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James A. Schafer Sixty-ninth President of APS

The State of the Society and Its Current Challenges

The last three years have brought unprecedented changes in The American Physiological Society and the benefits it provides for its members. The "White Paper," published by the APS Long-Range Planning Committee (7) in 1990, set the stage for these changes. A strategic planning retreat in January 1992 developed the details for new programs and objectives and the means of implementing them, and the Council adopted the plan in April 1992. Perhaps the most important decision was financial—we would invest a portion of the considerable assets of the Society in a Strategic Goals Fund, the income from which would be used to develop and fund new programs that would enhance our meetings, broaden our educational efforts, and improve the services we offer our members in many areas.

As a part of the plan, the Society hired a full-time Education Officer, Dr. Marsha Lakes Matyas, who has creatively expanded the educational resources available to our members, students, and postdoctoral fellows and to K-12 educators and the general public. Alice Hellerstein was engaged as the full-time Public Affairs Officer, and she has done a superb job of coordinating the efforts of the Public Affairs and Animal Care and Experimentation Committees. Hellerstein and Eric Feigl, Chair of the APS Public Affairs Committee and a member of the FASEB Public Affairs Advisory Committee (PAAC), have been essential in keeping APS



members and the Council informed about pending legislation that would affect our discipline and in integrating the position of APS with that of the other FASEB societies.

The Society also hired a full-time Marketing Officer, Jacqueline McKee, who has developed programs to promote our journals and our Society. The Council together with Ethan Nadel, Chair of the Program Committee, and the Program and Program Advisory Committees have worked hard to change the Experimental Biology meeting to better serve our needs for an APS Spring Meeting.

However, none of these initiatives would have been possible without the outstanding management and leadership of Dr. Martin Frank, our Executive Director. In his more than ten years with the Society, Marty has constantly chal-

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Take Responsibility, Open a New Door

I have read with interest and empathy several articles in *The Scientist* and *The Physiologist* that have discussed problems associated with the life sciences, physiology, and our society in general. I know these problems well. I have ridden the wave of a successful research physiology career down to the depths of apologizing for possessing an advanced degree. However, in the words of Mark Twain, "The rumors of my death have been greatly exaggerated." Likewise, research and clinical physiology careers are far from dead, they have just been transformed into something that many of us don't recognize.

In the recent articles, one gets the sense that it is society that is to blame for our current state of affairs. I say that we are all to blame. I knew going into my graduate studies that my career would not be easy or lucrative. I just wanted to prove myself and hopefully contribute some meaningful research. I remember succinctly when my advisor at Boston University indicated that I would have a more successful and better-funded career if I pursued my interest in calcium channels instead of human performance. However, I looked at myself and realized that I was much better suited to work with people rather than sit in a room looking through a microscope. Likewise, I chose to enter the US Navy as a research physiologist instead of obtaining a postdoctoral position. At the time, a career as a lieutenant in the Navy was much better for supporting a family. Although my military research career was short lived, should I blame myself for my decision?

No. We must all be honest with ourselves about our interest in science and research. Everything is so much clearer after the fact. Should I have focused on calcium channel blockers? I will never know the outcome of that path, and the science of physiology will not move forward if we do not stop complaining

about past decisions. The article by Matyas and Frank (1) provided an excellent overview regarding the basic economics of life sciences in medicine. Their figure indicating the jobs available versus those seeking jobs in the sciences said it all. Supply and demand holds up for any product, be it widgets or PhDs.

Can we blame the universities for this overproduction of PhDs? Their business is to educate, not forecast employment trends. Nor can we blame the senior physiologists for not retiring at the peak of their research and earning years. How can we deny them the adulation of their peers and students, not to mention the economic benefit of working longer to fund their retirement? How can we blame anybody? Each and every one of us has been involved in the process.

From what I have read and heard, the funding levels of the past will not return any time soon, if ever. Likewise, certain research areas run the course of their lifecycles. In the Navy, I conducted studies pertaining to human performance and tolerance in hot and cold environments; topics more important and useful during the Cold War period rather than during the current peace-time perestroika. I have seen many friends and colleagues affected by employment downsizing or redirected into more "politically correct" research areas. The skills of an applied physiologist are not necessarily in demand as might be the case for a molecular biologist. Is this bad for our profession? No, science must continue to reach beyond current wisdom and seek new answers to old and new questions. So, are we to grumble and blame the universities for graduating more students, the government for cutting back on NIH funding, or society for devaluing the prestige and importance of an advanced degree?

I believe that we must move forward

and share our knowledge with all who will listen. There are many industries that can use our help. The responsibility rests on those of us willing to use our skills in unconventional ways. I can think of no greater community in need than health care. I know this first hand because of my recent employment at a mid-sized medical center. Basically, my position is that of a statistician, but over the course of six months I have provided much more. Besides serving on the Institutional Review Board and providing statistical consultation, I have used my skills in research design, quality control, and patient management.

One particular area that I find most interesting is the identification of "clinical pathways" or "clinical outcomes." While it is a relatively new term in the health care environment, we know it as cause-and-effect. In other words, if I use drug A combined with treatment X, what are the clinical and physiological outcomes? Moreover, what is the association between these outcomes and their costs? To cut health care costs, products and services must be evaluated on a cost-benefit basis. Luckily, the skills we learn and develop as scientists are perfect to help answer questions like these.

I might add that this did not happen overnight. In fact, I searched for over two years to find such a position. It took a forward-thinking director of a "quality review" department to see the value of someone with my skills. Thankfully, this small regional medical center saw that "managed care" would soon require a more systematic approach to health care delivery, one that practices sound experimental design that is clinically tested. In other words, it is a job perfect for any physiologist in search of a new career.

In summary, there is no better time for

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Open a Door

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physiologists to get involved and to enliven their careers. While Malvin (2) suggested that we “not bar the door...let them in.” I say, take responsibility to open a new door. You just might find the opportunity of a lifetime.

Robert L. Hesslink, Jr.
Consultant

References

1. Matyas, M., and M. Frank. Physiologists at US medical schools: education, current status and trends in delivery. *Physiologist* 38: 1-12, 1995.
2. Malvin, R.L. Don't bar the door...let them in. *Physiologist* 38: 267-268, 1995.

Response to “Don't Bar the Door...”

Malvin's article “Don't Bar the Door...Let Them In” in the December *Physiologist* might touch a raw nerve in some of us over 65. However, perhaps the criterion should not be age per se but productivity. For example, if a Medline search shows nothing for, say, the last two years, perhaps a faculty member should step down irrespective of his age.

John B. West
University of California, San Diego

Responses to “Integrative Physiology”

I read the instructive exchange of views between Lenfant and Duling in the “A Matter of Opinion” section of the February issue of *The Physiologist*. The dispute between advocates of reductionist and integrative physiology seems to be nearing a resolution along the line suggested by Blaise Pasca: both approaches are needed.

This is not the place to question a belief in the potential existence of “final keys to unlock nature's mysteries...” What prompts me to write is a practical matter, a statement in Lenfant's letter: “it is incumbent on tissue and organ physiologists to bring into their vision the cellular and molecular biologists and not the reverse... ‘reductionists’ have no real motivation to partner with physiologists” (emphasis added).

If we consider that the physiology faculty at medical schools has a teaching responsibility and that medical students still need instruction primarily, although not exclusively, in organ physiology, we must wonder how reductionists, who have no real motivation to partner with physiologists, could contribute to the teaching of physiology to medical students.

G.G. Pinter
Retired

I read, with great interest, [Duling's] recent article published in *The Physiologist*, Vol. 39, No. 1, 1996, on “Integrative Physiology: A Response.” I personally applaud [Duling] and the leadership of The American Physiological Society (APS) for your proactive stance and visionary approach to ensur-

ing the future (i.e., evolution) of classical physiology into integrative physiology. The Society's innovative programming, as described in the article, is clearly targeted on sustaining critical biomedical research which will enhance our understanding of human health, aging, and susceptibility to disease. I also firmly believe that communication between molecular biologists and organ-based physiologists will be vital in our quest to understand how we, as human beings, function.

As Director of the Cardiovascular Aging Program, Geriatrics Program, National Institute on Aging, and as a systems physiology-trained cardiovascular scientist, there is no question in my mind that physiology will continue to play an important role in future biomedical research. The extramural grants program that I administer supports broad-based, clinically relevant, research focused on normative age-associated changes (both structure and function) of the cardiovascular, pulmonary, hematologic, and renal systems and the importance of these changes in age-related pathologies, pathophysiologies, dysfunctions, and diseases in mature and older persons. One special emphasis is to foster clinical research, focused on an integrative approach, to continue to define important age-associated changes in the human cardiovascular system and how these “normative” changes may lead to increased susceptibility to cardiovascular diseases.

Andre J. Premen
Director
Cardiovascular Aging Program
Geriatrics Program
National Institute on Aging

Please submit Letters to the Editor to *The Physiologist*, American Physiological Society, 9650 Rockville Pike, Bethesda, MD 20814. Letters are subject to editing for space and clarity. Letters may also be faxed to 301-571-8305.

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lenged the Council with innovative ideas, and he has restructured the headquarters to carry out the business of the Society in a highly efficient manner. Credit should also go to Jim Liakos, our Business Manager, and to the Finance Committee, which has been so ably headed by Frank Knox for the last four years. Their excellent management of the Society's finances and investments have provided the necessary resources for our initiatives.

In this article I would like to review the implementation of some of these initiatives and how they may be expected to help us in the years to come. However, I feel I must also address some of the challenges that our Society and we, as physiologists, are currently facing. In my view, paramount among these challenges are:

- Funding science in an era of inadequate federal support and the threat of an accelerated rate of decline in that support—how can we convince the public and our legislators of the importance of biomedical research, and how can we improve the ways in which available research funds are spent?
- Shrinking of the traditional job market for physiologists, and biomedical scientists in general, that has resulted in a prolonged postdoctoral period that is lacking in security and respect—a state of affairs that needs to be dealt with.
- Educating our graduate students so they can fulfill the role expected of the present-day physiologist as a true “integrative biologist.”
- Educating our university officials, the public, and our legislators about the importance of physiology, and all biomedical sciences, to the health and well being of our citizens, as well as to the health and well being of our economy and our world leadership in science.

These challenges are intertwined in complex ways and must be addressed

together as we prepare for the future. I wish to stress that, although the Society can help us through its offices and programs, we, as physiologists, must become individually responsible for implementing the necessary changes in our universities, colleges, schools, and communities and for making our views known to our elected officials.

Before addressing the problematic issues, let me begin on a more positive note by informing you of the strengths and successes of our Society so that the challenges I wish to discuss can be seen in the light of our resources.

Progress in Attaining Our Strategic Goals

Membership

The life blood of any society is its members and their common mission. It is very gratifying that our membership has grown continuously since the founding of the Society and that it has increased from 5,378 total members in 1980 to 7,851 in 1995 of whom 5,582 are regular members. In just five years, the number of regular members has increased by 16%, despite the forma-

tion of new biomedical groups and the budgetary constraints that have caused us all to have second thoughts about the number of societies to which we can afford to belong. In view of our continuing concerns about the relevance of our discipline in the era of the cell and its genes, it is particularly important to note that, as shown in Fig. 1, throughout the past 15 years approximately 50% of our membership has been under the age of 50.

We have made great efforts to attract our younger colleagues and use their talents in the interest of the Society. Student membership is free for the first year and only \$15 for subsequent years, and it includes subscriptions to *The Physiologist*, *News In Physiological Sciences*, and *Advances in Physiology Education*. Through our proactive awards programs (see below), such as the NIDDK Travel Fellowships for Minority Physiologists, the Procter & Gamble Awards, and the Caroline tum Suden/Francis A. Hellenbrandt Professional Opportunity Awards, as well as the Porter Development Program, we have also been successful in our efforts to broaden the resources of our Society by persistent efforts to increase the

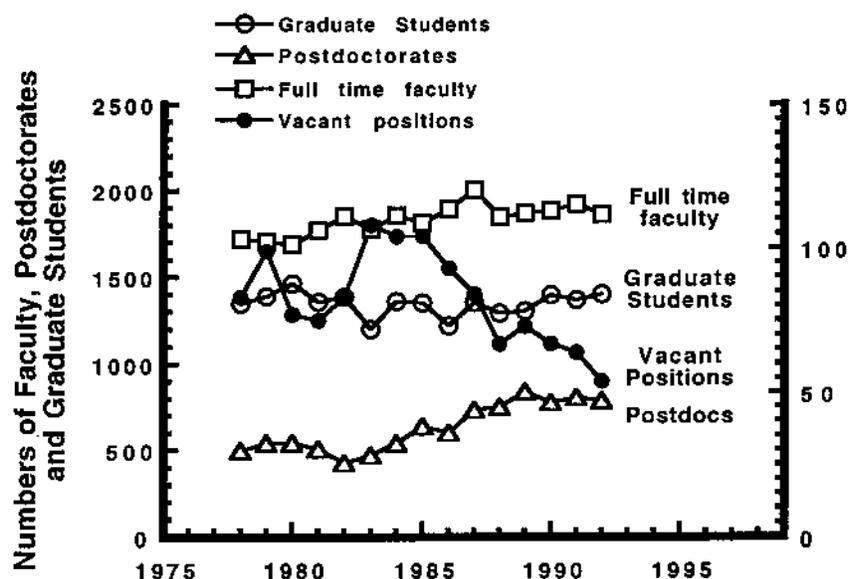


Figure 1. Distribution of APS members by age bracket over the past 15 years. (Data from APS member database.)

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numbers of women and minority members. Since 1980 the percentage of women in APS has increased by 114%. The Committee on Committees has also been very careful to maintain equitable sectional representation on committees while broadening that representation with younger members as well as members of minority groups.

Although we might boast that the number of our members representing ethnic minorities has nearly doubled since 1980, the absolute numbers are still appallingly low. While this is not a reflection of our efforts, rather a result of the size of the applicant pool, it must remain a concern of APS; we simply cannot afford to lose the talents of any group of our population, nor can we expect broad public support if APS does not represent the breadth of our nation's society. Thus APS must support broad educational reform, at all levels, with the intent to increase the accessibility of good science education to historically under-represented groups within science.

Publications

The brightest jewel in the APS crown has always been its publications, and they continue to thrive under the dedicated and resourceful direction provided by Brenda Rauner, our Publications Manager, Laurie Chambers, our Production Manager, and Rusty Johnson, the Chair of the Publications Committee, as well as all of their assistants and copy editors.

The ISI citation statistics for 1988 through 1995 compiled by Brenda Rauner (19) indicate that each of the APS journals, led by *Physiological Reviews*, is the best or one of the best in its field. The efforts of our editors and associate editors and their staffs have reduced the delay between submission of a manuscript and receipt of the reviewers' comments. The requirement that accepted manuscripts be supplied on computer disks for editing purposes

has also resulted in increased efficiency during the editing process. On the other hand, because of the cost per page of publication, the editors have encouraged increasing rigorosity in the review process, resulting in a slow rise in the rejection rate.

Among the most noticeable achievements has been the inception of the on-line publication of manuscript abstracts as soon as they are accepted for publication. This on-line abstract journal *APStracts* began in 1994 with *AJP: Cell Physiology* and was expanded to include all APS journals last year. If you have not yet tried this method of locating the most recent work in your field of interest, connect to the World Wide Web (WWW) (www.faseb.org/aps/journals) or the Gopher site (oac.hsc.uth.tmc.edu/3300/11/publications/apstracts) and use key words to search for your topics of interest.

This year also marks the beginning of our first effort in full text, on-line publishing of the *Journal of Applied Physiology*. The *Journal of Applied Physiology Online* will also be published as a CD-ROM archive every six months. We are exploring several options for publishing our other journals electronically, especially on-line, and if our experiment with the *Journal of Applied Physiology Online* proves to be successful, you can expect more to follow within the next two years.

The advance in electronic publication has also been reflected in the development of new lines of communication within the Society. The APS Home Page on the WWW (<http://www.faseb.org/aps/>) and its predecessor the Gopher server (gopher://gopher.uth.tmc.edu/3300/11/), both developed primarily through the efforts of Marty Frank, have provided a wealth of information for the public as well as for our members. Using these resources you can obtain information on everything from addresses and phone numbers of members (through the FASEB directory connection), to committee reports, educa-

tional resources, information about meetings, awards programs, and up-to-the-minute information about government actions that affect the Society and its members.

