

PhRMA
FOUNDATION



1996 ANNUAL REPORT

*Pharmaceutical
Research
and
Manufacturers
of America
Foundation*





MISSION STATEMENT

*T*he quality of healthcare 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 healthcare, 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.



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REPORT OF THE CHAIRMAN

*I*n 1995, thalidomide was back in the headlines—this time as a possible treatment for a complication of AIDS. For those who were around in the early '60s, the mention of the drug "thalidomide" still struck a note of anxiety as it did in 1962 when the world was stunned by the discovery that a touted miracle drug had actually caused deformities in as many as 10,000 babies. The hallowed halls of medicine were still reverberating when then-Pharmaceutical Manufacturers Association (PMA) member companies decided that something had to be done. A commission on drug safety was appointed and enabled by a grant from the PMA to determine the course the pharmaceutical industry should take to make sure the thalidomide incident never happened again. Quoting William C. Cray, former PMA Vice President of Public Relations, who wrote the Foundation's Twenty-year History, "Clearly, the industry felt a special responsibility to enlarge progress along frontiers that, true, were vital to its own well being but even more vital to every person who ever ingests a modern drug."

One of the commission's recommendations was to establish "an independent foundation...with funding by the pharmaceutical industry...to promote needed research by grants to qualified investigators." After some months of studying various proposals, the PMA Board, in 1965, formally established the PMA Foundation. As with many times in history, through a tragedy something good had come—the birth of the PhRMA Foundation.

The Foundation income that first year was only \$137,500. Last year—1995—the PhRMA member firms gave \$1.8 million to the Foundation based on its stellar record over the past thirty-one years. I am very pleased to say that the research-intensive pharmaceutical industry is still rallying to the meet the challenge posed by a new frontier of science and a new era of young researchers. As I stated in our *Scholars* brochure, the Foundation has brought consensus within our industry—a focal point of philanthropy for which our industry has become well known.

Last year was a landmark year. The Foundation made its first Faculty Development Awards in Pharmacoeconomics. As with the initiation of other Foundation programs, the Foundation Board saw a need and boldly stepped forward to help build the infrastructure of this new, essential discipline...and that is exactly what we are doing. In addition to the new Pharmacoeconomics Awards, last year the Foundation Board asked that the Foundation look into another new



Robert C. Black
Chairman
PhRMA Foundation

program—one in bioinformatics. I am very proud to say that this fall will bring our first round of applications for Faculty Development Awards in Bioinformatics. By developing this vital new discipline, the Foundation has stepped up its emphasis on entering the new millennium at the forefront of new scientific frontiers.

Last year, the Foundation revitalized its mission statement. I do not have to tell you that medical science and technology have changed. The industry has changed. The Foundation is also changing to match the changes taking place in academe and the research-intensive member companies of PhRMA which generously support us. The mission is still dedicated to “enhancing public health through biomedical technology and scientific research” but our new mission statement goes beyond to address the workforce needs of our industry as well as the alliance between our industry and academe which has been soundly established over the past thirty-one years. The new mission statement goes beyond the old one to address cost containment, outcomes research and strengthening the continuum of clinical and basic research—all for the improvement of healthcare. To echo the theme of PhRMA for 1995—we do this because “the patient is waiting.” Please take a moment to read our new mission statement on the first page of this Annual Report.

In 1995, the Foundation performed an awardee survey which you will read more about under “Tracking 31” in this report. Suffice it to say, PhRMA Foundation awardees are making an impact. The respondents—numbering about 450—have gone on to serve on a total of 432 editorial boards—influencing the decision-makers in our industry, in healthcare and in our country. They have gone on to obtain more than \$203 million in funding from NIH. When asked, they said the Foundation award opened the door. When we look at these numbers, we know the Foundation is also making an impact for the future of new medicines.

I feel very privileged to be Chairman at this critical juncture in the life of the PhRMA Foundation. Other Foundation board members, Morry Bectel—Foundation President—and his staff have taken great strides to make sure the programs of the Foundation are meeting the mission as well as they did in the post-thalidomide years. The good news is the Foundation is strong. It continues to build the infrastructure for the future of tomorrow’s medicines—awardee by awardee. These young men and women of science have looked to us—the members of PhRMA—for support, and we have begun the journey of success for them, and in turn, the journey of success for our very own industry. The real winners, however, will be the patients who are waiting for the cures.

Please join me in congratulating the awardees whose names appear in this Annual Report—those who carry the prestigious title of “PhRMA Foundation Awardee.”



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



REPORT OF THE PRESIDENT

*I*n November of this year we will elect our next President. When we elected our current President four years ago, the face of the industry was quite different. During these past four years, eleven consolidations have taken place, restructuring has occurred and approximately 54,000 men and women have lost their positions within our industry. What will the next four years bring? Someone once said that there are only two things in life that are certain—death and taxes. I say there is one more and that is **change**. The next four years will bring more of it.

The PhRMA Foundation in 1995 entered its third decade—over \$40 million contributed to more than 2,000 awardees. Where do we go from here? I would like to continue the theme begun by Chairman Robert C. Black and that is the Foundation stands strong for entering the new millennium.

In order for the Foundation to remain as vital as it is today, we must grow with our industry and the young scientists who have looked to the Foundation over the past thirty years. As Bob Black mentioned, the Foundation is growing. We have broadened our scope of awards by now offering Faculty Development Awards in Pharmacoeconomics and Bioinformatics. The Foundation Board deserves much credit for boldly stepping out to approve these new programs in the face of somewhat uncertain horizons. This bold step has been applauded by those in the industry who understand the critical need for building these two disciplines. The board has positioned the Foundation to ignite the educational fuel which serves as the training ground for scientists and healthcare professionals of the future.

Initiating these programs was no easy accomplishment. As with any new program, it not only takes the acknowledgment of need and approval of the Board—it takes contributions and commitment. The PhRMA member companies understand the stakes. By pooling the resources of the PhRMA member companies, associates and research affiliates, the Foundation has been able to represent the smallest and the largest company, without commercial overtones—philanthropy for medical science's sake. The public seems to like it that way, particularly Congress. The Foundation over the years has become known as a "bastion of integrity" in the halls of Congress.

Each year, as a goodwill effort, we notify Congressmen and Senators of awardees who are their constituents just to let them know of the honor his/her constituent has received—the honor of receiving



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

a PhRMA Foundation award. Each year we receive letters from such notables as Presidential candidate Bob Dole, Ted Kennedy and David Pryor applauding our industry for their goodwill and efforts in building the disciplines of basic and clinical pharmacology, toxicology, morphology including cell biology, pharmaceuticals and—most recently—pharmacoeconomics and bioinformatics.

The eminent reputation the Foundation has enjoyed over the years is directly attributable not only to the accomplished scientists who are awardees but to the distinguished scientists who have graciously become affiliated with the Foundation. For example, what a great honor it was for the Foundation to have two outstanding speakers at its 1996 Annual Awardee Meeting. How appropriate it was for Arthur Hull Hayes, Jr., M.D., President of MediScience and current member of PhRMA's Scientific Advisory Committee, to deliver the "Thomas E. Hanrahan Memorial Lecture." Dr. Hayes was one of the very first awardees in 1968 and is probably the Foundation's best known awardee. The public better knows him as Commissioner of the Food and Drug Administration from 1981 to 1983.

On the ticket as banquet speaker was a guest from The White House—The Honorable John H. Gibbons, Ph.D., Assistant to the President for Science and Technology and Director of the White House Office of Science and Technology Policy. Dr. Gibbons brought the message straight from the President regarding "the situation facing academic health centers today as they try to compete in a market dominated by managed care, with ever-decreasing resources." He noted the role PhRMA members play in the process of not "allowing our teaching hospitals to go down the tubes." He stated, "The pharmaceutical industry's contribution to public health through the work of the Foundation is extremely important."

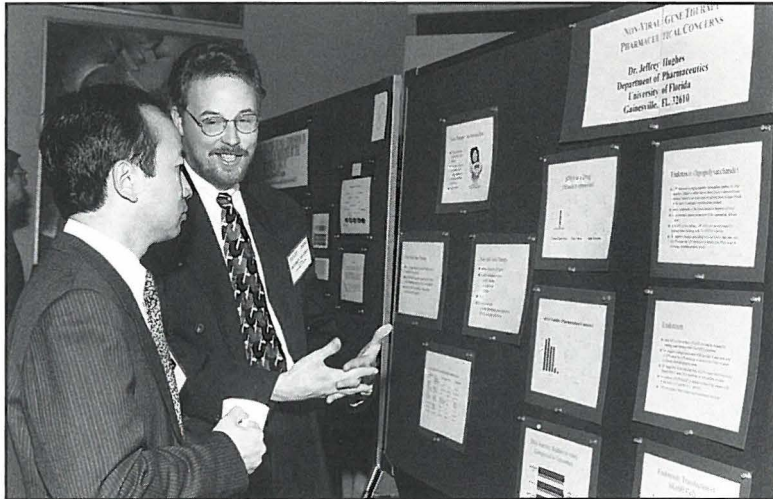
In addition to the PhRMA members who support the Foundation, the Foundation owes its success and reputation to the distinguished members of its Advisory Committees who hold the standard for reviewing each application—world-renown scientists who are dedicated to nurturing the next generation of scientists. One such example is Paul Calabresi, M.D., Professor and Chair Emeritus of the Department of Medicine of Brown University School of Medicine, and Chairman of the PhRMA Foundation Clinical Pharmacology Advisory Committee. In 1995, President Clinton appointed Dr. Calabresi to the National Cancer Advisory Board. Presidential appointments are not uncommon for Dr. Calabresi. In 1991 President Bush appointed him Chairman of the National Cancer Advisory Board. Another fine example is George Zografi, Ph.D., Professor of Pharmaceutics, School of Pharmacy, University of Wisconsin-Madison. Dr. Zografi, in 1995, received the Distinguished Pharmaceutical Scientist Award from the American Association of Pharmaceutical Scientists—an award sponsored by Zeneca Pharmaceuticals. More recently, he received the Volwiler Research Achievement Award—the most prestigious award of the American Association of Colleges of Pharmacy. Dr. Zografi served as Dean of the School of Pharmacy at Wisconsin University

from 1975 to 1980. We feel very privileged to have him as a member of the PhRMA Foundation's Pharmaceuticals Advisory Committee on which he has served since its inception in 1987.

