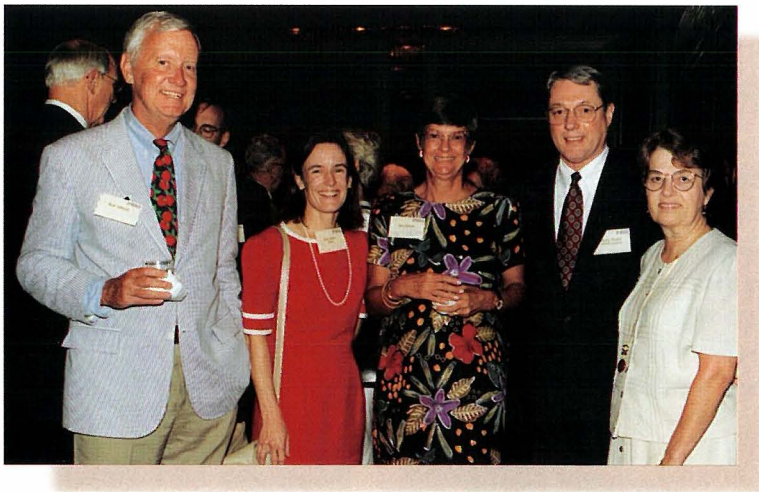
(left to right) Paul Burdett, formerly Marion Merrell Dow; Mary Beth Aring-Seely, PhRMA's Office of the President, Joe Stetler, and Bob Ingram, President and CEO of Glaxo-Welcome.

Joe Stetler, who has had many retirement parties himself, challenges Morry to catch up with him. Joe—one of the founding fathers of the Foundation—was also President of the Foundation for many years.



Katie and Jim Cope join in wishing Morry the best in all future endeavors. Jim is President of the Non-Prescription Drug Manufacturers Association.

Donna Moore, Joe and Norine Stetler and Morry, discuss the upcoming evening's events.



(left to right) Bob Allnutt, former PhRMA Senior Vice President; Judy Bello, PhRMA Executive Vice President, Policy and Strategic Affairs; Jan Allnutt, Morry and Theresa discuss future activities for the Bectel's.

Here Sidney Taurel, Chairman of the PhRMA Board, and COO of Eli Lilly and Company congratulates Morry on his retirement. Sidney and the PhRMA Board, along with PhRMA staff honored Morry at the Board meeting on February 13 by presenting him with a crystal pylon, etched with memorials of Washington, D.C.

(left to right) Paul Burdett, formerly with Marion Merrell Dow; Pat Zenner, PhRMA Foundation Board member and President of Hoffmann-La Roche; Hubert Shiayen, PhRMA's, Director of Allied Development; Morry; and Bob Ingram, PhRMA Foundation Board member and President and CEO of Glaxo Wellcome, enjoy a moment after presentations.

MORRY'S MOMENTS

Maxine and Paul Kaufman confer with Morry regarding his future golf game and pleasurable moments with grandchildren. Paul Kaufman is former PhRMA Assistant Vice President, Science and Technology, and now serves as PhRMA consultant.

MORRY'S MOMENTS

Morry and Theresa enjoy the evening as the speakers regale the audience with events from Morry's career.

Brian K. Shoichet, Ph.D., Assistant Professor, Department of Molecular Pharmacology and Biological Chemistry, Northwestern University Medical School: "Structure-Based Inhibitor Discovery Against Beta-Lactamases." Dr. Shoichet will discover novel inhibitors for beta-lactamases using structure-based and computational methods. These inhibitors will not be beta-lactams and will offer considerable advantages over current beta-lactamase inhibitors, which are failing. Dr. Shoichet will determine the structures of the new inhibitors complexed with beta-lactamases and will experimentally determine the energies of specific interactions. Dr. Shoichet hopes to find candidate drugs that will counter bacterial resistance to penicillin-like antibiotics and advance the suite of techniques used for structure-based drug discovery.

Very recently, Dr. Shoichet's lab has discovered completely novel, non-beta-lactam molecules that inhibit the beta-lactamases with sub-micromolar Ki values.

Those individuals who began their awards in July of 1996 are:

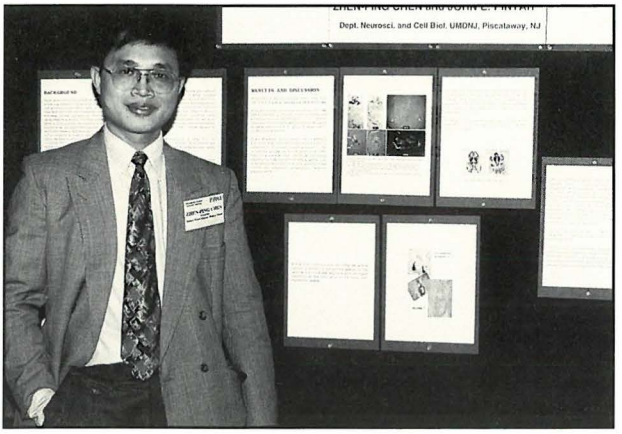
Richard H. Kramer, Ph.D., Assistant Professor, Department of Molecular and Cell Pharmacology, University of Miami, School of Medicine: "Probing the Structure and Function of Cyclic Nucleotide-gated Channels with Competitive Antagonists.".

Jia Bei Wang, M.D., Ph.D., Assistant Professor, Department of Pharmaceutical Sciences, University of Maryland at Baltimore, School of Pharmacy: "Studying the Relationships Between Structure and Function of the Opiate Receptors."

Those individuals who began their awards in 1995 and ended their award in 1997 are:

Emery H. Bresnick, Ph.D., Assistant Professor, Department of Pharmacology, University of Wisconsin-Madison, Medical School, "Mechanism of the Human β—Globin Locus Control Region."

Haian Fu, Ph.D., Assistant Professor, Department of Pharmacology, Emory University, School of Medicine: "Role of 14-3-3 Proteins in Cellular Signal Transduction."



Zhen-Ping Chen, M.D., Ph. D., '96 Postdoctoral Fellow in Pharmacology/Morphology, presents his research at the Poster Session, February 13.

Faculty Development Awards in Bioinformatics

Initiated in 1997, the Faculty Development Award in Bioinformatics seeks to build the infrastructure of expertise in the new science of Bioinformatics. As defined, Bioinformatics seeks to couple computer technology with the enormous amount of information currently stored in biological databases. It is a process whereby genomic sequence data is turned into molecular biology information for the purpose of benefiting mankind through drug discovery. Because of the shortage of trained scientists and faculty, the PhRMA Foundation is very pleased to offer this new program.

Beginning his award in July 1997:

Mark Gerstein, Ph.D., Assistant Professor, Department of Molecular Biophysics and Biochemistry, Yale University, School of Medicine: "Analysis of Sequences and Structures on a Large Scale." The amount of known biological information, particularly relating to protein structures and DNA sequences, is currently increasing at an exponential rate. Moreover, unlike the past, much of this information is in a form that is amenable to quantitative comparisons and detailed analysis. Broadly, Dr. Gerstein is interested in gaining insight into protein sequence-structure relationships through such comparisons and analysis. Dr. Gerstein wil attempt classification of protein sequences and structure on a large scale. Such classification would greatly help interpret the rapidly increasing number of gene sequences and provide a useful context for assessing whether any feature of a given protein is unique or typical. More specifically, he is interested in the classification of protein folding patterns. It is believed that there is a finite number of protein folds and that this "molecular parts list" is sufficient for all organisms to get on with life. As whole genomes are sequenced and more structures are determined, Dr. Gerstein hopes to be able to characterize all the folds used in a given organism—statistically, in the sense of a molecular census.

Fellowships for Advanced Predoctoral Training in Pharmacology/Toxicology

The PhRMA Foundation has had great success in its "Advanced Predoctoral Training in Pharmacology/Toxicology" program to increase the number of well-trained investigators in the field of pharmacological research. This program is designed to encourage and support promising students during their thesis research and is aimed at those candidates who are within two years of completing their research for pharmacology/toxicology doctoral dissertations.

This fellowship program provides a stipend of $12,000 a year and $500 a year for incidentals directly associated with preparation of the dissertation. The program, in its 20th year, has awarded a total of 238 fellowships.

