THE PHYSIOLOGIST

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Report to Congress on the Extent and Effects of Domestic and International Terrorism in Animal Enterprises

In a war you have to take up arms and people will get killed, and I can support that kind of action by petrol bombing and bombs under cars, and probably at a later stage, the shooting of vivisectors on their doorsteps. It's a war, and there's no other way you can stop vivisectors.

Tim Daley
British Animal Liberation Front Leader

Introduction

The Animal Enterprise Protection Act of 1992 and Mandated Report

The Animal Enterprise Protection Act, enacted into law on August 26, 1992 and codified as 18 U.S.C. 43, makes it a federal offense, punishable by fine and/or imprisonment for up to one year, to cause physical disruption to the functioning of an animal enterprise resulting in economic damage exceeding $10,000. The Act also imposes sentences of up to 10 years or life imprisonment, respectively, on persons causing the serious bodily injury or death of another person during the course of such an offense.

Congress passed the Animal Enterprise Protection Act in response to concerns about what was perceived by many to be the rapidly expanding use of violence and other disruptive expressions of extremism on behalf of animal rights. Indeed, since the early 1980s, a broad range of enterprises, in both public and private sectors, that use or market animals or animal-derived products in their commercial or professional operations, have been targeted by radical elements within the animal rights movement with acts of disruption, vandalism, and in many cases physical destruction. In enacting the Animal Enterprise Protection Act, Congress sought both to punish those who engagein acts of terrorism against animal enterprises and to deter others from doing the same.

In view of these objectives, the Act directs the Attorney General and the Secretary of Agriculture to conduct jointly a study on the extent and effects of domestic and international terrorism on enterprises using animals for food or fiber production, agriculture, research, or testing, and report the results of the study to Congress within a year of the Act's passage. In compliance with this mandate, the Criminal Division of the Department of Justice (DOJ), with the assistance of the Animal and Plant Health Inspection Service of the Department of Agriculture (USDA), conducted a study of animal rights extremism in the United States and abroad. The following report conveys the findings of this study.

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Headquarters phone: 301-530-7118. Fax: 301-571-8305.

HHMI Initiates International Grants

In recognition of the contributions of biomedical scientists in countries in Eastern Europe and the former Soviet Union and the need for support to sustain their research during the current period of political, economic, and social change, the Howard Hughes Medical Institute plans to award research grants to biomedical scientists in selected countries in the region. The countries selected as eligible for the awards are Belarus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Russia, Slovak Republic, and Ukraine.

The Institute plans to make grant awards that collectively will amount to up to $3 million each year for a total of five years. Two types of grants will be awarded.

Grants for Research at the Scientist's Own Institution. These grants will provide five years of support for research by scientists at their own institution in the eligible countries. They are open to all biomedical scientists who meet eligibility criteria. Between 40 and 60 grants will be awarded, after careful review of the applications. Grants will be in the range of $10,000–$75,000 for each year. The size of a grant will depend on the needs of the awardee and the economic conditions prevailing at the time the awards are announced.

Grants Involving International Research Collaboration. Collaborative research awards will be made to support new or ongoing joint research projects of scientists in the eligible countries and collaborating scientists in other countries, including Western Europe, Israel, Canada, and the United States. These grants will also be for five years and are intended to support the work of the eligible scientists and to foster their collaborations abroad.

The collaborative research grants are open to all scientists in the selected countries who meet eligibility criteria and who have made arrangements either to establish a new collaborative research effort or to continue an existing collaboration abroad. Between 40 and 60 grants will be awarded after careful review of the jointly submitted applications. These grants also will be in the range of $10,000–$75,000 each year.

Inquiries should be directed to Howard Hughes Medical Institute, Office of Grants and Special Programs, International Program, 4000 Jones Bridge Road, Chevy Chase, MD 20815-6789 USA. Tel: 1-301-215-8884; fax: 1-301-215-8888; internet: hhmigfil@class.org.

Education

Back to School, Part II

Norman C. Staub
University of California, San Francisco

One of the pleasures of being Past-President of the American Physiological Society was the opportunity to plan a symposium for Experimental Biology '93. I chose a symposium-workshop for high school biology teachers and students.

I made that choice for several reasons. First, the APS already has many high-quality scientific symposia. Second, at our January 1992 strategic planning retreat, Council identified education as a major goal of the Society (see *The Physiologist* 35: 37-passim, 1992). Third, a biology teacher-student symposium-workshop would be able to take advantage of the many resources available at EB '93. Fourth, it would provide stimulation to teachers and students in biology and enhance public recognition of the American Physiological Society and physiology as a discipline; both important goals in our Strategic Plan.

The symposium-workshop plan did not spring fullgrown from my head. We had two trial runs of some of its components. In 1991 Martin Frank, our Executive Director, organized a half-day high school student symposium at the APS Conference in San Antonio, Texas (see *The Physiologist* 35: 4, 1992). In 1992 Frank Powell, Chairman of the Education Committee, organized a high school teacher in-service workshop at Anaheim, California. From these experiences, we became familiar with the logistics and problems associated with such an undertaking. We gained experience as to which components would be attractive to students and to teachers. Teachers and students want to hear good science. However, it must be understandable, preferably interactive, to maintain the interest of the audience.

The APS summer teachers' research program, in which the Society invests $50,000 per year, had been in operation for three years. I wanted to make use of this core group of 36 experienced teachers. They know the problems associated with teaching physiology at the high school level, have had the experience of a summer of research, and have renewed enthusiasm for teaching modern physiological science. Therefore at the in-service workshop, I arranged with Frank Powell to have three of our summer teachers present lesson plans based on the work they had done. Furthermore, a fourth teacher, who had made an inspiring statement of her summer work, was invited to present her testimonial.

I will not describe each presentation at the symposium-workshop, but I do want to acquaint you with some of the topics we believed would interest the students and their teachers. In the morning session, there were three short demonstrations with audience participation. These were designed to teach some fundamentals of physiology that are only briefly presented at the high school level, if at all. Our aim was to use good teachers who were also productive scientists. Such a combination is not, unfortunately, as common as one would like. Our new Society Education Office needs to develop a resource list of such individuals. Feedback from the teachers and students indicates they liked these lecture-demonstrations; in fact, they want more such demonstrations with more interaction.

We showed a 30-minute videotape about physiology as a research career. The tape was made in Great Britain several years ago. It is effective in describing some aspects of physiology training. Both teachers and students commented favorably on the presentation. The APS has not been able to mobilize resources to produce a tape for the American market, although I think that it ought to be a priority item for our Education Committee and the Education Office.

As an innovation, I asked Dan Richardson, Chairman of the APS Teaching Section, to recruit proctors for the students and teachers during the two-hour lunch break. The teaching section provided 33 volunteer proctors, who escorted small groups of students or teachers to see selected physiology posters, have lunch, and see the exhibits. In my opinion, turning the students and teachers loose to wander among the posters or exhibits is not of much value. I believe our guests profit more by discussing one or two good posters with their authors or the proctor. As this was the first time we have used a large number of proctors there was some confusion, but overall it worked well. I hope the proctor component will be continued and improved.

In the afternoon, Frank Powell conducted an in-service workshop for the teachers making use, as I mentioned, of the splendid resource provided by our summer teachers. The students had a separate program in which they learned about careers in physiology and the use of animals in research. These instructive discussions were led by two distinguished physiologists who have expertise and are well known.

The symposium-workshop group included about 50 teachers and more than 75 students of advanced biology or human physiology, all from New Orleans and adjacent parishes. Each teacher was invited to select two students, based on their interest and scholastic aptitude for biology, especially physiology. With few exceptions the schools or dis-

tricts generously gave the teachers a free day for the program. When I say generously, I mean it. Schools are under severe financial strain; providing substitute teachers for a day is a substantial contribution.

What an opportunity we have to recruit physiology graduate students. For a modest effort and a small investment, we stimulated the teachers to improve their courses and interested the students in careers in physiology. I do not think we can make better use of our Society's resources.

What of the future? Unfortunately, the history of the American Physiology society is littered with the carcasses of programs that were begun enthusiastically but which fell by the wayside as interest flagged. I expect things to be different in the 1990s because we have a firm commitment from the Society through our Strategic Plan. Education will continue to be a major Society activity for members, students, teachers, and the general public. Our commitment is being fulfilled by the establishment of an APS Education Office and by applications for support grants. Our Education Committee and our Teaching Section are active. Let's support their efforts enthusiastically.

My Past-President's symposium was not intended to be a one-shot deal. It points the way to one aspect of our continuing education involvement. Frank Powell is busy planning another teaching symposium. Student-teacher workshops ought to be part of every APS spring meeting, conference, or multisection meeting. Whenever the Society meets, we should promote education in physiology.

Porter Physiology Development Program

The Porter Physiology Development Program needs your support. Since 1967, it has provided funds to train minority students in the science of physiology, thus increasing the involvement of underrepresented scientists in the discipline and in the Society. In 1992, a brochure describing the successful results of the program was distributed to the membership along with a solicitation. Many of our members responded generously to our request. We again urge all members to join in support of this program.

The enclosure of the donation form (below) is designed to give others an opportunity to make a contribution. Currently, the William Townsend Porter Foundation provides $50,000 in support for the program, and the APS allocates $25,000. In addition, the Society has recently solicited funds from a number of corporations to expand financial support for the program. Both the membership and the corporations have an incentive to make a contribution because the William Townsend Porter Foundation has made a matching offer for every additional dollar raised by the APS.

We encourage your consideration of this program and urge you to make a generous contribution to the Porter Physiology Development Fund. Please indicate your desired level of support on the form and return it to APS with your contribution.

The American Physiological Society
Porter Physiology Development Program

Name _____ Home Phone _____

Address _____ Office Phone _____

City _____ State _____ Zip _____

☐ I want to help the American Physiological Society strengthen the Porter Physiology Development Program and to encourage minority participation in the physiological sciences.

I wish to donate

☐ $25.00 ☐ $50.00 ☐ $100.00 ☐ other

I wish to make my contribution by

☐ check ☐ Visa ☐ MasterCard

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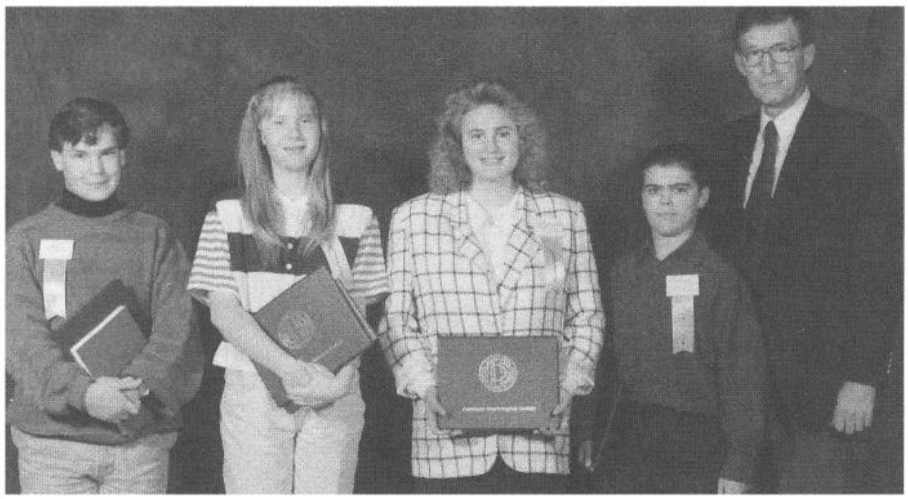
Signature

Checks should be made to the **APS Porter Physiology Development Program** and returned with this form to the American Physiological Society, 9650 Rockville Pike, Bethesda, MD 20814-3991. Contributions to the Porter Physiology Development Program are tax deductible.

State Science Day of Ohio Awards



1993 Ohio Physiological Society award winners were (l to r) Brian Coey, Allison Cochran, Kimberly Tessanne, and James Rohrer. E. Keith Michal (r) represented the Ohio Physiological Society and the American Physiological Society.

The Ohio Physiological Society presented awards to two middle school and two high school students for science fair projects competing in the annual State Science Day of Ohio. First place in the high school division was earned by Brian Coey (10th grade) of Kingston, OH, for his project, "Timing of Prothoracicotropic Hormone in Soccophaja bullata Larvae," and second place was awarded to Kimberly Tessanne (10th grade) of Carrollton, OH, for her project, "The Effects of Land Pollution on Mice." In the middle school division, Allison Cochran (8th grade) of New Matamoras, OH, earned the first place award for her study on "Scent Association in Hamsters" while James S. Rohrer (7th grade) of Oak Harbor, OH, placed second with his project, "In What Conditions Do Brine Shrimp Grow Best?"

Winners receive a certificate of accomplishment. First place recipients receive an APS "People and Ideas" book. The awards are co-sponsored by the Ohio Physiological Society and the APS. APS members interested in participating as judges in their state science fair or the International Science and Engineering Fair should contact the APS Education Officer, Marsha Matyas, at 301-530-7132.

New Science-by-Mail Program

Imagine 27,000 children throughout the world corresponding regularly with 2,300 scientists about challenging scientific problems. This wonderful image has become reality through the Science-by-Mail program, coordinated by the Boston Museum of Science and 18 other science museums around the country and in Canada. Participating students in grades 4–9 receive three challenge packets throughout the year. After doing experiments and developing theories, the students send their findings and their creative solutions to the scientist-correspondent who responds with encouraging feedback. The time commitment of the scientist requires no more that 20 hours per year. If you are interested in becoming a volunteer scientist for the program or to learn how a group of children can become involved, contact Melissa Cotter at the Boston Museum of Science, 1-800-729-3300.

New Education Resources Available

Three new resource sheets are available from the APS Education Office. The first, *K-12 Resource List*, includes information on videotapes and printed materials to help K-12 students understand what science is and what scientists, especially physiologists, do. The second resource sheet, *Criteria for Equitable Life Sciences Activities*, helps teachers revise classroom materials and strategies to create an atmosphere that promotes learning among all children, including female and minority students. Finally, the North Carolina Museum of Life and Science publication, *Sharing Science with Children: A Survival Guide for Scientists and Engineers*, has been reprinted with permission by APS. Single copies of each publication are free; write to Sande Montano at APS headquarters or call 301-571-1775.

Learn About Space-Based Research

A live videoconference focusing on Space Station research will be held on February 17, 1994 from 1:00 to 3:00 pm. "A New Era of Discovery: Plans for Research on Space Station" will be an overview of the plans, opportunities, and benefits of space-based research. Learn how Space Station will provide a laboratory for research in life sciences, materials, fluid physics, combustion, and biotechnology research and technology development.

Any site with connectivity to a satellite television receive earth station may license to carry this program at no cost. Call the Public Broadcasting System at 1-800-257-2578 to license a site. Beginning in January, call PBS to find a site near you that will receive the program.

Meetings

Experimental Biology '94

Anaheim, California
April 24–28, 1994

Cytokine Mediated Signal Transduction Pathways: Effects on Cellular Gene Expression and Function

Theme area: Inflammation
Sponsors: Cell & General Physiology Section and Epithelial Transport Group
Chairs: Etty Benveniste and Dale J. Benos
Participants: Dale J. Benos, Sergio Grinstein, Thomas Hamilton, Etty Benveniste, and Nancy Reich.

Cytokines comprise a diverse group of regulatory polypeptides that subserve and modulate many important cellular functions. Cytokines include the interleukins, interferons, transforming growth factors, colony stimulating factors, and tumor necrosis factors. These polypeptides act to stimulate essential cellular metabolic functions, proliferation, differentiation, and specialized effector cell functions. The signal initiated by binding of the cytokine to the ligand-binding portion of the receptor is transduced into the cell by the cytoplasmic portion of the receptor, oftentimes in conjunction with other associated proteins. The initial signal transduction is brought about either by alterations in specific ion transport systems, most notably Na+/H+ exchanges and certain ion pumps, or by direct activation of protein kinases. This symposium will focus on cytokine mediated signal transduction pathways in a variety of cell types, with an emphasis on how these second messengers are involved in cell function. Topics to be discussed include the physiological effects of cytokines on ion transport systems; the mechanisms by which protein kinases become activated; and the role of protein kinases in transcription factor activation and function. Recent evidence suggests that activation of a number of intracellular protein kinases (PKC, PKA, Tyrosine Kinases) by cytokines leads to phosphorylation of transcription factors which then can modulate the gene(s) of interest. This may be one mechanism by which pleiotropic cytokines exert their effects on specific genes. The symposium will begin with a brief (10 min) overview of the cytokine field by Dr. Benveniste. The subject matter of the symposium should be of general interest to members of the Society, because it concerns the study of both cellular and molecular mechanisms by which physiologically important genes are regulated in a variety of cells. Further, because of the interdisciplinary nature of the presentations, the symposium should attract many investigators of diverse backgrounds.

Cellular Regulation of the Endothelial Barrier

Theme area: Respiratory Biology
Sponsor: Respiration Section
Chair: Jahar Bhattacharya
Participants: Doina Popov, Elzabetta Dejana, Donald Ingber, Asrar B. Malik, Ann-Marie Schmidt, and Jahar Bhattacharya

This symposium will focus on specific molecules or molecule classes which have been identified in the regulation of endothelial barrier properties. As such, the symposium will review cutting edge issues which are likely to lead to important future directions. Speakers have been selected from a number of different disciplines to review new research implicating cell adhesion molecules, cytoskeletal elements, signaling mechanisms, and receptors in endothelial barrier regulation. In addition, the presentations encompass a variety of newly developed molecular, cellular and biophysical techniques that are current in endothelial research. The inclusions of presentations involving in vitro and in vivo approaches, is expected to provide provocative discussion. No APS symposium has addressed these issues in the bast five years, hence the proposed symposium is timely and required.

What Happens to Cardiovascular and Renal Homeostases During Pregnancy?

Theme area: Neurobiology
Sponsors: Cardiovascular, Water & Electrolyte Homeostasis, and Neural Control & Autonomic Regulation Sections
Chairs: Virginia L. Brooks and Susan Jacobs-Kaufman
Participants: Virginia L. Brooks, Maureen Keller-Wood, Cheryl M. Heesch, Kirk P. Conrad, Margaret K. McLaughlin, and Susan Jacobs-Kaufman.

Pregnancy is associated with profound changes in blood volume and blood pressure homeostasis. The objective of the symposium is to highlight recent data describing these changes and to discuss possible mechanisms and consequences. The symposium will

be introduced with an integrated description of the altered hemodynamic and hormonal responses to hemorrhage during pregnancy (Brooks). The remaining speakers will then focus on changes in specific aspects of cardiovascular/renal regulation. Two speakers will describe changes in the regulation of hormones involved in pressure/volume regulation, such as angiotensin II, ACTH, vasopressin and ANF, and the mechanisms underlying these changes will be discussed (Keller-Wood and Jacobs-Kaufman). Evidence for altered regulation of sympathetic activity will be presented (Heesch). Finally, two speakers will then explore pregnancy-induced changes in endothelial regulation (eg nitric oxide) of vascular smooth muscle function (McLaughlin and Conrad). By presenting a variety of experimental approaches, the symposium will provide an integrated, emerging view of the many pregnancy-induced changes in the cardio-renal systems, some of which may not be beneficial to maternal or fetal well-being.

Molecular Advances in the Study of Hibernation

Theme area: Metabolic Processes
Sponsor: Comparative Physiology Section
Chairs: Hannah V. Carey and Gregory L. Florant
Participants: Sandra L. Martin, Gregory L. Florant, Jan Nedergaard, Thomas S. Kilduff, and Hannah V. Carey

This symposium will focus on the advances being made using molecular approaches to the study of mammalian hibernation. Hibernators exhibit many physiological patterns that havelong been of interest both for their inherent uniqueness as well as their applications to the study of hypothermia, depressed metabolism, and circannual rhythms. Now, the major advances in biochemistry and molecular biology of recent times have led to the initiation of exciting, innovative research that ties many aspects of hibernation physiology to regulation at the level of the gene. This symposium will be the first to focus solely on molecular physiology in hibernators. Although this field is very much in its infancy, the symposium is intended to provide the groundwork upon which future questions and research directions can be pursued. The program will address five aspects of gene regulation in hibernators that represent regulatory points that are crucial for the preparation into hibernation, as well as survival during and after hibernation. These areas include liver gene expression, transcriptional regulation of lipid metabolism, gene expression in the central nervous system, cellular and molecular aspects of brown fat metabolism, and intestinal gene expression. A topic of much debate in the hibernation community that will be addressed in some of these presentations, and during the discussions among participants and audience, is the adaptive value of periodic arousals during the hibernation season. Several participants will describe studies of gene expression during these energetically expensive periods that will hopefully increase our understanding of the physiological significance to the hibernator.

Epithelia as Components of the Common Mucosal Immune System

Theme area: Epithelial Cell Biology
Sponsors: Gastrointestinal Section and Epithelial Transport Group
Chairs: Gilbert A. Castro and Helen Cooke
Participants: Gilbert A. Castro, Lloyd F. Mayer, Charles Elson, Michael Lamm, Jack Wood, Helen Cooke, James Madara, Jack Gauldie, Charles Wira, and Charles Arntzen

The global AIDS epidemic has generated considerable interest in mucosal immunity and immunophysiological connections between various mucosal tissues. This interest is derived, in part, from a desire to understand immune suppression induced by HIV and from the quest to develop a vaccine against the virus whose portal of entry into the body largely involves penetration of epithelial cells at mucosal surfaces. This symposium focuses on current work that is enhancing our knowledge of the role of mucosal epithelia in the afferent and efferent arms of the immune response and of factors that regulate epithelial cell-immune system interactions. Studies of epithelia from the gut, lung, kidney, respiratory tract and reproductive tract will be featured.

The symposium, to be moderated by Gilbert Castro and Helen Cooke, will be introduced by Gilbert Castro. Nine speakers are involved, Lloyd Mayer will discuss how antigens access the immune system via presentation by epithelial cells in addition to absorption by M cells and by bulk flow through paracellular pathways. The importance of the route of antigen delivery in the development of mucosal immunity and immunological tolerance will be the subject of Charles Elson's talk. Michael Lamm will present current views on functions of secretory immunoglobulins in relation to mucosal immunity based in large part on data derived from studies of canine kidney cells. Jack Wood will discuss, based on pharmacological studies and direct electrophysiological measurements, how local antigenic stimulation alters functions of the enteric nervous system. Helen Cooke will present evidence that enteric nerves are involved in transducing antigenic signals into altered epithelial functions. While the presentations by Jack Wood and Helen Cooke relate to antibody-mediated (anaphylaxis) changes in the gut, James Madara

APS Bowditch Lecture

Monday, 5:15 pm

"Regulation of Epithelial Cell Polarity"

W. James Nelson
Stanford University Medical Center

will discuss changes in epithelial behavior resulting from inflammatory mediators or "immune agonists" derived from myeloid cells and acting in paracrine fashion. The airway will be the focus of Jack Gauldie's talk on cytokine-epithelial cell interactions. Functional connections between the gastrointestinal and female reproductive tracts will be discussed by Charles Wira. In conclusion, Charles Arntzen will project expected future developments in the immunophysiology of the mucosal immune system as driven by biotechnological advancements, focusing on transgenic plants as foods and as potential "edible" vaccines. Results of work described in these presentations will support the currently obscure view of Bockman, Boydston and Bcczhold (*Ann NY Acad Sci* 499: 129-144, 1983) that gut associated lymphoid tissue (GALT), bronchus-associated lymphoid tissue (BALT) and mucosal-associated lymphoid tissue (MALT) are terms that should be appropriately expanded to include epithelia as functional component, eg., mucosal-associated lymphoepithelial tissue.

Mechanical Stresses and Cell Function

Theme area: Cardiovascular Biology
Sponsor: North American Society for Biorheology
Chair: John A. Frangos
Participants: Donald Ingber, Larry Thibault, Peter Davies, John A. Frangos, Larry V. McIntire, Bradford Berk, Seigo Izumo, and Renz Bizios

It is increasingly evident that mechanical forces play a crucial role in the physiology of living systems. Over the past fifteen years there has been exponential growth in the research in understanding how mechanical forces regulate vascular diameter and caliber, bone remodeling, and skin growth. It appears that many of the cell and tissue responses and mechanisms have a large degree of commonality. It is the objective of this symposium to bring a diverse group of investigators to summarize recent advances, and hopefully provide a more comprehensive and unifying review of the field.

Multiple Signalling Pathways in Steroid/Thyroid Hormone Action

Theme area: Metabolic Processes
Sponsor: Endocrinology & Metabolism Section
Chairs: William W. Chin and Nancy L. Weigel
Participants: Allan Munck, Nancy L. Weigel, William W. Chin, Mark R. Haussler, and Benita S. Katzenellenbogen

Steroid/thyroid hormones, vitamin D and retinoic acid regulate a myriad of cellular functions by interacting with nuclear receptors. These interactions form a major part of hormone action. Recent evidence suggests that the activity of nuclear hormone receptors may be regulated by posttranscriptional modifications, such as phosphorylation, directed by cell surface events. This symposium will focus on the mechanisms and physiological ramifications of this molecular cross talk.

Key questions include: 1) do post-translational covalent modifications of receptors occur? 2) what are the functional ramifications of such alterations? and 3) what kinase and other enzyme cascades are responsible?

It is expected that a full appreciation of the extent of receptor modifications and its effect on function will increase our understanding of the role of interacting signalling systems in endocrine physiology. This symposium will be multidisciplinary and will bring together speakers from endocrinology, physiology, genetics and biochemistry.

Mechanisms of Contractile Dysfunction of the Hypertrophied Adult Cardiocyte

Theme area: Cardiovascular Biology
Sponsor: Cardiovascular Section
Chairs: George Cooper and Joanne S. Ingwall
Participants: Joanne S. Ingwall, Judith K. Gwathmey, Jeanette Chloe Bulinski, George Cooper, and Michael R. Zile

A large body of work has clearly identified contractile dysfunction of hypertrophied myocardium on the organ and tissue levels, especially when the hemodynamic stimulus inciting hypertrophy is a pressure overload. More recent work has shown that this dysfunction is an intrinsic property of the cardiocyte, or cardiac muscle cell. The newest work has focused on the nature and the locus of this cardiocyte defect. Three leading candidates have been altered energetics, altered calcium metabolism, and, more recently, alterations in the cytoskeleton. This symposium is designed to first address the two more recognized areas. Since the third area has only recently become of interest, a consideration of the cytoskeletal role in contractile dysfunction will be preceded by an introduction to the organization and developmental regulation of the cardiocyte cytoskeleton.