Within the last five years the Publications Committee, beginning under the leadership of John Cook, began a more formal evaluation of candidates for journal editors and, importantly, a review of any journal and its editor before reappointment of that editor for a second three-year term. This review process, including input from authors, reviewers, competing journal editors, and the sections of the Society most closely allied with the journal, has been continued with considerable success by John Cook's successors as Chairs of the Publications Committee, Charlie Tipton and Rusty Johnson. The Finance Committee, in cooperation with the Publications Committee, has achieved an important goal of the Strategic Plan to make all APS journals profitable and fairly priced. All the journals, with the exception of *News In Physiological Sciences* and *The Physiologist*, which are provided as a membership benefit, are now financially self-sufficient.

Meetings

The meetings of the Society include the Spring Meeting in conjunction with the Experimental Biology Meeting and the smaller APS Conferences. The structures of these meetings have been an ongoing focus of the Council in its regular sessions as well as in its annual review of the Strategic Plan. Past President Brian Duling was particularly concerned about the Experimental Biology meeting with its Brobdingnagian proportions and inertia and its changing cast of participant societies. In the fall of 1994 the Council and Section Program Representatives even considered the possibility of abandoning the Experimental Biology meeting altogether.

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We decided instead to revitalize the meeting in the image and interests of APS, as described in Brian Duling's (3) editorial, "The Experimental Biology Meeting: It's Our Meeting." The new features of our program promise to indeed make this our meeting. Among these features is the development of what has proved to be an excellent Distinguished Lecturer Series, in the context of which each Section can choose and honor a speaker of their choice. New to this year's meeting is Physiology InFocus, which is designed to present the best science of interest to all the Society's sections and to address its subject from the molecular to the clinical levels.

Finally, to accommodate the most recent and rapidly developing science, beginning with this year, we have held back program time for the inclusion of up to three "Hot Topic Symposia" that are put on the program 6 months before the meeting rather than the usual 12 months. Although programming through this venue is highly competitive, we expect that the short lead time will encourage highly innovative and very current symposia.

We have found that the other societies participating in the Experimental Biology meeting have responded favorably to our innovations. American Society for Pharmacology and Experimental Therapeutics, American Society for Investigative Pathology, American Institute of Nutrition, and American Association of Immunologists have joined APS in an Experimental Biology Management Committee to revitalize the remainder of the Experimental Biology meeting and its intersociety themes. We are also taking steps to increase the appeal and effectiveness of the APS Conferences, and we are considering the possibility of a permanent venue and time for those meetings. The further development of excellent APS meetings will be one of my primary emphases as President.

Education

Perhaps the most noticeable accomplishment springing from the Strategic Plan has been the development of the Education Office and the expansion of its programs under the direction of Dr. Marsha Lakes Matyas. In her short tenure Matyas has brought in NSF and NIDDK grants for \$1.2 million over 3 years. These funds have enabled us to

program for minorities to attend the Experimental Biology Meeting and APS conferences.

The Education Office and associated committees are also fully engaged in efforts to increase public understanding of the biomedical sciences, such as participation in the high school International Science and Engineering Fair, Research!America, the National Academy of Sciences/National Research

the other societies participating in the Experimental Biology meeting have responded favorably to our innovations

more than double the number of high school teachers participating in the summer research program, Frontiers in Physiology, from the current 10 per year to 23+ and allowed us this past year to add a Summer Institute in Bethesda for representatives from participating institutions.

The Education Office also coordinates the activities of the Education, Careers in Physiology, Liaison With Industry, Porter Physiology Development, and Women in Physiology Committees. These committees are essential in developing instructional materials and information for all educational levels, as well as brochures and symposia on careers in physiology, which enables the Education Office to provide career and financial aid information in response to over 2,500 requests per year.

Through the Porter Physiology Development and Women in Physiology Committees, the Education Office facilitates membership and participation of minority members and women in the Society. As an example, the Women in Physiology Mentoring Program now has 50 mentor/mentee pairs, and the office also administers APS-NIDDK Travel fellowship

Council, the AAAS Coalition for Public Understanding of Science, and joint projects with the American Society of Microbiology (ASM) and other FASEB societies. The office has also developed an APS Speakers Bureau as a part of ASM life science speaker's bureau. Among the important goals of the Education Office over the next year will be to link APS WWW Home Page and Gopher Server to other key educational servers such as LabNet and Genentech's Access Excellence.

Award programs

APS continues to maintain and expand its awards program to promote excellence in the science of physiology. Among these are the Young Investigator Awards, the Research Career Enhancement Awards, APS-Genentech Postdoctoral Fellowships, and the Giles Filley Awards in Respiratory Physiology and Medicine. The travel awards program includes the above-mentioned NIDDK travel awards, as well as the Procter & Gamble and Caroline tum Suden awards.

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Public affairs

APS Public Affairs Officer Alice Hellerstein analyzes and distributes information on issues critical to physiologists, such as research funding, animal research, and government regulatory activity. Alice has developed an e-mail-based APS NetAlert system that allows for the timely distribution of background information on these issues when letters requesting congressional action are needed. APS NetAlert is available to any APS member who may wish to receive this information.

The public affairs activities of APS, and the other FASEB member societies, are coordinated with FASEB. APS and the nine other societies each have three representatives in FASEB. Eric Feigl, as our Chair of the Public Affairs Committee, is also our representative to the FASEB PAAC, which studies and recommends actions related to research funding by government agencies and indirect costs, as well as regulatory activity related to a wide variety of issues such as scientific misconduct. Alternate President-Elects of APS become members of the FASEB board for four years, with the more senior representing APS on the Public Affairs Executive Committee (PAEC). At present Brian Duling and I are the APS representatives to the FASEB Board, with Brian serving on the PAEC.

Given this background on the capabilities, new initiatives, and plans of APS, let me turn to the problem areas I wish to discuss. The first problem relates directly to the activities of the Public Affairs Committee and FASEB.

The Problem of Research Funding: Goals in an Era of Deficit Reduction

It seems like a broken record—every year we complain that government funds are not sufficient to conduct many of the best research projects. This year

the budget ax hung heavily over our heads, and the operations of the NIH, NSF, and other funding agencies had to be suspended while the White House and the Republican Congress battled. It was only through the efforts of Congressman John Porter, Chairman of the House Appropriations Subcommittee on Labor-HHS-Education, with the help of Senator Arlen Specter and Senator Mark Hatfield, Chairman of the Senate Appropriations Committee, that the NIH and the Center for Disease Control were among a very few programs singled out for full-year funding through a Continuing Resolution signed by President Clinton on January 6. (Major disruption of NIH business, including delayed funding of high priority grants, had already occurred. For example, review groups scheduled to meet in the first weeks of this year had to be postponed and grants from fall study sections were put on hold until the budget deal was reached.)

The resolution brought an unexpected bonus—the NIH was funded through this fiscal year with the 5.7% level approved by the House! Our favorable treatment by Mr. Porter and other legislators was in large part due to the efforts of FASEB, and its Past President, Sam Silverstein. It was also due to our response as individuals to the appeals of FASEB and similar groups to contact our congressional representatives and argue our case.

Considering the current climate in Congress and the need for deficit reduction, it seems unlikely that we can expect such a “windfall” again in the future, and even at the time of this writing the NSF and VA Research programs are being funded by a fourth Continuing Resolution due to expire on 15 March. In fact, it appears that the Congress has totally abandoned even the pretense of rational science policy and planning (10). The outlook beyond the current budget year is grim indeed. If one examines the current 7-year plans under consideration by the White House and

Congress, the most favorable plan (which is President Clinton’s latest offer at this writing), would result in a 25 to 35% decrease in purchasing power (i.e., adjusted for assumed inflation) in the total Discretionary Spending category from which non-defense research is funded. The lower end of this possible range of decreases in funding even assumes some draconian cuts in the Entitlements category, which includes Social Security, Medicare, Medicaid, and Welfare.

As revealed in the 1994 NIH Data Book (17), not all areas of research funding have such dreary forecasts. Support of research by private non-profit foundations, voluntary health organizations, the Howard Hughes Medical Institute, and others, has risen from a total of \$506 million in 1984 to a projected \$1.28 billion in 1994. Industrial biomedical research spending is expected to have exceeded \$17.1 billion in 1994 compared with \$4.8 billion in 1984. Although very little research support in the latter category is available outside of the interests of the companies involved, the professional research positions that are being created in the industrial sector provide important career opportunities for physiologists (see below). Nevertheless, the continued erosion of NIH and NSF support will put impossible pressures on the system.

Is there hope? How should we respond? Continued appeals to our legislators by APS and FASEB, and as by individual scientists will be essential, but we must go beyond merely responding to crises as they arise. It is obvious that we need to plan for a future that at the moment appears to contain a high degree of uncertainty as political and societal forces compete, well into each fiscal year, for their share of a shrinking pie. What changes can be made to keep federally funded research alive? This is a matter for economists and politicians, and I cannot pretend to understand either culture. However, an initiative

similar to that suggested by Senators Harkin and Hatfield to fund biomedical research independently by a “tax” on health care premiums and/or tobacco products would decrease the onus of direct competition with other agencies for the discretionary funds.

Another consideration is the calculation of automatic increases in entitlements based on the Consumer Price Index (CPI). Even a small correction in the way in which the CPI is calculated, as recommended by numerous economists, would have a compounding effect to greatly reduce entitlement spending over the next seven years, and would leave more for discretionary spending. What about defense expenditures? Our legislators tell us that defense spending has already been heavily cut since the early 1980s and can suffer no more. But might there not be a few billion extra floating around when legislators can foist a B2 bomber program on an unwilling defense department to the cheers of the defense industry?

It may seem selfish to join the scramble for the bucks, but we must realize that research and innovation are the ultimate hope for many of our citizens’ problems. If we are not strong advocates for science, who will be? At the same time we must take the responsibility of giving well-reasoned advice on how limited funds can be best used. There is also a personal responsibility in running our own laboratories in a cost-efficient manner that goes beyond what NIH and NSF can regulate.

Unfortunately, when we ask for cuts in other programs, we must also give our opinion on the best way that available funds can be used to best advantage in science. We can no longer maintain that as long as it is science it should be funded. In considering the best use of funds for science we come to the uncomfortable task of questioning the goals of fellow scientists as well as ourselves. But is \$94 billion for a space station a rational investment of our resources at this

time of a staggering budget deficit? Certainly, the space program, a darling of legislators, has great scientific promise, but could it not be better used in less costly programs concerning environmental and climate issues?

A less dramatic monetary threat is the founding of the NIH Office of Alternative Medicine (OAM). Is the OAM the best investment of our time, effort, and money? Every program has its defender and protectors, but Park and Goodenough (18) argue eloquently that “the scientific community is silent on these matters at its peril.”

APS Council has adopted a strong position in favor of investigator-initiated research and proposes limitations on initiating research through Requests for Applications (RFAs) with relatively short “lead times.” We would prefer to see programs curtailed, announcements used instead, and solicited research identified by a designation other than RO1. The Small Business Initiated Research (SBIR) program now consumes 2% of the extramural budgets of agencies such as the NIH and NSF, and that mandated percentage will automatically increase to 2.5% in 1997. SBIR proposals now enjoy much higher funding success rates than RO1 grants, and APS would like to see an end to the setback so that these proposals would be funded only if their scientific quality was comparable to that of the RO1 grant pool.

Indirect costs are a difficult issue to wrestle with. Most of us realize that, in the end, if our institutions receive less in indirect costs, we will be paying the resulting deficit from the direct costs on our grants. The best scenario we can work toward, as cogently argued in a recent editorial by Eric Feigl (6), is a fairer, clearer, and more consistent allocation of indirect costs to and among institutions.

Fortunately, FASEB has adopted a public affairs position that is consistent with the APS position. Furthermore, FASEB has recently decided to take a

more proactive position on the long-term future of funding biomedical research (5). Over the next three years FASEB will use \$1.5 million of its reserves to augment its public affairs activities. To this end, the Federation has retained the consulting firm Clark and Weinstock, Inc. to help it develop several high-priority initiatives including bringing research funding into the public political debate by persuading presidential candidates to include it as part of their platforms; by working through organizations such as government “think tanks,” journalists, and journalism schools to broaden the knowledge and interest base in the area of biomedical research; and by targeting important information to both established and freshmen legislators.

The Problem of Careers in Physiology

What is the relation between the supply of and demand for physiologists?

The answer to this question would appear to many physiologists to be a simple problem in compartmental analysis: if the pool of physiologists is to remain in a steady state, then the loss from this pool by attrition should be matched by an equal influx drawn from postdoctoral fellows who have received their PhD in physiology. As simple as the analysis might seem, it is becoming increasingly difficult to define who exactly comprises the “pool” of physiologists and whether that pool should remain constant or, in view of diminished support from the government and our institutions, decrease.

As a first approximation we can consider the data provided by the AAMC about the composition of physiology departments in US medical schools, as analyzed in *The Physiologist* by Marsha Matyas and Marty Frank (14). I have summarized part of their Table 2 in the form of Fig. 2. It is encouraging to see

that the pool of full-time faculty has at least remained in an apparent steady state from 1978 through 1992, numbering between 1,700 and 2,000. It is also encouraging to see that the total number of graduate students enrolled in physiology PhD programs has also remained steady at 1,200 to 1,400 during the same period. If the average time taken to obtain the PhD degree is six years (8) and if there is a loss of about 20% of those matriculating but not obtaining the degree, we can expect that we are providing an influx of, at most, 150 to 200 new PhDs to the pool each year. On first examination, this does not seem to be an unreasonable number given that there are about 100 departments of physiology as well as new job opportunities in industry.

However, further examination of the data in Fig. 2 shows that there has been a steady decline in the number of vacant positions in our departments from a yearly high of over 100 in the early 1980s to one-half that number in 1992.

At the same time the number of postdoctoral fellows in our departments has increased from 450-500 fifteen years ago to about 1,900 in 1991 and 1992.

The expansion of the postdoctoral pool is perhaps more immediately disturbing to us as we feel the anxiety of these junior members of our departments seeking a permanent faculty position. A large part of the expansion of the postdoctoral pool is also due to the accelerated influx of foreign students receiving their PhDs in the US; approximately 50% of them remain here because of even more limited opportunities in their countries of origin (8).

Clearly, we are producing more PhDs than the demand by our departments warrants, but the job pool for these physiologists is not limited to university faculties. As clearly argued by Past President Brian Duling (4), and as supported by the Committee on Science, Education, and Public Policy report (2), we have prepared our students and post-

doctoral fellows to look too exclusively at the traditional tenure-track faculty model, and we have not prepared them with sufficient breadth to consider alternative careers as opportunities develop. We are seeing an increased demand for physiologists and increased research spending in the biomedical industry, and we can have at least a reasonable expectation that there will be an expanding demand for educators who are able to assemble the bits and pieces of research information into a more digestible whole for students at all levels. But we can no longer merely be in the business of cloning ourselves.

In response to suggestions that we should curtail the number of graduate students we train (2, 8), it is my personal opinion that it is part of our responsibility to the future to train all qualified US students who apply to our programs. It seems an utter contradiction, on the one hand, to bemoan the decreasing numbers of students who choose a science as their undergraduate major and, on the other hand, close the door on those who would become physiologists.

Unfortunately, training these graduate students will increase competition in a shrinking job pool as observed throughout academia (16). Nevertheless, most other careers have experienced this increase in competition and a decrease in job security. In fact, as discussed in an article in the November 27, 1995 issue of *Barron's* (9), university faculty are widely regarded as being unfairly protected from job competition and that, "After decades of profligate spending, America's colleges are about to come under pressure to tighten their belts." And why not? It's exactly what's happened in industry, the medical field, and, as of this month, in government. Job competition and insecurity appear to have become fixtures of all professions in the present decade.