In summary, I must say the Foundation is poised for great things as the year 2000 approaches. It has built a bridge of unity between our industry and academe that must survive. The future of the Foundation relies on the members of PhRMA, but too on the continual search for excellence that these enthusiastic, young men and women of science provide. As Bob Dole once said, "You can't sit on the sidelines and say, 'Well, someone else will do it.' It doesn't work that way. You've got to be involved." Let me introduce to you, in our 1996 Annual Report, the PhRMA Foundation Awardees—they are involved!

Maurice Q. Beetel

Maurice Q. Beetel, D.Sc.
*President
Pharmaceutical Research and
Manufacturers of America
Foundation*



*Dr. Jeffrey Hughes—
with the University of
Florida College of
Medicine and two-time
awardee in
Pharmaceutics—
discusses his research
with Vincent H. H. Lee,
Ph.D., University of
Southern California
who has received six
Fellowships in
Pharmaceutics to assist
undergraduates at his
school. Dr. Lee also
served this year as
President of the
American Association
of Pharmaceutical
Scientists.*



TRACKING THIRTY-ONE:

ACTIVITIES OF THE FOUNDATION IN ITS THIRTY-FIRST YEAR

Twenty-fifth Annual Awardee Meeting

The twenty-fifth PhRMA Foundation Annual Awardee Meeting was held on February 7 and 8, 1996, at the Washington Vista International in Washington, D.C. Over the years, the PhRMA Foundation has brought together current and former awardees, staff and advisory committee members to provide a forum for interaction—observing current research and hearing scientific presentations in related areas. As one young awardee said, “It is an excellent opportunity to meet and be mentored by the truly great scientists in the discipline; otherwise, I may have only read their papers.” The meeting was well attended by more than 100 scientists who have the prestige of being called PhRMA Foundation Awardees.

The activities began with a banquet on the evening of February 7 with Board members, as well as distinguished advisory committee members and staff. The Foundation was highly honored to have as its

Enjoying a brief moment at the Annual Awardee Banquet are (l to r): Gil Cloyd, Secretary-Treasurer of the PhRMA Foundation and Vice President of Pharmaceuticals, Procter & Gamble USA; Dr. Paul Calabresi, Chairman of the Clinical Pharmacology Advisory Committee, and Professor and Chair Emeritus, Department of Medicine, Brown University School of Medicine; Arthur Hull Hayes, Jr., M.D., 1996 Thomas E. Hanrahan Memorial Lecturer, and President of MediScience Associates; and Dr. Carl C. Peck, Director, Center for Drug Development Science, Department of Pharmacology, Georgetown University School of Medicine.





Taking a few moments to discuss Dr. Gibbons' after-dinner remarks are (l to r): Jack Gibbons, Morry Bectel, Bob Black, and Paul Calabresi.

banquet speaker The Honorable John H. Gibbons, Ph.D., White House Director for the Office of Science and Technology Policy and Assistant to the President for Science and Technology. Dr. Gibbons is an internationally recognized scientist and an expert in energy and environmental issues who has a deep interest and concern about the support of science and the impact of technology on society. Among his many awards are the Federation of American Scientists Public Service Award, the AAAS Philip Hauge Abelson Prize for sustained exceptional contributions to advancing science and medals from French and German governments for fostering scientific cooperation. In March of 1995, Dr. Gibbons' home State of Virginia presented him with its Life Achievement in Science Award.

Gibbons brought the message straight from the President regarding "the situation facing academic health centers today as they try to compete in a market dominated by managed care, with ever-decreasing resources." He noted the role PhRMA members play in the process of not "allowing our teaching hospitals (and schools for allied health) to go down the tubes." **He stated, "The pharmaceutical industry's contribution to public health through the work of the Foundation is extremely important."** He also very graciously welcomed the input of those in attendance.

On the morning of February 8, former and current awardees displayed their posters. The enthusiasm and dedication of these young scientists and researchers as they display the fruits of their labor is always impressive. Awardees and advisory committee members alike take time and are extremely interested in the results of long and arduous hours in the laboratory, and the researchers are equally enthusiastic to display it.

The Poster Session was followed by the Annual Awardee Meeting's General Session, at which time the Foundation was honored to have as the Thomas E. Hanrahan Memorial Lecturer, Arthur Hull Hayes, Jr., M.D., President of MediScience Associates and current member of the Scientific Advisory Committee. How appropriate it was for Dr.

LEFT: At the banquet on February 7, the awardees, Board and committee members, and guests were honored to hear Dr. John H. Gibbons deliver the after-dinner remarks. Dr. Gibbons is Director of The White House Office of Science and Technology Policy and Assistant to the President for Science and Technology.

RIGHT: Delivering the Thomas E. Hanrahan Memorial Lecture is Arthur Hull Hayes, M.D., President of MediScience Associates, 1968 Foundation Awardee, former FDA Commissioner and current member of the Foundation's Scientific Advisory Committee.



Hayes to deliver the lecture. Dr. Hayes was one of the very first awardees in 1968 and probably is the Foundation's best-known awardee. He was a Rhodes Scholar and went on to receive his M.D. from Cornell, where he later became Associate Professor of Medicine and Pharmacology and Associate Dean for Academic Affairs. His illustrious career includes many titles—Provost and Dean of the New York Medical College, NYMC's Professor of Medicine, Pharmacology and Family & Community Medicine and Director of the Institute of Human Values in Medical Ethics—to mention a few. The public still knows him best as Commissioner of the Food and Drug Administration from 1981 to 1983. Dr. Hayes' presentation, entitled "A Career in Science: Back to Basics," was right on target. The Foundation plans to publish Dr. Hayes' remarks.

As usual, on the afternoon of February 8, subgroup sessions were held in order for second-year awardees to deliver progress reports on their research and for attendees to hear presentations in their particular disciplines from former awardees and Advisory Committee members.

Presenters at the Clinical Pharmacology Subgroup Session, moderated by Paul Calabresi, M.D., Professor and Chair Emeritus, School of Medicine, Brown University:

George H. Lambert, M.D., Associate Professor of Pediatrics, Director, Pediatric Pharmacology and Toxicology and Associate Director, Clinical Research Center New Jersey University of Health Sciences, University of Medicine and Dentistry of New Jersey Piscataway, New Jersey; **Richard B. Kim, M.D.**, Assistant Professor of Medicine and Pharmacology, Vanderbilt University School of Medicine, Nashville, Tennessee; **Andre Terzic, M.D.**, Assistant Professor of Medicine and Pharmacology, Mayo Clinic, Rochester, Minnesota; and **Merit E. Cudkowicz, M.D.**, Postdoctoral Fellow, Department of Neurology, Harvard Medical School, Massachusetts General Hospital, Boston, Massachusetts

Presenters at the Basic Pharmacology Subgroup Session, moderated by Irwin Weiner, Emeritus Professor and Former Dean of the College of Medicine at the State University of New York, HSC, Brooklyn:

George R. Lenz, Ph.D., Advisory Committee Member, PhRMA Foundation Basic Pharmacology Advisory Committee, and President of GRLEN R&D Associates, Andover, Massachusetts; **Ming Li, Ph.D.**, Assistant Professor, Department of Pharmacology, University of South Alabama College of Medicine, Mobile, Alabama; and **James E. Ferrell, Jr., M.D.**, Department of Molecular Pharmacology, Stanford University School of Medicine, Stanford, California.

Presenters at the Pharmacology/Morphology Subgroup Session, moderated by Hugh Lewis, B.V.M.S., M.R.C.V.S., Dean, Purdue University School of Veterinary Medicine, Lafayette, Indiana:

Gary M. Mawe, Ph.D., Associate Professor, Department of Anatomy and Cell Biology, University of Vermont, College of Medicine, Burlington, Vermont; **Sally Schroeter, Ph.D.**, Department of Pharmacology, Vanderbilt University School of Medicine, Nashville, Tennessee; and **Min-Tsai Liu, D.D.S.**, Department of Anatomy and Cell Biology, Columbia University, College of Physicians and Surgeons, New York, New York.

Presenters at the Pharmaceutics Subgroup Session, moderated by Phillip Smith, Ph.D., Assistant Professor, Division of Pharmaceutics, School of Pharmacy, University of North Carolina at Chapel Hill (in the absence of Dr. James Swarbrick):

Srinivasan Venkatesh, Ph.D., Research Investigator, Bristol-Myers Squibb, New Brunswick, New Jersey; **Jane P.F. Bai, Ph.D.**, Assistant Professor, Department of Pharmaceutics, University of Minnesota, College of Pharmacy, Minneapolis, Minnesota; and **Raymond Skwirczynski, Ph.D.**, Senior Scientist, Roche Carolina Inc., Florence, South Carolina.

Foundation Board is Steady at the Helm

At its April 15 spring meeting of the PhRMA Foundation Board, current officers were re-elected. Robert C. Black, President of Zeneca Pharmaceuticals, was re-elected Chairman; and Mr. Gilbert Cloyd, Vice President, Pharmaceuticals, Procter & Gamble USA, Procter & Gamble Company, was re-elected Secretary-Treasurer. The position of Vice Chairman was temporarily left open



Robert C. Black, PhRMA Foundation Chairman and President of Zeneca Pharmaceuticals introduces Dr. John Gibbons, at the Annual Awardee Banquet, Washington, D.C..

due to the restructuring of PhRMA Foundation Board member companies.

On July 15, 1996, the Foundation was extremely pleased to welcome Alan F. Holmer to the Board in an *ex officio* capacity as the new President of PhRMA.

