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Inside

Council Meets in Bethesda
p. 212

EB '98 Preview
p. 219

Career Corner
p. 237

The Physiology and Functional Diversity of Amiloride-Sensitive Na^+ Channels
p. 265

The Banbury Conference

Genomics to Physiology and Beyond: How Do We Get There?

Allen W. Cowley, Jr.
Medical College of Wisconsin

Recognition that the Human Genome Project is likely to result in the identification of nearly all 100,000 human genes by 2002 has stimulated the leadership of APS to develop strategies to expedite the application of physiological approaches for the research that will be required to develop an understanding of the relationships between genes and function. The Society's first effort brought together a small, diverse group of scientists to plan how to link this knowledge to human health. The meeting was organized and funded by APS with additional support from Norvartis Corporation and Burroughs Wellcome Foundation. A group of 33 internationally recognized scientists from the fields of molecular genetics, physiology, and pharmacology (basic and clinical), representing academia, industry, and government, convened at the Banbury Conference Center in Cold Spring Harbor, NY, to consider how to harness the vast potential of the Human Genome Project. Nobel laureate James D. Watson, whose discoveries and leadership paved the way for the Human Genome Project, opened the meeting by emphasizing that the next challenge is that of understanding the function of these genes in health and disease.

The emerging need for a partnership between physiologists and molecular geneticists was echoed a year ago by Francis S. Collins, Director of the National Human Genome Research Institute, at the Physiology InFocus symposium at EB '96 in Washington, DC, and through his support in organizing the agenda for the Banbury Conference. The Banbury Conference generated considerable discussion and a high level of enthusiasm, as the attendees expressed the view that there was the need to direct major resources and effort toward the development of a functional understanding of genes. This effort was viewed as phase II of the Human Genome Project and was named the "Genes to Health Initiative."

Before providing an overview of the discussions from the Banbury Conference, it is important to recognize some of the events that have already been initiated as a result of the February conference. First, a "Hot Topics" symposium focusing on the Cold Spring Harbor meeting was held at EB '97 in New Orleans, LA, to direct the physiological community's attention to the need to develop a functional understanding of the genes isolated as part of the Human Genome Project. Second, Jim Bassingthwaighte, who participated in the Banbury Conference, organized a two-day workshop in Petrodvoretz, Russia, following the IUPS meeting to evolve plans for designing what he has called the Physiome Project. This is an international effort to design, archive, and disseminate quantitative information and functional models of organelles, cells, tissues, organs, and organisms. Web-based accessibility of these types of data represents a prerequisite bridge to integrate genome database information with functionally based data. Third, a major focus on "physiological genomics" is presently being organized for EB '98 in San Francisco, CA. Collins will coordinate the Physiology InFocus program entitled "Genomics to Physiology and Beyond - How Do We Get There?" The four symposia scheduled as

(continued on page 207)

The Physiologist

Volume 40 Number 5 October 1997

Contents

The Banbury Conference Genomics to Physiology and Beyond: How Do We Get There? 205
Allen W. Cowley, Jr.

APS News

Council Meets in Bethesda 212
Cowley Thanks APS Staff 213
Nominations Invited for Teacher of the Year Award 213
Applications Invited for AAAS Mass Media Fellow 227

Membership

Election of New Members 214
Sustaining Associates 216
Deceased Members 245

Experimental Biology

EB '98 Symposia Preview 219
Distinguished Lecturers 228
Renal Teaching Workshop: Call for Abstracts 211

Meetings

1998 APS Conference: Endothelial Regulation of Vascular Tone 230
1998 APS Conference: Paraventricular Nucleus of the Hypothalamus 231

Public Affairs

NRC Issues Report on Long-term Care of Chimpanzees 232
APHIS Compiles List of AWA Requirements 232
Judge Throws Out Part of Lawsuit Against PETA 233

Education

Outreach Teams Meet at Summer Institute 234
Retreat Held for Summer Research Teachers 235

Career Corner

A Transition From NIH Postdoctoral Fellow to Industry 237
Nicholas S. Gantenberg
Positions Available 240

Web News 243

Chapter News

APS Chapter Program Adds Two New Chapters 244

People and Places

Hall to Leave NINDS in December 244

News From Senior Physiologists 247

Book Reviews 251

Books Received 253

Announcements

Nominations Sought for Bristol-Myers Squibb Award 254
Life Fitness Academy Seeks Candidates for Grants 254
PRAT Program Sponsors Research in Pharmacological Sciences 254

Scientific Meetings and Congresses 255

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part of this program will be coordinated with an American Society for Pharmacology and Experimental Therapeutics-sponsored "Workshop on Utilization of Resources from the Human Genome Project."

Thus, there have been considerable efforts made to inform the physiological community of the opportunities available in the area of "physiological or functional genomics." Avenues are being explored to develop a new APS journal, *Physiological Genomics*, that can publish research bridging the activities of the Human Genome Project with those scientists currently engaged in cellular, organ, and organismic function. It is my hope that these activities will not only provide new opportunities to physiologists at all levels of research but also attract and expand the scientific membership of APS and bring a new level of excitement to our scientific programming and publications. I have been gratified by the enormous level of enthusiasm and support I have received from both the APS membership and Council in moving this agenda forward.

The Banbury Conference

The major question addressed at the conference was how best to go about defining the function of tens of thousands of genes within complex organisms. A more detailed summary of the specific scientific strategic recommendations made at this conference will be published elsewhere. However, it is important for the APS membership to be informed of this meeting because of the tremendous impact that it is likely to have upon the future of physiology and our Society and the influence that this meeting has already had in defining APS scientific programs. It is clear that the Human Genome Project provides opportunities to understand the control and regulation of organisms at a level that we never dreamed would be possible in our lifetime. The major issue facing the conferees at Banbury was really the ultimate question of modern biology: how do we take all of this detailed information of the human genome and "put Humpty Dumpty back together again?" Was it time to begin these efforts and how and who will do this?

Attendees at the Banbury Conference.

The conferees strongly believed that now was the time, and it was stated repeatedly that the success of these efforts would rest heavily on scientists who had a solid understanding of complex living systems, that is, physiologists. There was also a clear realization that defining and understanding the function of genes would require as much dedication as that shown by the legions of international scientists who have revealed the genetic blueprints of life. It was stated repeatedly in many ways that physiologists must now step forward and embrace the challenge that is before them, and that others will have to be trained to meet these needs.

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Toward Function

The term "functional genomics" has been coined to describe the continuum from a gene's physical structure and its regulation to its role in the whole organism. It is a term that is used to imply different things to people working on different levels of gene function, ranging from the simple gene expression of a protein to the function of genes at the level of the whole, complex organism. It is, indeed, nothing more than the expressed physiological function of genes, i.e., "physiological genomics." The breadth of the definition reflects a paradigm shift that is underway; investigators interested in studying the function(s) of a particular gene will increasingly employ multiple model systems. The Human Genome Project has indeed supported work on model organisms besides humans, including *Escherichia coli* (bacteria), *Saccharomyces cerevisiae* (yeast), *Arabadopsis thaliana* (plant), *Caenorhabditis* (roundworm), *Drosophila melanogaster* (fruitfly), *Mus musculus* (mouse), and *Rattus norvegicus* (rat). The results of all of these genome projects developed in parallel have been made available on the World Wide Web, thanks to the data release policy of NIH. Nearly 93% of the positionally cloned disease genes (100+ genes) match a gene in at least one of these model organisms. In addition, it is amazing how well function

follows the sequence of the corresponding proteins so that the use of databases to determine sequence similarities of gene products and to identify homologs will greatly facilitate the discovery of gene function.

A number of technologies, such as "cDNA micro arrays," (4) are available for the study of multiple gene expression profiles using a large number of expressed sequence tag sites (ESTs) and cDNAs. These are still at the experimental level but are likely to facilitate the rapid and cheap analysis of large numbers (up to ~30,000 with current technology) of genes. Parts of genes can be arrayed and then analyzed by hybridization of total RNA from cell, tissue, or organ to determine the expression patterns. These technologies are likely to provide a quick and powerful screening tool.

It was the view of the Banbury participants that the functions of all the approximately 100,000 genes could not be studied over the next few decades, given the limitations on resources and manpower. The focus is likely to be on the genes most responsible for human morbidity and mortality, thereby fulfilling our contract with our public benefactors. Toward this end, however, it was thought to be essential that a detailed plan be developed that fosters the creation of an essential, "functional" infrastructure and technologies that will accelerate "functional" discoveries and drive down the costs of analysis, thereby setting the stage for the characterization of the function of all genes at some level. Physiologists need to be involved in these rapidly emerging events and participate in the development of the plans for the execution of these momentous events.

Model Systems for Identification of Gene Function

Lower order model systems of the genome project, such as *E. coli* and yeast, have now been completely sequenced and are proving to be highly informative model systems to link genes to metabolic functions. These and similar model systems, including vertebrate systems such as the zebrafish, are proving highly amenable to high-throughput strategies of mutating and knocking out genes and looking for loss or gain of structure and function. Data from such model systems combined with the dense genetic and physical maps of mammalian organisms that are rapidly emerging can provide a means to hypothesize a gene's function by looking for homologous genes with a known function in another species. Utilization of the mouse represents the first successful approach in mammals for well-controlled studies of gene function in mammalian organisms. The refinement of transgenic techniques to delete or add specific genes of interest (knockout and knockin, respectively) is being used increasingly in a number of laboratory settings (3, 7). Especially interesting to physiologists are the Cre-loxP recombination systems that enable site-directed recombination events to occur in the adult mouse upon demand.

The focus is likely to be on the genes most responsible for human morbidity and mortality, thereby fulfilling our contract with our public benefactors.

These studies emphasize that gene-based, hypothesis-driven research can now be applied to identify disease states, to determine physiological and pathophysiological gene function, and to determine gene-gene interactions of complex traits.

Mouse models can be used to evaluate the effects of mutations in specific genes and to devise ways of correcting gene defects. Because mice are small and relatively inexpensive and breed rapidly, gene manipulation in mice could lend itself to a high-throughput approach. Yet, even this small mammalian organism comes at a high cost. There are also significant technical limitations related to genetic background effects and physiological methodologies based on size considerations, as well as limited amounts of physiological data for mice.

Other novel approaches are being explored, such as the production of mutant mice, that have enabled gene discovery. For example, large numbers of mutant mice have been developed using an alkylating agent followed by identification of associated phenotypic changes for such genes as those responsible for circadian rhythms (6). However, the approach is still daunting if used to characterize all of the approximately 100,000 genes.

A parallel strategy for identification of gene function is to utilize existing model systems. Over approximately the last 100 years, scientists from all fields have developed or identified animals with genetic predispositions to disease by selecting for disease phenotypes. There now exist several hundred inbred strains of mice and rats with various disease traits. Typically, these strains are only studied for the traits for which they were selected. Yet it is likely that many genes in these strains that were also fixed exhibit unique phenotypes. For example, the fawn-hooded rat was developed and inbred for a single-gene bleeding disorder. However, this model system has been shown to be a good model for hypertension-associated end-stage renal disease (2), pulmonary hypertension, and alcohol preference, in addition to the bleeding disorder. Consequently, the various inbred strains are likely to carry many "naturally" occurring disease traits that have yet to be identified. These models are likely to provide an excellent initial source of sequence-variant effects of individual genes or gene families.

Lessons Learned From the Success of the Genome Project

Completion of the initial goals of the Human Genome Project was clearly dependent upon the development of a critical infrastructure and technology and scientific personnel. The initial plan was revised several times as a consequence of important technological advances that occurred in the seven years of the project. As a consequence of the parallel study of a number of model organisms, together with an early data release policy and the development of public databases on the World Wide Web, the results of all of these genome projects have been brought to biologists, biomedical scientists, and clinical scientists.

The advent of DNA "chips" ushered in a new era for genetic mapping, sequencing, and functional studies (5). Analysis of an individual's DNA, using a "resequencing chip," can now be performed overnight. This technology, when combined with the rapid pace of gene discovery and genome sequencing, has changed the way we look for disease genes, particularly for the common, multifactorial (genes and the environment) disorders.

In the last few years, there has been a tremendous amount of activity revolving around the sequencing of ESTs, which are partial cDNAs. Currently, there are more than 750,000 ESTs, cDNAs, and full-length genes in public databases, with the majority being ESTs. Recently, a UNIGENE set of ESTs was published identifying 16,000 clusters of mapped ESTs, presumably representing individual genes (see **http://www.ncbi.nlm.nih.gov/SCIENCE96**). While it is difficult to know what percentage of the complete human gene set has been captured, it is very likely that considerably more than 50% of the human gene set is represented by at least one EST.

The fruits of this parallel strategy and the public databases are evident. The number of published genes identified by positional cloning is currently 84, and an additional 100+ disease genes have been identified by using positional candidate gene(s) and functional cloning strategies. ("Positional candidate genes" are genes within a genetic interval that have been linked to a disease phenotype, and "functional cloning" refers to the use of matching sequence information to known proteins or enzymes.) Perhaps the more telling statistic is that 93% (78 of 84) of these positionally cloned genes match a gene in at least one of the five model organisms, according to a report by Francis Collins presented at the Fifth International Nature Genetics Conference. As more and more genomic sequences become available and genes are identified in both the model systems and the human, the number of disease genes identified using the positional candidate gene strategy and cross-species functional correlates will increase.

Merging of these current biological and technological achievements may spawn yet another scientific revolution and represent the future of integrative physiology.

Pivotal Role of Information, Technology, and Computer Modeling

Fortunately, along with the accomplishments related to the genome projects, there have been equally remarkable technological accomplishments related to our computational abilities and global communications. These developments are enabling the development of the new mathematical expressions of complex biological systems that are necessary to bridge the avalanche of DNA and protein sequence information to functions of organisms. There is also an increasing need to "recover" the results of decades of important research from journals and to place them into accessible electronic data warehouses.

Interactive models of biological function must become available to predict the impact of a mutant gene upon all of these levels of biological function. Physiology has been built on the precept that the properties of a biological system at high levels of organization are not predictable from the properties of the constituent parts, i.e., the whole is greater than the sum of its parts. As has been emphasized by Jim Bassingthwaighte (1), current computational tools, which free us of the need to limit our analysis to simple linear systems, are sufficiently robust to encompass systems in which the whole differs from the sum of its parts. Merging of these current biological and technological achievements may spawn yet another scientific revolution and represent the future of integrative physiology.

The current publically and privately available genomic databases are impressive data warehouses that, when linked with software tools, enable one to retrieve arrays of oligonucleotides (cDNAs, ESTs, and genomic DNA) and genetic and physical map positions as well as to carry out homology searches between species ("in silico biology"). Databases and software tools must now be expanded to include protein function and the continuum from biochemical pathways to function in the context of a cell, tissue, or organism. The increasing availability of electronic versions of biological journals will expedite these efforts. A prototype of such a database is presently available on the Web (**http://www.ai.sri.com/ecocyc**) for *E. coli*, and it is imperative to develop such strategies for biological systems of greater complexity. This database was designed using sequence similarities of gene products. It is amazing how well function follows the sequence similarities of proteins. As more functions are determined and correlated with the sequence of the corresponding proteins,

the identification of homologs will be facilitated.

A Call for Action

During the Banbury Conference, participants were each asked to address from their own perspectives what scientific initiatives would be required to utilize the knowledge of gene sequence and location within the genome to understand gene function in health and disease. However, as the conference evolved, a compelling case was made for an even broader goal. The conferees emphasized that if meaningful health benefits were to emerge from the detailed knowledge of the genomes of humans and other species, novel strategies would need to be formulated to allow us to link gene structure to function and for the diagnosis, treatment, and prevention of major diseases. It was emphasized repeatedly that the scientific and clinical communities at large need to be better positioned to capitalize on the information emanating from the Human Genome Project. It was evident that to the extent that the mouse, rat, and other animal models resemble human disease states, these models could be used effectively to evaluate specific interventions for diseases. It was also emphasized that existing model systems could be used effectively to uncover gene function.

Major Bottleneck of Appropriately Trained Physiologists for the Genes to Health Initiative

The view from Banbury was that great progress would be possible if adequate resources could be made available by the relevant institutes of NIH working in partnership with other governmental agencies, industry, and foundations to support the training and research efforts that will be required for the "Genes to Health Initiative."

The obstacles to such a bold initiative were considered at length. It was acknowledged that one of the major bottlenecks would be the current lack of appropriately trained physiologists and pharmacologists. It was the view of all of the participants at the conference that these investigators will be required to define the necessary in vitro and in vivo systems, create appropriate animal models, and define the functions of the many identified genes, merging hypothesis-driven research with large- scale technology. It was proposed that new paradigms for multidisciplinary research would have to be developed within our academic institutions, within NIH, and by international partners. Essential for success would be the rapid establishment of multidisciplinary training programs. Partnerships between governmental agencies (e.g., NIH, NSF, Department of Defense in the US), industry, and foundations would be required to provide the resources for success of these efforts. Enhanced clinical and public education for awareness of the genetics of common diseases coupled with health care support for genetic services would also be required. To link these efforts to a human health initiative, strategies would need to be developed to establish patient DNA registries to provide the appropriate populations for human studies and to provide the infrastructure for the diagnostics, prevention, and therapeutics that will emerge from this research.

It was only 15 years ago that the Human Genome Project was launched amidst much skepticism that the goals were overly ambitious or even impossible. Many members of the scientific and clinical community have been caught off guard by the speed at which the "impossible" has already been accomplished.

It was only 15 years ago that the Human Genome Project was launched amidst much skepticism that the goals were overly ambitious or even impossible. Many members of the scientific and clinical community have been caught off guard by the speed at which the "impossible" has already been accomplished. Although the next phases of discovery must encompass the coordinated efforts of a broader segment of the basic and clinical research communities, the scientists of the Banbury Conference believed that the goals were achievable.

A Bold Agenda

In keeping with the scale of the Human Genome Project, there emerged from this conference a vision of what could be accomplished during the first decade of the new millennium. A bold agenda was outlined with a 10-year goal of determining the underlying genetic and functional basis of many of the most complex and devastating illnesses that afflict our civilization. A compelling case was made for an international research effort that would lead to treatment and prevention of several forms of cancer (e.g., breast and prostate cancers), cardiovascular diseases (e.g., atherosclerosis and hypertension), neurological disorders (e.g., schizophrenia), diabetes, end-organ damage (e.g., kidney and eye), osteoporosis, and asthma. A case was made for the compelling need to formulate strategies that will effectively link the foundations of the Human Genome Project to that of gene function for the diagnosis, treatment, and prevention of diseases. It was emphasized that efforts must now be made to position the scientific and clinical communities at large to capitalize on the information emanating from the Human Genome Project. One reason the Human Genome Project was such a success was the development of a detailed, yet malleable plan. It was the view of many of the Banbury conferees — and a strongly held view of my own — that it is now time to begin formulating a similar plan for the postgenome era, so the appropriate infrastructure and technolo-

gies are in place to meet the challenge in translating the Human Genome Project from benchside to bedside.

The Banbury conferees unanimously agreed that now is the time to launch a coordinated effort called the "Genes to Health Initiative" that would involve NIH in partnership with other governmental agencies, industry, and foundations to provide the required resources. Consensus was achieved on the five goals of the initiative recommended above.❖

The five goals of the "Genes to Health Initiative":

- To develop over the next 10 years the essential, "functional" infrastructure and technologies enabling investigators to determine the underlying genetic and functional basis of a minimum of 10 complex diseases that impact broadly on public health. This effort should be spearheaded by NIH.
- To train life scientists so that they will be able to utilize the Human Genome Project infrastructure to define in vitro and in vivo systems suitable for merging hypothesis-driven research with largescale technology to deduce the functions of the many identified genes.
- To develop multidisciplinary research between NIH, academic institutions, industries, and international partners.
- To develop databases of genetic, biochemical, biophysical, and physiological data and develop software tools to facilitate the integration and use of these disparate data resources.
- To enhance physician and public education. Awareness of the genetics of common diseases coupled with strategies to develop patient DNA registries will be required to provide the appropriate population for human studies and the infrastructure for the diagnosis, prevention, and therapy that will emerge from this research.

Acknowledgments

The meeting was sponsored by APS with the advice of Francis S. Collins, Director of the National Human Genome Research Institute. Additional financial support for the conference was provided by Novartis Pharmaceuticals Corporation and the Burroughs Wellcome Fund.

The author also wishes to thank Claude Lenfant, Director of the National Heart, Lung, and Blood Institute, and Marvin Cassman, Director of the National Institute of General Medical Sciences, for their encouragement and support for this endeavor and Howard Jacob and George Koike for their valuable assistance in summarizing and capturing the essence of the two-and-a-half day Banbury Conference.

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Renal Teaching Workshop at EB '98: Call for Abstracts

The APS Education Committee is sponsoring a symposium entitled "Refresher Course for Teaching Renal Physiology" during EB '98, April 18-22 in San Francisco, CA. The purpose of this course is to review concepts and teaching strategies related to renal physiology.

An important segment of the course will consist of poster presentations of teaching strategies, demonstrations (e.g., computer simulations), and exhibits (e.g., books, lecture outlines, syllabi, and problem-based learning cases). Abstracts of these posters, demonstrations, and exhibits will be published in the *FASEB Journal*.

All interested individuals who have developed educational materials that emphasize innovative approaches for teaching renal physiology should submit an abstract — under topic category number 1138-1 Methods of teaching renal physiology — to APS using the forms and procedures outlined in the *Call for Abstracts* booklet. Abstracts are due December 1, 1997.

Any inquiries should be directed to: Virginia L. Brooks, Department of Physiology & Pharmacology, L-334, Oregon Health Sciences University, Portland, OR 97201, Tel: 503-494-5843; fax: 503-494-4352; e-mail: brooksv@ohsu.edu.

Council Meets in Bethesda

The summer Council meeting was held in Bethesda, MD, at APS Headquarters on July 25-27, 1997. This summer meeting is highlighted by the Council meeting with a majority of the committee chairs, receiving reports on the committees' accomplishments during the past year, and listening to their plans for the coming year. These committee reports were published in the August issue of *The Physiologist*. In addition, Council met with **Mordecai P. Blaustein**, President-elect of the Association of Chairs of Departments of Physiology (ACDP), to discuss the possibility of a future joint meeting of APS Council and ACDP in 1998.

Back (l to r): Francis Belloni, John Williams, Richard Traystman, Steven Bealer, Edward Blaine. Front (l to r): L. Gabriel Navar, Walter Boron, phone (James Schafer), Celia Sladek, John Hall, Allen Cowley, Jr., Gerald DiBona, and D. Neil Granger.

Among the issues discussed by Council were new awards/lectureships/symposia, two new petitions from groups for chapter status, a proposal for a new journal and acceleration of on-line publication of the remainder of the Society's journals, discussions about sponsorship of integrative biology summer workshops, and a new membership campaign.

Among the new awards, lectureships, and/or symposia approved were the Walter B. Randall Annual Lectureship on Biomedical Ethics, to be supported by Taylor University; Arthur C. Guyton Award for Excellence in Integrative Physiology, to be supported by donations; continuance of the (renamed) APS Postdoctoral Fellowship in Physiological Genomics in the form of two awards for 1998; participation in the AAAS Mass Media Fellowship Program; and Liaison With Industry graduate student and postdoctoral fellow awards, supported by Abbott Laboratories.