Those who have been awarded 1997 fellowships beginning between January and July are:

Allan L. Berger, D.V.M., Cornell University, School of Medicine (two years): "Fluorescence Studies of cGMP Phosphodiesterase Activation"—The mechanism by which G proteins interact with and regulate their specific effector enzymes is critical in regulating many signal transduction pathways. Using the vertebrate vision pathway as a model system, Dr. Berger will use fluorescence techniques to monitor protein-protein interactions, and protein structure and function, in real time.
Thesis Advisor: Richard A. Cerione, Ph.D., Professor, Department of Pharmacology.

Burns C. Blaxall, University of Colorado, Health Sciences Center (two years): "Molecular Mechanisms Involved in β1-Adrenergic Receptor Down-Regulation"—Heart failure is a prevalent disease characterized by increased adrenergic drive, which in turn leads to down-regulation of the β1-adrenergic receptor (AR). The purpose of this research is to investigate the role of molecular mechanisms which appear to play a significant role in β1-AR down-regulation, with specific focus on cis-acting mRNA sequences and trans-acting protein factors which may regulate β1-ARmRNA stability.
Thesis Advisor: J. David Port, Ph.D., Assistant Professor, Department of Medicine and Pharmacology.

Cynthia J. Brame, Vanderbilt University, School of Medicine (two years): "Biochemical and Molecular Toxicology of Isolevuglandins: Novel Reactive Products of Lipid Peroxidation"—Isolevuglandins are reactive products of free radical-catalyzed arachidonate peroxidation. Hypothetically, as such, they mediate free radical-induced injury. This project has a two-fold focus: detection of isolevuglandins as protein abducts *in vivo* and characterization of isolevuglandins' biological toxicity.
Thesis Advisor: L. Jackson Roberts II, M.D., Professor, Department of Pharmacology and Medicine.

Lin Gao, Stanford University, School of Medicine (two years): "Novel Dioxin-responsive Genes"—2,3,7,8-Tetrachlorodibenzo-p-dioxin is a widespread and persistent environmental contaminant. The aim of this study is to clone and characterize new dioxin-regulated genes, which may provide opportunities to analyze new mechanisms of dioxin action.
Thesis Advisor: James P. Whitlock, Jr., Ph.D., Chairman, Department of Molecular Pharmacology.

Marianne A. Grant, Brown University, School of Medicine (one and one-half years): "Structural Determination and Molecular Characterization of the N-Terminal Extracellular Domain of the nAChR α-Subunit"—The objective of this research is to obtain the first high resolution view of the molecular structure in the ligand binding domain of the nicotinic acetylcholine receptor through advanced 2-D and 3-D NMR studies of a large, soluble receptor fragment produced by recombinant technology in *E.coli.*
Thesis Advisor: Edward Hawrot, Ph.D., Chairman, Department of Molecular Pharmacology, Physiology and Biotechnology.

Peter Clarke Gray, University of Washington, School of Medicine (two years): "The Role of Kinase Targeting in the Regulation of Calcium Channel Function"—Calcium channels are the target of several therapeutically important drugs used to treat cardiovascular disorders. Reversible phosphorylation of the calcium channel by targeted cAMP-dependent protein kinase enhances channel activity and causes a subsequent increase in the calcium-dependent process of muscle contraction. The focus of this research is to identify and characterize the protein or proteins responsible for the targeting of cAMP-dependent protein kinase to the calcium channel.
Thesis Advisor: William A. Catterall, Ph.D., Professor and Chair, Department of Pharmacology.

Scott Hammond, State University of New York, Stony Brook, School of Medicine (two years): "Regulation of Phospholipase D1"—Phospholipase D activities are important components of cellular signaling processes. We have cloned the first human phosphatidylcholine specific phospholiase D, PLD1, and characterized its activity *in vitro.* Dr. Hammond's research will now study the regulation of phosphatidylcholine breakdown and arachidonic acid release via PLD1 in a cellular experimental system.
Thesis Advisor: Andrew J. Morris, Ph.D., Assistant Professor, Department of Pharmacological Sciences.

Violaine K. Harris, Georgetown University, School of Medicine (two years): "Pharmacological Modulation of Fibroblast Growth Factor Binding Proteins in Cancer Development"—FGF-BP is a protein which binds and activates fibroblast factors (FGF), resulting in the stimulation of angiogenesis, or growth of new blood vessels, during tumor growth. A better understanding of how the FGF-BP gene is regulated transcriptionally by retinoids will give us new therapeutic targets for the prevention and treatment of cancer.
Thesis Advisor: Anton Wellstein, M.D., Ph.D., Department of Pharmacology.

Joseph Christopher Holt, Tulane University, School of Medicine (two years): "The Acetylcholine Receptors of the Vestibular Hair Cells"—Acetylcholine, the dominant efferent transmitter, is known to produce two effects among vestibular organs, either an inhibition or facilitation of afferent firing. These effects are mediated by unique postsynaptic ACh receptors found on vestibular hair cells. Based on their unorthodox pharmacology, these unusual receptors have been defined as either nicotinic- or muscarine-like. This research involves identifying these receptors with special emphasis on their pharmacology and molecular details which may be used to develop selective pharmacological agents for the treatment of vestibular pathologies and disorders.
Thesis Advisor: Paul S. Guth, Ph.D., Professor, Department of Pharmacology.

Kim M. McGinnis, University of Michigan, School of Medicine (one year): "The Roles of Calmodulin and Calbindin in Neuronal Apoptosis"—Changes in intracellular calcium concentrations play a prominent role in the onset of neuronal apoptosis, a form of cell death implicated in a variety of neurodegenerative diseases. This project will investigate whether changes in localization or expression of the calcium-binding proteins calmodulin and calbindin affect the onset of apoptosis in cultured neuronal cells.
Thesis Advisor: Professor Margaret Gnegy, Department of Pharmacology.

Pharmacology/Morphology

FELLOWSHIP AWARDS IN PHARMACOLOGY-MORPHOLOGY

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

The awards are two years each. The level of support varies and is aimed at keeping within the existing stipends for similarly trained individuals within the applicant university. First offered in 1968, 100 awards have been made to date.

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

Recipients of the fellowship beginning July 1997 are:

Colleen M. Burns, Ph.D., Vanderbilt University, School of Medicine (one year): "Functional Characterization of Edited Serotonin 2C Receptor Isoforms in the Mammalian Central Nervous System." Transcripts encoding the 2C-subtype of serotonin receptor (5-HT_{2c}R) undergo RNA editing events in which genomically encoded adenosines are converted to inosines by members of a family of double-stranded RNA dependent adenosine deaminases. Editing events at four major positions, termed sites A, B, C, and D, are predicted to alter amino acids within the second intracellular loop of the protein, a region known to be involved in receptor: G-protein coupling. Analyses of mRNA from dissected brain regions reveal the existence of region-specific editing patterns predicting the production of seven major protein isoforms encoded by eleven distinct RNA species. In transfected cells, fully edited 5-HT_{2c}R isoforms stimulate the phospholipase C signal transduction cascade less efficiently than their nonedited counterparts, suggesting that RNA editing represents a novel mechanism for regulating serotonergic signal transduction. Dr. Burns' lab anticipates that an examination of the localization of edited 5-HT_{2c}R proteins will provide clues as to the possible functions of these proteins in the intact brain. Potential editing alterations in disease states in which the 5-HT_{2c}R has been implicated, such as schizophrenia and depression, may also provide evidence as to the role of 5-HT_{2c}R in the normal mammalian central nervous system.