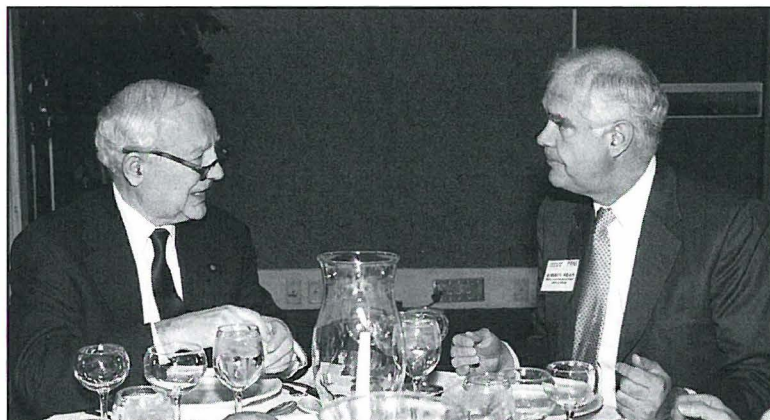
Leaving the Board during the past year were Mr. Gordon M. Binder, Chairman and Chief Executive Officer, Amgen; Mr. Sidney A. Taurel, Executive Vice President and President, Pharmaceutical Division, Eli Lilly and Company; Douglas G. Watson, President, Ciba Pharmaceuticals; and Mr. Gerald J. Mossinghoff (*ex officio*), who is outgoing President of PhRMA. The Foundation owes a huge debt of thanks to these men for their dedication of time and talent to the Foundation.

In addition to Black, Cloyd and Holmer, Board members serving for 1996-97 are:—Mr. Robert A. Ingram, President and Chief Executive Officer, Glaxo-Wellcome Inc.; Mr. Jan Leschly, Chief Executive, SmithKline Beecham; Mr. Robert N. Wilson, Vice Chairman, Board of Directors, Johnson & Johnson; and, Mr. Patrick J. Zenner, President and Chief Executive Officer, Hoffman-La Roche Inc.

Paul Calabresi, M.D., Chairman of the PhRMA Foundation Clinical Pharmacology Advisory Committee, Named to President's Cancer Panel

On May 1, 1995, the White House issued a press release announcing that President Bill Clinton had appointed Dr. Paul Calabresi to the President's Cancer Panel. Dr. Claiborne Pell (D-RI) had highly recommended Dr. Calabresi to the appointment because, as he stated, "Dr. Calabresi's knowledge, experience and commitment to understanding and eradicating cancer are extraordinary. I can think of no individual more qualified to serve on the President's Cancer Panel than Dr. Calabresi."

Paul Calabresi, M.D., and Bob Wilson, PhRMA Foundation Board Member and Vice Chairman, Board of Directors, Johnson & Johnson, discuss Foundation affairs at the Annual Awardee Banquet.





LEFT: Maurice Q. Bectel, President of the Foundation, speaks to the Annual Awardee banquet attendees on February 7.

RIGHT: Dr. William F. Darrow, Chairman of the Scientific Advisory Committee, and Senior Medical Advisor, Schering-Plough Research Institute, gives welcoming remarks at the Annual Awardee Meeting Luncheon on February 8.

The PhRMA Foundation is in full agreement. Since 1978, Dr. Calabresi has served on the Foundation's Clinical Pharmacology Advisory Committee, and as its chairman since 1989. He has also served on our Scientific Advisory Committee—the overseeing committee—since 1980. Maurice Q. Bectel, President of the Foundation, stated: "We are extremely pleased that President Clinton and Senator Pell have recognized Dr. Calabresi's great expertise in this vital area. This certainly is a great honor for Dr. Calabresi and the Foundation...to have Dr. Calabresi at the helm of its clinical pharmacology advisory committee."

Dr. Calabresi is Professor and Chairman Emeritus of the Department of Medicine at Brown University School of Medicine and Chairman of the Research Advisory Committee at Rhode Island Hospital. He is currently President of the New England Cancer Society and Associate Editor of the American Cancer Society's journal. In the past, in addition to serving on the National Cancer Institute's National Cancer Advisory Board, Dr. Calabresi has served as President of the American Society of Clinical Oncology and on the Board for the American Association for Cancer Research. He has served as an editorial consultant in oncology for the American Medical Association and has also been on the editorial board of the *New England Journal of Medicine*.

As an internationally recognized medical oncologist and authority on the pharmacology of anticancer agents, Dr. Calabresi has received the Oscar B. Hunter Memorial Award in Therapeutics from the American Society of Clinical Pharmacology and Therapeutics and the St. George medal for distinguished volunteer service from the American Cancer Society. Dr. Calabresi has authored or edited more than 200 manuscripts and books on the management of cancer and the pharmacology of anticancer agents.

In his busy schedule, Dr. Calabresi has found time to spend many dedicated hours assigning and reviewing applications for Foundation awards.* Certainly, the Foundation has been fortunate to have this caliber of reviewer serving on its advisory committees—as with many Foundation advisory committee members.

The President's Cancer Panel is charged with evaluating the National Cancer Program. On behalf of the Board of Directors, the Foundation congratulates Dr. Calabresi on this great honor conferred upon him by The White House.

* The Foundation's Clinical Pharmacology program has awarded 108 Faculty Development Awards, 61 Postdoctoral Fellowships for Careers in Clinical Pharmacology, 122 Medical Student Training Fellowships and assisted in the development of 26 Clinical Pharmacology Units at Schools of Medicine.

Bectel Receives Remington Award at American Pharmaceutical Association's Annual Meeting

It is with great pleasure the Foundation announces that the 1996 American Pharmaceutical Association (APhA) Remington Award—the profession of pharmacy's most prestigious honor—was bestowed on Foundation President Maruice Q. Bectel, D.Sc., for his lifetime dedication and leadership in making the profession of pharmacy an integral part of the healthcare picture. Morry delivered his Remington Lecture at a banquet in his honor on March 10, 1996, at APhA's annual meeting in Nashville, Tennessee.

Morry started his career as a practitioner-owner of Bectel Pharmacy in Muskegon, Michigan from 1963-1985 where he engaged in the general practice of pharmacy as well as being consultant pharmacist to two nursing homes. It was during this time that in 1976 he was elected to the APhA's Board of Trustees and elected chairman in

Theresa and Morry Bectel (left) relax with former PhRMA Foundation and Association President Joe Stettler and his wife Norine (right) after Morry's Remington Award presentation at the APhA's Annual Meeting in Nashville, Tennessee on March 10, 1996.



1983 and 1984. In 1984, with the untimely death of APhA Executive Director, Dr. William S. Apple, Morry stepped in to act as interim Executive Director.

In June of 1985, Morry became President of the PhRMA Foundation, succeeding the late Thomas E. Hanrahan, who had served the Foundation as Executive Director from 1966-78 and President from 1978-1985. After four years with the Foundation and with the departure of Dr. Lawrence Weaver, Morry was asked to serve as PhRMA Vice President of Pharmacy Relations, in addition to his duties as President of the Foundation.

Morry received his Bachelor of Science Degree in Pharmacy from Ferris State University in 1960 and honorary Doctor of Science Degrees from the Albany College of Pharmacy, Union University in 1992 and Ferris State University in 1994.

Other awards received by Morry are the Meritorious Award for Significant Contributions to the Profession of Pharmacy from Wayne State University College of Pharmacy; the Concurrent Resolution of Tribute from the State of Michigan Senate and House of Representatives; The Distinguished Alumni Award from Ferris State University and Special Recognition for Advancing the Profession of Pharmacy from APhA and the Michigan Pharmacists' Association.

The Remington Honor Medal was established in 1918 to recognize those with distinguished service on behalf of American pharmacy. It was begun by the then-APhA New York Chapter in honor of Joseph P. Remington (1847-1918), eminent community pharmacist, manufacturer and educator. The review panel includes all living APhA past Presidents.

Please join us in congratulating Morry on this prestigious honor!

Awardee Survey Reveals Interesting Data

The PhRMA Foundation recently completed an awardee survey—sent to current and past recipients of Foundation awards. The results were astonishing. First of all, note should be taken of the response rate. At the time of this printing, we have received over 52%—a remarkable response—indicative of the enthusiasm and loyalty these young researchers have for the work of the Foundation and for the research-intensive members of PhRMA which support them. These same enthusiastic scientists, as determined by our survey, have gone on to serve on a total of **432 editorial boards**—influencing the decision-makers in our industry, in the healthcare community and in our country today.

These awardees were asked to answer questions regarding their employment and current position. The results reflected that 86% of the respondents were employed in academia, 8% in the pharmaceutical industry and 3% in the government and other sectors. These statistics reflect almost identical proportions as the last survey—performed in 1987. The founding fathers had decided early in the life

of the Foundation to invest in faculty and the education and development of these individuals—the teachers of the teachers and the teachers of the “do’ers.” They decided to invest in the education and development of these individuals to achieve the multiplier effect—the effect of training those who train. It seems that their decision was prophetic in that 86% of those who received Foundation awards are still in academe.

Another interesting fact was brought to light by the survey. Since the inception of the Research Starter Grant, the Foundation noticed that many of those receiving our grant went on to obtain NIH grants. In this capacity, the Foundation awards serve as a “stepping stone” to new investigators—opening the door to larger grants, thus launching the careers of these bright, young scientists. Confirming this “stepping-stone” effect, the survey indicated that 450 respondents had gone on to receive **NIH grants totaling \$203,595,269.**

As with previous surveys, this survey substantiates the importance of the Foundation’s awards in “jump-starting” the careers of these young scientists. Had these young researchers not received a Foundation award, they may not have gone on to obtain more than \$203 million in NIH funding. They may not have gone on to serve on 432 editorial boards. The Foundation awards are given at a critical juncture in the lives of these young scientists, when they are making the decisions to stay in research or give it up in deference to other fields. We believe that these PhRMA Foundation awardees who are at the most prestigious schools of medicine, pharmacy and public health in the United States today, are the lifeblood of tomorrow’s innovations as well as being integral to the development of the next generation of scientists.