Council approved petitions from the Nebraska Physiological Society and the Oklahoma Society of Physiologists for chapter status. This brings to five the number of chapters currently affiliated with APS. The other three are the Ohio Physiological Society, the Iowa Physiological Society, and the Wisconsin Physiological Society. Members in other states also have indicated interest in forming chapters, and Council noted it was looking forward to welcoming more chapters in the near future.

An accelerated schedule for the on-line publication of the remainder of the Society's research journals was approved. *Journal of Neurophysiology* is scheduled to go on-line in October, with issues from January 1997 available. The individual journals of the *American Journal of Physiology* are scheduled to go up in April 1998. This is one to two years ahead of initial plans for on-line publication, but with the increased interest among researchers and other publishers for on-line publications, Council realized that the Society would have to take steps to remain at the forefront of electronic publications. In addition, Council approved in principle the idea for a new journal suggested by President **Allen Cowley, Jr.**, on physiological genomics. The Publications Committee will appoint a subcommittee to explore the potential readership of such a journal, develop a scope and focus for the journal, and report back to the Publications Committee at its September meeting, allowing for a report to Council at its fall meeting on the feasibility of starting such a journal.

A revised "Call for Proposals" will be distributed late this summer to chairs of departments of physiology concerning summer Integrative Biology Workshops. One workshop in cardiovascular physiology is scheduled to take place at the Medical College of Wisconsin, organized by **William Chilian**. The new "Call for Proposals" will consider proposals on any area of physiology, not just cardiovascular. Council voted to subsidize the entire cost of publicizing the workshops. Any profits generated from holding the workshops will remain with the host department.

President-elect **L. Gabriel Navar** will be spearheading a new membership campaign to reach a target goal of 10,000 members by the year 2000. Working in conjunction with the Membership Committee and staff in both the Membership Services and Marketing Departments, Navar plans to approach not only the traditional physiology departments but other related departments and colleges, junior colleges, and perhaps high schools as well. His aim will be to tap into a new pool of members by showing them how membership in APS can help them in their chosen careers. Much of the focus of this membership campaign will be drawn from responses to the recent "Member Needs Assessment Survey" conducted this past year. A report on the results of the survey will be forthcoming in *The Physiologist*.

Council plans a retreat in conjunction with the fall Council meeting at which representatives from the 12 sections will meet to discuss ways in which the Society can encourage and strengthen sections for greater involvement in Society governance and programming of the spring meeting.

Additional details of Council's actions during the June meeting will be communicated to the membership at the next business meeting and in *The Physiologist*.❖

Cowley Thanks APS Staff

APS President Allen W. Cowley, Jr., hosted a staff appreciation reception for the 70 employees at the Headquarters Office in Bethesda, MD. Together with Council and the committee chairs, Cowley thanked the staff for all their efforts over the past year. He noted that without the continued efforts of the staff — especially this past year in eliminating the backlog of manuscripts for all the journals — APS would not be able to maintain its leadership position in all the areas in which it is involved.

A major portion of the staff appreciation reception is the recognition of years of service to the Society. This year, Cowley presented a 20-year certificate to Maria Daca (Senior Manuscript Assistant); 10-year certificates to Anna Trudgett (Senior Copy Editor) and Mona Trang (Manuscript Assistant); and 5-year certificates to Alice Hellerstein (Public Affairs Officer), Eric Pesanelli (Senior Art Editor), Beth Caseman (Journal Copy Editor), and Michael Folker (Copy Editor). Cowley expressed Council's appreciation for their years of service.

In addition, Cowley expressed his appreciation for the efforts of all the staff in implementing the actions of the Council and committee chairs and their hope that the staff would continue in their tradition of excellence for many more years.❖

Back (l to r): Martin Frank, Alice Hellerstein, Beth Caseman, Eric Pesanelli, Allen Cowley, Jr. Front: Maria Daca.

Nominations Are Invited for the Sixth Annual Arthur C. Guyton Physiology Teacher of the Year Award

The APS Teaching of Physiology Section and the W. B. Saunders Company are again sponsoring the "Arthur C. Guyton Physiology Teacher of the Year" award. Nominees must be full-time faculty members of accredited colleges or universities and members of APS. They must be involved in classroom teaching and not exclusively the teaching of graduate students in a research laboratory.

Each proposed person must be nominated by an APS member. The nominator is responsible for providing the following application materials and forwarding three copies to the Chairperson of the Award Selection Committee, **postmarked no later than November 30, 1997:**

1. A letter of nomination from the nominator.
2. Letters of support from three other colleagues familiar with the nominee's teaching career, including one being the nominee's chairperson if possible.
3. Letters of support from up to 10 current and/or former students.
4. Scores on standard student evaluations of teaching effectiveness.
5. Competitive teaching honors received, such as the Golden Apple.
6. Evidence of education-related activities outside the classroom, such as developing laboratory exercises or teaching software, authoring textbooks or educational research articles, education-related presentations at professional meetings, educational committees within the institution, education consultation with other organizations, public appearances, etc.
7. A copy of the nominee's curriculum vitae.
8. Any additional documentation that the nominee wishes to include, such as number of graduate students trained, number of undergraduate students pursuing careers in physiology, teaching innovations introduced, etc.

The person selected will receive the award at the banquet of the Teaching of Physiology Section during the next APS annual meeting during EB '98 in San Francisco, CA, in April 1998. The Arthur C. Guyton Physiology Teacher of the Year will receive a framed, inscribed certificate, an honorarium of $1,000, and expenses of up to $750 to attend the meeting. The awardee is requested to write an essay on his/her philosophy of education for publication in *The Physiologist* and is expected to deliver this essay as an address at the annual Section dinner.

Send nominations to: Michael D. Johnson, Department of Physiology, West Virginia University School of Medicine, PO Box 9229, Morgantown, WV 26506-9229 (Tel: 304-293-1514; fax 304-293-3850).

Election of New Regular Members (50)

* Upgrade from Student

Venkataraman Balaraman
University of Hawaii

Christopher L. Berger
Univ. of Vermont College of Medicine

Cesar E. Blanco
University of Southern California

Nina S. Bradley
University of Southern California

Chung-Lin Chou
National Institutes of Health

Dale E. Claassen
Kansas State University

David E. Cochrane
Tufts University

Lawrence B. Cohen
Yale University School of Medicine

David J. Coughlin
Widener University

Jay B. Dean
Wright State University

Gary Desir
Yale University School of Medicine

Niki M. Dietz
Mayo Medical School

*** Nicholas Ralph DiPaola**
Cleveland Clinic Foundation

Marlowe W. Eldridge
University of California at Davis

Sean D. Farley
Washington State University

Laurie J. Goodyear
Joslin Diabetes Center

Daryl K. Granner
Vanderbilt University Medical Center

*** Craig A Harms**
University of Wisconsin

*** Peter J. Havel**
University of California at Davis

Russell T. Hepple
University of California at San Diego

Eduardo W. Hsu
Duke University Medical Center

*** Mark J. Hubley**
Washington College

Yoshihiro Ishikawa
Allegheny University

Faramarz Ismail-Beigi
Case Western Reserve University

Eric Jakobsson
University of Illinois

Bruce D. Johnson
Mayo Clinic

Raouf A. Khalil
University of Mississippi Medical Center

*** Richard Kinkead**
University of Wisconsin

Roy G. Knickelbein
Yale University School of Medicine

Robert Kraemer
Southwestern Louisiana University

Joseph Loscalzo
Boston University School of Medicine

Mark J. M. Nijland
Harbor-UCLA Medical Center

*** Dina Nicole Paltoo**
Univ. of Med. and Dentistry of New Jersey

Thomas Pannebecker
University of Arizona

Richard E. Rawson
Cornell University

Michael Regnier
University of Washington

Whitney M. Reilly
Indiana University

Ronald A. Schachar
Presby Corporation

Deborah L. Segaloff
University of Iowa

Willard W. Sharp
University of Illinois at Chicago

*** Ann M. Sherry**
University of Cincinnati

Fred Sullivan, Jr.
Baylor College of Medicine

Uma Sundaram
Ohio State University

*** Glenn M. Toney**
Univ of Texas Hlth. Sci. Ctr. at San Antonio

David R. Van Wagoner
Cleveland Clinic Foundation

Cecile Rose T. Vibat
University of California at Davis

Susan M. Wall
Univ. of Texas Hlth. Sci. Ctr. at Houston

Margaret T. Weis
Philadelphia College of Pharmacy

Gerald R. Weiss
Univ. of New Mexico School of Medicine

Flavia Pinheiro Zanotto
University of Sao Paulo, Brazil

Election of New Corresponding Members (26)

* Upgrade from Student

Sebastian Bachmann
Klinikum Charlottenburg, Germany

Michele Beaudry
University of Nice, France

Rekia Belahsen
Université Chouaib Doukkali, Morocco

Andrzej Breborowicz
Poznan Medical School, Poland

Margaret D. Brown
University of Birmingham, UK

Weibiao Cao
Rhode Island Hospital

Aidan Curran
University of Wisconsin

Tammo Delhaas
University of California at San Diego

Johannsson Erlingur
University of Oslo, Norway

***Sylvain Ernest**
Univ. of Texas Medical Branch at Galveston

Wayne R. Fitzgibbon
Medical University of South Carolina

Martin Fryer
University of New South Wales, Australia

Michael Fuchs
University of Luebeck, Germany

Shintaro Funahashi
Kyoto University, Japan

Christoph P. R. Klett
University of California at San Diego

Sawsan Kreydiyyeh
American University of Beirut, Lebanon

Sanli Sadi Kurdak
University of Cukorova, Turkey

Sarra Kirsti Laycock
New York Medical College

Raynond Mengual
Laboratoire de Biochimie, France

Katsuki Nakamura
Kyoto University, Japan

Andrew G. Ramage
Royal Free Hospital, UK

Noboru Saito
Magoya University, Japan

K. M. Spyer
University College, UK

Naotoshi Sugimoto
Legacy Portland Hospitals

Masato Tsutsui
Mayo Clinic

Elena Volpi
Shriners Burn Institute

Approved Student Members (51)

Carlos A. Mejias Aponte
University of Puerto Rico

Gudbjorn K. Asmundsson
University of New England, Australia

Brian Peter Bagatto
University of Nevada at Las Vegas

Jennifer Beck
Notre-Dame Hospital

William J. Becker
Pennsylvania State University

Douglas R. Bolster
University of Connecticut

Carol A. Bossone
Uniformed Services Univ. of Hlth. Sciences

Ako D. Bradford
Tougaloo College

Kristina Brannstrom
University of North Carolina

David L. Buchanan
University of Illinois

Hunter Clay Champion
Tulane University

Young-hui Chang
University of California at Berkeley

Myron A. Chornuk
University of Washington

Flavio C. Coelho
University of Texas at Arlington

Matthew Crill
Ohio University

Qun Dong
Duke University Medical Center

Shannon Dunn
Laurentian University, Canada

Jennifer Anne Florian
Michigan State University

Kathryn M. Gauthier-Rein
Medical College of Wisconsin

Donna Ann Goff
Univ. of Massachusetts at Amherst

David A. Golod
Purdue University

Timothy M. Griffin
University of California at Berkeley

Sierra R. Guynn
Long Island University

Zishan A. Haroon
Duke University Medical Center

David Hostler
Ohio University

Craig M. Houck
Wayne State University

Keith Mitchell Hume
University of Georgia

Haiying Jiang
University of Illinois at Chicago

Rachel A. Laudadio
Temple University

Shad John Lewis
University of Scranton

Angela M. Maddux
University of Cincinnati

William Marshall
Kansas State University

Michael M. Neeki
University of Akron

Valentino Piacentino, III
Rutgers University

Steven Pohnert
East Carolina University

Kit Erica Purdy
University of North Carolina at Chapel Hill

Glen Pyle
University of Tennessee

Matthew Sardelli
Michigan State University

Timothy P. Scheett
University of Connecticut

Beverlyn D. Settles-Reaves
Howard University

Apichai Shuprisha
University of Arizona

Andrea M. Stahl
Yale University

Michael S. Stephens
Wright State University

Francis A. Sylvester
Drake University

Erica Noelle Vincent
Michigan State University

Yanlin Wang
University of Texas Medical Branch

Christopher S. Williams
Vanderbilt University

Jocelyn Wilmot
University of Colorado at Boulder

Rui Xu
Wayne State University

Zhi-Wei Yang
SUNY Health Science Center

Qian Zhou
East Carolina University

Approved Affiliate Applicants (3)

Patricia B. Ahrens
Mount Mary College

Omar Cano
Texas State Technical College

David M. Flynn, Jr.
Pfizer, Inc., Central Research

Know Your Sustaining Associate Members

Abbott Laboratories

Abbott Laboratories started in 1988 and has evolved into one of the world's leading healthcare companies with a major presence in diagnostic, pharmaceutical, nutritional, hospital, and agriculture markets. Abbott is committed to technological leadership. In 1995, Abbott spent more than $1 billion on research and development activities in an effort to maintain its leadership position. In addition to internal discovery, leading-edge medical technologies are being pursued through global pursuit of appropriate acquisitions, licenses, and collaborations. A few of Abbott's products are Similac, Ensure, Biaxin, Norvir, Erythromycin, Hytrin, Depakote, Abbokinase, Survanta, ADD-Vantage, Ultane, Calcijex, AxSYM, IMx, and PRISM. Abbott Laboratories is an equal opportunity employer that recognizes its business performance is strongly linked to its ability to successfully attract, retain, and develop a diverse employee population

Alliance Pharmaceutical Corporation

Alliance Pharmaceutical Corporation is a research and development company focused on transforming innovative scientific discoveries into therapeutic and diagnostic agents.

Oxygent is in clinical development in conjunction with Johnson & Johnson as an oxygen carrier ("blood substitute") to reduce the need for donor blood transfusions during surgery. LiquiVent is an intrapulmonary agent for treatment of acute respiratory failure. LiquiVent has Subpart E ("fast track") FDA status and is in clinical trials with neonates, children, and adults. Imagent US is in preclinical development for enhancement of ultrasound images of blood flow abnormalities related to myocardial infarctions, blood clots, or solid tumors.

American Medical Association

The American Medical Association promotes the art and science of medicine and the betterment of public health. The AMA accomplishes this mission by advancing standards of medical education, promoting support for biomedical research, representing the medical profession, providing information about medical matters, and upholding professional conduct and performance.

Amgen, Inc.

Amgen, Inc., the largest independent biotechnology company in the world, is a global company that discovers, develops, manufactures, and markets human therapeutics based on advanced cellular and molecular biology. Amgen's four areas of research are hematopoiesis, neurobiology, inflammation/ autoimmunity, and soft tissue repair and regeneration.

Amgen has developed several biopharmaceutical products using recombinant DNA technology. Amgen currently markets two products: EPOGEN® (Epoetin alfa), used to treat anemia associated with chronic renal failure failure for dialysis patients, and NEUPOGEN® (Filgrastim), used to decrease the incidence of infection associated with some forms of chemotherapy.

Axon Instruments, Inc.

Axon Instruments, Inc. designs and manufactures instruments and software for electrophysiology. Axon Instruments produces full-featured amplifiers for single-channel and whole-cell patch clamp and for single- and two-electrode current/voltage clamp applications. These hardware products are supported with PC and Macintosh software and acquisition hardware for the acquisition and analysis of biophysical data. The latest products are the CyberAmp series of general-purpose analog signal conditioners. They provide up to eight channels of computer-controlled adjustment of gain, offset, and low-pass Bessel filtering. Virtually any type of transducer can be adapted for the CyberAmp. The computer can instantly determine the scaling and units of each transducer. Support for the CyberAmps is provided by software from Axon Instruments and others. The CyberAmp used in conjunction with Axotape software and TL-1-125 acquisition hardware makes a complete computer-based chart recorder system.

Berlex Biosciences

Berlex Biosciences is a US subsidiary of the multinational pharmaceutical and chemical firm Schering AG West Germany (not connected with Schering-Plough Corp. or Schering Corp. of New Jersey). It conducts research and markets prescription drug products primarily for cardiovascular, diagnostic imaging, metabolic, endocrine, and central nervous system uses.

Genentech, Inc.

Genentech, Inc., founded in 1976, is a leading biotechnology company focusing on the development, manufacture, and marketing of pharmaceuticals produced by recombinant DNA technology. Four approved therapies derived from biotechnology were pioneered by Genentech: human insulin, alpha-interferon, human growth hormone, and recombinant tissue plasminogen activator.

Grass Foundation

The Grass Foundation underwrites the annual Walter B. Cannon Lectureship given at the APS spring meeting. The naming of this lectureship serves two functions: to commemorate the enormous contribution of Cannon to the growth of knowledge of physiology and to pay a tribute to Cannon on behalf of many of the founding trustees of the Grass Foundation who were members of his research group at Harvard Medical School early in their careers.

This lectureship is in accordance with the Grass Foundation's charter mandate to support research and education in neurophysiology. Other programs include funding for other annual and visiting lectureships, summer fellowship support for young students, and occasional relevant course support.

Sustaining Associates

Harvard Apparatus

Harvard Apparatus, since its inception in 1904 at the Harvard Medical School, continues to design, develop, and supply the unique apparatus that has shaped the development of teaching and research in physiology and allied science, including syringe peristaltic and respiration pumps, recording systems, and research accessories.

Jandel Scientific

Jandel Scientific designs and sells IBM-compatible software for scientific research. Products include Sigma-Plot for publication-quality scientific graphs (with automatic error bars, regression lines, and many other scientific graphing options); Sigma-scan for *x-y* digitizing, morphometric measurement, and analysis; and PC3D for generating three-dimensional reconstructions of objects from serial sections. JAVA, the latest product, is a video analysis system capable of image processing, densitometry, automatic object counting and edge tracking, and morphometric measurement. JAVA works with a video digitizing board and input from a video camera, VCR, or other video source.

Janssen Research Foundation

Janssen Pharmaceutica was founded in Belgium in 1953 by Paul Janssen. It is now an international company built on the foundation of research and a bedrock of innovation. The company remains under the direction of Janssen and has an unparalleled record in the successful development and marketing of new pharmaceutical products. According to the Japan Drug Research studies, Janssen was responsible for more significant new drug discoveries during the period 1970-1983 than any pharmaceutical company in the world.

The company currently has approximately 6,000 employees world-wide. It is a world leader in medication used in the treatment of allergies, mental disorders, digestive and intestinal problems, cardiovascular conditions, and worm and fungal infections. Janssen's compounds have also enabled major advances in anesthesia and immunology. In addition, Janssen has also discovered many chemical compounds to identify and characterize receptors in the brain and the periphery that have played a prominent role in advancing our knowledge about neurotransmitters.

Eli Lilly and Company

The Lilly Research Laboratories is dedicated to the advancement of basic scientific information upon which further targeted medical breakthroughs may be identified. Scientists in the Lilly Research Laboratories are committed to excellence in research as evidenced by a steadily increasing investment in research and development over the years. Scientific research is being supported by the construction of new research facilities and with the use of a Cray II supercomputer. Scientists are focusing on basic research and targeted medical therapy for cardiovascular disease, central nervous system dysfunction, cancer, diabetes, and pulmonary disorders.

Pharmacia and Upjohn, Inc.

Human health care is at the heart of Pharmacia and Upjohn's endeavors. Pharmacia and Upjohn, Inc., a multinational corporation and one of the largest research-based pharmaceutical manufacturers in the world, has research, production, and warehousing facilities in more than 45 countries, and its products are sold in more than 150 countries.

Some of Pharmacia and Upjohn's most promising research has been in the fields of oncology, peptide hormones, cataract surgery, nutrition, and allergy diagnostics.

Procter & Gamble Co.

Procter & Gamble is a multinational consumer products and health care company committed to world-class research and product development. It has major technical centers in Cincinnati, Ohio; Norwich, New York; Hunt Valley, Maryland; Mexico City, Mexico; Caracas, Venezuela; Brussels, Belgium; Egham and Newcastle, UK; and Kobe, Japan.

The worldwide PhD population of Procter & Gamble is 1,200, divided about equally between life scientists and chemists. Total employees number 100,000.

Sales in the health care/pharmaceuticals, beauty care, cosmetics and fragrances, food and beverage, laundry and cleaning, and paper products make Procter & Gamble one of the largest companies in the US. Fortune magazine consistently recognizes Procter & Gamble as one of the "Most Admired Corporations."

Quaker Oats Company

The Quaker Oats Company is a leading consumer products company marketing both human and pet food products around the world. The development of new food and beverage products and the refinement of existing Quaker products occurs in the laboratories of Quaker's Research and Development facility in Barrington, Illinois. Quaker food scientists, nutritionists, biochemists, and physiologists devote their energies to making certain that Quaker products meet the high standards consumers expect of The Quaker Oats Company.

Rhone-Poulenc Rorer

An international company dedicated to health, RPR is the first pharmaceutical company in France, the third in Europe, with a turnover in 1994 of US$4.5 billion: a research-driven company with 14 percent re-invested in Research and Development and 3,000 employees in R&D. With research centers located in France, the US, and the UK Research and Development is focused on seven main therapeutic areas: Oncology; Cardiovascular diseases; Infectious diseases/AIDS; Rheumatology/Bone metabolism; Central nervous system disorders; Respiratory diseases/Allergies; and Plasma proteins. To invest in new technologies and gene and cell therapies is RPR's commitment to the future.

Schering-Plough Research Institute

Born out of a 1971 consolidation of two companies (Plough, Inc. and the Schering Corporation), Schering-Plough Research Institute is dedicated to the discovery, development, and marketing of novel therapeutic entities. The company focused its research in the fields of anti-inflammatory, antiallergic, cardiovascular, and anti-infective disorders. The company has also attained a leading position in immunology and recombinant DNA technology.

G. D. Searle and Company

The physiologic and scientific directions of G.D. Searle and Company are primarily in areas related to arthritis and inflammation, cardiovascular disease, and oncology with an emphasis on adjunctive therapy and opportunistic infections. In these three major therapeutic areas, the emphasis is on defining new molecular targets that are likely to elicit a dramatic shift in therapeutic efficacy with a true ultimate enhancement of therapeutic benefit.

Research employs high throughput robotic screening to define chemical or protein leads, medicinal chemistry and protein biochemistry, including protein mutagenesis, to maximize the properties of the chemical or protein lead, and extensive animal testing to determine proof of concept. Molecular and cell biology are utilized extensively to support screening efforts and to define the molecular targets underlying a particular disease, including the use of differential display PCR. The approach is to integrate expertise across scientific disciplines to rapidly determine proof of concept underlying a disease target.

