THE PHYSIOLOGIST

A Publication of the American Physiological Society Volume 37, Number 3 June 1994

Association of Chairmen of Departments of Physiology 1993 Survey Results

Charlene Smith
Department of Physiology, University of Oklahoma Health Sciences Center

Henry P. Clark
Programming Specialist, Oklahoma City, Oklahoma

The Association of Chairmen of Departments of Physiology annual survey was mailed to 157 physiology departments throughout the United States, Canada, and Puerto Rico. A total of 88 surveys were received (none from Puerto Rico), for a response rate of 56%. This rate is slightly higher than for the 1992 survey (49.7%), and identical for the 1991 survey. This was the first year that the new survey form was used in collecting information, and may account for the higher response rate.

Although results based on 88 responses are not statistically valid, they will provide the reader with general trends about faculty salary, overall departmental budgets, and space available for research. Faculty salary information is derived from the total compensation column, which includes any supplementary income, but not fringe benefits. Information was not calculated for any faculty whose salary was supported less than 50% by the respondent's department.

Most of the statistics are based on 88 responses (4 from Canada), but salary results are calculated on the number of respondents providing this information (N=86 for total; N=82 for Chairmen). For the most part, inconsistent data were eliminated in an attempt to achieve accurate results within each category. In addition to salary information, further data are provided on tenure, gender, ethnicity, and salary by number of years in rank. Table 3 reflects salaries by rank and region.

Student/trainee information is provided by ethnicity, for predoctoral and postdoctoral categories, as well as predoctoral trainee completions; stipends provided; and type of support.

Departmental budget information is provided by type of support, faculty salaries derived from grants, negotiated indirect cost rates, and percent of returned indirect costs. Space averages are presented by research, administration, teaching, and other.

Table 5 ranks responding institutions according to total budget dollars, research grant income, research dollars per faculty, research space, and research dollars per square foot of research space.

Inside . . .

Research Career Enhancement Awards.....78

Essential Role of Integrative Biomedical Sciences.....79

McDermott, Cooper Endorse Harkin-Hatfield.....104

APS Conference: Physiology of the Release and Activity of Cytokines Program.....i

(continued on p. 97)

CONTENTS

ACDP SURVEY RESULTS.
C. Smith and H. P. Clark 77

BIOMEDICAL SCIENCES
The Essential Role of Integrative Biomedical Sciences in Protecting and Contributing to the Health and Well-Being of Our Nation.
P. C. Jobe et al. 79

APS NEWS
Awards and Fellowships
Research Career Enhancement Awards 78

Committees
1994 Officers and Standing Committees 87

Meetings
Mechanotransduction and the Regulation of Growth and Differentiation 91
Regulation, Integration, Adaptation: A Species Approach 92

Membership
Membership Statistics 94
Senior Physiologists News 96

Publications
Call for Nominations for Editor of *Journal of Neurophysiology* 112
Call for Nominations for Editor of *AJP: Renal, Fluid and Electrolyte Physiology* 112

PUBLIC AFFAIRS
Natcher Dies 104
Importance of Animals in Biomedical and Behavioral Research 107

PEOPLE AND PLACES 108

POSITIONS AVAILABLE 109

BOOKS RECEIVED 109

BOOK REVIEW 110

ANNOUNCEMENTS 111

APS CONFERENCE
General Information iii
Program iv
Table of Contents ix
Abstracts A-2
Author Index A-51

The Physiologist
Published bimonthly and distributed by
The American Physiological Society
9650 Rockville Pike
Bethesda, Maryland 20814-3991
ISSN 0031-9376

Martin Frank, *Editor* and *Executive Director*

Brian R. Duling, President
William H. Dantzler, Past President
Leonard S. Jefferson, President-Elect

Councillors

Mordecai P. Blaustein, D. Neil Granger, Barbara A. Horwitz, Diana L. Kunze, James A. Schafer, and Heinz Valtin

Ex Officio

Leonard R. Johnson, Franklyn G. Knox, Frank L. Powell, Jr., and Richard J. Traystman

Publications Committee: *Chairman,* Leonard R. Johnson; *Members,* Leonard S. Jefferson, Diana Kunze, Lorne Mendell, John A. Williams, and Loring R. Rowell (*ex officio*). *Publications Manager,* Brenda B. Rauner; *Editorial Staff,* Laura North and Lorraine Tucker.

Subscriptions: Distributed to members as part of their membership. Nonmembers in the USA: individuals $25.00; institutions $37.00. Nonmembers elsewhere: individuals $35.00; institutions $48.00. Single copies and back issues when available, $10.00 each; single copies and back issues of Abstracts issue when available, $20.00. In 1994, subscribers to *The Physiologist* will receive it and the abstracts of the Fall Conferences of the American Physiological Society. The American Physiological Society assumes no responsibility for the statements and opinions advanced by contributors to *The Physiologist.*

Deadline for submission of material for publication: Jan.1, February issue; March 1, April issue; May 1, June issue; July 1, August issue; Sept. 1, October issue; Nov. 1, December issue. **If you change your address or telephone number, please notify the central office as soon as possible.** Printed in the USA.

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

APS Research Career Enhancement Awards

Statement of Purpose: The APS Research Career Enhancement Awards are designed to enhance the career potential of our members. The awards will provide up to $4,000 to allow individuals in the early phases of their careers to obtain special training and in later phases of their careers to develop new skills and to retrain in areas of developing interests.

The Awards can be used to support

- short-term visits to other laboratories to acquire new scientific skills
- attendance at special courses devoted primarily to methodologies appropriate for both new investigators and more senior investigators entering a new field of research.

Application Procedure: Candidates, who are members in good standing, may submit an application form including a curriculum vitae, justification for requesting an award, description of enhancement activity and current research program (not to exceed 2 pages), and anticipated budget for the proposed program of enhancement. The applicant must also include a letter of support either from his/her department chair, host laboratory or other appropriate individual.

Application Deadlines: February 15 and August 15.

Additional Information and Application Material: Martin Frank, Executive Director, American Physiological Society, 9650 Rockville Pike, Bethesda, MD 20814-3991. Tel: (301) 530-7118; fax: (301) 571-8305.

APS ACCEPTS VISA AND MASTERCARD FOR PAYMENT OF DUES AND SUBSCRIPTIONS

The Essential Role of Integrative Biomedical Sciences in Protecting and Contributing to the Health and Well-Being of Our Nation

EXECUTIVE SUMMARY

The biomedical sciences in the United States are currently experiencing the effects of an increased emphasis on in vitro models of biological and disease processes. Advances in cellular and subcellular biology have been a driving force in the funding of new research, the training of new scientists, and new drug discovery and development. The importance of new findings at the cellular and subcellular levels is not disputed. However, the corresponding decline in funding and training opportunities for biologically relevant investigations at the level of the intact animal (including humans; hereafter designated as integrative biology) is a serious threat to continued biomedical advances.

The lack of resources for integrative biology has far-reaching negative consequences in 1) the development and utilization of whole animal models of disease and dysfunction; 2) assessing the relevancy of in vitro studies to physiological mechanisms; 3) the evaluation of the scientific merit of whole animal investigations and their relevancy to the nation's scientific imperatives; 4) the instruction of young scientists in the technology and especially in the methods of integrative biology, including how to develop appropriate experimental hypotheses; 5) the instruction of graduate, medical, dental, pharmacy, and nursing students in drug and disease processes in the intact human; and 6) the ability of the pharmaceutical manufacturers, the FDA, the EPA and academia to hire scientists who can develop drugs and evaluate the effects of exogenous agents on the intact animal.

These negative consequences can be alleviated in a variety of ways. These include 1) increasing the availability of funding for research in integrative biology, 2) increasing the opportunities for training in integrative biology, and 3) instituting grant reviews of integrative biomedical research by peers in integrative biomedical sciences. These measures can revitalize integrative biomedical research, help ensure the continued advancement of biomedical understanding, and consequently contribute to the alleviation of human suffering.

PERSPECTIVE

1. Integrative Biomedical Sciences Are Essential Links Between Subcellular and Cellular Studies and Medical Practice

Interrelationships at the different levels of biological complexity are set forth in Figure 1. Studies of **subcellular biology** provide insights into the structure and function of DNA and RNA, proteins, and other processes important to biologic function. Studies at the level of **cellular biology** provide crucial insights into the function, differentiation and maturation of cells. In vitro investigations of **tissue slice/organ biology** are valuable partially because the results obtained at lower levels of biological complexity have limitations. In the tissue slices, cells are in contact with at least some of their natural neighbors. The architecture of spatial arrangements of the different cells in the slice resembles those in the intact animal. Yet, even in the tissue slice or isolated organ, many remote influences that would affect the native tissue are missing.

Studies of **intact animals** are essential because the full set of genetic, biochemical, physiological and pathological influences is present for all of the different organs of the body. As illustrated in Figure 1, information developed at any one level of study influences hypotheses that can be tested at the other levels. Research conducted at the level of intact animals is a fundamental part of the worldwide efforts to improve the prevention, treatment and diagnosis of human diseases; and to understand basic physiological processes at all levels of inquiry set forth in figure 1. Data from studies in intact animals have a strong potential to drive research at the subcellular and cellular levels. In many instances, medical scientists would be bereft of a rationale for undertaking studies at the in vitro levels in the absence of underpinnings from investigations of intact animals. This principle is applicable to essentially all fields of biomedical research. We provide one example from the field of diabetes research and another

Authors: **Phillip C. Jobe** (University of Illinois College of Medicine at Peoria), **Leah E. Adams-Curtis** (University of Illinois College of Medicine at Peoria), **Thomas F. Burks** (University of Texas, Houston), **Ray W. Fuller** (Indiana University School of Medicine, Indianapolis), **Carl C. Peck** (Sylvius Laboratories, Leiden University, The Netherlands), **Robert R. Ruffolo** (SmithKline Beecham Pharmaceuticals, King of Prussia, PA), **O. Carter Snead III** (University of Southern California School of Medicine, Los Angeles), and **Raymond L. Woosley** (Georgetown University Medical Center, Washington, DC).

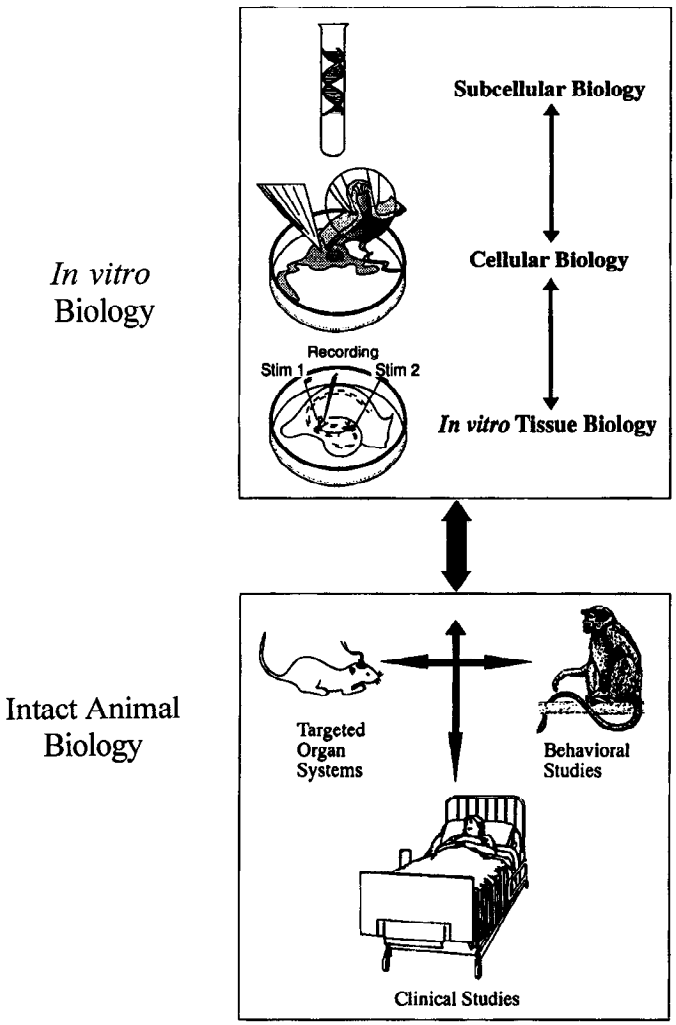


Figure 1. Levels of biological complexity in the biomedical sciences. The number of interacting endogenous variables is greatest with the intact animal models and least with subcellular biology.

from the field of epileptology.

In diabetes mellitus, abnormalities are not limited to derangements in blood sugar levels. Other life-threatening events occur. An important feature is a thickening of the capillary basement membrane. A progressive narrowing of the vessel lumen occurs. Consequently, premature atherosclerosis, intercapillary glomerulosclerosis, retinopathy, neuropathy and nephropathy (which is a major burden on the US health care system) result. Ulceration and gangrene of the extremities may also appear. Moreover, systemic reductions in insulin sensitivity occur. Clearly, subcellular and cellular studies in this arena are important to future progress in the understanding of these changes. However, the need for such studies is only apparent when there is knowledge of these changes that occur in the whole animal. The basis for relevant questions at the tissue, cellular and subcellular levels stems from investigations of the patient and other intact animals.

One current emphasis in the study of epilepsy is the role of inhibitory and excitatory mechanisms at the cellular and subcellular levels of the neuron. While these studies provide essential information concerning cellular events, they cannot, by themselves, explain epilepsy. Evidence on many fronts supports the concept that epilepsy is a disorder of interacting networks of neurons rather than a disorder of a single "epileptic cell." The underlying abnormalities are present continuously rather than momentarily when the mammal exhibits a seizure. Data also support the hypothesis that primary causes of epilepsy may reside within parts of the brain which are distant from the site of initial electrographic seizure discharges. Thus, if investigations are excessively focused on in vitro studies of mechanisms in isolated tissues obtained from the site of initial electrographic discharge, we have the potential to miss our ultimate goal in epilepsy research: the successful treatment of the underlying causes.

Four direct benefits of intact animal research to the understanding, treatment, and prevention of human disorders are evident. First, the data can be used to define and validate intact animals as biomedical models. These models are essential for the understanding of disease phenomenology and mechanisms of drug action, neural and hormonal regulation of target cells, and beneficial and adverse effects of drugs. Second, intact animal models are essential as tests to separate medically undesirable chemicals from those that have a potential to become therapeutic agents. Through this process, chemicals with pronounced adverse effects are eliminated before they enter clinical trials. Third, data derived from studies of intact models are useful for initial estimates of dosage in phase 1 clinical trials. Fourth, intact models can be used to assess questions regarding potential toxicity that may arise after clinical trials have begun.

2. *The Paucity of Training in Integrative Biomedical Sciences*

During the past 20 years, biomedical research has undergone profound changes. Molecular genetics and macromolecular biology have emerged as promising new investigative disciplines. Mass communication media have devoted substantial time in highlighting subcellular and cellular biomedical sciences. News sections of journals and newspapers which target scientists have also provided the same emphasis. Therefore, this type of research is in the forefront of our minds.

