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The Benefits of Biomedical Research **FASEB Office of Public Affairs**

Our nation's sustained investment in biomedical research has given us longer lives, better health, and lowered cost of illness. Important, too, are the myriad technological spin-offs that have applications to so many different areas of our economy. Ahead of us are a growing number of opportunities for advancement in health and quality of life, and public support for continued investment in research is strong. We can anticipate significant progress in the future if we maintain our commitment to federal funding of research conducted in government facilities, private institutes, and universities.

Longer Lives and Better Health

Investment in biomedical research has propelled a remarkable transformation in our understanding of the life sciences and has given us a bounty of new ways to prevent, treat, and cure disease. Major threats to public health have been reduced, quality of life has improved, and life expectancy has continued to rise. A child born in the United States in 1997 can expect to live 76.5 years, 3.9 years longer than a child born in 1975 (1).

Examples of improved therapies flowing from biomedical research include better methods for treating AIDS. New therapies made possible by the discovery of protease inhibitors have lowered mortality rates for this disease, and although HIV infection is still the leading cause of death for males between the ages of 25 and 44 (2), there is new hope for AIDS victims. New drugs and therapies have lowered death rates from heart attacks and stroke. In the past two decades, deaths from stroke have declined by 59% and deaths from heart attacks by 53% (3). For cancer, incidence and mortality rates have also begun to decline (4).

There's more good news. Because of opportunities created by federal government support for fundamental science, the pharmaceutical industry invests more than \$20 billion every year in research and today has more than 1,000 medicines in development (including 316 anti-cancer medicines and 146 vaccines and drugs for children) (5). In 1998, US pharmaceutical companies introduced 30 new drugs and 9 new vaccines. Further, more than 300 new medicines have become available in this decade (6).

Reducing the Cost of Illness

Research-based knowledge in the biomedical sciences reduces the burden of illness by lowering incidence rates for many diseases and raising the quality of life for those who are still afflicted. Improvements in the prevention and treatment of illness also lead to significant reductions in the cost of illness. While studies frequently differ in their methodologies and approaches to measurement, there is a growing body of evidence identifying research-based cost savings. A 1993 study identified 33 health care advances from NIH-supported research that saved between \$8.3 and \$12 billion per year (7). Additional examples of cost savings from medical research were compiled in a 1995 report by Silverstein et al. (8). One study has estimated that the federal government's investment in bioscience is \$62 per citizen, whereas the benefits returned to each of us are worth \$5,600 (9).

Some of the most expensive of health care costs are those associated with chronic disability. Rates of chronic disability in the US elderly population have been declining at an accelerated pace over the past 12 years (10). This reduction in long-term disability rates from 1982 to 1994 (continued on page 392)

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of Biomedical Research

The Benefits

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Individual Impact Factors for AJP Journals in 2000

For a number of years, the Society had been hearing from the membership that journal impact factors were being used to measure the quality of journals, influencing authors' decisions on manuscript submission and tenure committees' decisions on promotion. This has especially been a problem for authors publishing in the American Journal of *Physiology*. After all, the *AJP* impact factor of 3.077 is really an average based on the strengths and weaknesses of the individual AJP journals. In order to respond to this problem, the Society previously contracted with the Institute for Scientific Information (ISI) to perform a citation analysis of the individual AJP journals compared with similar journals in the field. The most recent analysis was published in the June 1998 issue of The Physiologist (http://www. faseb.org/aps/cstats.htm). A review of the article indicates that the AJP: Renal Physiology and the AJP: Cell Physiology had the highest mean citation scores of the AJP journals, exceeding the scores of a number of their competitor journals. Unfortunately, this information has not been sufficient to influence the decisions of authors and promotion committees.

In order to address this nagging problem, APS has negotiated with ISI to start providing Impact Factors for the individual *AJP* journals. Up until now, only the consolidated *American Journal* of *Physiology* has received an Impact Factor because most researchers cite articles from those journals using only the consolidated journal's volume and page numbers.

On August 20, 1999, at ISI headquarters in Philadelphia, PA, APS President Walter Boron, Publications Committee Chair Dale Benos, Executive Director Martin Frank, and Publications Manager Margaret Reich met with staff of ISI and its founder and developer of the Impact Factor, Eugene Garfield. ISI informed the APS representatives that they were prepared to change their procedures to accommodate the individual *AJP* journals.

In order to do this, APS will change slightly the way it references the *AJP* journals and add the volume number of the consolidated *AJP* to the covers of the individual journals starting in January 2000. Articles will now be referenced with the *AJP* and section title appearing as one title, and using the consolidated *AJP* volume number (e.g., *Am. J. Physiol. Cell Physiol.* 277: C361-C372, 1999). An ID line will appear in the upper right-hand corner of the first page of each article to help authors with the proper citation style.

When ISI releases Impact Factors in 2000, the Impact Factors for the section journals will have been derived using a manual calculation. They plan to fix the data back to 1994. ISI will develop a system to include this in their regular citation production during the next year. As more data are accumulated, and more links to our journal articles are fixed, the data will become more meaningful during the next 3-5 years. With many researchers using Impact Factors to decide where to submit articles, it was deemed critical that the section journals have Impact Factors, because manuscripts are submitted to them individually. As a result of this change, the consolidated AJP will no longer have an Impact Factor.

ISI publishes Impact Factors for 67 journals in its physiology category. The Impact Factors reported below are based on the citations of a journal in items published in 1996 and 1997 divided by the total number of items published by a journal in those two years. In 1998, the *AJP*, with an Impact Factor of 3.077, was ranked 1st in number of citations and 9th in Impact Factor among 67 physiology journals. The physiology journal with the highest Impact Factor was the Society's *Physiological Reviews*, with an Impact Factor of 23.656. The Journal of Neurophysiology ranked 7th, News in Physiological Sciences ranked 18th, and the Journal of Applied Physiology ranked 19th. If you would like to know more about Impact Factors, there is an article on the web by Helen Atkins of ISI at http://www.dlib.org/dlib/september 99/atkins/09atkins.html.

As stated above, Impact Factors have been used for years as an indicator of the quality of a journal. Libraries, too, have used them as indicators of quality when making purchasing decisions. In a subtle variation on this theme, they are now also being used when considering the value of a journal. In a recent study done at the University of Wisconsin, journals published by non-profit publishers were found to cost less than those published by commercial publishers. Non-profit journals were found to be particularly more cost-effective than for-profit journals when compared based on Impact Factors. The study looked at economics, physics, and neuroscience journals. Among the neuroscience journals, in a range of cost per impact of 0.14 to 61.32, the APS's Journal of Neurophysiology had a cost/impact of 0.298. The study, prepared by George Soete, can be found on the web at http://www.library.wisc.edu/ projects/glsdo/cost.htm.



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resulted in a smaller nursing home population in 1994 than would have been the case if the disability rates stayed the same. It also saved \$17.3 billion in nursing home expenses. Moreover, if these statistics continue to improve, there could be a substantial decrease in future Medicare and Medicaid costs. Among the factors contributing to this significant reduction in disability rates and projected health care expenditures are recent biomedical research on the fundamental biology of disease mechanisms and the modification of those mechanisms by biomedical interventions (11).

The use of pharmaceuticals (especially new pharmaceuticals) has reduced hospitalization rates. It is estimated that each dollar increase in pharmaceutical expenditure yielded a \$3.65 reduction in hospital costs (12). Improved understanding of molecular biology will result in even more efficient and effective pharmaceutical research and will lower the cost of drug development (13).

The estimated savings in nursing home and hospitalization costs cited above do not adjust for other expenses, such as the costs of home care, that might be incurred as inpatient stays are reduced. Thus, the net savings may be somewhat lower. However, regardless of the ultimate level of these countervailing costs, the movement of patients from hospitals and nursing homes has many advantages for patients and health care providers (not the least of which is enhanced patient comfort).

The most important qualification to the efforts to measure cost savings, however, involves the inability to quantify the quality of life improvements associated with more effective treatment and prevention of disease. These benefits are significant but cannot be converted to a simple dollar estimate. The incalculable value of better health and reduced disability is the most precious outcome of biomedical research.

The Unique Role of Federal Funding

Public funds promote the climate of openness and sharing that accelerates the process of discovery, verification, and product development. While the private sector is important to research and development in this country, the federal government is the only source able to provide the broad, long-term support necessary for basic research. The returns to investment in fundamental research are difficult to predict. We know that they occur and that they are extremely valuable. What we do not know is when they will happen or how they will be applied. If left totally to market forces, basic research would be underfunded since the gains from basic research are shared and the profits may not be captured by private investors.

For example, the basic research on the enzymology of DNA synthesis and degradation conducted by Nobel laureate Arthur Kornberg provided one of the cornerstones of the current revolution in biotechnology. Public support for Kornberg's research came "without any promise or expectation that this research would lead to marketable products or procedures. No industrial organization had, or ever would have, the resources or disposition to invest in such long-range, apparently impractical programs" (14).

Maintaining world leadership in research is vital for our prosperity, prestige, and even our national security. Our reputation, influence, and political power are reinforced by our role as the world's leader in research and education. The relationships forged by individuals working in our laboratories and schools also facilitate valuable links to their counterparts around the globe.

Recent studies have underscored the importance of federal funding for basic research. The House Committee on Science, under the direction of Vernon J. Ehlers (R-MI), reviewed our nation's science policy in 1998 and emphasized the unique role of federal funding. The committee recommended that Congress should make stable and substantial federal funding for scientific research a high priority (15).

The Council on Competitiveness (a nonprofit council of 161 corporate chief executives, university presidents, and labor leaders) recommends that the federal government increase its investment in basic research (16). The council's report concludes that health research has not been supported at levels required to realize the potential of emerging scientific opportunities and, moreover, changes in the health care system have diminished traditional sources of research support. Although we are currently the world's leader in research and innovation, the Council on Competitiveness cautions that increasing international competition leaves no room for complacency.

Our Thriving Pharmaceutical and Biotechnology Industries Rely on Publicly Supported Research

For many years, the success and prosperity of the US pharmaceutical industry has relied on publicly funded science for skilled personnel and "enabling discoveries," those fundamental scientific insights that lead to new therapeutics. The revolution in molecular biology increased the importance of this connection (17). A review of the 21 drugs with the greatest therapeutic effect introduced between 1965 and 1992 found that only 5 (24%) were not based on a key enabling discovery made in the public sector. Over time, this connection between publicly supported basic research and drug development has become stronger.

Government-funded basic research is an important precursor to innovation by the pharmaceutical industry (18). In addition to providing highly skilled personnel and new insights into the life sciences, public funding stimulates additional investment by the drug companies and enhances the effectiveness of

their R&D expenditures (19). Direct interactions and exchanges between academic scientists and researchers in the public sector is a critical mechanism by which private sector firms recognize and use new scientific discoveries. Relationships between pharmaceutical firms and publicly funded scientists in academia and government raise the level of private sector research productivity by as much as 30-40% (20).

This country's dynamic pharmaceutical industry is prosperous, with estimated sales of \$134 billion in 1999 (21). Domestic employment in researchbased pharmaceutical companies also continues to grow, having exceeded 208,000 workers in 1998. Many of these are high paying, high technology jobs that contribute substantially to growth in other technology-intensive sectors of the economy.

Federal support for biomedical research produced the new techniques of molecular biology and the scientist who could use them. The movement of these individuals and methods from academia to industry were vital for the emergence of the US biotechnology industry (22).

As this high technology industry continues to grow, it increases its contribution to society. Employment grew by 9%, with 153,000 people now working in the US biotech industry. Product sales of \$13.4 billion reflect an increase of 17% over the previous year.

Soon, over 80 biotech drugs will be on the market. More than 300 other products are in Phase II or Phase III clinical trials, and 2,200 more are in various stages of development (23).

Applications of biotechnology have expanded dramatically. In 1997, total US sales of agricultural biotechnology products reached \$875 million, an increase of 54% since 1994 (24). By 2002, sales are projected to be 2,885 billion for transgenic seeds, animal growth hormones, biopesticides, and other agricultural biotech products. According to some observers, the applications of biotechnology to agriculture will create more economic and social benefits than their applications of biotechnology to health.

Support For Research and Education in a Wide Range of Scientific Fields

We must fund research in a wide range of scientific fields. The contributions of chemistry, physics, mathematics, computer science, and engineering are essential to improving quality of life and raising standards of living. Advances in mathematics, physics, chemistry, and engineering are also vital to progress in medical science (25), any growth in future research funding must reflect their importance. The tremendous potential for progress in biological and medical research will be realized only if there is a steady flow of new insights from the other fields of science. Such discoveries have propelled much of our progress in the past and will undoubtedly guide our success in the future (26). The enzyme, Taq polymerase, for example, was first found in deep sea bacteria. It later proved essential in the development of polymerase chain reaction (PCR), a powerful tool for medicine, biotechnology, and forensic science (27).

Our continued progress and leadership in science and technology will also require the preparation of a new generation of scientists who will be able to extend the gains we have made and maintain our world leadership. We currently have the world's greatest system of advanced education, but it faces serious challenges, and we must make certain that we are able to maintain its excellence, expand access, and adapt it to meet the needs of a changing world.

Widespread Application of New Knowledge

Investment in basic science has fueled the development of new industries and increased the productivity of existing ones. Edwin Mansfield estimated that the total (i.e., social) rate of return on investment in academic research was 28% and that academic research was crucial to industrial innovation in hightech industries such as pharmaceuticals and information processing (28). It is difficult to overstate the economic importance of technology to the national economy: by one estimate, technology accounts for more than 50% of the economic growth in this country (29).

The benefits of research flow through a range of mechanisms, including personnel exchanges and direct applications of the scientific research literature (30). A recent examination of US patents revealed that 73% of the research papers cited by US industry patents were written by scientists working in universities, government, or other nonprofit institutions (31). A study conducted by the Massachusetts Institute of Technology found that approximately a billion dollars has been invested by private industry in the development and early commercialization of inventions licensed from currently active patents held by that institution (32). A subsequent study of exclusive patent licenses granted by the University of Pennsylvania found similar patterns of induced investment, and the authors estimated that in 1995 licenses from all universities led to investments of \$4.6 billion and created 27,000 private sector jobs in research and development nationwide (33). Much of the research that generated these university-held patents was performed by scientists working with federal research funds.

Government scientists also make significant contributions to technology transfer. In FY 1998, research performed by scientists on the NIH campus resulted in 124 patent awards, 215 executed licenses, and \$36.7 million dollars in royalty payments (34). Each of these technology transfer indicators reflects an increase over FY 1997 levels. From 1996 through 1998, NIH earned more than \$102 million on royalties from its 607 active invention licenses (35).

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Unmet Challenges

Recent progress in medical research has been phenomenal, but millions of Americans are still suffering from Alzheimer's disease, arthritis, cancer, chronic obstruction and pulmonary diseases, diabetes, heart disease, mental disorders, and stroke. We cannot measure the pain or hardship these illnesses impose on the victims and their families. The financial burden on our society, however, is substantial. Each year, the total economic cost (health care cost plus indirect costs such as lost wages) for each one of these diseases exceeds the budget for the NIH. In 1998, for example, the total economic cost of heart disease was estimated to be \$175.3 billion, more than 10 times the size of the 1998 NIH budget (36).

We must also prepare for new challenges and future threats to human health. The President's National Science and Technology Council reports that more than 30 new pathogenic microbes have been identified since 1973 and lists 21 other re-emerging infectious diseases (37).

We have seen a significant increase in federal funding for NIH, but our investment in health research is modest compared to the health and economic benefits it generates. Relative to our total national expenditure for health care, we spend only a small fraction on health research. In 1996, the total US expenditure on health care was \$1,035 billion dollars (38) or 13.7% of the Gross Domestic Product (39). Of that total, only \$30.6 billion (3.0%, or three cents out of every health care dollar) was spent on research (40).

That same year, 14.8% of the federal outlays for defense went for research and development (41).

Strong Support for Research Investment

Our nation's leaders recognize the importance of research for the US and its value to our citizens. The electorate

is clearly in support of increased federal funding, with 9 Americans in 10 believing we should invest more in medical research (42). Polls conducted by Research!America demonstrate that support for increased funding is found across the nation. Surveys conducted in states as different as Mississippi, New York, Tennessee, Wisconsin, and North Carolina all indicate strong support for increased federal investment in medical research. In each of these states, at least 60% of those polled favored doubling the level of government-sponsored medical research over the next five years (43).

Skeptics, questioning whether we can afford to use tax dollars to support biomedical research, say there are too many scientists, that high-tech innovations increase the cost of medical care, or that the government should leave it to private industry. However, as we have shown here, the investment must and should be made by the government because the benefits are broadly shared and long term. The savings in health care, especially from reduced disability and improved productivity, are far greater than the investment.

With our DNA genetic blueprints in hand, we are on the shores of a new intellectual continent that will transform our lives, our health, our medicines and our treatments. Recent discoveries have yielded significant breakthroughs in the prevention and treatment of disease, pointing the way to other improvements that may soon be within reach (44). We need a new generation of biomedical scientists and a continued commitment to research to realize these benefits, and we cannot afford to miss the opportunity. References

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Publications

Introducing Asrar B. Malik

Asrar B. Malik, Professor and Head of the Department of Pharmacology at the University of Illinois College of Medicine in Chicago, will assume the editorship of the AJP: Lung Cellular and Molecular Physiology, beginning January 1, 2000. Malik was raised and trained in Canada. He attended the University of Toronto where he received his doctorate in 1971. He subsequently carried out postdoctoral studies at Washington University School of Medicine in St. Louis. He joined the Department of Physiology and Cell Biology at the Albany Medical College of Union University in 1974 and was promoted to Professor in 1980. He assumed his current position at the University of Illinois in 1995.

Malik has served the American Physiological Society in various capacities. He has been a member of editorial boards of AJP: Heart and Circulatory Physiology, AJP: Lung Cellular and Molecular Physiology, and Journal of Applied Physiology. In addition, he has served on editorial boards of other journals such as Circulation Research. He has been a member of various study sections and review groups at NIH, Veterans Administration, and American Heart Association, including the Cardiovascular and Pulmonary (CVA) and Lung Biology and Pathobiology (LBLB) study sections, and NHLBI Program Project Review Committee A. Malik has also served as a consultant to public and private national and international agencies and is a member of the Executive Committee of the University of Illinois College of Medicine (Chicago). Malik was the recipient of the NIH Research Career Development Award (1977-1982) and NIH MERIT Award (1987-1997). Malik directs an NIH training program in lung research.

Malik's research area deals with two interrelated areas. A major interest of his laboratory is the study of the regulation of the pulmonary microvascular endothelial barrier. Malik is studying the signalling events occurring at the level of receptors and transduction pathways that regulate the barrier function of the endothelial cell monolayer. He and members of his group are investigating mechanisms of endothelial transport in microvessels using in vitro and in vivo approaches. The underlying premise of this work has been and



Asrar B. Malik

remains that both transcellular and paracellular mechanisms of transport are important in maintaining the microvascular barrier and that these are regulated by specific signalling events. These studies are pursuing the cellular effector pathways responsible for increasing endothelial permeability and how activation of signalling pathways mobilizes these effectors (e.g., actin-myosin motor, cadherin-catenin complex, and intermediate cytoskeletal filaments). This work has helped to unravel the complexity of the regulation of endothelial barrier function and role that signals play in the mechanisms of paracellular and transcellular permeability. His recent work has demonstrated the importance of transcytosis in microvascular endothelial cells in the regulation of lung fluid balance and that

this process can be activated by signalling events triggered at the cell surface by receptors. Another aspect of work in his laboratory deals with mechanisms of endothelial injury as induced by neutrophil adhesion to endothelial cell membrane and activation of adherent neutrophils and of neutrophils as they migrate across the endothelial barrier. This work is describing signalling mechanisms regulating expression of adhesion molecules such as ICAM-1 and how these signals activate transcription and thereby induce ICAM-1 expression on the endothelial cell surface. This work addresses the expression of the adhesion molecule ICAM-1 at the level of gene transcription. The objective in these studies is to understand the basis of ICAM-1 expression and then to develop strategies for controlling the inappropriate endothelial adhesivity and leukocyte trafficking across the vascular endothelium.

Malik has several important objectives for the journal in conjunction with the team of associate editors, (Michael Matthay, Ivan McMurtry, Bruce Pitt, Paul Schumacher, and Richard Ye). He intends to increase the visibility of the journal in publishing work in areas of lung biology and pathobiology. He views lung research advancing in the next decade to unravel critical questions such as regulation of extracellular matrix production, nature of the alveolar epithelial barrier in regulation of transport of ions and liquid, how endothelial and epithelial cells orchestrate the lung's inflammatory response, subtle signalling cues that mediate contractility of bronchial and pulmonary vascular smooth muscle cells, redox regulation of intercellular signalling, and nature of oxygen sensing mechanisms in the lung and how they control cellular function in the lung. Malik will refocus the journal as a major voice in lung biology by publishing the best original research in the field as well as

Publications

regular review and perspectives articles. Integrative lung biology utilizing genetic approaches for the study of lung function will also be emphasized. With the era of genomics upon us, the journal intends to encourage submission of manuscripts dealing with analysis of function of genes and their protein products and how they reveal aspects of lung cellular function.

Malik will continue the high standards set by his predecessors, **Donald** Masaro and Gene Rannels, to ensure rigorous, fair, and expeditious reviews of submitted review articles. This will be facilitated greatly by implementation of online submissions and review of manuscripts.

APS Welcomes New Publications Manager

On June 7, 1999, Margaret Reich joined the APS staff after the retirement of longtime Publications Manager, Brenda Rauner. Margaret was living in Dallas, TX, and working for the American College of Emergency Physicians as the Director of their journal, *Annals of Emergency Medicine*, and had been the Production Manager of the American Heart Association's Scientific Publications Department before that.

In the months since her arrival. Margaret has made a few changes in the APS's Publications Department. "I wanted to be involved in all aspects of our journals' publication, and I wanted to take advantage of the wealth of experience and skills of the staff, many of whom have worked on the journals for 10 years or more." Publications is now divided into Peer Review, Editorial, and Editorial Art departments, managed by Alice O'Donnell, Anna Trudgett, and Eric Pesanelli, respectively. In addition, each journal is lead by a Journal Supervisor, giving supervisory responsibility to the former Journal Copy Editors.

The restructuring of the department was not the only challenge facing Margaret when she arrived. She joined APS at the height of the controversy over Harold Varmus's E-Biomed proposal. "This is actually a very exciting time to be in scientific publishing, as outside forces push us in directions and at a speed that many publishers are not



Margaret Reich

comfortable with. I feel fortunate to be at APS, where many of the things that scientists want, such as online publication and peer review, have already been accomplished or started. I also feel fortunate to be at a society with a place at the podium in the debate."

When asked what particular challenges APS Publications face short-

term, Margaret answered, "One of the things that APS has been working on for a while is getting impact factors reported for the separate AJP journals. I'm happy to say that-due to work done by Marty Frank, Walter Boron, Dale Benos, and my predecessors-ISI has agreed to implement separate impact factors in 2000. We're implementing some changes in the referencing of the journals for the January issues in order to allow this. The other challenges I'll be turning my attention to in the near future, under the direction of the Publications Committee and especially from the Strategic Planning that is being done this fall, is what the best model for paying for the journal content will be: some combination of page charges, submission charges, and subscription pricing, and how to price and when to release the content online. I'll also be working closely with our new Editorial Manager, Anna Trudgett, and our vendors to continue to shorten time to publication.

"I'm very much looking forward to attending conferences and meeting APS members to learn what they like and don't like about our journals, and how we can improve the peer review and publication process for them."

Moving?

If you have moved or changed your phone, fax, or email address, please notify the APS Membership Office at 301-530-7171 or fax to 301-571-8313.

Thank You, Jim!

After nearly 33 years, James C. Liakos has decided to retire from APS and instead devote himself to the beaches of Florida and to his family. Jim joined the APS staff in 1966. In 1985, when Martin Frank became Executive Director, Jim was serving the Society as the Acting Business Manager since his boss had taken a leave of absence. By January 1986, Jim had demonstrated his competency in financial matters and he was promoted to Business Manager, a position that he has successfully filled since that time.

When Jim joined the Society in 1966, the APS President was Executive Secretary-Treasurer him with a watch.

was Ray Daggs. During Jim's tenure at APS, he worked with and knew all of the individuals who have served the Society as Executive Secretary/Executive Director. They include Milton O. Lee, Ray G. Daggs, Orr E. Reynolds, and Martin Frank.



John Brookhart and the APS President Walter Boron congratulates Jim and presents

In 1966, the overall Society budget was approximately \$600,000 and the APS had approximately \$800,000 in a reserve account. The Spring Meeting was held as part of the FASEB Meeting in Atlantic City, NJ, and the APS had 2,920 members. By the time Jim became the Society's Business Manager, the Society's annual budget had grown to approximately \$6,500,000. Thanks to Jim's astute management, the APS is financially sound with an annual budget of approximately \$14 million and reserves of approximately \$30 million.

Following the Society's Finance Committee meeting on Friday, October 15, the Committee members, the Executive Cabinet, and APS staff had a retirement reception for Jim and his wife, Bobbi. In appreciation of Jim's service, Walter Boron, Gerald DiBona, Ed Blaine, and Martin Frank presented him with a number of retirement gifts and expressed the hope that his retirement would be filled with health,

family, and a kaleidoscope of opportunities, which would bring fulfillment and happiness. Jim's financial acumen has left APS with a legacy that can be used to benefit the membership and the discipline. Jim, all of us in the APS family wish you all the best. 💠



APS Executive Director Martin Frank presents outgoing APS Business Manager Jim Liakos with a kalaidoscope to commemorate Jim's retirement.



APS Finance Committee Chair Ed Blaine reads a letter from a book of congratulatory wishes Jim received.



APS President-Elect Gerald DiBona presents Jim with a laptop computer as a token of appreciation for his service to the Society.

2000 Officers and Standing Committees

APS Council

Officers

Walter F. Boron, President Gerald F. DiBona, President-Elect L. Gabriel Navar, Past President

Councillors

Dale J. Benos (2000) Hannah V. Carey (2002) William W. Chin (2001) Richard J. Traystman (2000) Phyllis M. Wise (2001) Jo Rae Wright (2002)

ex officio members

Barbara E. Goodman, Education (2000) Mordecai P. Blaustein, Finance (2002) Judith A. Neubauer, Program (2001) Dale J. Benos, Publications (2001) Celia D. Sladek, Section Advisory (2002)

Society Standing Committees

Animal Care and Experimentation

Maintains and updates the APS "Guiding Principles in the Care and Use of Animals," provides consultation regarding animal experimental procedures and care, and keeps abreast of legislation and new developments in animal models for student teaching and alternatives for animal usage.

C. Terrance Hawk, Chair (2000) Susan E. Jacobs-Kaufman (2000) Kevin C. Kregel (2002) Steven W. Mifflin (2001) Linda A. Toth (2001) Elizabeth M. Wagner (2002) Matthew Walker, student member (2002) Terry J. Opgenorth, *ex officio* (2001) Joseph R. Haywood, *ex officio* (2000)

Awards

Oversees the award programs of the Society to ensure uniformity and conformity with the goals of APS, investigates new means of funding for the APS awards program, and selects Research Career Enhancement Awardees and APS Postdoctoral Fellowship Awardee. Four additional members are yet to be appointed.

Thomas V. Peterson, Chair (2001) William L. Joyner (2000) Bruce G. Lindsey (2002) Sadis Matalon (2001) J. Michael Overton (2002) Patricia Preisig (2001) D. Eugene Rannels (2002) Janice H. Urban (2002) Pamela J. Gunter-Smith, *ex officio* (2001) Susan M. Barman, *ex officio* (2001)

Career Opportunities in Physiology

Provides Council with information regarding availability and needs for appropriately trained physiological personnel and recommends measures to assure appropriate balance in the supply and demand for physiologists.

