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Pharmaceutical Research and Manufacturers of America Foundation

PhRMA

FOUNDATION

*Annual
Report*

The PhRMA Foundation Awards in Excellence Gala

The Awards-in-Excellence Gala was held in conjunction with the Foundation Annual Awardee Meeting this year on April 20-21 at the Grand Hyatt New York. Three-hundred fifty attendees joined the Foundation to honor the recipients of the Awards in Excellence.

See pages 25-28 of this Annual Report for full details.

PhRMA Foundation Officer Patrick J. Zenner kicks off Awards-in-Excellence Gala. Mr. Zenner is President and CEO, Hoffmann-La Roche.



Foundation President Donna Moore moderates the evening at the Foundation Awards-in-Excellence Gala, April 20, Grant Hyatt New York.



Patrick J. Zenner, as he addresses the Awards-in-Excellence.



Christopher McCabe, Industry VP for Reed, thanks Gala attendees and introduces comedienne/impressionist Mr. Gordie Howe.



Chris Pendergast, teacher, father, husband—has ALS. Chris has testified twice before the FDA for drug approvals and procedural reform. Here he calls to action the awardees and pharmaceutical companies for more research on ALS.

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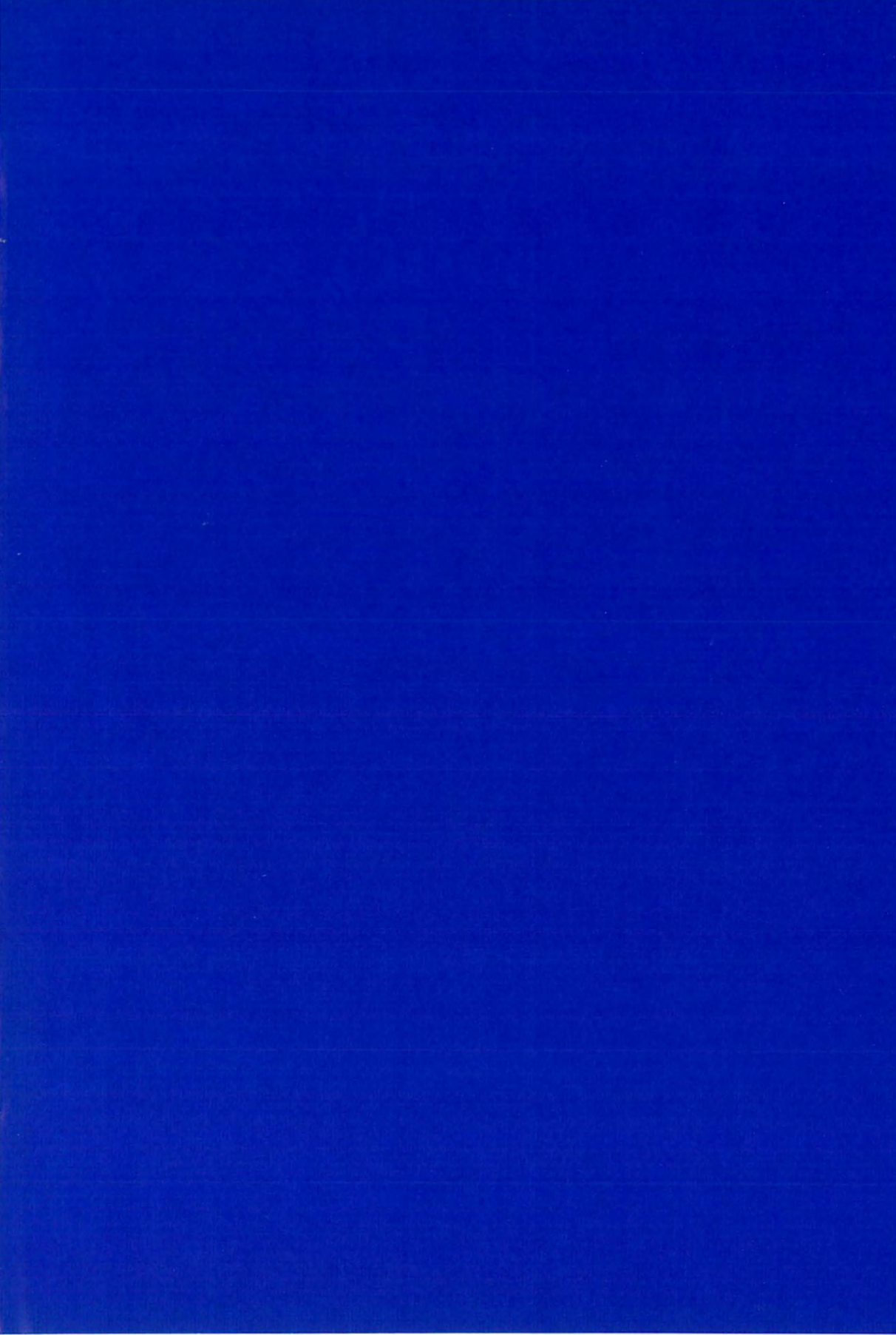


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In Memory



**Edward J. Cafruny, M.D., Ph.D.
(1924-1998)**

The first time I met Edward J. Cafruny, M.D., Ph.D., we talked about old "Loretta Young" movies, World War II, cats, golf and pharmacology. Ed was one of the most gracious individuals I have ever met. Ever the teacher, always nurturing—to the great benefit of the PhRMA Foundation. He was one of the founding fathers of the PhRMA (then-PMA) Foundation." — Donna Moore remembers Ed. He helped to set the Foundation's direction and was instrumental in its undertakings throughout the life of the Foundation—keeping it on a steady course and maintaining its integrity and prestigiousness. He had a passion for the work of the Foundation in jumpstarting the careers of these young biomedical and pharmaceutical scientists. He served on the Foundation's Scientific Advisory Committee from 1968-1987—then later, in addition, he became Chairman of the Basic Pharmacology Advisory Committee (1973-1987). In 1988, with the retirement of another stalwart in the Foundation—I. C. Winter, M.D.—Ed became the PhRMA Foundation Scientific Consultant (1988-1997). Ed passed away on November 23, 1998 and the Foundation lost an old friend.

Dr. Cafruny was born on December 17, 1924 in New Castle, Pennsylvania. After graduating from high-school, he enlisted in the Army and served in World War II. While in Germany, unfortunately he was wounded in the neck and treated under battlefield conditions. Ed received the Purple Heart for his courage. Twenty years later, to his surprise, a chest x-ray detected a Bard Parker scalpel blade sitting on his aorta. It was successfully removed.

Ed received his A.B. in 1950 from University of Indiana, his Ph.D. in 1955 from Syracuse University Medical Center, and his M.D. in 1959 from the University of Michigan. At Michigan, Ed worked part-time as an instructor along with a few other Ph.D. students while enrolled as medical students. Dr. Maurice Seevers, Ph.D., M.D., Chairman of Pharmacology and lifetime mentor to a great many, felt that the combined degree was the ideal preparation for teaching and a research career in a medical school.

Ed began as instructor and quickly climbed to Professor of Pharmacology at the Medical School of the University of Minnesota (1965-68). In 1968, Ed became Professor and Chairman of the Department of Pharmacology and Experimental Therapeutics at the Medical College of Ohio. At this time Ed became internationally known for his expertise in the pharmacology of diuretics – a field in which he made significant contributions. Every year, after he left the College, Ed would return to give his kidney lectures and sometimes to participate in presenting the “Annual Edward J. Cafruny Award for Excellence in Pharmacology” to a deserving medical student. In 1973, he joined our industry as President of the Sterling-Winthrop Research Institute—a position he held until 1977. He then left industry to return to academe in the capacity of Professor of Pharmacology at the Medical College of Wisconsin. In 1978, recognizing Ed’s many achievements and talents, the UMDNJ brought him on as Professor of Pharmacology and Dean of the Graduate School of Biomedical Sciences, a post he held for nine years. In a salute to Ed’s career, he was given the lifetime title of Distinguished Professor, UMDNJ in 1987.

Ed was also a strong supporter of the American Society for Pharmacology and Experimental Therapeutics (ASPET) by serving on the editorial Board of JPET (1965-70), NIH Pharmacology Study Section (1964-68), and NIH Anesthesiology Training Grant Study Section (1968-71). In 1969, Ed became ASPET’s Chairman of the Board of Publications Trustees, and helped found the journal, **Drug Metabolism and Disposition** (1973).

In the early years, along with Drs. E. Leong Way, Walter F. Riker, Leon Goldberg and John J. Burns, Ed was integral in cultivating the vision and mission of the Foundation. Ed gave generously of his talents, expertise and wisdom. He developed excellence into every facet of the Foundation’s programs. Ed was a valued mentor and friend and uncompromising advocate for what was right. We will certainly miss our good friend, but his memory lives on in the many programs he helped establish and all those he touched.

Ed is survived by wife of 51 years, Marilyn, his two sons—William and Alan—his daughter Madalyn, two sisters and three grandchildren.

*Information for this article was contributed by Drs. Harold F. Hardman, George A. Condouris, E. Leong Way and Donna Moore and taken, in part, from *The Pharmacologist*, Vol. 41, No. 1, 1999.

Ed's Gallery

*J. Cafruny, M.D. Edward, Ph.D,
(1924- 1998)*



*Ed always enjoyed
delivering lectures.*



*Ed with (l to r) Morry Bectel, former Foundation
President; Gertrude Elion, Ph.D., Nobel Prize Winner in
Medicine, Bob Parks, Eddie Way.*



*Two originators of the PhRMA
Foundation: Ed delivers a special
plaque to Walter Riker. Both men
were extremely influential in the
vision and mission of the PhRMA
Foundation.*



*Donna Moore, current Foundation
President, going over Foundation Annual
Awardee Meeting program with Ed.*



*Ed served many duties in the Foundation and
one was to present special plaques to special
people. Here Felix de la Iglesia receives
special recognition as he retires from the
Toxicology/Pathology Advisory Committee.*



*On many occasions, Joe Stetler, former
Foundation and Association President,
discussed Foundation activities with Ed.*



Here Ed relaxes enjoying his favorite sport—golfing—with one of his favorite friends, Ted Brody.



Ed with Keynote Speaker Michael B. Sporn (l), National Cancer Institute, and Ike Weiner, Chairman of the Basic Pharmacology Advisory Committee.



The Foundation usually worked Frank Standaert and Ed so hard that they took every opportunity to rest.

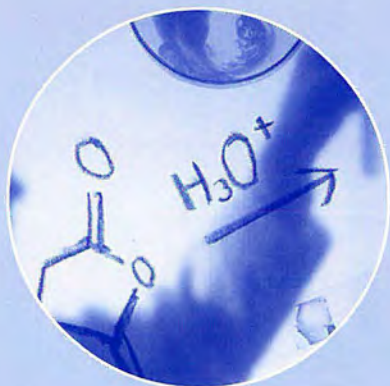


When Ed and I.C. Winter got together, there were always long discussions. I.C. was long-time consultant and friend of the Foundation.

Ed telling jokes again, this time to Kay Croker, former Executive Director of ASPET.



The three amigos: Eddie Way, Ed and Ted Brody



Mission Statement

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

This mission shall be accomplished by:

- 1 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.
- 1 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.
- 1 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.

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, morphology, pharmaceuticals, pharmacoeconomics and bioinformatics. Throughout the year, programs have been supported and developed which provide the means of achieving the goals of the Foundation. Many worthwhile proposals have been submitted. It has been necessary to limit support to those 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 49 and under the "Education and Training Programs" Section on page 33.

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 Chairman

Jan Leschly
Chairman
PhRMA Foundation

This year marks my first opportunity to address you as Chairman of the PhRMA Foundation. I am delighted to serve this vital Foundation along with my fellow Board members. It has been an excellent year. At the outset, I would like to express our deep appreciation to Mr. Robert C. Black as he steps down from four years as Chairman of the PhRMA Foundation. Bob has ably served the Foundation since 1992. In 1993 he became Secretary-Treasurer, and in 1995 he accepted the Chairmanship. On March 29, at our Spring Board meeting, he passed the gavel to me, and I am honored to serve as Chairman for the upcoming year. On behalf of the Board, Donna Moore, the advisory committee members and awardees, I wish to officially thank Bob Black for his dedication and steadfast leadership.

As my first order of business, I would like to thank my fellow Board members: Robert A. Ingram, Chairman, Chief Executive Officer and President of Glaxo Wellcome, and Foundation Vice Chairman; Patrick J. Zenner, President and Chief Executive Officer, Hoffmann-La Roche, Inc., and Foundation Secretary-Treasurer; Mr. Richard J. Markham, Chairman of the Board of Management and Chief Executive Officer, Hoechst Marion Roussel; Mr. Robert N. Wilson, Vice Chairman, Board of Directors, Johnson & Johnson; and Alan F. Holmer, President of PhRMA, serving *ex-officio*. My appreciation is extended to all of these gentlemen for taking time from their inordinately busy schedules to help steer the Foundation.

My thanks also to Donna Moore, President of the Foundation. During her term as President, our contributions have risen by 9 percent. Better still, during this past year, expenses are down by an astounding 36 percent and assets are up by 14 percent. Unfortunately for the PhRMA Foundation, during the Fall, Donna will be leaving the Foundation to pursue lifetime interests with pro-family organizations and family. We will miss her enthusiasm and dedication to the Foundation. On behalf of the Board, the advisory committee members and the awardees, I would like to extend our sincere gratitude for her service over the last 14+ years to the Foundation, especially the last two as President. I would

also like to thank her for her previous 15 years with PhRMA (then-PMA)—a total of almost 30 years devoted to serving our industry. Our best wishes and sincere appreciation go with her! I am very pleased that Donna has kindly agreed to stay on as consultant to the Foundation.