During this same interval of time, training programs and research in the integrative biomedical sciences have declined. In June 1993, the National Academy of Sciences through its Institute of Medicine, sponsored a meeting of the Forum on Drug Development. One agenda item focused on the adequacy of training in the pharmacology of integrated systems. Christine Carrico reported that the NIGMS funds 290 fellowships nationally in pharmacology. However, only 32 of these

provide any opportunities for fellows to conduct research at a level above that of the cell. Thus, 89% of trainees are working exclusively at subcellular or cellular level. We believe that it is reasonable to conclude that only a fraction of the remaining 11% are working at the highest levels of biological integration using whole animal models of disease and function.

3. *Consequences of the Training Deficit*

The paucity of training in integrative biomedical sciences is exerting detrimental effects: Section 1 has already emphasized the impairments emerging in the use of data and hypotheses from intact mammalian models to guide or stimulate investigation at the subcellular and cellular levels. Other consequences of the training deficit which are vitally important include 1) an impaired national capacity to develop intact animal models of human function and disease; 2) a continually declining pool of scientific manpower with the skills to conceptualize biomedical hypotheses and experiments at the level of the intact organism; 3) deterioration of key elements of preclinical and clinical drug development; 4) an impaired process for optimizing environmental safety; and 5) rapidly diminishing capacity to provide the scientific data essential to medical education and to rational judgments in clinical practice.

3.1 Impact on the development of intact animal models of human function and disease

3.1.1 The vanishing pool of scientific talent in intact animal research leaves too few scientists to conduct the studies

Scientists who lack training in intact animal biology are not prepared to undertake studies at this level. This deficit impedes progress. As the number of scientists actively studying intact animal biology diminishes, improved or new models of function and disease may fail to emerge.

3.1.2 The vanishing pool of intact animal scientists as members of NIH study sections imposes a barrier to development of new models at this level of biological complexity

Current NIH study section composition is a major impediment to the development of intact animal models of disease and function and to the continuation of research on already available models. With the advent of the increasing power of technologies in molecular biology, genetics and cellular biological sciences, initial enthusiasm in the scientific community was predictable. Moreover, with budgetary limitations, some reallocation of research dollars from integrative sciences was inevitable and reasonable, otherwise the potentials of these new areas of study would not have been fully explored. Membership in NIH study sections moved deeply into the cellular and subcellular domains. Consequently, the balance between subcellular and integrative biomedical science was lost. The chances that a grant proposal focused on intact animal investigations would be reviewed by a peer in the area of intact animal research have declined. The few integrative biologists that remain as study section members represent specialized areas of expertise within the whole realm of integrative biology. Because of these factors, NIH proposals which focus on intact animal models of function and disease only rarely receive peer review. In the absence of peers, who reviews the intact animal proposals? According to our experience as study section members, the proposals are now frequently reviewed by subcellular and cellular biologists who lack expertise in integrative sciences. The inevitable consequence is that, too frequently, scientifically valid proposals which examine intact animal models of disease and function are not recognized as such and are not assessed appropriate priorities.

3.2 Impact on skills to conceptualize biomedical hypotheses and experiments at the level of the intact animal

Scientists trained strictly at subcellular and cellular levels oftentimes lack the skills to conceptualize biomedical hypotheses in an integrative model. The composition of hypotheses that encompass the diverse actions of drugs and mechanisms of disease requires knowledge of the disparate characteristics of interacting biological systems throughout the intact animal. Formulation of hypotheses at this level requires practice. New scientists learn to do so by working with mentors who exhibit the appropriate skills. They also learn to do so by studying the pertinent published papers. Scientists without training in intact animal biology may not have the laboratory skills or the insight to apply and evaluate the appropriate experimental interventions at the level of the intact animal.

3.3 Impact on the process of preclinical and clinical drug discovery and development

The lack of training in intact animal biomedical sciences thwarts the process of drug development. This negative influence occurs in response to a number of factors. First, as pointed out in Section 3.1., new and improved intact animal models of human function and disease will be slower to emerge. In the absence of this knowledge, drug development cannot be guided by hypotheses relevant to the functioning of the intact system. In complex diseases, an unbalanced reliance on studies of subcellular or cellular models has two

probable outcomes. At best, it may lead to the formulation of hypotheses which do not account for the complexities of function and disease. At the worst, it may lead to conclusions that misguide the development of drugs and diagnostic procedures.

The need for increased studies of and training in integrative biomedical sciences has been felt at many levels pertinent to drug development. We provide four examples which highlight these needs in the NIH, industry, and the FDA. The lack of funding for investigations with intact animal models of human disease was highlighted at a 1993 meeting of the Antiepileptic Drug Development Consultants of the Epilepsy Branch of the National Institute of Neurological Disorders and Stroke. The discussion focused on developing drugs which have the capacity to correct the underlying abnormalities which cause the epilepsies. Consensus among the consultants was twofold. First, answers should be sought from studies of intact mammalian models of the epilepsies. The consultants saw substantial value in a conceptual interplay of hypotheses and data between studies at this level and others conducted to examine specific questions at reduced levels of biological complexity. Second, the consultants saw little or no likelihood that such studies would be supported by the current system of NIH extramural funding or by industry.

The impact of the national neglect of integrative biomedical research on pharmaceutical industry was also highlighted at the 1992 winter meeting of the Association for Medical School Pharmacology by Ray W. Fuller of Eli Lilly and Company and Robert R. Ruffolo of SmithKline Beecham. Both Ruffolo and Fuller stressed the necessity of revitalizing training in integrative biomedical sciences in the United States. They both pointed out that they are experiencing increasing difficulties in recruiting biomedical scientists with the expertise to provide the intellectual and technical bridges between studies of in vitro events in subcellular and isolated tissue models and investigations in the intact human. Because of the major decreases in American training programs in the integrative biomedical sciences, both Lilly and SmithKline Beecham have resorted to "in-house" attempts to provide some of the essentials to incoming scientists. Nevertheless, they stressed their conviction that such training should be obtained in universities. They thought that the training provided in the industrial setting is less than optimum and would benefit from the strong hypothesis orientation provided in the educational environments of universities.

The Subcommittee on Pharmacology and Industry of the American Society of Pharmacology and Experimental Therapeutics has identified the lack of training in intact animal pharmacology and physiology as a major impediment to drug development. Knowledge of gross anatomy, physiology and other integrative sciences is essential to sound judgments pertinent to the feasibility of drug development. Insights into the molecular structure of DNA and of transcription processes alone will not enable a scientist to consider the complex array of other biological factors which determine drug efficacy.

In September 1992, Carl Peck, then Director of the Center for Drug Evaluation and Research at the FDA, convened a meeting of FDA staff and leading directors of academic clinical pharmacology training programs throughout the United States. One of the topics considered in that meeting was the role of clinical pharmacology in the drug development processes of the United States. The implementation of additional training programs in clinical pharmacology was considered a paramount necessity. However, the participants in the meeting agreed that the success of clinical pharmacology is partially contingent upon a close linkage with the basic integrative biomedical sciences and with the body of knowledge being generated at the cellular and subcellular levels. The concern of the group, however, was that the essential linkage with the basic integrative biomedical sciences was undergoing serious erosion. Consensus focused on the necessity of re-instituting support of training and research before irreparable damage is done. Continued neglect of integrative biomedical sciences has to be stemmed soon or our nation will be faced with the prospect of reinvention of the discipline in the absence of competent practitioners to serve as teachers and mentors.

FDA scientists, like their counterparts in the pharmaceutical industry, must have the capacity to evaluate the effects of drugs on intact animals including humans. The present paucity of training for integrative scientists severely diminishes the capacity of the FDA to recruit beginning level individuals who are completing postdoctoral fellowships. Scientists from pharmacology programs have been encouraged to take training in integrative biomedical sciences including pharmacokinetics, toxicology, and physiology so that they can be effective researchers at the level of the whole animal. Recruiting is difficult in clinical pharmacology as reflected by the number of fellows who complete training each year. The difficulty in recruiting integrative basic pharmacologists is more severe because no training programs are dedicated to this area of expertise. Those who are recruited by the FDA must come largely from senior faculty of academic institutions or industry. Because senior researchers are hired, there is a substantial increase in cost to the government. Moreover, this process leaves even fewer qualified individuals in academia to provide training for those students who do choose to study integrative biology.

3.4 Impact on the Environmental Protection Agency

The need for researchers having knowledge and background in integrative biomedical sciences is particularly important for regulatory agencies such as the Environmental Protection Agency (EPA). According to Hugh A. Tilson,

Director of EPA's Neurotoxicology Division at the Health Effects Research Laboratory, toxicological testing and research will continue to require integrative in vivo and in vitro studies for several years to come and scientists trained to plan, execute and interpret results from such studies will be needed. The current emphasis on cellular and molecular methods in training researchers does not prepare young investigators to work effectively on many types of toxicological problems nor does it prepare them to formulate testable hypotheses concerning how chemicals affect systems at different levels of biological organization. Clearly, a more balanced approach in training biomedical researchers is needed.

3.5 Impact on medical education and on decisions made in clinical practice

Medical students, residents, and attending physicians must understand the way that diverse organs of the body interact. For example, nearly all drugs enter the general circulation and are delivered to essentially all parts of the human body. Many drugs indicated for hypertension also exert effects on behavior and emotion. But even the effects of drugs on one organ such as the heart result from multiple interactions. For example, a nonselective β-receptor blocking agent such as propranolol antagonizes the positive chronotropic effect of the sympathetic innervation of the SA node of the heart thereby allowing regulatory balance to favor the parasympathetic system. A decrease in heart rate ensues.

But the effects of propranolol are more complex than those produced by β_1-receptor blockade in the SA node. Propranolol also blocks β_1-receptors in the AV node, the His-Purkinje system and the ventricles. Therefore contractility, conduction velocity and automaticity are also influenced. β-receptors also are present in many other organs. Some of the effects of propranolol derive from its interactions at these other sites. For example, a major adverse effect of propranolol is caused by blockade of β_2-receptors in the bronchial smooth muscle. Thus, propranolol may increase airway resistance in patients suffering from bronchospastic disease. β-receptors also exist in the brain and propranolol has effects there as well. Because of numerous and widespread effects, it is not surprising that propranolol lowers blood pressure in hypertensive patients. It is also not surprising that, in some patients, propranolol may cause depression and suicidal ideation.

Lessons taught to medical students by pharmacologists must also include information regarding pharmacokinetics. Medical students learn about absorption, fate and excretion of propranolol. Is propranolol metabolized by the liver during its first passage through the portal circulation? What should a physician anticipate when other drugs, such as phenytoin or rifampin, are administered to a patient along with propranolol? Will these other drugs induce hepatic biotransformation enzymes, thereby decreasing plasma concentrations of propranolol? Does cigarette smoking have the potential to produce similar effects?

These are only examples of information that pharmacology faculty teach medical students. Similar examples are easily constructed for anatomy, physiology, pathology, behavioral neuroscience and other integrative biomedical sciences. Effective teachers must have an understanding of the complex interactions between diverse systems of the body. Insights into molecular genetics and subcellular function are not sufficient to enable a teacher to encompass and integrate the gross anatomy, physiology, pathology, clinical diagnostic categories, and pharmacological factors essential to a medical education. If the decline in training of integrative biomedical scientists continues, the quality of health care in our nation will decline because of the reduced capacity to teach this essential body of information to medical students.

With the ascendancy of the subcellular biomedical sciences, some colleges of medicine are considering collapsing individual basic sciences departments into larger units. Others are considering realignment of departments to reflect the subcellular and cellular orientations of existing departments. Part of the rationale for these changes stems from the enormous similarities between the sciences at the subcellular and cellular levels. Events occurring at the cellular and subcellular levels can be effectively communicated by any of the classical basic sciences disciplines. However, the classical sciences have unique perspectives that emerge largely at the integrative level.

Some have argued that the merging and/or realignment of basic sciences departments is a consequence of funding deficits. To some extent this may be true. However, we suggest that disciplinary irrelevancy has developed. The departments have become unbalanced by focusing on research and teaching of subcellular and cellular information and skills at the expense of understanding and working knowledge at the level of the intact animal.

Overall we believe that excessive subcellular and cellular orientation or preoccupation of the basic sciences in medical schools is contributing to the formation of a counterproductive academic vortex. Through this process, the essential, medically relevant body of basic sciences knowledge, skills and *esprit de corps* are being funneled away from medical education, residency training, and clinical practice. An understanding of the classic basic sciences perspectives is crucial to medical education and therefore to medical practice. Decisions in the clinical setting require continuing generation of pertinent information in the classic biomedical disciplines. When coupled with an effective method of dissemination, physicians will maintain a valid understanding of the interrelationships of the intact human body and its responses to diseases, diagnostic procedures, prophylaxes, and treatments. Incorporation of the emerging information into clinical practice modes results in improved patient care. While the above discussion is directed to medical schools, essentially the

same considerations apply to pharmacy, dental, and other health professional schools.

4. The Ultimate Consequences of the Decline in Integrative Biology

As fewer scientists are trained and active in integrative biology, fewer are able to evaluate the scientific merit in grant proposals which are designed to study the intact animal. Creative efforts to develop new or improved intact animal models of human function and disease will progressively decline. But the problem has broader dimensions. One of the first lessons learned by new graduate students is the area(s) in which research funding is available. Students are less inclined to migrate to the study of intact animals because of the lack of funding. Thus, even fewer scientists are being trained in integrative biology, and fewer still will conduct experimental work. Fewer mentors are available for the students who have such interests. These changes have been driven largely by the lack of NIH funding for integrative biomedical sciences research projects. In the absence of such funding, students do not perceive a future in the discipline. If we proceed further in this direction, a dangerously low number of mentors will remain to provide training and research at the intact animal level of biological complexity.

The final outcome of the process will be the decline of a biomedical discipline essential to the health and well-being of this country. Preclinical and clinical drug discovery and development will be greatly impeded. Pharmaceutical industry as an important part of the economic health of the United States will be hindered. Industrial and academic efforts to improve human health and the quality of life will be thwarted. The conceptual underpinnings of subcellular and cellular levels of investigation which are largely derived from intact animal studies will no longer emerge. The FDA will lose its access to the scientific judgments essential to drug development and approval. The EPA will become increasingly unable to evaluate potential environmental toxicants. Newly trained physicians will suffer from a diminished understanding of the intact human and the ways in which new medicinal agents might be effectively used in patient care. Ultimately, further advancement in medical research and care may fail to occur. Future generations will be the recipients of our neglect.

Future Meetings

1994	
APS Conference Mechanotransduction and the Regulation of Growth and Differentiation	October 5–8 Sarasota, FL
Intersociety Meeting Regulation, Integration, Adaptation: A Species Approach	October 29–November 2 San Diego, CA
1995	
Experimental Biology '95	April 9–14, Atlanta, GA
APS Conference Understanding the Biological Clock: From Genetics to Physiology	July 8–12, 1995 Hanover, NH
APS Conference New Discoveries Within the Pancreatic Polypeptide Family: Molecules to Medicine	November 8–11, 1995 Newport Beach, CA
1996	
Experimental Biology '96	April 14–18, Washington, DC
1997	
Experimental Biology '97	April 6–10, New Orleans, LA

Questionnaire

	Strongly Disagree			Neutral			Strongly Agree
1. Intact animal research is essential to a complete understanding of mammalian function and disease	-3	-2	-1	0	+1	+2	+3
2. Scientific investigation at the level of the intact mammal is an essential link between subcellular and cellular studies and medical practice	-3	-2	-1	0	+1	+2	+3
3. Sound peer review of intact animal applications by the NIH is becoming increasingly unlikely	-3	-2	-1	0	+1	+2	+3

If your answer to Question 3 is +1, +2, or +3, then please answer Question 4; if not then please skip to Question 5.