Dr. Lester F. Soyka—First Awardee to Serve as Foundation Reviewer—Retires

Lester Frank Soyka, M.D., Worldwide Vice President, Clinical Research and Development, has retired from the Bristol-Myers Squibb Pharmaceutical Research Institute and from the PhRMA Foundation Clinical Pharmacology Advisory Committee. Les has served on the Advisory Committee since 1983 and was the first Foundation awardee to serve as an advisory committee member.* He received a Faculty Development Award in Clinical Pharmacology in 1969 while he was Assistant Professor of Pediatrics at Stanford University School of Medicine, Menlo Park, California.

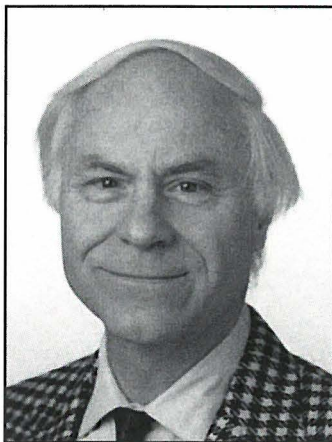
President Morry Bectel made this comment about Les’s retirement: “As the first awardee to serve on a Foundation advisory committee, his absence on the committee will be as the passing of an “era”—an era marked by wonderful accomplishments in broadening the base of clinical pharmacology to the betterment of biomedical science.”

Dr. Soyka received his M.S. (Pharmacology) and M.D. from the University of Illinois and B.S. from the University of Wisconsin

School of Pharmacy. After serving in the U.S. Army Medical Service Corps from 1952-1954, Les actively practiced as a registered pharmacist from 1952-1954, and then returned to school. After receiving his M.D., he trained at Massachusetts General Hospital as House Officer, Children's Service. Les steadily rose through the ranks—from Assistant Resident at Massachusetts General Hospital in 1962-63 to Chairman of the Department of Pharmacology and Professor of Pediatrics at the University of Vermont from 1973-1981. Mead Johnson, recognizing his talents, asked him to join their Department of Medical Research as Director of Clinical Pharmacology in 1981, and thus began his career at Bristol-Myers Squibb—again making his mark through the ranks to his most recent position as Vice President of Human Pharmacology in Lawrenceville, New Jersey.

In addition to numerous committees, Dr. Soyka has served on several editorial boards and was co-editor of *Developmental Pharmacology and Therapeutics*.

Soyka's dedication to the work of the Foundation has been admirable. He has performed meticulous reviews of applications from young faculty, postdoctoral fellows, medical students and unit directors, and has been an integral part of the long-standing advisory committee. His commitment to the Foundation has been evidenced, in part, by the fact that he has attended every Annual Awardee Meeting since he received his award in 1969—with the exception of 1991 when his sixth child—Grant—was born. We at the Foundation consider it an honor to have had Dr. Soyka serve on our advisory committee and to have him as our friend. We wish him every success in his future endeavors.



· Dr. Lester F. Soyka,
· 1968 Faculty
· Development
· Awardee in Clinical
· Pharmacology;
· retires from Bristol-
· Myers Squibb
· Pharmaceutical
· Research Institute
· and retires from the
· Foundation's
· Clinical
· Pharmacology
· Advisory Committee.

*Other committee members who were PhRMA Foundation awardees are:

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

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

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

Arthur H. Hayes, Jr., M.D.
President
MediScience Associates

David L.G. Nelson, Ph.D.
Senior Research Scientist
Lilly Research Laboratories
Eli Lilly and Company

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

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

Dr. Darrell Abernethy, 1974 Medical Student Fellowship awardee and current Clinical Pharmacology Advisory Committee member, intently listens to the research activities of Dr. Joshua Atiba, Assistant Professor at the University of California at Irvine, and 1992 Faculty Development Awardee, at the Annual Awardee Banquet in Washington, D.C.



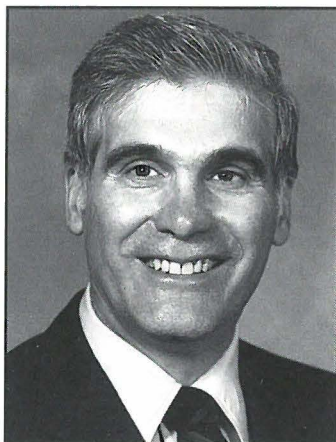
Dr. George Zografi Receives Top Awards

George Zografi, Ph.D., Professor of Pharmaceutics at the School of Pharmacy, University of Wisconsin-Madison and PhRMA Foundation Pharmaceutics Advisory Committee member since its inception in 1987, has received two prestigious awards. In 1995, he received the Distinguished Pharmaceutical Scientist Award from the American Association of Pharmaceutical Scientists (AAPS)—an award sponsored by Zeneca Pharmaceuticals. Most recently, in 1996, he was awarded the Volwiler Research Achievement Award—the most prestigious award given by The American Association of Colleges of Pharmacy (AACP).

Dr. Zografi received his B.S. in Pharmacy from Columbia University and his M.S. and Ph.D. in Pharmaceutical Chemistry from the University of Michigan. He has served as faculty at the University of Wisconsin School of Pharmacy since 1972 and as Dean of the School of Pharmacy from 1975-80. His innovative and unique approach to research in the areas of surface physical and biophysical chemistry is widely recognized. In addition, his contributions to the field of interfacial phenomena and his studies related to the molecular basis for the effects of water on the physical and chemical properties of pharmaceuticals in the solid state have been groundbreaking.

Indicative of preeminence in his field, Zografi was elected to the Institute of Medicine of the National Academy of Sciences in 1989 and selected for the Dale E. Wurster Award for Research Achievement in Pharmaceutics from the AAPS in 1990.

The Foundation, as well as all other advisory committee members, congratulate Dr. Zografi on receiving these distinguished and well-deserved awards.



George Zografi, Ph.D., Professor of Pharmaceutics, School of Pharmacy, University of Wisconsin-Madison, and Pharmaceutics Advisory Committee Member, receives two top awards.



EDUCATION AND TRAINING PROGRAMS

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 in clinical pharmacology, two in pharmacology/toxicology, one in the combined field of pharmacology-morphology, three in pharmaceuticals, one in pharmacoeconomics and one in bioinformatics (new in 1996). The Research Starter Grant provides starter funds in pharmacology, clinical pharmacology, drug toxicology and pharmaceuticals. The Foundation also accepts applications in all program areas for research on drugs for rare diseases.

CLINICAL PHARMACOLOGY

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

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, 1996, 107 individuals have been supported under this program since 1967.

Recipients of awards which began July 1, 1996:



Nabil S. Andrawis, Ph.D., M.D., Assistant Professor, Division of Clinical Pharmacology, Department of Medicine and Pharmacology, Georgetown University School of Medicine: "Endothelin-1 Regulation of Vascular Growth." Increase in aortic wall thickness in chronic hypertension models has been shown to be secondary to vascular smooth muscle cell (VSMC) hypertrophy and increased deposition of extracellular matrix (ECM) proteins. The pathogenesis of these changes is not clear. This research hypothesizes that ET-1 regulates vascular growth *in vivo* leading to VSMC hypertrophy and increased

deposition of ECM through transcriptional activation of cytoskeletal and ECM genes. The goals of this research are to: (1) Study effect of ET-1 on primary culture of rat aortic VSMC size, protein content, RNA and protein synthesis and steady state mRNA and proteins of SM α -actin and fibronectin; (2) Determine endothelin receptor subtype(s) that mediate ET-1 hypertrophic effect on VSMCs; (3) Determine VSMC size and total protein content and cytoskeletal SM α -actin and ECM fibronectin mRNA and protein expression in aortae isolated from spontaneously hypertensive rats and two kidney, one clip Goldblatt models of hypertension in presence and absence of endothelin receptor antagonists; and (4) Identify the transcription factor motif(s) in the promoter area of cytoskeletal SM α -actin and ECM fibronectin genes that is/are responsible for ET-1 coregulation of expression of both genes.

Barbara D. Haehner, Ph.D., M.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." Previous work has suggested that the excessive intrarenal cytochrome P450 3A (CYP3A) mediated conversion of cortisol to 6 β -Hydroxycortisol (6 β -OH cortisol) may lead to increased tubular reabsorption of Na⁺, volume expansion and result in the phenotype of salt sensitive hypertension in certain individuals. This research aims to further characterize human renal CYP3A to determine its importance in the conversion of cortisol both from an *in vitro* and *in vivo* standpoint. Aims include: (1) to determine the capacity of a bank of kidney microsomes to metabolize cortisol to 6 β -OH cortisol and compare the bimodality and kinetics to the activity data that has been obtained on the formation of 1'-OH midazolam; (2) to determine if CYP3A5 has the ability to convert cortisol to 6 β -OH cortisol; (3) to localize CYP3A5 activity to certain areas of the nephron by using kidney slices; (4) to investigate the inducibility of human kidney CYP3A5 using exposure of kidney cell culture to known CYP3A4 modulators; (5) to determine the renal clearance of formation of 6 β -OH cortisol in humans; (6) to associate the increased ratios of 6 β -OH cortisol (in urine) to salt sensitive hypertensive population in a restricted vs. a salt loaded state.



Matt Wachsman, M.D., Ph.D., Instructor, Department of Clinical Pharmacy, The Johns Hopkins University School of Medicine: "Mitochondrial Toxicity of Nucleoside Analogs." The broad, long-term objectives of this research are to explain why zidovudine and other anti-HIV and chemotherapy drugs produce their particular toxicity profile (bone marrow depression, myopathy, hepatic steatosis, peripheral neuropathy), and why certain individuals seem to be more susceptible. Dr. Wachsman plans to address specific questions of which mitochondrial functions are most susceptible to the effects of these agents, and whether all of these toxic manifestations can be



· tied to drug effects on mitochondrial DNA synthesis. He also plans to
· address specific questions of what host factors increase toxicity, and
· how the same proposed mechanism (inhibition of mitochondrial DNA
· synthesis) may also be a therapeutic site of action for antiviral and
· chemotherapeutic drugs.