And now, allow me to take a moment to thank the many internationally renowned men and women of science who spend countless hours selecting the most outstanding candidates to be deemed PhRMA Foundation awardees. Comprised of the top industry and academic scientists, these are our Foundation Advisory Committee members. The success and integrity that the Foundation enjoys has been a direct result of their strong dedication to the task of selecting only the best scientists and researchers to be named “PhRMA Foundation Awardees.” They deserve our accolades.

Last fall, these world-class advisory committee members took time from their busy schedules to review applications for the twelve PhRMA Foundation programs. Thanks to the generous contributions of PhRMA member firms, associates, international and research affiliates, they were able to fund 51 scientists totaling \$1.5 million. We have now jump-started the careers of over 2,400 young-in-career scientists and researchers with a total of \$44 million. This would not be possible without the generosity of the research-driven members of PhRMA, the associates, research and international affiliates (see “Benefactors” in the back of this *Report*). These companies have had the foresight to plant the seeds for future generations of scientists. Our very sincere appreciation goes to them.

As I mentioned before, it is very important to understand that the PhRMA Foundation really supports the pharmaceutical industry. The pharmaceutical industry is driven by science. I cannot emphasize enough—for our industry to be successful in the future, we must invest in the careers of these young scientists today! We have a responsibility and a vested interest, together with academia, to develop opportunities for scientists to utilize wonderful, new medical and pharmaceutical technology for the benefit of our future and, most importantly, for the benefit of the patients waiting for the cures.

This past year has seen our second Awards-in-Excellence Gala, held in conjunction with Interphex, an exhibition/conference given by Reed/Elsevier. Reed has generously come alongside the Foundation to join us in our mission and vision. Again, we offer our sincerest appreciation. This year, on April 20-21 in New York City, we successfully combined the Gala with our **Twenty-eighth Annual Awardee Meeting** for a wonderfully new forum. This event gave PhRMA Board members, for the first time, an opportunity to view, first-hand, the scientific poster displays of current and former awardees—to view first-hand the seeds being planted for the next generation of scientists.

Also, after a four-year respite, the Foundation once again participated in Experimental Biology '99—a multi-society interdisciplinary biomedical scientific meeting held in Washington, D. C. Michael D. Gershon, M.D.,

Chairman of the Foundation's Pharmacology/Morphology Advisory Committee, packed the room at the Washington Hyatt when he spoke on his hot-off-the-press, new book, **Gut Instinct: The Second Brain**. Dr. Gershon is also Professor and Chairman of the Department of Anatomy and Cell Biology, College of Physicians and Surgeons, Columbia University.

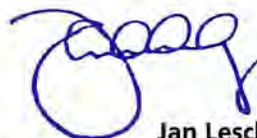
If you have not visited our website lately, please do: "<http://www.phrmaf.org>." During this past year, we have added such highlights as "Hall of Fame," "Where Are They Now," "Foundation Bookstore," "Philanthropy Spots," "News and Alerts" and much more. This has become the most time/cost efficient way to broadcast the good news regarding the PhRMA Foundation.

On a sad note, I must inform you that in 1998 we lost two stalwarts of the PhRMA Foundation. First, our long-time consultant and friend Edward J. Cafruny, M.D., Ph.D., passed away last November. In the early years, Ed was integral in developing the vision and mission of the Foundation. He served the Foundation first as advisory committee member, then Chairman of the Basic Pharmacology Advisory Committee and then finally as Consultant. To the great benefit of the Foundation, he generously gave of his time and talent to nurture these young awardees. We will all sorely miss his expertise and wise counsel.

Also, last year, we lost William B. Abrams, M.D., former Executive Director of Scientific Development for Merck and twenty-year member of the Foundation's Clinical Pharmacology Advisory Committee. Bill supported the Foundation with sage counsel and dedication in reviewing grants. His expertise helped to set the direction of the Foundation's clinical pharmacology programs. He too will be greatly missed.

Well, this is another time of change for the Foundation but it is an exciting time as we enter the new millennium poised strongly to develop the next generation of scientists in exciting new fields. Our Foundation has built a bridge of unity between academe and industry, and I very much look forward to strengthening that bridge during the upcoming year.

And now, please join me, in congratulating the class of 1999—our PhRMA Foundation awardees. Take a moment to peruse their cutting-edge research listed in the following pages of our Annual Report. The PhRMA Foundation awardees are, by their nature, in pursuit of a quest. The quest is a better tomorrow through enhanced biomedical and pharmaceutical research and technology, and the PhRMA Foundation is the fuel for that quest. Congratulations go to the 1999 PhRMA Foundation Awardees.



Jan Leschly
Chairman, PhRMA Foundation
and
Chief Executive Officer
SmithKline Beecham

Report of the President



Donna Moore
President
PhRMA Foundation

The time has come to say goodnight..."goodnight, goodnight my sweet, goodnight..." It is a bittersweet time for me and it is with mixed emotions that I advise you, after 14+ years with the PhRMA Foundation and 15 years with PhRMA — I have decided to move to my home in Kentucky. It is very difficult to leave my family of friends at PhRMA, but I am absolutely astatic to be able to pursue life-time interests with pro-family organizations and, of course, my own family.

It has truly been an honor to serve the Foundation over the past 14 years—the last two as President. My enthusiasm for the work of the Foundation and this industry has grown tremendously during this very short 30-year tenure. The Foundation has thrived because of the dedication of its advisory committee members and certainly the direction of our wonderful Board of Directors. In spite of inordinate demands on their time, they have been dedicated to jumpstarting the careers of these young scientists we call Foundation awardees. The Board and the Advisory Committee Members have, in essence, planted the seeds for the future of biomedical and pharmaceutical science and the development of tomorrow's medicines. This is the fruit of the Foundation and I am very, very proud to have been a part of it. With our new Awards-in-Excellence, the Gala, decreased expenditures and increased contributions, the Foundation is positioned strongly to make a difference for future generations of scientists in the new millennium.

This year the PhRMA Foundation is thirty-four years old. Brought about as a result of the Thalidomide tragedy, the Foundation was established by the PhRMA (then-PMA) Board to "enhance public health through biomedical and scientific research and technology." We accomplish this mission by investing in the careers of young biomedical and pharmaceutical scientists. Emphasis is placed on those young-in-career scientists who have sound research and are yet underfunded. These current and former Foundation Awardees go on to serve on many editorial boards, becoming very influential opinion leaders and they have a warm sport in their hearts for our industry and the PhRMA Foundation.

Eighty-six percent remain in academia, literally touching thousands of career scientists—a multiplier effect for funding. Our founding fathers knew what they were doing. So, has the Foundation been successful as the philanthropic arm of PhRMA. Resoundingly the answer comes back, “yes!”

Now, allow me to tell you more about this past year’s activities. It has been a busy one! On March 29, Jan Leschly very graciously agreed to become Foundation Chairman of the Board as Bob Black stepped down from that post after four years. As Jan mentioned, we are very grateful to Bob for his many years of dedicated service to the Foundation. We are also very grateful to Jan Leschly for taking time from his already very busy schedule, to lead us into the millennium. I am also extremely pleased to announce that Robert A. Ingram was elected Vice Chairman, and Patrick J. Zenner was elected Secretary-Treasurer. Our heartfelt thanks to these gentlemen for accepting these roles.

In early 1998, the Foundation participated with the Burroughs Wellcome Trust (BWT), Howard Hughes Medical Institute (HHMI) and the American Cancer Society (ACS) at a forum “Strengthening Health Research in America: Philanthropies Role.” One of the first forums of its kind, the conference drew leaders from private foundations and voluntary health organizations, as well as government and industry. The overall purpose of this gathering was to strengthen health research in the United States. As Purnelle W. Chopin, M.D., President of HHMI, states, in light of new opportunities created by advances in technology and changes in health care, existing funding mechanisms are inadequate for these new fields. Translational clinical research “which speeds results from the research bench to the bedside, has been hit hard in recent years.” And young postdoctoral biomedical scientists have been affected by recent changes that make their career options unclear.

Keeping these trends in mind, the participants in the conference agreed that philanthropies and private organizations have a very important role to play. As Dr. Chopin continues: “The mandate is especially important in the biological sciences...expanding knowledge and alleviating the worldwide burden of disease. We are unraveling the mysteries of how the brain functions...we are determining the molecular basis of how the immune system fights invading organisms and how it goes awry and causes autoimmune diseases such as rheumatoid arthritis and type I diabetes. We are establishing the genetic bases of many diseases and sequencing the human genome, as well as genomics of infectious agents involved in tuberculosis, Lyme Disease, malaria, peptic ulcers, bacterial meningitis and others...” These are very exciting times for biomedical scientists and the PhRMA Foundation was called for such a time as this.

The HHMI, the Burroughs Wellcome Trust and the American Cancer Society have all played and will play extremely important roles in biomedical research and science education. We all join forces because

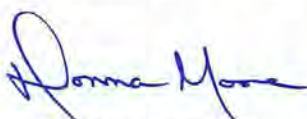
we have a responsibility to future generations for the betterment of human-kind. And so the vital work of the PhRMA Foundation continues with programs poised to accommodate changing trends. Programs in Bioinformatics, Pharmacoeconomics, Cell Biology—Pharmacology, Toxicology, Pharmaceuticals and Morphology—twelve programs in all. As Jan mentioned, but worth repeating, the PhRMA Foundation has given more than \$44 million to 2,400 young-in-career scientists.

The accomplishments of the PhRMA Foundation would not be possible without the excellent support from the research-intensive members of PhRMA, Associates, Research, International, and Pharmaceutical Affiliates. It is thanks to their generosity that we are able to raise up these, the next generation of scientists.

During this past year the Foundation has suffered a great loss. Last November 23, Edward J. Cafruny, M.D., Ph.D., passed away. This *Annual Report* is dedicated to Ed's memory. I cannot put into words how much he will be missed by all of his friends at the Foundation—advisory committee members and awardees alike—and most of all his lovely wife Marilyn and family. Ed was instrumental in the initial development of the Foundation, later serving on the Scientific Advisory Committee and as Chairman of the Basic Pharmacology Advisory Committee. From 1989 to 1997, Ed served the Foundation admirably as our Scientific Consultant—thirty-two years of dedication to the vital work of our Foundation. His memory will live on in us all.

With expenses down by 36 percent, contributions up by 9 percent, with the Awards-in-Excellence Program firmly in place, along with the wonderful Gala given by Reed/Elsevier, I have a strong sense of confidence that the Foundation is headed in the right direction. We have an extremely dedicated Board and Advisory Committee members in place. I look back over the last 30 years with the PhRMA Foundation and PhRMA and I feel very privileged and humbled to have been a part of such a magnificent success story—the story of our industry. I would venture to say that our industry has done more to improve quality of life and extend time with families than any other.

As I leave, it is with an extraordinary sense of appreciation toward all who have committed their lives to jumpstarting the young-in-career scientists we call PhRMA Foundation awardees. And to the incoming President, I must say...the Foundation has a great many opportunities coming its way, and to quote the great philosopher Wayne Gretsky: "You miss 100 percent of the shots you do not take." I pray the Foundation takes those "shots" and continues its vital quest for many decades to come—for the sake of future scientists and the future of science and our industry.



Donna Moore
President



P/RMA

Tracking Thirty-Four



Twenty-Eighth Annual Awardee Meeting Combines with Awards-in-Excellence Gala for Grand Event

The Awards-in-Excellence Gala

For the first time, the PhRMA Foundation Annual Awardee Meeting was held in conjunction with our Awards-in-Excellence Gala and it was a wonderful success.

- Over 350 people gathered on April 20 at
- the Grand Hyatt New York to join us in
- honoring the four career scientists who
- received our Award in Excellence (see
- story in this section), and to honor our
- 1999 awardees. For the first time Board
- members were able to view, first-hand, the
- wonderful seeds they have planted over
- the last 34 years in the scientific poster
- session. During the reception and while
- music played, the attendees viewed over
- 30 scientific posters, displaying cutting-
- edge research which is the cornerstone
- and future of our industry. Attendees
- included Board members, current and



The Awards-in-Excellence Gala was held in conjunction with the Foundation Annual Awardee Meeting this year on April 20-21 at the Grand Hyatt New York. Three-hundred fifty attendees joined the Foundation to honor the recipients of the Awards in Excellence.



Denise Pucci, Reed Exhibition Company, led the 350+ Gala attendees in our National Anthem.

former awardees, advisory committee members and consultants, attendees at the Interphex Conference/Exhibition, along with folks from Reed Exhibition, and press. The Foundation is continually grateful to Reed/Elsevier for coming along side the Foundation to assist us with this Gala. Special recognition go to Christopher McCabe, Industry Vice President for Reed, and Michael Critser, Director, Industry Development. Both of these gentlemen have gone above and beyond to magnify and give serious visibility to the work of the PhRMA Foundation. Our sincere gratitude!

The Evening's Events

Governor of the State of New York George E. Pataki sent special greetings to the group and congratulated the award recipients. Patrick J. Zenner, President and CEO of Hoffmann-La Roche and Secretary-Treasurer of the PhRMA Foundation, kicked the evening off by welcoming everyone and introducing the lovely Denise Pucci to sing our National Anthem. It was an evening filled with electricity as Dr. Larry J. DeLucas vividly described his 1992 journey in space as a pay-load specialist on the Columbia. Dr. DeLucas, Director Center for Macromolecular Crystallography, University of Alabama at Birmingham, School of Medicine, regaled the audience with a vivid description and slides of his experiments on crystallography growth in outer space and the rigors of being an astronaut. A standing ovation was given to Mr. Christopher Pendergast, assisted by his lovely wife Christine, after he challenged young scientists to more research for ALS, a disease that threatens his life.