Edward J. Zambraski, Chair (2000) Francis L. Belloni (2001) David P. Brooks (2000) Thomas C. Herzig (2001) John H. Johnson (2002) Raul Martinez-Zaguilan (2000) Darryl R. Peterson (2002)

Committee on Committees

Serves as an advisory committee to Council to make recommendations for nominees to the standing committees and reviews charges of the various committees regarding overlapping responsibilities.

Phyllis M. Wise, Chair (2001) Hannah V. Carey (2002) James B. Bassingthwaighte (2000) Eldon J. Braun (2000) Pamela K. Carmines (2002) Steven C. George (2001) Penny Hansen (2001) M. Harold Laughlin (2000) Thomas E. Lohmeier (2001) Marshall H. Montrose (2001) Johnny R. Porter (2002) Mrinalini C. Rao (2000) Louis D. Van de Kar (2002)

Ray G. Daggs Award

Annually selects a member of the Society to receive this award in recognition of distinguished service to APS and to the science of physiology.

Beverly P. Bishop, Chair (2000) John R. Claybaugh (2002) James E. Faber (2001)

Education

Provides leadership and guidance in the area of physiology education of undergraduate, graduate, and professional students; recommends objectives for the graduate programs in physiology; and organizes workshops on the application of new techniques in physiological problems.

Barbara E. Goodman, Chair (2000) George T. Blevins (2000) J. Thomas Cunningham (2002) Jeffery R. Demarest (2002) Cheryl M. Heesch (2001) Andrew J. Lechner (2000) Michael F. Romero (2002) Steven S. Segal (2000) Richard C. Vari (2001) John G. Wood (2002) Michael D. Johnson, ex officio (2002) Penny Hansen, *ex officio* (2001) Edward J. Zambraski, *ex officio* (2000)

Finance

Reviews the proposed annual budget and fiscal plan for all Society activities and recommends a final budget and implementation plan to Council.

Supervises the investment of the Society's financial resources subject to approval of Council.

Mordecai P. Blaustein, Chair (2002) Steven L. Britton (2001) William H. Dantzler (2001) David R. Harder (2000) L. Gabriel Navar, (2000) Walter F. Boron, *ex officio* (2000) Gerald F. DiBona, *ex officio* (2000) Dale J. Benos, *ex officio* (2001)

Honorary Membership

Recommends to Council distinguished scientists who have contributed to the advancement of physiology as candidates for honorary membership.

Franklyn G. Knox, Chair (2000) Leonard S. Jefferson (2001) Bodil M. Schmidt-Nielsen (2002)

International Physiology

Facilitates interchange between APS, other physiological societies, and their individual members; handles all matters pertaining to international physiological affairs, with an emphasis on developing countries; and maintains a clearinghouse for linkages with developing countries.

Hector Rasgado-Flores, Chair (2001) Albert F. Bennett (2002) Bernice Grafstein (2000) Carmen Hinojosa-Laborde (2001) Virginia Huxley (2002) John B. West (2002) Aviad Haramati, *ex officio* (2000) Shu Chien, *ex officio* (2000)

Joint Program

Develops the scientific programs for the Society and assists Council in shaping policy for scientific programs and in the organization of fall conferences.

Judith A. Neubauer, Chair (2001) At-Large Members: Michael C. Andresen (2000)

Michael Caplan (2001) Catherine S. Chew (2000) Craig H. Gelband (2002) Laurie J. Goodyear (2002) Steven R. Gullans (2000) Joseph M. Metzger (2000) Scott K. Powers (2001) Curt D. Sigmund (2000) Cardiovascular H. Glenn Bohlen (2000) and R. John Solaro (2001) Cell and Molecular Physiology Simon A. Lewis (2000) **Central Nervous System** J. Michael Wyss (2002) **Comparative Physiology** James W. Hicks (2000) Endocrinology and Metabolism Charles H. Lang (2001) Environmental and Exercise Physiology Ronald L. Terjung (2000) Gastrointestinal Matthew B. Grisham (2003) **Neural Control and Autonomic** Regulation Frank J. Gordon (2000) Renal Jeff L. Garvin (2000) and Christine Baylis (2002) Respiration Sadis Matalon (2001) **Teaching of Physiology** Ann P. McNeal (2000) Water and Electrolyte Homeostasis Joey P. Granger (2002) **Epithelial Transport Group** Thomas Kleyman (2002) **History of Physiology Group** G. Edgar Folk, Jr. (2000) Hypoxia Group Nanduri R. Prabhakar (2000) **Myobio Group** Thomas M. Nosek (indefinite) **Members in Industry Group** Terry J. Opgenorth (2001) **Education Committee** Barbara E. Goodman (2000)

Liaison With Industry

Fosters interactions and improved relations between the Society and industry and cooperates with the Career Opportunities in Physiology Committee to encourage high school and college students to choose a career in physiology.

Terry J. Opgenorth, Chair (2001)

Committee is being restructured and will be composed of representatives of each section.

Long-Range Planning

Advises and reports annually to Council and interacts with the Section Advisory Committee; prepares systematic, periodic analyses and realistic assessments of past and present Societal performance and accomplishments; conducts review of the Society's relationships with other organizations; and devises specific goals and objectives pertinent to the future scientific mission of APS and American physiology. Reviews the progress of the Strategic Plan annually, conducts studies as assigned by Council, and prepares proposals.

Allen W. Cowley, Jr., Chair (2002) William H. Beierwaltes (2001) Gregory D. Fink (2001) Peter A. Friedman (2002) Barbara A. Horwitz (2000) Gary J. Schwartz (2001) John A. Williams (2002) Richard J. Traystman, Councillor (2000)

Membership

Considers all matters pertaining to membership, reviews and evaluates applications received from candidates for membership, and recommends to Council the nominees for election to regular and corresponding membership.

Martha E. O'Donnell, Chair (2001) David H. Ellison (2002) Meredith Hay (2000) W. Larry Kenney (2002) Raouf A. Khalil (2001) Charles H. Lang (2002) Catherine F. T. Uyehara (2002)

Perkins Memorial Fellowship

Selects recipients for visiting scientist family support awards and supervises administration of the Perkins Fund.

Aviad Haramati, Chair (2000) Klaus W. Beyenbach (2001) Matthew J. Kluger (2000) Arthur D. Loewy (2000) Molly P. Hauck, *ex officio* (indefinite)

Porter Physiology Development

Selects recipients for visiting scientists and professorships and teaching and training fellowships, aimed at improving physiological departments of medical schools with predominately minority enrollments. Counsels underdeveloped physiology departments, assists in the selection of NIDDK minority fellowship awards, and supervises the administration of the Porter Fund.

Pamela J. Gunter-Smith, CoChair (2001) H. Maurice Goodman, CoChair (2001) Parimal Chowdhury (2001) J. Andrew Daubenspeck (2000) Jeffrey L. Garvin (2000) Evangeline D. Motley (2001) Jane F. Reckelhoff (2002) Frank Talamantes (2002) Marian R. Walters (2000)

Public Affairs

Advises Council on all matters pertaining to public affairs that affect physiologists and implements public affairs activities in response to Council guidance.

Joseph R. Haywood, Chair (2000) Virginia Brooks (2002) Philip S. Clifford (2000) David J. Dzielak (2000) Andrea R. Gwosdow (2001) Timothy I. Musch (2001) Willis K. Samson (2002) C. Terrance Hawk, *ex officio* (2000) Terry J. Opgenorth, *ex officio* (2001)

Publications

Manages all Society publications, including the appointment of editors and editorial boards, and supervises the Book Advisory Committees (handbooks, technical series, and history) to ensure timely publication.

Dale J. Benos, Chair (2001) David H. Alpers (2001) R. Davis Manning, Jr. (2000) Richard A. Murphy (2002) James A. Schafer (2001) Walter F. Boron, *ex officio*

Section Advisory

Recommends to Council ways to strengthen the Sections' roles in programs, public affairs, and governance of the Society; serves as a Nominating Committee to nominate Society officers; and nominates members as candidates for service on Society committees.

Celia D. Sladek, Chair (2002) Cardiovascular Kathleen H. Berecek (2001) Cell and Molecular Physiology Robert B. Gunn (2001) **Central Nervous System** Susan M. Barman (2002) **Comparative Physiology** David H. Evans (2000) **Endocrinology and Metabolism** David H. Wasserman (2001) Environmental and Exercise Physiology Charles M. Tipton (2000) Gastrointestinal Physiology Helen Raybould(2000) Neural Control and Autonomic Regulation Eileen M. Hasser (2000) Renal Physiology Jeff M. Sands (2002) Respiration Michael A. Matthay (2002) **Teaching of Physiology** Dee U. Silverthorn (2002) Water and Electrolyte Homeostasis Ronald H. Freeman (2000)

Senior Physiologists

Maintains liaison with senior and emeritus members and assists in the selection of recipients of the G. Edgar Folk, Jr. Award.

Eugene M. Renkin, Chair (2001) Michael Bárány (2000) Arthur E. Baue (2001) N. Herbert Spector (2002) Heinz Valtin (2001) Karlman Wasserman (2002) Kenneth L. Zierler (2000)

Women in Physiology

Deals with all issues pertaining to education, employment, and professional opportunities for women in physiology. Develops programs to provide incentives enabling graduate students to present their research work at APS meetings, coordinates activities with other committees on women in the FASEB organization, administers the Caroline tum Suden Professional Opportunities Awards, and provides mentoring opportunities for members.

Susan M. Barman, Chair (2001) Siribhinya Benyajati (2002) Ann C. Bonham (2000) Lisa M. Harrison-Bernard (2001) Carole M. Liedtke (2001) Suzanne M. Schneider (2002) Donna H. Wang (2002) Kim Huey, student member (2002)

Society Representatives to Other Organizations

Association for Assessment and Accreditation of Laboratory Animal Care, International C. Terrance Hawk (2000) American Association for the Advancement of Science Frank L. Powell (2001) Hershel Raff (2001) Council of Academic Societies of the Association of American Medical Colleges Vernon S. Bishop (2001) William H. Dantzler (2000)

Federation of American Societies for Experimental Biology Board L. Gabriel Navar (2001) Gerald F. DiBona (2003)

Executive Officers Advisory Committee Martin Frank (indefinite)

Experimental Biology Board Leonard S. Jefferson (2000)

FASEB Finance Committee Robert Gore (2001)

FASEB Excellence in Science Award Committee Susan Barman (2001) **FASEB Research & Education Committee** Mary Anne Frey (2000)

FASEB Public Affairs Executive Committee L. Gabriel Navar (2001)

FASEB Public Affairs Advisory Committee Joseph R. Haywood (2000)

FASEB Publications & Communications Committee Pamela Gunter-Smith (2000)

FASEB Research Conference Advisory Committee Mark Chapleau (2002) FASEB Wellcome Visiting Professorship M. Ian Phillips (2001)

National Association for Biomedical Research Martin Frank (indefinite)

US National Committee for IUPS Walter F. Boron (2001) L. Gabriel Navar (2000) Gerald F. DiBona (2002)

US National Committee on Biomechanics Andrew McCulloch (2002)

Membership

Distribution by Employment (7,416 respondents)	
	No.
Physiology departments	2,455
Clinical	1,593
College or University	1,277
Other preclinical departments	596
Government	345
Hospitals and Clinics	306
Institutes and Foundations	202

8,552

% 33.1% 21.5% 17.2% 8.0% 4.7%

Total Membership

Hospitals and Clinics	306	4.1%
Institutes and Foundations	202	2.7%
Commercial Companies	187	2.5%
Veterinary Schools	150	2.0%
Public Health & Graduate Schools	131	1.8%
Other	61	0.8%
Administration	43	0.6%
Dental School	37	0.5%
Private Practice	33	0.4%

Distribution by Earned Degree

(7,834 respondents —include	es 1,113 indi-
viduals with multiple doctora	ate degrees)
PhD	4,777
MD	2,656
DVM	192
ScD	112
DDS	33
EDD	23
Cand. Med.	41

Distribution by Type of v	VORK
Total respondents	7,440
	%
Research	77.9
Teaching	11.0
Clinical	6.7
Administration	4.5
Distribution by Gender (opt	ional personal data)
Total respondents	7,524
Female	1,360
Male	6,164
Distribution by Age (option	onal personal data)
Total respondents	8,234
70+	1,226
60-69	1,123
50-59	1,995
40-49	2,027
30-39	1,218
20.20	645

Haritage (antional personal data)

fieldage (optional personal data)	
Total respondents	5,783
American Indian or Alaskan	16
Asian or Pacific Islander	600
Black	71
White	4,983
Hispanic	113

Distribution by Primary Section Aff	iliation
Total respondents	7,398
-	%
Cardiovascular	24.8
Respiration	11.7
Cell & Molecular	11.5
Endocrinology and Metabolism	9.7
Environmental and Exercise	8.0
Central Nervous System	7.8
Renal	7.4
Gastrointestinal	5.6
Comparative	4.1
Neural Control and Autonomic Regu	ı. 4.1
Teaching of Physiology	2.8
Water and Electrolyte Homeostasis	2.4
Distribution by Group Affiliation	
Total respondents	1,384
	%
MyoBio/Muscle Group	30.3
Epithelial Transport Group	27.1
History of Physiology Group	16.3
Hypoxia Group	18.0

Distribution by Primary Specialty

Members in Industry Group

Total respondents	7,351
	%
Anesthesia	0.5
Anatomy and embryology	0.3

The Physiologist

8.4

Biochemistry	0.8	Chile	4	Louisiana	122
Biophysics	0.7	Jamaica	3	Washington	120
Biomedical engineering	0.5	British West Indies	3	Alabama	116
Blood	1.4	Peru	2	Iowa	108
Cardiovascular	23.8	Colombia	2	Arizona	107
Cellular and tissue	3.6	Honduras	1		
Comparative physiology	2.5	Dominican Republic	1	APS Membership Outside the Ar	nericas
Electrolytes and water balance	5.1	St. Vincent The Grenadines	1	(countries with five or more memb	ers)
Endocrines	6.4	Trinidad	1	Japan	180
Energy metabolism and temperature	2.5	Venezuela	1	Germany	103
Environment	2.2	Costa Rica	1	France	74
Enzymes	.1	Costa Rica	1	United Kingdom	60
Gastrointestinal	4.9	US States With More Than 100 Me	nhers	Australia	53
General physiology	0.9	(50 states plus District of Columbia 1	Duerto	Italy	43
Gerontology	0.3	Rico Guam and the Virgin Islands)	uerto	South Korea	42
Immunology	0.5	C-life min	770	Denmark	39
Liver and bile	0.5		779 540	Netherlands	39
Lipids and steroids	0.6	New York	542	Switzerland	32
Microbiology	.1	Texas	455	England	29
Minerals, bone, and teeth	0.6	Pennsylvania	396	Spain	26
Muscle and exercise	8.0	Massachusetts	332	Sweden	26
Neurosciences	12.2	Maryland	332	Belgium	25
Nutrition and food	1.2	Illinois	309	Taiwan	24
Pathology	.1	Ohio	278	Israel	22
Pharmacology	1.6	Florida	268	Norway	16
Radiology	0.2	Michigan	237	New Zealand	15
Renal	6.1	North Carolina	180	Austria	9
Reproduction	1.3	Missouri	180	Greece	9
Respiration	10.4	Wisconsin	169	Hong Kong	9
Other	0.6	New Jersey	157	India	9
		Georgia	157	Scotland	8
APS Membership in the Americas		Virginia	152	Turkey	7
US	7.096	Minnesota	135	Poland	7
Canada	379	Tennessee	133	South Africa	7
Brazil	50	Colorado	131	Ireland	7 7
Mexico	15	Connecticut	130	Hungary	, 7
Argentina	10	Indiana	128	People's Republic of Chipa	5
	10			respices republic of child	5

Experimental Biology 2000 Deadlines

February 18, 2000

Advance Registration Deadline

February 21, 2000

Late Breaking **Abstracts Deadline** March 6, 2000

Hotel Reservation Deadline

New Regular Members

* Transferred from Student Membership

Steven H. Abman University of Colorado Ayotunde Samuel Oke Adeagbo University of Louisville Banji Joseph Adegunloye University of Leeds Nasim Ahmed North Shore University Hospital Eyup Sabri Akarsu University of Ankara Ali Abdulla Al-Qarawi King Saud University Inci Alican Marmara University **Mark Edward Anderson** Vanderbilt University **Theodore J. Angelopoulos** University of Central Florida Veena Berry Antony Indiana University School of Medicine Maja Bago-Valic Medical College of Wisconsin **David Patrick Basile** Medical College of Wisconsin **Anthony John Bauer** University of Pittsburgh Peter L. Becker **Emory University** Ari Berkowitz University of Oklahoma Liliana Graciela Bianciotti University of Ottawa Heart Institute **Gary St.John Bird** NIH/NIEHS **Mihalv Boros** Szent-Gyorgyi Albert Medical Univ. Luc P. Brion Albert Einstein College of Medicine **Margaret Casarett Bruce** University of Kentucky Allson M.J. Buchan University of British Columbia **Rochelle Buffenstein** City University of New York Penny Wung Burgoon* University of Illinois Michael Alan Burson* United States Air Force

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Bing Han* Baylor College of Medicine Yi Han Baylor College of Medicine **Borje Haraldsson** Goteborg University **Richard Harding** Monash University **Adrian P. Harrison** Royal Veterinary of Agriculture Univ. **Kevan Leighton Hartshorn** Boston University **Charmaine Beverley Serene Henry** University of Virginia Shawn Hochman Emory Univ. School of Medicine Henry Masakazu Honda University of California-Los Angeles **Peter John Hunter** University of Auckland Victor Ivanovich Ilyin CoCensyc, Inc. **David Dunbar Ivy** University of Colorado Willis H. Jacob Southern University Lucie Jeannotte University of Laval **Bo Skaanina Jensen** NeuroSearch A/S **Roger Anthony Johns** Johns Hopkins Hospital **Robert Alan Johnson* Tulane University** Jon H. Kaas Vanderbilt University Hiroshi Kadotani Stanford University Motoni Kadowaki Niigata University **David Alan Kaminsky** University of Vermont Kazuo Katoh Tohoku University Adrian H. Keadrick **Bristol Royal Infirmary Robert L. Keith** Denver VA Medical Center Chi Dae Kim Pusan National University Joo-Sung Kim Seoul National University

Melissa B. King University of Minnesota Michael Kjaer **Bispebjerg Hospital** Maureen T. Knabb West Chester University Joshua Ka-Shun Ko University of Hong Kong Michael Koban Morgan State University Keith Edward Korsmeyer Hawaii Pacific University Herbert Johannes Kramer Medical Policlinic Anna Krystyna Kurdowska University of Texas Health Center M. Jane Lalli* University of Cincinnati Amir Landesberg Technion-IIT **Elanor Deland Lederer** University of Louisville Stephan E. Lehnart University of Goettingen **Terry Alan Lennie** Ohio State University **Christopher Sean Leonard** New York Medical College Kathy Jean LePard Midwestern University Kai-Hun Li University of Colorado Liang Li Indiana University **David Lichtstein** The Hebrew University-Hadassah Mingyao Liu University of Toronto Xiang Luo University of Texas Southwestern Christopher J. Lynch Penn State University Margaret Ann Maher* University of Wisconsin Anita Mandal University of Hawaii Prabir Kumar Mandal University of Hawaii **Raul Alberto Marinelli** Universidad Nacional de Rosario Wanda Sue Marley* Colorado State University

Gregory Francis Martel University of Maryland Eastern Shore **Paul James McDermott** Medical University of South Carolina Scott Medler Louisiana State University James S. Miller Goshen College Seema Mital Columbia University Sheba M.J. Mohankumar* Kansas State University **Bryan Douglas Moyer*** The Scripps Research Institute Joseph Thomas Murphy University of Texas Southwestern Sanjay Kumar Nigam Brigham and Women's Hospital **Richard Odessey** Quintiles, CNS Therapeutics **Robert Martin O'Doherty*** University of Pittsburgh Marie F. O'Rourke College of St. Mary Stephen T. O'Rourke North Dakota State University **Babu Joseph Padanilam** Washington University Soumitro Pal Beth Israel Deaconess Med. Center Angela Panoskaltsis-Mortari University of Minnesota **Christopher Joseph Pemberton** University of Otago **Steve Petersen** Washington University Janos Peti-Peterdi University of Alabama-Birmingham Xiujun Pi Kansas University Medical Center John Pooler **Emory University Richard Fraser Potter** University of Western Ontario **Robert William Powers** Magee-Womens Research Institute Harold Gerhard Preiksaitis University of Western Ontario **Charles Theodore Putman*** University of Regina Susan Pyner University of Birmingham

Vladimir Vjacheslavovich Raevsky Inst Higher Nerv. Activity & Neurophys. **Carroll L. Ramos** Southwestern Oklahoma State Univ. **Scott Howard Randell** University of North Carolina Diana Carla Rein University of Cincinnati **Adelina Martha Reis** Universidad Federal de Minas Gerais **Thomas Cahill Resta*** University of New Mexico Michael A. Reutter* University of Minnesota **Chrisotpher Alan Richard** University of California-Los Angeles Jesus Rico-Sanz Universidad Autonoma de Barcelona Attilio Rigotti Catholic University **Robert Brooks Robey** University of Illinois-Chicago **Donald W. Rodd*** University of Evansville **Rita Marie Ryan** University of Rochester Peter Saggau Baylor College of Medicine **Kent Sahlin** Karolinska Institute Max Erik Salomonsson University of Copenhagen **Mrinmoy Sanyal** Psoriasis Research Institute Lisa Michelle Satlin Mt Sinai Medical Center Takayuki Sato National Cardiovascular Center Nina C. Saxena **Emory University** Lawrence Allen Scheving Vanderbilt University Jane M. Schluter Benedictine University Jay J. Schnitzer Massachusetts General Hospital Solomon Silas Senok University of the West Indies Jyoti N. Sengupta **GI** Pharmacology Gerry P.J. Shaw University of Florida

Weiqun Shen* Eli Lilly and Company **Robert Shenkar** University of Colorado Larissa Akimi Shimoda Johns Hopkins University Minoru Shinohara University of Tokyo Ralph Mitchell Siegel **Rutgers University** Jon Olafur Skarphedinsson University of Iceland **Cris Allan Slentz** Duke University Medical Center Jakob Balslev Sorensen University of Copenhagen John Roger Speakman University of Aberdeen **Robert Charles Speth** Washington State University John M. Spitsbergen Western Michigan University **B.** Glenn Stanley University of California-Riverside **Robert Oden Stuart** Brigham and Women's Hospital Koh Sugawara Profectinal Shinjo Hospital Shuangdan Sun New York Medical College Chin K. Sung University of Southern California Peter W. Swaan Ohio State University John Gregory Swallow* University of Maryland Miyako Takaki Nara Medical University Shawn M. Talbott Pharmanex M.A. Hassan Talukder East Carolina University Kazuyoshi Taya Tokyo University William J. Tharion U.S.A.R.I.E.M. **Roger Christopher Thomas** University of Cambridge **Peter Thoren** Karolinska Institute Martha Tissot van Patot University of Colorado

Nakano Tomio Hyogo College of Medicine Todd A. Trappe University of Arkansas Nathan Andrew Trueblood Boston University Kemal Sitki Turker Adelaide University Nancy Delane Turner Texas A&M University **Robert Claude Tyler** University of Colorado Health Sci Ctr Gertjan Van Dijk University of Groingen Jennifer Eileen Van Eyk Queen's University Jamie Ian Vandenberg University of Cambridge J. Mark VanNess University of the Pacific Heikki Vapaatalo University of Helsinki **Theodoros Vassilakopoulos** University of Athens Medical School Marcelo Sergio Vatta University of Ottawa Sylvia Arlette Verbanck Free University Brussels **Enrique Verdu** University Autonoma Anitha Vijayan Washington University **Carlos P. Vio** Universidad Catolita de Chile Wanpen Vongpatanasin Univ. of Texas Southwestern Med Ctr Piper Lynn Wall Iowa Methodist Medical Center **Ping Ming Wang** Columbia University **Brad Wavne Warner** Children's Hospital Medical Center Debra L. Waters University of New Mexico Fadi Xu University of Kentucky Adel Youakim Immunex Corporation Gang Yue Emory University E. Paul Zehr* University of Alberta

Michael B. Zemel University of Tennessee Michael E. Zenilman Albert Einstein College of Medicine Donghai Zheng East Carolina University Wei Zheng University of Iowa Juleen Rae Ziereth Karolinska Institute Gregor Zupancic University of Ljubljana

Accepted Student Applicants

Jason David Allen Louisiana State University Newell St. George Baxter Florida Atlantic University Hans S. Bez Florida Atlantic University Keith Lawrence Bidsi Florida Atlantic University **Brian James Bolen** Florida Atlantic University Marni Della Boppart Joslin Diabetes Center **Becky Darlene Brick** Florida Atlantic University **Robert Arthur Brown** Memorial University of Newfoundland **Robert Raymond Buss** McGill University Dean J. Calsbeek Colorado State University **Deborah Cleveland** Florida Atlantic University Philip Anthony Cole, II Louisiana State University **Conan Benedict Cooper** University of Calgary **Chris R. Croushore** Florida Atlantic University Arianne R. DeGannes Florida Atlantic University **Gregg DiBerardine** Florida Atlantic University **Marie Rivas Doni** Florida Atlantic University **Ferdinand Ralph Dookie** Florida Atlantic University **Ines Drenjancevic-Peric** University of Osijek **Scott Earley** University of New Mexico **Dawn Elston** Florida Atlantic University

Lourens Johannes Erasmus University of the North Sovenga Iratxe Eskurza University of Colorado Linda A. Fisher Florida Atlantic University **Douglas Warren Frank** Florida Atlantic University Teresa Elena Garcia Florida Atlantic University Leon Max Gervitz Texas Tech University **Danielle Elyse Gillman** Florida Atlantic University **Rine Muriel Gonzalez** Florida Atlantic University **Tim Griesser** Florida Atlantic University **Morton Grunnet** Institute of Medical Physiology Joshua Michael Gulley Indiana University Milind V. Gurjar University of Iowa Kendal Paul Honea University of Mississippi Lauren Ann Hosbrouck Florida Atlantic University Jennifer Antoninette Ioli Florida Atlantic University Johanna Julean Isaacs Florida Atlantic University **Ronald Joseph Johnson** Michigan State University David S. Kump University of Missouri **Carrie A. Lavelle** Florida Atlantic University Monica Loretta Lawrence Florida Atlantic University Timao Li University of Manitoba

Sumei Liu Ohio State University Pete Lucia Florida Atlantic University **Christopher John Madden** University of Pittsburgh **Edward Antonio Medina** University of California-Davis Stephania Tenisha Miller University of Arkansas Deanna G. Moehle Florida Atlantic University Jennifer Ann Muller Florida Atlantic University **Jaime Anne Mullin** Florida Atlantic University **Chadwick H. Mullings** Florida Atlantic University **Erica Cristina Nagy** Florida Atlantic University Madhvsudan Natarajan Northwestern University Gary O'Donnell Florida Atlantic University Larry William Padgett Florida Atlantic University Sandhya Pahuja Kenpue University Kara Elaina Puhl Florida Atlantic University Marcel Rasa Florida Atlantic University Anita M. Rivera-Brown University of Puerto Rico Kelly Lynn Rodas Florida Atlantic University **Ana-Maria Nicole Romera** Florida Atlantic University Shankar C. Sanka Texas Tech. University Hlth. Sci. Ctr. **Donna M. Simmons** University of Southern California

Michael Raymond Sloan Florida Atlantic University Kendra Leigh Spangler Florida Atlantic University Scott Alan Spier Texas A&M University Christina Michele Stewart Florida Atlantic University Sean David Stocker University of Pittsburgh Shannon Leigh Streit Florida Atlantic University Elaine Jean Tanhehco University of Michigan Gerard A. Treiling Florida Atlantic University Traci Truman Florida Atlantic University Michelle Zavitz Tucker University of Southern California Vita Vinokurova Florida Atlantic University Ralph Stewart Welsh University of South Carolina Dexter Ray Williams Florida Atlantic University Jennifer A. Wolf Florida Atlantic University Fenfen Wu University of Pittsburgh Zhaojun Wu East Carolina University Alice Jane Yee University of Southern California Qingli Zhang University of South Florida Yanmei Zhao Ohio State University

Janet Moure

Essex Community College Charles G. Davis Doctor of Chiropractic

John Louis Pasalis Oracle Corporation

Sandra Ruth Severson Mayo Foundation

Next Deadline

Deadlines! Deadlines!

