

THE PHYSIOLOGIST



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EDITORIAL

I Have A Dream

The National Association for Biomedical Research (NABR) held its 10th Anniversary Conference January 28–30, 1990. The conference was designed to provide an open forum to share the experiences and concerns of both NABR members and federal agencies. Its goal was to solidify and coordinate action plans and policies within the community—research institutions, professional societies, and federal agencies—to respond effectively to the various crisis situations that confront the scientific community. As an active player in efforts to ensure that researchers continue to be able to use animals humanely, APS was asked to participate in the meeting. Specifically, we were asked “to discuss APS’ role in responding to the animal rights movement and (our) program and policies for assisting its members.” The following are my comments from the meeting.

I have a dream that someday researchers who use animals will be revered rather than reviled by a growing segment of the public.

I also have a dream that animal welfare regulations will be written to protect animals used in research as opposed to eliminating them from use because of the cost of overregulation.

Unfortunately, these are only dreams! Until the dreams become a reality, it will be necessary for us to continue to gather in meeting rooms and plot strategy.

The strategy I am asked to plot at this conference is “What should the involvement of a professional society be when a laboratory has been trashed?”

Sixty-Third President of APS

Shu Chien

Shu Chien was installed as the 63rd president of the American Physiological Society at the close of the Society’s spring meeting in Washington, DC.

Chien, a professor of bioengineering and medicine at the University of California-San Diego, succeeds Vernon S. Bishop, professor of pharmacology at the University of Texas Health Sciences Center in San Antonio.

A 23-year member of APS, Chien has served on the editorial boards of the *American Journal of Physiology*, the *Journal of Applied Physiology*, and the *American Journal of Physiology: Heart and Circulatory Physiology*. He also has been an active contributor to

the Society’s educational programs, including the slide-tape program on peripheral circulation and the *Handbook of Physiology: Circulation*.

In 1985, he was elected to the APS Council by the membership and last year was elected president-elect.

When Chien was elected to the Council, the Society was in the process of changing its governing structure with the goal of increasing the role of sections and broadening representation in the Society with members from various fields of interest. Using data from a membership survey, Chien proposed the Society change its procedures for the nomination of officers in order to broaden sectional representation on the Council. The proposal was adopted by the membership and has been in use since 1988.



“... physiologists have the responsibility to bridge the gap between molecular biology and organ-system research.”

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EDITORIAL

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The issue, however, is not focused on break-ins, trashings, theft, or vandalism. The issue is focused on a crime of both violence and passion. And the result is comparable to a crime we all find abhorrent, a crime in which the victim is often portrayed as the criminal and the perpetrator the innocent party. That comparable crime is called rape!

In order for the scientific community to have its anger heard, we cannot speak of passionless crimes of theft and break-ins. Instead, we must speak with the same passions reserved generally for discussions of rape!

Like rape, the actions of the animal liberation front represent violent intrusions into the person of the laboratory scientist. And it is a responsibility of the scientific society to ensure that the "defense attorney," in this case PETA and ALF, is not able to convince the public that the researcher is a criminal rather than an innocent victim. The scientific society must serve as the support group for those victimized by criminal actions.

A principal role for a professional society in situations where a laboratory has been trashed and an investigator has been sullied is to publicly uphold the need for the kind of research be-

ing challenged and to defend the privilege of an investigator to humanely use the laboratory animals required in such research.

The statement issued by the professional society must strongly condemn the actions of the animal activists, but it cannot refute the allegations unless a complete investigation has been performed. Only the aggrieved institution and the investigator can provide a refutation of the charges.

"... we cannot speak of passionless crimes of theft and break-ins . . . we must speak with the same passions reserved . . . for discussions of rape!"

The purpose of the statement made by the professional society is to inform the public, the press, and the media that such research is necessary and live animal models are a necessary part of the research performed, despite the charges raised by the animal activists.

Since its inception in 1887, the American Physiological Society has done battle with the animal activists. However, the antivivisection movement of the late 19th and early 20th centuries lacked the political sophistication of the current movement, making the task at that time much simpler.

The political sophistication of the current community of antivivisectionists and their commitment to violent action now make the task of the APS and other professional societies more difficult. Since the 1981 invasion of the laboratory of APS member Ed Taub, the Society has explored a dozen or so avenues in attempts to determine its role, if any, when a member's laboratory or office has been ransacked by animal activists.

One idea extensively explored by APS included the establishment of geo-

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Deadline for submission of material for publication: Dec. 5, February issue; Feb. 5, April issue; April 5, June issue; June 5, August issue; Aug. 5, October issue; Oct. 5, December issue. **If you change your address or telephone number, please notify the central office as soon as possible.**

Headquarters phone: (301) 530-7164. TELE-FAX: (301) 571-1814.

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PRESIDENT

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Chien has made a significant effort to share the knowledge and insights he has gained from learning molecular biology as a classical physiologist with the APS membership. During the APS centennial celebration in 1987, he organized a symposium on "Molecular Biology in Physiology." At the 1987 fall meeting in San Diego, he organized a mini-theme on "The Application of Molecular Biology to Physiology," which included two symposia and a hands-on workshop. For the 1988 fall meeting in Montreal, Chien organized a mini-theme on "Molecular Biology of the Cardiovascular System," including a tutorial, a symposium, and a hands-on practicum.

It is Chien's belief that physiologists have a major role to play in applying molecular biological techniques to the study of physiological problems. As he said in "Molecular Biology in Physiology" (p. 15, Raven Press, New York 1989):

The modern technologies of molecular biology have made it relatively easy to clone a gene of interest, but it often is difficult to determine its function. While the application of molecular biological techniques will help to open new horizons for physiological research, molecular biology is in search of problems to be solved, especially those of physiological relevance. In physiology the scope of investigations ranges from molecules and cells to tissues and organs. Hence, physiologists have the responsibility to bridge the gap between molecular biology and organ-system research.

Chien has further emphasized that physiological research at the organ-system level should be continued, adding that in fact such research should be strengthened by using all of the research techniques at our disposal.

Chien begins his tenure as president at a time when APS is in a dynamic phase of growth and development. Among the positive changes noted are the progressive strengthening of the sections, improvements in the governing structure, publication of new journals (*AJP: Lung Cellular and Molecular Physiology* and *Advances in Physiological Education*), transfer of the publication of handbooks and other book series to a publishing company, alteration of the meetings format (from a single fall meeting to multiple specialty conferences), improvement of programming procedures, and streamlining of the membership application review process.

"Although the Society is moving forward with vitality, we still face many problems. We need to work together to strengthen physiology as a discipline and APS as a Society," Chien said.

"A serious problem faced by physiologists, actually by all biomedical scientists, is the serious shortage of research funds. The National Institutes of Health funding percentile is down to the low teens," Chien said. "This means that many excellent investigators will lose funding support and much meritorious research will be discontinued. Research cannot be turned on and off like a faucet. Many years of effort are required to build an effectively functioning laboratory, and

once it is discontinued, recovery is extremely difficult, if ever possible."

Chien noted that the stringency of funding is a serious deterrent for potential young scientists to choose physiology or other biomedical sciences as a career and the current funding pattern will have a far-reaching and devastating effect on the future of biomedical research, if not immediately corrected.

"Although we still hold a leading position in the world in the area of biomedical research, the continuation of the current policies will have a disastrous effect and the nation's position will erode quickly," Chien predicts.

"And what has happened to the automobile industry will soon occur in biomedical research. . . ."

"A good analogy is our automobile industry. Thirty years ago, Detroit clearly was in a commanding position," Chien said. "And what has happened to the automobile industry will soon occur in biomedical research, probably with even greater rapidity."

In looking for a solution to the problem Chien said, "What we need to do is to strongly and clearly voice our views to the legislative and executive branches of our federal government, emphasizing the serious nature of the situation and demanding immediate remedy."

In a plea to all APS members, Chien urged everyone to take a few moments and write or telephone their Congressional delegation about the need to adequately fund biomedical research and, whenever possible, to visit with their senators and representatives in Washington or when they are in their home district. "Both APS and FASEB are doing this as scientific societies," Chien noted, "but what really is needed are the voices of the constituents."

Another important issue to physiologists, Chien cited, is the challenge of the animal activists. "APS is working hard on this," he said, "and the passage by the Senate of the Animal Research Facilities Protection Act, which would make the vandalizing and stealing from research facilities a federal offense, is a positive step." Similar legislation, H.R. 3270, is being considered in the House.

"Again, we need to make our views on the animal issue known to our elected representatives," Chien said, "We should make every effort to let the citizens-at-large know that animal research benefits the health and well being of both humans and animals, and scientists are humane in the care and use of laboratory animals."

APS and the other incorporated societies of FASEB are reassessing the future of FASEB, and Chien believes the efforts to broaden the representation of scientific societies in FASEB are worthwhile and essential. He also believes that with the cooperation and understanding of all concerned,

FASEB can emerge as an organization that can represent a broad spectrum of the scientific community and effectively promote biomedical research.

"The strength of APS lies in its members and their participation in the affairs of the Society," Chien said. "The future of the Society depends on its ability to attract young members."

Chien is asking each member to recruit new members (including associate and student members), especially young scientists with an interest in physiology. He also said he wants to see a greater participation by members in Society affairs and programs, either directly or through the individual sections. Such activities include volunteering for committee assignments, generating ideas for programs, and contributing to and reviewing for the APS journals.

"The Council, the sections, committees, and the APS national office all welcome input from the membership," Chien said. "Indeed, the entire Society needs input from the membership."

Chien comes to the APS presidency with years of experience serving scientific societies, including president of the Microcirculatory Society, president of the American-Chinese Medical Society, and chairman of the steering committee of the North American Society of Biorheology. He also helped Academia Sinica in Taiwan to establish the Institute of Biomedical Sciences.