· *Recipients of the awards which began July 1995 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: "Clinical Pharmacology of Combination Cancer Chemo-
· therapy and 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 entered the second year of their award in 1995:*

· **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: "Charac-
· terization 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 Pharma-
· cology, Mayo Clinic, Mayo Medical School (Mayo Foundation):
· "Molecular Pharmacology of Cardiotonic and Cardioprotective
· Regulation."

· *Those awardees who ended their awards in 1995:*

· **Evan D. Kharasch, M.D., Ph.D.**, Assistant Professor, Department of
· Anesthesiology, University of Washington, School of Medicine:
· "Human Anesthetic Toxicity—Mechanisms and Prevention."

· **David W. Rudy, M.D.**, Assistant Professor, Department of Medicine,
· Indiana University, School of Medicine: "The Influence of Renal
· Function Upon the Stereospecific Pharmacokinetics and Pharmaco-
· dynamics of Non-steroidal Anti-inflammatory Drugs (NSAIDS)."

Jason Gari Umans, M.D., Ph.D., Assistant Professor, University of Chicago, Pritzker School of Medicine: "Endothelial Modulation of Small Artery Function in Human Disease."

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 two years in advance of the activation date of the award. For example, those applying for a fellowship in the fall of 1996 may request that the fellowship begin July 1997 or July 1998.

First awards under this program were made in 1973. Since that time, 61 fellowships have been awarded. No awards were given for 1996.

Recipients who began their award in July 1995:

Sara Browne, M.D., Division of Clinical Pharmacology, Stanford University Medical Center: "Temporal Regulation of Ca^{2+} /Calmodulin Dependent Protein Kinase (CaM kinase) by Intracellular Ca^{2+} Oscillations."

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

Recipients of the award who entered their second year in 1995:

Richard Z. Lin, M.D., M.P.H., Stanford University School of Medicine, Harvard Medical School, Harvard University: "A Mechanism of α Adrenergic Receptor Desensitization; Endothelium-Derived Relaxing Factor."

Merit Cudkowicz, M.D., Harvard Medical School, Harvard University: "Therapeutic Trial of Free Radical Scavengers in Amyotrophic Lateral Sclerosis."

Raymond W. Urbanski, M.D., Ph.D., Jefferson Medical College, Thomas Jefferson University: "Targeted Cytotoxicity of Colorectal Tumors by E. Coli ST."

Walter F. Dixon, on left, (1979 Research Starter Grant Awardee and 1982 Faculty Development Awardee)—Associate Professor at the University of Kansas School of Pharmacy—and Dr. Aryeh Hurwitz, center, (1970 Faculty Development Awardee)—Professor at the University of Kansas School of Medicine—discuss Dr. Dixon's poster with SAC Chairman Bill Darrow at the Poster Session of the Annual Awardee Meeting.

Medical Student Research Fellowships in Pharmacology-Clinical Pharmacology

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

The Medical Student Training Fellowship will be phased out after 1996 due to the fulfillment of its goals and to the broadening discipline base of the Foundation.

Individuals whose awards began in July 1996 are:

Andrew Alan Bremer, Boston University Medical School (two years)—"Ribozyme Mediated Recombinant RNA."

Mark J. Horney, Medical University of South Carolina (one year)—"Impact of Elevated Glucose on IGF-1 Signaling."

Bill K. Huang, Northwestern University Medical School (three months)—"Mediators of Bone Growth in Response to Mechanical Load."

Krystle Quynh Pham, Dartmouth Medical School (two years)—"Molecular Dissection of Parathyroid Hormone Receptor Signaling Pathways."

Anne T. Tuveson, Georgetown University School of Medicine (one year)—"Molecular and Pharmacologic Targeting of Retinoic Acid Receptor-Alpha."



BASIC PHARMACOLOGY

Faculty Development Awards in Basic Pharmacology

Since 1973 the Faculty Development Award in Pharmacology has served to fulfill its goal to strengthen basic pharmacology by helping to maintain existing academic capability and, ultimately, expanding the field by enlarging the faculty base. To meet 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 66.

Recipients of the 1996 Faculty Development Awards in Pharmacology 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." Cyclic nucleotide-gated (CNG) channels are essential components of the sensory transduction cascade in retinal photoreceptors and olfactory neurons. Dr. Kramer's research is directed toward two fundamental questions concerning CNG channels: 1) What is the molecular mechanism of CNG channel activation? and 2) What other functions do CNG channels have? To address both questions, he will utilize specific phosphorothioate derivatives of cyclic nucleotides which are competitive antagonists of CNG channels. One such derivative, Rp-cGMPS, is an agonist of photoreceptor CNG channels and an antagonist of olfactory CNG channels, suggesting that the protein region that couples binding of this molecule to channel gating differs between the two channels. To identify this region, he is testing the effects of Rp-cGMPS on chimeric combinations between the two CNG channels. These studies will provide a molecular explanation for how ligand-gated channels discriminate between agonists and antagonists and will help elucidate how ligand binding elicits channel gating. To address the second question, he is using patch clamp and Ca^{2+} imaging techniques to test whether Ca^{2+} influx through CNG channels triggers neurotransmitter release. Application of membrane-permeant agonists and antagonists of CNG channels on isolated presynaptic terminals will help reveal whether CNG channels are important for regulating synaptic transmission.





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." Opiate receptors are the sites of action of analgesic, euphoric and abused drugs, such as morphine and heroin. There exist three subtypes of opiate receptors called mu, delta and kappa. Because of the success of Dr. Wang's laboratory and others in opiate receptor cDNA cloning, we now have an entire blueprint or diagram of the structure and function of the opiate receptors to learn how opiate drugs interact with opiate receptors at a molecular level. Using state-of-the art molecular biology techniques, Dr. Wang will locate the sites on the receptors where the drugs actually make contact with the receptors and try to understand how the three different opiate receptors recognize different opiate drugs. She also will study the role of protein phosphorylation in regulating the function of these receptors. These studies should help to facilitate the understanding of the mechanism of opiate action and, in addition, pain control that should have broad implications for drug abuse research and medical therapeutics.

Those individuals who began their awards in July of 1995 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."

Those who began the second year of their awards in 1995 and ended their awards in 1996 are:

James E. Ferrell, Jr., M.D., Ph.D., Stanford University, School of Medicine—"The Link from Ras to Raf-1."

Ming Li, Ph.D., University of South Alabama, College of Medicine, "Functional Regulation of Sodium Channels by Voltage-Dependent Phosphorylation with cAMP-Dependent Protein Kinase in the Mammalian Neuron."

Brian E. Wadzinski, Ph.D., Vanderbilt University, School of Medicine—"Localization and Targeting of Protein Ser/Thr Phosphatases in Mammalian Cells."

Fellowships for Advanced Predoctoral Training in Pharmacology or Toxicology

The PhRMA Foundation has had great success in its "Advanced Predoctoral Training in Pharmacology or 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 19th year, has awarded a total of 228 fellowships.

Those who have been awarded 1996 fellowships beginning between January and July are:

Michael E. Burzynski, University of Pennsylvania, School of Medicine (two years): "Regulation of the Human Dihydrodiol Dehydrogenase Gene by Reactive Oxygen Species"—Dihydrodiol dehydrogenase, an enzyme responsible for converting polycyclic aromatic hydrocarbon metabolites to redox-cycling ortho-quinones, is upregulated by reactive oxygen species. This enzyme may be responsible for the complete carcinogenic potential of polycyclic aromatic hydrocarbons by providing a prooxidant (tumor-promoting) environment in an initiated cell. This study proposes to determine the signal transduction events involved in the positive-feedback regulation of the human dihydrodiol dehydrogenase gene by reactive oxygen species. **Thesis Advisor:** Trevor M. Penning, Ph.D., Professor and Acting Chairman, Department of Pharmacology.

Ching-yi Chang, University of Cincinnati, College of Medicine (two years): "Exogenous Ligand-independent Activation of the Aromatic Hydrocarbon Receptor (Ah Receptor)"—The Ah receptor is a ligand-dependent transcription factor, which regulates expression of several Phase I and Phase II xenobiotic metabolizing enzymes, thus influencing drugs metabolism and genetic susceptibility to cancer risk. This project is directed at defining the endogenous functions of this receptor by analyzing its mechanism of activation.

Thesis Advisor: Alvaro Puga, Ph.D., Associate Professor, Department of Environmental Health.

Kerra A. Gergen, Tulane University, School of Medicine (one year): "The Role of Mu2 Opioid Receptors in the Analgesic Effects of the Endogenous Peptide Tyr-W-MIF-1"—TYR-W-MIF-1 is a small opioid peptide recently isolated from human brain. Spinal administration of TYR-W-MIF-1 produces analgesia with a potency comparable to

· morphine. This study will investigate the synergistic analgesic effects
· of coadministration of TYR-W- MIF-I and morphine.

· **Thesis Advisor:** James E. Zadina, Ph.D., Professor, Department of
· Medicine and Neuroscience.

· **Lauren Michele Posnick**, Harvard University, School of Public
· Health (two years): “DNA Alkylation: Endogenous Agents and
· Inducible Responses”—The goals of Ms. Posnick’s two projects are to
· (1) Investigate the contribution of S-adenosylmethionine to spontane-
· ous mutation and alkylation *E.coli* and to (2) investigate *S. cerevisiae*
· genes that are induced or repressed by the alkylating agent
· methylmethane sulfonate.

· **Thesis Advisor:** Leona D. Samson, Professor, Department of
· Molecular and Cell Toxicology.

· **Jo El J. Schultz**, Medical College of Wisconsin (two years): “A Role
· of Ape Receptors in Ischemic Preconditioning in the Rat Heart”—
· This research project will determine the involvement of morphine
· and morphine-like compounds in protecting the heart from tissue
· damage and death and to determine how these drugs produce their
· protective effect. It is suggested that morphine and morphine-like
· compounds can cause a decrease in potassium and calcium levels in
· the heart, thereby limiting tissue damage and death during a heart
· attack. The results of this proposal may lead to new therapeutic
· approaches in patients with coronary artery disease to limit tissue
· damage and death during a heart attack. In addition, evidence that
· morphine and morphine-like compounds may maintain tissue
· viability of the heart during a heart attack will be important since
· morphine is used clinically in pain management.