SmithKline Beecham

SmithKline Beecham is one of the world's leading health care companies. Its principal activities are the discovery, development, and marketing of both human and animal pharmaceuticals, over-the-counter (OTC) medicines, health-related consumer brands, and clinical laboratory testing services. ❖

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

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EB '98 Symposia Preview

Neurochemical and Peptidergic Pathways of the Baroreflex

Neural Control & Autonomic Regulation, Central Nervous System, and Cardiovascular Sections

David A. Averill and Sue A. Aicher

Sue A. Aicher, Jeanne Seagard, Alan Sved, David B. Averill, David Mendelowitz, and William Rose

This symposium will highlight recent studies of the processing and integration of baroreceptor input through neural pathways residing in the medulla oblongata. The first talk will review neuroanatomical studies of the synaptic connections among cell groups of the medulla oblongata that constitute pathways mediating reflex control of sympathetic nerve activity (Aicher). The second talk will focus on the neurochemical mechanisms responsible for activation of the nucleus tractus solitarii neurons that receive arterial baroreceptor input (Seagard). The third talk will review inhibitory neurotransmitter systems that constitute an important element of the baroreflex arc for regulation of sympathetic outflow (Sved). Peptidergic pathways impinging on components of the central baroreflex arc modulate the baroreceptor response. The role of angiotensin II in this context will be reviewed as it relates to the development of hypertension (Averill). The parasympathetic nervous system is the other arm of the autonomic nervous system that plays a crucial role in baroreceptor reflex regulation of the heart. Thus, the neurochemical mechanisms responsible for regulation of parasympathetic motoneuron activity and function will be addressed (Mendelowitz). The symposium will conclude with a talk that explores the utility of dynamic systems modeling as an approach to understand information processing of baroreceptor-related signals at various sites within the baroreflex pathway (Rose). It is hoped that by bringing together the diverse approaches of neuroanatomy, neurophysiology, and dynamic systems modeling, this symposium will generate new investigative approaches to further understanding of the normal and pathological functions of the baroreceptor reflex.

Control of Mitochondrial Free Fatty Acid Uptake and Oxidation in Working Skeletal Muscle

Environmental & Exercise Physiology and Endocrinology & Metabolism Sections

George A. Brooks

George A. Brooks, Gary D. Lopaschuk, William W. Winder, J. F. Heigenhauser, and Robert R. Wolfe

In resting skeletal muscle and the unstimulated heart, lipids, mainly blood-borne free fatty acids (FFAs), comprise most of the energy substrate. However, as power output increases in skeletal muscle, use of carbohydrate-derived fuels (glycogen, glucose, and lactate) increases, whereas lipid (FFA and intramuscular triglyceride) oxidation decreases. Similarly, under resting conditions the heart depends mostly on FFA oxidation, but as work of the heart increases, glucose and lactate become important energy substrates. What explains the switch from lipid- to carbohydrate-derived energy sources in working muscle? To address this and related questions, contemporary workers in the field evaluate the central role of carnitine palmitoyl transferase-1 by malonyl-CoA.

Lopaschuk will review the biochemical pathways and present his original research on mechanisms regulating the switch toward increased use of carbohydrate-derived fuels when cardiac muscle is stressed.

Winder will review results of his research on the effects of exercise and exercise training on malonyl-CoA responses in rodent muscle. Further, he will describe acute and chronic effects of exercise on induction of key regulatory enzymes, such as acetyl-CoA carboxylase.

Heigenhauser will present results of his work on regulation of pyruvate dehydrogenase and the interrelationships among activities of pyruvate dehydrogenase, phosphorylase, and CPT-1 in working human muscle.

Wolfe will present results of his studies on exercising humans in which the malonyl-CoA/CPT-1 hypothesis was evaluated using isotopic tracers.

And finally, Brooks will describe the effects of exercise intensity and prior endurance training on substrate flux in men and women.

Refresher Course for Teaching Renal Physiology

Renal and Water & Electrolyte Homeostasis Sections and Education Committee

Virginia L. Brooks and Arthur J. Vander

Virginia L. Brooks, James A. Schafer, Bruce M. Koeppen, Franklyn G. Knox, and Arthur J. Vander

A workshop will be presented that will review concepts and teaching strategies related to renal physiology. The course will consist of several segments: poster presentations, demonstrations (e.g., computer simulations), exhibits (e.g., books, lecture outlines, and problem-based learning cases), and didactic lectures. Material for the exhibits, demonstrations, and posters will be solicited from APS membership and publishing companies. The didactic portion will begin with three 30-minute

lectures, each with 10-minute discussion periods, and will review selected important topics of renal physiology. These topics include renal transport mechanisms (Schafer), regulation of potassium excretion (Knox), and renal aspects of acid-base balance (Koeppen). The emphasis will be to enhance the understanding of renal physiology and to provide an update on new information. A syllabus that summarizes course content will be produced and handed out during the workshop. In addition, a short lecture will focus on miscellaneous areas of renal physiology that are difficult to teach (Arthur J. Vander). The lecture portion of the workshop will end with a panel discussion that will draw not only from the previous lectures but from other questions submitted in writing by the audience throughout the workshop.

Emerging Technologies' Role in Physiology Instruction

Teaching of Physiology Section and Education Committee

Robert G. Carroll and Michael J. Davis

Robert G. Carroll, Michael J. Davis, Thomas M. Nosek, and Linda Schreiber

Technological innovation proceeds at an accelerated pace and has facilitated many recent research advances. Emerging technologies, however, have found a limited application in undergraduate and professional physiology instruction. This symposium will examine the strengths and limitations of four different technologies currently being introduced into instructional settings. First, Carroll will explore the use of teleconferencing and other forms of distance learning. The next two speakers will focus on multimedia developments. Schreiber from Prentice-Hall will explain the role of the publishing house in multimedia development and projects. This will be followed by Nosek's evaluation of student and faculty performance and his reaction to the multimedia resource developed and in use since 1993 at Medical College of Georgia. The final speaker, Davis, will describe the use of World Wide Web resources in the medical physiology course at Texas A&M University. Following a brief discussion, the symposium will conclude with demonstrations projects where interested attendees can test the discussed technologies.

Dominant-Negative Approaches to Explore Physiology

Cell & General Physiology and Respiration Sections

John R. Dedman

John R. Dedman, Ira Herskowitz, Thomas Doetchman, Guido Krupp, Michelle L. Hermiston, and Jiahong Wang

Molecular biology techniques have provided several unique approaches to understand physiological concepts. "Dominant negative" approaches have been developed to evaluate the function of specific genes at the cellular and whole animal level. Disruption of gene function has been studied at several molecular levels: gene ablation is achieved by homologous recombination, translation of mRNA can be interrupted by antisense RNA and hammerhead ribozymes, and protein function can be neutralized by targeted overexpression of mutant proteins as well as specific protein inhibitors. This symposium will describe current "dominant negative" technologies. The speakers will provide insight to bridge molecular biology and physiology.

Vascular Biology of Homocysteine

Cardiovascular Section

Stephen J. Elliott and Kilmer S. McCully

Stephen J. Elliott, Kilmer S. McCully, Neil Hogg, Joseph Loscalzo, Stephen J. Elliott, and Nobuyo Maeda

Homocysteine is a risk factor for atherosclerosis. The molecular and chemical mechanisms by which homocysteine promotes vascular occlusive disease are poorly understood. The reaction of homocysteine with low-density lipoprotein to form the reactive metabolite homocysteine thiolactone and the reaction of homocysteine with nitrosating agents to form *S*-nitrosohomocysteine will be explored. The potentially adverse effects of homocysteine thiolactone and the potentially protective effects of *S*-nitrosohomocysteine will be discussed. Homocysteine is converted to cystathionine via cystathionine synthase, and in patients with cystathionine synthase deficiency, the development of premature arteriosclerosis is common. The vascular phenotype of the cystathionine synthase knockout mouse will be presented and discussed. The multidisciplinary slate of speakers in this symposium will vertically integrate homocysteine chemistry, vascular wall biology, and the functional genomics of homocysteine metabolism.

Intestinal Adaptations to Fasting

Gastrointestinal and Endocrinology & Metabolism Sections

Ronaldo P. Ferraris and Hannah V. Carey

Ronaldo P. Ferraris, Leonard R. Johnson, Richard A. Hodin, and Hannah V. Carey

This symposium will focus on the response of the intestinal mucosa to fasting, a practice common in weight management and an accepted presurgical procedure. Prolonged fasting or caloric restriction has also attracted enormous interest because of its dramatic effect on lifespan. The symposium will begin with an overview of how mucosal growth is influenced by local nutrition and various regulatory molecules released during feeding. Changes in gene expression that occur during fasting and refeeding will then be described, including alterations in levels of transcription factors and brushborder proteins inin

response to hormones and growth factors provided exogenously. The influence of fasting on intestinal ion transport and permeability will be outlined, as well as how the absence of luminal nutrients alters regulation of ion transport. The final speaker will describe adaptations in hormonal and nutrient transporter gene expression to acute fasting and to caloric restriction. The symposium will close with a discussion of unsolved problems and future research directions.

Interaction Between Vascular Endothelium and Smooth Muscle: Advances in Physiology and Pathophysiology

Respiration Section and MyoBio (Muscle) Group

Guo-Wei He and Richard A. Cohen

Michael S. Wolin, Richard A. Cohen, Wolfgang F. Graier, Guo-Wei He, and Bruce M. McManus

There has been great progress in the understanding of the function of vascular endothelium and smooth muscle in the last decade. In particular, the interaction between endothelium and smooth muscle has greatly interested not only basic scientists but also clinicians. The important role of endothelium in the physiological and pathophysiological status of blood vessels has been recognized with regard to the following. How does the endothelium modulate the vascular tone through its interaction with vascular smooth muscle? What is the target in the smooth muscle for individual endothelium-derived relaxing factors such as nitric oxide and endothelium-derived hyperpolarizing factor? How to protect the coronary circulation with regard to its endothelium and smooth muscle during ischemia? What is the role of the interaction between endothelium and smooth muscle on the development of atherosclerosis, such as posttransplant vascular disease?

The aim of this symposium is to provide in depth lectures to the audience, given by world-renowned researchers in these areas, and to connect the basic science findings to clinical problems. Some of the lectures may involve new insight into the major theme, which is still controversial, and may bring our audience to a new step to further explore the interaction between endothelium and smooth muscle. The speakers will point out future directions for their own topics and the clinical implications when applicable. Therefore, we believe that these state-of-the-art lectures will provide our audience with updated knowledge and future directions and attract both basic scientists and clinical researchers working in this widely pursued field.

New Perspectives of Pulmonary Blood Flow Distribution

Respiration and Teaching of Physiology Sections and Education Committee

Michael P. Hlastala

John B. West, Mike Hughes, Robb Glenny, Kim Prisk, and Michael P. Hlastala

The primary framework for interpreting pulmonary blood flow data over the past thirty years has been the zone model developed by West, Hughes, and colleagues. Recent experimental findings with enhanced spatial resolution take issue with gravity as the dominant factor determining perfusion distribution. Experiments performed on astronauts in the Space Shuttle have revealed a considerable amount of heterogeneity in gas exchange at zero G. On the Earth's surface, detailed microsphere measurements of pulmonary perfusion distribution now demonstrate a considerable degree of heterogeneity within isogravimetric planes. Thus, the relative importance of gravity versus pulmonary vascular structure in determining distribution of perfusion is questioned.

This symposium will bring together the leaders in this controversy. It will provide a setting for the airing of opinions on both sides of the controversy, allowing the attendees an opportunity to evaluate both sides of this important and current physiological issue. West and Hughes were the original developers of the zone model and are currently very active in this field. Glenny is the developer of the fluorescent microsphere technique that has provided data contrasting with the zone model. Prisk has worked with West in obtaining the first respiratory gas exchange data at prolonged zero G demonstrating persistent heterogeneity in the absence of gravity. Hlastala will present data obtained on the centrifuge at Brooks Air Force Base that quantifies the relative importance of increased inertial force on pulmonary perfusion heterogeneity.

Mechanisms of Adaptation to Hypoxia: Organizational, Cellular, and Molecular Responses

Respiration, Environmental & Exercise Physiology, and Cardiovascular Sections and Hypoxia Interest Group

Faramarz Ismail-Beigi and Cynthia M. Beall

Cynthia M. Beall, Robert S. Balaban, Gregg L. Semenza, Napoleon Ferrara, and Sanders R. Williams

Maintenance of adequate delivery of oxygen to cells and tissues is critical for the survival of homeotherms. A decrease in the availability of oxygen (hypoxia) results in a variety of cellular derangements that in turn lead to a host of acute and chronic adaptive responses. In acute hypoxia, major responses include stimulation of glycolytic ATP synthesis, modulation of ion

channels, release of neurotransmitters, and channeling of ATP usage towards "essential" cellular functions. Adaptive responses to prolonged hypoxia, on the other hand, are mediated by additional events, including regulation of gene expression, phenotypic remodeling of specific tissues and organs, and angiogenesis. Examination of mechanisms underlying these adaptive responses constitute an important and a highly active area of investigation.

The aim of the proposed symposium is to summarize the current understanding of mechanisms mediating the adaptive responses to both acute and chronic hypoxia. The conceptual framework and design of the symposium is to examine the hypoxic adaptive responses from the level of the organism to cellular and molecular levels. Beall will examine the contrasts between the responses of Tibetan and Andean high-altitude natives to chronic hypoxia and will explore the genetic basis for the observed differences. Balaban will summarize our understanding of the cellular, energetic responses in the acute phase of adaptation to hypoxia utilizing noninvasive, NMR techniques. Semenza will describe the regulatory role of hypoxia-inducible factor-1 in the expression of specific genes, including erythropoietin, glycolytic enzymes, and vascular endothelial growth factor. Ferrara will summarize the role of vascular endothelial growth factor expression of angiogenesis in response to hypoxia. Finally, Williams will examine the expression and function of stress proteins (especially that of HSP-70) in the adaptive response to hypoxia and ischemia. Overall, the above series of presentations and the resulting discussions will not only serve to enhance our understanding of molecular, cellular, and organismal adaptive responses to hypoxia, but the topic of the proposed symposium is of great relevance to related fields of investigation, including cellular energetics, apoptosis, and cancer biology.

Molecular Mechanisms of Protein Traffic and Secretion

Cell & General Physiology and Renal Sections and Epithelial Transport Group

Kevin L. Kirk and Hugo J. Bellen

Kevin L. Kirk, William Balch, Kathryn Howell, and Hugo J. Bellen

The intracellular traffic of physiologically relevant proteins such as ion channels and hormone receptors can be regulated in response to specific physiological cues. The major aim of this symposium is to introduce physiologists to the basic paradigms that have led to our current understanding of the protein traffic machinery. These paradigms include genetic approaches to studying membrane traffic, the reconstitution of regulated secretion in semiintact cells and the combined use of cell biological approaches and high resolution electron microscopic methods to study membrane vesicle formation. The speakers in this symposium have utilized these paradigms to provide novel insights into the molecular basis of protein traffic. The proposed symposium should expose physiologists to current views of the protein traffic machinery and illustrate how this information can improve our understanding of basic physiological processes that are regulated by this machinery (e.g., neurotransmitter secretion and ion transport).

Is the Development of Atherosclerotic Lesions Determined by Monocyte-Endothelial Adhesion?

Cardiovascular Section

Klaus Ley and Arthur L. Beaudet

Don P. Giddens, Michael A. Gimbrone, Myron I. Cybulsky, Paul E. DiCorleto, Arthur L. Beaudet, and Klaus Ley

Atherosclerosis is known to have an inflammatory component. Monocytes recruited into early lesions are believed to differentiate into macrophages and foam cells. These cells secrete cytokines and growth factors that may promote smooth muscle proliferation and formation of a fibrous cap. Recently, interventional studies have become possible that bear the potential of elucidating the role of endothelial-leukocyte adhesion molecules in the atherosclerotic process. This interdisciplinary symposium will explore the interrelation between hemodynamic forces, shear stress-induced and -suppressed gene products, lipoproteins, and endothelial cell adhesion molecules in the formation and maturation of atherosclerotic lesions. The techniques used by the presenting investigators include endothelial cell biology, differential display, flow modeling, and transgenic and gene-targeted mice.

Neuronal Assembly Dynamics: Cellular and Network Mechanisms in Cardiorespiratory Control

Central Nervous System and Neural Control & Autonomic Regulation Sections

Susan M. Barman and Bruce G. Lindsey

Eve E. Marder, Jeffrey C. Smith, James S. Schwaber, Susan M. Barman, and Bruce G. Lindsey

This symposium will highlight recent advances in our understanding of how brain function emerges from dynamic interactions among neurons. The introductory talk will describe higher order properties in an invertebrate motor system that depend on cellular and molecular mechanisms for their expression and stability. Mammalian brainstem networks involved in cardiorespiratory control will then be considered. Cellular and network properties of the respiratory oscillator and computer models will suggest cooperative mechanisms that produce the timing and phases of breathing. Next, recent results from models of intracellular signal transduction pathways as a computation-

al network will be linked to the neuron's connectional network activity. Another perspective will come from both time and frequency domain analysis of cooperative phenomena in brainstem networks that coordinate sympathetic activity. Finally, repeated patterns of synchrony in neuronal assemblies will be described; they may reflect distributed mechanisms involved in the dynamic regulation of breathing by baroreceptors and chemoreceptors.

Strength, Functional Capacity and Trainability of Aging Skeletal Muscle

Environmental & Exercise Physiology Section and MyoBio (Muscle) Group

Robert S. Mazzeo

Robert S. Mazzeo, Lars Larsson, Frank Booth, Susan V. Brooks, and William J. Evans

The well-documented loss of muscle mass and function associated with advancing age carries with it a number of clinical and health consequences. As the elderly population continues to grow at a dramatic rate, it becomes imperative to have a better understanding of the causes, mechanisms, and possible interventions for sarcopenia. This symposium is intended to give a thorough overview of what is currently known regarding sarcopenia, ranging from the functional implications to the potential underlying molecular mechanisms. Additionally, as disuse atrophy of muscle appears to contribute significantly to the pathophysiology of this disorder, the role of exercise (both aerobic and strength training) as a possible intervention or therapeutic modality will also be examined. Specifically, Larsson will discuss the remodeling of the motor unit that occurs with advancing age as well as the potential mechanisms for this observation. Booth will examine the molecular mechanisms associated with sarcopenia and the influence of possible interventions. Brooks will examine intrinsic age-related changes in muscle that render them more susceptible to contraction-induced injury as well as a decrease in ability to recover from injury. Finally, Evans will discuss the functionality and health-related consequences of sarcopenia and the extent to which regular exercise can preserve or prevent muscle loss with age.

Hemodynamic and Renal Tubular Interactions of Endothelin and Nitric Oxide

Renal, Water & Electrolyte Homeostasis, Cardiovascular, and Respiration Sections

David M. Pollock and Timothy D. Warner

Timothy D. Warner, Christine Baylis, David M. Pollock, Jeffrey L. Garvin, and Michael S. Goligorsky

The enormous interest in endothelin (ET) and nitric oxide (NO) has led investigators to focus their attention on how these factors directly interact. It has been known for some time that the vasodilator actions of ET were due, in part, to release of NO. More recently, however, it has been reported that some of the vasoconstrictor responses to inhibition of NO production are mediated by ET. It has also been postulated that the tubular actions of ET are mediated by NO. This symposium will specifically address the question of how ET and NO interact to regulate cardiovascular and renal function. Studies using molecular to whole animal techniques will be discussed to provide a comprehensive analysis of this interaction. The physiological conditions under which NO regulates ET activity and the mechanism for this regulation will be key components of this symposium. Several speakers will address issues related to how ET and NO may influence function within the renal tubules. Finally, the role of ET and NO in endothelial cell migration and angiogenesis will be discussed. It is expected that the speakers will provide some of their latest insights into this fascinating relationship in an effort to further our understanding of endothelial cell function.

Current Mechanisms of Blood Coagulation

Cardiovascular Section and Physiologists in Industry Group

Stephen T. Rapundalo and Benedict R. Lucchesi

Stephen T. Rapundalo, James H. Morissey, Thomas S. Edgington, Katherine A. High, Shaun R. Coughlin, and Benedict R. Lucchesi.

The focus of the symposium will be on the recent advances made towards understanding the pathobiology of thrombosis, particularly as it relates to the function and regulation of specific molecular components of the coagulation cascade. New insights will be given into the molecular and biochemical characteristics of protein-protein interactions between tissue factor and factor VIIa. Emerging structural evidence will also be presented that may explain the interplay between these two components and thereby define their roles as primary cellular initiators of coagulation. A discussion of the key role of factor X in thrombogenesis will emphasize the specific residues in the molecule that are critical for its function in the prothrombinase complex as the primary activator of thrombin. This will be followed by a presentation on new advances in understanding structure-function of the thrombin receptor, its cell signaling pathways, and implications for pathophysiology, much of it based on studies using a genetic mouse knockout model. Finally, the various coagulation processes will be integrated at a physiological and pharmacological level by a description of the use of novel antithrombotic agents to regulate clotting in clinically relevant animal models. The session will create a unique forum for interdisciplinary dialogue regarding current concepts and state-of-the-art knowledge of coagulation protein function.

Role of Sex Steroids in Cardiovascular-Renal Physiology and Pathophysiology

Water & Electrolyte Homeostasis, Cardiovascular, Renal, and Respiration Sections

Jane F. Reckelhoff and Leonard Share

Carmen Hinojosa-Laborde, Jane F. Reckelhoff, Leonard Share, Virginia M. Miller, and Peter W. Ramwell

Gender has long been known as a predisposing factor for increased cardiovascular-renal disease. For example, men are at greater risk for chronic cardiovascular and renal diseases than are premenopausal women. As such, sex steroids have been implicated in the mechanisms responsible for the higher incidence in men and protection in women. The fact that the incidence of cardiovascular disease increases in postmenopausal women suggests that estrogen may play a protective role in preventing cardiovascular disease, whereas numerous studies in rats have shown that the progression of hypertension and subsequent renal injury can be ameliorated by gonadectomy in male. The exact mechanisms by which androgens promote and estrogens may protect against cardiovascular-renal disease are not completely understood and have thus recently been given increased scientific investigation. This symposium will address the highlights of the recent advances into the mechanisms by which sex steroids are involved in cardiovascular and renal function and will also address the important research questions yet to be answered.

Role of Tight Junctions in the Regulation of Tissue Permeability

Renal, Cell & General Physiology, and Respiration Sections and Epithelial Transport Group

Luis Reuss and Kenneth R. Spring

Luis Reuss, Marcelino Cereijido, James M. Anderson, James L. Madara, Olga Kovbasnjuk, and Roger Adamson

The junctions between epithelial or endothelial cells constitute an essential barrier to the movement of solutes. Regulation of the solute and water permeability of these junctions by a variety of intracellular and extracellular factors is the subject of this symposium. The recent advances in our understanding of the molecular structure of epithelial tight junctions have been paralleled by evidence for functional regulation of junctional tightness by a wide range of substances. Presentations will include state-of-the-art talks on the molecular structure and organization of tight junctions, the relationship between the tight junction and the cytoskeleton, regulation of the intestinal epithelial tight junctional barrier in both physiologic and pathophysiologic states, modulation of water permeation through epithelial tight junctions, factors that alter the structure and permeability of the endothelial cell cleft, and junctional tightness in capillaries.

Protein Phosphatases in Cell Signaling Pathways

Cell & General Physiology and Respiration Sections

Avril V. Somlyo and Claude B. Klee

Avril V. Somlyo, Anjana Rao, Kyle W. Cunningham, Claude B. Klee, Andrew P. Somlyo, and Nicholas K. Tonks

Protein phosphorylation/dephosphorylation is a major cellular signal-transduction mechanism. It has only recently become apparent that protein phosphatases, like protein kinases, are also highly regulated and important participants in many signaling pathways in a wide variety of cells. Examples reflecting this diversity will be presented, including the interplay of the calcium-calmodulin-activated phosphatase protein phosphatase 2B with transcription factors and immunophilins in T-cell signaling; the regulation of ion transporters by phosphatases; an example of a unique mode of phosphatase regulation by coupling Ca^{2+}-dependent dephosphorylation to the redox state of the cell; the ability of protein tyrosine phosphatases to serve as receptors for adhesion molecules; and finally, the role of the small GTPase RhoA in the regulation of smooth muscle myosin light chain phosphatase and, through it, smooth muscle contraction and nonmuscle cell motility.