Standing ovation for Chris Pendergast during Foundation Gala.



Mr. Christopher Pendergast

Teacher and Founder of the "Ride for Life" An ALS (Lou Gehrig's Disease) Awareness Campaign

Mr. Christopher Pendergast is much more than a teacher in Northport, Long Island. He is a father, a husband, and an ALS awareness advocate AND OUR HERO. ALS threatens his life.

He married his childhood sweetheart, Christine, and they celebrated their 26th anniversary this past June. He says he was blessed with two precious gifts: a daughter and a son.

Professionally, he holds a BA from the State University of New York at Fredonia and a MA from the State University of New York at Stony Brook. He has been active in numerous professional organizations including the New York State Science Teachers Association, the New York State Marine Educators Association, the New York State Outdoor Education Association and was President of the Long Island Educator's Council for Gifted Education. Mr. Pendergast has been recognized for his teaching excellence and innovative science programs.

Personally, Chris was a volunteer naturalist and a member of the Town of Brookhaven's Environmental Advisory Council. On Columbus Day weekend, 1993 he was diagnosed with ALS— amyotrophic lateral sclerosis— more commonly known as Lou Gehrig's disease. ALS is a progressive and fatal neuromuscular disease with no known cause and no effective, long term treatment. He was forced to curtail many of his outdoor pursuits as he became increasingly disabled by his disease. Yet while unable to dress and feed himself or walk well, he has refused to surrender. He had his son certified as a scuba diver and together they went to the Virgin Islands and had a specially trained group of dive masters take him and his 13-year-old son 60 feet below the ocean's surface among the coral reefs.

Chris is an ardent advocate for ALS awareness, twice testifying before the FDA for drug approvals and procedural reform. He has appeared on the Jerry Lewis MDA Telethon. Last year, Chris organized a 14-day, 325 mile journey from Gehrig's Yankee Stadium to Washington, D.C. He completed the trip last year on his electric disability scooter, traveling at three miles per hour. This year Chris formed a not-for-profit corporation, Ride For Life, Inc., and again took the trip—this time in his electric wheelchair. Profits will aid patient services and fund research.



Christopher Pendergast, ALS patient/advocate, holds PhRMA Foundation awardees as the "hope for the future." Chris founded "Ride for Life" which is an ALS (Lou Gehrig's disease) awareness campaign.

Banquet Speaker at Gala



**Former Astronaut
Lawrence J. DeLucas,
O.D., Ph.D., D. Sc. (Hon.)**

Dr. Larry J. DeLucas vividly describes the rigors of his 1992 journey in space as a pay-load specialist on the Columbia. Dr. DeLucas is Director Center for Macromolecular Crystallography, University of Alabama at Birmingham, School of Medicine, and performed experiments on protein crystal growth in outer space.

Dr. DeLucas is a Professor in the School of Optometry, the Director of the Comprehensive Cancer Center X-Ray Core Facility, and the Director of the Center for Macromolecular Crystallography at the University of Alabama at Birmingham (UAB). From October 1994 to October 1995, he served as Lead Scientist for the Space Station at NASA Headquarters. He currently serves as a member of NASA's Space Station Science Utilization and Advisory Subcommittee, NASA's Advisory Committee on the International Space Station, the U. S. Space and Rocket Center Advisory Committee, the Challenger Learning Center Advisory Board, the Executive Committee of the Helen Keller Eye Research Foundation, the Council of Biotechnology Centers Board, UAB School of Optometry Alumni Association Board, the UAB Vision Science Research Center Advisory Board, as Vice President of the Alabama State Biotechnology Association Board of Directors and as Chair of the Spacelab Science Advisory Board. He recently received an Honorary Doctor of Science degree from the State University of New York State College of Optometry (May, 1997) and from the Illinois College of Optometry (May, 1998). He received the Key to the City of Titusville, Florida for contributions to Americas Space Program and received a medal from Instituto Nacional de Pesquisas Espaciais (the Brazilian Space Agency) in recognition of a joint collaboration on STS-83 and STS-84. He is a recipient of the Order of Rio Branco in the rank of Commander from the Brazilian Government on behalf of the President of Brazil and the Grand Master of the Order of Rio Branco. (The Order of Rio Branco is given to recognize and celebrate the merits of Brazilian and foreign individuals who have significantly contributed to the promotion of Brazil's relations with the world.)

Dr. DeLucas received five degrees from UAB culminating in a Doctor of Optometry degree and a Ph.D. degree in Biochemistry. He has published over 80 research articles in various scientific journals and co-authored two books on protein crystal growth. He is a co-inventor on several patents involving protein crystal growth hardware and received a NASA Research Award for hardware that he designed for protein crystal growth experiments in space and a NASA Public Service Medal for exemplary performance in support of the Microgravity Projects Office. He has been an invited lecturer at numerous national and international scientific meetings concerning microgravity research. He flew as a Payload Specialist on the United States Microgravity Laboratory - 1 (launched in June, 1992), participating in thirty-one different scientific materials processing experiments.

The Annual Awardee Meeting

On April 21, during our Annual Awardee Meeting, the Foundation was extremely fortunate and honored to have as our Thomas E. Hanrahan Memorial Lecturer, Eric Kandel, Ph.D. Dr. Kandel is Professor at the College of Physicians and Surgeons of Columbia University and Senior Investigator at the Howard Hughes Medical Institute Research Laboratories. He is world renowned for his work on "Genes, Synapses and Long-Term Memory." Our deep appreciation goes to Dr. Kandel for taking time from his very busy schedule to speak at our General Session.



Eric Kandel, Ph.D., delivered the Thomas E. Hanrahan Memorial Lecture during the Foundation's General Session on April 21.

Dr. Kandel is Professor, College of Physicians and Surgeons of Columbia University and Senior Investigator at the Howard Hughes Medical Institute Research Laboratories.



Dr. James Swarbrick, Chairman of the Pharmaceuticals Advisory Committee and VP of R&D at AAI, enjoys the Foundation's Annual Awardee Meeting with Dr. William Mallet, 1997 Postdoctoral Fellow in Pharmaceuticals. Dr. Mallet is with the Weill Medical College of Cornell.

Our Awardee and Advisory Committee Presentations

This year with the changed format, our subgroup sessions took place early in the day on April 21. Our second-year awardees and advisory committee members delivered excellent presentations and shared their research findings with other Foundation awardees, an absolute necessity for the progression of biomedical and pharmaceutical science.

Presenters at the Clinical Pharmacology Subgroup Session, moderated by Terrence F. Blaschke, M.D. Professor of Medicine and Molecular Pharmacology at Stanford School of Medicine and member of the Clinical Pharmacology Advisory Committee, were: Mark S. Wallace, M.D., Assistant Clinical Professor, Department of Anesthesiology, University of California, School of Medicine; Sara Browne, M.D., Fox Laboratories, Palo Alto; Jin Chen, M.D., Ph.D., Postdoctoral Fellow, Stanford University School of Medicine.

Presenters at the Basic Pharmacology Subgroup session moderated by Irwin M. Weiner, M.D., Chairman of the Basic Pharmacology Advisory Committee and Former Dean and Emeritus Professor of the State University of New York HSC, Brooklyn: Brian K. Shoichet, Ph.D., Assistant Professor, Department of Molecular Pharmacology and Biological Chemistry, Northwestern University Medical School; John R. Hepler, Ph.D., Assistant Professor, Department of Pharmacology, Emory University School of Medicine; (Bioinformatics) Mark Gerstein, Ph.D., Assistant Professor, Department of Molecular Biophysics and Biochemistry, Yale University School of Medicine.

Presenters at the Pharmaceutics Subgroup Session moderated by James Swarbrick, D.Sc., Ph.D., Chairman of the Pharmaceutics Advisory Committee, and AAI Vice President, R&D: Lawrence K. Ng, Ph.D., Assistant Professor of Pharmaceutics, University of Colorado Health Sciences Center, School of Pharmacy; Prashant J. Chikhale, Ph.D., Assistant Professor,



Enjoying a few moments at the Foundation's Gala and Annual Awardee Meeting are Jeffrey Krise, Ph.D., 1999 Postdoctoral Fellow in Pharmaceutics, and his lovely wife, Joanna. Jeffrey is congratulated as one of the newest Foundation Awardees.



Dr. Eric Kandel (left), Professor, Columbia University's College of Physicians and Surgeons and Senior Investigator at the Howard Hughes Medical Institute Research Laboratories, delivered the Thomas E. Hanrahan Memorial Lecture. Dr. Kandel was introduced by Chairman of the Foundation's Pharmacology/Morphology Advisory Committee, Michael D. Gershon, M.D.

Department of Pharmaceutical Sciences, University of Maryland School of Pharmacy; and Dr. James Swarbrick, as presenter also.

Presenters at the Pharmacology/Morphology Subgroup Session moderated by Dr. Michael D. Gershon, Chairman and Professor, Department of Anatomy and Cell Biology, Columbia University School of Physicians and Surgeons and Chairman of the Pharmacology/Morphology Advisory Committee: Gary E. Pickard, Ph.D., Department of Anatomy and Neurobiology Colorado State University; Kirk Hillsley, Ph.D., Department of Physiology and Cell Biology Anderson Medical Science Building, School of Medicine, University of Nevada; and Zhen-Ping Chen, M.D., Ph.D., Postdoctoral Fellow, Department of Neuroscience and Cell Biology, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical Center.

Attendees at Gala Gather to Honor Four Great Scientists

Recipients of the 1999 Awards in Excellence

On April 20, the attendees at the PhRMA Foundation Gala gathered to join Donna Moore as she presented the 1999 Awards in Excellence. Four stellar scientists were selected from a national competition and three were present to receive this honor from the PhRMA Foundation. Accepting the award on behalf of Dr. Grant was Dr. Marilyn Speedie, Dean of the School of Pharmacy, University of Minnesota:

Award in Basic Pharmacology

Horace H. Loh, Ph.D.,

Alice and Frederick Stark Professor of Neuroscience and Professor and Chairman Department of Pharmacology University of Minnesota School of Medicine

Award in Clinical Pharmacology

Arthur Hull Hayes, M.D.

President
MediScience Associates Inc.
Division of Nelson Communications
Vice Chairman, Medical Director and Member
Board of Directors, Nelson Communications
Professor of Medicine, Pharmacology, and Community Preventive Medicine (Public Health)
Member, Faculty of the Graduate Schools
New York Medical College
Clinical Professor of Medicine and Pharmacology
Pennsylvania State University College of Medicine

Award in Pharmacology/Morphology

Raymond J. Dingleline, Ph.D.

Chairman
Department of Pharmacology
Emory University
School of Medicine

Award in Pharmaceutics

David J. W. Grant, M.A., D. Phil, D.Sc.

Department of Pharmaceutics
University of Minnesota
College of Pharmacy

Selected on a competitive basis, the recipients received this prestigious award to acknowledge the excellence in their careers. The Awards in Excellence are somewhat different from the other awards given by the Foundation. These awards, begun in 1998, represent a completely new area of recognition for the Foundation's scientific community. They honor both the career accomplishments of the individual researchers as well as the universities which have nurtured their

careers. Even more importantly, the Awards in Excellence, which now provide \$4,000 stipend, are given to scientists who previously received Foundation funds—funds which have helped them become leaders in research, industry, government and education.

Also, these awards offer testimony to the fact that these scientists have delivered on the promise they showed early in their careers. The Foundation, years ago, invested in the promise shown by these scientists and researchers and now, we have come full circle to acknowledge and

honor them for their excellent careers. And, actually, when we think about it, all of these bright, new-in-career scientists we call Foundation awardees, have the potential to earn the Award in Excellence—they are the cream of the crop and have competed for their place, well earned, as Foundation Awardees—not an easy task. These awardees have the potential to be our next leaders in academe, policy and public health and our own pharmaceutical industry.

Congratulations to our 1999 Awards in Excellence.



Dr. Ray Dingleline thanks the PhRMA Foundation for the “tangible and intangible” benefits of receiving the Foundation award early in his career.



Dr. Horrace Loh receives the prestigious “Award in Excellence” from President Donna Moore.



Dr. Arthur H. Hayes, graciously expresses his gratitude to the Foundation and other mentors such as Dr. Walter Riker—and his lovely wife, Barbara.



Dr. Marilyn Speedie, Dean of the University of Maryland College of Pharmacy, accepts the Award in Excellence on behalf of David J.W. Grant, Ph.D.

Awards in Excellence

Basic Pharmacology

Horace H. Loh, Ph.D.

*Frederick and Alice Stark Professor and
Head Department of Pharmacology
University of Minnesota*



After twenty years of a successful career at the University of California-San Francisco Medical Center, **Dr. Horace Loh** joined the University of Minnesota Medical School in 1989 to head the Department of Pharmacology as the Frederick and Alice Stark Professor in Neuroscience. Dr. Loh is well recognized for his scientific excellence with both national and international honors. Over the past thirty years, Dr. Loh's research has focused mainly on understanding the molecular mechanism of narcotic analgesics and tolerance with the goal of providing rational designs for more effective analgesics and better treatment of narcotic addiction. His research has had a significant impact on medicine and drug development by providing insights into the treatment of opiate addiction, making a non-addictive analgesic, and by explaining how opiate drugs affect the brain. Dr. Loh was a recipient of the Foundation's Research Starter Grant in 1972.