· **Thesis Advisor:** Garrett J. Gross, Ph.D., Professor, Department of
· Pharmacology & Toxicology.

· **Brandee Wagner**, Duke University, School of Medicine (two years):
· “Identification of Mechanisms of Agonist and Antagonist Action on
· the Human Progesterone Receptor”—The human progesterone
· receptor (PR) is a ligand-activated transcription factor expressed in
· the female reproductive tract. The aims of this study are to identify
· the processes which prevent PR from activating transcription in the
· absence of hormone and the processes which allow for the functional
· distinction between agonist and antagonist bound receptors by the
· cellular transcription apparatus.

· **Thesis Advisor:** Donald P. McDonnell, Ph.D., Associate Professor,
· Department of Pharmacology.

Horng-Dar Wang, University of Southern California, School of Pharmacy (two years): "Dependence of the Hepatitis B Virus X Protein-Mediated RNA Polymerase III Gene Induction on the Activation of the Ras Transduction Pathway"—This research involves determining the mechanism for disease progression in patients chronically infected with the hepatitis B virus. Mr. Wang is analyzing how the viral protein product—X—activates specific cellular genes that then leads to cell transformation and liver cancer.

Thesis Advisor: Deborah L. Johnson, Ph.D., Associate Professor, Department of Molecular Pharmacology & Toxicology.

George S. Watts, University of Arizona, College of Medicine (two years): "Reversing Drug Resistance by Manipulating 5-methylcytosine"—This research will investigate the mechanism(s) by which the modified DNA base 5-methylcytosine regulates the expression of MGMT, a gene that codes for a protein which makes tumor cells resistant to a class of cancer drugs called nitrosoureas

Thesis Advisor: Dr. Bernard Futscher, Assistant Professor, Department of Pharmacology/Toxicology.

David Jeffery Woodhouse, Stanford University, School of Medicine (two years): "Molecular Identification of Ion Channels Regulating Ca^{2+} Entry in Jurkat Cells." A sustained entry of extracellular calcium is crucial for T cell activation. The goal of this study is to investigate the molecular basis of mitogen-activated calcium influx by identifying ion channel proteins that regulate this event.

Thesis Advisor: Phyllis Gardner, M.D., Associate Professor, Department of Molecular 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, 97 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 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-1 Gene." A newly identified orphan clone, owing its structural similarity to the known opioid receptors, is believed to encode a novel member of the opioid receptor family and referred as the opioid receptor-like orphan receptor 1 (ORL-1). Its endogenous peptide ligand (orphanin FQ) has also recently been discovered. At present, the role of this ligand-receptor system is obscure but its potential biological importance has been implicated in many central processes including nociception, homeostasis, motor and sensory control, learning and memory. This research will characterize the anatomical distribution of the orphanin FQ- ORL-1 system through prenatal development to determine its ontogeny and identify prospective sites for ligand action during development and thus areas potentially susceptible to exogenous drug action, and examine whether the ORL-1 colocalizes with ν , δ and κ_1 opioid receptors in the spinal cord. The study will also use gene-targeting procedures to disrupt the ORL-1 gene to generate the mice deficient in the ORL-1 for examining its effect on biological processes. These studies should make a significant contribution to unveiling the function of the ORL-1 and its ligand.



Kirk Hillsley, Ph.D., University of Vermont, College of Medicine: "Mechanism of CCK's Action in the Control of Sphincter of Oddi Junction." The sphincter of Oddi (SO) acts as a valve to regulate the flow of bile and pancreatic juices into the lumen of the duodenum. Malfunction of the SO is now recognized as a major contributor to widespread morbidity associated with biliary tract disease. Electrophysiological studies have revealed that SO neurons are either excitable and spontaneously active (Tonic Cells), or elicit action potentials only when stimulated (Phasic Cells). Immunohistochemical studies also revealed that neurons in the SO ganglia express immunoreactivity for neuroactive compounds that have either an excitatory or an inhibitory effect on smooth muscle. As two distinct populations of neurons were found in both the electrophysiological and neurochemical coding studies, it is hypothesized that there is a relationship between the electrical properties and the neurotransmitters that are expressed by these groups of cells. To test this, neurons will be identified electrophysiologically and labeled with a marker for subsequent relocation. The preparations will then be immunohistochemically stained for choline acetyltransferase, an indicator of acetylcholine expression, and for nitric oxide synthase, an indicator of nitric oxide expression. The actions of cholecystokinin (CCK) on the membrane potential and synaptic inputs of SO neurons will also be elucidated, as CCK is a hormone that is crucial to the regulation of SO function.

Annika B. Malmberg, Ph.D., University of California, San Francisco, School of Medicine: "Spinal Mechanisms of Nociceptive and Neuropathic Pain." Tissue or nerve injury produces acute pain and can induce long-term changes that establish a persistent pain state/hyperalgesia. Hyperalgesia results from alterations in spinal dorsal horn processing, including changes in electrophysiological properties of nociceptive neurons, and in the regulation of neurotransmitter genes and receptors. During graduate training with Dr. Tony Yaksh, Dr. Malmberg used pharmacological techniques to study the neurochemical mechanisms through which noxious stimulation evokes hyperalgesia. Her work focused on the contribution of substance P (SP), glutamate receptors and prostanoids to pain behavior and hyperalgesia. Using morphological approaches, Dr. Allan Basbaum's laboratory has shown that the SP receptor, in contrast to others, is distributed over almost the entire surface of neurons, which suggested that it can respond to SP that diffuses from its site of release. Dr. Patrick Mantyh has recently shown that the "non-synaptic" SP receptor is functional. Noxious stimulation-evoked release of SP induces a profound internalization of the receptor and morphologic changes in a subpopulation of dorsal horn neurons. Dr. Malmberg's research will address the regulation of SP receptor internalization and neuronal structural reorganization in normal animals and in the setting of chronic nociceptive and neuropathic pain.



Individuals who began their awards in 1995 are:

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

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

Individuals who began their awards in 1994 and ended their awards in 1996 are:

Min-Tsai Liu, D.D.S., Columbia University, College of Physicians and Surgeons, "Characteristics of Pancreatic Neurons and Their Response to 5-HT."

Sally Schroeter, Ph.D., Emory University, School of Medicine, "Ontogeny of the Antidepressant-sensitive 5HT Transporter." Dr. Schroeter transferred her award to Vanderbilt University School of Medicine in early 1995.

PHARMACEUTICS

Undergraduate Research Fellowships in Pharmaceutics

Begun in 1990, this fellowship program is designed to encourage undergraduate students in pharmacy, chemistry, biology or a related discipline to pursue an advanced degree in pharmaceutics, thereby attempting to alleviate the current shortage of well-trained investigators in this vital 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. Six awards were made for 1996, bringing the total number of awards to 73.

Faculty and their undergraduate students who received fellowships between January and August 1996 are:

Janet P.F. Bai, Ph.D., Assistant Professor, Pharmaceutics Department, College of Pharmacy, University of Minnesota.

Student: Anna My Vu, "P-glycoprotein and Drug/Drug Interactions"—Research is being focused on how to improve the efficacy of antitumor drugs and intestinal absorption of insulin.

William F. Elmquist, Ph.D., Assistant Professor, Department of Pharmaceutical Sciences, College of Pharmacy, University of Nebraska Medical Center.

Student: Clare E. Prince (Kenney), "The Effect of MDR₁ Gene Expression on Cyclosporin A Intestinal Permeability in an *In Situ* Model"—The objective of this project is to determine the effect of p-glycoprotein pump has on the absorption of cyclosporin A from the intestine of an animal model.

David J. W. Grant, D.Sc., Professor, Department of Pharmaceutics, College of Pharmacy, University of Minnesota.

Student: Vijeev Menon, "Kinetics and Mechanism of Hydrate Phase Transformations of Nedocromil Salts"—Many drugs contain water in their crystal lattices and are therefore termed hydrates. Examples include nedocromil sodium and other nedocromil salts. This research will study the rates and mechanisms of water loss and gain for these hydrates to help understand their stability in pharmaceutical products.

Anthony J. Hickey, Ph.D., Associate Professor, Department of Pharmaceutics, School of Pharmacy, University of North Carolina at Chapel Hill.

Student: Kelly M. Atkins, "Lung Delivery of Immunomodulator Carrier Particles as Aerosols." Biological response modifiers will be delivered in aerosols to the lungs for the treatment of local tumors. The efficiency of delivery of immunostimulants will be controlled by their incorporation in polymeric microparticles of varying composition and structure.

Kristine Knutson, Ph.D., Associate Professor, Department of Pharmaceutics and Pharmaceutical Chemistry, School of Pharmacy, University of Utah.

Student: Klaudia Hacziewicz, "The Role of Gel phase Lipids in Percutaneous Absorption." Transdermal delivery of drugs offers a unique means of delivering drugs without many of the side effects of oral administration, even though the skin is a complex organ and formidable barrier. This research explores the mechanisms of how drugs cross the skin to be absorbed by the systemic circulation to reach their point of action. Components in transdermal drug formulations alter the skin's structure, therefore increasing drug transport across the skin.

Vincent H. L. Lee, Ph.D., Professor and Chairman, Department of Pharmaceutical Sciences, School of Pharmacy, University of Southern California.

Student: Jiaen Xu, "Characterization of the Conjunctival Peptide Transporter." This research seeks to determine whether a peptide transport mechanism exists in the eye.



Dick Stevenson, Assistant to the Director of Pre-clinical R&D, Hoffmann-La Roche, and Eddie Way, long-time Basic Pharmacology Advisory Committee Member, discuss Foundation activities after the Annual Awardee Meeting's General Session.