Regardless of whether we are willing to acknowledge that competition will be a part of the job market for physiologists, it is our responsibility to accept

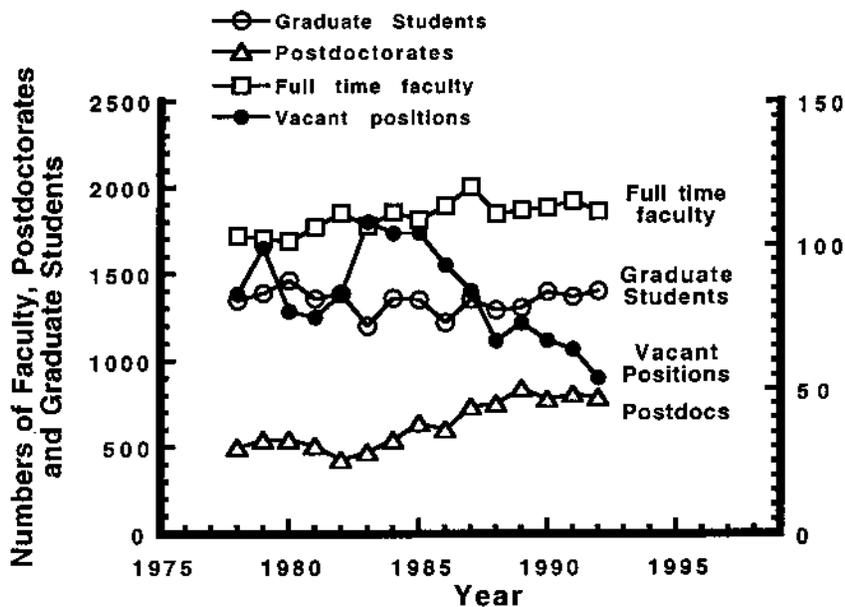


Figure 2. Trends in medical school physiology departments in numbers of full-time faculty, graduate students seeking PhD degree, and postdoctoral fellows in training (left ordinate) and in number of vacant faculty positions in those departments (right ordinate). [From Matyas and Frank (14), based on data obtained from AAMC in 1989 and 1994.]

only those students who are truly qualified and likely to contribute to science and society. We must also be quite hard boiled in assessing the progress of our students and persuading the marginal ones to seek alternative careers. Even the best of our students must be trained so that they can be flexible enough to change their career goals as opportunities emerge.

Different career paths in physiology

Our model of a successful career in physiology, as described in Brian Duling's (4) address, has been that of a productive scientist who has secured a tenured position in a physiology or related basic science department; who is the administrator and principal investigator of his or her laboratory and teaches medical and other professional students in his or her area of subspecialty; and who serves his or her institution and discipline as a member of local, national, and international committees of one form or another.

However, this career may no longer be suited for all of our PhD graduates, and we must make them aware of and prepared for alternative careers that will be professionally rewarding to them as physiologists. The choice of an alternative career by a PhD graduate is too often viewed incorrectly as a failure of the graduate or of our educational system. Instead we must recognize the need for the professional expertise of our discipline outside the illusory mirror our past holds in front of us.

The choice of an alternative career can also be a choice of lifestyle. Those of us who have entered the looking glass of the past model know too well the commitment of time and personal energy that is demanded. Does it really "take all the running you can do to stay in the same place" (1), or can one pursue a career as a professional physiologist/scientist and still maintain a reasonable lifestyle with, for example, adequate time for one's family? Do we

really want to guide all of our graduate students toward the same "rememberance of things past" and dismiss those who have chosen alternative careers? Or should we embrace colleagues who know our discipline and can also integrate it into different levels of our Society? Certainly there is an expanding role for the integrative talents of the physiologist in the biomedical industry, and I believe there will also be increasing opportunities to teach physiology at levels other than for the medical professional, especially at the undergraduate level. I encourage younger physiologists to pursue both possibilities as a means to a fulfilling career.

Research scientists who have the professional training but who do not wish to assume the responsibilities of the professor-principal investigator model are also invaluable to our laboratories. Such a career may be especially appealing for professional scientists with family responsibilities who do not want the lifestyle of the typical principal investigator. At present our need for such scientists is being filled by our growing pool of postdoctoral fellows, but neither they nor we can view their present position as a career. Thus there is a vast gulf between the respect and the rewards given the postdoctoral fellows/faculty-in-waiting (regardless of whether we call them Instructors or Research Assistant Professors) and the tenure-track faculty member. That gulf leaves them no option but to aspire to the goals their mentor and their discipline have de facto established.

We have also expanded our postdoctoral pool in physiology and other biomedical sciences by employing foreign MDs in our laboratories. Unquestionably, these individuals make essential contributions to our research and are a tremendous resource for the life sciences in this country. However, it is likely that relatively few of these postdoctoral fellows will be competing for tenure track faculty positions—but then what is their long-term role in our sci-

entific community and how can we continue to provide for their support and security within current administrative structures?

If we value these postdoctoral fellows and research faculty as instrumental in achieving our research goals, we must work with our institutions and funding agencies to afford them the respect, salary, and security they deserve. The present salary scale for senior non-tenure-track scientists is unrealistically guided by the NRSA stipend schedule for postdoctoral fellows, and there is no more security in that salary than there is certainty in the next RO1 being funded. Without doubt, some who choose a career with less responsibility and authority and a more realistic work schedule are bartering more favorable remuneration as a quid pro quo.

However, at the very least, we owe these individuals more security and ample fringe benefits. In many cases, fringe benefits and chances for advancement in their grade are better for our nonprofessional laboratory personnel than for the indentured postdoctoral fellow. A principal investigator cannot provide the necessary financial resources from his or her research grants for this security any more than he or she can for themselves, but we all need to work to change our system to recognize and reward our postdoctoral fellows and research faculty.

Meanwhile, we must give these essential colleagues the respect they deserve and, more importantly, the opportunity to develop their talents broadly so as to expand their long-term career options. In the end such an approach can only benefit our science by making the best use of the considerable talent pool we have assembled.

What specifically can we do to develop more career opportunities? APS has actively sought the involvement of the Liaison With Industry Committee to meet the needs of that community of physiologists as well as to understand how careers in this area are developing

Introducing...James A. Schafer

James A. Schafer was installed as the 69th President of the American Physiological Society at the close of the Society's Spring Meeting this month in Washington, DC.

Schafer is a Professor in the Department of Physiology and Biophysics at the University of Alabama at Birmingham (UAB) and holds secondary appointments as a Professor of Medicine and a Senior Scientist in the Nephrology Research and Training Center. He succeeds Leonard S. Jefferson as president of the nation's oldest biomedical scientific society.

Schafer was born in 1941 in Buffalo, NY, where he received his education through high school. He attended the University of Michigan, receiving his BS in biophysics in 1964 and his PhD in physiology in 1968. He received one year of postdoctoral training in the laboratory of Erich Heinz at the Gustav-Embden Center for Biochemistry in Frankfurt, Germany, followed by a year with Thomas E. Andreoli at Duke University. He moved to UAB with Andreoli in 1970, taking a position of Assistant Professor in the Departments of Physiology and Biophysics and of Medicine where he has remained for over 25 years. Schafer was appointed to his present position in 1976.

As a member of the APS since he was a graduate student in 1967, Schafer has served on the Membership, Program Advisory, Publications, and Long-Range Planning Committees, and was Editor of the *American Journal of Physiology: Renal, Fluid and*

Electrolyte Physiology from 1983 to 1989. He has also served on the editorial boards of the *AJP:Renal, Fluid, and Electrolyte Physiology* (1980–83), *Contemporary Nephrology* (1980–85), *Journal of General Physiology* (1981–present), and *Kidney International* (1990–95). Schafer has been active in the Renal Section of the APS, serving on the Steering Committee and as Secretary, and in the Epithelial Transport Group, serving on the Steering Committee and as Chair. Schafer was elected to a term on the APS Council from 1992 to 1995 and was elected President-Elect last year. He will also serve as one of the two APS members on the FASEB Board until 1999.

Schafer has also been involved in the American Society of Nephrology (ASN), serving on its Publications, Research Advisory, and Program Committees. He was elected Secretary-Treasurer of the ASN in 1989 and served in that position and as a member of the ASN Council until 1992. He was a member of the National Kidney and Urological Diseases Program Evaluation Committee from 1985 to 1987 and was Chair of the Research Committee of the National Kidney and Urological Diseases Advisory Committee from 1987 to 1990.

Schafer has been recognized for his research achievement in the area of renal epithelial transport and its regulation as the second recipient of the Robert F. Pitts Memorial Lectureship Award from the International Union of

Physiological Sciences in 1983 and the recipient of the Homer W. Smith Award from the ASN and the New York Affiliate of the American Heart Association in 1993. Last year he was also in the first group of investigators to be elected to honorary membership in the American Society of Clinical Investigation and was a corecipient, with Eberhard Schlatter of the University of Muenster, of the Max Planck Prize of the Max Planck Society and the von Humboldt Foundation of Germany. Among Schafer's other awards are an Established Investigator Award from the American Heart Association (1970-1975), a Wellcome Visiting Professorship at Dartmouth College, an award from the Mayor of the City of Birmingham, and the UAB President's Award. Especially important to him are the outstanding teacher awards he has received from five medical school classes at UAB.

Research in Schafer's laboratory is presently funded by the NIH and the Max Planck-von Humboldt award and has been funded in the past by the American Heart Association, the Alabama Kidney Foundation, and the National Kidney Foundation. His early work focused on the mechanisms of water transport in the collecting duct and the proximal tubule and their regulation and more recently on the regulation of ion and water transport in the collecting duct and the possible implications of altered regulation in salt-sensitive hypertension.

so that we can better advise our students and postdoctoral fellows. If we foster the development of physiology courses at the undergraduate level and as part of the usual curriculum for science teachers, there will certainly be a greater demand for physiologists to teach those courses.

Finally, as beautifully explored in Richard Malvin's (12) editorial, it is the responsibility of senior physiologists to consider carefully their present contributions to research in the light of the jobs that could be made available for younger colleagues. Malvin provides some excellent examples of how physiologists can continue to make essential contributions to physiology beyond their years of peak research activity.

The Need for Integrative Physiologists

As argued by Neill and Benos (15), it is increasingly obvious that physiologists must play a central role in integrating information obtained at the molecular and cellular levels into a fuller understanding of function at higher levels of organization. This is the challenge for physiology laid down this year in an editorial by Claude Lenfant (11), Director of the NHLBI, "the physiologist is at the threshold of an unprecedented scientific era. To him or her will fall the task of making sense of the bits and pieces of new knowledge that are so rapidly accumulating...This is the challenge—and the privilege—of today's integrative physiologist."

Although I would argue that physiology is intrinsically integrative, the message is that physiologists should naturally have a pivotal role in the future of biomedical science. I would further argue that most of our graduate students want to learn how to teach. But are we, and the physiologists we are educating, up to the challenge?

In recent times, most physiologists have been caught up in the rush to the molecular level, thus losing the broader

view of their discipline in favor of reductionism. As a consequence, our graduate students do not learn integrative physiology but rather the details of the specific project on which they are working. If physiologists continue along this path, there will be little to differentiate them from the more reductionist basic science disciplines, and it will fall to our clinical colleagues to serve the role of the integrators. Certainly there was something that made each of us seek training in physiology rather than biochemistry or cell and molecular biology. If physiologists do not assume the responsibilities of their discipline, then it is little wonder that our medical school administrators consider combining departments that seem to have the same research goals.

How can we provide the broad understanding of our discipline that is necessary for the integrative physiologist and then teach this approach to our graduate students? First, and most importantly, our graduate students must be educated in the discipline of a holistic physiology and understand its broad context. In teaching our students this way, we are also teaching ourselves to look at our own research problems with a more encompassing eye. Even in the laboratory, we must insist that our graduate students and postdoctoral fellows understand the background and context in which their experiments are being conducted and have full appreciation of the significance and possible application of the information they obtain. I firmly believe that this approach to the combination of research and teaching can have only a salutary effect on our science.

A guide along these lines is the superb and inspiring lecture delivered by Art Vander (21) as the Claude Bernard Distinguished Lecturer at the 1994 Experimental Biology Meeting. Vander's basic premise is that, "the quality and breadth of our teaching, even more than our research, will decide the future of physiology." Within

this context, he argues cogently that teaching can provide the integrating function we require to understand and communicate the implications of our research in the broader context of physiology and medicine. This understanding would be a definite asset to our research, even if only in the preparation of the background and significance sections of our grant proposals.

Our approach to drawing our graduate students and postdoctoral fellows into the broader understanding of integrative biology should not be limited to teaching them a medical physiology course but rather to involve them as teachers themselves. We must bring our graduate students and postdoctoral fellows into teaching discussion sessions for medical students and other graduate students. We can also extend this teaching to the laboratory by setting the example of frequently stepping back to analyze the broader implications of our research. This attitude fosters further teaching within the laboratories as postdoctoral fellows teach graduate students, and graduate students teach other laboratory personnel, about the importance of what they are doing in a much broader context than the methodological and molecular levels.

One might argue that teaching is an inappropriate use of graduate students' and postdoctoral fellows' time because they are being paid from research grants and other nonteaching funds. However, I would reply that science is a creative process, and unless we encourage the broader curiosity that comes with teaching and inquiry in our discipline, we are neglecting the most important sources of creativity in our research. Creativity is spurred by understanding of our problem at multiple levels, not by slavish attention to the most reductionist levels.

The Problem of Public Information and Education in Science

The legendary ignorance of the US population in the sciences is appalling (13). Even more troubling is the lack of even the most rudimentary understanding of how one's own body works and the constraints this imposes on public understanding of the abilities and limitations of medical practice and biomedical research. As explored last summer in a conference, "The Flight from Science and Reason" (20), in response to the explosion of ever more reductionist information, it is as if the public has surrendered any hope of understanding science and has turned instead to mystical rationalizations of what controls our lives and our health (13, 18, 20).

Scientists, including physiologists, have done little to try to better the situation (18). Instead they have placed themselves above the debate largely on the grounds that their neighbors and nonscientific social contacts could not hope to understand the work they are doing in the laboratory. Because of society's reaction, we are also seeing a decreased emphasis on reasoning and appreciation for the experimental scientific method in science courses at the high school and college levels and a decrease in the number of students who take sciences courses (13). Thus, it is essential that we also assume the roles of teachers of the public and of our legislators.

We must not counter the arguments of anti-science activists with the same polemics of which we accuse them. As my son (an undergraduate student at the University of Michigan) has pointed out to me in our discussions about the value of science in society, one cannot use the recursive argument that equates reason and science and then fault as unreasonable those who do not "believe" in science. We must use the primary tools of our profession, first to understand the complaints of our opponents and sec-

ond to inform the public about science in a manner it can appreciate. As stated by Art Vander (21), "it is our teaching that must convey physiology's special research achievements to the public, upon whom we depend for funding and permission to perform animal research."

Certainly, neither APS nor individual physiologists can hope to mount a successful campaign to change the K-12 curriculum and provide remedial adult education. Rather, we must be prepared to assist groups such as Research!America that are dedicated to this task. APS does encourage the education of teachers through its summer research program *Frontiers in Physiology*. Although the number of high school teachers we can train by this program is small, the impact is multiplied. Most of the teachers who have been in the program bring their students back to visit research laboratories and take important information about physiology back to the classroom.

I feel it is also important that physiology become more visible in the undergraduate curriculum. Several universities have developed superb undergraduate courses in mammalian physiology and can serve as models for other schools. Again, in the words of Art Vander (21):

"We ought to be teaching physiology to undergraduates in and for itself, because the knowledge of how one's body works is an essential part of a liberal education. Happily, in performing our mission of teaching physiology to all comers, we can also achieve our goal of attracting the best of them into physiology."

As a graduate student, I, too, found that the time I spent as a teaching assistant in the undergraduate physiology course was an important contributor not only to my development as a teacher but to my appreciation of the integrative nature of physiology.

I also feel that, with relatively little effort, our physiology departments can become important resources of adult education and continuing education for teachers. For example, my institution, University of Alabama at Birmingham, has sponsored a "Mini Medical School," which offers to the general public a series of lectures about the basic sciences and medicine. The response to this program has been quite enthusiastic, and, although most of the participants are driven by their desire to know more about various medical conditions of personal interest, they do learn some physiology along the way.

Another idea for an outreach to the community is the development of courses for the continuing education of teachers. In many states, even teachers with a Master's degree are required to take a certain number of graduate credit hours at recurring intervals of time. In many cases, the courses they have to choose from are limited to a few, sometimes questionable, education courses that are usually offered in the evening. I think it would generate considerable interest if a physiology department offered teachers a formal series of lectures on human physiology to be taught in the evening.

Certainly we could manage to persuade most of our colleagues to devote two hours once each semester to inform teachers about their specialty or about the relevance and excitement of physiology in general. Perhaps our graduate students could participate in these courses and thus gain an opportunity to better appreciate the "big picture" of physiology. Credit hour production by ventures such as this can also be a source of additional income to our departments and would certainly be a much better use of the time many teachers spend in continuing education.

At the K-12 level we can reach out to students not only through APS programs such as *Frontiers in Physiology* but also through our individual willingness to serve as resources to teach our

subject and the excitement of experimental science at this level. We can volunteer to work with established groups such as the Boy Scouts and Girl Scouts that profess science literacy as one of their goals. We can also help our K-12 teachers by providing them with materials or volunteering to teach a few classes ourselves. For some further examples, Richard Malvin (12) has provided some excellent suggestions for how physiologists can contribute to public science education.

The goal of public education is not just a matter of individual understanding of science but rather of public understanding that will also affect the perspectives of our legislators and university administrators. Regardless of how we choose to respond to this challenge, the response must be an individual and vigorous one.

So Where Does All This Leave Us?