Laurie S. Nadler, Ph.D., Ph.D., University of Washington, School of Medicine: "Targeting of Muscarinic Receptor Subtypes in Polarized Cells." Muscarinic acetylcholine receptors (mAchRs) are expressed in both the central and peripheral nervous systems. In neurons, different mAchR subtypes are present in axon terminals (presynaptic) and in somata and dendrites (postsynaptic). The mechanisms responsible for this differential localization, however, remain unknown. The proposed research will examine the amino acid sequences responsible for the polarized targeting of mAchR subtypes in neurons and other polarized cells. To achieve this goal, the subcellular distributions of wild type and chimeric mAchRs will be analyzed in Madin Darby canine kidney (MDCK) epithelial cells and in differentiated NTera 2 human teratocarcinoma cells by stable transfection followed by immunocytochemistry and confocal microscopy. Results to date demonstrate an apical localization of the m2 mAchR in transiently transfected MDCK cells, while m3 is targeted basolaterally. In addition to immunocytochemistry, the distribution of recombinant receptors in MDCK cells will be quantitated in biotinylation experiments. Taken together, these studies will provide novel information about the mechanisms which underlie the polarized sorting of receptors in neurons. A better understanding of receptor distribution is essential for predicting the CNS effects of drugs, as well as for the future design of receptor subtype-selective therapeutic agents.

Steven J. Ritter, Ph.D., The University of Texas Medical School at Houston: "Mechanism of Breast-Cancer Suppression by Retinoids." Retinoid-induced transcription regulation occurs via ligand-dependent transcription factors, Retinoic-Acid-Receptors (RAR's) and Retinoid-X-Receptors (RXR's). Retinoid-regulated cellular proliferation can be successfully investigated using chemically-induced breast cancer models. In NMU-induced breast tumors, activation of both RAR's and RXR's more effectively inhibited tumor growth than activating RAR's alone. The NMU-induced tumor model thus provides a system for investigating the RXR contribution to retinoid-induced ntiproliferation. The RXR contribution to antiproliferaation will be assessed in NMU-induced mammary tumors treated with RAR and/or RXR selective agonists or antagonists. Cellular proliferation and apoptosis will be determined morphologically to assess the antiproliferative activity. Retinoids can affect cellular proliferation by regulating expression of growth factor pathway components. NMU-induced breast tumors will be used to determine the RAR and/or RXR regulation of insulin-like growth factor-1 (IGF-1) pathway component expression and to assess the IGF-1 pathway components' ability to mediate the antiproliferation. Retinoid-induced changes in mRNA and

protein concentrations for the IGF-1 pathway components will be localized by *in situ* hybridization and immunohistochemistry and quantified by PCR. Selectively inhibiting the IGF-1 pathway components will demonstrate the ability of the component to mediate antiproliferation. The information gained from these studies will provide novel insight for the application of retinoid receptor-selective ligands to the treatment of breast cancer.

Recipients of the fellowships beginning July 1996 are:

Zhen-Ping Chen, M.D., Ph.D., University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School: "Anatomical Studies of Opioid Receptor Like-1 (ORL-1) Expression and Targeted Inactivation of the ORL-gene."

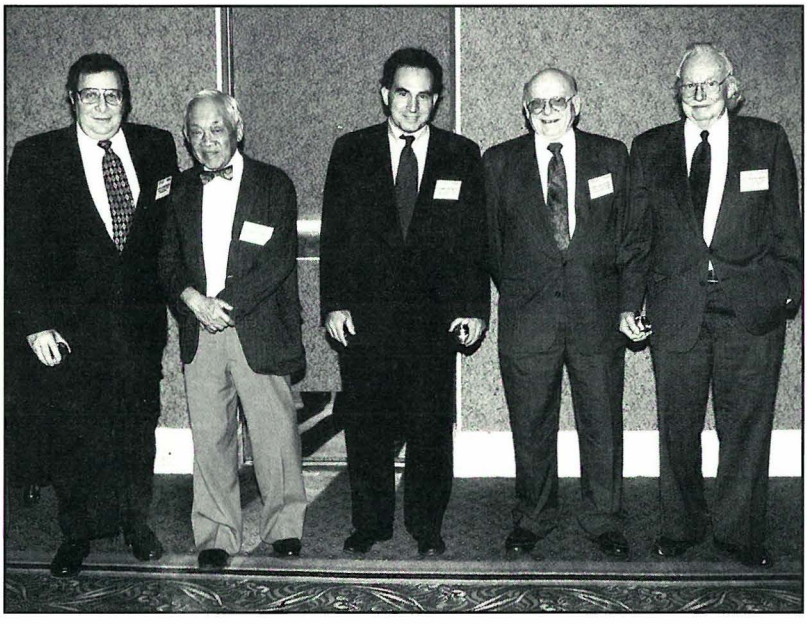
Kirk Hillsley, Ph.D., University of Vermont, College of Medicine: "Mechanism of CCK's Action in the Control of Sphincter of Oddi Junction."

Annika B. Malmberg, Ph.D., University of California, San Francisco, School of Medicine: "Spinal Mechanisms of Nociceptive and Neuropathic Pain."

Individuals who began their awards in 1995 and ended their awards in 1997:

Hui Pan, M.D., Columbia University, College of Physicians and Surgeons: "Signal Transduction in Serotonergic Neurons in the Peristalic Reflex Pathway."

Christine Saunders, Ph.D., Vanderbilt University, School of Medicine: "Adrenergic Receptor Involved in Targeting/Retention to the Basolateral Domain of Polarity Epithelial."



Retiring Committee members receive a standing ovation at the Annual Awardee Meeting banquet on February 12: (l to r) Lou Lemberger, Eddie Way, Larry Pinkus, Jim Gillette and Gil Mannering.

Pharmaceutics

UNDERGRADUATE RESEARCH FELLOWSHIPS IN PHARMACEUTICS

The Undergraduate Research Fellowship program began in 1990 and is designed to encourage undergraduate students in pharmacy, chemistry, biology or a related discipline to pursue an advanced degree in pharmaceutics, thereby attempting to increase the number of well-trained investigators in this important discipline. The Foundation's plan to accomplish this goal is by providing support for the undergraduate student to participate in a meaningful research project with a motivated, inspiring and research-active pharmaceutics faculty member.
The pharmaceutics faculty member must apply for the award and, once selected, is provided with a one-year, $5,000 fellowship which the faculty member can provide to a qualified undergraduate of his or her choosing. Seven awards were made for 1997, bringing the total number of awards to 80.

Faculty and their undergraduate students who received fellowships between January and August 1997 are:

Gayle A. Brazeau, Ph.D., Associate Professor, Pharmaceutics Department, College of Pharmacy, University of Florida.
Student: Kari Ann Svetic, "Myotoxicity of Pharmaceutically Relevant Buffers"—The goal of this project is to investigate the extent of muscle damage caused by commonly used pharmaceutical buffers, as a function of pH and ionic strength, following intramuscular injection.

Lane J. Brunner, Ph.D., Assistant Professor, Division of Pharmaceutics, College of Pharmacy, University of Texas at Austin.
Student: Minh M. Ha, "Effects of Chronic Cyclosporine Therapy on Intestinal Drug Absorption"—The purpose of this project is to investigate the possible role of alterations in intestinal absorption as mechanism to explain the variability in pharmacokinetic parameters by examining the absorption and pharmacokinetics of a probe compound, nifedipine. This data will be used to help understand the mechanism of highly variable pharmacokinetics often seen in transplant patients administered cyclosporine.

Jeffrey Hughes, Pharm.D., Ph.D., Assistant Professor, Pharmaceutics Department, College of Pharmacy, University of Florida.
Student: Maria Mercedes Boneta, "Characterization of pH Sensitive Surfactants and Their Use in Non-Viral Gene Therapy" —This project will involve the characterization of a new class of gene therapy adjuvants termed Biodegradable pH Sensitive Surfactant (BPS). Dr. Hughes' lab has previously synthesized several classes of the BPS family. In this project the BPS will be characterized with regard to their physiochemical and biochemical properties.

Kristine Knutson, Ph.D., Associate Professor, Pharmaceutics and Pharmaceutical Chemistry Department, School of Pharmacy, University of Utah.
Student: Kent A. Farnsworth, "Contributions of Interfacial Regions to Transport Across Phase-Separated Liposomes"—Gel phase liposomes offer some advantages in drug delivery applications including improved stability, increased circulation times and potential means of targeting the liposomes. However, barrier properties and transport mechanisms across the bilayers are not well understood. Heterophasic liposomes, which are composed of two different lipids that phase separate into unique domains processing different phases, provide insight into the contributions of phase structure and interfacial regions to the barrier properties of lipid bilayers and transport mechanisms across liposomes.