4. The priority scores of applications in the areas of intact animal models show a strong tendency to be outside the funding range because: (Check all that apply)

____There are too few scientists with expertise in intact animal studies serving on NIH study sections.

____The expertise required for judging proposals at the in vitro levels of biological complexity differs from that required for intact animal studies.

____Studies of intact animals generally lack sufficient scientific merit to be funded.

____It is difficult to formulate precise hypotheses and provide appropriate control conditions using intact animals.

____Other (please specify)

5. Drug development is being adversely affected by the lack of basic scientists with expertise at the intact animal level.	-3	-2	-1	0	+1	+2	+3

6. The process of drug development in the United States will be impaired if training and research funding at the intact animal level is not restored to academic institutions within:

____2 years
____5 years
____10 years
____20 years
____The process of drug development is not threatened.

(continued on next page)

7. Medical education will be adversely affected by the lack of basic sciences faculty with expertise in the intact animal level:

____currently
____within 2 years
____within 10 years
____within 20 years
____Medical education will not be adversely affected.

8a. Pharmaceutical industry is beset by difficulties in recruiting scientists with expertise at the intact animal level because of the virtual absence of training in American academic institutions at this level of biological complexity.	-3	-2	-1	0	+1	+2	+3
8b. Federal agencies with responsibilities for human health (i.e., the FDA and the EPA) are beset with similar recruiting difficulties.	-3	-2	-1	0	+1	+2	+3
9. Unique integrative biology perspectives of the classical basic sciences are being lost as a consequence of the undue emphasis on cellular and subcellular research and teaching.	-3	-2	-1	0	+1	+2	+3
This loss of disciplinary perspective is applicable to							
Anatomy	-3	-2	-1	0	+1	+2	+3
Biochemistry	-3	-2	-1	0	+1	+2	+3
Immunology	-3	-2	-1	0	+1	+2	+3
Microbiology	-3	-2	-1	0	+1	+2	+3
Pathology	-3	-2	-1	0	+1	+2	+3
Physiology	-3	-2	-1	0	+1	+2	+3
Pharmacology	-3	-2	-1	0	+1	+2	+3
10. The responsibility for funding training programs in the different areas of intact animal models should be assumed by							
the federal government	-3	-2	-1	0	+1	+2	+3
the state governments	-3	-2	-1	0	+1	+2	+3
pharmaceutical industry	-3	-2	-1	0	+1	+2	+3
hospitals	-3	-2	-1	0	+1	+2	+3
other elements of private enterprise	-3	-2	-1	0	+1	+2	+3

Please return questionnaire to Phillip C. Jobe, Department of Basic Sciences, University of Illinois College of Medicine at Peoria, Peoria, IL 61656.

Committees

1994 Officers and Standing Committees

APS Council

Officers
Brian R. Duling, President (1995)
Leonard S. Jefferson, President-Elect (1995)
William H. Dantzler, Past President (1995)

Councillors
Mordecai P. Blaustein (1995)
D. Neil Granger (1996)
Barbara A. Horwitz (1996)
Diana L. Kunze (1997)
James A. Schafer (1995)
Heinz Valtin (1997)

ex officio members
Franklyn G. Knox, Finance (1994)
Leonard R. Johnson, Publications (1995)
Frank L. Powell, Jr., Education (1994)
Richard J. Traystman, Section Advisory (1996)

Society Standing Committees

Animal Care and Experimentation

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

Joseph R. Haywood, Chair (1994)
Gordon Leitch (1996)
Jeffrey L. Osborn (1995)
Thomas V. Peterson (1995)
David Randall (1996)
Charles E. Wade (1994)
David Brooks, *ex officio* (1995)
Eric Feigl, *ex officio* (1994)
Alice Hellerstein, *ex officio* (indefinite)

Career Opportunities in Physiology

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

Susan J. Gunst, Chair (1994)
Stephen L. Bealer (1994)
R. Allan Buchholz (1995)
Michael A. Castellini (1996)
Joey P. Granger (1995)
Ulla C. Kopp (1996)
Mary A. Rokitka (1994)
Barbara A. Horwitz, *ex officio* Education (1995)

Committee on Committees

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

Helen J. Cooke, Chair (1994)
Mordecai P. Blaustein (1995)
Catherine S. Chew (1994)
David C. Dawson (1995)
M. Roger Fedde (1994)
Suzanne M. Fortney (1994)
Ronald H. Freeman (1995)
David R. Harder (1995)
Eileen M. Hasser (1996)
Ralph Lydic (1996)
Joel Michael (1995)
Lynne E. Olson (1995)
David W. Ploth (1996)
Gerald I. Shulman (1996)

Ray G. Daggs Award

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

Arthur C. Guyton, Chair (1994)
Robert Forster II (1996)
X. J. Musacchia (1995)

Education

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

Frank L. Powell, Jr., Chair (1994)
Beverly P. Bishop (1996)
Jack A. Boulant (1994)
Andrea R. Gwosdow (1996)
Aviad Haramati (1995)
Barry T. Peterson (1996)
Norman W. Weisbrodt (1995)
Carol F. Whitfield (1994)
Roger E. Thies, *ex officio*, Teaching of Physiology Section (1996)
Penny Hansen, *ex officio*, Editor, *Advances in Physiology Teaching* (1995)

Finance

Reviews the proposed annual budget and fiscal plan for all Society activities and recommends a final budget and implementation plan to Council. Supervises the investment of the Society's financial resources subject to approval of Council.

Franklyn G. Knox, Chair (1995)
Edward H. Blaine (1996)
Robert W. Gore (1994)
Leonard S. Jefferson, *ex officio* (1995)
Leonard R. Johnson, *ex officio* (1995)
Martin Frank, *ex officio* (indefinite)
James C. Liakos, *ex officio* (indefinite)

Honorary Membership

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

Ernst Knobil, Chair (1994)
Francis J. Haddy (1995)
John B. West (1996)

International Physiology

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

Melvyn Lieberman, Chair (1995)
Emile L. J. B. Boulpaep (1994)
Marie Cassidy (1996)
Marcelino Cereijido (1995)
Kenneth J. Dormer (1996)
Claes E. G. Lundgren (1996)
Clark M. Blatteis, *ex officio* (1994)
Craig Malbon, *ex officio* (1994)
Bodil Schmidt-Nielsen, *ex officio* (1994)
Harvey V. Sparks, Jr., *ex officio* (1997)

Liaison With Industry

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

David P. Brooks, Chair (1995)
David L. Crandall (1994)
Nancy J. Hutson (1996)
Steven S. Segal (1994)
Andrea A. Seymour (1994)
Bruce Stanton (1996)
Susan Gunst, *ex officio* (1994)
Frank L. Powell, Jr., *ex officio* (1994)
Heinz Valtin, *ex officio* (1994)

Long-Range Planning

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

Shu Chien, Chair (1996)
Clark M. Blatteis (1994)
Walter F. Boron (1995)
Allan D. Cherrington (1996)
J. Jay Gargus (1994)
Susan Leeman (1996)
Patricia J. Metting (1995)
James A. Schafer (1995)

Membership

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

Diana Marver, Chair (1994)
Hannah V. Carey (1996)
Michael J. Davis (1994)
Jack A. Rall (1995)
Lawrence Schramm (1996)
Thomas C. Vary (1996)
Nancy K. Wills (1995)

Perkins Memorial Fellowship

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

Bodil Schmidt-Nielsen, Chair (1994)
Robert W. Berliner (1995)
Jerome A. Dempsey (1994)
Arthur B. Otis (1995)
Molly P. Hauck, *ex officio* (indefinite)

Porter Physiology Development

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

H. Maurice Goodman, CoChair (1995)
Eleanor L. Ison-Franklin, CoChair (1996)
Martha Blair (1996)
Reynoldo Elizondo (1994)
Sarah Gray (1996)
David Mohrman (1995)
Phillip L. Rayford (1995)
David Robertshaw (1994)
Guido E. Santacana (1996)
James G. Townsel (1994)
Martin Frank, *ex officio* (indefinite)

Program

Develops the scientific programs for the Society with the assistance of the Program Advisory Committee; assists Council in shaping policy for scientific programs and in the organization of fall conferences.

Heinz Valtin, Chair (1994)
Elaine K. Gallin (1995)
Michael P. Hlastala (1995)
Ethan R. Nadel (1994)
Hiroko Nishimura (1996)
Albert P. Shepherd (1994)
Leonard S. Jefferson, *ex officio* (1995)
Martin Frank, *ex officio* (indefinite)

Program Advisory

Recommends to the Program Committee scientific programs for the APS meetings and conferences; organizes contributed abstracts into sessions; selects session chairs and introductory speakers.

Chair—Heinz Valtin (1994)
Cardiovascular—Diana L. Kunze (1994) & Frank C.-P. Yin (1996)
Cell and General Physiology—Jack H. Kaplan (1996)
Central Nervous System—Celia D. Sladek (1995)
Comparative Physiology—Stephen H. Wright (1994)
Endocrinology and Metabolism—Jessica Schwartz (1995)
Environmental and Exercise Physiology—Charles M. Tipton (1996)
Gastrointestinal Physiology—Patrick Tso (1997)
Neural Control and Autonomic Regulation—Eileen M. Hasser (1996)
Renal Physiology—Leon Moore (1996) & J. M. Sands (1997)
Respiration Physiology—R. D. Bland (1996)
Teaching of Physiology—Philip A. McHale (1994)
Water and Electrolyte Homeostasis—Ian A. Reid (1995)
Clinical Physiology Group—Richard J. Traystman (1995)
Epithelial Transport Group—John Cuppoletti (1995)
History of Physiology Group—Giuseppe Sant'Ambrogio (1995)
Hypoxia Group—Reed W. Hoyt (1996)
Myobio Group—T. M. Nosek (1996)
Liaison with Industry—David P. Brooks (1995)
Education Committee—Frank L. Powell, Jr. (1994) & Aviad Haramati (1995)

Public Affairs

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

Eric O. Feigl, Chair (1997)
Virendra B. Mahesh (1996)
Lazaro Mandel (1995)
Roger J. M. McCarter (1995)
George A. Ordway (1994)
Phyllis M. Wise (1996)
David Brooks, *ex officio* (1995)
Joseph R. Haywood, *ex officio* (1994)
Alice Hellerstein, *ex officio* (indefinite)

Publications

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

Leonard R. Johnson, Chair (1995)
Diana L. Kunze (1994)
Leonard S. Jefferson (1994)
Lorne Mendell (1995)
John A. Williams (1995)
Brian R. Duling, *ex officio* (1995)
Loring B. Rowell, *ex officio* (1995)
Martin Frank, *ex officio* (indefinite)
Brenda B. Rauner, *ex officio* (indefinite)

Section Advisory

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

Richard J. Traystman, Chair (1996)
Cardiovascular Section—James Covell (1994)
Cell and General Physiology Section—Melvyn Lieberman (1995)
Central Nervous System—Richard A. Hawkins (1994)
Comparative Physiology Section—Larry I. Crawshaw (1997)
Endocrinology and Metabolism Section—Charles Blake (1995)
Environmental and Exercise Physiology Section—Carl V. Gisolfi (1997)
Gastrointestinal Physiology Section—G. A. Castro (1997)
Neural Control and Autonomic Regulation Section—Cheryl M. Heesch (1996)
Renal Physiology Section—Roger G. O'Neil (1996)
Respiration Physiology Section—Edward D. Crandall (1996)
Teaching of Physiology Section—David S. Bruce (1996)
Water and Electrolyte Homeostasis Section—John E. Hall (1994)

Senior Physiologists

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

Helen M. Tepperman, Chair (1994)
John Blinks (1996)
Carl W. Gottschalk (1995)
Robert R. Grover (1995)
Suki K. Hong (1996)
Steven M. Horvath (1995)
Ralph H. Kellogg (1994)

Women in Physiology

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

Virginia L. Brooks, CoChair (1994)
Cheryl M. Heesch, CoChair (1995)
Kim E. Barrett (1996)
Gregory L. Florant (1996)
Cynthia A. Jackson (1996)
Kathryn F. LaNoue (1995)
Alice Villalobos (1996)
Martin Frank, *ex officio* (indefinite)

Society Representatives to Other Organizations

American Association for Accreditation of Laboratory Animal Care

Joseph R. Haywood (1994)

American Association for the Advancement of Science

Peter W. Hochachka (1995)
Jack L. Kostyo (1995)

Council of Academic Societies of the Association of American Medical Colleges

William H. Dantzler (1995)
George A. Hedge (1995)

Federation of American Societies for Experimental Biology

Board
Brian R. Duling (1996)
Stanley G. Schultz (1995)

Executive Officers Advisory Committee
Martin Frank (indefinite)

Finance Committee
Norman P. Alpert (1995)

Excellence in Science Award
Cheryl Heesch (1995)

Life Sciences Advisory Committee
Margaret C. Neville (1997)

Public Affairs Committee
Eric Feigl (1997)

Publications Committee
Catherine S. Chew (1997)

Research Conference Advisory Committee
A. W. Cowley, Jr. (1996)

Wellcome Visiting Professorship
M. Rao (1996)

National Association for Biomedical Research

Martin Frank (indefinite)

US National Committee for IUPS

William H. Dantzler (1995)
Brian R. Duling (1996)
Leonard S. Jefferson (1997)
Martin Frank, *ex officio* (indefinite)

US National Committee on Biomechanics

Peter Abbrecht (1996)

Meetings

Mechanotransduction and the Regulation of Growth and Differentiation

October 5–8, 1994
Sarasota, Florida

Wednesday, October 5	Thursday, October 6	Friday, October 7	Saturday, October 8
Evening Lecture: Historical Perspective Regarding Studies into Mechanotransduction **A. James Hudspeth** (U Texas Med. School)	*Morning Symposium:* Musculoskeletal Responses to Mechanical Stimuli **Herman Vandenburgh** (Brown U)	*Morning Symposium:* Cardiovascular Adaptations to Mechanical Stimuli I **Peter F. Davies** (U Chicago)	*Morning Symposium:* Mechanisms of Mechanochemical Signal Transduction **Fred Sachs** (SUNY, Buffalo) and **Peter A. Watson** (Weis Ctr Res/Geisinger Clin)
	Evening Symposium: Pulmonary Responses to Mechanical Stimuli **D. Eugene Rannels** (Penn State)	*Evening Symposium:* Cardiovascular Adaptations to Mechanical Stimuli II **Howard E. Morgan** (Weis Ctr Res/Geisinger Clin)	*Afternoon Symposium:* Regulation of Cell Shape and Function by the Extracellular Matrix **Martin A. Schwartz** (Scripps Res Inst)
			Evening Lecture: Complex Mechanochemical Signal Transduction Involved in the Regulation of Development **David R. McClay** (Duke U.)