Epithelial Cl^- Channels

Theme area: Epithelial Cell Biology
Sponsor: Epithelial Transport Group
Chair: John Cuppoletti
Participants: Jeffrey J. Wine, Burton Horowitz, John W. Hanrahan, Sharif E. Gabriel, John Cuppoletti, and Michael J. Welsh

Salt movement, water transport, and release of granule contents by the secretory epithelia involve the electrogenic movement of Cl^- on anion selective channels. New families and members of Cl^- channels are being identified and characterized at a rapid rate this symposium attempts to provide a forum to highlight these discoveries and to discuss the diversity, physiological roles, biophysical characteristics, and molecular nature of Cl^- channels of the secretory epithelia. Epithelial Cl^- channels are involved in regulated movements of salt, water, and other secretory mechanisms. Recent studies indicate that regulation of these channels occurs at the level of the gene, by covalent modification, such as by cyclic AMP dependent protein kinase, by small molecules including metabolites, and

by recruitment. One of these, the CFTR, is the focus of intense interest because of its role in cystic fibrosis. The mechanisms of regulation of these channels will be addressed. Of particular interest to this symposium are the multiplicity of function of these channels as studied in multifaceted, state-of-the-art approaches. The results of these studies, the approaches used, and the concepts which have emerged will have immediate application to studies by other secretory biologists and will have a solid impact on education in the physiological sciences. Where appropriate and where possible, the participants in this symposium were selected by the more senior members of the mteam to represent themselves and the work which resulted in the invitation to the symposium.

Physiological Functions of Atrial Natriuretic Factor Prohormone Peptides

Theme area: Non-theme
Sponsors: Water & Electrolyte Homeostasis Section and Liaison with Industry Committee
Chairs: John R. Dietz and Daniel Villarreal
Participants: David L. Vesley, Daniel Villarreal, Bruce A. Benjamin, John R. Dietz, and Mark L. Zeidel

It is well established that atrial natriuretic factor (ANF) plays an important role in the regulation of body fluid balance and arterial pressure. This symposium will present and discuss evidence from several laboratories suggesting that peptides derived from the N-terminus of the ANF prohormone circulate in plasma and like ANF, appear to have diuretic, natriuretic and vasodilator functions. The evidence presented will include changes in plasma levels of proANF peptides under both physiological conditions and pathophysiological conditions, such as heart failure. The effect(s) of the proANF peptides in humans, whole animals and isolated cells from medullary collecting ducts will be presented. These peptides circulate at 10-15 fold higher concentrations in healthy individuals than ANF and their effects are significantly prolonged with respect to ANF. The presenters will discuss the molecular species and possible mechanisms of action of these newly discovered peptides isolated from the heart.

Spinal Mechanisms of Autonomic Regulation

Theme area: Neurobiology
Sponsor: Neural Control & Autonomic Regulation Section
Chair: Frank J. Gordon
Participants: Ida J. Llewellyn-Smith, Frank J. Gordon, Lawrence P. Schramm, and Lynne C. Weaver

Preganglionic sympathetic and parasympathetic neurons in the spinal cord represent the final common pathway by which the central nervous system controls peripheral autonomic function. The activity of spinal autonomic neurons is regulated by inputs arising from peripheral receptors and supraspinal and propriospinal neural pathways. Understanding the mechanisms by which these inputs are integrated at the spinal level are important, indeed classical, problems in both normal and pathophysiology. Recent developments have greatly expanded our knowledge in this area and have provided new insights toward understanding the mechanisms by which autonomic function is integrated and regulated in the spinal cord. These investigations span a number of disciplines and approaches including neuroanatomy, cell biology, neurophysiology, pharmacology and systems physiology. Each of the speakers proposed for this symposium is internationally recognized for their contributions. Their presentations will address a broad range of questions related to the general theme of spinal autonomic regulatory mechanisms in normal and abnormal states. Although this topic area is central to our understanding of autonomic nervous system function, no recent symposia have addressed this theme.

Physiology in Perspective: Walter B. Cannon Memorial Lecture

Wednesday, 5:15 pm

"Molecular Basis of Osmotic Regulation"

Maurice B. Burg
National Institutes of Health

Physiology and Pathobiology of Postcapillary Venules

Theme area: Cardiovascular Biology
Sponsor: Cardiovascular Section
Chair: Harris J. Granger
Participants: Roger Wagner, Harris Granger, Peter Davies, James Hawker, Neil Granger, and Benedicht Paull

Postcapillary venules, composed of an endothelial layer surrounded by pericytes, are the primary sites of protein, leukocyte and tumor cell extravasation. In addition angiogenesis is localized almost exclusively to pericytic venules. The aim of this symposium is to highlight the multifunctional nature of this important section of the microvascular tree. The symposium begins with a discussion of the structure of postcapillary venules, emphasizing the interactions of venular endothelium and associated pericytes. Next the intracellular signaling mechanisms responsible for initiating receptor mediated venular hyperpermeability are evaluated, emphasizing studies

performed on single venular endothelial cells and isolated perfused venules. With reference to angiogenesis, the mechanisms of fibroblast growth factor-mediated endothelial cell proliferation and tube formation are presented. Since both venular hyperpermeability and angiogenesis involve a loosening of endothelial cells from the basal lamina, the dynamics of EC adhesion to the basement membrane is considered. The two final presentations focus on the interactions of leukocytes and tumor cells with the venular wall as they move from the blood stream into the tissues spaces. The symposium should be of interest to physiologists, pathologists, pharmacologists, bioengineers and cell biologists.

Multiple Physiological and Biochemical Roles of Carbonic Anhydrase

Theme area: Respiratory Biology
Sponsors: Comparative and Respiration Sections
Chairs: Raymond P. Henry and Thomas A. Heming
Participants: Raymond P. Henry, Thomas A. Heming, Randall E. Kochevar, Patrick J. Walsh, Carol V. Gay, and Gerolf Gros

This symposium focuses on the multiple physiological and biochemical roles of the enzyme carbonic anhydrase (CA). Because CA catalyses the conversion of CO_2 gas to charged ions (H^+ and HCO_3) it can potentially play a role in any physiological or biochemical process involving any of those chemical species. The symposium will highlight the role of CA in respiratory gas transport, ion transport, acid-base balance, calcium carbonate formation, and cellular excitability. The speakers represent a balance between biomedically oriented and comparative physiologists; thus both the general cellular aspects of CA function and its evolution will be treated. It is hoped that this combination of background and expertise will lead to further interdisciplinary exchange and collaboration between the mammalian and comparative groups and the identification of new model systems for the study of CA.

Pathophysiological Role of Endothelin in Renal/Cardiovascular Disease

Theme area: Cell Injury
Sponsors: Renal and Water & Electrolyte Homeostasis Sections and Liaison with Industry Committee
Chairs: Joey P. Granger and Terry J. Opgenorth
Participants: Terry J. Opgenorth, David M. Pollock, Joey P. Granger, Joan A. Keiser, and John C. Burnett, Jr.

It is now evident that the vascular endothelium has the ability to produce a variety of substances that could have an important effect on the regulation of renal and cardiovascular function. One of these substances, endothelin, is the most potent vasoconstrictor ever described. Although numerous studies have indicated that the synthesis of endothelin is elevated in a variety of cardiovascular and renal disease processes, information regarding the pathophysiological role of this peptide is just emerging. Therefore, the purpose of this symposium is to present some of the latest evidence regarding the possible role of endothelin in affecting the regulation of renal and cardiovascular function in pathophysiological processes. The symposium will begin with an overview of the molecular and biochemical aspects of the endothelin system. This will be followed by presentations describing the acute and chronic mechanisms whereby endothelin influences renal and cardiovascular regulation. Finally, evidence regarding the significance of endothelin in cardiovascular and renal disease processes will be presented. The speakers included in this symposium represent a diverse group of scientists and clinicians with particular expertise in the integrative aspects of the endothelin system. This mix of topics and expertise should provide an intriguing symposium for the diverse membership of Experimental Biology who are interested in the pathophysiological role of endothelin in cardiovascular and renal diseases.

Adipocytes and Adiposity: Regulation by Hormones and Cytokines

Theme area: Metabolic Processes
Sponsors: Endocrinology & Metabolism Section and Liaison with Industry Committee
Chairs: Christin Carter-Su and Cecilia Hofmann
Participants: M. Daniel Lane, Christin Carter-Su, Bruce M. Spiegelman, Phillip Pekala, Susan K. Fried, and Clifton Bogardus

This symposium recognizes adipose as a key tissue for maintaining metabolic energy balance. Reports of breakthrough findings will characterize advances in understanding how hormones and cytokines act to maintain or disturb this balance.

Initial presentations by M. Dan Lane and Christin Carter-Su will describe recent discoveries of molecular control mechanisms for normal growth and development of adipose cells. The symposium focus will then shift to detailing how adipose function is altered in the contrasting physiologic conditions of sepsis, obesity, and diabetes. Bruce Spiegelman will present exciting new findings that associate overexpression of the cytokine tumor necrosis factor-ß (TNF-ß) in fat with the condition of insulin resistance in obese diabetic animals. By contrast, Phillip Pekala will describe a role for TNF-ß in the cachectic/septic state and will reveal studies detailing molecular mechanisms underlying altered fat cell function by TNF-ß. Then Susan Fried will assess systemic energy metabolism in obesity by reporting glucocorticoid effects on fat in different body regions. Likewise, Clifton Bogardus will provide an overview of human energy metabolism and its relationship to diabetes and essential obesity.

As a multidisciplinary approach, this symposium has been systematically developed to include presentations on experimentation with cell culture models, tissues from animal models of sepsis and obesity/diabetes, as well as whole body animal and human studies involving stressed or diabetic states. To anticipate exciting new approaches for contemporary physiology, considerable attention is given to applications of molecular/cell biology methods at all of these levels of experimentation.

Adaptive Responses of Muscle to Microgravity: From Terrestrial Models to Spaceflight Experiments

Theme area: Non-theme
Sponsors: MyoBio Group and Environmental & Exercise Physiology Section
Chair: Erik J. Henriksen
Participants: Marc E. Tischler, Frank W. Booth, Roland R. Roy, Susan C. Kandarian, Erik J. Henriksen, and Kenneth M. Baldwin

During the past 15 years, numerous investigators have used various earth-based models to induce non-weight-bearing of rodent skeletal muscle to simulate the microgravity environment experienced during spaceflight. These investigations have identified numerous adaptive responses to non-weight-bearing in skeletal muscle protein metabolism, carbohydrate metabolism, contractile properties, and bioenergetics. Recently, several investigators have had the opportunity to analyze muscle from animals that have been exposed to microgravity during American Space Shuttle and Russian Cosmos missions. These spaceflight experiments represent a unique opportunity to investigate the adaptive responses of various skeletal muscle biological systems to actual microgravity and to test the validity of the earth-based models. This symposium will provide a forum for the presentation of these research findings and to discuss future directions for research in the area of skeletal muscle physiology and biochemistry utilizing both ground-based models of microgravity and opportunities for spaceflight experiments.

Comparative Adaptations to Environmental Hypoxia: New Perspectives on Accommodations and Compensations

Theme area: Respiratory Biology
Sponsors: Hypoxia Group and Comparative and Respiration Sections
Chairs: James W. Hicks and Peter Lutz
Participants: Jeffrey B. Graham, Christopher R. Bridges, Stephen C. Wood, Kenneth B. Storey, Jeremy Wasser, and Peter Lutz

The physiological response of different organisms to a common environmental stress provides insight not only into the diversity of responses, but the general rules of similarities between organisms. This symposium will provide a forum for the exposition and discussion of recent findings on the physiological and biochemical mechanisms that vertebrates and invertebrates use to survive environmental hypoxia. The goal of this symposium is to stimulate fresh perspectives and new insights into the divergent and convergent adaptations exhibited by animals. The symposium will encourage a multi-level approach that will include the behavioral, anatomical, physiological and biochemical characteristics that develop in response to the challenge of environmental hypoxia. The symposium will attempt to emphasize that the physiological responses to acute hypoxia apparently contrasts with the responses observed during chronic hypoxia. However, an appreciation of these similarities and differences may provide a clearer understanding of responses that appear to be contradictory.

Strategies for Developing Differentiated Epithelial Cell Lines

Theme area: Epithelial Cell Biology
Sponsor: Epithelial Transport Group
Chairs: Ulrich Hopfer and James W. Jacobberger
Participants: Parmjit S. Jat, Dieter C. Gruenert, James W. Jacobberger, Richard L. Eckert, and Jeffrey A. Whitsett

The ability to grow cells in culture and to maintain differentiated features has greatly improved during the last decade. However, most normal cells have a limited life span in culture. In recent years, the better understanding of regulation of cell cycle and mode of action of oncogenes has allowed design of expression vectors that can prolong the life span of cells or even produce immortalized cell lines which may remain differentiated. In principle, those tools can be applied to all tissues and allow the design of experimental systems that are particularly well suited to investigate the cell physiological aspects of tissues. It is anticipated that they will become very important for the investigation of human cells because of the ability to expand the limited amount of experimental material available. This symposium focuses on epithelial systems and approaches that have been particularly successful in terms of obtaining differentiated cell lines. Tissues covered include the lung, kidney, and female reproductive tract. The approaches include different transfection/infection vectors of primary cells as well as use of transgenic mice.

Molecular Physiology of Major Sodium Transporters

Theme area: Molecular Communication & Structural Biology
Sponsors: Epithelial Transport Group and Renal and Cell & General Physiology Sections
Chair: Jack H. Kaplan
Participants: B. Forbush III, K.D. Phillipson, S. Amara, E.M. Wright and J.H. Kaplan

In almost all higher eukaryotes the energy utilized for solute accumulation, reabsorption and secretion is contained in the electrochemical potential gradient for Na ions. The cytoplasmically directed gradient is maintained by the sodium pump or Na,K-ATPase which actively expels Na ions at the expense of cellular ATP. Solute uptake, electrolyte balance, fluid secretion, and neurotransmitter re-uptake are all processes which utilize the Na gradient by employing Na-dependent transporters.

In recent years, many of these systems have been cloned, sequenced and isolated, and their investigation at the molecular level has been initiated. This symposium will bring together investigators who conduct studies at the molecular level on these important membrane proteins.

Representatives of these Na transporting systems to be discussed include the Na,KCl2 cotransporter, the cardiac Na:Ca exchanger, Na-dependent excitatory amino acid transporters, Na-dependent glucose transporter, and the Na pump. Emphasis will be placed on new results and approaches to understanding the regulation and structure-function relations in these systems.

Molecular Basis of Fever and Related Host Responses

Theme area: Neurobiology
Sponsors: Environmental & Exercise Physiology, Comparative Physiology, and Neural Control & Autonomic Regulation Sections
Chair: Matthew J. Kluger
Participants: Matthew J. Kluger, Keith Kelley, John Stitt, Nancy Rothwell, Quentin Pittman, and James Lipton

During the past decade there has been a wealth of information regarding the roles of specific peptides (arginine vasopressin, ‡-MSH, lipocortin), cytokines (eg, IL-1, IL-6), and glucocorticoids in the regulation of body temperature and other acute phase responses during health and disease. As a result of using modern systems and integrative, neurobiological, cellular, and molecular tools, we now have a much clearer picture as to how contact with stressors result in bi-directional communication between the central nervous and immune systems. In fact, fever, the main focus of this symposium, is one of the best examples of neuroimmunomodulation in that in response to some pathogen "immune" factors such as cytokines trigger the rise in thermoregulatory set-point (of course, at the level of the central nervous system). This results in physiological and behavioral responses that elevate body temperature. And, there is overwhelming evidence that this elevation in temperature generally results in an enhancement of host defenses, which reduces the viability of the initiating pathogen.

Cytoskeletal Regulation of Membrane Transport Events

Theme area: Epithelial Cell Biology
Sponsors: Cell & General Physiology, Renal, Gastrointestinal and Cardiovascular Sections and Epithelial Transport Group
Chairs: Lazaro Mandel and John W. Mills
Participants: John Mills, Richard Hays, Bruce Stanton, Lazaro Mandel, Fred Sachs, Else K. Hoffmann, and James Madara

Recent investigations on control of ion and water transport have produced evidence that membrane transport processes and the integral membrane proteins that mediate the transport events may be regulated by interaction with components of the cytoskeleton. This role of the cytoskeleton in regulation could involve: 1) the control of the number of transport units present in the cell membrane, therefore involving a membrane shuttling mechanism for delivery and retrieval of transport proteins in vesicles; 2) the positioning and stabilization of membrane domain-specific transporters, which establishes the polarity necessary for vectorial transport across epithelial cells, or; 3) as a transducer in a second messenger signaling mechanism between primary stimulus and alteration in transport activity. This symposium brings together some of the leading authorities in this emerging area of investigation to discuss the current status of our knowledge on cytoskeletal-membrane interaction as it relates to membrane transport activity. The broad range of subjects, from water channels to coupled carriers to metabolic and second messenger regulation will provide a comprehensive and comparative scope to the subject matter. In addition, it is hoped that a result of the symposium will be more clearly defined experimental strategies that will serve as catalysts for progress in understanding the role of the cytoskeleton in regulating membrane transport.

One Hour Debate: Resolved that the Swimming Rat Model can be Used Effectively to Study the Cardiovascular Adaptations to Exercise in Humans

Theme area: Non-theme
Sponsor: Environmental & Exercise Physiology Section
Moderator: Ethan Nadel
Participants: James Scheuer and Charles Tipton

For more than fifty years physiologists have used the swimming rat as a model for studying the cardiovascular adjustments and adaptations to exercise and for extrapolating such findings to humans. However, it has been recognized that this model presents certain important differences from upright exercise in humans that, if not compensated for, might lead to erroneous conclusions. For example, the physical properties of water make it an excellent heat transfer medium; rats become hypothermic rapidly when swimming in 25°C water. Further, rats are able to trap air under their fur and thus increase their buoyancy and decrease the cost of swimming. Further yet, the swimming rat is effectively removed form the earth's gravitational sphere, with the hydrostatic effect of the water acting to

Annual Teaching Section Dinner

The annual dinner of the Teaching Section is Tuesday, April 26, 1994 at 7:00 pm. The dinner will feature the second annual Arthur C. Guyton Teacher of the Year Award. In addition, Michael Johnson of the West Virginia Medical School will give us his insights on "Teaching Physiology to Non-Science Majors." Plan to attend this informal gathering and mix with your colleagues.

The dinner is at the Anaheim Hilton. The buffet will include dips, spread, fajitas, pasta, and turkey breast. For tickets, send check (to APS Teaching Section) for $30.00 to Allen Rovick, Department of Physiology, Ruch Medical College, 1750 W. Harrison St., Chicago, IL 60612.

push blood centrally and aid venous return to the heart. This again provides both different circumstances and physiologic conditions than humans experience when exercising.

James Scheuer has used the swimming rat model extensively over the years and has made many important contributions to the literature concerning the cardiovascular adaptations to exercise. He will act as the proponent. Charles Tipton has used the running rat model to study cardiovascular adaptations to exercise and head down tilt model to study the cardiovascular adaptations to microgravity.

Transgenic Animals in Physiological Research

Theme area: Non-theme
Sponsor: Education Committee
Chairs: Curt D. Sigmund and Lynne E. Olson
Participants: Curt D. Sigmund, Kenneth R. Chien, Loren J. Field, and Beverly Koller

The purpose of this workshop is to provide physiologists the opportunity to hear and discuss recent advances in transgenic technology and its application to physiological research. The workshop will be presented in three sections. The first section will be an overview of transgenic technology including a description of the equipment, expertise, time and money required to use transgenic animals, and the strengths and weaknesses of the various techniques for generating transgenic and knockout mice. The second section will be a discussion of how questions of interest to physiologists can be addressed using transgenic models. The third section will be presentations by two speakers who will discuss the application of transgenic technology in cardiac development and cystic fibrosis research. The workshop will be targeted at scientists who may want general information about transgenic technology as well as those who may be considering applying the technology in their research.

Cell Volume Signalling and Regulation in Vertebrate Cells

Theme area: Epithelial Cell Biology
Sponsors: Cell & General Physiology, Renal, and Gastrointestinal Sections and Epithelial Transport Group
Chairs: Roger G. O'Neil and Nancy K. Wills
Participants: Peter M. Cala, Owen P. Hamill, Thomas J. Jentsch, Melvyn Lieberman, Roger G. O'Neil, Nancy K. Wills, and Deborah J. Nelson

The regulation and maintenance of cell volume are critical functions for the survival of most vertebrate cells. Over the past few decades, extensive progress has been made into identifying and characterizing the mechanisms of solute transport which underlie cell volume regulation, but not into the volume sensing and regulatory/signalling pathways controlling cell volume regulation. Recently, significant progress has been made into these later areas where an emerging diversity of regulatory mechanisms and pathways among different cell/tissue types in becoming evident. The purpose of the symposium is to present our current understanding of the signalling and regulatory pathways that mediate cell volume regulation in various vertebrate cells. The speakers have used a variety of cell/tissue types and experimental approaches to demonstrate the emerging diversity (and similarity) of volume regulatory/signalling pathways and novel ion channels which mediate cell volume regulation. Not only will the symposium provide important new insights in the diversity of processes mediating volume regulation in vertebrate cells, but it will demonstrate that within any one cell/tissue type diversity of these processes may exist depending on the functional state of the cell/tissue. The insights obtained from the symposium should point to important future directions of investigation into how cells sense and regulate cell volume in both normal and altered functional states.

Magnetic Resonance Techniques for In Vivo Physiology

Theme area: Non-theme
Sponsor: Cardiovascular Section
Chair: Norbert J. Pelc
Participants: Robert S. Balaban, G. Allan Johnson, Norbert J. Pelc, and Bruce R. Rosen

This workshop will describe recently developed magnetic resonance (MR) capabilities and applications capable of providing unique information about biological systems. While MR imaging uses signals from plentiful water and lipid protons, MR spectroscopy uses much weaker signals from protons and other nuclei in metabolites to open a window into in vivo physiology. Optimized instruments can produce 3-dimensional MR images with spatial resolution well below 50 μm. These can be used to study histology with image contrasts distinct from optical microscopy and without destroying the sample. Motion sensitive MRI can noninvasively quantify flow in blood vessels and CSF spaces. Similar techniques can measure the contraction dynamics of myocardial or musculoskeletal samples. Finally, advances using administered contrast agents as well as endogenous NMR effects can study cerebral hemodynamics, including changes resulting from stimuli. Further adding to these exciting possibilities is the reasonably wide availability of MR based tools.

Molecular and Cellular Mechanisms of Endothelin in the Kidney

Theme area: Cell Injury
Sponsors: Renal and Water & Electrolyte Homeostasis Sections and Liaison with Industry Committee
Chairs: Robert F. Highsmith and David M. Pollock
Participants: Robert F. Highsmith, Philip A. Marsden, Edward P. Nord, and Richard M. Edwards

Over the past ten years, there has been a tremendous expansion of research into the role of factors released from the vascular endothelium in control of physiological and pathophysiological systems. One of the major areas of emphasis relates to the family of peptides known as endothelins. The physiology of endothelin in the

kidney appears to have some unique aspects and tremendous implications related to the control of both hemodynamic and tubular processes. Therefore, the purpose of this symposium is to present some of the latest information about what is known of the localized role of endothelin in the kidney. Since this is a new area of investigation, a brief historical overview of the events leading to the discovery of endothelin will be presented. A major emphasis of this symposium will be to discuss the molecular and cellular events that regulate endothelin release as well as signal transduction and second messengers with particular emphasis on renal systems. Participants will also focus on the potential role of endothelin in the control of glomerular filtration and tubular handling of salt and water. The speakers represent a diverse background of scientists who are considered pioneers in their respective areas related to endothelin physiology and should provide an excellent synthesis of ideas for the evolving role of endothelin in the kidney.

Brain Aging

Theme area: Neurobiology
Sponsor: Central Nervous System Section
Chairs: Russel J. Reiter and Caleb E. Finch
Participants: Barry Halliwell, Denhan Harman, Russel J. Reiter, Caleb E. Finch, Edward J. Masoro, and Phyllis M. Wise

As the population ages, neurodegenerative diseases will become progressively more common. The purpose of this symposium will be to provide attendees with an overview of degenerative changes that occur in the central nervous system during aging. The speakers will discuss the major theories of brain aging and consider experimental models which may delay neurodegenerative processes. In particular free radical damage, age-related alterations in circadian rhythmicity and the role of inflammatory processes as factors in brain aging will be considered. The speakers include individuals from both basic and clinical science and therefore the symposium should be equally attractive to experimentalists and clinicians. The speakers are leaders in their respective research fields and have each had 20-30 years of research and/or clinical experience with aging as it relates to the central nervous system. The subject has not been covered in an APS-sponsored symposium in a number of years.

Role of Natriuretic Peptides in Cardiorenal Regulation

Theme area: Non-theme
Sponsors: Liaison with Industry Committee and Renal and Water & Electrolyte Homeostasis Sections
Chair: Andrea Ann Seymour
Participants: James P. Henry, Kazuwa Nakao, Thomas E. Lohmeier, Robert J. Cody, and Andrea Ann Seymour

The role of natriuretic peptides in the regulation of cardiorenal homeostasis has continued to unfold since the discovery of atrial natriuretic peptide (ANP) in 1981. This symposium will provide a contemporary review of natriuretic peptide research ranging from the subcellular level to its clinical implications. For this session, a panel of uniquely qualified speakers has been assembled to discuss the evolution of humoral cardiorenal integration, the molecular biology and biochemistry and natriuretic peptides and their receptors, and ANP and its regulation under normal and pathophysiological conditions.

James Henry will briefly discuss the early experiments that pioneered the concept of cardiorenal integration mediated by humoral factors. The molecular biology and biochemistry of atrial natriuretic peptide and the more recently discovered brain natriuretic peptide (BNP) and C natriuretic peptide (CNP) will be described by Dr. Kazuwa Nakao. This presentation will also explore the seminal work describing the subtypes of natriuretic peptide receptors and their mediation of the biological responses to the 3 peptides. The control of ANP release and its role in long-term volume homeostasis has been elegantly analyzed in conscious dogs by Thomas Lohmeier. His presentation will elucidate the role of natriuretic peptides in normal volume regulation. Robert Cody will review the participation of natriuretic peptides in cardiovascular disorders, including hypertension and heart failure. Finally, Ann Seymour will describe the pathways by which natriuretic peptides are degraded or removed form systemic circulation. The therapeutic potential of inhibitors of neutral endopeptidase, a major metabolic route, will also be discussed.