Vincent H.L. Lee, Ph.D., Professor and Chairman, Department of Pharmaceutical Science, School of Pharmacy, University of Southern California.
Student: Jiaen "John" Xu, "Structure Function of the Dipeptide Transporter"—This research seeks to characterize the dipeptide transporter in the intestine for improving oral drug absorption.

Lawrence Ka-yun Ng, Ph.D., Assistant Professor, Department of Pharmaceutics, School of Pharmacy, University of Colorado HSC.
Student: Robert Pasqual Serravo, "Transfection of Human CD4+ Tcells using a Novel Series of Imidazolinium Compounds"—This research evaluates the potential of cationic liposomes prepared with a novel series of cationic lipids in transfecting CD4+ Tcells. It is expected that further enhancement in transfection efficiency with these liposomes can be realized by optimizing a number of experimental variables that may affect cationic liposome-mediated intracellular gene delivery.

Samuel H. Yalkowsky, Ph.D., Professor, Department of Pharmaceutics, College of Pharmacy, University of Arizona.
Student: Danielle Amy Rosin, "Effect of Contact Time on Hemolysis"—The aim of this research is to develop an accurate method of determining hemolysis induced by parental formulations during intravenous injection and evaluate ways of preventing it. By preventing the destruction of red blood cells, hemolytic nephropathy, hemolytic anemia, and other hemolytic induced illnesses could be avoided.

Fellowship for Advanced Predoctoral Training in Pharmaceutics

Initiated in 1987, this program is intended to assist candidates who have one or two years remaining in their pharmaceutics predoctoral training—the time during which they are engaged in dissertation research.

The fellowship program provides a stipend of $12,000 a year for two year and $500 a year for incidentals directly associated with the preparation of the dissertation. Five awards were made for 1997 bringing the total number of awards made to 61:

Those who received fellowships beginning between January and July 1997 are:

James Stephens Cavenaugh, School of Pharmacy, University of Utah: "Formulation and Efficacy of a Peptide Vaccine for Targeting Pathogenic B Lymphocytes." In this project, Mr. Cavenaugh is investigating the use of synthetic peptides in a vaccine for systemic lupus erythematosus (SLE), an autoimmune disease in which the patient develops autoantibodies to nucleic acids. Mr. Cavenaugh will also investigate several different vaccine formulation issues including: (1) conformation and stability of the synthetic peptide; (2) conjugation of the peptide to a macromolecular carrier; and (3) adjuvants.

Gregory A. Sacha, School of Pharmacy, Purdue University: "Supercritical Fluid Technology for Particle Size Reduction." This project utilizes supercritical fluid technology as a new method for particle size reduction of pharmaceutical materials. It will be compared with conventional mechanical micronization with respect to particle size, particle size distribution, and amount of amorphous material present.

Brent D. Sinclair, College of Pharmacy, University of Michigan: "An Approach to Regulating the Crystallization of Pharmaceutical Compounds During Dissolution, Comparing Molecular Simulations with Experimental Observations." This research is aimed at understanding the molecular processes that control crystallization during dissolution. Specifically, Dr. Sinclair will be studying the effects that surfactants have on crystal growth in an attempt to relate them to their effect as nucleation inhibitors or enhancers. The use of molecular modeling software will allow them to compare morphology predictions with experimental results of crystals grown in the presence of these additives.

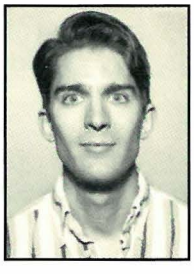
Marc Tesconi, College of Pharmacy, University of Arizona: "A Method for the Rapid Estimation of Saturated Vapor Pressure for Organic Compounds." The study will develop a method for estimating the saturated vapor pressure of organic compounds. It will involve correlating evaporation rate with functions of temperature and pressure.

This will allow the estimation of evaporation rates at 25°c and 1.0 atm (standard temperature and pressure; STP). The STP evaporation rates will then be related to saturated vapor pressures.

Vance Hayden Thomas, College of Pharmacy, University of Michigan: "Characterization of Multivalent Oligosaccharides as Potential Selectin Antagonists." In an inflammatory response, leukocyte infiltration is controlled by a carbohydrate selectin interaction. This research will investigate the valency of the selectin family by using bi, tri and tetravalent oligosaccharides which have been enzymatically modified to possess sialyl-Lewis^x, a known selectin ligand. The information gained will further the development of selectin anti-inflammatory therapeutics.

Postdoctoral Research Fellowships in Pharmaceutics

Complementing the other two pharmaceutics programs offered by the PhRMA Foundation, the Postdoctoral Research Fellowships in Pharmaceutics was initiated to encourage more qualified graduates to obtain the postdoctoral research training so vitally needed in the area of pharmaceutics. The PhRMA Foundation and its Pharmaceutics Advisory Committee recognize the critical need for such well-trained scientific investigators. The postdoctoral award gives $25,000 per year for two years. Since its inception, 10 awards have been given.



William G. Mallet, Ph.D., Cornell University Medical College: "The Intracellular Transport and Localization of TGN38/41." The interactions of cells with their surroundings are established and regulated in large part by the distribution of specific cellular proteins. The major protein sorting station in the eukaryotic cell is the *trans*-Golgi network (TGN), which communicates with the endocytic pathway and from which proteins are delivered specifically to the plasma membrane, to lysosomes, or to secretory granules. A resident protein which has been implicated in secretion from the TGN is the glycoprotein TGN38/41. The localization of TGN38/41 is maintained by rapid endocytosis from the plasma membrane and subsequent delivery to the TGN from endosomes. The detailed mechanism of transport and targeting of TGN38/41 has not been described. Currently, Dr. Mallet is characterizing the trafficking pathway of TGN38/41 to

the TGN and measuring the kinetics of TGN38/41 transport. He also intends to identify the factors which interact with TGN38/41 to mediate sorting. Determining the mechanism of TGN38/41 transport may reveal novel aspects of the communication between the secretory and endocytic pathways and the mechanisms of protein sorting. Such information may be valuable for the specific and efficient delivery of therapeutic agents to subcellular sites.

Beginning her award in January of 1996:

Sandy Koppenol, Ph.D., University of Washington, School of Pharmacy. *"Two Dimensional Protein Crystallization at Interfaces"*—This study will examine the parameters that control the binding and two-dimensional crystallization of a bacterial surface layer (S-layer) protein using protein engineering and surface analytical techniques. These studies will provide a base of information necessary for the engineering of two dimensional crystals with specifications to fit a variety of applications in biotechnology, biomedicine and molecular nanotechnology.

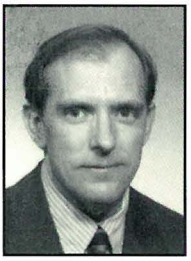
Ending the second year of her award in 1997:

Kathleen M. Hillgren, Ph.D. School of Pharmacy, University of California, San Francisco, School of Pharmacy: "Oral Absorption of Peptidic Drugs."

Faculty Development Awards in Pharmacoeconomics

There is widespread concern about rising health care expenditures as well as increasing interest in understanding the impact of new therapies on patient-focused outcomes such as mortality, functional status, and quality of life. Because of these new perspectives, choices about new drugs are now based not only on traditional safety and efficacy measures but also on patient-assessed efficacy and economic values measures. A drug development program needs to include all of the outcome measures so that the information needs of the different decision makers can be met. Taking this into consideration, the PhRMA Foundation, recognizing the need for manpower to perform these outcome analyses, has implemented its Faculty Development Awards in Pharmacoeonomics program. Two awards were given for 1997 and each award offers $40,000 annually for two years. The program, now in its third year, has made seven awards.