The 58-year-old Chien is the fifth from California and the first of Asian origin to be elected president of the 104-year-old Society. He was born in Peiping (now Beijing) and grew up in Shanghai.

Chien went to the National Peking University for his pre-medical education and then the medical school of the National Taiwan University. After completing his medical education and an internship, Chien decided to devote his career to basic science research and teaching.

He was awarded a Li Foundation fellowship to come to the United States to study physiology at Columbia University's College of Physicians and Surgeons. Under the advisorship of Dr. Magnus Gregersen, he performed his doctoral dissertation research on the role of the sympathetic nervous system in compensatory mechanisms to hemorrhage.

Following his graduation in 1957, Chien remained at Columbia, where he served for a year as an instructor and, in 1958, was promoted to assistant professor of physiology. During the late 1950s and early 1960s Chien continued his research on hemorrhage and shock (including that induced by x-irradiation, histamine, endotoxin, and pericardial tamponade) with emphasis on the roles of neurohumoral regulation, blood volume, and capillary permeability. In the course of these studies, he discovered that changes in flow properties of the blood also may play a significant role in some of these conditions.

By 1964, when he was promoted to associate professor, Chien's research emphasis had shifted to the mechanisms controlling blood viscosity. In such studies, biophysical and engineering principles and techniques are used to study phys-

iological problems. As a result, he began working closely with engineering colleagues, developing novel interdisciplinary approaches at the interface of biology, medicine, and engineering.

In 1969 he was appointed director of the Division of Circulatory Physiology and Biophysics and promoted to the rank of full professor.

By the early 1970s Chien had become a leading authority in blood rheology, largely because of his elucidation of the fundamental mechanisms governing blood viscosity, including red cell deformation and aggregation. He began applying such basic knowledge to investigate rheological abnormalities in a variety of diseases, including sickle cell, paraproteinemias, acute myocardial infarction, hypertension, and surgical conditions. For his contributions in these studies Chien was awarded the first Fahracus Medal of Clinical Hemorheology in 1981.

While applying blood rheology to clinical investigations, Chien also began to probe into microrheology of blood at levels of cells and membranes and into the influence of blood rheology on blood flow in vivo, especially microcirculation. In recognition of these accomplishments, Chien was given the Landis Award in Microvascular Research in 1983.

For the last five years, Chien's research has extended into the molecular biology of red blood cell membrane proteins and the molecular basis of cell-cell interactions. In pursuing these studies at the molecular level, Chien has continued to keep his focus on the more global problems at the organ-system level. His long-term goal in working on the molecular structure of erythrocyte membrane skeletal proteins is to provide the information needed to deduce the microarchitecture of the membrane skeleton, so he can proceed to interpret microrheological findings on single cells and, eventually, flow and deformation in the circulation in health and disease.

Chien also is performing experiments on the effects of blood cell properties on regional blood flow distribution in intact animals. The ultimate goal is to experimentally manipulate the molecular structure of the erythrocyte membrane skeleton and to determine the consequence on blood flow in vivo.

Chien's research career is characterized by his learning and application of new concepts and technology to solve fundamental physiological problems. His interdisciplinary approach to physiological research on the role of blood cells in blood flow spans a wide spectrum of objects ranging from molecules to cells, tissues, organs, and the whole body. The scheme he published in his Landis Award lecture to represent this approach is the basis of a diagram used by APS to summarize modern physiological research activities.

Drawing upon his own research career, Chien reminded the membership that "physiology is poised at the threshold of a golden period. If we can take advantage of the marvelous new technologies, we will not only make significant advances in physiology, per se, but also place physiology at the center stage in this new era of development in biomedical sciences." ¶

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graphically designated truth squads, composed of experts who would serve as SWAT teams to investigate and respond to the allegations of the activists after carefully investigating the charges.

After the break-in at the Institute of Behavioral Research, the Society conducted its own investigation of the allegations made by PETA of animal cruelty and fraudulent research. The purpose of the investigation was threefold: 1) to determine the basis, if any, for the allegations; 2) to determine whether the granting agency and/or the institution had treated the investigator fairly; and 3) to determine the objectivity of the press and media in their reports. Neither these nor other considerations explored by APS ever proved to be completely satisfactory to the investigator or the institution that had been attacked.

During the last decade, the only response that has continued to prove to be beneficial to a member sullied by the animal activists is the issuance of a public statement describing the research, its prospective benefits, and the need to humanely use laboratory animals for the research in question.

APS has found that such statements are not only received with authority but also serve as a statement independent of and distanced from the institution and investigator under attack. This provides the public, the press, and the media with a balance between the allegations of fraud and cruelty by the activists and the defensive comments from the victims.

The key element in the response of the professional society is time. An action by a society has a limited life span measured in hours. Any statement emanating from a professional society or an institution and its investigator must be issued within 24 hours after the crime. Second- or third-day comments are too late to make a positive impact on public opinion.

The most recent episode of forced entry into an APS member's laboratory occurred on July 4th, 1989, when the animal liberation front vandalized the

laboratory of John Orem at Texas Tech University.

In three short paragraphs, the APS statement described the society, condemned the destruction by the animal activists, and spoke of Dr. Orem's international reputation and his research in the area of sudden infant death syndrome. It also spoke of the need to determine the cause of crib death, which affects countless children during their first three years of life, and why intact living organisms are needed to monitor these physiological systems.

"... the scientific society must serve as the support group for those victimized by criminal actions. . . ."

The statement was picked up by the wire services and was used in news reports as a bridge between charges and countercharges about frivolously funded federal research and the needless use of animals.

The bottom line is that often the professional society is the only voice telling the public, the press, and the media what the ruckus is all about. The federal government remains mute whenever its grantees are charged with animal abuse by animal activists. And tragically, some universities and research institutions remain silent, adding to the credibility of the activists' charges.

Inaction by support groups leaves the investigators, as well as the rape victims, fending for themselves in negatively charged environments that provide for a lose-lose situation.

The professional society represents the support group for the victimized investigator. Whenever a member is attacked, it is the responsibility of the professional society to condemn the actions of the activists and to uphold the need for the kind of research being challenged. Additionally, it is the professional society's responsibility to defend the member's privilege to hu-

manely use animals for such research. That is the least any member should expect from his or her professional society in a time of need.

Professional societies also have a responsibility to those members who have not been victimized by PETA and ALF. It is the society's responsibility to help prepare its members to deal with the activists through educational and informational programs.

The American Physiological Society prepares its members by conducting several educational programs each year. In April, at the annual meeting, the Society is presenting a program on "Media Training for the Scientist." Other programs planned for this year include a workshop on the recently promulgated animal welfare act regulations and a workshop on how to establish grassroot support groups. Previous workshops focused on the law and institutional care and use committees; how coalitions deal with the animal issue; and strategies for dealing with the proposed repeal of pound release laws.

As for informational tools, the Society has developed a brochure entitled "Considerations for Medical Students Using Lab Animals." More than 20,000 copies of the brochure have been distributed to medical students at the beginning of the animal laboratory component of their coursework. The same brochure has also been placed in surgery waiting rooms and on patient meal trays.

The Society has also developed a model pound release bill that is being distributed upon request to APS members. Since its development, the Society has provided numerous copies to its members.

The Society is also in the process of preparing a model animal facilities bill that would require localities and/or states to set standards of animal care for pounds, shelters, animal clinics and hospitals, kennels, and pet shops.

The model animal facilities bill is being developed to counter the actions of activists seeking legislation to restrict animal use by scientists and educators at the state and local levels. Such coun-

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Official Indicates USDA Will Repropose Part III of Animal Welfare Regulations

A senior official at the US Department of Agriculture (USDA) said within 12 to 18 months the agency probably will repropose the rules for the controversial Part III of the animal care regulations being added to the Animal Welfare Act.

Part III proposes regulations for the exercise of dogs and the psychological well being of primates. Part I (definitions) and Part II (administration and management) were enacted in October. The regulations are being promulgated to implement Congressional amendments to the Act.

In response to a direct question from the American Physiological Society, Joan Arnoldi said the Animal and Plant Health Inspection Service is still reading the more than 20,000 letters of comment, mostly from the scientific community, and in all probability the new regulations will be proposed within the next 12 to 18 months.

Arnoldi is the USDA's deputy administrator for regulatory enforcement and animal care.

Animal Activist Gets Fine, Probation for NIH Damage

A 40-year-old New York man was fined \$100 and sentenced to one-year probation for breaking down the door to the administration building at the National Institutes of Health last April during a demonstration by animal activists protesting the use of laboratory animals.

Edward M. Ashton of Beacon, NY, also was ordered to perform 40 hours of community service and to pay \$667 in restitution for the damaged door. He could have been fined \$250,000 and sentenced up to 10 years by Judge Joseph C. Howard of the US District Court in Baltimore.

Ashton was found guilty on felony charges resulting from the damaged door. Two other activists, Alex Pacheco and Carol Lyn Burnett, were acquitted of charges resulting from the April 24 demonstration. Pacheco is the founder and chairman of People for the Ethical Treatment of Animals and Burnett is the organization's director of communications.

Activist Gets Probation

An animal activist who was arrested in 1988 for possession of two powerful pipe bombs found in her Queens, NY, apartment has been sentenced to three-years probation and the time served in jail, November 1988 to January 1990.

However, Fran Stephanie Trutt, 34, remains in custody because she was turned over to law enforcement authorities in Connecticut where she will face attempted murder and other charges, according to US Attorney Leslie R. Caldwell.

Trutt pleaded guilty last summer in US District Court in Brooklyn to possession of the two pipe bombs after she was charged with planting another bomb in the parking lot of the United States Surgical Corporation in Norwalk, CT. The medical supply firm uses live dogs to demonstrate its surgical staplers.