Accepted Affiliate Applicants

The APS sponsored awards are plentiful, but in order to be considered, don't forget to submit the application information before the deadline!

Award

William T. Porter Fellowship Awards	January 15
APS Postdoctoral Fellowship in Physiological Genomics	January 15
AAAS Mass Media Science and Engineering Fellowship	January 15
Research Career Enhancement Awards	February 15
Teaching Career Enhancement Awards	April 15
John F. Perkins, Jr., Memorial Fellowships	May 15
William T. Porter Fellowship Award	June 15
NIDDK Minority Travel Fellowships for APS Conference	July 16
Research Career Enhancement Awards	August 15
Teaching Career Enhancement Awards	October 15
Shih-Chun Wang Young Investigator Award	November 1
Arthur C. Guyton Awards in Integrative Physiology	November 1
Giles F. Filley Memorial Awards for Excellence in	
Respiratory Physiology and Medicine	November 1
Lazaro J. Mandel Young Investigator Award	November 1
Procter & Gamble Professional Opportunity Awards	November 8
Caroline tum Suden/Francis A. Hellebrandt	
Professional Opportunity Awards	November 8
John F. Perkins, Jr., Memorial Fellowships	November 15

FASEB AD

Distinguished Lectureships



PHYSIOLOGY IN PERSPECTIVE: THE WALTER B. CANNON AWARD LECTURE (SUPPORTED BY THE GRASS FOUNDATION)

M. Judah Folkman Children's Hospital, Boston

SATURDAY, APRIL 15, 5:30 PM



HENRY PICKERING BOWDITCH AWARD LECTURE

Curt D. Sigmund University of Iowa

Genetics &Physiology in Mice: A Perfect Marriage

SUNDAY, APRIL 16, 5:30 PM

August Krogh Distinguished Lectureship of the Comparative Physiology Section

George N. Somero Stanford University

Co-evolution of Proteins and Their Aqueous Milieu: Messages From the Medium

SUNDAY, APRIL 16, 8:00 AM

JOSEPH ERLANGER DISTINGUISHED LECTURESHIP OF THE CENTRAL NERVOUS SYSTEM SECTION

Catherine Rivier Salk Institute

Role of Gaseous Neurotransmitters in Regulating Hypothalamic-Pituitary-Adrenal Axis

SUNDAY, APRIL 16, 2:00 PM

SOLOMON A. BERSON DISTINGUISHED LECTURESHIP OF THE ENDOCRINOLOGY AND METABOLISM SECTION

Jeffrey S. Flier

Beth Israel Deaconess Medical Center

Leptin: Physiology and Role in Disease

SUNDAY, APRIL 16, 3:00 PM





Heini Murer

DISTINGUISHED LECTURESHIP

University of Zurich, Switzerland

CARL W. GOTTSCHALK

OF THE RENAL SECTION

Cellular Mechanisms in Renal Phosphate Handling: Old Questions and Some New Answers

SATURDAY, APRIL 15, 3:00 PM

CLAUDE BERNARD DISTINGUISHED LECTURESHIP OF THE TEACHING OF PHYSIOLOGY SECTION

Clyde F. Herreid State University of New York, Buffalo

Teaching in the Year 2061

SUNDAY, APRIL 16, 2:00 PM

ERNEST H. STARLING DISTINGUISHED LECTURESHIP OF THE WATER AND ELECTROLYTE HOMEOSTASIS SECTION

Gerald F. DiBona University of Iowa

The Neural Control of the Kidney in Health and Disease

SUNDAY, APRIL 16, 3:00 PM









HUGH DAVSON DISTINGUISHED LECTURESHIP OF THE CELL AND MOLECULAR PHYSIOLOGY SECTION

Ferid Murad University of Texas, Houston

Cellular Signaling with Nitric Oxide and Cyclic GMP

Monday, April 17, 9:00 Am



Edward F. Adolph Distinguished Lectureship of the Environmental and Exercise Physiology Section

Carl V. Gisolfi

University of Iowa

What's Your 'Gut' Reaction to Exercise?

Monday, April 17, 10:15 Am



JULIUS H. COMROE, JR. DISTINGUISHED LECTURESHIP OF THE RESPIRATION SECTION

John A. Clements University of California, San Francisco

Lung Surfactant: A Fantastic Voyage From Theory to Practice

Monday, April 17, 2:00 pm



CARL LUDWIG DISTINGUISHED LECTURESHIP OF THE NEURAL CONTROL AND AUTONOMIC REGULATION SECTION

Francois M. Abboud University of Iowa

College of Medicine

Functional Genomics of Baroreceptors

Monday, April 17, 3:00 pm



ROBERT M. BERNE DISTINGUISHED LECTURESHIP OF THE CARDIOVASCULAR SECTION

David R. Harder Medical College of Wisconsin

Cellular and Molecular Mechanisms Mediating Functional Hyperemia in the Brain

TUESDAY, APRIL 18, 8:00 AM



HORACE W. DAVENPORT DISTINGUISHED LECTURESHIP OF THE GASTROINTESTINAL SECTION

Ernest M. Wright University of California Los Angeles

Molecular Insights Into Intestinal Salt, Sugar, and Water Absorption

TUESDAY, APRIL 18, 2:00 PM

Section-Sponsored Featured Topics

Recent Advances in Comparative Solute Transport and Molecular Biology of Aquatic Organisms Gregory A. Ahearn and Michele G. Wheatly Muscle Fatigue William Ameredes Role of Excitatory Amino Acid Neurotransmission in Control of Cardiorespiratory Function Susan M. Barman and Steve Mifflin Phosphoinositide Signaling: Implications for Transport Regulation Kim Barrett and Bonnie Blazer-Yost Impact of Gender and Pregnancy on Renal Function **Christine Baylis** Control of Gene Expression: Exercise/Environment Stress Frank W. Booth and Jacob Friedman Diseases of Protein Trafficking and Expression **Dennis Brown and Janet Van Adelsburg** The Threshold of Consciousness in the Zoological Kingdom **Michael Cabanac** Proteomics and Functional Genomics in Gastrointestinal Tract Research **Robert Coffey** Mechanics of Cardiac Remodeling James W. Covell Emerging Concepts: Protein Kinase C Isozymes and the Regulation of Diverse Cell Response Edward C. Dempsey and Paul A. Insel Dietary Flavonoids and Cardiovascular Regulation and Pathophysiology John D. Folts Respiratory Control: Plasticity, Redundancy or Both? Hubert V. Forster and David Gozal Cell Physiology of VEGF **Michael Goligorsky** Medical Physiology Instructional Resources **Barbara Goodman** Regulation of Water and Electrolyte Homeostasis Joey P. Granger and F.G. Knox Role of Oxidative Stress in Cardiovascular-Renal Disease Kathy Griendling and Christine Schnackenburg Fatty Acid Metabolites and Signal Transduction in the Microvasculature: Genetic, Molecular, and Functional Mechanisms David R. Harder Alpha-Adrenergic Vasoconstriction in the Coronary Vasculature **Gerd Heusch**

Neurohumoral Mechanisms of Hypertension **Carmen Hinojosa-Laborde and Cristof Klett** Plasticity of the Neuromuscular Synapse Bernard J. Jasmin MAP Kinase Pathways and the Cell Stress Response Gary Johnson and David Sheikh-Hamad Molecular and Cellular Regulation by Nitric Oxide **Paul Kubes and Matthew Grisham** New Frontiers in Central Autonomic Regulation: Beyond the RVLM Andrew J. Lawrence Cardiovascular Regulatory Effects of Dietary Sodium, Calcium, and Potassium Julian Lombard Intracardiac Ganglia and Cardiac Function: Central and Peripheral Control V. John Massari Ventral Respiratory Group Neurons: Roles in Rhythm Versus Pattern Generation Donald R. McCrimmon and Edward J. Zuperku Physiology and Pathophysiology of Aquaporins Soren Nielson Salt and the Brain: Mechanisms by Which Dietary Salt Alters Autonomic Nervous System Regulation John W. Osborn and Virginia L. Brooks Oxygen Sensitive Ion Channels and Second Messengers C. Peers Endocrine Cells as Sensory Transducers Helen Raybould and Patrick Tso Models of Heart Failure John Ross, Jr. Biomechanics and Bioenergetics of Airway Smooth Muscles **Gary Sieck and Jeffrey Fredberg** Point/Counterpoint: Does Deconditioning Affect Blood Pressure Regulation? Lawrence Sinoway and James A. Pawelczyk Co-Evolution of Proteins and Their Aqueous Milieu: Messages from the Medium George N. Somero Role of Angiotensin in Central Neural Control of the Circulation Alan F. Sved Interstitial Cells of Cajal Sean Ward and Kent Sanders Imidazoline Receptors and Cardiovascular Control: Brainstem Mechanics and Therapeutic Potential J. Michael Wyss

Saturday, April 15, Morning Session

Refresher Course: Integrating Molecular Biology into the Physiology Curriculum J.C. Schadt and A.J. Lechner

Saturday, April 15, Afternoon Session

Redox Regulation of Cardiomyocyte Life and Death **D.K. Das, B. Frei**

Adhesion and Motility of Metastic Cells C. Dong and K. Anderson

The History of Organ Transplantation: Physiological Aspects **G.E. Folk, Jr. and H. Brown**

President-Elect Symposium: Biochemical Signaling in the Control of Microcirculatory Function Microcirculatory Society W.N. Duran

Ion Regulation in Cell Organelles Cell & Molecular Physiology Section **T. Machen**

Cancer Genetics American Federation for Medical Research **P. Wiernik**

Sunday, April 16, Morning Session

Muscle Research in the 20th Century M. Bárány

Oxygen Sensing and Signaling: Role of Reactive Oxygen Intermediates **H.F. Bunn**

Tissue Engineering of Vascular Grafts for the Third Millenium J.A. Frangos and N. L'Heureux

Afferent Regulation of the Stress Response: New Views and New Approaches **D. Morilak**

eNOS Dysfunction in Vascular Disease I K.A. Pritchard, Jr. and D.G. Harrison

Fever: The Role of the Vagus **A.A. Romanovsky** Aquaporins and Other Members of the MIP Family Physiology InFocus **P. Agre**

Therapeutic Manipulation of Angiogenesis American Federation for Medical Research **D. Arenberg**

Cells and Genes and Their Applications for Therapies for the Brain I Central Nervous System Section **B.L. Davidson and H. Federoff**

Cells and Genes and Their Applications for Therapies for the Brain II Central Nervous System Section **B.L. Davidson and H. Federoff**

MAP Kinases: New Implications for Renal Cell FunctionRenal SectionD. Kültz and D.W. Good

Role of TGF-α in Renal and Cardiovascular Fibrosis: Mechanisms and Therapeutic Prospects Water & Electrolyte Homeostasis Section N.J. Laping

Sunday, April 16, Afternoon Session

Capillaries: How their Structure and Function Can Alter to Meet Tissue Demands A. Baldwin and V. Huxley

Lung Redox Homeostasis: Emerging Concepts M.P. Merker and C.A. Dawson

Differential Control of Sympathetic Outflow: A Window into Central Mechanisms Mediating Patterned Autonomic Responses S. Morrison and G. Gebber

Teaching Physiology Laboratories in the 21st Century **D.U. Silverthorn**

Physiology of Water Transport E.M. Wright

Bone Marrow Transplantation in Non-Malignant Diseases American Federation for Medical Research G.C. Tsokos and S. Berney

Monday, April 17, Morning Session

Emerging Concepts: Protein Kinase C Isozymes and the Regulation of Diverse Cell Response **E.C. Dempsey and P.A. Insel**

Low Saturated Fat, High Carbohydrate Diets: Effects on Triglyceride and LDL Synthesis, the LDL Receptor and Cardiovascular Disease Risk **R.H. Knopp**

Interaction of Body Fluid Balance and Thermal Strain G.W. Mack

Intrapituitary Interactions: Another Level of Endocrine Regulation J. Schwartz and G.V. Childs

Mechanisms Regulating Endothelial Cell Barrier Function T. Stevens and A. Malik

Integrin Mechanics K-L.P. Sung and G.A. Truskey

Chemokines: From Bench to Bedside American Federation for Medical Research **S. Gupta**

Monday, April 17, Afternoon Session

Neurobiology of the GnRH Neuron **D.W. Brann and J.L. Roberts**

Hypoxia-Induced Muscle Damage from Reactive Oxygen Intermediates: From Pathways to Function M.A.P. Brotto and T.M. Nosek

Involvement of the Cytoskeleton in Regulation of Vascular Smooth Muscle Contractile Function G.A. Meininger

Extracellular ATP and cAMP as Paracrine and Interorgan Regulators Renal Section L. Bankir and E. Inscho

Host Polymorphisms and Susceptibility to Infectious Diseases American Federation for Medical Research M. Goldsmith Point/Counterpoint: Does Deconditioning Affect Blood Pressure Regulation? Environmental & Exercise Physiology Section Point: L. Sinoway Counterpoint: J.A. Pawelczyk

Tuesday, April 18, Morning Session

Molecular and Functional Diversity of Epithelial Chloride Channels C. Fuller and D. Benos

The Metabolic Status of Theropod Dinosaurs: New Insights from Comparative Physiology J.W. Hicks

Epithelial-Microbial Interactions: Lessons in Communication M.F. Kagnoff

Microvascular Remodeling: Physical Stimuli and Molecular Regulation **T.C. Skalak**

Bioinformatics: Analysis From Sequence to Disease P.J. Tonellato and D. Brown

Cellular Transport Systems in the Regulation of FFA Metabolism L.P. Turcotte

Apoptosis in Lung Pathophysiology **B.D. Uhal**

Regulation of Transporters and Channels by Binding Proteins Cell & Molecular Physiology Section **D. Rotin**

Physiological Function Explored in Microgravity Comparative Physiology and Environmental & Exercise Physiology Sections **C.E. Wade**

Tuesday, April 18, Afternoon Session

Complement Activation and Inhibition in the Cardiovascular System G.I. Stahl and S.A. Rollins

The Mammalian Distal Tubule: Physiology and Disease Renal and Cell & Molecular Physiology Sections **D.H. Ellison and J. B. Wade**

The Biology of Potassium Channels: From Molecules to Disease September 22-25, Snowmass Village, Colorado

The shimmering yellow aspens and snow-capped Rocky Mountains served as the backdrop for the Society's 1999 conference on *"The Biology of Potassium Channels: From Molecules to Disease"* organized by Gerhard Giebisch and Steven Hebert. The conference featured an in-depth exchange of ideas about new and evolving information on the gating/regulatory and structural/genetic elements of potassium channels and the involvement of potassium channels in several inherited diseases.

There was an internationally recognized and interdisciplinary group of investigators present and interaction was enhanced by the presence of young scientists, students and established investigators in the field of potassium channels. The conference attracted 300 registrants, 32% of which represented young scientists, including 48 students and 47 postdoctoral registrants. Twentynine (10%) were APS members including one Emeritus member—and 123 (41%) were not members of APS. Invited speakers and session chairs represented 42 (14%) of the registrants.

The outstanding program consisted of 7 symposia, 5 state-of-the-art addresses,

and a total of 147 poster presentations. The social program included the Wednesday evening Opening Reception and Saturday evening banquet and awards presentation.

The awards presentation recognized recipients of the Graduate Student Award for outstanding poster presentation. The awardees presented with a cash prize and certificate were First Place: Louis Nicholas Manganas, "Posttranslational regulation of voltage-gated K^+ channel surface expression by differential assembly of α and β subunits"; Second Place: Simon Bernèche, "Molecular dynamics of the KSCA channel in a lipid membrane: ion correlations and flexibility of the selectifity filter"; Third Place: Thomas Flagg, "A mutation linked with Bartter's syndrome locks Kir 1.1a (ROMK1) channels in a closed state"; Honorable Mentions: Antonio J. Carrasco, "Adenylate kinase-like activity intrinsic

Table 1. Distribution by Department of Submitted Abstracts

	Abs	tracts
Department	No.	%
Physiology or Physiol./Biophysics	31	31
Pharmacology	26	18
Neurology or Neuroscience	20	14
Biology, Biological Sci. or Biomed. Sci.	13	9
Cell & Molecular Phys. or Biology	12	8
Biochemistry	5	3

and associated with cardiac ATP-sensitive K^+ channels"; and **Uwe Schulte**, "pH-gating of ROMK (Kir 1.1) channels: control by an ARG-LYS-ARGtriad disrupted in antenatal Bartter syndrome."

Osei Kwame Asamoah, University of California, Los Angeles; Krista N. Blackwell, Howard University; and Antonio J. Carrasco, Mayo Clinic & Foundation were recipients of the NIDDK Fellowship Awards provided to encourage participation of under represented minority students. Supported by the National Institutes of Diabetes and Digestive and Kidney Diseases, the fellowship provides reimbursement of all expenses associated with travel to and

(continued on page 416)



Conference organizers Gerhard Giebisch and Steven Hebert congratulate the award winners.



Conference attendees discuss a poster display.

Table 2. Registration Statistics

(continued from page 415)

participation in the conference. The recipient is matched with an APS member attending the conference who will offer guidance and make introductions to other scientists.

A total of 147 abstracts were submitted to the conference for poster presentation. Table 1 provides a distribution of abstracts based on submitting department. Female first authors submitted 21% of the abstracts; 72% were submitted by authors at institutions outside

0			
	No.	%	
APS Member	28	9	
Non-member	123	41	
Postdoctoral	47	16	
Student	48	16	
Retired	1	.3	
Invited Speaker	42	14	
Guest	11	4	
Total	300	100	

The Americas. A total of 300 registrants attended the conference. Table 2 provides the breakdown of registration by type. Of the registrants, 24% were female, 43% were from outside The Americas, and 14% were from industry. The Society and Organizing Committee gratefully acknowledge financial support provided through generous educational grants from Bristol-Myers Squibb Pharmaceutical Research and National Institutes of Diabetes and Digestive and Kidney Diseases. 💠

APS Sustaining Associate Members

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

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- The Grass Foundation Harvard Apparatus Janssen Research Foundation Eli Lilly and Company The Mack Printing Group Merck and Company, Inc. Nycomed, Inc. Pfizer, Inc.



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Baroreceptor and Cardiopulmonary Receptor Reflexes 2000 APS CONFERENCE August 23-27, 2000 City Plaza Hotel in Iowa City, Iowa

PURPOSE: This meeting will focus on baroreceptor and cardiopulmonary reflexes. A wide range of scientific questions will be covered ranging from studies of cellular and molecular mechanisms of mechanoelectrical transduction to studies of baroreflex control in humans. Multidisciplinary approaches will be emphasized ranging from molecular studies to systems physiology. Major investigators active in this area of research will participate in this conference with emphasis on young investigators and students. A substantial international attendance is anticipated.

ORGANIZERS:

Mark Chapleau (Chair) Francois Abboud, Gerald DiBona, Robert Felder, A. Kim Johnson, Allyn Mark, Virend Somers, William Talman

STEERING COMMITTEE:

Michael Andresen, Vernon Bishop, Jeanne Seagard, Irving Zucker

SESSIONS AND SPEAKERS:

Mechanolelectrical Transduction

Monica Driscoll, Heather Drummond, Owen Hamill

Sensory Mechanisms

Mark Chapleau, Ellis Cooper, Meredith Hay, Holly Middlekauff, Helio Salgado, Daniel Weinreich

Nucleus Tractus Solitarius (NTS) I

Michael Andresen, Steven Mifflin, Julian Paton, Robert Rogers, Jeanne Seagard

Nucleus Tractus Solitarius (NTS) II Allison Hegarty, Lisete Michelini, William Talman

Central Baroreflex Mechanisms

Sue Aicher, Patrice Guyenet, David Mendelowitz, Shaun Morrison, Alan Sved

Interactions Between Neural Reflexes and Humoral Factors Virginia Brooks, Cheryl Heesch

Effects of Microgravity on Baroreflex Dwain Eckberg, Eileen Hasser

Spectral Analysis/Respiratory-Cardiovascular Interactions Phyllis Gootman, Nicola Montano, Virend Somers

Resetting of Baroreflex During Exercise Vernon Bishop, Donald O'Leary, Jeffrey Potts

Neural Reflexes in Pathological States Mark Dunlap, John Floras, Stephen Hull, Irving Zucker

DEADLINES

Abstract Deadline- May 19, 2000 Advance Registration Deadline - June 30, 2000

The Integrative Biology of Exercise 2000 APS CONFERENCE September 21-23, 2000 Portland, Maine

PURPOSE: This meeting will provide a forum for research presentation and discussion through which there will be a critical mass for poster presentations of primary research. The symposia and other invited sessions have been constructed so as to provide younger investigators an opportunity to present their research. Broad interdisciplinary areas of interest such as gender, aging and obesity will be included along with updates in the now "standard" areas of addressing the molecular basis of adaptation to exercise in the muscles and cardiovascular system. Student awards will be presented. Substantial time will be devoted to poster presentations.

ORGANIZER: Peter Wagner **STEERING COMMITTEE:**

Kenneth Baldwin, Albert Bennett, George Brooks, Carl Gisolfi, M. Harold Laughlin, Ronald Meyer, Brenda Russell, David Wasserman

SESSIONS AND SPEAKERS:

Gender-Dependent Responses to Exercise

George Brooks, Stephen Davis, Anne Friedlander, Susan Hopkins, M. Harold Laughlin, Anne Loucks, Robert Marcus

The Role of Physical Activity in the Prevention of Obesity and Management of Body Weight

Claude Bouchard, Michael Goran, Andrew Prentice, Tuomo Rankinen, Dale Schoeller, David York

Impact of Transgenic Manipulations on Integrated Exercise Performance

H. Lee Sweeney, Elizabeth Barton-Davis, Evangelia Kranias, Leslie Leinwand, Jeffery Robbins, Brian Roman

Exercise-Induced Cardioprotection: Cellular Aspects

Douglas Bowles, Donna Korzick, Colin Bloor, Marvin Boluyt, Edward G. Lakatta

Exercise and Aging: Challenge, Resiliency and Function

Carl Gisolfi, Loretta DiPietro, Karl Insogna, Wendy Kohrt, Kevin Kregel, Maria Singh

How Does Skeletal Muscle Adapt to Exercise

Brenda Russell, Karyn Esser, Marc Hamilton, Charlotte Peterson, Steven Swoap

DEADLINES

Abstract Deadline- June 1, 2000 Advance Registration Deadline - August 1, 2000

SPS-APS Joint Meeting August 16-19,2000 Stockholm, Sweden

The Scandinavian Physiological Society (SPS) cordially invites the American Physiological Society (APS) to a joint meeting in conjunction with our regular annual meeting. The purpose of the proposed joint meeting is to promote scientific exchange between APS and SPS members.

The tentative meeting venue will be Karolinska Institute and the Nobel Forum in Stockholm

or Stockholm University at Frescati.

PROGRAM:

Wednesday, August 16, 2000

Registration 4 pm-8 pm. Stockholm University, Frescati Welcome and plenary lecture 6.30pm-7.45 pm, Frescati Reception at City Hall

(bus transportation from SU) 8.00-10.00 PM Thursday, Friday and Saturday, August 17-19, 2000

I. 8:30 - 9:30 AM (Plenary lecture)

II. 10:00 -12:00 AM (Morning symposia 3 parallel sessions)

III.12:00 -1:00 PM (Lunch)

IV. 1.00 - 2:30 PM (Poster session)

IV. 2:30 - 5:00 PM (Afternoon symposia 3 parallel sessions)

A social program for accompanying guests will be available.

TRANSPORTATION & LODGING:

There are excellent direct flight connections between Stockholm/Arlanda, the US and major cities in Europe. The airport bus terminal (Haga Terminal behind the KI/KS) is close to the meeting sites at the KI/Nobel Forum or Stockholm University.

Hotel prices range from 100-150 US dollar. There are also available alternatives for low budget living.

Invited lecturers

Gerhard Giebisch, New Haven, CT John Forte, Berkeley, CA Per Andersen, Oslo, Norway Mike Mulvany, Aarhus, Denmark

PRELIMINARY LIST OF SYMPOSIA OR FEATURE TOPICS

Signalling from gut to integrate the digestive response Gastrointestinal mucosal barrier

. Microvascular responses to acute and chronic inflammation

. Molecular mechanisms in exercise physiology.

Control of sodium balance

NO and hypertension

New concepts in pulmonary ventilation and perfusion distribution

Physiological methods for the study of the genetically altered mice

Capillary permeability and Mechanisms of glomerular ultrafiltration

Satellite symposia in Reyjavik (pathophysiology of diabetes mellitus) are under planning. There will also be an Acta Physiologica Scandinavica Symposium organized by Peter Neurohumoral regulation of arterial pressure and body fluid volume Aquaporins Gene therapy Renin - angiotensin system Paracrine mediators and signalling in the TGF Presynaptic regulation of transmitter release-molecular mechanisms of exo- and endocytosis. Sensory motor integration in the control of movement from ion channels to behaviour Memory, learning and synaptic plasticity Cell pH regulation Matrix and receptors

Thoren and Neil Granger on "Experimental techniques in mouse physiology" starting on Saturday, August 19, with overlap of the present meeting.

DEADLINES Abstract Deadline- April 1, 2000 with response from the committee within one month.

The VIII Oxford Conference on Frontiers in Modeling and Control of Breathing: Integration at Molecular, Cellular, and Systems Levels

October 11-15, 2000

N. Falmouth (Cape Cod), Massachusetts, USA

INTERNATIONAL ORGANIZING COMMITTEE: Originated in 1978 by D.J.C. Cunningham and R.

Hercynski in Oxford, the triannual international *Oxford Conferences* bring together modeling and experimental scientists to review and chronicle the current advances in respiratory control at a common forum. As a historic juncture to the next millenium, the year 2000 Conference will focus on the integration of experimental and modeling studies of respiratory control at the molecular, cellular, and systems levels.

CONFERENCE CO-CHAIRS:

Chi-Sang Poon & Homayoun Kazemi

LOCAL ORGANIZING COMMITTEE:

S.A. Shea, M. Siniaia, D. Systrom, D. Ward

INTERNATIONAL PROGRAM COMMITTEE:

M. Aoki (Japan), E.N. Bruce (USA), J. Champagnat (France), J. Duffin (Canada), A. Guz (UK), M.C.K. Khoo (USA), J. Lipski (New Zealand), E.E. Nattie (USA), N. Prabhakar (USA), J.E. Remmers (Canada), D.W. Richter (Germany), G. Song (China), S.A. Ward (UK), G. Benchetrit (France), Y. Honda (Japan), R.L. Hughson (Canada), C.-S. Poon (USA), P.A. Robbins (UK), J.W. Severinghaus (USA), S.A. Ward (UK), B.J. Whipp (UK)

HIGHLIGHTS:

- · All relevant topics in respiratory control are welcomed.
- Scientific program will include contributed oral/poster sessions and discussion workshops.
- Selected papers will appear in a Conference proceedings book *Frontiers in Modeling and Control of Breathing*

For information on abstract submission and registration, check the Conference web page at http://hst-hu-mit.mit.edu/Oxford2000/ or contact C.-S. Poon, PhD, Harvard-MIT Division of Health

- A student papers competition for pre- or postdoctoral trainees will be held.
- Attendance will be limited to 200 participants. Contributed abstracts and book chapters will be peer reviewed.

Sciences & Technology, Massachusetts Institute of Technology, Bldg. E25-501, Cambridge, MA 02139; Tel: 617-258-5405; Fax: 617-258-7906; Email: cpoon@mit.edu.

DEADLINES Abstract Deadline- March 31, 2000

Sponsored/endorsed by the American Physiological Society, Whitaker Foundation, American Thoracic Society, Harvard Apparatus, GlaxoWellcome.