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL: The University was founded in 1851 and is now consistently ranked among the top fifteen medical schools on the United States. Its mission is "to be a leader in enhancing people's health through education, biomedical research and clinical programs." Widely recognized for leadership in cardiovascular medicine and organ and bone marrow transplantation among other fields, the University of Minnesota Medical School has earned its share of "firsts" on the history of medicine. The Medical School maintains affiliate relationships with many hospitals in the Twin Cities area, including the Fairview-University Medical Center, a unique public-private partnership that began in January, 1997. The expanded hospital and clinics are closely linked with the Medical School's education and research programs and provide a wide range of clinical opportunities to students.



Pharmacology/Morphology

Raymond Dingledine, Ph.D.

*Professor and Chairman
Department of Pharmacology
Emory University School of Medicine*

Raymond Dingledine received his Ph.D. in pharmacology under Avram Goldstein at Stanford University in 1975, and that year was awarded a PMA Foundation Pharmacology/Morphology Fellowship for postdoctoral study at the University of Cambridge, England. After additional postdoctoral training at the University of Oslo, he joined the faculty at the University of North Carolina at Chapel Hill in 1978 before moving to Emory University in 1992. His research seeks to understand the molecular and cellular basis of epilepsy, with current focus on genetic regulation of glutamate receptors. His research, published in over 100 articles, is highly cited and has been recognized by nine national awards. He serves or has served on a variety of corporate and government advisory panels and holds or has held leadership positions in three national societies. He has served on eight editorial boards and is currently Editor of "**Molecular Pharmacology**," the most highly cited primary journal in the field.

EMORY UNIVERSITY SCHOOL OF MEDICINE: In 1917 the old Atlanta Medical College was incorporated into Emory University. Long known for the quality of clinical training and care, Emory University School of Medicine began investing heavily in its research enterprise about ten years ago and has been one of the fastest growing earners of NIH research funding for much of the time since. With special strengths in neuroscience, cardiovascular and vaccine research, a new building program that will add more than 500,000 square feet of new research space within two years, the development last year of a joint biomedical engineering department with Georgia Institute of Technology, and a recent acquisition of a 43 acre tract of land near the main campus, Emory is poised to further intensify its research efforts in the coming decade.

Clinical Pharmacology

Arthur Hull Hayes, Jr., M.D.

*President and COO, MediScience Associates,
Division of Nelson Communications
Vice Chairman, Medical Director and Member,
Board of Directors, Nelson Communications
Professor of Medicine, Pharmacology, and
Community Preventive Medicine
(Public Health)*

*Member, Faculty of Graduate Schools, New
York Medical College*

*Attending Physician, Westchester County Medical Center; and
Clinical Professor of Medicine and
Pharmacology, Pennsylvania State University College of Medicine.*



Dr. Hayes received his M.A. (with Honours) from Oxford University as a Rhodes Scholar and Danforth Fellow. He then pursued pre-medical and clinical studies at Georgetown and received his M.D. degree from Cornell in 1964. Dr. Hayes received one of the Foundation's first Clinical Pharmacology Faculty Development Awards while at Cornell in 1968. In April 1981, he was appointed U. S. Commissioner of the Federal Food and Drug Administration and Assistant Surgeon General and served until 1983. Immediately following his term as FDA Commissioner, he was named Provost and Dean and Director of the Institute of Human Values in Medical Ethics at the New York Medical College. Joining industry in July of 1986, Dr. Hayes was named President and CEO of EM Pharmaceuticals, a North American Subsidiary of E. Merck, Darmstadt, Germany. On July 1, 1991, he founded MediScience Associates. He is Past President of the United States Pharmacopeia and the American Society of Clinical Pharmacologists. He has served as a consultant on pharmaceutical and regulatory issues to several national governments including Russia, Poland, Canada and Uzbekistan. Adding to his illustrious career, he has published over 100 scientific and public policy articles, delivered more than 2,500 lectures and has testified at 27 Congressional Hearings.

WEILL MEDICAL COLLEGE OF CORNELL UNIVERSITY: Formerly known as Cornell University Medical College, Weill Medical College integrates scientific study with patient care and promotes a strong social commitment, creative leadership and personal scholarship. Founded in 1898, and affiliated with The New York Hospital since 1927 and New York Presbyterian Hospital since 1998, Weill Medical College is among the top ranked clinical and medical research centers in the country. In addition to offering degrees in medicine, Cornell also has PhD programs in biomedical research and education, and with neighboring Rockefeller University and the Sloan-Kettering Institute, has established a joint MD-PhD program for students to intensify their pursuit of Cornell's triple mission of education, research and patient care.



Pharmaceutics

David J. W. Grant, M.A., D. Phil, D.Sc.

*Professor of Pharmaceutics and
William and Mildred Peters Chair in
Pharmaceutics
University of Minnesota
College of Pharmacy*

Dr. Grant is a graduate of Oxford University; B.A. in Chemistry in 1960; D. Phil. in Physical Chemistry in 1963; M.A., Keble College; and D.Sc. for recognized published research on the physical chemistry of pharmaceutical systems in October 1990. He has held academic appointments at the University College of Sierra Leone, at the University of Nottingham, UK, and at the University of Toronto, Canada. In 1988 he was appointed to the William and Mildred Peters Chair in Pharmaceutics, University of Minnesota. Since January 1994, David Grant has served as Associate Editor of the "**Journal of Pharmaceutical Sciences**." He is also a member of the Editorial Board of the journals "**Pharmaceutical Development and Technology**" and "**Kona Powder and Particle**." In April 1998, he was elected to the Board of Hosokawa Micron International, Inc. Dr. Grant has worked on bacterial drug resistance and metabolism and, since 1972, on the physical chemistry of pharmaceuticals. Since 1978 Dr. Grant has been studying the crystal engineering of drugs and the properties of the solid state, particularly the thermodynamics, solvation, polymorphism, crystallization, compaction, solubility and dissolution of drugs. His recent work focuses on doping, hydration, hydrogen bonding, and chirality in the solid state. He is author and co-author of over 120 scientific articles and serves as a consultant for numerous companies that manufacture fine chemicals and pharmaceuticals.

UNIVERSITY OF MINNESOTA COLLEGE OF PHARMACY: The University of Minnesota College of Pharmacy is recognized as one of the outstanding pharmacy education and research institutions in the world. It is ranked among the top five colleges of pharmacy in the United States by the Gourman Report and "**U.S. News and World Report**." Research in pharmaceutics at the University of Minnesota is concerned with all aspects of the design, development, manufacture and evaluation of effective drug delivery systems. Of importance, therefore, are the elucidation analysis, and means of control of the properties of a drug and its dosage forms as they influence drug availability to the site of action. Other centers of excellence at the University encompass medicinal chemistry, pharmacy management and economics, and experimental and clinical pharmacology.



*William Mallet, Ph.D.,
Postdoc at Weill Medical
College of Cornell, describes
his scientific research
during the Foundation's
Poster Session, April 20.*

Foundation Board Elects New Chairman, Vice Chairman and Secretary-Treasurer

On March 29, at the Boca Raton Hotel and Country Club, Boca Raton, Florida, Mr. Jan Leschly, Chief Executive Officer of SmithKline Beckman, very graciously agreed to become Foundation Chairman of the Board as *Robert C. Black, President of Zeneca Pharmaceuticals, stepped down from that post after four years. On behalf of the Board and the Advisory Committee members, we wish to thank Bob for his many years of dedicated service to the Foundation. Joining the Board in 1992, Bob also served as Secretary-Treasurer from 1993-1995. We are also very grateful to Jan Leschly for taking time from his already very busy schedule, to lead us into the millennium. Jan has also served on the Board since 1992. At the same Board meeting, Robert A.

Ingram was elected Vice Chairman after serving on the Board since 1994 and Patrick J. Zenner was elected Secretary-Treasurer, after serving on the Board since 1993. Our heartfelt thanks to these gentlemen for accepting these roles.

Other Board members serving for 1999-2000: Mr. Richard J. Markham, Chairman of the Board of Management and Chief Executive Officer, Hoechst Marion Roussel (since 1997); Mr. Robert N. Wilson, Vice Chairman, Board of Directors, Johnson & Johnson (since 1993); *Mr. Wayne P. Yetter, President and Chief Executive Officer, Novartis Pharmaceutical (since 1997); and Alan F. Holmer, President of PhRMA, serving *ex-officio* (since 1996). Our appreciation is extended to all of these gentlemen for taking time from their inordinately busy schedules to help steer the Foundation.

* Mr. Yetter resigned from the Board in July 1999.

* Mr. Black resigned from the Board in April 1999.

PhRMA Foundation Joins in Experimental Biology '99 with Scientific Forum/ Reception

April 17, 1999: Michael D. Gershon, M.D., Speaker.

After a four-year respite and thanks to Chrissie Carrico, Ph.D., Executive Director of the American Society for Pharmacology and Experimental Therapeutics, the Foundation once again participated in Experimental Biology '99—a multi-society interdisciplinary biomedical scientific meeting held in Washington, D. C. Michael D. Gershon, M.D., Chairman of the Foundation's Pharmacology/Morphology Advisory Committee packed the room at the Washington Hyatt when he spoke on his hot-off-the-press, new book, **Gut Instinct: The Second Brain**. Dr. Gershon is also Professor and Chairman of the Department of Anatomy and Cell Biology, College of Physicians and Surgeons, Columbia University. Our sincere thanks to Dr. Gershon for taking time from his busy schedule to speak at our forum.



The Foundation is very grateful to Michael D. Gershon, M.D., for his presentation at our Scientific Forum during Experimental Biology '99, April 17. Dr. Gershon is Chairman, Department of Anatomy and Cell Biology at Columbia University's College of Physicians and Surgeons, Chairman of the Foundation's Pharmacology/Morphology Advisory Committee, and author of "Gut Instinct: The Second Brain."

If you would like an autographed version of Dr. Gershon's book, please call Helena at: (212) 305-3447(o) or unautographed through the Foundation Website (<http://www.phrmaf.org>) and click on Amazon.com. (The Foundation receives a donation on every book ordered from our website).



William R. Darrow, M.D., Ph.D., Foundation's Chief Science Advisor, and Senior Medical Advisor for Schering-Plough Research Institute, brings awardees up-to-date on Foundation activities at the Luncheon on April 21.

Applicants Find Funding Opportunities on GrantsNet

A Joint Web Project with the American Association for the Advancement of Science and the Howard Hughes Medical Institute.

Last year, the American Association for the Advancement of Science (AAAS) and the Howard Hughes Medical Institute (HHMI) launched **GrantsNet**, a searchable online database (www.grantsnet.org) that provides up-to-date information on biomedical funding for scientists in the early stages of their careers. GrantsNet is a community resource involving funding organizations from all sectors of the biomedical community and is free to thousands of researchers who use it to search for funding opportunities each month.

As a long-term project, the PhRMA Foundation is confident that being part of GrantsNet will help to fulfill our long-time goal of tracking valuable information for committee members, Board members and awardees themselves regarding the Foundation grant programs.

“Hope for the Future”: A Revised Foundation Fundraising Video

During the Annual Awardee Meeting and Gala, cameras were rolling. “Hope for the Future”—a revised, Foundation video, has finally been released. This seven-minute video is specifically made to tell the story of the PhRMA Foundation. The enthusiasm of former awardees and the recipients of the Awards in Excellence, the call to action speech made by ALS activist



Christopher Pendergast and the genuine dedication of Board Chairman Jan Leschly are all captured in this invaluable information tool for the Foundation. Many thanks to those who took time from their very busy schedules to participate and to Sandy Cannon-Brown of VideoTakes on the preparation of such an excellent video.

Foundation Participates in Marketing Forces Forum: “Strengthening Health Research in America: Philanthropy’s Role”

Sponsored by Burroughs Wellcome Fund, Howard Hughes Medical Institute and the American Cancer Society

In early 1998, the Foundation participated with the Burroughs Wellcome Trust (BWT), Howard Hughes Medical Institute (HHMI) and the American Cancer Society (ACS) at a forum “Strengthening Health Research in America: Philanthropies Role.” One of the first forums of its kind, the conference drew leaders from private foundations and voluntary health organizations, as well as government and industry. The overall purpose of this gathering was to strengthen health research in the United States. As Purnelle W. Chopin, M.D., President of HHMI, states in light of new

opportunities created by advances in technology and changes in health care, existing funding mechanisms are inadequate for these new fields. Translational clinical research "which speeds results from the research bench to the bedside, has been hit hard in recent years." And young postdoctoral biomedical scientists have been affected by recent changes that make their career options unclear. Keeping these trends in mind, the participants in the conference agreed that philanthropies and private organizations have a very important role to play. As Dr. Chopin continues: "The mandate is especially important in the biological sciences...expanding knowledge and alleviating the worldwide burden of disease. We are unraveling the mysteries of how the brain functions...we are determining the molecular basis of how the immune system fights invading organisms and how it goes awry and causes autoimmune diseases such as rheumatoid arthritis and type I diabetes. We are establishing the genetic bases of many diseases and sequencing the human genome, as well as genomics of infectious agents involved in tuberculosis, Lyme Disease, malaria, peptic ulcers, bacterial meningitis and others..." These are very exciting times for biomedical scientists and the PhRMA Foundation was called for such a time as this.

The HHMI, the Burroughs Wellcome Trust and the American Cancer Society have all played and will play extremely important roles in biomedical research and science education. We all join forces because we have a responsibility to future generations for the betterment of humankind.