From the summary at the beginning of this article our Society is clearly in excellent shape and is positioning itself to face the challenges that we have before us. These challenges are indeed daunting, and the Society cannot accomplish much without the participation of its members, which brings me to another point.

Check around your department. How many of your colleagues are members of APS or of any biomedical research society for that matter? Encourage those who are not members to do their part in advocating biomedical research and the advancement of scientific literacy by joining APS or another FASEB society if they cannot envision themselves as integrative biologists. It is not the extra dues income that we need but rather their participation in Society activities and their understanding of our objectives as an academic and a scientific community.

The obligations of Society membership are not only to write letters to con-

gressmen, participate in meetings, and read *The Physiologist*. First and foremost, we need our members to participate individually in the activities of the Society and our discipline and to join the dialogue about how best to safeguard the future of science. We encourage all our members to become as involved as possible. No one should feel bashful about nominating themselves for APS committees, because we need members who want to do the job and do it right. More than that, we need members who communicate our goals and our problems to the public and our legislators. The offices of APS can provide the information we need, but we must deliver the message personally. ♦

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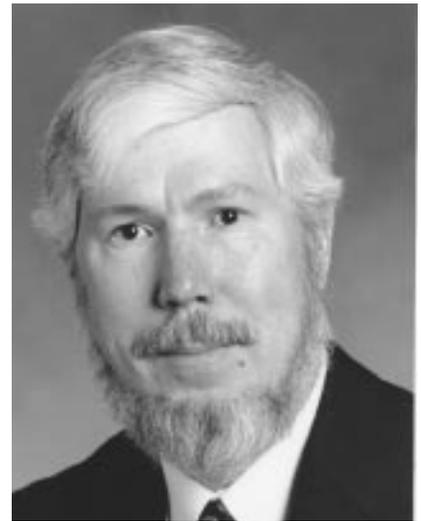
APS Election Results

Allen W. Cowley, Jr., Professor and Chair, Department of Physiology, Medical College of Wisconsin, is the new President-Elect. The two newly elected Councillors taking office on April 17, 1996, for three-year terms are **Celia D. Sladek**, Professor, Department of Physiology, Finch University of Health Sciences/Chicago Medical School; and **John A. Williams**, Professor and Chair, Department of Physiology, University of Michigan Medical School.

President Elect



Councillors



Horwitz Receives 1996 Arthur C. Guyton Teacher of the Year Award



Barbara A. Horwitz, Professor of Physiology and Chair of the Section of Neurobiology, Physiology, and Behavior at the University of California, Davis has been selected to be the Arthur C. Guyton Teacher of the Year for 1995. The award is given for documented excellence in teaching both in and out of the classroom and a demonstrated commitment to physiology education. W.B. Saunders Company sponsors the award, which consists of a certificate, a cash award of \$1,000, and funds to defray some of the expenses to attend the meeting.

The award will be presented during

the Experimental Biology '96 meeting in Washington, DC at the annual dinner of the Teaching Section of the American Physiological Society on Sunday, April 14, 1996 at 6:30 PM in the Latrobe Room of the Grand Hyatt Hotel. Judith Stern, Horwitz's sponsor, will introduce Horwitz who will then present a talk on some aspect of physiology teaching or education.

The Award Selection Committee consisted of Heinz Valtin and Bruce Koeppen, the recipients of the award in 1994 and 1995, and Lois Heller, a past member of the Teaching Section Steering Committee. ❖

Massfelder Chosen for the 1996 APS-Genentech, Inc. Postdoctoral Fellowship



Andrew F. Stewart (*left*) and Thierry Massfelder (*right*), 1996 APS-Genentech winner.

The selection of the 1996 APS-Genentech, Inc. Postdoctoral Fellowship in Mammalian Organ System Physiology has been completed. The Awards Committee, consisting of D. Neil Granger (Chair), Helen Cooke, Robert Gore, James Wade, Martha

O'Donnell, and Mike Cronin reviewed the 36 applications that were received. The Committee used a two-stage process for review of the applications. For the first stage, each application was reviewed by at least three members; for the second stage, the top six applications were reviewed by the entire Awards Committee.

The Awards Committee selected Thierry Massfelder, PhD, from Yale University School of Medicine and the Veterans Affairs Connecticut Healthcare System as the 1996 APS-Genentech, Inc. Postdoctoral Fellow.

Massfelder plans to supplement his knowledge of renovascular physiology with the molecular biology techniques of the host laboratory of Andrew F.

Stewart, MD. His research will focus on the physiological role of parathyroid hormone-related protein (PTHrP) in renovascular homeostasis. Specifically, Massfelder proposes first to examine the posttranslational processing of PTHrP in vascular smooth muscle cells. Second, he plans to study the genotype, level of expression, and phenotype of transgenic mice, which PTHrP is targeted for overexpression to vascular smooth muscle using the α -actin smooth muscle promoter-2. Third, Massfelder will investigate the proliferation and contraction of aortic and renal vascular smooth muscle cells derived from the PTHrP "knockout" mouse.

As a recipient of the APS-Genentech, Inc. Postdoctoral Fellowship, Massfelder will receive a stipend allowance of \$32,000 and a mini-grant of \$3,500 for laboratory expenses. ♦

1996 FASEB Summer Research Conferences

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Retinal Neurobiology and Visual Processing
Molecular Biophysics of Cellular Membranes
Protein Folding and Assembly in the Cell
Folic Acid, Vitamin B12 and One-Carbon Metabolism
Plant Development

Copper Mountain Colorado

Signal Transduction in Plants
Retinoids
Mechanisms of Maturation, Function and Decay in the Prokaryotic RNA World
Receptors and Signal Transduction
Neural-immune Interactions in Injury and Disease: Molecules and Mechanisms
Protein Phosphatases
Splanchnic Circulation
Molecular Genetic Basis of Cell and Tissue Structure and Function
Neurobiology of CNS Injury
Transport ATPases

Snowmass Village Colorado

Principles in Viral, Bacterial, Fungal, and Protozoan Pathogenesis
Yeast Chromosome Structure, Replication and Segregation
Sorting/Intracellular Transport of RNA
Neurofibromatosis
New Trends of Fc Receptor Research
Cellular and Molecular Mechanisms of Liver Growth Regulation
Transcriptional Regulation during Cell Growth, Differentiation, and Development
Clonal Senescence and Differentiation

To receive complete conference schedules and the application form (available in Feb., 1996), contact:

9650 Rockville Pike

FASEB Summer Research Conferences Office
Bethesda, MD 20814-3998 FAX 301-571-0650

E-mail: src@faseb.org

APS Conference

APS Conference I pHysiology of Acid–Base Regulation: From Molecules to Humans July 12–15 • Snowmass Village, Colorado

Friday, July 12

2:00 PM

Registration Opens

6:30–8:00 PM

Opening Reception

buffet dinner and cash bar

8:00–9:30 PM

Welcome and Overview of Conference

Chair: Robert Gillies, Univ. Arizona
Speakers: Albert Roos, Washington Univ.; David W. Deamer, Univ. California, Davis

Saturday, July 13

8:30 AM–12:00 NOON

pH Measured In Vivo

Chair: John Griffiths, St. Georges Hosp., London, UK
Speakers: John Griffiths, S. Georges Hosp., London, UK; Martin Kushmerick, Univ. Washington; Mitch Chessler, New York Univ.; Jeff Evelhoch, Wayne State Med. Ctr.; Zaver Bhujwalla, Johns Hopkins Univ.

4:00–6:00 PM

Poster Discussion Sessions

from contributed abstracts

8:00–9:30 PM

Cell Physiology I

Chair: Walter Boron, Yale Univ.
Speakers: Walter Boron, Yale Univ.; Sergio Grinstein, Hosp. for Sick Children, Toronto; George Sachs, Univ. California, Los Angeles

Sunday, July 14

8:30 AM–12:00 NOON

Cell Physiology II

Chair: Richard Vaughn-Jones, Oxford Univ., UK
Speakers: Richard Vaughn-Jones, Oxford Univ., UK; Robert Gillies, Univ. Arizona; Walter Boron, Yale Univ.; Keith Buckler, Oxford Univ., UK; Jacques Pouyssegur, Univ. Nice, France

4:00–6:00 PM

Poster Discussion Sessions

from contributed abstracts

8:00–10:00 PM

Workshop/Open Mike Session—What Are the Molecular Targets for Intracellular H⁺

Moderator: Robert Alpern, Univ. Texas, Southwestern Med. School
Members of the audience will be called upon to document effects of altering pH on specific intracellular molecular targets

Monday, July 15

8:30–11:00 AM

Regulation of pH in Subcellular Systems

Chair: Mike Forgac, Tufts Univ.
Speakers: Mike Forgac, Tufts Univ.; Masamitsu Futai, Osaka Univ., Japan; Ted Steck, Univ. Chicago; Patty Kane, SUNY Syracuse; Barry Bowman, Univ. California, Santa Cruz

12:30–4:30 PM

Molecular Systems

Chair: Carolyn Slayman, Yale Univ.
Speakers: Carolyn Slayman, Yale Univ.; Roland Baron, Yale Univ.; Ron Kopito, Stanford Univ.; Mike Caplan, Yale Univ.; Tom Stevens, Univ. Oregon; Steve Gluck, Washington Univ.

4:30–7:00 PM

Workshop/Open Mike Session

Bookkeeping: Can We Do Better Than Back-of-the-Envelope?

Moderator: Robert Putnam, Wright State Univ.

Audience will examine the stoichiometry and activities of H⁺ transporting mechanisms and relate them to the magnitudes of the so-called “acid-load,” imposed by metabolism and by transmembrane H⁺ influx

7:00–10:00 PM

Banquet

Deadlines

Registration

May 27, 1996

(both conferences)

Housing

June 11 (Snowmass Village)

June 29 (Madison)

APS Conference Office
301-530-7171

APS Conference

APS Conference II Neural Control of Breathing: Molecular to Organismal Perspectives July 21–25 • Madison, Wisconsin

Sunday, July 21

1:00–9:00 PM

Registration

2:00–2:15 PM

Welcome Address

Meeting overview and geographic orientation

2:15–5:25 PM

The Central Neural Network Mechanisms of Rhythm Generation

Moderator: E.E. Marder, Boston

Participants: N.I. Syed, Calgary; J-M. Ramierez, Göttingen; J.L. Feldman, Los Angeles; B.G. Lindsey, Tampa; J.M. Orem, Lubbock

5:30–7:30 PM

Opening Reception

featuring hors d'oeuvres and cash bar

Monday, July 22

9:00 AM–12:10 PM

Neurochemicals in Ventilatory Control

Moderator: D.E. Millhorn, Cincinnati

Participants: A.J. Berger, Seattle; M.S. Dekin, New Brunswick; D.W. Richter, Göttingen; M. Czyzyk-Krezeska, Cincinnati; G.D. Funk, Auckland; L.K. Kubin, Philadelphia

12:10–2:00 PM

Free Time

2:00–5:10 PM

Central CO₂-Sensory Mechanisms

Moderator: P. Scheid, Bochum

Participants: J.A. Neubauer, New Brunswick; E.E. Nattie, Hanover, NH; J.S. Erlichman, Dayton; H.V. Forster, Milwaukee; S.A. Shea, Cambridge, MA

5:10–7:30 PM

Free Time

7:30–10:00 PM

Poster Presentations

Tuesday, July 23

9:00 AM–12:10 PM

Integrated Ventilatory Responses: Sensory Mechanisms

Moderator: G.E. Bisgard, Madison

Participants: D.F. Donnelly, New Haven; G.G. Haddad, New Haven; T.G. Waldrop, Urbana; S.W. Mifflin, San Antonio; F.L. Powell, San Diego; E.N. Bruce, Lexington

12:10–1:30 PM

Free Time

1:30–4:00 PM

Poster Presentations

4:00–6:00 PM

Free Time

6:00–9:00 PM

Banquet

Wednesday, July 24

9:00 AM–12:10 PM

Phylogeny and Ontogeny in Ventilatory Control

Moderator: S.J. England, New Brunswick

Participants: N.J. Smatresk, Arlington, TX; E.W. Taylor, Birmingham, UK; M.A. Hanson, London; D.A. Bayliss, Charlottesville; M. Denavit-Saubié, Gif-Sur-Yvette; L. Ling, Madison

12:10–2:00 PM

Free Time

2:00–5:10 PM

Modulation and Plasticity in Ventilatory Control

Moderator: G.S. Mitchell, Madison

Participants: J.C. Houk, Chicago; D.R. McCrimmon, Chicago; D.L. Turner, Leeds; D.M. Katz, Cleveland; K.P. Strohl, Cleveland; G.C. Sieck, Rochester, MN

5:10 PM

Free Time

Thursday, July 25

8:30 AM–12:05 PM

Integrated Ventilatory Responses: Exercise and Sleep

Moderator: J.A. Dempsey, Madison

Participants: D.M. Ainsworth, Ithaca; D.F. Bogs, Missoula; R.F. Fregosi, Tucson; M.P. Kaufman, Davis; L. Adams, London; A.I. Pack, Philadelphia; W.K. Milsom, Vancouver

APS Conference

1996 Intersociety Meeting Integrative Biology of Exercise October 16–19 • Vancouver, British Columbia

Wednesday, October 16

2:00–8:00 PM

Registration Opens

6:00–8:00 PM

Opening Reception

hors d'oeuvres and cash bar

Thursday, October 17

8:00–11:00 AM

Comparative Exercise Physiology: Insights on Human Performance From Animals

Chair: D.R. Jones

Speakers: D.R. Jones, R.J. Full, W.K. Milsom, P.J. Butler, J.H. Jones, S.L. Lindstedt

8:00–11:00 AM

Central Neural Control of the Cardiorespiratory System During Exercise

Chair: T.G. Waldrop

Speakers: T.G. Waldrop, M.P. Kaufman, L.B. Wilson, G.A. Iwamoto, L. Adams, E. Garcia-Rill

11:00 AM–2:30 PM

Poster Sessions

2:30–5:30 PM

Plasticity of Muscle

Chair: S. Kandarian

Speakers: B. Russell, D.B. Thomason, K. Esser, J.A. Carson, R.W. Tsika

2:30–5:30 PM

Regulation of Glucose Utilization by Working Muscle

Chair: J.L. Ivy

Speakers: J.L. Ivy, L.J. Goodyear, A. Bonen, D.H. Wasserman, A.D. Baron

7:00–8:00 PM

Lecture: Hyperventilatory Response to Heavy Exercise: Causes and Consequences

Speaker: J.L. Dempsey

8:00–9:00 PM

Lecture: Magnetic Resonance Approaches in Exercise Physiology

Speaker: B. Balaban

Friday, October 18

8:00–11:00 AM

Linking Muscle Mechanics and Energetics: From Cross-Bridge to Locomotion

Chair: K.E. Conley and S.L. Lindstedt
Speakers: K.E. Conley, E. Homsher, T.L. Daniel, M.J. Kushmerick, L.C. Rome, S.L. Lindstedt

8:00–11:00 AM

Cardiovascular Plasticity/Exercise

Chair: M.H. Laughlin

Speakers: R.L. Moore, C.A. Tate, L. Leinwand, J.M. Lash, T.H. Hintze

11:00 AM–2:30 PM

Poster Sessions

2:30–5:30 PM

Force Modulation in Skeletal Muscle: Molecules to Motor Units

Chair: B.R. MacIntosh and J-M. Renaud

Speakers: D.G. Allen, H.L. Sweeney, B.R. MacIntosh, J-M. Renaud, C.J. de Luca, P.F. Gardiner

2:30–5:30 PM

Adaptations in Body Fluid Regulation to Physical Activity

Chair: E. Nadel

Speakers: S. Weinbaum, P. Watson, H. Nose, E. Nadel, G. Mack, P. Wagner

7:00–8:00 PM

Lecture: Molecular Approaches in Exercise Physiology

Speaker: F. Booth

8:00–9:00 PM

Graduate Student Poster Competition

Saturday, October 19

8:00–11:00 AM

Anabolic Effects of Exercise: A Systems Approach

Chair: D.M. Cooper

Speakers: D.M. Cooper, C. Roberts Jr., S. Mohan, G. Haddad, G. Attardi, F. Booth

8:00–11:00 AM

Fatigue

Chair: R. Fitts

Speakers: R. Enoka, J.K. Barclay, A. Wagenmaker, R. Fitts, R. Godt

11:00 AM–2:30 PM

Poster Sessions

2:30–5:30 PM

Vascular Remodeling: Angiogenic Growth Factors, Ischemia, and Exercise

Chair: R. Terjung

Speakers: O. Hudlicka, J. Abraham, E.F. Unger, J.F. Symes, R. Terjung

2:30–5:30 PM

Muscle Use and Overuse

Chair: B. Russell

Speakers: R. Lieber, R. Fielding, M. Jackson, R. Armstrong, S. Kandarian

7:00–9:00 PM

Banquet and Awards Ceremony

Keynote Speaker: To be announced

Second Announcement

St. Petersburg, Russia

Background

The International Union of Physiological Sciences (IUPS) will hold its General Assembly and the XXXIII International Congress of Physiological Sciences in St. Petersburg, Russia, from June 30 to July 5, 1997. The Congress site will be the Medical-Military Academy (formerly the emperor's Medical Surgical Academy), which, having been founded in 1798 by Paul I, the son of Catherine the Great, is one of the oldest and most attractive institutions of higher education and biomedical research in Russia.