Fellowships

1999 APS Postdoctoral Fellowship Recipients

The APS Awards Committee made the decision to award two APS Postdoctoral Fellowships in Physiological Genomics for 1999.

A total of 26 applications were received for the fellowship. After reviewing all the applications, the Awards Committee selected **W. Grady Campbell** and **Elaine Margaret Joseph** as the 1999 APS Postdoctoral Fellows. As awardees, each will receive a yearly stipend allowance of \$30,000 and a mini-grant of \$3,500 for laboratory expenses. The length of the award is two years.

Campbell, currently a postdoctoral fellow in the laboratory of Frank W. Booth at the University of Texas Health Sciences Center at Houston, plans to use the award to establish a functional tool for genomics: an in vitro model for a



Marc Hamilton, Grady Campbell, and Frank Booth at the University of Texas Health Sciences Center, Houston.

study of the functions of protein-RNA interactions and polymorphisms in the 3' untranslated regions of mRNAs.

Joseph is currently a postdoctoral fellow with Mark C. Fishman at the Cardiovascular Research Center, Massachusetts General Hospital, Harvard Medical School. She plans to use the award to develop a genomic approach to the study of heart development in zebrafish. This approach will involve the cloning and mapping of candidate heart-specific genes and characterization of wild-type and mutant embryonic hearts based on the spatio-temporal analysis of gene transcripts.

The deadline for applications for the 2000 APS Postdoctoral Fellowships in Physiological Genomics is **January 15, 2000**.



Mark Fishman and Elaine Joseph at the Cardiovascular Research Center, Massachusetts General Hospital, Harvard Medical School.

APS Undergraduate Summer Research Fellowship Program

The APS has initiated a new "Undergraduate Summer Fellowship Program" to afford undergraduate students the opportunity to be exposed to physiological research early in their careers. The

intent of this program is to excite and encourage students to pursue a career as a basic research scientist. Support is being provided to allow the students the opportunity to work in the lab of an established investigator over the summer months. These fellowships will provide:

\$2,000 summer stipend to the student (10 weeks of support) \$500 grant to the faculty sponsor/advisor

up to \$800 travel award/reimbursement to the student so that he/she may attend and present their data at the Experimental Biology meeting.

Application materials can be obtained by downloading the



application from the APS website (http:// www.faseb.org/aps/ educatn/Careers/Und SumFell.html) or by writing or calling the APS Education office

(Tel: 301-530-7132; Email: educatio@aps.faseb.org). The deadline for the receipt of all application materials is January 24, 2000. (Applications received by the APS after January 24th will not be reviewed.) Award recipients will be notified by March 1, 2000 for the funding of the Fellowships for the summer of 2000. Four Undergraduate Summer Fellowships will be funded for the summer of 2000. All applications will be reviewed, evaluated, and ranked by the APS Careers Opportunities in Physiology Committee. Decisions will be final.

Fellowships

The AAAS Mass Media Experience

Two APS student members spent last summer as Mass Media Science and Engineering Fellows in a program organized and administered by the American Association for the Advancement of Science (AAAS). The program places advanced students in the sciences and engineering in the newsrooms of major media outlets as apprentice science writers for ten weeks over the summer. The APS sponsored Kawanza Griffin, and the AAAS sponsored Elizabeth Cowley. In the articles below, Griffin and Cowley recount their experiences at the Milwaukee Journal Sentinel (Griffin) and Popular Science (Cowley).

APS will again sponsor a AAAS Mass Media Fellow in 2000. Applications will be accepted through January 15, 2000 for next summer's Fellowship program. For further information, visit the Student Awards page on the APS website at http://www. faseb.org/aps/student.htm or contact Public Affairs Officer Alice Ra'anan at araanan@aps.faseb.org

Kawanza L. Griffin

1999 APS-AAAS Mass Media Fellow Milwaukee Journal Sentinel

The AAAS Mass Media Science and Engineering Fellowship provides the unique opportunity for a scientist to gain invaluable experience as a science or medical writer, while simultaneously improving their ability to effectively communicate information to the general public.

Prior to my acceptance of the fellowship, I had contemplated pursuing medical writing as a career, but had focused primarily on work for either a medical communications or pharmaceutical company. Although I had previously written for a newsmagazine while pursuing my doctoral degree in the Department of Physiology at the University of Missouri in Columbia, I believed that my scientific background would be better utilized working for an organization that catered specifically to the scientific community. Contrary to my initial belief, I now realize that using my knowledge to communicate science to the public not only brings a great sense of achievement, but also allows me to use my creativity and love of science to enlighten the public about issues that may affect them.

My AAAS fellowship placement was at the *Milwaukee Journal Sentinel*, a newspaper that has a long-standing and strong reputation for its accurate coverage of health and science issues. In fact, I was surprised by the depth of scientific knowledge acquired by the four members of the Health and Science team through reporting.

On my first day I was given several assignments to complete over the first few weeks at the paper. Since the Health and Science section only ran once a week, my deadlines were not pressing. I was very appreciative of the immediate independence I was given, but was unsure of how to complete the assignments on time. However, I quickly learned that my scientific writing style (background then conclusion) would not suffice for a public that required an immediate explanation of why they should read my story. I did not always use my scientific knowledge to write stories, but I did use the analytical skills acquired during my scientific training to question research and other stories that came across the Health and Science desk

My editor and the *Journal-Sentinel*'s medical writers were both crucial in my transition. Both were very confident about my capabilities, and always very honest and frank in their criticisms of my writing. They also enabled me to "fine-tune" my skills by ensuring that I completely understood the changes they made to my stories, as well as by always giving me stories that were outside my area of expertise.

The most fulfilling part of my internship came not from the comments from people within the newsroom, but from those that were received via phone and mail from people in the community who seemed to appreciate my coverage. I also appreciated the receptiveness of the health team and the newspaper to my attempts to bring more diversity to those stories that I covered. I began to associate minority "faces" with health conditions, and was allowed to cover more stories that targeted under-served communities. I realized that these communities have distinct voices, and that the media has a responsibility to listen to those voices.

Overall, I believe that the AAAS Mass Media Fellowship is a great tool for scientists who are looking either for an alternative career or to strengthen their communication skills. My placement at the *Journal Sentinel* strengthened my experience because the newspaper was very receptive to what I, as a scientist, could offer, and was not afraid to push me to produce. In addition, they helped to build my confidence as a writer. This is very important, especially when venturing into a new field.

As far as my career, I have accepted a full-time position at the Journal Sentinel as a medical writer for the upcoming year. This will give me more experience and allow me continue to pursue my interest in writing. The primary distinctions between the internship and full-time job are an increased workload, an expanded "beat" list of medical subjects to cover, and a greater expectation of scientific thoroughness. I am enjoying the challenge. I may possibly pursue medical writing for the pharmaceutical industry in the future, but for the time being, I am very pleased with my choice to write for the public.

Elizabeth Cowley

1999 AAAS Mass Media Fellow *Popular Science*

The more I learn, the more I realize how little I know. That particular maxim goes a long way toward sum-

Fellowships

ming up my experiences this summer working as a science writer for *Popular Science* magazine. In my non-journalist life, I'm a Post-Doc in Dalhousie University's Department of Physiology and Biophysics. So what was I up to, pitching story ideas to editors in a Manhattan newsroom? Benefiting from a once-in-a-lifetime opportunity to expand my skills as a science communicator, courtesy of the American Association for the Advancement of Science.

Dazzled, bewildered, excited, intimidated. That begins to convey some of the emotions that spring to mind as I recall my first weeks as a AAAS Mass Media Fellow at Popular Science magazine. Each year the AAAS awards fellowships to around 20 people in the early stages of their scientific careers. The majority this year were senior PhD students, but a couple of post-docs managed to sneak in, and I was lucky enough to be one of them. Coming from an entirely research background, with an extremely limited experience of writing science for a general audience, it was difficult to even know what to expect from the opportunity of being a full-time journalist.

So what do journalists do all day? I soon found out that there were lots of phone calls to be made and that it was probably the only job where reading the newspaper and surfing the Internet are actively encouraged. I was treated as a

"real" journalist from the first day, and soon discovered the areas scientists and iournalists do have in common-they do research and they ask questions. My first interviews were probably what intimidated me most, since I knew how busy scientists are and was afraid of wasting their time. That was when I discovered the best thing about being a science writer. Scientists love to talk about their research and are usually amazingly flattered that you've called them up. Additionally, it seemed that 90% of the people I called up had read Popular Science as a child, which put both of us at ease as there was inevitably some anecdote about the magazine to chat about at the beginning of the interview. My particular area of expertise turned out to be almost useless in this new profession and I ended up writing about a wide range of topics-how cochlear implants work, experiments to discover whether neutrinos have mass, why urine smells after consuming asparagus. penile reconstructive surgery, phosphenes, spider silk, how dogs see the world, crush injuries, even product reviews for cars. And it was all interesting. I rediscovered that sense of fascination with science in general that attracted me to research in the first place- but that years of lab bench work had dampened somewhat. I didn't know I was interested in any of these things and began to realize how little I knew about so many aspects of science, even though

I called myself a scientist.

Calling people up and asking them questions was a wonderful way to spend a summer. I talked to many extraordinary people, though my most remarkable interview had to be with the man who woke up one morning profoundly deaf. Eventually he received a cochlear implant and described to me the first time he heard his wife's voice and hearing his unborn baby's heartbeat. I consider myself tremendously lucky to have been able to participate in this year's AAAS program and to have talked with such people. Popular Science sells around 1.5 million copies each month, and the possibility of being read by that number of people rather than the dozen or so that might have read my last scientific paper still astonishes me.

AAAS runs this program to increase the communication skills of young scientists, though around half of the participants do move into science journalism full time. I haven't made that decision yet. If you're considering trying for this fellowship, I strongly encourage you to apply. If you're the supervisor of someone considering this program, wish them well and let them do it. Don't see it as a frivolous interruption to their studies-they may well come back a better scientist as well as a more rounded person. And for the rest of you, if a journalist calls, be nice-they're only doing their job. 🔹

Science's Next Wave

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FREE access to APS members! (Login: APS; Password: APS) http://www.faseb.org/aps/Membership.html

Public Affairs

NIH Grant Success Rates Improving

The success rates of NIH grants are improving, according to a letter by H. George Mandel, Chairman for the National Caucus of Basic Biomedical Science Chairs, and Elliot Vesell in the September, 10, 1999, issue of Science.

In fiscal year 1998, NIH reported that 31 percent of R01 requests were funded. However, the letter from Mandel and Vesell noted that this total included all new and renewal submissions, as well as solicited grant requests. According to a breakdown the two developed, the success rates for new, unamended R01 and R29 grant applications was 20% in FY 1998, up from 14 percent in fiscal year 1994, the first year they provided a similar analysis. A total

of 36 percent of proposals (including amended proposals) submitted in fiscal year 1998 were ultimately funded. However, they reported that this number was "difficult to establish accurately because the timing of submission of amended applications usually extends beyond the fiscal year, the reporting period used by NIH."

Mandel and Vesell also reported that the average direct plus indirect cost of a Type I funded grant was \$228,000, whereas the average budget requested was \$274.000.

Mandel and Vesell's letter noted that "Grant reviewers have been impressed by the increasingly high quality of proposals over the years, probably because

severe competition has all but eliminated clearly poor-quality applications."

Meanwhile, according to NIH data, researchers between the ages of 41-45 submit the most successful grant requests, at least according to fiscal year 1998 figures. There were 6,162 grants awarded to that age group, while only 1,347 grants were given funding to researchers in the 61-65 age group. There were 5,776 grants awarded to those 46-50 years of age, 4,643 to those 51-55, and 2,800 to 56-60 year olds. Researchers over the age of 65 were awarded 958, the fewest number of grants, whereas those under 36 received 1,020. 💠

Mass Media Science and Engineering Fellowship Applications Being Accepted

BACKGROUND:

Applications are currently being accepted for an APS sponsored American Association for the Advancement of Science (AAAS) Mass Media Science and Engineering fellow. This individual will spend a summer working in the newsroom of a newspaper, magazine, radio or television station, sharpening his or her ability to communicate complex scientific issues to nonscientists and helping to improve public understanding of science.

DUTIES: The APS-sponsored fellow will spend 10 weeks helping to cover science and technology issues. AAAS will arrange placement at a participating media outlet as part of the selection process. The fellowship will include travel to Washington for an advance orientation to journalism and an evaluation session at the conclusion of the assignment, as well as travel to the job site and a weekly stipend based upon local cost of living.

You must be currently enrolled as a graduate or postgraduate student of physiology or a related discipline. ELIGIBILITY:

APPLICATION INFORMATION: Application forms are available from Alice Ra'anan in the APS Office of Public Affairs at the address below. In addition to the completed form, applicants must submit a current résumé, at least one three- to fivepage writing sample directed to the general public, transcripts of graduate and undergraduate work, and three letters of recommendation. Two recommendation letters should be from faculty members, and the third should be a personal reference. The selection process is designed to seek out qualified candidates especially from underrepresented communities, including African-Americans, Hispanics, and Native Americans, as well as scientists with disabilities.

DEADLINE & CONTACT: The application deadline is January 15, 2000. For more information, contact Alice Ra'anan, APS Office of Public Affairs, 9650 Rockville Pike, Bethesda, MD 20814-3991. Tel: 301-530-7105; fax: 301-571-8305; e-mail: araanan@aps.faseb.org.
NIH Budget Set at \$17.9 Billion in 2000; Other Agency Increases More Modest

In the early morning hours of November 18, Congress and the White House signed off on a fiscal year 2000 budget agreement that would provide NIH with \$17.9 billion. The agreement was reached nearly two months after the October 1 start of the new fiscal year. The House ratified the package later that day, and the Senate followed suit the following day, clearing the way for the adjournment of the first session of the 106th Congress.

With this increase of nearly 15%, Congress has provided NIH with the second step toward a five-year doubling of its budget, a goal sought by biomedical research advocates, including the APS and FASEB. Congressional champions led by Sen. Arlen Specter (R-PA) and Rep. John Edward Porter (R-IL) fought hard to provide this increase at a time when many of their Republican colleagues were just as insistent that federal spending be kept within agreedupon limits. Because of their concern, the budget agreement also includes a .38% spending reduction to be applied to all federal programs. Republicans used the cut to reduce spending to the levels prescribed in the Balanced Budget Act. The President had objected to this approach, which was put forward

first as a 1% reduction. The final agreement reduced the cut to .38% and gave the President flexibility to make larger cuts in some programs to spare others, as long as no program is cut more than 5%. An announcement about how the spending reduction will be applied was expected at the beginning of December. It is estimated that NIH would lose \$68 million under a .38% cut.

The agreement also requires NIH to delay spending \$3 billion until the end of September 2000. This delay was a way to get around limits in government disbursements in fiscal year 2000 and means that \$3 billion funds will actually be counted against outlays of funds in fiscal year 2001. The earlier version of the bill that was vetoed contained \$7.5 billion in "delayed obligations," which had been a source of concern. During the recent era of tight budgets, NIH had previously managed a few hundred million dollars in delayed obligations, but it had never had a delay in such a large proportion of its funds. Many worried that it would be difficult for NIH to disburse two-fifths of its budget (\$7.5 billion) over a few days' time. The reduction of that figure in the final agreement to \$3 billion in delayed obligations was viewed as an important change.

Earlier Congress approved legislation providing fiscal year 2000 funding for other biological and biomedical research programs. The VA-HUD bill, which provides funds for the National Science Foundation (NSF), Department of Veterans Affairs (VA), and National Aeronautics and Space Administration (NASA), was signed October 20. The bill provided \$2.966 billion for Research and Related Activities (R&RA) at the National Science Foundation in FY 2000, a 7.1% increase over its FY 1999 level. The NSF overall was given \$3.912 billion, a 6.5% increase. The FASEB Consensus Conference had advocated a 14.4% increase for the NSF.

The VA-HUD bill also provided \$321 million for the VA Medical and Prosthetic Research program, an increase of 1.6% over FY 1999. The Consensus Conference had recommended a 14% increase for this program.

NASA Life Sciences Research was provided with \$120.8 million, a decrease of 3.4% over its FY 1999 funding level. The Consensus Conference had recommended a 40% increase to enable this small program to fund a larger percentage of the requests for research support it receives.

OMB Finalizes FOIA Regulation

The Office of Management and Budget on October 8 published the final version of language enabling the public to request access to data from federallyfunded research under the Freedom of Information Act (FOIA). Language providing for FOIA access to research data was added to OMB Circular A-110 as a result of language included in last year's omnibus appropriations bill at the behest of Sen. Richard Shelby (R-AL). Federal agencies must now incorporate the same provision into their regulations and funding agreements, a process that is expected to take about a year.

The Shelby legislative language was extremely broad, calling for public access to all federally funded research data. Legal decisions by the courts had previously determined that FOIA applied only to information actually held by government agencies, while grantees' research data was seen as the property of the researcher and the research institution. However, the Shelby language changed that, and OMB and the scientific community quickly recognized that using FOIA to provide public access to research data presented serious problems.

Last February, in the first draft of the regulation, OMB tried to narrow the scope of FOIA access to data from published research that had been used in support of federal policy decisions. This (continued on page 430)

(continued from page 429)

interpretation was based not on the original Shelby legislative language but on the floor statements of senators explaining the intent of the provision. However, even so, many in the scientific community regarded the definitions of key terms as too vague. In its comment letter, the APS asked for clarification about when research is considered to have been "published." APS also asked what materials would be considered data and what agency actions would be considered "policy." Concerns were also raised that FOIA access to research data might violate patient confidentiality and researcher's intellectual property rights.

The second iteration, published in August, took into account many concerns that had been voiced by the scientific community in terms of narrowing the definitions of key terms. The final

regulation published October 8 is similar to the August version. It permits the public to make FOIA requests for "research data relating to published research findings produced under an award that were used by the Federal Government in developing an agency action that has the force and effect of law." There is also language specifying that data means "the recorded factual material commonly accepted in the scientific community as necessary to validate research findings" but excludes "preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, or communications with colleagues." The definition also excludes physical objects such as laboratory samples. Further excluded are:

trade secrets, commercial information, materials necessary to be held confidential by a researcher until publication of their results in a peer-reviewed journal, or information which may be copyrighted or patented; and

personnel and medical files and similar files the disclosure of which would constitute a clearly unwarranted invasion of personal privacy, such as information that could be used to identify a particular person in a research study.

The regulation defines "published" as either when research findings are published in a peer-reviewed scientific or technical journal, or when a Federal agency "publicly and officially cites the research findings in support of an agency action that has the force and effect of law."

The final regulation is viewed as probably the best possible outcome given the legislative language behind it. However, concerns remain because the FOIA law was not designed or intended to be a tool to compel data sharing. \clubsuit

HHS Revises Animal Research Cost Allocations

On November 15, the DHHS Office of Grants and Acquisition Management issued an "Action Transmittal Memorandum" instructing the Department's indirect cost negotiators to change the way they treat animal research facility costs. Under the new policy, certain portions of animal facility costs may now be included in an institution's Facilities & Administrative (F&A) rate, which is the term used to describe indirect costs. These costs include procedure rooms, operating and recovery rooms, isolation rooms, and quarantine rooms directly related to research protocols, "as well as rooms that house animals involved in research that are not generally removed from the facility for conducting research."

The current policy calls for all costs to be included in animal per diem rates unless the institution itself subsidizes them. Therefore, to the extent that an institution previously charged these costs through per diems, this change should provide some relief.

The APS and other organizations such as the American Association of Immunologists and the AAMC had raised concerns with HHS about the language originally proposed, which seemed to exclude housing costs for animals if they are ever removed from the facility for research. HHS responded to this concern by changing the wording to read "animals involved in research that are not generally removed from the facility for conducting research." Although this does not fully respond to the concern about housing costs for animals that are transferred to research laboratories elsewhere in the institution, the HHS action is generally viewed as a meaningful step toward

reducing per diem rates.

The DHHS action, which was approved by OMB, becomes effective immediately for all new F&A rate proposals. In adopting the new policy, HHS noted that the "sophistication of animal research has caused more of this animal research to be conducted within the confines of these facilities." Since most non-animal research takes place in office or laboratory space (which is included as part of the F&A cost), HHS acknowledged that "an inequity exists." The HHS action is an attempt to recognize that animal research facilities are similar to other research facilities at educational institutions and with this action has modified its cost allocation policy to treat them more similarly in most cases. 🔹

Government Publishes Misconduct Definition

On October 14, the government published its long-awaited Proposed Federal Policy on Research Misconduct to Protect the Integrity of the Research Record. The *Federal Register* notice published by the Office of Science and Technology Policy (OSTP) was the culmination of efforts by the National Science and Technology Council to arrive at a single definition of research misconduct that was acceptable to all federal agencies.

The proposed policy consists of a definition plus a set of guidelines for handling allegations of research misconduct. The proposed policy was subject to a 60-day comment period ending December 13, 1999.

The policy proposes to define research misconduct as "fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results." The policy then provides a definition of each of those key terms:

"Fabrication is making up results and recording or reporting them.

"Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.

"Plagiarism is the appropriation of another person's ideas, processes,

results, or words without giving appropriate credit, including those obtained through confidential review of others' research proposals and manuscripts."

The policy goes on to specify that "research misconduct does not include honest error or honest differences of opinion." The policy states further that "A finding of research misconduct requires that:

"There be a significant departure from accepted practices of the scientific community for maintaining the research record;

"The misconduct be committed intentionally, or knowingly, or in reckless disregard of accepted practices; and

"The allegation be proven by a preponderance of evidence."

The Office of Research Integrity sponsored a town meeting on November 17 to discuss the proposed policy. The policy will apply to all federally-funded research, regardless of where or by whom the research is conducted. The town meeting was co-sponsored by the NIH, NSF, and OSTP, and was hosted by the National Academy of Science and the Institute of Medicine

The meeting was held halfway through the 60-day comment period so that participants could consider the discussions at the public meeting and submit their comments to the Office of Science and Technology Policy (OSTP) afterwards. In addition to OSTP, other co-sponsors of the town meeting included the National Institutes of Health (NIH), and the National Science Foundation (NSF).

Many observers consider it significant that the proposed definition omitted a phrase that currently appears in the PHS and NSF misconduct rules prohibiting "other serious deviation from accepted practice." In 1992, a National Academy of Sciences panel recommended deleting this language because it was too vague. However, the NSF sought to retain the language because it provided latitude to pursue cases that might not fit under the categories of fraud, falsification, and plagiarism.

The proposed definition specifically identifies fraud, falsification, and plagiarism as prohibited acts. However, the definition goes on to state that in order for there to be a finding of misconduct, there must be "a significant departure from accepted practices of the scientific community for maintaining the integrity of the scientific record."

The proposed policy was posted to the Federal Register web site at http://frwebgate.access.gpo.gov/cgibin/getdoc.cgi?dbname=1999_register&docid=fr14oc99-59. It was also available through the ORI website at http://ori.dhhs.gov/fedreg101499.htm.

USDA and Coulston Foundation Reach Consent Agreement

The Coulston Foundation, the largest primate research facility in the US, and the USDA have reached a consent agreement regarding Coulston's alleged violations of the Animal Welfare Act (AWA). As a result of the agreement, the Foundation has agreed to surrender up to 300 chimpanzees, one-half of its current chimp population, by January 2002. In addition to relinquishing the 300 chimps, the Foundation must arrange for a USDA-approved external review team to examine its entire animal program and then implement all reasonable recommendations of the review team. The Foundation can also no longer breed chimpanzees without identifying to APHIS long-term funding sources, and the facility cannot acquire any new chimps without specific written approval by APHIS.

The Coulston Foundation neither admitted nor denied any violations of the AWA, which ranged from not providing adequate ventilation for nonhuman primates in the facility to not providing satisfactory pre-procedural care for the animals. But in 1996, according to the September 10, 1999, edition of *Science*, the lab paid a \$40,000 penalty to settle an investigation into the deaths of seven animals. After two more chimps died in 1997, the USDA started a new investigation, which lead to a formal complaint in 1998. By signing the consent decision, the Foundation has ended USDA's investigation.

Activist Accuses ALDF of False Solicitation

The Animal Legal Defense Fund (ALDF) recently sent out a fundraising solicitation falsely claiming that it has an active program to help an Oregon County prosecute animal abuse cases an animal activist has alleged. The accusation was raised in a letter in the October issue of Animal People written by Gail R. O'Connell-Babcock of the group for Humane Citizens Animal Legislation. Animal People, a monthly newspaper that describes itself as providing "News for People Who Care About Animals," also published the results of its own inquiry into the matter

O'Connell-Babcock wrote that the ALDF solicitation states that its "Special Prosecutor Program in Multnomah County, Oregon, which provides a team of experienced trial attorneys to help the local District Attorney prosecute animal abuse cases, has proven so successful that 19 other cities have asked us to bring the program to their communities." However, O'Connell-Babcock reported that Fred Lenzser of the Multnomah County Prosecutor's office told her that the program was inactive and virtually nonexistent. O'Connell-Babcock characterized it as a program that "exists only on paper and does nothing."

When asked by *Animal People* for comment, ALDF executive director Joyce Tischler provided background information about the program, which had been announced with great fanfare on May 21, 1997. The program was supposed to involve attorneys in private practice who would prosecute animal abuse cases on a volunteer basis for the County, but the lawyers had not yet been identified when the program was announced. Based on the information supplied by ALDF, two years passed before there was any further activity in this program. That action took place on June 22, 1999. Dana Campbell, an attorney hired by ALDF to coordinate the Special Prosecutor Program, met with Lenzser and provided him with a list of trial lawyers who were willing to volunteer their services. In an interview with *Animal People*, Campbell blamed the D.A.'s office for the lack of progress.

Based upon this chronology of events, *Animal People* pressed ALDF executive director Tischler for an explanation as to why ALDF was attempting to raise funds based upon a "misleading" claim about the success of the program. Tischler's explanation was that she had not written the appeal herself and was unaware that it included a misstatement.

"We believe that an attorney, especially representing an organization of attorneys, should know enough to read documents carefully before signing them," *Animal People* wrote.

Illinois Congressman John Porter Set to Retire

Congressman John Porter (R-IL), Chair of the House Labor-HHS Appropriations Subcommittee since 1995, and a champion of NIH funding, has announced he will retire in January 2001, at the end of the 106th Congress and his current term.

Porter assumed the role of the Subcommittee Chair after the Republican Party obtained the majority in the House in the 1994 elections. Since then, NIH has been the beneficiary of significant increases in appropriations:

> FY 1996 +5.6 % FY 1997 +6.8 % FY 1998 +7.1 % FY 1999 +14.4 % FY 2000 +14.7%

Porter's announcement surprised House leaders and the biomedical research advocacy community alike. Both scientists and patient advocacy groups have grown accustomed to having Porter as chair of the Labor-HHS subcommittee, but he would have to give up the post anyway at the end of the 106th Congress because of a term limit rule for committee chairs adopted after the Republicans gained the majority.

Despite this year's difficulties in approving the FY 2000 Labor-HHS funding bill, which Porter authored and includes the NIH budget, Porter insists the obstacles of the bill were not factors in his decision to retire.

"I have experienced great frustration every year," he said. "This is a personal decision. It has nothing to do with the difficulty in passing the Labor-HHS bill."

When asked what he felt was his most remarkable achievement in

Congress, Porter immediately referred to his drive to designate more funds for NIH.

"I'm particularly proud that my subcommittee has made biomedical research a very big priority and that we are working now to double the funding for biomedical research over five years," he said. "I think it is one of the most important priorities for human being across the world. That, I am very proud of."

In his resignation announcement, Porter said that as he contemplated whether to seek a twelfth term, he concluded it was time to pursue "other opportunities and challenges," though he added that he does not yet know what they are. He added that he wanted to spend more time with his children and grandchildren.