The following individuals received awards beginning July 1997:



John M. Brooks, Ph.D., Assistant Professor, College of Pharmacy, University of Iowa: "The Use of Instrumental Variable Techniques in Pharmacoeconomics Outcomes Research." In his research, Dr. Brooks is concentrating on applying instrumental variable techniques in outcomes research. These techniques have the exciting potential to unlock the wealth of information in administrative claims databases for assessing treatment outcomes. Instrumental variable techniques exploit the portion of treatment variation that is assumed unrelated to unmeasured "confounding factors." While instrumental variable techniques have been used for many years in economic research, their application to outcomes research is a fairly new phenomenon. Instrumental variable outcomes estimates will increase the generalizability of pharmacoeconomic research. Pharmacoeconomic research previously relied on evidence from randomized clinical trials (RCTs) for outcome estimates. However, it is unclear whether estimates of efficacy or costs from RCTs actually represent the effectiveness of treatments in practice. Patient characteristics and clinical states often vary widely from what is observed in RCT populations. In these cases, RCT evidence may greatly exaggerte treatment effects for more general populations. Application of instrumental variable techniques to administrative claims databases gives researchers the capability of estimating treatment outcomes for patients outside RCT populations. As a result, in pharmacoeconomic research instrumental variables estimates can provide a more general assessment of the cost-effectiveness of individual treatments.

Matthew M. Murawski, R.Ph., Ph.D., Assistant Professor, School of Pharmacy, University of Mississippi: "Development of a Pharmacoeconomic Center at The University of Mississippi." Dr. Murawski's intended research will be comprised of three distinct initiatives. The first initiative consists of the development of a new theoretical construct, pharmaceutical related quality of life (PTRQOL). The second initiative will consist of the operationalization of this concept via the design, development and testing of the major components of a measurement system, the PTRQOL instrument. It is hoped this instrument will be of value in evaluating pharmaceuticals and pharmacy services as well as an educational tool. The third initiative will consist of further explorations by the applicant into the nature and patterns of HRQOL instrument responsiveness, via direct-mail survey in selected populations

Those who began their awards in 1996 are:

Karen Blumenschein, Pharm.D., Assistant Professor, College of Pharmacy, University of Kentucky: "Incorporating Quality of Life Assessments into Pharmacoeconomics Evaluations"

A. Mark Fendrick, M.D., Assistant Professor, School of Medicine, University of Michigan: "Development of a Pharmacoeconomics Research and Education Program at the University of Michigan"

Those who began their awards in 1995 and ended their awards in 1997 are:

Karen Ann Sauer, Pharm.D., Assistant Professor, College of Pharmacy, University of Arizona: "A Cost-Benefit Analysis of Four Hormonal Contraceptive Methods."

Kevin A. Schulman, M.D., Assistant Professor, School of Medicine, Georgetown University: "Methods of Propsective Economic Assessment."

Jane C. Weeks, M.D., Assistant Professor, Dana Farber Cancer Institute, Harvard Medical School: "Validation of a New Method for Measuring Utilities for Pharmacoeconomic Studies in Cancer."

Research Grants

One of the most important aspects of the PhRMA Foundation effort has been the support of fundamental research. In 1971 a change in emphasis within the Foundation shifted the bulk of the funds into educational support programs and, consequently, less into research. It is understood that these educational programs place high emphasis on the research programs of the applicants for each award. In this sense, educational support programs are in fact also supporting research. The Foundation continues to accept requests for research support and suggestions for pertinent research projects since it is important that the potential within the Foundation for helping that particularly promising effort be maintained.

Ethical Considerations

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

Research Starter Grants

Research Starter Grants are intended to provide financial support for beginning investigators. The program, in 1997, allowed for 10 Research Starter Grants at $12,500 per year with the second year contingent upon need. The first awards were made in 1972, and a total of 50 grants have been made, including the 10 awards beginning January 1, 1997.

Recipients of the Research Starter Grant which began January 1997:

John R. Hepler, Ph.D., Emory University School of Medicine: "The Gq Family of G Proteins: Functional Roles for Amino Terminal Diversity and Interactions with RGS Proteins."

Robert L. Judd, Ph.D., Northeast Louisiana University School of Pharmacy: "Effect of Metformin on Phosphoenolypruvate Carboxykinase Activity in Cultured Rat Hepatocytes and H4IIE Cells."

Terri Goss Kinzy, Ph.D., University of Medicine & Dentistry of New Jersey-Robert Wood Johnson Medical School: "Effects of Mutations in EF-1 on the Steps in Translation Elongation."

Patrick T. Murray, M.D., University of Chicago School of Medicine: "Mechanisms of Endotoxin Effect on Mesangial Calcium Mobilization."

Anthony L. Parola, Ph.D., Creighton University School of Medicine: "Fluorescence Spectroscopy of the Calcitonin Gene-Related Peptide Receptor."

Kathryn M. Partin, Ph.D., Colorado State University College of Veterinary Medicine: "Pharmacological Contributions of GluRB to Allosteric Modulation of AMPA Receptors."

Steven P. Schwendeman, Ph.D., Ohio State University College of Medicine: "Maintaining Protein Structure in Biodegradable Polymer Microspheres."

Zhao-Hui Song, Ph.D., Texas A&M University College of Medicine: "Characterization of Cannabinoid Receptors in the Eye."

Elizabeth Wattenberg, Ph.D., University of Minnesota Medical School: "cJun as a Target for TPA-type and Non-TPA-Type Tumor Promoters."

Based on need for funds, a review of the 13 research starter grantees whose awards began January 1, 1996, for a second year of the award resulted in 12 of them having their awards continued. These are:

Steven L. Brody, M.D., Washington University School of Medicine: "Molecular Regulations of Airway Epithelial Cell Gene Expression."

Michael W. Crowder, Ph.D., Miami University School of Medicine: "Characteristics of Metallo-beta-Lactamase from X. Maltophilia."

Stephen G. Graber, Ph.D., West Virginia University School of Medicine: "The Role of βγ Subunits in Determining the Specificity of G Protein Action."

Sandra J. Hewett, Ph.D., University of Connecticut School of Medicine: "Prevention of N-methyl-D-aspartate-induced Neurotoxicity by Nitric Oxide."

Begonia Y. Ho, Ph.D., Medical College of Wisconsin: "G Protein Selectivity of the Adenylyl Cyclase-Coupled Cannabinoid Receptor."

Lisa R. Merlin, M.D., SUNY Health Science Center at Brooklyn School of Medicine: "The Function of Metabotropic Glutamate Receptor Subclasses in Cerebral Cortex."

Keith J. Miller, Ph.D., Nova Southeastern University College of Pharmacy: "Modulation of Effector Proteins by Nitric Oxide: A Novel Mechanism for the Physiological Action of Serotonin."

Yoichi Osawa, Ph.D., University of Michigan Medical School: "The Regulation of Nitric Oxide Synthase by Chemical Agents: Toxicological and Pharmacological Implications."

Brian K. Shoichet, Ph.D., Northwestern University Medical School: "Structure-based Inhibitor Discovery and Protein Stability Studies of β-lactamases."

Jeffery B. Travers, M.D., Ph.D., Indiana University School of Medicine: "The Role of Platelet-Activating Factor in Keratinocyte Function."

Edith H. Wang, Ph.D., University of Washington School of Medicine: "Transcriptional Regulation of Growth Control Genes."

Stephanie W. Watts, Ph.D., Michigan State University College of Human Medicine: "Role of Vascular 5-HT2B Receptor in Hypertension."

Eddie Way, retiring committee member and longtime friend of the Foundation, shares a moment with Margot Ingoldsby Schulman, the Foundation photographer extraordinaire.

Report of the Treasurer

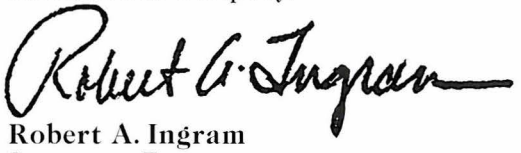
Robert A. Ingram
Secretary-Treasurer
PhRMA Foundation

The PhRMA Foundation has been jumpstarting the careers of young scientists now for 32 years. During this time, the Foundation has been supported by the generosity of the research-intensive pharmaceutical manufacturers —the PhRMA member firms—associates and research affiliates. As I recap the finances of this prestigious Foundation for 1996, I would like to give special thanks to our benefactors who are listed in the back of this annual report.

The total income of the Foundation in 1996 was $1,925,116. Of this amount, $1,413,000 came from contributions; $376,782 came from interest and dividends; $4,060 was from realized gains on sales of securities; $115,733* was from unrealized gains on sale of securities; and $15,541 came from unexpended grant monies.