The pipe bomb was powerful enough to blow up a car and was placed near the car owned by Leon Hirsch, company chairman.

William M. Samuels

Aging Council Resolution Supports Animal Research

The National Advisory Council on Aging initiated and approved a resolution supporting the use of laboratory animals in research.

The Council is an independent body composed of leaders in science, public policy, law, and economics for the purpose of advising and providing guidance to the Secretary of the US Department of Health and Human Services, the Assistant Secretary for Health, and the directors of both the National Institutes of Health and the National Institute on Aging in matters dealing with aging research and related manpower activities. The Council also provides recommendations on the aging institute's progress, future directions, and policies.

The Council's resolution stated:

Be it resolved, therefore, that the National Advisory Council on Aging affirms its support of the use of animals in research as vital to the advancement of human and animal health; that the Council acknowledges the leadership demonstrated by the National Institute on Aging and its commitment to the humane use of animals in research; and that the Council calls upon national, state, and local legislators, officials of biomedical research institutions, individual scientists, clinicians, public health professionals, concerned professionals and lay organizations, and others to support the humane use of laboratory animals and to speak out publicly to inform the community-at-large of the necessity and importance of using laboratory animals in biomedical and behavioral research to ensure continued progress in improving the nation's health and preventing disease.

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ter action becomes a public relations ploy inasmuch as the humane societies, kennel operators, and pet store owners will be forced to accept such standards or publicly reject humane animal standards for themselves. Obviously, they cannot publicly hold scientists and researchers to a higher level of humane animal care than they are willing to accept.

“... We must not allow our members to stand alone against the animal activists. ...”

Educational programs and informational tools are a benefit any member should expect from his professional society. To fail to do so, I submit, is a failure to provide a basic membership service that a member should expect in return for his or her annual dues.

We must not allow our members to stand alone against the animal activists. Only through the responsible and timely actions of professional societies will we overcome the activists and contribute to the fulfillment of my dreams.

Thank you!

Martin Frank



CPS/APS Joint Meeting November 3-4, 1990

The Chinese Physiological Society in Taiwan, ROC, has invited members of the American Physiological Society to participate in a joint meeting in Taipei, Taiwan. The first joint meeting of the two societies will be held at the Institute of Biomedical Sciences, Academia Sinica in Taipei. Participants are invited to submit abstracts for either oral or poster presentations.

There are many close ties between physiologists in Taiwan and the United States arising from the role the laboratories of American physiologists have played in training Chinese scientists from Taiwan. The joint meeting between the CPS and APS will provide an opportunity to visit the laboratories in Taiwan, to renew past friendships, and to establish new relationships. Preliminary plans include visits to physiological laboratories in other institutions in Taiwan, as well as tours of historical and cultural areas.

Accommodations will be available at the Activity Center (guest houses) lo-

cated on the campus of the Institute. Lodging rates range from approximately \$20.00 for a single to \$30.00 for a double. A block of rooms has also been reserved at the Fortune Hotel in Taipei at the rate of approximately \$120 for a single or double.

Registration for the CPS/APS Joint Meeting will be approximately \$50 to cover the cost of meeting administration, program bulletin, welcome party, and a farewell banquet.

Air travel is being handled through Global Travel, Springfield, VA (1-800-556-7711). The carrier for the meeting will be United Airlines, and preliminary indications are that fares will range from \$1,100 to \$1,400 depending on departure city.

Members interested in participating in this meeting should contact Dr. Martin Frank, CPS-APS Joint Meeting, The American Physiological Society, 9650 Rockville Pike, Bethesda, MD 20814. ☎

Future Meetings

1990

APS Fall Meeting

October 6-10, Orlando, FL

1991

FASEB Annual Meeting

April 21-25, Atlanta, GA

APS Fall Meeting

September 29-October 3, San Antonio, TX

1992

FASEB Annual Meeting

April 5-10, Anaheim, CA

1993

FASEB Annual Meeting

March 28-April 1, New Orleans, LA

1994

FASEB Annual Meeting

April 24-29, Anaheim, CA

1995

FASEB Annual Meeting

April 9-14, Atlanta, GA

US-USSR Bilateral Exchange Program The Year in Review

On June 2, 1988, Franklyn G. Knox and Martin Frank signed a bilateral exchange agreement with representatives of the Pavlov All-Union Physiological Society. The agreement, which took effect on November 1, 1988, was designed to facilitate "the dissemination of scientific information and exchange of expertise for the benefit of physiological sciences and mankind."

To accomplish this goal, the agreement called for 1) the exchange of information in the form of books and journals; 2) the exchange of scientists; 3) the organization of joint symposia; and 4) the reciprocal publication of scientific papers.

To date, the most visible aspect of the program has been the exchange of scientists between the two countries. Since the inception of the program, three Soviet physiologists have visited laboratories in the United States and four American physiologists have visited laboratories in the Soviet Union. The names of the scientists participating in the program and the institutions visited are listed in the table on page 37.

The APS members participating in the program have had varying experiences as a result of the program, but each has returned from the Soviet Union with a new appreciation for physiology in that country. In addition, each of the participants has expressed the view that the program provides an opportunity to contribute to the opening of the Soviet Union. George Somjen has detailed his impressions and experiences in an article published on this page.

The exchange visit of Bruce Stevens and Alexander Ugolev is an example of the role the program can play in the development of scientific collaborations. Dr. Stevens' visit to Leningrad was designed to allow him to learn the chronic rat technique developed by Ugolev for the study of intestinal function. Drs. Stevens and Ugolev initiated a collaborative study in Leningrad that was continued in Gainesville several months later.

The Soviet scientists participating in the program have had the opportunity to visit the APS headquarters and the sights of Washington, DC. More importantly, the Soviet physiologists visited with physiologists at several US institutions, presenting talks and discussing opportunities for future interactions.

The program provides for visits of up to four APS members a year for a total of 10 weeks. Support in the USSR is provided by the Pavlov All-Union Physiological Society. Soviet physiologists visiting the United States are provided with airline tickets, purchased by APS, for travel to the host institutions. The host institution is responsible for covering the scientist's expenses for food, lodging, and honoraria. Invitations to the visiting scientist, whether Soviet or American, must be extended by the host society and the institution.

Interested APS members should contact: US/USSR Bilateral Exchange Program in Physiology, c/o Dr. Martin Frank, APS, 9650 Rockville Pike, Bethesda, MD 20814.

Impressions of Soviet Neuroscience: A Two-Week Visit to Soviet Academic Institutes

It is hard to describe in a short space the impact of spending two weeks immersed in the life of intellectuals in the USSR. The purpose of the trip was participation in the symposium "Functions of Neuroglia" sponsored by IBRO and organized and hosted by the Beritashvili Institute of the Academy of Science, Georgian SSR, plus visits to three other research institutes. This was my first visit to the USSR, and it was sponsored by the Bilateral Exchange Program between the American Physiological Society and the Pavlov All-Union Physiological Society of the USSR.

General Impressions of Soviet Science

First and foremost: science in the Soviet Union no longer seems fossilized, sterile, or bound by ideology. The scientists I met were as competent as the best in the West, and they are generally better informed about what we are doing than we are about them. Moreover, they have fresh and original ideas and, precisely because some of their approaches

are different, we are well advised to take note of them.

It is true that in some (not all) instances the buildings in which our Soviet colleagues must work seem poorly maintained. Also, of course, equipment in Soviet laboratories looks curiously different from ours. Optical instruments manufactured in East Germany are basically similar, but the oscilloscopes, stimulators, and computers made in Hungary or the USSR may appear too big, slow, and dated to us. There are only very few IBM-compatibles and other Western models recently imported. Massively built stereotactic frames, electrode pullers, and micromanipulators come mostly from the workshop of the Bogomoletz Institute in Kiev, which seems to supply all other Soviet institutes with such items. Still, one should remember very few years ago we used instruments of similar design, often homemade, and yet we, too, got important results. Admittedly, my time in the USSR was short and my contacts limited. It is entirely possible that the dinosaurs of ideological orthodoxy may still be around somewhere. If so, I have not met them.

Some Highlights in Research

I will describe the scientific highlights in the sequence in which I visited the various institutions. My first stop was at the Institute of Higher Nervous Activity in Moscow, in the laboratory of Dr. G. D. Kuznetsova. The most impressive among their several projects are unconventional, noninvasive techniques for recording cerebral neuronal activity. One such approach, depending on magnetic fields, has its Western counterparts. The other, *thermoencephaloscopy*, which uses infrared imaging is, to my knowledge, not yet represented in the West. I saw some exciting computer-stored moving pictures showing sensory evoked potentials, seizure discharges, and spreading depression as they move over a two-dimensional representation of the cortical surface. The principal investigators are I. A. Shevelev, E. N. Tsicalov, and A. M. Gorbach. The team has been working on the system for more than five years. A comprehensive description of the method is in press in the *Journal of Neuroscience Methods*. Even though the precise nature of the recorded signals is not completely understood, the potential of this technique seems enormous, and it is high time it is transplanted to North America.

The Beritashvili Institute in Tbilisi belongs to the Georgian Academy, which is independent of the Academy of the USSR. The Institute is housed in a new and ample building where the symposium was held, chaired by Professor A. I. Roitbak. Roitbak is the head of one of the several departments of the Institute. His second-in-command, Dr. I. V. Ocherashvili, showed us around the laboratory. His team's main research area is the electrophysiology of glial cells. They have the capabilities of intra- and extracellular recordings and the use of ion-selective electrodes in mammalian and amphibian brain in situ as well as tissue slices in vitro.