Cytokines in Epithelial Cell Biology

Theme area: Epithelial Cell Biology
Sponsors: Gastrointestinal, Cell & General Physiology, Renal, and Respiration Sections and Epithelial Transport Group
Chairs: Andrew W. Stadnyk and Fergus Shanahan
Participants: Fergus Shanahan, Dennis McGee, R. Balfour Sartor, Andrew Stadnyk, Jim Mullin, and Jack Elias

The epithelium has long been appreciated as an important passive barrier, protecting an organism against pathogens and noxious chemicals. Lately, a better understanding of the diversity of epithelia, their contibutions to normal homeostasis, and the ubiquitous nature of the pro-inflammatory cytokines, has lead to the realization that epithelial cells play an active role in the inflammatory response. In some circumstances epithelial cells serve as effector cells, possibly initiating the inflammatory response via the production of cytokines; in other circumstances they are subject ot regulation by the cytokines produced by other cells, and thirdly, epithelial cells may respond to their own cytokine production in autocrine loops. This symposium is intended to combine the expertise of investigators interested in epithelial cell function during inflammation, but with the collective emphasis on the role of cytokines in directing those functions.

The first contributor, and co-chairperson, Fergus Shanahan, will speak on the proliferation and prostaglandins produced by primary colon epithelial cells exposed to the cytokines, Interleukin-1 (IL-1), IL-6 and tumor necrosis factor-‡ (TNF-‡). Little work has been done examining the responses of primary intestinal epithelial cells because of difficulties in preserving their integrity in culture, but Shanahan has been quite successful in this regard and has been rewarded with findings that conflict with similar work utilizing transformed colonic epithelial cell lines. The second speaker,

Dennis McGee, will discuss his findings utilizing a non-transformed rat small intestinal epithelial cell line that can be induced to produce IL-6 following exposure to transforming growth factor- , or combinations of IL-1, IL-6 and TNF-‡. Good models comparing cytokine production by epithelial cells in vitro and in vivo have been slow coming. In this regard, the third speaker, R. Balfour Sartor, introduces the idea that inflammation of the intestine may occur due to an imbalance between constitutive IL-1 and the IL-1 receptor antagonist in epithelial cells, with IL-1 production by cells recruited into the lamina propria tipping the balance in favor of inflammation. The fourth speaker and Co-chairperson, Andrew Stadnyk, will broaden the effect of the epithelial response by reviewing the local and systemic cytokine changes due to an infection of the small intestinal epithelium- cytokine cascades initiated by IL-1 elicited in the intestine early in the infection. Jim Mullin will then discuss his work involving the effects of TNF-‡ on epithelial barrier functions and renal epithelial cell bilogy. The final speaker will be Jack Elias, who will review his work examining the elicitation of cytokines in the inflamed lung epithelium due to eosinophil products.

The symposium's multidisciplinary combination is expected to generate discussions around the issue of whether all epithelial cells respond in a similar way to cytokines or whether there are organ specific reactions, and whether epithelial cells from different organis produce the pro-inflammatory cytokines and under what conditions. In turn, the outcome of this discussion may help understand the epithelial cells' role during the inflammatory responses of various causes.

The Biology of Alveolar Epithelial Fluid and Solute Transport

Theme area: Respiratory Biology
Sponsor: Respiration Section
Chairs: J. Iasha Sznajder and Edward Crandall
Participants: Bernard Rossier, Sadis Matalon, J. Iasha Sznajder, Richard Lubman, Michael Matthay, and Jerry Lingrell

This symposium will address the new developments on the biology of alveolar epithelial fluid and solute transport. There has been numerous recent developments highlighted by the characterization and cloning of the Na+ channels in epithelial cells, and the understanding of the role of active mechanisms in the transport of fluids and solute across the lungs during lung injury. There will be four speakers working on these areas in the lungs and two featured speakers who contributed to the understanding of Na+ channels and the Na+K+-ATPase in epithelial cells. Sadis Matalon from the University of Alabama will speak on "The characterization of Na+ channels in the alveolar epithelium", J. Iasha Sznajder from Michael Reese Hospital/University of Illinois will speak on "The role of Na+K+-ATPase in edema clearance during lung injury", Richard Lubman from the University of Southern California will speak on "Hydrogen ion transport by the alveolar epithelium", and Michael Matthay from the University of California at San Francisco will speak on "The mechanisms of alveolar epithelium transport in vivo". The featured speakers are Bernard Rossier from Switzerland speaking on "Structure and function of epithelial Na+ channels" and, Jerry Lingrell from the University of Cincinnati speaking on "Structure and function of the Na+K+-ATPase".

The Importance of Lavoisier's Work for Physiology and Nutritional Science

Theme area: Metabolic Processes
Sponsors: History of Physiology Group and AIN
Chairs: John B. West and Kenneth J. Carpenter
Participants: Pierre Dejours, Robert G. Frank, Jr., Daniel L. Gilbert, Ralph H. Kellogg, Roger Hahn, and Alfred E. Harper

Antoine-Laurant Lavoisier (August 26, 1743–May 8, 1794) was sentenced by the Revolutionary Tribunal to death the morning of May 8, 1794 and executed on the guillotine the same afternoon. A tragic conclusion to a life of great and multiple achievements. This symposium wants to be a tribute to a scientist who proved to be great for his ability to design the "right" experiment, to execute it, and to interpret its results. Quantitative analysis was a prerogative of Lavoisier's work. Capable of putting together different observations he realized the similarities between combustion and respiration, measured the heat released by a burning candle and a living animal and perceived the origin of animal heat. Indeed he had a unifying intellect that understood the close association between physio-chemical and biological laws.

The symposium will be introduced by Pierre Dejours, a distinguished respiratory physiologist and a Lavoisier's scholar, who will discuss the place of Lavoisier in the scientific Enlightenment of the XVIII century. Robert Frank will summarize the concepts of combustion and respiration in the first half of the XVIII century and thus sets the ground for a full appreciation of the break-through achieved by Lavoisier. Daniel Gilbert will take us from the inconsistencies of the phlogiston theory to the terse logic of Lavoisier's ideas on combustion. Ralph Kellogg will specifically discuss the work of Lavoisier on respiratory gas exchange and bioenergetics. A speaker, not yet identified by AIN, will discuss the basis of nutritional interest in Lavoisier who has often been considered the father of nutritional science. First, because of his clear presentation of the "new chemistry" based on non-interchangeable elements, so that each element found in the body had to have been provided "as such". Second, his physiological studies of "carbonic acid" losses in respiration changing with physical activity showed how nutrient requirements (to balance these losses) might be determined. Roger Hahn, a historian from Berkeley, will tell us about the work accomplished by Lavoisier as a public servant and explain the circumstances that led to the tragic conclusion of his life.

Leukocyte–Microvascular Interactions in Cerebral Ischemia

Theme area: Cardiovascular Biology
Sponsor: Biomedical Engineering Society
Chairs: Gregory J. del Zoppo and Geert W. Schmid-Schoenbein
Participants: Hermes Kontos, Ron Tuma, John Hallenbeck, Donald Heistad, Gregory J. del Zoppo, Julio H. Garcia, and Geert W. Schmid-Schoenbein

Very recent progress in understanding PMN leukocyte behavior in microvascular beds has now been extended to the cerebral cir-

culation. Quantitative methods applied to microvascular responses to ischemia and reperfusion implicate the interaction of PMN leukocytes to the vessel wall. This symposium brings together, for the first time, the principal contributors to the growing literature on cerebral microvascular flow phenomena, most particularly following ischemic injury. The focus of the session will be the normal microvascular anatomy of both cortical and deep beds, the interactions between PMN leukocytes and endothelia, the ability of leukocytes to promote microvascular injury, differences resulting from reperfusion, and the potential role of cytokines in these processes. Primary data supporting the importance of the PMN leukocyte to cerebral microvascular responses will be discussed. This topic has major implications for the physiologist, bioengineer, and clinician in considering approaches to cerebral injury.

Indicator Dilution Theory: In Vivo Cell Biology

Theme: Non-theme
Sponsor: Biomedical Engineering Society
Chairs: John H. Linehan and James B. Bassingthwaighte
Participants: Carl A. Goresky, Richard A. Weisiger, Albert Gjedde, John H. Linehan, and James B. Bassingthwaighte

Recent advances in the development of models of biochemical kinetics applied to the physiology of the endothelium of intact organs combined with computational means of solving the models on the digital computer has provided a methodology of more fully interpretating measurements obtained at the organ level. This symposium will discuss the state-of-the-art approaches in the lung, heart, liver, and brain.

The physiological processes occurring at the plasma membrane and within the cells of organs in living organisms are generally not directly quantifiable on a local level. However, with the appropriate indicators of these processes, mathematical models can be used to translate the information contained in measurements, that can be made at the organ level, into parameters that provide quantitative assessment of the local cellular processes. The approaches are inherently multidisciplinary involving engineering, mathematics, computers, biochemistry, and physiology. The symposium will address current understanding of the processes controlling the fate of bloodborne substrates. These processes include microvascular perfusion heterogeneity, cellular biochemical kinetic mechanisms and the kinetics of reactions occurring within the blood including those between plasma proteins and substrates and between substrate conformers. A particular purpose of the symposium will be to inform the audience about those questions that have been tentatively resolved and those that need to be addressed in the future. The discussion of model development will illustrate how the organ and cellular physiology becomes embodied in the model. Hypothesis testing via simulation will also be discussed relative to supporting the sensitivity and resolution of the models for interpretation of in vivo cell physiology.

Future directions in this field will be delineated and discussed. Newer experimental technologies will be discussed with respect to the trend in future studies.

Signal Transduction and the Regulation of Hematopoietic Cell Growth

Theme: Molecular Communication & Structural Biology
Sponsor: Society for Experimental Biology and Medicine
Chair: John A. Adamson and Ernst R. JaffÇ
Participants: John A. Adamson, Ernst R. JaffÇ, David Gearing, Atsushi Miyajima, James N. Ihle, Alan Bernstein, Craig Smith, and Jacqueline Dyck

Hematopoietic progenitor cells survive, divide, and differentiate in the presence of specific growth factors. These growth factors interact with hematopoietic target cells through cell surface receptors which have multiple subunits. A number of hematopoietic growth factor receptors have been identified. Several have structural similarities and are now classified as members of the cytokine receptor super-family. Of considerable interest is the fact that several growth factor receptors share identical beta subunits and that these subunits are generally responsible for signal transduction. The purpose of this symposium is to discuss receptor organization, the role of the receptors and their subunits in signal transduction, and novel molecules involved in the transduction process, including retinoic acid and the retinoic acid receptor in promyelocyte cell differentiation. The speakers will present their and others most current data and will consider future directions for research to answer unresolved questions.

Biophysical Regulation of Metabolism, Growth, and Remodeling in Musculoskeletal Tissues

Theme: Growth & Development
Sponsor: Biomedical Engineering Society
Chairs: Robert L. Sah and Kathryn G. Vogel
Participants: Jill P.G. Urban, Alan J. Grodzinsky, Marcy Wong, Farshid Guilak, Kathryn G. Vogel, Steven A. Goldstein, and Robert L. Sah

Clinical observations and experimental studies in vivo and in vitro suggest that mechanical forces regulate the composition and structure of articular cartilage, intervertebral disc, tendon, and bone. However, the precise mechanisms by which physical forces are transduced into cellular and molecular mechanisms that alter cell metabolism and tissue matrix synthesis, assembly, and remodeling are not yet clear. Potential regulatory signals to the cell include strain, stress, hydrostatic pressure, streaming potential, physicochemical phenomena, as well as the convection of diffusion of nutrients or hormones within the extracellular matrix to the cell surface. This session offers interdisciplinary presentations from investigators using state-of-the-art methods from bioengineering and the biomedical sciences to address the possible physical regulatory mechanisms and biological response mechanisms. The techniques used involve cellular and molecular biology, biochemistry, biomechanics, electromechanics, confocal microscopy, image processing, and tissue engineering.

Introducing . . .

1994
APS Distinguished Lectures

Experimental Biology '94
Anaheim, CA April 24–28, 1994

Cardiovascular Section
ROBERT M. BERNE DISTINGUISHED LECTURE

Arthur M. Brown, Baylor College of Medicine
"Context and Content: How a Physiologist uses Molecular Biology to Understand the Heart"

Cell & General Physiology Section
HUGH DAVSON DISTINGUISHED LECTURE

Hugh E. Huxley, Brandeis University
"40 Years of Sliding Filaments—What Have We Learned?"

Central Nervous System Section
JOSEPH ERLANGER DISTINGUISHED LECTURE

Donald L. Price, Johns Hopkins University
"Models of Neurodegenerative Disease: Mechanisms and Potential Therapies"

Comparative Physiology Section
AUGUST KROGH DISTINGUISHED LECTURE

Bodil Schmidt-Nielsen, Salisbury Cove, Maine
"Renal Concentrating Mechanism: Insights from Comparative Physiology and Anatomy"

Endocrinology & Metabolism Section
SOLOMON A. BERSON DISTINGUISHED LECTURE

Jean D. Wilson, University of Texas Southwestern Medical Center
"The Use of Single Gene Mutationas for the Analysis of Phentypic Sex Differentiation"

Environmental & Exercise Physiology Section
EDWARD F. ADOLPH DISTINGUISHED LECTURE

Bengt Saltin, University of Copenhagen
"Matching Oxygen Delivery to Energy Demand During Exercise in Man"

Gastrointestinal Section
HORACE W. DAVENPORT DISTINGUISHED LECTURE

Sir James Black, James Black Foundation, King's College

Neural Control & Autonomic Regulation Section
CARL LUDWIG DISTINGUISHED LECTURE

Bjorn Folkow, University of Goteborg
"Reflex and Central Nervous Control in the Aging Cardiovascular System"

Renal Physiology Section
CARL W. GOTTSCHALK DISTINGUISHED LECTURE

Peter Agre, Johns Hopkins University
"Aquaporin CHIP, the Archetypal Molecular Water Channel"

Respiration Section
JULIUS H. COMROE, JR. DISTINGUISHED LECTURE

Jeffrey A. Whitsett, University of Cincinnati
"Transgenic Models of Lung Development and Disease"

Teaching of Physiology Section
CLAUDE BERNARD DISTINGUISHED LECTURE

Arthur J. Vander, University of Michigan

Water & Electrolyte Homeostasis Section
DISTINGUISHED LECTURE

John H. Laragh, Cornell University Medical Center
"The Endocrine Basis for Human Hypertension and Its Cardiovascular Sequellae: Containment of the Renin System as a Strategy for Prevention of Heart Attack and Stroke"

APS Intersociety Meeting

Regulation, Integration, Adaptation:

October 30–November 2, 1994

Sunday, October 30 AM	Sunday, October 30 PM	Monday, October 31 AM	Monday, October 31 PM
8:15–9:15 am *Plenary Lecture* **J. Diamond**	1:00–3:00 pm *Poster Defending and Exhibit Viewing*	8:15–9:15 am *Plenary Lecture* **B. Block**	1:00–3:00 pm *Poster Defending and Exhibit Viewing*
9:30 am–12:30 pm *Symposium:* Excretion of nitrogen-containing compounds: comparative aspects **W. H. Dantzler**	2:00–5:30 pm *Workshop:* Phylogenetic approaches in comparative physiology **T. Garland, Jr. and R. Huey**	9:30 am–12:30 pm *Symposium:* Comparative respiratory neurobiology I **N. Smatresk**	2:00–5:30 pm *Workshop:* Kinetics and limitations of intracellular pH regulation **N. Heisler**
9:30 am–12:30 pm *Symposium:* Biomedical applications of marine mammal physiology: adaptation to an aquatic world **M. A. Castellini**	5:30–8:00 pm *Free Time*	9:30 am–12:30 pm *Symposium:* Anhydrobiosis **J. Crowe**	5:30–8:00 pm *Free Time*
9:30 am–12:30 pm *Symposium:* Evolution of endothermic metabolism **A. J. Hulbert**	8:00–9:00 pm *Plenary Lecture* **G. Somero**	9:30 am–12:30 pm *Symposium:* From myxine to man: the physiology of the blood volume in regulation **K. Olson**	8:00–9:00 pm *Plenary Lecture* **C. R. Taylor**
9:30 am–12:30 pm *Symposium:* Calcium regulation: mechanisms and control I: Calcium regulation in crustaceans **M. Wheatly and P. Greenway**		9:30 am–12:30 pm *Symposium:* Calcium regulation: mechanisms and control II: Calcium regulation in lower vertebrates **M. Wheatly and P. Greenaway**	
9:30 am–12:30 pm *Symposium:* Advances in reptilian and amphibian osmoregulation **S. Yokota and S. Benyajati**		9:30 am–12:30 pm Symposium: Neural modulation of muscle properties **E. Arbas**	

Poster boards are on display Sunday through Wednesday from 8:00 am to 9:00 pm.

A Species Approach

San Diego, California

This meeting is a collaborative effort of The American Physiological Society, American Society of Zoologists (Comparative Physiology & Biochemistry Division), The Canadian Society of Zoologists (Comparative Physiology & Biochemistry Division), German Society of Zoologists, and Society of Experimental Biology

Tuesday, November 1 **AM**	Tuesday, November 1 **PM**	Wednesday, November 2 **AM**	Wednesday, November 2 **PM**
8:15–9:15 am *Plenary Lecture* **M. Koehl**	1:00–3:00 pm *Poster Defending and Exhibit Viewing*	8:15–9:15 am *Plenary Lecture* **A. Bennett**	1:00–3:00 pm *Poster Defending and Exhibit Viewing*
9:30 am–12:30 pm *Symposium:* Comparative respiratory neurobiology II **N. J. Smatresk**	2:00–5:30 pm *Discussion:* Contributions of comparative systemic physiology to theoretical biology **F. Powell**	9:30 am–12:30 pm *Symposium:* Subzero temperature adaptations of poikilothermic organisms **J. Duman**	2:00–5:30 pm *Discussion:* Evolutionary design of functional capabilities: How much is enough but not too much? **P. Suarez**
9:30 am–12:30 pm *Symposium:* Environmental and physiological determinants of muscle performance capacities **H. Guderley**	5:30–8:00 pm *Free Time*	9:30–12:30 pm *Symposium:* Neurohormonal peptides in invertebrates—A model approach **M. C. Thorndyke**	5:30–8:00 pm *Free Time*
9:30 am–12:30 pm *Symposium:* Ontogeny of cardiovascular systems I: Mechanisms **W. Burggren**	8:00–9:00 pm *Plenary Lecture* **L. Riddiford**	9:30 am–12:30 pm *Symposium:* Ontogeny of cardiovascular systems II: Diversity in developmental patterns **W. Burggren**	6:00–8:00 pm *Banquet, Awards Presentation, and Lecture*
9:30 am–12:30 pm *Symposium:* New insights into the function of the vertebrate kidney: Lessons from jawless, cartilagenous and bony fish I **K. Beyenbach**		9:30 am–12:30 pm *Symposium:* New insights into the function of the vertebrate kidney: Lessons from jawless, cartilagenous and bony fish II **K. Beyenbach**	8:00–9:00 pm *Scholander Award Lecture* **P. W. Hochachka**
9:30 am–12:30 pm *Symposium:* Ecological physiology of endangered animals: Physiological contributions to the preservation of biological diversity **M. S. Gordon**		9:30 am–12:30 pm *Symposium:* Adaptations to hypoxia: Regulatory mechanisms on the systemic and metabolic levels **M. Grieshaber**	
9:30 am–12:30 pm *Symposium:* Adaptations to extreme exvironments **N. Hazon**			

APS Conference

Physiology of the Release and Activity of Cytokines

June 25–28, 1994
Yale University, New Haven CT

Saturday, June 25	Sunday, June 26	Monday, June 27	Tuesday, June 28
Noon–6:00 pm Alpha Room, Holiday Inn Hotel Registration	7:30–8:30 am Commons Dining Hall Breakfast	7:30–8:30 am Commons Dining Hall Breakfast	7:30–8:30 am Commons Dining Hall Breakfast
6:30–8:30 pm Mezzanine, Sterling Hall of Medicine Registration	8:30 am–Noon Harkness Auditorium *Symposium:* Cytokines and Homeostatic Mechanisms Chair: **Joseph G. Cannon**	8:30 am–Noon Harkness Auditorium *Symposium:* Cytokines in Stress, Trauma and Disease Chair: **Alan J. Lewis**	8:30 am–Noon Harkness Auditorium *Symposium:* Cytokine Networks in the Body Chair: **Matthew J. Kluger**
6:30–8:30 pm Sterling Hall of Medicine Welcoming Remarks and Buffet Dinner	12:30–1:30 pm Sterling Hall of Medicine Lunch	12:30–1:30 pm Sterling Hall of Medicine Lunch	12:30–1:30 pm Sterling Hall of Medicine Lunch
8:30–9:30 pm Harkness Auditorium *Plenary Lecture:* The Ubiquity and Diversity of Cytokines in the Body Chair: **John T. Still** Speaker: **C. A. Dinarello**	1:30–5:00 pm Harkness Auditorium *Symposium:* Mechanisms of Cytokine Regulation Chair: **Gordon W. Duff**	1:30–3:30 pm Harkness Auditorium Poster presentations at Harkness Hall followed by panel discussion	1:30–5:00 pm Harkness Auditorium *Symposium:* Inhibitors of the Actions of Cytokines Chair: **Ivan G. Otteerness**
	5:30–7:00 pm Commons Dining Hall Dinner	3:30–5:30 pm Harkness Auditorium *Workshop:* Measurement of Cytokines in Tissues and Fluids Chair: **Joe Cannon**	6:00–10:00 pm Sterling Hall of Medicine Barbeque Dinner
	7:30–9:30 pm Sterling Hall of Medicine Poster presentations	7:00–10:00 pm Sterling Hall of Medicine Conference Banquet	

Publications

Publications Committee Holds Fall Meeting

The Publications Committee held its Annual Fall Meeting in Bethesda on September 9. All regular members were able to attend and were joined by the President, William H. Dantzler, and President-Elect, Brian R. Duling.

The Committee discussed *Physiological Reviews* and made arrangements for interviewing candidates for the new editorship in San Francisco in November; the deadline for application is October 15. Roger Green was reappointed as Chairman of the European Committee for a second, 3-year term.

The Committee amended the page charge statement on the reprint form to make it more difficult for authors to waive payment, discussed revisions to journal reviewing sheets as submitted by several editors, and revised the Information for Authors to incorporate changes recommended by the Public Affairs Committee.

The Committee received reports on the results of the ISI citation study on theindividual journals of the *American Journal of Physiology*, the progress on developing CD-ROM, the possibility of reprints on demand, the *NIPS* meetings at the IUPS Congress, the change in printer from Waverly Press to Science Press, the CORE Agricultural Library on CD for the Third World, and the new *Journal of Applied Physiology* experiment, whereby the APS office sends the manuscripts directly to reviewers. The Publications Manager reported that three APS editors had attended the Second International Congress on Peer-Review in Biomedical Publication and would be submitting reports to the Committee.

At Leonard Johnson's invitation, Jasna Markovac, an executive editor at Raven Press, discussed with the Committee the operation of journal publishing at a commercial company. The members of the Committee were particularly interested in how commercial companies promote and market the journals.

Future APS Conferences and Meetings

1994

Intersociety Meeting

Regulation, Integration, Adaptation: A Species Approach — October 29–November 2
Organizers: E. J. Braun, J. R. Hazel, and S. H. Wright — San Diego, CA

APS Conferences

Physiology of the Release and Activity of Cytokines — June 25–28
Organizers: J. T. Stitt, J. G. Cannon, G. W. Duff, M. J. Kluger, A. J. Lewis, and I. G. Otterness — Yale University, New Haven, CT

Mechanotransduction and the Regulation of Growth and Differentiation — October 5–8
Organizers: H. E. Morgan, P. A. Watson, D. E. Rannels, F. Sachs, M. Schwartz, and H. Vandenburgh — Sarasota, FL

1995

Understanding the Biological Clock: From Genetics to Physiology
Organizers: Jay C. Dunlap and Jennifer J. Loros

New Discoveries Within the Pancreatic Polypeptide Family: Molecules to Medicine
Organizers: William Zipf, Ian Taylor, Claes R. Wahlestedt, Richard Rogers, and Helen J. Cooke

Membership

Honorary Memberships Awarded to Four Distinguished Scientists

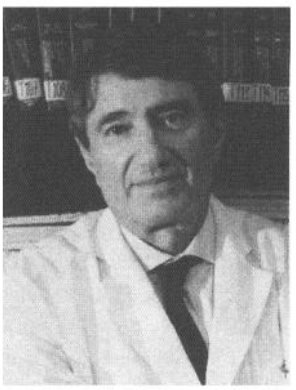
The American Physiological Society has awarded honorary memberships to four renowned European scientists: Ivan Assenmacher and Etienne E. Baulieu of France, Knut Aukland of Norway, and Christopher C. Michel of the United Kingdom.

Ivan Assenmacher has made numerous contributions in the field of regulatory physiology, most recently in the area of neuroendocrine control systems and their interactions with the environment, which he calls "endocrine ecophysiology." Assenmacher and the late Jacques Benoit did pioneering work on the concept of a neuro-hemal system of signal transfer as the sole CNS control mechanism for pituitary gonadotropic function. He also demonstrated the mechanisms of reciprocal interactions between the gonadotropic and thyreotropic systems in the fine programming of environmentally controlled annual sexual and molting cycles in birds and wild mammals.

In the late 1970s, Assenmacher began to focus on mammalian neuroendocrinology, and in particular on the CNS control mechanisms of the hypothalamic-pituitary-adrenocortical (HPA) axis. With his collaborators, he first demonstrated the episodic pattern of CRH41 release in the push-pull cannulated median eminence and its modulation under various physiological conditions. He also produced evidence for a basic role of both the serotoninergic innervation of the suprachiasmatic nuclei and of the catecholaminergic innervation of the paraventrical nuclei housing the CRH neurons in both regulation of the HPA axis, its circadian rhythmicity, and its acute stimulation under various stress conditions.

Assenmacher was born in Erstein, France and received his MD from the University of Strasbourg in 1951 and his DSc from the Faculty of Sciences of the University of Paris in 1958. Since 1959 he has been associated with the University of Montpellier, first where he established a Research Laboratory in Physiology. In 1976 and 1982 he was Exchange Professor of Physiology at the University of California at Berkeley. Assenmacher is a past president of the French national societies for Endocrinology, Experimental Neuroendocrinology, Chronobiology, and Ecophysiology. He was elected a member of the French Academy of Sciences in 1982 and of the London-based Academia Europae in 1990. He was made a Chevalier of French Ordre National du MÇrite in 1971 and of the LÇgion d'Honneur in 1989.