The Congress will be held during the first week in July, which is the most fascinating time of the year in St. Petersburg. This is when the city is under the spell of the "white nights" and the sun sets for only two hours. There are magnificent palaces, Neva embankments, gardens, and parks, as well as about fifty museums in St. Petersburg and its suburbs (including the famous Hermitage and Russian Museum). Special tours for Congress participants and accompanying guests will be organized.

Program

The scientific program for the Congress was developed by an International Program Committee cochaired by Pavel Simonov (Moscow, Russia) and Stanley G. Schultz (Houston, TX). The theme of the scientific program will be "Integrative Physiology: From Molecules to Humans," a logical extension of the "date with the future of physiology" theme of the 1993 IUPS Congress in Glasgow. Each morning and afternoon session will open with a Plenary Lecture delivered by a scientist of international renown; the ten lectures will cover the spectrum of integrative physiology from intracellular signaling through emotions and cognition.

Complementing the symposia will be approximately thirty workshops dealing, more informally, with timely subjects. As at past Congresses, there will be poster sessions organized by topics and coordinated with the symposia and workshops. A call for posters will be published in the final announcement. A workshop on teaching physiology will be organized the week following the Congress.

Following is a preliminary program for the XXXIII IUPS Congress.

Plenary Lectures

On the Human Brain - Opening Ceremony (N.P. Bechtereva, Russia)
Receptors (P. Chambon, France)
Molecular Mechanisms Underlying Mammalian Development (P. Gruss, Germany)

Sensory (J. Hudspeth, USA)
Central Nervous System (E. Kandel, USA)
Reproduction (E. Knobil, USA)
Design and Use of Muscles for Maximal Performance (R.M. Alexander, UK)
Neuroreceptor to Brain Function (S. Nakanishi, Japan)
The Epithelial Sodium Channel: From Physiology to Physiopathology (B.C. Rossier, Switzerland)
Exocytosis (J. E. Rothman, USA)
Conditional Reflex and Psychophysics in the Framework of Neurophysiology (E.N. Sokolov, Russia)

Cell and Molecular Physiology

Symposia

- 001** *Intracellular Messengers* O.H. Peterson (UK) and A.N. Malviya (France)
- 002** *Molecular Mechanisms of Ion Channel Control* P.G. Kostyuk (Ukraine) and W. Stuhmer (Germany)
- 003** *Membrane Traffic and Protein Sorting* M. Cerejido (Mexico) and E.J. Rodriguez-Boulan (USA)
- 004** *Nitric Oxide: Regulator of Renal Vascular and Tubular Function* T.F. Luscher (Switzerland) and L. G. Navar (USA)
- 005** *Steroid Receptors* E.V. Jensen (Germany) and M. Muramatsu (Japan)
- 006** *Epithelial Transporters* S.C. Hebert (USA) and H. Murer (Switzerland)
- 007** *Non-genomic, Rapid Actions of Steroid Hormone* Y-Z. Chen (China) and R.L. Moss (USA)
- 008** *Apoptosis* P. Davies (USA)
- 009** *Gastric Acid Secretion and Cytoprotection* S.J. Konturek (Poland) and G. Sachs (USA)
- 009a** *Calcium Homeostasis* J. Potts (USA) and I. MacIntyre (UK)

Workshops

- 010** *Functional Neurochemistry of Excitatory Amino Acid Receptors* S.A. Dambinova (Russia) and R.J. Winthold (USA)
- 011** *Cross-Talk Between Apical and Basal Membranes in Epithelia* B.J. Harvey (Ireland)
- 012** *Local Calcium Signaling and Calcium Channels* I. Schulz (Germany)
- 013** *Epithelia of the Eye* M.M. Civan (USA)
- 014** *Control of Internal Ion Concentration* C.O. Lee (Korea)
- 015** *Ion Co- and Countertransporters* R. DiPolo (Venezuela)
- 016** *Cellular Compartmentation* J. Hoffman (USA)

XXXIII IUPS Congress

- 017** *Cell Modeling* H.J. Jongsma (The Netherlands)
018 *Gap Junctions: From Molecular Biology to Tissue Function* P.R. Brink (USA)
019 *Oxidant Regulation of Cellular Functions* S.J. Elliott (USA)
020 *Structure, Function and Regulation of ATPases in Epithelia* K. Geering (Switzerland)
021 *Developmental Aspects of Ion Transport* L.N. Ivanova (Russia)
022 *Nuclear Pores* H. Oberleithner (Germany)
023 *Cellular Calcium Signaling* W.J. Lederer (USA)

Ion-Water Balance and Renal Physiology

Symposia

- 024** *Aquaporins and Water Transport* P. Agre (USA) and S Sasaki (Japan)
025 *Cell Volume Regulation* M. Burg (USA) and F. Lang (Germany)
026 *Regulation of Salt and Water Metabolism* M. P. Blaustein (USA) and P.B. Persson (Germany)
027 *Renin-Angiotensin System* D. Ganten (Germany) and M.I. Phillips (USA)

Workshop

- 028** *Renal Transport of Organic Anions and Cations* K. J. Ullrich (Germany)

Respiration

Symposia

- 029** *Respiratory Mechanics* P.T. Macklem (Canada) and G. Miserocchi (Italy)
30 *Control of Respiration* S. Lahiri (USA) and P. Scheid (Germany)
031 *Gas Exchange and Pulmonary Circulation* J.P. Dvoretzky (Russia) and J.B. West (USA)
032 *Respiration in Extreme Environments* P. Cerretelli (Switzerland) and V.S. Novikov (Russia)

Workshop

- 033** *Respiratory Tract Electrolyte Transport in Health and Disease* H.E. Larsen (Denmark)

Muscle Physiology

Symposia

- 034** *Excitation Contraction Coupling and Molecular Mechanisms of Contraction* C. Franzini-Armstrong (USA) and H. Sugi (Japan)
035 *Molecular Motors* R.S. Orlov (Russia) and J.A. Spudis (USA)

- 036** *Pacemaker Activities in Cells* A. Noma (Japan) and K.M. Sanders (USA)

Workshops

- 037** *Membrane and Intracellular Mechanisms of Contraction Activation in Smooth Muscles* M.F. Shuba (Ukraine)
038 *Muscle Fibers Composition: Effects on Performance* F.Booth (USA)
039 *Mathematical Modeling of Muscle Energetics* R.H. Morton (New Zealand)

Environmental Physiology

Symposia

- 040** *Cellular Mechanisms in Thermal Regulation* J.A. Boulant (USA) and E. Simon (Germany)
041 *Adaptation to the Environment* M. Horowitz (Israel) and V.I. Medvedev (Russia)
042 *Maximal Performance in Locomotion* G.A. Cavagna (Italy) and B. Saltin (Sweden)
043 *Physiological Adaptation of Muscle to Use S. Schiaffino (Italy) and R.J. Schwartz (USA)*
044 *Oxygen, Antioxidants and Exercise* S.P. Chatterjee (India) and O. Hanninen (Finland)
045 *Space Physiology* A.I. Grigoriev (Russia) and J. Vernikos (USA)

Workshops

- 046** *Comparative Aspects of Temperature Regulation in Homeotherms* L. Folkow (Norway)
047 *Physiological Aspects of Exposure to Electromagnetic Fields* E.B. Lyskov (Russia) and K.H. Mild (Sweden)

Endocrinology

Symposia

- 048** *Neuroendocrine Effects of Cytokines* K. Fuxe (Sweden) and C.B. Saper (USA)
049 *Pancreatic B Cell Regulation* S. Misler (USA)
049a *Neuroendocrine Control of Thirst* M. McKinley (Australia) and A.K. Johnson (USA)

GI and Nutrition

Symposia

- 050** *Motility and Enteric Nervous System* J.B. Furness (Australia) and M.A. Medvedev (Russia)
051 *Gut Endocrine Mechanisms* J.J. Holst (Denmark) and R.A. Liddle (USA)
052 *Control of Food Intake* Y. Oomura (Japan) and G.P. Smith (USA)

XXXIII IUPS Congress

- 053** *Epithelial Secretion* P.Y.D. Wong (Hong Kong) and J.A. Young (Australia)
- 054** *Gut Growth and Differentiation* L.R. Johnson (USA) and E. Rozengurt (UK)
- 054a** *Genetic and Learned Mechanisms in Ingestive Behavior* D. Denton (Australia) and J. Fitzsimons (UK)

Cardiovascular

Symposia

- 055** *Regulation of Endothelial and Vascular Smooth Muscle Ion Channels* J. Daut (Germany) and F. Fay (USA)
- 056** *Local Control of Blood Flow* H.J. Granger (USA) and R.S. Reneman (The Netherlands)
- 057** *Cardiac Factors and Vascular Development - Transcription to Function* K.R. Chien (USA) and Y. Shevchenko (Russia)
- 058** *Regulation of Arterial Pressure, Cardiac Output and Body Fluid Volumes* J.E. Hall (USA) and O.S. Medvedev (Russia)
- 059** *Genetic Models of Human Vascular Diseases* V.J. Dzau (USA) and E.J. Mullins (UK)
- 060** *Electromechanical Aspects of Cardiac Function* M.R. Rosen (USA) and L.V. Rosenschtraukh (Russia)
- 061** *Neural Regulation of Blood Vessels* F. Abboud (USA) and V.M. Khayutin (Russia)

Workshops

- 062** *Nitric Oxide and Microcirculation* G. Kaley (USA)
- 063** *Coronary Physiology and Cardiac Metabolism* E. Feigl (USA)
- 064** *Myocardial Calcium* B. Lewartowski (Poland)

Fetal Physiology

Symposia

- 065** *Fetal - Maternal Interactions* J.R.G. Challis (Canada) and P.D. Gluckman (New Zealand)
- 066** *Prenatal Development of Organ Functions* E.R. Lumbers (Australia) and F.A. Van Assche (Belgium)
- 067** *Functional Organization of the Brain in Human Ontogenesis* D.A. Farber (Russia) and A. Diamond (France)

Autonomic Nervous System

Symposia

- 068** *Transmission in Autonomic Ganglia* E.M. McLachlan (Australia) and V.I. Skok (Ukraine)

- 069** *Visceral Afferent Mechanisms* D. Grundy (UK) and V.G. Kassil (Russia)
- 070** *Neural Mechanisms of Somatic and Autonomic Interactions* A.D. Nozdrachev (Russia) and A. Sato (Japan)

Ecological and Comparative Physiology

Symposia

- 071** *The Evolution of Visual Systems* J.K. Bowmaker (UK)
- 072** *Evolution of Physiological Systems* F. Huber (Germany) and V.L. Svidersky (Russia)
- 073** *Integrative Physiology and Evolutionary Design* J. Diamond (USA) and E. Weibel (Switzerland)

Synaptic Functions and Plasticity

Symposia

- 074** *Dynamics and Plasticity in the Visual System* U. Eysel (Germany) and C. Gilbert (USA)
- 075** *Mechanisms of Synaptic Transmitter Change* P. Anderson (Norway) and L.L. Voronin (Russia)

Workshop

- 076** *Control of Synaptic Release* S. Tucek (Czech Republic)

Motor Functions

Symposia

- 077** *Motor Maps and Population Coding in the Central Nervous System* A. Georgopoulos (USA) and U. Windhorst (Canada)
- 078** *Posture and Locomotion* A. Berthoz (France) and V. Gurfinkel (Russia)

Sensory Systems

Symposia

- 079** *Mechanotransduction* R. Busse (Germany) and O.H. Hamill (USA)
- 080** *Central Visual Processing* I.A. Shevelev (Russia) and W. Singer (Germany)
- 081** *Auditory Processing* J.A. Altman (Russia) and M. Konishi (USA)
- 082** *Cellular and Molecular Mechanisms of Sensory Transduction* J.F. Ashmore (UK) and D.A. Baylor (USA)
- 083** *Somatosensory System* Y. Iwamura (Japan) and M.J. Rowe (Australia)
- 084** *Pain: From Molecules to Perception* H.O. Handwerker (Germany) and W. Willis (USA)

XXXIII IUPS Congress

Workshop

- 085** *Mechanisms of Electro- and Echolocation* N. Suga (USA) and A.Y. Supin (Russia)

Higher Nervous Activity and the CNS

Symposia

- 086** *Conscious Vision (IBRO-IUPS)* S. Zeki (UK)
087 *Non-Invasive Study of Higher Brain Function* R. Hari (Finland) and M.E. Raichle (USA)
088 *Emotions: Interdisciplinary Approach* R.J. Davidson (USA) and T. Ono (Japan)
089 *Neural System for Learning and Memory* Y. Miyashita (Japan) and L.R. Squire (USA)
090 *Consciousness and Attention* Y. Kropotov (Russia) and R. Naatanen (Finland)
091 *Brain Systems Underlying Cognition* A.M. Ivanitsky (Russia) and M. Posner (USA)
091a *The Neurobiology of Sleep* M. Jouvet (France) and M. Mukhametov (Russia)

Workshop

- 092** *Memory Processes and Their Cellular Mechanisms* K.V. Anokhin (Russia) and S. Rose (UK)

Clinical Physiology

Symposium

- 093** *Ischemia: From Channel to Organ* D.J. Hearse (UK) and G.N. Kryzhanovsky (Russia)

Workshop

- 094** *Physiological Problems of Transplantation and Artificial Organs* V.I. Shumakov (Russia)

Immunology

Workshops

- 095** *Neuroimmunology* I.D. Stolyarov (Russia) and M. Rosental (USA)
096 *Blood-Brain Barrier* W. Kuschinsky (Germany)

General

Symposium

- 097** *Physiology and the Limits of Man: The Ethical Issues* A.M. Genin (Russia), K. Hartiala (Finland) and J-D. Vincent (France)

Workshop

- 098** *History of Physiology* M.M. Khananashvily (Russia) and T. Tansey (UK)

Accommodations

Hotel prices (Table 1) include accommodation in a chosen room type, breakfast, and tax. Payment conditions require a \$500 (US) deposit to be paid six months before the Congress. Should currency rates, taxes, or other fees by authorities increase substantially, the Secretariat reserves the right to adjust the prices as well as to make corresponding changes to the accommodation reservations should conditions change substantially.

Travel

St. Petersburg's International Airport, which is located 40 minutes from the City Center, can be reached from anywhere. There are direct flights from North America and a growing number of flights from European and Asian countries.

The official carrier to the Congress is Finnair, who will provide fare discounts and assistance to those attending the Congress. The most direct route to St. Petersburg is through Helsinki with either a connecting flight, train or boat from Finland or Sweden.

All participants will receive a warm welcome on arrival and will be provided with a guide and transport to take them to their reserved accommodation. Shuttle buses will be available to participants to take them from their hotels to the Congress site during their stay in the city.

Deadlines

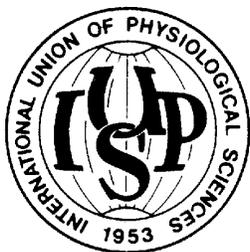
August 31, 1996: Deadline for returning Preliminary Registration Form. Only those people completing a Preliminary Registration Form will receive the Final Announcements.

September 1996: Distribution of Final Announcement and Abstract and Registration Forms

February 28, 1997: Date of receipt of abstracts. Abstracts must be postmarked on or before this date and must be accompanied by a completed Registration form and deposit.

Table 1. Hotel and accommodation prices

Hotel	Price Level per Night	
	Single	Double
Deluxe Class	\$300-475	\$350-525
Hotel Category II (Nevskij Palace or Astoria)	\$165-215	\$210-245
Hotel Category III (Pribaltiskaja, St.Peters- burg, Pulkovskaja)	\$105-125	\$105-155
Hotel Category IV or V (Ohtinskaja, Hostels, Dormitories)	\$75 and less	



IUPS 1997 (International Union of Physiological Sciences)
St. Petersburg, Russia
June 30-July 5, 1997
PRELIMINARY REGISTRATION FORM

Registration no.