The Bogomoletz Institute in Kiev, employing 550 persons of whom about half are scientists, is perhaps the one best known among physiologists in the West. There are no signs of neglect of the building and physical plant here. I spent most of my time in the laboratories of Dr. P. G. Kostyuk, director of the Institute, and Dr. Krishtal. This team is famous for pioneering techniques of intracellular perfusion of vertebrate neurons and for early studies of ion channels. Much of their current work continues these biophysical and pharmacological traditions. More than half of the Institute is devoted to the neurosciences, while the other departments represent the various branches of organ and systems physiology.

In the Sechenov Institute of Evolutionary Physiology in Leningrad, my hosts were professor Y. E. Moskalenko and Dr. G. B. Weinstein. Their laboratory specializes in measurements of cerebral blood flow. Besides conventional techniques, they have a long-standing interest in noninvasive methods suitable to human studies for both clinical applications and experimentation in outer space. The team designed several experiments for the Soviet space program. The main assignment is space sickness, conducted in parallel projects using cosmonauts and animal models. Cerebral tis-

sue electric impedance is measured to estimate blood content and hence obtain an index of blood flow (dubbed *rheoencephalography*). A variant of the method using an extended spectrum of alternating current frequencies permits estimation of changes in the water content of the brain. From such measurements arose the hypothesis that space sickness (and possibly other motion sickness) is associated with transient mild cerebral edema.

General Conclusions

It is important that we should make full use of the opportunities of the newly opened borders. In part, this is a moral obligation, because our colleagues in the Soviet Union need our collaboration. For generations, they lived in virtual quarantine in an atmosphere that was intellectually stifling and physically threatening. They are trying to make the most of newly found freedoms in a still very difficult and uncertain situation, and they are starved for contact with us. But we can gain too, for the intellectuals of the Soviet countries are a highly talented, civilized, and cultured population. They have original ideas and much strength and energy.

There should be as much two-way traffic as possible. But most importantly, there should be large numbers of young investigators from the USSR invited to work for extended periods in the US. One repeatedly hears the complaint that "good post-docs are hard to find." Anyone in such a predicament should consider "importing" someone from the USSR for a year or two. They are usually able to buy their airline ticket to New York. The American host has to pick up the support from that point on.

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US/USSR Bilateral Exchange Program

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Fred S. Grodins (1915-1989)

Fred S. Grodins was born in Chicago and received his BS, MS, MD, and PhD (physiology) degrees from Northwestern University in 1937, 1940, 1942, and 1944, respectively. After service in the US Army Air Force from 1944 to 1946, he spent a year at the University of Illinois College of Medicine in Chicago before returning to Northwestern University Medical School as an associate professor of physiology. From 1951 to 1967, Dr. Grodins was Abbott Professor of Physiology at Northwestern University. He came to the University of Southern California in 1967 as professor of physiology and electrical engineering. Under Dr. Grodins' leadership, the School of Engineering at USC established the Biomedical Engineering Program in 1970. Dr. Grodins served as professor and chairman of Biomedical Engineering from 1970 to 1986. During his tenure as chairman, Dr. Grodins established the Biomedical Engineering Department as one of the top biomedical engineering programs in the United States. From 1986 until his death he was emeritus professor of



biomedical engineering, electrical engineering, and physiology and biophysics at USC.

Dr. Grodins was an acknowledged pioneer in the field of biomedical engineering and made profound and lasting contributions in the area of regulation of breathing. His famous monograph on "Control Theory and Biological Systems" published in 1963 is considered a landmark publication on the application of engineering control theory to physiological systems. Dr. Grodins published over 100 scientific articles and book chapters in respiratory physiology, cardiovascular control, mathematical modeling, and

computer simulation. Through his career-long active research program, funded by the National Institutes of Health, Dr. Grodins was responsible for training numerous graduate students and postdoctoral research fellows.

Dr. Grodins served on many governmental panels and advisory committees for the NIH, NSF, and NASA and was on the editorial boards of the *American Journal of Physiology*, the *Journal of Applied Physiology*, *Circulation Research*, and *Physiological Reviews*. A past president and member of the board of directors of the Biomedical Engineering Society, Dr. Grodins was also a member of the American Physiological Society, Phi Beta Kappa, Sigma Xi, and the American Association for the Advancement of Science.

In Dr. Grodin's memory, a memorial fund is being established to support graduate study in biomedical engineering. Contributions may be made to the USC Fred S. Grodins Memorial Fund through the Office of the Dean, USC School of Engineering, OHE 200, Los Angeles, CA 90089 (213-743-4612).

Gordon K. Moe (1915-1989)

Dr. Gordon K. Moe of Barneveld, NY, a renowned medical research scientist in the field of experimental cardiology and Director of Research Emeritus at the Masonic Medical Research Laboratory, passed away at St. Lukes Memorial Hospital, Oct. 24, 1989.

Dr. Moe and his colleagues at the Masonic Medical Research Laboratory pioneered the study of cardiac arrhythmias; these abnormal rhythms are responsible for the majority of deaths that occur soon after a heart attack.

Over the years, his research has contributed immeasurably to delineation of normal and abnormal mechanisms of heart function. Dr. Moe and his colleagues were responsible for defining the mechanism of a number of arrhythmias, including paroxysmal supraventricular tachycardia, atrial flutter, and fibrillation. Most recently, they discovered two mechanisms responsible



for the generation of abnormal extra beats in diseased hearts. These findings have greatly enhanced modern day understanding of the cellular mechanisms responsible for cardiac rhythm disturbances and have been instrumental in the development of applications for the artificial pacemaker.

During his career, Dr. Moe authored more than 200 articles on various cardiovascular subjects that have been

published worldwide and translated into several languages.

Upon Dr. Moe's retirement in 1984 as Director of Research of the Masonic Medical Research Laboratory, an international symposium was organized in his honor in Amelia Island, FL. This symposium, which brought together the most eminent scientists and cardiologists from all over the world, was heralded as the most significant scientific event of the decade in the field of cardiology. It was a fitting tribute to a world-class scientist whose dedication and excellence in biomedical research had earned the admiration and respect of his colleagues all over the world.

Dr. Moe devoted his life to the service of humankind. His contributions to basic biomedical research have contributed importantly to the improved quality of health care that we all enjoy today.

News From Senior Physiologists

Letters to Roy O. Greep

"I have been fortunate to be in a position to continue my research on microcirculation at the University of California-San Diego through an ongoing grant from NIH," writes **Ben Zweifach**. "I manage to put in about four days a week and still feel reasonably useful despite the difficulties in keeping abreast of the molecular revolution. I do attend one or two meetings a year and life here in Southern California is quite comfortable."

Arthur B. Otis writes that he does not find retirement boring, adding, "In fact, there never seems to be enough time to do all of the things I might like to do." Among the things cited, he noted that he continues to use his office at the University of Florida and attends physiology departmental meetings and keeps in touch with research and teaching through seminars and chats with students and faculty. He also serves as chairman of a subcommittee of the Respiration Section of APS, charged with developing a curriculum appropriate for graduate students specializing in respiratory physiology.

His words of wisdom for younger colleagues comes from one of his mentors, Joseph Hall Bodine, who once advised Otis, "Get yourself a sail, not an anchor."

Letter to John Brobeck

Robert K. Crane and his wife started with a small horse farm in 1972, trading for a larger farm in 1985 near Buttzville, NJ. The Pequest River, a noted trout stream in New Jersey, flows through their farm on its way to Delaware, four miles downstream. Using a tractor and a backhoe, Crane has put in $\frac{1}{4}$ mile of water and electric lines, erected $\frac{1}{2}$ mile of three-board horse fence, built horse wash stalls, pruned the orchards, and restored substantial portions of the house. "I did, indeed, make myself useful," he said.

The AAAS and APS

The American Association for the Advancement of Science, known mostly for its weekly journal *Science* and for its news-making annual meeting, has representatives from the APS on two committees, Biology "G" committee and Medical Sciences "N" committee. The APS representative to the G committee is **Ian Phillips**, professor and chairman of the Department of Physiology at the University of Florida, and the representative to the N committee is **Leo C. Senay**, professor with the Department of Physiology at Louisville University.

Each committee is made up of numerous representatives of member organizations. The committees meet at the annual meeting. Generally, they rubber-stamp most of the issues. These are related to new membership on the committee and discussions of how to best accomplish the goals of the association. Also, it is through support of the committees that symposia for the annual meeting are proposed.

Committee G is by far the largest in the association, because so many biological societies belong to it. Last year, Phillips managed to table the rubber stamping of membership for the "Scientists Center for Animal Welfare" (SCAW) to committee G. Tabling was to give time to check the goals of SCAW because it had undergone radical changes, including a hasty change of the executive secretary. Considerable debate arose about whether the SCAW was now for animal welfare and against scientists or for scientists who were also concerned about animal welfare. Judith Willis, chairman of committee G, contacted many individuals to ascertain the nature of SCAW activities. Committee N also moved to table the application. SCAW, however, had also applied for membership on the education committee. SCAW was admitted to the Societal Impact X committee so that it became a participating member of the AAAS de facto. Nevertheless, the debate over the SCAW membership in the AAAS and its possible rejection alerted biological societies to the continuing need to monitor "animal rights" tactics.