OPRR Human Subjects Division to Move

HHS Secretary Donna Shalala has accepted a recommendation to move the human subjects division of the Office for Protection from Research Risks (OPRR) from NIH to the Office of the Secretary of HHS. The recommendation to move OPRR came from a special committee that investigated concerns about the protection of human research subjects. In a report submitted to the Advisory Committe to the Director of NIH in June, the OPRR Review Panel suggested that OPRR's current location within NIH compromises its effectiveness in dealing with entities outside NIH. The Panel asserted that by relocating that division of OPRR to the Office of the Secretary of HHS, it will be in a position to exercise a more effective leadership role in the research community on issues relating to the protection of human research subjects. While the human subjects division is expected to move in April, 2000, OPRR's animal welfare division will remain at its current location within NIH.

OPRR is responsible for overseeing protection of human subjects and the humane care and use of animals in PHS-funded studies. In addition, OPRR has the authority to investigate complaints or concerns regarding an institution's oversight practices, and, if necessary, to demand corrective action or even suspend HHS funding until the problems are resolved. When humans are used as research subjects, the OPRR is responsible for implementing the HHS regulations for the humans' protection, which includes negotiating formal written assurances of compliance with institutions engaged in research involving human subjects, investigation and oversight of institutional compliance, and professional and public education.

There have been many instances reported recently about problems with human subjects protection at major research institutions. According to the October 11, 1999 issue of US News and World Report, an audit by the National Cancer Institute of its own cancer trials from 1995 through September, 1999 found noteworthy problems in one-third of the 23,455 reviewed cases. A more detailed review of federally funded cancer trial investigations found problems in human subjects research at more than 100 institutions. The violations included the following:

• Researchers neglected to record or report serious adverse reactions to experimental drugs, including deaths, thus, jeopardizing the safety of subjects remaining in the study.

Patients were coerced into waiving their legal rights in case of malpractice.
Researchers placed patients in trials that were medically inappropriate, which may have reduced their chances for survival. • Institutions allowed researchers who had financial interests in cancer studies to conduct reviews of those studies, in violation of federal regulations.

• Doctors failed to accurately inform patients of the benefits and risks of a study or to describe alternatives that might be more efficacious.

In response to the growing concern about the faulty oversight of human subject research, two Boston-based national organizations, Public Responsibility in Medicine and Research (PRIM&R) and Applied Research Ethics National Association (ARENA) are looking into the possibility of establishing a new organization for accreditation of human subject research programs. PRIM&R and ARENA have consulted with the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC), which, since 1965, has provided private accreditation of animal care and use programs.

The recommendation to retain the OPRR animal welfare division at NIH was the result of a report by Surgeon General David Satcher, as presented to HHS Secretary Shalala.

Monitoring animal subject welfare is a role divided between NIH, the US Department of Agriculture, and FDA; HHS concluded this balance is best maintained at NIH.

Varmus Leaving NIH to Head Memorial Sloan-Kettering Cancer Center

After serving six years as one of the most important leaders in advancing biomedical research in the United States, Harold Varmus will step down as the director of the National Institutes of Health at the end of this year.

Upon his resignation, he will assume the role of President and Chief Executive Officer of Memorial Sloan-Kettering Cancer Center in New York. He will replace Paul Marks, who has filled the position since 1980.

During his NIH tenure, Varmus fought tirelessly to increase the nation's budget for biomedical research. He was also commended and applauded for recognizing biomedical research issues, and for his initiative to restructure certain areas of NIH, including intramural research. Varmus' research interest has been the genetic basis of cancer, specifically retroviruses and their ability to cause genetic change. He began his career as a postdoctoral fellow at the University of California at San Francisco in 1970, and became a full professor in 1979. His collaborative work with J. Michael Bishop on normal genes that control

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growth and division in cancer cells led to his earning of the 1989 Nobel Prize.

Remarking on the departure of Varmus, Department of Health and Human Services Secretary Donna Shalala commented, "The appointment of Harold Varmus as Director of the National Institutes of Health was one of the most important accomplishments of this administration....To have a scientist of his brilliance and stature lead NIH has been invaluable to the scientific community and to the American people. History will judge him as the leader who brought new energy, vision, and excitement to the world's greatest scientific institution....We wish him well in his new position."

FASEB President David Kaufman said Varmus' "enthusiasm and 'bench scientist' approach to research policy is refreshing and convincing to the public, his colleagues in science, and policy makers in Washington. As Director of NIH, he conveyed the excitement of science and the researcher's dedication to discovery and its potential to improve human health.

"Few individuals can be said to have done so much to improve human health as can Harold Varmus.....We wish him good fortune in his new endeavor. We shall miss him and the strength of character and skill which he brings to our common goal: the improvement of human health through the tools of science," Kaufman said.

Shalala said every effort is going to be made to find a permanent director as fast as possible and to try and have one confirmed before the next presidential election. Meanwhile, Ruth Kirchstein, the current NIH deputy director, will serve as the acting Director. Kirchstein previously served as acting director in 1993 after Bernadine Healy left the position and prior to Varmus' arrival. She was also the Director of NIGMS prior to accepting her position as NIH Deputy Director \clubsuit

New NIH Website on Animal Models

The National Institutes of Health recently inaugurated a new segment of the NIH website, designed to provide information on national and international activities and resources that are being focused on the development of animal models. The web address is http://www.nih.gov/science/models/.

Boundaries Panel Adds Review Groups

In response to comments from the scientific community, NIH's Panel on Scientific Boundaries for Review added three Integrated Review Groups (IRGs) to the 21 originally proposed in its draft report. The panel was convened by Ellie Ehrenfeld, director of the Center for Scientific Review, and asked to conduct a comprehensive examination of the organization and function of the grant review process at CSR.

The panel's Phase 1 report was published July 29 with a comment period that extended through October 15. Many APS members commented individually, and the Society submitted a comment letter. "Of immediate concern to many physiologists is that the proposed realignment appears to convey a bias toward reductionist approaches to the detriment of integrationist ones," APS President Walter Boron wrote. The APS letter urged the panel to address specific gaps in the proposed review structure by adding IRGs on the kidney and urinary tract; exercise sciences; aging and geriatric medicine; and development in its broadest sense, including pregnancy, embryology, fetal and neonatal well-being, as well as development from infancy through adulthood. The letter is posted on the web at http://www.faseb.org/aps/boundariesletter.htm.

On November 8-9, the Panel on Scientific Boundaries for Review met to consider comments on its Phase 1 Report. The panel agreed to add IRGs for Biology of Development and Aging; Renal and Urological Sciences; and AIDS and AIDS-Related Research. The panel now plans to conduct a series of conference calls with experts in specific areas to help it "refine further recommendations in the Phase 1 report." It expects to finalize that report in January, 2000, and then to move on to the next phase of its work.

Phase 2 will entail the establishment of expert panels that "will be asked to design the study sections for several of the newly recommended IRGs," according to a notice posted on the NIH web site. The panel anticipates that additional expert panels will be commissioned in 2001 to complete Phase 2. The July 29 draft of the panel's Phase 1 report described this process as involving "expert groups of extramural scientists and NIH staff. . . [to] create the scientifically related study sections that will populate each IRG on the basis of the principles outlined in this report."

The panel's update on its November meeting is posted on the NIH website at http://www.drg.nih.gov/events/scientificboundariesupdate.htm. This page also contains a link to the Phase 1 report.

Animal Rights Group Sends Booby-Trapped Letters to Researchers

An extremist animal rights group, calling itself the "Justice Department," claimed responsibility for a radical act that resulted in biomedical researchers more carefully examining and opening their mail.

The group posted a communiqué, including the names and institutions of targeted researchers, on the Internet that warned it had hidden razor blades in envelopes and mailed them to at least 80 specific researchers working with nonhuman primates to find vaccines and treatments for AIDS, cancer and other diseases. To reinforce their point, the activists strategically placed a razor blade on the inside of the envelope, positioned so that anyone opening it would slice a finger. In addition to the razor, the envelopes contained a short message: "You have been targeted and you have until autumn of 2000 to release all of your primate captives and get out of the vivisection industry. If you do not heed our warning, your violence will be turned back upon you."

The universities were warned of the letters by research groups that monitor animal rights web sites, which forwarded the list and the communiqué to the intended recipients.

Letters have been received or intercepted at universities around the US, including Emory, Harvard, Tulane, Oregon Health Sciences University, Universities of California at Davis, Michigan, and Wisconsin at Madison. Only a handful of the letters were actually opened, and no injuries were reported. All of the letters are being turned over to the Federal Bureau of Investigation, which has taken over the case.

This is the first time the "Justice Department," a little-known extremist group that originated in the United Kingdom, has focused on researchers in the United States. In 1994, the groups sent six letter bombs to European companies that export live animals. In 1996, the organization mailed 87 envelopes to Canadian furriers. Those letters were rigged with razor blades allegedly contaminated with AIDS-infected blood.

Lab Animal Use Declines-Again

The number of research animals used in the US each year continues to decline, according to figures released in a USDA report. As required by the Animal Welfare Act (AWA), the USDA's Animal and Plant Health Inspection Service (APHIS) annually reports to Congress the number of animals in regulated species that are used each year for biomedical research, teaching, and testing. The data, however, are incomplete, because research facilities are not required to disclose their use of rats, mice, and birds, which are not regulated. Rats, mice, and birds account for approximately 80-90 percent of all animals used.

According to the latest USDA report on the 1998 numbers, the use of dogs in research has declined 61 percent since the reports were first issued in 1973. The number of cats used has dropped 62 percent since 1973. Guinea pigs are down 36 percent, hamsters have dropped 54 percent, and the number of rabbits used has declined 35 percent since 1973.

The decline in the numbers of animals used in research can be attributed to a variety of reasons, including the increased use of more refined techniques and the development of valid non-animal methodologies. In addition, APHIS is serious about its responsibility to enforce the AWA effectively. According to APHIS, over the past three years, it has implemented a new strategy to improve enforcement of the AWA. Conditions for animals protected under the law have improved, and there has been a reduction in the time it takes to resolve cases, resulting in savings to US taxpayers by avoiding excessive litigation.

The philosophy behind the new enforcement strategy of the APHIS is to work with those individuals who show an interest in improving the conditions for their animals and get tough on those that continue to show disregard for the law and well-being of their animals. In addition to charging research facilities, circuses, airlines, and a zoo for failure to comply with the AWA regulations, APHIS has also targeted animal dealers. One such case, in September 1997, was brought against a class B animal dealer for more than 1,500 AWA recordkeeping violations. The charges against the dealer included selling dogs and cats to research facilities under falsified documents and maintaining false acquisition records for dogs. The case was closed with a permanent revocation of the dealer's license and a \$175,000 fine.

APHIS has also sought to allow monetary penalties to be used for innovative purposes, including facility improvements, employee training, and research to promote better overall animal health and welfare. \diamondsuit

Deputy Editor

Physiological Genomics, a new research journal published by The American Physiological Society, has an immediate need for a Deputy Editor to be based in Boston, Massachusetts. Responsibilites include:

recruitment of articles through direct contact with the scientific community

writing of research commentaries

coordinating the receipt and review of manuscripts close coordination with authors, editors, and publisher representation of the journal at scientific meetings

writing skills to communicate complex concepts clearly, and strong editorial and interpersonal skills.

Brigham and Women's Hospital/ Harvard University and The American Physiological Society offer an outstanding compensation and benefits package. Please forward your resume, writing sample, and salary requirements to:

Dr. Victor Dzau, Editor-in-Chief **Physiological Genomics** c/o The American Physiological Society EOE, WILD 20814-3991

The APS Summer Research Programs for Teachers allow science educators nationwide at middle schools, high schools, Native American reservation schools, tribal colleges, and community colleges to learn about science "in action."

Become a part of APS' efforts to increase teachers' and students' knowledge about what scientists do, how the research process works, and the intrinsic satisfaction and sense of excitement that comes from conducting scientific research.



across the nation who work in APS researchers' laboratories in their own communities.



Explorations Summer Research Teachers are middle/high school science teachers serving Native American students in Montana, and science faculty at Montana tribal colleges who work in the laboratories of APS researchers outside the state of Montana.

For more information, contact the APS Education Office: (301) 530-7132 or educatio@aps.faseb.org OR see program descriptions and applications on the website: http://www.faseb.org/aps/educatn/k-12prog.htm

Postdoctoral Position: We are seeking bright, innovative physiologists to develop and validate non-invasive assays to characterize juvenile and adult mice with a variety of genetic defects. These assays will be performed on mice mutagenized both by ENU and by directed genome manipulation. This individual will be responsible for developing and validating novel assays to assess the function of any one of a wide range of physiologic systems including cardiovascular, renal, bone, hematopoiesis, learning and memory, respiration and development. A PhD, MD or DVM is required. Salary commensurate with experience. The position is MRC funded and available for up to three years. Please send a cover letter indicating research interests, CV, and names and contact information for three references to: Dr. Lee Adamson, The Samuel Lunenfeld Research Institute at Mt. Sinai Hospital, 600 University Ave., Room 138P, Toronto, ON, M5G 1X5, Canada (adamson@mshri.on.ca).

Postdoctoral Position: An NIH funded position to study molecular and cellular mechanisms in skeletal muscle regeneration and hypertrophy is available at the Emory University, Atlanta, GA. Muscle satellite cells are the postnatal muscle precursor cells that are responsible for normal muscle growth, muscle regeneration after injury and exercise-induced increases in muscle size. The functions of the satellite cell are crucial to normal human and animal growth, injury repair, muscle disease progression and muscle loss during disuse or aging. We study the molecular and cellular mechanisms that regulate the functions of satellite cells (Developmental Dynamics, 212:495-508, 1998); Molecular Biology of the Cell, 9:2905-2916, 1998; Amer. J. Physiology (Cell Physiol.) 277(2):C320-C329, 1999). A combination of molecular, cellular, biochemical, in vitro and in vivo approaches are used in the laboratory to address four main areas of research in skeletal muscle myogenesis: 1) signaling pathways in muscle satellite cells; 2) the role of specific growth and differentiation factors in myogenesis; 3) enhancement of muscle regeneration or muscle mass using gene therapy or systemic administration of pharmacologic agents; 4) the role of calcium in regulating gene expression during muscle repair or maintenance of muscle size in the adult. Applicants should have a PhD with background in cell or molecular biology or exercise physiology. Position is available immediately. Send CV and short description of research interests to: Dr. Grace K. Pavlath, Emory University School of Medicine, 1510 Clifton Road, Department of Pharmacology, Room 5027, Atlanta, GA 30322. Fax: 404-727-0365; email: gpavlath@bimcore. emory.edu. [EOE/AA]

Postdoctoral Associate/Assistant Research Scientist: The University of Iowa Health Care, Department of Internal Medicine, Pulmonary, Critical Care and Occupational Medicine Division is seeking both a Postdoctoral Associate and an Assistant Research Scientist to perform research related to macrophage biology and molecular regulation in acute and chronic lung diseases. For Postdoctoral Associate, a PhD in molecular biology or immunology supplemented by one or more years of progressively responsible experience in the conduct of related research is required. For Assistant Research Scientist, a person in this classification has the academic knowledge of a discipline that is generally associated with a doctoral degree or an equivalent professional degree, i.e., MD, DDS, and DVM. In addition, the person will have demonstrated the ability to plan and execute a research study through some progressively responsible independent research work. A PhD in immunology or molecular biology and postdoctoral research and reasonable (1-3 years) experience in immunology and molecular biology are desired. Please send resume and cover letter to Dr. Gary Hunninghake, c/o Carol Wehby, Human Resources, Internal Medicine, E400 GH, 200 Hawkins Drive, Iowa City, IA 52242-1081. Indicate #39334 for the Assistant Research Scientist and #39335 for the Postdoctoral Associate. Women and minorities are strongly encouraged to apply. [EOE/AA]

Biomechanics and Human/Systems Physiologists: Biomechanics: University of Oregon - Assistant Professor and Human/Systems Physiologist: University of Oregon -Assistant/Associate Professor. Applications invited for one Assistant Professor (tenure track) in Biomechanics and one Assistant/Associate Professor (tenure track) in Human/ Systems Physiology. Biomechanics position requires a PhD with specialization in biomechanics, outstanding research accomplishments, and expertise to teach in undergraduate and graduate courses in biomechanics and related areas. Requirements for Human/Systems Physiologist position include PhD with specialization in physiology, sufficient expertise to assist in teaching courses in undergraduate human and exercise physiology and/or graduate courses in areas related to his/her research expertise. The development of a strong independent research program with external funding is expected for both positions. Postdoctoral experience preferred. Salary is competitive and commensurate with experience. Direct phone or email inquiries to 541-346-4337 or bdutton@oregon.uoregon.edu. Send letter of application, vita, samples of scholarly work, and three letters of reference to Biomechanics and Physiology Position Searches, 1240 University of Oregon, Eugene, OR 97403-1240. Deadline: December 1, 1999, or until filled. AA/EO/ADA institution committed to cultural diversity.

Assistant/Associate Professor in Physiology: New York Chiropractic College (NYCC), a leading accredited college of chiropractic, has an immediate opening for a full-time, assistant/associate professor in the basic sciences. Located in Seneca Falls, New York, NYCC is dedicated to providing students with a quality education that will enable them to deliver excellence in alternative health care. Responsibilities include teaching a systems physiology lecture and laboratory course (6 credits), as well as ongoing scholarly activity and professional development. Current research interests at our institution include, but are not limited to, biomechanics and gait analysis, motor control, skeletal muscle physiology, sports medicine, and performing arts medicine. Candidates must possess a PhD degree in physiology, biology, or a related discipline. Experience teaching at an accredited graduate or professional level institution as well as familiarity with instruction methods for a health carebased curriculum is desired. Applications will be accepted until a suitable candidate is found. Interested candidates should submit a cover letter and current vitae to: Office of Human Resources, New York Chiropractic College, 2360 State Route 89, Seneca Falls, NY 13148. M/F/V/D [EOE].

Assistant Professor-Exercise Science: Applications are invited for a tenure-track faculty position at the Assistant Professor level in the Department of Exercise Science, University of Southern California, commencing July 1, 2000. Applicants must have fulfilled all requirements for their PhD degree by the time of appointment. The degree earned should be relevant to the areas of muscle mechanics, muscle physiology, muscle metabolism, biomechanics, and/or any specialization area that would be relevant to the current research efforts of the Exercise Science Department at USC. Candidates must demonstrate evidence of scholarly productivity and potential for external funding. The successful candidate's responsibilities will include development of an independent research laboratory, publication in peerreviewed journals, acquisition of external funding for research, instruction at the undergraduate and graduate level, and supervision of graduate students. The Department of Exercise Science is located within the College of Letters, Arts, and Sciences. Applicants should provide a letter of interest including research goals and teaching philosophy, a current curriculum vitae, three letters of reference, and examples of publications (maximum of 3) to: Dr. Casey Donovan, Department of Exercise Science, University of Southern California, 3560 Watt Way, PED 107, Los Angeles, CA 90089-0652. Fax: 213-740-7909; email: donovan@usc. edu. Screening of applications will begin on December 15, 1999 and continue until the position is filled. [AA/EOE]

Assistant Professor, Tenure Track: Successful applicant will maintain an active research program, seek extramural funding, and supervise student research. See *Science* 286: 1024, 1999 for full description. Letter of application, curriculum vitae, statement of research and teaching interests, and 3 letters of recommendation to: Dr. Douglas Meikle, Chair, Department of Zoology, Miami University, Oxford, OH 45056. Review of applications will begin on December 1, 1999 and continue until the position is filled. Tel: 513-529-3100; Email to: meikled@muohio.edu; website: http://www.muohio.edu/ for more information. Miami University offers Equal Opportunity in Employment and Education.

Assistant or Associate Professor: The New York University School of Education Department of Physical Therapy is seeking an Assistant or Associate Professor to teach in the Department's new professional education program at the doctorate level (DPT). The position is a tenure track nine-month appointment beginning September 1, 2000 with opportunities to do summer teaching and research. New York University, a pioneer in physical therapist education, is one of the eight programs in the country to offer physical therapist professional education at the doctorate level. Our post-professional master's degree programs and a post-professional PhD program, which are internationally recognized, are also part of the Department's offerings. Qualifications: physical therapist preferred; an earned doctorate at the time of appointment; experience in teaching and clinical practice in the area of musculoskeletal or cardiopulmonary physical therapy; eligible for licensure in New York State. We will also consider candidates with strong teaching experience in human physiology or neuromuscular physiology. Candidate should have an established research track and interest in seeking external funding. Application: The application should include: a letter indicating the appropriateness of the candidate's qualifications for the responsibilities of the position; a curriculum vitae; and the names and telephone numbers of four references. The completed application should be sent to: Tsega A. Mehreteab, Chair, Search Committee, Department of Physical Therapy, New York University, 380 Second Avenue, 4th Floor, New York, NY 10010-5615. Review of applications will begin in November 1999 and continue until the position has been filled. Nominations of candidates for the position may also be submitted to the above address. For more information concerning the Physical Therapy Department, consult our website at: http://www.nyu.edu/education/pt. New York University encourages applications from women and members of minority groups.

Assistant Professor: The Department of Biological Sciences at Illinois State University invites applications for an Assistant Professor with research interests in fundamental aspects of the physiology of vertebrates. Individuals employing biophysical, cellular and molecular approaches to investigate the physiology of tissues, organs and organ systems are particularly encouraged to apply. Teaching responsibilities will include an advanced graduate course in vertebrate/mammalian physiology and participation in undergraduate courses in physiology or related areas. The successful applicant will be expected to develop an independent, high-quality, and extramurally funded research program and to contribute to the training of PhD and Master's students. Postdoctoral experience preferred. Applications should consist of curriculum vitae, copies of three representative publications, three recommendation letters, and a brief statement of research and teaching goals sent to Dr. Robert L. Preston, Chair, Physiology Search Committee, Department of Biological Sciences, Campus Box 4120, Illinois State University, Normal, IL 61790-4120 (Email: rlpresto@ilstu.edu). To assure full consideration, please apply by **December 7, 1999**. Illinois State is an Equal Opportunity/Affirmative Action University encouraging diversity.

Assistant Professor-Tenure Track: The Department of Biology at Mount Allison University invites applications for a tenure track position, subject to budgetary approval. Candidates should possess a PhD and have postdoctoral experience with research interests in any area of animal physiology (vertebrate or invertebrate, including insects) will be considered. The successful candidate's undergraduate teaching shall include animal physiology and courses in the candidate's specialty. The successful candidate would also be expected to establish a strong, externally-funded research program and supervise thesis students. The appointment will be made at the rank of Assistant Professor and will commence on July 1, 2000. The 1998-99 annual salary range for Assistant Professor is \$39,305 - \$52,380 (subject to current negotiations). An application should include a curriculum vitae, a statement of research and teaching interests, and the names of three referees, and be sent to: Dr. R.B. Aiken, Chair of the Search Committee, Department of Biology, Mount Allison University, 63B York Street, Sackville, NB E4L 1G7, Fax: 506-364-2505; Email: raiken@mta.ca. The closing date is January 31, 2000. Mount Allison University has an employment equity program and encourages applications from all qualified women and men, including aboriginal peoples, persons with disabilities, and members of visible minorities. In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents.

Faculty Position, Comparative Vertebrate Endocrinologist: The Department of Zoology at the University of Toronto invites applications for a tenure-track position in comparative vertebrate endocrinology at either the Assistant or Associate Professor level, effective July 1, 2000. The successful candidate will be expected to develop a vigorous, externally funded research program, train graduate students, participate in departmental teaching at both the graduate and undergraduate levels and collaborate with colleagues in evolutionary biology, molecular biology, ecology and physiology. Applicants should submit a curriculum vitae, copies of up to four recent publications, a statement of present and projected research and teaching interests not to exceed three pages and arrange for three letters of reference to be forwarded by the closing date of 3 December, 1999. Applications should be sent to Professor F. Michael Barrett, Chair, Comparative Vertebrate Endocrinology Search Committee, Department of Zoology, University of Toronto, 25 Harbord St., Toronto, ON M5S 3G5 Canada. In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents of Canada. The University of Toronto encourages applications from qualified women or men including members of visible minorities, aboriginal persons and persons with disabilities.

Assistant Professor/Molecular and Cellular Physiology: The University of Michigan Department of Physiology invites applications for a tenure-track position at the Assistant Professor rank. We are seeking an individual studying the function of eukaryotic cells at the cellular and molecular levels. Applications are encouraged from individuals studying molecules involved in membrane permeability and transport. The successful applicant will be considered for the Biological Scholars Program (see 20 August 1999 Science) and will have the opportunity to participate in the new Center for Integrative Genomics. The applicant will be expected to establish an externally funded research program and participate in the teaching of graduate and professional students. Qualifications include a PhD or its equivalent and postdoctoral research. Candidates should send a curriculum vitae and summary of research interests and arrange for at least three references to be sent to: Chair: Molecular and Cellular Physiology Search, Department of Physiology, University of Michigan, Ann Arbor, MI 48109-0622. The review process will start January 3, 2000. The University of Michigan is an Equal Opportunity/Affirmative Action Employer committed to achieving diversity among its faculty and staff.

Faculty position in Evolutionary Organismal Biology: The Department of Biology at University of California at Riverside invites applications for a faculty position at the junior (tenure-track Assistant Professor) or senior (tenured Associate or Full Professor) level. We seek an evolutionary biologist working at the interface between the individual and the environment; relevant areas of interest include evolutionary physiology, functional morphology, and ecological genetics. The successful candidate will establish a vigorous research program, contribute to undergraduate and graduate training, and participate in our interdepartmental graduate research unit in evolution and ecology. Applicants must have a PhD degree and a strong record of research accomplishment. Junior-level applicants must have two or more years of postdoctoral training; senior applicants must have an excellent research and teaching record. A curriculum vitae, statement of research interests, and three to five letters (as well as the names and addresses of references for senior applicants) should be sent to: Chair, Evolution Search Committee, Department of Biology, University of California, Riverside, CA 92521. Review of applications will begin January 21, 2000.

Assistant/Associate Professor: The Department of Physiology of the East Tennessee State University is looking to fill a tenure-track, 12-month, state funded position as Assistant/Associate or Full Professor. Position is revised/readvertised. Possibility for joint appointment in Internal Medicine and the Cardiovascular Research Institute. Applicant must have doctoral degree, training or experience in cell and molecular biology, and at least two or more years postdoctoral experience. Seeking an excellent scientist who will complement our existing strengths in the biology of the vascular wall, neural control of the cardiovascular system, membrane ion transport and epithelial cell biology. Our departmental faculty's research involves cellular, molecular, and systems-oriented approaches. Potential to develop and sustain a strong, extramurally funded, independent research program is an important selection criterion. Further collaboration opportunities exist throughout the College and Cardiovascular Research Institute in areas of neurocardiology, atherosclerosis and cancer in a growing research community. Ample start-up package, excellent benefits, competitive salary, and beautiful location in the Appalachian Mountains. Candidates should submit a letter, curriculum vitae, and names of three references by March 1, 2000 to: Dr. William L. Joyner, Professor and Chair, Department of Physiology, James H. Quillen College of Medicine, East Tennessee State University, Box 70576, Johnson City, TN 37614-0576. Applications accepted for review until position is filled. [EOE/AA].

Assistant Professor, Animal Physiologist-Ecological Toxicologist: The Department of Biological Sciences at Capital University invites applications for a tenure-track position at the assistant professor level in Animal Physiology-Ecotoxicology to begin Fall 2000. Candidates should possess a PhD at the time of appointment. We are seeking a collegial Animal Physiologist with a specialization in Ecological Toxicology and candidates with strong commitments to liberal arts undergraduate education. A background in environmental chemistry, vertebrate physiology, numerical modeling, and environmental risk assessment would be an asset to the position. Successful candidates need to be willing to teach across the curriculum, including non-science majors, and introductory through advanced Biology and Environmental Science courses. The appointee will be expected to advise and work closely with undergraduate students in course work and undergraduate research projects, as well as maintain an active research program in his/her field. Applications should include a curriculum vitae, transcripts, three letters of reference, and a statement of teaching and research experience, philosophy, and interests. Send complete applications to: Chair of the Search Committee, Department of Biological Sciences, Capital University, 2199 East Main Street, Columbus, Ohio 43209-2394. Review of application begins January 15, 2000. More information on Capital University and the Department of Biological Sciences may be obtained at http://www.capital.edu. Capital University is an equal opportunity employer. Applications from women and minorities are strongly encouraged.