Please return this preliminary registration form by August 31, 1996 to:

IUPS 1997
c/o CONGREX
P.O.Box 35
FIN-00621 HELSINKI
FINLAND
Tel: +358-0-7523611
Fax: +358-0-7520899

DELEGATE INFORMATION Please use block letters. Only one delegate per registration form.

Family name		Given (first) name and initials	
Title		Male	<input type="checkbox"/>
Position		Female	<input type="checkbox"/>
Institute			
Department			
Street address			
City and Postal/Zip code		Country	
Office telephone (international)		Telefax (international)	
Home telephone (international)		E-Mail address	
No of accompanying person(s)			

Please indicate your preliminary choice of accommodation.

HOTEL RATES

Please note that these special hotel rates are valid only when the booking is made through CONGREX and the total payment for your hotel reservation has been paid in advance.

CHOICE OF HOTEL ACCOMMODATION		Room type and approximate price level per night	
De luxe class	*****	Single room (USD 300-475) <input type="checkbox"/>	Double room (USD 350-525) <input type="checkbox"/>
First class	****	Single room (USD 165-215) <input type="checkbox"/>	Double room (USD 210-245) <input type="checkbox"/>
Second class	** or ***	Single room (USD 105-125) <input type="checkbox"/>	Double room (USD 105-155) <input type="checkbox"/>
Economy class	*	Single room (USD 75 and less) <input type="checkbox"/>	Double room (USD 100 and less) <input type="checkbox"/>
Arrival date:	JUNE _____, 1997	Departure date:	JULY _____, 1997
Special requests:		I wish to share room with:	

SYMPOSIA

Please indicate which Symposia/Workshops you are likely to attend. Enter up to ten choices using their Code number (eg 15) listed in the Second Announcement. Your first choice must correspond to the Symposium/Workshop for which you would like to submit the results of your investigations.

SYMPOSIA

Please indicate below (as a code; eg 15) your first and other possibility choices of Symposia/Workshops you would like to attend.

1	2	3	4	5
6	7	8	9	10

Searching on the World Wide Web: Where to Start

The Internet can be intimidating. The Magellan search engine estimates there are currently 16 million Web pages, with more added daily; at least 10,000 Gopher servers are accessible; and a full Usenet feed, with regional and private groups, consists of about 20,000 newsgroups. It is no wonder that finding information on a particular topic often seems like searching for a needle in the proverbial haystack, and it's easy to believe that you will never find what you need. Here are three simple techniques you can use to improve your odds.

There is more to the Internet than the World Wide Web.

Often people say "I looked on the Web and did not find anything—there must not be any information about that topic on the Internet." The Web and the Internet are not interchangeable; the Web is only a part of the Internet. If you want to get the most out of the Net, you need to be familiar with all of the Net. This includes Gopher, Telnet, FTP, Usenet, and listservs. If you can use these in addition to the Web, you are far more likely to find information about your topic.

Know how to search and where to search.

You need to know how and where to search to successfully find information on the Internet. There are many search engines available, but you need to know what is in the database before you search. For example, if I searched DejaNews (<http://www.dejanews.com>) for a web page, I would not get a single hit—DejaNews only indexes Usenet archives. Conversely, if I searched the excellent Yahoo index (<http://www.yahoo.com>) for Usenet archives, I would again go hitless—Yahoo only indexes Web pages. If I searched Yahoo

for a friend's personal home page, I probably would not find it. Yahoo (as a rule) does not index personal home pages. Several engines search more than one part of the Net. Alta Vista (<http://www.altavista.digital.com>) indexes Usenet and the Web; Magellan (<http://www.mckinley.com>) indexes Web pages, FTP sites, Gopher, and Usenet; and Infoseek (<http://guide.infoseek.com>) indexes Web pages, FTP sites, Gopher, and Usenet but also lets you restrict your search to one or more parts of the Net.

Structuring your search is important as well. Most search engines work from the title of the document, rather than the text, so use general terms. In addition, some search engines do not support Boolean searches (using operators like OR and NOT), but rather "fuzzy AND" searches. For example, if I do a Boolean search for "salmon AND fishing," I will probably get a lot of hits about fishing for salmon. If I do a fuzzy AND search for "salmon fishing," the search engine will retrieve every document that contains the words "salmon" or "fishing," but it will prefer documents that contain both terms. I will get some hits on salmon fishing, some on halibut or trout fishing, and some recipes for salmon croquettes.

Don't forget about FAQs. Many topics have an FAQ (frequently asked questions) list. You can find an excellent list of FAQs on a variety of topics at <http://www.cis.ohio-state.edu/hypertext/faq/usenet/>. An FAQ is usually an excellent introduction to a topic and can often point you to more specialized resources.

These tips, persistence, and a little luck are all you need to find what you are looking for. Happy surfing! ♦

Kelly Thompson

Here is a list of URLs of departmental and personal home pages of APS members. Point your browsers at:

<http://physiology.uthscsa.edu/> for the Graduate Program in Physiology at the University of Texas Health Science Center at San Antonio Home Page, submitted by Craig G. Crandall

<http://wings.buffalo.edu/academic/department/fnsm/bio-sci/> for the Department of Biological Sciences, State University of New York at Buffalo Home Page, submitted by Christopher A. Loretz

<http://zeus.bwh.harvard.edu/research/cet+ri.html> for the home page of the Center for Experimental Therapeutics and Reperfusion Injury at Brigham & Women's Hospital, Harvard Medical School, submitted by Gregory L. Stahl

http://www.hmc.psu.edu/depts/bsci/physio/dep_phy.htm at the Department of Cellular and Molecular Physiology at Pennsylvania State University College of Medicine

<http://www.physiology.uab.edu/> at the Department of Physiology and Biophysics at the University of Alabama, Birmingham

<http://www.med.virginia.edu/inter-dis/cvrc/home.html> at the University of Virginia Cardiovascular Research Center

Please send your URLs to webmaster@aps.faseb.org. Questions and suggestions for future columns are always welcome.

29 Teachers Named as Summer Research Fellows for 1996

The APS Council has approved the Education Committee selection of 29 teachers to participate in the 1996 Frontiers in Physiology Science Teacher Summer Research Program. This represents more than a 25% increase over last year in the number of teachers participating in the program. This increase in the number of qualified teachers participating in the program is due largely to the increase in cost sharing by host research institutions. Host research institutions will be providing nearly 20% of the funding for the program. Additional funding will be provided by the APS and through grants from the NSF and the NIDDK.

Middle and high school teachers participating in the Frontiers program will receive a fellowship of up to \$5,750; conduct physiology research for a seven-to-nine-week period in the laboratory of an APS member; and attend a one-week summer institute at the APS offices in Bethesda, MD, where each teacher will explore the Internet and learn how to translate their research experiences into classroom activities. Teachers will also attend the Experimental Biology '97 meeting in New Orleans, LA, where they and their hosts will be honored at a luncheon.

The 1996 summer research fellows and their APS research hosts are listed below. ❖

Madelyn D. Asperas, Woodland Middle School, East Meadow, NY
Dr. Seiichi Yasumura, Brookhaven National Laboratory, Upton, NY

Richard W. Carruba, Brackenridge High School, San Antonio, TX
Dr. Byung Pal Yu, University of Texas Health Science Center, San Antonio, TX

Katheryn E. Cassidy-Shannon, Del Crest Junior High, Del City, OK
Dr. Robert D. Foreman, University of Oklahoma Health Science Center, Oklahoma City, OK

Terri C. DeCresie, A.G. Cox Middle School, Winterville, NC
Dr. Stephen C. Wood, East Carolina University School of Medicine, Greenville, NC

Louise M. Gerl, Western Hills High School, Cincinnati, OH
Dr. Ronald W. Millard, University of Cincinnati College of Medicine, Cincinnati, OH

Nikki Faye Golar, Southwest High School, Macon, GA
Dr. T. Richards Nichols, Emory University, Atlanta, GA

Thomas Edward Haren, McKinley Senior HS, Canton, OH
Dr. Daniel L. Ely, University of Akron, Akron, OH

Clifford M. Harriman, Frances C. Richmond Middle School, Hanover, NH
Dr. Bruce A. Stanton, Dartmouth Medical School, Hanover, NH

DeLois Gene Harris, Dogan Middle School, Tyler, TX
Dr. Barry T. Peterson, University of Texas Health Center, Tyler, TX

Anthony W. Houle, Wheaton Warrentville South HS, Wheaton, IL
Dr. Shaun Morrison, Northwestern University Medical School, Chicago, IL

Evelyn B. Kelly, Fort King Middle School, Ocala, FL
Dr. M. Ian Phillips, University of Florida College of Medicine, Gainesville, FL

Tricia Kritzberger, Mitchell High School, Mitchell, SD
Dr. Gregory L. Florant, Colorado State University, Fort Collins, CO

Sue Lighthall, James Madison High School, San Antonio, TX
Dr. Andrew Tsin, The University of Texas, San Antonio, TX

Regina C. Long, Two Eagle River School, Pahlö, MT
Dr. Delbert L. Kilgore and Dr. Dona F. Boggs, The University of Montana, Missoula, MT

Vincent Joseph Lumetta, De LaSalle Collegiate High School, Warren, MI
Dr. Paul Standley, Wayne State University School of Medicine, Detroit, MI

Grace Lyon, Shiloh High School, Lithonia, GA
Dr. Timothy C. Cope, Emory University, Atlanta, GA

Sandra J. Mahl, Seymour Middle School, Seymour, IN
Dr. C. Subah Packer, Indiana University School of Medicine, Indianapolis, IN

G. Duane Nichols, Alhambra High School, Alhambra, CA
Dr. Richard L. Lubman, University of Southern California HMR, Los Angeles, CA

Cynthia Ann Orso, Millard Central Middle School, Omaha, NE
Dr. Kaushik P. Patel, University of Nebraska Medical Center, Omaha, NE

Carl Steven Rapp, University School, Johnson City, TN
Dr. William L. Joyner, East Tennessee State University, Johnson City, TN

Sarah Beth Riegel, Ankeney Junior High School, Beavercreek, OH
Dr. Julian Gomez-Cambronero, Wright State University/School of Medicine, Dayton, OH

Pamela Kay Runyan, Chester Nimitz Academy, San Antonio, TX
Dr. Vernon S. Bishop & Dr. Jeremiah Herlihy, University of Texas Health Science Center, San Antonio, TX

(continued on page 68)

Education

Summer Research Fellows

(continued from page 67)

Cuauhtemoc “Tim” Segovia, Dillard McCollum High School, San Antonio, TX

Dr. Roger J.M. McCarter, University of Texas Health Science Center, San Antonio, TX

Teresa Sheldahl, Manzano High School, Albuquerque, NM

Dr. William R. Gale, Jr., University of New Mexico School of Medicine, Albuquerque, NM

Steve Stultz, Macy Public School, Macy, NE

Dr. Irving H. Zucker, University of Nebraska College of Medicine, Omaha, NE

Marlene Tewner, St. Margaret Mary School, Harrisburg, PA

Dr. Kathryn F. LaNoue, Pennsylvania State University College of Medicine, Hershey, PA

Freeman R. Thompson, Booker T. Washington High School, Norfolk, VA

Dr. Russell L. Prewitt, Jr., Eastern Virginia Medical School, Norfolk, VA

Karen Ann Wickersham, Troy High School, Troy, MI

Dr. Diana L. Kunze, MetroHealth Medical Center, Charles H. Rammelkamp, Jr. Center for Education and Research, Cleveland, OH

Gwenever Marion Young, McEvoy Middle School, Macon, GA

Dr. Douglas C. Eaton, Emory University School of Medicine, Atlanta, GA

Public Affairs

Westinghouse Prohibits Student Use of Live Vertebrate Animals

APS has written to the Westinghouse Science Talent Search to object to changes in the rules and regulations that prohibit the submission of projects involving the use of live vertebrate animals in this year's talent search.

The new rules state that “if a student is working in a laboratory where animal experimentation is taking place, the student's research is eligible for entry in the Science Talent Search if: (1) the student has no physical contact with the animals; (2) the material on which the student is working (tissue, blood, etc.) is supplied to the student by the supervising scientist; and (3) the animals involved are sacrificed for a purpose other than the research being done by the student.”

APS Executive Director Martin Frank wrote in March to William Saunders, the director of the Westinghouse Talent Search's Youth Department, protesting the change. Frank noted that “one of the great benefits to advanced students of

the sciences participating in the Talent Search is the opportunity to work closely with scientists in their chosen fields.” However, because of the new rule, “the very brightest students of the biomedical sciences will now be channeled away from efforts to answer some of our most fundamental questions.”

Frank suggested instead that student scientists entering the Talent Search be allowed to work with laboratory animals when their work is appropriately supervised and conducted in compliance with relevant federal guidelines such as the Animal Welfare Act and the Guide to the Care and Use of Laboratory Animals.

Concerns about the change in the Talent Search rules can be directed to Saunders at the Westinghouse Science Service, 1719 N Street, NW, Washington, DC 20036. For a copy of the APS letter, contact Public Affairs Officer Alice Hellerstein at 301-530-7105. ❖

APS Underwrites New Health Series

The American Physiological Society has underwritten the local broadcast of a new public television series called Health Week. The program was developed by Maryland Public Television in association with the NIH in an effort to use the television news magazine format to present research-based health information to the American public.

The first half-hour pilot was broadcast on Maryland Public Television stations at 10:30 PM on Tuesday, February 27, following Nova and Frontline. It included segments about research on spinal cord injury, the genetic basis for obesity, and angiogenesis therapy for heart dis-

ease. A brief message concerning the APS as an underwriting sponsor was broadcast at the beginning and end of the program.

The second half-hour pilot was broadcast at the same time on Tuesday, March 19. It included segments concerning melatonin, flu vaccines, pain management, and angiogenesis and cancer.

If the pilots are successful, Maryland Public Television will seek national underwriters to sponsor the production of a year's worth of programs to be broadcast to 349 public television stations nationwide in 1997. ❖

APS President Provides Views on NIH to Congress

The American Physiological Society is grateful for the extraordinary efforts of its congressional champions, APS President Leonard S. Jefferson told a House Appropriations Subcommittee. Testifying March 5 before the Labor-HHS-Education Appropriations Subcommittee, Jefferson thanked Chairman John Porter (R-IL) for securing a 5.7% increase in NIH funding for Fiscal Year (FY) 1996.

Turning to the current appropriations cycle, Jefferson recommended that NIH be provided with a 6.5% increase in FY 1997. This is the increase recommended by two major NIH advocacy groups, the

FASEB Consensus Conference on FY 1997 funding and by the Ad Hoc Group for Medical Research Funding. It was also expected to be the level recommended by NIH Director Harold Varmus in his professional judgment budget.

Jefferson urged the Porter subcommittee to keep in mind the importance of integrative physiology to the fulfillment of NIH's mission of using science to solve health problems.

Last year the House panel wrote language in the report accompanying the NIH funding legislation that instructed NIH to make its resource allocation decisions on the basis of scientific opportunity. Jefferson encouraged the subcommittee to retain that emphasis again this year to protect NIH from the harmful effects of disease and mechanism-specific earmarks.

Jefferson spoke out in particular against the current system of legislated set-asides for Small Business Innovation Research (SBIR) grants, which is scheduled to rise next year from 2% to 2.5% of the extramural research budget. "NIH should uphold the same high standards of quality for SBIR grants as for RO1 grants, since this is where individual sci-



entists seek funding for their best ideas." He urged the subcommittee to "relieve NIH of the obligation to award a fixed percentage of its extramural budget as SBIR grants." Rep. Porter indicated that he was interested in pursuing this issue.

Jefferson also encouraged the subcommittee to continue its efforts to identify ways to reduce the burden of excessive federal regulations on the conduct of research. ❖



Animal Rights Activism Still a Problem

Animal rights activism has not "gone away," Frankie Trull wrote in a guest opinion column of the January/February *FASEB Newsletter*.

Trull is the president of the National Association for Biomedical Research and the Foundation for Biomedical Research, which provide legislative advocacy and educational materials concerning the humane use of animals in biomedical research. She warned of the continuing impact on science policy being made by the animal rights movement.

"Since extremists at least temporarily have stopped breaking-in, burning down, or otherwise destroying research projects in order to grab headlines, a false sense of security may allow our attention to be diverted," Trull wrote. "While animal research opponents thankfully have abandoned their worst criminal methods for now, they have not abandoned classrooms, computer networks, the courts, or the U.S. Congress."