The AAAS annual meetings have an impressive array of important topics and high-level speakers. They are usually held in large cities and attract numerous college professors, teachers, and science writers from the press to hear from scientists in all fields. Last year's meeting was held in January in San Francisco. Phillips and **William F. Ganong** organized a technical session representing advances in physiology at that meeting. The idea was to have the discipline of physiology presented at the meetings so the work physiologists are doing will become better known and encourage college professor and student interest in physiology for graduate study. The technical symposium in San Francisco was on the renin-angiotensin system from the molecular biology of the renin gene to the physiology of organ systems. The speakers were mostly drawn from the abundant talent at UCSF. This year the AAAS meeting was held in New Orleans from February 15-20, 1990. Again, a technical program was accepted to represent physiology. The symposium entitled "New Insights into Physiological Adjustments" was chaired by **Gabriel Navar**, chairman of physiology at Tulane University. This session included body temperature regulation, atrial natriuretic peptide, trauma, arteriosclerosis, brain gas interactions, and human-powered flight. For this conference, support had been obtained for speaker, **Ethan Nadel**, director of the Pierce Foundation at Yale, from the Quaker Oats Company. The other contributors were from a pool of local talent in New Orleans. There was no cost to the APS for these meetings because local physiologists were the speakers.

It is hoped that including these symposia as part of the AAAS annual meetings will become a regular feature with physiologists from the host city organizing the symposium. In this small way the approach of physiologists can be heard and understood by the influential audiences of these annual meetings and by the teachers who may encourage their students to consider physiology for graduate school.

If you have suggestions for a symposia or would like to have issues raised at the respective committee meetings, contact your representatives. ☛

Research in Respiratory Physiology

Division of Lung Diseases, NHLBI

Since its formation nearly two decades ago, the Division of Lung Diseases of the National Heart, Lung, and Blood Institute has supported research programs on the physiology of the respiratory system. Through the support of investigator-initiated research projects and special grant and contract programs, the Lung Division has worked to foster and promote research in lung physiology and to keep it on the cutting edge of research. Today, these dynamic programs are investigating a wide variety of research questions, with real and potential payoffs for millions of people of all ages who may suffer from respiratory problems.

In this article, we will provide an overview of the Lung Division's programs in respiratory physiology. We hope the descriptions will provide a perspective of the work currently supported and the many exciting opportunities for future research in respiratory physiology.

The Lung Division's Programs in Respiratory Physiology

Since its formation, the Lung Division has served as the primary focus within the NIH for the funding of research in respiratory physiology. It is clear the rapid growth of the pulmonary physiology program and its increasing sophistication and diversity has played a key role in the growth of the Lung Division over the last two decades. In the sections that follow, we will briefly describe some of the research in respiratory physiology currently supported by the Division and highlight some of the newest ideas and most exciting areas for future research. Many important areas, however, cannot be included in this very brief summary.

Gas Exchange

In man, cellular respiration is dependent on a complex system that involves many steps between the outside air and the internal environment of the cell. Clinically important limitations can occur at nearly every step along the way, and fundamental research into the physiology of gas exchange continues to have great relevance.

Innovative approaches to the study of airflow within the lung is yielding new and important information. Using high-frequency ventilation (HFV) as a tool, researchers have learned that regional volume excursions and gas clearances can be quite different and may not be in phase throughout the lung. Other studies have shown regional differences in pressures and air flows during HFV, with higher pressures developing in lower lobes. Newly evolving mathematical ap-

proaches such as fractal analysis are being applied to characterize intraregional blood flow heterogeneity and its relationship to gas exchange. Lung researchers are also measuring regional blood flow by positron emission tomography and assessing gas exchange by the multiple inert gas elimination technique. These sophisticated techniques, which are constantly being refined and improved in their sensitivity, hold the promise of revealing the important inhomogeneities that are present in a number of disease states. Hypoxia and exercise are two common stresses on the gas exchange system whose effects are being examined at a number of levels. Breath holding in sleeping elephant seal pups is being examined both as a model of sleep apnea and as a means of exploring the mechanisms by which the body adjusts to bouts of hypoxia. Other studies are exploring vasomotor control of blood flow distribution in hypoxia through pharmacologic means, while muscle capillarity and pH control during hypoxia and exercise are also being investigated. At the sub-cellular level, mitochondrial density and movement in response to endurance training and hypoxia are also under study. Through such basic research, much can be learned about the many disease processes that result in hypoxia and exercise limitation.

Respiratory Muscle Fatigue

Interest in this area has built steadily over the decade of the 80s, with the recognition of the potential importance of inspiratory muscle fatigue in a number of circumstances, most notably in chronic obstructive lung diseases. The Lung Division has taken an active part in trying to stimulate research in this field.

A great deal of basic research has been performed over the past decade, and it is now recognized that the interactions between the diaphragm, the accessory muscles of respiration, the central nervous control of breathing, and the blood supply to the muscles are extremely complex. A key finding may be that the diaphragm appears to be protected from potentially damaging nervous stimulation when it begins to fatigue, a feature that appears to make it unique as a muscle. An important piece of missing information is the true prevalence of respiratory muscle fatigue, because there is no reliable means of detecting respiratory muscle fatigue in a patient who presents with respiratory failure at present. Some researchers have suggested the possibility that certain patients may be chronically fatigued; if that can be demonstrated, programs of long-term intermittent rest may prove to be therapeutic. Other open questions relate to the safety and efficacy of resting and/or training the respiratory muscles.

Lung Mechanics

Over the years, a great deal of research has focused on the mechanical properties of the lung. Advances in this area have been translated into clinical practice, and current pulmonary function testing relies heavily on the understanding that has been gained about lung pressures and flows. Still, many exciting opportunities exist to further the understanding of lung mechanics. Understanding and describing regional inhomogeneities of lung properties is a key element in much of the current research. Advances in this area have a high potential for improving our understanding of disease processes and hence for diagnosis and treatment of such disorders.

Engineering approaches and mathematical modeling continue to be used to good advantage in studying the lung. Several investigators are exploring lung mechanics through studies of lung deformability, using, for instance, externally applied pressure of excised lungs, manipulation of airway pressures and surrounding parenchymal pressures, pneumonectomy, or postural shifts. These methods are being used to derive estimates of the "material properties" of the lung, which allow for a mathematical description of how the lung will deform when exposed to various stresses. Some of the recent results have shown the material properties cannot be considered constant, since lung volume changes and surface tension effects on resistance to lung deformation are likely to be smaller than expected. Also, it seems that postural shifts can be expected to alter lung function in pneumonectomized patients, while normal subjects will have lung function preserved during changes in posture due to shifting of lung lobes within the thorax. Other studies have as a goal the development of noninvasive techniques for determining lung function in uncooperative subjects, such as children. Sophisticated models are being developed for the analysis of reflected sound waves that have the potential of revealing early lung disease or inhomogeneous flow and resistance. Mechanical studies of the nasal passages and sinuses are now being undertaken, with the relation between nasal resistance and lung airway resistance having potential importance in the field of asthma.

Understanding lung micromechanics has been advanced by the development of the tensed cable-membrane theory of the lung, which has been derived from careful three-dimensional reconstructions and analytical techniques that allow the localization of the various structural components. According to this theory, elastin and collagen "cables" course through the lung to intersect with other cables or the pleural surface, with alveolar walls being stretched over the cable network. Surface tension forces interact with this elastic structure in different ways, depending on the lung volume. As this theory is refined, and as more and more is learned about the basic biochemistry of lung structural components, a better understanding of the processes involved in lung injury and repair should emerge.

Respiratory Neurobiology and Sleep

Research in respiratory neurobiology and sleep has experienced rapid and continuing exponential growth in recent years as a result of the many significant advances being made in the neurosciences. Research in this area has successfully combined traditional physiology with sophisticated cellular and molecular neurobiology, with studies ranging from very basic electrophysiology and neuropharmacology of respiratory brainstem networks to clinical studies in sleep-disordered breathing and infant apnea.

Application of the neurosciences to respiratory biology has markedly increased the knowledge of how the brain regulates breathing. Lung Division-sponsored researchers are using a combination of *in vivo* and *in vitro* techniques, as well as neuroanatomical, histochemical, and electrophysiological approaches in order to localize important respiratory and cardiovascular neurochemicals, map the neural pathways, and determine the physiological and pharmacological mechanisms involved in the central nervous system control of respiration and circulation.

The carotid body has long been recognized to play a significant role in regulating the level of respiration through monitoring of blood oxygen levels, but the mechanisms used by this minute organ to actually sense oxygen have, to date, eluded definition. Now, Lung Division-sponsored researchers are investigating the cellular, subcellular, and biophysical mechanisms by which the carotid body senses oxygen through the use of sophisticated *in vitro* and *in vivo* approaches, along with modern neurobiological, biochemical, and physiological techniques.

Excellent progress is being made in identifying some of the chemical messengers produced by neurons within the respiratory networks. An increasing number of these chemical mediators, including amino acids and peptides, have been shown to play a significant role in the control of breathing. Studies are now aimed at determining if these substances are indeed produced endogenously by respiratory neurons and whether they are of major physiological importance in the direct control of this system. Because information is constantly being sent to the brain, further work needs to be done to determine not only how the information is processed, but how the processing of the sensory information translates into motor output signals that produce respiratory responses that alter the level of breathing. Other opportunities for research in the area of respiratory neurobiology range from understanding the very basic anatomy underlying the respiratory centers in the brain to performing clinical studies to determine if the administration of neurotransmitters may be effective therapy for common respiratory breathing disorders.

The Lung Division has also played an active role in promoting research into normal and disordered breathing during sleep and recently established a new Specialized Centers of Research (SCOR) program on "Cardiopulmonary Disorders of Sleep." Basic and clinical research is being

directed toward a better understanding of the physiology and pathophysiology of sleep apnea and the development of effective therapeutic approaches for the treatment of sleep-disordered breathing. Basic research on sleep apnea is addressing the relative roles of the central nervous system and sensory information from the upper airways in determining respiratory rhythm during sleep. The anatomy and physiology of the upper airway are also being studied to see whether abnormalities in this area play an important role in causing disordered breathing during sleep. New noninvasive techniques are being used to identify sites of airway collapse in patients with obstructive sleep apnea. Studies are also underway to determine and evaluate the most effective treatment for relief of the upper airway obstruction during sleep.