In 1996, grant expenditures totaled $1,590,534; Foundation Annual Awardee Meeting expenses amounted to $63,885; Advisory Committee Meetings and Travel was $90,782; Honoraria totaled $39,450; Publications cost $55,003; Professional Services totaled $37,010; and office expenses for 1996 rent, salaries, taxes and trust commission totaled $261,806. The total net assets as of December 31, 1995 was $5,035,989. This figure, however, does not reflect the tentatively authorized, undisbursed funds for some of the grants and programs described earlier. The Foundation reports these amounts as expenditures when the funds are disbursed. As of December 31, 1996, the contingency liability for 1996-99 was $3,039,681.

The Foundation's financial position as of December 31, 1996, has been audited by the Rosslyn, Virginia accounting firm of Buchanan & Company.



Robert A. Ingram
Secretary-Treasurer
PhRMA Foundation
and
President and Chief Executive Officer
Glaxo Wellcome Inc.

*New in 1995, FASB rules require that "unrealized gains on sales of securities" be reported as part of total income.

Statement of Income and Expenditures For the Year Ended December 31, 1996

INCOME:

Contributions	$1,413,000
Interest and Dividends	376,782
Realized Gains on Sale of Securities	4,060
Unrealized Gains on Sale of Securities	115,733
Miscellaneous Income	15,541
Total Income	**$1,925,116**

EXPENDITURES:

Grants —Note A	
Clinical Pharmacology Unit Award	$ 30,756
Faculty Awards in Clinical Pharmacology	319,750
Faculty Awards in Basic Pharmacology	135,000
Fellowships for Careers in Clinical Pharmacology	96,900
Advanced Predoctoral Fellowships in Pharm/Toxicology	225,500
Pharmacology-Morphology Fellowships	134,878
Medical Student Research Fellowships	32,500
Research Starter Grants	262,500
Advanced Predoctoral Fellowships in Pharmaceutics	119,000
Undergraduate Fellowships in Pharmaceutics	30,000
Postdoctoral Fellowships in Pharmaceutics	43,750
Faculty Development Award in Pharmacoeconomics	160,000
Grand Total	$1,590,534
Administrative	
Meetings and Travel:	
Annual Awardee Meeting	$ 63,885
Committee Meetings and Travel	90,782
Management and General:	
Honoraria	39,450
Publications	55,003
Office Expense	57,231
Professional Services	37,010
Rent	29,058
Salaries and Retirement Fund Contribution	212,366
Taxes, Insurance and Depreciation	43,406
Trust Commission Expense	6,034
Administrative Total	$ 634,225
TOTAL EXPENDITURES	**$2,224,759**

Note A—In addition to the amounts shown, the Foundation is committed, subject to annual review, to make certain grants. At December 31, 1996 the amounts still to be disbursed with respect to these grants amounted to aggregated $3,039,681 with $1,819,384 of this to be disbursed during 1997; $1,040,297 in 1998; $180,000 in 1999.

Change in Net Assets	$299,643
Net Assets, January 1, 1996	$5,035,989
Net Assets, December 31, 1996	$4,736,346

The PhRMA Foundation operates through its Officers, Board of Directors and six advisory committees. In March of 1997, Mr. Robert C. Black, President of Zeneca Pharmaceuticals, was re-elected Chairman. Mr. G. Gilbert Cloyd, Vice President, Pharmaceuticals, Procter & Gamble USA, was elected Vice Chairman, and Robert A. Ingram was elected Secretary-Treasurer. As of this printing, Gil Cloyd has taken on new responsibilities in Japan and has retired as Vice Chairman of the Board effective July 1997. Our many thanks to Gil for his outstanding leadership in serving the PhRMA Foundation as Secretary-Treasurer for three years and, more recently, as Vice Chairman.

Maurice Q. Bectel, D.Sc., again served as the Foundation's President. Donna Moore served as Director of Programs, and Edward J. Cafruny, M.D., Ph.D., as Foundation Scientific Consultant.

Effective August 31, 1997 Maurice Q. Bectel will retire as President of the Foundation—a post he has held since 1985. Donna Moore will step into the position as President and CEO at that time.

Also at the meeting in March, Edward J. Cafruny, M.D., Ph.D. scientific consultant, was honored for his impending retirement in September. Dr. Cafruny began his association with the Foundation by serving on the Scientific Advisory Committee beginning in 1968. He later became Chairman of the Basic Pharmacology Advisory Committee, then Consultant to the Foundation in 1989.

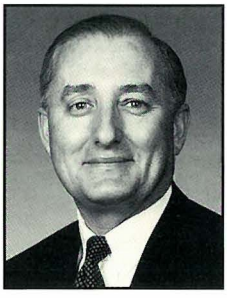
Stepping into a newly created post of Chief Science Advisor is William R.. Darrow, M.D., Senior Medical Advisor, Schering-Plough Research Institute, Keniworth, New Jersey. Dr. Darrow has served as Chairman of the Scientific Advisory Committee since 1993 and continues in that capacity.

Organization and Administration

1997-98 Officers

Robert C. Black
Chairman
PhRMA Foundation
President
Zeneca Pharmaceuticals
Wilmington, Delaware

*G. Gilbert Cloyd
Vice Chairman
PhRMA Foundation
Vice President, Pharmaceutical
Procter & Gamble USA
The Procter & Gamble Company
Cincinnati, Ohio



Robert A. Ingram
Secretary-Treasurer
PhRMA Foundation
and
President and Chief Executive Officer
Glaxo Wellcome Inc.
Research Triangle Park, North Carolina

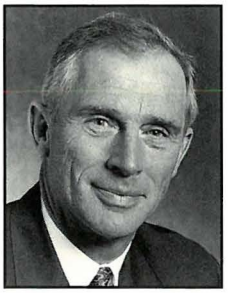
**Maurice Q. Bectel, D.Sc.
President
PhRMA Foundation

**Donna Moore
President-Designate

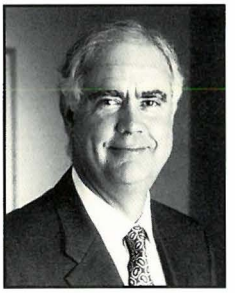
* Mr. Cloyd retired from the Board effective July 1, 1997, to take a post with Procter & Gamble in Japan.

** Morry Beetel retires as President & CEO August 31, 1997. Donna Moore steps into that position September 1.

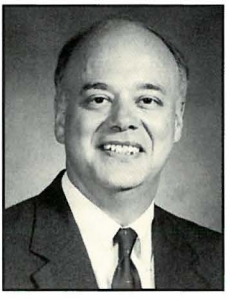
1997-98 Board of Directors



Jan Leschly
Chief Executive Officer
SmithKline Beecham
Philadelphia, Pennsylvania

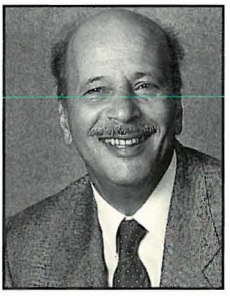


Robert N. Wilson
Vice Chairman, Board of Directors
Johnson & Johnson
New Brunswick, New Jersey



Patrick J. Zenner
President and Chief Executive Officer
Hoffmann-La Roche Inc.
Nutley, New Jersey

Alan F. Holmer
President
Pharmaceutical Research and Manufacturers of America
Washington, D. C.
(*Ex-Officio*)



*Edward J. Cafruny, M.D., Ph.D.
PhRMA Foundation Scientific Consultant
and
Distinguished University Professor
University of Medicine and Dentistry of New Jersey
Newark, New Jersey

**William R. Darrow, M.D., Ph.D.
PhRMA Foundation Chief Science Advisor
and
Senior Medical Advisor
Schering-Plough Research Institute
Schering-Plough Corporation
Kenilworth, New Jersey

Staff Consultants:

* Dr. Cafruny retired as Foundation Scientific Consultant September 1997.