Trull cited the results of a November

1995 Associated Press national poll, which found that two-thirds of adults agree to some extent that "an animal's right to live free of suffering should be just as important as a person's right to live free of suffering." Because uncritical acceptance of this view may have a negative impact on public policy governing research and its funding, she emphasized the need for strong input from researchers into public policy decisions in this area. ❖

Position Available

Vascular Biology. Postdoctoral position available to work on an NIH-funded project exploring the mechanisms by which the ions and hormones involved in calcium homeostasis modulate vascular smooth muscle function. Projects include the study of mechanisms by which 1,25-vitamin D modulates isoform-specific expression of the myosin and voltage-dependent calcium channels and an entirely new area exploring the cellular mechanism by which the receptor for extracellular calcium modulates vascular reactivity. Experience with protein biochemistry and/or vascular physiology/pharmacology techniques is highly desirable. Please submit curriculum vitae and names of three references to: R. D. Bukoski, PhD, Codirector, Section of Hypertension and Vascular Research, 8.104 Medical Research Building, University of Texas Medical Branch, Galveston Island, TX 77555-1065. ❖

Positions Available

There is a \$50 charge for each position listed. Positions will be listed in the next available issue of *The Physiologist* and immediately upon receipt on the APS Gopher.

A check or money order payable to The American Physiological Society must accompany the position listing. Purchase orders will not be accepted unless accompanied by payment. Ads not prepaid will not be printed. Copy must be typed double space and is limited to 150 words. Copy must reach the APS office before the 15th of the month, two months preceding the month of issue. Mail copy with payment to:

The Physiologist
APS
9650 Rockville Pike
Bethesda, MD 20814-39911

People and Places

John M. Brookhart (1913-1995)

The APS's 38th president, John M. Brookhart died of causes related to age on December 30, 1995 in Portland, Oregon. Jack Brookhart was born in Cleveland in 1913. He received his undergraduate and graduate training at the University of Michigan. In 1939, he completed the requirements for the PhD degree and went on to do postdoctoral work at Northwestern University. He served on the medical school faculties of Loyola University (1940-1946), the University of Illinois (1946-1947), and Northwestern University (1947-1949). In 1949 he moved to Portland, Oregon, as an Associate Professor of Physiology at the University of Oregon Medical School. In 1952 he was appointed chairman of the department, a position he held until 1979. From 1979-1983, he served as vice president of Academic Affairs of the Oregon Health Sciences University.

Brookhart considered Robert Gesell and S.W. Ranson as having important influences on his development as a scientist. He worked in Gesell's laboratory and then in Ranson's at a time when both were interested in the neural control of pulmonary ventilation but had different ideas regarding how the central control mechanisms were organized. During the period that he worked in Chicago, Brookhart collaborated with Fred Day and published a number of seminal papers on neural control of mating behavior in guinea pigs. His interests in neurophysiology were fostered by his association with H. W. Magoun at Northwestern University and G. Moruzzi at the University of Pisa in Italy. Brookhart also credited Theodore Boyd (his chairman at Loyola) for providing him with valuable lessons regarding persistence in science and continuing at the bench despite heavy teaching loads.

Brookhart's interests focused pri-



marily on ways in which brain function is manifested in motor neuron output. In his early studies he investigated neural control of respiration followed by a brief foray into hypothalamic regulation of mating behavior. Later, he studied the characteristics of corticospinal systems and spent the last years of his research career investigating postural control mechanisms.

Jack Brookhart's career was replete with public service for the NIH, the American Physiological Society, and for the university. His first appointment to an NIH study section occurred in 1951. After this appointment, he served on a succession of committees and councils and as a consultant to the NIH, the National Institutes of Neurological Diseases and Blindness, the National Science Foundation, and the Office of Naval Research. He served two terms (1959-1979) as a member of the Physiology Test Committee of the National Board of Medical Examiners.

Among the many honors that he received were the following: he was appointed a Fullbright Research Scholar at the University of Pisa (1956-1957), was an elected fellow of the American Association for the Advancement of Science (AAAS) in 1967, and was elected to foreign mem-

People and Places

bership in the Accademia della Science dell'Instituto di Bologna in 1967. He was the first recipient of the Ray G. Daggs Award of the APS in 1974.

Jack Brookhart served on the APS Council from 1960-1964 and as the 38th President of the APS (1965-1966). During his tenure as Councillor, the Society's constitution was revised to limit the independence of the Board of Publication Trustees and the Council-dependent Finance and Publication Committees were established. From 1960-1964, Brookhart served on the Editorial Board of the *Journal of Neurophysiology*. He was involved in the negotiations to purchase the journal from Yale University and Charles C. Thomas Company. He became chief editor of the *Journal of Neurophysiology* in 1964 and for the next ten years worked toward moving the journal to a place of eminence among scientific journals. Brookhart joined the Editorial Board of the *Handbook of Physiology* in 1967 and with Vernon Mountcastle was instrumental in revising the section on

the nervous system. He chaired the Finance Committee for APS for six years (1967-1973), during which time the reorganization of the Society's business operations occurred.

Jack Brookhart was chairman of the Physiology Department at the University of Oregon Medical School (in 1981 it became one of the Schools of the Oregon Health Sciences University) for 27 years. His greatest contributions at the university level were in teaching medical students and in organizing and administering the graduate program of the basic science departments. Brookhart taught neurophysiology to first- and second-year medical students, and in addition attended all the lectures presented by other faculty in the Medical Physiology course. The many hundreds of physicians who graduated from the school during the time that Brookhart was on the faculty surely remember and respect "Captain Jack" as a teacher and administrator in the medical curriculum. He served as the first Chair of the Graduate Council, the

administrative body of the graduate program in the school of medicine. He helped set up a program that has graduated many outstanding scientists since its inception in 1952. Brookhart always was willing to share equipment, space, and expertise with others in the scientific community. His generosity extended to members of the clinical departments as well as to those in private practice who wished to do research.

After Brookhart's retirement in 1983, he continued to be friend and benefactor of the Physiology Department. With his passing, we will miss this friendship but continue to remember his contributions to the teaching and research efforts at the medical school. Those who knew him on Council or major committees of the APS recall his devotion and good judgement that served the Society and its journals so well. ❖

John A. Resko
Oregon Health Sciences University

Deceased Members*

A. Clifford Barger	Brookline, MA
Leslie L. Bennett	Albany, CA
Herbert J. Berman	Boston, MA
Jay W. Constantine	Mystic, CT
Robert Scott Conway	Belle Mead, NJ
Lewis Dexter	Walpole, MA
Melvin J. Fregly	Gainesville, FL
Sidney A. Harris	Mill Valley, CA
Eugene U. Still	Owensboro, KY

* Notifications received since October 25, 1995.

Please notify APS Membership of any change in your status as soon as possible. The change will be printed in the next available issue of *The Physiologist* and entered in our member records.

People and Places

Latifeh Amini-Sereshki has moved from the Department of Adult Health & Illness, University of Pennsylvania, Philadelphia, PA, to the Department of Biology, Worcester State College, Worcester, MA.

Moving from the Department of Surgery, Michigan State University, East Lansing, MI, **Irshad H. Chaudry** has accepted a position in the Department of Surgery, Rhode Island Hospital and Brown University School of Medicine, Providence, RI.

Formerly affiliated with the Division of Environmental Physiology, Johns Hopkins University, Baltimore, MD, **Chung-Long Chou** is now with the Department of Physiology and Biophysics, National Defense Medical Center, Taipei, Taiwan, R.O.C.

Howard D. Colby has recently moved from the Department of Pharmacology & Toxicology, Philadelphia College of Pharmacy and Science, Philadelphia, PA. Colby has accepted a position as Associate Dean Academic Affairs, Albany College of Pharmacy, Union University, Albany, NY.

Recently joining the Center for Anesthesiology Research, Cleveland Clinic Foundation, Cleveland, OH, **David V. Defily** moved from the Department of Medical Physiology, Texas A&M University, College Station, TX.

Michael D. Delp is no longer affiliated with the Allegheny-Singer Research Institute, Medical College of Pennsylvania, Pittsburgh, PA. Delp is

now with the Department of Health and Kinesiology, Texas A&M University.

Having accepted a position with the Department of Health Sciences, Boston University, Boston, MA, **Arthur Roger Fielding** has left the USDA Human Nutrition Research Center, Tufts University, Boston, MA.

Recently, **Horst B. Fischer** accepted a position with the Department of Cell Biology and Physiology, University of Pittsburgh School of Medicine, Pittsburgh, PA. Prior to his new appointment, Fischer was affiliated with the Department of Molecular & Cell Biology, University of California, Berkeley, CA.

Ann Harrison has left the Department of Physiology, United Arab Emirates University, Al-Ain, United Arab Emirates. Harrison has joined the Department of Physiology, St. Georges University School of Medicine, St. Georges, Grenada, West Indies.

Moving from the Department of Medicine, University of California, San Diego, CA, **Steven C. Hempleman** has joined the Department of Biological Sciences, Northern Arizona University, Flagstaff, AZ.

Patricia Ann Lee has now joined the Department of Pharmacology, Amgen Boulder Inc., Boulder, Co. Previously, Lee was affiliated with the Pediatric Critical Care Research, Humana Hospital Medical City, Dallas, TX.

Now with the Department of Internal Medicine, Rueil-Malmaison Center,

Synthelabo, Rueil-Malmaison, France, **Yvan Lopez** was formerly with the Department of Pharmacology, University of Arizona, College of Medicine, Tucson, AZ.

Josef Moravec was previously affiliated with the Department of Cardiology Cellulaire, INSERM, Dijon, France. Now, Moravec is affiliated with the Department of Physiology, Claude Bernard University, Lyon, Villeurbanne, France.

Sushil K. Sarna has left the Department of General Surgery, Medical College of Wisconsin, Milwaukee, WI. Sarna is now affiliated with Surgical Research, Zablocki VA Medical Center, Milwaukee, WI.

Once a member of the Department of Physiology, University of North Carolina, Chapel Hill, NC, **Stephen P. Schneider** is now affiliated with the Department of Anatomy, Michigan State University, East Lansing, MI.

Gregory S. Smith has accepted a position with the Surgical Research Institute of Saint Louis University Health Sciences Center, St. Louis, MO. Prior to this new position, Smith was assigned to the Department of Surgery, University of Texas Medical School, Houston, TX.

Margaret Ann Vizzard moved from the Department of Pharmacology, University of Pittsburgh School of Medicine, Pittsburgh, PA; Now, Vizzard is with the Department of Neurology, University of Vermont College of Medicine, Burlington, VT.

APSTRACTS: an online abstract publication

Available at gopher.gopher.uth.tmc.edu 3300 or on the Web at <http://www.uth.tmc.edu/apstracts>. If you do not have access to a gopher and would like to receive free information, send e-mail to: aps_server@oac.hsc.uth.tmc.edu.

News from Senior Physiologists

Letter to Harold S. Weiss

Domenic A. DeBias writes, "I am still Professor and Chairperson of the Department of Physiology and Pharmacology at Philadelphia College of Osteopathic Medicine, a position I held since 1975 when I arrived here. Previous to that I had spent 18 years at Jefferson Medical College on the faculty after my graduation from Jefferson.

"I am also presently Assistant Dean for Special Training Programs, after having served as Assistant Dean for Basic Sciences since 1979.

"I already informed my administrators that I will retire at age 72 because I am anxious to see the curriculum changes I had instituted at the college become established. Essentially I combined physiology, pharmacology, internal medicine, pathology, and geriatrics into a single course titled 'Pathophysiological Basis of Medicine.' And, as the coordinator, I've been very busy. Hopefully, the course should be on a

solid foundation in about two years which will signal my retirement."

Letter to Suk Ki Hong

Allan D. Callow writes, "I work a 60-70 hour week on vascular biology research, using knockout apo E deficient mice as a model of atherosclerosis and gene transfer for its control. Our second project is the molecular biology of restenosis after coronary angioplasty and various arterial revascularization procedures. We rely heavily on cell culture models and when animals are required to validate the data we use mice, rats, and rarely rabbits. The laboratory's funding is 85% NIH. More and more we seek funds from industry, for the university is less able to provide.

"Approximately 40% of my time and effort is spent in writing and rewriting NIH applications. Time available to do research has been steadily dwindling because of the demands of seeking

funds. Fifteen percent of my time is spent on university affairs, committees, teaching, and personal professional affairs, i.e., society activities.

"1995 saw the publication of a 1776-page text I co-edited and 1996 [saw] another text written singlehandedly, both enormously time-consuming efforts [that], although ego satisfying, delayed research activities unduly.

"My greatest concerns are shrinking research funds, the outrageously low stipends available for pre- and post-docs—our greatest national resource—and the excess years post-docs are forced to spend as such because of the paucity of available appointments.

"It is a wonderful life. I would do it all again. Advice? Treacherous ground here. I would pick a forward-looking mentor with good managerial skills and seek some administrative and business experience during my training." ❖



Sayeski Receives Graduate National Achievement Award

Peter Sayeski, a student member of APS, was awarded the National Graduate Achievement Award on December 8, 1995, at the banquet of the annual meeting of the Council of Graduate Schools in Washington, DC. The award, which carries a \$1,000 prize, is funded by Alpha Epsilon Lambda, the National Association of Graduate Students.

Sayeski is a doctoral candidate in the Department of Physiology and Biophysics at the University of Alabama, Birmingham. His mentor is Jeff Kudlow. Sayeski's dissertation was on *The Cloning and Characterization of the Mouse Glutamine:fructose-6-phos-*

phate Amidotransferase (GFAP). Sayeski was nominated by the director of the UAB Graduate Program, Gil Hageman.

Sayeski has received other prizes at UAB, including the Samuel Barker Award for Excellence in Graduate Studies (1995) and the Student Affairs Award (1994). He also has won research awards at the Graduate Student Research Day and the Department of Medicine's research competition.

Sayeski will be starting his postdoctoral training with the Department of Pathology at Emory University after graduating from UAB. ❖

Book Reviews

The Limits of Medicine: How Science Shapes Our Hopes for the Cure

Edward S. Golub

New York: Random House, 1994, 226 pp., illus., index, \$23.00

ISBN: 0-8129-2141-0

This is a remarkable book. In only 226 pages the author has given us an overview of the past 2,500 years of science and medicine in the Western World. The book is full of valuable information for biomedical scientists, but it was written for a much wider audience. Golub states that he wrote the book so that everyone could understand the problems involved in the delivery of health care in the US. He wants to enable people to participate rationally in the decisions that are being made now to change medical care in the US. The language is straightforward, and technical terms are explained whenever they are introduced. Large print, subdivisions of the text, and an index of terms and topics also contribute to make the book reader friendly.

Golub shows convincingly that, until the beginning of this century, death due to infectious disease was a familiar part of life for most people and average life expectancy was only about thirty years. Epidemics spread over large parts of the known world and as much as one-third of the population could be wiped out in a single year. Since the time of the ancient Greeks the signs and symptoms of illnesses had been accurately recorded. It was known that disease was transferred between people who lived in proximity and that if attention was paid to hygiene the number of deaths could be minimized, but the proximal cause of illness was not understood.

About 500 years ago, when modern science began, thinking people became convinced that the use of reason would allow them to understand how the world works. The laws of physics and chemistry that were established allowed for spectacular progress in transportation, mining, and manufacturing, and by the eighteenth century people in industrialized countries had richer, more varied lives than ever before.

The new science did not affect medicine until the beginning of the nineteenth century. The systematic recording of human anatomic data and of the changes that are observed during various illnesses began at that time and still continues. Then the role of living microorganisms in causing disease was discovered, and rapid progress in the medical sciences began. The identification of a specific cause for some diseases made specific treatment and/or prevention of those diseases possible and increased interest in using science to study biomedical problems. At this point, Golub distinguishes between scientists who study the application of science to medicine and physicians who treat sick individuals. He warns us not to rely on experts when making decisions about people's lives.

The rest of the story is told primarily through anecdotes about the lives of major players in the field of bacteriology and immunology. These anecdotes are interesting and amusing, but unfortunately Golub gets carried away. He slips into the assumption that all medicine has become "Medical Science," that the concentration on the study of ever smaller subunits of the body is inevitable, and that we must accept the word of "experts." He states that medical science is dominated by "paradigms," a term that a physicist, Thomas Kahn, introduced into the discussion of the philosophy of science in 1962.

Kahn used the term in several different ways. Golub accepts this ambiguity and states that a paradigm refers to both the fundamental assumptions and the rules of analysis in a given specialty. Investigators work within rigid rules and limits set by the paradigm and understand only their narrow specialty. No doubt this is true of many employees in the "medical industrial complex," but it is not how scientists work. Golub then states that at any time in history there can be only one paradigm (major basic assumption), but this paradigm at times changes abruptly. Progress in science depends on these inexplicable sudden paradigm changes. He maintains that for the last 100 years the dominant paradigm has been the specificity of disease, a concept that led not only the general public but also medical

scientists to demand specific cures for diseases from medical technology.