Pluripotent Effects of Tumor Necrosis Factor on Insulin Sensitive Tissues

Endocrinology & Metabolism Section and Physiologists in Industry Group

Jacqueline M. Stephens and Philip A. Kern

Jacqueline M. Stephens, Bruce M. Spiegelman, Andrew G. Swick, Andrew Greenberg, and Philip A. Kern

In conditions of obesity and insulin resistance, tumor necrosis factor (TNF) is produced from adipocytes and has been shown to play a key role in mediating the pathogenesis of obesity-associated insulin resistance. TNF has a number of effects on adipocytes, including the regulation of glucose transport, interference with insulin signaling, stimulation of lipolysis, and regulation of gene expression. Since the bulk of glucose disposal in the body is mediated by muscle, more recent studies have examined the effects of TNF in muscle. An important consideration is whether TNF derived from adipocytes acts in an endocrine manner on muscle or whether local production of TNF from muscle is necessary.

This symposia will focus on the actions of TNF in fat and muscle that are associated with obesity. There are conflicting issues in this area, particularly concerning the mechanisms involved in the interference of insulin receptor signaling. The session offers a comprehensive examination of the considerable regulation of insulin-sensitive tissues by TNF and the relatedness of these effects. The future direction considered in this

symposia is the role of thiazolidinediones in their ability to overcome TNF-induced insulin resistance and the implications of these observations.

Molecular Approaches to Understanding Cellular Responses to Stress

Comparative Physiology, Renal, Respiration, and Environmental & Exercise Physiology Sections

Kenneth B. Storey

Kenneth B. Storey, Bruce Demple, David M. Cohen, Douglas V. Faller, and Richard I. Morimoto

Comparative physiologists and biochemists strive to find out "How Animals Work," how they adapt, endure, and prosper under a range of environmental stresses and constraints. The focus of comparative research has gradually shifted "downwards" from whole organism to organ, cell, and metabolic levels to unravel the mechanisms of adaptation. The last remaining frontier is that of the gene. Molecular biologists working with mammalian cell lines are making great strides in identifying gene responses to external stresses (e.g., osmotic, temperature, oxygen) applied in vitro using systems that are largely stress-intolerant. Comparative physiologists and biochemists have a range of naturally stress-tolerant organisms but are only beginning to become acquainted with molecular techniques that could be applied to their systems. This symposium will introduce the techniques and approaches of molecular biologists to the field of comparative physiology and biochemistry. Most speakers are molecular biologists who are at the forefront of their fields in stress-induced gene expression and who will illustrate the enormous scope of this approach for identifying the genes and gene products that are upregulated as adaptive responses to stress.

Na-K-2Cl Cotransporters: Heterogeneity of Structure, Function, and Regulation

Renal and Cell & General Physiology Sections and Epithelial Transport Group

Susan M. Wall and Bliss Forbush III

Susan M. Wall, Bliss Forbush III, R. James Turner, Martha O'Donnell, and Carolyn M. Ecelbarger

The Na-K-2Cl cotransporters serve a variety of functions including net acid secretion, volume regulation, and both NaCl secretion and absorption. The physiological role and the regulation of the cotransporters is varied and often tissue-specific. The Na-K-2Cl cotransporters are encoded by two distinct genes, BSC-1 and BSC-2. BSC-1, or the absorptive isoform, is kidney specific and localized to the apical membrane of the thick, ascending limb of Henle's loop. The secretory isoform of the cotransporter, BSC-2, is widely distributed. It is found in nonepithelial cells and on the basolateral membrane of epithelia. Recent cloning of both cotransporters has revealed numerous splice variants and has enabled study of the tissue distribution of the cotransporters and their molecular regulation. This symposium will explore the diversity of the cotransporters in structure, function, and regulation. The structure and functional expression of the cotransporters will be discussed by Forbush. The role of the cotransporters in fluid secretion and volume regulation will be reviewed by Turner and O'Donnell. Finally, the contribution of the cotransporters to urinary concentration and acid secretion will be discussed by Ecelbarger and Wall.

Glutamate Transport, Metabolism, and Physiological Responses

Renal, Cell & General Physiology, and Gastrointestinal Sections and Epithelial Transport Group

Tomas C. Welbourne

Susan Amara, Matthias A. Hediger, John D. McGivan, Itzhak Nissim, and Tomas C. Welbourne

The role of glutamate and glutamate transporters in regulating cellular processes in the central nervous system and the kidney and intestine will be the general theme. In the mammalian central nervous system, glutamate sequestration and regulation of glutamate transporters is seen from the perspective of fine tuning the excitatory neurotransmission and maintaining extracellular glutamate below neurotoxic levels. In epithelial cells, the role of glutamate and glutamate transporter turnover is viewed from the perspective of regulating multiple cellular processes involving metabolic, osmolar, and acid-base homeostasis. Functional expression of the transporters, ionic and substrate fluxes, and gene expression will be matched, when possible, to the physiological stimuli promoting their activity in order to define these systems (glia/neurons; nephron segments; intestine) in a biologically meaningful manner. Multiple levels of investigation include molecular (cloning, gene expression, protein structure) and physiological (functional expression, ionic and metabolic fluxes, signaling pathways, and organ responses). The aim is to provide a coherence attractive to investigators across multiple disciplines and to invite further exploration.

APS Public Affairs Symposium: Institutional Animal Care and Use Committee (IACUC) Issues Roundtable

Animal Care and Experimentation Committee

C. Terrance Hawk and Steven W. Mifflin

This session is intended to serve as a forum where scientists who serve on IACUCs can compare how their institutions' committees respond to various issues in protocol review. Among the issues likely to come up for discussion are death as an endpoint, justification of animal numbers, verification that

research is not duplicative, footpad injections, and other areas that the USDA regulations and the *Guide for the Care and Use of Laboratory Animals* leave to the discretion of each IACUC. Symposium organizers also invite audience discussion of what scientists find frustrating and rewarding about IACUC service, as well as what scientists would like to see changed in the current animal care regulatory framework.

Guest Societies

Alternative Premessenger RNA Splicing: Biology and Pathology

Society for Experimental Biology and Medicine

Edward J. Benz and Philip A. Sharp

Philip A. Sharp, Paula Grabowski, Stephen Berget, Shu Huang, and John Conboy

The appearance of intrans in the genomes of organisms created the necessity for a molecular mechanism that provided for the elimination of transcripts of the intrans from messenger to precursors and the precise ligation of, in the correct register, the exons that ultimately form mature mRNA. This process, called premessenger RNA splicing, has been extensively studied with respect to both its fundamental biochemical mechanisms and the elements responsible for modulating it in different tissues. In particular, the identical premessenger RNA transcripts are spliced differently in different tissues, yielding an array of messenger RNA products that, in turn, can cope for an array of proteins of like, but nonidentical function. This symposium will focus on the role of intrans and posttranscriptional premessenger RNA splicing in normal cell physiology, the anatomy and physiology of splicing apparatus that support premessenger RNA splicing, emerging information about the factors that govern the use of alternative mRNA splicing pathways in different tissues, and examples drawn from the impact of normal and abnormal alternative mRNA splicing in health and disease.

Understanding Biological Systems Through Mathematical Modeling

Biomedical Engineering Society

Jerry C. Collins

Ray C. Boston, Kevin Lewis, Janet A. Novotny, Stephen P. Coburn, Blossom Patterson, Meryl E. Wastney, and James B. Bassingthwaighte, and Jerry C. Collins

This crossdisciplinary symposium has been organized to honor the memory of Loren Zech, senior scientist in the Mathematical Biology Laboratory of the National Cancer Institute. An endocrinologist and engineer, his interests, knowledge, and influence spanned a wide spectrum and crossed several FASEB societies. The talks in this symposium center on his interests and contributions, including the development and dissemination of SAAM and CONSAM, the compartmental analysis software distributed from his laboratory at the National Cancer Institute, and his uncanny and unique understanding of the human body from an engineering systems point-of-view. The final two presentations describe novel uses of the Internet to promulgate models developed by Loren Zech and others and develop from shared databases a new generation of models linking genomic and molecular information to health care practice.

Transport Phenomena in Cellular and Molecular Processes

Biomedical Engineering Society, APS MyoBio (Muscle) and Epithelial Transport Groups and Cell & General Physiology Section

Scott L. Diamond

Joel Keizer, Johannes Nitsche, David A. Edwards, George Oster, and Scott L. Diamond

This session seeks to report some of the recent advances in the study of transport phenomena as it regulates to biological processes from the molecular to cellular level. With the increase of computational power and the advance of computational techniques that include molecular and Brownian dynamics, statistical mechanics, large scale simulation, and rapid imaging, the time is perfect for a session on this topic. Speakers have been selected to provide insight and discussion on topics of microscale diffusion and convective transport. A range of topics will cover ion mobility through gap junctions, intracellular calcium diffusional dynamics, the role of reaction and transport on endocytotic systems inside the cell, diffusive and convective/reactive events in human blood, and finally, mechanochemical coupling in biological systems whereby chemical energy drives mechanical events and transport. This session will be attractive to a range of biophysicists, biologists, bioengineers, and clinicians interested in fundamental processes of transport phenomenon at the microscale. Speakers have been selected across a range of expertise and disciplines.

Engineering Gene Therapeutics

Biomedical Engineering Society

Martin L. Yarmush and Jeffrey R. Morgan

Jeffrey R. Morgan, Mitchell Finer, Scott Diamond, Jeffrey L. Nordstrom, and David Curiel

Gene therapy holds great promise for the treatment of a variety of inherited and acquired diseases. During the past decade, this potential of gene therapy has spawned the development of numerous gene transfer technologies for the introduction of therapeutic genes into cells in vitro as well as tissues in vivo. These gene transfer technologies are diverse, from the com-

plex viral mediated approaches to the more simple chemical and mechanical approaches. Although each gene transfer technology fundamentally seeks to attain the same goal, namely the introduction and expression of a therapeutic gene into a target cell or tissue, the success of the clinical application of these technologies will ultimately depend on the advantages and limitations of each technology and its suitability to its medical application. At this juncture in the progress of gene therapy, the limiting factor is not the availability of therapeutic genes. Rather, the limitations lie within the dynamics of the gene transfer processes. The objective of this session is to highlight the studies in life sciences and bioengineering that are addressing these issues surrounding the technologies of gene transfer. A few of the issues include the production of high-titer stocks, the efficiency of gene delivery in vitro, the trafficking and targeting of genes and gene delivery vehicle in vivo, the persistence and level of gene expression after gene delivery, and the inflammatory consequences and immunogenicity of in vivo gene delivery vehicles. This session will bring together leading experts from academia and the biotechnology industry to discuss recent advances by life scientists as well as the new and emerging efforts of the bioengineering community to address these important issues in gene therapy.

Molecular and Cellular Changes During Aging

Chinese Physiological Society

Paulus Shyi-Gang Wang and Yau-Huei Wei

Paulus Shyi-Gang Wang, Zee-fen Chang, Tsuei-Chu Mong Liu, Byung Pal Yu, and Yau-Huei Wei

The topics in gene expression, signal transduction, and the role of the mitochondria will be included to discuss the relationship between aging and cellular or molecular changes. Chang will demonstrate the temporal relationship between downregulation of thymidine kinase and changed levels of cell cycle regulators p16, p21, and E2F-1 during senescence of human diploid fibroblasts. Liu found that the inhibition of transforming growth factor beta 1 on prolactin synthesis and mRNA expression — but not on prolactin secretion — is age dependent. Wang will present the correlation between cAMP production and steroidogenesis in rat testicular interstitial and adrenocortical cells with different ages. Yu's presentation will support the hypothesis of the oxidative stress theory of aging by using pertinent data to elaborate on the involvement of free radicals in the oxidative modification of protein, DNA, and lipids involved in cellular structure and function during aging. Wei will indicate that the vicious cycle operates in various cells at different rates and leads to differential accumulation of oxidative damage and to mutation of mitochondria DNA, which may explain the difference in functional decline and structural deterioration of different tissues in human aging.❖

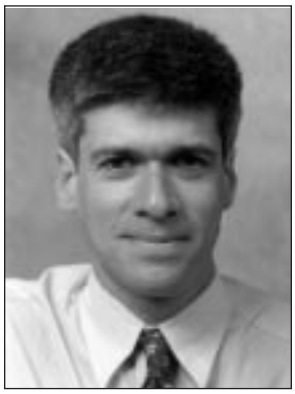
APS To Sponsor AAAS Mass Media Science and Engineering Fellow Applications Invited

In 1998, APS will sponsor an American Association for the Advancement of Science (AAAS) Mass Media Science and Engineering fellow. This individual will spend a summer working in the newsroom of a newspaper, magazine, or radio or television station, sharpening his or her ability to communicate complex scientific issues to nonscientists and helping to improve public understanding of science. The fellowship program is a 23-year-old AAAS initiative that has already provided summer placements for some 359 advanced students of the sciences.

The APS-sponsored fellow will spend 10 weeks helping to cover science and technology issues. AAAS will arrange placements at a participating media outlet as part of the selection process. Fellows will travel to Washington for an advance orientation to journalism and a wrapup and evaluation session at the conclusion of their assignments. The fellowship includes travel to these sessions and the job site and a weekly stipend based upon local cost of living.

Application information: To be eligible for the program, you must be currently enrolled as a graduate or postgraduate student of physiology or a related discipline. Application forms are available from Alice Hellerstein in the APS Office of Public Affairs at the address below. In addition to the completed form, applicants must submit a current resumé, at least one three- to five-page writing sample directed to the general public, transcripts of graduate and undergraduate work, and three letters of recommendation. Two recommendation letters should be from faculty members, and the third should be a personal reference. The selection process is designed to seek out qualified candidates especially from underrepresented communities, including blacks, Hispanics, and Native Americans, as well as scientists with disabilities.

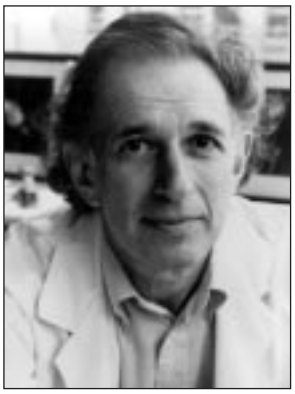
The application deadline is January 15, 1998. For more information, contact Alice Hellerstein, APS Office of Public Affairs, 9650 Rockville Pike, Bethesda, MD 20814-3991. Tel: 301-530-7105; fax: 301-571-8305; e-mail: ahellers@aps.faseb.org.



HENRY PICKERING BOWDITCH AWARD

Michael Caplan
Yale University

The Sorting of Ion Transport Proteins in Polarized Cells: From Molecular Signals to Physiological Function



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

Eric R. Kandel
Columbia University

To be announced

Distinguished Lectureships

ROBERT M. BERNE DISTINGUISHED LECTURESHIP OF THE CARDIOVASCULAR SECTION

Kenneth R. Chien
University of California at San Diego

Genetically Engineered Animal Models of Cardiac Development and Disease: Genes and Physiology

HUGH DAVSON DISTINGUISHED LECTURESHIP OF THE CELL AND GENERAL PHYSIOLOGY SECTION

Sir Andrew Huxley
Trinity College (UK)

The Unpredictability of Science: Lessons from Muscle Physiology

JOSEPH ERLANGER DISTINGUISHED LECTURESHIP OF THE CENTRAL NERVOUS SYSTEM SECTION

Lawrence B. Cohen
Yale University

Optical Measurement of Brain Activity in Aplysia and Turtle: Spikes and Waves

AUGUST KROGH DISTINGUISHED LECTURESHIP OF THE COMPARATIVE PHYSIOLOGY SECTION

Harold T. (Ted) Hammel
Indiana University

Evolving Ideas About Osmosis

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

Phyllis M. Wise
University of Kentucky

"Menopause": Interplay Among Several Endocrine Pacemakers

EDWARD F. ADOLPH DISTINGUISHED LECTURESHIP OF THE ENVIRONMENTAL AND EXERCISE PHYSIOLOGY SECTION

Kenneth M. Baldwin
University of California at Irvine

Interaction of Mechanical Activity and Thyroid Hormone on Skeletal Muscle Plasticity

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

K. Michael Spyer
Royal Free Hospital, UK

Neuromechanisms Underlying Autonomic Control of Circulation

CARL W. GOTTSCHALK
DISTINGUISHED LECTURESHIP OF THE RENAL SECTION

Walter F. Boron
Yale University

Acid-Base Transport: From the Squid Giant Axon to the Renal Proximal Tubule

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

John M. Harlan
University of Washington

Leukocyte-Endothelial Interaction: Molecular Basis and Clinical Relevance

CLAUDE BERNARD
DISTINGUISHED LECTURESHIP OF THE TEACHING OF PHYSIOLOGY SECTION

Donald T. Frazier
University of Kentucky

Appreciation and Enhancement of Physiological Teaching Through Outreach Involvement

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

John E. Hall
University of Mississippi

Cardiovascular and Renal Pathophysiology of Obesity and Insulin Resistance

HORACE W. DAVENPORT
DISTINGUISHED LECTURESHIP OF THE GASTROINTESTINAL SECTION

George Sachs
University of California at Los Angeles

Gastric Acid and Gastric Microorganisms

1998 APS Conference

Endothelial Regulation of Vascular Tone: Molecular to Integrative Physiology

September 16–19, 1998 • Augusta, GA

Radisson Riverfront Hotel

ORGANIZER:

David M. Pollock
Medical College of Georgia

STEERING COMMITTEE:

John D. Catravas
Medical College of Georgia

Harris J. Granger
Texas A&M University

L. Gabriel Navar
Tulane University

Jennifer S. Pollock
Medical College of Georgia

Subsequent to the realization that endothelial cells are important regulators of vascular, immunological, and probably many other functions, endothelial cell biology has rapidly expanded into a distinct discipline. Simply in terms of vascular function, this relatively new area covers an extremely wide range of the more traditional disciplines, including physiology, pharmacology, and cell and molecular biology. The purpose of this conference is to present the most recent information on the interaction among major endothelial factors in the control of the vascular tone.

The conference brings together rapidly growing areas of endothelial cell biology so as to develop a more cohesive picture of the vascular endothelium as a physiological organ system. While the primary emphasis will be on specific mediators, related subjects such as shear stress and vascular remodeling will also be covered. Molecular and whole animal physiologists will demonstrate how their methodologies integrate into a central hypothesis and also define the similar aspects and unique mechanisms that exist among the different vascular beds. The conference is different from other vascular related meetings in that it attempts to bring together diverging areas of endothelial cell biology to develop a more cohesive picture of vascular endothelial function.

WEDNESDAY, September 16, 1998

Discovery of EDRF
Salvador Moncada, University College, London

Signal Transduction and Gene Regulation
Robert Highsmith, University of Cincinnati; **Rudi Busse**, J.W. Goethe University, Germany; **Ferid Murad**, Molecular Geriatrics; **Brian Duling**, University of Virginia

THURSDAY, September 17, 1998

Paracrine Regulation of the Renal Circulation
L. Gabriel Navar, Tulane University

Endothelial Control of the Renal Microcirculation
Josephine P. Briggs, Univ. of Michigan; **Christopher Wilcox**, Georgetown University; **William J. Arendshorst**, Univ. of North Carolina

Interaction of Nitric Oxide With Other Mediators
David Pollock, Medical College of Georgia; **Pam Carmines**, University of Nebraska; **Tom Hintze**, New York Medical College

Regulation of NOS in Vascular Smooth Muscle
Jennifer Pollock, Medical College of Georgia

TGF in Fibrotic Disease
Wayne Border, University of Utah

FRIDAY, September 18, 1998

Transgenic Mice as Models for Hypertension
Ed Shesley, Henry Ford Hospital

Endothelial Dysfunction: Pharmacology
Joan Keiser, Parke-Davis; **Lou Ignarro**, University of California at Los Angeles; **Ulrich Förstermann**, Gütenberg University, Germany

Endothelial Dysfunction: Pulmonary
Bruce Pitt, University of Pittsburgh; **John D. Catravas**, Medical College of Georgia; **Steve Abman**, University of Colorado

Endothelial Dysfunction: Cardiovascular
Richard Paul, University of Cincinnati; **Leslie Fuchs**, Medical College of Georgia; **Richard Cohen**, Boston University

Peptidase Activity in the Vascular Endothelium
Jim Ryan, Medical College of Georgia

Pivotal Role of Endothelium to Heart-Lung Transplantation
Sir Magdi Yacoub, Imperial College, London, UK

SATURDAY, September 19, 1998

Endothelial Regulation of Angiogenesis
Harris Granger, Texas A&M University

Vascular Remodeling
Mary Gerritsen, Bayer; **David Harrison**, Emory University

Shear Stress
John Frangos, University of California at San Diego; **Robert Nerem**, Georgia Tech; **Barbara Ballerman**, Johns Hopkins

Estrogen Modulation of the Vascular Endothelium: Implications for Development of Coronary Artery Disease
Virginia Miller, Mayo Clinic

Endothelial Gene Transfer in Restenosis

OOOoops!

Attention: All APS members. We sincerely regret an error made in a recent mailing to you about this APS meeting's program. Joan Keiser (and not John Kaiser as listed) is the speaker from Parke-Davis for the session "Endothelial Dysfunction: Pharmacology."

1998 APS Conference

The Paraventricular Nucleus of the Hypothalamus: A Crossroads of Integrative Physiology

December 5–9, 1998 • San Antonio, TX
The Menger Hotel

ORGANIZER:

Joseph R. Haywood
University of Texas Health Sciences Center, San Antonio

STEERING COMMITTEE:

Alan K. Johnson
University of Iowa

Arthur D. Loewy
Washington University

Leo P. Renaud
University of Ottawa

Catherine Rivier
Salk Institute

A. J. W. Scheurink
University of Groningen, The Netherlands

The paraventricular nucleus of the hypothalamus (PVN) serves as the crossroads of integrative physiology. This discrete hypothalamic area receives neural, humoral, and endocrine input regarding the state of the cardiovascular, endocrine, and immune systems, as well as fluid and electrolyte and energy balance. Integration of afferent inputs results in efferent neural or hormonal regulation of specific organ systems. This conference will bring together scientists who study different physiological systems and who use a variety of technical approaches ranging from molecular biology to whole animal physiology. The goal will be to understand how the PVN integrates afferent information, controls specific physiological functions, and coordinates interactions among organ systems.