** Dr. Darrow stepped into the newly created position of Chief Science Advisor in September 1997.

Scientific Advisory Committee

William R. Darrow, M.D., Ph.D.
(Chairman)
Senior Medical Advisor
Schering-Plough Research Institute
Schering-Plough Corporation
Kenilworth, New Jersey

Paul Calabresi, M.D.
Professor and Chair Emeritus
Department of Medicine
Brown University
Providence, Rhode Island

Jean Paul Gagnon, Ph.D.
Director of Industry Affairs
Hoechst Marion Roussel Inc.
Kansas City, Missouri

Michael D. Gershon, M.D.
Professor and Chairman
Department of Anatomy & Cell Biology
Columbia University
College of Physicians and Surgeons
New York, New York

Arthur Hull Hayes, Jr., M.D.
President
MediScience Associates
New Rochelle, New York

James Swarbrick, D.Sc., Ph.D.
Vice President
Research & Development
AAI
Wilmington, North Carolina

Hugh H. Tilson, M.D., Dr.P.H.
Senior Medical Advisor for Health Affairs
International Surveillance
Epidemiology and Economics
Glaxo Wellcome Inc.
Research Triangle Park, North Carolina

W. Leigh Thompson, Jr., M.D., Ph.D.
Chairman and Chief Executive Officer
Profound Quality Research
Charleston, South Carolina

Irwin M. Weiner, M.D.
Emeritus Professor and Former Dean
College of Medicine
State University of New York, Brooklyn
Health Science Center
Brooklyn, New York

Advisory Comm ittees

Clinical Pharmacology Advisory Committee

Paul Calabresi, M.D.
(Chairman)
Professor and Chair Emeritus
Department of Medicine
Brown University
Providence, Rhode Island

Darrell R. Abernethy, M.D., Ph.D.
Francis Cabell Brown Professor of Medicine and Pharmacology and
Director
Division of Clinical Pharmacology
School of Medicine
Georgetown University
Washington, D.C.

*Thorir D. Bjornsson, M.D., Ph.D.**
Vice President, Clinical Pharmacology
Worldwide Clinical Research & Development
Bristol-Myers Squibb
Princeton, New Jersey

Terrence F. Blaschke, M.D.
Professor of Medicine and Molecular Pharmacology
Division of Clinical Pharmacology
Stanford University
School of Medicine
Stanford, California

Edward A. Carr, Jr., M.D.
Emeritus Professor of Pharmacology and Therapeutics, and Professor of Medicine
School of Medicine and Biomedical Sciences
SUNY at Buffalo
Buffalo, New York

Louis Lemberger, M.D., Ph.D.
Emeritus Professor of Pharmacology, Medicine and Psychiatry
School of Medicine
Indiana University
Indianapolis, Indiana

Gilbert Mannering, Ph.D.
Professor Emeritus
Department of Pharmacology
University of Minnesota
Medical School
Minneapolis, Minnesota

Alan S. Nies, M.D.
Executive Director
Clinical Pharmacology
Merck & Co., Inc.
Rahway, New Jersey

Basic Pharmacology Advisory Committee

Irwin M. Weiner, M.D.
(Chairman)
Emeritus Professor and Former Dean
State University of New York
Brooklyn, New York

* Joined CPAC in 1997
** Retired from CPAC 1997

James W. Aiken, Ph.D.
Director of Experimental Biology
Pharmacia & Upjohn Inc.
Stockholm, Sweden

Terry L. Bowlin, Ph.D.
Director of Biology
Bio Chem Therapeutics
Laval, Quebec, Canada

Theodore M. Brody, Ph.D.
Professor and Former Chairman
Department of Pharmacologyand Toxicology
Michigan State University
East Lansing, Michigan

George C. Fuller, Ph.D.
Dean and Professor of Pharmacology
College of Pharmacy and Allied Health Professions
Wayne State University
Detroit, Michigan

***James R. Gillette, Ph.D.**
Former Chief, Laboratory of Chemical Pharmacology
National Heart, Lung & Blood Institute
National Institutes of Health
Bethesda, Maryland

Paul S. Guth, Ph.D.
Professor of Pharmacology
School of Medicine
Tulane University
New Orleans, Louisiana

Keith F. Killam, Jr., Ph.D.
Professor and Former Chairman
Department of Medical Pharmacology
University of California, Davis
School of Medicine
Davis, California

George R. Lenz, Ph.D.
President
GRLEN AND Associates
Andover, Massachusetts

Bernard L. Mirkin, M.D., Ph.D.
William G. Swartchild, Jr. Distinguished Chair in Research
Head and Director of Research
Children's Memorial Institute for Education and Research
Professor of Pediatrics
Northwestern University Medical School
Chicago, Illinois

***Robert E. Parks, Jr., M.D., Ph.D.**
E. E. Brintzenhoff Professor of Medical Science Emeritus
Division of Biology and Medicine
Brown University
Providence, Rhode Island

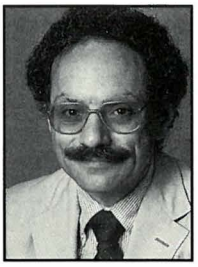
Sidney Pestka, M.D.
Professor and Chairman
Department of Molecular Genetics and Microbiology
University of Medicine & Dentistry of New Jersey
Robert Wood Johnson Medical School
Piscataway, New Jersey

Frederick M. Radzialowski, Ph.D.
President
FMR Research Associates
Glenview, Illinois

***E. Leong Way, Ph.D.**
Professor Emeritus of Pharmacology, Toxicology and Pharmaceutic Chemistry
Schools of Medicine and Pharmacy
University of California, San Francisco
San Francisco, California

* Retired from BPAC 1997

Pharmacology-Morphology Advisory Committee



Michael D. Gershon, M.D. (Chairman)
Professor and Chairman
Department of Anatomy & Cell Biology
Columbia University
College of Physicians & Surgeons
New York, New York

George A. Condouris, Ph.D.
Professor and Former Chairman
Department of Pharmacology
University of Medicine & Dentistry of New Jersey
Newark, New Jersey

Cheryl Dreyfus, Ph.D.
Associate Professor
Department of Neuroscience & Cell Biology
University of Medicine and Dentistry of New Jersey
Robert Wood Johnson Medical School
Piscataway, New Jersey

Felix A. de la Iglesia, M.D.
Vice President
Pathology & Experimental Toxicology
Parke-Davis Pharmaceutical Research
Ann Arbor, Michigan

Robert B. Jennings, M.D.
James B. Duke Professor of Pathology
School of Medicine
Duke University
Durham, North Carolina

Hugh B. Lewis, B.V.M.S., M.R.C.V.S.
Dean, School of Veterinary Medicine
Purdue University
West Lafayette, Indiana

David L. Nelson, Ph.D.
Senior Research Scientist
Lilly Research Laboratories
A Division of Eli Lilly and Company
Indianapolis, Indiana

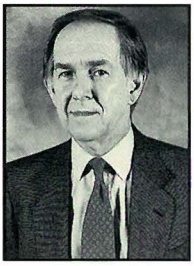
*__Lawrence M. Pinkus, Ph.D.__
Scientific Review Administrator
Division of Research Grants
National Institutes of Health
Bethesda, Maryland

Henry J. Ralston III, M.D.
Professor and Chairman
Department of Anatomy
School of Medicine
University of California, San Francisco
San Francisco, California

*__Leonard L. Ross, Ph.D.__
President, Chief Executive Officer
and
Annenberg Dean
Medical College of Pennsylvania
Philadelphia, Pennsylvania

* Retired from PMAC 1997

Pharmaceutics Advisory Committee



James Swarbrick, D.Sc., Ph.D. (Chairman)
Vice President
Research & Development
AAI
Wilmington, North Carolina

*__William J. Curatolo, Ph.D.__
Assistant Professor
Pfizer Central Research
Pfizer Inc.
New York, New York

William I. Higuchi, Ph.D.
Distinguished Professor and Chairman
Department of Pharmaceutics
College of Pharmacy
University of Utah
Salt Lake City, Utah

**__Lynda M. Sanders, Ph.D.__
Consultant
Palo Alto, California

George Zografi, Ph.D.
Professor of Pharmaceutics
School of Pharmacy
University of Wisconsin-Madison
Madison, Wisconsin

Pharmacoeconomics Advisory Committee

Jean Paul Gagnon, Ph.D. (Chairman)
Director of Industry Affairs
Hoechst Marion Roussel Inc.
Kansas City, Missouri

Lyle Bootman, Ph.D.
Dean
College of Pharmacy
University of Arizona
Tucson, Arizona

*__John E. Eisenberg, M.D.__
Chairman
Department of Medicine
Georgetown University
School of Medicine
Washington, D. C.