Etienne Baulieu is perhaps best known as the inventor and developer of RU486, a steroid analogue that offers a new method of fertility control through an antiprogestational technique involving an antagonist at the receptor level. It was the discovery of the progesterone receptor, followed by studies on human antisteroid mechanisms, that led to development of



RU486. Clinical trials of RU486 have been conducted in more than 20 countries, and France, China, Sweden, and the UK have approved its use for early pregnancy interruption. The drug also has a wide range of potential applications ranging from treating hormone-dependent diseases and use as a "morning-after" contraceptive to facilitating labor and delivery.

Baulieu's early work dealt with the biosynthesis of steroid hormones. He discovered the secretion of dehydroepiandrosterone sulfate by the adrenal glands and its transformation to estrogens during pregnancy, as well as the metabolism of testosterone to active metabolites in the prostate. He described the progesterone and androgen receptors, the priming effect of estrogen on progesterone receptor concentration, and the "down regulation" of the progesterone receptor.

Recently Baulieu has discovered the biosynthesis in the brain of what he calls "neurosteroids," including pregnenolone sulfate, which is synthesized from cholesterol in the glial cells oligodendrocytes and inhibits the GABAA receptor function both in vitro and in vivo. This finding disclosed a hitherto unknown relationship between steroids and the nervous sys-

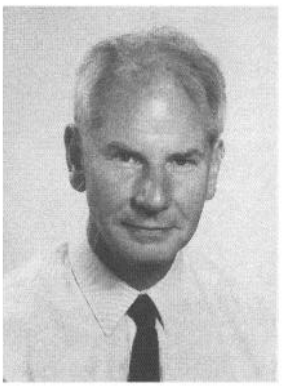
tem. He also found that estrogen induces progesterone to be formed from pregnenolone receptors in glial cells, and that progesterone has unsuspected effects on growth and differentiation. He found further that the synthesis of myelin basic protein in glial cells is under progesterone control, which may make it possible to develop new drugs to treat pathological demyelinization.

Baulieu was born in Strasbourg, France and received his MD from the Faculties of Medicine and Science in Paris in 1955 and received his PhD in 1963. He has been director of U 33 at INSERM (French National Institute of Health and Medical Research) since 1963. Since 1970 he has also been a professor of Biochemistry in the Faculty of Medicine at the University of Paris-Sud. His numerous awards include membership in the French Academy of Sciences (1982), Commander of the French Legion of Honor (1990), and election as Foreign Associate Member of the US National Academy of Sciences (1990).

Knut Aukland has had a major impact on the fields of renal physiology, circulatory physiology, and interstitial physiology. He has also educated a generation of physiologists at the University of Bergen, Norway. His earliest research contributions were in the field of renal physiology and regulation of renal circulation. He developed the hydrogen washout technique for measuring renal blood flow in collaboration with B. F. Bower and R. W. Berliner while he was a postdoctoral fellow at NIH. He continued his studies on renal circulation at the University of Bergen, where he used variations on that technique to measure total and local renal blood flow. He also developed a mathematical model of renal circulation and myogenic autoregulation in the kidney, allowing detailed study on how different segments of the renal vasculature can interact to maintain autoregulation of renal blood flow. In recent years, he has made major contributions to the regulation of interstitial physiology and regulation of interstitial fluid volume.

Aukland was born in Vigmostad, Norway and received his MD from the University of Bergen in 1954. He started his career in physiological research with Fredrik Kiil at the Department of Experimental Medicine of the University of Oslo in 1958. This collaboration was briefly interrupted in 1961 for a year of residency with the Nephrology Department and 16 months on a postdoctoral fellowship with Robert W. Berliner at the Laboratory for Kidney and Electrolyte Metabolism at what was then the National Heart Institute of NIH. He returned to the University of Oslo and remained there until 1970, when he became Professor of Physiology at the University of Bergen. He spent the 1981-82 and 1989-90 academic years on sabbatical as a Visiting Professor in the Department of Physiology of the University of California at Davis. He is a member of the Norwegian Academy for Science and Letters and was Vice Chairman of the Norwegian Medical Research Council from 1982 to 1986.

C. Charles Michel began with an interest in microvascular exchange and determining the normal pathways taken by water and small solutes through microvascular endothelium. Starting in the mid-1960s when he set up his lab, he developed methods for measuring the permeability coefficients of single capillaries, with the long-term aim of correlating these with information obtained from electron microscopy on the same vessel. This work led to major contributions to



transcapillary exchange theory.

Most of Michel's research over the past 20 years has been concerned with the ultrastructural basis of normal and increased microvascular permeability. He has recently begun to use the single vessel micro perfusion technique to address problems of exchange in specific organs, starting with fluid exchange in the vasa recta of the renal medulla.

Michel was born in Leeds and read *Physiology and Medicine* at Queen's College, Oxford. Between his undergraduate physiology studies and his clinical courses in medicine, he received his DPhil (the Oxford equivalent of a PhD) in the University Laboratory of Physiology and took a short postdoctoral fellowship at the SUNY Downstate Medical Center in Brooklyn. He received his MD at Oxford in 1965 and was elected to a Tutorial Fellowship at Queen's College, remaining there as University Lecturer in Physiology and Medical Tutor until 1984. He is Professor of Physiology and Head of the Department of Physiology and Biophysics at St. Mary's Hospital Medical School, in the Imperial College of London University.

Michel won the Malpighi Prize and Gold Medal of the European Society for Microcirculation in 1984. He was elected to membership in the Royal College of Physicians in 1986 and won the Annual Prize of The Physiology Society of the UK in 1987. Michel has frequently participated in APS meetings and conferences and is a contributor and co-editor of the APS *Handbook of Physiology*.

Walter Clark Randall 1916–1993

Walter C. Randall, a fifty-year member and past-president of the American Physiological Society, died on August 20, 1993 in Muncie, Indiana. Walt, as he was known to most of his colleagues and friends, was born in Akeley, Pennsylvania, on December 12, 1916. He was the second child of Harry W. and Ruth (Wiggins) Randall.

Walter completed his primary and secondary education in Akeley, a small farming community. As a young man he worked on his father's farm and commercial dairy operation. He was an avid hunter and fisherman. He played on the high school baseball team and at one time was approached to pitch for a local municipal team in what eventually became the NY-Penn minor league.

Walter left home in 1934 to attend Taylor University, an evangelical four-year liberal arts college in Upland, Indiana. While in college, he worked as a lab assistant to meet expenses. He received his bachelor's degree in biology in 1938. Although initially interested in further training in forestry, his financial resources were limited by the depression; Walter was therefore attracted by the availability of a teaching assistantship in physiology at Purdue University. He received his masters from that institution in 1940 and then his doctorate in 1942 under William A. Hiestand. His doctoral dissertation examined temperature regulation in the chicken. He published his first *American Journal of Physiology* article, titled "Influence of proprioceptive

vagal afferents on panting and accessory respiratory movements in mammals and birds," in volume 138 (1942).

Upon receiving his degree, Randall was offered a postdoctoral fellowship under Carl J. Wiggers at Western Reserve University in Cleveland. Although his stay in Cleveland lasted only through 1943, the time spent with Wiggers strikingly influenced his career. Walt described the laboratory as "a veritable beehive of research" where he and his colleagues "enjoyed an esprit de corps that defies both time and advancing technology."

During his junior year at Taylor, Walter had met Gwendolyn Ruth Niebel, daughter of Mathias and Caroline (Ireland) Niebel of Dunkirk, New York. In 1943, Wiggers recommended Walt for an Instructorship in the Department of Physiology at St. Louis University. With a steady job at hand, Gwen and Walt were married on August 1, 1943.

Randall advanced in the academic ranks at St. Louis to become Associate Professor in 1949. His research during these early years focused on the control of cutaneous blood flow and sweating. During this period he helped develop the photoelectric plethysmograph for quantifying skin blood flow. He also developed a technique to quantify the number of sweat glands active in human subjects during thermal stress; he described this technique in the second volume of the Journal of Applied Physiology (1949).

In 1954 Walter accepted the position of Professor and Chairman of the Department of Physiology at the Stritch School of Medicine of Loyola University in Chicago. The move to Chicago required his building a new climate control facility. While awaiting its completion he undertook what he anticipated to be a short series of experiments to clarify a few questions he had regarding the neural control of the heart. As a result, during his tenure at Chicago he studied not only the reflex and hypothalamic control of sweating, but also the physiological actions of individual cardiac nerves and the nature and control of atrial pacemakers. He and his colleagues also became intensely interested in the specific patterns of projection of the cardiac nerves over the heart; this work culminated in the development of several procedures for selectively denervating specific regions of the heart. During the course of these experiments the Loyola team began to study the physiology of the intrinsic ganglia of the heart.

The Loyola faculty was heavily involved in teaching, and deeply committed to the importance of the medical student laboratory. They inaugurated the use of the polygraph recorder in that setting. Throughout his career Walter championed the importance of the use of animals in both research and teaching.

Randall was active in the American Physiological Society both in the

Temperature Regulation Section (chairman, 1957) and Circulation Section (Chairman, 1963). He was a member of Council (1976-80) and President (1982-83) of the Society. He was a member of the editorial boards of the *American Journal of Physiology* and the *Journal of Applied Physiology* as well as *Circulation Research.* He served in a number of capacities at the National Institutes of Health, as a member of the Physiology Section of the National Board of Medical Examiners, and a member of the Governing Board of AIBS. In addition, he was a member of the Board of Trustees of Taylor University for more than 20 years. Throughout his life he served his church in many ways; he and Gwen sang in the church choir for almost 50 years together.

In 1975 Walt resigned as chairman of physiology at Loyola and devoted full time to research. He left Loyola in 1987 to return to his undergraduate alma mater in Indiana, where he was appointed Research Professor. While at Taylor he worked tirelessly to introduce his undergraduate students to the excitement and challenges of research. He insisted that the experiments that he and his Taylor students undertook be physiologically viable and significant; his success may be gauged by the fact that his Taylor students were first authors on several recent papers in the *American Journal of Physiology.* He believed strongly in the importance of the research experience to undergraduate education and described the program at Taylor in the *American Journal of Physiology* (263: S3-6, 1992). Securing adequate and continuing funding for the program was of vital concern to him and he spent much of his time during the last years of his life attempting to build an endowment for the program.

Walter received numerous professional and personal honors. He was elected Honorary Fellow in the American College of Cardiology (1977) and given the Carl J. Wiggers Award by the Circulation Group of APS (1979). Loyola conferred the Stritch Medal in 1971 and the Medical Alumni Golden Apple in 1993. Taylor University named him "Alumnus of the Year" in 1963 and awarded him an honorary doctorate in 1991. That same year Taylor honored both Gwen and Walt by naming their newest academic facility "The Randall Environmental Studies Center."

Walt was deeply saddened by Gwen's death on August 30, 1992. Despite this loss he continued to work in his laboratory, and was performing experiments until the spring of 1993. He rejoiced in the productivity of science during his own career. Several times during his hospitalization in intensive care he remarked that he'd served on the NIH study sections that authorized the development of the first intensive care wards. During his final hospitalization, his cardiologist inserted a Swan-Ganz catheter; at that time Walt recalled that he'd also served on the committee that funded development of that technology and remarked that he thought "it was money well spent."

Walter Randall is survived by his three sisters (Edith Larson, Helen Galloway and Jennett Robertson), four children (David, Marilyn Anderson, Douglas, and Craig), and eight grandchildren. He will be remembered by colleagues, friends and family for his warm, caring personality and his unwavering commitment to his Christian faith.

Future Meetings

1994	
Experimental Biology '94	April 24–28, Anaheim, CA
APS Conference	June 25–28
Physiology of the Release and Activity of Cytokines	New Haven, CT
APS Conference	October 5–8
Mechanotransduction and the Regulation of Growth and Differentiation	Sarasota, FL
Intersociety Meeting	October 29–November 2
Regulation, Integration, Adaptation: A Species Approach	San Diego, CA
1995	
Experimental Biology '95	April 9–14, Atlanta, GA

APS Gopher Server Marks Anniversary

In December 1992, APS brought its "Gopher" information server on-line, joining over 600 other institutions and organizations who offer information to the public on this network within the Internet. The APS information server is designed to provide the scientific community with rapid access to information about the Society, its meetings, and its publications. The APS information server is a pioneer in this field and is one of only 14 servers listed on the Library of Congress Gopher as a medical information resource.

Gopher is a computer program developed by the University of Minnesota that lets you search for information held on computers anywhere in the world that are part of the same system. The name is a play on words since the University of Minnesota is the home of the "Golden Gophers," and Gopher software fetches information the way a junior staffer designated as "go-fer" might do.

For the novice Internet user, Gopher offers the advantage of letting you browse through file holdings and do key word searches using menus and some relatively simple commands without having to know beforehand the Internet addresses where the materials are held. The Gopher software handles that part automatically for the user.

The easiest way to use Gopher is if your own Internet computer has Gopher "client" software installed on it. (You can find out whether it does by asking a knowledgeable colleague or contacting your campus computer network administrator.) If your Internet computer has a Gopher client, then you can start your explorations by typing "Gopher" at the Internet prompt. (If it doesn't have Gopher software, it probably give you a message that the command wasn't found.) If your machine has a Gopher client, by typing Gopher and pressing the return key, you will find yourself at a main Gopher menu, which will offer you various options, one of which should be to connect with other Gophers and information servers. (Most Gopher servers offer this option.) This permits you to gain access to servers around the world by positioning your indicator arrow beside its name and pressing the return key. You can find the APS information server by selecting the following menu options:

"Other Gophers" —> "North America" —> "USA" —> "General" —> "American Physiological Society"

You may also be able to go directly to the APS Gopher by typing "gopher oac.hsc.uth.tmc.edu 3300" at the Internet prompt. Once you arrive at the APS Information Server, a wealth of possibilities are available. Figure 1 shows a list of the menu choices on the first screen of the Server.

Since the APS Information Server was launched, it has been receiving increasing attention from the community of Gopher users on the Internet, as shown in Table 1. In

Internet Gopher Information Client 2.0
Root gopher server: gopher.uth.tmc.edu

1. Welcome: American Physiological Society
2. What's New (Look Here Often)
3. Administration/
4. Announcements and Meeting Notices/
5. Employment Opportunities/
6. Information for Authors/
7. Public Affairs Information/
8. Publications/
9. Reports from Committees and Councils/

Press ? for Help, q to Quit, u to go up a menu

Figure 1. APS Gopher—Main Menu

December 1992, 340 host computers accessed the APS Server to request information objects. For the month of September this year, the number of host computers accessing the APS server had increased to 874. Each time a host computer recovers information, a "connection" is made. As Table 2 shows, connections have increased from 2,227 in December of last year to 5,297 in September of this year. Examples of information that might be retrieved through a connection include

the main APS menu
the list of items within the "Publications" section
the "Awards Programs" text file
a search of the "Tables of Contents of APS Journals"

Some Gopher Hints

When you see a Gopher menu,

/ at the end of the line means a directory, that is, another menu.
. at the end of the line means a text item.
? at the end of the line means an indexed directory where you can search on key words.

Select an item by pressing the return key.

Table 1. APS Gopher Information Server: Access and Utilization

	Hosts	Connections
December 1992	340	2,227
January 1993	432	2,540
February 1993	452	3,259
March 1993	541	4,008
April 1993	614	3,995
May 1993	732	4,656
June 1993	707	4,243
July 1993	691	4,733
August 1993	722	4,589
September 1993	874	5,297

Table 2. APS Gopher Information Server: Main Menu Utilization

	Dec. '92	March '93	June '93	Sept. '93
/ (main menu)	618	963	1,089	1,250
Administration	111	49	36	65
Announcements	101	82	70	78
Author	25	61	59	60
Committee Reports	20	48	60	89
Employment		186	244	284
Introduction	223	205	188	222
Public Affairs		76	66	76
Publications	211	353	345	429
What's New!		207	250	274

Table 2 also provides information on how often host computers made connections with the Main Menu and with items deeper in APS's "gopherspace." Access to the main menu has risen from 618 in December 1992 to 1,250 in September 1993. In September, there were 1,577 connections made beyond the first menu. As indicated, the four most popular connections beyond the main menu were "Publications" (429 or 27.2%), "Employment" (284 or 18.0%), "What's New!" (274 or 17.4%), and "Introduction" (222 or 14.1%).

The "Publications" selection provides the user with access to the Table of Contents of all the APS journals from January 1993 to the present. The Tables of Contents of APS journals are usually posted on Gopher up to three weeks in advance of publication. You can scan the Tables of Contents by viewing each month individually, or you can search it using WAIS (Wide Area Information Search), which finds each occurrence of key word(s) and provides a list of titles containing the requested word(s). The "Publications" section also provides a listing of the editors and associate editors of the journals and subscription information. APS's future plans include posting the abstracts of accepted manuscripts on the Gopher server up to four months in advance of print publication, and you will be able to do key word searches of them using WAIS.

The "Employment" section provides a listing of all jobs published in *The Physiologist*. For a fee of $50, employers are able to post job vacancies on Gopher for a three-month period and have the announcement published in *The Physiologist*. This service will hopefully be expanded next year with more position vacancies and a listing of individuals seeking employment.

"What's New!" provides information on new items added to the APS Gopher. It includes notifications of updates in the Public Affairs and Publications area. "Introduction" provides access to a menu of approximately 12 items that detail various aspects of Society function. Individuals interested in learning about the APS are encouraged to browse through the listings under "Introduction."

It is worth noting that although you can move hierarchically through a menu structure, it is also possible to take shortcuts. If you plan to check a particular screen frequently for new information, you may be able to set up a "bookmark" that will take you directly to that screen. For example, if a cell physiologist wishes to keep tabs on what is posted on the "AJP: Cell Physiology" screen, he/she can place a "bookmark" there. (See accompanying box.)

The APS Gopher is the first step in APS's effort to publish and communicate electronically with the physiological community. The quality of that effort will depend on the membership's assessment of the utility of the Server and an indication of what additional items should be included. To that end, the Society encourages you to visit the APS Gopher and send your comments to APS at the following e-mail address: marty@aps.mhs.compuserve.com.

Marking Your Place in Gopherspace

Many Gopher clients permit you to set up "bookmarks," which are a very convenient way to revisit resources you find useful. You can create a bookmark by holding down the shift key and typing the letter A at the screen you wish to mark. The gopher client will ask you for a name, but you can acceot the default it offers by pressing the return key.

You can call up your bookmarks anywhere by typing "v," or you can enter Gopher at your bookmarks by starting your session with the command "Gopher-b."

Proposed Amendments to the APS Bylaws

One of the objectives of the Strategic Plan is to have 9,000 members by the year 2,000. To explore how best to accomplish this goal, Council appointed a Task Force on Membership chaired by Diana Marver. The task force recommended that the Bylaws governing membership be amended to encourage the participation of young scientists in the Society. With the current employment picture necessitating extended postdoctoral training, the requirement of independence was a deterrent for associate members seeking regular membership. The task force proposed that the criteria for regular and corresponding membership be amended to allow a direct transition from student to regular and that application procedures be simplified. The Council accepted the task force's recommendation to dissolve the associate and associate corresponding membership categories and to establish a new affiliate membership category for individuals interested in the physiological sciences but lack scholarly work in the field.

ARTICLE III. *Membership*

Section 1. The Society shall consist of regular, corresponding, honorary, ~~associate~~, ~~associate corresponding~~ affiliate, emeritus, student and sustaining associate members.

Section 5. ~~Associate~~ *Affiliate Members*. Persons who are ~~engaged in research in physiology or related fields and/or teaching physiology~~ interested in fostering the mission and aims of the American Physiological Society but do not have evidence of scholarly work in the physiological sciences shall be eligible for proposal for ~~associate~~ affiliate membership in the Society provided they are residents of The Americas. ~~associate members may later be proposed for regular membership.~~

~~Section 6. Associate Corresponding Members. Persons who are engaged in research in physiology or related fields and/or teaching physiology shall be eligible for proposal for associate corresponding membership in the Society provided they reside outside the Americas. Associate corresponding members may later be proposed for corresponding membership.~~

Section ~~7~~ 6. *Emeritus Members*. A regular or ~~associate~~ corresponding member may apply to Council for transfer to emeritus membership if that person (1) has reached the age of 65 and is retired from regular employment or (2) has been forced to retire from regular employment because of illness or disability. An emeritus member may be restored to regular membership status on request to Council.

Section ~~8~~ 7. *Student Members*. Any student who is actively engaged in physiological work as attested to by two regular members of the Society shall be eligible for proposal for student membership. No individual may remain in this category for more than five years without reapplying for membership.

Section ~~10~~ 9. *Nominations for Membership*. Two regular members of the Society must ~~join in proposing~~ nominate a person for regular, corresponding, ~~honorary, associate, associate corresponding,~~ or affiliate ~~student~~ membership ~~in writing and~~ on forms provided by the Executive Director. In the nomination of corresponding members, a corresponding or honorary member of the Society may substitute for one of the regular members.

a. The Membership Committee shall assess the qualifications of potential regular and corresponding members and recommend nominations to Council.

b. Nominations for ~~associate, associate corresponding,~~ affiliate and student membership shall be reviewed by the Executive Director. If the nominees meet the criteria established by Council, they will be accepted immediately and so notified. The Executive Director will inform Council of the names of new ~~associate, associate corresponding,~~ affiliate and student members.

Section ~~11~~ 10. *Election of Members*. Election of regular, corresponding, and honorary members shall be by secret ballot by members of Council. A two-thirds majority of the members present and voting shall be necessary for election.

Section ~~12~~ 11. *Voting*. Only regular members shall be voting members. Corresponding, honorary, ~~associate, associate corresponding, and~~ emeritus, student, and affiliate members, shall have the privilege of attending the Business Meeting of the Society but shall not vote.

ARTICLE III. *Expulsion of Members*

In reviewing the Task Force's recommendations, the Council recognized that while Bylaws exist for the election of members, the Bylaws include no statement on the expulsion of members. Article III. Membership, Section 12, was written to recognize this deficiency in the Bylaws.

Section 12. Expulsion of Members. The Society reserves the right to revoke the membership of a member found guilty of scientific misconduct.

What Does Congress Need to Hear?

What should the medical research community be telling Congress about health care reform? As you may know, there are an unprecedented number of new members in the 103rd Congress, and these individuals may hold the key to what shape—if any—health care reform takes. APS members should make a point of meeting with their Representatives and Senators in their district offices during December and January to pass on the following message:

President Clinton wants to reduce total health care costs by keeping people out of the health care system, basically through improved prevention. What we've heard so far is that the President's plan will be based on the assumptions that 1) high-tech medicine in the form of heart surgery, organ transplants, dialysis, and expensive medications leads to escalating health-care costs, and 2) medical research yields high-tech interventions. However, this line of reasoning does not take into account the fact that chronic illness drains the system even more than acute illness and that medical research also addresses the hows and whys of disease and health. So the plan must include strong support for a broad array of basic medical research.

FY 1994 Funding Approved

Congress has completed action on FY 1994 funding measures, providing significant increases for biomedical research at the NIH, NSF, and for VA medical research and both were signed into law in late October. Congress has also provided $9.262 million in FY 1994 to USDA for APHIS Animal Welfare Act (AWA) enforcement. This represents an increase of $74,000 or less than 1% more than the $9.188 million APHIS was provided in FY 1993 for AWA enforcement. There was no controversy over the amount because both the House and the Senate approved funding at the level requested by the administration.

FY 1994 Funding for Selected Agencies (in millions)

Agency	FY 1994 Funding	President's Request	FY 1993 Funding	FY 1994+/– FY 1993
NIH	$10,965	$10,668	$10,339	+ 6.1%
NSF	$3,005	$3,180	$2,734	+ 9.9%
VA Medical Research	$252	$206	$232	+ 8.6%

ARTICLE VI. *Dues*

The proposed changes in Article VI. *Dues*. is a modification to be consistent with the prospoed revisions in the membership categories.

Section 1. *Annual Dues.* The annual dues for regular members, corresponding members, ~~associate members, associate corresponding~~ affiliate members and student members shall be determined by the Council and shall be paid in advance of July 1. Honorary members and emeritus members shall pay no membership dues.

Section 2. *Non-payment of Dues.* A regular member, corresponding member, ~~associate member, associate corresponding~~ affiliate member or student member whose dues are two years in arrears shall cease to be a member of the Society, unless, after payment of ~~his~~ dues in arrears and application to the Council, he/she shall be reinstated at the next meeting by vote of Council. It shall be the duty of the President-Elect to notify the deliquent of his/her right to request reinstatement.

Section 3. *Retirement.* A regular~~,~~ or corresponding member, ~~associate member, or associate corresponding member~~ who has been granted emeritus membership status is relieved from the payment of dues but retains the other privileges of his former membership status, except voting privileges.

Popovic Cleared; Hamosh Charges Dropped

Actions of the HHS departmental appeals board brought swift closure to two more long-standing cases of alleged scientific misconduct brought by the Office of Research Integrity (ORI). On November 4, former NIH researcher Mikulas Popovic was cleared of charges that he made false statements in a 1984 Science article about his pioneering efforts to isolate the HIV. Popovic, who was then a senior scientist in Robert Gallo's lab, left his position at NIH under an ethical cloud in 1989 because of the ORI investigation and is presently working in Sweden.

The Departmental Appeals Board reviewed a huge volume of records in the case, which it characterized as "all focused essentially on the meaning which we should give a handful of words and notations containedin one heavily-edited paper written by a scientist with limited English skills during a volatile period of scientific discovery a decade ago." Pointing out the "undisputed" scientific importance of the paper, the Board said that it found not even a "residue of palpable wrongdoing."

Following the Popovic decision, ORI asked the Departmental Appeals Board to delay a hearing involving allegations of misconduct against Robert Gallo that were scheduled to begin the next week. The Associated Press reported that ORI said the decision "may have significant implications" for its case against Gallo and asked for time to reevaluate its plans.

Earlier, on October 6, ORI abruptly halted its four-year-old misconduct investigation of Georgetown University researcher Margit Hamosh. ORI issued a report last January alleging that Hamosh, a professor of pediatrics, made a false statement about her findings on the use of rabbits and other animals in studying infant nutrition in a 1985 grant application.

Acting ORI Director Lyle Bivens told Hamosh's attorneys in a letter that his office still "maintains that its initial determination was correct" but it is dropping the case because of an August ruling by the HHS appeals board in another case involving Cleveland Clinic researcher Rameshwar Sharma. That ruling articulated a standard of proof for misconduct cases requiring that the government show that there was intent involved and that the alleged false statement is material to the grant proposal.