Abstract Deadline: June 10, 1994

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:* Evolutionary matching of physiological capacities to natural loads. **J. Diamond**	1:00–3:00 pm *Poster Defending*	8:15–9:15 am *Plenary Lecture:* Evolution of physiological function: insight on endothermy from fish. **B. Block**	1:00–3:00 pm *Poster Defending*
9:30 am–12:30 pm Symposium: Neural modulation of muscle properties. **E. Arbas**	1:00–3:30 pm *Exhibit Viewing*	9:30 am–12:30 pm *Symposium:* Comparative respiratory neurobiology **I. N. Smatresk and G. Mitchell**	1:00–3:30 pm *Exhibit Viewing*
9:30 am–12:30 pm *Symposium:* Biomedical applications of marine mammal physiology: adaptation to an aquatic world. **M. A. Castellini**	2:00–5:30 pm *Discussion:* Contributions of comparative physiology to theoretical biology. **F. Powell**	9:30 am–12:30 pm *Symposium:* Anhydrobiosis. **J. Crowe**	2:00–5:30 pm *Workshop:* Phylogenetic approaches in comparative physiology. **T. Garland, Jr. and R. Huey**
9:30 am–12:30 pm *Symposium:* Evolution of endothermic metabolism. **A. J. Hulbert**	5:30–8:00 pm *Free Time*	9:30 am–12:30 pm *Symposium:* Red cell membranes: molecular perspectives on environmental physiology. **A.R. Cossins**	5:30–8:00 pm *Free Time*
9:30 am–12:30 pm *Symposium:* Calcium regulation: mechanisms and control I: calcium regulation in crustaceans. **M. Wheatly and P. Greenway**	8:00–9:00 pm *Plenary Lecture:* Proteins and temperature: Little things can mean a lot. **G. Somero**	9:30 am–12:30 pm *Symposium:* From myxine to man: the physiology of blood volume regulation. **K. Olson**	8:00–9:00 pm *Plenary Lecture:* Energy to burn: optimizing fuel and O_2 pathways for running animals. **C. R. Taylor**
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:* Calcium regulation: mechanisms and control II: calcium regulation in lower vertebrates. **M. Wheatly and P. Greenaway**	
Poster boards are on display Sunday through Wednesday from 8:00 am to 9:00 pm. **Abstract Deadline: July 11, 1994**		9:30 am–12:30 pm *Symposium:* Excretion of nitrogen-containing compounds: comparative aspects. **W. H. Dantzler**	

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:* When does morphology affect performance? Feeding, smelling, and swimming with hairy little legs. **M. Koehl**	1:00–3:00 pm *Poster Defending*	8:15–9:15 am *Plenary Lecture:* Phenotypic and evolutionary adaptation. **A. Bennett**	1:00–3:00 pm *Poster Defending*
9:30 am–12:30 pm *Symposium:* Comparative respiratory neurobiology II. **N. J. Smatresk and G. Mitchell**	1:00–3:30 pm *Exhibit Viewing*	9:30 am–12:30 pm *Symposium:* Subzero temperature adaptations of poikilothermic organisms. **J. Duman**	1:00–3:30 pm *Exhibit Viewing*
9:30 am–12:30 pm *Symposium:* Environmental and physiological determinants of muscle performance capacities. **H. Guderley**	2:00–5:30 pm *Discussion:* Evolutionary design of functional capacities: how much is enough but not too much? **R. K. Suarez**	9:30–12:30 pm *Symposium:* Neurohormonal peptides in invertebrates—a model approach. **M. C. Thorndyke**	2:00–5:00 pm *NSF Workshop:* Funding opportunities in comparative/integrative/evolutionary physiology and special Foundation programs. **T.E. Brady**
9:30 am–12:30 pm *Symposium:* Ontogeny of cardiovascular systems I: mechanisms. **W. Burggren**	5:30–8:00 pm *Free Time*	9:30 am–12:30 pm *Symposium:* Ontogeny of cardiovascular systems II: diversity in developmental patterns. **W. Burggren**	3:00–6:00 pm *Free Time*
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**	8:00–9:00 pm *Plenary Lecture:* Juvenile hormone insect metamorphosis: the status of its "status quo" zction. **L. Riddiford**	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**	6:00–8:00 pm *Banquet, Awards Presentation, and Lecture*
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 tohigh and low oxygen stress. **M. Grieshaber**	8:00–9:00 pm *Scholander Award Lecture:* The Scholander legacy: from simulated diving to microchips on mesopelagic seals. **P. W. Hochachka**
9:30 am–12:30 pm *Symposium:* Adaptations to extreme exvironments. **N. Hazon**			

Membership

Membership Statistics

Total Membership	7,464

Distribution by employment (7,083 respondents)

	No.	%
Physiology depts.	2,321	32.7
Other preclinical depts.	546	7.7
Clinical	1,705	24.0
Administration	59	0.8
Hospitals and clinics	282	3.9
Veterinary schools	157	2.2
Dental schools	45	0.6
Public health and graduate schools	118	1.6
College or university	941	13.2
Commercial companies	201	2.8
Government	402	5.6
Institutes and foundations	203	2.8
Private practice	44	0.6
Other	59	0.8

Distribution by Racial Background and Heritage (optional personal data)

	Total respondents
American Indian or Alaskan	12
Asian or Pacific Islander	510
Black	77
White	5,408
Hispanic	119

US States With More Than 100 Members (50 States Plus Puerto Rico and Virgin Islands)

California	741
New York	591
Texas	456
Pennsylvania	395
Maryland	369
Massachusetts	319
Illinois	308
Ohio	269
Michigan	236
North Carolina	195
Florida	186
New Jersey	183
Missouri	164
Virginia	147
Minnesota	132
Tennessee	130
Wisconsin	128
Georgia	126
Connecticut	125
Indiana	118
Louisiana	115
Kentucky	105
Alabama	104
Washington	103

APS Membership in The Americas

US	6,767
Canada	360
Brazil	18
Mexico	9
Chile	6
Argentina	5
British West Indies	5
Bolivia	1
Costa Rica	1
Panama	1
Peru	1
Venezuela	1

Canadian Provinces With 5 or More Members

Ontario	134
Quebec	83
British Columbia	49
Alberta	39
Manitoba	28
Nova Scotia	11
Saskatechewan	10

Other provinces represented
New Brunswick, Newfoundland, Prince Edward Island

APS Membership Outside The Americas (Countries with 5 or more members)

Japan	108
Germany	61
United Kingdom	51
France	34
Switzerland	32
Australia	29
Italy	27
Netherlands	21
Sweden	17
Israel	16
Spain	16
Denmark	15
Taiwan	15
Belgium	14
South Korea	14
Norway	11
China	9
Austria	8
Hong Kong	8
Greece	7
Hungary	6
India	6

Other Countries Represented
Czechoslovakia, Finland, Iceland, Indonesia, Ireland, Luxembourg, Morocco, New Zealand, Nigeria, North Korea, Philippines, Poland, Portugal, Republic of South Africa, Russia, SW Africa, Saudi Arabia, Thailand, Turkey, United Arab Emirates, Yugoslavia

Distribution by Earned Degree (6,761 respondents) (Includes 982 individu als with multiple doctorate degrees)

PhD	4,672
MD	2,697
DVM	175
ScD	100
DDS	30
ED.D	10
Cand. Med.	24

Distribution by Age (optional personal data)

	Total respondents
70+	916
60–69	1,298
50–59	1,840
40–49	2,102
30–39	1,027
20–29	171

Distribution by Sex
(optional personal data)

	Total respondents
Female	967
Male	5,882
Total	6,849

Principle Type of Work
(7,147 respondents)

	%
Research	73.7
Teaching	12.1
Clinical	7.0
Administration	6.1
Other	0.2

(6,986 respondents)

	%
Anesthesia	0.6
Anatomy & Embyology	0.3
Anthropology	0.0
Biochemistry	0.7
Biophysics	0.6
Biomedical engineering	0.5
Blood	1.7
Cardiovascular	23.7
Cellular & tissue	3.8
Comparative physiology	2.3
Electrolytes & water balance	5.0
Endocrines	7.3
Energy metabolism & temp.	2.3
Environment	2.6
Enzymes	0.0
Gastrointestinal	4.8
General physiology	0.5
Gerontology	0.3
Immunology	0.3
Liver & bile	0.4
Lipids & steroids	0.6
Microbiology	0.0
Minerals, bone & teeth	0.5
Muscle & exercise	6.5
Neurosciences	10.4
Nutritional & food	0.8
Pathology	0.1
Pharmacology	1.7
Radiology	0.3
Renal	6.0
Reproduction	1.5
Respiration	11.6
Other	0.6

Distribution by Section Affiliation
(6,173 respondents)

	%
Cardiovascular	20.2
Cell & general	9.2
Central nervous system	6.0
Comparative	3.3
Endocrinology & metabolism	8.7
Environmental & exercise	6.3
Gastrointestinal	4.6
Neural control & autonomic regulation	3.1
Physiologists in Industry Group	2.7
Renal	6.6
Respiration	11.6
Teaching of physiology	2.0
Water & electrolyte homeostasis	2.0

Statistics represent membership as of April 1994

Base Compensation for Faculty With "Other Doctoral Degrees (e.g., PhDs) at US Medical Schools, 1993-1994

Department	Mean Salary (in thousand of dollars) by position				
	Instructor	Assistant Professor	Associate Professor	Professor	Department Chair
Anatomy	35.7	47.6	61.9	83.1	116.7
Biochemistry	32.1	47.9	61.6	86.9	125.2
Microbiology	36.4	49.6	62.0	86.7	119.9
Pharmacology	33.1	48.0	61.3	86.7	125.0
Physiology	35.9	48.8	62.4	84.6	119.6
Other Basic Sciences	41.9	53.5	65.7	92.9	120.5
Total Basic Sciences	35.1	49.1	62.3	86.4	121.3

From Association of American Medical Colleges (AAMC). *Report on Medical School Faculty Salaries, 1993-94.* Washington, DC: AAMC, p. 51.

News From Senior Physiologists

Letter to Ralph Kellogg

F. A. Sunahara writes, "Although I have been officially retired from the University for 5 years, I still retain a laboratory to carry out some research and do some teaching to science students. It is still fun to be associated with undergraduate and graduate students and having to answer queries on the physiology and pharmacology of the circulation. I visit the government aviation physiology laboratory every so often to get updated on problems related to vestibular and hypobaric physiology. My non-academic time has been taken up with my ever growing extended family and with community services. It seems strange that I have very little spare time which I can allot to gardening around home or to cottage-living in our lake country retreat. Perhaps I should remedy this situation in the coming years."

Letters to Suk Ki Hong

Robert Plonsey writes, "Although I will be 70 this year my University activity has not changed—except that starting two years ago I have been taking off the entire summer. But even that still hasn't affected my summer routines very much (though I have been doing a little more summer travel—and I hope to increase it).

I do give a lot of thought to how I want to spend the remaining years and I enjoy reading about the experiences of others in *The Physiologist*. My field of electrophysiological modeling seems to have grown rapidly in the last few years so that I'm not sure I could continue to contribute without maintaining a very high level of effort. It would have been nicer if I could continue to be productive, but at a reduced pace. I also think that one's decision is greatly affected by one's physical health. (Mine has fortunately been excellent, but an increasing number of minor matters keeps me alert to this question.) In view of new rules in retirement and new experiences there is relatively little guidance—so I think we particularly need to pool our experiences."

W. Glen Moss writes in response to birthday wishes: "Thanks to you and the society for remembering that I am approaching that "tender age" of post adulthood (80). I still refuse to accept aging—I attend the local "Senior Center" each Wednesday morning and do blood pressures for the Warren Memorial Hospital's free clinic for 1-1/2 hours in the afternoon. At the Senior Center I do blood sugar and blood pressure measurements and then give a little talk on some aspect of health problems of interest to Seniors—usually selected by the director. On alternate Saturday mornings, I help another scientist do a battery of measurements on 70–80 samples taken from the length of the Shenandoah River—for the "Friends of the Shenandoah River."

This Fall I interred my wife's ashes in Wichita, KS where we both grew up. Upon returning I was invited by BioReview Inc. to set up two Review Committees for the USAMRT-DC-Breast Cancer Program. The Committees are complete; applications sent, assignments made and a three-day meeting for each arranged for mid February.

"When I finish the Summary Statements for these, I'm sure I'll never want to work again—though handling Review was the kind of work I liked most at the NIH."

Letter to Robert Grover

Stewart Wolf writes that he retired from the University of Texas Medical Branch at Galveston in 1978. He was Director of the Marine Biological Institute and Professor of Medicine and Physiology. "I moved back to Bangor, Pennsylvania where, in 1958, I had established the Totts Gap Institute, a summer laboratory for young investigators. Totts Gap then began to engage in year round research activity focused mainly on the involvement of the forebrain in the control of the heart.

"During the past sixteen years at Totts Gap we have enjoyed the collaboration of young and senior investigators from Sweden, China, Canada, and Romania as well as the United States. A year ago a distinguished neuroscientist, James E. (Skip) Skinner, joined Totts Gap. His influence has guided the inquiry into the field of regulatory complexity (chaos theory) in the study of cardiovascular adaptations. I have no plans to stop working and writing. For the past four years I have been Editor of *Integrative Physiological and Behavioral Science*, the official journal of the Pavlovian Society.

"My prediction is that in coming years the integrative thinking and research in physiology at the organismic level will answer questions that are not accessible to inquiry at the level of the molecule. I also suspect that, ironically, knowledge from an even lower level, the atomic charge, will assist in explaining non-linear adaptive behavior."