Two tenure-track positions: The University of Tennessee, Memphis, Department of Physiology is actively recruiting for two tenure-track faculty positions. Academic rank is dependent upon experience and gualifications. Candidates should have a PhD or MD degree, a good track record in publications, and postdoctoral research experience with a background in cellular and/or molecular biology. The abilities to establish an independent research program in the areas of cardiovascular, gastrointestinal, developmental, endocrine, or epithelial physiology and to engage in teaching activities of the department are expected. Applicants should send a curriculum vitae, copies of three representative publications, and the names of three references to: Leonard R. Johnson, PhD, Chair, Department of Physiology, University of Tennessee, Memphis, 894 Union Avenue, Memphis, TN 38163. These positions will remain open until filled. The University of Tennessee is an EEO/AA/Title VI/Title IX/Section 504/ADA/ADEA employer. Minorities and females are encouraged to apply.

Assistant Professor-Tenure Track: York University Faculty of Pure and Applied Science, Kinesiology and Health Science, invites applications for a tenure-track appointment at the Assistant Professor level in neurophysiology/neuroscience with an emphasis on some aspect of the broad areas of physical activity, behavior and health. A research program that utilizes molecular approaches will be a definite asset. The present Master's program covers healthrelated aspects of exercise physiology, psychology, occupational biomechanics and fitness/epidemiology. We are seeking to broaden the range of academic areas that we cover, as well as to build our faculty complement towards a PhD in Kinesiology and Health Science. The opportunity exists for a cross-appointment to the Graduate Program in Biology. Duties will include the supervision and teaching of graduate students and undergraduate teaching. A PhD and a promising publication record in refereed journals are required, as well as the ability to develop a productive research program supported by external funding. Postdoctoral experience would be an asset. Applicants should send a curriculum vitae, a cover letter stating future research goals, relevant reprints, and the names, addresses and telephone numbers of at least three individuals who may act as references by 15th January, 2000 to: Dr. E. Cafarelli, Chair, Search Committee, Kinesiology and Health Science, York University, Toronto, Ontario M3J 1P3 (e-mail: ecaf@yorku.ca). Duties commence July 1, 2000. The position is subject to budgetary approval. Further information can be obtained at www.yorku.ca/dept/physed. York University has a policy of employment equity, including affirmative action for women faculty. In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents.

Faculty Position-Investigator: The University of Missouri is accepting applications for a tenured or tenure track mid/senior level investigator with research achievements/ interests in molecular biology and its application to understanding mechanisms involved in neurohumoral control of physiological systems. Desirable research interests include synaptic transmission, sensory processing, or receptor systems in central autonomic pathways. Outstanding candidates in related areas also are encouraged to apply. The primary research focus may vary, but the individual should have an active interest in applying information gained in molecular studies to functional aspects of neurohumoral control of the cardiovascular system. The successful candidate will exhibit an active, well established, nationally recognized research program. A desire to lead research and training initiatives to integrate molecular biological with functional approaches related to neurohumoral control of the circulation is essential. This position is a Mission Enhancement Initiative of the University in support of the existing excellence in neurohu**Tenure-Track** Faculty Member-Anatomy and Physiology/Biology Education: The Department of Zoology and Genetics at Iowa State University seeks a tenure-track faculty member to teach a large enrollment, non-majors course in introductory anatomy and physiology, to supervise coordination of accompanying laboratories, and to develop a scholarship program in biological science education. The successful candidate will have a PhD in a biological science and a record of scholarly accomplishments in biology education. Those making a transition from biological research into educational scholarship are encouraged to apply. Areas of interest include, but are not limited to, distance education, innovative teaching methods, outreach to teachers, or such as in science education or curriculum reform. It is expected that the person chosen will attract outside funding to support their scholarship or teaching innovations and attract graduate students. The person will join a growing campus community of faculty from several departments who are interested in science education. A portfolio approach to evaluation and opportunities for professional development in the university will provide clear support for this position. A start-up package and logistical staff support will be provided. Applications will be considered until the position is filled. Submit a curriculum vitae, a statement of teaching philosophy, and a plan for future scholarly activities and arrange for three letters of reference to be sent to: Dr. Dennis G. Emery, Department of Zoology and Genetics, Iowa State University, Ames, IA 50011. Email: dgemery@iastate.edu.

moral control of the circulation on campus. The successful candidate will participate in the Mission Enhancement Initiative for recruitment of a junior level investigator with complementary research interests. Teaching requirements will be commensurate with the expertise of the individual. The appointment is in Biomedical Sciences, College of Veterinary Medicine, with joint appointments in the College of Medicine (e.g., Physiology) and the Dalton Cardiovascular Research Center, as appropriate. Applications should include a curriculum vitae, names of three references, and a letter stating professional goals. Review of applications will begin on February 1, 2000, and continue until the position is filled. Interested individuals should send a curriculum vitae, statement of research interests, and three references to: Eileen M. Hasser, PhD, Dalton Cardiovascular Research Center, 134 Research Park, University of Missouri, Columbia, MO 65211-3300. Tel: 573-882-6125; Email: HasserE@missouri.edu.

Assistant Research Scientist: The University of Iowa Health Care, Department of Internal Medicine, Infectious Diseases Division, has an opening for an Assistant Research Scientist to perform basic independent research relating to a wide range of molecular virology, specifically hepatitis A, C, and G viruses. A person in this classification has the academic knowledge of a discipline that is generally associated with a Doctoral degree, or an equivalent professional degree, i.e., MD, DDS, or DVM. In addition, the person will have demonstrated the ability to plan and execute a research study through some progressively responsible independent research work. Research experience in the area of molecular hepatitis A virus, hepatitis C virus and hepatitis G virus; graduate work in molecular hepatitis research; experience with molecular biology and molecular methods used in the amplification, cloning, sequencing, sequence analysis of hepatitis viruses; and experience with biophysical characterization of virus particles and vaccine development are desirable. Please send resume and cover letter indicating #39345 to: Carol Wehby, Human Resources, Internal Medicine, E400 GH, 200 Hawkins Drive, Iowa City, IA 52242-1081. Women and minorities are strongly encouraged to apply. [EOE/AA]

Assistant Research Scientist: The University of Iowa Health Care, Department of Internal Medicine, Cardiovascular Diseases Division is seeking an Assistant Research Scientist to perform basic research to advance knowledge of cellular and molecular mechanisms involved in the function of baroreceptor and cardiac neurons and map the neuroanatomical pathways of these neurons in vivo. The work will require expertise in the theoretical and methodological aspects of cellular electrophysiology and confocal microscopy. A person in this classification has the academic knowledge of a discipline that is generally associated with a doctoral degree or an equivalent professional degree, i.e., MD, DDS, and DVM. In addition, the person will have demonstrated the ability to plan and execute a research study through some progressively responsible independent research work. A PhD in neuroscience and/or physiology, research experience in the area of cellular electrophysiology, neuroanatomical tracing methods, and confocal microscopy are desirable. Please send resume and cover letter indicating #39333 to Carol Wehby, Human Resources, Internal Medicine, E400 GH, 200 Hawkins Drive, Iowa City, IA 52242-1081. Women and minorities are strongly encouraged to apply. [EOE/AA]

Faculty Positions, Physiology and Pharmacology: The Department of Physiology and Pharmacology in the College of Veterinary Medicine of the University of Georgia invites applications for two tenure-track positions at the Assistant or Associate Professor level beginning July 1, 2000, or thereafter. Successful candidates are expected to establish an active independent program of extramurally funded research and participate in veterinary medical and graduate teaching. We seek candidates who will complement the research strengths within the department and college. Program strengths in the department include cell and molecular physiology, endocrinology, cardiovascular and renal physiology, molecular pharmacology, reproductive physiology, toxicology and neuroscience (http://www.uga.vet.edu/ vph). A DVM/PhD or PhD is required. Applicants should submit curriculum vitae, statement of research interests, and a list of three references to Dr. Scott Brown (sbrown@calc. vet.uga.edu), Search Committee Chair, Department of Physiology and Pharmacology, College of Veterinary Medicine, University of Georgia, Athens, GA 30602. Applications received by February 15, 2000 are assured full consideration. The University of Georgia is an EEO/AA Institution.

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Ads are accepted for either positions available or positions wanted under all categories. The charge for this listing is only \$75, effective January 2000. In addition to being posted here, positions are also listed on the APS Career Opportunities Web page (www.faseb.org/aps/ career) until the deadline to apply has passed, or three months, whichever comes first.

If you would like to have your ad listed in *The Physiologist* or on the APS Career Opportunities Web page, the following items are needed: a copy of the ad, the name of a contact person, and either a purchase order number, credit card number (with expiration date and name of cardholder), or billing address. Send the information to Melinda Lowy (e-mail: mlowy@aps.faseb. org; phone: 301-530-7165; fax: 301-571-8305).

Clinical Scientist: The University of Dundee, Departments of Anatomy and Physiology and Biochemistry, is seeking a medically qualified Clinical Scientist (up to Registrar Grade 3) to work with Professor Michael Rennie on the control of human muscle protein synthesis by amino acids and contractile activity, and the role of eukaryotic initiation factors (eIFs) in this. Both clinical and laboratory work will be involved. This could give insights into the understanding of diabetes, dyslipidaemia, insulin resistance and other metabolic diseases. The 3-year post would suit a clinician (physician or surgeon) who had obtained Membership or Fellowship and wished to register for a higher degree (MD or PhD). One year of the research will be considered for contributing towards Calman training and clinical sessions in diabetes and endocrinology will be available if required and clinical sessions in other specialties could be arranged. Applications from doctors qualified in the EC or the USA would be welcome. The salary will be on the Clinical Academic scale (£23,300-£25,660). Starting date to be arranged: January 2000. Informal inquiries can be made to Professor Rennie (email: mjrennie@utmb.edu, or m.j.rennie@dundee.ac.uk) Tel: 1-409-770-6609 (US). Applications in the form of a CV and covering letter (two copies of each), including the names and addresses of three referees, should be sent to Janette Cordiner, Administrator, Wellcome Trust Building, MSI/WTB Complex, University of Dundee DD1 5EH quoting reference EST/421/90N. Closing date: December 31, 1999. The Medical Research Council has recently awarded Co-operative Group status to a consortium of nine research groups in the Departments of Anatomy & Physiology and Biochemistry at the University of Dundee. The Group seeks to elucidate the molecular mechanisms by which eukaryotic cells sense nutrients, and the downstream signalling events.

Assistant Research Scientist: The University of Iowa Health Care, Department of Internal Medicine, Infectious Diseases Division is seeking an Assistant Research Scientist to perform basic and/or applied research in the area of the role of free radical reactions in the pathogenesis of Pseudomonas aeruginosa-associated tissue injury with emphasis in part on the role of secretory products of the organism in this process. The person in this position will identify and select the areas to be studied, the approach to them, and analyze the results obtained. A person in this classification has the academic knowledge of a discipline that is generally associated with a doctoral degree or an equivalent professional degree, i.e., MD, DDS, and DVM. In addition, the person will have demonstrated the ability to plan and execute a research study through some progressively responsible independent research work. Some (1-3 years) of direct Physiologist/Comparative Physiologist Tenure Track Position: The California State Polytechnic University, Pomona, Department of Biological Sciences, seeks a Physiologist or Comparative Physiologist with the ability to teach system-level vertebrate physiology at the undergraduate level. The successful candidate will have the potential for excellence in undergraduate teaching and for developing an externally-funded research program that will involve undergraduate and master's students. Teaching responsibilities will include components of established courses in comparative animal physiology and cell physiology and the development of an upper-division course and a graduate course dealing with one or more of the following systems: endocrine, renal, respiratory, cardiovascular, digestive, reproductive, neural or muscular. Depending on the candidate's interest and experience these two courses might be taught from the general or comparative perspective and at any level of organization from the systemic to the molecular. Additional teaching assignments might include Introductory Biology. Candidates with research in all subdisciplines of physiology are encouraged to apply. A PhD in biology, physiology or related fields is required at the time of appointment. Teaching and post-doctoral research experience are preferred. Assistant Professor position begins fall 2000. Our 35-member faculty offers BS degrees in five areas and MS degrees to a total enrollment of 980 students. For more information see: www.csupomona.edu/~biology. Applicants must send letter of intent, completed application form, curriculum vitae, three recent letters of reference, and two additional referees (with telephone numbers for all) to: Physiology Search Committee, Biological Sciences Department, California State Polytechnic University, Pomona, CA 91768-4032. Email: dfhoyt@csupomona.edu. Initial review of applicants will begin January 15, 2000, and continue until position is filled. An Equal Opportunity/Affirmative Action Employer.

and applicable experience in techniques employed for the study of free radical reactions in biological systems is required. Some (1-3 years) experience in culture of human cells and cell lines is desirable. Experience in the determination of free radical-mediated injury to cellular functions and with molecular biology techniques, particularly as they pertain to free radical biology, including but not limited to gene transfer and expression of antioxidant enzymes in cellular systems and Southern and Northern blot methodology is desirable. Evidence of the ability to contribute significantly to the publication of scientific papers in the field of free radical biology is desirable. Please send resume and cover letter indicating #39327 to Carol Wehby, Human Resources, Internal Medicine, E400 GH, 200 Hawkins Drive, Iowa City, IA 52242-1081. Women and minorities are strongly encouraged to apply. [EOE/AA]

Physiology Lecturer: Applications are invited from suitably qualified graduates in medicine or physiological sciences for a tenure-eligible Lectureship in the Department of Physiology at University of Dublin, Trinity College, Dublin, tenable from October 1, 2000. Candidates should have demonstrable experience in research and teaching and should hold a higher degree. The successful candidate will have a good and broad knowledge of human physiology and pathophysiology and must be prepared to teach at an undergraduate level over a range of organ systems, as well as undertaking research in the Department. Opportunities exist for clinical affiliations, if appropriate. Applications will be particularly welcome from candidates whose background and interests will complement one or both of the experimental key research areas in the Department- exercise physiology (with current emphasis on cardiorespiratory adaptations, muscle fatigue and biomechanics) and cellular communication (with current emphasis on neuronal plasticity, development and aging). However, applications are also welcome

from candidates with exceptional records of research achievement outside these guidelines. Salary Scale: £17,354-£42,869 per annum. Appointment will be made within the salary range £17,354-£35,025 per annum, at a point to accord with qualifications and experience to date. The Departmental profile and a job description for this post may be accessed via the Internet at http://www2.tcd.ie/Physiology. Further details of academic aspects of the appointment may be obtained from the Head of Department, Professor C. Bell (Tel: +353-1-608-1076; Fax: +353-1-608-1468; e.mail:cbell@tcd.ie. Intending candidates are invited to submit a full curriculum vitae, to include the names of three referees, to: Establishment Officer, Staff Office, Trinity College, Dublin 2. Tel: 608-1678; Fax: 677-2169; Email: recruit@tcd.ie to arrive not later than Friday, January 15, 2000. Website: http://www.tcd.ie/Staff_Office. Trinity College is an Equal Opportunities Employer.

Marcus E. Raichle Receives Bristol-Myers Squibb Award for Distinguished Achievement

APS Member Marcus E. Raichle, MD, is the recipient of the 12th Annual Bristol-Myers Squibb Award for Distinguished Achievement in the Neurosciences for creating brain imaging strategies to identify specific brain regions as centers for complex thought processes.

Raichle is Professor of Radiology, Neurology and Neurobiology, and Co-Director of the Division of Radiological Sciences, Mallinckrodt Institute of Radiology, at the Washington University School of Medicine in St. Louis.

In the early 1970s, Raichle developed a method of positron-emission tomography (PET) scanning in the brain using a form of water labeled with the rapidly decaying isotope oxygen-15. This method allowed brain blood flow to be measured in just 40 s, and to directly relate a person's behavior to changes in a specific brain region. Raichle and colleagues used this technique in performing the first detailed functional mapping of the human visual cortex. They later adapted the stereotaxy system of the French neuroradiologist Jean Talairach to determine the anatomical location of brain blood flow responses within individuals-and to make comparisons across groups of subjects. Today, this system for performing and reporting functional imaging research, both with PET and MRI, has been adopted worldwide.

With the cognitive psychologist Michael Posner, Raichle mapped far more complex brain functions, breaking down complex cognitive functions and ascribing the component mental processes to specific brain regions. Raichle and his group also discovered that the brain does not, as had been



Marcus E. Raichle

assumed, consume more oxygen during brief increases in mental activity. This finding led Seji Ogawa, a researcher at Bell Labs, to propose a method of functional magnetic resonance imaging today, the most widely used technique for assessing human brain function.

Raichle graduated from the University of Washington in Seattle in

1955, and received his medical degree from the same institution in 1964. He performed his internship and residency in the Baltimore City Hospitals, served as Chief Resident in Neurology at New York Hospital/Cornell Medical Center, and subsequently held the rank of Major as a neurologist and flight surgeon, in the United States Air Force. He came to Washington University in St. Louis in 1971 as a Research Instructor; became an Assistant Professor of Neurology at the University's School of Medicine in 1972; and was named full Professor in Neurology (1978), Radiology (1979), Biomedical Engineering (1979) and Neurobiology (1993). He was named co-director of the Division of Radiological Sciences in 1995.

Raichle's numerous contributions to science have been recognized by his election to the National Academy of Sciences, the Institute of Medicine and the American Academy of Arts and Sciences. In addition to holding positions on many peer-review journals, he has received the Paul C. Aebersold Award of the Society of Nuclear Medicine, the Decade of the Brain Medal of the American Association of Neurological Surgeons, the William James Book Award of the American Psychological Association, the Charles A. Dana Award for Pioneering Achievement in Health, and the Lashley Prize of the American Philosophical Society. 💸

APS Members Elected to IOM

On October 12, the Institute of Medicine (IOM) announced the election of 55 new members, raising the total active membership to 588. In addition, five people were honored by direct election to senior membership, bringing that roll to a total of 695. A

category of foreign associate membership established 11 years ago now totals 51 with the election of six this year.

Two APS members were elected to active membership, including:

Kevin P. Campbell, PhD, investigator, Howard Hughes Medical Institute, and professor, department of physiology and biophysics and department of neurology, University of Iowa College of Medicine, Iowa City.

C. Kern Wildenthal, MD, PhD, president, University of Texas Southwestern Medical Center, Dallas.

Beyenbach Receives Germany's Order of Merit Award

Germany's highest civilian award, the Bundesverdienstkreuz (Officer of the Cross of the Order of Merit), was conferred on Cornell University Professor of Physiology Klaus W. Beyenbach.



The award by German President Roman Herzog was presented to Beyenbach by Jürgen Chrobog, Germany's Ambassador to the United States, in Oct. 29 ceremonies at the German Embassy in Washington, DC. Beyenbach was cited for his work on behalf of the Alexander von Humboldt Association of America.

An offshoot of Germany's Alexander von Humboldt Foundation, the American association was formed in 1995 to promote scholarly, professional, educational and scientific collaboration between the German and American academic and research communities. One of three founders of the Alexander von Humboldt Association of America, Beyenbach served as the organization's second president from 1997-99.

All members of the American association are Humboldtians, as former participants in Humboldt Foundation programs are known. Since 1953 the Humboldt Foundation has sponsored the study in Germany by more than 19,000 scholars from some 125 countries in highly competitive programs such as the Humboldt Fellowships and the Humboldt Research Awards. There are some 4,500 Humboldtians in the US, where 22 Nobel Laureates have been Humboldt awardees. At Cornell, 70 Humboldtians are members of the faculty and research staff of the university.

Beyenbach, whose research focuses on kidney function and ion transport across cell membranes in the kidney is supported by the National Institutes of Health and the National Science Foundation, joined the Cornell faculty in 1978 and was named a professor of physiology in 1989. He earned a PhD in zoophysiology (1974) from Washington State University and served as a Fellow of the National Kidney Foundation (1974-76) at the University of Arizona College of Medicine.

Beyenbach received a Humboldt Research Award in 1992 and was a visiting scientist at the Max Planck Institute for Molecular Physiology in Dortmund, Germany, from 1991 to 1992 working with Rolf and Eva-Maria Kinne. At Cornell he teaches the seniorlevel course Mammalian Physiology, as well as renal physiology in the veterinary medicine curriculum.

Bruno Balke Grand Junction, CO Theodor H. Benzinger Bethesda, MD **Kao Liang Chow** Stanford, CA **Paul Churchill** Detroit. MI **D. Harold Copp** Vancouver, British Columbia William W. Douglas Hamdeu, CT **Humberto Fernandez-Moran** Stockholm, Sweden **Irving Y. Fishman** Grinnell, IA **Rov P. Forster** Hanover, NH

Deceased Members

Wallace G. Frasher Dallas. TX Pierre M. Galletti Providence, RI Harper K. Hellems Jackson, MS **Oliver P.J. Heroux** Aylmer, Quebec Lerner Hinshaw Roseville, CA Suk Ki Hong Buffalo, NY Frederic T. Jung Evanston. IL Nathaniel Kleitman Santa Monica, CA **Edward H. Lanphier** Madison, WI

Cheng-Chun Lee Washington, DC Gary P. Moberg Davis, CA **Robert L. Moss** Dallas, TX Shih H. Ngai Teaneck, NJ Saroja K. Reddy Davenport, IA **Richard W. Schayer** Spring Valley, NY William A. Weber Pasadena, CA **Charles A. Winter** Woodinville, WA

Moving to the Department of Biochemistry and Molecular Biology, University of New Mexico, Albuquerque, NM, **Steve F. Abcouwer** has left the Surgical Oncology Research Labs, Massachusetts General Hospital, Boston, MA.

Ronald F. Abercrombie has moved to the Department of Physiology, Emory University, Atlanta, GA. Prior to his new position, Abercrombie was with the Department of Physiology and Biophysics, University of Washington, Seattle, WA.

Previously with the Department of Pharmacology and Biochemistry, University of New England College of Medicine, Biddeford, ME, Ahmmed Ally recently joined the Massachusetts College of Pharmacy and Health Sciences, Boston, MA.

Affiliating with the Department of Physiology and Basic Sciences, Lake Erie College of Osteopathic Medicine, Erie, PA, **Mark Anthony Andrews** has moved from the Department of Preclinical Medical Education and Physiology, New York College of Osteopathic Medicine, Old Westbury, NY.

Margaret E. Ardelt was formerly associated with the Department of Physiology, Dartmouth Medical School, Lebanon, NH. Ardelt has recently affiliated with the Department of Physical Education, University of Southern Indiana, Evansville, IN.

Stephane Claude Baudet has affiliated with the Department of Internal Medicine, Intervet Pharma R&D, Beaucouzé, France. Prior to her new assignment, Baudet was with the Department of Pharmacology, Intervet International, Boxmeer, The Netherlands.

Anindya Bhattacharya has moved to Eli Lilly and Co., Lilly Corporate Center, Indianapolis, IN. Bhattacharya was formerly with the Department of Pharmacology, SUNY at Buffalo, Amherst, NY.

Nisha Charkoudian has left the Department of Physiology, University of Texas Health Science Center, San Antonio, TX. Recently, Charkoudian has joined the Laboratoire De Physiologie, Faculty of Medicine, Universite De D'Angers, Angers, France.

Accepting a position in the Human Performance Laboratory of the School of Health & Human Performance, East Carolina University, Greenville, NC, **Ronald N. Cortright** has left the Division of Endocrinology & Internal Medicine, Charlottesville, VA.

Jeffrey Duerr has moved from the Science Department, Warner Pacific College, Portland, OR, to the Department of Biology and Chemistry, George Fox University, Newberg, OR.

Having left the Ludwig Institute Cancer Research, Uppsala, Sweden, **Muhammad Emaduddin** recently joined the Department of Physiology, University of Tennessee, Memphis, TN.

Formerly with the Department of Cardiology, University Hospital, University of Heidelberg, Mannheim, Germany, **Georg Ertl** has recently joined the Bayerischen Clinic, Julius Maximilians University at Wurzburg Medical Clinic, Wurzburg, Germany.

Ana Yesenia Estevez has joined the Anesthesiology Research Division, Vanderbilt University Medical School, Nashville, TN. Prior to her new assignment, Estevez was affiliated with the Department of Physiology, Wayne State University School of Medicine, Detroit, MI.

Having accepted a position with Medronic Inc, Minneapolis, MN, **David E. Euler** has left Angeion Corporation, Brooklyn Park, MN. **Richard L. Evans** has accepted a position with Unilever Research, Port Sunlight Laboratory, Bebington, Wirral, England. Prior to his new position, Evans was with the Center for Oral Biology, Rochester Institute of Biomedical Sciences, Rochester, NY.

Accepting a position with the Department of Pediatrics, Wake Forest University School of Medicine, Winston Salem, NC, **Candice D. Fike** has left the Department of Pediatrics, Medical College of Wisconsin, Zablocki VA Research Service, Milwaukee, WI.

Henry Jay Forman had previously held a position in the Department of Molecular Pharmacology and Toxicology, University of Southern California, Los Angeles, CA. Currently, Forman is in the Department of Environmental Health Sciences, School of Public Health, University of Alabama at Birmingham, Birmingham, AL.

Ellen V. Freund has recently joined the Organismic and Evolutionary Biology Department, Harvard University, Cambridge, MA. Prior to her new position, Freund was at Stanford University, Pacific Grove, CA.

Stewart B. Gottfried has affiliated with the Respiratory Division, Royal Victoria Hospital, Montreal, Canada. Previously, Gottfried was associated with the Respiratory Division, Montreal General Hospital, Montreal, Canada.

Having moved from the Department of Pediatric Pulmonology, Department of Pediatrics, Tulane University Medical Center, New Orleans, LA, **David Gozal** is presently Director, Kosair Children's Research Institute, Department of Pediatrics, Louisville, KY.

John D. Griffin is currently in the Department of Biology, College of William and Mary, Williamsburg, VA.

Prior to his new post, Griffin was associated with the Biology Faculty, Sacred Heart University, Fairfield, CT.

Affiliating with the Department of Kinesiology and Health Science, York University, Toronto, Ontario, Canada, **Tara Little Haas** has left the Department of Pathology, Yale University, New Haven, CT.

Jong-Sik Hah is spending a sabbatical year at the Department of Physiology and Biophysics, College of Medicine and Biomedical Sciences, State University of New York, Buffalo, NY. Hah is from the Department of Physiology, Ewha Womans University, College of Medicine, Seoul, South Korea.

Joining Searle's Department of Cardiovascular and Metabolic Diseases, St. Louis, MO, **Amy Halseth** has left the Department of Molecular Physiology and Biophysics, Vanderbilt University Medical School, Nashville, TN.

Affiliating with the Department of Cell & Molecular Physiology, University of North Carolina at Chapel Hill, NC, **Jaclyn R. Holda** was formerly with the Department of Physiology, Loyola University Medical Center, Maywood, IL.

Victor W. Hurst, IV has joined the Department of Cardiovascular Laboratory, NASA-Johnson Space Center, Houston, TX. Prior to his new position, Hurst was affiliated with the Department of Physiology and Cell Biology, Albany Medical College, Albany, NY.

Formerly connected with the Section of Nephrology, Yale University School of Medicine, New Haven, CT, **Peter Igarashi** has joined the Division of Nephrology, University of Texas Southwestern Medical Center, Dallas, TX.

Having moved from the Department of Internal Medicine, Washington

University School of Medicine, St. Louis, MO, **Wendy M. Kohrt** is presently affiliated with the Department of Medicine, Division of Geriatric Medicine, University of Colorado Health Sciences Center, Denver, CO.

Having completed training at St. Luke's Roosevelt Hospital, Columbia University, New York, NY, **Wolfgang M. Kuebler** has recently returned to Munich, Germany at the Institute for Surgical Research, University of Munich.

Having left the Pulmonary Division, University of Texas Medical Branch, Galveston, TX, **Samuel T. Kuna** has joined the Department of Medicine, Veterans Affairs Medical Center, Philadelphia, PA.