Everything You Wanted to Know About the PhRMA Foundation on the Website:

<http://www.phrmaf.org>.

We have yet again revitalized our Foundation website. This website will be critical especially to those young-in-careers scientists looking to us for their future funding. If you have not visited our website lately, please do: "http://www.phrmaf.org." During this past year, we have added such highlights as "Hall of Fame," "Where Are They Now," "Foundation Bookstore," "Philanthropy Spots," "News and Alerts" and much more. The website will now serve as an archive in that our **Annual Reports** and **Scholars** publications will be held on the web for ready reference on any category. This website has become the most time/cost efficient way to broadcast the good news regarding the PhRMA Foundation.

Recently, we sent our first virtual "**Scholars**" publication. For the first time, with the click of a button, hundreds of thousands of E-mails went to universities containing our "**Scholars**" publication as viewed on the web location—no postage, no mailhouse cost and no printing cost. For your information, we are now building our E-mail address book. If you would like to receive regular funding notices and our **Scholars** or **Annual Report**, E-mail us at Foundation@phrma.org with your E-mail address.



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 clinical pharmacology, two in pharmacology/toxicology, one in the combined field of pharmacology-morphology, three in pharmaceuticals, and one in pharmacoeconomics, and one in bioinformatics. 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, 1999, 113 individuals have been supported under this program since 1967.

• *Recipients of the awards which began July 1999:*



Laurence J. Egan, M.D. Mayo Clinic and Foundation: "Inhibition of Nuclear Factor Kappa B in Inflammatory Bowel Disease."

Aminosalicylates and glucocorticoids are important therapies for inflammatory bowel disease, but are limited by lack of efficacy and adverse effects in many patients. Recent observations have suggested a central role for the transcription factor nuclear factor kappa B (NF-kB) in the maintenance of chronic mucosal inflammation. Data from Dr. Egan's studies and from others have demonstrated that aminosalicylates inhibit NF-kB by different mechanisms. This research outlines a

research plan that would extend these preliminary observations. This research will test the related hypotheses that the anti-inflammatory mechanisms of aminosalicylates and glucocorticoids are due to inhibition of NF-kB, and that chronic inhibition of NF-kB in models of inflammatory bowel disease is safe and effective. A variety of experimental approaches will be utilized. Gene transfer techniques will be used to over express and also to inhibit NF-kB activity in models of mucosal inflammation. The effects of aminosalicylates and glucocorticoids on NF-kB activity in these systems and in humans with inflammatory bowel disease will be studied. The information obtained will lead to better understanding and therefore more rational use of aminosalicylates and glucocorticoids. The potential for inhibition of NF-kB in the therapy of chronic inflammatory bowel disease will be evaluated.



Jane E. Freedman, M.D., Assistant Professor of Pharmacology and Medicine, Georgetown University School of Medicine: "Antioxidants in Platelet Function and Thrombo-

sis." Epidemiological studies have shown that dietary antioxidant consumption is inversely associated with the development of cardiovascular disease but the precise mechanisms that underlie these observations are not clear. Platelets have been implicated in the development of atherosclerosis, as well as in the acute occlusion of coronary vessels. While dramatic changes in the platelet redox status occur during normal aggregation, the introduction of additional oxidative stress is prothrombotic. Modulation of platelet

redox status, as well as the addition of exogenous antioxidants, inhibits platelet aggregation *in vitro*, but the significance of these findings *in vivo*, as well as the precise mechanism(s) which underlies these observations, is not clear. As a central hypothesis, Dr. Freedman proposes that the local platelet balance between oxidative stress and antioxidant protection modulates platelet function and thus influences vascular homeostasis. The specific aims of the project is to characterize the role of cytosolic (water-soluble) and membrane (lipid-soluble) antioxidant status in modulating platelet function as well as to determine the significance of these findings *in vivo*.

Entering their second year in 1999 are:

Nananda Francette Col, M.D., M.P.H., Assistant Professor of Medicine, Department of Medicine, Tufts University, School of Medicine (three years): "Hormone Replacement versus Alendronate Therapy for Postmenopausal Osteoporosis: Costs, Risks and Preferences."

William G. Haynes, M.D., M.B.Ch.B., Assistant Professor, Department of Internal Medicine, University of Iowa, College of Medicine (three years): "Vascular Effects of Homocysteine: Effect of Genetic Moderate Hyperhomocysteinemia on Endothelial Function (Protocols A-E)."

Richard Z. Lin, M.D., M.P.H., Assistant Professor, Department of Pharmacology, University of Texas, San Antonio, School of Medicine (three years): "Sphingosine-1-phosphate Inhibits Vascular Smooth Muscle Cell Migration via p38 Mitogen Activated Protein Kinase."

Those awardees who entered the third year of their award in 1999 are:

Craig W. Hendrix, M.D., Department of Medicine, The Johns Hopkins University School of Medicine: "Antiretroviral Pharmacodynamics in the Semen."

Mark S. Wallace, M.D., Assistant Clinical Professor, Department of Anesthesiology, University of California, San Diego, School of Medicine: "Pharmacology of Human Experimental and Neuropathic Pain."

Awardees who ended their award in 1999 are:

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."

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."

Fellowships for Careers in Clinical Pharmacology

The second program in clinical pharmacology provides is postdoctoral "Fellowships for Careers in Clinical Pharmacology." These fellowships offer clinicians an opportunity for intensive study in any of the basic sciences that fall within the general field of pharmacology. The program is open to physicians, dentists, and veterinarians who are well into their clinical training and wish to pursue careers in clinical pharmacology. With the year or two of support offered by this fellowship program, depending on the particulars of

the undertaking, the individual can pursue full-time study in the basic pharmacologic sciences needed to complement his clinical skills.

The program allows an individual to apply for a fellowship three years in advance of the activation date of the award. For example, those applying for a fellowship in the fall of 1999 may request that the fellowship begin July 2000 or July 2001, or 2002.

First awards under this program were made in 1973. Since that time, 67 fellowships have been awarded.

Recipients who began their award in July 1999:



Hagit Peleg, M.D., Stanford University School of Medicine: "The Effect of Different Protein Kinase C Isozymes on Cardiac Fibroblast Proliferation, Response to Hypoxia

and Hormones or Medications." This will be conducted by using inhibitors and activators specific to the different protein kinase C isozymes. Since fibroblasts play an important role in cardiac remodeling after an acute myocardial infarction and during the postnatal development of the heart this study may eventually aid in therapeutic decisions when activators and inhibitors of protein kinase for human use may be available.

Awardees who entered the second year of their award in 1999 are:

Jin Chen, M.D., Ph.D., Division of Clinical Pharmacology, Stanford University, School of Medicine (two years): "Role of Altered Transcription Factor CREB in Cellular Aging."

Luiza Cecilia Iancu, M.D., Division of Respiratory & Critical Care, Physiology & Medicine, Harbor-University of California, LA., Research & Education Institute (two years): "mtDNA Mutations in Patients with Peripheral Arterial Disease."

Recipients who ended their award in 1999:

Gerald P. Linette, M.D., Ph.D., Harvard University, Massachusetts General Hospital: "Dendritic Cell Therapy of Human Malignant Melanoma."

Spencer Z. Rosero, M.D., University of Rochester School of Medicine: "Gene-Specific Pharmacotherapy in the Hereditary Long QT Syndrome Caused by the SCN5A Gene Mutation."

Medical Student Research Fellowships

The third program is the Medical Student Research Fellowships. 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 thirty-eight awards have been made since 1974.

- *Individuals whose awards began in 1999 are:*
- **Ali Al-Attar**, School of Medicine, Georgetown University: "Cell Surface Molecules Driving Breast Cancer/Endothelial Interactions." Mr. Al-Attar's goal is to identify peptides which specifically bind breast cancer cells and their associated blood vessels, but not normal breast cells.
- Using a powerful technology phage peptide display, Mr. Al-Attar can rapidly and effectively screen peptides for their ability to bind one type of cell-breast cancer, but not a second, normal breast epithelium.
- **James S. Chen**, School of Medicine, Boston University: "Role of RING3 Kinase in Inflammatory Signaling Disorders." RING3 is a recently characterized inducible human nuclear kinase that integrates signal from inflammatory cytokines such as interleukin-1 (IL-1). Intensive investigation of the novel component of IL-1 signaling will provide new insight into inflammatory disorders with the potential for developing new therapeutics.
- **Ellen D. Herbst**, School of Medicine, Brown University: "Pharmacokinetic Interactions Between Selegiline and Cocaine." To date, cocaine dependence has not been treated successfully with pharmacological intervention. Recent data suggest that the tricyclic antidepressant selegiline may be effective in the treatment of cocaine dependence. Ms. Herbst's study will evaluate Pharmacokinetic and pharmacological interactions between 20 mg. of selegiline and cocaine in twelve nondependent cocaine users.

Vikas Patel, *School of Medicine, Duke University*: "Mechanistic Analysis of CPT-11 and Temozolomide." This research will focus on two chemotherapy agents—Temozolomide and CPT-11. The goal of the research will be to determine if there is any enhancement of brain tumor response when used in combination with a nude mouse model. If an enhancement is observed, its mechanism will be sought.

Brett K. Warren, *School of Dentistry, Medical College of Georgia*: "The Role of Atrial Natriuretic Peptide and Angiotensin II in Type 2 Diabetic Nephropathy." The neonatal streptozotocin-treated rat model of type 2 diabetes demonstrates a progressive decline in excretory function and impaired functional adaptation to the loss of renal mass. This research will examine the contributions of the atrial natriuretic peptide and the renin-angiotensin-aldosterone systems to the renal dysfunction.

Basic Pharmacology

Faculty Development Awards in Basic Pharmacology

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

The program provides stipend and fringe benefits of \$30,000 per year for two years. To date the total number of awards made is 74.

Recipients of the 1999 Faculty Development Awards in Pharmacology which began July 1999 are:



Yue Feng Ph.D., Assistant Professor, Emory University School of Medicine: "Functional Influence of QKIs on CNS Myelin Protein mRNAs." Myelination, the formation of spiral wrappings on vertebrae

axons by specialized plasma membrane extensions, is essential for the function and development of the nervous system. The process of myelination requires accurate expression of myelin proteins governed by a variety of extracellular signals. Understanding the molecular basis of myelination is a crucial prerequisite in designing new therapeutics against myelin disorders and neural injuries. Dr. Feng is currently using the qk^y hypomyelinating mice as a model system to study the regulation of myelination in the central nervous system (CNS). The qk^y mutation results in the loss of the QKI proteins, a small group of RNA-binding proteins containing hallmarks indicative of signal transduction. The absence of QKIs causes severe deficits in oligodendrocyte maturation and axonal ensheathment in the CNS. Dr. Feng has found a significant reduction of the mRNAs encoding the mature isoforms of a few myelin structural proteins in the qk^y brain, which has led us to hypothesize that QK may play a critical role in regulating the homeostasis of mRNAs encoding CNS myelin proteins. Dr. Feng's investigation focuses on the functional importance of interactions between QKIs and CNS myelin protein mRNAs, presumably under the control of extracellular signals that direct myelination.



Fang Liu, Ph.D.,
Assistant Professor,
Rutgers University:
"TGF-beta-Inducible
Gene Regulation and Its
Role in the Control of
Tumorigenesis." The
transforming growth

factor-beta (TGF- β) plays a key role in the control of tumorigenesis and may mediate the actions of chemopreventive agents such as retinoids and tamoxifen. TGF- β signals the growth inhibitory effect and a variety of other responses through transmembrane serine/threonine kinase receptors, leading to regulation of genes that encode crucial determinants of cell fate. Recent studies have discovered that a family of proteins, designated as Smads (mammalian homologues of *drosophila* Mad and *C. elegans* Sma), can transduce the TGF- β signal from cell surface to the nucleus. Smads can be directly phosphorylated by TGF- β family receptor kinases upon ligand stimulation, and represent thus far the only known substances for the receptors. Following phosphorylation, Smads form heteromeric complexes, move into the nucleus, bind to DNA and activate transcription in association with a DNA binding partner. Importantly, Smads are tumor suppressors mutated in certain types of cancers. It is therefore necessary to identify Smads target genes that are essential in the control of tumorigenesis. I propose to search for such target genes for Smads and to study TGF- β -inducible gene regulation. These studies should allow us to have a greater understanding of the role of TGF- β in carcinogenesis and cancer prevention.



Tatyana Voyno-Yasenetskaya, M.D., Ph.D., Assistant Professor, University of Illinois at Chicago:
"Heterotrimeric G13 Protein Signaling: Role of Radixin."

Heterotrimeric G proteins transduce signal from G protein-coupled receptors and are classified into four distinct families—Gs, Gi, Gq, and G12/G13 on the basis of their amino acid sequence homology. Dr. Voyno-Yasenetskaya and others have identified several intracellular and cellular events mediated by G13 proteins. G13 regulate the Na⁺/H⁺ activity, induce mitogenesis and neoplastic transformation, apoptosis, and regulate the ERK and JNK pathways. Rho family of G proteins is involved in the downstream signaling initiated by G13. Using a yeast two-hybrid screen, Dr. Voyno-Yasenetskaya has now identified that G13 directly interacts with radixin, a member of ERM (ezrin/radixin/moesin) family proteins. Radixin has been shown to regulate the association of actin cytoskeleton with plasma membrane in a rho-dependent manner. This research will use the combination of biochemical, cellular, and genetic approaches to investigate the nature of the radixin interaction with G13. Results obtained during this study will provide new information about signaling and cellular responses regulated by G13 protein. In addition, new function of ERM proteins, namely, the ability to be regulated by heterotrimeric G proteins, will be determined. Understanding of the signaling pathways regulated by G proteins will lead to design of new drugs and new approaches for the treatment of cancer.