TENTATIVE PROGRAM

Anatomy, Neural Pathways and Neurochemistry
Arthur Loewy, Washington University; **Paul Sawchenko**, Salk Institute; **Larry Swanson**, University of California at Los Angeles

Integration of Ingestive Behaviors
Alan Kim Johnson, University of Iowa; **Glenn Stanley**, University of California at Riverside; **Stephen Woods**. University of Washington; **Joseph Verbalis**, University of Virginia; **John Wright**, Washington State University

Role in Metabolism and Energy Balance
Anton J. W. Scheurink, University of Groningen, The Netherlands; **John Vissing**, University of Copenhagen, Denmark; **Barry Levin**, Veterans Affairs Medical Center., East Orange, New Jersey; **Gerjan van Dijk**, University of Washington, **Martine Orosco**, College of France

Neuroendocrine Regulation
Leo P. Renaud, University of Ottawa; **Stanley Watson**, University of Washington; **Ruud Buijs**, Netherlands Institute of Brain Research; **Charles Bourque**, Montreal General Hospital; **William Crowley**, University of Tennessee; **Paul Plotsky**, Emory University

Stress and the Immune System
Catherine Rivier, Salk Institute; **Serge Rivest**, Laval University; **Dwight Nance**, University of Manitoba; **Adrian Dunn**, Louisiana State University Medical Center; **James Herman**, University of Kentucky

Control of Cardiovascular-Renal Function
Joseph R. Haywood, University of Texas Health Sciences Center, San Antonio; **Steven Bealer**, University of Tennessee; **Quentin Pittman**, University of Calgary; **Marianna Morris**, Bowman Gray School of Medicine; **Kaushik Patel**, University of Nebraska; **Alastair Ferguson**, Queen's University at Kingston

Attention Authors!

Manuscript Submission Fee Required effective January 1, 1998

All manuscripts submitted to the *American Journals of Physiology* and the *Journal of Neurophysiology* must be accompanied by a Mandatory Submission Form and a manuscript submission fee of US$50. This fee is a processing fee, not a reviewing fee, and is nonrefundable. Payment must be made at the time of submission in US dollars only, by money order, check drawn on a US bank, credit card (Visa/MasterCard), or institutional purchase order. Checks should be made payable to The American Physiological Society and should indicate clearly the corresponding author's name. No wire transfers will be accepted. Please see Instructions for Authors on the Web at **http://www.faseb.org/aps/publications** or see the June and December issues of the journal for more information.

NRC Issues Report on Long-term Care of Chimpanzees in Research

A National Research Council report has recommended that the US government consolidate ownership of chimpanzees used in medical research and take a series of steps to improve long-term management of the animals.

Currently, about 1,500 chimpanzees are housed in six biomedical facilities throughout the US. About 1,000 are owned by various federal agencies or are being used in federally sponsored research. The remaining 500 are privately owned.

Chimpanzee breeding was stepped up in 1986 in response to expectations that these animals would play a major role in AIDS research. However, only in a few rare instances have chimpanzees become infected with the AIDS virus, so the need was smaller than expected.

In response to a request from NIH, the Committee on Long-term Care of Chimpanzees in Biomedical and Behavioral Research, which was convened by the National research Council, spent a year assessing research needs and the status of the existing chimpanzee population. The committee released its report, *Chimpanzees in Research: Strategies for their Ethical Care, Management, and Use* on July 16.

The panel concluded that there are more chimpanzees than are currently needed for research, but that the animals might again be needed in the future. Therefore, the panel recommended a series of steps be taken.

The panel urged that a federal agency such as NIH create a central office to take over ownership and long-term care of the 1,000 government-owned chimpanzees. Chimpanzees are expensive to care for, with per diem costs reaching as high as $30. While the average lifespan is 25 years for males and 34 years for females, some may live as long as 55 to 60 years. It is estimated that NIH currently spends $7.3 million per year to provide care for chimpanzees, in some cases charging researchers $60,000 per animal to use them in research projects because of the need to cover their long-term care costs. If a centralized management system provides cost savings, the government may be able to reduce or eliminate those user fees.

The panel recommended a five-year moratorium on chimpanzee breeding to avoid contributing further to the current surplus. It also recommended transferring as many animals as possible to facilities where care can be provided more cheaply over the long run than in existing government facilities. Options include remodeled government facilities, zoos, or government-funded and private sanctuaries. Recognizing the special status of chimpanzees as a close relative to human beings, the panel recommended criteria for any facility that houses chimps for more than six months, including daily access to the outdoors and social contact with other animals unless a research protocol prohibits it.

Some animals will need to be maintained as research candidates, and some should be kept as potential breeders in case a public health emergency such as a new infectious disease increases demand for them. These animals should be kept in controlled environments staffed by trained personnel.

About 260 of the government-owned chimpanzees that are candidates for retirement from research are infected with disease-causing agents that might pose a public health risk. These animals will have to be housed at designated facilities that can safely contain them.

The majority of the panel rejected euthanasia as a population control option. However, Sarah Williams-Blangero of the Southwest Foundation for Biomedical Research offered the dissenting view that "in the face of limited financial resources, euthanasia is an appropriate mechanism for maximizing the quality of life for the remaining chimpanzee population while facilitating the continued production of chimpanzees to fulfill critical needs in medical and behavioral research."

The report was sent to NIH for its consideration. Lou Sibal, Director of NIH's Office of Laboratory Animal Resources, told the *New York Times* NIH was "very pleased" with the report. "It includes a series of good options that make sense," Sibal said, "and we will have to see which ones we take up and determine how we will support them."❖

APHIS Compiles List of Animal Welfare Act Requirements

The Animal Care Program of USDA's Animal and Plant Health Inspection Service (APHIS) has compiled and published 20 policies on various aspects of Animal Welfare Act (AWA) requirements. These policies now replace all the previous memoranda and response letters that were used by inspectors in the APHIS Animal Care Program.

By publishing the material in a comprehensive manner, USDA hopes to increase the quality and uniformity of AWA reports, inspections, and enforcement. This is also a first step in developing a program manual to explain, clarify, and interpret Animal Welfare Act standards and regulations.

Although primarily intended for the use of APHIS inspectors, the policies are available upon request from the APHIS Animal Care headquarters office at 301-734-4981. The material is also available on the APHIS Animal Care home page at **http://www.aphis.usda.gov/ac**.❖

Judge Throws Out Part of Lawsuit Against PETA, Court Date Set

US District Court Judge Henry Morgan dismissed part of a lawsuit filed by Huntingdon Life Sciences, Inc., against People for the Ethical Treatment of Animals (PETA) over its undercover operation against Huntingdon.

PETA still faces 16 other charges in the lawsuit, including allegations of racketeering, trespassing, conspiracy, and illegal wiretapping. The suit is set to go to trial on December 8. Judge Morgan, however, dismissed Huntingdon's claim that PETA was a competitor with an inherent interest in harming its business during a hearing in September. Earlier, Huntingdon dropped four other claims against PETA, including allegations of disruption of business and stealing trade secrets.

Huntingdon, which tests products for pharmaceutical companies, sued PETA in June after it released to the public "undercover" videotapes of alleged animal abuse at Huntingdon's East Millstone, NJ, facility. In its lawsuit, Huntingdon claimed that PETA-paid investigator Michelle Rokke infiltrated its laboratory and stole confidential information while posing as an animal care technician. During the eight months she worked at Huntingdon, Rokke testified she photocopied more than 8,000 documents off coworkers' desks, took photographs, and wore a video camera embedded within her eyeglasses to compile allegations of animal abuse. In June, Judge Rebecca Beach Smith issued a temporary restraining order to prevent PETA from releasing the Rokke documents to the public.

The temporary restraining order against PETA was set to expire in July. During that time, PETA violated the order by releasing Huntingdon's client list to the public and staging a protest outside Huntingdon's facility in New Jersey. A preliminary hearing was held in the case, and Judge Robert G. Doumar imposed an injunction against PETA barring it from using the videotapes and documents it seized. Judge Doumar also levied a $50,000 bond against PETA to prevent any further violations of court orders. Doumar ruled that PETA obtained the Huntingdon documents and videotapes "surreptitiously and fraudulently" and therefore had limited free speech rights in distributing these materials further. Doumar has since resigned from the case after concerns arose over a possible conflict of interest, turning the case over to Judge Morgan.

The Huntingdon case has been compared to *Food Lion vs. ABC News*, in which ABC was ordered to pay $5.5 million in damages — reduced recently on appeal to $315,000 — to Food Lion Supermarkets after using undercover video surveillance to acquire information about the company. Huntingdon cited the Food Lion case in its lawsuit. "This case is about the law," the Huntingdon suit begins. "More particularly, about whether a radical special interest group with an extreme political agenda is above the law, or whether it must be held accountable to those injuries when it chooses to take the law into its own hands."

An editorial in the September 1997 issue of *Lab Animal* examined possible implications of the Huntingdon case. "What is significant about the case is more subtle than legal precedence. Huntingdon seemingly made a decision to use the courtroom as a forum to — as some put it — 'kick back,' instead of shadow boxing with PETA," the editorial stated. It noted further that if Huntingdon gets a favorable ruling, "This will encourage other targeted research facilities to use the law for protection, forcing PETA to consider the consequences of being perpetually tied up in court and litigation."❖

Outreach Teams Meet at Summer Institute

Members of the 1997-98 APS Local Outreach Teams (LOTs), which will lead professional development workshops on physiology topics for middle and high school teachers in their communities, received their training June 26-29 at the Airlie Center in Warrenton, VA.

The Outreach Institute participants included at least one APS member researcher and one local science teacher from the eight teams named by Council in April. The Institute was designed to provide training for LOT members in using the APS-developed, hands-on, inquiry-based physiology activities in the modules, "Neural Networks" and "The Physiology of Fitness."

LOT team leaders present were APS members **H. Bruce Bosmann**, University of Illinois at Chicago College of Medicine; **C. Subah Packer**, Indiana University School of Medicine; **Candace B. Matthew**, US Army Research Institute of Environmental Medicine, Natick, MA; **Gerald K. Weiss**, University of New Mexico School of Medicine; and **Barry T. Peterson**, University of Texas Health Science Center at Tyler. APS member **Birgit Bach**, of the University of Wisconsin at Madison LOT headed by member **James Will**, also attended the Institute.

LOT teams headed by APS members **James C. Schadt** of the Dalton Cardiovascular Research Center in Columbia, MO, and **Stephen C. Wood** of the East Carolina University School of Medicine in Greenville, NC, also attended the workshop.

Two of the teacher LOT members present included past Summer Research Teachers (SRTs) **Nancy Pelaez** ('93 SRT) and **Teri Sheldahl** ('96 SRT).

Past LOT members assisting in the training of the new LOT teams included APS member and team leader of the Dallas, TX, LOT, **Jureta Horton**, University of Texas Southwestern Medical Center. Also assisting were **Richard Carruba**, SRT '96 and a member of the University of Texas Health Science Center at San Antonio LOT, and **Mary Lightbody**, a science teacher in the Columbus, OH, public schools and a member of the LOT that developed the "Neural Networks" activities.

This fall, local workshops were successfully held in Indianapolis, IN; Columbia, MO; and Albuquerque, NM. Other workshops planned are in Tyler, TX, on October 11; Natick, MA, on October 15; Indianapolis, IN, on October 24; and Madison, WI, and Chicago, IL, on November 14.

For more information about these workshops, contact the APS Education Office, 9650 Rockville Pike, Bethesda, MD 20814-3991. Tel: 301-530-7132; fax: 301-571-8305; e-mail: educatio@aps.faseb.org. ❖

Activities from the 1997-98 APS Local Outreach Team Summer Institute at the Airlie Center in Warrenton, VA, June 26-29, 1997.

Retreat Held for Summer Research Teachers

More than 30 teachers, participants in the APS Frontiers in Physiology and Explorations in Biomedicine science teacher summer research programs, participated in a summer retreat at the Airlie Center in Warrenton, VA, July 14-20.

In addition to this week-long retreat, these teachers worked for seven to nine weeks during the summer in the research laboratories of APS members. The 28 middle and high school teachers funded through the Frontiers program worked at research institutions in or near their home communities. The Explorations program, which is designed to encourage physiology research among teachers of Native American students on Montana reservations, worked at institutions in states distant from their homes.

The teachers attending the retreat came from nearly 20 states to share their research experiences and to brainstorm the development of hands-on, inquiry-based laboratory activities they could bring back to their classes. The week also provided intensive training in using hands-on, inquiry-based activities in their classrooms. Teachers also learned how to look at their current teaching methods and practices and reflected on how they could improve their performance and ultimately their students' achievement.

Past Summer Research Teachers (SRTs) assisted in training the 1997 participants. These former SRTs were: **Evelyn Bradshaw**, '95 SRT; **John Nishan**, '95 SRT; **Jeanna Pisegna**, '95 SRT; **Jay Sylvester**, '95 SRT; and **Karen Wickersham**, '96 SRT. APS member **Robert Carroll** from East Carolina University in Greenville, NC, served as the "physiologist in residence" during the retreat.❖

Activities from the Retreat of the 1997 Summer Research Teachers at the Airlie Center in Warrenton, VA, July 14-20, 1997.

A Transition From NIH Postdoctoral Fellow to Industry

This article is an illustration of one physiologist's transition into an industrial research career. It highlights some important themes and gives my experience and perceptions of a necessary change in perspective to enter industry. It gives some of my insights, which I hope are helpful to students, postdoctoral fellows, and established scientists alike. I welcome any questions or feedback that may arise.

The Academic Life

Live a long, scholarly life and enjoy it. Graduate students are impressionable as they experience the stress of information overload from course work and the impressions of professorship, lectureship, and academic administrators. Graduate students must compete constantly against each other, professional students, postdoctoral fellows, faculty, and even the occasional secretary. The quick learner realizes what is most important for his/her research program, sets priorities, and leaves the rest behind. Every graduate student becomes disillusioned from time to time. Do your best to remain focused on your scientific challenges and, above all, make it fun.

While in graduate school, I was not trained to market myself. I thought that postdoctoral fellowship offers would come from friends of my mentor or other faculty. Students should be more aggressive and assertive, marketing themselves and envisioning the next five or ten years. Set a timeline for completion of your degree and look into the future. Do not overextend your abilities and remember that things are not always under your control. Develop a vision of what you can do and what is needed for a postdoctoral fellowship or employment. I had to figure these elements out in the last months of my degree program.

The importance of good mentors for success during graduate school and throughout a career is noteworthy. Different mentors are needed throughout life, although they are not always present. During graduate school, look for a mentor who has more than a sociobiological gut feeling that he/she is making the world a better place by coaching and directing you. Graduate mentors have the biggest stake in your development because it reflects on them, their department, and the university. You may be able to count on a life-long friendship. I am still in touch with my graduate mentor, Gilbert R. Hageman, who has entered yet another career phase, an NIH sabbatical, moving from Birmingham, AL, to Bethesda, MD, a trip I made seven years ago. The availability of these types of mentors decreases when you leave the university and graduate level training. Good mentoring is not valued or encouraged at the postdoctoral stint nor is it easily attained at a large Research and Development organization. Helping, coaching, and guiding young careers is not a high priority.

Nicholas S. Gantenberg

The Government Postdoctoral Fellowship

Toward the end of my graduate studies in physiology and biophysics, I was motivated and sought out postdoctoral fellowship positions. I really wanted to go abroad to Europe or Australia, but this was complicated by a dual career plan I shared with my spouse. The greater Washington, DC, area offered the most hope for a physiologist and a biomedical engineer at the time. I remember the two of us meeting after our simultaneous interviews. We hesitated to say much until we found out how the other felt about the interview, not wanting only one of us to be happy about the prospect. We both passed "the test" and felt positive about our respective opportunities, mine at NIH and hers at FDA. When working for the government, one needs a certain amount of fortitude to get through little things like a budget crisis! Within weeks of starting our new positions, we both received furlough — funny word for no pay — notices. The federal budget was settled, and we both kept our positions for a few years. While at NIH, I witnessed, paradoxically, times of financial famine that occurred early in the fiscal year and times of feast very late in the fiscal year.

During my NIH postdoctoral fellowship, my goal was to gain experience and exercise independence. I wanted to learn numerous disciplines and techniques. My biggest lesson was that it can take years to master a discipline. The postdoctoral fellowship is the time to show you can be more than just a pair of hands for someone's hypothesis or agenda. It is a time to design your own hypothesis and set your own agenda. Too many projects without significant focus can be detrimental. If you become a jack of all trades and a master at none, you will shape yourself for an industry career. If you are the master of one, however, you will likely be sought after by academia. Industrial and academic timelines, priorities, and missions are vastly different. Understanding how to solve a problem and progress the result to a marketed product is important for the industrial pursuit. Being the world's authority on a method or scientific process will aid your success at a university and with granting agencies. No pathway is necessarily better than the other, just different.

Nicholas S. Gantenberg is a member of the APS Career Opportunities in Physiology Committee.

The postdoctoral years are also a time to place a self-marketing plan into action. Envision where you want to be and get any help you can to make it happen. Going to society meetings and one-on-one interactions are important. Interact with people from all scientific walks of life. Interact with APS and its membership. During most of my graduate years, the only industrial contacts I made were in drug sales. A lot of "free looks" and a multitude of information on companies have become available on the World Wide Web. Attend career workshops and job fairs. Be selective so that you target companies and positions for which you offer a good match. Be open with people and talk to them. Discovering what is available and possible for your career growth and happiness is just as important as the cellular mechanisms of induced gene expression that you are working on in the laboratory. Do both.

While the emphasis differs, your application package is the same for industry and academia. Offer a total package: good grades, successful projects, publications, scientific excellence, scientific creativity and innovation, human factors, manager/leadership skills, and a business sense (a recruiter's delight). The ability to get along well with others and a crime-free/drug-free lifestyle should not be under emphasized. When making applications, you must demonstrate that your application provides a good fit for what is being sought and a good fit with the organization. Your application must set you apart from others so that you are chosen. Rigorously interrogate the institution as well. Ultimately, you must also choose them. There are self-help books at local libraries that discuss many of these principles and offer detailed recommendations on the process from letter writing to interviewing.

Before moving on to gainful employment, postdoctoral fellows should enjoy the time with other postdoctoral fellows and cherish those experiments done in a "just for fun" mode. A relaxed posture and experiments done just for the fun of it have little room in most, not all, industry research endeavors.

After two years of postdoctoral work, I realized a career at NIH would not fit my needs to find solid applications of my scientific work, as I would see in drug development. Playing NIH grant lotto and struggling up the academic ranks seemed daunting. I became intrigued by working with a drug or biotechnology company. I wanted to work for a profitable company with an established infrastructure and not a start-up with only two years worth of venture capital. I sought information on larger companies with programs that were compatible with my interests and skills. I was willing to change disciplines as long as there was a chance to do integrative physiology and pathophysiology. In my search, I learned of Procter and Gamble (P&G), a Fortune 50 company with big aspirations to maintain or build global leadership in healthcare and pharmaceuticals. Another postdoctoral fellow tipped me off that P&G was recruiting physiologists. Initially, I interviewed for a cardiovascular position, but I was hired to use my integrative skills for inflammatory respiratory diseases. P&G had two programs that were of interest, over-the-counter medicines and pharmaceuticals. The company also offered global technical sites, a $1 billion Research and Development budget, a large community of PhD scientists, and, of course, an attractive compensation package. I joined at a time when this part of P&G's business was in its infancy, a great time to get in and help set the course and strategies.

The Industry Research Position

The industry research position has many faces. It is a mix of science, science management, business, and politics. It is dynamic and often changes under business pressures, with a focus on consumers. To manage the transition, you need to develop a science manager skill-base, with a business approach. After all, you are in business for the marketshare of the product. One can expect opportunities to learn different sides of the business, management training, and a crosslinking of scientists who are really after the science first. Everyone has the common goal that the science will drive the products that are driven by consumer need. Your ability to work with others in other disciplines to help solve your problem is a key element to your personal and business success. Your willingness to help others and share ideas internally are also important characteristics; return the favors. Most companies will want to assist your development and train you to lead and manage. These are very different, although often mistaken for the same. A manager organizes and maintains a process or a group of people. A leader can be someone at any level who sets direction by envisioning the future endpoint and makes it happen. Companies have a vested interest in developing their employees' abilities to gain empowerment. The diversity of personalities offers a wealth of human resources and may present difficulties for project teams. The "adaptors" are stable, precise problem solvers, and the "innovators" dream, challenge, and discover problems. A balance must be set to overcome the scientific, management, and business issues to drive your career, project, product, and the company. External competition exists at the company level and unfortunately, internal competition exists as projects compete for funds and employees compete for career advancement. The playing field is rarely level.

The scientist interacts with others to set project direction, manage laboratory associates, and direct extramural research contracts and grants. Because these activities can take time, there is less time to actually do experiments in the laboratory. One needs to find a happy medium between laboratory work and science management that is mutually agreed upon by the company and the employee. State your expectations, get clear alignment on the job description, and recheck this periodically. Draw from personal experience,

read a bit, and observe the patterns of successful peers and superiors as part of your "on the job training." The independence and trailblazing skills of graduate students and postdoctoral fellows remain necessary for the industrial position. The company has hired you to take it to new heights in a particular field that they expect to own. Scientists work on a focused level but with many disciplines and numerous pieces of data. You must be willing to skip certain steps and think ahead to the final chapter to get to the market more quickly. Remember the competition is inside and outside of the company.

The scientist must demonstrate a willingness to get along with others and work in a team environment. Anyone who reads the want ads can often see this stated up front. Teamwork is very important, as you will collaborate, internally and externally, and you will count on a team of experts to address your problem in the most rational way. You need to be expert enough to know you need an expert. Effective use of company or external experts can advance the project. Instead of doing all of the work in your laboratory, you will empower or beg another scientist, perhaps from another function, to advance your project. One day, if all goes well, you will give your whole project over to another business function so that the product can go to market.

A major difference between academic science and industry is the meetings. We have a ton of them — some very worthwhile, others a waste of time. We have meetings to plan more meetings and meetings to discuss past meetings. We have even had meetings to discuss cutting down the number of meetings. Make sure the meeting needs you or you need the meeting.

An understanding of the market and the consumer base are helpful. After all, you are in it for the money and shareholder value. Push that stock higher, split it, and do it again. While many companies have vast experience with consumer and market research, there are times when even scientists review the market numbers. Researchers may also sit in on a consumer focus group to better understand the many facets of business. The financial numbers usually drive the decision in a particular area. Because this is a business reality, you need to be prepared to hear the bad words, "You did great work, but the business prospect looks bleak, so we are canceling the project."

Solid communicative (people) skills are needed to work with others and convince them you are on the right track or your position has merit. Candidates or employees with demonstrated success at working things out between people or motivating others against a common effort are sought after by many. Communicate effectively and demonstrate educated risk taking with milestones to enable your managers to clearly follow your progress and fund your cause. Sell your science to management, marketers, product developers, financial analysts, and to regulatory and clinical affairs specialists. Create a need for your science and ideas in other business functions to ensure your position and leverage within the company. Market yourself inside the walls, selling your ideas and building a network that ties you to many projects in order to maintain your position. Knowing how to interact effectively with people aids your fight for money, time with management, and your ideas and data. Communication plays a key role in your ability to distill the most complex problems into a few sentences that can be understood by a sixth grader. Simplifying problems when they are not is difficult.

Finally, the present environment for scientists demands that they maintain a state of dynamism and readiness to move on to another project, business focus, discipline, or company. Business priorities change, and personal philosophies may separate. The days of joining a company for 30 years with a grand retirement party are vanishing. Make personal progress reports and checks of your professional development and happiness with XYZ, Inc. By talking with your peers and supervisors, you can benchmark yourself against others. Is the company progressing in your field, healthcare, versus its competition? Examine your job satisfaction. How is your career tracking? Are you being developed, valued, and promoted within the norm? Most companies have excellent compensation packages that include good salaries and good benefits. Remember to evaluate the total compensation package, not just salary. In general, industry competes very well and usually at a premium versus its academic and government counterparts. When you feel settled, become a mentor to younger scientists who may need your comments, suggestions, or direction. Give back your skills and experience. It can serve you well.