Senate Holds Varmus Hearing

The Senate Labor and Human Resources Committee held hearings November 3 on the nomination of Harold Varmus to be director of the National Institutes of Health. Committee Chair Edward Kennedy (D-Mass.) praised Varmus and said that his "training as both a physician and a research scientist, his scientific accomplishmentes, and his leadership experience make him an outstanding choice for NIH Director." The Senate vote to confirm Varmus was expected to take place in November.

Research Day Celebrated

October 21, 1993 was officially designated as National Biomedical Research Day after the House and the Senate both passed a resolution designating it as such. President Clinton issued a proclamation recognizing the importance of biomedical research, and the House and Senate sponsors of the bill, Rep. Harold Volkmer (D-Mo.) and Sen. Howell Heflin (D-Ala.), held a news conference on Capitol Hill to point out the importance of research to improvements in the life and health of both people and animals.

No Study Section Cuts Imposed

On February 10, President Clinton issued an Executive Order requiring that as of October 1, 1993, government agencies were to reduce by one-third the number of advisory committees not mandated by law. APS President William Dantzler wrote to Office of Management and Budget Director Leon Panetta urging him to exempt NIH's Initial Review Groups from the cut. Dantzler argued that while the individual study sections are not chartered by law, their function is set out in the Public Health Service Act. To date, although no formal action has been taken to amend this Executive Order, neither have any cuts been imposed on study sections.

FASEB Office Releases Research Impact Study

"Can the Impact of Basic Biomedical Research Be Measured?: A Case Study Approach" has just been published by FASEB's Life Sciences Research Office as part of an effort to develop quantifiable justifications for basic research. The report was commissioned by the FASEB Board as part of an effort to determine the "cost, quantity, quality, character, impacts, and utility" of untargeted, investigator-initiated basic biomedical research. This report, first in a planned series, highlights the development of monoclonal antibodies, which have yielded such tangible benefits as the tests now used to screen the nation's blood supply for HIV contamination.

APS members can request a single copy of the report at no charge from the LSRO at 9650 Rockville Pike, Bethesda, MD 20814.

New Medical Trust Fund Ideas Proposed by Hatfield

Discussions continue on Senators Tom Harkin and Mark Hatfield's proposal to establish a medical research trust fund to supplement the NIH's annual appropriations from Congress. As first proposed last June, a $6 billion trust was to be funded by a $5 per month surcharge on all health insurance policies written under the Clinton health care reform plan.

Although this proposal was not picked up by the administration, Hatfield did succeed in having the idea included in the outline of the Senate Republican alternative. However, the Republicans were unwilling to finance it with a monthly surcharge on health policies, so Hatfield has been contemplating alternative funding schemes, such as a check-off box on federal tax forms, similar to the one for making contributions to public funding of election campaigns. In 1990, the tax return checkoff method raised some $29 million for campaign financing from some 114 million income tax filers.

"Eye to Eye" on Pet Theft

On August 26, the CBS news program "Eye to Eye" with Connie Chung aired a segment entitled "Unleashed" about pet dogs that were allegedly stolen, sold to unscrupulous animal dealers, and ended up in research labs. APS Executive Director Martin Frank wrote to Chung and CBS Chairman Lawrence Tisch to protest that the segment "created the false impression that there is a conspiracy of inaction between the medical research community and the USDA that fosters pet theft." The letter pointed out that research facilities purchase dogs only from USDA-licensed dealers, most of whom do obey the laws. It also stated that the problem of pet theft has grown considerably worse now that researchers are no longer able to use a few thousand of the 20 million dogs and cats euthanized annually by pounds and shelters. "If there is any 'conspiracy,' it is that of the so-called animal rights movement to make it impossible for scientists to use animals in biomedical research," Frank wrote.

APHIS Import Permits

The USDA's Animal and Plant Health Inspection Service has recently adjusted and expanded the "user fees" it charges for services relating to imports of live animals, animal products, organisms and vectors, and germplasm. According to some figures, about 30% of all animal and plant materials sent to US scientists from other countries are delayed or stopped because they lack an import permit. Scientists intending to import animals or materials cultured in animal sera should make advance arrangements with the Export-Import Staff of the APHIS Veterinary Services Program at 6505 Belcrest Rd, Hyattsville, MD 20782; telephone: (301) 436-7885.

APS Executive Director Martin Frank, encountering animal activists at the IUPS Congress in Glasgow.

NIH Guide to be Revised; New AWA Farm Animal Regulations Expected

An advisory committee convened by the Institute for Laboratory Animal Resources (ILAR) of the National Research Council was scheduled to hold its first public hearing on the revision of the NIH Guide for the Care and Use of Laboratory Animals on December 1, 1993 in Washington, DC. Two more public hearings will be held in San Francisco on February 2 and in St. Louis on February 3.

The APS Animal Care and Experimentation Committee is developing comments on behalf of the Society to submit to the 14-member advisory committee, which is conducting the first such revision in nearly a decade. The NIH Guide was first published in 1963 and has been revised and updated five times since then, most recently in 1985. This year, for the first time, the project to revise the Guide is being cosponsored by various federal agencies such as USDA and the CDC that share NIH's interest in laboratory animal research. In addition, the new Guide will be published by the National Academy Press rather than by the Government Printing Office.

ILAR has selected an advisory panel comprised of experts from relevant disciplines ranging from animal pain and primatology to large animal colony production and biomedical ethics. The advisory committee will seek to update care recommendations in terms of current knowledge about husbandry, management and care. Since this is the first revision since the new USDA Animal Welfare Act regulations took effect, the panel will consider how best to assure consistency with those rules. The panel will also be asked to address public and scientific concerns about animal care and well-being. Other issues that may be raised are standards of care for farm animals used for biomedical research, and standards for maintaining free-ranging or semi free-ranging colonies of nonhuman primates.

APS members can send written comments Guide before February 1, 1994, to Thomas L. Wolfle at ILAR, National Academy of Sciences, Room 347, 2101 Constitution Ave., N.W., Washington, DC 20418.

Meanwhile the USDA's Animal and Plant Health Inspection Service (APHIS) has also begun work on developing Animal Welfare Act regulations on the care and use of farm animals used in biomedical research. APHIS held a day-long meeting in Oklahoma City on September 28 to assess the state of the art. There was general agreement that USDA should look to the the well-accepted guidelines that have already been drawn up by other organizations, rather than starting anew in developing its regulations. There is no precise timetable for the regulations, and it may be a year before there is a draft.

Bill to Protect Animal Workers

Rep. George Gekas (R-Pa.) has introduced a bill to extend the Animal Enterprise Protection Act of 1992 to individuals. H.R. 3064 would make it a federal crime to travel between states or use the mail system to cause physical harm to a person or their property to prevent that person from participating in an animal enterprise or to retaliate against them for their participation. "Individuals have now become the targets of violent and life-threatening attacks by animal rights extremists," Gekas said in introducing the measure. H.R. 3064 has been referred to the House Judiciary Committee.

Book Exposes Animal Rights Charities

Animal Rights: The Inhumane Crusade by Daniel T. Oliver has just been published by the Capital Research Center, a Washington, DC–based think tank that monitors charitable organizations. Oliver summarizes work others have done in exposing the activities of animal activist and extremist groups and provides a lengthy list of such organizations nationwide. The book also contains detailed information on the background, activities, budgets, and boards of directors of 10 of the largest groups, including PETA, Friends of Animals, Fund for Animals, and the Humane Society of the United States. The stated intention of the book is to persuade potential donors to exercise caution before contributing to groups whose agenda is the elimination of animal use. The book estimates that there are about 1,000 animal rights groups in this country that receive as much as $200 million in contributions each year.

Oliver sketches the history of animal activism and critiques the movement's opposition to the use of animals in research, farming, hunting and trapping, education and entertainment, and as pets. There is some exposition of the inherent contradictions in the arguments put forward to justify elimination of animals in biomedical research: namely, that "animal research is immoral" and "it doesn't work well anyway." However, the contrast between that section and discussions elsewhere about the medical significance of certain research findings gives the impression that the author feels more at ease with science that is political rather than medical.

Copies of the softcover book are available from Capital Research Center at 727 15th Street NW, Washington, DC 20005 1599 at a cost of $35 each for 1-4 copies, with discounts available for larger quantities.

AWA Regulations Still Pending

The National Association for Biomedical Research (NABR) has won the right to step into the legal fray in the event the government decides not to appeal a court decision striking down current USDA Animal Welfare Act (AWA) Regulations on dog exercise and primates' psychological well-being. NABR was granted the right to intervene on behalf of the regulated community after appealing a ruling from US District Court Judge Charles Richey denying NABR intervener status.

Uncertainty still remains about the future of the regulations that Judge Richey struck down last February in the suit brought by the Animal Legal Defense Fund against USDA and other agencies. ALDF is expected to ask for a further hearing on the Appeals Court decision to permit NABR to intervene. Assuming that the court's "summary judgment" is upheld, NABR's entrance on the legal stage might have some influence on how the government proceeds with its own appeal. To date the government has filed only a protective notice retaining the option to appeal. However, it may now be more likely to proceed with an appeal since it might otherwise be placed in the position of having to do what the court orders after hearing the arguments of a nongovernmental entity, namely NABR.

It should be noted that it took the government 14 months to decide to appeal an earlier ruling by Judge Richey that USDA must extend AWA coverage to rats, birds, and mice. Oral arguments in that appeal were held were held October 8, with the government arguing that the Secretary of Agriculture has broad discretion to determine which animal species Congress intended to be covered under AWA regulations. USDA objected to covering rats, birds, and mice under the AWA regulations because it does not have the resources to enforce standards affecting so many additional animals and facilities.

For those who might have wondered why Judge Richey gets all the cases involving the AWA regulations, it seems that when a case comes into the US District Court involving a new topic, it is randomly assigned to a judge. However, subsequent litigation on the same topic is then almost always referred to the same judge. Thus Judge Richey has become the Court's expert on the Animal Welfare Act.

HSUS Animal Reports Petition Denied

APHIS REAC Deputy Administrator Dale Schwindaman has denied an HSUS petition to change the form of the animal use reports required under the Animal Welfare Act. HSUS wanted APHIS to require greatly expanded reports, including the use of a pain scale and sections to report the scientific purpose of experiments and the source of the animals. HSUS said this information was consistent with congressional intent and is similar to that required by other countries such as Great Britain, the Netherlands, and Australia.

Schwindaman rejected the request for a pain scale on the grounds that current procedures requiring IACUC review with USDA oversight is sufficient. In a letter to HSUS, he said that information on the purpose of experiments is already available elsewhere. With respect to collecting information on the source of all animals, he said that this would place an undue burden on USDA and regulated facilities. HSUS has announced plans to sue USDA over this issue.

Montgomery County Passes Anti-Harassment Measure

Montgomery County, Maryland has approved a bill making it illegal for animal activists to harass researchers by picketing and demonstrating in front of their homes. The bill was modeled closely on the Brookfield, Wisconsin ordinance that was passed to protect employees of an abortion clinic from harassment. That measure was challenged in court as a violation of free speech rights but was eventually upheld by the US Supreme Court.

Montgomery County (Maryland) Council Member Gail Ewing introduced the bill in 1991 out of concern for the plight of USUHS researcher Sharon Juliano, who had been picketed and harassed in her home for more than two years. The research community supported the bill, but animal activists and the local chapter of the American Civil Liberties Union opposed it. According to Ewing, the bill "protects the rights of families to privacy and security at home," without stopping protestors from expressing their views by picketing at the person's place of business. The ordinance goes into effect December 24.

California Beagle Colony Closed

The University of California at Davis has closed its 40-year old research colony of beagles on October 1. Starting in the early 1950s, research involving low-level radiation studies was conducted on beagles. Those studies were completed in the 1980s, but the colony continued to be maintained. Vice Chancellor for Research Robert Shelton told the United Press International that 47 dogs were transferred to other campus research projects on Alzheimer's disease and leukemia, and the last 180 dogs were given to the Marin County Humane Society for placement.

Third Witness Jailed, Two Freed in WSU Break-in

A third potential grand jury witness in the probe of a 1991 break-in at Washington State University was jailed briefly in early October after she refused to answer questions about the incident. The Animal Liberation Front (ALF) claimed responsibility for the WSU break-in that did $100,000 in damage to research facilities. The grand jury is seeking information about the whereabouts of Rodney Coronado, a key figure in the Animal Liberation Front, who went into hiding after the raid.

Kimberly Trimiew, 21, of Oregon, spent two weeks in jail before the 9th US Circuit Court of Appeals freed her pending the outcome of an appeal of her contempt citation. The Court also acted to free WSU graduate student and sociology researcher Rik Scarce, who had also been jailed for contempt.

Trimiew was first called before the grand jury in August and asked to answer some 50 questions about ALF. According to an Associated Press report, she refused to do so, invoking her Fifth Amendment right against self-incrimination. At a second hearing on September 16, Tremiew's attorney asked the court to grant her complete immunity from prosecution in the current ALF investigations. Assistant US Attorney Frank Wilson told the court such protection was not needed. Federal Judge Fremming Nielsen of Spokane, Washington, issued a warning to Trimiew that she would be jailed if she continued to refuse to cooperate and did so when she refused to cooperate at a third hearing. Trimiew's lawyer then appealed her jailing to the 9th Circuit Court of Appeals in San Francisco, which freed her on October 20. According to reporter Ken Olsen of the Moscow-Pullman Daily News, Trimiew is a "target of the federal government's ALF investigation in other states" and has also been subpoenaed to appear before an Oregon grand jury investigating another break-in.

Scarce, 35, who acknowledges that he is a friend of Cornado, spent 159 days in jail on contempt charges before his release on October 19. Scarce is the author of *Eco-Warriers: Understanding the Radical Environmental Movement*, which includes a discussion of ALF activities and Coronado's involvement in them. Scarce is considered a key witness because Coronado was house-sitting for Scarce at the time of the ALF break-in and may have discussed it with Scarce, who returned from vacation the next day. In a decision released in September, the 9th Circuit Court of Appeals initially upheld its earlier decision to keep Scarce in jail on the grounds that he had no right to claim a First Amendment privilege for scholars or even journalists to refuse to answer questions posed by a grand jury acting in good faith. "The newsperson's privilege that Scarce claimed by analogy did not exist," the Court ruled. Scarce appealed that decision to the US Supreme Court.

A third uncooperative witness, California animal activist Jonathan Paul, spent 159 days in jail for refusing to answer questions in the same probe. He was freed in April.

Americans for Medical Progress

Americans for Medical Progress is a public awareness advocacy group that is working to counter the false information being disseminated by animal activists and extremists. AMP seeks to build public support for the research community through timely and topical advertisements in major newspapers and a bi-weekly column (Medical Milestones) that is syndicated to small- and medium-sized newspapers. AMP is also developing materials for children including a color comic strip for children called Heroes of Medicine and *Hot Shots*, a magazine that will be distributed in doctor's waiting rooms.

Individual membership in AMP costs $25 and includes a subscription to AMP's two bi-monthly newsletters Breakthroughs, which details medical advances from animal research, and Progress, which addresses public policy issues and AMP programs. For more information, contact AMP at Crystal Square Three, 1735 Jefferson Davis Highway, Suite 907, Arlington, VA 22202-3401.

Airlines Ban Primate Transport

Nine international airlines have succumbed to pressure from the U.K.-based European Coalition to End Animal Experiments (ECEAE) to halt air transport of nonhuman primates for medical research. Aeromexico, Alitalia, British Midland, British West Indian Airways, Finnair, Singapore Airlines, Surinam Airlines, Swissair, and Zambia Airways join 40 other airlines that stopped carrying primates before the ECEAE began its campaign in June. The British Union for the Abolition of Vivisection, one of the key participants in the ECEAE, has said 26 airlines continue to carry primates, but it is expected to focus particular attention on Air France, Lufthansa, and Northwest Airlines.

L'Oreal Halts Animal Tests

French cosmetic maker L'Oreal announced in October that it signed an agreement to halt animal tests of its cosmetic products. This action was taken after a four-year-old consumer boycott of its products organized by PETA. L'Oreal, the world's largest cosmetics company, is the parent firm for Helena Rubenstein and numerous other brands. L'Oreal announced that the agreement it signed to end cosmetic testing on animals does not apply to tests on cosmetic ingredients or to drugs developed by the company's pharmaceutical division.

XXXII IUPS Congress—Glasgow

The participation of over 5000 scientists from more than 50 countries made the XXXII IUPS Congress a scientific and social success. Greeted by signs proclaiming "Glasgow Welcomes the World's Physiologists," scientists attended a Congress that will hopefully serve as a precedent for future Congresses.

In a departure from the traditional format, the Glasgow Congress contained no independent satellite meetings. Instead, topics that would previously have formed the basis of satellites were incorporated into the main congress as symposia. As a result, lecture theatres were used at Glasgow University and the Scottish Exhibition and Conference Centre (SECC), which caused minor problems because of the distance between the two sites. However, it also added to the sense of a "meeting within a meeting" format that was hoped for when the organizing committee recommended moving the satellites into the main Congress.

As part of the registration package, attendees received the Congress book, "The Logic of Life," a collection of essays edited by Denis Noble, Congress Chairman. The book focuses on the future of physiology. The authors express the view that physiology must return to addressing integrative functional questions if the wealth of information emerging at the molecular levels are to be applied successfully to an understanding of how the body functions in health and disease.

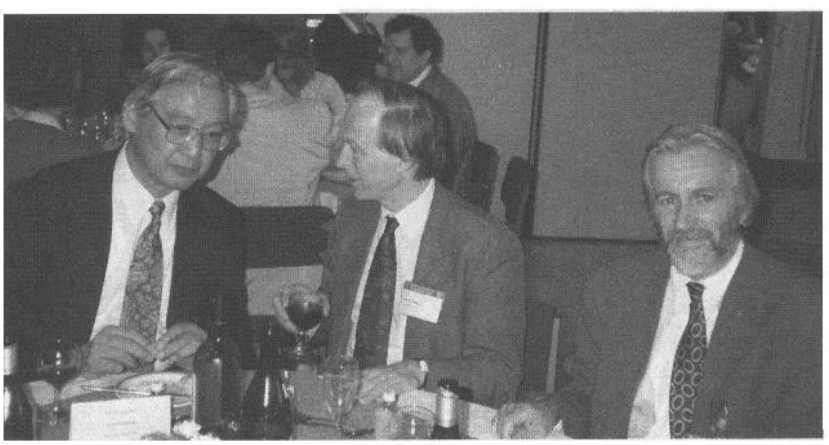
The Opening Ceremony featured a lecture by the Fenn Lecturer, Sir Bernard Katz. Before the lecture, Ian McGrath, Chair of the Local Organizing Committee, welcomed the attendees and introduced Denis Noble, Congress Chairman, who addressed the audience. The Lord Provost of Glasgow and the Convenor of Strathclyde Regional Council, both dressed in kilts, warmly welcomed the visitors to Glasgow. Katz's lecture was introduced by Sir Andrew Huxley, IUPS President, who gave a brief history of the Fenn Lectures,

Opening reception: Roger Green, U. K.; Anthony MacKnight, New Zealand; and Ramon Latorre, Chile.

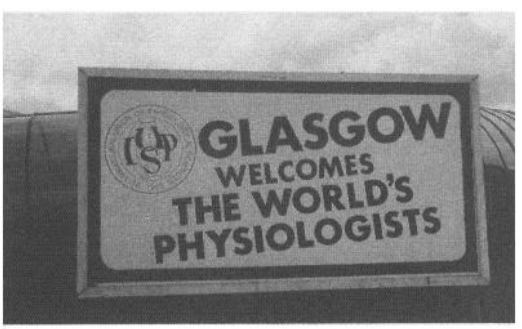
which were initiated as a memorial to Wallace Fenn. In his lecture, Sir Bernard Katz delivered an account of his work leading up to the discovery of miniature end plate potentials and from there to our current concepts of vesicle release.

The Glasgow Congress provided a unique view of British royalty. Her Royal Highness Princess Anne spent three hours at the SECC touring the poster hall and exhibitors' stands, including the APS booth. During her tour of the posters, her attention was turned from subject to subject in rapid succession as she saw posters on topics from the "Biophysics of Memory and Learning" to "Kidney Transplants." At no stage during her tour was she at a loss for pertinent words, relevant comments or perceptive questions. Her performance was most impressive because of the serious interest in the Congress that she conveyed to attendees.

Evenings during the Congress were filled with dinners at castles, cruises on the Clyde, and dancing at the Ceilidh. At



L-r: Masao Ito, IUPS President; Denis Noble, IUPS Secretary; and Ian McGrath, Chair of the Local Organizing Committee.



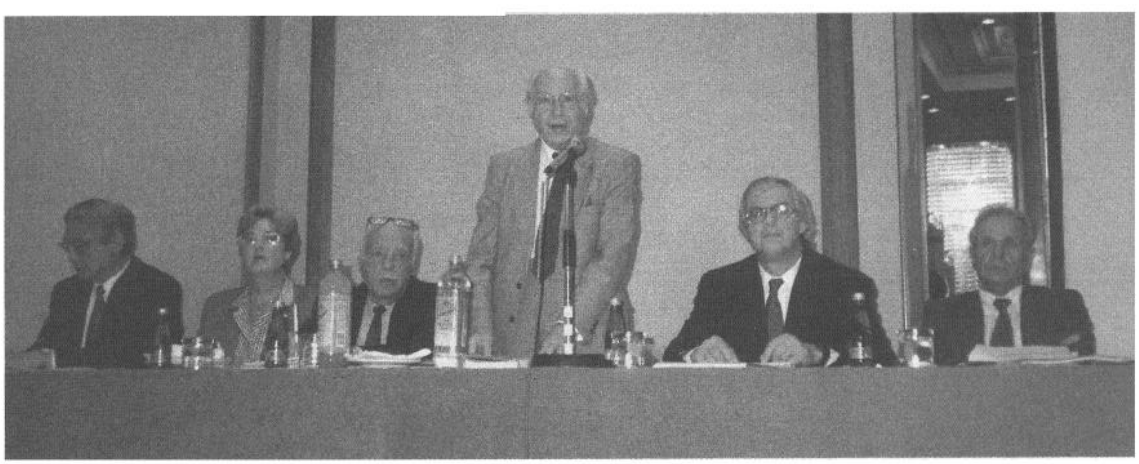
L-r: Denis Noble, Princess Anne, and Charles Michel viewing poster.

the Ceilidh, attendees tried their feet at steps that characterize Scottish folk dancing. Even Sir Andrew and Lady Huxley were observed doing a mean "strip-the-willow" during the evening.

The closing banquet was held at Glasgow Univerity and was followed by a presentation by a "pipes and drum" brigade. During the display of Scottish music and dancing, the passing of the IUPS flag from Ian McGrath to Sviatoslav V. Medvedev took place. Medvedev thanked McGrath for hosting an outstanding Congress and promised to do the same at the 1997 Congress scheduled for St. Petersburg, Russia. He invited all physiologists to plan on attending the XXXIII IUPS Congress.

Before the Congress, the IUPS General Assembly met and reconfirmed their support for the Russian bid for the 1997 IUPS Congress and voted to take the first IUPS Congress of the new millenium to New Zealand in 2001.

L-r: Oleg Adrianov, Michael Khananashrili, and Oleg Gazenko.



L-r: Masao Ito, Sue Orsoni, Robert Naquet, Sir Andrew Huxley, Harvey Sparks, and Platon Kostyak.

NIPS Joint Managing Board Meets in Glasgow

The *NIPS* Joint Managing Board held three meetings at the IUPS Congress in Glasgow. It hosted an appreciation luncheon meeting for the Editorial Board of the journal, which was followed by a meeting presided over by the editor, John Shepherd. Board members were encouraged to give their opinions on the perceived strengths and weaknesses of the journal.

The Board invited the heads of the larger physiological societies to a meeting to enlist their financial support of the journal through subscriptions by their members. The Society heads agreed to present to their societies proposals to buy the journal for their members as part of dues, or to include *NIPS* subscription forms in their dues notice, or to distribute brochures at meetings and to run ads in their journals.

The Board interviewed candidates for the editorship of the Journal and selected Stanley G. Schultz as the new editor beginning July 1, 1994.

L-r: Ralph Kellogg, Mel Fregley, Patricia Gwirtz, and David Brooks at the IUPS Congress.

L-r: Derek Denton, Gil Hageman, Sir Andrew Huxley, Harvey Sparks, and Andrzej Trzebski.

Schafer Receives Homer W. Smith Award

James A. Schafer is the 1993 recipient of the Homer W. Smith Award. The award is given jointly by the New York Heart Association and the American Society of Nephrology and is presented to Schafer in recognition of his outstanding research in salt, water, and nonelectrolyte transport and their regulation in the kidney.

Schafer presented a lecture entitled, "Salt and Water Homeostasis: Is it just a matter of good bookkeeping?" at the annual meeting of the American Society of Nephrology.

Schafer is professor of physiology and biophysics at the University of Alabama at Birmingham. He is also a professor of medicine and a senior scientist in the Nephrology Research and Training Center. He is serving on the APS Council. Schafer formerly served on the council of the American Society of Nephrology and on the research

committee for the National Kidney and Urological Diseases Advisory Board of the US Department of Health and Human Services.

The Homer W. Smith Award was established to recognize scientists who have made original and significant contributions to the understanding of renal physiology or pathophysiology.

People and Places

People and Places notices come almost exclusively from information provided by members and interested institutions. To ensure timely publication, announcements must be received at least two months (by the 15th of the month) before the desired publication date. Send all information to *The Physiologist*, APS, 9650 Rockville Pike, Bethesda, MD 20814-3991.

Reynaldo Elizondo has accepted a position as Dean of the College of Sciences and Engineering at the University of Texas at San Antonio. He was formerly at the University of Texas, El Paso.

APS member **David Kostreva** has moved from the VA Medical Center, Wood, WI, to Procter and Gamble Pharmaceuticals, Norwich, CT.

Hubert J. Bardenheuer has moved from the University of Munich to the Clinic of Anesthesiology, University of Heidelberg, Heidelberg, Germany.

Formerly at the University of Missouri, **Donald H. York** is now at St. John's Mercy Medical Center, St. Louis, MO.

Alice H. Huang has moved to the Department of Physiology, Morehouse School of Medicine, Atlanta, GA. An APS member since 1988, Huang was formerly at Crawford Long Hospital, Atlanta.

Richard E. Klabunde has moved from Abbott Laboratories to Deborah Research Institute, Brown Mills, NJ.

APS member **Donald E. Roberts** is now at the Naval Health Research Center, SAn Diego, CA. He was formerly with US Army/ARIEM, Natick, MA.