Those individuals who began their awards in July of 1998 are:

Vladlen Z. Slepak, Ph.D., Assistant Professor, Department of Molecular & Cellular Pharmacology, University of Miami, School of Medicine (two years): "Investigation Signaling Pathway Mediated by a Novel G Protein β Subunit, G β 5."

Stephanie Wengert Watts, Ph.D., Assistant Professor, Department of Pharmacology & Toxicology, Michigan State University (two years): "Vascular Tyrosine Kinase Activation in Hypertension; Interaction with Nitric Oxide."

Ending their awards in 1999 are:

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

Brian K. Shoichet, Ph.D., Assistant Professor, Department of Molecular Pharmacology and Biological Chemistry, Northwestern University Medical School: "Structure-Based Inhibitor Discovery Against Beta-Lactamases."

Fellowships for Advanced Predoctoral Training in Pharmacology/Toxicology

One of the most popular awards is the PhRMA Foundation "Advanced Predoctoral Training in Pharmacology or Toxicology" fellowship program. The goal of this award is 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 twenty-second year, has awarded a total of 260 fellowships.

Those who have been awarded 1999 fellowships beginning between January and July are:

Jennifer L. Berkeley, Emory University, School of Medicine (two years): "Muscarinic Activation of MAPK and Regulation of APP Processing in Neuronal Systems." Cholinergic signaling is important for many central nervous system functions including learning and memory and is severely impaired in Alzheimer's Disease. MAPK signaling pathways are also believed to be important in learning and memory. In transfected systems, muscarinic receptors (mAChR) have been shown to activate MAPK, but relatively little is known about these pathways in endogenous neuronal systems. Ms. Berkeley will examine the mechanisms by which mAChR activates MAPK in three neuronal systems.

Ashley E. Brady, Vanderbilt University, School of Medicine (two years): "Delineation of the Molecular Mechanism(s) by which RGS Proteins Alter Gi-Mediated Signaling." Recently a novel group of proteins called Regulators of G Protein Signaling (RGS) were identified. These proteins which are GTPase activating proteins (GAPs) for G_i/G_o coupled G proteins may play an indispensable role in modulating signaling in both the periphery and in the central nervous system where rapid on and off rates are required. This research will explore the molecular mechanism(s) by which RGS4 affects α_2 -adrenergic receptor signaling, and will hopefully shed additional light on this increasingly complicated signaling paradigm.

Jennifer Case, Albany Medical College (two years): "The Effects of Age and Estrogen on Vascular Reactivity." Both advancing age and the male gender serve as risk factors for the development of cardiovascular disease. Ms. Case's research will focus on how age and estrogen as well as the interaction of the two affect cardiovascular function.

James S. Chen, Boston University, School of Medicine (18 months): "Role of RING3 Kinase in Inflammatory Signaling Disorders." RING3 is a recently characterized inducible human nuclear kinase that integrates signal from inflammatory cytokines, such as interleukin-1 (IL-1). Intensive investigation of the novel component of IL-1 signaling will provide us with some new insight into inflammatory disorders with the potential for developing new therapeutics.

Nicole R. Sullivan Hanley, University of Texas, Health Science Center at San Antonio (two years): "Mechanisms of Antagonist-induced Desensitization of the Serotonin_{2A} Receptor." Receptors for the neurotransmitter serotonin have been implicated in a variety of psychiatric disorders. Ms. Hanley is studying the processes underlying the regulation of the serotonin_{2A} receptor function. By understanding serotonin_{2A} receptor regulation, we may better understand the receptor's role in disease such as depression and schizophrenia.

Adam William Hendricson, Tulane University, School of Medicine (two years): "The Metabotropic Glutamate Receptors of the Vestibular System." Mr. Hendricson's research will hypothesize that Group I metabotropic or G-protein coupled receptors for glutamate (the afferent transmitter in the inner ear) which exist on the hair cell may mediate a positive feedback on glutamate release when the cells are mechanically stimulated...but not in resting mode. This phenomena is a potentially important modulatory input on the overall vestibular input to the CNS. It also has implications for the development of selective antagonists of these receptors which might suppress vestibular activity without the side-effects of anti-cholinergic or anti-histaminic drugs.

Mark J. Hickman, Harvard University, School of Public Health (two years): "The Induction of Apoptosis by the DNA Base Lesion, O6-Methylguanine." The Role of Mismatch Repair, p53 and Other Proteins: Mr. Hickman's lab has shown that a specific type of DNA damage, the base lesion, O6-methylguanine (O6-meG), causes apoptosis. Mr. Hickman proposes to examine proteins that may mediate this response. First, he has shown that O6-meG causes apoptosis only in the presence of a functional mismatch repair system. Second, He seeks

to determine the role of the tumor suppressor, p53, in this process. Third, apoptosis induced by O6-meG will be observed in vivo using DNA repair-deficient mice. Finally, other proteins believed to be involved in signaling apoptosis in response to DNA damage will be studied in human cells, including ATM, JNK, c-Abl and others.

Jamie Horn, University of Kentucky, School of Medicine (two years): "The Testing of Hydroxymethyl Sulfate Esters as Ultimate Metabolites of Carcinogenic Benz[a]anthracene Meso-Substituted Derivatives." This research will investigate the formation of sulfate esters as ultimate metabolites of carcinogenic benz[a]anthracene derivatives, containing either electron-withdrawing or electron-donating groups. DNA adduct and complete carcinogenicity studies will determine the extent to which this pathway can account for activation of PAH.

Arthur Soren Leonard, University of Wisconsin, Madison, School of Medicine (two years): "Functional Analysis of the Interaction of CaMKII with NMDA Receptors." The neurotransmitter glutamate is responsible for brain damage during a stroke. Mr. Leonard will study how glutamate receptors interact with an enzyme (i.e., kinase) that determines their activity and thereby the extent of the neuronal damage.

Robert L. Levine, State University of New York at Stony Brook (two years): "ACellular Responses to a 3,N⁴ ethano-2'-deoxycytidine DNA Adduct in Human Cells." BCNU (carmustine) is an anti-cancer agent that exerts its effects by damaging the DNA in cancer cells. It is believed that DNA damage causes the death of cancer cells. This study will explore the mechanism by which BCNU kills cancer cells.

M. Benjamin Major, University of Utah, School of Medicine, Huntsman Cancer Institute (two years): "Characterization of a Novel Tgf-1 Responsive Gene That Induces Growth Arrest." Many cancers do not stop growing in the presence of growth inhibitory signals such as transforming growth factor-. This project will characterize the downstream targets of transforming growth factor- in hopes of identifying potential drug targets capable of circumventing defective signaling pathways within cancer cells.

Shane Christopher Masters, Emory University, School of Medicine (two years): "Biochemical and Functional Evaluation of the Role 14-3-3 in BAD Mediated Apoptotic Signaling." This research will investigate whether the 14-3-3 proteins can prevent cellular suicide, apoptosis, through their interaction with the Bcl-2 homolog BAD. Description of 14-3-3/BAD binding may be a useful target for antineoplastic therapies as many cancer cells are resistant to apoptosis.

Stephanie J. Walker, Cornell University, Veterinary Medical Center (two years): "Growth Factor Signaling to Phospholipase D." The goal of this research is to understand the biochemical mechanisms of growth factor signaling to phospholipase D (PLD). This project will investigate: (1) Modulation of PLD by growth factor receptors in mammary cells; (2) Perturbations of this signaling in mammary carcinomas; and (3) Tamoxifen in estrogen receptor independent blocks of PLD activity.

Bioinformatics

Faculty Development Awards in Bioinformatics

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

Beginning their awards in 1998 are:

Patricia C. Babbitt, Ph.D., Assistant Professor, Department of Biopharmaceutical Science, University of California, San Francisco, School of Pharmacy: "Understanding the Protein Universe Using Superfamily Analysis."

Iosif Vaisman, Ph.D., Research Assistant Professor, Division of Pharmaceutics, University of North Carolina, Chapel Hill, School of Pharmacy (two years): "Computational Analysis of Protein Structure."

Ending his award in 1999:

Mark Gerstein, Ph.D., Assistant Professor, Department of Molecular Biophysics and Biochemistry, Yale University, School of Medicine: "Analysis of Sequences and Structures on a Large Scale."

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.

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

The awards are two years each. The level of support varies and is aimed at keeping within the existing stipends for similarly trained individuals within the applicant university. First offered in 1968, 102 awards have been made to date.

Receiving the fellowship beginning July 1999:



Gregg D. Stanwood, Ph.D., University of Pittsburgh: "Dopaminergic Influence on Neuronal Development and its Modification by *in utero* Exposure to Cocaine." The

proposed research program will identify the mechanism by which dopamine receptor activation modulates neuronal growth, examine regional differences in the effects of dopamine on morphogenesis, and

identify adaptations in a family of receptor tyrosine kinase and their ligands (Ephrine and Eph receptors) which are involved in axonal growth and guidance. These studies will employ *in vitro* and *in vivo* model systems to analyze the effects of prenatal cocaine administration in the rabbit on cortical and striatal development. As one of the most robust biochemical effects produced by *in utero* cocaine is a long-lasting uncoupling of the D1 receptor from its G-protein, additional studies will address the regulation of guidance cues in the D1 receptor-deficient mouse. These studies will provide important insights into the mechanisms by which dopamine modulates neuronal development and the deleterious effects of prenatal cocaine exposure on brain structure and function.

Entering the second year of her award in 1999:

Laura Beth Kozell, Ph.D., Oregon Health Science University, School of Medicine (two years): "The Effects of Cocaine on Glutamate Synapses."

Individuals who ended their awards in 1999 are:

Laurie S. Nadler, Ph.D., Ph.D., University of Washington, School of Medicine: "Targeting of Muscarinic Receptor Subtypes in Polarized Cells."

Steven J. Ritter, Ph.D., The University of Texas Medical School at Houston: "Mechanism of Breast-Cancer Suppression by Retinoids."

Pharmaceutics

Undergraduate Research Fellowships in Pharmaceutics

The Undergraduate Research Fellowship program began in 1990 and is designed to encourage undergraduate students in pharmacy, chemistry, biology or a related discipline to pursue an advanced degree in pharmaceutics, thereby attempting to supplement the infrastructure of well-trained investigators in this important discipline. The Foundation's plan to accomplish this goal is by providing support for the undergraduate student to participate in a meaningful research project with a motivated, inspiring and research-active pharmaceutics faculty member.

The pharmaceutics faculty member must apply for the award and, once selected, is provided with a one-year, \$5,000 fellowship which the faculty member can provide to a qualified undergraduate of his or her choosing. Six awards were made for 1999, bringing the total number of awards to 92.

Faculty and their undergraduate students who received fellowships between January and August 1999 are:

Mansoor M. Amiji, R.Ph., Ph.D., Assistant Professor of Pharmaceutics, Department of Pharmaceutical Sciences, Northeastern University

Student: Phung Kim Lai "Novel thermogelling Paclitaxel Formulation for Intratumoral Delivery." The objective of this study is to develop and test a novel thermogelling system for intra-tumoral delivery of paclitaxel in the treatment of solid tumors. After spending a year to study the properties of paclitaxel in different concentration of Pluronic solutions, the lab has found that paclitaxel can

be dissolved in Pluronic-F127 solution at the temperature below 25/C. At physiological temperature (37/C), the Pluronic F-127 containing paclitaxel system turns gel, the release of paclitaxel in different concentrations was studied.

Moo J. Cho, Ph.D., Associate Professor, School of Pharmacy, University of North Carolina at Chapel Hill

Student: John S. An "Polymorphism of Cyclosporine A." This project is concerned with crystallinity of cyclosporine A as a potential determinant of oral bioavailability from solid dosage form.

Alekha K. Dash, Ph.D., Associate Professor, Department of Pharmaceutical and Administrative Sciences, Creighton University

Student: Heather M. Owens "The Utilization of Microdialysis in an Experimental Rabbit Meningitis Model to Study the Blood Brain Barrier Permeability Characteristics of Various Antibiotics." The objective of this research is to utilize a rabbit meningitis model to study the BBB permeability characteristics of various antibiotics using microdialysis technique. This study will enhance the understanding of altered BBB permeability in meningitis.

Jagdish Singh, Ph.D., Assistant Professor of Pharmaceutical Sciences, North Dakota State University
Student: Lisa Marie Vandrovec "Changes in Skin Resistance by Iontophoresis." This research evaluates an alteration in the skin barrier properties and transport enhancement of solutes by iontophoresis.

William Gurley, Ph.D., Associate Professor of Pharmaceutics, University of Arkansas for Medical Sciences

Student: Kathryn Neill "Age-Related Changes in Blood-Brain Barrier P-Glycoprotein Function." Our purpose is to determine the effects of aging on an active efflux pump present in the blood-barrier (BBB). In rats of varying age, microdialysis and High Performance Liquid Chromatography are employed to quantitate changes in BBB penetration.

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

Student: Hovhannes J. Gukasyan "Amino Acid Ester Prodrugs for Adenoviral Eye Infections." This research seeks to design topically applied drugs for treating eye infections.



Allen Nickols, Science Fellow at Monsanto/Searle, enthusiastically shares the results of his research at the Foundation's Poster Session.

Fellowship for Advanced Predoctoral Training in Pharmaceutics

Active for eleven years, this program assists awardees who have one or two years remaining in their pharmaceutics predoctoral training—the time during which they are engaged in dissertation research.