Thus, I have given you a picture of some perceptions and operative changes that are required for the industrial research position that is centered on product conception and development. With this information, you can enter a position with a sense of what will occur. If you are working perhaps in the industrial field, you can reflect and act on changes that would make the process of science and scientific career development easier and more pleasant for all. A sufficient number of worthy challenges are presented to the scientific researcher to offer a rewarding career in physiology and other disciplines. Because scientific problems are so numerous and seemingly so difficult, the need for integrative physiologists and molecular physiologists will remain for many generations to come.❖

Nicholas S. Gantenberg
The Procter and Gamble Company

Positions Available

Fellowship in Pulmonary/Thoracic Research. A two- to three-year fellowship in pulmonary/thoracic research is offered for qualified MD, PhD, or MD/PhD applicants with experience in human pulmonary mechanics measurements, small animal model of asthma (including pharmacology and biochemical assays on BAL fluid), or epithelial cell function. An individual receiving this appointment will participate in three potential areas of investigation, including human pulmonary mechanics, small animal model of hyperventilation-induced asthma, or mediator release using cultured epithelial cells, at the Mayo Foundation in Rochester, MN. Salary will be determined by the successful candidate's experience. There is an attractive benefit package. Mayo Foundation is a nonprofit, physician-led clinical practice integrated with education and research in a unified multicampus system. Interested individuals should send copies of their curriculum vitae and three letters of reference to Kenneth Beck, Division of Pulmonary and Critical Care Medicine, Third Floor Plummer Building, Mayo Clinic, Rochester, MN 55905, **before November 1, 1997**. [EOE/AA]

Assistant/Associate Professor. Tenure-track position in the Department of Exercise Science at the University of Iowa, commencing in August 1998. The position is expected to be at the assistant professor level; however, exceptional candidates may be considered at the associate professor level. Applicants must have a PhD and a strong potential to attract external research funding. Postdoctoral training and teaching experience are highly desirable. Preference will be given to individuals with training and/or expertise in exercise physiology. The successful candidate will be expected to establish an independent research program and teach undergraduate and graduate courses in the broad areas of exercise and human physiology. **Review of applications will begin in October 1997.** Submit a letter of application, curriculum vitae, representative publications, a five-year research plan, teaching interests, and three letters of reference to Kevin Kregel, Department of Exercise Science, University of Iowa, 516 FH, Iowa City, IA 52242. Minorities and women are especially encouraged to apply. [EOE/AA]

Tenure-Track Assistant Professor of Physiology. The Physiology Department at the University of North Dakota School of Medicine and Health Sciences invites applications for a tenure-track assistant professorship to begin July 1, 1998. Applicants should have a PhD or MD degree with postdoctoral experience and should demonstrate proven success applying modern cellular and molecular approaches to physiologically based biomedical research. A competitive startup package and state-funded salary are available as well as extensive collaborative support. Teaching at the graduate and medical school level and participation in the development of disease-oriented research consortia will be expected. Please forward a statement of professional goals, a current curriculum vitae, and a list of three references with addresses to: W. K. Samson, Chair in Physiology, University of North Dakota School of Medicine and Health Sciences, 501 N. Columbia Road, Grand Forks, ND 58202-9037. **Screening of applications will begin on November 1, 1997.** [EOE/AA]

Postdoctoral Fellow. The Department of Pharmacology, University of Alberta, Edmonton, Alberta, Canada, has a postdoctoral position available. Current research involves damage to sensory nerves, which can invoke changes in their pharmacological and electrophysiological properties and can lead to the generation of chronic pain. Investigations are ongoing concerning the mechanism of such changes in dorsal root ganglion and spinal neurons with a view to developing better therapeutic approaches. The salary will be approximately $30,000 (Canadian) per year. Funding is for a minimum of one year with renewals for up to three years by mutual agreement. The successful applicant will be expected to submit applications for competitive funding. Applicants who are more than three years past receiving their PhDs will not be considered. **The position will remain open until it is filled.** Inquiries should be directed to: Peter Smith, Dept artment of Pharmacology, University of Alberta, 9-75 Medical Sciences Building, Edmonton, Alberta, Canada T6G 2H7.

Faculty Position. The Department of Biology at Davidson College seeks applicants in the fields of animal physiology. The teaching responsibilities for this position will include comparative animal physiology and introductory biology. Research program involving undergraduates expected. Startup funds available. **Appointments begin August 1, 1998.** Interested persons should send their curriculum vitae, teaching and research statements, selected reprints, and three letters of reference to: Verna Miller Case, Department of Biology, Davidson College, P.O. Box 1719, Davidson, NC 28036 **by November 3, 1997**. Women and minorities encouraged to apply. [EOE/AA]

Postdoctoral Position in Physiology/Surgery-Mayo Clinic. A position is available immediately in an NIH training grant to study neutral regulation of water and electrolyte absorption-secretion. Applicants must have a PhD or MD degree with expertise in methods involving Ussing chamber work and in vitro transport studies. Applicants must be a US citizen or permanent resident. Send resume and letters of reference to: Michael G. Sarr, Mayo Clinic/Mayo Foundation, GI Research Unit, Alfred Building, Second Floor, 200 First Street S.W., Rochester, MN 55905. [EOE/AA]

Positions Available

Faculty Position. The Department of Molecular and Cellular Physiology at the Louisiana State University Medical Center in Shreveport invites applications for a tenure-track faculty appointment beginning in the spring of 1998. Although preference will be given to candidates at the rank of assistant professor, outstanding applicants at the associate or full professor levels will also be considered. Applicants must have a PhD and/or MD degree and appropriate postdoctoral research experience. We are seeking individuals with demonstrated competence in the use of modern cell and/or molecular biological approaches and whose research interests complement existing areas of excellence in the biology of the vascular wall and/or inflammation. The appointee will be expected to establish a vigorous independent research program supported by extramural funding and to participate in the teaching of graduate and medical students. Applicants must submit a curriculum vitae, a brief summary of current and future research plans, and the names of three references to Shari Boyett, Search Committee Coordinator, Department of Physiology, LSU Medical Center, 1501 Kings Highway, Shreveport, LA 71130. **The closing date for applications is October 31, 1997,** or until the position is filled. [EOE/AA]

Faculty Positions. The Department of Physiology and Biophysics at the University of Mississippi Medical Center invites applications for tenure-track faculty appointments at the rank of assistant, associate, or full professor. Applicants must have a PhD and/or MD and postdoctoral training and must be a permanent resident or citizen of the US. We are seeking individuals with expertise in molecular and/or cellular physiology with research interests that complement existing areas of excellence in cardiovascular and/or renal physiology. Special consideration will be given to candidates with research interests in areas of regulation of extracellular matrix, angiogenesis, or hypertrophy of vascular or cardiac muscle. Successful applicants are expected to establish a nationally recognized research program in his/her field, supported by extramural funding, and contribute to the teaching of graduate and medical students. The department has a large nucleus of faculty in the areas of cardiovascular and renal physiology and offers excellent opportunities for research collaboration in many areas, including vascular biology, hypertension, heart failure, diabetes and obesity, atherosclerosis, and preeclampsia. Applicants should send a curriculum vitae, an indication of past and current research funding, a statement of research interests and career goals, and the names of at least three references to: Faculty Search Committee, Department of Physiology and Biophysics, University of Mississippi Medical Center, Jackson, MS 39216-4505. [EOE, M/F/D/V]

Tenure-Track Faculty Position for Systems Neurophysiologist/Neuroscientist. The Departments of Physiology and Physical Medicine and Rehabilitation at Northwestern University are jointly seeking a full-time, tenure-track faculty member at the assistant or associate professor level to pursue studies of physiology, pharmacology, and pathophysiology of normal and injured spinal cord. The appointee will hold a primary appointment in physiology and a secondary appointment in physical medicine and rehabilitation. The appointee will undertake neurophysiological studies of spinal cord physiology and acute spinal cord injury in animal models and will establish interactions with clinical faculty sharing interests in spinal cord injury to develop approaches for diagnosis and treatment of spinal cord injury in humans. The appointee will have teaching and administrative responsibilities within both departments. These will include teaching of medical students, teaching and supervision of graduate students from several interdisciplinary programs, and participation in educational programs for physical medicine and rehabilitation residents. The applicant should have earned a doctorate in physiology, neuroscience, or related disciplines with a minimum of three years postdoctoral experience. Experience with electrophysiological and biophysical studies in mammalian central nervous system preparations is required. A history of successful publication and extramural grant acquisition is strongly preferred. Please send a curriculum vitae, statement of research interests, and a list of four potential references who are able to comment on research capacity, teaching, and personal attributes to: Barry W. Peterson, Chair, Search Committee, Department of Physiology, Northwestern University Medical School, 303 E. Chicago Avenue, Chicago, IL 60611. **Applications must be received by December 1, 1997.** [EOE/AA]

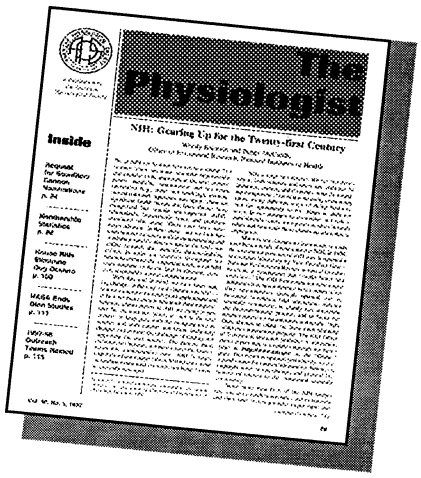
Tenure-Track Assistant Professor of Physiology. The Department of Biological Sciences at Mary Washington College is seeking a physiologist for a tenure-track appointment at the assistant professor level **beginning August 1998**. Applicants are required to have a PhD or an equivalent terminal degree and must be committed to excellence in teaching. Previous teaching experience preferred. Course responsibilities will include human physiology, general biology, and an upper level course in your area of expertise. The area of research interest should complement those of current members of the department, with preference given to investigators working at the systemic or organismal level. Mary Washington College is a liberal arts and science college located midway between Washington, DC, and Richmond, VA. Interested persons must submit a curriculum vitae, transcripts (unofficial acceptable), and brief statements of teaching philosophy and research goals and must arrange to have three letters of reference sent directly to the Personnel Office, Mary Washington College, Box 615, Fredericksburg, VA 22401-5358. **Deadline for receipt of applications is October 24, 1997** [EOE/AA]

ATTENTION

Employers & Job Seekers

(in the Physiological Sciences)

This Career Resource tool can help you find the right job match



Both a print and online career resource, *The Physiologist* is the official newsletter for The American Physiological Society. It is published bimonthly and is also available electronically through our Web Site at http://www.faseb.org/aps.

Easily accessible and highly visible, *The Physiologist* is mailed to over 8,000 physiological life scientists (including students) in the country. This readership pool provides you with many choices for a good job match.

Very cost effective, *The Physiologist* charges only $50.00 for any size classified ad or position listing. This one-time charge of $50.00 will also keep your ad on our Web Site until the deadline date is reached.

To place your ad or listing, take the following steps:

1. Attach an original of your ad/listing with a check or purchase order payable to "The American Physiological Society" *(Please note: EOAAE indicates Equal Opportunity /Affirmative Action Employer and appears only when given on original copy.)*
2. Indicate on this line _____ the month you wish your ad/listing to be published: *(The Physiologist is published the following months: Feb, Apr, Jun, Aug, Oct, and Dec. Copy must be received before the first of the month, one month preceding the issue month.)*
3. Complete the following information: Name (please print) _____

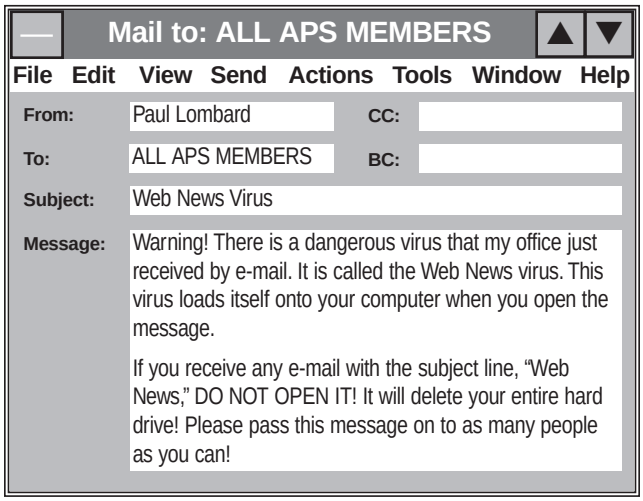
   Signature _____ Phone _____ Fax _____
4. Mail this completed form (with copy and payment) to: *The Physiologist,* APS, 9650 Rockville Pike, Bethesda, MD 20814-3991 **or** for faster service, fax this form (with copy and purchase order) to 301-571-8305.

For further information, contact The American Physiological Society at:
(Phone) 301-530-7165 (Fax) 301-571-8305 (Email) mlowy@aps.faseb.org

Tphys10/97

Virus Alert!

If you work on the Web and you have an e-mail system, chances are you have received at least a few messages with the subject line, "Virus Alert." Take the following message for example:



This message is a fraud I just invented. All that is left for me to do now is to forward this message to as many people as I can, and within a short period of time, the entire East Coast will be furiously scanning their hard drives for a virus that does not exist.

What this message does, as many of these messages do, is claim to serve as a warning for a destructive virus that is being circulated in your area. Often, these messages describe viruses that are being transmitted by e-mail, and almost all of them turn out to be hoaxes. Some of the more well known virus hoaxes debunked recently include the AOL4 FREE virus, the EBOLA virus, the Good Times virus, the Penpal Greetings virus, the Undeliverable Mail virus, and the ever-popular April Fool's virus.

These virus alert messages serve the same purpose as a virus itself. They stir up hysteria and disrupt the flow of business. While these false warnings may serve as a nuisance, there are a number of computer viruses being circulated that can erase your data and waste valuable time. After all, a computer virus once installed and executed can delete files, corrupt your hard drive, or disable your modem. So how do you determine if the risk is genuine?

Here are a few facts to consider. To date, there are no known e-mail viruses. Expert sources, such as McAfee Associates, Symantec, and IBM agree that no virus may be transmitted and installed to your hard drive by e-mail. A computer virus, like the Trojan Horse virus, sits within an executable program and needs to be run before it can perform the malicious task for which it was designed.

Second, when in doubt, research it. There are a number of sources available on the Web that specialize in debunking computer virus myths. One excellent resource can be found at **http://www.kumite.com/myths**. This site, operated by Rob Rosenberger, a recognized authority and consulting editor on computer viruses, specializes in the investigation of and exposure of e-mail myths. Other sources for virus information include Stiller Research at **http://www.stiller.com**, Seven Locks Software at **http://www.sevenlocks.com**, and Computer Knowledge at **http://www.cknow.com**.

Finally, if you receive a message like the one above, consider the contents carefully before you forward it to anyone else. You may be being used to perpetuate a hoax.

If you have a subject related to the Web that you would like addressed, or if you know of an interesting site that you would like to have posted, please contact Paul Lombard at plombard@aps.faseb.org.❖

NIH to Issue NGA Via E-mail

Continuing the transition from paper-based research administration to the electronic exchange of information, NIH announced it will begin issuing the Notice of Grant Award (NGA) by e-mail.

Over the summer, NIH began a pilot test of the electronic NGA with a small set of institutions. In a process similar to the current paper-based procedure, NIH sent the NGA to a central e-mail address for a pilot institution, and the institution was responsible for distributing the NGA to the principal investigator and the appropriate officials within the organization. By the end of 1998, NIH anticipates that it will transmit NGAs in this fashion to all institutions with the capacity to receive e-mail.

Eventually, the NGA will be available on the "NIH Commons," an interface for the support of electronic research administration on the World Wide Web that is currently under development. For more information about changes to the NGA, see the August 1 *NIH Guide to Grants and Contracts* at **http://www.med.nyu.edu/ cgi-bin/display_nih_guideidx?199708 01.index**.❖

LCME Establishes Web Site

The Liaison Committee on Medical Education (LCME), the accrediting authority for medical education programs in the US and Canada sponsored by the Association of American Medical Colleges and the American Medical Association, has established a new Web site at **http://www.lcme.org**. The site includes information about accreditation standards and procedures, publications, and accredited schools.❖

Chapter News

APS Chapter Program Adds Two New Chapters

The APS Chapter Program continues to grow. With the addition of two new chapters that were approved at the recent APS Council meeting, there are now a total of five chapters, with more in the planning stages.

Since the program's inception in November 1993, the momentum for the program has been gathering slowly but surely. With a number of state physiological societies already in existence, the development of a chapter program under the auspices of APS seemed a natural extension for the Society to undertake.

The ability of chapters to attract members not usually targeted by the Society, including those from junior colleges, undergraduate teaching colleges, and even high schools, allows for better dissemination of information on the benefits of biomedical research, the use of animals in research, and other public affairs issues. Annual meetings enable this diverse group of people to meet and talk about common interests and for younger researchers to present their data in a less overwhelming environment than the EB meeting. The financial support of the Society for those chapters just starting and the yearly support enabling each chapter to bring in one keynote APS Lecturer for its meeting allow the chapters to build a stronger meeting, thereby attracting more local people to attend. The contacts made and collaborations planned at these meetings can be very beneficial.

Members of chapters, in turn, help APS by directing members of the local chapter to the Society as a whole and through the enumeration of the benefits of membership, are able to encourage them to join. This enables the Society to reach a more diverse group of people than it might be able to contact under normal circumstances.

The Ohio Physiological Society, a long-time active organization, became the first official APS chapter in April 1995. It was followed shortly thereafter by the newly formed Iowa Physiological Society in July 1995. The Midwest Physiological Society was then formed, with several states participating: Wisconsin, Michigan, Illinois, Minnesota, and Iowa. The participating states were encouraged to form individual societies and utilize the Midwest Physiological Society as a meeting venue. Consequently, the first of those, the Wisconsin Physiological Society, was organized and became an official chapter in April 1997. Another newly formed organization, the Nebraska Physiological Society, requested chapter status from Council at the recent summer Council meeting. In addition, a long-time organization, the Oklahoma Society of Physiologists, also petitioned to become a chapter. Both requests were unanimously approved by Council.

Other states continue to work toward the establishment of their own societies prior to approaching APS concerning the chapter program. Interestingly enough, it appears the Midwestern states are leading the other states in the development of statewide societies.

Anyone interested in organizing a state society and APS chapter should contact Martin Frank, Executive Director, at APS Headquarters for assistance (301-530-7118).❖

People and Places

Hall To Leave NINDS in December

APS member **Zach W. Hall**, Director of the National Institute of Neurological Disorders and Stroke (NINDS), announced he will leave NINDS in December in order to become Associate Dean for Research at the University of California at San Francisco (UCSF) School of Medicine.

Appointed as Director of NINDS in September 1994 by NIH Director Harold Varmus, Hall presided over the reorganization of both the intramural and extramural programs at NINDS as well as other changes.

Varmus said in a statement that Hall "has made major accomplishments at NIH. In particular, he has been a leader in creating an atmosphere of cooperation among the neuroscience institutes.
ther, he has inspired and built powerful connections between the fundamental neurosciences and clinical neurology."

Zach W. Hall

Hall took a leave from UCSF in 1994 to serve as Director of NINDS. At UCSF, he was Chair of the Department of Physiology and widely recognized as an academic leader.

In his new post at UCSF, Hall will oversee the medical school's research enterprise, the largest biomedical research program of its kind in the West.❖

People and Places

Richard K. Albert has moved from the Division of Respiratory Disease, University of Washington Medical Center, Seattle, WA, to the Department of Medicine, Denver Health Medical Center, Denver, CO.

Previously, **Cynthia M. Arbeeny** was a senior research investigator with Sepracor Pharmaceuticals, Marlboro, MA. Presently, Arbeeny is Director of Lipid Research, Gel-Tex Pharmaceuticals, Inc., Waltham, MA.

A graduate student, **James Ernest Blevins** has moved from the Department of Physiology, Creighton University, Omaha, NE, to the Department of Anatomy, Physiology, and Cell Biology at the University of California at Davis School of Veterinary Medicine.

Michael S. Conley, a postdoctoral fellow formerly with the Department of Exercise Science at the University of Georgia in Athens, GA, has become affiliated with the Muncie Center for Medical Education, Ball State University, Muncie, IN.

Having accepted a position with the Department of Obstetrics/Gynecology at Albany Medical College, Albany, NY, **Daniel I. Edelstone** has left the Department of Obstetrics/Gynecology, Magee Womens Hospital, Pittsburgh, PA.

D. Farley has joined the Alaska Science Center, National Biological Service/Biological Resources Division of Standards, US Geological Survey, Anchorage, AK. Prior to his new position, Farley was with the Department of Zoology, Washington State University, Pullman, WA.

Deceased Members

Roger C. Bone	Toledo, OH
Lewis Dexter	Walpole, MA
John F. Gaugl	Fort Worth, TX
Stanley Glauser	Bryn Mawr, PA
M. D. Hammond	Scottsdale, AZ
Keith Kroll	Seattle, WA
Ade T. Milhorat	Pelham Manor, NY
Richard Skalak	La Jolla, CA
Roy H. Steinberg	San Francisco, CA
John R. Sutton	Lidicombe, Aus.

Recently, **Colleen G. Farmer** joined the Department of Ecology and Evolutionary Biology, University of California at Irvine. Formerly, Farmer was associated with Brown University in Providence, RI.

Formerly with the Department of Nutrition at the University of California at Davis, **Maria Florez-Duquet** has joined the Psychology Department at the University of Delaware, Newark, DE.

Jeffrey Fredberg of the Biomechanical Institute Inc. in Boston, MA., has recently relocated to Harvard School of Public Health, Boston, MA.

Jefferson Clark Frisbee has affiliated with the Department of Physiology, Medical College of Wisconsin, Milwaukee, WI. Prior to his new affiliation, Frisbee was associated with the National Simulation Resource Center for Bioengineering, University of Washington, Seattle, WA.

Leaving the Department of Physiology and Biophysics with the Faculty of Medicine at the University of Calgary in Calgary, Alberta, **Matthew James Gdovin** has recently joined the Division of Life Sciences at the University of Texas at San Antonio.

Paul M. Gross recently became Vice President of CroMedica Inc., of Ottawa, Ontario. Prior to his new position, Gross was Director of the Neurosurgical Research Unit at Queen's University in Kingston, Ontario.

Having been appointed Special Advisor to the Deputy Director, **Gilbert R. Hageman** has joined the NIH Rockledge Center, Bethesda, MD, for one year. Hageman is from the Department of Physiology, University of Alabama at Birmingham Medical Center.

Rowshanak Hashemiyoon was formerly associated with the Department of Physiology and Biophysics, Hahnemann University, Philadelphia, PA. Recently, Hashemiyoon has joined the Department of Neurobiology and Anatomy, Allegheny University of the Health Sciences, Philadelphia, PA.

Formerly a graduate teaching assistant with the Department of Biology, University of Texas at Arlington, **Jay K. Herman** has joined the Department of Comparative Biosciences at the University of Wisconsin at Madison.

Matthew Sean Hickey has left the Human Performance Laboratory, East Carolina University, Greenville, NC, to join the Department of Exercise and Sport Science, Colorado State University, Ft. Collins, CO.