Harvey V. Sparks has accepted a position as Professor of Physiology at Michigan State University, East Lansing, MI. He was formerly Vice Provost for Human Health Services at MSU.

Israel Rubenstein has moved from the University of Nebraska Medical Center to the Department of Medicine, University of Illinois at Chicago.

W. Richard Dukelow has accepted an I.P.A. two-year leave from Michigan State University to serve as Director of the Regional Primate Research Centers Program, Comparative Medicine Program, National Center for Research Resources at the National Institutes of Health, Bethesda, MD.

Formerly at the University of Connecticut, **Lynn T. Landmesser** has moved to the Department of Neurosciences, Case Western Reserve University, Cleveland, OH.

Richard J. Bing has accepted a position as Director of Experimental Cardiology, Huntington Medical Research Institutes, Pasadena, CA.

APS member **David J. Fisher** is now at the Baylor College of Medicine, Pediatric Cardiology, Houston, TX. He was formerly at Texas Children's Hospital, Houston.

Yi Pan has relocated from Massachusetts General Hospital to the Department of Neurology, St. Louis University Hospital, St. Louis, MO.

Formerly at the University of Iowa, **Chester A. Ray** has moved to the Department of Exercise Science, University of Georgia, Athens.

Richard Hawkins has accepted a new position as Executive Vice President, Chief Academic Officer at the University of Health Sciences, The Chicago Medical School. He was for-

merly Chair of Physiology at the school.

APS member **Gabor M. Rubanyi** is now with Berlex Biosciences, Richmond, CA. He moved from Schering AG, Berlin, Germany.

Barbara J. Zimmerman has moved from Louisiana State University to the University of Tennessee at Memphis.

Formerly at Tufts University, **Joseph G. Cannon** has moved to Pennsylvania State University, University Park, PA.

James L. Borke has relocated from Loyola University School of Dentistry to the Department of Oral Biology, Medical College of Georgia, Augusta.

APS member **Susan C. Opava-Stitzer** has accepted a position as Dean for Research and Graduate Programs at California Polytechnic State University, San Luis Obispo, CA.

Matthew J. Kluger is now Director, Institute for Basic and Applied Medical Research, The Lovelace Institute, Albuquerque, NM.

Phillip L. Rayford has stepped down as Chairman of the Department of Physiology and Biophysics at the University of Arkansas for Medical Sciences, where he remains as Professor and Associate Dean for Minority Affairs for the College of Medicine. In his place, **Lawrence E. Cornett** has been appointed Acting Chair.

APS Membership

Membership applications may be obtained from APS Membership Services, 9650 Rockville Pike, Bethesda, MD 20814-3991. Applications are reviewed and approved by Council on a regular basis throughout the year.

Professor and Chair. The Department of Biological Sciences, University of Maryland, Baltimore, is seeking a distinguished scientist with a vigorous research program to serve as Professor and Chair. The Department, committed to excellence in research and in graduate and undergraduate education, includes 22 faculty members, 56 doctoral students, 28 masters students, and approximately 400 undergraduate majors. The PhD degree is offered in molecular and cellular biology, biological sciences, and environmental sciences, and an MS degree is offered in applied molecular biology. Research is well funded and covers the range of modern biology from cellular and molecular biology to organismic biology and environmental sciences. Please send curriculum vitae and names and addresses of at least three references to S. Ostrand-Rosenberg, Chair, Search Committee, Department of Biological Sciences, UMBC, Baltimore, MD 21228-5398. [EOAAE]

Chairperson and Professor. The East Carolina School of Medicine invites nominations and applications for the position of Professor and Chairperson of the Department of Physiology. Research interests include neural, cellular, cardiovascular, and respiratory physiology. The candidate should possess a distinguished record in teaching and research, proven skills in leadership, and experience in administration. Additional requirements include an MD or PhD degree, a strong background in physiology or related discipline, and experience in an academic medical center. Salary and benefits are nationally competitive. Interested parties should submit a curriculum vitae and three references to Alvin Volkman, Chairperson; Physiology Search Committee; Brody 2W-33; East Carolina University School of Medicine; Greenville, NC 27858-4354. Closing Date: January 31, 1994. [EOAAE] Federal law requires proper documentation of identity and employability prior to final consideration for this position.

Positions Available

There is a $50 charge for each position listed. Positions will be listed in the next available issue of *The Physiologist* and immediately upon receipt on the **APS Gopher Information Server**. Listings will remain on the APS Information Server for 3 months.

A check or money order payable to the American Physiological Society must accompany the position listing. Purchase orders will not be accepted unless accompanied by payment. Ads not prepaid will not be printed. Copy must be typed double spaced and is limited to 150 words. All copy is subject to the editorial policy of *The Physiologist*. EOAAE indicates Equal Opportunity/ Affirmative Action Employer and appears only when given on original copy. Copy deadline: copy must reach the APS office before the 15th of the month, two months preceding the month of issue (e.g., before February 15th for the April issue). Mail copy to APS, *The Physiologist*, 9650 Rockville Pike, Bethesda, MD 20814-3991.

Assistant/Associate Professor of Kinesiology–Physical Therapy (tenure track). The Department of Kinesiology at the University of Wisconsin-Madison offers BS in physical therapy, MS in Therapeutic Science, and MS and PhD in Kinesiology. An entry-level masters in physical therapy is under development. Duties include maintaining an independent research program and teaching in area of expertise. Doctorate and eligibility for Wisconsin physical therapy licensure required. Submit letter of application, curriculum vitae, copies of three published articles, and names and addresses of three references to Barbara J. Morgan, 1087 Medical Sciences Center, 1300 University Avenue, Madison, WI 53706. Deadline: December 15, 1993. Information about confidentiality of applicant names is available on request. Applications encouraged from women, members of minority groups, and persons with disabilities.

CONGRESSIONAL REPORT
(continued from p. 207)

Methodology Employed in Conducting Study

The goal of this study was to present information that describes as accurately as possible the extent and effects of animal rights terrorism, as well as how it has changed or evolved over the years. Consequently, this report employs a broad, inclusive view of animal rights terrorism, expanding upon but never neglecting the criteria that form the basis of the Animal Enterprise Protection Act. In this regard, it is important to note that:

• The Animal Enterprise Act defines the term "animal enterprise" as: 1) a commercial or academic enterprise that uses animals for food or fiber production, agriculture, research, or testing; 2) a zoo, aquarium, circus, rodeo, or lawful competitive animal event; or 3) any fair or similar event intended to advance agricultural arts and sciences. Using these categories as a starting point, this report considers as an animal enterprise any private or public enterprise, or individual working on account thereof, that produces, uses, or markets animals or animal-derived products. During the course of this study, 28 different types of enterprises or entities, most relating to those categories specified in the Act, were documented as having been victimized by animal rights extremists with acts of disruption or destruction.

• While the Act characterizes terrorism as physical disruption caused to the functioning of an animal enterprise (including stealing, damaging, or causing the loss of property), the Federal Bureau of Investigation (FBI) defines terrorism as "the unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives."[1] This report considers a wider range of activities than is covered by either the Act or FBI's definition of terrorism. It takes as its focus of analysis the more inclusive issue of animal rights "extremism," which includes actual or attempted actions of theft, vandalism, violence, disruption, or destruction. In all, this study identified 16 categories of animal rights extremist activities.

• Although Congress did not enact the Animal Enterprise Protection Act until 1992, incidents attributable to animal rights extremism were first documented 15 years earlier. In order to accurately reflect the full extent of this activity, this report uses as its chronological frame of reference the period 1977 (when the first incident was recorded) through June 30, 1993.

The sources of the statistical, historical, and other information analyzed and presented in this study varied considerably. In order to present as reliable a profile of animal rights extremism as possible, representatives from entities that have been victimized by animal rights extremists, including government agencies, private industry, and organizations representing the interests of targeted industries or professions, were interviewed. Officials from law enforcement agencies also were interviewed. All, without exception, were forthcoming with their views and perspectives, as well as with statistical and anecdotal data. The information derived from these sources provides the basis of the analyses and conclusions presented in this report. We believe that the enthusiastic response to our study is a clear indicator of how serious targeted enterprises and individuals alike consider the threat posed by animal rights extremism to their livelihood and well-being.

The Animal Rights Movement And Animal Rights Extremism In the United States

The Animal Rights Movement in Perspective: From Animal Welfare to Animal Rights

Organized concern for the plight of animals dates back to early 19th century England, just as great advances were being made in applied biomedical research. As the use of animals in research and industry became more commonplace, groups such as the Royal Society for the Prevention of Cruelty to Animals, the British Union for the Abolition of Vivisection, and the National Anti-Vivisection Society were formed to promote animal welfare. Equipped with these examples, similar groups began to appear in the United States toward the end of the century. Among these were the American Humane Association, the American Society for the Prevention of Cruelty to Animals, and the American Anti-Vivisection Society. Most of these original animal welfare societies, many of which still exist, did not seek to end animal research or other uses of animals, per se, but rather to work within established legal channels to ensure that laboratory and other animals were treated humanely. The tactics for achieving this goal were, and in most instances continue to be, nonviolent and lawful, confined to lobbying government and other public institutions, launching demonstrations and protests, and sponsoring public education campaigns.

The animal welfare movement's early efforts resulted in protective laws, first in the United Kingdom and later in the United States, that placed increasingly rigorous restrictions and standards on the treatment of animals used for commercial or scientific purposes. In 1873, the United States Congress enacted the first federal legislation pertaining to animal welfare in the form of the "28-hour law," which required that animals be properly rested, watered, and fed while in interstate transportation. In 1958, Congress passed the Humane Slaughter Act, which required meat packers selling to the U.S. Government to provide anesthetization or stunning prior to slaughter. These laws were followed by the Laboratory Animal Welfare Act in 1966, the Endangered Species Act in 1969, and the Animal Welfare Act in 1970, as well as a series of subsequent amendments strengthening these and other animal welfare-related statutes.

By the early 1970s, the animal welfare movements in the United Kingdom and the United States were being dramatically transformed by the emergence of an "animal rights" agenda. With the publication of such works as the anthology Animals, Men and Morals, Richard Ryder's Victims of Science, and, most influentially, Peter Singer's Animal Liberation: A New Ethic for Our Treatment of Animals, concern for protecting animal welfare became eclipsed by the philosophical imperative that animals, like humans, possess certain fundamental and inalienable rights, and therefore should be treated as equals. Often comparing the use of animals in research

This report was prepared by the Department of Justice and the Department of Agriculture and presented to Congress in September 1993 as mandated by the Animal Enterprise Protection Act of 1992.

and industry to slavery and the Holocaust, many advocates of animal rights oppose all ways in which animals are confined and utilized by humans, whether it be for food, clothing, servitude, or household pets.

The cause of animal rights soon became a mainstream "single issue" movement, in some instances competing for or displacing the agenda of traditional animal welfare societies and in others fueling the proliferation of new organizations. In the United States, the most prominent among the new organizations was the non-profit People for the Ethical Treatment of Animals (PETA), established in 1982 and which, in just over 10 years, has gained a membership of over 350,000. By some estimates, in the United States there currently are as many as 7,000 animal protection groups, of varying sizes, interests, and objectives.

The Emergence of Extremism Within the Animal Rights Movement

Like the traditional animal welfare movements, most modern animal rights advocacy organizations do not openly condone the use of violence or other unlawful means to further their agenda. With the advent and propagation of the animal rights philosophy, however, came a radical fringe element willing to employ more direct measures to fulfill the objectives of the movement. Calling themselves animal "liberationists" or "liberators," animal-rights extremists radically shifted the tone of the dialogue between the animal rights movement and animal users. Frustrated with what they considered to be the insufficient pace of change as effected by legal, peaceful tactics, this emerging element diverged from the mainstream movement, went underground, and began to victimize animal enterprises with acts of violence, intimidation, theft, and property destruction.

As with most earlier developments relating to animal welfare, the origins of extremism as a means for promoting animal rights lay in the United Kingdom. The British organization believed to have initiated the trend toward "direct action" within the animal rights movement was the Hunt Saboteurs Association (HSA). Established in 1962 and still active today, the HSA introduced the "hunt sab" tactic, or the act of mounting sabotage raids aimed at disrupting fox hunts by harassing the hunters and distracting the hounds. In 1972, believing that HSA tactics were insufficient, two of the group's members—Ronnie Lee and Cliff Goodman—founded the "Band of Mercy" (after a 19th Century anti-vivisection group of the same name) as an instrument for attacking hunters more directly. The Band of Mercy proceeded to do just that, by vandalizing hunters' vehicles and equipment. The group soon expanded its array of targets, however, to include animal research laboratories, food production facilities, and other enterprises using or marketing animals in any way. Under Lee's leadership, the Band of Mercy also escalated its level of violence and destruction, progressing from (but never abandoning) animal theft and vandalism to arson as its preferred means of destruction.

> By the early 1980s, in the United States, incidents involving the theft or release of animals and vandalism were being claimed by the Animal Liberation Front.

In 1975 Ronnie Lee was arrested in the United Kingdom for attempting to firebomb an animal research facility and was sentenced to three years of imprisonment. After being released on parole in 1976, he joined with a number of supporters to form the Animal Liberation Front (ALF). The Animal Liberation Front is a militant, underground group dedicated to the liberation of all animals from "exploitation" by humans. From the outset, ALF characterized its policy as "non-violent direct action." From the group's viewpoint, however, an act entailing the disruption or destruction of an animal enterprise normally is not described as "violent," as it is perpetrated against an inanimate object. In describing ALF's position toward animal enterprises, Lee defined the group's objectives as follows:

- to save animals from suffering here and now. To inflict an economic loss on people who exploit animals, resulting in less profit for them to plough back into their animal exploitation business; and

- to escalate events to a point where all of these industries are under threat and can't operate.

These words quickly proved to be more than rhetoric. Immediately following its formation, ALF began actively exercising this technique of "economic sabotage" in the United Kingdom, victimizing a wide array of enterprises using or marketing animals and inflicting damage reaching into the millions of pounds. It should be emphasized that, like the Band of Mercy before it, ALF escalated its level of violence throughout the 1980s. While reserving petty vandalism, such as graffiti and broken windows, for "low impact" targets, ALF became increasingly willing to employ more sophisticated methods of inflicting damage, including, most notably, incendiary and electrical bombing. In pursuing this course, the group appears to have been intentionally following the tactical example established by the Irish Republican Army.

By the early 1980s, in the United States, incidents involving the theft or release of animals and vandalism were being claimed by the Animal Liberation Front. Although the exact circumstances surrounding ALF's appearance in the United States remain a matter of speculation, it is apparent that the emergence of ALF activity in the United States coincided directly with the popularization of the modern animal rights movement and the formation of its advocacy organizations. It is not entirely clear whether ALF took root in the U.S. as a transplanted organization or simply as a cause adopted and emulated by frustrated activists. No evidence has been uncovered to suggest that ALF in the U.S. is, beyond its origins, connected either operationally or financially to ALF in the United Kingdom.[2] Despite this apparent separation, however, it can be observed that ALF in the United States has followed organizational and operational patterns established in the United Kingdom, escalating quickly in both activity and technique, while maintaining the same central objective. In both countries, ALF continues to be the most active underground animal rights group.

According to a flyer published on behalf of the Animal Liberation Front in the United States, ALF's goals can be summarized as follows:

- to liberate animals from places of abuse and place them in good homes where they can live out their natural lives free from suffering;

• to inflict economic damage upon those who profit from the misery and exploitation of animals; and,

• to reveal the horrors and atrocities committed against animals behind locked doors.

As this report will demonstrate, ALF and other militant animal rights groups in the United States have pursued these objectives in the tradition of their counterparts in the United Kingdom. The following sections examine in detail the characteristics and activities of these groups as they have come to manifest themselves in the United States since their initial appearance.

Profile of Animal Rights Extremism: Organizational and Operational Characteristics

In the United States as in the United Kingdom, ALF and other groups involved in animal rights extremism are clandestine in operation, amorphous in organization and membership, and, somewhat ironically, expertly skilled in public relations. These characteristics have allowed extremist animal rights groups to successfully evade detection and prosecution as well as garner some public sympathy, which in turn has emboldened them further to expand their list of victims and escalate their means of violence and destruction.

Whether ALF in the United States can be characterized as an organization, per se, or as an "umbrella" ideology or cause, is an issue still being debated. Regardless of how it may be characterized as a whole, it is widely believed that ALF is a loose configuration of small, autonomous "cells," with no centralized command structure. It is also believed that there are no formal membership requirements beyond the willingness to inflict damage upon an animal enterprise. Some contend that ALF founder Ronnie Lee deliberately fashioned this cellular structure after 19th century English anarchist groups in order to allow small groups of people to operate covertly with minimal risk of compromising the larger movement. By some accounts, this strategy to compartmentalize the group's activities has proven more successful in the United States, with its large territory and population, than in the much smaller United Kingdom. In each country, ALF, in whatever form it takes, is believed to be composed of one hundred or fewer "hard core" members; i.e., activists who actually are willing to perpetrate violence or destruction on behalf of their cause. More numerous are those activists or sympathizers who are willing to engage in less destructive activities. Some even suspect that, as a tactic of evading detection, ALF's hard core membership hires individuals—especially youths—otherwise not actively affiliated with the cause to perpetrate certain illicit acts. This suspicion, however, could not be substantiated.

The Animal Liberation Front's operational style is as distinctive as its manner of organization, leaving in its wake what practitioners have come to regard as the "ALF signature." Always striking under cover of night, ALF activists, concealing their identities with ski masks, victimize major targets with evident forethought and precision. It is widely believed within law enforcement, academic, and industry circles alike that ALF activists conduct careful surveillance of a selected target before victimizing it. Animal Liberation Front activists often accomplish this, it is further alleged, by infiltrating selected targets, either by gaining employment in the enterprise or by cultivating close contacts with employees having ready access to the facility. This tactic serves two purposes. First, it provides the activist opportunity to develop an intimate familiarity with the structure to be targeted. During raids, this knowledge is used to circumvent security systems and identify specific targets—such as animal quarters or laboratory equipment—for theft or destruction. Second, ALF activists are known to use this pre-raid access to document cases of alleged animal abuse for use in justifying an attack after it takes place. It also has been observed that extremist animal rights-related activity involving ALF or other groups often occurs on weekends, preferably long holiday weekends, when activity in and around the targeted enterprise is low and its surroundings quiet.

Obviously, the Animal Liberation Front's organizational and operational patterns do not lend themselves to an ability to access or manipulate public opinion, which is integral to its ability to garner sympathy for its cause and raise funds for its operations. To compensate for this inconsistency, ALF and other underground direct action groups in the U.S. and U.K. alike are suspected of maintaining connections with legitimate, above-ground animal rights advocacy groups. The U.K.'s Hunt Saboteurs Association is believed to have originated this pattern of working through spokespersons or organizations that serve to publicize, and in some cases purportedly fund, the activities of the underground group. In the United States, most notably, People for the Ethical Treatment of Animals traditionally has publicized ALF activities soon after their occurrence.[3] This often includes releasing videotape footage taken by ALF activists during the course of a raid on an enterprise. In addition, in both countries there are above-ground "ALF Support Groups" that boast large memberships of sympathizers willing to support ALF's cause through legal means, such as funding defense-related litigation and arranging for publicity. In the United States, the Animal Liberation Front Support Group claims a membership of 10,000. Although various members of these support groups have been questioned in connection with certain major incidents, none of the groups or their members have ever been charged with complicity in any illegal animal rights-related action.

It also has been observed that extremist animal rights–related activity . . . often occurs on weekends, preferably long holiday weekends, when activity in and around the targeted enterprise is low and its surroundings quiet.

It is important to note within this context that individuals or groups that operate under other names (see Appendix 1) are believed to be associated by membership or leadership with the Animal Liberation Front. In fact, ALF activists are believed to use alterative group titles as another tactic of evading detection, often alternating names according to the severity of the activity. During the course of this study, no information arose to suggest that any of these groups operated fully independently of, or in competition or conflict with, the Animal Liberation Front. The most prominent and violent of these counterpart groups is the Animal Rights Militia, which has claimed responsibility for acts in the United Kingdom, the United States, and Canada. The newest name to arise in connection with extremist animal rights activity is the Animal Liberation Action Foundation, which was not observed as claiming responsibility for acts until 1993. In all, 23 different entities were document-

ed as having claimed responsibility for violent or disruptive acts against animal enterprises in the United States since 1977.

The operational relationship between extremist animal rights groups such as ALF and radical environmental groups has not been definitively determined. Both groups undoubtedly share a belief in direct action tactics, and are believed by many to maintain interlocking contacts among their leadership and membership networks. According to available information, however, in only two extremist incidents involving an animal enterprise has an environmental advocacy group claimed responsibility.[4]

Extent of Animal Rights Extremism in the United States

Throughout the 1980s, fueled by a desire to achieve more tangible results and encouraged by confrontational publications such as *A Declaration of War: Killing People to Save Animals and the Environment*,[5] the frequency and severity of extremist animal rights-related activity in the United States expanded significantly. According to the data examined, between 1977 and June 30, 1993, the Animal Liberation Front and other extremist animal rights groups were documented as having perpetrated 313 individual acts, varying widely in nature and scope, against enterprises or individuals using or marketing animals or animal-derived products. Approximately 60% of the total incidents documented were claimed by ALF. The following is a numerical analysis of this activity. The analysis is based on data compiled by numerous law enforcement, government, professional/trade association, and private industry sources analyzed by the authors of this study.[6] It should be emphasized that the data presented here is based on an aggregation of reported or documented cases only, and does not necessarily represent the entire universe of extremist acts perpetrated on behalf of the animal rights cause.[7]

On the basis of this information, it was possible to identify a number of important factors and trends that characterize animal rights extremist activity in the United States since the first incident was documented in 1977. These patterns, illustrated in the following charts and analyzed in detail below, are, if considered in combination, critical to an effective legislative and law enforcement response to animal enterprise terrorism.

Types of Enterprises Victimized

During the period 1977–June 1993, a total of 28 different types of animal enterprises were victimized by animal rights extremists. University facilities—primarily research laboratories in which animals were maintained for testing—were victimized most frequently. Universities were followed, in order of frequency, by fur retailers, individuals, and the food production and retail industries. The chart on the following page and the table below illustrate the frequency (and percentage of total documented
incidents) at which targeted enterprises and individuals have been victimized during the period.

Generally speaking, ALF and other animal rights extremists tend to target animal enterprises that are easy to infiltrate and access, are readily visible to news media, and can generate maximum public sympathy. They also tend to select enterprises whose employees tend to avoid publicity and who are least prepared to defend themselves or their use of animals before the public. As this study demonstrates, since the inception of animal rights extremism in the United Kingdom and the United States, the biomedical research community has most closely fit these criteria. Assuming that the biomedical research community encompasses universities, federal and private research facilities, and individual researchers, this category represents 135, or 43% of the 313 documented incidents. Taken together, the biomedical research community, the food industry (food production and retail), and the fur retail industry (department stores included),[8] represent almost 82% of all animal enterprises victimized. Just as they have in the United Kingdom, in the U.S. these three industries have been targeted systematically and persistently by animal rights extremists.

Perhaps the most disturbing pattern to emerge during the period in question was that individuals and their personal property were targeted with increasing frequency. In recent years especially, animal rights extremists appear to have become more willing to repeatedly and systematically victimize individuals and their personal property with varying degrees of harassment, intimidation, and property defacement or destruction. Since 1977, 43, or almost 14%, of all documented incidents involved the victimization of individuals or their personal property. The victimized individuals were, primarily, research scientists working in the field of biomedical research using animals. According to practitioners, and substantiated by ALF leaflets and other militant animal rights publications, two interrelated factors could account for this trend. First, beginning in the United Kingdom and, predictably, taking root in the U.S., animal rights extremists deliberately have sought to personalize their attacks, victimizing living perpetrators of "animal abuse" in addition to sabotaging the facilities in which they work. Second, and more practically, most industries that have been targeted systematically throughout the years have responded to this onslaught with heightened security, leaving the individual researchers themselves highly visible and vulnerable representatives of the biomedical research community.[9] It is important to note that acts against individuals or their property are likely underestimated in the data analyzed for this study. It is assumed that, for fear of retaliation or other emotional factors, not all of the individuals who are victimized by animal rights extremists choose to publicize or report incidents to law enforcement authorities.

Table 1 provides a detailed breakdown of the types of enterprises victimized by animal rights extremists and number of times each was victimized during the 1977–June 1993 period.

Thus far, unlike in the United Kingdom, pharmaceutical companies in the U.S. that use animals for drug testing have not been regularly victimized by animal rights extremists. During the period examined, no pharmaceutical companies using animals for testing medicinal products were documented as having been victimized by animal rights extremists. Only four cosmetic companies were victimized. In view of the increasingly militant rhetoric as well as numerous threats leveled against the pharmaceutical industry, however, law enforcement officials and representatives of the biomedical research community agree that it soon could become a target for extremist actions.

Types of Activity

By far the most prominent animal rights-related activities in the U.S. that fall within this report's definition of "extremism" are

Table 1. Type of Enterprise Victimized and Number of Incidents Documented (In Order of Frequency)

Enterprise Type	No. of Incidents	Percentage of Total Incidents
University Facilities (medical and research)	63	20
Fur Retailers	48	16
Individuals/Private Residences	43	14
Agricultural/Food Production Facilities*	28	09
Markets/Delis/Butcher Shops	33	11
Private Research Facilities/Labs/ Medical Centers	21	07
Department Stores	12	04
Federal Research or Medical Facilities	08	03
Breeding Ranches**	07	
Professional Associations	06	
Restaurants	06	
Animal Shelters/Animal Welfare Societies	05	
Cosmetic Companies	04	
Fur-Animal Farms/Breeders	03	
Local Government Facilities	03	
Rodeos	02	
Feed Cooperatives	02	
Stables/Liveries	02	
Parks/Youth Centers	02	
High School Laboratories	02	
Zoos/Wild Animal Parks	02	
Hunt Clubs	02	
Guns and Ammunition/Hunting Stores	02	
Taxidermists	02	
Circuses	01	
Leather Retail Stores	01	
Wildlife Societies	01	
Stadiums	01	
Pet Breeders	01	
Total	313	

* Most commonly meat packing/processing companies, but also including slaughterhouses, and, much less frequently, livestock and poultry farms.
** Including ranches raising animals for the purpose of research.

those that were introduced and perfected during the modern animal rights movement's early development in the United Kingdom as "staples" of extremist activism. As the graph on the following page illustrates, the most common of these activities is vandalism involving minor property damage. This activity includes the painting of graffiti (usually ALF slogans or threats[10]), broken windows, defacement, glued locks, and other acts causing minor property damage and/or minimal disruption of commercial or professional operations. Minor vandalism is the most easily perpetrated and least costly form of "economic sabotage," involving some activities that do not have to be reserved for the most violent, "hard core" adherents to the animal rights cause. Of the 313 documented incidents examined in this study, minor vandalism was documented as having occurred 160 times, or in about half the cases. These data demonstrate that a majority of the documented incidents would likely not constitute a violation of the Animal Enterprise Protection Act or any other federal law, and therefore would not normally be reported to federal law enforcement authorities.