Pulmonary Vascular Physiology

The Lung Division supports an extensive research program on the physiology of the pulmonary vasculature with the goal of elucidating both the normal physiological control mechanisms of the pulmonary circulation and the pathogenesis of pulmonary edema and pulmonary hypertension.

A major research focus for a number of years has been to improve understanding of the forces that control fluid and solute dynamics in the lung, with a particular emphasis on identifying the specific mechanisms affecting the permeability of the capillary-alveolar barrier. Currently, new dynamic methods to evaluate changes in the net rate of liquid and labeled protein flow across this barrier are being developed and evaluated. Clinical application of such methods will aid physicians in improving diagnosis and treatment of lung diseases where increased vascular permeability and edema are major manifestations.

The role of the central nervous system in regulating the pulmonary vascular bed has been an area of considerable scientific interest but remains an enigma. Extensive physiological and pharmacological studies provided evidence that the central nervous system, through the autonomic and peptidergic nervous systems, possesses the capacity to contribute to the regulation of the pulmonary circulation. However, a clear role for maintaining low pressure in the pulmonary vascular bed has not been established. More recent studies are directed toward understanding other pulmonary physiological functions that may have a neurological component such as maintaining oxygenation or the coordination of ventilation and perfusion matching.

Lung Division-supported researchers are utilizing both traditional and cellular physiological approaches to better define the role of the endothelium in modulating the response of vascular smooth muscle to various stimuli. Similar approaches are being used to study the pathogenesis and pathophysiology of ischemia and reperfusion injury in the lung following events such as thromboembolism and lung transplantation.

One particularly exciting area of current research involves the study of the role of growth factors in vascular remodeling and the control of vascular cell proliferation in the pulmo-

nary circulation. The application of molecular biological approaches to the study of pulmonary hypertension is another area that is providing valuable insights to potential mechanisms that regulate the genetic expression of contractile and connective tissue proteins.

There are several areas that need to be developed further. These include new approaches to study the early development and clinical diagnosis of pulmonary hypertension, the involvement of immune and inflammatory mediators in the control of pulmonary vascular tone and permeability, the intracellular mechanisms that control permeability and the role of the cytoskeleton in determining microvascular permeability, and the response of vessel wall cells to physical forces like shear stress and pressure.

Cystic Fibrosis

The recent discovery of the cystic fibrosis gene has provided scientists with a powerful new tool for understanding the basic mechanisms underlying cystic fibrosis. Scientists are already working hard to unravel the physiologic function of the gene product. An important problem will be to understand how the defective gene product causes the observed cellular defects such as abnormal chloride movement across the membrane; in particular, it will be critical to discern whether the chloride channel abnormality is the basic biochemical defect in this genetic disease or whether it is secondary to some other change that is unknown. The link between the defective chloride channels and the thick mucus and respiratory disease, so typical of cystic fibrosis, is also still not clear. Of critical importance will be studies exploring how these genetic and cellular defects cause the pathophysiology, such as the propensity for airway infection and the resulting inflammation that is the cause of death in most cystic fibrosis patients. Additionally, the development of animal models would represent a major breakthrough, both to the study of the physiologic consequences of the disease process, as well as the development of new and more effective treatment modalities. This resource would permit clinical testing of potential pharmacologic and genetic approaches to the therapy of cystic fibrosis. The availability of probes for the cystic fibrosis gene is already promoting investigations of genetic heterogeneity in cystic fibrosis and the search for additional mutations.

Research into the abnormality in chloride channel function has long been recognized as critical, and it remains so today. Over the past six years, the Lung Division has moved to stimulate research in this area by issuing two RFAs, one to study ion channels in pulmonary cells and the other to establish a new SCOR program in cystic fibrosis. These programs have made major contributions to our understanding of the pathophysiology of cystic fibrosis. In investigations of salt movement across the airway epithelia, investigators have found that cystic fibrosis epithelia are chloride impermeable and have increased sodium transport. Several of the laboratories involved have noted that the phosphorylation-dependent activation of chloride channels is defective in cys-

tic fibrosis. Future work will continue to focus on the mechanisms underlying this ion transport abnormality and its relationship to the cystic fibrosis gene product.

Following the recommendations of a 1987 workshop, the Lung Division issued an RFA aimed at developing immortalized cell lines from normal and cystic fibrosis airways. Progress has been made in establishing such cell lines, which will prove invaluable in meeting the growing need for large quantities of normal and cystic fibrosis airway cells for a wide variety of genetic, biochemical, and physiologic studies.

Lung Cell Biology

The lung cell biology program supports investigations of cellular and molecular aspects of lung physiology. Research projects supported under this program investigate a wide range of topics, including surfactant physiology and biochemistry, alveolar epithelial and endothelial cell biology, the functions and characteristics of airway cells, and cellular and molecular aspects of lung development. Although an important goal of this program is to identify and characterize the many different lung cell types, the long-range objective is to understand how individual lung cells interact to contribute to the function of the lung as a whole and how lung injury or disease alters these cellular activities.

Studies of lung surfactant physiology are an important component of the cell biology program. Control of surfactant synthesis and secretion by type II cells, the genetic regulation and functions of the surfactant associated proteins, and physicochemical studies of surfactant continue to attract a great deal of interest. Two surfactant preparations have recently been approved by the Food and Drug Administration for the treatment of neonatal respiratory distress syndrome under a Treatment Investigational New Drug Protocol. It is expected that marked reductions in morbidity and mortality will occur when routine use of surfactant replacement therapy is utilized in the treatment and prevention of respiratory distress syndrome in newborns. Topics for future study include testing the efficacy of the surfactants in treating pneumonia and acute lung injury in neonates and respiratory distress syndrome in adults.

The cell biology of the airway epithelium is attracting increasing attention from pulmonary investigators. Goals are to develop methods to isolate and culture airway epithelial cells and to elucidate their contributions to airway secretion and function. Both of these goals should be aided by the application of molecular biology techniques to the study of airway cells and their products. Research on airway smooth muscle physiology and cell biology is another area of active investigation, and includes structural studies of airway muscle, studies of the mechanical properties of intrapulmonary airways, the role of myosin phosphorylation in tracheal smooth muscle, and the mediators involved in regulation of airway smooth muscle contraction. The Lung Division announced a new RFA program in airway physiology this year, "Beta-Adrenergic Modulation of Airway Function," with the goal of encouraging research on the cellular and molecular

mechanisms by which the beta-adrenergic receptor and cascade regulate airway function in health and disease.

Research in pulmonary endothelium also covers a wide range of topics. Studies on cell activation responses and signal transduction in pulmonary endothelium, the metabolic activities of the endothelium, and the effects of lung injury on cell metabolic activities are some of the areas under study. A new direction is exploration of the potential of endothelial cells to serve as targets for insertion of genes, for the purpose of delivering gene products *in vivo*.

Other cell biology research supported by the Lung Division includes studies of lung cell-cell interaction, the biology of extracellular matrix, regulation of alveolar formation, and other cellular aspects of lung developmental physiology. The growing availability of new probes and reagents for the study of lung cells and their products makes this a most exciting time to approach these challenging and important areas of lung cell research.

Conclusion

In these times, so-called "classic" physiology is facing several challenges. With the advent of new and sophisticated techniques in cell and molecular biology, tremendous opportunities are opening up to understand biological processes with a level of detail not dreamed of a few decades ago. Because of the enthusiasm felt by many for the exploration of these areas, a shift in emphasis by reviewers and, consequently, a shift in funding patterns has resulted. Should the funding of whole animal and organ systems physiology stop altogether? We believe the answer must be no. While the human genome project may provide a listing of all the parts required to produce a human being, it will not provide the blueprints for the assembly, nor the instruction manual for operation and repair. Traditional physiology will be needed in order to synthesize the information coming out of the cell and molecular laboratories, but clearly that integration is more likely to occur if strong collaborative ties and cross disciplinary training programs are established between the laboratories. The physiologists of the future who will make the biggest mark on the field will be the ones who can also master the state-of-the-art techniques in molecular biology and apply them to questions of importance in physiology. Clearly, the Lung Division's programs, as described above, represent the full diversity of physiologic opportunities, with strong research programs ranging from genetic studies to whole animal investigations. The Lung Division will continue to do its best to support and encourage researchers who can exploit the full range of opportunities that are available in respiratory physiology.

Everett E. Sinnett
James P. Kiley
Thomas P. Jacobs
Susan Banks-Schlegel
Dorothy Berlin Gail
Suzanne S. Hurd

Letters to Editor

Maybe it's because I'm old enough to remember the days when NIH did *not* provide *any* salary support for me that I find your editorial in the October 1989 *Physiologist* to be realistic. We, in the research-oriented universities, have become beholden to the Federal government for much of our livelihood. Your editorial required much courage because many will be up in arms. Unfortunately, as we (and our administrators) demand more and more from NIH, in terms of direct support (salaries) and indirect support (facilities plus administrative costs and anything else that can be negotiated), we are wounding the goose that lays our golden eggs.

Good luck!

Carl F. Rothe

Professor, Indiana University
NIH MERIT grant P.I., years 23-32

Thank you for sending me a copy of your editorial: "A Question Worth Asking." As we discussed, I disagree not only with your conclusion, but several of your premises. Let me explain.