The fellowship program provides a stipend of \$12,000 a year for two years and \$500 a year for incidentals directly associated with the preparation of the dissertation. Five awards were made for 1999 bringing the total number of awards made to 71:

Those who received fellowships beginning between January and July 1999 are:

R. Tyler Degraw, University of Utah, College of Pharmacy (two years): "Development of a Local Intestinal Inhibition Model for the Enhancement of Oral Bioavailability." Many drugs have limited oral absorption caused by degradation from enzymes in the intestinal wall. This project will examine the use of enzyme inhibitors to improve the oral absorption of anti-AIDS drugs while minimizing the systemic effects of the inhibitor.

Gerald J. Fetterly, State University of New York at Buffalo, School of Pharmacy (two years): "Pharmaceutical Evaluation of Paclitaxel in Liposomes." Paclitaxel is a novel anticancer drug used to treat a variety of malignancies. The objective is to develop a safer and more efficacious formulation of paclitaxel by incorporating the drug in liposome drug carriers.

V. Mark Kothapalli, University of Iowa, College of Pharmacy (two years): "Study of the Effects of Plasticization of Polymeric Systems Utilizing Compression Calorimetry." Compression calorimetry represents an emerging technology to study the

energy required for tablet formation. A thermodynamic assessment of the compaction process will yield information about the strength and extent of interparticulate bonding in a tablet. This information will enable the rational selection of ingredients in formulation, the development of tablets with desired material properties, and the optimization of manufacturing efficiencies.

Peter T. Mayer, University of Utah, College of Pharmacy (two years): "Determination of Important Factors Contributing to Permeation of Compounds Across a Lipid Bilayer." Very little is known about the specific processes that are involved in the movement of drug molecules into and out of cells. One of the main components of cell walls are lipid bilayers and these are utilized to determine the factors that are important in these processes. The eventual goal in this research is to develop a model that predicts the behavior of molecules when encountering these barriers.

Patrick S. Mulski, University of Michigan, College of Pharmacy (two years): "Understanding the Molecular Association Between Crystallizing Solutes, Additives and Solid Surfaces and Their Application to the Isolation of Preferred Crystal Forms." The objective of this research is to understand the effects that additives and solvents have on the mechanisms and kinetics of crystal nucleation and growth of pharmaceutical compounds. By relating these effects to molecular associations in the crystal and in solution, Mr. Mulski intends to control the process of crystallization so that he might obtain crystals of the preferred structure and morphology.

Postdoctoral Research Fellowships in Pharmaceutics

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

Beginning his award in 1999:



Jeffrey P. Krise,
Postdoctoral Fellow,
Stanford University
School of Medicine,
"Molecular Analysis of
Mannose 6-Phosphate
Receptor Trafficking."

Dr. Krise seeks to

understand the mechanism by which a newly discovered protein, TIP47, facilitates the collection of Mannose 6-phosphate Receptors (MPRs) into transport vesicles that bud from the endosomes and carry the receptors to the Golgi. Specific aims include characterization of the interaction of TIP47 with the MPR cytoplasmic domains which will involve determination of those amino acids residues directly involved in binding. Additionally we will test if TIP47 and AP-2 compete for binding to the MPR and will also test the effect of MPR cytoplasmic domain palmitoylation and phosphorylation on TIP47:MPR interactions. These experiments will provide clues for understanding the mechanism of receptor trafficking in mammalian cells.

Ending his award in 1999:

William G. Mallet, Ph.D., Cornell University Medical College: "The Intracellular Transport and Localization of TGN38/41."

Pharmacoeconomics

Faculty Development Awards in Pharmacoeconomics

There is widespread concern about rising health care expenditures as well as increasing interest in understanding the impact of new therapies on patient-focused outcomes such as mortality, functional status, and quality of life. Because of these new perspectives, choices about new drugs are now based not only on traditional safety and efficacy measures but also on patient-assessed efficacy and economic values measures. A drug development program needs to include all of the outcome measures so that the information needs of the different decision makers can be met. Taking this into consideration, the PhRMA Foundation, recognizing the need for human resources to perform these outcome analyses, has implemented its Faculty Development Awards in Pharmacoeconomics program. Each award offers \$40,000 annually for two years. The program is now in its fifth year and has made two awards for 1999:

Beginning their awards in July 1999:



Brenda Motheral, Ph.D., Assistant Professor, College of Pharmacy, University of Arizona: "Validation of Pharmacoeconomics Models." Dr. Motheral has four major areas of

research emphasis:

(1) pharmacoeconomic model validation; (2) pharmacy benefit design evaluation; (3) small-area analysis; and (4) applied outcomes research. The model validation project will examine whether previously published decision-analytic models are representative of routine clinical care and whether the model results actually predict real-world experience. This project has the potential to contribute to both applied and methodological aspects of pharmacoeconomic and outcomes research. In the area of pharmacy benefit design evaluation, Dr. Motheral recently completed a study of a closed formulary and of a \$5 copay increase. Future efforts include an evaluation of a three-tier copay and a mail-order pharmacy benefit. The small-area analysis will examine rates of geographic variation in the utilization of pharmaceuticals by therapy class and identify predictors of this variation. The ultimate goal is not to just identify whether meaningful variation exists, but what factors predict this variation (e.g. physician supply in the area, managed-care penetration, etc.) and whether the variation is appropriate. The fourth area, labeled applied outcomes research, involves projects in a number of disease states including the cost effectiveness of aggressive depression treatment, and medication compliance in congestive heart failure and osteoporosis.



Aaron A. Stinnett, Ph.D., Assistant Professor, School of Public Health, University of Alabama at Birmingham; "Theoretical and Methodological Issues in the Economic

Evaluation of Health Interventions and on Applied Pharmacoeconomic Research." Dr. Stinnett's research includes three major components:

1. *Theoretical advances in pharmacoeconomics.* Dr. Stinnett's prior research in this area has addressed the relationship between constrained optimization and cost-effectiveness analysis and the relationship between human instinct and rational choice in health care. Planned research includes a formal examination of the concept of inefficiency in pharmacoeconomics, with a focus on the role of dominance in cost-effectiveness analysis.
2. *Methodological advances in pharmacoeconomics.* Examples of Dr. Stinnett's work in this area include papers on the advantages of using net benefits rather than ratio-based measures in pharmacoeconomic evaluations and on competing methods for estimating cost-effectiveness ratios in simulation-based studies. Plans for collaborative research include the development of methods of probabilistic analysis in economic evaluations that compare more than two treatments and the development of regression models for predicting health-related quality-of-life.
3. *Applied pharmacoeconomic research.* In addition to one-and-a-half years of pharmacoeconomic research experience in the pharmaceutical industry, Dr. Stinnett also was the principal investigator on a cost-effectiveness analysis of cholesterol

lowering therapies performed in cooperation with the U.S. Public Health Service's Panel on Cost-Effectiveness in Health and Medicine. Dr. Stinnett is working with colleagues to identify opportunities for clinically important and policy-relevant pharmacoeconomic research, in addition to co-authoring a follow-up to his previous work on cholesterol reduction.

Entering the second year of his award is:

C. Daniel Mullins, Ph.D., Assistant Professor, University of Maryland, School of Pharmacy (two years): "Integration of Theory and Practice of Pharmacoeconomics by Disease State."

Those who ended their awards in 1999 are:

John M. Brooks, Ph.D., Assistant Professor, College of Pharmacy, University of Iowa: "The Use of Instrumental Variable Techniques in Pharmacoeconomics Outcomes Research."

Matthew M. Murawski, R.Ph., Ph.D., Assistant Professor, Purdue University: "Development of a Pharmacoeconomic Center at The University of Mississippi."



The Foundation is sincerely appreciative to those at Reed/Elsevier (Reed Exhibitor Companies) for coming alongside the Foundation with our Gala. Many thanks to Michael Critser, Director, Industry Development for Reed Exhibition Companies, who went "above and beyond" to make it happen.

Research Grants

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

Ethical Considerations

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

Research Starter Grants

Research Starter Grants are intended to provide financial support for beginning investigators. The program, in 1999, supported five 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 513 grants have been made, including the five awards beginning January 1, 1999. In 2000, for the first time, the Research Starter Grant will become a one-year award for \$25,000.

Recipients of the Research Starter Grant which began January 1999:

Michelle D. Ardell, Ph.D. D., James H. Quillen College of Medicine, East Tennessee State University (two years): "Mechanisms of the Cardioprotective Agent Fostreicin in Ischemic Myocytes."

Pastor R. Couceyro, Ph.D., The Chicago Medical School, Finch University of Health Sciences (two years): "Characterization and Cloning of CART Peptide Receptors in the Brain."

Brian A. McCool, Ph.D., Texas A&M University Health Sciences Center, College of Medicine (two years): "Cellular Basis for Anti-anxiety Activity and Side-effect Liability of Benzodiazepine and Novel Anxiolytic Therapies."

Raymond R. Mattingly, Ph.D., Wayne State University School of Medicine (two years): "Regulation of Ras through the Ras-GRF Exchange factor."

Rosita J. Rodriguez, Ph.D., Oregon State University College of Pharmacy (two years): "Metabolism and Covalent Binding of Ketoconazole in Rat Hepatic Tissue."

Based on need for funds, a review of the eight research starter grantees whose awards began January 1, 1998, for a second year of the award resulted in seven of them having their awards continued. Those who did not receive the second year should be congratulated on receiving further funding.

Rama S. Dwivedi, Ph.D., Northwestern University, School of Medicine: "Regulation of Adenosylmethionine (Adomet) Synthetase Gene Expression in Neuroblastoma Tumor Cells. A Potential Role in Drug Resistance."

Linda A. Felton, Ph.D., University of New Mexico, College of Pharmacy: "Influence of Additives in Aqueous Polymeric Dispersions on Film-Tablet Adhesion."

Richard Z. Lin, M.D., University of Texas, Medical School at San Antonio: "Sphingosine-1-phosphate Inhibits Vascular Smooth Muscle Cell Migration via p38 Mitogen Activated Protein Kinase."

Jose E. Manautou, Ph.D., University of Connecticut, School of Pharmacy: "Regulation of Hepatic ATP-Dependent Transport Proteins and their Potential Role in the Hepatobiliary Secretion of Model Hepatotoxic Agents."

Peter W. Swaan, Ph.D., Ohio State University, School of Pharmacy: "Molecular Specificity of the Intestinal Bile Acid Carrier."



Report of the Treasurer

Mr. Patrick J. Zenner
Secretary-Treasurer
PhRMA Foundation

The PhRMA Foundation has been building the infrastructure for biomedical science for nearly 34 years now. By jumpstarting the careers of young scientists, the Foundation has planted the seeds for the future of medicine and the future of our industry. During this time, the Foundation has been supported by the generosity of the research-intensive pharmaceutical manufacturers — the PhRMA member firms — associates and research and international affiliates. As I recap the finances of this prestigious Foundation for 1998, I would like to give special thanks to our benefactors who are listed in the back of this *Annual Report*.

The total income of the Foundation in 1998 was \$2,374,573. Of this amount, \$1,549,652 came from contributions; \$337,645 came from interest and dividends; \$100,592 was from realized gains on sales of securities; \$354,376* was unrealized gains on sale of securities; and \$32,308 came from unexpended grant monies.

In 1998, grant expenditures totaled \$1,405,929; Foundation Annual Awardee Meeting expenses amounted to \$70,185; Advisory Committee Meetings and Travel was \$39,871; Honoraria totaled \$21,850; Publications cost \$43,732; Professional Services totaled \$57,521; rent** and Office Expenses for 1998 Salaries, Taxes and Trust Commission totaled \$387,090. The total net assets as of December 31, 1998 was \$5,345,867. 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, 1998, the contingency liability for 1999-2001 was \$2,891,186.

It is certainly worthy of note that expenses in the Foundation were reduced by 36 percent in 1998. At the same time contributions have risen by three percent last year and nine percent total over the last two years. The Board wishes to congratulate Donna Moore and the Foundation staff for this accomplishment. The Board feels that the Foundation is certainly on solid ground entering the new millennium.

The Foundation's financial position as of December 31, 1998, has been audited by the Rosslyn, Virginia accounting firm of Buchanan & Company.

A handwritten signature in dark ink, reading "Patrick J. Zenner". The signature is fluid and cursive, with a large, stylized "P" and "Z".

Patrick J. Zenner
Secretary-Treasurer, PhRMA Foundation
and
President and Chief Executive Officer
Hoffmann-La Roche Inc.

* FASB rules require that unrealized gains on sales of securities be reported as part of total income.

** Effective May 1, 1998, PhRMA began contributing the space to the Foundation so no further rental payments will be made. Cash paid for rent in 1998 was \$7,428. The remaining \$14,856 was recorded as a contribution bringing total rent expense to \$22,284.