Although minor vandalism is not itself a new tactic, the targets at which it is directed have become more personalized. All of the extremist acts that have been directed against individual researchers have involved either threats against their person or family members or vandalism to their personal property, or both. Of all the cases examined, 29 involved personal threats ranging in severity from intimidation and harassment to letters promising death or bodily injury. In many cases, researchers' homes or automobiles were vandalized, most commonly with graffiti. However, no cases involving acts against individuals or their property entailing destruction greater than minor vandalism have ever been attributed definitively to animal rights extremism.

The second most common type of activity, occurring 77 times, was the theft or release of animals. Animal "liberation" is a traditional tactic that reaches to the heart of the animal rights movement and provides the ultimate philosophical justification for militant activity. Indeed, most raids on research laboratories and other animal enterprises in which live animals are maintained are conducted for the sole purpose of freeing the animals from captivity. In some cases, raids conducted by the Animal Liberation Front are known to have resulted in the release of hundreds of animals. Many practitioners in the biomedical research community maintain that this activity can be as threatening to the freed animals as it is to the enterprise itself. By ALF activists' own admission, for instance, animals of undomesticated origin that are bred and raised in captivity are most often released into the wild, where they may not possess the skills to survive.[11] During the course of most of these raids, the painting of graffiti and other acts of minor or major vandalism, most often entailing the destruction of equipment, are perpetrated at the scene.

The high incidence of minor vandalism suggests that most extremist animal rights–related acts continue to be small scale and fairly haphazard. The data nevertheless indicate that ALF and associated groups are capable of more sophisticated actions requiring a higher level of planning and coordination. Of these more serious but less frequent activities, vandalism involving major property damage, most often by arson, is the most noteworthy. Major vandalism includes, primarily, the destruction of property by arson or other means resulting in major structural damage and/or property loss as well as significant disruption of commercial operations. This activity, occurring in 26 of the 313 documented incidents, is the most destructive and costly form of "economic sabotage," and in some cases has been categorized by the Federal Bureau of Investigation as "domestic terrorism."[12] Acts of major vandalism have ranged from the destruction of sophisticated laboratory equipment to the destruction of the victimized facility as a whole. As the figures below indicate, in the tradition of ALF activity in the United Kingdom, arson is the preferred means of major destruction for ALF's "hard core" activists in the U.S.[13] In the United States, arson is most commonly accomplished with unsophisticated non-electrical incendiary devices. Just since the passage of the Animal Enterprise Protection Act in August 1992, there have been two incidents of major vandalism, both involving arson.[14]

Given the multiplicity of the types of activities animal extremists engage in, it should be emphasized that these actions are not necessarily mutually exclusive, often being perpetrated in various combinations. For example, ALF and other groups paint graffiti at the incident scene in a vast majority of cases, although most commonly in combination with other acts such as vandalism or the theft of animals. In the data presented below, cases involving overlapping activities during any one incident are sorted according to themost serious activity perpetrated during that event. Even though arson

Table 2. Type of Activity Perpetrated and Number of Times Documented (In Order of Frequency)

Activity	No. of Incidents	Percentage of Total Incidents
Vandalism: Minor Property Damage	160	51
Theft/Release of Animals	77	25
Threats Against an Individual	29	09
Vandalism: Major Property Damage	26	08
Arson	21	07
Bomb Threat	16	05
Firebombing	14	04
Hoax Bomb	09	03
Other Theft	05	
Billboards destroyed/defaced	04	
Bombing Attempt	03	
Non-Threatening Letters/Telephone Calls*	02	
Personal Attack/Assault	02	
Arson Attempt	01	
Assassination Attempt	01	

* Pertains to animal rights groups making friendly contact with a perceived conduit or sympathizer in a targeted enterprise.

and firebombing were the principal means by which acts of major vandalism were perpetrated, they have been factored out of the major vandalism category to depict the incidence of each tactic during the 1977–June 30, 1993 period.

Table 2 provides a detailed breakdown of the types of extremist activities perpetrated by animal rights extremists and the number of times each activity was documented during the 1977–June 1993 period. As these activities often overlap in any given incident, a total of the activities would far exceed the incident total and therefore is not stated. It should be noted that, due to their only marginal relevance to the mandate of the Act as well as their high incidence, demonstrations, sit-ins, and other protests are not presented here. According to the data analyzed, during the 1977–1993 period over 200 animal rights-related demonstrations were recorded as occurring, some resulting in arrests of individuals for trespassing.

Despite the severely destructive nature of some of these activities, none of the extremist animal rights-related activities analyzed for this report is known to have resulted in the injury or death of another individual.[15] In addition, it is important to note that, unlike in Canada and the United Kingdom, there have been no major incidents involving product tampering or contamination hoaxes claimed by or attributed to animal rights extremists. And, finally, there is no evidence to indicate that firearms were used during the course of any of the documented incidents in the United States.

Geographical Patterns of Activity

It is generally believed that extremist animal rights-related activity in the United States originated on the east coast. The first on record, for instance, occurred in New York.[16] Soon afterward, activities in Maryland, the District of Columbia, and Florida were documented. During the course of the 1980s, however, the locus of ALF activity shifted to the west coast as the incidence of activities dramatically increased. Since the mid-1980s, California has been unequalled in the number of incidents claimed by ALF and other groups. Altogether, approximately 54% of all documented incidents occurred in the western United States (excluding Hawaii). The corresponding figure for the east coast region of the U.S. is 34%. Extremist animal rights-related activity was documented in 28 states and the District of Columbia during the 1977–June 30, 1993 period. The overall geographical patterns are depicted by the chart on page 18 and in Table 3.

Chronological Patterns

The first documented extremist animal rights-related incident occurred on May 29, 1977, when two dolphins were released from a marine laboratory at the University of Hawaii by a group calling itself the Undersea Railroad. Following this incident, incidents numbered only a few each year through the late 1970s. Beginning in 1982, the level of activity increased fairly steadily through the mid-1980s, decreasing for the years 1985 and 1986, and surging significantly in 1987 and 1988. In the subsequent years, extremist animal rights activity dropped steadily, by 1992 reaching its lowest level since 1986. As of June 30, 1993, the number of extremist animal rights-related incidents had already exceeded the 1992 incident total. About half of the activities occurring during the first half of 1993 involved threats against individual researchers and/or acts of

Table 3. Number of Incidents by State (In Order of Frequency)

State	No. of Incidents	Percentage of Total Incidents
California	143	46
Maryland	20	06
Pennsylvania	16	05
Florida	16	
New York	16	
North Carolina	11	04
Washington	09	03
Illinois	08	
Georgia	07	
Unknown*	07	
Washington, DC	06	
Oregon	05	
Minnesota	10	
Massachusetts	05	
Ohio	04	
Tennessee	04	
Nevada	03	
Connecticut	03	
Michigan	03	
Arizona	02	
Hawaii	02	
Utah	02	
Montana	02	
Texas	02	
Virginia	02	
New Jersey	01	
Delaware	01	
Missouri	01	
Colorado	01	
South Carolina	01	
Total	313	

* Available sources did not indicate the location of these incidents.

minor vandalism against their personal property, including private residences.

Given the wide fluctuations in ALF activity during the 1980s, the cause of this recent decline cannot be reliably discerned. Nevertheless, a number of occurrences directly resulting from the onslaught of animal rights extremism throughout the 1980s can be isolated as possibly having influence on this decline. First, as detailed above, in 1988 the FBI began its investigation of ALF as a domestic terrorist organization. Second, the decline in ALF activity through the early 1990s coincided with the deliberation of legislation to protect animal enterprises and the ultimate passage of the Animal Enterprise Protection Act in August 1992. Third, at this time federal grand juries were being convened to investigate ALF's highly destructive activity. And, finally, according to representatives of the biomedical research, agriculture, and fur producing communities, by the late 1980s industries that systematically had been targeted by animal rights extremists began to significantly tighten their security postures.

Whether or not these events in any way affected the incidence of extremist animal rights activity, the evidence clearly suggests that by the early 1990s activity claimed by ALF and other groups had noticeably declined. In view of these trends, illustrated in Table 4, ALF activity should be monitored regularly to ensure that animal rights extremism in the 1990s does not suddenly and destructively increase as it did during the 1980s.

Effects of Animal Rights Extremism in the United States

The consensus among practitioners in industry, government, academia, and law enforcement alike is that animal rights extremism in the United States has significantly affected, both directly and indirectly, the enterprises and industries that it has victimized. As the statistical data on this issue was inadequate, however, it was impossible to derive any definitive estimate of the cumulative financial or other effects of this activity. In examining the effects of animal rights extremism in the United States, therefore, this study relies primarily on anecdotal information, including the impressions of interviewed officials as well as information pertaining to specific documented incidents provided by those officials or by law enforcement authorities. From these accounts we were able to identify the consequences targeted enterprises in private industry, government, and the academic community believe to be most pertinent as well as costly to their operations.

Table 4. Number of Incidents by Year

Year	No. of Incidents	Percentage of Total Incidents
1977	01	
1979	02	
1980	03	
1981	01	
1982	10	
1983	15	05
1984	31	10
1985	17	05
1986	07	
1987	53	17
1988	52	17
1989	37	12
1990	23	07
1991	37	12
1992	11	
1993 (as of June 30)	13	04

Total Years: 16
Total Incidents Reported: 313

By all accounts, the effects of animal rights extremism begin with but go well beyond the readily apparent costs of physical destruction or stolen property. In general, animal rights extremism has had direct, collateral, and indirect effects on animal enterprises or industries. Despite our inability to quantify these effects, the unanimity of concern among all targeted enterprises as well the documentary information that was obtained suggests that the compounded impact of animal rights extremism has imposed a significant cost upon both individual enterprises and the wider commercial industries and research communities of which they are a part. The following is a summary of those effects.

Direct Effects refer to the immediate economic impact of extremist animal rights–related activity. These consequences are the most apparent and costly, as they relate to the disruption of commercial or otherwise critical operations and/or the loss of property due to destruction or theft inflicted during a specific incident. These effects are usually realized in the form of repair or replacement costs. The most common activities—minor vandalism and the theft or release of animals—though less destructive, invariably involve some degree of property damage or loss. For any enterprise type, the release of animals can impose a severe economic burden upon the facility and its operations. Laboratory animals, for instance, can cost thousands of dollars each and, if especially bred and conditioned for the purposes of research, can be difficult to replace.

Even more seriously, as mentioned above, 26 acts of major vandalism, including arson, have been documented since 1977. These cases alone, comprising only 8% of all animal rights-related cases, have involved millions of dollars in economic loss resulting from damaged or destroyed equipment and facilities. The most destructive and costly incident to date was the arson and destruction by fire of a veterinary diagnostic lab under construction at the University of California at Davis. Total damages resulting from this act were estimated at $4.5 million.[17] In all, a total of 12 animal rights-related acts have resulted in direct damages estimated in the hundreds of thousands of dollars, and at least one in which direct damages exceeded $1 million. In five of these cases, the victimized enterprise was a university research facility. (See Appendix 11 for a list of those incidents for which estimates of direct costs were made available.)

Collateral Effects represent the longer-term economic impact of animal rights-related activity. These are the costs enterprises or industries have been compelled to incur in response to being victimized or threatened by animal rights extremists. They are, primarily, expenses relating to attempts to prevent acts of animal rights extremism. According to many practitioners, the need to enhance security is the most prominent among these effects on animal enterprises or industries. Although at least one study has been conducted within the biomedical research community to quantify the financial burden of added security on research facilities, the difficulty of isolating costs solely attributable to animal rights extremism is said to have prevented any definitive or reliable conclusion from being made. Informally, however, most targeted industries agree that security costs for animal enterprises have risen anywhere from 10% to

20% as a result of extremist animal rights activity. These costs most often include the addition or enhancement of both operational (e.g., security personnel) and structural security systems.

For all targeted industries, another collateral cost associated with animal rights extremism is a higher overall risk of being victimized, which often translates into higher insurance premiums. Although most animal industries agree that this is without doubt a collateral cost factor, none could comfortably offer a measure of its actual effect on animal enterprises. For commercial enterprises such as food or fur retailers, collateral costs also include the temporary loss of business due to the repair or replacement of the facility. In more extreme cases such as those experienced in the fur industry, the impact of an attack on local public opinion can translate into the gradual and potentially permanent loss of clientele.

The fur retail industry was the only industry regularly victimized by animal rights extremism that provided a current estimate of the cumulative direct and collateral effects of this activity. According to a recent survey of the approximately 1,500 fur retailers in the United States,[18] animal rights-related activity resulted in an estimated $17.5 million in direct and collateral costs from 1987 through 1992. Most of this, the analysis concludes, reflects the cost of physical damages, including repair and replacement expenses. Costs relating to enhanced security, although proportionally much less, also are included in this estimate. The impact on clientele and other potential "opportunity costs" were not quantified in the fur industry's study.

Indirect Effects are those that cannot be directly measured in financial or economic terms, but which may result from the direct or collateral costs mentioned above. Despite the unavailability of specific estimates, it can be concluded with some confidence that both the direct and collateral effects of extremist animal rights activities are often high enough to eliminate or divert resources away from research or other activities relating to the use of animals. The loss or diversion of resources inevitably has intangible consequences, especially for the biomedical community and other non-revenue generating industries. These costs often include: the loss, disruption, or delay of ongoing research; higher research costs; scheduled research projects postponed or cancelled; and research grants withheld. Another disruptive, albeit less resource-dependent effect of animal rights extremism is the apprehension and fear that this activity can instill in an employee of any victimized animal enterprise.

For university-based, or otherwise non-revenue generating animal enterprises especially, the theft of animals and records and the destruction of equipment or other property, perpetrated in tandem, can be financially burdensome, disruptive to the progress of the targeted project, and demoralizing for employees. In order to illustrate the compounded effect animal rights extremist activity can have on an animal enterprise, it is worth relating the details of an incident for which cost estimates were made available. The following describes one of the three incidents that the FBI has officially characterized as being an act of domestic terrorism.

In July 1989, without warning, ALF activists illegally entered a laboratory and office at Texas Tech University's Health Sciences Center in Lubbock, Texas. The laboratory was operated by Dr. John Orem, who was conducting research on sleeping disorders—including Sudden Infant Death Syndrome (SIDS)—and using cats for experimentation. During the intrusion, laboratory equipment was damaged or disabled, slogans were spray-painted on the walls, and five adult research-conditioned cats were stolen. Immediately following the raid, an intense propaganda and harassment campaign focusing on Dr. Orem's research ensued. In traditional fashion, People for the Ethical Treatment of Animals held a news conference and issued a statement justifying the release of the cats.

According to an official with the South Central Sector of USDA's Animal and Plant Health Inspection Service, Regulatory Enforcement and Animal Care:

> Research was essentially stopped for one year. Extensive time was lost repairing or replacing equipment and [Dr. Orem] was not permitted to house animals in his facility until added security was installed. Responding to the continuing propaganda campaign and investigations together with the loss of morale, energy, and productivity caused by this "incident" interfered with the resumption of research and cannot be assigned a monetary value.

The cost of replacing the stolen cats, which had not yet been used in research, was estimated at $2,500. Repair and replacement costs were estimated as follows: facilities—$15,500; equipment—$3-1,800; and supplies—$6,200. It was also reported that, as a result of the incident, the laboratory facilities and equipment were fully or partially inactive for 45 weeks. In addition, it was estimated that the institution's cost of paying the research scientists and staff as well as maintaining the facilities and equipment during the inactive period ran into the hundreds of thousands of dollars. Ultimately, after the direct, collateral, and indirect consequences of the incident were considered, the total cost to the targeted institution was estimated at just over $1 million.

When the direct, collateral, and indirect effects of incidents such as this are factored together, ALF's professed tactic of "economic sabotage" can be considered successful, and its objectives, at least toward the victimized facility, fulfilled.

The Official Response to Animal Rights Extremism in the United States

In addition to the FBI's investigation of ALF as a terrorist organization from 1988 through 1990, and the ultimate enactment of the Animal Enterprise Protection Act, federal authorities have responded to animal rights extremism by launching a number of grand jury investigations of major incidents. Some of these currently are ongoing, including inquiries into the following incidents:

- June 1991 break-in and firebombing of mink farm facility at Oregon State University. The facility damaged by fire was used for storing feed and equipment. ALF claimed responsibility.

- June 1991 destruction by fire of the Northwest Farm Food Cooperative facility in Edmonds, Washington. The cooperative supplied animal feed and bedding to northwest fur farms. ALF claimed responsibility.

- October 1992 break-in, release of animals, and arson at Utah State University. The target was a USDA-sponsored predator ecology project in which coyotes were maintained for experimentation. ALF claimed responsibility.

On July 16, 1993, a federal grand jury in Grand Rapids, Michigan returned a five-count indictment against Rodney Coronado—a suspected ALF member—in connection with the

February 1992 break-in, vandalism, and arson at Michigan State University.[20] The indictment includes charges of arson, destruction of government property, theft, and the use of an explosive. The targeted project involved fertility research using minks for experimentation. ALF claimed responsibility for the incident.

Since the appearance of illegal activity relating to the cause of animal rights, only nine persons have been convicted in connection with a specific incident. Only one person—Fran Trutt—was convicted on federal charges (see footnote number 27 below), and only one person—Roger Troen—has been convicted of involvement in an incident claimed by ALF.[21] To date, no one has been charged under the Animal Enterprise Protection Act of 1992.

Since 1988, 32 states have enacted laws aimed at protecting animal enterprises from animal rights-inspired violence and destruction. They are, by year of enactment, as follows:

1988	1989	1990
Massachusetts	Indiana	Arizona
Minnesota	Utah	Georgia
		Idaho
		Illinois
		Kansas
		Kentucky
		Louisiana
		Maryland
1991	**1992**	**1993**
Arkansas	Colorado	Florida
Iowa	Missouri	Maine
Montana	Nebraska	
New York	South Carolina	
Naorth Dakota	Tennessee	
Oklahoma	Virginia	
Oregon		
Texas		
Washington		
Wisconsin		

As of June 1993, similar legislation was being considered by legislatures in New Jersey, Alabama, and New Hampshire.

Animal Rights Extremism in Other Countries

On the basis of the information examined during the course of this study, there appear to be no operational, logistical, or financial linkages between the Animal Liberation Front or other extremist animal rights groups in the United States and groups in other countries. Similarly, we found no evidence that groups based in other countries are operating or sponsoring activities in the United States. As evidenced by its "cellular" organizational structure, ALF and its associated groups appear to remain localized, connected with their foreign counterparts by little more than a common philosophy and operational "example."[22] As such, animal rights extremism can more accurately be characterized as multinational than as international. Besides the United Kingdom, animal rights extremism has been observed in other European countries, including the Netherlands, Germany, France, Ireland, Sweden, Iceland, and Italy. Activity also has been documented in Canada, Australia, New Zealand, and Israel.[23]

Despite the apparent absence of tangible connections, animal rights extremism in the United Kingdom exerts considerable influence over the phenomenon in the United States. Since emergence of the Band of Mercy and then the Animal Liberation Front in the 1970s, militant animal rights-related activity in the United Kingdom has continued unabated. Not only has animal rights extremism in the U.K. set the ideological stage for adherents in the United States and other countries over the years, but it also has established the example for violence and destruction. Consistent with their common origins, it is widely believed by practitioners in targeted enterprises and law enforcement alike that animal rights extremism has and continues to progressively follow the movement in the U.K. According to an official with New Scotland Yard's Animal Rights National Index (ARNI),[24] for example, the United States is "five years behind the United Kingdom, but catching up quickly," in the severity of activity. If this assessment is correct, the critical differences between animal rights extremism in the U.K. and the U.S. will be extremely important to the ability of law enforcement, government, and industry to identify and prepare for potential changes in the nature of animal rights extremism in this country. The patterns of activity in the U.K. that reflect these differences are highlighted below.

First, the frequency of extremist animal rights activity in Britain has consistently far exceeded that in the United States.[25] Since the mid 1970s for instance, thousands of extremist animal rights incidents have been documented in the United Kingdom. During the period 1990–1992 alone, ARNI documented 2,980 incidents involving militant animal rights activity. Even during this three year period, yearly incident totals varied widely, mirroring very roughly the fluctuation of activity in the United States, but on a much larger scale. Following a lull in 1990, when 573 incidents causing damage estimated at £551,350 were recorded, British authorities observed a substantial increase in activity. In 1991, 1,718 incidents were documented, causing an estimated £8,539,000 in damage. Activities decreased to 689 in 1992, when cumulative damage was estimated at almost £2 million.[26]

Secondly, the willingness to cause more severe destruction to animal enterprises in the United Kingdom traditionally has been greater than in the United States. As the Band of Mercy and the Animal Liberation Front in Britain pioneered the tactic of economic sabotage, they have progressively broadened the means by which it is achieved. Most notably, throughout the 1980s, ALF in Britain escalated its use of incendiary devices to cause damage to animal enterprises. Although unsophisticated non-electrical incendiary devices—such as "Molotov cocktails"—were and continue to be preferred for their ease of construction and predictable effectiveness, ALF and other groups in the U.K. have demonstrated an increasing willingness to use timed or electrical incendiary devices in their attacks against important targets. These have included mail bombs and car bombs, which are both more controllable and destructive than simple incendiary devices. In recent years, it has become common for hundreds of incendiary devices of varying levels of sophistication to be used in attacks during the course of only one year in the U.K. In 1991, for instance, over 250 crude incendiary devices reportedly were used against the meat industry alone.

The increased sophistication and use of incendiary devices in the United Kingdom appears to have coincided with the "personalization" of the conflict—that is, the willingness to cause harm to an individual or his/her personal property. In a number of cases during

the 1980s and early 1990s, explosive devices were attached to automobiles belonging to biomedical researchers, some without warning. Most were discovered and defused, but some actually detonated. Although these and other devices have caused much harm to vehicles and other property, they are known to have resulted in no deaths and only one injury—to a small child, who recovered. In the United States by contrast, there has been only one confirmed case involving the use of this type of explosive with the intent of harming an individual.[27]

In addition, also unlike in the United States, threats and claims of product tampering or contamination have been common in the U.K. The most disruptive and costly of these occurred in 1984, when activists claimed to have poisoned Mars chocolate bars to protest dental research on monkeys. The claim turned out to be a hoax, but cost the company an estimated £3 million. More recently, in November 1991 animal rights activists claimed to have contaminated bottles of Lucozade, a health drink manufactured by Smith Klein Beecham. Removing the product from store shelves for one day alone cost the company an estimated £9 million.

With regard to targeted enterprises or industries in the United Kingdom, it should be mentioned that the tactics of economic sabotage and propaganda have most seriously affected the country's fur industry. According to British law enforcement sources, a prolonged arson campaign that began in the mid-1980s has resulted in a dramatic loss in fur sales and, consequently, revenue. Claiming this a success, animal rights extremists, while continuing to victimize the meat industry, biomedical research community, and fox hunters, began shifting their attention toward the pharmaceutical industry. In contrast with the activities of animal rights extremists in the United States, for activists in the United Kingdom the pharmaceutical industry has become a "preferred target" to be systematically and persistently victimized.

Whether animal rights extremism in the United States will evolve toward these patterns of heightened activity in the United Kingdom cannot be predicted with any certainty. After all, the frequency and severity of incidents in any country relates as much to the unique national circumstances and constraints—such as geography and the level of public sympathy or tolerance—as to the diligence or ideological zeal of the individual activists. It is believed, for instance, that given the U.K.'s geographical size,[28] hard core animal fights extremists there work in closer coordination with each other than activists in the United States. It also has been suggested that ALF and other groups in the United Kingdom have and continue to draw members from the ranks of other fringe and/or subversive political groups. Prominent among these are left-wing anarchists presumably disaffected by the end of the Cold War. There is no evidence relating to the role of other political groups or ideologies in ALF's operations or membership sources in the United States. Despite these fundamental differences, however, it can be concluded that, since its inception in the U.S., the general momentum of animal rights extremism in this country has and continues to follow closely the example established in the United Kingdom.

General Conclusions

On the basis of the analyses conducted during the course of this study, it is possible to draw the following general conclusions about animal rights extremism in the United States.

• After emerging in the United States out of the tradition established in the United Kingdom, extremist animal rights-related activity increased in frequency from the late 1970s through the mid-1980s, reaching a high point in the years 1987 and 1988, and generally declining through June 1993. In all, 313 incidents involving animal rights extremism were documented during the period.

• Claiming approximately 60% of the 313 documented incidents, the Animal Liberation Front (ALF) is by far the most active of the 23 entities observed as having claimed responsibility for violent or disruptive acts against animal enterprises in the United States since 1977. ALF is believed to have a very loosely organized membership of 100 or fewer militant activists who are willing to inflict large-scale damage or destruction on behalf of their cause. All extremist animal rights groups are believed to be associated with each other by leadership, membership, or both.

• Throughout the 1980s, ALF and other groups employed the traditional tactics of minor vandalism and the theft of animals most frequently. Altogether, a largemajority of the extremist animal rights-related incidents occurring during the 1977–June 30, 1993 period were not of the severity or cost to be covered by the Animal Enterprise Protection Act of 1992. During the same period, however, extremists associated with the animal rights cause demonstrated an increasing willingness to engage in more militant and costly activities. These included acts of major property destruction, primarily by means of arson. A total of 26 acts of major property destruction, inflicting damages estimated in the millions of dollars, were documented during the period.

All extremist animal rights groups are believed to be associated with each other by leadership, membership, or both.

• Animal enterprises most persistently and systematically targeted by animal rights extremists during the 1977–June 1993 period were, in order of frequency, the biomedical research community, the meat production and retail industries, and the fur production and retail industries. The biomedical research community alone, encompassing university, federal, and private research facilities, constitutes 43% of all documented cases. The most disturbing pattern to emerge during the 1980s was that individuals and their personal property were and continue to be targeted with increasing frequency and persistence.

• Although, in the United States, animal rights extremism was first observed on the east coast, during the study period as a whole the majority of incidents occurred in California. In all, approximately 54% of all documented incidents claimed by ALF and other groups occurred in the western United States (excluding Hawaii). Extremist animal rights-related activity was documented in 28 states and the District of Columbia during the 1977 - June 30, 1993 period.