ACDP STATISTICS

(continued from p. 77)

TABLE 1. Faculty Salaries for Fiscal Year 1993

	Mean	% Change From Previous Survey	Minimum	Maximum	No. of Faculty
Chairmen					
All schools	$122,088	6.4	$61,500	$212,000	82
Medical public	117,397	7.2	74,846	183,000	52
Medical private	132,717	-3.0	61,500	212,000	26
Nonmedical	113,996	12.7	96,000	144,000	4
Female	84,548	-0.8	74,846	94,250	2
Professors					
All schools	84,564	2.6	42,600	185,650	529
Medical public	81,497	-0.5	42,600	163,400	361
Medical private	93,821	7.6	47,474	185,650	132
Nonmedical	81,366	9.6	56,910	135,576	36
Female	80,534	1.9	46,437	124,252	46
Associate Professors					
All schools	61,133	1.9	39,292	96,601	355
Medical public	59,818	-0.2	39,292	96,600	214
Medical private	63,230	3.8	40,000	96,601	119
Nonmedical	62,585	7.8	43,945	93,360	22
Female	61,575	-0.4	46,119	93,360	71
Assistant Professors					
All schools	47,391	3.1	23,000	100,280	281
Medical public	46,184	2.5	23,000	100,280	160
Medical private	49,306	2.9	30,030	73,025	108
Nonmedical	46,335	-3.1	31,398	55,523	13
Female	47,673	2.9	28,548	69,552	70
Instructors					
All schools	35,693	19.2	20,700	87,970	48
Medical public	36,392	24.6	20,700	87,970	35
Medical private	34,461	5.3	20,968	42,147	12
Nonmedical	26,001	-17.5	26,001	26,001	1
Female	30,346	15.0	20,700	41,000	16

TABLE 2. Average Salary by Number of Years in Rank

Chairpersons			Professors			Associate Professors			Assistant Professors			Instructors		
Years	Salary	No. of Faculty	Years	Salary	No. of Faculty	Years	Salary	No. of Faculty	Years	Salary	No. of Faculty	Years	Salary	No. of Faculty
0–5	$114,415	30	0–5	$78,522	192	0–5	$61,173	207	0–5	$47,339	250	0–5	$34,845	41
6–10	126,065	19	6–10	86,971	128	6–10	61,014	73	6–10	48,826	22	6–10	32,155	4
11–15	134,875	15	11–15	88,146	80	11–15	62,563	33	11–15	44,489	5	11–15	0	0
16–20	121,632	9	16–20	87,434	78	16–20	59,314	29	16–20	47,750	1	16–20	87,970	1
21–25	116,480	8	21–25	88,776	36	21–25	61,923	11	21–25	45,913	3	21–25	32,000	1
26+	133,887	1	26+	97,207	15	26+	59,724	2	26+	0	0	26+	36,000	1

Type of Institution (n=87)

Support		Teaching Interactions			
Public	57	MD/DO	77	Pharmacy	15
Private	30	DDS	18	Other Biomedical	39
		DVM	7	Life Science	39
		Allied Health	44	Bioengineering	18

Faculty Summary (n=1,306)

	Male	Female
American Indian/Alaskan Native	3	2
Asian/Pacific Islander	65	12
Black, not of Hispanic origin	16	6
Hispanic	27	6
White, not of Hispanic origin	944	173
Foreign national	46	6

Tenure status in each department by degree (n=1,295)

	Tenured	Not Tenured	Not Eligible	Total
MD	75	17	8	100
PhD	739	224	155	1,118
Both	38	6	10	54
Other	10	4	9	23

Predoctoral Trainee Completions

Number of trainees who have completed doctoral work during the year ended June 30, 1993 (n=49).

Predoctoral male 84 Predoctoral female 55

US citizens/resident aliens

	Male	Female
American Indian/Alaskan Native	4	2
Asian/Pacific Islander	9	2
Black, not of Hispanic Origin	2	1
Hispanic	0	1
White, not of Hispanic origin	44	29

Foreign nationals

African	0	0
Asian/Pacific Islander	15	15
Central or South American	2	2
European, Canadian, Australian	4	3
Middle Eastern	2	0
Other	2	0

Student/Trainee Summary

Total number of pre- and postdoctoral students/trainees

Predoctoral male	812	Postdoctoral male	534
Predoctoral female	564	Postdoctoral female	260

Total number of foreign pre- and postdoctoral students/trainees

Predoctoral male	317	Postdoctoral male	305
Predoctoral female	186	Postdoctoral female	139

Ethnicity of each pre- and postdoctoral student/trainee

	Predoctoral		Postdoctoral	
	Male	Female	Male	Female
American Indian/Alaskan Native	10	11	9	6
Asian/Pacific Islander	37	27	25	19
Black, not of Hispanic origin	27	26	5	4
Hispanic	14	11	4	2
White, not of Hispanic origin	407	303	186	90
African	5	2	4	0
Asian/Pacific Islander	199	111	147	48
Central and South American	13	10	22	12
European, Canadian, Australian	70	53	111	69
Middle Eastern	23	6	17	4
Other	7	4	4	6

Number of foreign pre- or postdoctoral trainees whose primary source of support is

	Predoctoral	Postdoctoral
Institutional	180	110
Research grants	397	238
Private foundations	28	9
Home (foreign) governments	37	22
Other	37	10

Average annual starting stipend (in US dollars) for trainees

Predoctoral (n=80)	Postdoctoral (n=71)
$12,079.31	$23,260.54

Space Controlled by Department (n=87)

Research	15,267
Administration	2,349
Teaching	1,929
Other	1,500
Total space	21,047

TABLE 3. Salaries by Region

	Mean	Minimum	Maximum	No.		
Chairpersons						
Northeast	$127,478	$61,500	$187,913	18	Northeast:	ME NH VT NY
Midwest	119,804	69,450	193,100	24		MA RI CT NJ
South	128,373	84,160	212,000	25		PA MD DE DC
West	116,227	92,000	150,000	11		
Canada/Puerto Rico	84,381	77,562	107,125	4		
Professors						
Northeast	95,219	53,500	185,650	88	Midwest:	MI OH IN IL WI
Midwest	84,315	47,474	146,350	151		IA MO KS NE
South	83,610	42,600	163,400	181		ND SD MN
West	77,711	52,863	130,523	76		
Canada/Puerto Rico	78,297	52,434	132,498	33		
Associate Professors						
Northeast	65,513	40,000	96,601	63	South:	VA WV KY TN
Midwest	60,743	41,572	82,065	112		NC SC GA FL
South	59,472	39,292	93,360	132		AL MS AR
West	62,012	47,500	96,600	31		LA OK TX
Canada/Puerto Rico	58,766	45,522	73,158	17		
Assistant Professors						
Northeast	49,834	34,000	73,025	48	West:	AK HI MT WY
Midwest	49,101	28,548	69,552	91		CO NM AZ
South	46,408	23,000	100,280	94		ID NV WA
West	43,210	25,000	60,631	39		OR CA UT
Canada/Puerto Rico	45,448	34,398	53,512	9		
Instructors						
Northeast	36,815	20,968	50,580	9		
Midwest	35,313	31,104	42,147	4		
South	35,815	20,700	87,970	29		
West	34,560	31,081	41,000	4		
Canada/Puerto Rico	31,889	28,125	35,652	2		

TABLE 4. Budgets by Institutions

	All Institutions	No.	Public Medical	No.	Private Medical	No.	Nonmedical	No.
Institutional	$1,158,424	88	$1,174,883	52	$1,079,606	30	$1,409,867	6
Outside research grants (direct costs only)	1,910,166	87	1,844,959	52	1,817,844	30	3,142,259	5
Training grants (direct costs only)	209,833	38	179,667	22	275,016	14	85,384	2
Endowments	142,424	35	67,716	21	281,896	12	90,037	2
Indirect recovery cost (amount to dept)	84,998	46	89,772	38	48,632	6	103,376	2
Other budget support	184,239	44	200,151	28	182,534	13	43,114	3
Average	3,330,689	88	3,296,577	52	3,227,374	30	4,142,906	6
Standard Deviation	1,927,955		1,764,313		2,027,230		2,503,423	

Financial Information

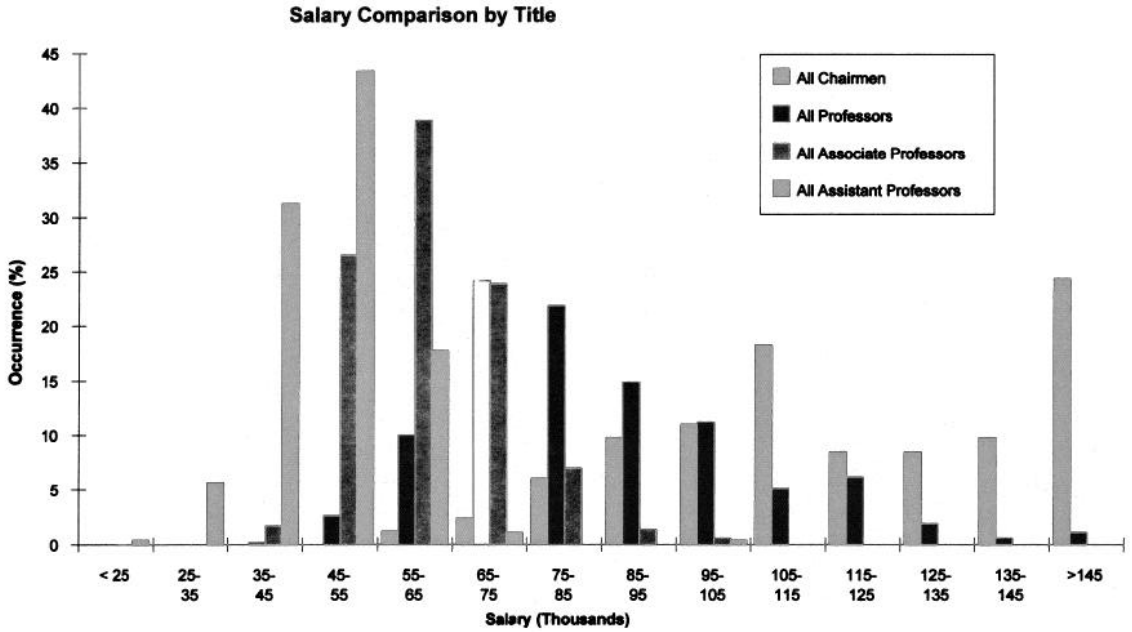
Percent of total faculty salaries supported by research grants (not including fringe benefit amounts):	29.6%	(n=70)
Current fringe benefit rate most frequently used for primary faculty:	24.6%	(n=88)
For faculty salaries generated from grants, etc., percentage of allocated salary dollars directly reutrned to your department:	78.6%	(n=49)
Federally negotiated indirect cost rate for fiscal year 92-93 on campus:	50.0%	(n=82)
off campus:	25.3%	(n=51)
Percentage of indirect costs returned to your department:	16.7%	(n=43)

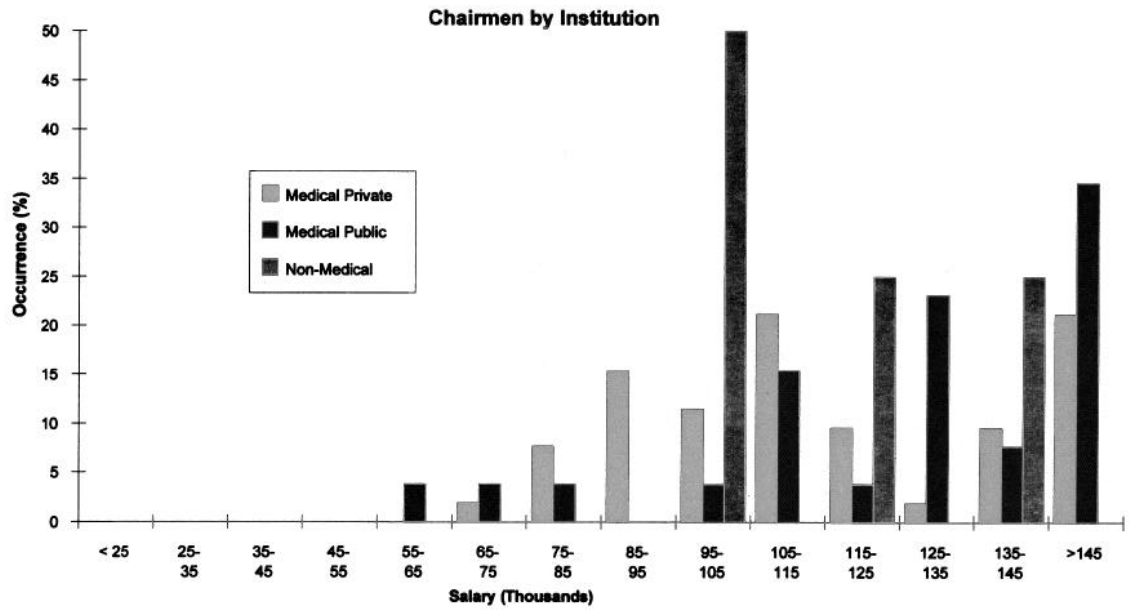
TABLE 5. Complete Ranking According to Total Dollars

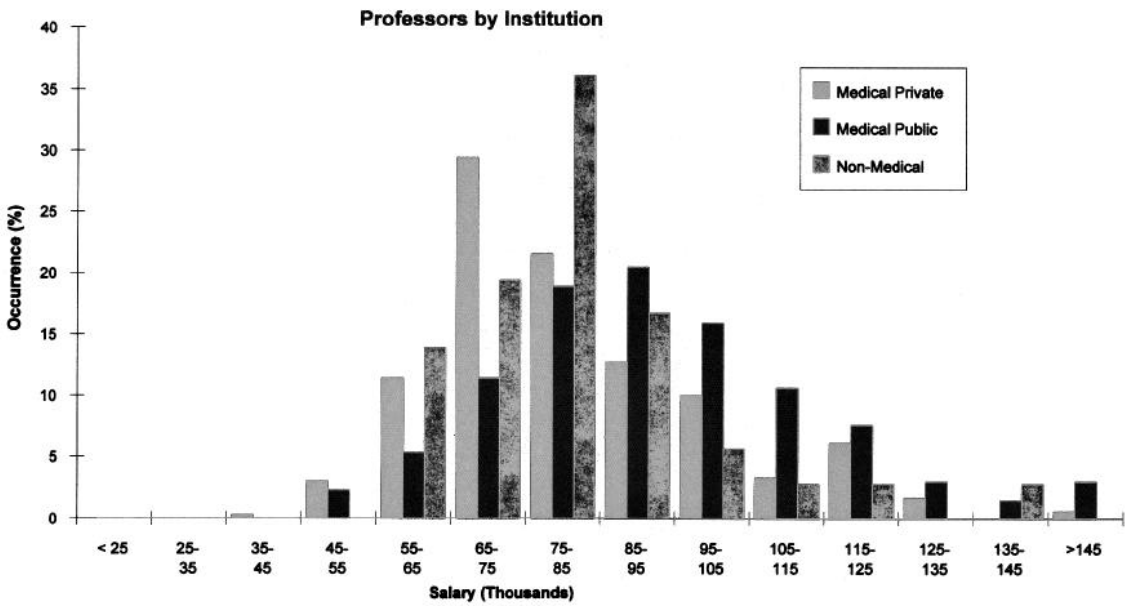
Rank Total Dollars	Total Dollars	Rank Research Grant Dollars	Research Grant Dollars	Rank Research Dollars/ Faculty	Research Dollars per Faculty	Rank Total Research Space	Research Space (sq.ft.)	Rank Research Dollars/ sq. ft.	Research Dollars/ sq. ft.	No. Faculty
1	$8,130,000	1	$5,897,700	1	$536,155	7	28,387	14	$208	11
2	7,533,939	3	5,095,118	18	175,694	36	16,634	3	306	29
3	7,199,834	4	4,779,884	8	227,614	3	31,266	24	153	21
4	7,116,000	6	4,000,000	5	235,294	1	42,786	51	93	17
5	7,028,923	7	3,970,499	28	136,914	39	15,970	7	249	29
6	7,005,319	2	5,424,812	4	258,324	11	23,883	11	227	21
7	6,158,751	24	2,426,719	38	110,305	51	12,261	15	198	22
8	6,113,770	11	3,882,950	21	161,790	37	16,510	9	235	24
9	6,053,822	15	3,397,208	22	161,772	43	15,057	12	226	21
10	5,893,530	5	4,321,900	23	160,070	12	23,261	17	186	27
11	5,817,402	16	3,364,093	15	186,894	34	17,479	16	192	18
12	5,689,120	35	2,088,732	30	122,867	25	19,700	44	106	17
13	5,677,883	10	3,939,850	11	207,361	46	14,391	5	274	19
14	5,621,637	8	3,950,709	25	151,950	13	23,000	19	172	26
15	5,525,217	13	3,612,321	9	225,770	58	10,503	1	344	16
16	5,436,500	9	3,943,297	3	262,886	19	22,000	18	179	15
17	5,409,000	12	3,710,000	10	218,235	10	24,222	25	153	17
18	4,966,230	19	2,903,950	24	152,839	33	17,534	21	166	19
19	4,940,838	21	2,821,133	14	188,076	14	22,935	34	123	15
20	4,844,618	20	2,855,873	33	118,995	21	21,540	32	133	24
21	4,777,000	14	3,500,000	20	166,667	4	30,037	37	117	21
22	4,505,298	28	2,285,498	57	84,648	38	16,347	29	140	27
23	4,437,182	45	1,785,944	36	111,622	16	22,777	60	78	16
24	4,405,551	25	2,402,428	45	100,101	20	21,719	40	111	24
25	4,328,894	30	2,231,092	41	106,242	27	18,657	35	120	21
26	4,264,636	51	1,554,579	74	53,606	15	22,798	69	68	29
27	4,241,452	33	2,154,684	47	97,940	6	28,638	63	75	22
28	4,130,828	34	2,138,871	35	112,572	32	17,825	36	120	19
29	4,106,233	32	2,200,000	58	81,481	22	21,307	48	103	27
30	4,055,988	17	3,032,688	51	94,772	24	20,273	26	150	32
31	4,026,208	41	1,836,600	32	122,440	17	22,530	56	82	15
32	3,997,478	18	2,923,413	2	324,824	50	12,667	10	231	9
33	3,985,297	22	2,513,997	48	96,692	8	28,189	52	89	26
34	3,774,758	36	2,056,871	12	205,687	62	9,671	13	213	10
35	3,750,920	31	2,205,920	17	183,827	49	12,948	20	170	12
36	3,683,000	47	1,754,000	39	109,625	29	18,415	50	95	16
37	3,647,800	27	2,297,180	29	135,128	45	14,587	23	157	17
38	3,621,190	38	2,026,571	49	96,503	47	14,380	28	141	21
39	3,601,408	42	1,836,600	53	87,457	18	22,530	57	82	21
40	3,417,205	46	1,783,544	88	0	56	10,921	22	163	0
41	3,414,818	26	2,302,392	6	230,239	63	9,618	8	239	10
42	3,383,450	50	1,570,836	52	92,402	55	11,387	30	138	17
43	3,364,229	43	1,823,816	55	86,848	28	18,512	49	99	21
44	3,213,692	29	2,285,264	7	228,526	41	15,679	27	146	10