Paul M. L. Janssen, formerly of the Department of Physiology and Biophysics, University of Illinois at Chicago, has obtained a position at the Department of Cardiology at the University of Freiburg, Freiburg, Germany.

Having moved from the Department of Biology, Keimyung University, Daegu, South Korea, **Jin Seok Jeon** has relocated to the Department of Zoology, Ohio State University, Columbus, OH.

David Joseph Lefer recently affiliated with the Department of Physiology, Louisiana State University, Shreveport, LA. Prior to his new position, Lefer was affiliated with the Tulane University School of Medicine, Department of Medicine, Cardiology Section, New Orleans, LA.

Yu-Fung Lin has joined the Jan Laboratory, University of California at San Francisco. Prior to his new appointment, Lin was associated with the Neuroscience Laboratory, University of Michigan, Ann Arbor, MI.

Brian N. Ling has joined the Mountain Kidney Associates, Asheville, NC. Prior to his new position, Ling was with the Renal Division, Emory University School of Medicine, Atlanta, GA.

Having accepted a position with the Division of Science, College of Liberal Arts, Florida Atlantic University, **H. Jay Lyons** has left the Department of Physiology, Southeastern College of Medicine, North Miami Beach, FL.

James L. Madara has joined the Department of Pathology, Emory University Hospital, Atlanta, GA. Previously, Madara was affiliated with the Department of Pathology, Brigham & Women's Hospital, Boston, MA.

Affiliating with the Department of Physiology, New York Medical College, Valhalla, NY, **Michael P. Massett** has left the Department of Exercise Science, University of Iowa, Iowa City, IA.

People and Places

Moving to Hiroshima, Japan, **Kanji Matsukawa** has joined the Department of Physiology, Hiroshima University School of Medicine, Institute of Health Sciences. Matsukawa was previously with the Department of Cardiac Physiology, Suita, Osaka, Japan.

Daniel S. Miles has become Director of Crozer-Keystone Health System, Center for Preventive Medicine and Human Performance of Springfield Hospital, Springfield, PA. Previously, Miles was associated with Renaissance Technologies, Inc., Clinical Affairs and Business Development, Newtown, PA.

Accepting a position with Concordia University, Department of Natural Sciences, River Forest, IL, **Aaron J. Moe** has left the Department of Pediatrics, Washington University School of Medicine, St. Louis, MO.

Aage R. Moller moved from the Department of Neurological Surgery, Presbyterian University Hospital, Pittsburgh, PA. Moller has joined the Callier Center for Communication Disorders, University of Texas at Dallas.

Robert S. Moreland is presently affiliated with Allegheny University of the Health Sciences, Department of Physiology, Philadelphia, PA. Moreland previously was with the Bockus Research Institute, Graduate Hospital, Philadelphia, PA.

Toyoaki Murohara has affiliated with the Kurume University School of Medicine, Kurume City, Fukuoka-ken, Japan. Prior to his new assignment, Murohara was with St. Elizabeth's Medical Center, Division of Cardiovascular Research, Boston, MA.

Joining the American Association of Pharmaceutical Scientists, Alexandria, VA, **David C. Pang** is no longer with Medical Information at US Pharmacopeia Convention, Inc., in Rockville, MD.

Gregory John Quirk has accepted a position in the Department of Physiology, Ponce School of Medicine, Ponce, PR. Quirk moved from the Center for Neural Science, New York University, New York, NY.

Having joined the Montage Media Corporation in Mahwah, NJ, **Roberto Refinetti** has moved from the Department of Psychology at the College of William & Mary in Williamsburg, VA.

Michael Samardzija has become affiliated with the Department of Pharmacology, University of California at San Diego. Prior to his new affiliation, Samardzija was with the Graduate Hospital, Bockus Research Institute, Philadelphia, PA.

Jennifer C. Schiltz has joined the Laboratory of Neural Structure and Function at the Salk Institute, San Diego, CA. Formerly, Schiltz was with the Department of Neuroscience, University of Pittsburgh, Pittsburgh, PA.

Having accepted a position with the Puget Sound VA Health Care System in Seattle, WA, **Dana Kevin Sindelar** has left the Vanderbilt University Medical Center in Nashville, TN.

Kevin Strange has joined the Department of Anesthesiology and Pharmacology, Vanderbilt University School of Medicine, Nashville, TN. Previously, Strange was associated with the Division of Nephrology, Childrens Hospital, Harvard Medical School, Boston, MA.

Currently a graduate student with the Department of Physiology, Medical College of Wisconsin, Milwaukee, WI, **Francis A. Sylvester** has left Drake University, Des Moines, IA.

Dorothy E. Vatner has become associated with the Cardiovascular and Pulmonary Research Institute, Allegheny University of the Health Sciences, Pittsburgh, PA. Prior to her new position, Vatner was with the Department of Pediatrics, New England Primate Research Center, Southborough, MA.

Paul R. Wade has accepted a position with the Department of Zoology and Physiology, University of Wyoming, Laramie, WY. Prior to his new appointment, Wade was associated with the Anatomy and Cell Biology Department, Columbia University, New York, NY.

Recently, **Cheryl Watson** joined the Department of Biology, Central Connecticut State University, New Britain, CT. Prior to moving to Connecticut, Watson was with the Department of Physiology, University of Maryland at Baltimore.

Doug White has joined the Department of Nutrition and Food Science, Auburn University, Auburn, AL. Prior to his new assignment, White was with the Department of Foods and Nutrition, University of Georgia, Athens, GA.

Having left the Department of Pharmacology and Toxicology, Dartmouth Medical School, Hanover, NH, **Kenneth E. White** has joined the Indiana University School of Medicine, Endocrine Division, Indianapolis, IN.

Christine Wilson has moved to the Boston, MA, area, having joined the Department of Physical Therapy at Northeastern University. Prior to her recent move, Wilson was affiliated with the Department of Preventive Medicine, University of Wisconsin, Madison, WI.

Recently, **Jennifer Joy Wilson** joined the Department of Pharmacology, Vanderbilt University, Nashville, TN. Prior to her new position, Wilson was affiliated with the Department of Biophysics, University of Rochester School of Medicine, Rochester, NY.

Frank C. P. Yin has accepted a position with the Department of Biomedical Engineering, Washington University, St. Louis, MO. Prior to his new post, Yin was Professor of Medicine, Johns Hopkins Hospital, Cardiology Division, Baltimore, MD.

Correction

In the August 1997 issue of *The Physiologist*, Mariana Morris was listed as having "joined the Department of Physiology and Toxicology, Wright State University School of Medicine, Dayton, OH."

The statement should have read "joined the Department of Pharmacology and Toxicology, Wright State University School of Medicine, Dayton, OH.

We apologize for the error.

News from Senior Physiologists

Letter to Harold S. Weiss

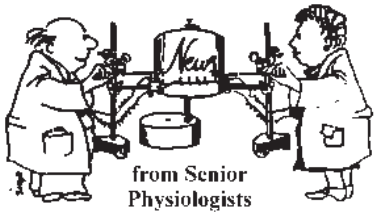
C. Edward Stevens writes: "I retired from my position as Associate Dean, Director of Research and Graduate Programs, in 1992 and fully retired from the university in 1995. I continue teaching in a graduate course and completed a second edition of *Comparative Physiology of the Vertebrate Digestive System* with Ian Hume in 1995. We also wrote an article for *Physiological Reviews* on "Contributions of microbes in the vertebrate gastrointestinal tract to the production and conservation of nutrients," which should be published early next year.

"My best advice to younger colleagues is to not let committee assignments or administrative responsibilities allow you to forget your original reasons for choosing your career. The greatest perk of the job is the rejuvenation of sabbatical leaves and contact with young people. One of the greatest joys of retirement is reading and trying to understand what you could not before."

Letters to Arthur J. Vander

Helen M. Tepperman writes: "It is hard to believe it is 10 years since the Society sent me the earlier [70th birthday] letter. I am happy to report that the time has been full of more good things than I could have anticipated. My husband **Jay Tepperman** and I have been fortunate in so many ways. We have enjoyed watching the many accomplishments of our three children and seeing our five grandchildren growing up. Traveling around the country to keep in touch with them and taking advantage of our retirement time to visit foreign places have earned us many free air miles.

"Jay and I closed our research laboratory when we retired 12 years ago, but we continue to try to understand some of the advances in endocrinology. I participate in biweekly meetings of our faculty endocrinology and metabolism journal club and use that as a stimulus to learn enough to take my turn at presenting a review of some recent developments. A few years ago, I enjoyed contact with



medical students again by leading a weekly seminar for a small group as part of their pharmacology course. One of my pleasurable activities was participating in the APS Senior Physiologists Committee. I appreciated the opportunity to correspond with so many members who were enjoying their retirement years in interesting ways.

"In addition, I have been busier than I sometimes wish with volunteer activities at our science museum, tutoring many wonderful people who have come here from other countries needing help with their English, and working with our local Peace Action chapter. Whenever I can, I try to read some of the literature I never had time to explore before. I hope I can continue in good health for a few more years. There is lots to do."

Philip R. Steinmetz writes: "Yes, I do belong to the year of 1927, which may have been a vintage year for steering its newcomers to the direction of the physiological sciences. Ever since my student days at Leiden, I have zigzagged between physiology and medicine. Now that I have reached the status of an emeritus professor, I consider these oscillations part of my career. They allow me to remain active and to focus on new areas of exploration without going too far astray.

"In terms of experimental work, I have completed what is going to be our last study on the density and distribution of particles associated with the apical membrane in the proton-secreting cells of the turtle urinary bladder. I am now involved in studying the scaling of urinary acidification, that is, the occurrence of iterative patterns of functional organization as we look back at a 35-year period and compare the scales of study for the whole kidney, tubule, cell, membrane, and proton pump. It is informative to compare the experimental complexity of the different scales of study. Such comparisons allow us to make qualitative predictions about a new scale of study and to identify the units of function.

"This point perhaps should serve as a word of advice for colleagues joining the Society: maintain an open mind for developments outside your field. That goes for mathematical biology, molecular biology, neurobiology, behavioral sciences, and other fields that may have fundamental connections with your own. It does not matter whether you approach these fields from a reductionist or an integrative point of view. Secondly, keep an eye on the emergence of nonlinear dynamics as more and more attempts are made to deal with qualitative knowledge. To paraphrase Warren Buffett, "It is better to be approximately right than to be precisely wrong." Finally, look beyond homeostasis as an explanatory principle for physiology. Aside from the body's ability to preserve its internal environment in the face of external changes, there are other perhaps more remarkable abilities that come into play when living systems respond to contingencies or initiate new actions rather than being reactive to the environment. To me, such phenomena are of great interest. Do they represent self-organization or a form of entrainment linked to physiological processes? In any event, I enjoy having the time and freedom to explore some of these questions."

Letters to Robert M. Berne

Herbert Gershberg writes: "For many years, I combined research with the practice of medicine. Each had its own satisfaction, and each may have suffered from the intrusion of the other. In the last 20-odd years, I have practiced internal medicine and endocrinology full-time.

"Practice has changed drastically. It has become unrewarding both psychologically and financially because of HMOs. I will be glad to retire at the end of the year."

Paola S. Timiras writes: "My teaching and research activities remain somewhat the same despite my early retirement in 1994 from the Department of Molecular and Cell Biology at the University of California. I continue to teach the two courses I initiated several years ago, Physiology of Human Development and Physiology of the Aging Process, and to coteach an introductory human physiology course and one on interdisciplinary advances in aging.

"The concept first introduced in my early book *Developmental Physiology and Aging* (Macmillan, 1972) that aging is a stage — albeit the last one — of a continuum of physiologic adjustments throughout life currently receives general validation. Indeed, as indicated in the second edition of a subsequent book, *Physiological Basis of Aging and Geriatrics* (CRC Press, 1994), 'successful' aging in senescence depends in part on the vigor of physiologic competence and absence of disease at young and adult stages and their persistence in old age.

"In relation to these interests, I was invited by the University of Rome, 'La Sapienza,' to present a series of lectures on the physiology of aging. It was a great pleasure to return to as a visiting professor to 'La Sapienza,' the medical school from which I graduated in 1947 and where several members of my family taught, starting with my grandfather at the turn of the century.

"The major buildings of the medical school and the university hospital have not changed on the outside since my student days but have been very much improved within. Despite the clamorous traffic, Rome remains (especially for a born Roman like me) a most beautiful city, blending ancient history with modern enterprise.

"Researchers in the Department of Pharmacology, which hosted my visit, conduct research under the direction of the chairman, Luciano Angelucci, on the neuroendocrinology of stress during development and aging, an area of investigation close to my own interests from my postgraduate training days in the laboratory of Hans Selye at the University of Montreal.

"It may be recalled that the fields of endocrinology and gerontology started simultaneously in 1889 with the identification by the French physiologist E. Brown Séquard of 'internally secreted' substances that have beneficial effects on the brain and muscles of elderly individuals. As discussed in many subsequent publications, chemical mediators such as hormones play an important role not only during development but also in senescence. Several current studies of replacement of estrogens, growth hormone, and some adrenal andogens in the elderly seem to support this view. We have demonstrated in early studies that estrogen and thyroid hormones have an important role in the functional and biochemical maturation of the brain. We are continuing to investigate today with students and visiting researchers in my laboratory the role of these hormones on normal and abnormal aging of cultured neural cells."

John J. Spitzer writes: "I must apologize for this enormously long delay in answering your kind note. I suppose part of the reason for my usual tardiness is that although I am quite used to taking advantage of senior citizen theater tickets and senior citizen discounts on airfares, I am not used to the idea that I am now a 'senior physiologist.'

"Even though I recently passed my 70th birthday, nothing really changed concerning my professional activities. I am still head of the Department of Physiology at the Louisiana State University Medical Center in New Orleans, a position I have held since 1973. I still enjoy running the department (at least most of the time) largely due to the fact that my faculty is very pleasant, active, and cooperative. Not to speak of the special pleasure of seeing young associates receive their first NIH grants. In addition, I continue as director and active participant in our National Institute on Alcohol Abuse and Alcoholism-supported Alcohol Research Center.

"As far as our departmental teaching activities are concerned, I am still quite proud of the fact that we have a relatively heavy laboratory teaching component in our medical physiology course and some laboratory teaching in our dental, allied health, and nursing courses as well. It is fun to see the changes that the recent introduction of MacLabs is bringing to our laboratory teaching.

"In my less optimistic moments, I frequently recall the times in the not too distant past when our main concerns in directing a department were hard work, striving for excellence, and good productivity, rather than the more politically correct activities of writing mission statements, strategic plans, and executive summaries. It is indeed a miracle that our departments achieved a modicum of success, even without knowing what our 'missions' were."

Letter to Eugene M. Renkin

James F. Masken writes: "I became Professor Emeritus in May 1992 after serving on the faculty of the Department of Physiology at Colorado State University for 30 years. Upon retiring, I moved to Chicago and have been living here ever since.

"Shortly after arriving here, I became Adjunct Professor of Biology in the Department of Biological Science at DePaul University, and I continue to serve in this capacity. Besides teaching and advising, I serve on graduate committees and am doing some research and writing. I also serve on a research committee (IACUC) at Children's Memorial Hospital here in Chicago. So I am quite active in my 'retirement' and enjoy it very much."

Letter to Richard L. Malvin

Donald C. Johnson writes: "*The Physiologist* came today, and it reminded me that I, too, am a 'senior physiologist.' Reading the latest news from that group is somewhat depressing. More and more I think that Rep. Claude Pepper did science a great disservice by allowing all professors to die of old age in their jobs.

"What is it they cannot give up?

Authority, prestige, imagined importance to science, money, or what? I wonder how many of these seniors would have their positions if their mentors had the opportunity to hold a job forever. My mentor had to give up his professorship when he turned 68, and his retirement made room for two new faculty members. However, some of his most important contributions came during his emeritus years.

"I became emeritus in 1996 when I turned 69, not because I was going brain dead or had any physical infirmity but simply to make a position for a new faculty member. If we are going to make any progress toward solving the employment problem for our bright, young graduates, somebody has to give up his or her full-time equivalency. I still enjoy laboratory work but now as a coinvestigator rather than as a primary investigator. I still enjoy teaching as well, but I do not miss the committee meetings, the politics of academia, or the meeting of grant deadlines.

"Fortunately, because of the foresight of administrators and faculty members many years ago, we are provided with magnificent pension systems that remove any worries about having the wherewithal to do whatever we want. What more can one ask? You have the ultimate tenure, one that does not have to be reviewed or renewed by anyone. This freedom allows one to severely criticize administrators in governments as well as institutions in, I hope, a constructive way and not in a way to simply bitch at something.

"I wish I had some pearls of wisdom for the younger members of the Society, but I do not. Some of their research at the molecular level is very exciting, but much of it also seems boring because it has little or no relationship to understanding in vivo physiological mechanisms. Many of them are in danger of 'painting themselves into a corner' with little chance of escape. Some of us oldies can learn the new tricks of molecular biology, but unfortunately it is difficult for narrowly trained investigators to pick up the basics of integrated animal physiology."

Letter to William J. Stekiel

Tauba Pasik writes: "My retirement was not at age 70 — it should have been that way — but much earlier. Due to health conditions directly related to my work in the laboratory, I developed a severe allergy to toxic fumes (aldehydes, chloroform, ether, osmic acid, etc.) and tobacco smoke. Unfortunately, at that time, I could do very little to avoid these situations, so I decided to retire and work from home.

"Since my husband **Pedro Pasik** continued to be very successful with his laboratory endeavors, I took advantage of the situation and contributed with ideas, written work, and discussions. But as you know, that is not enough for a person used to working from morning until night. So I filled the gaps in time with other activities that gave me much pleasure and that I could not indulge myself in previously: reading the *New York Times* in the morning for one hour while having breakfast (even if the my morning meal is only a cup of tea, what a luxury!) and reading a pile of books that have been waiting for me for quite an amount of time.

"My husband and I worked together to publish the scientific research I had done while still in the laboratory and the research from more recent projects in which my contribution was substantial.

"I started doing some physical activity, for which I could never find time before, like taking the long, brisk walks that my cardiologist advised for me in 1975! Needless to say, my health has improved considerably, particularly my respiratory functions.

"Since my husband reduced his presence in the laboratory to nine months of the year, we are doing a lot of traveling, enjoying being visiting professors in places like China, Russia, Hungary, Argentina, and Spain at the invitation of their respective academies of science and visiting wildlife places like the Serengeti, etc.

"For the last couple of years, we have been engaged in a mammoth project, the translation of the formidable *Texture of the Nervous System of Men and Vertebrates* by Santiago Ramón y Cajal. We obtained the permission of the Cajal family, and we are doing a translation directly from the Spanish version, with all the pertinent new developments that Cajal studied during the interval between *Textura* and the publication of the French translation by Azoulay, called *Histology of the Nervous System*.

"We are correcting the errors contained in the *Histology*. The bibliography was incomplete and many times in great error; great savants like Cajal did not care so much about this kind of precision. We used the original Cajal artwork, which the Cajal Institute director was so kind to place at our disposal.

"So this translation, with all the library and research work that it entails, is now occupying most of my time.

"You asked me for some words of wisdom for my colleagues. These are very difficult to give because not everyone is in the same state of health, nor does everyone have the same amount of energy. Some enjoy a blissful retirement in a relaxed way; others keep on working. Others enjoy their grandchildren; others play golf in Florida. But whatever they do, they deserve it, and no one has to feel diminished because he or she chooses a relaxed lifestyle. One should not feel obligated to keep working, unless one enjoys it fully.

"A combination of both lifestyles is best but difficult to achieve. I, myself, find it very difficult to relax; I am still working at it. I want to finish this translation with my husband, write a biography, and finish a family chronicle I have been writing for the last 10 years and that seems never to have an end. Meanwhile, I enjoy our three children and their spouses — four MDs and two PhDs in all — and our five grandchildren, who, due to great luck, live in the tristate area. We see them often and enjoy them fully."❖

Keystone Symposia

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Announcing 1998 Conferences

Code	Abbreviated title	Date
A1	Manipulation of Insects	1/9 - 1/15
J3	Platelet Production	1/10 - 1/15
J4	Hematopoietic Stem Cells	1/10 - 1/15
A2	Genomics and Drug Delivery	1/10 - 1/15
J5	Wound Repair	1/10 - 1/15
J6	Tissue Engineering	1/10 - 1/15
B1	Plant Cell Biology	1/13 - 1/19
J7	Gene Therapy	1/19 - 1/25
J8	Non-viral Gene Delivery	1/19 - 1/25
C1	Enteric Nervous System	1/22 - 1/27
B2	Rheumatoid Arthritis	1/23 - 1/29
B3	T Lymphocyte Activation	1/26 - 2/1
B4	Genetic Networks	1/29 - 2/3
B5	JAKs and STATs	2/3 - 2/8
B6	Bacterial Chromosomes	2/6 - 2/12
C2	Viral Immunity	2/16 - 2/22
X1	Breast and Prostate Cancer	2/21 - 2/26
X2	Motility and Metastasis	2/21 - 2/26
C3	Transcriptional Mechanisms	2/21 - 2/26
C4	Lipid Second Messengers III	3/1 - 3/6
C5	Specificity/Signal Transduction	3/1 - 3/7
C6	Dendritic Cells	3/7 - 3/13
X3	Synapse Formation	3/7 - 3/13
X4	The Hippocampus	3/7 - 3/13
D1	HIV Pathogenesis	3/13 - 3/19
X5	Leukocyte Trafficking	3/22 - 3/28
X6	Endothelium	3/22 - 3/28
D2	The Cell Cycle	3/27 - 4/2
D3	Nuclear Receptor Gene Family	3/28 - 4/3
X7	Cardiovascular System	3/28 - 4/3
X8	Angiogenesis	3/28 - 4/3
Y1	TB: Molecular Mechanisms	4/2 - 4/8
Y2	Infections in AIDS	4/2 - 4/8
Y3	Extracellular Matrix Signaling	4/3 - 4/8
Y4	Vertebrate Development	4/3 - 4/8
Y5	The Nuclear Matrix	4/4 - 4/9
Y6	Epigenetic Regulation	4/4 - 4/9

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All meetings are subject to change.

Respiratory Physiology: People and Ideas

John B. West (Editor)
Bethesda, MD: American Physiological Society, 1996, 431 pp., illus., index, $85.00. APS Member price: $55.25
ISBN: 0-19-508081-5

> "As I read of respiratory physiologists of previous generations and look back on the many colleagues who worked with me and taught me, ... I recognize what a fine, helpful, generous group they were."
>
> Robert Forster, Chapter 2
> *Respiratory Physiology: People and Ideas*

This volume, *Respiratory Physiology: People and Ideas*, sponsored by APS and edited by John West, provides a benchmark for respiratory physiology: how far it has come, where it is, and even clues as to where the field may go. The reader can be confident that each chapter is by an acknowledged leader in the field. The chapters in this outstanding book provide the opportunity for the reader to look back and, as Forster says, to be taught by "fine, helpful, and generous" associates who help us know the past so that we can better understand the present from which the future must be built.

The first of the book's five sections is on morphology. Although but a single chapter, it is a tour de force. Ewald Weibel, who brought mathematics and careful quantitative measurement to anatomy, describes our steps through time in understanding how the lung is built and how its structure allows gas exchange suitable for various mammals and for increasing metabolic activity. Thus, the reader sees at once the development of the concept of interdependence of structure and function.