*__Faye A. Luscombe, Dr.P.H.__
Director of Epidemiology and Outcomes Research
Greenstone Healthcare Solutions
Kalamazoo, Michigan

Jane T. Osterhaus, Ph.D.
Director of Medical Affairs
Pharmacoeconomic Research
Glaxo Wellcome Inc.
Research Triangle Park, North Carolina

* Joined the PAC 1997

** Retired from PAC 1977

*** Retired from PCO 1977

Details of the twelve PhRMA Foundation grant programs and application forms are available on the World Wide Web: www.phrmaf.org.

For more information, please write to:

Donna Moore
President
Pharmaceutical Research and Manufacturers
of America Foundation
1100 Fifteenth Street, N.W.
Washington, D.C. 20005

(202) 835-3470 (phone)
(202) 467-4823 (fax)

Donna Moore, Gil Cloyd, and Joe and Norine Stetler chat about the activities of the evening—Annual Awardee Meeting banquet, February 12, 1997.

Applications

Benefactors

PhRMA Member Companies and Company Foundations

OVER $3.5 MILLION

Hoffmann-La Roche
  Foundation
  Hoffmann-La Roche, Inc.
Bristol-Myers Squibb
  Foundation
  Bristol-Myers Squibb
    Company

OVER $2.5 MILLION

The Merck Company
  Foundation
  Merck & Co., Inc.
  Merck Human Health
    Division
Warner-Lambert Foundation
  Warner-Lambert Company
    Parke-Davis

OVER $2 MILLION

Glaxo Wellcome Inc.
Pharmacia & Upjohn
  Foundation
  SmithKline Beecham
    Foundation
  SmithKline Beecham p.l.c.
  SmithKline Beecham
    Animal Health
  SmithKline Beecham
    Pharmaceuticals
  SmithKline Beecham
    Consumer Brands
  SmithKline Beecham
    Clinical Laboratories
Eli Lilly and Company
  Foundation
  Eli Lilly and Company
American Home Products
  Corporation
  Wyeth Ayerst Laboratories
    Division
Johnson & Johnson
  Advanced Care Products
  Advanced Sterilization
    Products
  Cordis Corporation
  Direct Access Diagnostics
  Ethicon, Inc.
  Ethicon Endo-Surgery
  Immunobiology Research
    Institute, Inc.
  Janssen Pharmaceutica, Inc.
  Johnson & Johnson
    ClinicalDiagnostic
  Johnson & Johnson
    Consumer Support
    Center
  Johnson & Johnson
    Development
    Corporation
  Johnson & Johnson Finance
    Corporation
  Johnson & Johnson Health
    Care Systems, Inc.
  Johnson & Johnson
    Interventional Systems
    Company
  Johnson & Johnson Medical,
    Inc.
  Johnson & Johnson - Merck
    Consumer
    Pharmaceuticals Co.
  Johnson & Johnson
    Professionals, Inc.
  LifeScan, Inc.
  McNeil Consumer Products
    Company
  McNeil Specialty Products
    Company
  Neutrogena Corporation
  Noramco, Inc.

* Aggregate Contributions

Ortho Biotech, Inc.
Ortho Dermatological
Ortho Diagnostic Systems, Inc.
Ortho McNeil Pharmaceutical
Personal Products Company
R. W. Johnson Pharmaceutical Research Institute
Therakos, Inc.
Vistakon
Johnson & Johnson Vision Products, Inc.
Pfizer Inc.

OVER $1 MILLION

Novartis Corporation
Searle
Searle Pharmaceutical Group
Hoechst Marion Roussel Inc.
Schering-Plough Foundation, Inc.
Schering-Plough Corporation

OVER $500,000

Zeneca Pharmaceuticals
Sanofi Winthrop, Inc.
Bayer Corporation
Boehringer Ingelheim Corporation
Boehringer Ingelheim Pharmaceuticals, Inc.

OVER $250,000

The Procter & Gamble Company
Rhone-Poulenc Rorer Inc.

OVER $100,000

3M Pharmaceuticals

$100,000 (and under)

Knoll Pharmaceutical Company
Organon Inc.
Amgen Inc.
Astra USA, Inc.
Pasteur Merieux Connaught
Alza Corporation
Genentech, Inc.
Yamanouchi U.S.A., Inc.
Solvay Pharmaceuticals Inc.
B.F. Ascher & Company Inc.

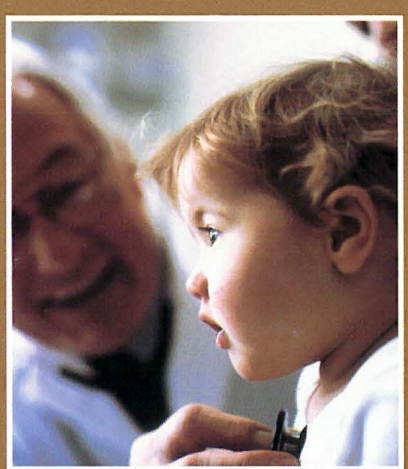
PHRMA ASSOCIATES AND RESEARCH AFFILIATES

AAI
American Medical Association
Clark-O'Neill, Inc.
Corbett Healthconnect
IMS America Ltd.
Kelly/Waldron and Company
Klemtner Advertising
Lowe McAdams
Medical Economics Co., Inc.
Medicus Intercon
Scott-Levin Associates

PhRMA Foundation Current Programs for 1998-1999

Name of Program/ Year of First Awards	Number of Awards Budgeted Yearly/ Length of Award	Program Budget	Deadline Announcement Date Starting Time
Clinical Pharmacology Advisory Committee			
(1) Faculty Awards in Clinical Pharmacology (1967)	3 budgeted/ 3 years	$ 360,000 total $ 40,000 per award per year	October 1 December 15 July 1
(2) Fellowships for Careers in Clinical Pharmacology (1973)	2 budgeted/ 2 years	$ 96,000 total $ 24,000 per award	October 1 December 15 July 1
(3) Medical Student Research Fellowships (1974-Amended 1982)	4 budgeted/ 3 months up to 24 months	$ 48,000 total $ 1,000 per month maximum $ 12,000	October 1 December 15 July 1
Basic Pharmacology Advisory Committee			
(4) Faculty Awards in Basic Pharmacology/Toxicology (1973)	2 budgeted/ 2 years	$ 120,000 total $ 30,000 per award per year	September 15 December 15 July 1
(5) Research Starter Grants (1972)	11 budgeted/ 2 years	$ 275,000 total $ 12,500 per award per year	September 1 December 15 January 1
(6) Advanced Predoctoral Fellowships in Pharmacology/Toxicology (1978)	9 budgeted/ 1 or 2 years	$ 225,000 total $ 12,500 per award per year	September 15 December 15 January-August
(7) Faculty Development Award in BioInformatics (1997)	1 budget/ 2 years	$ 60,000 total $ 30,000 per award	September 1 December 15 July 1
Pharmacology-Morphology Advisory Committee			
(8) Fellowships in Pharmacology-Morphology including Cell Biology (1968)	3 budgeted/ 2 years	$ 129,000 total $ 21,500 per award per year	January 15 March 15 July 1
Pharmaceutic Advisory Committee			
(9) Advanced Predoctoral Fellowships in Pharmaceutics (1987)	5 budget/ 1 or 2 years	$ 12,500 total per award per year	October 1 December 15 January-August
(10) Undergraduate Research Fellowships in Pharmaceutics (1990)	7 budgeted/ 1 year	$ 35,000 total $ 5,000 per award	October 1 December 15 January-July
(11) Postdoctoral Fellowships in Pharmaceutics (1992)	1 budgeted/ 1 or 2 years	$ 50,000 total $ 25,000 per award per year	October 1 December 15 January-December
Pharmacoeconomics Advisory Committee			
(12) Faculty Awards in Pharmacoeconomics (1995)	2 budgeted/ 2 years	$ 160,000 total $ 40,000 per award per year	September 1 December 15 July 1

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



Pharmaceutical Research and
Manufacturers of America Foundation

1100 Fifteenth Street, NW
Washington, DC 20005