Fellowship for Advanced Predoctoral Training in Pharmaceutics

Initiated in 1987, this program's purpose is to assist candidates who have one or two years remaining in their 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 years and \$500 a year for incidentals directly associated with the preparation of the dissertation. Five awards were made for 1996 bringing the total number of awards made to 56.

Those who received fellowships beginning between January and July 1996 are:

Sherry LaPorte, School of Pharmacy, University of California, San Francisco: "Evolution of Ligand Binding onto the Framework of a Designed Four-Helix Bundle Protein." Protein-ligand binding is the initial step in many biological processes, such as enzyme catalysis and receptor signaling. That ligand binding can induce protein folding and stabilization has been shown by NMR and X-ray crystallography. Such changes in conformation and stability cannot be at the present time predicted *a priori*. As an alternative to investigating these complex phenomena as they exist in nature, a *de novo* designed protein model system will be synthetically evolved to explore ligand binding. Thus, a molecular biological selection will be used to find the novel binding protein. That protein-ligand complex will be characterized physically and structurally.

Thesis Advisor: Robert M. Stroud, Professor of Biochemistry & Biophysics.

Zhang Jane Li, College of Pharmacy, University of Minnesota: "Implications of Chirality on the Physicochemical Properties and Crystallization of Chiral Drugs." Chiral impurity and racemate resolution are two important issues on chiral drugs. Interactions between enantiomers and diastereomers may result in significant changes in the physicochemical properties of such drugs. This research investigates the effects of chiral impurity and characterizes the solid racemate phase using salts of ephedrine and other structurally related chiral drugs.

Thesis Advisor: David J.W. Grant, D.Phil., D.Sc., Professor, Pharmaceutics.

Sheung Yung Kevin Li, College of Pharmacy, University of Utah: "Characterization of the Iontophoretic Transport Behavior and of the Effects of Iontophoresis (with/without Chemical Enhancers) on the Barrier Properties of Skin." To better understand the iontophoretic transport behavior of human skin, the relative contributions of the direct field effect, the electroosmotic flow and the alteration of skin to the iontophoretic flux will be quantified with a model approach. The effects of chemical enhancers on the rate and extent of the induction

of pores in human skin will also be investigated with the available theories to provide mechanistic insights for the combined effects of iontophoresis and chemical enhancers.”

Thesis Advisor: William T. Higuchi, Ph.D., Distinguished Professor & Chairman, Pharmaceutics.

Katherine Anne Pikal, School of Pharmacy, University of Colorado: “Her research will investigate the mechanisms of inactivation of monomeric beta-galactosidase (*A. oryzae*) and tetrameric phosphofructokinase (rabbit skeletal muscle) during freezing and freeze-drying in sodium and potassium phosphate buffer solutions. She will explore how the stresses of freeze-drying (i.e., low temperatures, freeze concentration, pH changes) alter the protein’s native structure, and if preservation of the native conformation during freeze-drying is requisite for optimal recovery of activity and stability during storage.

Thesis Advisor: John F. Carpenter, Assistant Professor, Pharmaceutical Sciences.

Jayna M. Rose, School of Pharmacy, The University of Kansas: “Peptide Transport Across the Blood-Brain Barrier.” The delivery of peptides and proteins from the blood into the central nervous system(CNS) is very restrictive due to the properties of these compounds and the blood-brain barrier (BBB). The goal of this research is to define the delivery mechanism of selected peptides across the BBB. This would potentially enable the use of these transport systems in the delivery of therapeutic substances from the blood into the CNS.

Thesis Advisor: Kenneth L. Audus, Associate Professor, Pharmaceutical Chemistry.

Postdoctoral Research Fellowships in Pharmaceutics

Complementing the other two pharmaceutics programs offered by the PhRMA Foundation, the Postdoctoral Research Fellowships in Pharmaceutics entered its fourth year in 1996. The purpose of this program is 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 recognizes the critical need for such well-trained scientific investigators. The postdoctoral award gives \$25,000 per year for two years. Since its inception, nine awards have been given.



Beginning her award in July 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.

Beginning her award in 1995:

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

Entering the second year of their award in 1995:

Kenneth R. Phares, Ph.D., School of Pharmacy, University of North Carolina, Chapel Hill: “*In Vitro* Cell Monolayer Model for Investigating Folate Receptor-mediated Transcytosis.” (Currently with 3-M Pharmaceuticals.)

Srinivasan Venkatesh, Ph.D., School of Pharmacy, University of Utah: “Influence of Compositional and Morphological Heterogeneity on Equilibrium Distribution and Kinetics of Drug Transport in Parenteral Emulsions.” (Currently with Bristol-Myers Squibb.)

PHARMACOECONOMICS

Faculty Development Awards in Pharmacoeconomics

There is widespread concern about rising healthcare 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 Pharmacoeconomics program. Two awards were given for 1996 and each award offers \$40,000 annually for two years. The program, now in its second year, has made five awards.

The following individuals received awards beginning July 1996:

Karen Blumenschein, Pharm.D., Assistant Professor, College of Pharmacy, University of Kentucky: "Incorporating Quality of Life Assessments into Pharmacoeconomics Evaluations." An important issue in health economics is how to measure, value and incorporate changes in quality of life (QOL) into economic evaluations. This work will focus on exploring the relationship between three different approaches to measure changes in QOL: quality of life instruments, the quality-adjusted life year (QALY) approach and the willingness-to-pay (WTP) approach. If a relationship is found between these measures, it may be possible to translate a the score from a QOL instrument into a QALY weight or the WTP for an improved health state. Since QOL instruments are more apt to be incorporated into routine clinical practice, this approach would offer tremendous advantages in facilitating the incorporation of QOL changes into pharmacoeconomic analyses.

A second aim of this work is to explore the link between cost-benefit analysis (CBA) and cost-effectiveness analysis (CEA) by estimating the willingness to pay per QALY gained in asthma and congestive heart failure treatment. This information will be useful for decision making, particularly when evaluating the efficiency of treatment according to guidelines for these diseases.



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." Funding from the Pharmaceutical Research and Manufacturers of American Foundation will facilitate the development of a comprehensive research and education program in pharmacoeconomics at the University of Michigan. The principle objectives of the program are threefold: (1) *Methodological Improvement:* Creation of a venue that would allow academics and industry-based scholars from multiple disciplines to advance the field of pharmacoeconomics both conceptually and methodologically. *Example:* Should the cost-effectiveness ratios of less expensive, yet less effective interventions ("decremental" cost-effectiveness analysis) be interpreted differently than the ratios of more expensive, yet more effective interventions? (2) *Project-Based Pharmacoeconomic Research:* Increase the volume of pharmacoeconomic research by enhancing the visibility of methodological expertise and experience in economic evaluation. Many healthcare researchers, now cognizant of the critical importance of healthcare cost inflation, are unaware of the resources available to perform economic assessments alongside clinical trials. As a result, important resource utilization data go uncollected. *Example:* Provide methodological support to a prospective trial of sepsis therapy which would allow simultaneous economic evaluation of alternative treatment strategies. (3) *Pharmacoeconomic Training:* Provide a significant faculty commitment to the newly established training program in pharmacoeconomics and allow it to expand to its full potential.



Those who began their awards in 1995 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 Prospective 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

An important aspect of the PhRMA Foundation effort has been the support of fundamental research. Since 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.

Robert E. Parks, Jr., M.D., Ph.D. (left), Brown University, and member of the Basic Pharmacology Advisory Committee, and Gil Mannering, Ph.D., University of Minnesota, and member of the Clinical Pharmacology Advisory Committee, reminisce about long-time friends and previous awardee meetings. Dr. Parks has served on the BPAC since 1976 and Dr. Mannering on the CPAC since 1974.



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 1996, allowed for 12 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 500 grants have been made, including the 12 awards beginning January 1, 1996.

Recipients of the Research Starter Grant which began January 1996:

Steven L. Brody, M.D., Washington University School of Medicine: "Molecular Regulation 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 $\beta\gamma$ 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.”

· **Alan V. Smreka, Ph.D.**, University of Rochester School of
· Medicine: “Regulation of Phospholipase C by G Proteins and
· Lipids.”

· **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-HT_{2B}
· Receptor in Hypertension.”

· *Based on need for funds, a review of the 11 research starter*
· *grantees whose awards began January 1, 1995, for a second*
· *year of the awards resulted in six of them having their awards*
· *continued. These are:*

· **Sandra Bajjalieh, Ph.D.**,
· University of Washington
· School of Medicine
· “Molecular Mechanisms of Neurotransmission”

· **Michael Philip Gosland, Pharm.D.**
· University of Kentucky
· College of Medicine
· “Evaluation of the Role for Multidrug Resistance (MDR) Genes
· in Normal Human Lymphocyte Function”

· **Kalpana R. Kamath, Ph.D.**
· South Dakota State University
· College of Pharmacy
· “Islets of Langerhans in Gellan Microcapsules as Bioartificial
· Pancreas”



· Enjoying a few
 · moments before the
 · General Session on
 · February 8 are Dr.
 · Bernard Mirkin,
 · Northwestern
 · University School of
 · Medicine and
 · member of the Basic
 · Pharmacology
 · Advisory Committee,
 · and Donald Fink,
 · Ph.D., 1986
 · Awardee and
 · current Senior Staff
 · Fellow in the
 · Division of Cytokine
 · Biology at the Food
 · and Drug
 · Administration.

Rhoda A. Reddix, Ph.D.

Louisiana State University, New Orleans
School of Medicine

“Pharmacological Management of Secretory Diarrhea: Role of Nitric Oxide, Endothelin-1 and Prostaglandins in Cholera Toxin-Induced Intestinal Secretion”

Bonita Gay Taffe, Ph.D.

Wayne State University
School of Medicine

“The Role of Nitric Oxide in DNA Damage and Repair.”

Hermann von Grafenstein, M.D., Ph.D.