Statement of Income and Expenditures For the Year Ended December 31, 1998

Income:

Contributions	\$1,549,652
Interest and Dividends	337,645
Realized Gains on Sale of Securities	100,592
Unrealized Gains on Sale of Securities	354,376
Miscellaneous Income	<u>32,308</u>

Total Income	<u>\$2,374,573</u>
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Expenditures:

Programs:

Grants — Note A

Faculty Awards in Clinical Pharmacology	287,875
Faculty Awards in Basic Pharmacology	128,000
Fellowships for Careers in Clinical Pharmacology	116,250
Advanced Predoctoral Fellowships in Pharm/Toxicology	194,876
Pharmacology-Morphology Fellowships	122,678
Research Starter Grants	175,000
Advanced Predoctoral Fellowships in Pharmaceutics	115,000
Undergraduate Fellowships in Pharmaceutics	35,000
Postdoctoral Fellowships in Pharmaceutics	31,250
Faculty Development Award in Pharmacoeconomics	140,000
Faculty Development Award in Bioinformatics	60,000
Subtotal - Grants	\$1,405,929

Annual Awardee Meeting	70,185
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Program Total	\$1,476,114
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Administrative

Committee Meetings and Travel	39,871
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Management and General:

Honoraria	21,850
Publications	43,732
Office Expense	32,884
Professional Services	57,521
Rent	22,284
Salaries and Retirement Fund Contribution	116,315
Taxes, Insurance and Depreciation	29,522
Trust Commission Expense	<u>8,982</u>

Administrative Total	\$372,961
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TOTAL EXPENDITURES	<u>\$1,849,075</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, 1998 the amounts still to be disbursed with respect to these grants amounted to aggregated \$2,891,186 with \$1,726,236 of this to be disbursed during 1999; \$1,009,050 in 2000; \$155,900 in 2001.

Change in Net Assets	\$525,498
Net Assets, January 1, 1998	\$4,820,369
Net Assets, December 31, 1998	\$5,345,867



Organization and Administration

The PhRMA Foundation operates through its Officers, Board of Directors and six advisory committees. On March 29, Mr. Robert C. Black, President of Zeneca Pharmaceuticals, stepped down as Chairman, after four years as Chairman. The Foundation Board presented Bob with a crystal gavel as a small token of their sincere appreciation for his vital leadership. The Board elected Mr. Jan Leschly, Chief Executive of SmithKline Beecham plc, as Chairman, Robert A. Ingram, Chairman, Chief Executive Officer and President of Glaxo Wellcome Inc., as Vice Chairman, and Patrick J. Zenner, President and Chief Executive Officer as Secretary-Treasurer.

Donna Moore served as President and CEO. Continuing as Chief Science Advisor is William R. Darrow, M.D., Ph.D., Senior Medical Advisor for Schering-Plough Research Institute, Schering-Plough Corporation. Dr. Darrow has served as Chairman of the Scientific Advisory Committee and continues in that capacity.



1999-2000 Officers



Jan Leschly

Chairman

PhRMA Foundation

Chief Executive Officer

SmithKline Beecham

Philadelphia, Pennsylvania



Robert A. Ingram

Vice Chairman

PhRMA Foundation

Chairman, Chief Executive Officer and
President

Glaxo Wellcome Inc.

Research Triangle Park, North Carolina



Patrick J. Zenner

Secretary-Treasurer

PhRMA Foundation

President and Chief Executive Officer

Hoffmann-La Roche Inc.

Nutley, New Jersey



Donna Moore

President

PhRMA Foundation

Washington, D.C.

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President
Zeneca Pharmaceuticals
Wilmington, Delaware



***Wayne P. Yetter**

President and Chief Executive Officer
Novartis Pharmaceuticals Corporation
East Hanover, New Jersey

*Resigned from Foundation Board 1999



Alan F. Holmer

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



Richard J. Markham

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Chief Executive Officer
Hoechst Marion Roussel Inc.
Bridgewater, New Jersey



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Vice Chairman, Board of Directors
Johnson & Johnson
New Brunswick, New Jersey

Staff Consultant



William R. Darrow, M.D., Ph.D.

Chief Scientific Advisor, *PhRMA Foundation*
Senior Medical Advisor
Schering-Plough Research Institute
Schering-Plough Corporation
Kenilworth, New Jersey

Advisory Committees



Scientific Advisory Committee



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Schering-Plough Research Institute
Schering-Plough Corporation
Kenilworth, New Jersey

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Professor and Chair Emeritus
Department of Medicine
Brown University
Providence, Rhode Island

Michael D. Gershon, M.D.

Professor and Chairman
Department of Anatomy & Cell Biology
Columbia University
College of Physicians and Surgeons
New York, New York

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President
MediScience Associates
New Rochelle, New York

James Swarbrick, D.Sc., Ph.D.

Vice President
Research and Development
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Wilmington, North Carolina

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Retired, Senior Medical Advisor for
Health Affairs
International Surveillance Epidemiology and
Economics
Glaxo Wellcome Inc.
Research Triangle Park, North Carolina
and
Senior Advisor to the Dean
University of North Carolina at Chapel Hill
School of Public Health
Chapel Hill, North Carolina

Irwin M. Weiner, M.D.

Emeritus Professor and Former Dean
College of Medicine
State University of New York, Brooklyn
Health Science Center
Brooklyn, New York

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(Chairman)

Professor and Chair Emeritus
Department of Medicine
Brown University
School of Medicine
Providence, Rhode Island

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Clinical Director
National Institute on Aging
Chief, Laboratory of Investigation
Gerontology Research Center
Baltimore, Maryland

Thorir D. Bjornsson, M.D., Ph.D.

Vice President, Clinical Pharmacology
Worldwide Clinical Research &
Development
Bristol-Myers Squibb
Princeton, New Jersey

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Professor of Medicine and Molecular
Pharmacology
Division of Clinical Pharmacology
Stanford University
School of Medicine
Stanford, California

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Clinical Sciences
Merck & Co., Inc.
Rahway, New Jersey

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State University of New York, Brooklyn
Brooklyn, New York

James W. Aiken, Ph.D.

Director of Experimental Biology
Pharmacia & Upjohn AB
Stockholm, Sweden

Terry L. Bowlin, Ph.D.

Vice President, Research
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Professor and Former Chairman
Department of Pharmacology and
Toxicology
Michigan State University
East Lansing, Michigan

George C. Fuller, Ph.D.

Dean and Professor of Pharmacology
College of Pharmacy and Allied Health
Professions
Wayne State University
Detroit, Michigan

Paul S. Guth, Ph.D.

Professor of Pharmacology
School of Medicine
Tulane University
New Orleans, Louisiana

George R. Lenz, Ph.D.

Vice President, R&D
NeoGenesis Inc.
Cambridge, Massachusetts

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William G. Swartzchild, Jr. Distinguished
Chair in Research
Head and Director of Research
Children's Memorial Institute for Education
and Research
Professor of Pediatrics and Pharmacology
Northwestern University Medical School
Chicago, Illinois

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

Frederick M. Radzialowski, Ph.D.

President
FMR Research Associates
Glenview, Illinois

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Morphology Advisory
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Columbia University
College of Physicians & Surgeons
New York, New York

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Professor and Former Chairman
Department of Pharmacology
University of Medicine & Dentistry
of New Jersey
Newark, New Jersey

Cheryl Dreyfus, Ph.D.

Professor
Department of Neuroscience & Cell Biology
University of Medicine and Dentistry
of New Jersey
Robert Wood Johnson Medical School
Piscataway, New Jersey

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Pathology & Experimental Toxicology
Parke-Davis Pharmaceutical Research
Ann Arbor, Michigan

Robert B. Jennings, M.D.

James B. Duke Professor of Pathology
Duke University School of Medicine
Department of Pathology
Durham, North Carolina

Hugh B. Lewis, B.V.M.S.

Senior Vice President
Practice Development
Medical Management International Inc.
Portland, Oregon

David L. Nelson, Ph.D.

Senior Research Scientist
Lilly Research Laboratories
Lilly Corporate Center
Indianapolis, Indiana

Henry J. Ralston III, M.D.

Professor and Chairman
Department of Anatomy
School of Medicine
University of California, San Francisco
San Francisco, California

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Committee**



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(Chairman)**

Vice President
Research & Development
AAI Inc.
Wilmington, North Carolina

William J. Curatolo, Ph.D.

Assistant Director
Pfizer Central Research
Pfizer Inc.
Groton, Connecticut

William I. Higuchi, Ph.D.

Distinguished Professor and Chairman
Department of Pharmaceutics
College of Pharmacy
University of Utah
Salt Lake City, Utah

George Zografi, Ph.D.

Professor of Pharmaceutics
School of Pharmacy
University of Wisconsin-Madison
Madison, Wisconsin

Pharmacoeconomics Advisory Committee



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(Chairman)

Director of Industry Affairs
Hoechst Marion Roussel
Kansas City, Missouri

Lyle Bootman, Ph.D.

Dean
College of Pharmacy
University of Arizona
Tucson, Arizona

Jane T. Osterhaus, Ph.D.

Director of the Anthritis Team
Searle
Skokie, Illinois

Frederick W. Telling, Ph.D.

Vice President
Corporate Strategic Planning & Policy
Pfizer Inc.
New York, New York

*Viewing awardee's research at
Poster Session is George
Condouris, Ph.D., member of
the Pharmacology/Morphology
Advisory Committee and
Professor and Former Chair-
man, Department of Pharma-
cology/Toxicology, New Jersey
Medical School, UMDNJ.*



Descriptive brochures and application forms for all of the PhRMA Foundation grant programs are available on the World Wide Web:
www.phrmaf.org.
For more information, please write to:

Ms. Donna Moore
President

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

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



Over \$3.5 Million

Hoffmann-La Roche Foundation
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Bristol-Myers Squibb Foundation
Bristol-Myers Squibb Company

Over \$2.5 Million

The Merck Company Foundation
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Warner-Lambert Foundation
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Over \$2 Million

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

Over \$1 Million

- Novartis Corporation
- Abbott Laboratories
- Hoechst Marion Roussel Inc.
- Searle
 - Searle Pharmaceutical Group
- Schering-Plough Foundation, Inc.
- Schering-Plough Corporation
- Astra/Zeneca Pharmaceuticals

Over \$500,000

- Bayer Corporation
- Boehringer Ingelheim Corporation
 - Boehringer Ingelheim Pharmaceuticals, Inc.
- Sanofi Pharmaceuticals, Inc.

Over \$250,000

- The Procter & Gamble Company
- Rhone-Poulenc Rorer Inc.

Over \$100,000

- 3M Pharmaceuticals
- Amgen Inc.

\$100,000 (and under)

- Organon Inc.
- Knoll Pharmaceutical Company
- Pasteur Merieux Connaught
- Yamanouchi U.S.A., Inc.
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Special Contributor to the Foundation

- Reed/Elsevier

*Aggregate contributions

***Special thanks go to all of the following companies
and individuals who have come alongside the
Foundation by participating in the
Awards-in-Excellence Gala***

**April 20, 1999
Grand Hyatt New York**

American Home Products	• NAC Environmental
American Pharmaceutical Review	• NASA
Amgen	• Novartis
Astra/Zeneca Pharmaceuticals	• Oracle
Bayer Corporation	• PA Department of Economic Development
DAICHI Pharmaceuticals	• Chris Pendergast
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Glaxo Wellcome, Inc.	• Secretary-Treasurer, PhRMA Foundation
Hoffmann-La Roche	• and
Johnson & Johnson	• President and Chief Executive Officer
Kelly Waldron	• Hoffmann-La Roche, Inc.
Horace H. Loh, Ph.D.	•
Frederick and Alice Stark Professor and	•
Head, Department of Pharmacology,	•
University of Minnesota	•



PhRMA Foundation Current Programs for—2000

Name of Program/ Year of First Awards	Number of Awards Budgeted Yearly/ Length of Award	Program Budget	Deadline Announcement Date Starting Time
Clinical Pharmacology Advisory Committee			
(1) Faculty Awards in Clinical Pharmacology (1967)	3 budgeted/ 3 years	\$ 360,000 total \$ 40,000 per award per year	October 1 December 15 July 1
(2) Fellowships for Careers in Clinical Pharmacology (1973)	2 budgeted/ 2 years	\$ 96,000 total \$ 24,000 per award per year	October 1 December 15 July 1
(3) Medical Student Research Fellowships (1974-Amended 1982)	4 budgeted/ 3 months up to 24 months	\$ 48,000 total \$ 1,000 per month maximum \$ 12,000	October 1 December 15 July 1
Basic Pharmacology Advisory Committee			
(4) Faculty Awards in Basic Pharmacology/Toxicology (1973)	2 budgeted/ 2 years	\$ 120,000 total \$ 30,000 per award per year	September 15 December 15 July 1
(5) Research Starter Grants (1972)	6 budgeted/ 1 year	\$ 150,000 total \$ 25,000 per award	September 1 December 15 January 1
(6) Advanced Predoctoral Fellowships in Pharmacology/Toxicology (1978)	9 budgeted/ 1 or 2 years	\$ 225,000 total \$ 12,500 per award per year	September 15 December 15 January-August
(7) Award in Bioinformatics (1997)	1 budgeted/ 2 years	\$ 60,000 total \$ 30,000 per award per year	September 1 December 15 July 1
Pharmacology-Morphology Advisory Committee			
(8) Fellowships in Pharmacology-Morphology including Cell Biology (1968)	3 budgeted/ 2 years	\$ 129,000 total \$ 21,500 per award per year	January 15 March 15 July 1
Pharmaceutics Advisory Committee			
(9) 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
(10) Undergraduate Research Fellowships in Pharmaceutics (1990)	7 budgeted/ 1 year	\$ 35,000 total \$ 5,000 per award	October 1 December 15 January-July
(11) Postdoctoral Fellowships in Pharmaceutics (1992)	1 budgeted/ 1 or 2 years	\$ 50,000 total \$ 25,000 per award per year	October 1 December 15 January-December
Pharmacoeconomics Advisory Committee			
(12) Faculty Awards in Pharmacoeconomics (1995)	2 budgeted/ 2 years	\$ 160,000 total \$ 40,000 per award per year	September 1 December 15 July 1

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



**Pharmaceutical Research and Manufacturers
of America Foundation**

1100 Fifteenth Street, N.W.
Washington, D.C. 20005