• The consensus among practitioners in industry, government, academia, and law enforcement alike is that animal rights extrem-

ism in the United States has significantly affected the enterprises and industries it has victimized. These effects include the direct costs of physical destruction or stolen property, the collateral costs of enhanced security, higher insurance rates, lost clientele, and the indirect costs of disrupted, delayed, or cancelled research. These compounded effects on targeted animal enterprises have not been reliably quantified.

• Since the emergence of animal rights extremism in the United States, only six persons have been convicted in connection with a specific incident. Only one person has been convicted on federal charges, and only one (another) person has been convicted of involvement in an incident claimed by ALF. To date, no one has been charged under the Animal Enterprise Protection Act of 1992.

• Incidents relating to animal rights extremism have been documented in numerous foreign countries. Animal rights extremism in the United Kingdom, where the phenomenon originated and continues to be much more severe than in the United States, has substantially influenced the movement in this country. British activists have set not only the ideological stage for adherents in the U.S. but also have established the example for violence and destruction. Activists in the United States have and could continue to progressively follow this example. Nevertheless, this study uncovered no evidence that would suggest that there are any operational, logistical, or financial connections between ALF or other groups in the U.K. (or other countries) and their counterparts in the United States.

Endnotes

1. See "Terrorism in the United States: 1990," published by the FBI's Terrorist Research and Analytical Center, Counterterrorism Section, Criminal Investigation Division.

2. It has been observed, however, that some prominent activists within the animal rights movement in he United States are, or at one time were, British subjects. Some even suspect that ALF in the United Kingdom operates "training camps" for activists from the United States and other countries. This suspicion has never been substantiated.

3. Though never publicly condoning ALF's illegal activities, PETA representatives almost always voice support for the motive or principle underlying any given incident.

4. In January 1989, the Dixon Livestock Building in Dixon, California was set on fire, resulting in damage estimated at $250,000. The radical environmental advocacy group Earth First! claimed responsibility for this incident and for painting the slogan "Agribusiness Kills" on the California Cattleman's Association building in Sacramento.

5. Published in 1991 under the pseudonym "Screaming Wolf." A Declaration of War is an inflammatory "call to arms" for animal liberationists. In extremely confrontational terms, the book encourages an escalation of violence and sabotage against animal enterprises, and, especially, individuals.

6. It should be noted that this data, by the acknowledgement of the numerous entities that provided it, was derived and compiled primarily on the basis of news media reports, often with confirmation from law enforcement authorities or the targeted enterprise or industry. As of the completion of this study, there was no federal or otherwise central independent authority for regularly monitoring animal rights-related extremist activity in the United States.

7. In fact, it is generally believed that many animal rights-related incidents—especially those involving relatively minor acts of violence such as graffiti—go unreported, and therefore are numerically underestimated in this analysis.

8. As it was not possible to determine conclusively from documented cases whether department store were targeted for their fur or leather sales, or both, these stores were factored out of the fur retail category. As most anecdotal data suggests that the vast majority of victimized department stores were targeted for their fur sales, however, these incidents can be added back to the fur retail category for a view of the wider impact of animal rights activity on the fur industry. When this is done, 60, or 19% of all documented incidents involved the fur industry. Because this figure is based on the number of documented incidents only, it may be an underestimation. According to a recent industry-sponsored survey of fur retailers, for example, 43% of the 1,500 fur retailers in the United States reported that they had been victimized by animal rights activists in some way just within the past year. Because individual fur retailers, like other animal enterprises, often prefer to avoid the potential consequences of publicity, many incidents go unreported and therefore would not be reflected in this analysis.

9. A recent example of this factor involved the vandalism of research scientists' personal property in the Maryland suburbs of Washington, D.C. On April 27, 1993, the homes, and in some cases automobiles, of five scientists employed with the National Institutes of Health (NIH) were vandalized with graffiti. A group calling itself the "Animal Avengers" claimed credit for the acts. In response to numerous demonstrations, burglaries, and other animal rights-related incidents occurring throughout the 1980s, the NIH has and continues to enhance its security posture. It is believed that, deterred by the increased risk of detection at the NIH facilities, the perpetrators of these crimes sought to fulfill their objectives by targeting the individual researchers where they were most vulnerable.

10. Slogans commonly painted on walls and windows include: "ALF," "Meat is Murder," "Animal Auschwitz," and "Meat is Death and You are Next."

11. Ironically, in some cases the animals the activists intended to release during the given raid never left their cages. In other cases, animals were known to have returned to the victimized facility following the incident.

12. To date, the most serious and costly act attributable to animal rights extremism was the April 1987 destruction by fire of a veterinary diagnostic laboratory under construction at the University of California-Davis. This attack, claimed by the Animal Liberation Front, was the first animal rights-related incident to be categorized as an act of domestic terrorism by the Federal Bureau of Investigation. As a direct result of this case, in late 1987 the FBI launched an investigation of ALF as a domestic terrorist organiza-

tion. The FBI continued this investigation through September 1990. Only two other incidents have been officially characterized as domestic terrorist acts: 1) the April 1989 arson at the University of Arizona in Tucson; and 2) the July 1989 theft of animals and destruction of equipment at Texas Tech University in Lubbock.

13. In both the United States and the United Kingdom, the Animal Liberation Front has claimed in many cases involving arson that its intent was not to engulf the targeted facility in flames, but rather to activate the sprinkler system so as to damage the contents of the facility with water.

14. These incidents were: 1) the October 1992 break-in and arson at the USDA predator ecology project at Utah State University; and 2) the November 1992 firebombing of five Swanson Meat trucks in Minneapolis, Minnesota. Direct damage in each case was estimated at over $100,000.

15. In February 1990 Dr. Hyram Kitchen, Dean of the Veterinary School of the University of Tennessee, was shot and killed on his private farm. One month before the incident, a local police department issued an alert through the FBI's National Crime Information Center that various sources, including mail received by the University of Tennessee, indicated that animal rights extremists has threatened to assassinate a veterinary dean within the following 12 months. No one was ever arrested for the act and there was no claim of responsibility. Some suspect that ALF or another extremist animal rights group or individual was responsible, It must be emphasized, however, that this suspicion has never been substantiated.

16. This case involved the theft of four laboratory animals from a New York University research facility.

17. Although "ALF" graffiti was discovered at the scene of the blaze and a television reporter received a call from an individual claiming responsibility on behalf of ALF, the group later claimed that it had set the fire selectively, not intending to destroy the entire facility.

18. According to fur retail industry representatives, the number of fur retail enterprises in the United States has dropped from approximately 2,400 in 1987 to about 1,500 in 1993. The industry does not attribute this decline to animal rights activism, but rather to recessionary and other economic factors.

19. Many of the university-based research projects victimized over the years have ben funded—either partially or in full—by government agencies such as the U.S. Department of Agriculture or the National Institutes of Health.

20. Rodney Coronado, who also is wanted in Canada on charges relating to the vandalism of fur retailers, is still at large.

21. In January 1988, Roger Troen was convicted in an Oregon county circuit court on charges of first-degree theft and second-degree burglary relating to his involvement in an October 1986 break-in and theft at the University of Oregon in Eugene.

22. Operational techniques employed by ALF in the United Kingdom are often shared with counterparts in other countries through underground manuals, such as a guide to building incendiary devices, and openly available periodicals, such as the British ALF publication "Arkangel for Animal Liberation."

23. In Canada most notably, over 50 incidents—including a costly product contamination hoax—claimed by extremist animal rights groups have been documented since the early 1980s. Most of these acts were claimed by either the Animal Liberation Front or the Animal Rights Militia.

24. In 1984, the Animal Rights National Index was established for the purpose of monitoring animal rights activities in the United Kingdom. The unit is responsible for collecting, evaluating, and disseminating intelligence relating to animal rights extremism. ARNI has no investigative role; offenses are investigated by officers from other authorities within the British law enforcement community. There is no law in the United Kingdom that is specifically designed to counter animal rights extremism. Rather, charges are often brought under the Criminal Damage Act, Offences Against the Person Act, and the Public Order Act.

25. The higher rate of extremist animal rights-related incidents in the United Kingdom is further accentuated by the size of its population. As of 1992, the population of the U.K. was approximately 58 million, compared with the United States' population of almost 256 million.

26. During the 1990-1992 period, one British pound was worth an average of $1.60.

27. In November 1988, Fran Stephanic Trutt was arrested for planting a sophisticated radio-controlled pipebomb near the parking space of the head of United States Surgical Corporation, a company that uses dogs for testing surgical staples. The bomb was discovered and successfully disarmed. Trutt was apprehended on the company's premises in possession of the bomb's detonator. In January 1989, Trutt pled guilty to federal charges of possessing explosives found in her Queens, New York, apartment, and was sentenced to 14 months of imprisonment. In April 1990, in Connecticut Superior Court, Trutt pled no contest to charges of attempted murder, possession of explosives, and bomb manufacturing. As part of the plea agreement, Trutt was sentenced to one year in prison followed by three years of probation.

28. The United Kingdom comprises a land area roughly the size of the state of Oregon.

Appendix I: Names and Acronyms of Animal Rights Organizations That Claim to Have Perpetrated Acts of Extremism in the United States

Animal Avengers
Animal Liberation Front (ALF)
Animals Now
Animal Rights Calls Animal Rights Militia (ARM)
Band of Mercy (BOM)
Earth First! (EF!)
Earth Night Action Group
Farm Freedom Fighters
Farm Sanctuary
Friends of Animals (FOA)
Fund For Animals (FFA)
Guardian Apes
Human Animal Liberation Front (HALF)
Last Chance for Animals
Paint Panthers
Primarily Primates
Socialist Committee for the Protection of Animals (SCPA)
SUPPRESS (Students United Protesting Research of Sentient Subjects)
True Friends
Undersea Railroad
Urban Gorillas
Vegan Action League
Western Wildlife Unit/Cell (of the Animal Liberation Front)

Appendix II: Major Incidents For Which Estimated Direct Costs Were Available (Exceeding $10,000)

Date	Enterprise Victimized	Description of Action	Estimated Direct Cost
4/16/87	University of California–Davis	Arson/Vandalism	$4,500,000
4/20/85	University of California-Riverside	Break-in-in/Theft	$600,000
12/9/84	City of Hope Research Inst.* and Medical Center, Duarte, CA	Break-in/Theft	$400,000-500,000
6/5/88	Sun Valley Meat Packing Company* San Jose, CA	Arson/Vandalism	$300,000
4/2/89	University of Arizona-Tucson	Break-in/Arson Theft	$250,000
1/29/89	Dixon Livestock Building,* Dixon, CA	Arson/Vandalism	$250,000
11/28/87	V. Melani Poultry,* Santa Clara, CA	Arson/Vandalism	$230,000
11/25/87	Ferrara Meat Company,* San Jose, CA	Arson	$200,000
5/1/86	Simonsen Laboratories,* Gilroy, CA	Vandalism	$165,000
2/28/92	Michigan State University East Lansing, MI	Break-in/Arson Vandalism	$125,000
10/24/92	Utah State University, Logan	Break-in/Arson	$110,000
11/10/92	Swanson Meats,* Minneapolis, MN	Arson	$100,000+
12/6/86	SEMA Corporation* and National Institutes of Health, MD	Theft	$100,000
6/10/91	Oregon State University Corvallis, OR	Break-in/Arson Vandalism	$75,000
7/1/89	Texas Tech University, Lubbock	Break-in	$50,000-70,000
12/25/83	Harbor-UCLA Medical Center	Break-in/Theft	$58,000
10/26/86	University of Oregon, Eugene	Break-in/Theft	$50,000+
9/1/87	San Jose Valley Veal & Beef Co.* Santa Clara, CA	Arson	$35,000
5/29/84	University of Pennsylvania, Philadelphia	Break-in/Theft	$20,000
11/24/86	Omega and HMS Turkey Ranches* Wilton, CA	Theft/Vandalism	$12,000
8/15/88	Loma Linda University, Loma Linda, CA	Break-in/Theft	$10,000

*Indicates a private or otherwise non-academic enterprise

Cerebral Blood Flow and Metabolism

Lars Edvinsson, Eric T. MacKenzie, and James McCulloch
New York: Raven, 1993, 683 pp., illus., index, $130.00

Every so often a scientific field is rewarded by the appearance of a comprehensive, up-to-date, and lucidly written textbook that illuminates a field. Such events have occurred on occasion in physiology, pharmacology, biochemistry, neurobiology, and other disciplines, as well as in narrower, more specialized sub-divisions of the disciplines. Usually such books are single-authored or prepared by two or, at most, three authors who write all the chapters themselves instead of editing a collection of chapters contributed by a variety of authors with often disparate styles and, unfortunately, also quality. When they appear, they greatly enhance the teaching of the subject and the ease with which novices in the field can acquire a sound background. They also provide a ready source of useful information and reference for those already experienced in the field. This book by Edvinsson et al. promises to be such a work in the field of cerebral circulation and metabolism.

Interest in the cerebral circulation and metabolism goes back a long time, but it has particularly burgeoned in the last half century when reliable quantitative methods to study these processes were developed. The availability of such methods to measure not only global but also regional rates of blood and metabolism in the brains of both animals and man has led to an explosion of investigations and, of course, publications on the physiology, pharmacology, and pathology of both processes. Much of the research has been directed at the problems of cerebral ischemia and stroke. Also, because both processes are coupled to the functional activities of neural tissues, measurements of the rates of blood flow and energy metabolism have been used to probe normally and abnormally functioning neural pathways and higher complex functions of the nervous system, such as cognitive processes. Almost all of the information acquired from these studies have been deposited in research papers, specialized review articles, symposium volumes, or monographs and books devoted to limited circumscribed areas within the field. This book by Edvinsson and his colleagues has been sorely needed to select, critically evaluate, combine, and integrate this information in a single readily accessible source. This it has accomplished superbly.

The contents are divided into five major sections, each consisting of a number of chapters. The first three sections are devoted to the Anatomical Bases, Physiological Bases, and Pharmacological Bases. The section on anatomy is beautifully illustrated and contains the most readable and informative treatment of the functional anatomy of the cerebral circulation that I have ever encountered. This is particularly useful for the understanding of not only some subtle aspects of several key methods used to study cerebral blood flow and metabolism but also of some of the focal pathological characteristics of cerebrovascular diseases. The contents of the section on physiology are somewhat more arbitrarily selected and divided into four chapters with most of it devoted to vascular smooth muscle reactivity and metabolic and vascular effects of neurotransmitters in vivo and less than one-third to the blood-brain barrier and energy generation in the nervous system. The emphasis may be criticized, but the treatment of those topics that were selected is uniformally excellent. The last two sections are on Fundamental Responses of the Cerebral Circulation, which includes chapters on methods and on physiological influences and mechanisms important in the regulation of the cerebral circulation, and on Discodered Control-Pathophysiological Aspects-An Overview, which contains in only 62 pages separate chapters devoted to various disorders of the cerebral circulation, such as disordered substrate supply, cerebral ischemia, migraine, subarchnoid hemorrhage, and aging.

One might justifiably raise questions about the distribution of the emphasis given to the various topics comprising the overall subject of the cerebral circulation and metabolism. For example, there appears to be an inordinate amount of space and discussion to the nerve supply to the cerebral vessels and to the role of neurogenic factors in the regulation of cerebral blood flow. Even the chapters on neurotransitters are oriented more to their possible effects on the cerebral vasculature than on their roles in synaptic transmission. This emphasis reflects a parochial viewpoint of the authors who have labored long and hard to establish the importance of neurogenic control of the cerebral circulation, a viewpoint that is still controversial and probably not widely shared.

Nevertheless, this book must be rated as a truly major contribution to its field. The authors should be commended for having assembled from an enormous literature this comprehensive and lucidly written treatment of an active and important field. It should serve as the authoritative textbook for teachers and for new and established investigators for years to come.

Louis Sokoloff
National Institute of Mental Health

Physical Activity and Health

N. G. Norgan (Editor)
34th Symposium Volume of the Society for the Study of Human Biology
New York: Cambridge University Press, 1993, 251 pp., illus., index, $69.95. ISBN: 0-251-41551-9

Possible causal relationships between physical activity and human health interest both physiologists and the general public. The media, for example, widely reported recent U.S. national public health recommendations that the desirable amount and intensity of exercise be revised downwards. The present volume, resulting from a Symposium of the Society for the Study of Human Biology, consists of 16 chapters covering many aspects of the exercise-health connection. Of 16 contributors, 13 are from institutions in the United Kingdom (including the editor), two are from the Netherlands, and only one is from a U.S. institution. Although many U.S. studies are referenced, the volume should prove especially useful for obtaining a non-U.S. perspective. Chapters are generally readable and informative, although the amount of jargon and acronyms, some apparently not defined in the text, seemed a little excessive (e.g., DIY=Do-It-Yourself home improvement?); a table summarizing and defining the acronyms would have helped.

My main conclusion from reading this volume is that the empirical data base pertaining to the exercise-human health relationship is tenuous at best and positively misleading in some cases. I suspect that any empirically-oriented physiologists would find this area of inquiry to be extremely frustrating. As in many scientific studies involving complex human behavior (e.g., amount of voluntary activity, diet, "health"), quality of basic data is a primary limiting factor. Much data on activity and health are based on surveys (often clearly biased), and estimates of something as straightforward as maximal oxygen consumption (VO_2max), which is widely con-

sidered to be the single best indicator of aerobic capacity, are sometimes taken from predictive equations rather than measured. Given the practical problems of studying humans, one immediately imagines that animal models could be fruitfully pursued, but nary a chapter considers them. I do not know if this is due mainly to a lack of such studies, but I do know that some relevant studies exist. A chapter on animal models of human exercise and health relationship, following Alexander's chapter comparing humans to other animals, would have been most helpful. Alexander's conclusion that "human activity is unremarkable," as are their exercise abilities and associated physiological tyraits, strengthens the notion that animal models could prove useful. His comment that "by all other measures of activity, humans seem rather like pigs" should be emblazoned.

Another memorable comment is provided by Durnin (pp. 25–26), discussing jogging: "Surely, at no time in human history, has such useless and selfish exercise been underatken by so many people . . . many of them otherwise sensible and perhaps even intelligent. . . . Nothing constructive is accomplished, no general improvement in anything has occurred, except of a temporary nature, and of concern only for the individual. . . . It is depressing to think of this as a sign of the degradation to which our industrialized culture has descended. " If Sir Winston had ever uttered such rhetoric, no Englishperson would today be a jogger!"

Ironically enough, I read this volume while at a field site in southern France, measuring treadmill endurance capacilties of lizards to test for possible relationships with survivor or dispersal tendencies. As a physiological ecologist and evolutionary phsyiologist, I was struck by parallels between the questions asked of both humans and other animals. For example, do individual differences in aspects of physical fitness, such as locomotor performance abilities, correlate with aspects of Darwinian fitness (i.e., lifetime reproductive success) in natural populations? Do individual differences in habitual activity levels (e.g., home range size) correlate with physical abilities? And, if so, which comes first, the physical abilities or the high activity levels? Judging from Physical Activity and Health, we have virtually no hard evidence pertaining to such questions in humans. For other animal species, only slightly more data are available (see "Evolutionary Physiology in Annu. Rev. Physiol. 1994: 56: in press). Good studies of humans and of "wild" animals could offer reciprocal illumination. I must also note that double labeled water studies of whole-animal energy expenditure by free-living animals are not "new" (p. 160); physiological ecologists have employed them routinely since the late 1960s (e.g., review in Physiol. Zool., 1989, 62: 237–252).

Several chapters deal with psychological aspects of "health," and these ideas and results should be new to most physiologists. I learned, for example (p. 28), that the WHO in 1946 defined "Health [as] a state of complete physical, mental and social well being and not merely the absence of disease or physical infirmity." Proceeding from this definition to a discussion of measurement of "health," Kem (p. 42) goes so far as to conclude that: "In health measurement, the best that can be achieved is to make the value judgements used explicit so that those with other value systems can interpret the data." Again, I can imagine many physiologists squirming.

Misconceptions about genetics are presented more than once. For example, on page 143: "Differences [in VO_2max] of 100% or more between individuals of the same age and sex are . . . too great . . . to be attributable to training status alone and must reflect genetic predisposition." This is incorrect. Such differences do indeed appear too great to be caused by relatively short-term physical conditioning alsone, and therefore must represent inherent differences among individuals. But such differences can be caused wither by genetic or by environmental factors. The latter include any environmental difference experienced by individuals at any stage during development, even, perhaps, during gestation. We simply do not know if environmental factors, applied with sufficient intensity and duration, could produce inter-individual differences of 100% in VO_2max. Thus, "the capacity of the cardiorespiratory system . . . is influenced by both genetic endowment and adaptation through training" (p. 66) and other environmental influences. Claims that "individual potential for physical fitness is genetically based" (p. 58) are similarly without much empirical support.

Theodore Garlan, Jr.
University of Wisconsin–Madison

BOOKS RECEIVED

Bronchial Asthma, Third Edition. Earle B. Weiss and Myron Stein (Editors). Boston, MA: 1993, 1259 pp., illus., index, $210.00. ISBN: 0-316-92899-2.

Clinical and Physiological Applications of Electrical Impedance Tomography. David Holder (Editor). Bristol, PA: Taylor & Francis, 1993, 310 pp., illus., index, $95.00. ISBN: 1-85728-164-0 HB.

Clinical Disturbances of Water Metabolism. Donald W. Seldin and Gerhard Giebisch (Editors). New York, NY: Raven, 1993, 317 pp., illus., index, $150.00. ISBN: 0-7817-0102-3.

Cell Surface and Extracellular Glycoconjugates: Structure and Function. David D. Roberts and Robert P. Mecham (Editors). San Diego, CA: Academic, 1993, 314 pp., illus., index, $79.95. ISBN: 0-12-589630-1.

Cellular and Molecular Biology of Bone. Masaki Noda (Editor). San Diego, CA: Academic, 1993, 567 pp., illus., index, $99.00. ISBN: 0-12-520225-3.

Monitoring in Anesthesiology: Current Standards and Newer Techniques. David Royston and Thomas W. Feeley (Editors). Boston, MA: Little, Brown, 1993, 200 pp., illus., index, $39.00. ISBN: 0-316-27687-1.

Neurobiology of Cingulate Cortex and Limbic Thalamus. Brent A. Vogt and Michael Gabriel (Editors). Cambridge, MA: BirkhÑuser Boston, 1993, 639 pp., illus., index, $199.00. ISBN: 0-8176-3568-8.

Principles of Exercise Biochemistry. 2nd, Revised Edition. J.R. Poortmans (Editor). Medicine and Sport Science, Vol. 38. Basel, Switzerland: Karger, 1993, 304 pp., illus., index, $125.00. ISBN: 3-8055-5778-7.

The Neurobiology of Neural Networks. Daniel Gardner (Editor). Cambridge, MA: MIT Press, 1993, 227 pp., illus., index, $45.00. ISBN: 0-262-07150-9.

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Scientific Meetings and Congresses

Coronary Artery Spasm, February 22–25, 1994, New York, NY. *Information:* Conference Department, New York Academy of Sciences, 2 East 63rd Street, New York, NY 10021. Tel: 212-838-0230; fax: 212-838-5640.

ASPET Colloquium: Multiple Phosphodiesterases, April 23–24, 1994, Newport Beach, CA. *Information:* Kay A. Croker, ASPET, 9650 Rockville Pike, Bethesda, MD 20814-3995. Tel: 310-530-7060.

Workshop on Hepatic Injury Responses and Carcinogenesis, April 24, 1994, Anaheim, CA. *Information:* ASIP, 9650 Rockville Pike, Bethesda, MD 20814-3993. Tel: 301-530-7130; fax: 301-571-1879.

Pharmacology '94 at Experimental Biology '94, April 24–28, 1994, Anaheim, CA. Short Course: "Genetic Manipulation in Pharmacology: Therapeutic Implications for Human Gene Therapy." *Information:* Kay A. Croker, ASPET, 9650 Rockville Pike, Behtesda, MD 20814-3995. Tel: 301-530-7060.

Post-Polio Syndrome: Advances in the Pathogenesis and Treatment, April 27–30, 1994, Bethesda, MD. *Information:* Conference Department, New York Academy of Sciences, 2 East 63rd Street, New York, NY 10021. Tel: 212-838-0230; fax: 212-838-5640.

ARVO Annual Meeting, May 1–May 6, 1994, Sarasota, FL. *Information:* ARVO Central Office, 9650 Rockville Pike, Bethesda, MD 20814-3998. Fax: 301-571-8311.

Third International Congress of Neuroendocrinology, July 3–8, 1994, Budapest, Hungary. *Information*: Congress Secretariat, H-1450 Budapest 9, PO Box 95, Hungary. Tel: +36-1-218-6046; fax: +36-1-215-3064.

Integrative Study in Physiology and Medicine

The 9th Annual Workshop/Annual Meeting of Integrative Study in Physiology and Medicine will be held on Sunday, April 24, 1994, in Anaheim, CA. Introductions will begin at 8:30 am and ends at noon. The integrative study will be "A patient with orthostatic hypertension, neuropathy and amyloidosis" (*N. Engl. J. Med.* 327: 943–950, 1992).

The conveners are Roger Thies, Dept. of Physiology, University of Oklahoma College of Medicine, PO Box 26910, Oklahoma City, OK 73190; tel: 405-271-2226; fax: 405-271-3181; and Joseph Engelberg, Dept. of Physiology, University of Kentucky College of Medicine, 800 Rose Street, Lexington, KY 40536-0084; tel: 606-233-5563; fax: 606-258-1070.

Wellcome Visiting Professorships

Nominations for the Wellcome Visiting Professorships in the Basic Medical Sciences, sponsored by The Burroughs Wellcome Fund, are due by March 1, 1994. The purpose of the Visiting Professorships is to stimulate interst in the basic sciences and to enhance communications with scientists in physiology, biochemistry/molecualar biology, pharmacology, pathology, nutrition, immunology, call biology, biophysics, and anatomy. Selected US institutions will receive distinguished scientists whose interests relate to these disciplines.

Applications should be made by the institutions, not individuasl who want to visitn the institution. A prospective host institution should ascertain the nominee's interest and availability before submitting an application.

The fund provides an award of $1,500 and a plague to the host institution for presentation to the Visiting Professor at the time of the Wellcome Lecture. The fund also provides $500 to each host institution to assist with some of the attendant expenses.

For information contact the Wellcome Visiting Professorship Program, Executive Ofice, FASEB, 9650 Rockville Pike, Bethesda, MD 20814-3998. Tel: 301-530-7090; fax: 301-530-7049.