This presentation undermines the author's aim of engaging lay people in thoughtful discussions about science as it affects medicine and health care. Before such meaningful discussions between lay people, scientists, and physicians are possible, all must agree to use unambiguous terms. Scientists have the responsibility of explaining how they work. We do indeed accept major unproved assumptions, such as the following: 1) There is an essential stability in the universe. In studying human beings we now know that human anatomy has not changed in the last 100,000 years. 2) Biological function can be understood in terms of physical and chemical laws. 3) The laws of biological function can be learned by experimentation.

Experimental science requires a thorough knowledge of all previous observations in the field. This is why the precise and clear publication of all findings in the open literature is the first commandment for scientists. When designing experiments scientists must keep in mind the appropriate dimensions of space and time for their investigations. The concepts they test are generally ones that can be disproved by their measurements since this can be done with far fewer tests than an attempt to establish that a concept is correct. Progress in medical science is the result of thousands of individual experiments accurately reported and the insights scientists gain by studying the records and observing patients and healthy people.

I highly recommend this book to my fellow physiologists and hope that they will read to the end. The author, who seems to champion the domination of reductionist science and molecular biology, shows from experimental data how absurd is the assertion that molecular biology is the future of medicine. On the very last page he expresses his belief that we must return to Claude Bernard's concept of the constant "milieu interieur" in health, i.e., to the study of physiology in order to understand health and disease.

*Edith E. Rosenberg
Howard University*

Book Reviews

Essentials of Biochemistry

Second Edition

Dorothy E. Schumm

Boston, MA: Little, Brown, 1995, 382 pp.,
illus., index, \$29.95

ISBN: 0-316-77531-2

What should be the objective of a review

text for students in the medical sciences? The answer to this question is indeed a difficult one to formulate as the lines between biochemistry, cell biology, and molecular biology are quite fuzzy. Those who set out to provide such a work have taken on an enormous task. Dorothy Schumm has revised her first edition of *Essentials of Biochemistry*

for the intended audience of "students in medicine, dentistry, pharmacy, and nursing." "In addition," she states, "graduate students in the medically related sciences of anatomy, physiology, pharmacology, pathology, microbiology, and immunology, may also find this text fulfills their need for basic bio-

(continued on page 76)

Books Received

The Aging Cardiovascular System: Physiology and Pathology

Vladimir V. Frolkis, Vladislav V. Bezrukov, Oleg K. Kulchitsky, (Editors)
New York: Springer, 1996, 238 pp., illus.,
index, \$55.95
ISBN: 0-8261-9050-2

Alpha and Gamma Motor Systems

Anthony Taylor, Margaret H. Gladden, and Rade Durbaba (Editors)
New York: Plenum, 1996, 639 pp., illus.,
index, \$139.50
ISBN: 0-306-45186-7

Autonomic Ganglia

Elsbeth M. McLachlan (Editor)
The Autonomic Nervous System
Geoffrey Burnstock (Series Editor)
London, UK: Harwood Academic, 1995,
518 pp., illus., index, \$150.00
ISBN: 3-7186-5148-3

Carbon Dioxide and Terrestrial Ecosystems

George W. Koch and Harold A. Mooney (Editors)
San Diego, CA: Academic, 1996, 444 pp.,
illus., index, \$79.95
ISBN: 0-12-505295-2

Current Issues and New Frontiers in Animal Research

Kathryn A.L. Bayne, Molly Greene, and Ernest D. Prentice (Editors)
Greenbelt, MD: SCAW, 1995, 105 pp.,
index, \$35.00
LCCN: 95-71537

Fatigue: Neural and Muscular Mechanisms

Simon C. Gandevia, Roger M. Enoka, Alan J. McComas, Douglas G. Stuart, and Christine K. Thomas (Editors)
Advances in Experimental Medicine and Biology, Volume 384
New York: Plenum, 1995, 541 pp., illus.,
index, \$125.00
ISBN: 0-306-45139-5

The Frontal Lobes and Voluntary Action

Richard Passingham
Oxford Psychology Series, No. 21
New York: Oxford University Press, 1995,
299 pp., illus., index, \$28.00
ISBN: 0-19-852364-5

Life and Death in the Nervous System: Role of Neurotrophic Factors and Their Receptors

C.F. Ibáñez, T. Hökfelt, L. Olson, K. Fuxe, H. Jörnvall, and D. Ottoson (Editors)
Wenner-Gren International Series, Volume 67
Oxford, UK, Pergamon: 1995, 472 pp.,
illus., index, \$140.00
ISBN: 0-08-042527-5

Medical Physiology

Rodney A. Rhoades and George A. Tanner (Editors)
Boston, MA: Little, Brown, 1995, 839 pp.,
illus., index, \$59.95
ISBN: 0-316-74228-7

Molecular and Subcellular Cardiology: Effects of Structure and Function

Samuel Sideman and Rafael Beyar (Editors)
Advances in Experimental Medicine and Biology, Volume 382
New York: Plenum, 1995, 354 pp., illus.,
index, \$95.00
ISBN: 0-306-45123-9

The Neurological Side of Neuropsychology

Richard E. Cytowic
Cambridge, MA: MIT Press, 1995, 529
pp., illus., index, \$55.00
ISBN: 0-262-03231-7

Neurotransmitter Release and Its Modulation: Biochemical Mechanisms, Physiological Function and Clinical Relevance.

David A. Powis and Stephen J. Bunn (Editors)
New York: Cambridge University Press,
1995, 356 pp., illus., index, \$49.95
ISBN: 0-521-44616-3

Perceptual Consequences of Cochlear Damage

Brian C.J. Moore
Oxford Psychology Series, No. 28
New York: Oxford University Press, 1995,
232 pp., illus., index, \$82.00
ISBN: 0-19-852330-0

Book Reviews

(continued from page 75)

chemistry.”

After thoroughly examining the second edition, I would suggest its utility to a more limited audience with a narrower scope. Medical students will find modern developments missing, while the practice questions avoid both the newer formats and the goal of multidiscipline integration on the USMLE Part I licensure examination. An emphasis has been placed on eukaryotic cells, which may require the student audience to consult additional resources for the biochemistry of eubacterial systems.

The review book is divided into eight sections comprising the cell, molecular biology, proteins, metabolism of carbohydrates (the central pathways), lipid metabolism, amino acid metabolism, nucleotide metabolism, and integration of metabolism. The layout is simple, with a list of objectives for each chapter, although figures and tables need better design, particularly with font styles and size. Many important terms are placed in bold face. However, important concepts on a plethora of topics, many related to clinical sciences, are buried in the narrative, easily missed by the average student in search of highlighted information. The text would be better served by more carefully crafted headings and the use of better designed figures that emphasized concepts and de-emphasized the two-dimensional structures, especially those molecular structures with nonsense bonding characteristics.

The choice of topics is interesting but somewhat limited for a review text. Examples of the text's deficiency are the following. 1) The ribosome is illustrated with only an A and P site, no E site. 2) There is no discussion of the structure of antibodies and their diversity, an important topic in protein structure and function. 3) Within the chapter on specialized proteins,

there is no mention of dystrophin and related proteins, an especially conspicuous omission in light of the wealth of information about muscular dystrophy. 4) Proteins important to the cascade involved with vision are introduced under the topic of vitamins. Thus there is a lack of information about the concept of regulating the light-sensing mechanism. 5) Although Wilson's disease is mentioned for copper metabolism, there is no mention of Cooley's anemia for iron metabolism. 6) No mention of the copper, zinc superoxide dismutase, which appears associated with amyotrophic lateral sclerosis, or the manganese superoxide dismutase found within mitochondria. These are but a few of the deficiencies found in the text. There are even errors in the questions and answers, such as the following, "Tay-Sachs disease is due to the lack of a hexamidase." I assume the author means hexosamidase.

Several drawbacks to writing a narrowly focused review text of biochemistry include length constraints and missed opportunities to connect to other basic sciences. In such circumstances, it would be useful to direct the audience to appropriate resources. Probably the most serious concern is the weighted presentation of individual facts and terms over concepts and themes.

In general, although review texts aim to provide a broad, yet terse, summary of a particular field, their construction requires special attention to the kinds of information that today's medical and basic science students require. This text falls short in many respects. Essentials of Biochemistry may be useful for students that need only cursory treatment of limited biochemistry topics, but I would carefully consider the available options. ❖

Eric C. Niederhoffer
Southern Illinois University

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Announcement

NIH Sponsors Workshop

The NIH Office for Protection From Research Risks (OPRR) is continuing to sponsor workshops on implementing the Public Health Service Policy on Humane Care and Use of Laboratory Animals.

This workshop is titled "The Role of the Institutional Official in Compliance With the Animal Welfare Act and the PHS Policy on Humane Care and Use of Laboratory Animals." It will take place on May 16-17, 1996, at Wright State University, Dayton, OH 45435. Below is listed registration information.

Registration: Theresa Atwood
Office of Conference and Events
Wright State University
3640 Colonel Glenn Highway
Dayton, OH 45435
Tel: 513-873-5512
Fax: 513-873-5517

Sponsored by Central State University, Wilberforce, OH; Ohio University, Athens, OH; Wright State University, Dayton, OH.
Fee: \$150

This workshop will address the responsibilities of the institutional official in assuring the institutional program for animal care and use complies with the PHS Animal Welfare Policy and the USDA Regulations.

A knowledgeable and supportive institutional official is essential for establishing and maintaining a high quality animal care and use program. Topics to be addressed will include:

- the role of members of the IACUC
- the role of the institutional official in noncompliance
- methods for evaluating the effectiveness of the institutional program for animal care and use

Announcement

- determining how effectively the program meets its mandates.

Evaluation of the IACUC minutes, the IACUC semiannual program and facility reviews, and other indicators of program effectiveness will be discussed.

For further information concerning future NIH/OER/OPRR Animal Welfare Education Workshops, please contact: Darlene M. Ross, Education Coordinator, Office of Protection From Research Risks, National Institutes of Health, 6100 Executive Blvd., Suite 3B01 (MSC 7507), Rockville, MD 20892-7507, Tel: 301-496-8101 X 233, fax: 301-402-0527. ♦

Kennedy Institute of Ethics and Poynter Center Sponsor Conference

This conference, entitled "Ethical Issues of Animal Research," will take place May 30-June 1, 1996 in Bloomington, Indiana. The conference is for those interested in questions of ethics and animal use, and will present a well-balanced wide range of moral perspectives on the ethical dilemmas of balancing human benefits against animal harms in scientific research.

The registration fee is \$300 if paid by

May 1, 1996. For more information, write to Kenneth D. Pimple, Research Associate, Poynter Center for the Study of Ethics and American Institutions, 410 North Park Avenue, Bloomington, IN 47405; Tel: 812-855-0261; Fax: 812-855-3315; e-mail: pimple@indiana.edu.

The Poynter Center has a Web page at <http://www.indiana.edu/~poynter/index.html> ♦

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SmithKline Beecham
Squibb Corporation
Sutter Instrument Company
Wyeth-Ayerst Laboratories
Zeneca, Inc.

Scientific Meetings and Congresses

- 17th Annual International Gravitational Physiology Meeting**, April 14-19, 1996, Warsaw, Poland. *Information:* Professor Hilding Bjurstedt, Environmental Physiology Laboratory, Karolinska Institute, 171 77 Stockholm, Sweden. Tel: 46-8334012; Fax: 46-8339702.
- 21st Annual AAAS Colloquium on Science and Technology Policy**, April 17-19, 1996, Washington, DC. *Information:* Directorate for Science and Policy Programs, American Association for the Advancement of Science, 1333 H Street, NW, Washington, DC 20005. Tel: 202-326-6600; Fax: 202-289-4950; e-mail: science_policy@aaas.org.
- ARVO Annual Meeting**, April 21-26, 1996, Ft. Lauderdale, FL. *Information:* ARVO Central Office, 9650 Rockville Pike, Bethesda, MD 20814-3998. Tel: 301-571-1844; Fax: 301-571-8311.
- 6th Annual Cell Adhesion Molecules and Matrix Proteins**, May 6-7, 1996, San Francisco, CA. *Information:* IBC USA Conferences, 225 Turnpike Road, Southborough, MA 01772-1749. Tel: 508-481-6400; Fax: 508-481-7911.
- Society for Information Display International Symposium Seminar & Exhibition**, May 12-17, 1996, San Diego, CA. *Information:* Russel Martin, Xerox PARC, 3333 Coyote Hill Road, Palo Alto, CA 94304. Tel: 415-812-4538; Fax: 415-812-4605; e-mail: ramartin@parc.xerox.com
- Biomechanics and Neural Control of Movement IX: Neural-Mechanical Control: Interaction Between Neural Circuits and Biomechanics**, June 1-6, 1996, Mt. Sterling, OH. *Information:* Engineering Foundation, 345 E. 47th Street, New York, NY 10017. Tel: 212-705-7836; Fax: 212-705-7441; e-mail: engfnd@aol.com.
- 6th European Symposium on Life Sciences Research in Space**, June 16-20, 1996, Trondheim, Norway. *Information:* T.-H. Iversen, Norwegian University of Science and Technology, Department of Botany—Plantebiosenteret, N-7055 Dragvoll, Norway. Tel: 47-7359 6087; fax: 47-7359 0177; e-mail: torive@alfa.avh. unit.no
- Advances in the Understanding and Treatment of Multiple Sclerosis**, June 17-18, 1996, San Francisco, CA. *Information:* IBC USA Conferences, Inc., 225 Turnpike Road, Southborough, MA 01772-1749. Tel: 508-481-6400; fax: 508-481-7911.
- 12th International Symposium on Flavins and Flavoproteins**, June 30-July 6, 1996, Calgary, Canada. *Information:* Kenneth J. Stevenson, Department of Biological Sciences, University of Calgary, Calgary T2N 1N4, Alberta, Canada. Fax: 403-284-4184.
- 4th IUBMB Conference: The Life and Death of the Cell**, July 14-17, 1996, Edinburgh, Scotland. *Information:* The Conference Assistant IUBMB 1996, The Biochemical Society, 59 Portland Place, London W1N 3AJ. Tel: 0171 580 5530; fax: 0171 637 7626; e-mail: meetings@biochemsoc.org.uk.
- Overtraining & Overreaching in Sport: Physiological, Psychological, and Biomedical Considerations**, July 14-17, 1996, Memphis, TN. *Information:* Laura Wilhelm, Tel.: 800-747-4457; Int. Tel.: 217-351-5076.
- Bioartificial Organs: Science and Technology**, July 21-26, 1996, Nashville, TN. *Information:* Barbara Hickernell, Engineering Foundation Conferences, 345 E. 47th Street, New York, NY 10017. Tel: 212-705-7836; fax: 212-705-7441; e-mail: engfnd@aol.com.
- VI World Conference on Clinical Pharmacology and Therapeutics and VI Congress of the Interamerican Society for Clinical Pharmacology and Therapeutics**, August 4-10, 1996, Buenos Aires, Argentina. *Information:* CPT96 and ISCPT VI, Marcelo T. de Alvear 1980, 1122 Buenos Aires, Argentina. Tel: 54-1-81-6650; Fax: 54-1-814-2733.
- Frontiers in Maternal, Fetal, and Neonatal Health: Programming for a Lifetime of Good Health**, August 9-12, 1996, Ithaca, NY. *Information:* Linda Alfreds, T1 001 VRT, College of Veterinary Medicine, Cornell University, Ithaca, NY 14853-6401. Fax: 607-253-3198.
- Bernstein's Traditions in Motor Control**, August 23-25, 1996, University Park, PA. *Information:* Mark Latash, Pennsylvania State University, Biomechanics Laboratory, University Park, PA 16802. Tel: 814-863-5374, Fax: 814-865-2440, e-mail: mll11@psu.edu.
- Society of General Physiologists 50th Annual Meeting on Cytoskeletal Regulation of Membrane Function**, September 5-7, 1996, Woods Hole, MA. *Information:* Society of General Physiologists, PO Box 257, Woods Hole, MA 02543-0257. Tel: 508-540-6719; Fax: 508-540-0155; e-mail: sgp@mbl.edu.
- 4th International Dermatology Symposium: Sebaceous Gland and Its Disorders**, September 13-15, 1996, Berlin, Germany. *Information:* Ch. C. Zouboulis, Department of Dermatology, University Medical Center, Benjamin Franklin, Free University of Berlin, Hindenburgdamm 20, D-12200 Berlin, Germany. Tel: 49-30-8445-2808; Fax: 49-30-8445-4262.