University of Southern California
School of Pharmacy

“Mannosylated Peptides as Candidate Vaccines and Probes for Mannose Receptor Function”

PURPOSE

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, pharmaceuticals and pharmacoconomics. 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 which 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 39 and under the "Education and Training Programs" Section on page 20.

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



REPORT OF THE TREASURER

*L*ast year the PhRMA Foundation celebrated its 30th birthday. During that span of thirty years, the Foundation has been supported by the generosity of the research-intensive pharmaceutical manufacturers—the PhRMA member firms, associates and research affiliates. The total income of the Foundation in 1995 was \$2,620,909. Of this amount, \$1,788,000 came from contributions; \$250,088 came from interest and dividends; \$105,798 was from realized gains on sales of securities; \$451,993* was from unrealized gains on sale of securities and \$25,030 came from unexpended grant monies.

In 1995, grant expenditures totaled \$1,750,299; Foundation Annual Awardee Meeting expenses amounted to \$67,749; Advisory Committee Meetings and Travel was \$56,559; Honoraria totaled \$42,080; Publications cost \$50,944; Professional Services totaled \$43,708; and office expenses for 1995, rent, salaries, taxes, insurance and trust commission totaled \$331,338. 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, 1995, the contingency liability for 1995-99 was \$2,846,608.

The Foundation's financial position as of December 31, 1995, has been audited by the accounting firm of Buchanan & Company of Rosslyn, Virginia.

G. Gilbert Cloyd
Secretary-Treasurer
PhRMA Foundation

and
Vice President, Pharmaceuticals
Procter & Gamble USA
The Procter & Gamble Company



Mr. G. Gilbert Cloyd
*Secretary-Treasurer
PhRMA Foundation*

*New 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, 1995

INCOME:

Contributions	\$1,788,000
Interest and Dividends	250,088
Realized Gains on Sale of Securities	105,798
Unrealized Gains on Sale of Securities	451,993
Miscellaneous Income	<u>25,030</u>
Total Income	<u>\$2,620,909</u>

EXPENDITURES:

GRANTS—NOTE A

Clinical Pharmacology Unit Award	\$ 48,474
Faculty Awards in Clinical Pharmacology	399,875
Faculty Awards in Basic Pharmacology	165,000
Fellowships for Careers in Clinical Pharmacology	151,768
Advanced Predoctoral Fellowships in Pharm/Tox	300,500
Pharmacology-Morphology Fellowships	145,015
Medical Student Research Fellowships	30,000
Research Starter Grants	212,500
Advanced Predoctoral Fellowships in Pharmaceutics	127,500
Undergraduate Fellowships in Pharmaceutics	45,000
Postdoctoral Fellowships in Pharmaceutics	64,597
Faculty Development Award in Pharmacoeconomics	<u>60,000</u>
Grant Total	\$1,750,229

ADMINISTRATIVE

Meetings and Travel:

Annual Awardee Meeting	\$67,749
Committee Meetings and Travel	56,559

Management and General:

Honoraria	42,080
Publications	50,944
Office Expense	44,645
Professional Services	43,708
Rent	29,058
Salaries and Retirement Fund Contribution	202,907
Taxes, Insurance and Depreciation	44,953
Trust Commission Expense	<u>9,775</u>

Administrative Total	592,378
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TOTAL EXPENDITURES	<u>\$2,342,607</u>
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Note A—In addition to the amounts shown, the Foundation is committed, subject to annual review, to make certain grants. At December 31, 1995, the amounts still to be disbursed with respect to these grants amounted to aggregated \$2,846,608 with \$1,539,033 of this to be disbursed during 1996; \$933,450 in 1997; \$294,125 in 1998 and \$80,000 in 1999.

Change in Net Assets Before Effect of Change in Accounting Principles	\$ 278,302
Effect of Change in Accounting Principles as of January 1, 1995	54,825
Change in Net Assets	333,127
Net Assets, January 1, 1995	\$4,702,862
Net Assets, December 31, 1995	\$5,035,989



ORGANIZATION AND ADMINISTRATION

*T*he PhRMA Foundation operates through its Officers, Board of Directors and six advisory committees. In April of 1996, Mr. Robert C. Black, President of Zeneca Pharmaceuticals, was re-elected Chairman. Mr. G. Gilbert Cloyd, Vice President, Pharmaceuticals, Procter & Gamble USA, The Procter & Gamble Company, was re-elected Secretary-Treasurer. The Office of Vice-Chairman was temporarily left vacant due to the restructuring of several PhRMA member companies.

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., served as Foundation Scientific Consultant.



Board Officers and Thomas E. Hanrahan Memorial Speaker confer on the activities surrounding the Annual Awardee Meeting: (l to r) Gil Cloyd (Secretary-Treasurer), Bob Black (Chairman), Art Hayes (TEH Memorial Speaker) and Morry Bectel (President).

*1996-97 Officers
and Board of
Directors*



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



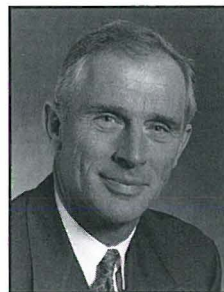
G. Gilbert Cloyd
Secretary-Treasurer
PhRMA Foundation
Vice President, Pharmaceuticals
Procter & Gamble USA
The Procter & Gamble Company
Cincinnati, Ohio



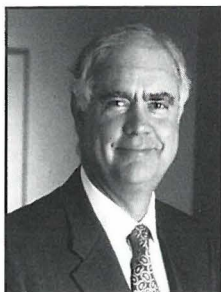
Maurice Q. Bectel, D.Sc.
President
PhRMA Foundation



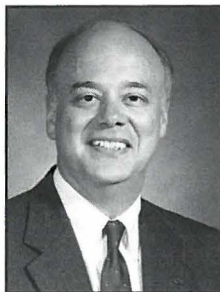
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Jan Leschly
Chief Executive Officer
SmithKline Beecham
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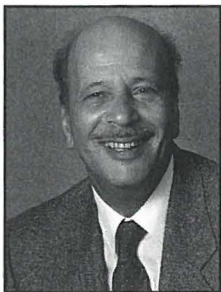
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(Ex-Officio)



Edward J. Cafruny, M.D., Ph.D.
Distinguished University Professor
University of Medicine and
Dentistry of New Jersey



Donna Moore
Director of Programs

*Staff and Staff
Consultants*

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Institute
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Bethesda, Maryland

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School of Medicine
Tulane University
New Orleans, Louisiana

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School of Medicine
Davis, California

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President
GRLEN R & D Associates
Andover, Massachusetts

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Ph.D.**

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Head and Director of Research
Children's Memorial Institute
for Education and Research
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Northwestern University Medical
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Chicago, Illinois

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Ph.D.**

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of Medical Science Emeritus
Division of Biology and Medicine
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Providence, Rhode Island

Sidney Pestka, M.D.

Professor and Chairman
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and
Microbiology
University of Medicine &
Dentistry of New Jersey
Robert Wood Johnson Medical
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Piscataway, New Jersey

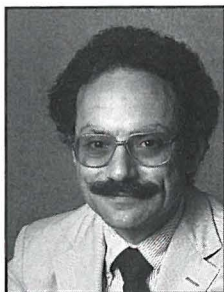
**Frederick M. Radzialowski,
Ph.D.**

President
FMR Research Associates
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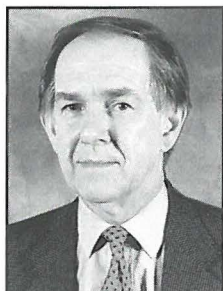
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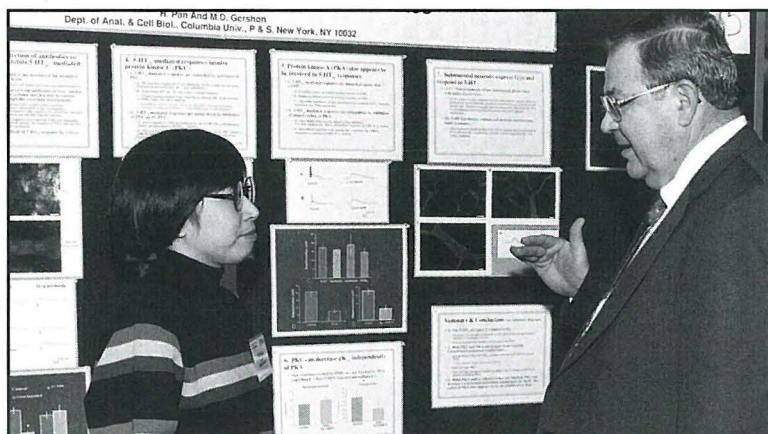
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*Hui Pan, M.D., a
postdoc at Columbia
University and 1995
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displays her
research in poster
form and discusses it
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*This ad was placed
in The Washington
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of the public
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bring more
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*D*escriptive brochures and application forms for all of the PhRMA Foundation grant programs are available by contacting the Foundation offices.

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Pharmaceutical Research and Manufacturers of America Foundation

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(202) 835-3470 (phone)

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PhRMA Foundation Current Programs for 1997

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)	3 budgeted/ 2 years	\$144,000 total \$ 24,000 per award per year	October 1 December 15 July 1
Basic Pharmacology Advisory Committee			
(3) 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
(4) Research Starter Grants (1972)	11 budgeted/ 2 years	\$275,000 total \$ 12,500 per award per year	September 1 December 15 January 1
(5) 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
(6) Faculty Development Award in Bioinformatics	1 budgeted/ 2 years	\$ 60,000 total \$ 30,000 per award per year	September 1 December 15 July 1
Pharmacology-Morphology Advisory Committee			
(7) 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
Pharmaceutics Advisory Committee			
(8) Advanced Predoctoral Fellowships in Pharmaceutics (1987)	5 budgeted/ 1 or 2 years	\$125,000 total \$ 12,500 per award per year	October 1 December 15 January-August
(9) Undergraduate Research Fellowships in Pharmaceutics (1990)	7 budgeted/ 1 year	\$ 35,000 total \$ 5,000 per award	October 1 December 15 January-July
(10) 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			
(11) 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



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