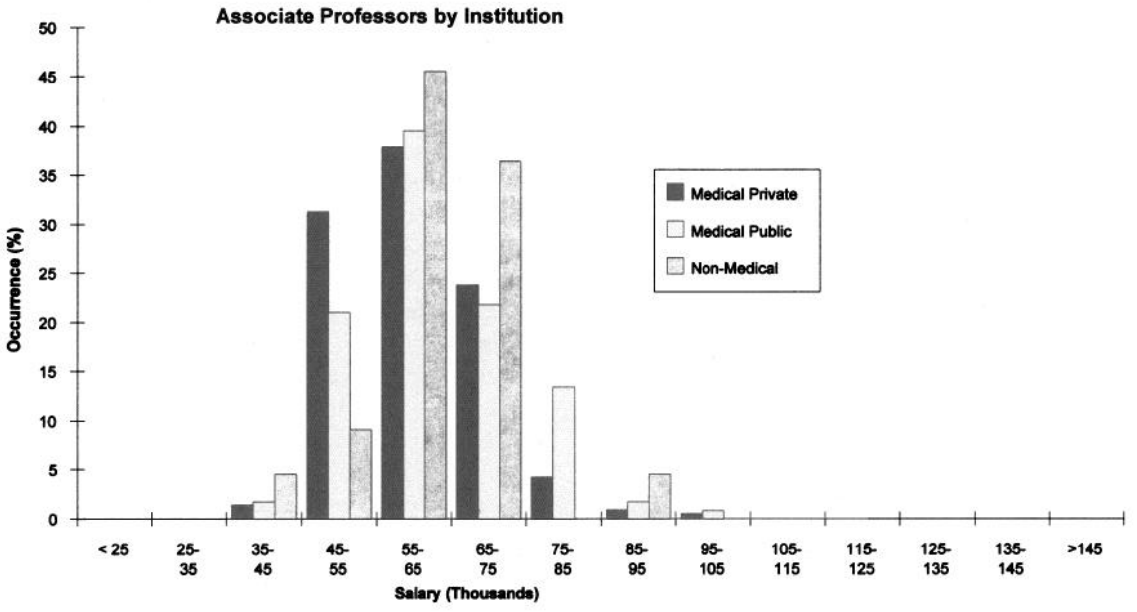
TABLE 5 (continued). Complete Ranking According to Total Dollars

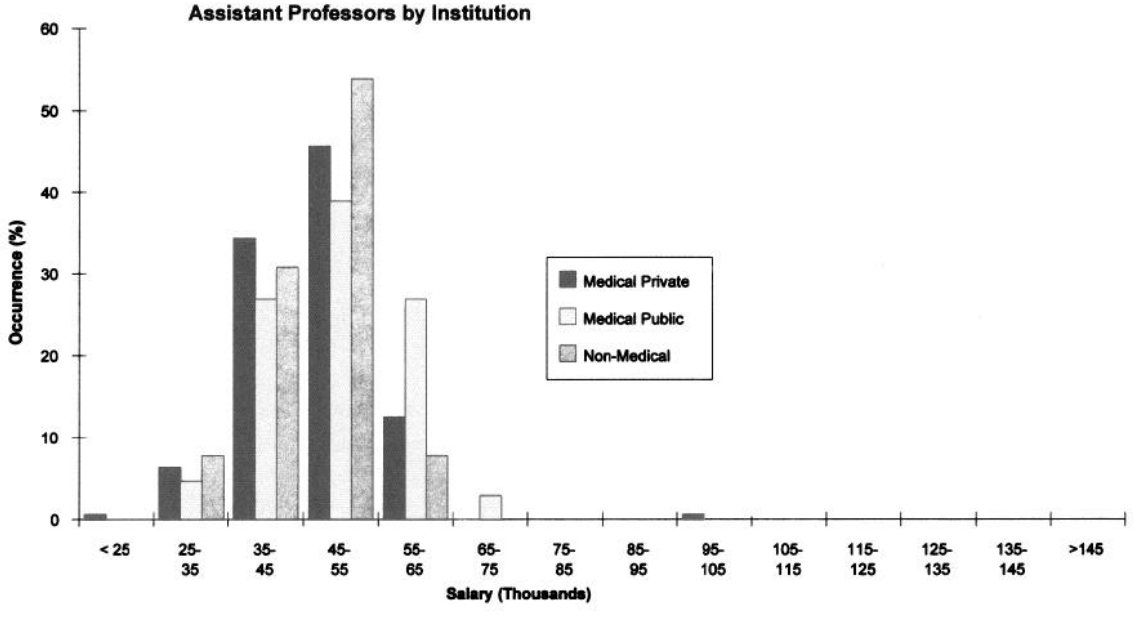
Rank Total Dollars	Total Dollars	Rank Research Grant Dollars	Research Grant Dollars	Rank Research Dollars/ Faculty	Research Dollars per Faculty	Rank Total Research Space	Research Space (sq.ft.)	Rank Research Dollars/ sq. ft.	Research Dollars/ sq. ft.	No. Faculty
45	3,208,000	49	1,600,000	46	100,000	23	21,000	61	76	16
46	3,177,600	23	2,454,000	13	204,500	9	28,055	54	87	12
47	3,145,641	44	1,807,245	27	139,019	78	5,892	2	307	13
48	3,080,263	58	1,057,320	76	45,970	30	18,396	71	57	23
49	3,041,476	48	1,629,000	59	81,450	48	14,199	38	115	20
50	2,777,118	40	1,889,496	34	118,094	76	6,565	4	288	16
51	2,752,717	53	1,491,137	40	106,510	35	16,845	53	89	14
52	2,723,719	63	874,597	73	54,662	5	29,952	82	29	16
53	2,702,318	61	986,048	65	70,432	31	18,000	72	55	14
54	2,523,131	37	2,049,683	16	186,335	69	7,800	6	263	11
55	2,459,989	52	1,530,109	19	170,012	54	11,578	33	132	9
56	2,368,669	39	1,964,079	43	103,373	26	18,971	47	104	19
57	2,319,146	56	1,150,000	50	95,833	59	10,050	39	114	12
58	2,315,861	59	1,044,730	66	69,649	60	9,809	42	107	15
59	2,268,407	69	669,242	72	55,770	77	6,391	45	105	12
60	2,105,967	64	871,572	54	87,157	67	8,020	41	109	10
61	1,984,873	60	998,668	61	76,821	73	7,343	31	136	13
62	1,950,762	57	1,104,192	31	122,688	42	15,563	66	71	9
63	1,944,781	55	1,266,977	42	105,581	2	31,564	78	40	12
64	1,907,052	65	848,690	60	77,154	53	12,000	65	71	11
65	1,858,234	66	846,916	64	70,576	52	12,084	67	70	12
66	1,813,917	68	709,654	67	64,514	64	9,131	59	78	11
67	1,763,189	70	663,000	71	60,273	44	14,881	77	45	11
68	1,758,840	54	1,308,735	44	100,672	40	15,762	55	83	13
69	1,708,000	76	386,000	79	32,167	68	8,000	75	48	12
70	1,617,409	67	773,372	37	110,482	61	9,676	58	80	7
71	1,442,614	72	499,819	70	62,477	75	6,700	64	75	8
72	1,428,689	62	900,000	26	150,000	88	0	87	0	6
73	1,317,635	71	572,163	68	63,574	70	7,507	62	76	9
74	1,144,258	75	397,328	78	36,121	82	3,799	46	105	11
75	1,131,625	80	298,452	77	37,307	65	9,112	80	33	8
76	1,130,446	78	362,383	75	51,769	74	7,325	74	49	7
77	1,051,353	73	446,143	63	74,357	66	8,483	73	53	6
78	1,049,426	81	194,865	81	19,487	71	7,450	83	26	10
79	1,012,259	74	439,951	69	62,850	72	7,431	70	59	7
80	1,009,428	79	341,138	56	85,285	81	5,000	68	68	4
81	928,877	77	376,587	62	75,317	83	3,534	43	107	5
82	896,345	84	116,650	83	16,664	57	10,545	84	11	7
83	722,823	82	150,000	82	18,750	80	5,070	81	30	8
84	445,902	86	25,000	85	6,250	84	3,527	85	7	4
85	360,555	87	5,000	86	1,250	79	5,800	86	1	4
86	199,000	83	141,000	80	20,143	85	3,118	76	45	7
87	190,000	85	54,000	84	13,500	87	1,600	79	34	4
88	65,500	88	0	87	0	86	3,000	88	0	24


Salary Comparison by Title
All Chairmen
All Professors
All Associate Professors
All Assistant Professors
Occurrence (%)
0
5
10
15
20
25
30
35
40
45
< 25
25-35
35-45
45-55
55-65
65-75
75-85
85-95
95-105
105-115
115-125
125-135
135-145
>145
Salary (Thousands)


Chairmen by Institution
Medical Private
Medical Public
Non-Medical
Occurrence (%)
0
5
10
15
20
25
30
35
40
45
50
< 25
25-35
35-45
45-55
55-65
65-75
75-85
85-95
95-105
105-115
115-125
125-135
135-145
>145
Salary (Thousands)


Professors by Institution
Medical Private
Medical Public
Non-Medical
Occurrence (%)
0
5
10
15
20
25
30
35
40
< 25
25-35
35-45
45-55
55-65
65-75
75-85
85-95
95-105
105-115
115-125
125-135
135-145
>145
Salary (Thousands)





Objectives for a Course in Physiology

In 1978 the APS Education Committee published a listing of objectives for a course in physiology. These objectives were translated from ones developed at the Institute of Physiology, University of Aarhus, Denmark. Although the publication is dated, the overall list of objectives may be useful as US physiologists work to revise their course contents and focus. A limited number of single copies of this publication are available from the APS office; contact Marsha Lakes Matyas, Education Officer, via mail (9650 Rockville Pike, Bethesda, MD 20814), phone (301-530-7132), or email (marsha@aps.mhs.compuserve.com).

Rep. William Natcher Dies at Age 84

Rep. William Natcher (D-Ky.) died of congestive heart failure on March 29 at the Bethesda Naval Hospital at age 84. Rep. Natcher came to Washington in 1953 as winner of a special election. As Chairman of the Appropriations Subcommittee on Labor-HHS-Education Subcommittee since 1979, the biomedical research community knew him best for his unwavering support for the National Institutes of Health.

But Natcher was known for other things as well: He was an expert parliamentarian with a reputation for such fairness that he was often asked to preside over the House during its most contentious debates. He did not accept political contributions and financed his campaigns—which usually cost less than $1,000—out of his own pocket. He never missed a vote on the floor of the House of Representatives from the day he assumed office until illness forced him to remain in the hospital on March 9, 1994. That record—18,401 votes during the course of 40 years—is unlikely to be broken. He also kept a daily journal of his observations about the day's legislative business and wrote weekly letters to his seven beloved grandchildren, sharing with them his vantage point on history in the making.

Natcher's wife, the former Virginia Reardon, died in 1991. He is survived by two daughters, seven grandchildren, and one great-grandchild.

Natcher was succeeded as chairman of the House Appropriations Committee by Rep. David Obey (D-Wisc.). Obey had been designated by House Democrats on March 23 as acting Chairman to assist the ailing Natcher in carrying out his duties. Natcher had assumed chairmanship of the full committee in June 1992, under strikingly similar circumstances when he was chosen to assist Rep. Jamie Whitten (D-Miss.), who had suffered a stroke.

Rep. Obey's selection was somewhat surprising in that Rep. Neal Smith (D-Iowa), had greater seniority on the Appropriations Committee. However, Obey promised a more aggressive leadership style, which was evidently seen as an advantage. Smith was expected to succeed Natcher as chairman of the Labor-HHS-Education Subcommittee. What this means for the NIH is uncertain, because although Smith is a long-time member of the Labor-HHS subcommittee, he has been more involved with the programs under the jurisdiction of the Commerce, Justice, State and Judiciary Subcommittee that he previously chaired.

McDermott, Cooper Endorse Harkin-Hatfield

The proposal to place 1% of all health care premiums in a trust fund to be used for biomedical research got a boost on April 19 when the House sponsors of two leading health care reform plans endorsed the plan. Reps. Jim McDermott (D-Wash.) and Jim Cooper (D-Tenn.) announced their support for the Harkin-Hatfield proposal on the eve of its introduction in the House.