George V. Lauder has accepted a position with the Organismal & Evolutionary Biology and Zoology Department, Harvard University, Cambridge, MA. Lauder was previously affiliated with the Department of Ecology & Evolution, University of California, Irvine, CA.

Having accepted a new assignment with the Department of Pathology, the University of Pittsburgh, Pittsburgh, PA, **Youhua Liu** has left the Renal Division, Rhode Island Hospital, Providence, RI.

Maureen Jane MacDonald is currently with the Department of Kinesiology & Physical Education, Wilfrid Laurier University, Waterloo, Canada. Prior to her new position, MacDonald was with the Department of Kinesiology, McMaster University, Hamilton, ON, Canada.

Recently, **Taylor J. Marcell** has joined the Department of Internal Medicine, University of Texas Medical Branch,

Galveston, TX. Prior to his new position, Marcell was affiliated with the Gerontology Research Center, NIA/NIH. Johns Hopkins Bayview Medical Center, Baltimore, MD.

Having moved from the Department of Physiology, University of Tennessee, Memphis, TN, **David Mendelowitz** has accepted a position with the Department of Pharmacology, George Washington University, Washington, DC.

Allison Wineloff Miller has accepted a position with the Department of Physiology and Pharmacology, Wake Forest University School of Medicine, Winston Salem, NC. Prior to her new position, Miller was with the Clinical Pharmacy Program, Medical College of Georgia, August, GA.

Recently, **Patricia E. Molina** accepted a position with the Department of Physiology, Louisiana State University Medical Center, Shreveport, LA. Prior to her new position, Molina was associated with the Brookhaven National Laboratory, North Shore University Hospital, Upton, NY.

Having moved from the Department of Human Kinetics, University of Wisconsin, Milwaukee, WI, **Jay Naik** is now affiliated with the University of New Mexico School of Medicine, Albuquerque, NM.

Formerly with the Department of Physiology and Biophysics, University of Alabama at Birmingham, AL, **Holly Krull Patton** has moved to NASA Headquarters, Office of the Inspector General, Washington, DC.

Nancy J. Pelaez has accepted a position with the School of Natural Science and Mathematics, California State University, Fullerton, CA. Prior to her new position, Pelaez was with the Department of Physiology and Biophysics, Indiana University School of Medicine, Indianapolis, IN.

Karen M. Ridge has recently joined the Department of Medicine, Northwestern University, Chicago, IL. Prior to her new assignment, Ridge was a Postdoctoral Fellow at the Michael Reese Hospital, Chicago, IL.

Accepting a position with Bourne Research Laboratory, Weill Medical College, Cornell University, White Plains, NY, **Gary J. Schwartz** has moved from the Department of Psychiatry and Behavioral Science, Johns Hopkins University School of Medicine, Baltimore, MD.

Sinclair Allan Smith has recently accepted a position with the Department of Occupational Therapy, Temple University, Philadelphia, PA. Prior to his new affiliation, Smith was with the Occupational Therapy Department, Belmont University School of Sciences, Nashville, TN.

Claudette Marie St. Croix was previously associated with the Department of Preventive Medicine, University of Wisconsin, Madison, WI. Recently, St. Croix joined the Department of Pharmacology, University of Pittsburgh School of Medicine, Pittsburgh, PA.

Michael James Stonerook has accepted a position with Parke-Davis Pharmaceutical Research, Ann Arbor, MI. Previously, Stonerook was with the Battelle Memorial Institute, Columbus, OH.

Joining the Department of Endocrinology & Internal Medicine, University of Virginia, Charlottesville, VA, **John S. Striffler** has left the Department of Diabetes, Endocrinology & Metabolism, City of Hope National Medical Center, Duarte, CA.

Anna Marie Taylor has joined the Department of Kinesiology, Colorado University, Boulder, CO. Prior to her move, Taylor was with the Department of Exercise Science, University of California, Davis, CA. Currently, **Maria Isabel Tejero** is with the Department of Internal Medicine, Division of Cardiology, Medical College of Virginia, Richmond, VA. Prior to her new position, Tejero was at the Department of Integrative Physiology, University of North Texas Health Science Center, Forth Worth, TX.

John X. Thomas, Jr., has joined the Office of Medical Education, Northwestern University Medical School, Chicago, IL. Prior to his new appointment, Thomas was with the Department of Physiology, Loyola University Medical Center, Maywood, IL.

Accepting a position with the Weis Center for Research, Danville, PA, **Dorothy E. Vatner** is no longer affiliated with the Cardiovascular & Pulmonary Research Institute, Allegheny University of the Health Sciences, Pittsburgh, PA.

Currently the Assistant Professor of the Department of Health, Physical Education, and Recreation, South Dakota State University, Brookings, SD, **Michael D. Vukovich** was formerly Clinical Research Director for Experiment and Applied Sciences, Golden, CO.

Yanlin Wang recently joined the Department of Cardiovascular Research Program, Biomedical Biotechnology

Research Institute, Durham, NC. Wang was originally affiliated with the Department of Internal Medicine, University of Texas Medical Branch, Galveston, TX.

Yoshio Watanabe has affiliated with Chiba Tokushu-kai Hospital, Funabashi, Japan. Previously, Watanabe was at the Toyota Regional Medical Center, Toyota, Aichi, Japan.

John G. Widdicombe has joined the Division of Physiology & Aerospace Medicine, Guy's, King's and St. Thomas' School of Biomedical Sciences, London, UK. Widdicombe was formerly with the Division of Physiology, Sherrington School of Physiology, UMDS Guy's & St. Thomas's Hospital Campus, London, UK.

Having joined the Department of Exercise Sciences, University of Mississippi, University, MS, James S. Williams has left the Department of Physiology, University of Arizona, Tucson, AZ.

Darryn S. Willoughby recently has joined the Department of Kinesiology, Texas Christian University, Fort Worth, TX. Prior to his new affiliation, Willoughby was with the Department of Sports Medicine, University of Southern Maine, Portland, ME.

Having affiliated with the Department of Molecular Biophysics and Biochemistry, Yale University, New Haven, CT, **Xiang Wu** has moved from the Department of Biochemistry and Molecular Biology at Medical College of Georgia, Augusta, GA.



News From Sr. Physiologists

Letter to Stephen Cain

Thomas A. Lesh writes: "Thank you for your letter inquiring about my present activities at age 70.

"I am fully retired from scientific work, and am happy to be following up on various other interests that I previously couldn't spare enough time for. Our new country home, on a hillside surrounded by woods, is a satisfying place to live; it provides plenty of opportunities for healthful exercise as well as quiet comtemplation. I perceive that time passes more quickly as the years pile up, and I suspect that the real reason is a slowing of my own 'processor'."

Letter to Eugene Renkin

J. Leonard Brandt writes: "I returned to the US in 1979 after twenty years as Physician-in-Chief of the Jewish General Hospital, a major undergraduate teaching unit of McGill Medical School in Montreal, Canada, I had left the Downstate Medical Center in Brooklyn for the move to Canada. Back in the US, again I took up the post of Physician-in-Chief of the Hebrew Home and Hospital in Hartford, Connecticut, a major Geriatric teaching unit of the University of Connecticut Medical School. After ten years (in 1989) I finally retired at the over-ripe age of seventy.

"Since retiring I have kept up a busy schedule of teaching, in spite of the ravages that time has had on my health. I am on three times per week of hemodialysis, which removes about fifteen hours out of every week. I fill in the free time left available with organizing the Mini Medical School for the interested adults of the community. The program is modeled after the adult program, which originated at the University of Colorado.

"A few years ago I adapted the adult program to the local inner city high school juniors and seniors who are recommended to us by their science teachers as those students who would most likely benefit from the exposure.



"Looking back over the last few years, I can say that the mini-medical school (both the adult and the high school) programs have proven to be enormously successful. Indeed, many of the major hospitals in the area have mounted similar programs. For those who are interested, I would be happy to share with them the details of what we have done. How to get started. My e-mail address is: jlbrandtmd@aol.com

"I can't close without a word about my three gorgeous grandchildren and my two physician offspring. One is a successful child psychiatrist in New York, and the other is Head of the Glaucoma service at UC-Davis and a member of the APS. Those five plus a remarkable and beautiful wife makes retirement a time for delightful reminiscences. AND THAT, MY FRIENDS, IS WHAT IT IS ALL ABOUT."

Letter to Michael Bárány

Christina Enroth-Cugell writes: "Thank you very much for asking me to contribute a brief 'look back' to the 'News From Senior Physiologists' section. Like so many other people of my vintage my career has been one of two countries and two continents. Two events profoundly affected my professional life: 1) leaving Sweden for the USA, and 2) spending my professional life in the company of engineers. I received both my MD and PhD degrees the Karolinska Institutet in at Stockholm. My subsequent clinical training in ophthalmology and a PhD in visual neurophysiology were completed at the same institution. In 1953, I met my husband during a postdoctoral fellowship at the Biology Department at Harvard and then moved to this country. That I then fell in with engineers occurred quite by accident, and occurred in the following manner.

"In 1955 my husband and I moved to Chicago where he joined the department of Medicine at Northwestern University Medical School. I finished a one-year internship, passed the Illinois State licensing examination, and then became a Research Fellow in the Department of Ophthalmology at Northwestern while trying to decide whether to go into clinical ophthalmology or, if my pending NIH research grant was successful, try my hand at basic science. At this time, the late Professor Richard Jones of the Electrical Engineering Department of Northwestern's Engineering School had collaborated with two members of the Physiology Department, John Gray and Fred Grodins, both now deceased. They published a noteworthy paper in the field of respiratory physiology, using an engineering approach. This was one of the first examples of a cooperative effort between engineers and life scientists and encouraged Professor Jones' plan to open a new area of study in the Engineering School-mathematical and engineering analysis of biological systems. One of his goals was to apply his keen understanding of control and feedback systems to the visual system, and in particular to the behavior of single visual neurons. In pursuit of this goal he visited the head of the Ophthalmology Department looking for somebody with experience recording from single visual neurons. The topic of my PhD thesis was temporal properties of cat retinal ganglion cells. When my grant application was funded I was asked to set up a laboratory in the Engineering School on Northwestern's Evanston campus rather than in the Medical School in Chicago. Thus, quite by chance, I ended up spending 40 years in Northwestern's Biomedical Engineering program, one of the first of its kind in this country. The program expanded quite rapidly and in 1985 became a full fledged, independent department of Biomedical Engineering.

"In the early 1960s beginning engineering students had very little back-

News From Sr. Physiologists

ground in life sciences. Thus, during my first years in the Engineering School I gave formal classes in basic mammalian anatomy and physiology. In the lab I spent much time teaching students how to put a cat to sleep with an intravenous injection, how to tell the difference between a vein, an artery and a nerve, etc. The graduate students in turn introduced me to the difference between linear and non-linear systems, what feedback was, and encouraged me to take calculus courses, which I did. In the fall of 1962 the late Fergus Campbell of the Physiology Department at Cambridge University joined the biomedical group as a visiting professor in the Electrical Engineering Department. He was a Fourier analysis fan and highly enthusiastic about using temporally and spatially modulated sinusoidal stimuli in visual experiments. A year after his return to England Campbell 'shipped' his former graduate student, John Robson, together with John's homemade grating stimulator, to do cat retinal ganglion cell experiments with me. It was thanks to these two remarkable individuals that my laboratory 'took off.' Their enthusiasm was endless, both of them were remarkably good 'person-to-person' teachers who patiently explained to me the basics of quantitative physiology, thus opening an entirely new world to me. Hopefully, I did reciprocate, to some degree, by teaching them something about mammalian surgery, anesthesia, and maintenance of the animal's physiological condition during experiments that lasted from one to three days. The papers resulting from their work at Northwestern stimulated individuals from this country and from other continents to come and work in my laboratory as postdoctoral fellows and graduate students in numbers large enough to keep me busy until 1989 when I officially retired. Since then the engineering school has generously allowed me to keep my office. I continue to work with both my successor, John Troy, and with his and with other graduate students. This I do for my own enjoyment and as a means of slowing down the aging process.

"If I learned anything during all the years of experiments that lasted many long hours throughout the day and night and about writing papers with co-workers it is this: it may be very desirable, perhaps even necessary, to have one or several 'geniuses' in your group, but you cannot survive and progress without also having what I call 'real human beings' as colleagues."

Letter to Arthur Baue

Menard Gertler writes: "I taught Physiology at McGill following my graduation and then I headed south to MGH under the tuteledge of the late Paul Dudley White. McGill is honoring me this year with a Doctor of Science, honoris causa. In addition, the Regius Professor of Medicine from Oxford University, Sir David Weatherall, is also being honored.

"I am now at New York Hospital-Cornell, Division of the New York Hospital-Cornell-Presbyterian Columbia Union! Still teaching, etc.

"It was good of you to recognize my octogenarian event and even more considerate to write me about it."

Letter to Arthur Vander

Samuel Meerbaum writes: "Thank you and the APS Committee on Senior Physiologists for the greetings on the occasion of my 80th birthday. I suppose most of us 'four score' seniors go through a similar mental process reviewing, yet starting to place behind us, the active professional years while developing a new, hopefully creative, agenda.

"Mine was a research career, split evenly between exciting developments in Aerospace and Propulsion, and later on equally satisfying investigations in the field of Cardiology. I tried to apply my knowledge in bioengineering and particular aspects of physiology, and was very lucky being involved in areas which turned out to be significant in the breathtaking advances of diagnostic and interventional tools for the treatment of heart disease. Among the topics addressed in our laboratory at the Cedars Sinai Medical Center (LA) were myocardial perfusion and ischemia, reperfusion, retroperfusion, and various modes of echocardiography. Many publications reviewed our progress over the years.

"During the last decade, I first worked on books and chapters, recapitulating the most recent research. Thus, for several years, I kept in touch with research efforts in America and throughout the world. Keen interest in striking new advances continues, but the latter portion of the decade was devoted to an altogether different issue, even while my wife and I enjoyed our family (5 grandchildren) and a very active creative agenda.

"I had promised myself in the mid-1940s to eventually address a difficult topic, partly because of the loss of a childhood friend, who went through the ghetto-Auschwitz-slave labor route. In the mid-90s, I began to intensively study documentation and sources of information on aspects of the brutal Holocaust. One aspect was the establishment by the Nazis of 'propaganda' ghetto in Theresienstadt (near Prague), which actually turned out to be a transshipment camp, feeding victims to Auschwitz and other death camps. A second investigation concerned the terrible period of 1944 in Hungary, when Eichmann and his gang sent several hundred thousand Jews to be gassed in Auschwitz/Birkenau, but when a dedicated Wallenberg and other courageous individuals helped save some 150,000 Budapest Jews. I have been setting down my findings and conclusions in various write-ups. A third and most recent research concerns Jewish life in WW II ghettos, and the Nazi inhumanity of forcing designated Jewish leaders to make up lists and facilitate the victims' deportations.

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"If I were to address young colleagues active in one of the many areas so well represented by the APS, FASEB or America's Heart Organizations, here is what I would say.

"1) Having selected the field you wish to be active in, dedicate yourself fully and with an open mind to study and actively participate in advancing our understanding of processes and devising sound applications. Do not place highest priority on remuneration at this stage.

"2) In this highly complex and competitive world, try to be as open and unbiased as you can be toward the work of others and advances you may not have been involved in. Conversely, in presenting your contributions, do give appropriate credit to related work previously carried out by others.

"3) Keep in mind that your professional

work should be integrated into a fuller agenda, encompassing a satisfactory family life and involvement in community affairs. This country will benefit if more scientists will make an effort to communicate to our political leaders their views on any number of significant National issues.

"Thank you again, and please forgive my setting down my response on our word processor."

Book Reviews

Atlas of Sleep Medicine in Infants and Children.

Stephen H. Sheldon, Susan Riter, and Mark Detrofan (Editors) Armonk, NY: Futura Publishing Co., 1999, 288 pp., illus., index, \$150. ISBN: 0-87993-423-9

Although pediatric sleep medicine is making inroads to bring needed care to many young individuals, there are very few reference books devoted to the subject. The Atlas of Sleep Medicine in Infants and Children is aimed at assisting practitioners in caring for children who suffer during their hours of sleep. In 1971, under the auspices of NFNDS, the first atlas for scoring states of sleep and wakefulness in the newborn was edited by Anders, Emdee, and Parmalee. Since that time, only one similar effort has been attempted: the Manual of Methods for Recording and Analyzing Sleep-Wakefulness States in Pre-term and Full-term Infants (L. Curzi-Dascalova and M. Mirmiran

eds.). This new atlas has a broader agenda: to provide overall information for individuals developing pediatric sleep laboratories. Section I of the book deals with the standard and recommended recording montage. Section II discusses how to investigate breathing during sleep both in the home and in the lab. Section III discusses and looks at examples of aftefacts. Section IV focuses on specific sleep disorders. The authors indicate that this is a first attempt to fill a void in the field, and at times it shows. One might question why so much importance is given to artefacts when examples of many pathological entities are missing. In some of the presented examples, the child's age at the time of the example is unclear. In addition, the selection of certain recording techniques seems arbitrary at times, and some techniques are completely omitted (esophageal pressure monitoring, for example). The overall organization is at times difficult to follow. Why not present "normal sleep" following the chronological development of the

child? Why not organize the polygraphic examples so that the reader can more easily follow the changes related to age? At times it seems that the authors were overwhelmed by the demands of the project. As the authors stated, however, this book is a first step. The atlas brings important information and examples to anybody interested in children's sleep. Practitioners who are interested in learning about pediatric sleep and its pathology now have a manual to help them get started, and they may find themselves consulting the pages of this volume more than they would have thought, checking artifacts, EEG recordings and polygraphic abnormalities against those printed here. And the use of six or eight EEG leads in many of the examples will show to those who rely on only a few recorded channels what one may miss with too much of a reductionist attitude.

> Christian Guilleminault UCSF Stanford Health Care

Concepts of Human Physiology

Richard L. Malvin, Michael D. Johnson, and Gary M. Malvin Addison Wesley Longman 1997, 450 pp., illus., index, \$49.00 ISBN: 0-673-98562-8

This text is, refreshing, and I will argue, desperately needed. Why? Mostly, for what it lacks-a dense mat of trivia which entangles the student, an octopus of bolded words holding them back as they try to learn. As teachers, we should carefully look at our students, ask ourselves what we are trying to teach, and then take a good hard look at our textbooks. In terms of what we want students to learn, most of us would list a handful of concepts, and then want the students to be sufficiently fluent in these to apply them to real life situations. This book truly focuses on concepts; as one reads, one finds the text explaining; explaining the nature of the underlying physical and chemical principles, explaining how new ideas fit into a larger whole. Frequently, details are left out, for instance, delayed rectifier, voltage-sensitive potassium channels. I would argue that the authors have wisely practiced restraint, creating a book where the ideas pop out; unencumbered by trivia which confuses, and

facts likely to be forgotten within hours. While this is a novel idea, it is exactly what we need. The physics community now has several conceptual physics books available which are transforming science education. As a result of these books, physics has become a popular course. For those of you who feel that physiology is crucial information for the general citizen, I maintain it is going to be either this book or a similar one which will widen the cognoscenti from a select few, to include all high school and college graduates. Shouldn't everyone have a good sense of how their body works? Why are so many physiology courses avoided at all costs by undergraduates? It is easy enough to teach to a deeper level where we, as individuals, feel it is needed, or have the students look something up; in contrast, it is very difficult to help the struggling student pick out the major ideas from many of our encyclopedic texts.

This text contains everything needed for a first course in physiology. The standard major topics are covered. The illustrations are excellent, extremely clear, again suggesting that the authors are genuinely interested in communicating concepts. Electron micrographs are numerous and well chosen. There are a fair number of clinical photographs, illustrating the medical importance of various discoveries. Each chapter begins with a list of objectives, an outline, and a well written introduction which places the coming topics in a larger perspective. At the end of each chapter there is a summary, a set of straightforward homework questions, and a section called "Applying What You Know." The questions in this last section impressed me, they are quite provocative, obviously designed to encourage thought, curiosity, and depth.

While this book may be used by teachers in a one-semester course, as the total number of pages is 411, I am reminded that the number of concepts in this book is identical to one twice its size. It is true that here they are explained more clearly, but I suspect a few chapters will have to be skipped. I can easily envision this book being used in a year-long course with minimal enrichment by the professor, for example analysis of newspaper clippings, or extra assigned articles, or experiments. For those of you who are interested in teaching a physiology course which focuses on learning key concepts, that is, one which tries to maximize what the students take away from a course, this text is definitely worth a look. Be careful though, you might be soon teaching more sections.

Steven Eiger Montana State University - Bozeman

The Physiological Basis of Primary Care

Patrick Eggena Carmel, NY: Novateur Medmedia 1998, 745 pp., illus., index, \$59.95. ISBN: 0-9663441-0-3

One of the great challenges to instructors of basic science courses in medical schools is to help students learn an enormous amount of information in a short period of time. Instructors in physiology have a both difficult and enviable task. Their task is difficult because of the ever-increasing mass and complexity of the material available to be taught. Their task is enviable, however, because physiology, the study of function, is immediately and obviously relevant to students as they set their sights on attempting to understand disordered function. Hence in many ways physiology stands at the gateway to a rational understanding of disease mechanisms. Eggena has captured the essence of this challenge and its opportunities. Each of the 29 chapters in this textbook starts with a case presentation of a patient who has a specific clinical problem. To his credit Eggena has chosen classic medical problems that are easily recognized (by the experienced clinician) and which illustrate critical physiological points. The explanation of the clinical problem is usually brief. The main purpose of presenting the case is to introduce the student to the material in such a context as to convince him or her that the physiological lessons to follow are, in fact, relevant to patient care.

In general, the strategy works well. Particularly good examples are those of Sheehan's Syndrome for introduction of the physiology of pregnancy, chronic obstructive pulmonary disease and asthma presentation before an introduction

Book Reviews

to pulmonary physiology, compensated congestive heart failure for an introduction to cardiac physiology, central diabetes insipidus as an introduction to water metabolism and the countercurrent system. Other attempts at using a case to introduce the material seem forced. One particular example in Chapter Two is a case of congestive heart failure which is used to introduce the concepts of membrane transport. Although I am quite fond of the principles of membrane transport and could therefore be accused of being biased, these physiological processes are so basic that they could apply to almost any disease. For this chapter and perhaps one or two others, I would have eliminated the case report introduction.

The author accomplishes well what he sets out to do. The classic concepts of physiology are clearly presented in the context of real life patient-related problems. The figures (all black and white) are clear and supplement the text well. Key words and phrases are printed in bold and identify the important vocabulary for the students. The organization of the textbook proceeds in a highly logical fashion. The introductory chapters on membrane transport are followed by chapters on cardiovascular physiology, pulmonary physiology, renal fluid and electrolyte physiology, GI physiology, temperature regulation, endocrine physiology, and muscle and nerve physiology. The pages are indicated by chapter (i.e., 18-6) rather than being numbered sequentially. This organization works well when one wishes to use the index to identify discussion of certain topics. On each page of the index is a list of the chapters so that one immediately knows which page reference is associated with a discussion of which organ system.

Where does this textbook fit in the broad scheme of medical education? In

my view it could be used in several parts of a medical curriculum. Most logically it would fit into the introductory years of the basic science curriculum. The strength and the focus of this textbook is most clearly on physiological mechanisms and its breadth and depth is sufficient to structure an entire course. These days, as medical education comes under increasing scrutiny and re-evaluation, medical educators may wish to consider using this textbook in courses that bridge clinical medicine and the basic sciences. Used in this way, this textbook could supplement the use of those focusing on specific clinical disciplines.

Another valuable use for this book would be for physicians interested in maintaining or improving their grasp of basic physiology as it applies to medicine. Instructors involved in teaching clinical medicine to third and fourthvear medical students and residents may find that the discussions of many of these physiological processes provide valuable basic information to supplement their methods of teaching young physicians how to take care of patients. In this regard, the inclusion of the words 'primary care' in the title should not be interpreted to indicate that this is a textbook for the specialty of family practice. This is clearly a solid textbook of physiology.

This textbook is certainly not perfect. Some of the clinical presentations are presented in non-standard ways. For example, on page 8.3 the author asserts 'congestive heart failure is a symptom'. I would argue that congestive heart failure is a syndrome, not a symptom. These days, first year medical students will probably bring this to the attention of any instructor attempting to defend the author's position.

Several facts are incorrect and will need to be addressed in the next addition. For example, polyethylene is not water-permeable (page 2-9) but cellophane is water-permeable. On page 2-18, the author asserts that the chloride concentration in most cells is at its electrochemical equilibrium. To the contrary, most cells have a chloride concentration that is well above its electrochemical equilibrium. Unfortunately, introducing the correct fact at this particular time in the textbook raises rather difficult conceptual obstacles to a straightforward flow of simple ideas.

This volume has all of the advantages and few of the disadvantages of a single-authored textbook. There is consistency of presentation and style which renders the flow of logic easier for the reader to anticipate and recognize. Hence the key concepts can be assimilated rapidly. I looked for specific disadvantages of a single-author volume. Overall the breadth and the depth of the presentation in each of the specific areas were appropriate. Each of the important topics was covered in adequate detail. Those subjects that were not covered, (blood formation, musculoskeletal mechanics), are often covered in other course material and do not represent any serious deficiency.

My general assessment of this textbook is that it should be of great assistance in helping students master the key physiologic concepts in such a way as to be available for their application to real clinical problems. Teachers of clinical medicine will find this book useful for reviewing basic physiology for teaching the application of these concepts. Finally, students should find it refreshing to have real clinical examples on which to form their understanding of the physiological basis for diseases.

> John B. Stokes University of Iowa

Book Reviews

Taking Women Seriously Lessons and Legacies for Educating the Majority

M. Elizabeth Tidball, Daryl G. Smith, Charles S. Tidball, and Lisa E. Wolf-Wendel.

Phoenix, AZ: Oryx Press, 1999, 222 pp., illus., index, \$29.50 Series on Higher Education ISBN: 1-57336-092-8

"The critic leaves at curtain fall To find, in starting to review it He scarcely saw the play at all For watching his reaction to it" E. B. White

The above quotation accurately portrays the likely response of any senior woman scientist/educator perusing this sophisticated body of work for the first time. The four authors of this volume hail from diverse disciplinary milieux and different generational perspectives, but bring their talents to bear on current critical policy questions in higher education. This book seeks to articulate and clarify educational/environmental factors and patterns which are essential underpinnings in the development and full empowerment of achieving women. Despite increased access to higher education by women in the past three decades it remains clear that full acceptance, recognition of, and rewards for women in the professions is still lacking. The gender gap in scientific faculty salaries has actually increased between 1972 and 1992. During which period, the same gender gap in the general and professional workforce decreased. In the era of outcomes research coupled with economic pressures in managed academia the substantive research and accompanying recommendations and conclusions presented here should be required reading for any academic administrator whose responsibilities include the provision of sound experiences and nurturant opportunities for women in higher education, including graduate and medical schools.

In 1970, M. E. Tidball first published her statistically-based research on the role played by womens' colleges in forging future women achievers. This landmark contribution became a Citation Classic and served as a catalyst to the emerging field of the significance of mentorship/role models in pedagogic formulations. These findings ran counter to the thrust of the time for coeducational access. This book analyzes the research generated in the past thirty years together with the legacies and lessons derived, and seeks to present characteristics of an effective model in the coeducational environment, thus maximizing the potential of women students.