In fact, Congress did accept the proposal to cap salaries at the rate of \$120,000/year. While this cap, this year, at this level is not likely to be a hardship for any large number of scientists or institutions, it also produced no extra funds for biomedical research. The estimated \$10M of "savings" was shifted out of the NIH account; in fact, the money was not spent in the PHS budget at all. These funds were lost to research, but the costs remain. My political judgment is that all such proposals to micromanage NIH funding to "save money" result in those funds being transferred out of research into other programs or chalked up as "deficit reduction." Even if you believe such ideas are good policy, they never result in more money for research. The sole effect of this cap is that those scientists, largely faculty in clinical disciplines, who make more than the arbitrary cap, may no longer charge that portion of their salaries, attributable to work on federally sponsored research, to the grant; other funds such as endowment, tuition, or clinical practice

income (if available) will have to pick up the difference. (A technical but important fact must be understood: the wording of the cap was "at the rate of . . ." this means that a scientist who earns \$130,000 per year and charges 10% of his time to a grant is still limited to \$12,000 reimbursement.)

You assert that a favorable outcome of a policy to limit or disallow salaries on grants would be that "smaller colleges and universities with hard dollar positions would be able to attract researchers to their campuses." I have worked in higher education for over 10 years, and I am unaware of the existence of such positions or capacity. Research universities create the "community of scholarship" that attracts the best scientists and students. Research universities underwrite to a very significant extent the costs of research, facilities, equipment and instrumentation, and support services. Biomedical research is successful in a highly sophisticated environment with the necessary critical mass of other graduate departments and relies heavily on the talent and work of graduate students. I simply do not believe this capacity can or would be picked up by "smaller colleges and universities." Instead, these faculty would be lost to academic science.

This in fact is the crux of your proposal: if we cannot afford to support science at the level we once aspired to, we should cut back. On this point I do concur, but I hope this retrenchment, if necessary, is based on the fundamental underpinning of our success: support fully the best science by the best people as determined by peer review.

Any analysis of our current situation should be based on an accurate analysis of where we are and why. There are no magic answers. The current NIH budget is not adequate to fund existing opportunities in biomedical research. The disastrously low number of new and competing grants is the inevitable outcome of a set of good policies combined with a budget that has failed to grow quickly enough. Simply put, in response to burgeoning opportunity to do important research Congress increased the numbers of new and

competing grants markedly (from 5,000 in FY '81 to 6,200 in FY '83; this level was maintained for four fiscal years). At the same time NIH, in response to the logical complaint that too much important research time was spent writing reapplications and not research, began to increase the length of grants (from an average of 3.3 years in FY '81 to an average of 4.2 years in FY '84). Finally, the size of research grants, in a real reflection of the growing complexity of science, has grown. These three factors have resulted in an unprecedented number of funded grants at a high level of funding. But, because the number of "noncompeting grants" is so high, the number of new opportunities is low. All these factors created the "elephant in the python": the commitment base is so large it requires double digit increases in order to maintain anything that approximates a current services budget.

The solution to the current funding crisis in biomedical research is not to micromanage existing funds. This micromanagement virtually always results in reduced support for research; the NIH budget lost the \$10M "savings" that was the result of the salary cap. Furthermore, the proposal to disallow salaries is not based on good public policy. It is, in fact, a central mission of universities to conduct research, and it certainly is the responsibility of universities to pay the salaries of their faculty. This is not the issue. What is under debate is the portion of salaries allocated to that portion of university research that is federally sponsored research. Universities have expanded their faculty and staff markedly in response to expectations that there would be expanded opportunities for federal research support within universities. The fact is that universities have limited sources of funds; if the federal government does not reimburse universities for the costs of federally sponsored research, this money must come from the (also limited) sources of tuition or endowment. The policy question then becomes, who appropriately pays for federally funded research? While it is

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APS Member Elected President of Aerospace Medical Association

Carl Bredenberg, MD, was appointed chairman of the Department of Surgery at the Maine Medical Center in Portland. Formerly professor of surgery, State University of New York at Syracuse, Bredenberg has been a member since 1983.

Long-time member, **James Yarbrough, PhD**, has been named Dean, College of Arts and Science, University of Alabama. Yarbrough was professor and head, Division of Structural and Systems Biology, University of Missouri.

APS member, **Mary Anne Frey, PhD**, has moved to the Lockheed Engineering and Sciences Company, Washington, DC. Frey was at the Johnson Space Center in Dayton, OH.

John W. Fara, PhD, has been appointed president and chief operating officer of Prototek, Inc. An active member since 1973, Fara is currently on the Society's Liaison with Industry Committee.

Suzanne S. Palmer, PhD, has accepted a position as associate professor in the Department of Physical Therapy, Texas Tech University. Palmer, elected to membership in 1987, was assistant professor in the Department of Physiology, Oral Roberts University.

Barbara C. Hansen, PhD, professor of physiology, University of Maryland Medical School, Baltimore, has been elected president of the International Association for the Study of Obesity, involving 15 countries and over 3,000 members. Her presidency will culminate at the end of the 6th International Congress for the Study of Obesity to be held in Kobe, Japan in October, 1990.



Sarah A. Nunneley, MD

In May 1990, **Sarah A. Nunneley, MD**, will become the first female president of the Aerospace Medical Association. In 1975, Nunneley joined the USAF School of Aerospace Medicine, Brooks Air Force Base, where she established a new research program in thermal research. She is now senior research scientist and physician-in-charge of thermal physiology and consultant on protocols for human experimentation. Nunneley has been guest referee editor of the *Journal of Applied Physiology* since 1976, and is associate editor of *Aviation, Space and Environmental Medicine*.

Scientific Meetings and Congresses

First Craigie Conference on Brain Capillaries, University of Toronto, Ontario, Canada, June 24, 1990. *Information:* Paul M. Gross, Neurosurgical Research Unit, LaSalle Building, Queen's University, Kingston, Ontario, Canada K7L 3N6 (Tel: 613-545-6464, Fax: 613-545-6191).

Genetics of Hearing Impairment, New York Academy of Sciences and Deafness Research Foundation, Sheraton Centre, New York, NY, September 24-26, 1990. *Information:* Conference Dept., New York Academy of Sciences, 2 East 63rd Street, New York, NY 10021. (Tel: 212-838-0230, Fax: 212-888-2894).

6th Annual Graduate Hospital Research Symposium, "Regulation of Smooth Muscle—Progress in Solving the Puzzle," Philadelphia, PA, September 24-26, 1990. *Information:* Maxine Blob, Symposium Registrar, or Robert S. Moreland, Symposium Chairman, Bockus Research Institute, The Graduate Hospital, 415 S. 19th Street, Philadelphia, PA 19146. (Tel: 215-893-2375 or 215-893-2378).

Advances in the Understanding and Treatment of Asthma, New York Academy of Sciences, Royal College of Surgeons, London, England, October 1-3, 1990. *Information:* Conference Department, New York Academy of Sciences, 2 East 63rd Street, New York, NY 10021. (Tel: 212-838-0230, Fax: 212-888-2894).

6th International Congress on Obesity, International Association for the Study of Obesity, Kobe, Japan, October 21-26, 1990. *Information:* Shigeaki Baba, MD, Chairman, Organizing Committee, c/o Japan Convention Services, Inc., No. 1 Nippon Press Center Building, 2-2-1 Uchisaiwai-cho, Chiyoda-ku, Tokyo 100, Japan. (Tel: 03-508-1213, Fax: 03-508-0820, Telex: J33104 JCSTOKYO).

International Meeting on the Control of Breathing, "Modulation of Respiratory Pattern: Peripheral and Central Mechanisms," Lexington, KY, October 25-27, 1990. *Information:* D. T. Frazier, Department of Physiology and Biophysics, University of Kentucky, Lexington, KY 40526-0084. (Tel: 606-233-5254).

Trauma and Burn Research Conference, Washington, DC, June 21-23, 1990, The National Institute of General Medical Sciences, National Institutes of Health, in conjunction with the International Society for Burn Injuries, is sponsoring an international research conference entitled "Advances in Understanding Trauma and Burn Injury." Invited speakers will present original research in the areas of nutrition and metabolism, pulmonary injury, immunological consequences, wound healing, and sepsis and organ failure. *Information:* Ms. Judy Gale, Social and Scientific Systems, Inc., 7101 Wisconsin Ave., Suite 610, Bethesda, MD 20814-4805, (301) 986-4886.

People and Places notices come almost exclusively from information provided by members and interested institutions. To ensure timely publication, announcements must be received at least *three months* (by the 5th of the month) before the desired publication date. Send all information to Martin Frank, Editor, *The Physiologist*, APS, 9650 Rockville Pike, Bethesda, MD 20814.

Cardiologists, Internal Medicine.

The University of California, Davis, School of Medicine is recruiting for one fulltime faculty position in the Division of Cardiovascular Medicine, Department of Internal Medicine. The position will be in the Clinical or In Residence series. The appointment will be commensurate with credentials.

Applicants should be board certified in internal medicine, either board eligible or board certified in cardiovascular medicine, and eligible for licensure in the state of California.

Expertise in cardiac catheterization and angioplasty is required. The individual recruited will assist in organizing and developing an angioplasty service in conjunction with other cardiologists in the Division of Cardiovascular Medicine. Other divisional duties will include teaching, research, and development of a private practice clinic.

Letters of interest, including a complete curriculum vitae, should be forwarded to: Zak Vera, M.D., Chair, Cardiology Faculty Search Committee, Room 2040, Prof. Building, 4301 X Street, Sacramento, CA 95817. Applications will not be accepted after July 1, 1990.

LETTERS TO EDITOR

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likely that universities will continue to debate with the federal government over the rules of allocating these costs, I do not believe it can be seriously suggested that private funds can or should pick up the costs or that such federally sponsored research can or should be charged appropriately to undergraduate tuitions.

The problem is serious and complex but is not amenable to quick fixes. Such "adjustments" as disallowing salaries could dismantle the fragile system of biomedical research. I believe your proposed cure would kill the patient.

Carol R. Scheman
Director, Federal Relations
Association of American Universities

Assistant Professor of Physiology and Biophysics.