Senators Tom Harkin (D-Iowa) and Mark O. Hatfield (R-Ore.) initiated the plan dubbed the Health Research Act of 1994 as way to increase NIH funding by 50%. Current co-sponsors of the Senate measure, which has taken the form of an amendment to Sen. Edward M. Kennedy's health care reform bill S. 1779, include Kennedy (D-Mass.) and Senators Ernest F. Hollings (D-S.C.), Paul Simon (D-Ill.) and Nancy Kassebaum (R-Kansas). The companion House bill is H.R. 4260, and its chief co-sponsors are Representatives William J. Coyne (D-Pa.), Bill Richardson (D-N.M.) and Frederick S. Upton (R-Mich.).

The trust fund is expected eventually to make $5 billion per year in new funding available to the NIH. The money would come from a phased-in 1% health care premium set-aside and from a check-off box on federal tax forms permitting taxpayers to designate a portion of their refunds for this purpose. The funds could only be used if the regular NIH appropriation were increased over the previous year. Five percent of the money would be spent on extramural construction and renovation of research facilities, the Office of the Director, and the National Library of Medicine. The rest would be distributed to NIH's institutes and centers in the same proportions as under the regular appropriation.

APS has joined FASEB in endorsing this proposal because current budgetary constraints make it unlikely that NIH's regular appropriation will be increased substantially in the next few years. APS members should write to their Senators and Representatives urging them to support the Harkin-Hatfield amendment and H.R. 4260.

ILAR Guide Committee Adds Unaffiliated Member

The National Research Council has added Jo Ann D. Steggerda to the roster of the Institute of Laboratory Animal Resources (ILAR) committee that is revising the NIH *Guide for the Care and Use of Laboratory Animals*. Several witnesses representing animal welfare and animal activist groups suggested the addition of a "public" member during hearings that were held between December and February.

Steggerda is a member of the Champaign, Illinois, Humane Society and serves as the nonaffiliated member of the Laboratory Animal Care Advisory Committee of the University of Illinois at Urbana Champagne. She is a member of the American Society for the Prevention of Cruelty to Animals (ASPCA), incurably ill For Animal Research (iiFAR), the World Wildlife Fund, the National Psoriasis Foundation, and the Nature Conservancy.

NIH Reorganizes Study Sections

In response to an Executive Order issued early in the Clinton administration, NIH has reorganized study sections within the Division of Research Grants (DRG) into 19 initial review groups. These 19 are clustered within six scientific areas:

- behavioral and neurosciences
- biological and physiological sciences
- chemistry and related sciences
- clinical sciences
- microbial and immunological sciences
- technology and applied sciences

These changes do not affect grant applicants and are expected to involve only modest changes for the study sections, according to NIH. The changes were made because Executive Order 12838 required government agencies to reduce by one-third the number of advisory committees that are not chartered by law. APS wrote to President Clinton at the time urging that study sections be exempted from this reduction. The Society argued that while individual study sections are not chartered by law, their function is set out in the Public Health Service Act.

In announcing the changes, DRG said that the restructuring "will maintain the integrity of the NIH peer review system while fostering interdisciplinary reviews and enhancing responsiveness to changing scientific directions and cutting edge research."

Court Schedules Arguments for USDA Rules Case

Oral arguments were scheduled for May 12 in the appeal of the 1993 ruling by US District Court Judge Charles R. Richey that overturned significant portions of USDA Animal Welfare Act Regulations involving dogs and nonhuman primates.

A three-judge panel of the US Court of Appeals for the District of Columbia Circuit was scheduled to hear arguments in the appeal of Judge Richey's decision in *Animal Legal Defense Fund et al.* v. *the Secretary of Agriculture et al.* The National Association for Biomedical Research (NABR) had been granted intervener status in the case and was to argue in favor of overturning Judge Richey's decision on behalf of the research community, while the US Department of Justice was to argue the appeal on behalf of the USDA and the other federal agencies involved in the case.

In February 1993, Judge Richey ruled that the USDA failed to conform to the intent of Congress and had violated the federal Administrative Procedures Act when it formulated regulations concerning caging for nonhuman primates and exercise for dogs. The Appeals Court decision is expected by the end of the summer.

Animal Cost Changes Not Expected to Cause Problems

Requiring that all animal care costs be charged directly is a matter of uniform enforcement of existing regulations rather than a change of procedure, NIH Director Harold Varmus told APS President William Dantzler in a recent exchange of correspondence. Dantzler had written to Varmus to raise concerns that new indirect cost reimbursement regulations would have a negative impact on research at institutions where animal care costs were previously covered by indirect costs.

"While this change may cause some difficulties in the short-term," Varmus wrote, "I am confident that institutions will not allow deleterious effects on animals, animal care, or biomedical research as a whole." Furthermore, with respect to renewals, Varmus indicated that NIH tends to look at total costs of grants, so switching animal costs from the indirect to direct category will not affect a particular grant's competitiveness since total costs presumably will not have changed.

APS Letter Criticizes *Nature* Review

The American Physiological Society joined with the Society for Neuroscience, Association of American Medical Colleges, American Society for Pharmacology and Experimental Therapeutics, and the Federation of Behavioral, Psychological and Cognitive Sciences in a letter to *Nature* protesting its selection of "animal rights" philosopher Peter Singer to review two books on animal research issues. The two books were *Monkey Business* by Kathy Snow Guillermo and *In the Name of Science* by Barbara Orlans. Singer's selection "serves neither the purpose of objectivity nor intellectual criticism," the societies wrote.

The rest of the letter is as follows.

"*Monkey Business* is a partisan accounting of the explosive events that put People for the Ethical Treatment of Animals on the map. As a reviewer of this book, Singer provides no balance: He is of the same philosophical bent as the book's author and is widely recognized as the intellectual father of the current animal rights movement. While most of *Nature*'s readers are probably aware of the Silver Spring monkeys case, few of them are likely to have more than a sketchy recollection of the hotly-contested charges and counter-charges the case involving Edward Taub has engendered during the past decade. Singer's review adds clarity neither to *Monkey Business* nor the debate.

"Singer selectively rehashes a few disputed facts in the case but neglects even to mention author Kathy Snow Guillermo's affiliation with PETA and glosses over the huge financial benefits PETA has reaped by utilizing the hapless primates as bait for a decade of direct-mail fund-raising. He simply uses the credibility granted to him as a book reviewer for *Nature* to enshrine through repetition a distorted version of the case. He is entitled to his opinions, but *Nature* surely owes its readers a better analysis than he provided.

"Singer states that researcher Edward Taub was prosecuted for animal cruelty by the State of Maryland in connection with his alleged treatment of the 17 monkeys under his supervision at the Institute for Behavioral Research. He notes that Taub was convicted of only a single count of the more than 100 initial charges, and that this guilty finding was set aside later on the 'scarcely reassuring ground that Maryland animal protection laws did not apply to experimenters receiving federal grants.' The Maryland Court of Appeals may have decided the Taub case on the issue of jurisdiction, but its reasoning vindicated Taub on two grounds: his research (which addressed problems of stroke rehabilitation by creating in monkeys a comparable loss of sensory perception) fell within the state statute's exemption for "normal human activities to which the infliction of pain to an animal is purely incidental and unavoidable" and as federally-funded research with regulated species, it was already subject to multiple federal regulations concerning humane animal care and use.

"Singer also misses the mark in his review of *In the Name of Science* when he suggests that the 'animal research industry oppose(s) every attempt by the animal rights movement to achieve the most moderate gains in animal welfare.' The undersigned members of the scientific community have engaged in cooperative efforts with many animal welfare groups. The scientific community has sought to improve laboratory animal care. Scientists participated in the development of the U.S. Animal Welfare Act regulations, and we are involved in efforts to ensure adequate funding for the U.S. Department of Agriculture's Animal and Plant Health Inspection Service, which enforces those regulations.

"In the U.S. the constructive dialogue between the research community and *moderate* animal welfare groups has produced regulations that ensure that research animals are humanely treated as they contribute to the development of treatments to alleviate suffering of animals and humans alike. But it must at the same time be recognized that it is impossible for researchers to find common ground with the most extreme organizations and individuals, whose goal is the abolition of animal use in research, rather than the improvement of laboratory animal care."

The societies closed the letter by offering the hope that "in the future [*Nature*] would select book reviewers who can provide commentary that offers more balanced information to your readers."

Nominations for Honorary Membership

Members are welcome to submit nominations for honorary membership. Send nominations and documentation of the candidate's contributions to the APS Honorary Membership Committee, 9650 Rockville Pike, Bethesda, MD 20814-3991.

The Importance of Animals in Biomedical and Behavioral Research

(A Statement from the Public Health Service)

Virtually every medical achievement of the last century has depended directly or indirectly on research with animals. The knowledge gained from animal research has extended human life and made it healthier through many significant achievements, as illustrated by the following examples: vaccines to prevent poliomyelitis and other communicable diseases; surgical procedures to replace diseased heart valves; corneal transplants to restore normal vision; new medicines to control high blood pressure and reduce death from stroke; anti-psychotic drugs to treat mental disorders; broad spectrum antibiotics to treat infections; and chemical agents to cure or slow childhood cancers. Of course, there are many other diseases and disorders, such as AIDS, many forms of cancer, common cold, Alzheimer's disease, schizophrenia, hepatitis, arthritis, cystic fibrosis, and brain and spinal cord injuries—just to name a few—for which no effective prevention, treatment, or cure now exists.

The use of living animals remains an important way to solve a medical problem. Researchers continually seek other models to understand the human organism, study disease processes, and test new therapies. In seeking more rapid and less expensive ways to obtain basic biological information that can be applied to human disease, scientists often study simpler organisms, such as bacteria, yeasts, roundworms, fruit flies, squids, and fishes. Researchers have spent decades learning how to sustain cells, tissues, and organs from both animals and humans outside the body to understand biological processes and develop new medical treatments. Mathematical, computer, and physical models complement animal experimentation as well. Although computers alone cannot produce new biological information, they enable scientists to analyze vast amounts of data and test ideas. In the end, the validity of the results obtained from these model systems must be verified in appropriate animal systems and, possibly as the final step, in clinical trials using human volunteers.

Like most people, scientists are concerned about animal well-being. Elaborate safeguards in the form of Federal laws have been implemented to ensure that institutions comply with the regulations and policies affecting the care and use of animals in research. Before beginning a project, all research proposals involving animals must be carefully reviewed and approved at each research facility by an Institutional Animal Care and Use Committee comprised of scientists, veterinarians, and private citizens. Veterinarians trained in laboratory animal medicine are responsible for observing and caring for animals, providing guidance to researchers, and overseeing institutional animal care programs. In addition, institutions conducting animal research are routinely inspected by the U.S. Department of Agriculture and monitored by the U.S. Public Health Service. Many institutions are further accredited by an independent evaluating body, the American Association for Accreditation of Laboratory Animal Care.

For more than a century, there have been organized groups and individuals who have objected to using animals in biomedical research. This opposition has increased markedly in the last two decades. Animal activist organizations spurred by a philosophy that there is no moral justification for the use of animals in research—even to save human lives—have attempted to slow or halt the work of scientists. Some disseminate misleading information, intimidate or harass individual scientists, conduct mass demonstrations, or even commit acts of vandalism or terrorism. The few health professionals who support the activist movement stand apart from the vast majority of the Nation's physicians, and most Americans readily accept the fact that animal research is necessary to achieve medical progress.

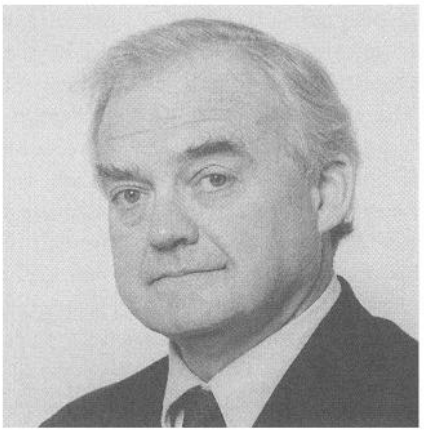
Institutions receiving support from the Public Health Service are obliged to adhere to the highest possible standards for the humane care and responsible use of laboratory animals. And scientists themselves have adopted the principle: "Good Animal Care and Good Science Go Hand in Hand."

(February 1994)

Correction

The US Department of Justice's "Report to Congress on the Extent and Effects of Domestic and International Terrorism in Animal Enterprises" erroneously included the Fund for Animals in an appendix listing the names and acronyms of animal rights organizations claiming to have perpetuated acts of extremism in the United States. This report was reprinted in its entirety in the December 1993 issue of *The Physiologist* (36: 207,247–259). Assistant US Attorney General Sheila F. Anthony confirmed that the Fund for Animals should not have been included in this list, which appeared on page 259 of *The Physiologist.*

Ramsay Named President of University of Maryland, Baltimore



David J. Ramsay has been appointed President of the University of Maryland at Baltimore (UMAB).

Ramsay, a former member of the APS Council, is currently representing the APS on the *NIPS* Joint Managing Board of the International Union of Physiological Sciences. He has been senior vice chancellor of academic affairs at the University of California, San Francisco since 1982.

UMAB is one of the 11 degree-granting institutions of the University of Maryland System. The Baltimore campus comprises the schools of Dentistry, Law, Medicine, Nursing, Pharmacy, and Social Work. Sponsored research funding of UMAB has more than doubled since 1987. The university received more than $110 million in grant and contract awards in FY 1993.

Myers New President of IBNS

APS member **Robert D. Myers** has been elected as the third President of the International Behavioral Neuroscience Society (IBNS). Currently he is Professor of Pharmacology and Psychiatric Medicine and Director of the Research Division of the Center for Alcohol and Drug Abuse Studies at the East Carolina University School of Medicine, Greenville, NC.

Stylianos Orfanos has relocated to the University of Athens Medical School, Evangelismos General Hospital, Athens, Greece.

Klaus F. Ley has moved from Berlin to the Department of Biomedical Engineering, University of Virginia, Charlottesville, VA.

James C. Delehunt is now the Manager of Applied Research at SmithKline Beecham Consumer Healthcare, Parsippany, NJ. He was formerly with Procter & Gamble.

Formerly at the University of Wales College of Medicine, **Chris Jones** is now a consultant cardiologist at the Princess of Wales Hospital, South Wales.

APS member **Rene Schleiffer** has moved from INSERM to the IRCAD Hopitaux Universitaires de Strasbourg, France.

Marvin R. Brown is now with Alanex, Inc., San Diego, CA. He was formerly with the University of California Medical Center.

Timothy A. Jones recently moved from the University of Nebraska Medical Center to the University of Missouri–Columbia School of Medicine, Columbia, MO.

Herbert Levitan has accepted a position as Section Head, Division of Undergraduate Education, National Science Foundation, Arlington, VA.

Formerly at the University of Georgia, **Robert B. Armstrong** has moved to the Department of Health and Kinesiology, Texas A & M University, College Station, TX.

Barbara A. Block has moved from the University of Chicago to the Biological Sciences Department of Stanford University's Hopkins Marine Station, Pacific Grove, CA.

APS member **Svein A. Rodt** recently relocated from Hammerfest Hospital to the Department of Physiology, University of Bergen, Bergen, Norway.

Paul A. Murray has accepted a position in the Division of Anesthesiology, Cleveland Clinic Foundation, Cleveland, OH. He moved from Johns Hopkins University.

Formerly at Boston University School of Medicine, **Bartolome R. Celli** is now Chief of the Pulmonary Section, St. Elizabeth's Medical Center, Boston.