The book is coherently organized to suit the needs and specific priorities of interested readers. Part 1 recapitulates the history of womens' colleges and documents their diminished market share of the available student pool. In Part 2 the pioneering methodology M. E. Tidball introduced, i.e., disaggregating data by gender and institutional classification, is pivotal in reviewing more recent studies. Charles Tidball is the creator of the longitudinal Small College Demographic Database, a valuable national resource. The major lineaments and striking correlations sustaining their conclusions are clearly and succinctly conveyed in a series of tabular and graphical formats, e.g., baccalaureate institutions identified as a Who's Who list of productivity leaders. A framework and contextual guidelines for the practical application of these principles to all institutions of higher learning is presented in Parts 3 and 4. Of particular interest to the readership of this journal is the striking correlation (r=0.953, P<0.005) between the number of women faculty in an educational institution and the number of women earning science or medical doctorates and/or cited in a national register of career achievement. This study definitively establishes the principle that the more women faculty on campus the more women students become achievers, regardless of institution type. Currently there is a robust debate both within the educational policy framework and at the national level concerning the perceived oversupply of PhDs in the sciences. Many graduate training programs now provide courses in nontraditional career trajectories, i.e., pathwavs outside the classic academic/tenure prototype. The previously noted predominant influence of womens colleges on the performance of their graduates remains a potent factor in that several recent reports document a 6:1 overrepresentation of that cohort of baccalaureates in successful corporate America, with similar disproportions on boards of Fortune 500 companies and even within the halls of Congress. An institutional ethos, conscious of and focused on the core objective of educating women for leadership, is obviously critical to this measure of success.

Of interest is the assessment that institutional success in this enterprise is closely aligned with certain essential characteristics, e.g., a critical mass of women in all constituencies, opportunities for womens leadership in all aspects of collegial life are clearly paramount factors. Of considerably, and surprisingly lesser import are profile characteristics such as admissions selectivity, substantial endowment portfolios and lavish levels of faculty compensation (Table 13, p. 141). Visionary academic leadership and dedicated commitment to positive interactions and outcomes are of primary significance.

The two senior authors, here Charles Tidball and M. E. Tidball, were trained as physiologists, and sustained successful academic careers in our discipline. Their rigorous experimental approach to perplexing questions in the social sciences reflect their conjoint credentials. The configurations of their research designs is elegantly explained for educators by recounting the 1730 methodology of the Rev. Stephen Hales in recording the first direct observations and measurement of mammalian blood pressure.

Book Reviews

While it is possible to perceive a central theme in this work, which could be dismissed as the modernization of the power of ancestral sororities, the legacies and lessons which continue to work well for women students, articulated and promulgated here, are of enduring value to all who are stakeholders in the higher education of women. Even though the academy, per se, may be nearing the end of an expansionary period, higher education is still a mammoth

industry and women in college are now in the majority.

Marie Mullaney Cassidy The George Washington University

Books Received

Comparative Testicular Biology in Animals. Sardul S. Guraya. Enfield, NJ: Science Publishers, 1999, 369 pp., illus., index, \$95.00. ISBN: 1-57808-066-5.

Mitochondrial Inhibitors and Neurodegenerative Disorders. Paul R. Sanberg, Hitoo Nishino, and Cesario V. Borlongan (Editors). Totowa, NJ: Humana, 2000, 328 pp., illus., index, \$125, 00. ISBN: 0-89603-805-X. Orthopaedics: Principles of Basic and Clinical Science. Felix Bronner and Richard V. Worrell (Editors). New York: CRC, 1999, 296 pp., illus., index, \$79.85. ISBN: 0-8493-9237-3.

The Physiology and Biochemistry of Prokaryotes, 2nd Edition. David White. New York: Oxford University Press, 1999, 565 pp., illus., index, \$59.95. ISBN: 0-19-512579-7. Regulation of Acid-Base Status in Animals and Plants. S. Egginton, E.W. Taylor, and J.A. Raven. (Editors). Society for Experimental Biology Seminar Series 68. New York: Cambridge University Press, 1999, 380 pp., illus., index, \$105.00. ISBN: 0-521-62317-0.

Sturkie's Avian Physiology, 5th Edition. G. Causey Whittow (Editor). San Diego, CA: Academic, 1999, 685 pp., illus., index, \$89.95. ISBN: 0-12-747605-9.

Announcements

Medical Faculty of University in Banja Luka Looking for Equipment

The Medical Faculty of the University in Banja Luka, part of Bosnia Herzegovina, is looking for equipment assistance following the country's war. Below is a list of items and contact information.

I) Computers (software for practical and theoretical lectures); We use computers from the computer center that provides needs of the whole clinic center, while the Department does not have its own computer,

2) System for isolated organ perfusion,

3) ECG - portable- one channeled

4) Photoelectric plethysmograph

5) Blood gas analysis apparatus (Po_2 and Pco_2), as well as the machine for measuring the concentration of the ions 6) Microscopes of all kinds

7) Apparatus for coagulation studies

8) Perimeter and indirect ophtalmoscope

9) "Sound fork" for hearing examinations

10) Practicum and plan and program from some USA Medical faculty

11) Faculty textbook

We would also be pleased to organize a visit for some APS professors to our Department.

Centar Adravstvenog Informativnog Sistema Katedra Z Fiziologiju Zdrave Korde BR.8 Banja Luka 78000 Bosna-Hercegovina (Republika Srpska) Email: fiziologija.bl@zdravstvosrpske.org; fiziologija.bl@hotmail.com.

Amela Matavulj Zoran Pavicevic Zvjezdana Rajkovaca Pedja Kovacevic

Wellcome Visiting Professorships in the Basic Medical Sciences 2000-2001

The Federation of American Societies for Experimental Biology invites nominations from US medical schools, universities and other nonprofit scientific research institutions for Wellcome Visiting Professorships in the Basic Medical Sciences. Institutions are strongly encouraged to include among their nominations eminent women scientists and eminent minority scientists for Professorships. Individuals cannot apply for this program. For application procedures and information, contact Rose P. Grimm, Executive Office, Federation of American Societies for Experimental Biology, 9650 Rockville Pike, Bethesda, MD 20814-3998. Tel: 301-530-7090; fax: 301-530-7049; Email: rgrimm@execofc. faseb.org. Deadline for institutions to apply is March 1, 2000. Sponsored by The Burroughs Wellcome Fund.

FASEB 2000 Summer Research Conferences Announced

The 2000 FASEB Summer Research Conferences will be held in Saxtons River, VT, Copper Mountain, CO, and Snowmass Village, CO.

The schedule for the Conferences has been posted on the FASEB web site at http://www.faseb.org/meetings/src. The preliminary programs and an application and abstract form that can be submitted electronically, will be posted in March.

For more information, contact jlafrankie@faseb.org or ahewitt@faseb.org.

Call for Nominations FASEB Excellence in Science Lecture and Award 2001

Purpose: To recognize outstanding achievement by women in biological sciences.

Eligibility:

1) All women who are members of one or more of the societies of FASEB will be eligible for nomination.

2) Nominations will recognize a woman whose research has contributed significantly to further our understanding of a particular discipline by excellence in research.

Nominations:

1) Nominations may be made only by members of the FASEB Societies.

2) A call for nomination of candidates for the Excellence in Science Award will be posted in the newsletters of the invididual Societies as well as the FASEB Newsletter and The the FASEB Journal.

3) The call for nominations will be made each year in November. **The nomination deadline is March 1, 2000.** The nomination will be transmitted to the FASEB Board before its May meeting.

4) Nominations must be made in the form of a letter, original and fifteen (15) copies, setting forth in detail:

the contributions to the field that represents the nominee's outstanding achievement in science

leadership and mentorship

evidence of national recognition

honors and awards

5) Fifteen (15) copies of the curriculum vitae and brief selected bibliography of the nominee, as well as fifteen (15)

copies of not more that five (5) reprints, must accompany the nomination.

6) Additional letters of support 15 copies of each for the nominee are optional but are encouraged.

7) The nominations and supporting letters are to be sent to: Ms. Leah C. Valadez

FASEB Excellence in Science Award

Federation of American Societies for Experimental Biology 9650 Rockville Pike

Bethesda, MD 20814-3998

Tel: 301-530-7092

Selection: The Excellence in Science Award Committee, comprised of a member from each society of the Federation, will receive the nominations and recommend an awardee based on an evaluation of scientific accomplishments. The awardee must agree to present an Excellence in Science Lecture. The name of the awardee and a summary of the candidate's qualifications will be sent to the FASEB Board for approval at the May meeting.

Award Presentation: The award will be presented before presentation of the Excellence in Science Lecture by the awardee. The award will be presented by the Chair of the Excellence in Science Award Committee or her representative in conjunction with a member of the FASEB Board. The award includes a \$10,000 unrestricted research grant, funded by Eli Lilly and Company, travel expenses, complimentary registration at the meeting, and a plaque in recognition of the award.

Announcements

Breakthroughs in Bioscience Articles Available from FASEB

FASEB's Breakthroughs in Bioscience articles are available from the Office of Public Affairs. While these articles are accessible at FASEB's website, http://www.faseb.org/opar/ opar.html, additional printed copies are available, which may be ideal for use when speaking to lay audiences or educators.

This diverse series of articles reflects the varied expertise and interests of our member societies and is intended to promote an understanding of how basic biomedical research leads to disease prevention and advancements in treatment.

The series includes the following articles:

- 1) Science, Serendipity, and a New Hantavirus
- 2) Blood Safety in the Age of AIDS
- 3) The Polymerase Chain Reaction

- 4) Cardiovascular Disease and the Endothelium
- 5) Unraveling the Mystery of Protein Folding
- 6) Helicobacter pylori and Ulcers: a Paradigm Revised
- 7) Cloning: Past, Present and the Exciting Future

FASEB has disseminated these articles to a wide variety of organizations and individuals, including members of Congress, congressional staffers, members of the press, think tanks, patient advocacy groups, journalism schools, outreach organizations, state education associations, text book publishers, and individuals requesting copies.

Requests for the article may be place by phone at 301-571-0657 or email: nhartsoc@opa.faseb.org.

New Slide Units in Clinical and Undergraduate Teaching Projects

The American Gastroenterological Association announces the release of new slide units in both the Clinical and Undergraduate Teaching Projects. The new units are *Acute Gastrointestinal Bleeding, Second Edition, Neurogastroenterology and Motility,* and *Development of the Human Gastrointestinal System.*

Acute Gastrointestinal Bleeding, from the Clinical Teaching Project, has been completely redone for this second edition. This long-awaited unit contains 112 new slides covering both upper and lower GI bleeding and completely rewritten text and references. The cost is \$150.

Neurogastroenterology and Motility is the first of three

planned units on this topic, from the Undergraduate Teaching Project. This release includes 112 slides covering current concepts and principles of neurogastroenterology in relation to motor functions of the specialized organs and muscle groups of the digestive tract. It is currently available for \$135.

Development of the Human Gastrointestinal System includes 83 slides covering the development of form and function of the human GI tract from the time of conception until birth.

To order any of the slide units, contact the distributor, Milner-Fenwick, Inc. at 800-432-8433.

FASEB Summer Re	esearch Conference			
Lung Surfactant: Cellula	r and Molecular Biology			
July 1-6, 2000				
Saxtons River, Vermont				
Organizers: Aron B. Fisher, Jo Rae Wright and Philip	Synthesis, and Protein Processing and Function;			
Ballard	Secretion, Extracellular Transformations,			
<i>opics:</i> Transcriptional Regulation of Surfactant Edocytosis/Recycling; Host Defense, Manifestation				
oteins. Surfactant Synthesis. Surfactant Protein Disease, Replacement Surfactants.				
Processing and Function. Surfactant Secretion.	Additional speakers, chosen from submitted abstracts, will			
Extracellular transformation of Surfactant.	be selected to give short talks.			
Endocytosis/Recycling. Host Defense. Manifestations of	For additional information and an application, contact:			
Disease. Replacement Surfactants.	FASEB Summer Research Conferences, 301-571-0650;			
Posters: Transcriptional Regulation, Surfactant	Email: ahewitt@faseb.org			

Applications Sought For Postdoctoral And Senior Research Associateship Awards

The National Research Council announces the 2000 Postdoctoral and Senior Research Associateship Programs to be conducted on behalf of over 120 research laboratories throughout the United States representing nearly all US Government agencies with research facilities. The programs provide opportunities for PhD, ScD or MD scientists and engineers of unusual promise and ability to perform research on problems largely of their own choosing, yet compatible with the research interests of the sponsoring laboratory. Initiated in 1954, the Associateship Programs have contributed to the career development of over 8000 scientists ranging from recent PhD recipients to distinguished senior scientists.

Approximately 350 new full-time Associateships will be awarded on a competitive basis in 2000 for research in: chemistry; earth and atmospheric sciences; engineering, applied sciences and computer science; life and medical sciences; mathematics; space and planetary sciences; and physics. Most of the laboratories are open to both US and non-US nationals, and to both recent doctoral recipients and senior investigators.

Postdoctoral awards are made for one or two years, renewable for a maximum of three years; senior applicants who have held the doctorate at least five years may request shorter periods. Annual stipends for recent PhD recipients for the 2000 program year range from \$30,000 to \$50,000 depending upon the sponsoring laboratory, and will be appropriately higher for senior award recipients. Financial support is provided for allowable relocation expenses and for limited professional travel during the duration of the award. The host laboratory provides the Associate with programmatic assistance including facilities, support services, necessary equipment, and travel necessary for the conduct of the approved research program.

Applications, submitted directly to the National Research Council, are accepted on a continuous basis throughout the year. Those postmarked by January 15 will be reviewed in February, by April 15 in June, and by August 15 in October. Initial awards will be announced in March and April—July and November for the two later competitions—followed by awards to alternate candidates later.

Information on specific research opportunities and participating federal laboratories, as well as application materials, may be obtained from our web site at http://www.nationalacademies.org/rap or by contacting:

National Research Council Associateship Programs (TJ 2114/D3) 2101 Constitution Avenue, NW Washington, DC 20418 Fax: (202) 334-2759 Email: rap@nas.edu

DEADLINES FOR APPLICATION: JANUARY 15, APRIL 15 AND AUGUST 15, 2000 Qualified Applicants will be reviewed without regard to race, creed, color, age, sex or national origin.

Online Career Development Center Offers Practical Advice About Science Careers

How can aspiring scientists obtain advice on funding, arranging a postco, setting up their own labs, or navigating the peer review process? There is a new web resource to help postdoctoral students and others find answers to such questions as these. The "Career Development Center," part of *Science's* NextWave, will provide practical advice about science careers. It can be accessed at http://nextwave.sciencemag.org/ feature/careercenter.shtml. The Career Development Center is a complement to the biomedical funding database GrantsNet at http://www. grantsnet.org, which was launched by the American Association for the Advancement of Science and the Howard Hughes Medical Institute in 1998. Both resources are free, and offer powerful online tools for graduate students, post-doctoral researchers, and faculty members.

Second Annual Real-Time 3D Imaging and Volume Rendering: Principles, Techniques, and Clinical Applications

Date: March 10-12, 2000

Sponsor: Johns Hopkins University School of Medicine, Department of Radiology

Location: Hyatt Regency Orlando International Airport, Orlando, Florida

Description: The introduction of Spiral CT, followed closely by the introduction of subsecond (.75) CT and now followed by the introduction of multidetector CT, provides the radiologist with the unprecedented capability of acquiring high resolution volume CT data sets. These data sets represent far more than a series of individual scans but hold the key to a new paradigm in imaging, true volume imaging with 3D display. Although the use of 3D or three-dimensional imaging has been around for two decades, it is only with the introduction of workstations like the 3D Virtuoso, with its real-time volumetric imaging, that the radiologist can create highly detailed three-dimensional images that can be used for both better patient diagnosis and clinical management. Time will be allotted for participants to have hands-on training on the 3D Virtuoso workstation.

Credit: 15 credit hour in Category 1 of the Physician's Recognition Award of the AMA; The American Society of Radiologic Technologists recognizes Category 1 for Category A credit for the radiologic technologist Fee: \$300 for Physicians; \$275 for Residents, Fellows and Technologists For Further Information contact: Office of Continuing Medical Education Johns Hopkins University School of Medicine Turner 20, 720 Rutland Avenue Baltimore, MD 21205-2195 Phone: 410-955-2959 Fax: 410-955-0807 Email: cmenet@jhmi.edu Web: http://www.med.jhu.edu/cme Please contact the Office of Continuing Medical Education at the above address if you have any questions.

Critical Issues in Tumor Microcirculation, Angiogenesis and Metasis: Biological Significance and Clinical Relevance A Continuing Education Course

Rakesh K. Jain of Harvard Medical School and Massachusetts General Hospital is offering a Continuation Education summer course entitled "Critical Issues in Tumor Microcirculation, Angiogenesis and Metasis: Biological Significance and Clinical Relevance." The purpose of the course is to present the latest research findings in cancer research. It will be held **June 5-8, 2000** at the Harvard Medical School and Massachusetts General Hospital Boston, MA.

Faculty who will be teaching are:

Harold F. Dvorak, MD, Mallinckrodt Professor of Pathology, Harvard Medical School, and Chief of Pathology, Beth Israel Deaconess Medical Center

Judah Folkman, MD, Andrus Professor of Pediatric Surgery and Professor of Cell Biology and Anatomy, Harvard Medical School and Children's Hospital

Rakesh K. Jain, PhD, Cook Professor of Tumor Biology, Harvard Medical School: Director, Steele Laboratory for Tumor Biology, Massachusetts General Hospital; and Professor, Harvard-MIT Division of Health Sciences and Technology

Robert S. Kerbel, PhD, Tory Professor of Experimental Ocncology, University of Toronto, and Director, Biological Sciences Program, Sunnybrook Health Science Center

Erkki Ruoslahti, MD, President, Burnham Institute, LaJolla, CA

Ian Tannock, MD, PhD, Professor of Medicine and Medical Biophysics, Princess Margaret Comprehensive Cancer Centre and University of Toronto, Canada

Bruce R. Zetter, PhD, Professor of Cell Biology and Surgery, Harvard Medical School and Children's Hospital.

This course meets the criteria for 22 credit hours in category I of the Physician's Recognition Award of the American Medical Association.

For information contact: Ms. Carol Lyons, Administrator, Radiation Oncology, Massachusetts General Hospital, Boston, MA 02114. Phone: 617-726-4083 Fax: 617-726-4172.

Scientific Meetings and Congresses

2000

February 12-16

44th Annual Meeting of Biophysical Society, New Orleans, LA. *Information:* Biophysical Society, 9650 Rockville Pike, Bethesda, MD 20814. Tel: 301-530-7114; fax: 301-530-7133; email: society@biophysics.faseb.org; Internet: http://www.biophysics.org/biophys.

March 1-4

Neuroprotection and Neurorepair - Cellular and Molecular Mechanisms International Conference in combination with a technical workshop, Magdeburg, Germany. *Information:* Professor Georg Reiser, Institut fuer Neurobiochemie, Otto-von Guericke Universitat Magdeburg, Leipziger Str. 44, 39120 Magdeburg, Germany. Tel: +49-391-6713088; fax: +49-391-6713097; Internet: http://www.fanmagdeburg.de/neurorepair

March 27-30

International Conference on Physiological and cognitive Performance in Extreme Environments, Canberra, Australia. *Information:* Dr. Tony Lau. Tel: +61-3-9626-8475; fax: +61-3-9626-8410; email: ExPhyConf200@dsto.defence. gov.au

April 3-8

21st Annual Gravitational Physiology Meeting of the International Society for Gravitational Physiology, Nagoya, Japan. Information: Tadaaki Mano, MD, PhD, Dept. of Autonomic Neuroscience, Research Institute of Environmental Medicine, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8601, Japan. Tel: +81-52-789-3881; fax: +81-52-789-3885; email: mano@riem.nagoya-u.ac.jp; Internet: http://www.isgp.org.

May 13-16

Pediatric Academic Societies and American Adacemy of Pediatrics Joint Annual Meeting, Boston, MA. *Information:* Debbie Anagnostelis, APS-SPR Central Office, 3400 Research Forest Drive, Suite B-7, The Woodlands, TX 77381. Tel: 281-419-0052; fax: 281-419-0082; email: info@aps-spr.org

May 15-26

International Course on Laboratory Animal Science, Utrecht, The Netherlands. *Information:* Prof. dr. L.F.M. van Zutphen or Mr. Stephan van Meulebrouck, Department of Laboratory Animal Science, Faculty of Veterinary Medicine, PO Box 80.166, 3508 TD Utrecht, The Netherlands. Tel: +31-30-2532033; fax: +31-30-2537997; email: pdk@las.vet.uu.nl.

June 4-7

11th International Conference on the Biochemistry of Exercise -- Molecular Aspects of Physical Activity and

Aging, Little Rock, AR. *Information:* William J. Evans, PhD, 11th International Conference on the Biochemistry of Exercise, University of Arkansas for Medical Sciences, Office of Continuing Education, 4301 West Markham Slot 525, Little Rock, AR 72205. Email: evanswilliamj@ exchange.uams.edu; Internet: http://www.uams.edu/ biochem2000/.

June 5-8

Critical Issues in Tumor Microcirculation, Aniogenesis and Metasis: Biological Significance and Clinical Relevance (15th Annual Course Offering), Boston, MA. *Information:* Carol Lyons, Administrator, Radiation Oncology, Massachusetts General Hospital, Boston, MA 02114. Tel: 617-726-4083; fax: 617-726-4172.

June 9-11

Cerebral Blood Flow: Quantifying Consciousness (5th Annual Symposium), Pittsburgh, PA. *Information:* Michael R. Pinsky, MD, 604 Scaife Hall, 3550 Terrace Street, Pittsburgh, PA 15261. Tel: 412-647-5387; fax: 412-647-8060; email: pinsky@smtp.anes.upmc.edu.

July 17-21

Millennium Congress of International Society for Autonomic Neuroscience, London, UK. Information: ISAN Congress Secretariat, Congress House, 65 West Drive, Cheam, Sutton, Surrey SM2 7NB, UK. Tel: +44-208-661-0877; fax: +44-208-661-9036; email: info@conforg.com; Internet: http://www.conforg.com.

July 30-August 4

9th International Conference on Environmental Ergonomics, Ruhr-University Bochum, Germany. The integrative physiological, biomedical, & engineering approach. *Information:* Prof. Werner. Tel: +49-234-7005442; fax: +49-234-7094117; email: icee2000@bio-med.ruhr-uni-bochum.de; Internet: http://www.biomed.ruhr-uni-bochum.de/icee2000.html.

September 6-10

Xith International Vascular Biology Meeting, Geneva, Switzerland. *Information:* IVBM 2000, c/o MCI Group SA, Rue de Lyon 75, 1211 Geneva 13, Switzerland. Tel: +41-22-345-3600; fax: +41-22-240-2363; email: anne-lise@mcitravel.com.

September 7-13

2000 Pre-Olympic Congress, International Congress on Sports Science, Sports Medicine and Physical Education, Brisbane, Australia. *Information:* Amanda Costin, 2000 Pre-Olympic Congress, C/-Queensland University of Technology, Human Movement Studies, Locked Bag 2, Red Hill, Queensland 4059, Australia. Tel: +61-7-3864-5824; fax: +61-7-3864-9690; email: a.costin@qut.edu.au.

How to Apply for Membership...

One application form serves all membership categories. There are however, specific sets of instructions for each category. Therefore, it is essential that sponsors and applicants carefully follow the specific instructions in their desired category.

Send no money now. You will receive a dues statement upon election to membership.

General Instructions

Check the box indicating the category of membership for which you are applying. Type the requested information on the application. Fill out all applicable spaces. Only completed and signed applications will be reviewed. Do NOT include a curriculum vitae or reprints.

The Bibliography should be submitted in the form found in the American Journal of Physiology. Applications with incomplete bibliographies will be returned. An example of the current form is:

JONES, A.B., and C.D. Smith. Effect of organice ions on the neuromuscular junction in the frog. Am. J. Physiol. 220:110-115, 1974.

Deadline Dates

Completed applications for Regular membership are considered for nomination by the Council three times per year. Affiliate and Student applications are accepted monthly upon approval of the Executive Director of the Society. Applications are not complete until all materials are received.

Qualifications for Regular Membership

The following categories are used when evaluating an application:

1. Education.

Applicants who possess an advanced degree (Ph.D., D.V.M., M.D., etc.); however individuals who hold a masters degree will be considered on a case-by-case basis.

2. Occupation.

Applicants should have a full-time position in physiology or related area, in an academic department, or industrial or government laboratory. The applicant may be an independent investigator, postdoctoral or clinical fellow, or research scientist.

3. Contributions to Physiological Literature.

The applicant's bibliography is evaluated on the basis of publications in major, refereed journals. Emphasis is given to papers published as the result of original research on topics judged to be primarily physiological in nature.

4. Special Considerations.

This category permits the Membership Committee to acknowledge an applicant's unique accomplishments and scholarly contributions to physiology outside of research. The accomplishments should result from the applicant's talents, interests or background. In such instances, a sponsor should submit a letter reviewing any special considerations.

In general, persons who qualify for **Regular membership** will have a doctoral degree in physiology or related area and will have published at least one paper in a peer-reviewed journal.

Qualifications for Affiliate and Student Membership

In general, applicants will be considered for **Affiliate membership** if they have an interest in fostering the mission and aims of the Society, but do not have evidence of scholarly work in the physiological sciences.

Applicants will be considered for **Student membership** if they are actively engaged in physiological work. No individual may remain in this category for more than five years, without reapplying.

Sponsors

Primary responsibility for membership rests with the two sponsors who must sign the form and be Regular members of the Society (an Honorary Member may substitute for one Regular member). Sponsors should discuss the appropriateness of the class of membership with prospective applicants.

Two sponsors must sign an application form. A letter concerning the candidate's qualifications is optional, and perhaps best suited to those instances when a sponsor wishes to document an applicant's independence or unique accomplishments.

Mailing Address

Applicants for Regular membership should mail the original application signed by two sponsors, plus 7 copies to:

Membership Secretary The American Physiological Society 9650 Rockville Pike Bethesda, Maryland 20814-3991

Applicants for Student or Affiliate membership should mail the original application only to the Membership Secretary at the address shown above.

Send no money now. You will receive a dues statement upon election to membership.

MEMBERSHIP A THE AMERICAN P	APPLICATION FORM hysiological Society
Tphys10.99	
Check membership category you are applying for: \Box Regular	□ Affiliate □ Student
Do you currently hold membership in the APS? $\hfill \mbox{Yes}$ $\hfill \mbox{No}$	
If you answered yes to above, what is your category of Membe	rship?Year elected?
Name of Applicant:/	/ Middle Name
Date of Birth / /	Optional: Male Female
Month Day Year	Department
Institution Street Address	
City/State/Zip/Country	
Phone	Fax
E-mail	
DOCTORAL DISSERTATION TITLE (if applicable):	
POSTDOCTORAL RESEARCH TOPIC (if applicable):	
SPONSORS (Sponsors must be APS Members. If you are una back of this form and we will locate them for you.)	able to find sponsors, mail or fax this form to the address on the
Check this box if applicable: Please locate sponsors on my	behalf.
#1 Sponsor Name	#2 Sponsor Name
Mailing Address	Mailing Address
Phone	Phone
Fax	Fax
E-mail	E-mail
Sponsor Signature*	

*signature indicates that sponsor attests applicant is qualified for membership.

► Please turn over for 2 more questions...and mailing instructions.

Membership Application (Continued...) Applicant Last Name (please print)_

OCCUPATIONAL HISTORY [Check if student 🗇]

Current	Position:	

Dates	Title	Institution	Department	Supervisor
Prior Position	s: Title	Institution	Department	Supervisor

LIST YOUR PUBLICATIONS FROM THE PAST 5 YEARS (List them in the same style as sample below).

Sample: Cheung, Stephen S., and Tom M. McLellan. Heat acclimation, aerobic fitness, and hydration effects on tolerance during uncompensable heat stress. J. Appl. Physiol. 84(5): 1731-1739, 1998.

IMPORTANT INFORMATION:

Do not include a curriculum vitae or reprints.

 Mail your application to:
 Membership Services Department, The American Physiological Society 9650 Rockville Pike, Bethesda, Maryland 20814-3991 (U.S.A.)

Send no money now: You will receive a dues statement upon approval of membership.

Approval Deadlines: Regular membership applications are considered for approval by the Council three times per year. Student and Affiliate membership applications are accepted monthly upon approval of the Executive Director of the Society.

Questions? Call: 301-530-7171 = Fax: 301-571-8313 = E-mail: members@aps.faseb.org = Web: www.faseb.org/aps