A tenure track faculty position in human physiology and biophysics is available. Experience beyond the PhD/MD is required. Successful applicant will be expected to participate in innovative teaching in a problem-solving medical school curriculum and to establish a strong and independent research program in the area of specialty. Rank and salary negotiable, depending on qualifications and experience. Starting date: July 1, 1990.

Send curriculum vitae and three letters of recommendation to: Dr. Panayotis G. Iatridis, Northwest Center for Medical Education, Indiana University School of Medicine, 3400 Broadway, Gary, IN 46408. Indiana University is an Equal Opportunity/Affirmative Action Employer.

Chair, Department of Physiology, University of North Carolina at Chapel Hill. The department has a tradition of strong scholarship and productivity in neurobiology, renal physiology, endocrinology, and cellular physiology, but the search committee does not feel constrained to limit its scope to those areas. We construe physiology to encompass a wide range of methodologic disciplines directed toward understanding biological function at all levels, ranging from the molecular to the whole organism. Minimum qualifications for the Chair include a PhD or MD degree, a distinguished record of creative scientific productivity, and evidence of a commitment to graduate and postgraduate education. The successful candidate also will have shown a potential for academic and administrative leadership.

Send a curriculum vitae, the names of three references, and a letter expressing your interest. Preference will be given to candidates who apply before April 15, 1990. Send nominations to: John C. Parker, MD, Chair, Search Committee for the Chair of Physiology, Office of the Dean, The School of Medicine, CB# 7000 MacNider Building, The University of North Carolina at Chapel Hill, Chapel, Hill, NC 27599-7000.

12th Annual Meeting IUPS Commission on Gravitational Physiology October 14-18, 1990 Leningrad, USSR

The 12th Annual Meeting of the Commission on Gravitational Physiology of the International Union of Physiological Sciences will be held in Leningrad, USSR, October 14-18, 1990. Symposia, voluntary papers, and poster sessions dealing with the effects on physiological systems of humans, animals, and plants as a result of changes in magnitude or direction of the force environment will be scheduled. Information and Call for Papers may be obtained from Orr E. Reynolds, PhD, Commission Business Officer, American Physiological Society, 9650 Rockville Pike, Bethesda, MD 20814, USA.

The Supplement on Gravitational Physiology to the February 1990 issue of *The Physiologist* (Volume 33, Number 1) is available to APS members on request.

1990 Summer Course

MIT will offer a six day elementary course entitled, "Design and Analysis of Scientific Experiments," July 16-July 21, 1990. Applications will be made to the physical, chemical, biological, medical, and industrial sciences and experimentation in psychology. The course will be taught by Professors Harold Freeman and Paul Berger. *Information:* please write to the Director of the Summer Session, Room E19-356, MIT, Cambridge, MA 02139.

Positions Available

There is a \$25 charge per issue for each position listed. A check or money order payable to the American Physiological Society must accompany the copy. Purchase orders will not be accepted unless accompanied by payment. Ads not prepaid will not be printed. Copy must be typed double-spaced and limited to 150 words. All copy is subject to the editorial policy of *The Physiologist*. EOAAE indicates Equal Opportunity/Affirmative Action Employer and appears only where given on original copy. Copy deadline: copy must reach the APS office before the 15th of the month, 2 months preceding the month of issue (e.g., before February 15 for the April issue). Mail copy to APS, 9650 Rockville Pike, Bethesda, MD 20814.

US-USSR Cooperation in the Field of Basic Scientific Research

The National Science Foundation (NSF) announces its program for US-USSR Cooperation in the Field of Basic Scientific Research to encourage and support US participation in international science and engineering programs and activities that promise to benefit the US research effort. Through the program, NSF seeks to contribute to the advancement of scientific knowledge by combining the complementary efforts and capabilities of leading researchers of the United States and the Soviet Union in the area of basic scientific research on the basis of equality, reciprocity, and mutuality of benefit. It promotes this objective through support of long-term cooperative research projects in areas and topics of basic scientific research mutually agreed to by the NSF and the Soviet Academy of Sciences, including joint research projects, joint seminars and workshops, and individual scientific visits. *Inquiries* should be made to the US-USSR Cooperative Research Program, Room 1212, Division of International Programs, National Scientific Foundation, Washington, DC 20550, (202) 357-7494. No application deadline is published.

FASEB News

Nominations Invited for 16th Annual "3M Life Sciences Award"

The Federation of American Societies for Experimental Biology is pleased to announce that the 16th annual "3M Life Sciences Award," administered by the Federation, will be presented at the 1991 FASEB annual meeting in Atlanta, GA. The award, sponsored and supported by 3M, provides a sum of \$25,000 to the awardee.

Criteria for Eligibility: The nominee must have contributed to the welfare of mankind by conducting research in the broad area of the life sciences that has led to a significant increase in scientific knowledge. The criterion will be excellence.

Deadline for Receipt of Nominations: The deadline for receipt of nominations and supporting letters is October 15, 1990. *This deadline must be strictly observed.* Nominations should be sent to: Mrs. Margaret Averil, 3M Life Sciences Award Committee, 9650 Rockville Pike, Bethesda, Maryland 20814, Telephone: (301) 530-7092.

Wellcome Visiting Professorships in the Basic Medical Sciences 1990-91

The Federation of American Societies for Experimental Biology invites nominations for the 14th series of Wellcome Visiting Professorships in the Basic Medical Sciences, sponsored by The Burroughs Wellcome Fund. Administered by the Federation, the professorships are offered annually to medical schools, universities, and other scientific research institutions within the United States.

The purpose of the Visiting Professorships is to stimulate interest in the basic sciences and enhance communication with scientists in physiology, biochemistry/molecular biology, pharmacology, pathology, nutrition, immunology, and cell biology. Selected US institutions will receive distinguished scientists from within the United States or abroad whose interests relate to the above disciplines. Twenty-one awards will be made annually. Each scientist will serve as a Wellcome Visiting Professor and spend two to five days at the institution, engaged in teaching and discussion with students and faculty. During the visit, each visiting professor will deliver a Wellcome lecture on a subject pertinent to his/her discipline. An announcement of the Wellcome lecture in the basic medical sciences will be prepared and publicized in advance by the institution.

Address letters of application or inquiries to: The Wellcome Visiting Professorship Program, Executive Office, FASEB, 9650 Rockville Pike, Bethesda, MD 20814; telephone: (301) 530-7092. *The deadline for receipt of applications is May 1, 1990.*

NIH News

Requirement for Programs on the Responsible Conduct of Research in National Research Service Award Institutional Training Programs

A fundamental aspect of research is that it be conducted in an ethical and scientifically responsible manner. National Institutes of Health (NIH) and Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) supported research training programs are notable for producing high quality researchers in the various fields of biomedical and behavioral science. Within this framework of excellence and relevance, it is important that attention be directed

toward scientific integrity in the conduct of research.

To address this aspect of research training, the NIH and ADAMHA are revising the administrative guidelines for all National Research Service Award institutional training grants to require that a program in the principles of scientific integrity be an integral part of the proposed research training effort.

Effective July 1, 1990, all competing National Research Service Award institutional training grant applications must include a description of the formal or informal activities related to the instruction about the responsible conduct of research that will be incorporated into the proposed research training program.

Salary Limitation on Grants and Contracts

Section 217 of the Appropriations Act of the Department of Health and Human Services for fiscal year (FY) 1990 (Public Law 101-166) restricts the amount of direct salary of an individual under a grant or contract award issued by the National Institutes of Health (NIH) and the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) to a rate of \$120,000 per year. NIH and ADAMHA will apply the restriction to all grant and contract awards and all funding amendments to existing grants and contracts made during FY 1990 and with FY 1990 funds. The salary limitation applies to amounts included in grant and contract awards as well as amounts allowed to be charged to those grants and contracts. It is important to note, however, that an individual's institutional salary, per se, is not constrained by this legislative provision.

Other important points are:

- salary limitation provision does not apply to payments made to consultants under an NIH or ADAMHA grant or contract (however, as with all costs, such payments must continue to meet the test of reasonableness);

- salary limitation is intended to apply to those subawards for substantive work under an NIH or ADAMHA grant or contract;

- unobligated funds from a prior grant/contract period "carried over" into a FY 1990 award period are subject to the salary limitation provisions; and

- in a noncompeting continuation application (type 5) setting, a grantee organization is not permitted to redistribute an amount of "excess" salary among other budget categories in an attempt to apply for the full level of funding as previously recommended by the peer review process.

APS Sustaining Associate Members

The Society gratefully acknowledges the contributions received from Sustaining Associate Members in support of the Society's goals and objectives



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APS Election Results

Norman C. Staub, Professor of Physiology, Department of Physiology and Cardiovascular Research Institute, University of California at San Francisco, is the new president-elect. The two newly elected councillors taking office on April 19, 1990 for three-year terms are **Allen W. Cowley, Jr.**, Chairman, Department of Physiology, Medical College of Wisconsin, Milwaukee, and **David J. Ramsay**, Senior Vice Chancellor for Academic Affairs, University of California at San Francisco.

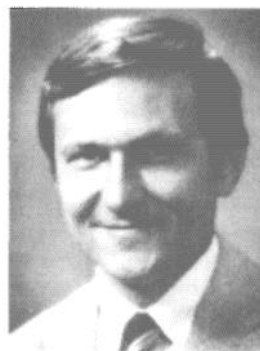
President-Elect

Councillors



Norman C. Staub

"... major new science issues face our Society in the 1990s including: science *education* from grammar school to university; *recruitment* of new physiologists (especially women and minorities); improved national, state and private *funding* of investigator-originated research; and *international* cooperation in research, training and education ... physiologists could have important effects on science curriculum, teacher training and textbooks. ..."



Allen W. Cowley, Jr.



David J. Ramsay