Corresponding member **Jun Iwamoto** is relocating to the Department of Physiology, Asahikawa Medical College, Nishikagura, Asahikawa, Japan. He was formerly at the State University of New York at Buffalo.

Owen Rickford Carryl has moved from SmithKline Beecham to Procter & Gamble, Cincinnati, OH. Carryl has been an APS member since 1989.

John E. Gerich is now at the University of Rochester Medical Center, Rochester, NY. He recently relocated from the Whittier Institute, San Diego.

Francisco Alvarado has moved from CNRS to the University of Paris, Chatenay-Malabry, France.

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.

Faculty Positions. Applications are invited for tenure-tract positions in the Department of Physiology and Biophysics at the University of Mississippi Medical Center. Candidates must have a PhD or an MD and postdoctoral training and are expected to maintain an independent research program with a strong commitment to teaching. Special consideration will be given to candidates with a background in molecular and/or cellular physiology, regulation of extracellular matrix, or an interest in renal tubular transport or vascular smooth muscle mechanisms. Faculty rank and salary will be commensurate with credentials. Interested applicants should send a CV, an indication of past and current research funding, a statement of research interests and the names of at least 3 references to John Hall, Department of Physiology and Biophysics, University of Mississippi Medical Center, Jackson, MS 39216. [EOAAE]

Scientific Review Administrator. The Experimental Cardiovascular Sciences Study Section of the National Institutes of Health is seeking a Scientific Review Administrator who has proven independent research experience in the cardiovascular sciences, cardiovascular pharmacology, renal and vascular smooth muscle and/or physiology. Individuals must be United States citizens and have a PhD degree or equivalent. A Health Scientist Administrator Notice of Rating from the Office of Special Examiner, NIH, is required. Interested persons should send a resume or contact Jeanne N. Ketley, Chief, Clinical Sciences Review Section, NIH, Division of Research Grants, Westwood Building Room 203A, Bethesda, MD 20892. Tel: 301-594-7375.

Manager. BIOQUAL, Inc., is seeking a PhD or MS with 5–15 years experience to supervise laboratories conducting in vivo endocrine, anitfertility and toxicology studies in rodents, rabbits, and monkeys. This R & D effort is funded by the Contraceptive Development Branch, NICHD. Experience with personal computers, biostatistics, and FDA GLP's desirable. Salary commensurate with experience. Full time, full benefits. Submit curricula vitae to Human Resources Manager, BIOQUAL, Inc., 9600 Medical Center Dr., Rockville, MD 20850. [EOAAE]

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.

BOOKS RECEIVED

Anthropometry: The Individual and the Population. S.J. Ulijaszek & C.G.N. Mascie-Taylor (Editors). New York: Cambridge University Press, 1994, 213 pp., illus., index, $54.95. ISBN:0-521-41798-8.

Bucket Diagrams: A Problem-Solving Approach to Renal Physiology. Herbert F. Janssen. Lubbock, TX: Texas Tech University Press, 1994, 224 pp., illus., index, $17.50. ISBN: 0-89672-323-2.

Case Studies in Physiology. (Third Edition). Robert M. Berne and Matthew N. Levy (Editors). St. Louis, MO: Mosby, 1994, 225 pp., illus., $14.95. ISBN: 0-8151-0544-4.

Current Management of Cerebral Aneurysms. Issam A. Awad (Editor). New York: Oxford University Press, 1994, 326 pp., illus., index, $90.00. ISBN: 1-879284-13-8.

Dynamic Energy Budgets in Biological Systems: Theory and Applications in Ecotoxicology. S.A.L.M. Kooijman. New York: Cambridge University Press, 1993, 350 pp., illus., index, $64.95. ISBN: 0-521-45223-6.

Protein Kinase C. J.F. Kuo (Editor). New York: Oxford University Press, 1994, 326 pp., illus., index, $75.00. ISBN: 0-19-508101-3.

Respiration in Health and Disease. Peter Scheid (Editor). Stuttgart, Germany, Gustav Fischer Verlag, 1993, 392 pp., illus., $80.00. ISBN: 3-437-11552-9.

Spatial Vision in Humans and Robots. Laurence Harris and Michael Jenkin (Editors). New York: Cambridge University Press, 1993, 448 pp., illus., index, $59.95. ISBN: 0-521-43071-2.

Respiratory Physiology. Basics and Applications

Alan R. Leff and Paul T. Schumaker
Philadelphia, PA: Saunders, 1993, 198 pp., illus., index, $21.95

In part I of this volume, Leff and Schumaker have provided the classics of respiratory physiology and applied them to clinical testing. But a major component of this text, and its uniqueness, lies in part II, devoted to lung growth and development, cellular defense mechanisms, neurobiology of the lung, and the biology of the conducting airways.

Part I, subtitled Physiological Functions of the Lung, presents, in 134 pages, eight chapters on mechanics, ventilation, circulation, diffusion, gas transport, ventilation/perfusion relationships and control. A ninth chapter summarizes the physiology of exercise. The presentation is briefer and less detailed than in other texts and seems more in concordance with the eight to ten hours of lecture time typically devoted to respiration in a freshman medical physiology course. The authors make good use of graphs and equations while derivations of equations are appropriately limited. There is good reference to clinical testing. I was pleased to find mention of choke point flow and citation and interpretation of the wave speed equation in the airflow dynamics section and to see emphasis on gas solubility of oxygen in the chapter on diffusion; these important topics are often overlooked in texts at this level.

The thirty-seven pages of part II, subtitled Lung Cell Biology, contain three chapters (Lung Growth and Development, Lung Defenses, biology of Conducting Airways). Generally, the content of part II relates to classic respiration physiology but there is abundant biochemical, histological and pathological content that is not typically presented in an introductory physiology course. The first of these chapters describes fetal gas exchange and the process of alveolization of fetal and neonatal lung. Particle deposition and clearance, and a brief section on pathophysiology of alveolar macrophages, make up the content of Lung Defenses. The chapter on conducting airways seems a bit anachronistic and probably represents a special interest of the authors. Its content seems more appropriate for a later time on the medical curriculum, but it undeniably contains some material of a basic physiological nature.

My impression is that this book provides, in part I, an overview of classic respiratory physiology better attuned to the time now typically allotted to its consideration than are its competitors. In a first course, part II might well be looked upon as supplemental. At a later stage of training, part I might be used as a review of classic physiology and part II as an introduction to related topics in cell and tissue biology. Overall the content is modern and inclusive, generally well written and illustrated, and reinforced by review questions (with answers) for each chapter.

There are, however, numerous problems of varying seriousness, some of which I cite. There are no educational objectives or literature references. Transpulmonary pressure is incorrectly defined. There is an incorrect algebraic derivation in the text and another in the answer to one problem, and there are several other errors in figure legends, figures, and definitions that suggest there has been less that critical review. There is failure to show accurately the phase relationship of transpulmonary pressure to volume during tidal breathing that is not helpful to those who wish to make more of the reactive and resistive components of that pressure. No mention is made of gas laws or of the conventions for reporting volumes and as a consequence, many equations are not in the applicable form: this is no doubt done in the interest of simplicity, but a brief justification would be appropriate. Similarly, only the approximate "ideal" alveolar air equation is given when the full form and a brief discourse on the principle of its derivation teaches a valuable lesson. Breathing during sleep is largely ignored. More attention could be given to the nature of the fibrous skeleton of the lung and to the functions of capillary endothelium. Inclusion of the V/Q equation based on R, alveolar ventilation, and the fick equation, would be useful. Some of the material on conducting airways could have been used, or referred to, in the chapters on mechanics and control.

My overall impression is that this book will best serve as a syllabus in a guided education experience where the instructor can take an active role expanding, clarifying, correcting, and documenting the text. Its strengths include brevity with broad coverage and its deficiencies can be easily recognized and corrected. It would be a less favorable text for unguided self-study: for that, and for the provision of compulsive attention to details to students who have the time, my personal choice is "Basic Respiratory Physiology" by Norman Staub.

Thomas C. Lloyd, Jr.
Indiana University Medical Center

NIH Issues New Guidelines for Inclusion of Women, Minorities in Clinical Research

To comply with the directives of the NIH Revitalizing Act of 1993, NIH has issued new guidelines for the inclusion of women and minorities in clinical research. The guidelines, published in the March 9 *Federal Register* (59 FR 11146) and in the March 18 *NIH Guide for Grants and Contracts*, build on policies for the inclusion of women and minorities adopted by the agency in 1990 but include several significant differences.

With the adoption of these new guidelines, all research involving human subjects is expected to include not only women and minorities but also subpopulations of minority groups. Only Phase III clinical trials, however, will be formally required to examine the differences between various groups of subjects; they will be required to include study populations large enough to provide high statistical power only when previous studies indicated the existence of significant difference among groups.

Even though early clinical research will not be held to the same requirements as Phase III clinical trials, investigators are reminded that increased attention must be given to gender, race, and ethnicity in the early stages of research to allow for informed decisions in the planning of later clinical trials.

As is currently the case, any research project involving human subjects may be exempted from this policy if the inclusion of women and/or minorities would be inappropriate with respect to the health of the subjects or the purpose of the research. Whereas the 1990 guidelines were silent on the subject of costs, the new guidelines explicitly indicate that the expectation that additional costs may be incurred by including women and minorities may not be a justification for excluding them.

These new guidelines will apply to all projects receiving funding in FY 1995 and, on a transitional basis, to Phase III clinical trials awarded since the NIH reauthorization bill was signed into law in June 1993. As implementation progresses, NIH officials have indicated that they will welcome comments and consider modification to the guidelines, as long as they fall within the scope of the statute. Written comments may be sent to either the Office of Research on Women's Health or to the Office of Research on Minority Health, both in Building 1, National Institutes of Health, Bethesda, MD 20892.

Scientific Meetings and Congresses

American Association of Cardiovascular and Pulmonary Rehabilitation Ninth Annual Meeting, Portland, OR, October 6–9, 1994. *Information:* Alice Holbrow, AACVPR, 7611 Elmwood Avenue, Suite 201, Middleton, WI 53562. Tel: 608-831-6989; fax: 608-831-5122.

Neuroimmunomodulation: Stress and Immune Function (The Lovelace Institutes' Annual Scientific Symposium), Albuquerque, NM, October 7–9, 1994. *Information:* Lettie Dupuy, Education Coordinator, The Lovelace Institutes, 2425 Ridgecrest Drive SE, Albuquerque, NM 87108-5127. Tel: 505-262-7746 or 505-262-7768.

Genetic & Biochemical Approaches for Studying Cell Death (ASBMB Fall Symposium), Lake Tahoe, CA, October 7–10, 1994. *Information:* ASBMB Symposia Office, Room 3206, 9650 Rockville Pike, Bethesda, MD 20814-3998. Tel: 301-530-7010; fax: 301-530-7014.

Mechanisms of Regulated Intracellular Protein Degradation (ASBMB Fall Symposium), Whistler, British Columbia, Canada, October 14–17, 1994. *Information:* ASBMB Symposia Office, Room 3206, 9650 Rockville Pike, Bethesda, MD 20814-3998. Tel: 301-530-7010; fax: 301-530-7014.

Oligonucleotide Selection and Molecular Diversity (ASBMB Fall Symposium), Lake Tahoe, CA, October 28–31, 1994. *Information:* ASBMB Symposia Office, Room 3206, 9650 Rockville Pike, Bethesda, MD 20814-3998. Tel: 301-530-7010; fax: 301-530-7014.

Engineering Advances: New Opportunities for Biomedical Engineers (16th Annual International Conference of IEEE Engineering in Medicine and Biology Society), Baltimore, MD, November 3–6, 1994. *Information:* IEEE/EMBS Conference Office, Meeting Management, 2603 Main Street, Suite 690, Irvine, CA 92714. Tel: 714-752-8205; fax: 714-752-7444.

Australian and New Zealand Society for Comparative Physiology and Biochemistry, December 2–4, 1994, Brisbanne. *Information:* Gordon Grigg, Zoology Department, University of Queensland, St. Lucia, Queensland, 4072, Australia. Tel: 617-365-2471; fax: 617-365-1655.

American Society for Cell Biology Annual Meeting, December 10–14, 1994, San Francisco, CA. *Information:* Edward A. Newman, ASCB, 9650 Rockville Pike, Bethesda, MD 20814-3992. Tel: 301-530-7153; fax: 301-530-7139.

Second International Meeting on Endothelial Control of Cardiac Performance: Role in Cardiac Failure, June 28–30, 1995, Antwerp, Belgium. *Information:* Dirk L. Brutsaert, University of Antwerp, Groenenborgerlaan 171, B-2020 Antwerp–Belgium.

APS Sustaining Associate Members

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

Abbott Laboratories
Alliance Pharmaceutical Corporation
American Medical Association
Axon Instruments, Inc.
Berlex Biosciences
* Boehringer Ingelheim
Boeing Defense & Space Group
Burroughs Wellcome Company
Coulbourn Instruments, Inc.
Dagan Corporation
Du Pont Pharmaceuticals
Fisons Pharmaceuticals
* Genentech, Inc.
Glaxo, Inc.
Gould Instrument Systems, Inc.
Grass Foundation
Harvard Apparatus
Hoechst-Roussel Pharmaceuticals, Inc.
* Hoffman-La Roche, Inc.
Institut de Researche Servier
Jandel Scientific
Janssen Research Foundation
R. W. Johnson Pharmaceutical Research Institute
Kabi Pharmacia
Lederle Laboratories
Eli Lilly & Company
Lockheed Missles & Space Company, Inc.
Mack Printing Group
Marion Merrell Dow Inc.
McNeil Pharmaceutical
* Merck & Co., Inc.
Miles Inc.
NARCO Bio-Systems
Pfizer, Inc.
Pharmacia, Inc.
Procter & Gamble Company
Quaker Oats Company
* Sandoz Pharmaceuticals Corporation
* Schering-Plough Corporation
G. D. Searle and Company
SmithKline Beecham
* Squibb Corporation
Sutter Instruments Company
Synergen
* The Upjohn Company
Warner-Lambert/Parke Davis
Waverly Press
Wyeth-Ayerst Laboratories
Zeneca Inc.

* Second Century Corporate Founders

Call for Nominations

Editorships

Journal of Neurophysiology

Nominations are invited for the editorship of the *Journal of Neurophysiology* to succeed Gordon Shepherd, who will complete his term as editor on June 30, 1995. The Publications Committee plans to interview candidates in November 1994. Applications should be received on or before September 15, 1994. Nominations, accompanied by a curriculum vitae, should be sent to the chair of the Publications Committee: Leonard R. Johnson, American Physiological Society, 9650 Rockville Pike, Bethesda, MD 20814.

American Journal of Physiology: Renal, Fluid and Electrolyte Physiology

Nominations are invited for the editorship of the *AJP: Renal, Fluid and Electrolyte Physiology* to succeed Keith Hruska, who will complete his term as editor on June 30, 1995. The Publications Committee plans to interview candidates in September 1994. Applications should be received on or before July 15, 1994. Nominations, accompanied by a curriculum vitae, should be sent to the Chair of the Publications Committee: Leonard R. Johnson, American Physiological Society, 9650 Rockville Pike, Bethesda, MD 20814.