The second section is concerned with gas exchange and blood flow. Robert Forster, pioneer in oxygen hemoglobin kinetics, takes us through the mistaken views of oxygen secretion in the early days of this century to the current concepts of diffusion, chemical reactions, and pulmonary nonuniformities. Poul Astrup and John Severinghaus, who were key to the development of modern blood gas analysis, review our understanding of respiratory gases from Hippocrates and Galen, leading up to blood gas electrodes and oximetry, and emphasize how these innovative methods sparked scientific advances. Norman Staub, a founder of our current concepts of pulmonary edema, takes us from Laennec, Welsh, Starling, and Miller through the early, seminal studies of Guyton, Taylor, and his own work up to the year 1968. It includes noninvasive measurements of lung water in humans and the application of Laplace's law to surface tension. John West — well known for his description of "lung zones," his work in gas exchange at altitude, and his contributions to the ventilation-to-perfusion ratio — develops the origins of pulmonary blood flow measurement and the related concept of matching of ventilation and perfusion.

The third section on pulmonary mechanics appropriately begins with Jere Mead, who has been working in pulmonary and chest wall mechanics for nearly 50 years and is rightly a dean of the field. The chapter takes us from the pioneering work of the Swiss physiologist Rhorer through the development of research tools, including pressure transducers, flow meters, body plethysmographs, and mathematical models. He then shows how the tools have been applied to the fundamental problems of mechanics, such as pulmonary hysteresis, frequency dependence, expiratory flow limitation, and the work of breathing. The chapter on pulmonary surfactant is by John Clements, whose work has given us a firm understanding of the alveolar lining layer. He shows how several decades of research were needed to establish that the surface lining layer helps stabilize the lung alveolus, but once that was established, it "opened the floodgates and everyone could see the application to clinical problems." Peter Maclem, in his chapter on respiratory muscle physiology, describes his painful but ultimately productive controversy with Jere Mead on the relative functions of the diaphragm versus the chest wall muscles. This is exactly the sort of chapter, written clearly and with honest humility, that brings light and not smoke to future generations of scientists.

The fourth section on the control of breathing begins with Curt von Euler's steps to our current understanding of rhythmic breathing. Neurophysiology is complex — and rhythmic breathing is no exception — but the chapter follows Einstein's dictum of being as "simple as possible but not one bit simpler." It also raises unsolved questions, such as the question of pacemaker tissue in the fetus and newborn. The chapter on the history of chemoreception by Robert Fitzgerald and Sukhamay Lahiri begins with Hall, Kussmaul, Traube, Rosenthal, and Pflüger and ends with the discovery of the oxygen-sensitive potassium channels in the carotid body type I cells. The rich and occasionally turbulent history in between is well described. The chapter on the history of upper airway and lung reflexes is by John Widdicombe and Guiseppe Sant'Ambrogio. They put into perspective the lasting contributions of Hering's disciples, Breuer, Head, and Kratschmer of the 19th century, and those of Adrian and Zotterman of the early years of this century.

The fifth and final section on comparative respiratory physiology by Marsh Tenney begins with giants near the turn of the century: D'Arcy Thompson (growth and form), Max Rubner ("the law of isodynamics"), Julian Huxley (oxygen consumption and body size), August Krogh ("for many problems there is an animal on which it can be ... studied"), and more recently the work of Fenn, Rahn, Dejours, and Piiper. The section describes clearly the great understanding that has been derived in gas transport, mechanics, breathing designs, and control mechanisms that have come from the study of fish, birds, amphibians, and other "lower" animals. The section also provides a kind of completion for the whole volume by returning to the work of Weibel and Taylor, where morphometric study of various animals gives particular insight into function of the lung.

This book is richly illustrated and well indexed. Criticisms of the book are few indeed. Even the duplication of people and ideas that occurs in several chapters is useful in that different points of view are brought to light. The volume is recommended to students of all ages who are interested in problems of respiration. ❖

John T. Reeves
Univ. of Colorado Health Sciences Center

Essential Endocrinology, Third Edition

John Laycock and Peter Wise
New York: Oxford University Press, 1996, 409 pp., illus., index, $34.95
ISBN: 0-19-262471-7

This book, the third edition of this series, has been completely revised to account for updates in the field of endocrinology in the last decade. Many improvements have been made, including several introductory chapters that briefly cover many of the molecular aspects of hormone action. The book, therefore, goes from a discussion of the core principles of molecular endocrinology to tissue actions and the aberrant processes that result in clinically important issues. This book is well organized and written and serves as an "essential" book for medical students as well as for graduate students in many fields. The text is thoroughly illustrated with simplistic diagrams, allowing the reader to visualize the concepts discussed. The addition of color plates provides the opportunity to give a feel for clinical disorders and the gross dramatic effects often portrayed by aberrant endocrinology. Each chapter is followed by a section suggesting current further reading. These references are not only up-to-date but provide excellent resources for the reader who wants a further elucidation of points raised in the chapter.

The introductory chapter provides an entrance into endocrinology by introducing the reader to the field. Critical starting points, including what hormones and hormone families are and why they are important, are addressed. The following chapters provide a beginning understanding to the molecular mechanisms by which hormones exert their actions. While this is a complex and constantly changing field, the critical elements are discussed in a manner that allows for a understanding of how hormones bring about cellular changes. It is important to note that this book is principally one of the physiology and clinical aspects of endocrinology. While the early chapters present a primer with which to understand the molecular aspects of endocrine action, readers who seek a thorough discourse of this area should seek alternative sources.

With that in mind, the remainder of the book provides an excellent resource with which to understand endocrinology. The authors have accomplished the extremely difficult task of taking complex issues and distilling them to their critical elements. Readers should walk away with an understanding of endocrinology and the spectrum of clinical pathologies that result when these complex pathways are disturbed. The remaining chapters are broken down according to organ sites, starting at the hypothalamo-hypophysial (pituitary) axis. Following are two chapters describing the adrenal gland. Since the adrenal cortex and medulla have quite distinct endocrine actions, this division is logical and serves as a clear representation of the complexity even within a single organ. The next two chapters discuss the hormonal regulation of the male and female reproductive systems, respectfully. These chapters cover well the endocrine regulation of the testes and the ovaries, although other hormonally regulated organs, i.e., the prostate, are not covered as adequately. This discussion of reproductive endocrinology is followed by a thorough review of the thyroid. Calcium regulation and its role in bone and metabolic disorders is then covered. Included within this chapter is a discussion of other hormonal components of this regulation, including vitamin D and parathyroid hormone. Just as the adrenal gland was divided into two distinct chapters, so is the pancreas. The first pancreas chapter focuses on the control of metabolism, diabetes, and hypoglycemia, while the second centers on other pancreatic peptides and their related syndromes.

The final four chapters discuss aspects of endocrinology that cover multiple organ sites and endocrine disorders. Chapters are dedicated to the important area of understanding how hormones influence our growth and development. It is clear that many hormones have different roles depending on our point in the life cycle, and it is important to understand how hormones are involved in developmental processes. Disorders of endocrine action are then reviewed, including lipid metabolism and obesity and ectopic hormone syndromes. The book closes with a section on tests and procedures for evaluating endocrine function and tables of normal ranges for commonly measured hormones.

I would like to reiterate that I think that this book is "essential" endocrinology. By this, I mean that this book is important for medical and other students just beginning to learn the field of endocrinology but also to both clinical and basic scientists who have worked in the area for many years. Basic scientists will find it useful in that it is an easily understood discussion of the clinical aspects of the hormones that are being studied at the molecular level. In summary, this is an excellent book that is a resource of endocrinology, and I recommend it highly. ❖

Robert H. Getzenberg
University of Pittsburgh Medical Center

Cardiovascular Physiology, Seventh Edition

Robert M. Berne and Matthew N. Levy
St. Louis, MO: Mosby-Year Book, 1997, 324 pp., illus., index, $35.95
ISBN: 0-8151-0901-6.

This textbook is authored by two world-renown experts on the cardiovascular system whose individual expertise complement one another. As such, this book is highly authoritative and accurate. Although this introductory level textbook is intended for medical and graduate students, it is useful as a reference book for dental, nursing, and allied health students as well. It also serves as an excellent reference book for faculty and researchers on the cardiovascular system. I recommend that all faculty who teach cardiovascular physiology read this book in its entirety. I certainly learned very much by reading it.

The Seventh Edition has been updated and extensively revised, including deleting some old and adding some new figures. The figures were selected for their didactic usefulness. In fact, the whole book was written with the student in mind. Italics and bolding are used to emphasize new terms, definitions, key facts, and important concepts. Each chapter has a summary section that highlights key points, followed by a problem section with answers given in Appendix A. Appendix B provides review questions and answers. Examples of abnormal function have been added to the Seventh Edition and are presented throughout the text in framed boxes. The bibliography at the end of each chapter focuses primarily on review-type articles and key research papers. Some topics that are still controversial are carefully pointed out.

Book Reviews

The book emphasizes control mechanisms relevant to the cardiovascular system. The various regulatory mechanisms are discussed first in the individual chapters, and the last chapter discusses how the individual components are coordinated and integrated in the body. This is done by describing how the body responds to the two important stresses of exercise and hemorrhage. The first chapter presents a brief overview of the circuit elements for the cardiovascular system. This is followed by the normal and pathophysiological electrical activity of the heart, the heart as a pump, regulation of heart rate and contractile force, hemodynamics, properties of the arteries, microcirculation, lymphatics, control of the peripheral circulation, control of cardiac output, coupling between the heart and vasculature, coronary circulation, and other special circulations.

Certain chapters stand out as being outstanding, such as Chapter 7 on microcirculation, the Law of Laplace, diffusion, and the Starling hypothesis. Chapter 5 on hemodynamics is very well illustrated and quantitative, as is Chapter 6 on the arterial system. The same is true of the other chapters. Chapter 2 on the electrical activity of the heart covers the important highlights of the cardiac action potential and its propagation under normal and pathological conditions.

In summary, this is an excellent, well-done, well-illustrated, didactic, and authoritative textbook on the cardiovascular system and its regulation. It is comprehensive, covering virtually all the important topics and concepts. Because it is written in a clear and concise manner, the book's length is quite manageable, having a total length of only 324 pages (including the index). This textbook is actually a delight to read. I strongly recommend it to the student and teacher. ❖

Nicholas Sperelakis
University of Cincinnati College of Medicine

Books Received

Adhesion Molecules in Health and Disease.
Leendert C. Paul and Thomas B. Issekutz (Editors).
New York: Dekker, 1997, 768 pp., illus., index, $195.00.
ISBN: 0-8247-9824-4.

Animal Physiology: Adaptation and Environment. Fifth Edition.
Knut Schmidt-Nielsen
New York: Cambridge University Press, 1997, 607 pp., illus., index, $49.95.
ISBN: 0-521-57098-0.

The Anthropology of Modern Human Teeth: Dental Morphology and Its Variation in Recent Human Populations.
G. Richard Scott and Christy G. Turner II.
New York: Cambridge University Press, 1997, 382 pp., illus., index, $80.00.
ISBN: 0-521-45508-1.

Colony-Stimulating Factors: Molecular and Cellular Biology. Second Edition.
John M. Garland, Peter J. Quesenberry, and Douglas J. Hilton (Editors).
New York: Dekker, 1997, 594 pp., illus., index, $195.00.
ISBN: 0-8247-9492-3.

Concepts of Human Physiology.
Richard L. Malvin, Michael D. Johnson, and Gary M. Malvin.
Menlo Park, CA: Addison Wesley Longman, 1997, 450 pp., illus., index, $49.00.
ISBN: 0-673-98562-8.

From Living Eyes To Seeing Machines.
Mandyam V. Srinivasan and Svetha Venkatesh (Editors).
New York: Oxford University Press, 1997, 271 pp., illus., index, $85.00.
ISBN: 0-19-857785-0.

Methods in Enzymology: Cell Cycle Control, Vol. 283.
William G. Dunphy (Editor).
San Diego, CA: Academic, 1997, 678 pp., illus., index, $105.00.
ISBN: 0-12-182184-6.

Molecular Physiology of Growth.
P. T. Loughna and J. M. Pell (Editors).
New York: Cambridge University Press, 1997, 170 pp., illus., index, $54.95.
ISBN: 0-521-47110-9.

Neural Control of the Respiratory Muscles.
Alan D. Miller, Armand L. Bianchi, and Beverly P. Bishop (Editors).
Boca Raton, FL: CRC, 1997, 310 pp., illus., index, $139.00.
ISBN: 0-8493-40001-2.

Nitric Oxide and the Kidney: Physiology and Pathophysiology.
Michael S. Goligorsky and Steven S. Gross (Editors).
New York: Chapman & Hall, 1997, 463 pp., illus., index, $197.00.
ISBN: 0-412-08061-3.

Oxygen, Gene Expression, and Cellular Function, Vol. 105.
Linda Biadasz Clerch and Donald J. Massaro (Editors).
New York: Dekker, 504 pp., 1997, illus., index, $185.00.
ISBN: 0- 8247-0062-7.

Purinergic Approaches in Experimental Therapeutics.
Kenneth A. Jacobson and Michael F. Jarvis (Editors).
New York: Wiley, 579 pp., 1997, illus., index, $89.95.
ISBN: 0-47114071-6.

Review of Medical Physiology, 18th Edition.
William F. Ganong.
Norwalk, CT: Appleton & Lange, 1997, 830 pp., illus., index, $36.95.
ISBN: 0-8385-8443-8.

Announcements

Nominations Sought for Bristol-Myers Squibb Award

The eighth annual Bristol-Myers Squibb Award for Distinguished Achievement in Cardiovascular/ Metabolic Research will be presented in May 1998 to a scientist who has made an outstanding contribution to the progress of research in cardiovascular and related metabolic diseases. The award includes a $50,000 prize and a silver commemorative medallion. The deadline for the receipt of nominations is **December 19, 1997**.

All medical schools, hospitals, and cardiovascular or related metabolic disease research centers are invited to nominate candidates for the award.

For more information regarding the nominating procedures for the award, contact the Secretary, Bristol-Myers Squibb Award for Distinguished Achievement in Cardiovascular/ Metabolic Research, 345 Park Avenue, Room 21-4, New York, NY 10154-0037. Tel: 212-546-4616.❖

Life Fitness Academy Seeks Candidates for Research Grants

The Life Fitness Academy Scientific and Medical Advisory Board, which consists of 32 of the country's most renowned professionals in exercise science and sports medicine, is pleased to announce the availability of $20,000 in grants for exercise science research to be conducted in 1998-99.

Two grants of $5,000 each will be awarded to junior investigators, and four grants of $2,500 each will be awarded to graduate students. The grants will support applied human studies focusing on the effects of physical activity on various health states, such as diabetes, osteoporosis, anorexia, hypertension, menopause, obesity, depression, stroke, back injury, asthma, cancer, arthritis, and visual impairment.

The project funded by these monies may be part of another project funded by another source. The specific component of the project to be funded by this grant must be a unique component of the total research project. The idea for the project must be the original thought of the graduate student or junior investigator.

Researchers interested in applying for the grants must submit a two-page letter of intent by **December 1, 1997**. For more information on the application procedure, contact Barbara Usmial, Life Fitness, 10601 W. Belmont Avenue, Franklin Park, IL 60131. Tel: 800-735-3867 extension 3617; fax: 847-288-3791; e-mail: busmial@lifefitness.com.❖

PRAT Program Sponsors Research in Pharmacological Sciences

The Pharmacology Research Associate (PRAT) Program of the National Institute of General Medical Sciences (NIGMS) sponsors postdoctoral fellows conducting research at NIH in pharmacological sciences. This can include research in the areas of signal transduction, drug metabolism, immunopharmacology, chemistry and drug design, structural biology, endocrinology, neuroscience, clinical pharmacology, and other areas.

Potential fellows make an application together with a preceptor to the PRAT Program. Selected fellows receive a two-year appointment, salary, supplies, and travel funds from NIGMS to support research in the preceptors' laboratories.

Candidates should apply to the PRAT Program prior to coming to NIH. Applications are due on or before **January 2, 1998**, for fellowships starting in October of that year. Only US citizens or permanent residents are eligible.

Contact the PRAT Program Assistant at 301-594-3583 or by e-mail at prat@nigms.nih.gov to request a PRAT fact sheet and an application kit or visit the NIGMS home page at **http://www.nih.gov/nigms** to view the PRAT fact sheet.❖

AACR Gertrude B. Elion Cancer Research Award

The purpose of the American Association for Cancer Research (AACR) Gertrude B. Elion Cancer Research Award is to foster meritorious basic, clinical, or translational research in the US or Canada by a nontenured scientist at the level of assistant professor.

Tenured faculty, federal government employees, and employees of private industry are not eligible for this award.

Terms: The one-year award includes a $30,000 grant plus travel to the AACR annual meeting to accept the award. Candidates must be nominated by a member of AACR and submit a detailed application.

Deadline: December 15, 1997.

For application information, contact Jenny Anne Horst-Martz, American Association for Cancer Research, Public Ledger Building, Suite 826, 150 South Independence Mall West, Philadelphia, PA 19106-3483. Tel: 215-440-9300; fax: 215-440-9372; e-mail: horst@aacr.org.❖

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1997

October 13-16

9th International Conference on Occupational Respiratory Diseases, Kyoto, Japan. *Information:* 9th ICORD Secretariat, c/o Japan Industrial Safety and Health Association, 5-35-1, Shiba, Minato-ku, Tokyo 108, Japan. Tel: +81-3-3452-6841 extension 525 or 526; fax: +81-3-3453-8034.

October 20-23

Morphogenesis: Cellular Interactions. A New York Academy of Sciences Conference, Bethesda, MD. *Information:* Science and Technology Meetings, New York Academy of Sciences, 2 East 63rd Street, New York, NY 10021. Tel: 212-838-0230, extension 324; fax: 212-838-5640; e-mail: conference@nyas.org; Internet: **http://www.nyas.org.**

October 22-25

Fourth World Congress on Sport Sciences, Monte Carlo, Monaco. *Information:* SPORTEL Organisation, Fourth IOC World Congress on Sport Sciences, 4, Bd du Jardin Exotique, MC 98000 Monaco. Tel: +377-93 30 41 59; fax: +377-93 30 41 62.

October 25-28

Sixth International Conference on Fetal and Neonatal Physiological Measurement, Memphis, TN. *Information:* University of Tennessee at Memphis, Office of Continuing Medical Education, 956 Court Avenue, Room A101, Memphis, TN 38103. Fax: 901-448-6182.

November 7-8

3rd International Symposium on Exercise and Immunology: Integration and Regulation, Paderborn, Germany. *Information:* Heinz Liesen, Institute of Sports Medicine, University of Paderborn, Warburger Str. 100, 33098 Paderborn, Germany. Tel: +49-5251-603200; fax: +49-5251-603500; e-mail: kkm@sportmed.uni-paderborn.de.

November 16-17

Gene Mutational Analysis: Advances in Detection, Diagnostics, Databases, and Clinical Applications, Hamilton, Bermuda. *Information*: Cambridge Healthtech Institute, 1037 Chestnut Street, Newton Upper Falls, MA 02164. Tel: 617-630-1300; fax: 617-630-1325; e-mail: chi@healthtech.com; Internet: **http://www.healthtech.com/conferences**

November 19-21

Human Diet and Endocrine Modulation: Estrogenic and Androgenic Effects, Fairfax, Virginia. *Information:* International Life Sciences Institute (ILSI) North America, Attn: Conference on Human Diet and Endocrine Modulation, 1126 Sixteenth Street, N.W., Washington, DC 20036-4810. Tel: 202-659-0074; fax: 202-659-3859; e-mail: meetings@dc.ilsi.org.

November 19-22

13th Annual Meeting of the American Society for Gravitational and Space Biology, Washington, DC. *Information:* P. Russell, ASGSB, PO Box 12247, Rosslyn, VA 22219. Fax: 703-671-1706; e-mail: ASGSB@usra.edu; Internet: **http://www.indstate.edu/asgsb**.

December 13-17

Thirty-seventh Annual Meeting of the American Society for Cell Biology, Washington, DC *Information:* American Society for Cell Biology, 9650 Rockville Pike, Bethesda, MD 20814-3992. Tel: 301-530-7153; fax: 301-530-7139; e-mail: ascbinfo@ascb.org; Internet: **http://www.faseb.org/ascb**.

1998

February 12-17

AAAS Annual Meeting and Science Innovation Exposition, Philadelphia, PA. *Information:* AMSIE'98, Office of Membership and Meetings, American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Tel: 202-326-6450.

February 21-26

The International Society for Optical Engineering International Symposium on Medical Imaging 1998, San Diego, CA. *Information:* SPIE, PO Box 10, Bellingham, WA 98227-0010l. Tel: 360-676-3290; fax: 360-647-1445; e-mail: spie@spie.org.

March 4-7

Heart and Brain–4th International Conference on Stroke and 1st Conference of the Mediterranean Stroke Society, Marrakech, Morocco. *Information:* N. M. Bornstein, PO Box 50006, Tel Aviv 61500, Israel. Tel: +972-3-5140014; fax: +972-3-5175674 or 5140077; e-mail: stroke@kenes.ccmail.compuserve. com.

March 7-11

Twenty-ninth Annual Meeting of the American Society for Neurochemistry, Denver, CO. *Information:* Adron Harris, Department of Pharmacology, University of Colorado Health Sciences Center, 4200 East Ninth Avenue, Denver, CO 80262-0236. Tel: 303-315-8609; fax: 303-315-7499; e-mail: adron.harris@uchsc.edu; Internet: **http://www.med.usf.edu/ASN/asn.html**.

May 22-24

6th International Congress on Physical Education and Sport, Komotini, Greece. *Information:* Savvas Tokmakidis, 6th International Congress on Physical Education and Sport, Department of Physical Education and Sport Science, Democritus University of Thrace, Komotini, 69100, Greece. Tel: +30-531-21764 or 21762; fax: +30-531-33582 or 26908; e-mail: stokmaki@kom.forthnet.gr; Internet: **http://www.cc.duth.gr/conf/icpes98**.

June 28-July 2

International Conference on Intensive Cardiac Care, Jerusalem, Israel. *Information:* ISAS International Seminars, PO Box 574, Jerusalem 91004, Israel. Tel: +972-2-6520574; fax: +972-2-6520558; e-mail: isas@netvision.net.il.

June 28-July 3

3rd International Congress of Pathophysiology, Lahti, Finland. *Information:* ISP98, Department of Physiology, University of Kuopio, 70211 Kuopio, Finland. Tel: +358-17-163-080 or 163-108; fax: +358-17-163-112; e-mail: isp98@uku.fi; Internet: **http://packer. berkeley.edu/conferences/isp98.html**.

September 6-9

European Atherosclerosis Society 70th EAS Congress, Jerusalem, Israel. *Information:* Yechezkiel Stein, 70th EAS Congress, PO Box 50006, Tel Aviv 61500, Israel. Tel: +972-3-5140014; fax: +972-3-5175674 or 5140077.

September 19-23

European Respiratory Society Annual Congress, Geneva, Switzerland. *Information:* European Respiratory Society, 1 boulevard de Grancy, CH-1006 Lausanne, Switzerland. Tel: 41-21-613-02-02; fax: 41-21-617-28-65; e-mail: @ersnet.org.